Important Notice:

Not Yet Approved by FEMA

Subject to Change per FEMA Review

CHANDLER / GILBERT
FLOODPLAIN DELINEATION STUDY

PHASE 1

Eastern Canal Watershed

CONTRACT FCD 2002C023

TECHNICAL DATA NOTEBOOK

Volume 4

(Sections 5S & 5N,
Appendix E)

September 2005
Revised December 2007

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

In association with:
Project Engineering Consultants, Ltd
2310 W. Mission Lane, #4
Phoenix, Arizona 85021
(602) 906-1901

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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(602) 506-1501

Registered Professional Engineer (Civil)
CERTIFICATE NO.
23969
FRANK EDWARD
BROWN
Date Signed 12 Dec 2007
ARIZONA, U.S.A.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
25972
MICHAEL D.
HEATON
Date Signed 12.12.07
ARIZONA, U.S.A.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON Date Signed 12-12-07 ARIZONA, U.S.A.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed 12 Dec 2007 ARIZONA, U.S.A.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed 12 Dec 2007 ARIZONA, U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON Date Signed 12-12-07 ARIZONA, U.S.A.

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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 and along Arizona Avenue (SR 87). Each Phase is further subdivided into north and south regions. This report addresses Phase 1 – South and North, Eastern Canal Watershed.

David Evans and Associates prepared the hydrologic and hydraulic analyses for Phase 1- South, and Project Engineering Consultants prepared the hydrologic and hydraulic analyses for Phase 1-North.

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed 12 Dec 2007 ARIZONA, U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON Date Signed 12-13-07 ARIZONA, U.S.A.

Section 5S: PHASE 1 – SOUTH, HYDRAULIC ANALYSIS

5S.1 Method Description

David Evans and Associates prepared the hydraulic analysis for Phase 1- South. The U.S. Army Corp of Engineers computer program HEC-1, Version 4.1, is used to determine the storage routing water surface elevation for floodplain ponding adjacent to the Eastern Canal within the Phase 1 study area. There are no conveyance areas between ponding areas in Phase 1 – South that require HEC-RAS modeling, although HEC-RAS Version 3.1.2 is utilized for the tailwater ditch analysis, refer to Section 5S.4.8.2 Eastern Canal Tailwater Ditch. Phase 1 is divided into two (2) sections, Phase 1- North and South, Eastern Canal watershed, with the boundary between the two being the Union Pacific Railroad. Separate HEC-1 models were prepared for each section. This section addresses Phase 1 – South. Refer to Section 5N, in Volume 3, for information on Phase 1 – North. The preparation of the input data necessary for the analysis includes all of the hydrologic parameters and computations described in the hydrology section.

There are five new subdivisions located near the Eastern Canal, constructed after the initial mapping and draft TDN in September 2005. Those subdivisions are, from north to south, Quail Springs, Villas at Spectrum, Eagle Glen 2 (or II), Layton Lakes in Chandler, and Layton Lakes in Gilbert. The FEMA number for Layton Lakes in Gilbert is Case No. 07-09-0177A; other FEMA case numbers are unknown or unassigned at this time. The workmap topographic mapping in these new areas is replaced (for computations) by the subdivision grading plans, in many cases based upon As-Built drawings. The workmaps themselves continue to portray the original topographic contours and may contain the pond contours. Based upon survey (Volume 2) two subdivisions were datum-adjusted beyond the datum equations shown on the workmaps. Quail Springs was adjusted down an additional 0.5 feet (NAVD88-NGVD29=1.13ft). Eagle Glen II was adjusted up an additional 0.7 feet (NAVD88-NGVD29=2.36ft). As first discussed in Section 4S.3.2 Storage Routing, if insufficient data was provided in the subdivision drainage report to determine the storage volume utilizing contour information, then the volume reported in the subdivision Final Drainage Report is utilized. Excerpts from these five reports, along with the grading plans with contours, are presented in Appendix A.1 in Volume 1.

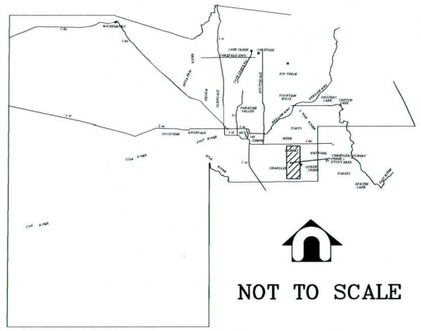
5S.2 Work Study Maps

The detailed delineation for Chandler Gilbert FDS, Phase 1 – South, Eastern Canal Watershed is presented on 1 in.= 400 ft., 2 ft. contour interval base mapping. The work study maps and Index Sheet are presented with this Technical Data Notebook (TDN) on 8 - 24 in. x 36 in. sheets with Phase 1 –South depicted on Sheets 1- 4 and Phase 1 – North depicted on Sheets 5-8. 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 5 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.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CHANDLER / GILBERT
FLOOD DELINEATION STUDY
PHASE 1, EASTERN CANAL WATERSHED

F.C.D. CONTRACT NO. 2002C023



NOT TO SCALE

LOCATION MAP

DATUM INFORMATION

VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83 (1992.0 EPOCH)
COORDINATE SYSTEM: ARIZONA COORDINATE SYSTEM, 1983, CENTRAL ZONE
UNIT OF MEASUREMENT: INTERNATIONAL FEET

STATEMENT BY PROFESSIONAL REGISTRANTS

THE PHOTOGRAMMETRIC MAPPING CONTROL SURVEY WAS PREPARED UNDER MY DIRECT SUPERVISION:

CERTIFICATION

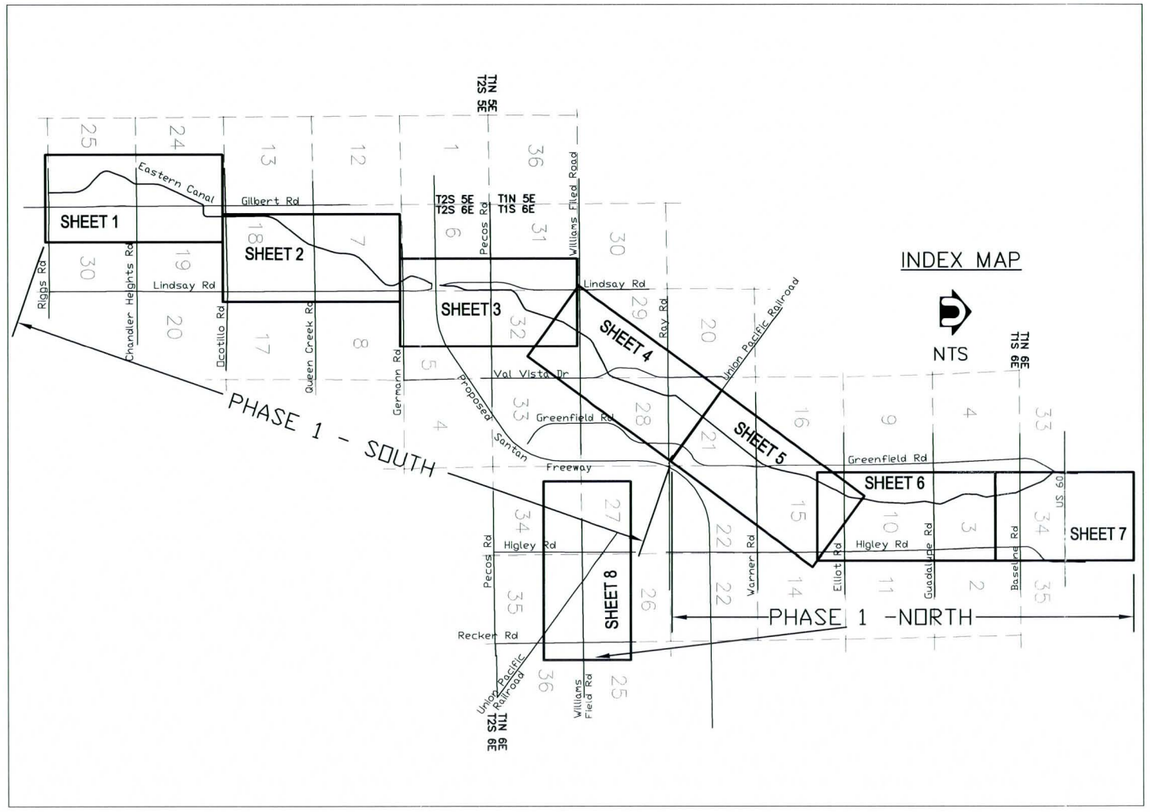
THE FOLLOWING MAP REPRESENTS A PHOTOGRAMMETRIC SURVEY MADE BY ME OR UNDER MY DIRECTION IN THE COUNTY OF MARICOPA, STATE OF ARIZONA. I, JAIME A. SATALICH, A STATE OF ARIZONA REGISTERED LAND SURVEYOR (NO. 35326, EXPIRES 9/30/2009), WITH MY SIGNATURE AND SEAL AFFIXED BELOW, HEREBY CERTIFY TO THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, ARIZONA, THAT THE INFORMATION SHOWN HEREON COMPLIES WITH THE NATIONAL STANDARD FOR SPATIAL DATA ACCURACY. COMPILED ±1.0' HORIZONTAL ACCURACY AT THE 95% CONFIDENCE LEVEL. COMPILED ±1.25' VERTICAL ACCURACY AT THE 95% CONFIDENCE LEVEL.

"CERTIFICATION" WHEN USED IN THE CONTEXT OF THIS DOCUMENT ONLY CONSTITUTES AN EXPRESSION OF PROFESSIONAL OPINION REGARDING THOSE FACTS OR FINDINGS WHICH ARE THE SUBJECT OF THE CERTIFICATION, AND DOES NOT CONSTITUTE A WARRANTY OR GUARANTEE, EITHER EXPRESSED OR IMPLIED. NO NEW PROPERTY LINES OR PARCELS WERE CREATED AS A RESULT OF THIS SURVEY.

THE FOLLOWING STATEMENTS APPLY TO THE INDIVIDUAL SEALS AFFIXED TO THE MAPS FOLLOWING THIS COVER SHEET.

THE FLOODPLAIN DELINEATION FOR PHASE 1–SOUTH WAS PREPARED UNDER MY DIRECT SUPERVISION:

THE FLOODPLAIN DELINEATION FOR PHASE 1–NORTH WAS PREPARED UNDER MY DIRECT SUPERVISION:



SHEET INDEX

NOT TO SCALE

LEGEND

SECTION LINES

SECTION NUMBER 25

PHOTOGRAMMETRIC MAPPING

STEWART GEO TECHNOLOGIES, INC.
5730 NW PARKWAY, SUITE 500.
SAN ANTONIO, TEXAS 78249 (210) 777–2600
DATE OF PHOTOGRAPHY: 4/12/03
CONTOUR INTERVAL: 2 FEET
MAPPING SCALE: 1"=400'

PHOTOGRAMMETRIC MAPPING CONTROL

DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVENUE, STE 200
PHOENIX, AZ 85016 (602) 678–5151

ADDITIONAL SURVEY

DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVE, STE 200
PHOENIX, AZ 85016 (602) 678–5151

HYDROLOGY

DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVE, STE 200
PHOENIX, AZ 85016 (602) 678–5151

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, #4
PHOENIX, AZ 85021 (602) 906–1901

HYDRAULICS

DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVE, STE 200
PHOENIX, AZ 85016 (602) 678–5151

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, #4
PHOENIX, AZ 85021 (602) 906–1901

DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVE, STE 200
PHOENIX, AZ 85016

	BY	DATE	
DESIGN	TJN	4/05	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	TSG	4/05	
PLANS	LFSI / FEB	10/07	RECOMMENDED BY: DATE
PLANS CHK.	FEB	10/07	APPROVED BY: DATE
SUBMITTED BY: DATE:			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 1 OF 1

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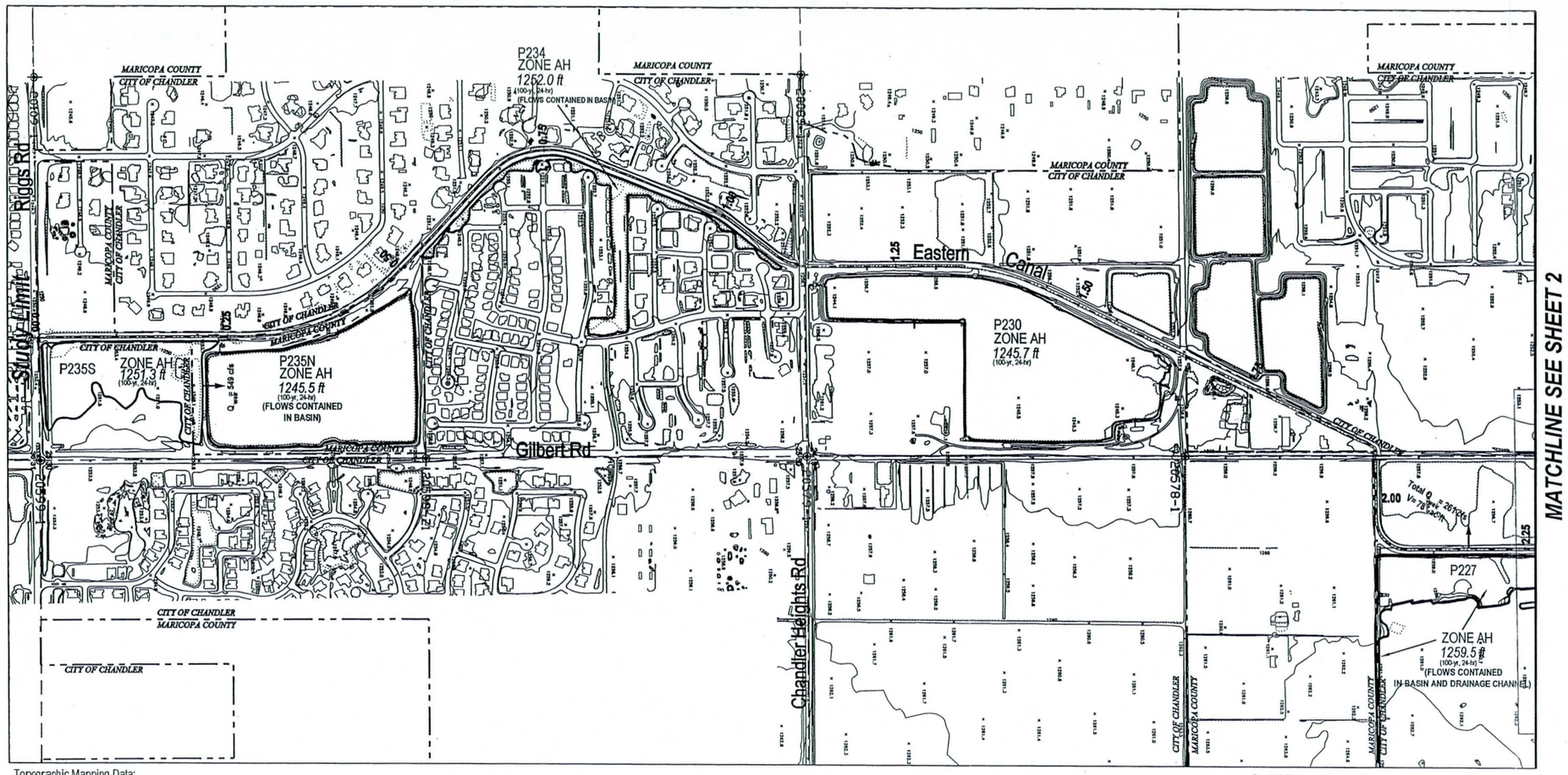
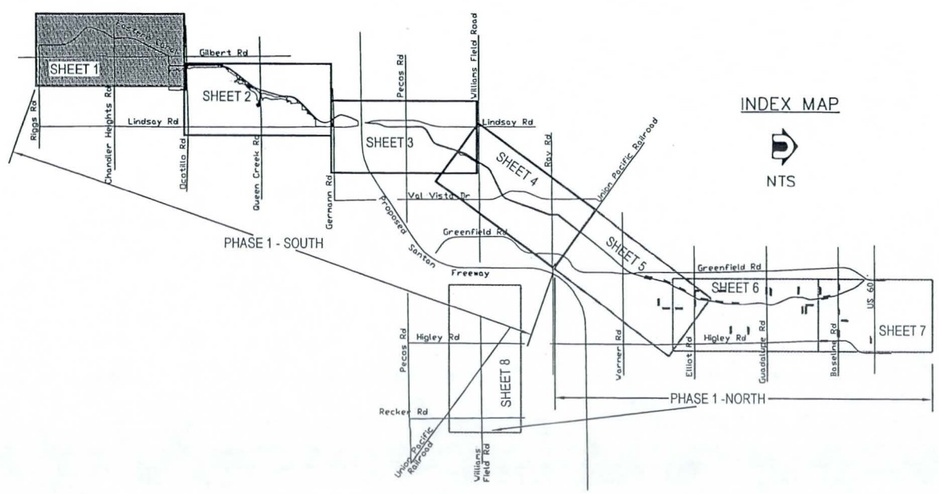


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

EASTERN CANAL

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.63'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.



INDEX MAP
NTS

NOTES:
1. Topographic data for Ponds P227, P219/237, P238, P224, P208N, and P208S are per subdivision grading; refer to Technical Data Notebook Volume 1 Tab A.1 for data and Volume 4 Tab Section 5S Section 5S.1 for report text. Revised topographic data not shown on workmaps except for pond area.
2. P227 Conversion Factor: NGVD29=NAVD88-1.13'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.
P219 Conversion Factor: NGVD29=NAVD88-2.36'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – SOUTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- CROSS SECTION
- x 1252.7 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
20109-1	807277.77	736312.79	1247.20	FD 3" CHANDLER BC IN HH 0.45' DN NO STAMPING NOTE- FND +/- 10 FT. NORTH OF NORTH E/P
20599-1	807315.72	738952.94	1253.21	FD 3" CHANDLER BC IN HH 0.4' DN NO STAMPING NOTE- NO C/L PUNCH
20598-Z1	809958	738935.26	1256.24	SET 4 FT SS ROD W/ 3" MARICOPA COUNTY BC STAMPED "T2S R1E S25 R1E S36 2001 RLS 15573" NOTE- FL
20089-1	812565.69	736283.05	1250.48	FD 3" MCDOT BC IN HH 0.3' DN NO STAMPING NOTE- FND ON CL CHANDLER HGHTS
20579-1	812599.01	738911.18	1258.80	FD 3" MCDOT BC IN HH 0.4' DN NO STAMPING NOTE- NO DATE
20578-1	815248.61	738898.14	1259.00	FD 1 1/2" AGENCY UNREADABLE AL CAP FL NOTE- PIECE OF CAP BROKEN OFF, LOCATE MEANED C/L OF CAP.

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed ARIZONA, U.S.A.

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	TJN	4/05
DESIGN CHK.	TJN	4/05
PLANS	LFS	10/07
PLANS CHK.	FEB	10/07

SUBMITTED BY: DATE:

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

SHEET 1 OF 8

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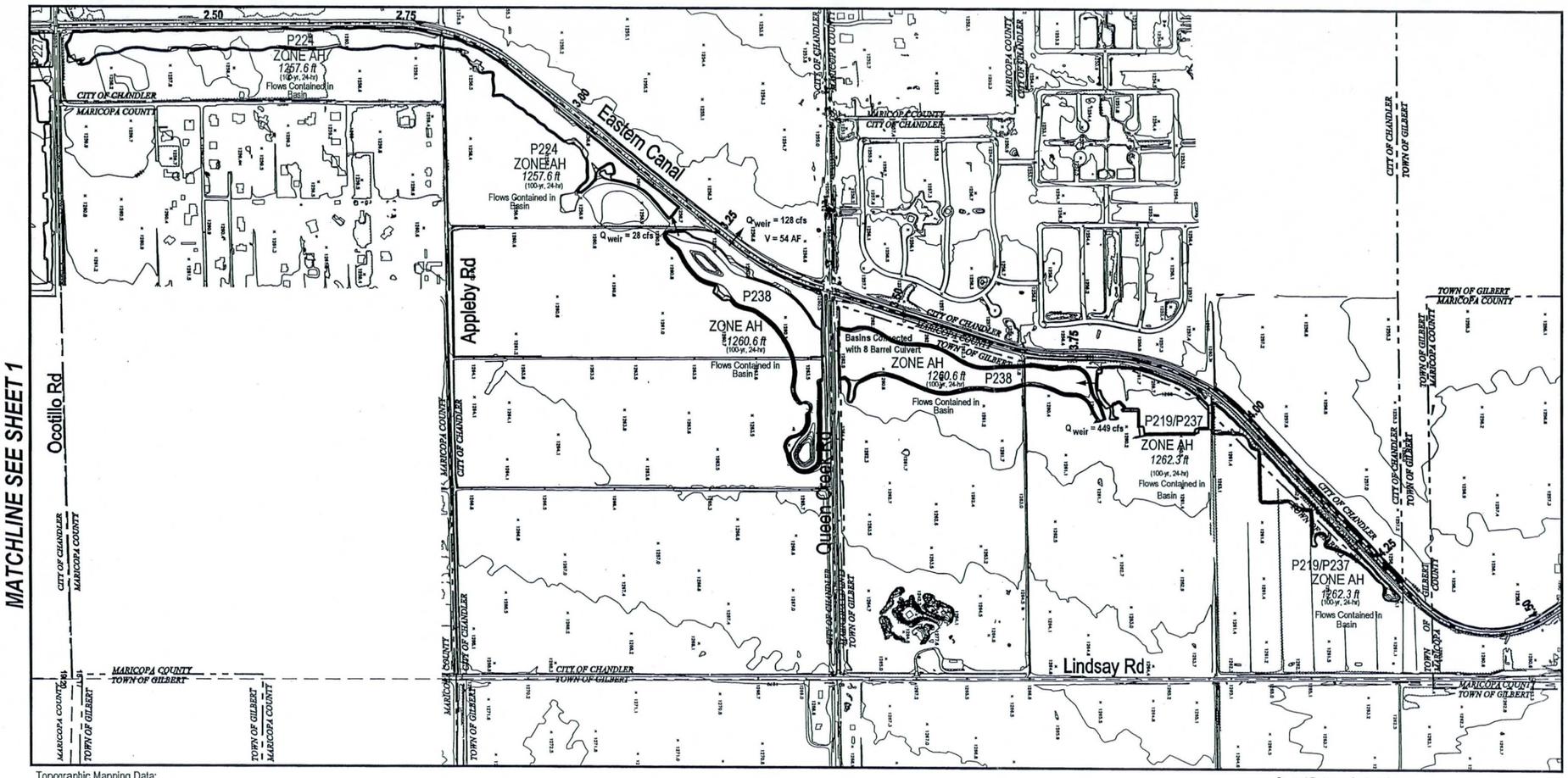
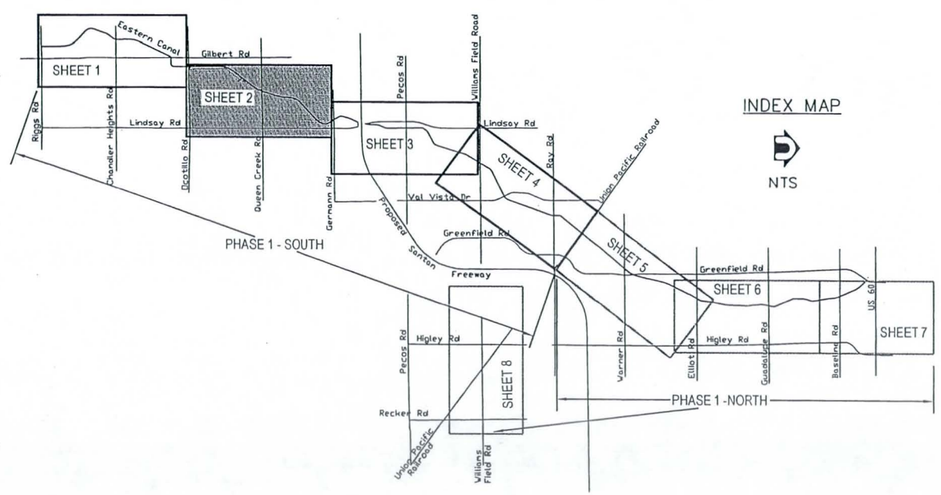


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

EASTERN CANAL



Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.66'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.

NOTES:
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P219 Conversion Factor: NGVD29=NAVD88-2.36'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – SOUTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7,862 Q = 146 cfs FP = 1268.9 ft CROSS SECTION
- x 1263.7 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
20561-1M	817951.54	741372.4	1263.32	FD 3/8" RB WITH NO ID FL NOTE- FND AT INTERSEC OF OCOTILLO AND 140TH ST. REFURBISHED WITH 2" MARICOPA COUNTY AL CAP STAMPED "T2S-R6E 1/4 S18 S19 2001 RLS 15573"
20562-1M	818011.07	744030.65	1271.55	FD 1/2" RB WITH NO ID FL NOTE- FND IN POTHOLE MIDDLE PAVED ROAD . REFURBISHED RB WITH 2" MARICOPA COUNTY AL CAP STAMPED "T2S R6E S17 S18 S19 S20 2001 RLS 15573"
20558-1M	820643.84	744024.41	1272.12	FD 3/4" RB WITH NO ID FL NOTE- FND IN POTHOLE IN MIDDLE OF PAVED ROAD. REFURBISHED RB WITH 2" MARICOPA COUNTY AL CAP STAMPED "T2S-R6E 1/4 S17 S18 2001 RLS 15573 " NOTE- DH
20541-1	823234.3	741359.82	1260.83	FD 1" IP IN HH 0.45' DN W/ NO ID NOTE- FND IN CL GC ROAD
20542-1	823276.65	744018.19	1269.03	FD 3" MCDOT BC IN HH 0.3' DN NO STAMPING NOTE- FND IN HH MIDDLE PAVED ROADS NO DATE
20538-1M	825921.98	744002.5	1265.91	FD 1" IP FL WITH NO ID NOTE- FND IN CL OF LINDSEY ROAD. REFURBISHED WITH 2" MARICOPA COUNTY AL CAP STAMPED "T2S-R6E 1/4 S8 S7 2001 RLS 15573" NOTE- DN 0.2

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed ARIZONA, U.S.A.

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

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

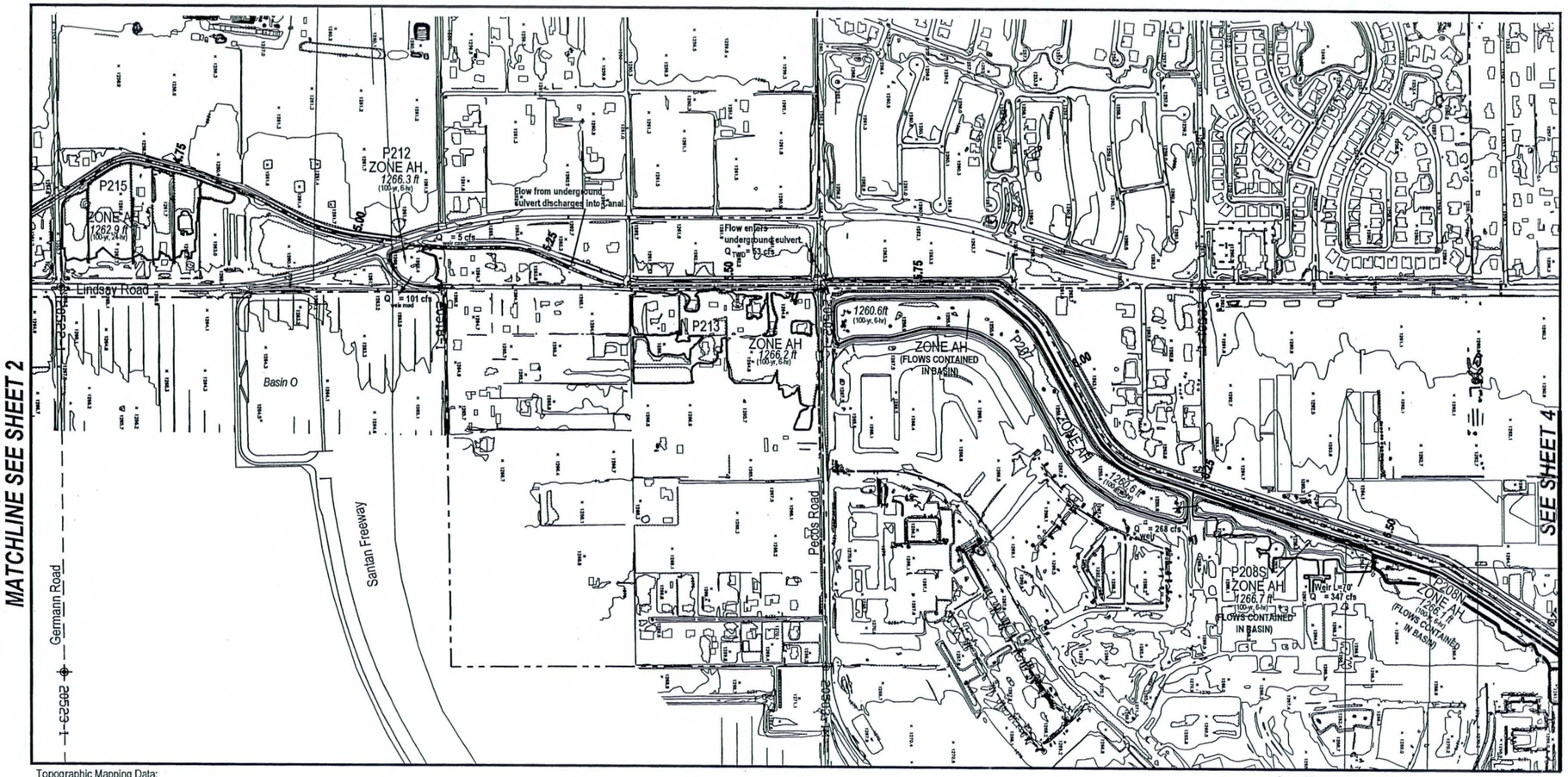
	BY	DATE
DESIGN	TJN	4/05
DESIGN CHK.	TJN	4/05
PLANS	LFS	10/07
PLANS CHK.	FEB	10/07

SUBMITTED BY: DATE:

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

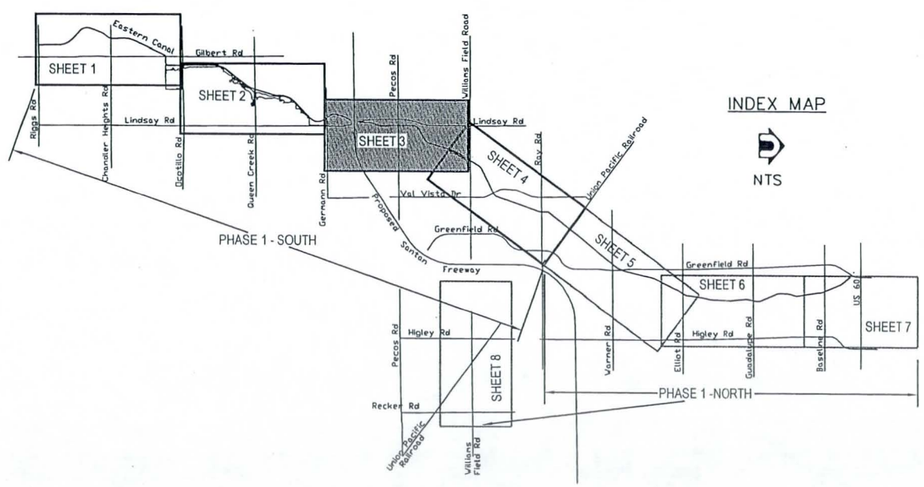
SHEET 2 OF 8

P:\Mar00000-0040\SEDwgSheets\MAR00040-SEDrfyWin02.dwg



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

EASTERN CANAL



Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.68'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.

NOTES:

1. Topographic data for Ponds P227, P219/237, P238, P224, P208N, and P208S are per subdivision grading; refer to Technical Data Notebook Volume 1 Tab A.1 for data and Volume 4 Tab Section 5S Section 5S.1 for report text. Revised topographic data not shown on workmaps except for pond area.
2. P227 Conversion Factor: NGVD29=NAVD88-1.13'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

   P219 Conversion Factor: NGVD29=NAVD88-2.36'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – SOUTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 2.00 Q = 146 cfs FP = 1266.9 ft — CROSS SECTION
- x 1252.7 — 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
20522-1	828566.88	743987.09	1264.53	FD 3" MC ENG DEPT BC IN HH 1" DN STAMPED "EL=1264.26" NOTE- FND IN HANDHOLE MIDDLE OF PAVED INTERSEC W/ STRADDLES
20523-1	828585.18	746664.93	1273.96	FD 4" MC ENG DEPT BC IN HH 0.45' DN STAMPED "T2S R4E S8 S5 1963" NOTE- FND NORTH OF THE NORTH EDGE OF GERMANN ROAD
20518-1	831186	743982.3	1266.06	FD 3" MCDOT BC FL STAMPED "1265.71" NOTE- FND FL MIDDLE PAVED ROAD NO STRADDLES
20502-1	833815.19	743977.58	1269.07	FD 3" MCDOT BC IN HH 0.7' DN NO STAMPING NOTE- +/- 25FT EAST OF APPROACH SLAB TO R.W.C.D. CANAL CROSSING (BRIDGE). CHS X IN CAP
20503-1M	833845.84	746603.68	1269.94	FD 1/2" RB WITH NO ID FL NOTE- FND ON CL OF PECOS ROAD. REFURBISHED RB WITH 2" MARICOPA COUNTY AL CAP 0.1' DN STAMPED "T2S-R4E 1/4 S32/S5 2001 RLS 15573"
20501-1	833786.37	741335.38	1258.90	FD 3" GILBERT BC FL NO STAMPING NOTE- CL EAST BOUND LANE

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed ARIZONA, U.S.A.

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	TJN	4/05
DESIGN CHK.	TJN	4/05
PLANS	LFS	10/07
PLANS CHK.	FEB	10/07

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

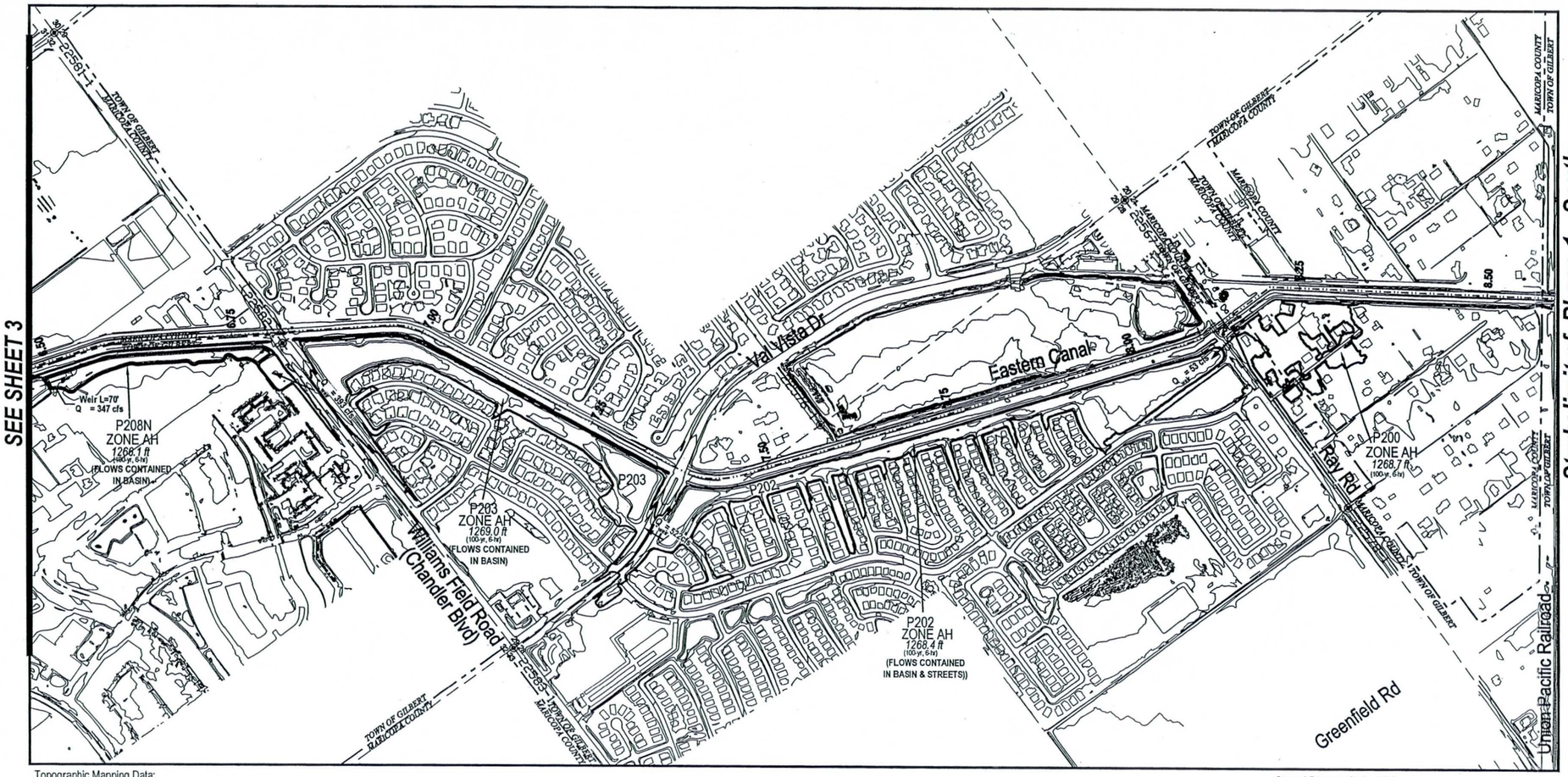
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

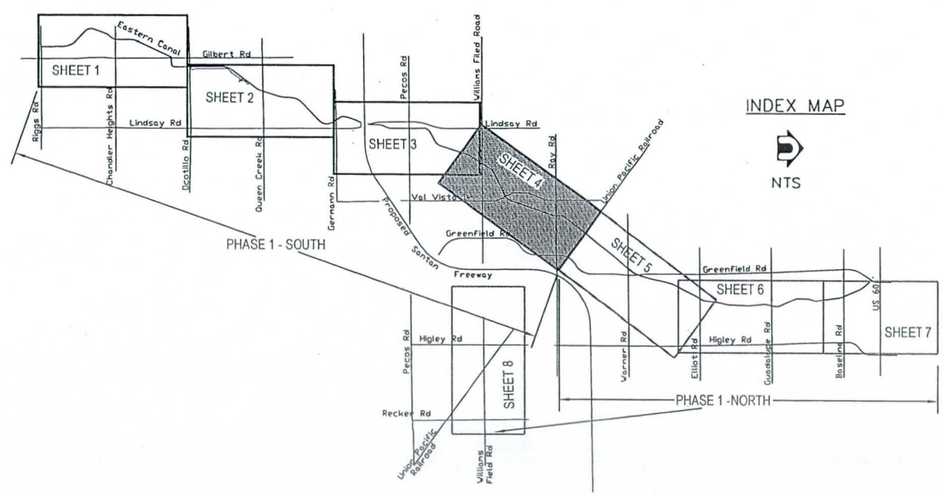
SHEET 3 OF 8

P:\Mar\0000-0040\MA\0000\40-SE\AugSheets\MA\00040-SE\ybWm03.dwg



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

EASTERN CANAL



Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.69'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.

NOTES:

1. Topographic data for Ponds P227, P219/237, P238, P224, P208N, and P208S are per subdivision grading; refer to Technical Data Notebook Volume 1 Tab A.1 for data and Volume 4 Tab Section 5S Section 5S.1 for report text. Revised topographic data not shown on workmaps except for pond area.
2. P227 Conversion Factor: NGVD29=NAVD88-1.13'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

   P219 Conversion Factor: NGVD29=NAVD88-2.36'; refer to Technical Data Notebook Volume 2 Tab J and Volume 4 Tab Section 5S Section 5S.1.

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

CHANDLER/GILBERT
FLOODPLAIN DELINEATION STUDY
PHASE 1 – SOUTH
EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

	100-YR FLOODPLAIN BOUNDARY
2.00	HYDRAULIC BASE LINE WITH RIVER MILE
7.803 Q = 146 cfs FP = 1268.0	CROSS SECTION
x 1253.7	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
22581-1	839124.47	743935.56	1261.17	FD 3" MCHD BC IN HH 0.3' DN STAMPED "1260.87"
22582-1	839147.57	746574.59	1271.19	FD 3" MCHD BC IN HH 0.45' DN NO STAMPING
22583-1	839172.03	749212.46	1271.73	FD 3" MCHD BC IN HH 0.45' DN NO STAMPING
22576-1	841806.76	749204.15	1266.62	FD 1/2" RB W/O ID 1' DN
22567-1	844441.71	749196.24	1266.44	FD 3" GILBERT BC IN HH 0.7' DN NO STAMPING
22578-1	841892.4	759726.54	1293.80	FD 3" MCHD BC FL STAMPED "RD ALIGN"

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN Date Signed ARIZONA, U.S.A.

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	TJN	4/05
DESIGN CHK.	TJN	4/05
PLANS	LFS	10/07
PLANS CHK.	FEB	10/07

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

SUBMITTED BY: DATE:

SHEET 4 of 8

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5S.3 Parameter Estimation

HEC-RAS V.3.1.3 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

5S.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. See Appendix ES.1 for detailed Manning's n-value Report.

5S.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 5.2 (above).

Cross sections are labeled according to river mile increasing in the upstream direction, using the Centerline of Eastern Canal 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.

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

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 and by utilizing the ineffective flow options available in HEC-RAS V.3.1.3.

5S.4.6 Supercritical Flow

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

5S.4.7 Floodway modeling

No floodway was delineated for this study.

5S.4.8 Special problems encountered during the study

5S.4.8.1 100-yr, 6-hr vs. 100-yr, 24-hr Results

Normally, the 100-yr, 6-hr and 24-hr modeling results are compared and the model that produces the higher results is considered the base model for other dependant modeling, i.e. floodplain modeling. The Phase 1 – South watershed produced mixed results in regard to dominant resulting discharge and high water surface elevations. Generally, sub-basins north and west (PB Region 1) of the Santan Freeway alignment produced higher results for the 100-yr, 6-hr model compared to the 24-hr model and the sub-basins south of the Santan Freeway alignment (PB Regions 2 and 3) resulted in higher 24-hr results. Therefore, the 100-yr, 6-hr model is the base model for the floodplain mapping for PB Region 1 and the 100-yr, 24-hr model is the base model for PB Regions 2 and 3 of the Phase 1 – South watershed. See Section 4S in Volume 3 for more information about the HEC-1 modeling.

5S.4.8.2 Eastern Canal Tailwater Ditch

A tailwater ditch parallels the east bank of the Eastern Canal from the Union Pacific Railroad to Pecos Road. The ditch originally was intended to return tail water from agricultural fields to the Eastern Canal as part of the Roosevelt Conservation District (RWCD) canal system. Although not its primary purpose, the tailwater ditch can intercept and carry storm water runoff.

The tailwater ditch was analyzed as part of the delineation process to determine where the ponded floodplain and tailwater ditch are hydraulically connected and where they are independent. Places where there is a direct connection between the ponded floodplain, P208N for example, the tailwater ditch is modeled as part of the ponded area. In other locations, there is no interaction between the tailwater ditch and adjacent deeper ponding areas. Most often, there is little interaction and the two systems remain separate. In locations where the capacity of the tailwater ditch is exceeded, adjacent to P200 and P208S for example, overflow is added to the adjacent floodplain ponding area.

The analysis determines where it is appropriate to include the tailwater ditch in the floodplain delineation. Where there is no interaction between the floodplain zone AH ponds and the tailwater ditch, it was determined that the tailwater ditch was not part of the flood hazard. It would be inappropriate to delineate the tailwater ditch as a FEMA flood hazard since the tailwater flows are contained in the ditch on the RWCD property, and due to the ditch's short width the flood information would not even be legible on the FIRM panel.

HEC-RAS was used to determine the conveyance capacity and interaction with adjacent ponding areas. The tailwater ditch is a trapezoidal channel with a concrete bottom and sides. Manning's n value of 0.015 was used for the channel and an n-value of 0.035 was used for the overbanks to represent agricultural areas. Longitudinal slopes along the tailwater ditch are very flat, with the steepest grade less than 1%. The floodplain analysis was modeled as a subcritical flow regime. Since the geometry of the tailwater ditch does not vary much, cross-sections were spaced approximately 500 feet apart.

An assumed water surface elevation was used for the starting water surface conditions at the most downstream cross-section by adding one-foot of water to the lowest ground elevation at cross-section 5.633, located at Pecos Road. See Appendix ES.6, Special Problems, for tailwater ditch HEC-RAS model and cross-section location exhibit.

See Volume 3, *Section 4S.5.2, Special Problems*, in the Hydrology portion of this report for more information about the tailwater ditch.

5S.4.9 Calibration

No hydraulic calibration was performed during this study.

5S.5 Hydraulic analysis results

There are no hydraulic analysis for flows between basins in the southern portion of the study.

5S.6 References

1. *U.S. Army Corp of Engineers HEC-RAS Version. 3.1.2*, April 2004 (not for floodplain delineation)

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

Section 5N: PHASE 1 – NORTH, HYDRAULIC ANALYSIS

5N.1 Method Description

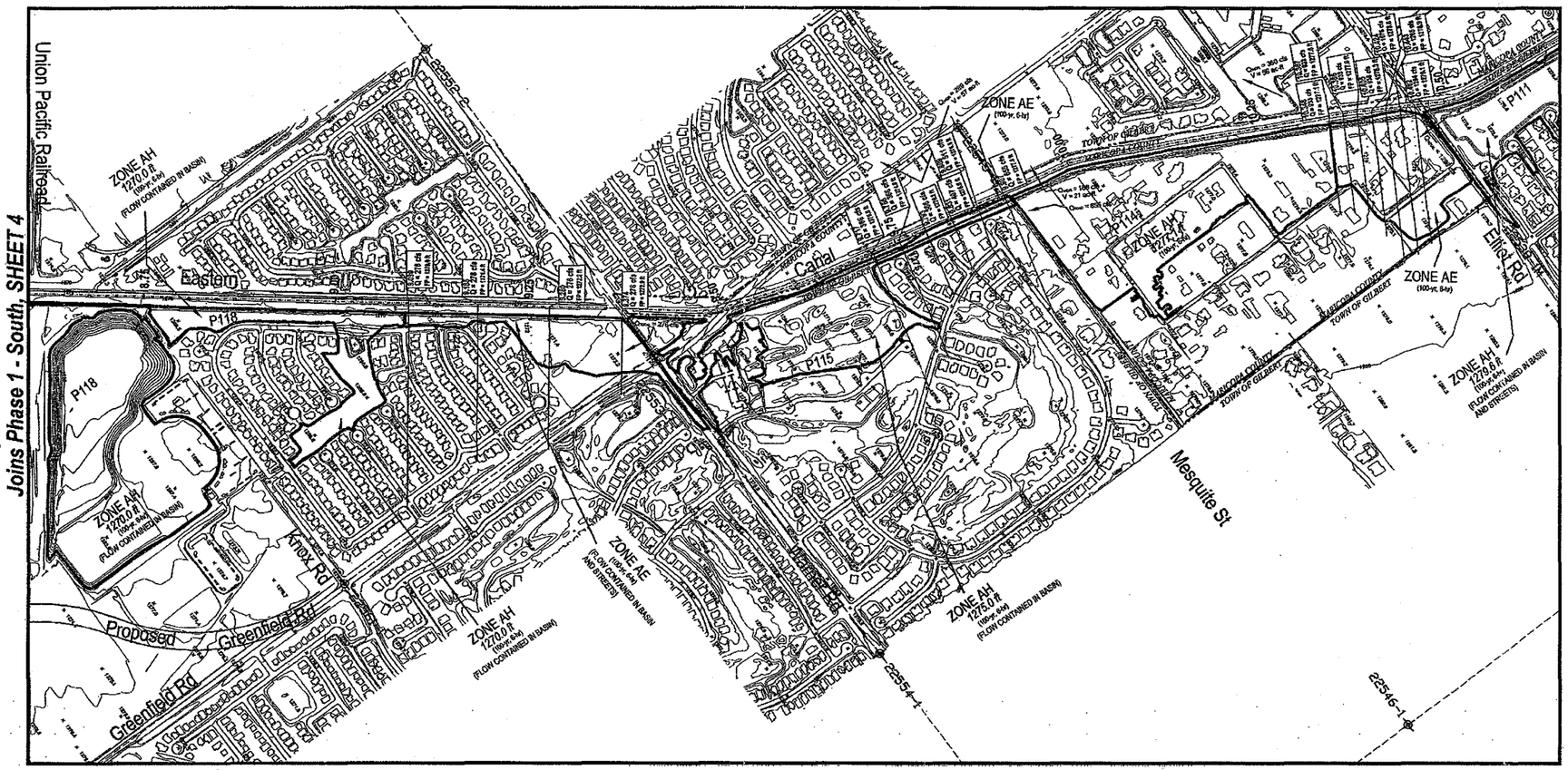
Project Engineering Consultants prepared the hydraulic analysis for Phase 1- North. The U.S. Army Corp of Engineers HEC-RAS V. 3.1.3 (Reference 1) was used to perform step-backwater profile calculations for conveyance between ponding areas. These areas are mapped as Zone AE on the Workmaps (see Exhibit F, Phase 1 -North, Sheets 5-8). 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 1 – North, Eastern Canal Watershed is presented on 1 in.= 400 ft., 2 ft. 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 8 - 24 in. x 36 in. sheets with Phase 1 –South depicted on Sheets 1- 4 and Phase 1 –North depicted on Sheets 5-8. Reduced-scale copies of the work study maps, Sheets 5 – 8, are included on the following pages. The full-size sheets are contained in Volume 5 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 1 - North
Joins Phase 1 - South, SHEET 4



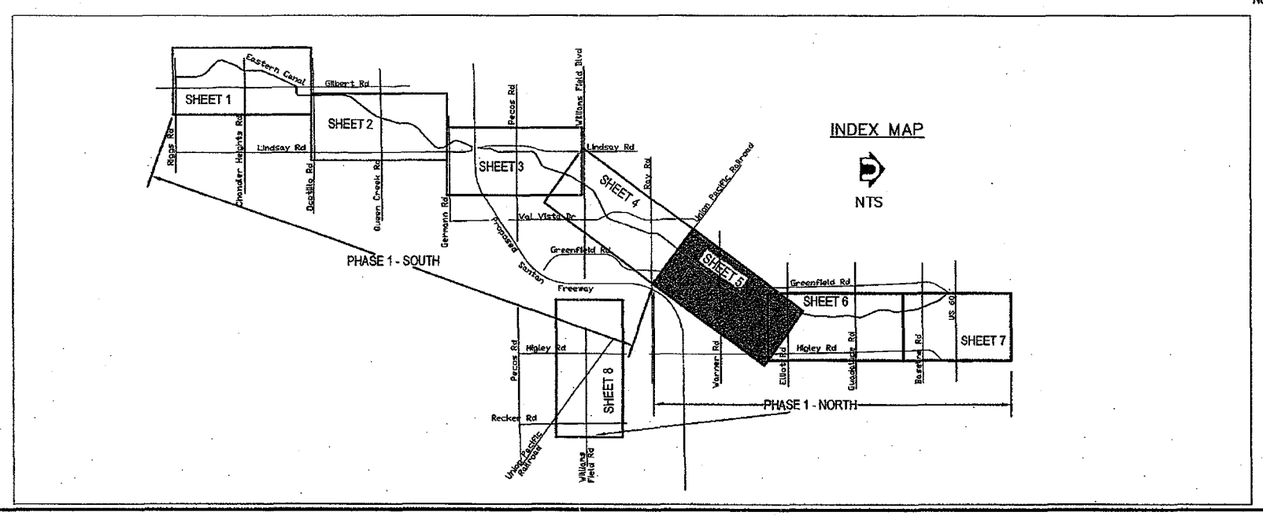
MATCHLINE SEE SHEET 6

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

EASTERN CANAL

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.69'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – NORTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 12.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7.897 Q = 148 cfs FP = 1258.9 ft CROSS SECTION
- x 1258.7 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
22538-1M	855031.68	757027.42	1278.32	FD 1/2" RB W/O ID 1" DN. AFIXXED 2" MARICOPA COUNTY AL CAP STAMPED "T1S R4E 1/4 S10 S15 2003 RLS" 21752"
22552-2	849721.03	751815.13	1268.76	FD 3" GILBERT BC IN HH 0.5' DN NO STAMPING NOTE- IN MEDIAN OF WARNER RD AND 30FT +/- EAST OF POWER LINES
22553-1	849735.71	754456.2	1274.09	FD 3" GILBERT BC IN HH 0.45' DN NO STAMPING
22561-1	847073.75	754462.64	1275.75	FD 3" GILBERT BC IN HH 0.3' DN NO STAMPING NOTE- CL OF GREENFIELD RD AND KNOX RD
22554-1	849763.56	757061	1280.52	FD 3" GILBERT BC IN HH 0.3' DN NO STAMPING NOTE- CL OF WARNER RD AND 300FT +/- EAST OF RESEDA STREET
22545-1	852373.03	754444.96	1272.52	FD 3" MCDOT BC IN HH 0.6' DN NO STAMPING NOTE- EAST EDGE OF PAVEMENT ON GREENFIELD RD AND 30FT +/- SOUTH OF MESQUITE STREET
22546-1	852423.4	759643.41	1289.09	FD 3" GILBERT BC FL NO STAMPING

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 25872 MICHAEL D. HEATON 10-31-07

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

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

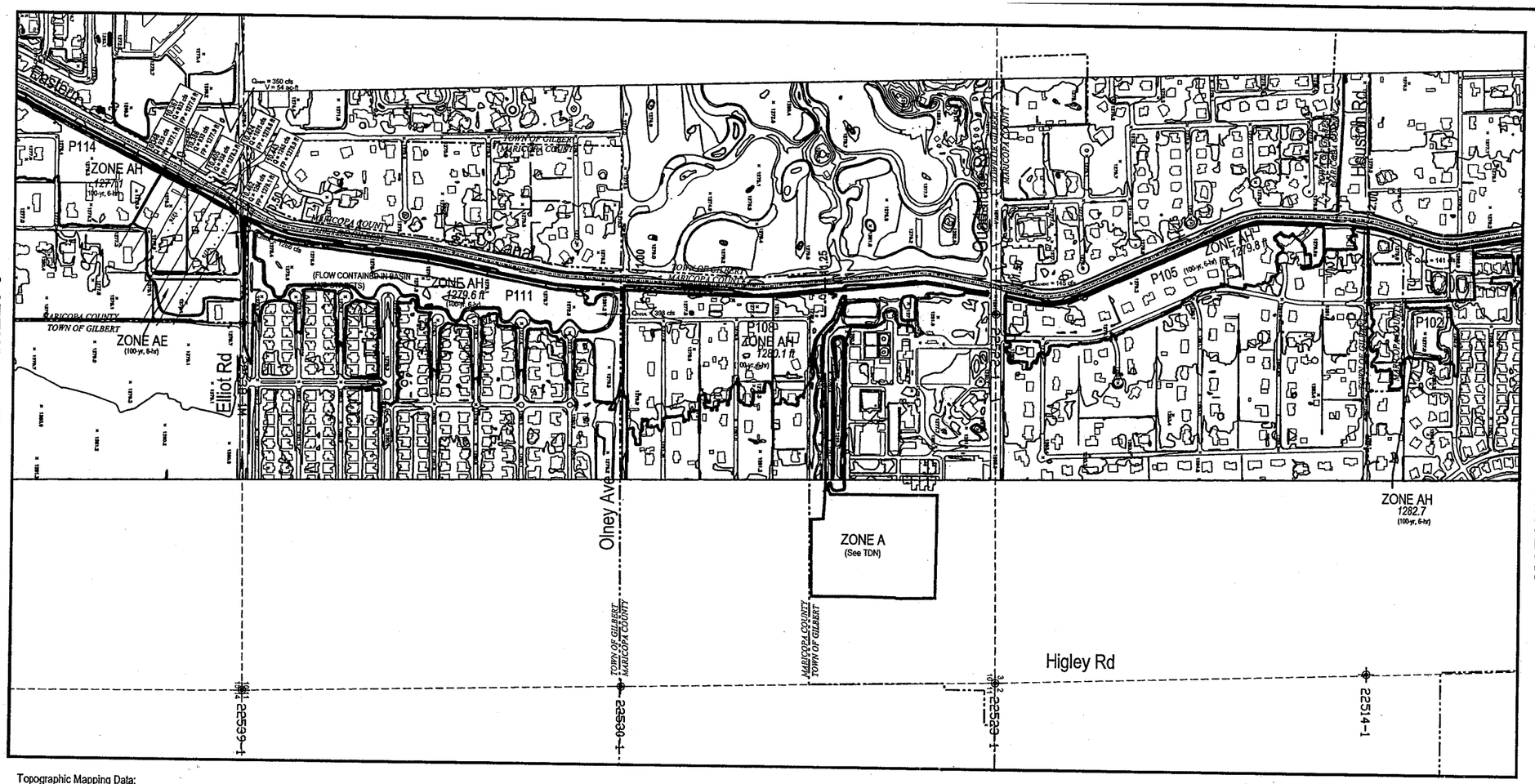
	BY	DATE
DESIGN	XY	4/05
DESIGN CHK.	MDH	4/05
PLANS	GSB	4/05
PLANS CHK.	MDH	4/05
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

SHEET 5 OF 8

MATCHLINE SEE SHEET 5



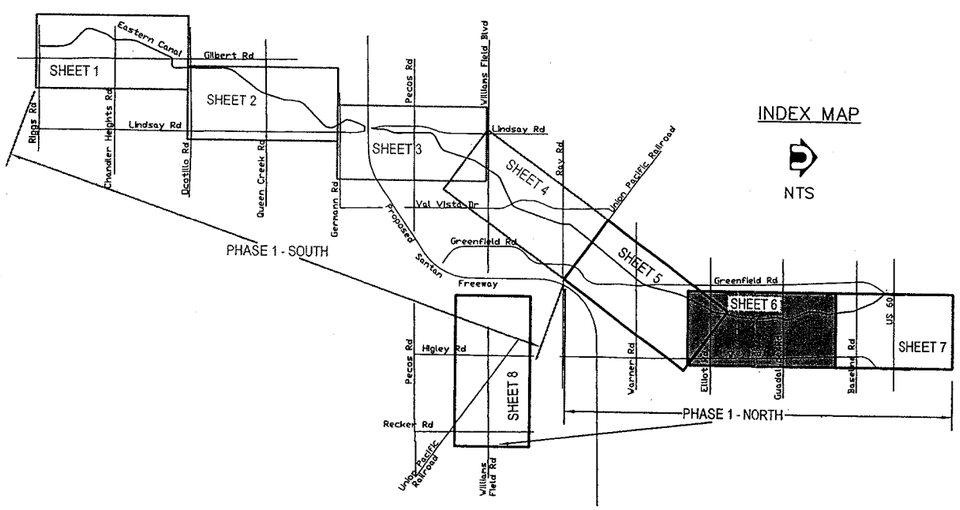
MATCHLINE SEE SHEET 7

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

EASTERN CANAL

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.69'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – NORTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7,892 Q=146 cfs FP=1268.8 ft CROSS SECTION
- x 1286.7 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
22538-1M	855031.68	757027.42	1278.32	FD 1/2" RB W/O ID 1" DN, APPIXED 2" MARICOPA COUNTY AL CAP STAMPED "T1S R6E 1/4 S10 S15 2003 RLS 21782"
22539-1	855055.48	759621.19	1287.27	FD 3" BC IN HH 0.3' DN NO STAMPING
22530-1	857694.09	759560.41	1285.75	FD 3" MCHD BC IN HH 0.65' DN NO STAMPING NOTE- IN MEDIAN OF HIGLEY RD AND 50FT +/- NORTH OF POWER LINES
22522-1	860312.86	756896.58	1281.19	FD 3" GILBERT BC IN HH 0.55' DN NO STAMPING
22523-1	860332.93	759499.46	1289.61	FD 3" GILBERT BC IN HH 0.6' DN NO STAMPING
22514-1	862954.54	759402.54	1291.64	FD 3" GILBERT BC IN HH 0.2' DN NO STAMPING

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 25672 MICHAEL D. HEATON 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

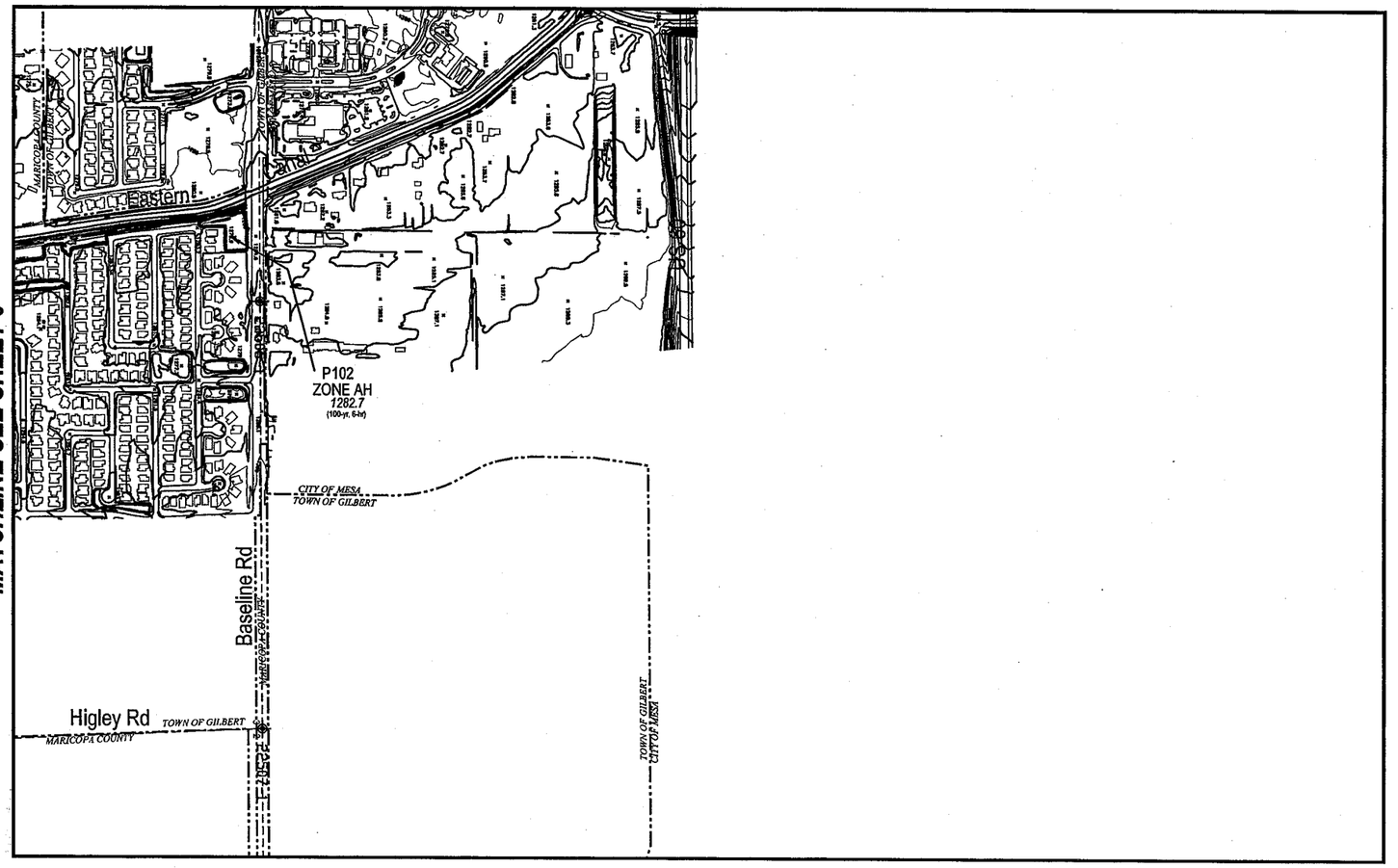
	BY	DATE
DESIGN	XY	4/05
DESIGN CHK.	MDH	4/05
PLANS	GSB	4/05
PLANS CHK.	MDH	4/05

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

SHEET 6 OF 8

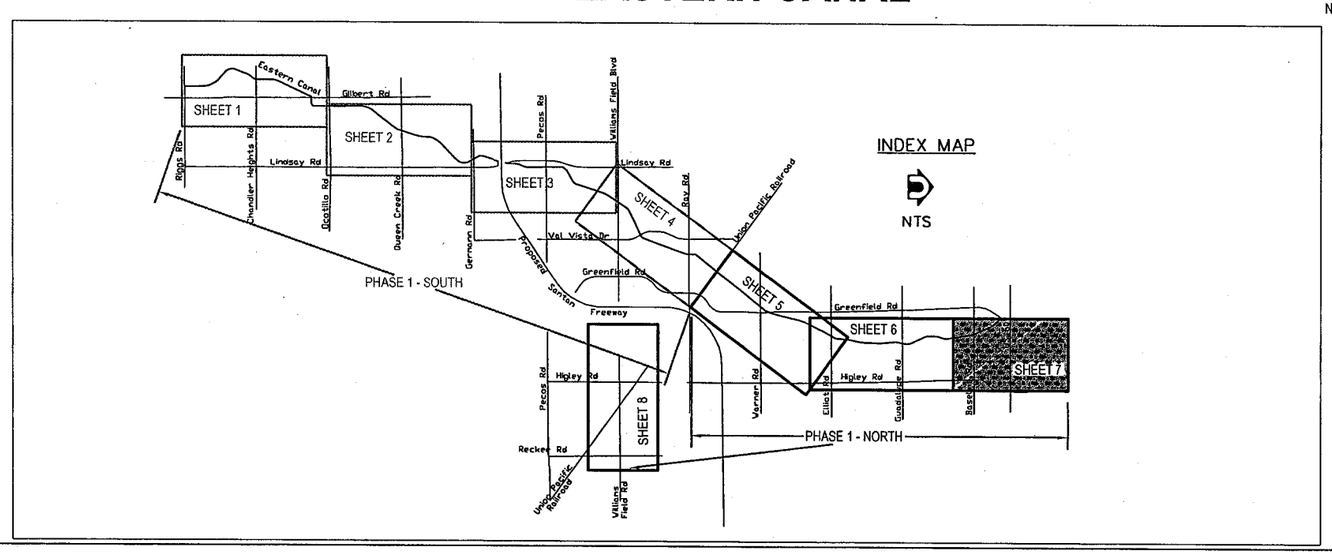


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

EASTERN CANAL

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.69'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 1 – NORTH EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7,892 Q = 146 cfs FP = 1256.3 ft CROSS SECTION
- 1256.7 SPOT ELEVATION
- -1260 BASE FLOOD ELEVATIONS
- ZONE AH 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
22506-1	865561.95	756665.74	1286.40	FD 3" MCHD BC IN HH 0.35' DN NO STAMPING
22507-1	865576.08	759305.17	1296.78	FD 3" MCHD BC IN HH 0.35' DN NO STAMPING NOTE- LOCATED ROUND PUNCH

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON 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

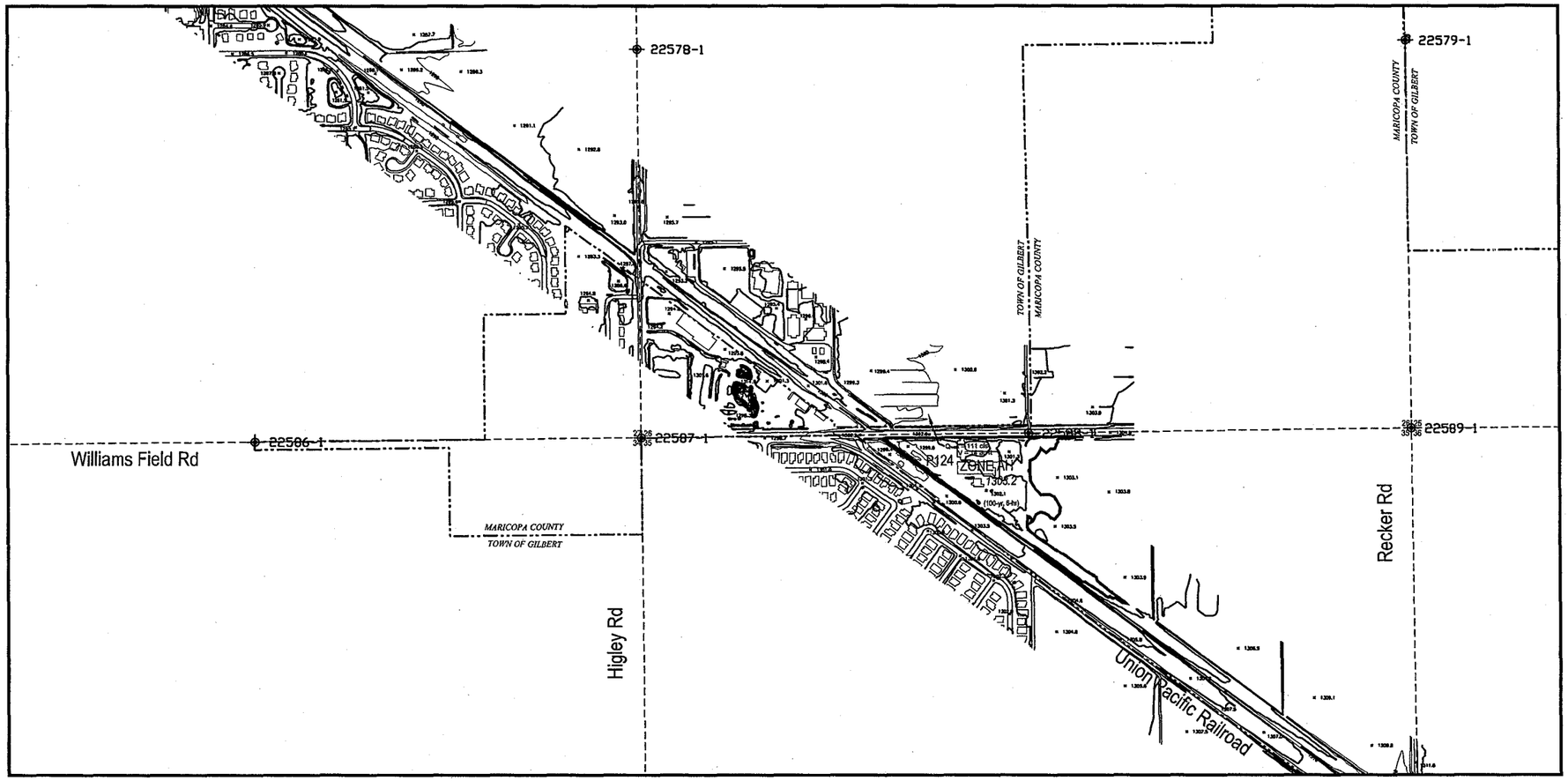
	BY	DATE
DESIGN	XY	4/05
DESIGN CHK.	MDH	4/05
PLANS	GSB	4/05
PLANS CHK.	MDH	4/05

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

SHEET 7 OF 8

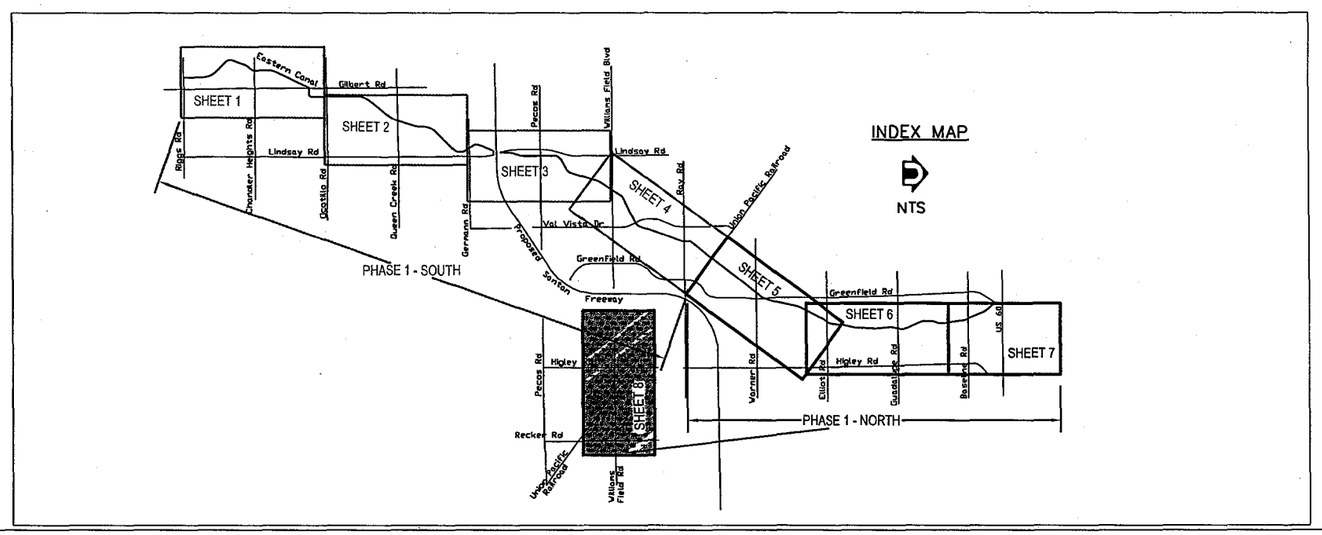


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.67'

Note: The Hydraulic Baseline is measured from the centerline of Eastern Canal.

EASTERN CANAL



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

CHANDLER/GILBERT
FLOODPLAIN DELINEATION STUDY
PHASE 1 – NORTH
EASTERN CANAL WATERSHED

CONTRACT FCD 2002C023

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7,692 Q = 146 cfs FP = 1253.9 ft CROSS SECTION
- 1293.7 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
22586-1	839232.94	757119.51	1290.62	FD 3" MCHD BC IN HH 0.95' DN NO STAMPING
22587-1	839260.27	759746.78	1297.10	FD 3" MCDOT BC IN HH 0.45' DN NO STAMPING
22588-1	839291.87	762380.51	1302.55	FD 3" MCHD BC IN HH 0.7' DN NO STAMPING
22589-1	839325.24	765013.81	1310.71	FD 3" MCHD BC IN HH 0.5' DN NO STAMPING
22579-1	841952.85	764977.22	1308.31	FD 3" GILBERT BC IN HH 0.3' DN NO STAMPING
22578-1	841892.4	759726.54	1293.80	FD 3" MCHD BC FL STAMPED "RD ALIGN"

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON 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	XY	4/05
DESIGN CHK.	MDH	4/05
PLANS	GSB	4/05
PLANS CHK.	MDH	4/05

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

SHEET 8 OF 8

5N.3 Parameter Estimation

HEC-RAS v.3.1.3 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. See Appendix EN.1 for detailed Manning's n-value Report.

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 5.2 (above).

Cross sections are labeled according to river mile increasing in the upstream direction, using the Centerline of Eastern Canal 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 and by utilizing the ineffective flow options available in HEC-RAS Version 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

There were no special problems to report for the hydraulic analyses.

5N.4.9 Calibration

No hydraulic calibration was performed during this study.

5N.5 Hydraulic analysis results

Weir flow of 1,294 cfs is conveyed across Elliot Road at the Eastern Canal and conveyed through Sub-basin 114 to the P114 (see Exhibit A in Volume 5 for Sub-basin Boundaries). Cross-sections 10.348 though 10.462 represent this reach (see Workmap Exhibit F, Sheet 6, located in Volume 5 of this report).

Weir flow of 655 cfs is conveyed across Mesquite Road at the Eastern Canal and conveyed through Sub-basin 115 to the P115. Cross-sections 9.717 though 9.907 represent this reach (see Workmap Exhibit F, Sheet 5, located in Volume 5 of this report).

Weir flow of 276 cfs is conveyed across Warner Road at the Eastern Canal and conveyed through Sub-basin 118 to the P118. Cross-sections 9.090 though 9.374 represent this reach (see Workmap Exhibit F, Sheet 5, located in Volume 5 of this report).

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 Version 3.1.3*, May 2005.

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

PREFACE

The following report describes the evaluation of Manning's roughness coefficients for this floodplain delineation study.

CHANDLER/GILBERT
FLOODPLAIN DELINEATION STUDY
FCD CONTRACT NO. 2002C023

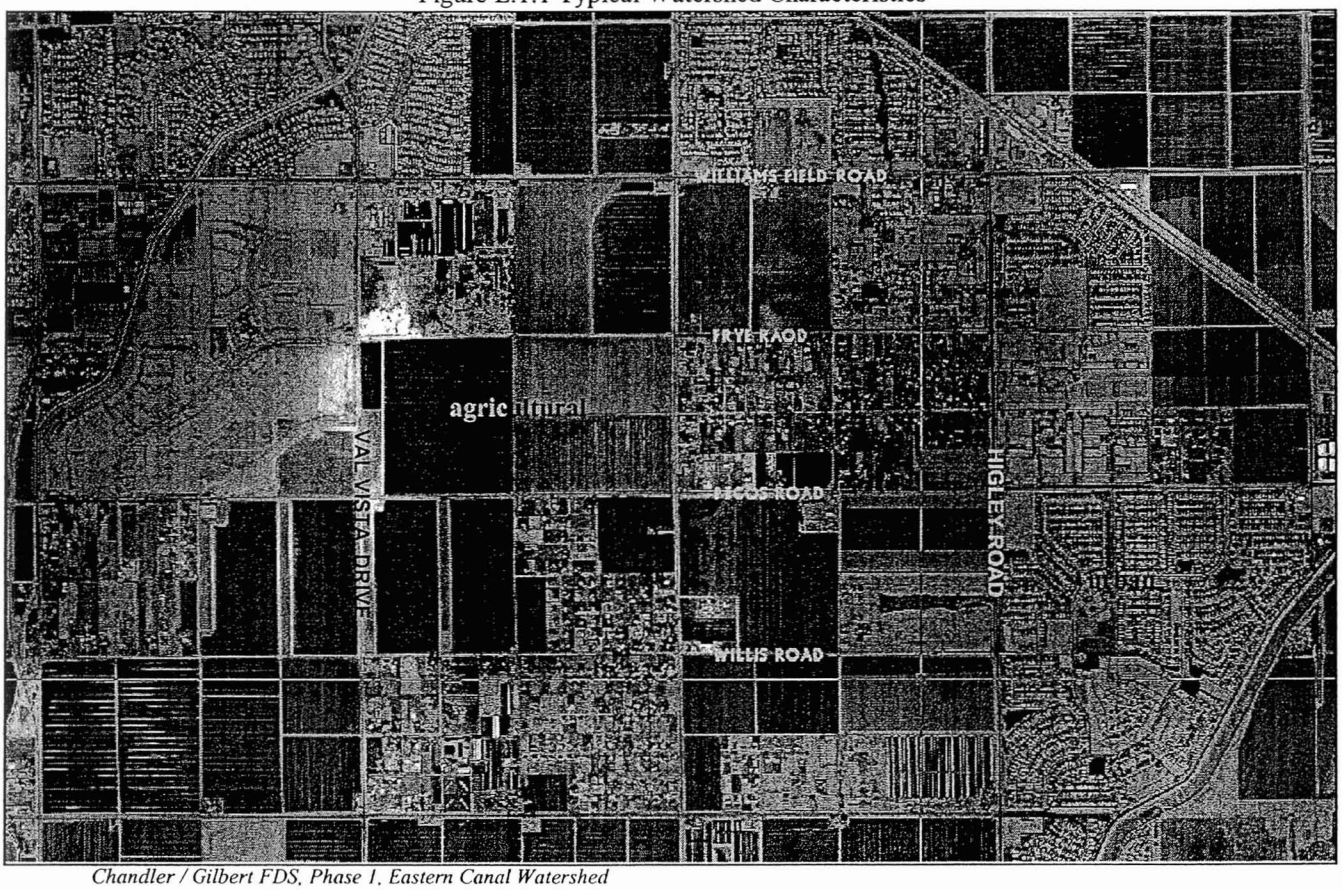
ESTIMATED MANNING'S ROUGHNESS COEFFICIENTS

TASK 6.6.2 FIELD RECONNAISSANCE

The Chandler/Gilbert, Phase 1 watershed is not a riverine environment. The area consists of agricultural fields and urban development. The floodplain within the watershed 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, tailwater ditches or within street sections in the urban areas.

Roughness values used for the sub-basin and routing parameters for they hydrologic modeling included n-values of 0.015 for urban areas where flow is routed within street sections, and n-values of 0.035 agricultural areas, which assumes that the fields are fallow with no large crop plants. This assumption was made to represent conditions in the winter months, when typically larger storm events take place. The original Gilbert / Chandler FIS used an n-value of 0.075 for agricultural areas which assumed large amounts of vegetation. Figure E.1.1 is an aerial photograph showing the typical watershed characteristics.

Figure E.1.1 Typical Watershed Characteristics



Chandler / Gilbert FDS, Phase 1, Eastern Canal Watershed
FCD# 2002C023
David Evans & Associates, Inc.

Roughness values for areas of conveyance were estimated for the hydraulic modeling of the floodplain. In a natural riverine system, the roughness coefficient, n, varies depending on bed material, vegetation type and size, depth of flow, channel meandering and flow velocity. The USGS published reference, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County (April, 1991)* presents an equation to determine adjusted roughness coefficients to account for surface irregularities, corrections for obstructions and vegetation, channel meandering, and channel shape and size. This equation was used to determine the average n-value for each conveyance reach. The equation states:

$$n = m\,(nb + n1 + n2 + n3 + n4)$$

where:

$n =$	equivalent roughness coefficient
$m =$	correction factor for channel meandering
$n_b =$	base value for straight uniform channel
$n_1 =$	correction for surface irregularities
$n_2 =$	variation in channel shape and size
$n_3 =$	correction for obstructions
$n_4 =$	correction for vegetation

Base n-values were taken from Table 6.1 in *Volume 2, Hydraulics, Drainage Design Manual for Maricopa County, Arizona.*

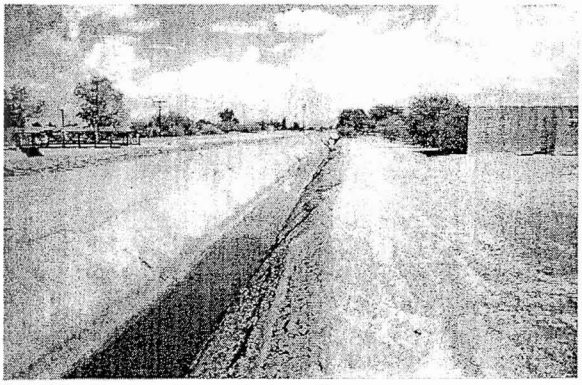
Areas where runoff is conveyed from one ponding to the next downstream ponding area where modeled with HEC-RAS. Roughness coefficients used in the hydraulic modeling include 0.035 for open space and 0.05 for residential. An n-value of 0.05 was used for portions of cross-section where houses are elevated and runoff is conveyed within street sections. In areas of conveyance through agricultural fields, and n-values of 0.035-0.040 were used.

Sections of a tailwater ditch paralleling the Eastern Canal from the US 60 to Pecos Road were modeled with HEC-RAS. An n-value of 0.015 was used for concrete lined sections of the tailwater ditch and an n-value of 0.022 was used for unlined dirt sections. An n-value of 0.035 was used for the overbanks.

The following photos were taken along each conveyance reach showing the typical cross-section characteristics. Figure E.1.2 shows the photo locations with respect to the Eastern Canal. Calculations for n-values at the various locations are located at the back of Appendix E.1.

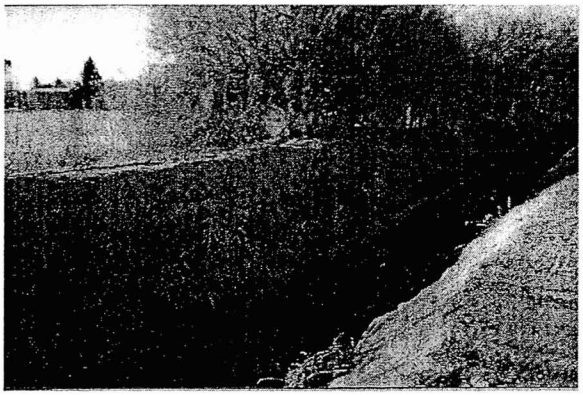
1. Representative photo of conveyance area just south of Elliot at Eastern Canal.

2. Representative photo of conveyance area just north of Warner Road.

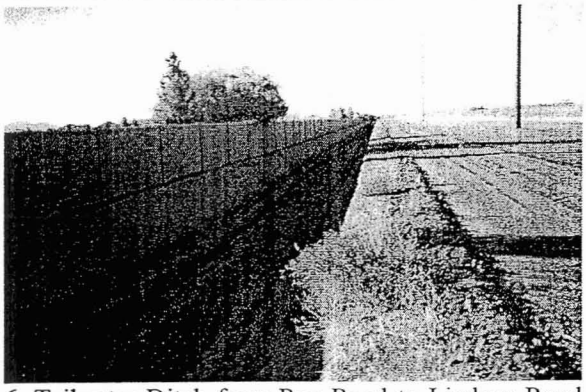


3. Representative photo of conveyance area just north of Crossroads Park.

4. Tailwater Ditch from Union Pacific Rail Road to Ray Road looking north.

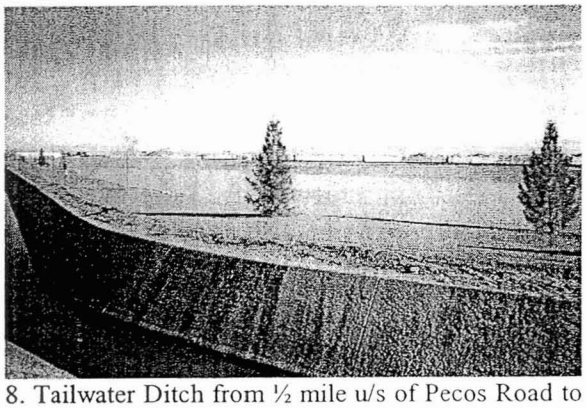


5. Tailwater Ditch from Southern Pacific Rail Road to Ray Road looking southeast.

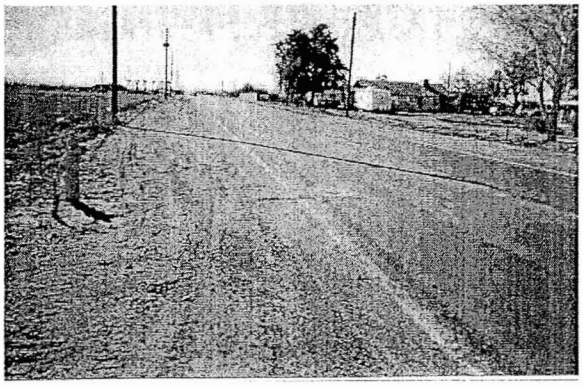


6. Tailwater Ditch from Ray Road to Lindsay Road looking south.

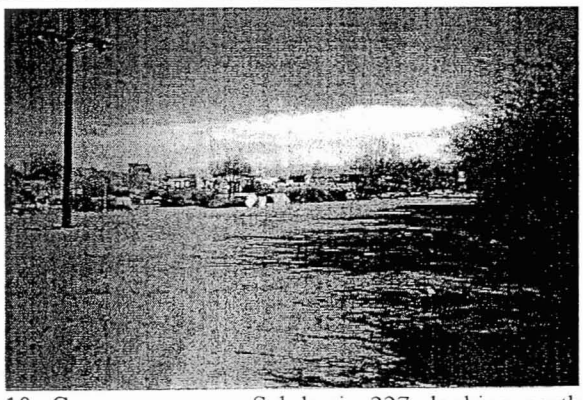
7. Tailwater Ditch from Lindsay Road to Chandler Blvd. (Williams Field Road) looking south.



8. Tailwater Ditch from ½ mile u/s of Pecos Road to Pecos Road looking north.



9. Conveyance area Sub-basin 227, Gilbert Road, looking south.



10. Conveyance area Sub-basin 227, looking north east, just u/s of RWCD storage facility (P230).

11. Conveyance area Sub-basin 238, looking southeast.

Chandler / Gilbert FDS
Phase 1, Eastern Canal Watershed
Manning's N-value Determination

OK

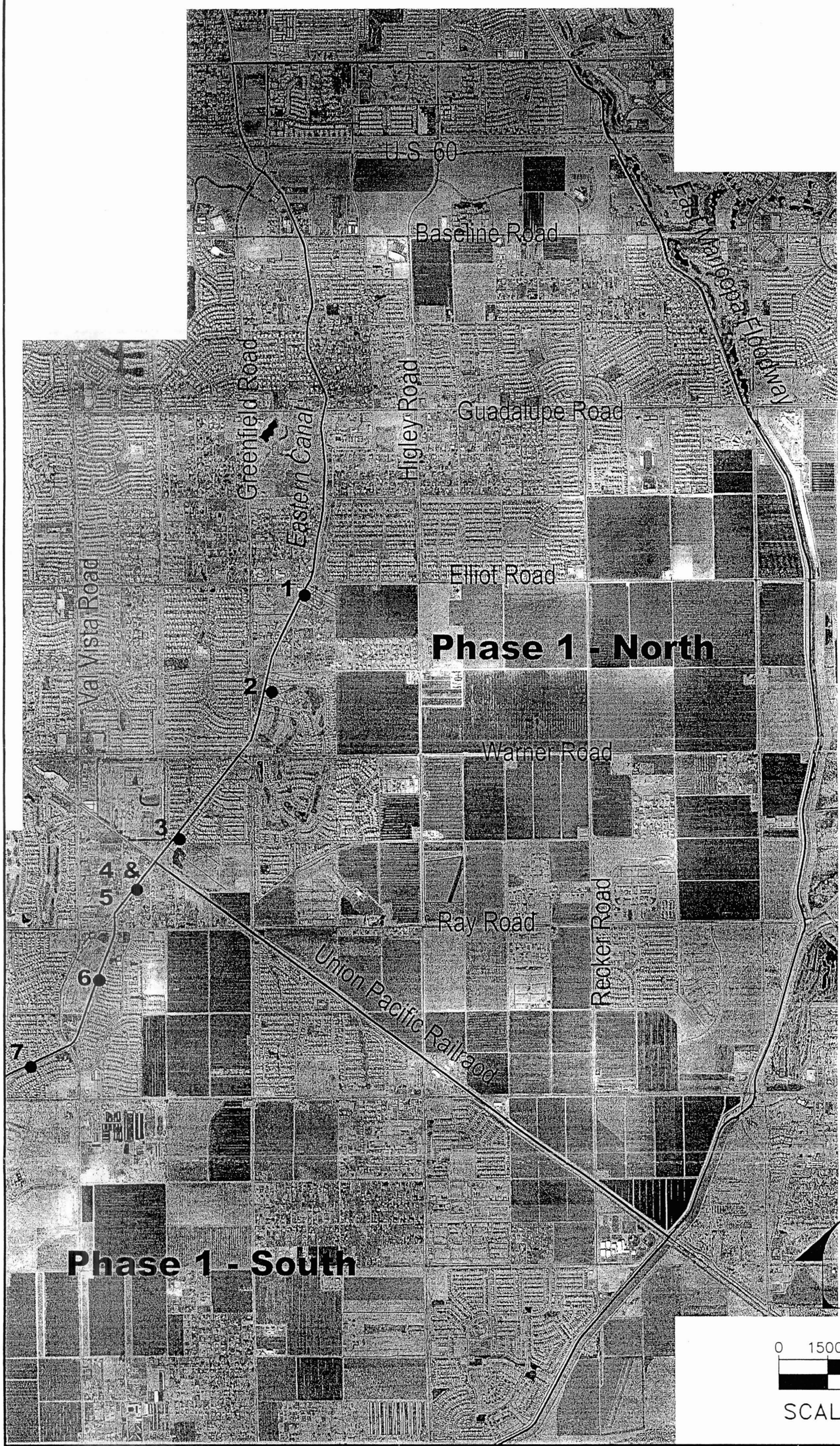
	Location	n_b	n_1	n_2	n_3	n_4	m	n
main channel	1	0.022	0.003	0.000	0.003	0.007	1.000	**0.035**
overbank		0.015	0.005	0.000	0.030	0.000	1.000	**0.050**
main channel	2	0.022	0.003	0.000	0.003	0.007	1.000	**0.035**
overbank		0.015	0.005	0.000	0.030	0.000	1.000	**0.050**
main channel	3	0.022	0.003	0.000	0.003	0.007	1.000	**0.035**
overbank		0.015	0.005	0.000	0.030	0.000	1.000	**0.050**
main channel	4	0.022	0.000	0.000	0.000	0.000	1.000	**0.022**
overbank		0.030	0.003	0.000	0.000	0.002	1.000	**0.035**
main channel	5	0.022	0.000	0.000	0.000	0.000	1.000	**0.022**
overbank		0.030	0.003	0.000	0.000	0.002	1.000	**0.035**
main channel	6	0.015	0.000	0.000	0.000	0.000	1.000	**0.015**
overbank		0.030	0.005	0.000	0.000	0.000	1.000	**0.035**
main channel	7	0.015	0.000	0.000	0.000	0.000	1.000	**0.015**
overbank		0.030	0.005	0.000	0.000	0.000	1.000	**0.035**
main channel	8	0.015	0.000	0.000	0.000	0.000	1.000	**0.015**
overbank		0.030	0.005	0.000	0.000	0.000	1.000	**0.035**
main channel	9	0.025	0.005	0.000	0.000	0.010	1.000	**0.040**
overbank		0.022	0.003	0.000	0.000	0.010	1.000	**0.035**
main channel	10	0.025	0.005	0.000	0.010	0.000	1.000	**0.040**
overbank		0.025	0.005	0.000	0.005	0.000	1.000	**0.035**
main channel	11	0.025	0.005	0.000	0.010	0.000	1.000	**0.040**
overbank		0.025	0.005	0.000	0.005	0.000	1.000	**0.035**

$$\mathbf{n} = m\,(n_b + n_1 + n_2 + n_3 + n_4)$$

where:

- n = equivalent roughness coefficient
- m = correction factor for channel meandering
- n_b = base value for straight uniform channel*
- n_1 = correction for surface irregularities
- n_2 = variation in channel shape and size
- n_3 = correction for obstructions
- n_4 = correction for vegetation

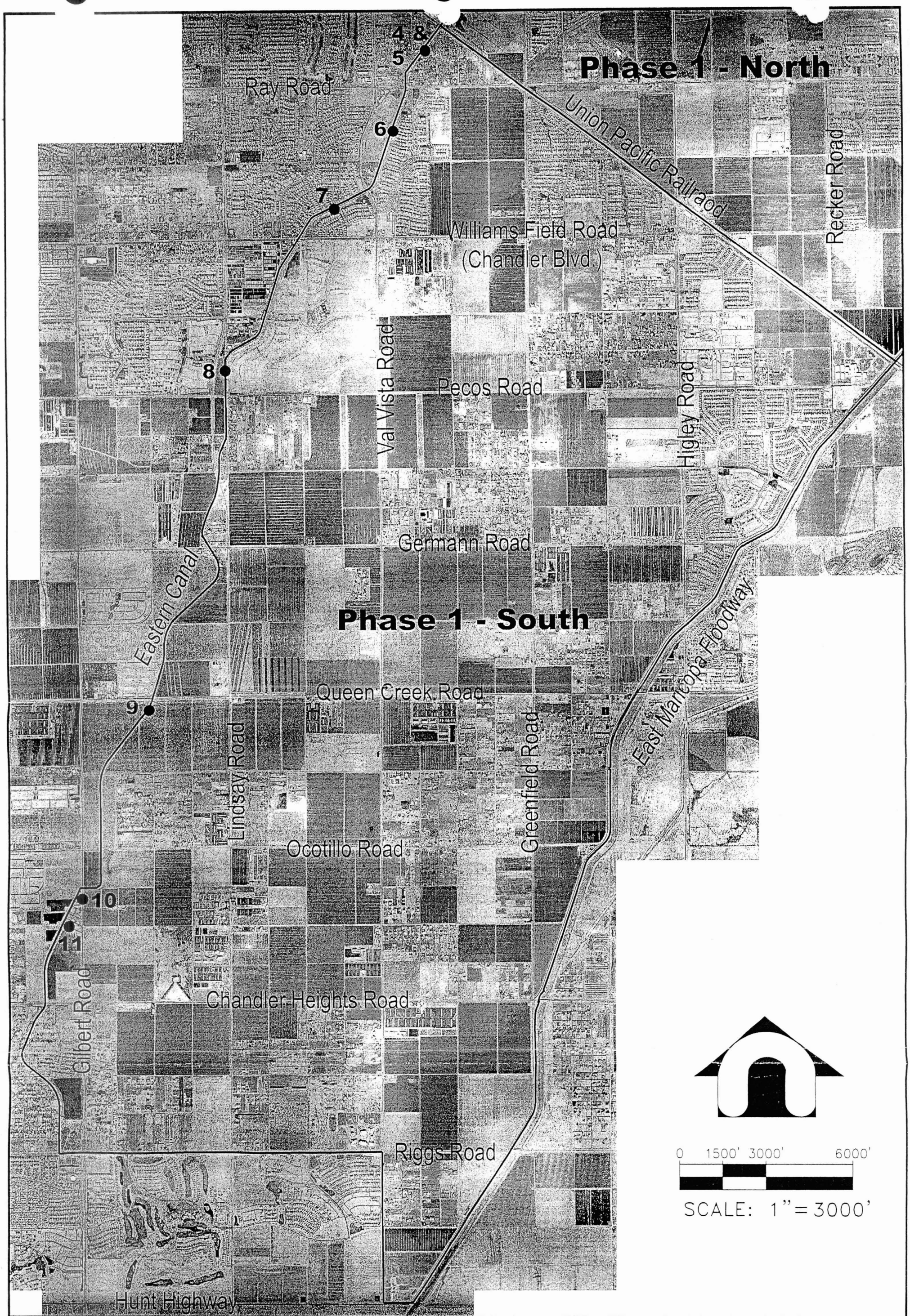
* base n-values, n_b, taken from Table 6.1 of *Volume 2, Drainage Design Manual, Hydraulics, 4/2002*



Chandler / Gilbert Flood Delineation Study - Phase 1, Eastern Canal Watershed

Figure E.1.2 - Manning's N-Value Determination Photo Locations

Sheet 1 of 2

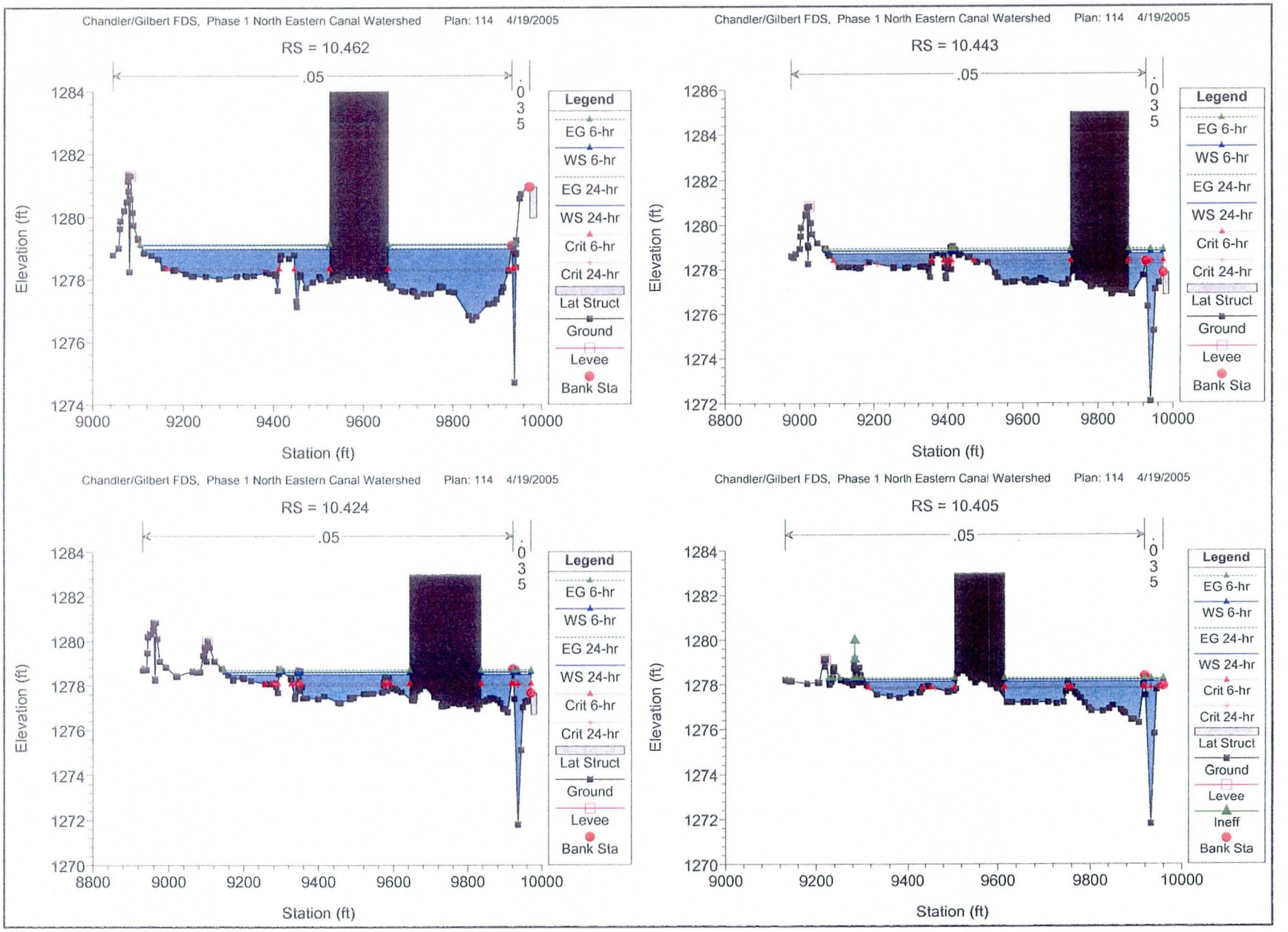


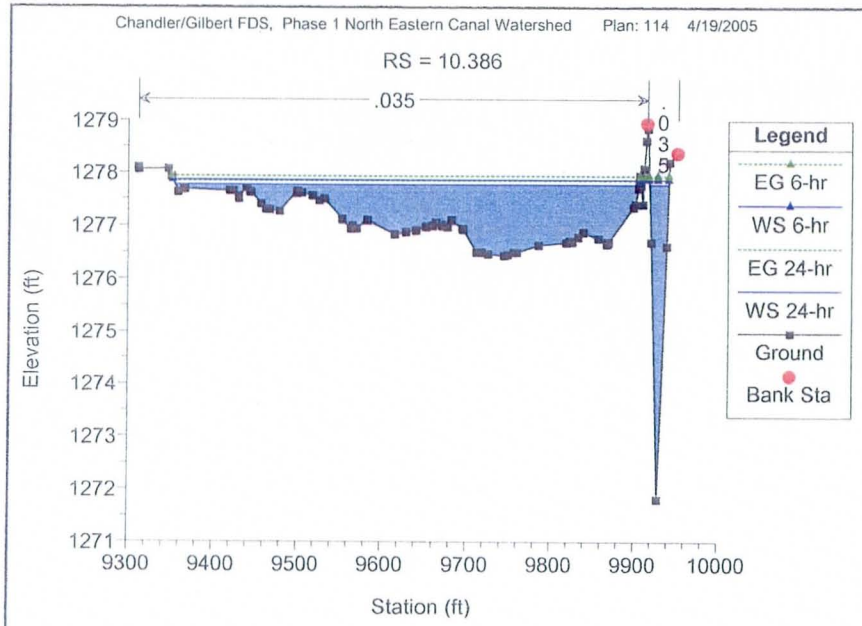
Chandler / Gilbert Flood Delineation Study - Phase 1, Eastern Canal Watershed

Figure E.1.2 - Manning's N-Value Determination Photo Locations

Sheet 2 of 2

ES & EN.2 Cross-section Plots


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 114 4/19/2005
RS = 10.462
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 114 4/19/2005
RS = 10.443
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 114 4/19/2005
RS = 10.424
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 114 4/19/2005
RS = 10.405
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Ineff
Bank Sta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RS = 10.386
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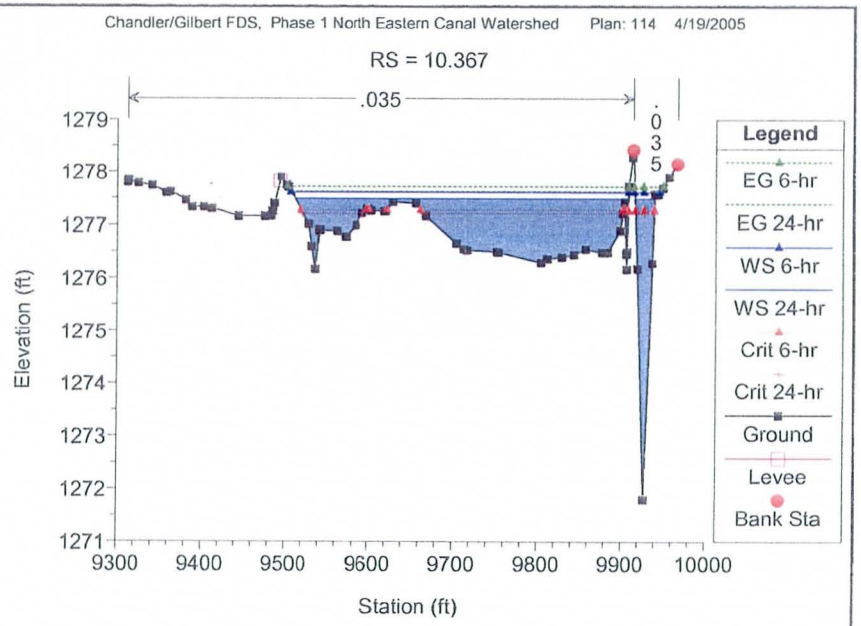
Elevation (ft)
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Ground
Bank Sta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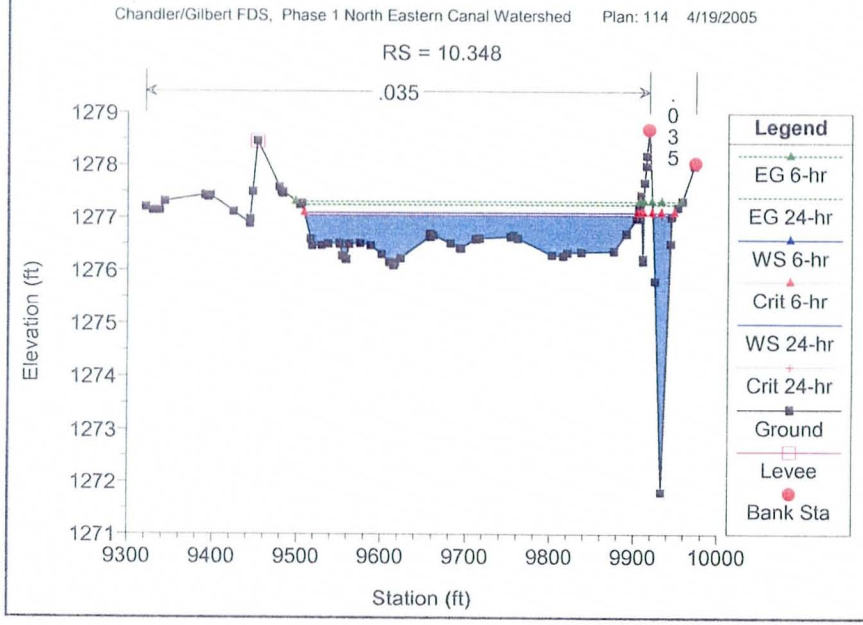
RS = 10.367
.035
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 114 4/19/2005
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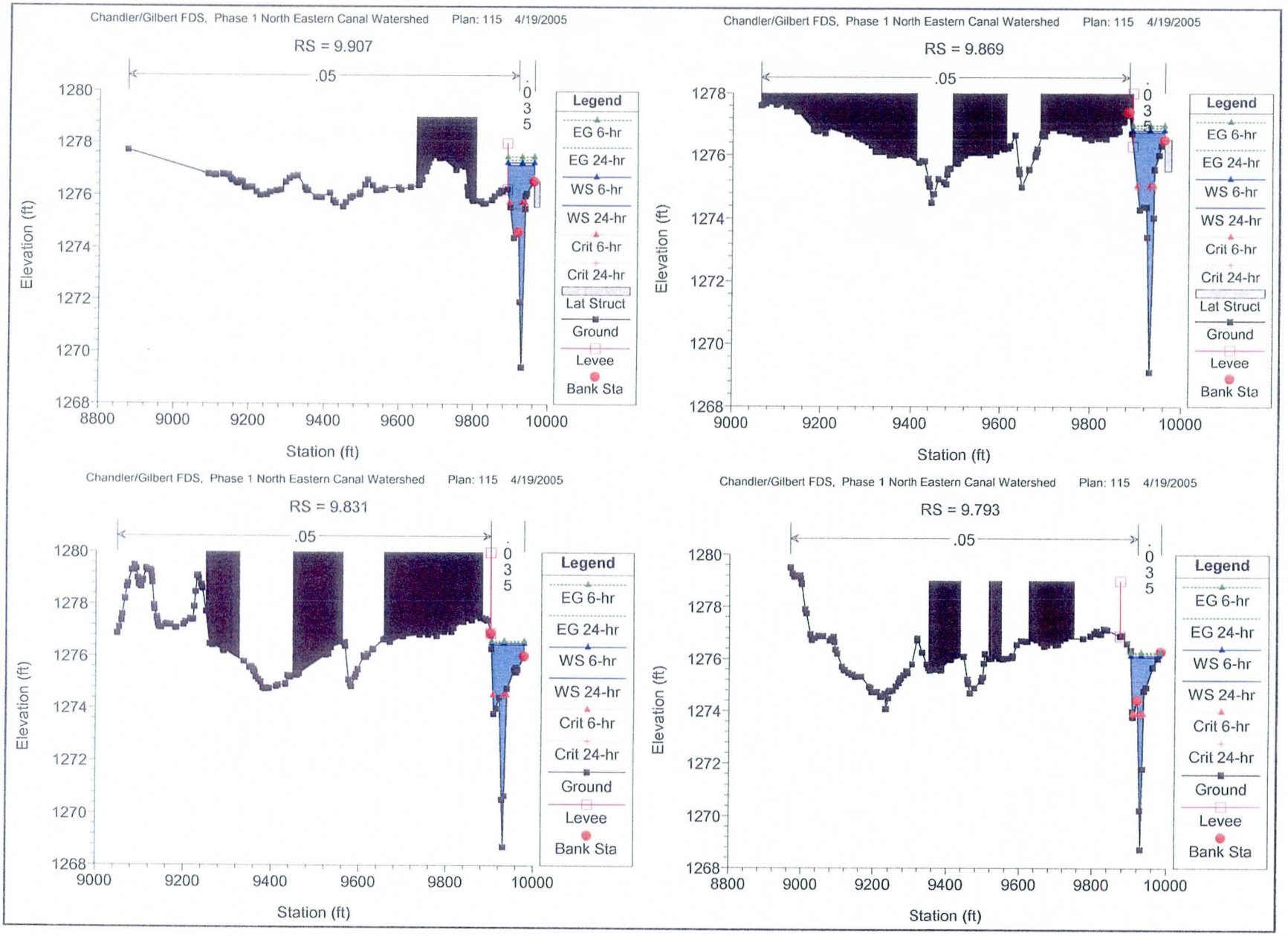
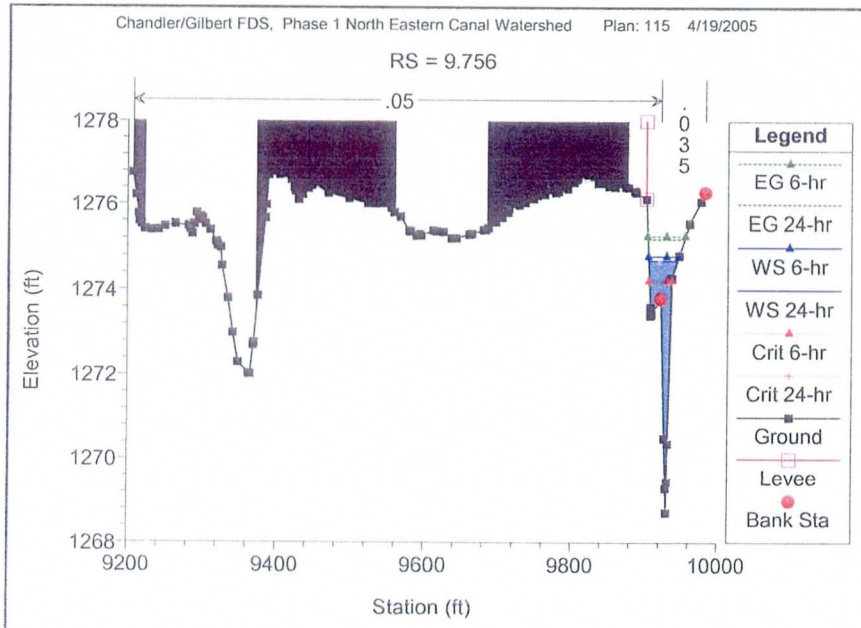
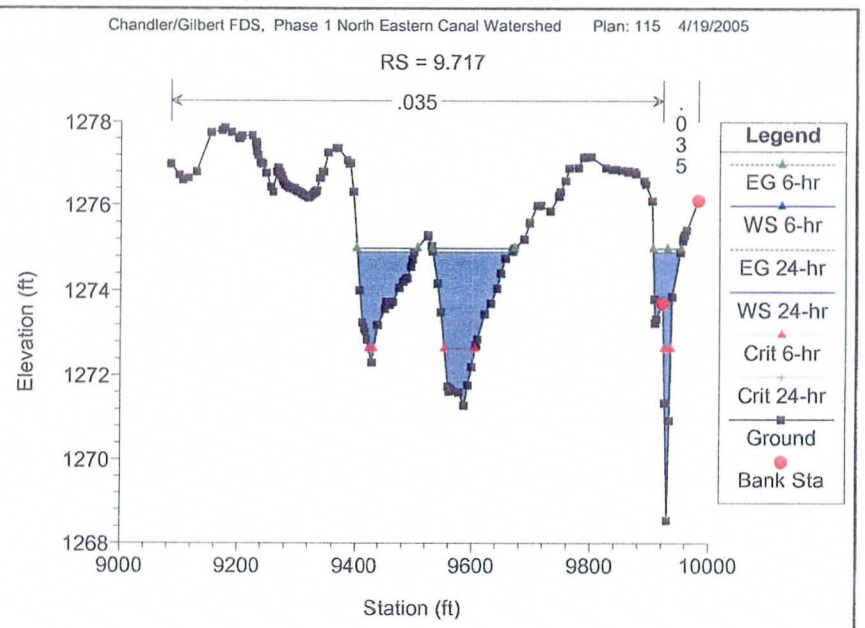
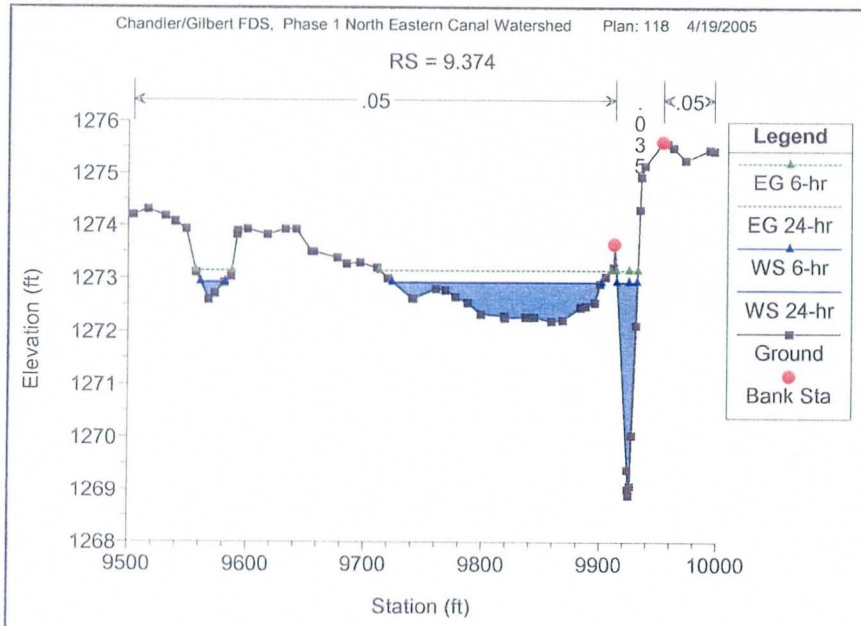
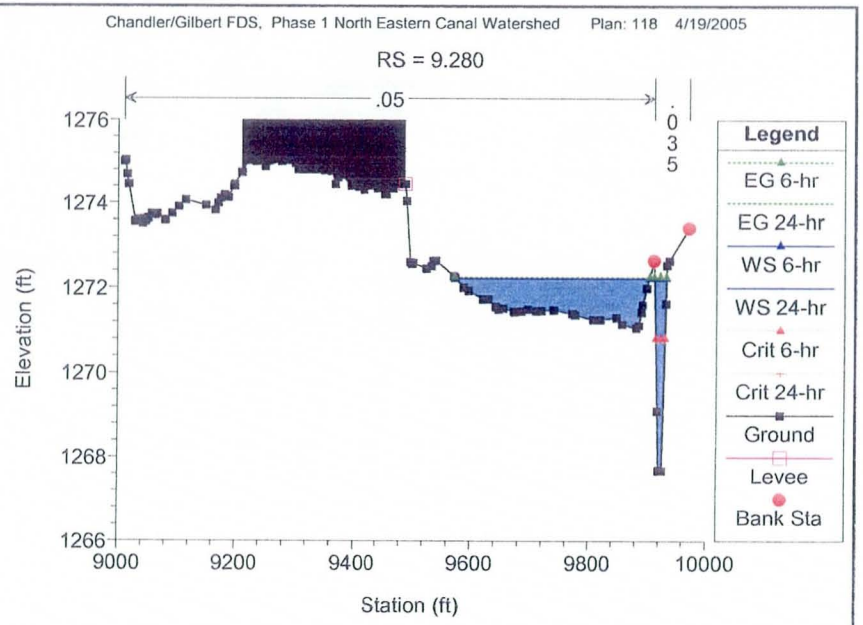
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
Crit 6-hr
WS 24-hr
Crit 24-hr
Ground
Levee
Bank Sta

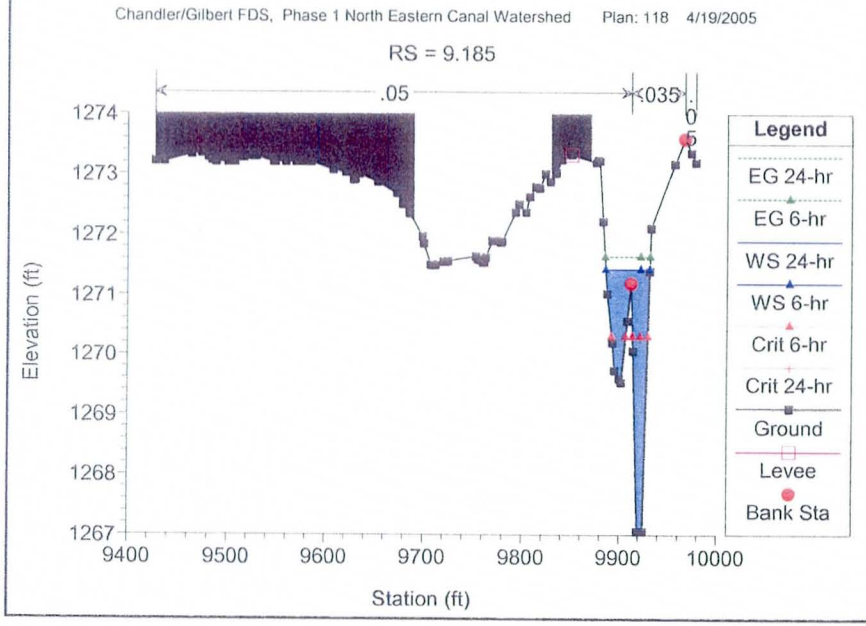

Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.907
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.869
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.831
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta
Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.793
.05
.035
Elevation (ft)
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta

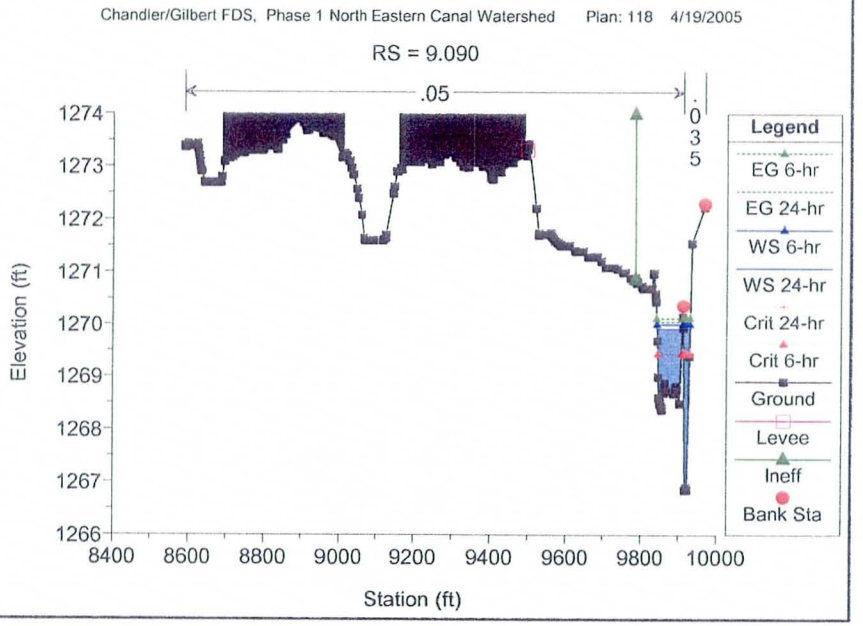

Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.756
.05
.035
Elevation (ft)
1278
1276
1274
1272
1270
1268
9200
9400
9600
9800
10000
Station (ft)
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 115 4/19/2005
RS = 9.717
.035
.035
Elevation (ft)
1278
1276
1274
1272
1270
1268
9000
9200
9400
9600
9800
10000
Station (ft)
Legend
EG 6-hr
WS 6-hr
EG 24-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Bank Sta


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 118 4/19/2005
RS = 9.374
.05
.05
.035
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 118 4/19/2005
RS = 9.280
.05
.035
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 118 4/19/2005
RS = 9.185
.05
.035
.05
Legend
EG 24-hr
EG 6-hr
WS 24-hr
WS 6-hr
Crit 6-hr
Crit 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eastern Canal Watershed Plan: 118 4/19/2005
RS = 9.090
.05
.035
Legend
EG 6-hr
EG 24-hr
WS 6-hr
WS 24-hr
Crit 24-hr
Crit 6-hr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

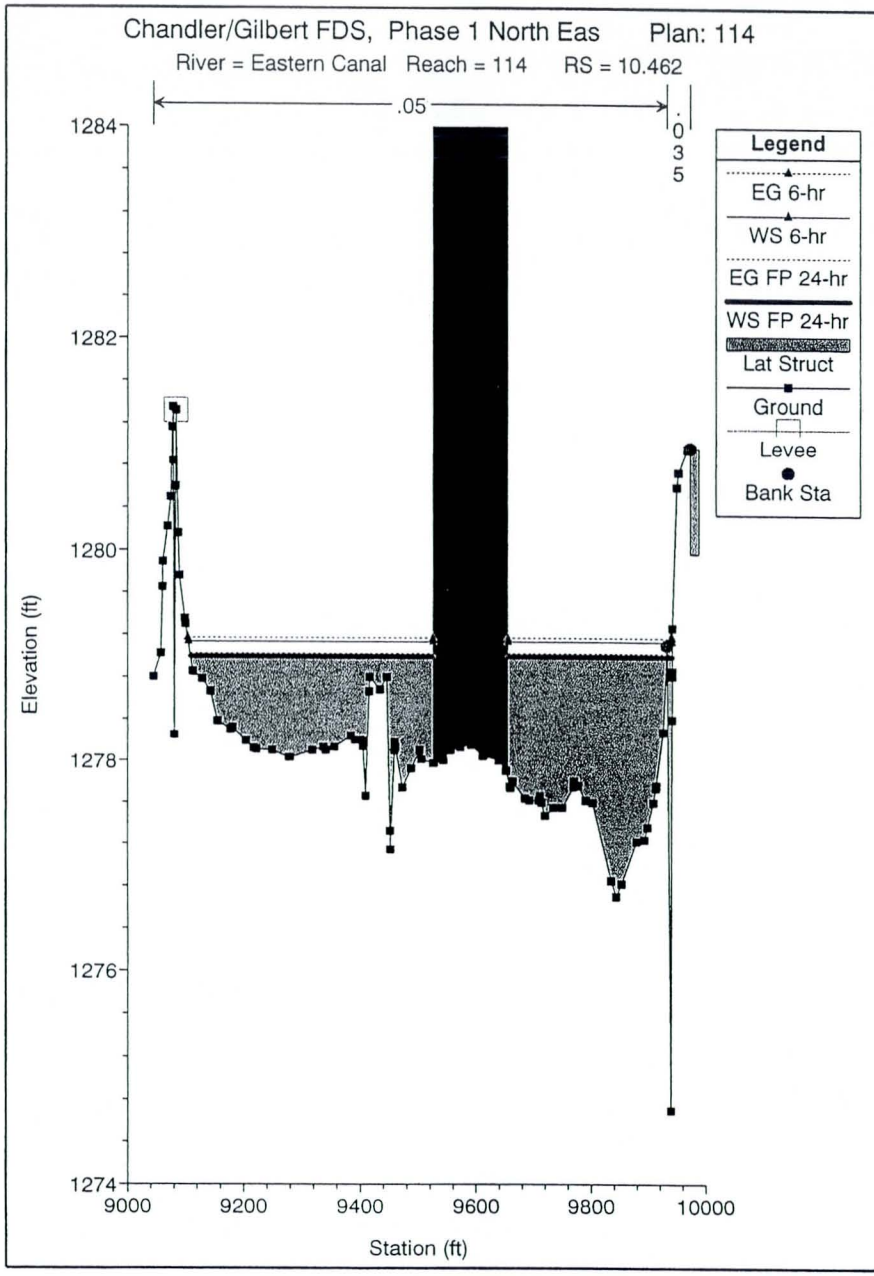
ES & EN.3 Expansion and Contraction Coefficients

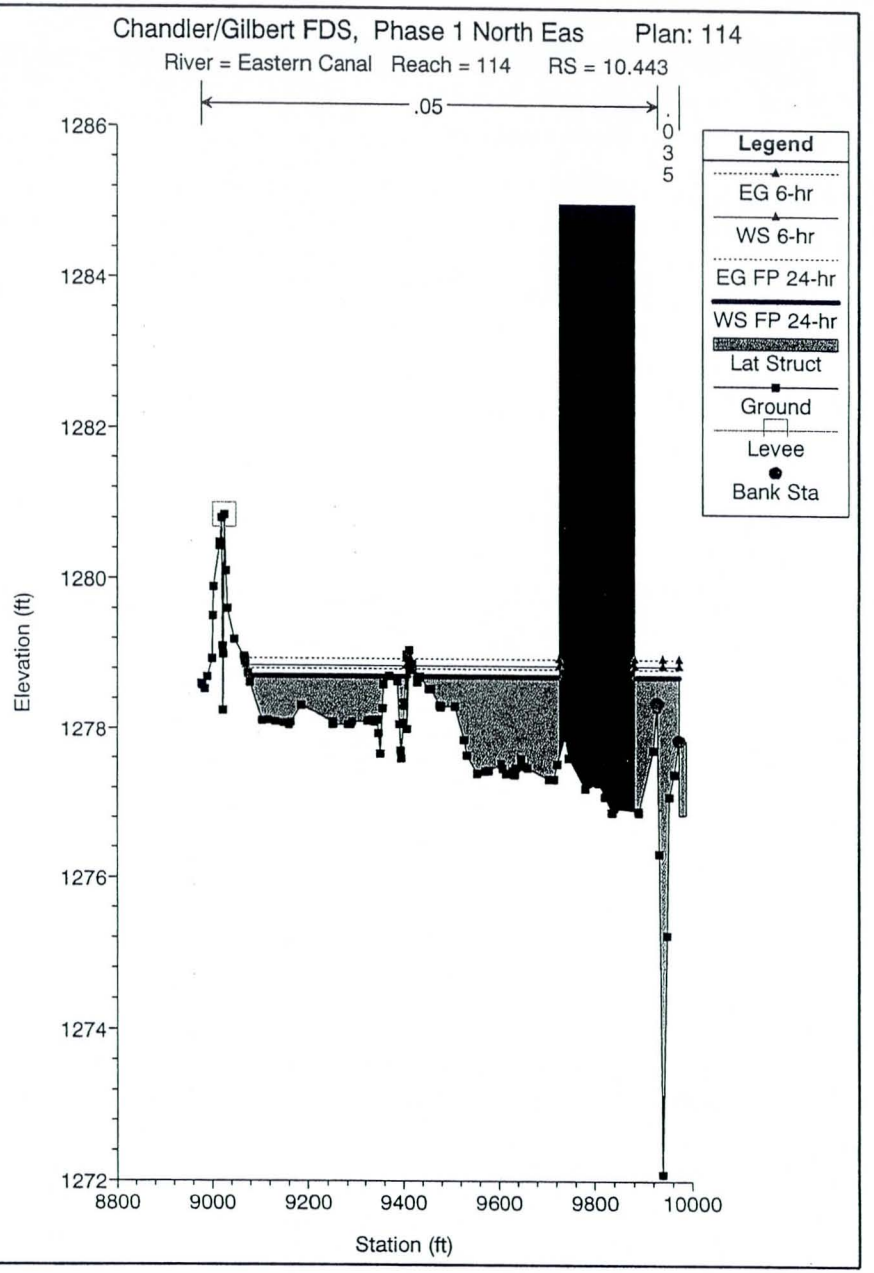
ES & EN.4 Analysis of Structures

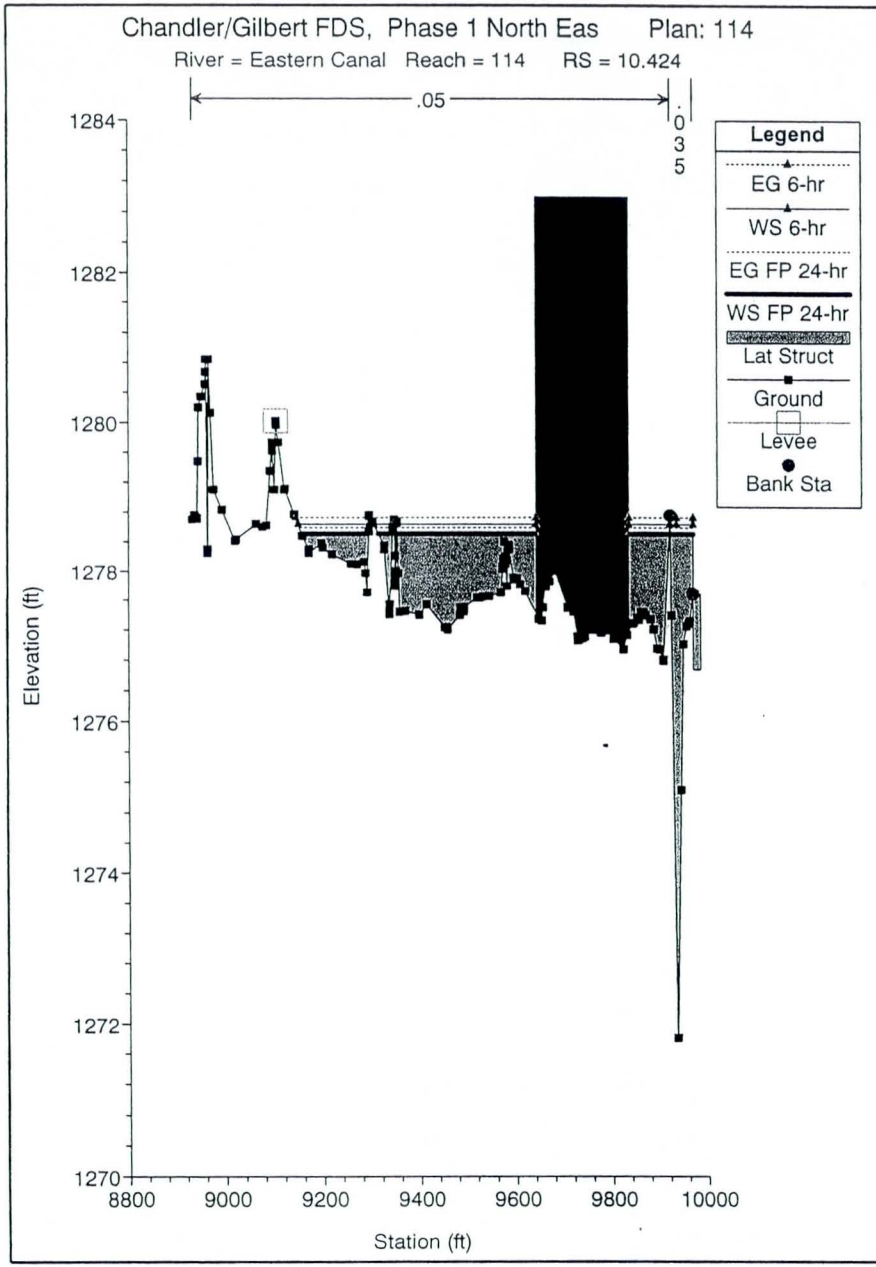
ES & EN.5 Hydraulic Calculations

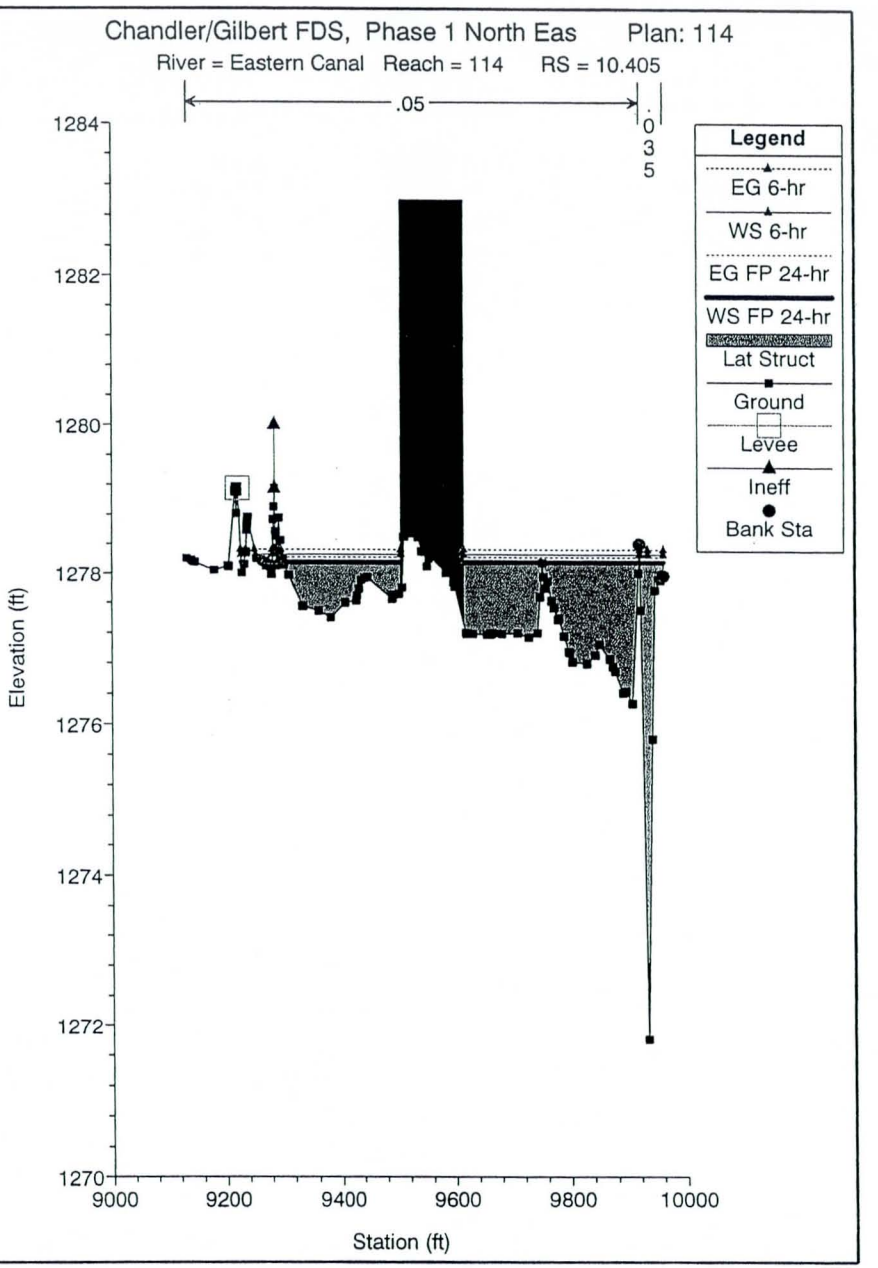
HEC-RAS Plan: 114 River: Eastern Canal Reach: 114

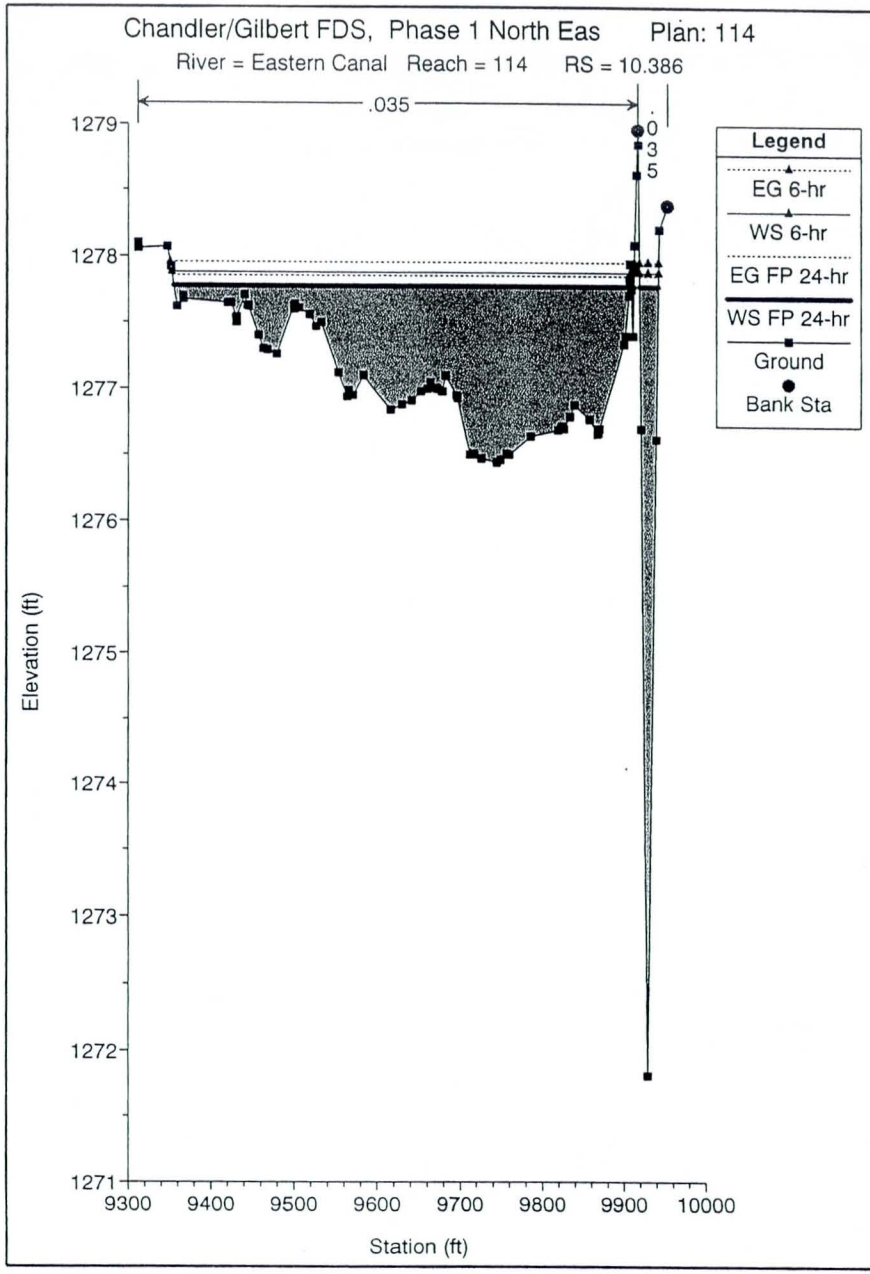
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
114	10.462	24-hr	1065.00	1274.70	1278.99	1278.29	1279.03	0.001731	2.36	763.08	702.62	0.28
114	10.462	6-hr	1294.00	1274.70	1279.13	1278.36	1279.17	0.001770	2.45	861.40	707.69	0.29
114	10.45		Lat Struct									
114	10.443	24-hr	1045.20	1272.09	1278.71	1278.25	1278.80	0.002120	3.58	632.04	724.21	0.39
114	10.443	6-hr	1265.31	1272.09	1278.85	1278.40	1278.94	0.002142	3.71	733.53	738.44	0.39
114	10.43		Lat Struct									
114	10.424	24-hr	892.02	1271.81	1278.51	1278.02	1278.59	0.001768	3.22	549.02	594.54	0.35
114	10.424	6-hr	1074.59	1271.81	1278.64	1278.12	1278.72	0.001865	3.40	626.98	616.85	0.36
114	10.41		Lat Struct									
114	10.405	24-hr	790.52	1271.81	1278.15	1277.83	1278.22	0.002070	3.06	503.63	565.53	0.37
114	10.405	6-hr	938.13	1271.81	1278.26	1277.88	1278.33	0.002163	3.21	561.54	588.92	0.38
114	10.39		Lat Struct									
114	10.386	24-hr	788.91	1271.81	1277.78		1277.86	0.001803	3.46	456.00	577.37	0.35
114	10.386	6-hr	933.34	1271.81	1277.88		1277.96	0.001779	3.47	515.93	581.90	0.35
114	10.367	24-hr	788.91	1271.80	1277.50	1277.22	1277.63	0.002807	4.19	350.54	420.99	0.44
114	10.367	6-hr	933.34	1271.80	1277.63	1277.30	1277.73	0.002866	3.71	405.14	433.10	0.43
114	10.348	24-hr	788.91	1271.81	1277.06	1277.06	1277.26	0.004925	5.12	291.68	422.19	0.57
114	10.348	6-hr	933.34	1271.81	1277.11	1277.11	1277.33	0.005830	5.35	314.36	426.14	0.62

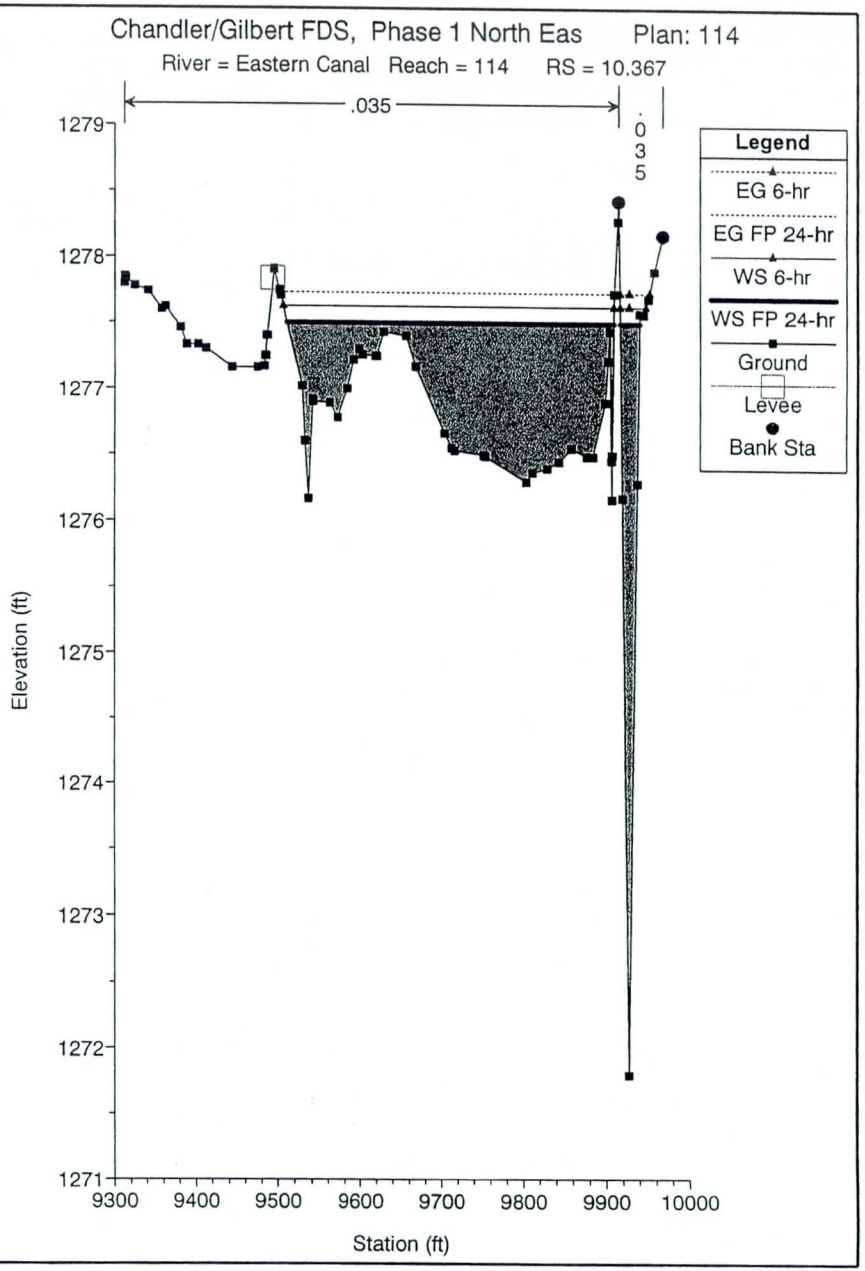

Chandler/Gilbert FDS, Phase 1 North Eas Plan: 114
River = Eastern Canal Reach = 114 RS = 10.462
.05
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
1284
1282
1280
1278
1276
1274
9000
9200
9400
9600
9800
10000
Station (ft)

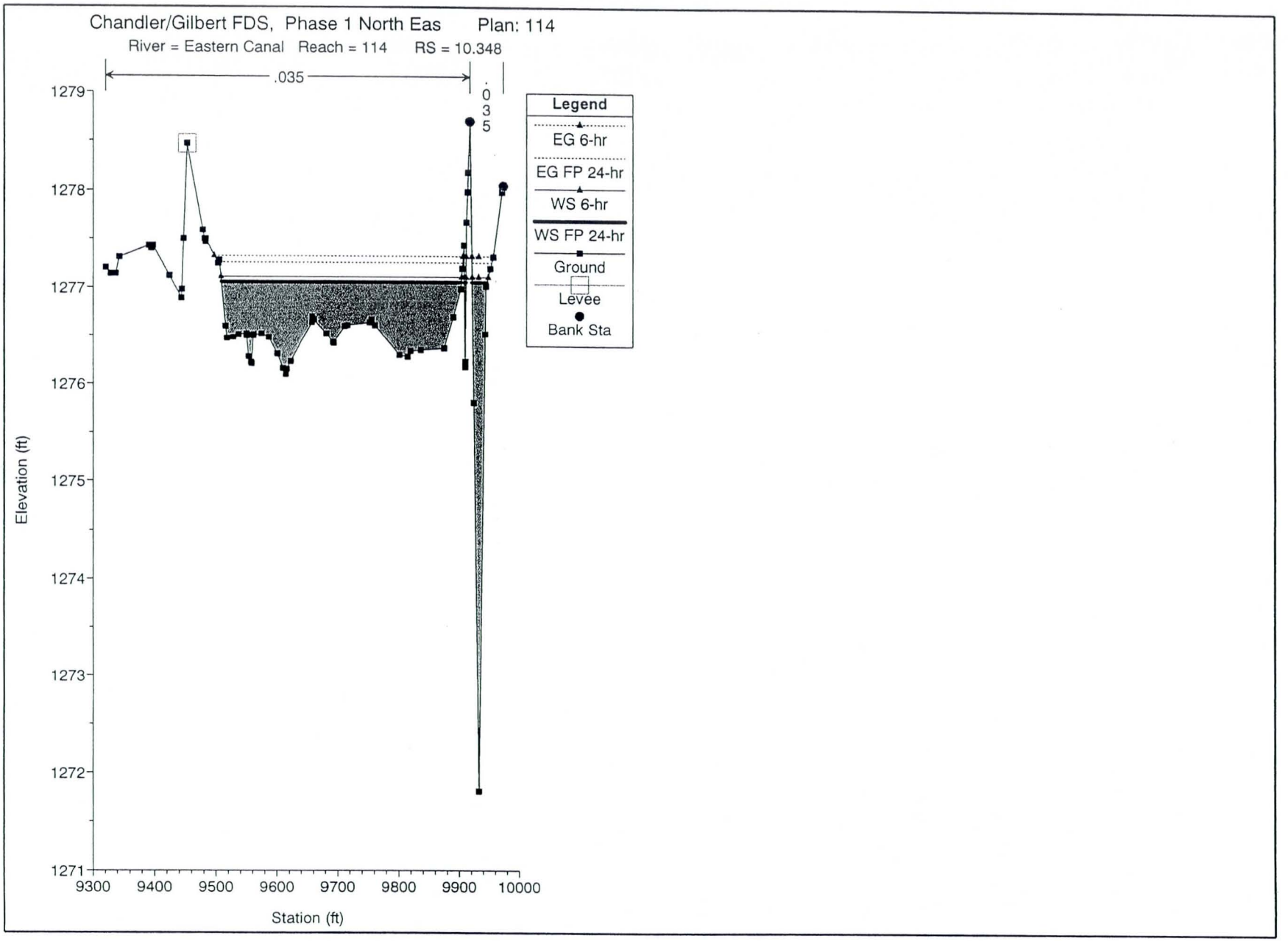

Chandler/Gilbert FDS, Phase 1 North Eas Plan: 114
River = Eastern Canal Reach = 114 RS = 10.443
.05
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
1286
1284
1282
1280
1278
1276
1274
1272
8800
9000
9200
9400
9600
9800
10000
Station (ft)

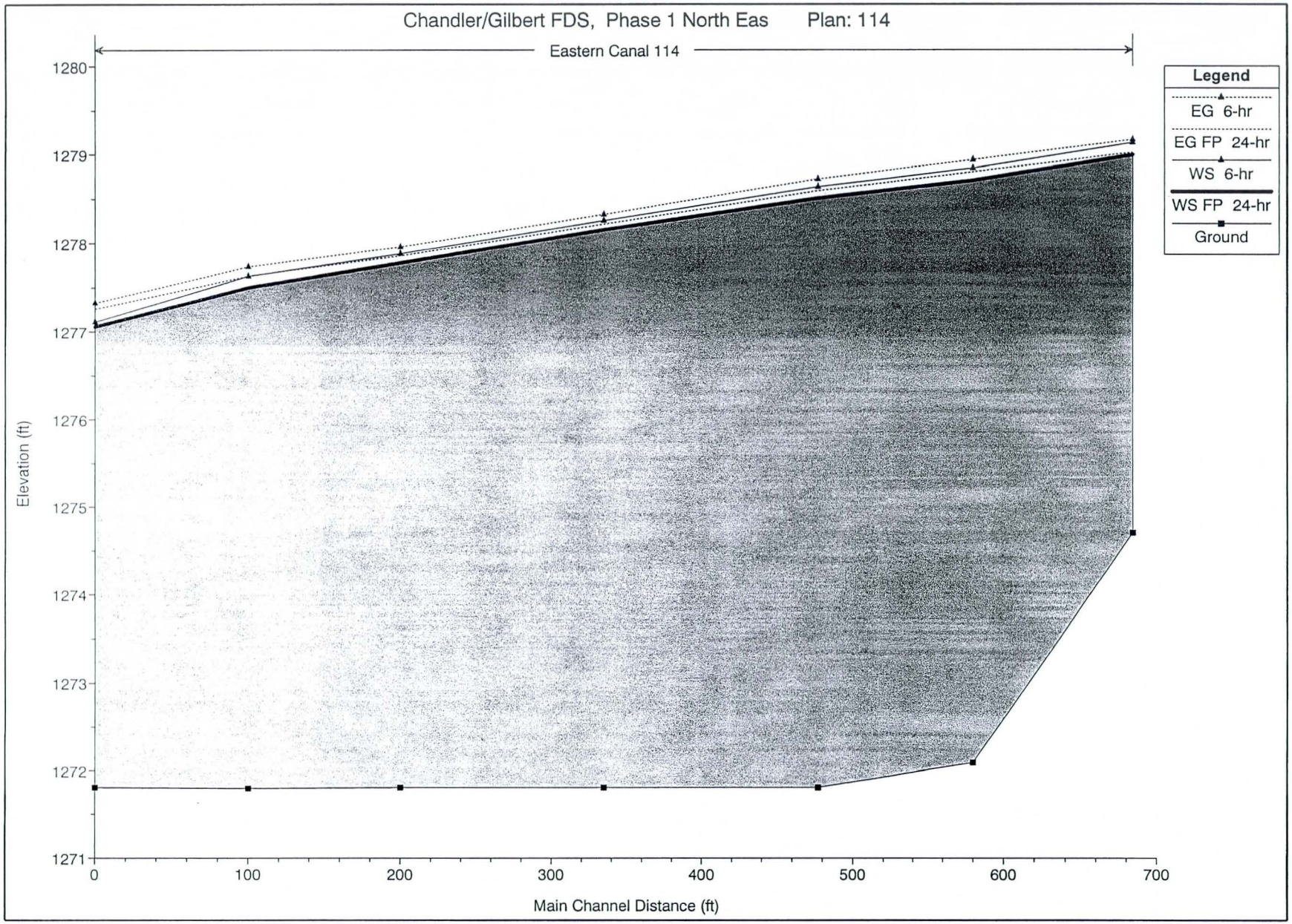

Chandler/Gilbert FDS, Phase 1 North Eas Plan: 114
River = Eastern Canal Reach = 114 RS = 10.424
.05
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
1284
1282
1280
1278
1276
1274
1272
1270
8800
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 114
River = Eastern Canal Reach = 114 RS = 10.405
.05
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
1284
1282
1280
1278
1276
1274
1272
1270
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 114
River = Eastern Canal Reach = 114 RS = 10.386
.035
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Ground
Bank Sta
Elevation (ft)
1279
1278
1277
1276
1275
1274
1273
1272
1271
9300
9400
9500
9600
9700
9800
9900
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 114
River = Eastern Canal Reach = 114 RS = 10.367
.035
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1279
1278
1277
1276
1275
1274
1273
1272
1271
9300
9400
9500
9600
9700
9800
9900
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 114
River = Eastern Canal Reach = 114 RS = 10.348
.035
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1279
1278
1277
1276
1275
1274
1273
1272
1271
9300
9400
9500
9600
9700
9800
9900
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 114
Eastern Canal 114
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Elevation (ft)
1280
1279
1278
1277
1276
1275
1274
1273
1272
1271
0
100
200
300
400
500
600
700
Main Channel Distance (ft)

```
                    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 1 North Eas
Project File : CGFDP1N.prj
Run Date and Time: 10/31/2007 2:36:01 PM

Project in English units

Project Description:
3 conveyance analyses for Chandler/Gilbert FDS Phase 1 North included in this HEC-RAS model.
Analyses were conducted by Project Engineering Consultants, Ltd.
Models updated on 10/31/2007.

Clear conveyances exist between Pond 111 and Pond 114, between Pond 114 and Pond 115, and between Pond 115 and Pond 118. Exact pond locations can be found in the accompanying HEC-1 models and work maps.
Geometry data was obtained from the DEA. Cross sections were cut from the surfaces using Autodest Land Desktop 2004, and imported to this project as HEC-2 input data files. Levees, ineffective areas, blocked obstructions and lateral structure were designated according to local situation.
Steady flow data was obtained from the HEC-1 models simulating 100-year 6-hour and 24-hour rainfall storm events. Flow rates used in analyses are the rates contributing to thedownstream conveyances. Water loss from the upstream ponding areas to the Eastern Canal was not a part of the in-flow rates for conveyance analyses.
Plan 114 uses 111EAS (HEC-1 models) as infow rate.
Plan 115 uses 114EAS (HEC-1 models) as inflow rate.
Plan 118 uses 115EAS (HEC-1 models) as inflow rate.
Downstream ponding elevations were considered as the downstream boundary conditions.
Plan 114 uses elevation of P114 (HEC-1 models) as downstream boundary condition.
Plan 115 uses elevation of P115 (HEC-1 models) as downstream boundary condition.
Plan 118 uses elevation of P118 (HEC-1 models) as downstream boundary condition.
Putting the modeled water loss from the lateral structures into HEC-1 models affected the downstream ponding elevations. Performed this iteration several times until the results converged. Models shown in this project are the final "converged" models.

******* Autodesk, Inc. HEC-2 Input Data file ********

********** Minimum Data Input **********

****

****

PLAN DATA

Plan Title: 114
Plan File : c:\Projects\chandlergilbert\phaselras\CGFDP1N.p02

Geometry Title: 114geom
Geometry File : c:\Projects\chandlergilbert\phaselras\CGFDP1N.g01

Flow Title : 114flow
Flow File : c:\Projects\chandlergilbert\phaselras\CGFDP1N.f02

Plan Description:
This plan uses 114geom (CGFDP1N.g01) as geometric data and 114flow (CGFDP1N.f02) as steady flow data. This plan saved as 114 (CGFDP1N.p03). The flow data are obtained from the HEC-1 models. Peak flows at 111EAS are used.

Plan Summary Information:

```
Number of:  Cross Sections =    7    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    4

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: 114flow
Flow File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.f02

Flow Data (cfs)
***********************************************************************
* River           Reach           RS      *           24-hr           6-hr *
* Eastern Canal   114             10.462  *            1065           1294 *
***********************************************************************

Boundary Conditions
*****************************************************************************************************
* River           Reach           Profile          *           Upstream                  Downstream    *
*****************************************************************************************************
* Eastern Canal   114             24-hr            *                                 Known WS = 1277.04 *
* Eastern Canal   114             6-hr             *                                  Known WS = 1277.1 *
*****************************************************************************************************


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

GEOMETRY DATA

Geometry Title: 114geom
Geometry File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.g01

CROSS SECTION


RIVER: Eastern Canal
REACH: 114                RS: 10.462

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9044.24  1278.8 9057.18 1279.02 9059.81 1279.65 9060.69 1279.89  9068.8 1280.22
 9074.55  1280.5 9077.28 1281.16 9077.98 1281.35 9078.55 1280.84  9080.4 1278.25
 9082.53  1280.6 9082.99 1281.32 9087.15 1280.16 9089.14 1279.76 9098.61 1279.35
 9099.98  1279.3 9112.51 1278.85 9128.59 1278.78 9143.29 1278.66  9155.2 1278.38
 9177.26  1278.3 9180.64 1278.32 9204.02 1278.19 9217.55 1278.12 9221.89 1278.11
 9249.03  1278.1 9278.48 1278.03 9279.51 1278.03 9318.03  1278.1 9337.26 1278.13
 9341.18  1278.1 9355.74 1278.13 9356.13 1278.13 9383.93 1278.24 9391.59  1278.2
 9400.33  1278.2 9404.13 1278.19 9404.49 1278.14 9409.38 1277.66 9416.01 1278.66
 9416.63  1278.8 9434.53 1278.68 9445.99  1278.8 9451.55 1277.32  9452.3 1277.14
 9459.02  1278.1  9459.3 1278.18 9460.89 1278.13 9472.58 1277.74 9487.98 1277.92
 9501.98  1278.1 9505.49 1278.01 9525.73 1277.97 9526.36 1277.97 9526.45 1277.97
 9543.18    1278 9555.41  1278.1 9572.89 1278.13 9591.97 1278.15 9612.14 1278.04
 9639.47    1278 9652.67  1277.9 9659.32 1277.75 9659.78 1277.74 9659.99 1277.74
 9664.16  1277.8 9685.22 1277.64 9692.37 1277.62 9708.79 1277.62 9711.35 1277.66
 9714.09  1277.6  9720.2 1277.47 9735.03 1277.55 9750.27 1277.55 9769.69 1277.75
 9770.33  1277.8 9777.91 1277.76 9790.81 1277.62 9802.72  1277.6 9835.07 1276.85
 9843.68  1276.7 9852.99 1276.82 9879.52 1277.22 9892.91 1277.24 9898.68 1277.36
 9909.29  1277.6 9913.25 1277.74 9913.82 1277.76 9925.45 1278.28 9933.07  1279.1
 9939.18  1274.7 9941.91  1278.4 9942.08 1278.81 9942.21 1278.86 9942.36 1279.27
 9950.32  1280.6 9952.93 1280.74 9968.43 1280.96  9971.1 1280.96  9973.5 1280.97

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
 9044.24     .05 9933.07    .035  9973.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9933.07  9973.5           117.66  104.33     100            .1        .3
Left Levee      Station= 9082.99      Elevation= 1281.32
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 9525.24 9655.24    1284

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************************
* E.G. Elev (ft)          * 1279.03  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.03  * Wt. n-Val.              *   0.050  *   0.035  *          *
```

W.S. Elev (ft)	1278.99	Reach Len. (ft)	117.66	104.33	100.00	
Crit W.S. (ft)	1278.29	Flow Area (sq ft)	743.52	19.56		
E.G. Slope (ft/ft)	0.001731	Area (sq ft)	743.52	19.56		
Q Total (cfs)	1065.00	Flow (cfs)	1018.84	46.16		
Top Width (ft)	702.62	Top Width (ft)	693.58	9.04		
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)	1.37	2.36		
Max Chl Dpth (ft)	4.29	Hydr. Depth (ft)	1.07	2.16		
Conv. Total (cfs)	25597.9	Conv. (cfs)	24488.4	1109.5		
Length Wtd. (ft)	114.66	Wetted Per. (ft)	696.27	12.67		
Min Ch El (ft)	1274.70	Shear (lb/sq ft)	0.12	0.17		
Alpha	1.05	Stream Power (lb/ft s)	0.16	0.39		
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	8.34	1.34		
C & E Loss (ft)	0.01	Cum SA (acres)	10.75	0.52		

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1279.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1279.13	Reach Len. (ft)	117.66	104.33	100.00
Crit W.S. (ft)	1278.36	Flow Area (sq ft)	840.56	20.84	
E.G. Slope (ft/ft)	0.001770	Area (sq ft)	840.56	20.84	
Q Total (cfs)	1294.00	Flow (cfs)	1243.03	50.97	
Top Width (ft)	707.69	Top Width (ft)	698.45	9.24	
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	1.48	2.45	
Max Chl Dpth (ft)	4.43	Hydr. Depth (ft)	1.20	2.26	
Conv. Total (cfs)	30760.8	Conv. (cfs)	29549.1	1211.7	
Length Wtd. (ft)	114.95	Wetted Per. (ft)	701.42	13.00	
Min Ch El (ft)	1274.70	Shear (lb/sq ft)	0.13	0.18	
Alpha	1.04	Stream Power (lb/ft s)	0.20	0.43	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	9.62	1.40	
C & E Loss (ft)	0.01	Cum SA (acres)	11.02	0.54	

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9082.99	9295.51	125.25	129.68	187.01	11.76	0.69	0.97
2	LOB	9295.51	9508.03	195.57	178.45	212.94	18.36	0.84	1.10
3	LOB	9508.03	9720.55	146.86	103.93	84.70	13.79	1.26	1.41
4	LOB	9720.55	9933.07	551.16	331.46	211.61	51.75	1.57	1.66
5	Chan	9933.07	9943.18	46.16	19.56	12.67	4.33	2.16	2.36

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9082.99	9295.51	170.08	156.02	190.90	13.14	0.82	1.09
2	LOB	9295.51	9508.03	255.53	208.08	212.94	19.75	0.98	1.23
3	LOB	9508.03	9720.55	176.57	115.43	84.98	13.65	1.40	1.53
4	LOB	9720.55	9933.07	640.85	361.03	212.60	49.53	1.70	1.78
5	Chan	9933.07	9943.18	50.97	20.84	13.00	3.94	2.26	2.45

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

LATERAL STRUCTURE

RIVER: Eastern Canal
REACH: 114 RS: 10.45

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over this lateral weir.
Lateral structure position = Next ot right bank station
Distance from Upstream XS = 0
Deck/Roadway Width = 15
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
0	1280.97	100	1277.85

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Eastern Canal
REACH: 114 RS: 10.443

INPUT
Description:
Station Elevation Data num= 108

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8977.8	1278.6	8979.29	1278.58	8984.26	1278.53	8989.6	1278.69	8999.96	1278.93
9001.79	1279.5	9003.06	1279.89	9015.49	1280.43	9016.08	1280.46	9016.29	1280.48
9020.09	1280.8	9021.95	1279.1	9022.86	1278.25	9023.53	1278.99	9025.21	1280.84
9029.09	1280.1	9031.92	1279.6	9046.76	1279.19	9067.36	1278.96	9068.88	1278.93
9069.28	1278.9	9075.34	1278.74	9079.57	1278.62	9105.43	1278.11	9117.38	1278.12
9132.41	1278.1	9150.68	1278.08	9160.44	1278.05	9164.45	1278.09	9186.67	1278.32
9250.34	1278.1	9250.55	1278.06	9250.58	1278.06	9281.58	1278.06	9288.69	1278.06
9292.37	1278.1	9324.52	1278.11	9324.61	1278.11	9330.34	1278.12	9334.65	1278.13
9338.91	1278.1	9344.98	1278.13	9347.6	1277.94	9351.72	1277.66	9356.31	1278.28
9357.59	1278.6	9369.78	1278.71	9387.17	1278.64	9391.15	1278.07	9393.91	1277.7
9395.02	1277.6	9399.2	1278.09	9401.18	1278.32	9401.62	1278.36	9406.65	1278.99
9407.58	1278	9412.17	1279.05	9417.8	1278.87	9419.34	1278.79	9429.09	1278.63
9434.54	1278.7	9453.49	1278.54	9457.62	1278.54	9475.92	1278.32	9477.07	1278.31
9477.63	1278.3	9478.74	1278.31	9507.49	1278.31	9527.05	1277.85	9533.22	1277.64
9555.02	1277.4	9572.3	1277.43	9578.15	1277.44	9605.43	1277.53	9608.88	1277.47
9615.95	1277.4	9629.88	1277.43	9633.5	1277.39	9635.98	1277.48	9646.84	1277.6
9653.71	1277.5	9659.91	1277.48	9705.22	1277.33	9715.42	1277.33	9721.74	1277.53
9738.88	1277.9	9746.28	1277.61	9781.09	1277.21	9786.49	1277.28	9805.04	1277.3
9805.11	1277.3	9808.76	1277.28	9822.5	1277.1	9835.46	1276.88	9839.43	1276.94
9889.48	1276.9	9890.28	1276.88	9890.39	1276.88	9890.51	1276.88	9920.05	1277.72
9926.64	1278.3	9928.11	1278.36	9931.96	1276.33	9939.5	1272.09	9948.17	1275.24
9952.49	1277.1	9962.63	1277.4	9973.07	1277.85				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8977.8	.05	9928.11	.035	9973.07	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9928.11 9973.07 109.72 102.74 100 .1 .3
Left Levee Station= 9025.21 Elevation= 1280.84
Blocked Obstructions num= 1

Sta L	Sta R	Elev
9726.8	9881.8	1285

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1278.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1278.71	Reach Len. (ft)	109.72	102.74	100.00
Crit W.S. (ft)	1278.25	Flow Area (sq ft)	512.15	119.89	
E.G. Slope (ft/ft)	0.002120	Area (sq ft)	512.15	119.89	
Q Total (cfs)	1045.20	Flow (cfs)	616.05	429.15	
Top Width (ft)	724.21	Top Width (ft)	679.25	44.96	
Vel Total (ft/s)	1.65	Avg. Vel. (ft/s)	1.20	3.58	
Max Chl Dpth (ft)	6.62	Hydr. Depth (ft)	0.75	2.67	
Conv. Total (cfs)	22700.9	Conv. (cfs)	13380.0	9320.8	
Length Wtd. (ft)	106.74	Wetted Per. (ft)	682.81	48.38	
Min Ch El (ft)	1272.09	Shear (lb/sq ft)	0.10	0.33	
Alpha	2.24	Stream Power (lb/ft s)	0.12	1.17	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	6.65	1.17	
C & E Loss (ft)	0.00	Cum SA (acres)	8.89	0.46	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1278.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1278.85	Reach Len. (ft)	109.72	102.74	100.00
Crit W.S. (ft)	1278.40	Flow Area (sq ft)	607.41	126.12	
E.G. Slope (ft/ft)	0.002142	Area (sq ft)	607.41	126.12	
Q Total (cfs)	1265.31	Flow (cfs)	796.80	468.51	
Top Width (ft)	738.44	Top Width (ft)	693.48	44.96	
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)	1.31	3.71	
Max Chl Dpth (ft)	6.76	Hydr. Depth (ft)	0.88	2.81	
Conv. Total (cfs)	27338.1	Conv. (cfs)	17215.6	10122.6	
Length Wtd. (ft)	107.00	Wetted Per. (ft)	697.40	48.52	
Min Ch El (ft)	1272.09	Shear (lb/sq ft)	0.12	0.35	
Alpha	2.08	Stream Power (lb/ft s)	0.15	1.29	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	7.67	1.22	
C & E Loss (ft)	0.00	Cum SA (acres)	9.14	0.48	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9025.21	9250.94	73.59	88.29	174.44	7.04	0.51	0.83
2	LOB	9250.94	9476.66	64.97	88.07	208.99	6.22	0.42	0.74
3	LOB	9476.66	9702.39	331.98	241.68	225.74	31.76	1.07	1.37
4	LOB	9702.39	9928.11	145.50	94.12	73.64	13.92	1.33	1.55
5	Chan	9928.11	9939.35	134.42	38.17	12.83	12.86	3.40	3.52
6	Chan	9939.35	9950.59	233.62	51.82	12.03	22.35	4.61	4.51
7	Chan	9950.59	9961.83	39.81	17.55	11.41	3.81	1.56	2.27
8	Chan	9961.83	9973.07	21.31	12.35	12.11	2.04	1.10	1.73

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9025.21	9250.94	109.69	112.81	179.60	8.67	0.63	0.97
2	LOB	9250.94	9476.66	103.47	117.74	218.15	8.18	0.54	0.88
3	LOB	9476.66	9702.39	410.73	272.95	225.74	32.46	1.21	1.50
4	LOB	9702.39	9928.11	172.91	103.92	73.91	13.67	1.47	1.66
5	Chan	9928.11	9939.35	146.10	39.73	12.83	11.55	3.53	3.68
6	Chan	9939.35	9950.59	249.56	53.38	12.03	19.72	4.75	4.68
7	Chan	9950.59	9961.83	46.64	19.11	11.41	3.69	1.70	2.44
8	Chan	9961.83	9973.07	26.21	13.91	12.25	2.07	1.24	1.88

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

LATERAL STRUCTURE

RIVER: Eastern Canal
REACH: 114 RS: 10.43

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over this lateral weir.
Lateral structure position = Next ot right bank station
Distance from Upstream XS = 0
Deck/Roadway Width = 15
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
0	1277.85	100	1277.69

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Eastern Canal
REACH: 114 RS: 10.424

INPUT
Description:
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8932.73	1278.7	8937.26	1278.76	8939.96	1278.73	8942.15	1278.71	8944.09	1279.48
8945.81	1280.2	8951.15	1280.34	8959.63	1280.51	8960.64	1280.67	8960.98	1280.84
8964.17	1278.3	8964.17	1278.25	8964.18	1278.26	8966.18	1280.84	8970.22	1280.13
8976.58	1279.1	8993.38	1278.83	9020.2	1278.41	9022.83	1278.43	9063.64	1278.64
9076.33	1278.6	9083.97	1278.62	9091.95	1279.35	9096.48	1279.73	9096.79	1279.62
9100.61	1279.1	9100.66	1279.1	9103.89	1280.02	9104.57	1279.97	9109.34	1279.73
9121.44	1279.1	9121.74	1279.11	9121.88	1279.11	9141.42	1278.77	9158.09	1278.48
9171.24	1278.3	9171.45	1278.25	9197.06	1278.38	9200.11	1278.32	9219.35	1278.23
9258.05	1278.1	9267.87	1278.1	9271.01	1278.09	9285.76	1278.13	9287.96	1277.97
9291.9	1277.7	9294.95	1278.54	9295.6	1278.76	9302.34	1278.67	9326.52	1278.35
9327.05	1278.3	9337.51	1277.41	9337.61	1277.43	9338.22	1277.54	9344.2	1278.59
9344.98	1278.6	9347.45	1278.7	9348.81	1278.21	9349.92	1277.88	9350.16	1277.79
9350.63	1278	9352.62	1278.67	9356.3	1277.97	9358.7	1277.44	9370.1	1277.45
9399.11	1277.4	9415.6	1277.54	9452.65	1277.24	9456.48	1277.24	9458.81	1277.21
9484.28	1277.4	9485.04	1277.49	9486.6	1277.46	9491.08	1277.45	9493.16	1277.45
9493.95	1277.5	9520.93	1277.63	9525.5	1277.63	9531.63	1277.64	9545.8	1277.65
9570.17	1277.7	9573.88	1278.03	9574.24	1278.06	9575.31	1278.17	9577.85	1278.4
9579.6	1278.2	9580.34	1278.1	9582.73	1277.79	9586.37	1278.35	9586.51	1278.36
9586.82	1278.3	9587.14	1278.33	9587.88	1278.3	9595.94	1277.91	9599.42	1277.88
9603.6	1277.9	9610.23	1277.81	9620.68	1277.72	9648.98	1277.35	9654.84	1277.33
9657.33	1277.5	9661.77	1277.78	9663.09	1277.78	9670.87	1277.85	9683.02	1278
9709.56	1277.5	9721.5	1277.45	9729.09	1277.12	9729.8	1277.07	9732.95	1277.08
9739.21	1277.1	9743.65	1277.12	9758.23	1277.21	9764.27	1277.21	9778.02	1277.17
9788.68	1277.2	9803.44	1277.09	9824.63	1276.95	9831.8	1277.14	9842.73	1277.29
9845.88	1277.3	9852.87	1277.37	9856.1	1277.34	9860.8	1277.44	9866.56	1277.44

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 9870.81  1277.4 9880.78 1277.35 9887.59 1277.22 9895.19 1276.96 9900.26 1276.95
 9907.57  1276.8 9907.64  1276.8 9907.66  1276.8  9907.7 1276.81 9922.62 1278.76
 9925.06  1277.4  9935.8 1271.81 9944.44 1275.11 9949.19 1277.02 9956.33 1277.26
 9960.96  1277.3 9963.44 1277.33 9970.88 1277.69

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 8932.73     .05 9922.62    .035 9970.88     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9922.62 9970.88           225.31  142.35     100            .1       .3
Left Levee      Station= 9103.89      Elevation= 1280.02
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 9643.73 9835.73    1283

CROSS SECTION OUTPUT  Profile #24-hr
*************************************************************************************************
* E.G. Elev (ft)          * 1278.59  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.08  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1278.51  * Reach Len. (ft)         *  225.31  *  142.35  *  100.00  *
* Crit W.S. (ft)          * 1278.02  * Flow Area (sq ft)       *  424.99  *  124.03  *          *
* E.G. Slope (ft/ft)      *0.001768  * Area (sq ft)            *  424.99  *  124.03  *          *
* Q Total (cfs)           *  892.02  * Flow (cfs)              *  492.95  *  399.08  *          *
* Top Width (ft)          *  594.54  * Top Width (ft)          *  546.73  *   47.81  *          *
* Vel Total (ft/s)        *    1.62  * Avg. Vel. (ft/s)        *    1.16  *    3.22  *          *
* Max Chl Dpth (ft)       *    6.70  * Hydr. Depth (ft)        *    0.78  *    2.59  *          *
* Conv. Total (cfs)       * 21211.7  * Conv. (cfs)             * 11721.9  *  9489.8  *          *
* Length Wtd. (ft)        *  192.82  * Wetted Per. (ft)        *  550.02  *   51.27  *          *
* Min Ch El (ft)          * 1271.81  * Shear (lb/sq ft)        *    0.09  *    0.27  *          *
* Alpha                   *    2.04  * Stream Power (lb/ft s)  *    0.10  *    0.86  *          *
* Frctn Loss (ft)         *    0.37  * Cum Volume (acre-ft)    *    5.46  *    0.88  *          *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *    7.35  *    0.35  *          *
*************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION OUTPUT  Profile #6-hr
*************************************************************************************************
* E.G. Elev (ft)          * 1278.72  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.09  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1278.64  * Reach Len. (ft)         *  225.31  *  142.35  *  100.00  *
* Crit W.S. (ft)          * 1278.12  * Flow Area (sq ft)       *  496.77  *  130.21  *          *
* E.G. Slope (ft/ft)      *0.001865  * Area (sq ft)            *  496.77  *  130.21  *          *
* Q Total (cfs)           * 1074.59  * Flow (cfs)              *  632.44  *  442.15  *          *
* Top Width (ft)          *  616.85  * Top Width (ft)          *  568.81  *   48.04  *          *
* Vel Total (ft/s)        *    1.71  * Avg. Vel. (ft/s)        *    1.27  *    3.40  *          *
* Max Chl Dpth (ft)       *    6.83  * Hydr. Depth (ft)        *    0.87  *    2.71  *          *
* Conv. Total (cfs)       * 24880.7  * Conv. (cfs)             * 14643.4  * 10237.4  *          *
* Length Wtd. (ft)        *  195.29  * Wetted Per. (ft)        *  572.45  *   51.66  *          *
* Min Ch El (ft)          * 1271.81  * Shear (lb/sq ft)        *    0.10  *    0.29  *          *
* Alpha                   *    1.94  * Stream Power (lb/ft s)  *    0.13  *    1.00  *          *
* Frctn Loss (ft)         *    0.39  * Cum Volume (acre-ft)    *    6.28  *    0.92  *          *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *    7.55  *    0.37  *          *
*************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

  Profile #24-hr
*****************************************************************************************************
*          * 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      * 9103.89   * 9376.80   *    50.58 *    75.32 *   195.47 *     5.67 *     0.39 *     0.67 *
* 2        * LOB      * 9376.80   * 9649.71   *   297.81 *   247.64 *   268.16 *    33.39 *     0.93 *     1.20 *
* 3        * LOB      * 9649.71   * 9922.62   *   144.55 *   102.02 *    86.39 *    16.21 *     1.20 *     1.42 *
* 4        * Chan     * 9922.62   * 9934.69   *   107.30 *    35.87 *    13.12 *    12.03 *     3.09 *     2.99 *
* 5        * Chan     * 9934.69   * 9946.75   *   237.34 *    57.52 *    12.99 *    26.61 *     4.77 *     4.13 *
* 6        * Chan     * 9946.75   * 9958.81   *    34.47 *    17.66 *    12.26 *     3.86 *     1.46 *     1.95 *
* 7        * Chan     * 9958.81   * 9970.88   *    19.97 *    12.98 *    12.89 *     2.24 *     1.08 *     1.54 *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

  Profile #6-hr
*****************************************************************************************************
*          * 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      * 9103.89   * 9376.80   *    79.80 *   101.73 *   216.65 *     7.43 *     0.47 *     0.78 *
* 2        * LOB      * 9376.80   * 9649.71   *   378.58 *   282.02 *   268.29 *    35.23 *     1.06 *     1.34 *
* 3        * LOB      * 9649.71   * 9922.62   *   174.06 *   113.03 *    87.51 *    16.20 *     1.32 *     1.54 *
* 4        * Chan     * 9922.62   * 9934.69   *   117.95 *    37.38 *    13.39 *    10.98 *     3.16 *     3.16 *
* 5        * Chan     * 9934.69   * 9946.75   *   258.03 *    59.08 *    12.99 *    24.01 *     4.90 *     4.37 *
* 6        * Chan     * 9946.75   * 9958.81   *    41.26 *    19.21 *    12.26 *     3.84 *     1.59 *     2.15 *
* 7        * Chan     * 9958.81   * 9970.88   *    24.91 *    14.54 *    13.02 *     2.32 *     1.20 *     1.71 *
```

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

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

LATERAL STRUCTURE


RIVER: Eastern Canal
REACH: 114                RS: 10.41

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over
             this lateral weir.
Lateral structure position     = Next ot right bank station
Distance from Upstream XS =       0
Deck/Roadway Width        =      15
Weir Coefficient          =       2
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        2
     Sta    Elev     Sta    Elev
*********************************
       0 1277.69     130 1277.96

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: Eastern Canal
REACH: 114                RS: 10.405

INPUT
Description:
Station Elevation Data    num=     137
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
 9131.89  1278.2 9139.59 1278.18 9142.57 1278.16  9145.8 1278.15 9179.71 1278.04
 9204.02  1278.1 9205.25 1278.09 9215.74  1279.1 9215.87 1279.12  9216.8 1279.17
 9216.97  1279.1 9218.67 1278.81 9220.58 1279.15 9220.66 1279.17 9220.89 1279.15
 9221.06  1279.1 9228.36    1278 9232.09 1278.12  9235.7 1278.29 9236.74 1278.59
 9236.75  1278.6 9236.76  1278.6 9236.78  1278.6 9236.81 1278.61 9236.84 1278.61
 9236.87  1278.6 9236.91 1278.63 9236.96 1278.63 9237.01 1278.64 9237.07 1278.65
 9237.14  1278.7 9237.21 1278.66  9237.3 1278.67 9237.39 1278.68 9237.49 1278.69
  9237.6  1278.7 9237.71  1278.7 9237.84 1278.71 9237.93 1278.72 9238.13 1278.76
 9253.73  1278.2 9262.41 1278.18 9263.56 1278.17 9265.19 1278.16 9267.64 1278.15
 9271.61  1278.1 9278.05 1278.09 9278.29 1278.08 9279.79 1277.98  9282.7 1278.73
 9283.75  1278.9 9285.16 1279.15 9285.83 1278.57  9286.9 1278.51 9288.19 1278.34
  9288.6  1278.1 9288.94 1278.11 9293.26 1278.75 9296.23 1278.45 9298.57 1278.19
  9300.1  1278.2 9302.08 1278.11 9310.32 1277.97 9333.04 1277.55 9360.08 1277.49
 9381.23  1277.4 9408.74  1277.6 9428.01 1277.63 9429.32 1277.69 9432.29 1277.78
 9436.34  1277.9 9441.73 1277.93 9446.54 1277.94 9489.86 1277.65 9490.32 1277.66
 9490.85  1277.7 9491.22 1277.66 9500.65 1277.71 9502.43 1277.72 9507.47  1277.8
 9509.82  1278.5 9509.85  1278.5 9510.11  1278.5 9511.03  1278.5 9535.19 1278.49
 9540.83  1278.3 9546.25 1278.29 9550.55 1278.09 9553.75  1278.2 9555.23 1278.24
 9584.06    1278 9597.11 1277.87 9599.48 1277.81 9619.18  1277.2 9619.82 1277.19
 9620.07  1277.2 9630.97 1277.19 9656.03 1277.18 9660.67  1277.2 9663.17 1277.18
 9665.84  1277.2 9681.06 1277.19  9709.2  1277.2 9727.97 1277.14  9728.4 1277.14
 9743.22  1277.2 9747.78 1277.68 9751.84 1278.14 9753.67 1277.95 9756.93 1277.79
 9758.03  1277.8 9760.68 1277.89  9767.7 1277.63 9771.77 1277.54 9778.77 1277.38
 9779.68  1277.4 9788.69 1277.16 9797.65 1276.95 9798.78 1276.94 9803.22 1276.82
 9828.06  1276.8 9842.05 1276.91 9849.45 1277.05  9867.4 1276.86 9872.38 1276.76
 9876.36  1276.7    9890 1276.42  9895.9 1276.44 9906.43 1276.28 9916.91    1278
 9919.29  1278.4 9921.15 1277.51 9932.78 1271.81 9940.61 1275.81 9944.85 1277.77
 9954.43  1277.9 9959.37 1277.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9131.89     .05 9919.29    .035 9959.37     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9919.29 9959.37           207.24  134.85     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 9131.89 9285.16    1280        F
Left Levee      Station= 9220.58      Elevation= 1279.15
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 9504.89 9614.89    1283

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)          * 1278.22  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    0.06  * Wt. n-Val.             *   0.050 *   0.035 *         *
* W.S. Elev (ft)          * 1278.15  * Reach Len. (ft)        *  207.24 *  134.85 *  100.00 *
* Crit W.S. (ft)          * 1277.83  * Flow Area (sq ft)      *  418.70 *   84.93 *         *
* E.G. Slope (ft/ft)      *0.002070  * Area (sq ft)           *  419.86 *   84.93 *         *
* Q Total (cfs)           *  790.52  * Flow (cfs)             *  530.70 *  259.82 *         *
* Top Width (ft)          *  565.53  * Top Width (ft)         *  525.97 *   39.56 *         *
* Vel Total (ft/s)        *    1.57  * Avg. Vel. (ft/s)       *    1.27 *    3.06 *         *
```

Max Chl Dpth (ft)	6.34	Hydr. Depth (ft)	0.83	2.15			
Conv. Total (cfs)	17374.5	Conv. (cfs)	11664.0	5710.5			
Length Wtd. (ft)	184.36	Wetted Per. (ft)	508.85	42.61			
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.11	0.26			
Alpha	1.69	Stream Power (lb/ft s)	0.13	0.79			
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	3.28	0.54			
C & E Loss (ft)	0.00	Cum SA (acres)	4.57	0.21			

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1278.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1278.26	Reach Len. (ft)	207.24	134.85	100.00
Crit W.S. (ft)	1277.88	Flow Area (sq ft)	472.43	89.11	
E.G. Slope (ft/ft)	0.002163	Area (sq ft)	476.80	89.11	
Q Total (cfs)	938.13	Flow (cfs)	651.97	286.16	
Top Width (ft)	588.92	Top Width (ft)	549.14	39.78	
Vel Total (ft/s)	1.67	Avg. Vel. (ft/s)	1.38	3.21	
Max Chl Dpth (ft)	6.45	Hydr. Depth (ft)	0.92	2.24	
Conv. Total (cfs)	20170.9	Conv. (cfs)	14018.2	6152.8	
Length Wtd. (ft)	186.55	Wetted Per. (ft)	513.82	42.96	
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.12	0.28	
Alpha	1.60	Stream Power (lb/ft s)	0.17	0.90	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	3.76	0.56	
C & E Loss (ft)	0.00	Cum SA (acres)	4.66	0.23	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9220.58	9285.16	0.00	1.15	18.65	0.00	0.06	0.00
2	LOB	9285.16	9496.54	78.32	94.25	196.12	9.91	0.48	0.83
3	LOB	9496.54	9707.91	117.22	92.64	102.59	14.83	0.91	1.27
4	LOB	9707.91	9919.29	335.17	231.81	210.14	42.40	1.10	1.45
5	Chan	9919.29	9929.31	51.28	21.98	10.57	6.49	2.31	2.33
6	Chan	9929.31	9939.33	191.52	49.63	11.22	24.23	4.95	3.86
7	Chan	9939.33	9949.35	15.57	10.77	10.61	1.97	1.07	1.45
8	Chan	9949.35	9959.37	1.45	2.55	10.21	0.18	0.25	0.57

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9220.58	9285.16	0.00	4.37	37.13	0.00	0.12	0.00
2	LOB	9285.16	9496.54	110.27	115.16	200.25	11.75	0.58	0.96
3	LOB	9496.54	9707.91	143.55	103.32	102.80	15.30	1.02	1.39
4	LOB	9707.91	9919.29	398.16	253.95	210.78	42.44	1.21	1.57
5	Chan	9919.29	9929.31	56.95	23.00	10.82	6.07	2.37	2.48
6	Chan	9929.31	9939.33	207.50	50.69	11.22	22.12	5.06	4.09
7	Chan	9939.33	9949.35	19.04	11.82	10.61	2.03	1.18	1.61
8	Chan	9949.35	9959.37	2.68	3.60	10.32	0.29	0.36	0.74

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

LATERAL STRUCTURE

RIVER: Eastern Canal
REACH: 114 RS: 10.39

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over this lateral weir.
Lateral structure position = Right overbank
Distance from Upstream XS = 0
Deck/Roadway Width = 15
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
0	1277.96	99	1278.39

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Eastern Canal
REACH: 114 RS: 10.386

INPUT
Description:
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9311.99	1278.1	9312.28	1278.06	9347.33	1278.07	9351.61	1277.92	9358.97	1277.62
9366.19	1277.7	9366.79	1277.68	9420.06	1277.65	9424.07	1277.65	9430.53	1277.54
9430.78	1277.5	9430.83	1277.54	9439.91	1277.71	9443.67	1277.63	9445.15	1277.62
9457.11	1277.4	9463.03	1277.3	9467.44	1277.29	9479.07	1277.26	9499.58	1277.63
9499.82	1277.6	9500.54	1277.64	9505.58	1277.61	9518.28	1277.56	9526.37	1277.47
9532.3	1277.5	9553.46	1277.12	9563.98	1276.94	9565.77	1276.99	9570.85	1276.95
9583.67	1277.1	9615.75	1276.84	9629.4	1276.88	9640.92	1276.91	9652.31	1276.98
9660.1	1277	9664.04	1277.05	9670.67	1277.01	9672.02	1277	9677.78	1276.98
9682.36	1277.1	9695.43	1276.95	9696.53	1276.93	9712.51	1276.5	9716.24	1276.51
9717.44	1276.5	9726.04	1276.47	9744.59	1276.44	9749.31	1276.46	9756.38	1276.51
9759.83	1276.5	9785.93	1276.64	9819.12	1276.69	9822.65	1276.71	9823.42	1276.72
9826.31	1276.7	9833.37	1276.79	9839.14	1276.88	9857.4	1276.77	9867.45	1276.66
9867.62	1276.7	9868.06	1276.67	9868.3	1276.67	9869.68	1276.7	9899.33	1277.34
9901.5	1277.4	9905.72	1277.71	9906.48	1277.83	9907.4	1277.95	9908.49	1277.76
9910.54	1277.4	9911.88	1277.91	9912.28	1278.09	9914.66	1278.62	9916.33	1278.96
9916.52	1278.852	9920.32	1276.7	9928.71	1271.81	9939.17	1276.62	9942.49	1278.21
9952.52	1278.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9311.99	.035	9916.33	.035	9952.52	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9916.33	9952.52	100	100	100	.1	.3

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1277.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.78	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	386.75	69.25	
E.G. Slope (ft/ft)	0.001803	Area (sq ft)	386.75	69.25	
Q Total (cfs)	788.91	Flow (cfs)	549.57	239.34	
Top Width (ft)	577.37	Top Width (ft)	554.20	23.17	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	1.42	3.46	
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.70	2.99	
Conv. Total (cfs)	18576.9	Conv. (cfs)	12941.0	5635.8	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	554.39	26.09	
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.08	0.30	
Alpha	1.68	Stream Power (lb/ft s)	0.11	1.03	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	1.36	0.30	
C & E Loss (ft)	0.01	Cum SA (acres)	2.00	0.11	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1277.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.88	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	444.27	71.67	
E.G. Slope (ft/ft)	0.001779	Area (sq ft)	444.27	71.67	
Q Total (cfs)	933.34	Flow (cfs)	684.49	248.84	
Top Width (ft)	581.90	Top Width (ft)	558.33	23.57	
Vel Total (ft/s)	1.81	Avg. Vel. (ft/s)	1.54	3.47	
Max Chl Dpth (ft)	6.07	Hydr. Depth (ft)	0.80	3.04	
Conv. Total (cfs)	22128.6	Conv. (cfs)	16228.8	5899.9	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	558.55	26.54	
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.09	0.30	
Alpha	1.51	Stream Power (lb/ft s)	0.14	1.04	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	1.57	0.31	
C & E Loss (ft)	0.00	Cum SA (acres)	2.02	0.13	

Warning: Divided flow computed for this cross-section.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9311.99	9463.08	7.74	16.78	108.01	0.98	0.16	0.46
2	LOB	9463.08	9614.16	82.65	79.45	151.10	10.48	0.53	1.04
3	LOB	9614.16	9765.25	246.44	153.02	151.09	31.24	1.01	1.61
4	LOB	9765.25	9916.33	212.74	137.50	144.19	26.97	0.95	1.55
5	Chan	9916.33	9925.38	32.10	13.93	8.04	4.07	2.00	2.30
6	Chan	9925.38	9934.43	181.66	43.25	10.15	23.03	4.78	4.20
7	Chan	9934.43	9943.47	25.58	12.07	7.90	3.24	1.69	2.12

Warning: Divided flow computed for this cross-section.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9311.99	9463.08	18.36	28.07	110.55	1.97	0.25	0.65
2	LOB	9463.08	9614.16	113.87	95.07	151.10	12.20	0.63	1.20
3	LOB	9614.16	9765.25	296.01	168.65	151.09	31.72	1.12	1.76
4	LOB	9765.25	9916.33	256.25	152.48	145.81	27.46	1.05	1.68
5	Chan	9916.33	9925.38	34.15	14.66	8.25	3.66	2.05	2.33
6	Chan	9925.38	9934.43	187.13	44.19	10.15	20.05	4.88	4.23
7	Chan	9934.43	9943.47	27.57	12.82	8.14	2.95	1.74	2.15

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Eastern Canal
REACH: 114 RS: 10.367

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9312.14	1277.8	9312.88	1277.85	9313.41	1277.84	9324.95	1277.78	9341.14	1277.74
9357.71	1277.6	9362.56	1277.62	9380.95	1277.46	9388.44	1277.33	9402.53	1277.33
9412.08	1277.3	9443.78	1277.16	9475.1	1277.16	9482.96	1277.17	9484.55	1277.25
9486.58	1277.4	9494.83	1277.91	9501.6	1277.75	9503.43	1277.71	9528.25	1277.02
9531.75	1276.6	9535.84	1276.17	9540.83	1276.91	9540.9	1276.92	9541.09	1276.91
9541.58	1276.9	9561.97	1276.89	9572.33	1276.78	9584.56	1277	9592.3	1277.22
9599.09	1277.3	9603.16	1277.26	9618.77	1277.25	9620.36	1277.25	9629.22	1277.43
9656.45	1277.4	9668.36	1277.17	9703.95	1276.66	9712.8	1276.55	9716.77	1276.53
9751.72	1276.5	9753.48	1276.49	9803.84	1276.3	9810.95	1276.37	9811.43	1276.37
9828.7	1276.4	9842.86	1276.45	9857.46	1276.55	9876.79	1276.49	9883.77	1276.49
9898.51	1276.9	9901.36	1277.22	9903.93	1277.44	9905.62	1276.46	9906.3	1276.17
9906.58	1276.5	9908.78	1277.73	9913.31	1278.28	9914.42	1278.43	9918.77	1276.18
9927.11	1271.8	9936.95	1276.29	9940.02	1277.58	9944.05	1277.57	9949.84	1277.69
9957.08	1277.9	9967.42	1278.17						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9312.14	.035	9914.42	.035	9967.42	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9914.42	9967.42	100	100	100	.1	.3

Left Levee Station= 9493.74 Elevation= 1277.84

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1277.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.50	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1277.22	Flow Area (sq ft)	283.85	66.70	
E.G. Slope (ft/ft)	0.002807	Area (sq ft)	283.85	66.70	
Q Total (cfs)	788.91	Flow (cfs)	509.43	279.47	
Top Width (ft)	420.99	Top Width (ft)	397.38	23.61	
Vel Total (ft/s)	2.25	Avg. Vel. (ft/s)	1.79	4.19	
Max Chl Dpth (ft)	5.70	Hydr. Depth (ft)	0.71	2.82	
Conv. Total (cfs)	14889.5	Conv. (cfs)	9614.8	5274.6	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	398.28	26.23	
Min Ch El (ft)	1271.80	Shear (lb/sq ft)	0.12	0.45	
Alpha	1.64	Stream Power (lb/ft s)	0.22	1.87	
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	0.59	0.15	
C & E Loss (ft)	0.01	Cum SA (acres)	0.91	0.06	

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1277.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.63	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1277.30	Flow Area (sq ft)	335.09	70.05	
E.G. Slope (ft/ft)	0.002866	Area (sq ft)	335.09	70.05	
Q Total (cfs)	933.34	Flow (cfs)	673.26	260.07	
Top Width (ft)	433.10	Top Width (ft)	402.22	30.88	
Vel Total (ft/s)	2.30	Avg. Vel. (ft/s)	2.01	3.71	
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)	0.83	2.27	
Conv. Total (cfs)	17434.2	Conv. (cfs)	12576.2	4858.0	
Length Wtd. (ft)	100.00	Wetted Per. (ft)	403.15	33.55	
Min Ch El (ft)	1271.80	Shear (lb/sq ft)	0.15	0.37	
Alpha	1.27	Stream Power (lb/ft s)	0.30	1.39	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.67	0.15	
C & E Loss (ft)	0.01	Cum SA (acres)	0.92	0.07	

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9493.74	9633.97	67.63	54.55	123.10	8.57	0.44	1.24
2	LOB	9633.97	9774.19	156.25	94.99	140.23	19.81	0.68	1.64
3	LOB	9774.19	9914.42	285.56	134.31	134.95	36.20	1.00	2.13
4	Chan	9914.42	9927.67	146.30	34.08	12.91	18.54	2.98	4.29
5	Chan	9927.67	9940.92	133.18	32.62	13.32	16.88	2.68	4.08

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9493.74	9633.97	103.69	70.61	127.71	11.11	0.55	1.47
2	LOB	9633.97	9774.19	213.19	112.96	140.23	22.84	0.81	1.89
3	LOB	9774.19	9914.42	356.39	151.52	135.21	38.18	1.13	2.35
4	Chan	9914.42	9927.67	138.01	35.56	13.19	14.79	3.04	3.88
5	Chan	9927.67	9940.92	122.00	34.24	14.43	13.07	2.58	3.56
6	Chan	9940.92	9954.17	0.06	0.25	5.93	0.01	0.04	0.24

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Eastern Canal
REACH: 114 RS: 10.348

INPUT
Description:
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9320.87	1277.2	9329.24	1277.14	9337.06	1277.14	9343.09	1277.31	9390.94	1277.43
9394.69	1277.4	9397.38	1277.43	9424.26	1277.12	9443.65	1276.89	9444.24	1276.98
9447.09	1277.5	9452.92	1278.47	9478.58	1277.59	9481.24	1277.5	9482.81	1277.47
9483.25	1277.5	9503.14	1277.25	9503.27	1277.25	9504.24	1277.25	9505.73	1277.28
9515.81	1276.6	9517.97	1276.47	9528.66	1276.48	9537.1	1276.51	9550.44	1276.52
9550.72	1276.5	9553.65	1276.28	9557.62	1276.22	9558.85	1276.21	9561.45	1276.51
9561.91	1276.5	9575.06	1276.52	9587.15	1276.48	9600.95	1276.31	9609.93	1276.16
9614.64	1276.1	9614.88	1276.13	9616.07	1276.15	9622.99	1276.23	9657.57	1276.64
9658.07	1276.7	9661.45	1276.67	9681.56	1276.52	9692.25	1276.43	9693.85	1276.42
9711.72	1276.6	9715.89	1276.61	9752.64	1276.64	9755.94	1276.67	9761.28	1276.61
9801.64	1276.3	9815.12	1276.28	9820.02	1276.34	9837.18	1276.35	9875.61	1276.37
9890.75	1276.7	9903.06	1276.99	9905.7	1277.2	9908.27	1277.44	9910.55	1276.18
9910.6	1276.2	9910.69	1276.23	9912.68	1277.68	9914.59	1277.99	9915.31	1278.19
9918.53	1278.7	9924.72	1275.81	9933.05	1271.81	9943.82	1276.52	9944.93	1277.02
9952.33	1277.2	9957.38	1277.32	9971.7	1277.99	9973.87	1278.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9320.87	.035	9918.53	.035	9973.87	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9918.53 9973.87 0 0 0 .1 .3
Left Levee Station= 9452.92 Elevation= 1278.47

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1277.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.06	Reach Len. (ft)			
Crit W.S. (ft)	1277.06	Flow Area (sq ft)	231.45	60.23	
E.G. Slope (ft/ft)	0.004925	Area (sq ft)	231.45	60.23	
Q Total (cfs)	788.91	Flow (cfs)	480.43	308.48	
Top Width (ft)	422.19	Top Width (ft)	397.75	24.44	
Vel Total (ft/s)	2.70	Avg. Vel. (ft/s)	2.08	5.12	
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)	0.58	2.46	
Conv. Total (cfs)	11241.9	Conv. (cfs)	6846.1	4395.8	
Length Wtd. (ft)		Wetted Per. (ft)	398.33	26.72	
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.18	0.69	
Alpha	1.76	Stream Power (lb/ft s)	0.37	3.55	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1277.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1277.11	Reach Len. (ft)			
Crit W.S. (ft)	1277.11	Flow Area (sq ft)	252.76	61.60	
E.G. Slope (ft/ft)	0.005830	Area (sq ft)	252.76	61.60	
Q Total (cfs)	933.34	Flow (cfs)	603.76	329.58	
Top Width (ft)	426.14	Top Width (ft)	399.39	26.75	
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)	2.39	5.35	
Max Chl Dpth (ft)	5.30	Hydr. Depth (ft)	0.63	2.30	
Conv. Total (cfs)	12223.8	Conv. (cfs)	7907.3	4316.5	
Length Wtd. (ft)		Wetted Per. (ft)	400.00	29.05	
Min Ch El (ft)	1271.81	Shear (lb/sq ft)	0.23	0.77	
Alpha	1.57	Stream Power (lb/ft s)	0.55	4.13	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9452.92	9608.12	121.53	58.22	99.15	15.40	0.59	2.09
2	LOB	9608.12	9763.33	169.08	84.91	155.22	21.43	0.55	1.99
3	LOB	9763.33	9918.53	189.82	88.32	143.97	24.06	0.62	2.15
4	Chan	9918.53	9932.37	126.57	25.24	11.43	16.04	2.45	5.01
5	Chan	9932.37	9946.20	181.91	34.98	15.00	23.06	2.53	5.20

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9452.92	9608.12	152.23	63.54	99.94	16.31	0.64	2.40
2	LOB	9608.12	9763.33	215.00	93.21	155.22	23.04	0.60	2.31
3	LOB	9763.33	9918.53	236.53	96.01	144.84	25.34	0.67	2.46
4	Chan	9918.53	9932.37	134.74	25.80	11.56	14.44	2.47	5.22
5	Chan	9932.37	9946.20	194.82	35.72	15.00	20.87	2.58	5.45
6	Chan	9946.20	9960.04	0.02	0.08	2.49	0.00	0.03	0.30

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

SUMMARY OF MANNING'S N VALUES

River:Eastern Canal

Reach	River Sta.	n1	n2	n3
114	10.462	.05	.035	.05
114	10.45	Lat Struct		
114	10.443	.05	.035	.05
114	10.43	Lat Struct		
114	10.424	.05	.035	.05
114	10.41	Lat Struct		
114	10.405	.05	.035	.05
114	10.39	Lat Struct		
114	10.386	.035	.035	.05
114	10.367	.035	.035	.05
114	10.348	.035	.035	.05

SUMMARY OF REACH LENGTHS

River: Eastern Canal

Reach	River Sta.	Left	Channel	Right
114	10.462	117.66	104.33	100
114	10.45	Lat Struct		

```
*114            *    10.443      *   109.72*   102.74*      100*
*114            *    10.43       *Lat Struct*         *         *
*114            *    10.424      *   225.31*   142.35*      100*
*114            *    10.41       *Lat Struct*         *         *
*114            *    10.405      *   207.24*   134.85*      100*
*114            *    10.39       *Lat Struct*         *         *
*114            *    10.386      *      100*      100*      100*
*114            *    10.367      *      100*      100*      100*
*114            *    10.348      *        0*        0*        0*
*****************************************************************

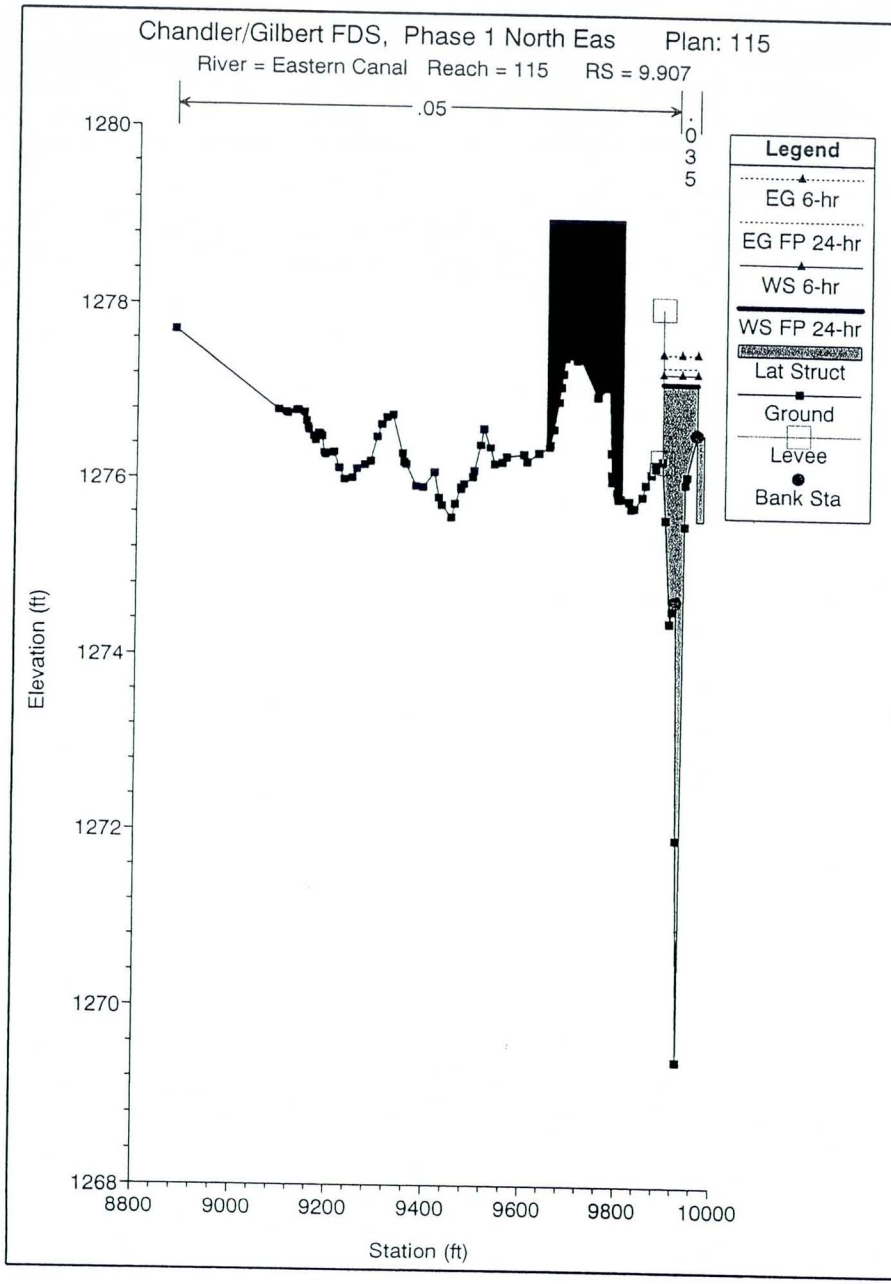
*******************************************************************************

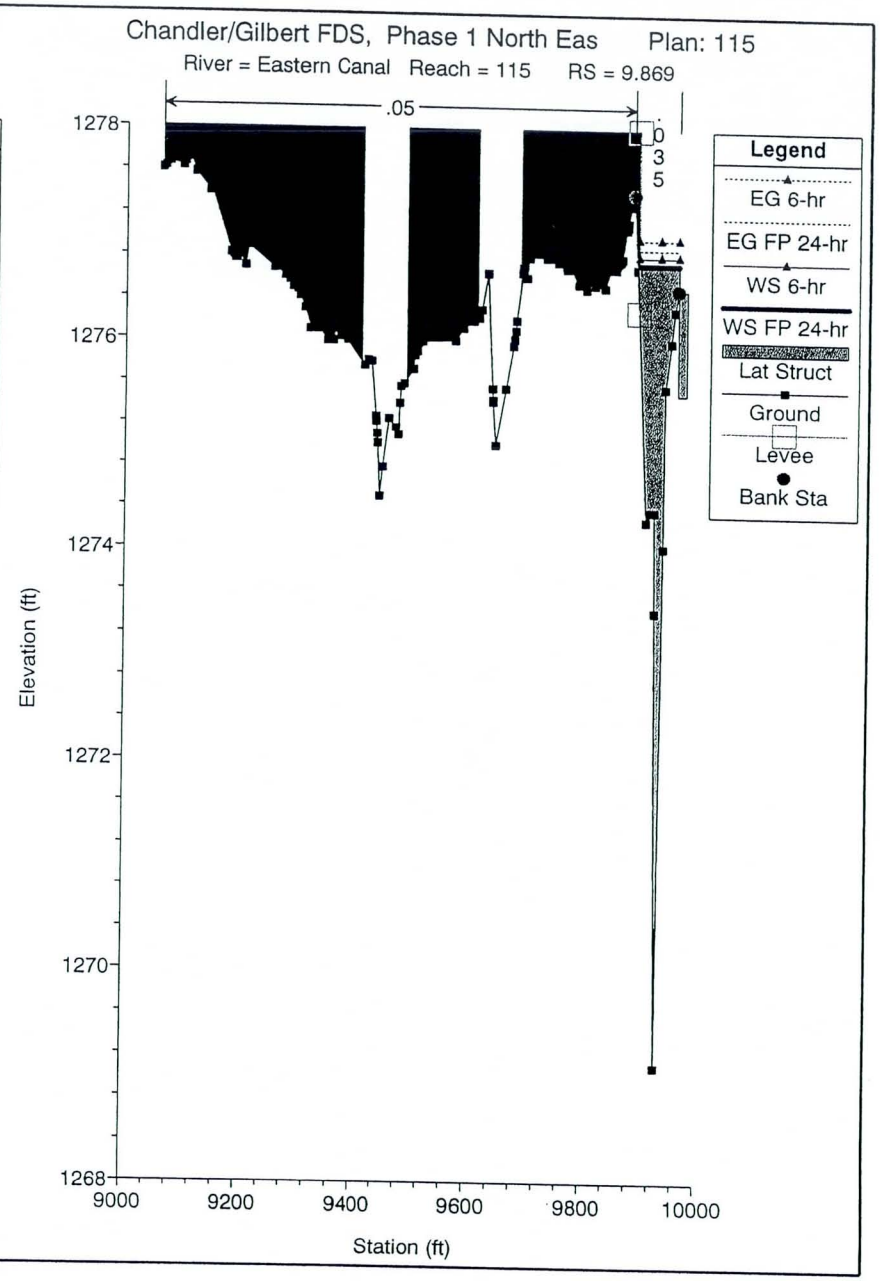
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Eastern Canal

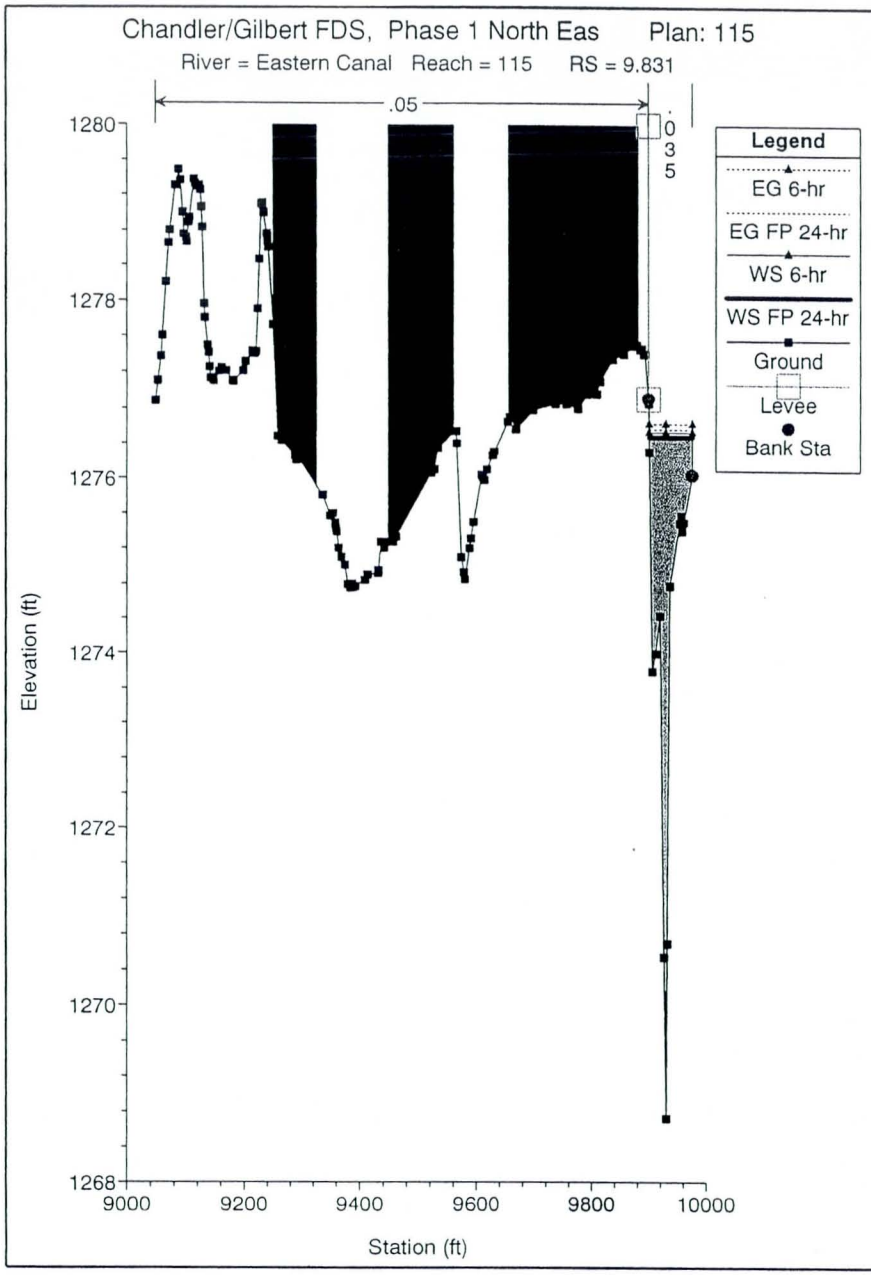
*****************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*****************************************************
*114            *    10.462  *       .1*       .3*
*114            *    10.45   *Lat Struct*         *
*114            *    10.443  *       .1*       .3*
*114            *    10.43   *Lat Struct*         *
*114            *    10.424  *       .1*       .3*
*114            *    10.41   *Lat Struct*         *
*114            *    10.405  *       .1*       .3*
*114            *    10.39   *Lat Struct*         *
*114            *    10.386  *       .1*       .3*
*114            *    10.367  *       .1*       .3*
*114            *    10.348  *       .1*       .3*
*****************************************************
```

HEC-RAS Plan: 115 River: Eastern Canal Reach: 115

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)	
115	9.907	24-hr	572.00	1269.41	1277.14	1275.52	1277.33	0.002456	3.79	174.74	72.11	0.41
115	9.907	6-hr	655.00	1269.41	1277.25	1275.77	1277.48	0.002798	4.15	182.65	72.11	0.44
115	9.89		Lat Struct									
115	9.869	24-hr	463.83	1269.10	1276.75	1274.95	1276.89	0.001854	3.00	154.85	69.32	0.35
115	9.869	6-hr	510.51	1269.10	1276.82	1275.10	1276.98	0.002033	3.20	159.66	69.32	0.37
115	9.85		Lat Struct									
115	9.831	24-hr	383.14	1268.72	1276.48	1274.48	1276.56	0.001251	2.39	160.31	74.96	0.29
115	9.831	6-hr	406.51	1268.72	1276.53	1274.53	1276.63	0.001293	2.47	164.64	75.07	0.29
115	9.8		Lat Struct									
115	9.793	24-hr	353.98	1268.72	1276.10	1273.86	1276.21	0.002224	2.85	133.67	74.24	0.37
115	9.793	6-hr	365.84	1268.72	1276.16	1273.95	1276.27	0.002198	2.84	138.28	76.25	0.37
115	9.756	24-hr	353.98	1268.72	1274.69	1274.17	1275.19	0.008031	5.97	68.66	39.56	0.70
115	9.756	6-hr	365.84	1268.72	1274.79	1274.22	1275.26	0.007881	5.83	72.49	41.54	0.69
115	9.717	24-hr	353.98	1268.54	1274.91	1272.61	1274.92	0.000162	0.87	464.16	281.30	0.10
115	9.717	6-hr	365.84	1268.54	1274.99	1272.64	1275.00	0.000156	0.86	487.12	292.70	0.10


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 115
River = Eastern Canal Reach = 115 RS = 9.907
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
1280
1278
1276
1274
1272
1270
1268
8800
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 115
River = Eastern Canal Reach = 115 RS = 9.869
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
1278
1276
1274
1272
1270
1268
9000
9200
9400
9600
9800
10000
Station (ft)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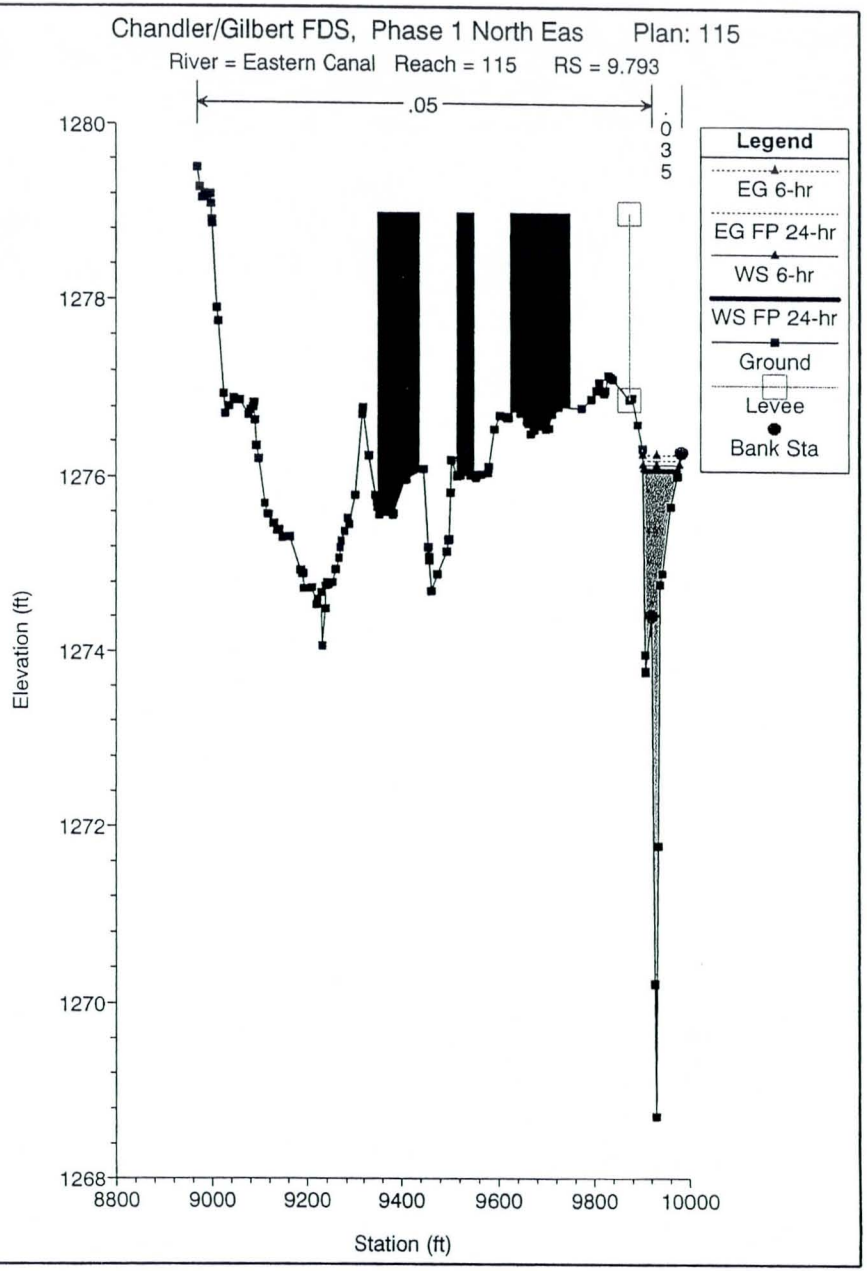
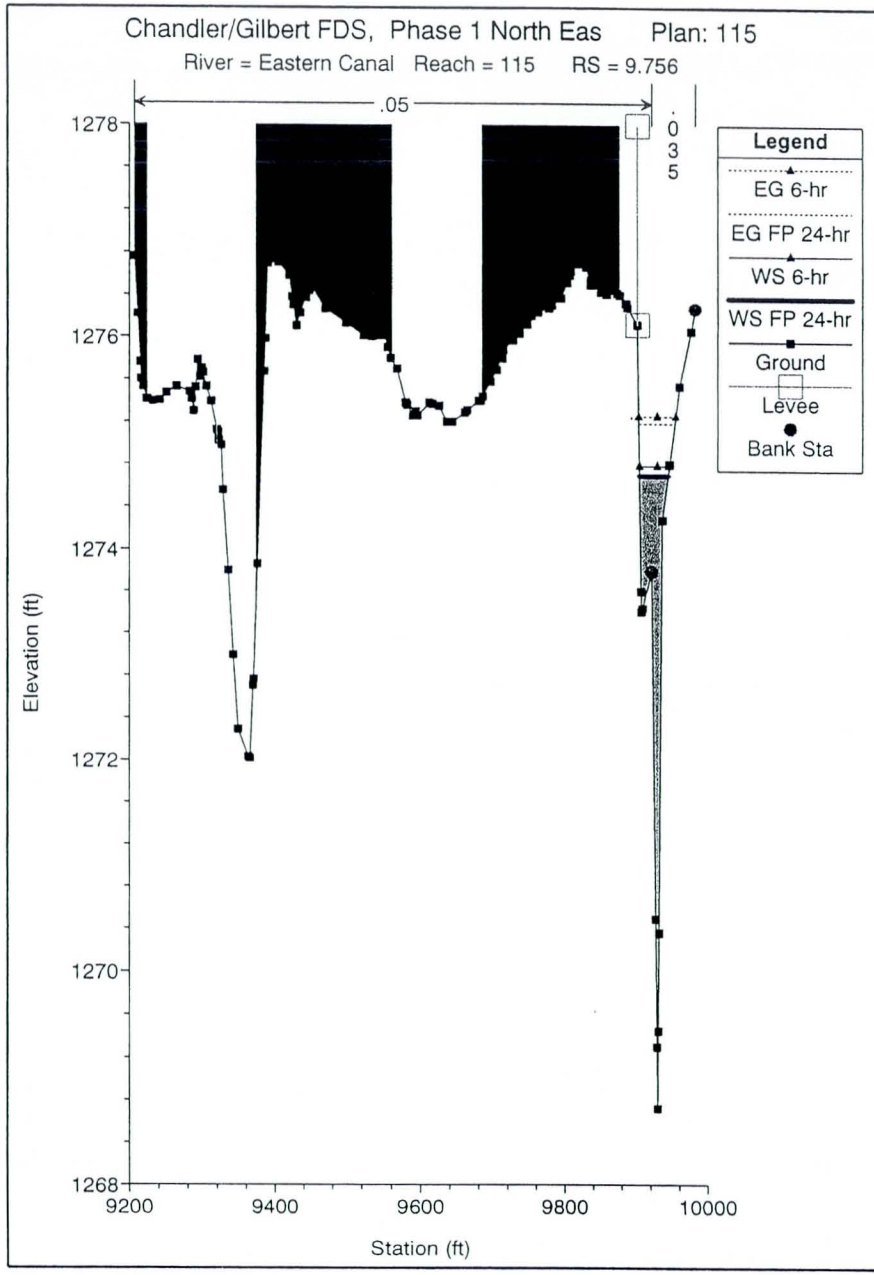
River = Eastern Canal Reach = 115 RS = 9.831
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1280
1278
1276
1274
1272
1270
1268
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 115
River = Eastern Canal Reach = 115 RS = 9.793
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1280
1278
1276
1274
1272
1270
1268
8800
9000
9200
9400
9600
9800
10000
Station (ft)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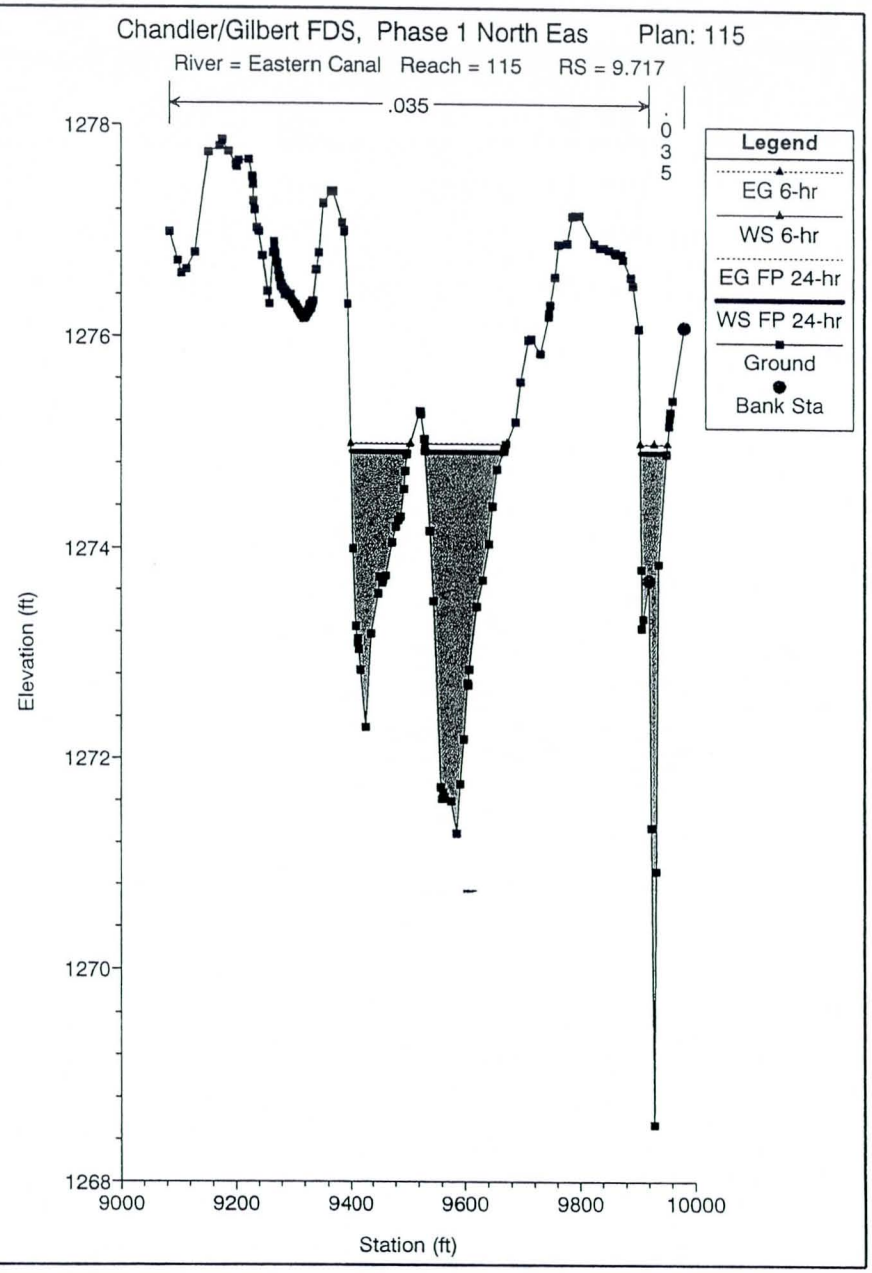
River = Eastern Canal Reach = 115 RS = 9.756
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1278
1276
1274
1272
1270
1268
9200
9400
9600
9800
10000
Station (ft)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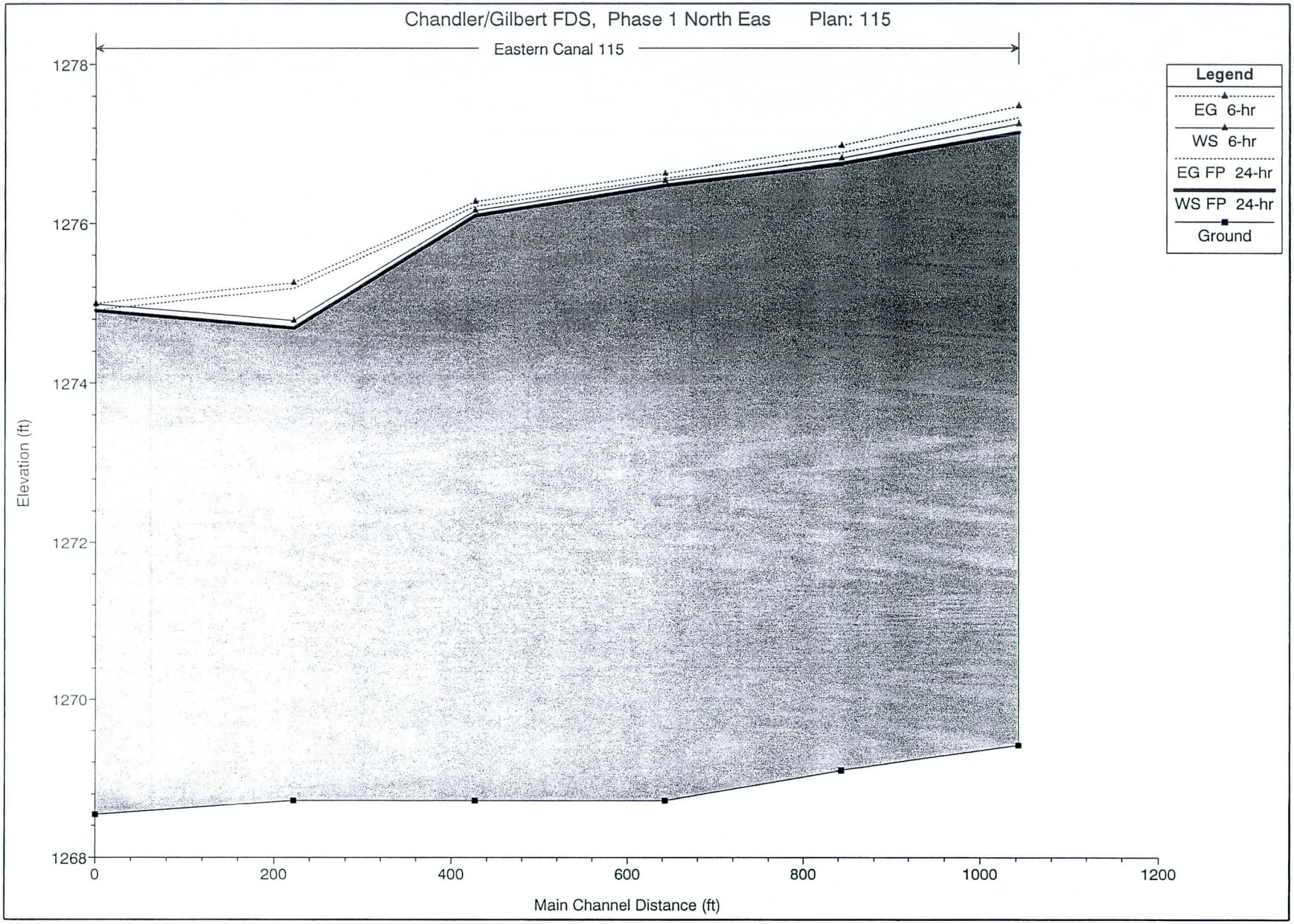
River = Eastern Canal Reach = 115 RS = 9.717
.035
.035
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Ground
Bank Sta
Elevation (ft)
1278
1276
1274
1272
1270
1268
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 115
Eastern Canal 115
Legend
EG 6-hr
WS 6-hr
EG FP 24-hr
WS FP 24-hr
Ground
Elevation (ft)
1278
1276
1274
1272
1270
1268
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

```
                    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 1 North Eas
Project File : CGFDP1N.prj
Run Date and Time: 10/31/2007 2:35:54 PM

Project in English units

Project Description:
3 conveyance analyses for Chandler/Gilbert FDS Phase 1 North included in this
HEC-RAS model.
Analyses were conducted by Project Engineering Consultants,
Ltd.
Models updated on 10/31/2007.

Clear conveyances exist between Pond
111 and Pond 114, between Pond 114 and Pond 115, and between Pond 115 and Pond
118. Exact pond locations can be found in the accompanying HEC-1 models and
work maps.
Geometry data was obtained from the DEA. Cross sections were cut
from the surfaces using Autodest Land Desktop 2004, and imported to this
project as HEC-2 input data files. Levees, ineffective areas, blocked
obstructions and lateral structure were designated according to local
situation.
Steady flow data was obtained from the HEC-1 models simulating
100-year 6-hour and 24-hour rainfall storm events. Flow rates used in analyses
are the rates contributing to thedownstream conveyances. Water loss from the
upstream ponding areas to the Eastern Canal was not a part of the in-flow rates
for conveyance analyses.
Plan 114 uses 111EAS (HEC-1 models) as infow
rate.
Plan 115 uses 114EAS (HEC-1 models) as inflow rate.
Plan 118 uses
115EAS (HEC-1 models) as inflow rate.
Downstream ponding elevations were
considered as the downstream boundary conditions.
Plan 114 uses elevation of
P114 (HEC-1 models) as downstream boundary condition.
Plan 115 uses elevation
of P115 (HEC-1 models) as downstream boundary condition.
Plan 118 uses
elevation of P118 (HEC-1 models) as downstream boundary condition.
Putting the
modeled water loss from the lateral structures into HEC-1 models affected the
downstream ponding elevations. Performed this iteration several times until the
results converged. Models shown in this project are the final "converged"
models.

      ******* Autodesk, Inc. HEC-2 Input Data file ********

************     Minimum Data Input     *************

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



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PLAN DATA

Plan Title: 115
Plan File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.p03

           Geometry Title: 115geom
           Geometry File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.g02

           Flow Title    : 115flow
           Flow File     : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.f03

Plan Description:
This plan uses 115geom (CGFDP1N.g02) as geometric data and 115flow
(CGFDP1N.f03) as steady flow data. This plan saved as 115 (CGFDP1N.p03).
The
flow data are obtained from the HEC-1 models.  Peak flows at 114EAS are used.


Plan Summary Information:
```

```
Number of:  Cross Sections =    6    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    3

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: 115flow
Flow File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.f03

Flow Data (cfs)
*****************************************************************************
* River          Reach          RS      *          24-hr          6-hr *
* Eastern Canal  115            9.907   *            572           655 *
*****************************************************************************

Boundary Conditions
*****************************************************************************************************************
* River          Reach          Profile          *          Upstream                Downstream    *
*****************************************************************************************************************
* Eastern Canal  115            24-hr            *                                Known WS = 1274.91 *
* Eastern Canal  115            6-hr             *                                Known WS = 1274.99 *
*****************************************************************************************************************

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

GEOMETRY DATA

Geometry Title: 115geom
Geometry File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.g02

CROSS SECTION


RIVER: Eastern Canal
REACH: 115                RS: 9.907

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 8876.21  1277.7 9090.21  1276.8 9106.08 1276.77 9109.38 1276.76 9127.72 1276.79
 9129.01  1276.8 9130.68  1276.8 9143.68 1276.77 9148.72 1276.67 9152.18  1276.6
 9153.84 1276.57 9163.97  1276.5 9168.04 1276.45 9174.55 1276.53 9177.13 1276.52
  9181.2  1276.5 9186.73  1276.3 9188.42 1276.28  9199.5  1276.3 9206.31 1276.31
 9217.38 1276.13 9228.34    1276 9244.83 1276.02 9254.04 1276.12 9270.66 1276.17
 9282.63 1276.21 9295.78  1276.5 9305.12 1276.64 9314.96 1276.72 9326.75 1276.75
 9347.29  1276.3  9350.5  1276.2 9354.74 1276.18  9376.3 1275.93 9390.32 1275.92
 9413.01 1276.09  9422.9  1275.8 9428.34 1275.71 9448.84 1275.57 9455.89 1275.73
 9467.94 1275.92 9468.61  1275.9 9474.43 1275.96 9492.27 1276.04  9494.8 1276.11
 9508.16 1276.41 9514.62  1276.6 9528.31 1276.38 9537.52 1276.19 9553.86 1276.21
  9562.2 1276.27 9598.12  1276.3 9604.73 1276.22 9630.19 1276.32 9651.87 1276.39
 9653.76 1276.42  9660.9  1276.6 9670.96 1276.92 9675.02 1277.09 9678.73 1277.24
  9683.2 1277.42 9707.79  1277.4 9713.38 1277.42 9714.94 1277.42 9752.02 1276.98
  9774.7 1277.09 9775.73  1277.1 9776.98 1277.13 9777.38 1277.14 9781.73 1276.33
 9783.42 1276.08 9784.04    1276 9794.66 1275.88 9796.32 1275.83 9796.71 1275.83
 9797.34 1275.83 9797.95  1275.8 9801.99 1275.81 9818.87 1275.78 9819.49 1275.77
 9824.13 1275.69  9830.5  1275.7 9847.66 1275.83 9854.18 1275.97 9866.26 1276.09
 9871.41 1276.15 9872.52  1276.2 9873.73 1276.17 9875.87 1276.17 9889.36 1276.24
 9896.79 1275.57 9907.21  1274.4 9912.73 1274.54 9919.38 1274.64 9924.12 1271.93
 9928.93 1269.41  9937.6  1275.5 9938.32 1275.98 9941.79 1276.07 9961.47 1276.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 8876.21     .05 9919.38    .035 9961.47     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9919.38 9961.47              200     200     200            .1       .3
Left Levee      Station= 9889.36      Elevation=    1278
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 9645.21 9805.21    1279

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************************
* E.G. Elev (ft)         * 1277.33  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.19  * Wt. n-Val.             *   0.050  *   0.035  *          *
```

W.S. Elev (ft)	1277.14	Reach Len. (ft)	200.00	200.00	200.00	
Crit W.S. (ft)	1275.52	Flow Area (sq ft)	63.45	111.29		
E.G. Slope (ft/ft)	0.002456	Area (sq ft)	63.45	111.29		
Q Total (cfs)	572.00	Flow (cfs)	150.56	421.44		
Top Width (ft)	72.11	Top Width (ft)	30.02	42.09		
Vel Total (ft/s)	3.27	Avg. Vel. (ft/s)	2.37	3.79		
Max Chl Dpth (ft)	7.73	Hydr. Depth (ft)	2.11	2.64		
Conv. Total (cfs)	11542.2	Conv. (cfs)	3038.1	8504.1		
Length Wtd. (ft)	200.00	Wetted Per. (ft)	31.02	46.09		
Min Ch El (ft)	1269.41	Shear (lb/sq ft)	0.31	0.37		
Alpha	1.12	Stream Power (lb/ft s)	0.74	1.40		
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	1.81	2.65		
C & E Loss (ft)	0.01	Cum SA (acres)	1.16	1.23		

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1277.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1277.25	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1275.77	Flow Area (sq ft)	66.74	115.91	
E.G. Slope (ft/ft)	0.002798	Area (sq ft)	66.74	115.91	
Q Total (cfs)	655.00	Flow (cfs)	174.42	480.58	
Top Width (ft)	72.11	Top Width (ft)	30.02	42.09	
Vel Total (ft/s)	3.59	Avg. Vel. (ft/s)	2.61	4.15	
Max Chl Dpth (ft)	7.84	Hydr. Depth (ft)	2.22	2.75	
Conv. Total (cfs)	12382.9	Conv. (cfs)	3297.5	9085.4	
Length Wtd. (ft)	200.00	Wetted Per. (ft)	31.13	46.20	
Min Ch El (ft)	1269.41	Shear (lb/sq ft)	0.37	0.44	
Alpha	1.12	Stream Power (lb/ft s)	0.98	1.82	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	1.91	2.74	
C & E Loss (ft)	0.02	Cum SA (acres)	1.20	1.26	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9889.36	9919.38	150.56	63.45	31.02	26.32	2.11	2.37
2	Chan	9919.38	9929.90	266.45	56.62	12.08	46.58	5.38	4.71
3	Chan	9929.90	9940.43	128.23	36.87	12.38	22.42	3.50	3.48
4	Chan	9940.43	9950.95	17.01	10.28	10.53	2.97	0.98	1.65
5	Chan	9950.95	9961.47	9.75	7.52	11.11	1.70	0.72	1.30

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9889.36	9919.38	174.42	66.74	31.13	26.63	2.22	2.61
2	Chan	9919.38	9929.90	298.84	57.77	12.08	45.62	5.49	5.17
3	Chan	9929.90	9940.43	146.39	38.02	12.38	22.35	3.61	3.85
4	Chan	9940.43	9950.95	22.02	11.44	10.53	3.36	1.09	1.93
5	Chan	9950.95	9961.47	13.32	8.68	11.22	2.03	0.82	1.54

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

LATERAL STRUCTURE

RIVER: Eastern Canal
REACH: 115 RS: 9.89

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over this lateral weir.
Lateral structure position = Next ot right bank station
Distance from Upstream XS = 0
Deck/Roadway Width = 15
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
0	1276.56	200	1276.5

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Eastern Canal
REACH: 115 RS: 9.869

INPUT
Description:
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9063.22	1277.6	9066.91	1277.62	9074.43	1277.66	9097.64	1277.62	9101.01	1277.66
9110.21	1277.7	9120.49	1277.57	9144.55	1277.4	9148.58	1277.4	9181.65	1276.82
9186.02	1276.8	9189.12	1276.77	9189.24	1276.77	9191.77	1276.77	9196.15	1276.82
9207.44	1276.7	9211.59	1276.89	9258.21	1276.68	9276.62	1276.61	9284.31	1276.57
9290.79	1276.5	9299.22	1276.48	9303.12	1276.42	9312.25	1276.3	9320.93	1276.1
9328.26	1276.1	9335.31	1276.1	9350.48	1275.99	9354.98	1275.99	9359.23	1275.99
9363.83	1276.1	9372.73	1276.03	9385.93	1276	9417.98	1275.76	9424.3	1275.81
9430.03	1275.8	9438.24	1275.27	9438.98	1275.22	9440.84	1275.1	9441.62	1275.01
9445.75	1274.5	9450.89	1274.78	9460.96	1275.25	9473.56	1275.16	9477.87	1275.09
9480.12	1275.4	9481.51	1275.56	9487.16	1275.59	9503.43	1275.73	9505.27	1275.86
9510.08	1275.9	9511.92	1275.98	9512.41	1275.99	9513.13	1275.99	9518.83	1275.99
9575.39	1276	9589.24	1276.12	9606.96	1276.19	9613.35	1276.22	9616.2	1276.22
9621	1276.3	9631.64	1276.65	9640.25	1275.55	9641.23	1275.44	9641.45	1275.42
9646.49	1275	9663.13	1275.55	9676.55	1275.96	9678.05	1276.02	9680	1276.1
9681.32	1276.2	9691.24	1276.66	9692.59	1276.71	9697.93	1276.61	9701.42	1276.81
9701.93	1276.8	9702.27	1276.81	9732.01	1276.81	9732.88	1276.8	9735.99	1276.8
9739.9	1276.8	9752.96	1276.76	9765.89	1276.73	9767.5	1276.7	9771.27	1276.71
9775.39	1276.7	9788.01	1276.55	9794.98	1276.55	9795	1276.55	9801.56	1276.5
9814.38	1276.6	9817.24	1276.54	9820.28	1276.57	9833.59	1276.52	9834.51	1276.52
9843.26	1276.7	9845.4	1276.7	9847.43	1276.71	9849.3	1276.72	9850.64	1276.72
9852.6	1276.7	9854.37	1276.74	9857.26	1276.76	9859.06	1276.77	9860.64	1276.78
9862	1276.8	9863.17	1276.8	9870.93	1277.07	9871.83	1277.09	9872.57	1277.1
9873.17	1277.1	9873.67	1277.13	9878.74	1277.29	9880.98	1277.33	9884.69	1277.4
9890.06	1276.7	9908.57	1274.28	9917.44	1274.37	9923.13	1274.37	9924.51	1273.42
9931.08	1269.1	9938.57	1274.03	9940.32	1275.56	9950.19	1276	9955.64	1276.3
9962.54	1276.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9063.22	.05	9884.69	.035	9962.54	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9884.69	9962.54	200	200	200	.1	.3

Left Levee Station= 9893.22 Elevation= 1278
Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
9063.22	9413.22	1278	9492.22	9613.22	1278	9688.22	9893.22	1278

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1276.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.035	
W.S. Elev (ft)	1276.75	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1274.95	Flow Area (sq ft)		154.85	
E.G. Slope (ft/ft)	0.001854	Area (sq ft)		154.85	
Q Total (cfs)	463.83	Flow (cfs)		463.83	
Top Width (ft)	69.32	Top Width (ft)		69.32	
Vel Total (ft/s)	3.00	Avg. Vel. (ft/s)		3.00	
Max Chl Dpth (ft)	7.65	Hydr. Depth (ft)		2.23	
Conv. Total (cfs)	10773.3	Conv. (cfs)		10773.3	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		73.82	
Min Ch El (ft)	1269.10	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		0.73	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	1.66	2.04	
C & E Loss (ft)	0.02	Cum SA (acres)	1.09	0.98	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1276.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.035	
W.S. Elev (ft)	1276.82	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1275.10	Flow Area (sq ft)		159.66	
E.G. Slope (ft/ft)	0.002033	Area (sq ft)		159.66	
Q Total (cfs)	510.51	Flow (cfs)		510.51	
Top Width (ft)	69.32	Top Width (ft)		69.32	
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)		3.20	
Max Chl Dpth (ft)	7.72	Hydr. Depth (ft)		2.30	
Conv. Total (cfs)	11322.2	Conv. (cfs)		11322.2	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		73.96	
Min Ch El (ft)	1269.10	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.88	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	1.75	2.11	
C & E Loss (ft)	0.02	Cum SA (acres)	1.13	1.00	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #24-hr

	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	9893.22	9910.55	57.20	27.32	17.92	12.33	1.58	2.09
2	Chan	9910.55	9927.88	149.48	49.02	18.29	32.23	2.83	3.05
3	Chan	9927.88	9945.21	246.45	68.60	20.02	53.13	3.96	3.59
4	Chan	9945.21	9962.54	10.69	9.91	17.59	2.30	0.57	1.08

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #6-hr

	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	9893.22	9910.55	64.72	28.52	17.99	12.68	1.65	2.27
2	Chan	9910.55	9927.88	164.32	50.22	18.29	32.19	2.90	3.27
3	Chan	9927.88	9945.21	267.84	69.80	20.02	52.47	4.03	3.84
4	Chan	9945.21	9962.54	13.62	11.12	17.66	2.67	0.64	1.23

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

LATERAL STRUCTURE

RIVER: Eastern Canal
REACH: 115 RS: 9.85

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over this lateral weir.
Lateral structure position = Next ot right bank station
Distance from Upstream XS = 0
Deck/Roadway Width = 15
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
0	1276.5	199	1276.04

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Eastern Canal
REACH: 115 RS: 9.831

INPUT
Description:
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9048.08	1276.88	9052.34	1277.1	9057.81	1277.37	9059.79	1277.6	9065.98	1278.2
9070.34	1278.65	9070.43	1278.65	9071.05	1278.65	9072.51	1278.8	9081.78	1279.3
9084.85	1279.3	9087.59	1279.48	9091.18	1279.36	9095.02	1279	9097.18	1278.75
9100.83	1278.71	9102.22	1278.66	9104.9	1278.89	9105.56	1278.9	9106.38	1278.94
9114.2	1279.37	9116.66	1279.32	9119.6	1279.29	9123.05	1279.3	9125.31	1279.25
9127.21	1279.06	9128.42	1278.83	9132.1	1277.96	9133.26	1277.8	9138.16	1277.49
9139.65	1277.41	9141.34	1277.25	9143.27	1277.13	9148.14	1277.1	9157.67	1277.2
9161.99	1277.24	9169.43	1277.21	9180.7	1277.1	9181.74	1277.1	9182.46	1277.09
9198.83	1277.21	9202.79	1277.31	9214.37	1277.43	9218.32	1277.4	9221.08	1277.42
9223.88	1277.9	9226.85	1278.46	9230.28	1279.09	9231.91	1279.1	9234.14	1279
9239.53	1278.76	9240.39	1278.73	9241.15	1278.66	9242.19	1278.6	9250.71	1277.72
9258.92	1276.48	9265.64	1276.43	9288.91	1276.25	9290.76	1276.2	9291.52	1276.25
9336.42	1275.81	9337.01	1275.81	9349.86	1275.57	9354.13	1275.6	9358.11	1275.49
9358.75	1275.46	9359.62	1275.43	9360.79	1275.39	9363.97	1275.2	9369.4	1275.1
9375.24	1275.01	9380.01	1274.79	9384.6	1274.75	9387.25	1274.8	9389.7	1274.76
9391.89	1274.77	9393.81	1274.77	9409.82	1274.84	9414.27	1274.9	9431.17	1274.92
9431.58	1274.95	9436.02	1275.27	9440.71	1275.27	9442.05	1275.2	9448.48	1275.27
9457.16	1275.27	9462.15	1275.33	9522.64	1276.06	9528.5	1276.1	9534.53	1276.34
9563.75	1276.54	9566.16	1276.54	9567.12	1276.4	9574.65	1275.1	9579.06	1274.93
9580.66	1274.85	9589.23	1275.2	9591.59	1275.31	9596.06	1275.5	9609.96	1276.04
9612.03	1276.01	9613.93	1275.98	9615.57	1275.98	9619.09	1276.1	9629.36	1276.26
9631.44	1276.3	9655.29	1276.65	9658.57	1276.7	9660.62	1276.7	9669.56	1276.56
9699.49	1276.78	9738.46	1276.85	9757.64	1276.85	9777.6	1276.8	9794.26	1276.96
9810.46	1276.96	9815.79	1277.1	9837.96	1277.34	9857.49	1277.4	9877.36	1277.49
9880.95	1277.5	9886.61	1277.45	9889.02	1277.46	9892.29	1277.4	9894.47	1277.4
9900.88	1276.91	9901.51	1276.86	9902.58	1276.3	9907.7	1273.8	9913	1274
9921.39	1274.43	9927.58	1270.55	9930.54	1268.72	9932.74	1270.7	9938.13	1274.78
9955.43	1275.49	9958.5	1275.58	9959.29	1275.4	9962.41	1275.5	9977.21	1276.04

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9048.08	.05	9900.88	.035	9977.21	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9900.88 9977.21              200  216.21     200            .1       .3
Left Levee      Station= 9900.88      Elevation=    1280
Blocked Obstructions     num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
 9250.67 9326.67    1280 9448.67 9561.67    1280 9656.67 9882.67    1280

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)         * 1276.56  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.09  * Wt. n-Val.              *          *    0.035 *          *
* W.S. Elev (ft)         * 1276.48  * Reach Len. (ft)         *  200.00  *  216.21  *  200.00  *
* Crit W.S. (ft)         * 1274.48  * Flow Area (sq ft)       *          *  160.31  *          *
* E.G. Slope (ft/ft)     *0.001251  * Area (sq ft)            *          *  160.31  *          *
* Q Total (cfs)          *  383.14  * Flow (cfs)              *          *  383.14  *          *
* Top Width (ft)         *   74.96  * Top Width (ft)           *          *   74.96  *          *
* Vel Total (ft/s)       *    2.39  * Avg. Vel. (ft/s)         *          *    2.39  *          *
* Max Chl Dpth (ft)      *    7.75  * Hydr. Depth (ft)         *          *    2.14  *          *
* Conv. Total (cfs)      * 10831.6  * Conv. (cfs)              *          * 10831.6  *          *
* Length Wtd. (ft)       *  214.79  * Wetted Per. (ft)         *          *   79.85  *          *
* Min Ch El (ft)         * 1268.72  * Shear (lb/sq ft)         *          *    0.16  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)   *          *    0.37  *          *
* Frctn Loss (ft)        *    0.35  * Cum Volume (acre-ft)     *    1.66  *    1.32  *          *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)           *    1.09  *    0.65  *          *
*****************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION OUTPUT  Profile #6-hr
*****************************************************************************************
* E.G. Elev (ft)         * 1276.63  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.09  * Wt. n-Val.              *          *    0.035 *          *
* W.S. Elev (ft)         * 1276.53  * Reach Len. (ft)         *  200.00  *  216.21  *  200.00  *
* Crit W.S. (ft)         * 1274.53  * Flow Area (sq ft)       *          *  164.64  *          *
* E.G. Slope (ft/ft)     *0.001293  * Area (sq ft)            *          *  164.64  *          *
* Q Total (cfs)          *  406.51  * Flow (cfs)              *          *  406.51  *          *
* Top Width (ft)         *   75.07  * Top Width (ft)           *          *   75.07  *          *
* Vel Total (ft/s)       *    2.47  * Avg. Vel. (ft/s)         *          *    2.47  *          *
* Max Chl Dpth (ft)      *    7.81  * Hydr. Depth (ft)         *          *    2.19  *          *
* Conv. Total (cfs)      * 11306.5  * Conv. (cfs)              *          * 11306.5  *          *
* Length Wtd. (ft)       *  214.79  * Wetted Per. (ft)         *          *   80.03  *          *
* Min Ch El (ft)         * 1268.72  * Shear (lb/sq ft)         *          *    0.17  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)   *          *    0.41  *          *
* Frctn Loss (ft)        *    0.35  * Cum Volume (acre-ft)     *    1.75  *    1.36  *          *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)           *    1.13  *    0.67  *          *
*****************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

  Profile #24-hr
*************************************************************************************************************
*          * 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     * 9900.88   * 9919.96   *    74.96 *    36.96 *    18.35 *    19.56 *     2.09 *     2.03 *
* 2        * Chan     * 9919.96   * 9939.05   *   256.63 *    84.43 *    22.85 *    66.98 *     4.42 *     3.04 *
* 3        * Chan     * 9939.05   * 9958.13   *    36.02 *    24.19 *    19.10 *     9.40 *     1.27 *     1.49 *
* 4        * Chan     * 9958.13   * 9977.21   *    15.53 *    14.74 *    19.55 *     4.05 *     0.77 *     1.05 *
*************************************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

  Profile #6-hr
*************************************************************************************************************
*          * 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     * 9900.88   * 9919.96   *    80.05 *    37.98 *    18.47 *    19.69 *     2.13 *     2.11 *
* 2        * Chan     * 9919.96   * 9939.05   *   268.78 *    85.53 *    22.85 *    66.12 *     4.48 *     3.14 *
* 3        * Chan     * 9939.05   * 9958.13   *    39.76 *    25.29 *    19.10 *     9.78 *     1.33 *     1.57 *
* 4        * Chan     * 9958.13   * 9977.21   *    17.91 *    15.84 *    19.61 *     4.41 *     0.83 *     1.13 *
*************************************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

LATERAL STRUCTURE


RIVER: Eastern Canal
```

```
REACH: 115                RS: 9.8

INPUT
Description: Water in the tail water ditch may flow into the Easter Canal over
             this lateral weir.
Lateral structure position     = Next ot right bank station
Distance from Upstream XS =   9.831
Deck/Roadway Width        =      15
Weir Coefficient          =       2
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        2
     Sta    Elev     Sta    Elev
*******************************
       0 1276.04     200  1276.3

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: Eastern Canal
REACH: 115                RS: 9.793

INPUT
Description:
Station Elevation Data    num=     141
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
 8969.55  1279.5 8974.93 1279.28 8979.86 1279.16 8985.39 1279.18 8987.35 1279.21
 8990.46  1279.2 8997.05  1279.2 8998.46 1279.09 9000.16 1278.91 9000.93 1278.86
 9010.42  1277.9 9013.81 1277.75 9024.78 1276.95 9028.35 1276.72 9036.96 1276.81
 9046.25  1276.9 9053.71 1276.88 9059.09 1276.88 9077.16 1276.71 9082.21 1276.77
 9087.04  1276.8 9088.54 1276.85 9090.95 1276.65 9094.29 1276.35 9098.81 1276.21
 9112.28  1275.7 9117.26 1275.58  9120.7 1275.57 9130.42 1275.47 9138.47 1275.39
 9142.23  1275.4 9148.83 1275.31 9157.09 1275.32 9164.95 1275.32 9187.34 1274.94
 9191.15  1274.9 9194.67 1274.73 9202.28 1274.73 9208.89 1274.74 9219.26 1274.54
 9221.85  1274.6 9229.11 1274.68 9232.01 1274.07 9238.05 1274.49 9238.75 1274.76
 9242.23  1274.8 9243.41 1274.77 9250.79  1274.8 9258.86 1274.95 9266.41 1275.08
 9269.08  1275.2 9271.94 1275.27 9279.76 1275.38 9286.68 1275.53 9290.47 1275.46
 9302.81  1275.8 9318.14 1276.72 9319.11 1276.77 9319.59  1276.8 9332.36 1276.25
 9345.43  1275.8 9348.85 1275.72 9350.06 1275.66 9353.97 1275.57 9360.49 1275.66
  9370.5  1275.6 9383.02 1275.57 9384.29 1275.59 9407.29 1275.97 9410.93 1275.98
 9445.86  1276.1 9456.19 1275.21 9457.63  1275.1 9458.09 1275.06 9462.82  1274.7
 9474.69  1274.9 9493.86 1275.16  9496.8 1275.29 9498.29  1275.3 9501.31 1275.83
 9503.38  1276.2 9514.86 1276.02 9515.15 1276.03 9521.69 1276.03 9542.65 1276.03
 9553.45    1276 9555.85 1276.03 9560.23 1276.04 9565.07 1276.04 9578.39 1276.06
 9579.46  1276.1 9580.53 1276.13 9591.46 1276.55 9602.93 1276.71 9603.39 1276.71
 9614.89  1276.7 9618.02 1276.68  9619.4 1276.68 9620.78 1276.68 9635.01  1276.8
 9637.86  1276.8 9641.02 1276.83 9646.03 1276.74 9659.11 1276.64 9662.56 1276.62
 9667.44  1276.5 9674.62 1276.54 9698.93 1276.55 9705.45 1276.56 9711.37 1276.73
 9713.71  1276.8 9717.79 1276.83 9719.96 1276.81 9721.06 1276.82 9724.86 1276.81
 9773.81  1276.8  9793.6  1276.9 9804.48    1277 9810.34 1277.09 9820.48 1276.97
 9822.44    1277 9829.74 1277.17 9832.88 1277.15 9834.56 1277.15  9838.1 1277.13
 9873.64  1276.9 9879.84 1276.92 9891.81 1276.61 9902.27 1276.34 9907.34 1273.99
 9907.89  1273.8 9908.38 1273.78  9920.9 1274.43 9928.22 1270.23 9930.69 1268.72
 9934.74  1271.8 9938.21 1274.79 9943.69 1274.92 9961.27 1275.68 9974.93 1276.03
 9983.21  1276.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 8969.55     .05  9920.9    .035 9983.21     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9920.9 9983.21            546.33  205.05  505.46            .1       .3
Left Levee      Station= 9873.64      Elevation=    1279
Blocked Obstructions     num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************
 9350.55 9437.55    1279 9514.55 9549.55    1279 9624.55 9749.55    1279

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)          * 1276.21  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.11  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1276.10  * Reach Len. (ft)         *  546.33  *  205.05  *  505.46  *
* Crit W.S. (ft)          * 1273.86  * Flow Area (sq ft)       *   32.10  *  101.57  *          *
* E.G. Slope (ft/ft)      *0.002224  * Area (sq ft)            *   32.10  *  101.57  *          *
* Q Total (cfs)           *  353.98  * Flow (cfs)              *   64.66  *  289.31  *          *
* Top Width (ft)          *   74.24  * Top Width (ft)          *   18.11  *   56.13  *          *
* Vel Total (ft/s)        *    2.65  * Avg. Vel. (ft/s)        *    2.01  *    2.85  *          *
* Max Chl Dpth (ft)       *    7.38  * Hydr. Depth (ft)        *    1.77  *    1.81  *          *
* Conv. Total (cfs)       *  7506.6  * Conv. (cfs)             *  1371.3  *  6135.3  *          *
* Length Wtd. (ft)        *  257.95  * Wetted Per. (ft)        *   18.62  *   59.85  *          *
* Min Ch El (ft)          * 1268.72  * Shear (lb/sq ft)        *    0.24  *    0.24  *          *
* Alpha                   *    1.05  * Stream Power (lb/ft s) *    0.48  *    0.67  *          *
* Frctn Loss (ft)         *    0.99  * Cum Volume (acre-ft)    *    1.59  *    0.67  *          *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)          *    1.05  *    0.32  *          *
*****************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
```

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

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1276.27	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.11	Wt. n-Val.	0.050	0.035		
W.S. Elev (ft)	1276.16	Reach Len. (ft)	546.33	205.05	505.46	
Crit W.S. (ft)	1273.95	Flow Area (sq ft)	33.21	105.07		
E.G. Slope (ft/ft)	0.002198	Area (sq ft)	33.21	105.07		
Q Total (cfs)	365.84	Flow (cfs)	67.70	298.14		
Top Width (ft)	76.25	Top Width (ft)	18.24	58.01		
Vel Total (ft/s)	2.65	Avg. Vel. (ft/s)	2.04	2.84		
Max Chl Dpth (ft)	7.44	Hydr. Depth (ft)	1.82	1.81		
Conv. Total (cfs)	7802.8	Conv. (cfs)	1444.0	6358.9		
Length Wtd. (ft)	260.59	Wetted Per. (ft)	18.77	61.73		
Min Ch El (ft)	1268.72	Shear (lb/sq ft)	0.24	0.23		
Alpha	1.05	Stream Power (lb/ft s)	0.50	0.66		
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)	1.68	0.69		
C & E Loss (ft)	0.04	Cum SA (acres)	1.09	0.34		

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth (ft)	Velocity (ft/s)
1	LOB	9873.64	9920.90	64.66	32.10	18.62	18.27	1.77	2.01
2	Chan	9920.90	9936.48	253.57	73.76	18.72	71.63	4.74	3.44
3	Chan	9936.48	9952.06	28.47	18.72	16.14	8.04	1.20	1.52
4	Chan	9952.06	9967.63	6.83	7.84	15.59	1.93	0.50	0.87
5	Chan	9967.63	9983.21	0.45	1.25	9.40	0.13	0.13	0.36

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth (ft)	Velocity (ft/s)
1	LOB	9873.64	9920.90	67.70	33.21	18.77	18.51	1.82	2.04
2	Chan	9920.90	9936.48	258.28	74.71	18.72	70.60	4.80	3.46
3	Chan	9936.48	9952.06	30.84	19.67	16.14	8.43	1.26	1.57
4	Chan	9952.06	9967.63	8.24	8.79	15.59	2.25	0.56	0.94
5	Chan	9967.63	9983.21	0.79	1.89	11.28	0.22	0.17	0.42

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Eastern Canal
REACH: 115 RS: 9.756

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9207.21	1276.76	9211.67	1276.21	9214.88	1275.76	9215.93	1275.6	9218.99	1276.53
9223.37	1275.41	9224.24	1275.41	9231.98	1275.39	9241.43	1275.4	9250.34	1275.47
9264.44	1275.53	9282.57	1275.48	9285.05	1275.41	9287.62	1275.3	9290.25	1275.52
9293.76	1275.78	9296.63	1275.62	9299.04	1275.67	9299.35	1275.7	9301.25	1275.66
9305.52	1275.53	9312.1	1275.39	9319.58	1275.12	9321.38	1275.1	9322.1	1275.03
9322.78	1275.02	9325.97	1274.98	9328.09	1274.55	9335.87	1273.8	9342.35	1272.99
9349.19	1272.29	9363.24	1272.03	9365.45	1272.01	9369.48	1272.7	9370.19	1272.76
9375.66	1273.86	9385.37	1275.67	9386.8	1275.98	9389.89	1276.7	9404.73	1276.71
9420.59	1276.58	9424.59	1276.38	9426.18	1276.3	9430.14	1276.1	9435.3	1276.22
9442.88	1276.37	9447.33	1276.44	9448.2	1276.47	9449.09	1276.5	9469.9	1276.26
9498.33	1276.13	9523.52	1276.01	9529.87	1276.01	9534.36	1276	9539.33	1276.01
9541.78	1276.01	9550.95	1276.01	9555.62	1275.9	9559.86	1275.8	9568.4	1275.7
9580.23	1275.38	9581.78	1275.36	9589.96	1275.26	9593.92	1275.3	9596.06	1275.26
9612.65	1275.38	9616.87	1275.37	9625.81	1275.35	9637	1275.2	9643.83	1275.2
9661.42	1275.29	9664.62	1275.31	9680.89	1275.4	9683.85	1275.4	9686.65	1275.44
9697.21	1275.58	9705.73	1275.69	9713.49	1275.84	9713.71	1275.8	9714.92	1275.88
9728.68	1275.97	9736.92	1276.03	9747.98	1276.12	9753.72	1276.2	9762.83	1276.23
9762.97	1276.24	9763.5	1276.24	9778.51	1276.27	9782.34	1276.3	9794.97	1276.37
9803.61	1276.52	9807.06	1276.59	9808.49	1276.63	9821.68	1276.7	9824.45	1276.75

```
  9825.1 1276.75 9826.52 1276.74 9830.82 1276.67 9836.64  1276.5  9836.8 1276.53
 9836.96 1276.53 9837.13 1276.54 9837.29 1276.54 9837.45  1276.5 9844.15  1276.5
 9851.28 1276.43 9859.13 1276.41 9873.98 1276.42 9877.56  1276.4 9886.25 1276.32
    9887 1276.32 9888.44 1276.28 9902.55 1276.12 9907.96  1273.6  9908.3 1273.41
  9909.4 1273.44 9922.25 1273.79 9927.52 1270.49 9929.44  1269.3 9930.32 1268.72
 9931.14 1269.45 9932.38 1270.36 9937.41 1274.28 9947.19  1274.8 9961.22 1275.54
 9977.35 1276.06 9983.29 1276.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9207.21     .05 9922.25    .035 9983.29     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9922.25 9983.29           271.54  221.51  201.63            .1        .3
Left Levee      Station= 9902.55      Elevation=    1278
Blocked Obstructions      num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
***********************************************************************
 9138.76 9223.76    1278 9373.76 9560.76    1278 9685.76 9876.76    1278

CROSS SECTION OUTPUT  Profile #24-hr
*************************************************************************************************
* E.G. Elev (ft)          * 1275.19  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.50  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1274.69  * Reach Len. (ft)         *  271.54  *  221.51  *  201.63  *
* Crit W.S. (ft)          * 1274.17  * Flow Area (sq ft)       *   16.93  *   51.73  *          *
* E.G. Slope (ft/ft)      *0.008031  * Area (sq ft)            *   16.93  *   51.73  *          *
* Q Total (cfs)           *  353.98  * Flow (cfs)              *   45.07  *  308.90  *          *
* Top Width (ft)          *   39.56  * Top Width (ft)          *   16.64  *   22.92  *          *
* Vel Total (ft/s)        *    5.16  * Avg. Vel. (ft/s)        *    2.66  *    5.97  *          *
* Max Chl Dpth (ft)       *    5.97  * Hydr. Depth (ft)        *    1.02  *    2.26  *          *
* Conv. Total (cfs)       *  3949.9  * Conv. (cfs)             *   503.0  *  3446.9  *          *
* Length Wtd. (ft)        *  245.43  * Wetted Per. (ft)        *   16.93  *   26.31  *          *
* Min Ch El (ft)          * 1268.72  * Shear (lb/sq ft)        *    0.50  *    0.99  *          *
* Alpha                   *    1.20  * Stream Power (lb/ft s)  *    1.33  *    5.89  *          *
* Frctn Loss (ft)         *    0.12  * Cum Volume (acre-ft)    *    1.28  *    0.31  *          *
* C & E Loss (ft)         *    0.15  * Cum SA (acres)          *    0.83  *    0.14  *          *
*************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #6-hr
*************************************************************************************************
* E.G. Elev (ft)          * 1275.26  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.47  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1274.79  * Reach Len. (ft)         *  271.54  *  221.51  *  201.63  *
* Crit W.S. (ft)          * 1274.22  * Flow Area (sq ft)       *   18.51  *   53.98  *          *
* E.G. Slope (ft/ft)      *0.007881  * Area (sq ft)            *   18.51  *   53.98  *          *
* Q Total (cfs)           *  365.84  * Flow (cfs)              *   51.37  *  314.48  *          *
* Top Width (ft)          *   41.54  * Top Width (ft)          *   16.84  *   24.70  *          *
* Vel Total (ft/s)        *    5.05  * Avg. Vel. (ft/s)        *    2.78  *    5.83  *          *
* Max Chl Dpth (ft)       *    6.07  * Hydr. Depth (ft)        *    1.10  *    2.19  *          *
* Conv. Total (cfs)       *  4121.0  * Conv. (cfs)             *   578.6  *  3542.4  *          *
* Length Wtd. (ft)        *  245.84  * Wetted Per. (ft)        *   17.16  *   28.09  *          *
* Min Ch El (ft)          * 1268.72  * Shear (lb/sq ft)        *    0.53  *    0.95  *          *
* Alpha                   *    1.19  * Stream Power (lb/ft s)  *    1.47  *    5.51  *          *
* Frctn Loss (ft)         *    0.12  * Cum Volume (acre-ft)    *    1.35  *    0.32  *          *
* C & E Loss (ft)         *    0.14  * Cum SA (acres)          *    0.87  *    0.14  *          *
*************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #24-hr
*****************************************************************************************************
*          * 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      * 9902.55   * 9922.25   *    45.07 *    16.93 *    16.93 *    12.73 *     1.02 *     2.66 *
* 2        * Chan     * 9922.25   * 9937.51   *   307.19 *    50.17 *    18.64 *    86.78 *     3.29 *     6.12 *
* 3        * Chan     * 9937.51   * 9952.77   *     1.71 *     1.56 *     7.67 *     0.48 *     0.20 *     1.09 *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #6-hr
*****************************************************************************************************
*          * 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      * 9902.55   * 9922.25   *    51.37 *    18.51 *    17.16 *    14.04 *     1.10 *     2.78 *
* 2        * Chan     * 9922.25   * 9937.51   *   311.60 *    51.62 *    18.64 *    85.17 *     3.38 *     6.04 *
* 3        * Chan     * 9937.51   * 9952.77   *     2.88 *     2.37 *     9.45 *     0.79 *     0.25 *     1.22 *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
```

water surface was used.

CROSS SECTION

RIVER: Eastern Canal
REACH: 115 RS: 9.717

INPUT
Description:
Station Elevation Data num= 170

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9084.89	1276.99	9099.02	1276.72	9105.87	1276.6	9114.15	1276.64	9128.97	1276.8
9153.14	1277.74	9153.17	1277.74	9153.18	1277.74	9153.24	1277.74	9172.39	1277.8
9176.64	1277.86	9187.91	1277.75	9200.73	1277.62	9201.46	1277.63	9202.5	1277.6
9205.49	1277.66	9222.99	1277.67	9229.06	1277.51	9229.69	1277.5	9230	1277.5
9230.64	1277.43	9231.32	1277.28	9233.41	1277.2	9237.49	1277.03	9240.55	1277
9246.57	1276.77	9255.59	1276.43	9258.9	1276.31	9265.24	1276.8	9267.24	1276.9
9267.67	1276.87	9269.61	1276.8	9270.2	1276.78	9272.01	1276.71	9273.24	1276.7
9274.44	1276.63	9276.23	1276.58	9276.89	1276.56	9279.19	1276.5	9279.31	1276.5
9279.92	1276.48	9281.63	1276.47	9283.84	1276.45	9285.97	1276.44	9286.59	1276.4
9288.02	1276.42	9290.02	1276.41	9291.98	1276.39	9293.91	1276.38	9295.83	1276.4
9297.74	1276.35	9299.65	1276.33	9301.57	1276.32	9303.53	1276.3	9305.52	1276.3
9307.55	1276.27	9309.65	1276.25	9311.83	1276.23	9314.1	1276.21	9316.48	1276.2
9318.77	1276.17	9318.96	1276.17	9318.99	1276.17	9321.12	1276.18	9321.63	1276.2
9322.49	1276.2	9324.29	1276.22	9326.08	1276.24	9326.96	1276.25	9329.17	1276.3
9329.73	1276.27	9332.09	1276.31	9333.51	1276.34	9339.04	1276.64	9343.73	1276.8
9352.12	1277.26	9366.06	1277.37	9368.47	1277.37	9384.8	1277.08	9388.1	1277
9389.4	1277.01	9395.07	1276.31	9405.47	1274	9410.53	1273.26	9413.88	1273.1
9414.04	1273.1	9414.41	1273.14	9416.17	1273.04	9418.82	1272.84	9428.66	1272.3
9437.68	1273.19	9450.13	1273.57	9452.34	1273.73	9457.4	1273.67	9459.24	1273.7
9463.6	1273.74	9474.69	1274.06	9481.3	1274.21	9485.31	1274.27	9488.95	1274.3
9494.75	1274.56	9497.42	1274.73	9500.14	1274.89	9522.88	1275.3	9523.78	1275.3
9524.21	1275.27	9530.22	1275.04	9531.87	1274.92	9540.14	1274.17	9545.87	1273.5
9558.54	1271.73	9560.89	1271.62	9562.78	1271.68	9565.15	1271.64	9576.64	1271.6
9586.01	1271.29	9592.05	1271.76	9598.74	1272.19	9605.57	1272.72	9606.22	1272.7
9608.24	1272.85	9620.69	1273.45	9631.4	1273.7	9642.22	1274.05	9648.77	1274.4
9656.38	1274.75	9667.94	1274.92	9669.24	1274.94	9671.37	1274.99	9687.79	1275.2
9696.92	1275.58	9709.98	1275.98	9714.98	1275.99	9730.96	1275.85	9745.58	1276.2
9746.36	1276.23	9748.38	1276.31	9756.8	1276.58	9762.66	1276.89	9777.77	1276.9
9787.12	1277.15	9789.6	1277.15	9791.3	1277.16	9800.04	1277.16	9825.16	1276.9
9835.69	1276.86	9841.82	1276.86	9850.97	1276.84	9860.85	1276.82	9862.59	1276.8
9862.76	1276.82	9872.38	1276.8	9875.25	1276.75	9889.34	1276.58	9892.4	1276.5
9903.09	1276.09	9907.31	1273.81	9908.09	1273.25	9910.57	1273.34	9920.89	1273.7
9924.63	1271.35	9929.68	1268.54	9932.81	1270.93	9937.45	1273.86	9951.26	1274.9
9955.55	1275.17	9956.59	1275.24	9957.91	1275.3	9961.72	1275.41	9981.92	1276.1

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9084.89	.035	9920.89	.035	9981.92	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9920.89	9981.92	278.03	221.95	200	.1	.3

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1274.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1274.91	Reach Len. (ft)			
Crit W.S. (ft)	1272.61	Flow Area (sq ft)	394.98	69.18	
E.G. Slope (ft/ft)	0.000162	Area (sq ft)	394.98	69.18	
Q Total (cfs)	353.98	Flow (cfs)	293.47	60.51	
Top Width (ft)	281.30	Top Width (ft)	250.77	30.53	
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)	0.74	0.87	
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	1.58	2.27	
Conv. Total (cfs)	27793.0	Conv. (cfs)	23042.3	4750.7	
Length Wtd. (ft)		Wetted Per. (ft)	251.81	33.63	
Min Ch El (ft)	1268.54	Shear (lb/sq ft)	0.02	0.02	
Alpha	1.01	Stream Power (lb/ft s)	0.01	0.02	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1275.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1274.99	Reach Len. (ft)			
Crit W.S. (ft)	1272.64	Flow Area (sq ft)	415.45	71.67	
E.G. Slope (ft/ft)	0.000156	Area (sq ft)	415.45	71.67	
Q Total (cfs)	365.84	Flow (cfs)	304.46	61.38	
Top Width (ft)	292.70	Top Width (ft)	260.90	31.80	
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)	0.73	0.86	
Max Chl Dpth (ft)	6.45	Hydr. Depth (ft)	1.59	2.25	
Conv. Total (cfs)	29300.6	Conv. (cfs)	24384.6	4916.0	
Length Wtd. (ft)		Wetted Per. (ft)	261.97	34.90	
Min Ch El (ft)	1268.54	Shear (lb/sq ft)	0.02	0.02	
Alpha	1.01	Stream Power (lb/ft s)	0.01	0.02	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9293.89	9502.89	79.96	126.53	100.14	22.59	1.27	0.63
2	LOB	9502.89	9711.89	200.43	247.90	135.58	56.62	1.83	0.81
3	LOB	9711.89	9920.89	13.08	20.55	16.08	3.70	1.32	0.64
4	Chan	9920.89	9936.15	57.69	59.96	18.08	16.30	3.93	0.96
5	Chan	9936.15	9951.40	2.82	9.22	15.53	0.80	0.60	0.31

Warning: Divided flow computed for this cross-section.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9293.89	9502.89	86.11	134.63	102.15	23.54	1.32	0.64
2	LOB	9502.89	9711.89	204.24	259.01	143.57	55.83	1.81	0.79
3	LOB	9711.89	9920.89	14.11	21.80	16.25	3.86	1.38	0.65
4	Chan	9920.89	9936.15	58.01	61.18	18.08	15.86	4.01	0.95
5	Chan	9936.15	9951.40	3.37	10.44	15.53	0.92	0.68	0.32
6	Chan	9951.40	9966.66	0.00	0.05	1.29	0.00	0.04	0.05

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:Eastern Canal

Reach	River Sta.	n1	n2	n3
115	9.907	.05	.035	.05
115	9.89	Lat Struct		
115	9.869	.05	.035	.05
115	9.85	Lat Struct		
115	9.831	.05	.035	.05
115	9.8	Lat Struct		
115	9.793	.05	.035	.05
115	9.756	.05	.035	.05
115	9.717	.035	.035	.05

SUMMARY OF REACH LENGTHS

River: Eastern Canal

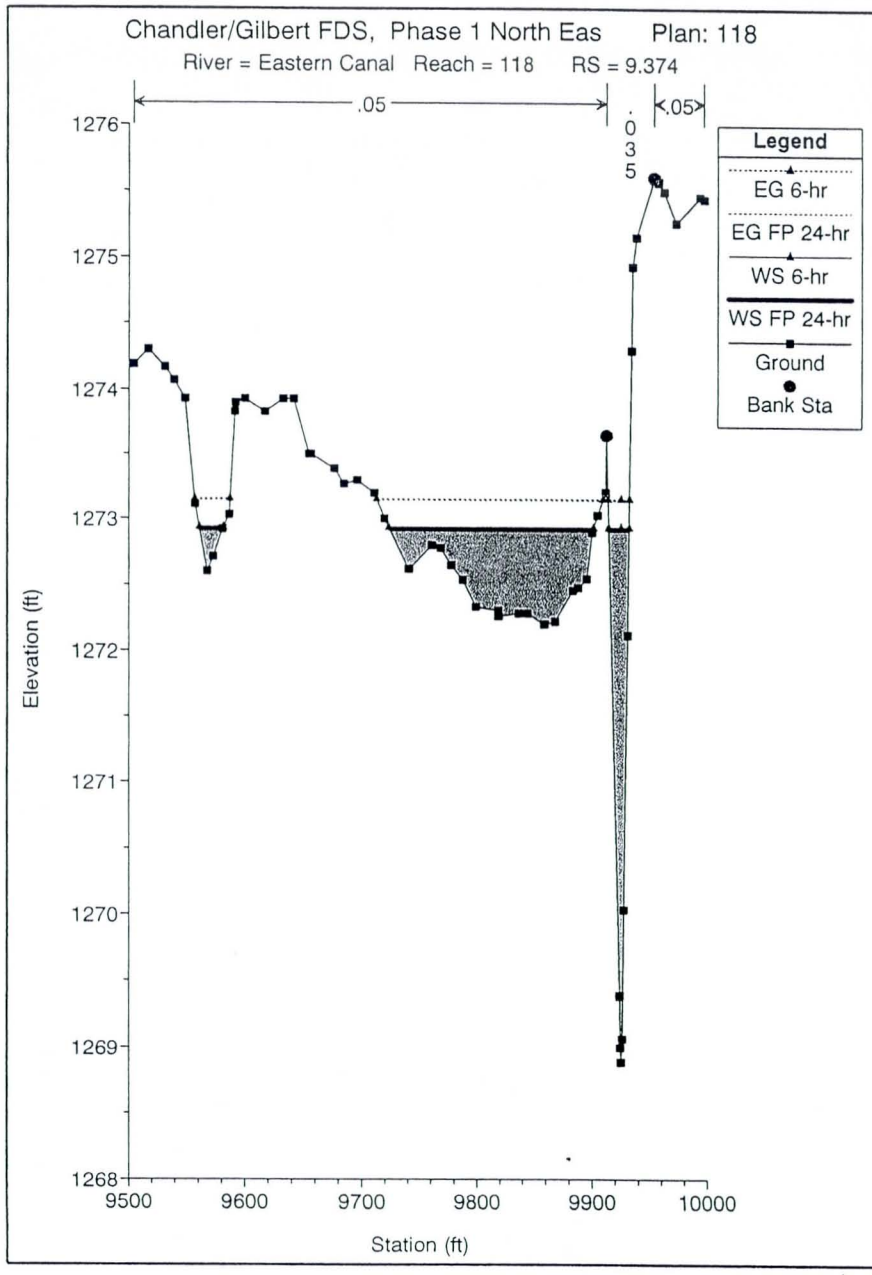
Reach	River Sta.	Left	Channel	Right
115	9.907	200	200	200
115	9.89	Lat Struct		
115	9.869	200	200	200
115	9.85	Lat Struct		
115	9.831	200	216.21	200
115	9.8	Lat Struct		
115	9.793	546.33	205.05	505.46
115	9.756	271.54	221.51	201.63
115	9.717	278.03	221.95	200

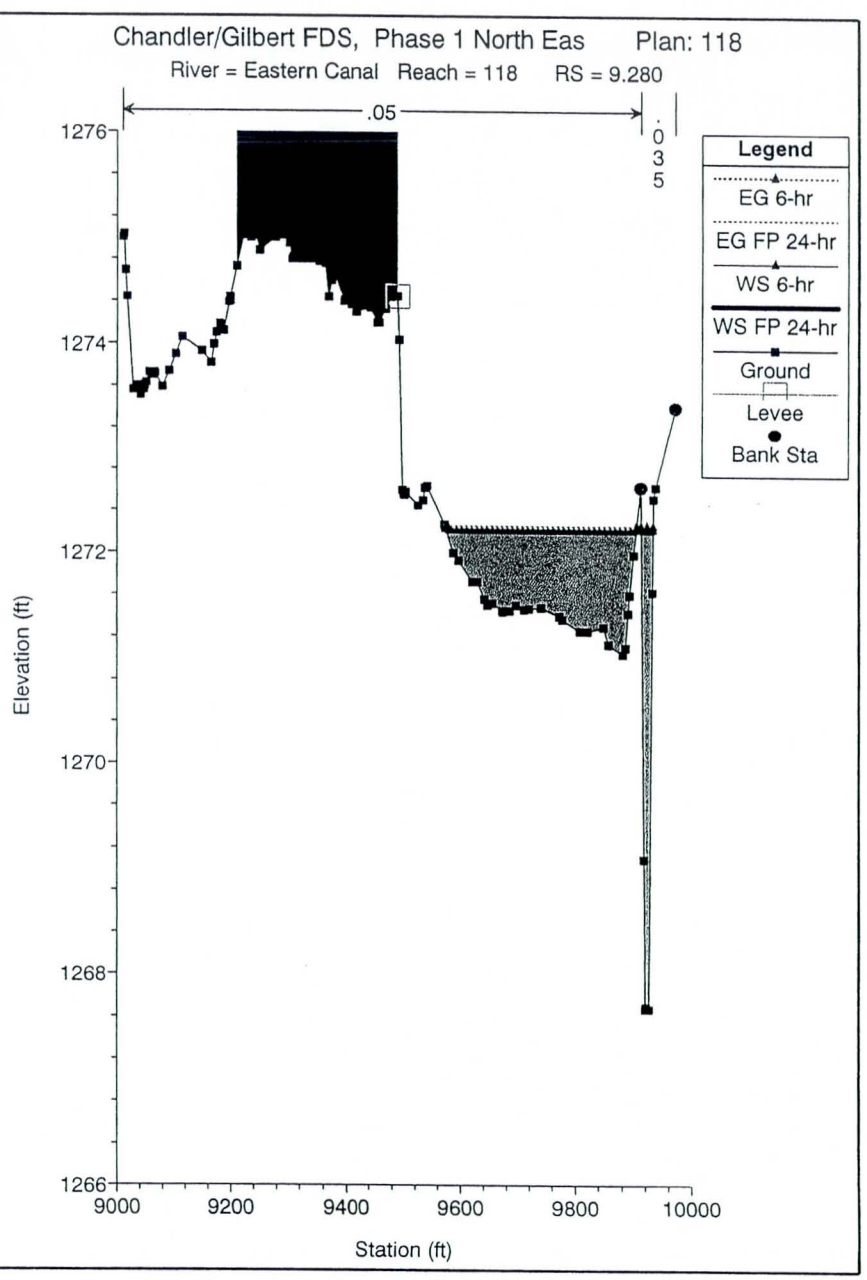
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Eastern Canal

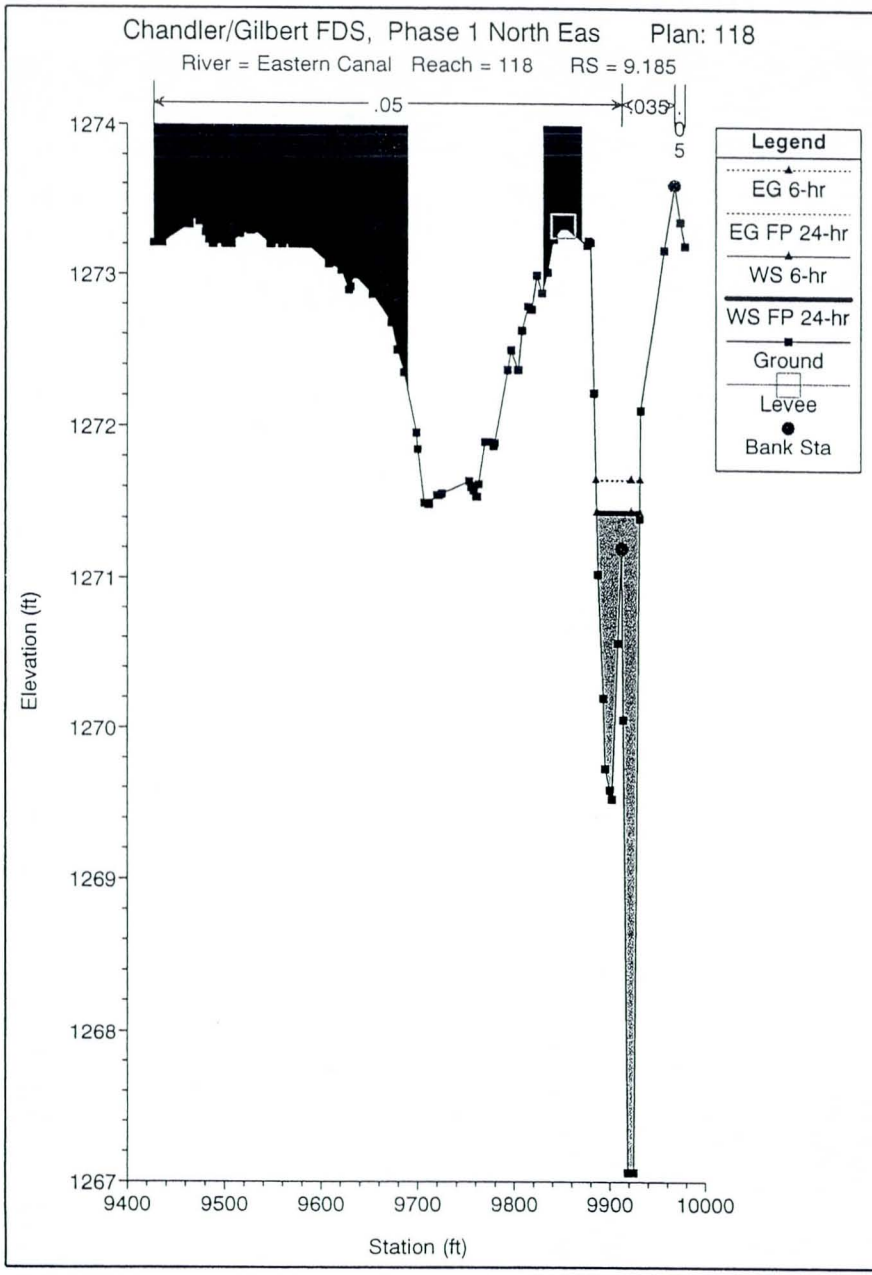
Reach	River Sta.	Contr.	Expan.
115	9.907	.1	.3
115	9.89	Lat Struct	
115	9.869	.1	.3
115	9.85	Lat Struct	
115	9.831	.1	.3
115	9.8	Lat Struct	
115	9.793	.1	.3
115	9.756	.1	.3
115	9.717	.1	.3

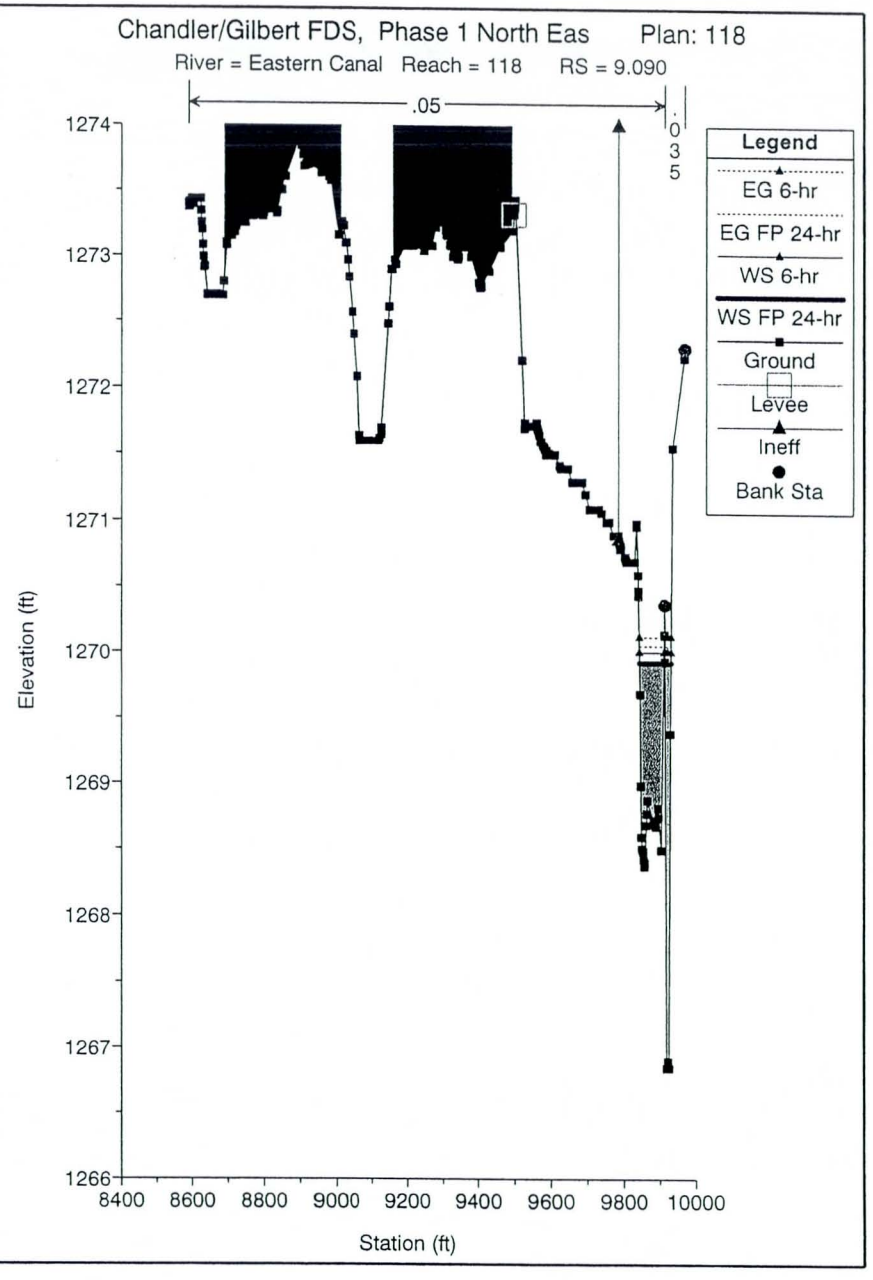
HEC-RAS Plan: 118 River: Eastern Canal Reach: 118

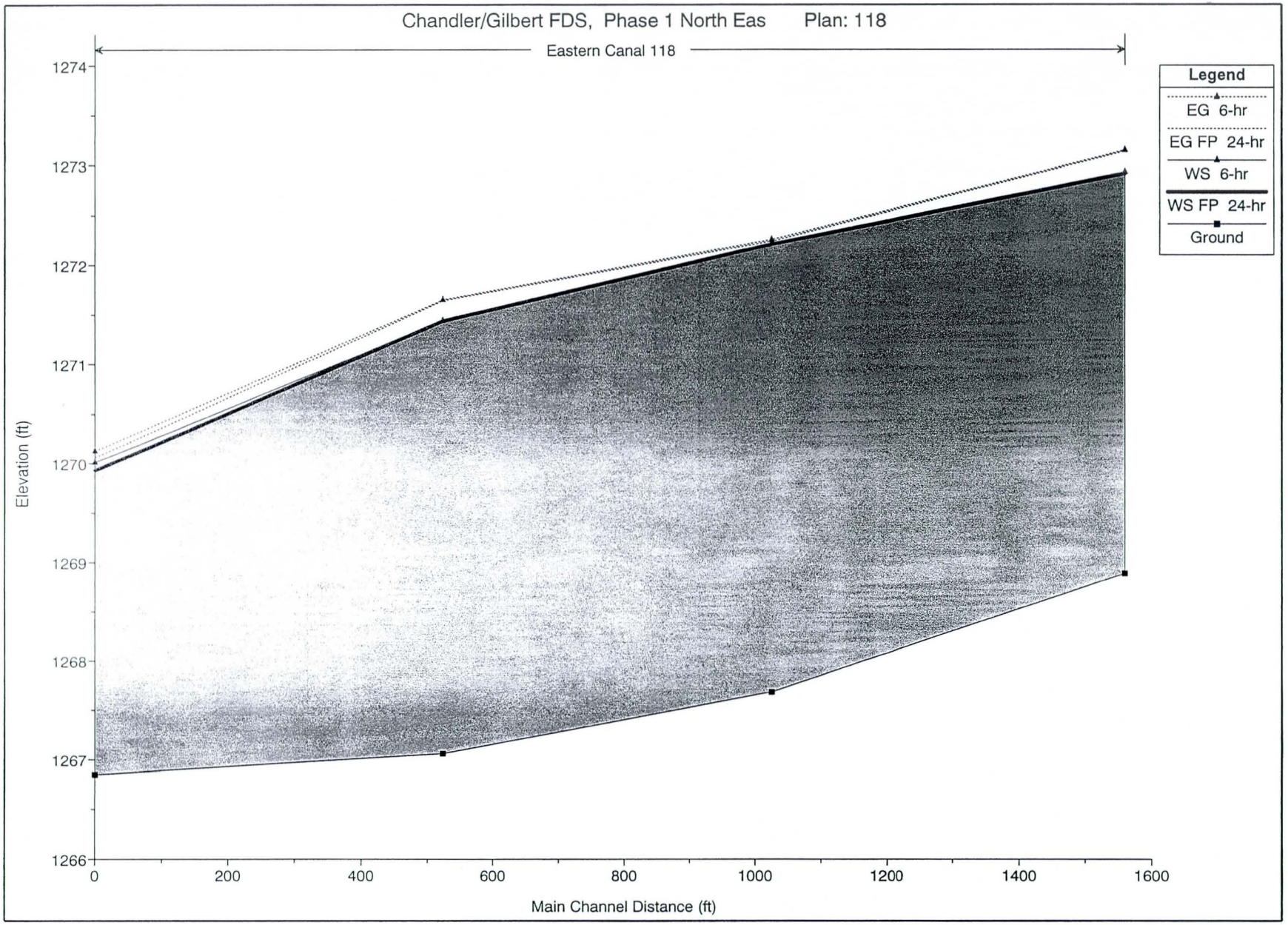
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
118	9.374	24-hr	271.00	1268.89	1272.92		1273.15	0.005335	4.69	118.07	214.03	0.58
118	9.374	6-hr	276.00	1268.89	1272.94		1273.15	0.005292	4.68	120.88	216.24	0.57
118	9.280	24-hr	271.00	1267.68	1272.21	1270.78	1272.25	0.000668	2.05	299.57	349.02	0.21
118	9.280	6-hr	276.00	1267.68	1272.23	1270.77	1272.26	0.000664	2.05	304.91	350.24	0.21
118	9.185	24-hr	271.00	1267.06	1271.44	1270.27	1271.65	0.002479	3.96	86.77	45.43	0.41
118	9.185	6-hr	276.00	1267.06	1271.44	1270.31	1271.65	0.002564	4.03	86.85	45.44	0.42
118	9.090	24-hr	271.00	1266.85	1269.93	1269.44	1270.06	0.003316	3.71	111.69	84.65	0.46
118	9.090	6-hr	276.00	1266.85	1270.01	1269.45	1270.13	0.002930	3.53	118.51	85.89	0.43


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 118
River = Eastern Canal Reach = 118 RS = 9.374
.05
.035
<.05>
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Bank Sta
Elevation (ft)
1276
1275
1274
1273
1272
1271
1270
1269
1268
9500
9600
9700
9800
9900
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 118
River = Eastern Canal Reach = 118 RS = 9.280
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1276
1274
1272
1270
1268
1266
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 118
River = Eastern Canal Reach = 118 RS = 9.185
.05
.035
.05
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Bank Sta
Elevation (ft)
1274
1273
1272
1271
1270
1269
1268
1267
9400
9500
9600
9700
9800
9900
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas
Plan: 118
River = Eastern Canal Reach = 118 RS = 9.090
.05
.035
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
1274
1273
1272
1271
1270
1269
1268
1267
1266
8400
8600
8800
9000
9200
9400
9600
9800
10000
Station (ft)


Chandler/Gilbert FDS, Phase 1 North Eas Plan: 118
Eastern Canal 118
Legend
EG 6-hr
EG FP 24-hr
WS 6-hr
WS FP 24-hr
Ground
Elevation (ft)
1274
1273
1272
1271
1270
1269
1268
1267
1266
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

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                    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
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PROJECT DATA
Project Title: Chandler/Gilbert FDS,  Phase 1 North Eas
Project File : CGFDP1N.prj
Run Date and Time: 10/31/2007 2:35:46 PM

Project in English units

Project Description:
3 conveyance analyses for Chandler/Gilbert FDS Phase 1 North included in this
HEC-RAS model.
Analyses were conducted by Project Engineering Consultants,
Ltd.
Models updated on 10/31/2007.

Clear conveyances exist between Pond
111 and Pond 114, between Pond 114 and Pond 115, and between Pond 115 and Pond
118. Exact pond locations can be found in the accompanying HEC-1 models and
work maps.
Geometry data was obtained from the DEA. Cross sections were cut
from the surfaces using Autodest Land Desktop 2004, and imported to this
project as HEC-2 input data files. Levees, ineffective areas, blocked
obstructions and lateral structure were designated according to local
situation.
Steady flow data was obtained from the HEC-1 models simulating
100-year 6-hour and 24-hour rainfall storm events. Flow rates used in analyses
are the rates contributing to thedownstream conveyances. Water loss from the
upstream ponding areas to the Eastern Canal was not a part of the in-flow rates
for conveyance analyses.
Plan 114 uses 111EAS (HEC-1 models) as infow
rate.
Plan 115 uses 114EAS (HEC-1 models) as inflow rate.
Plan 118 uses
115EAS (HEC-1 models) as inflow rate.
Downstream ponding elevations were
considered as the downstream boundary conditions.
Plan 114 uses elevation of
P114 (HEC-1 models) as downstream boundary condition.
Plan 115 uses elevation
of P115 (HEC-1 models) as downstream boundary condition.
Plan 118 uses
elevation of P118 (HEC-1 models) as downstream boundary condition.
Putting the
modeled water loss from the lateral structures into HEC-1 models affected the
downstream ponding elevations. Performed this iteration several times until the
results converged. Models shown in this project are the final "converged"
models.

      ******* Autodesk, Inc. HEC-2 Input Data file ********

************     Minimum Data Input     *************

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


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

PLAN DATA

Plan Title: 118
Plan File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.p05

           Geometry Title: 118geom
           Geometry File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.g03

           Flow Title    : 118flow
           Flow File     : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.f04

Plan Description:
This plan uses 118geom (CGFDP1N.g03) as geometric data and 118flow
(CGFDP1N.f04) as steady flow data. This plan saved as 118 (CGFDP1N.p05).
The
flow data are obtained from the HEC-1 models.  Peak flows at 115EAS are used.


Plan Summary Information:
```

```
Number of:  Cross Sections =    4    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: 118flow
Flow File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.f04

Flow Data (cfs)
*************************************************************************
* River           Reach           RS      *          24-hr           6-hr *
* Eastern Canal   118             9.374   *           271             276 *
*************************************************************************

Boundary Conditions
*****************************************************************************************************
* River           Reach           Profile          *           Upstream                Downstream    *
*****************************************************************************************************
* Eastern Canal   118             24-hr            *                                Known WS = 1269.93 *
* Eastern Canal   118             6-hr             *                                Known WS = 1270.01 *
*****************************************************************************************************

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

GEOMETRY DATA

Geometry Title: 118geom
Geometry File : c:\Projects\chandlergilbert\phase1ras\CGFDP1N.g03

CROSS SECTION


RIVER: Eastern Canal
REACH: 118                RS: 9.374

INPUT
Description:
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************************
 9504.18 1274.19 9516.61  1274.3 9531.06 1274.17 9539.11 1274.07 9548.48 1273.93
 9557.22 1273.11 9567.59  1272.6 9572.96 1272.71 9580.86 1272.92 9586.67 1273.03
 9591.58 1273.83 9591.92  1273.9 9600.19 1273.93 9617.29 1273.83 9632.63 1273.93
 9641.52 1273.93  9654.8  1273.5 9656.71  1273.5 9676.65 1273.39 9684.81 1273.27
 9696.33  1273.3 9710.83  1273.2 9719.88    1273 9740.57 1272.62 9741.18 1272.62
 9741.37 1272.62 9760.79  1272.8 9768.41 1272.78 9777.35 1272.65 9787.48 1272.54
 9798.92 1272.33 9818.44  1272.3 9818.59 1272.26 9819.06 1272.26 9836.69 1272.28
 9843.99 1272.28 9858.64  1272.2  9867.9 1272.22 9883.25 1272.46  9887.7 1272.48
 9895.35 1272.55 9899.86  1272.9 9904.74 1273.03 9911.45 1273.21 9912.54 1273.65
 9923.79 1269.39 9924.44    1269 9924.88 1268.89 9925.96 1269.07  9927.2 1270.04
 9930.75 1272.12 9934.02  1274.3 9934.96 1274.93 9938.18 1275.15 9953.84  1275.6
 9957.39 1275.57 9962.42  1275.5 9972.79 1275.26 9993.49 1275.46 9997.34 1275.44

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9504.18     .05 9912.54    .035 9953.84     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9912.54 9953.84           628.77  535.15     500             .1       .3

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)          * 1273.15  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.22  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1272.92  * Reach Len. (ft)        *  628.77  *  535.15  *  500.00  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)      *   81.96  *   36.10  *          *
* E.G. Slope (ft/ft)      *0.005335  * Area (sq ft)           *   81.96  *   36.10  *          *
* Q Total (cfs)           *  271.00  * Flow (cfs)              *  101.70  *  169.30  *          *
* Top Width (ft)          *  214.03  * Top Width (ft)          *  196.54  *   17.49  *          *
* Vel Total (ft/s)        *    2.30  * Avg. Vel. (ft/s)        *    1.24  *    4.69  *          *
* Max Chl Dpth (ft)       *    4.03  * Hydr. Depth (ft)        *    0.42  *    2.06  *          *
* Conv. Total (cfs)       *  3710.3  * Conv. (cfs)             *  1392.4  *  2317.9  *          *
* Length Wtd. (ft)        *  578.67  * Wetted Per. (ft)        *  196.58  *   19.42  *          *
* Min Ch El (ft)          * 1268.89  * Shear (lb/sq ft)        *    0.14  *    0.62  *          *
* Alpha                   *    2.72  * Stream Power (lb/ft s)  *    0.17  *    2.90  *          *
* Frctn Loss (ft)         *    0.84  * Cum Volume (acre-ft)    *    4.65  *    1.78  *          *
* C & E Loss (ft)         *    0.06  * Cum SA (acres)          *    6.49  *    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.

CROSS SECTION OUTPUT  Profile #6-hr
*****************************************************************************************
* E.G. Elev (ft)         * 1273.15  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    0.22  * Wt. n-Val.             *   0.050 *   0.035 *         *
* W.S. Elev (ft)         * 1272.94  * Reach Len. (ft)        *  628.77 *  535.15 *  500.00 *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *   84.55 *   36.33 *         *
* E.G. Slope (ft/ft)     *0.005292  * Area (sq ft)           *   84.55 *   36.33 *         *
* Q Total (cfs)          *  276.00  * Flow (cfs)              *  105.95 *  170.05 *         *
* Top Width (ft)         *  216.24  * Top Width (ft)          *  198.70 *   17.55 *         *
* Vel Total (ft/s)       *    2.28  * Avg. Vel. (ft/s)        *    1.25 *    4.68 *         *
* Max Chl Dpth (ft)      *    4.05  * Hydr. Depth (ft)        *    0.43 *    2.07 *         *
* Conv. Total (cfs)      *  3794.1  * Conv. (cfs)             *  1456.5 *  2337.6 *         *
* Length Wtd. (ft)       *  579.36  * Wetted Per. (ft)        *  198.74 *   19.48 *         *
* Min Ch El (ft)         * 1268.89  * Shear (lb/sq ft)        *    0.14 *    0.62 *         *
* Alpha                  *    2.70  * Stream Power (lb/ft s)  *    0.18 *    2.88 *         *
* Frctn Loss (ft)        *    0.84  * Cum Volume (acre-ft)    *    4.77 *    1.79 *         *
* C & E Loss (ft)        *    0.06  * Cum SA (acres)          *    6.53 *    0.68 *         *
*****************************************************************************************

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 #24-hr
*****************************************************************************************************************
*          * 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      * 9504.18   * 9606.27   *     2.08 *     3.34 *    19.96 *     0.77 *     0.17 *     0.62 *
* 2        * LOB      * 9606.27   * 9708.36   *          *          *          *          *          *          *
* 3        * LOB      * 9708.36   * 9810.45   *    23.24 *    25.54 *    86.35 *     8.58 *     0.30 *     0.91 *
* 4        * LOB      * 9810.45   * 9912.54   *    76.38 *    53.08 *    90.27 *    28.18 *     0.59 *     1.44 *
* 5        * Chan     * 9912.54   * 9922.87   *    53.02 *    13.37 *     8.99 *    19.57 *     1.59 *     3.97 *
* 6        * Chan     * 9922.87   * 9933.19   *   116.28 *    22.73 *    10.43 *    42.91 *     2.50 *     5.11 *
*****************************************************************************************************************

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 #6-hr
*****************************************************************************************************************
*          * 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      * 9504.18   * 9606.27   *     2.29 *     3.61 *    20.92 *     0.83 *     0.17 *     0.63 *
* 2        * LOB      * 9606.27   * 9708.36   *          *          *          *          *          *          *
* 3        * LOB      * 9708.36   * 9810.45   *    24.82 *    26.67 *    87.06 *     8.99 *     0.31 *     0.93 *
* 4        * LOB      * 9810.45   * 9912.54   *    78.85 *    54.27 *    90.76 *    28.57 *     0.60 *     1.45 *
* 5        * Chan     * 9912.54   * 9922.87   *    53.39 *    13.48 *     9.02 *    19.35 *     1.60 *     3.96 *
* 6        * Chan     * 9922.87   * 9933.19   *   116.66 *    22.85 *    10.45 *    42.27 *     2.51 *     5.10 *
*****************************************************************************************************************

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: Eastern Canal
REACH: 118                RS: 9.280

INPUT
Description:
Station Elevation Data    num=     131
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9010.55    1275  9012.4 1275.03 9014.98 1274.69 9017.57 1274.44 9028.63 1273.56
  9033.8  1273.6 9035.69  1273.6 9038.73 1273.57 9041.69 1273.51 9046.87 1273.56
 9048.73  1273.6 9048.96 1273.61 9051.38 1273.63 9057.01 1273.73 9057.08 1273.73
 9063.02  1273.7 9064.94 1273.73 9066.73 1273.72 9080.06 1273.59 9091.49 1273.74
 9103.21  1273.9 9114.76 1274.06 9149.28 1273.93 9165.02 1273.82 9169.95 1273.99
 9174.43  1274.1 9180.65 1274.18 9183.54 1274.16  9187.6 1274.12 9197.03 1274.39
 9198.32  1274.4  9198.7 1274.44 9210.18 1274.73 9222.16 1275.02 9230.89 1275.02
 9235.06    1275 9241.16 1275.02 9243.19 1275.02 9243.57 1275.02 9249.97 1274.88
  9277.9    1275 9286.57 1275.02 9290.99 1275.02  9299.9 1275.02  9302.2 1274.95
 9306.89  1274.8 9308.51 1274.82 9312.89 1274.82 9316.76 1274.82 9319.13 1274.82
 9320.48  1274.8 9320.51  1274.8 9320.54  1274.8 9331.02  1274.8 9331.05  1274.8
 9331.09  1274.8 9331.13  1274.8 9335.16 1274.82  9339.1 1274.82 9339.99 1274.81
 9340.19  1274.8 9351.94 1274.78 9360.84 1274.79 9362.47 1274.76 9368.43 1274.44
 9373.57  1274.6 9375.86 1274.67 9376.12 1274.67 9377.38 1274.69 9379.35 1274.66
 9395.89  1274.4 9396.52 1274.41 9396.68 1274.41 9402.49 1274.44 9408.32 1274.37
  9418.1  1274.3 9442.12 1274.34 9454.88  1274.2 9455.24  1274.2 9455.77  1274.2
 9456.92  1274.2 9468.63 1274.33  9478.4 1274.44 9489.54 1274.45 9491.97 1274.04
 9498.18  1272.6  9500.6 1272.56 9501.57 1272.55 9503.22 1272.58 9525.72 1272.45
 9534.14  1272.5 9537.67 1272.62 9541.59 1272.64 9571.83 1272.27 9573.95 1272.24
 9587.73    1272 9596.68 1271.93 9620.92 1271.73 9629.33 1271.73 9642.07 1271.56
 9646.93  1271.5 9655.19 1271.52 9672.87 1271.45 9674.29 1271.44 9685.71 1271.45
 9696.94  1271.5 9710.97 1271.46 9719.49 1271.47 9740.57 1271.48 9741.14 1271.48
 9771.91  1271.4 9776.93 1271.37 9807.76 1271.26 9815.84 1271.26 9820.75 1271.26
```

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 9847.89  1271.3 9857.04 1271.14 9881.65 1271.05 9885.81 1271.11 9890.39 1271.43
 9892.78  1271.6 9899.88 1271.99  9912.2 1272.63 9918.08  1269.1 9920.25 1267.68
 9921.44  1267.7 9926.06 1267.68 9932.27 1271.63 9933.82 1272.52 9938.06 1272.63
 9971.62  1273.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9010.55     .05  9912.2    .035 9971.62     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9912.2 9971.62           507.03  501.46     500            .1       .3
Left Levee      Station= 9489.54      Elevation= 1274.45
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 9210.55 9488.55    1276

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)          * 1272.25  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.03  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1272.21  * Reach Len. (ft)        *  507.03  *  501.46  *  500.00  *
* Crit W.S. (ft)          * 1270.78  * Flow Area (sq ft)      *  240.76  *   58.81  *          *
* E.G. Slope (ft/ft)      *0.000668  * Area (sq ft)           *  240.76  *   58.81  *          *
* Q Total (cfs)           *  271.00  * Flow (cfs)             *  150.26  *  120.74  *          *
* Top Width (ft)          *  349.02  * Top Width (ft)         *  328.63  *   20.39  *          *
* Vel Total (ft/s)        *    0.90  * Avg. Vel. (ft/s)       *    0.62  *    2.05  *          *
* Max Chl Dpth (ft)       *    4.53  * Hydr. Depth (ft)       *    0.73  *    2.88  *          *
* Conv. Total (cfs)       * 10486.0  * Conv. (cfs)            *  5814.2  *  4671.8  *          *
* Length Wtd. (ft)        *  503.54  * Wetted Per. (ft)       *  328.67  *   22.98  *          *
* Min Ch El (ft)          * 1267.68  * Shear (lb/sq ft)       *    0.03  *    0.11  *          *
* Alpha                   *    2.56  * Stream Power (lb/ft s) *    0.02  *    0.22  *          *
* Frctn Loss (ft)         *    0.58  * Cum Volume (acre-ft)   *    2.32  *    1.19  *          *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)         *    2.70  *    0.44  *          *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #6-hr
*****************************************************************************************
* E.G. Elev (ft)          * 1272.26  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.03  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)          * 1272.23  * Reach Len. (ft)        *  507.03  *  501.46  *  500.00  *
* Crit W.S. (ft)          * 1270.77  * Flow Area (sq ft)      *  245.78  *   59.12  *          *
* E.G. Slope (ft/ft)      *0.000664  * Area (sq ft)           *  245.78  *   59.12  *          *
* Q Total (cfs)           *  276.00  * Flow (cfs)             *  154.74  *  121.26  *          *
* Top Width (ft)          *  350.24  * Top Width (ft)         *  329.80  *   20.44  *          *
* Vel Total (ft/s)        *    0.91  * Avg. Vel. (ft/s)       *    0.63  *    2.05  *          *
* Max Chl Dpth (ft)       *    4.55  * Hydr. Depth (ft)       *    0.75  *    2.89  *          *
* Conv. Total (cfs)       * 10708.5  * Conv. (cfs)            *  6003.6  *  4704.9  *          *
* Length Wtd. (ft)        *  503.56  * Wetted Per. (ft)       *  329.84  *   23.04  *          *
* Min Ch El (ft)          * 1267.68  * Shear (lb/sq ft)       *    0.03  *    0.11  *          *
* Alpha                   *    2.53  * Stream Power (lb/ft s) *    0.02  *    0.22  *          *
* Frctn Loss (ft)         *    0.59  * Cum Volume (acre-ft)   *    2.39  *    1.21  *          *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)         *    2.72  *    0.44  *          *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #24-hr
*************************************************************************************************************
*          * 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       * 9489.54   * 9700.87   *    33.05 *    67.00 *   125.34 *    12.20 *     0.53 *     0.49 *
* 2        * LOB       * 9700.87   * 9912.20   *   117.21 *   173.76 *   203.33 *    43.25 *     0.85 *     0.67 *
* 3        * Chan      * 9912.20   * 9927.06   *   103.15 *    46.83 *    15.63 *    38.06 *     3.31 *     2.20 *
* 4        * Chan      * 9927.06   * 9941.91   *    17.59 *    11.98 *     7.35 *     6.49 *     1.92 *     1.47 *
*************************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #6-hr
*************************************************************************************************************
*          * 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       * 9489.54   * 9700.87   *    34.41 *    68.92 *   126.22 *    12.47 *     0.55 *     0.50 *
* 2        * LOB       * 9700.87   * 9912.20   *   120.33 *   176.86 *   203.62 *    43.60 *     0.87 *     0.68 *
* 3        * Chan      * 9912.20   * 9927.06   *   103.54 *    47.05 *    15.66 *    37.51 *     3.32 *     2.20 *
* 4        * Chan      * 9927.06   * 9941.91   *    17.72 *    12.08 *     7.38 *     6.42 *     1.93 *     1.47 *
*************************************************************************************************************

Warning: Divided flow computed for this cross-section.
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Eastern Canal
REACH: 118 RS: 9.185

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9427.21	1273.21	9436.38	1273.21	9464.15	1273.33	9472.7	1273.4	9474.14	1273.35
9480.83	1273.28	9484.22	1273.23	9485.01	1273.23	9488.06	1273.2	9488.44	1273.2
9500.83	1273.2	9507.4	1273.2	9516.18	1273.27	9523.1	1273.3	9527.03	1273.29
9529.55	1273.3	9529.7	1273.3	9547.24	1273.2	9548.39	1273.2	9559.3	1273.2
9559.47	1273.2	9559.58	1273.2	9570.01	1273.2	9577.81	1273.2	9582.63	1273.2
9585.24	1273.2	9607.8	1273.07	9620.9	1273.03	9628.95	1272.9	9630.61	1272.92
9634.58	1273	9653.51	1272.87	9673.04	1272.68	9679.21	1272.5	9686.06	1272.35
9698.92	1271.96	9700.32	1271.85	9707.26	1271.5	9711.2	1271.5	9711.38	1271.49
9711.56	1271.49	9711.74	1271.49	9711.91	1271.49	9712.07	1271.5	9720.28	1271.55
9722.1	1271.55	9724.8	1271.56	9753.07	1271.64	9755.06	1271.6	9757.54	1271.58
9760.58	1271.54	9761.42	1271.54	9762.98	1271.62	9769.4	1271.9	9774.39	1271.9
9778.64	1271.87	9779.52	1271.89	9793.19	1272.37	9796.92	1272.5	9803.94	1272.37
9807.84	1272.63	9813.98	1272.79	9817.92	1272.77	9823.53	1273	9828.63	1272.88
9834.64	1273.02	9840.64	1273.24	9850.65	1273.33	9875.81	1273.2	9877.21	1273.23
9879.39	1273.22	9882.91	1272.22	9887.34	1271.03	9892.81	1270.2	9895.05	1269.73
9899.86	1269.59	9901.74	1269.53	9908.25	1270.57	9912.19	1271.2	9913.98	1270.06
9918.82	1267.06	9923.35	1267.06	9924.62	1267.06	9931.18	1271.4	9932.29	1272.11
9956.41	1273.17	9967.31	1273.6	9973.49	1273.36	9978.22	1273.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9427.21	.05	9912.19	.035	9967.31	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9912.19	9967.31	588.64	523.56	500	.1	.3

Left Levee Station= 9850.65 Elevation= 1273.33
Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9829.89	9869.89	1274	9409.89	9689.89	1274

CROSS SECTION OUTPUT Profile #24-hr

E.G. Elev (ft)	1271.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1271.44	Reach Len. (ft)	588.64	523.56	500.00
Crit W.S. (ft)	1270.27	Flow Area (sq ft)	31.47	55.29	
E.G. Slope (ft/ft)	0.002479	Area (sq ft)	31.47	55.29	
Q Total (cfs)	271.00	Flow (cfs)	51.99	219.01	
Top Width (ft)	45.43	Top Width (ft)	26.38	19.05	
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)	1.65	3.96	
Max Chl Dpth (ft)	4.38	Hydr. Depth (ft)	1.19	2.90	
Conv. Total (cfs)	5443.0	Conv. (cfs)	1044.1	4398.9	
Length Wtd. (ft)	547.10	Wetted Per. (ft)	26.68	21.56	
Min Ch El (ft)	1267.06	Shear (lb/sq ft)	0.18	0.40	
Alpha	1.35	Stream Power (lb/ft s)	0.30	1.57	
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	0.74	0.54	
C & E Loss (ft)	0.02	Cum SA (acres)	0.64	0.21	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #6-hr

E.G. Elev (ft)	1271.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.050	0.035	
W.S. Elev (ft)	1271.44	Reach Len. (ft)	588.64	523.56	500.00
Crit W.S. (ft)	1270.31	Flow Area (sq ft)	31.52	55.33	
E.G. Slope (ft/ft)	0.002564	Area (sq ft)	31.52	55.33	
Q Total (cfs)	276.00	Flow (cfs)	53.01	222.99	
Top Width (ft)	45.44	Top Width (ft)	26.38	19.06	
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)	1.68	4.03	
Max Chl Dpth (ft)	4.38	Hydr. Depth (ft)	1.19	2.90	
Conv. Total (cfs)	5450.2	Conv. (cfs)	1046.8	4403.3	
Length Wtd. (ft)	547.54	Wetted Per. (ft)	26.69	21.56	
Min Ch El (ft)	1267.06	Shear (lb/sq ft)	0.19	0.41	
Alpha	1.35	Stream Power (lb/ft s)	0.32	1.66	
Frctn Loss (ft)	1.50	Cum Volume (acre-ft)	0.77	0.55	
C & E Loss (ft)	0.03	Cum SA (acres)	0.64	0.22	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #24-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9850.65	9912.19	51.99	31.47	26.68	19.18	1.19	1.65
2	Chan	9912.19	9925.97	195.17	46.11	15.24	72.02	3.35	4.23
3	Chan	9925.97	9939.75	23.85	9.19	6.32	8.80	1.74	2.60

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Profile #6-hr

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	LOB	9850.65	9912.19	53.01	31.52	26.69	19.21	1.19	1.68
2	Chan	9912.19	9925.97	198.70	46.13	15.24	71.99	3.35	4.31
3	Chan	9925.97	9939.75	24.29	9.20	6.32	8.80	1.74	2.64

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Eastern Canal
REACH: 118 RS: 9.090

INPUT
Description:
Station Elevation Data num= 244

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8589.64	1273.4	8590.27	1273.37	8590.87	1273.37	8591.45	1273.38	8592	1273.4
8592.54	1273.4	8593.05	1273.4	8593.54	1273.41	8594.64	1273.39	8595.17	1273.4
8595.67	1273.4	8596.16	1273.4	8596.62	1273.41	8597.07	1273.41	8597.5	1273.4
8597.92	1273.42	8598.32	1273.42	8598.7	1273.43	8600.35	1273.39	8600.75	1273.4
8601.13	1273.39	8601.5	1273.4	8601.86	1273.4	8602.2	1273.4	8602.54	1273.4
8602.86	1273.4	8622.49	1273.43	8623.94	1273.34	8625.55	1273.25	8627.28	1273.2
8629.1	1273.08	8630.95	1272.99	8632.8	1272.91	8634.58	1272.92	8642.06	1272.7
8642.6	1272.69	8644.43	1272.69	8645.07	1272.69	8646.92	1272.69	8647.68	1272.7
8649.5	1272.69	8650.4	1272.69	8652.16	1272.69	8662.92	1272.69	8670.64	1272.7
8685.02	1272.69	8687.68	1272.8	8694.94	1273.08	8695.39	1273.08	8695.69	1273.1
8708.64	1273.15	8717.55	1273.18	8721.09	1273.22	8723.18	1273.24	8724.99	1273.3
8732.23	1273.25	8736.11	1273.26	8742.51	1273.26	8747.12	1273.25	8768.74	1273.3
8790.34	1273.31	8791.78	1273.32	8793.43	1273.32	8793.84	1273.32	8795.21	1273.3
8798.42	1273.32	8834.54	1273.32	8836.32	1273.34	8836.77	1273.34	8848.21	1273.5
8857.41	1273.6	8898.04	1273.91	8898.11	1273.91	8898.14	1273.9	8898.35	1273.91
8904.01	1273.84	8909.4	1273.77	8911.92	1273.68	8916.47	1273.7	8919.86	1273.69
8956.28	1273.64	8957.39	1273.63	8959.68	1273.63	8977.61	1273.6	8982.69	1273.57
9005.25	1273.16	9012.17	1273.26	9017.42	1273.23	9023.62	1273.1	9024.92	1273.1
9029.34	1272.97	9034.06	1272.84	9044.26	1272.57	9048.6	1272.4	9058.04	1272.08
9064.54	1271.64	9065.11	1271.6	9066.35	1271.6	9083.37	1271.6	9092.7	1271.6
9116.62	1271.6	9120.06	1271.62	9125.3	1271.65	9125.88	1271.7	9144.68	1272.48
9147.41	1272.61	9153.59	1272.9	9155.8	1272.9	9156.71	1272.9	9163.83	1272.97
9167.12	1272.94	9192.19	1273.08	9209.31	1273.08	9212.12	1273.1	9215.57	1273.08
9246.27	1273.04	9250.31	1273.08	9257.74	1273.08	9258.92	1273.1	9264.09	1273.08
9267.12	1273.08	9278.3	1273.22	9285.54	1273.26	9307.08	1273.2	9308.78	1273.17
9311.72	1273.16	9319.48	1273.09	9322.05	1273.08	9327.93	1273	9330.4	1273.03
9334.27	1273	9335.99	1273	9340.21	1272.98	9342.78	1273	9354.31	1273.07
9354.42	1273.07	9354.44	1273.07	9362.91	1273.07	9377.84	1273	9400.35	1272.8
9403.27	1272.78	9403.98	1272.77	9404.53	1272.76	9405.78	1272.8	9406.42	1272.77
9427.01	1272.89	9458.4	1273.07	9458.46	1273.07	9458.51	1273.1	9458.52	1273.07
9458.54	1273.07	9458.57	1273.07	9458.61	1273.07	9494.45	1273.2	9497.31	1273.32
9499.02	1273.37	9500.02	1273.43	9519.72	1272.21	9526.74	1271.7	9527.24	1271.74
9531.56	1271.72	9540.21	1271.72	9559.03	1271.74	9560.96	1271.7	9563.39	1271.68
9566.38	1271.65	9569.59	1271.6	9569.74	1271.6	9571.39	1271.6	9575.9	1271.57
9578.47	1271.56	9580.06	1271.55	9581.23	1271.54	9584.62	1271.5	9586.65	1271.53
9592.92	1271.51	9599.51	1271.5	9608	1271.5	9609.16	1271.5	9623.24	1271.42
9626.32	1271.4	9639.82	1271.4	9644.9	1271.4	9657.55	1271.3	9664.91	1271.3
9675.27	1271.3	9683.93	1271.3	9694.2	1271.21	9705.88	1271.1	9720.87	1271.1
9729.98	1271.1	9737.45	1271.07	9752.56	1271	9757.7	1271	9771.39	1270.9
9778.92	1270.9	9781.33	1270.9	9782.96	1270.89	9783.44	1270.9	9785	1270.86
9785.49	1270.86	9786.96	1270.84	9787.44	1270.84	9788.82	1270.8	9789.29	1270.82
9790.56	1270.8	9802.51	1270.74	9804.56	1270.72	9806.46	1270.7	9808.18	1270.7
9829.14	1270.7	9833.72	1270.97	9834.13	1270.99	9838.56	1270.6	9839.21	1270.48
9839.78	1270.44	9844.57	1269.69	9846.65	1268.99	9848.04	1268.6	9850.53	1268.51
9852.76	1268.49	9854.32	1268.43	9856.32	1268.38	9857.29	1268.4	9862.32	1268.69
9863.27	1268.78	9864.45	1268.88	9882.23	1268.73	9886	1268.7	9887.96	1268.68
9888.28	1268.69	9894.43	1268.82	9896.16	1268.75	9903.57	1268.5	9912.15	1270.15
9913.23	1270.37	9913.89	1269.94	9918.39	1266.85	9921.56	1266.9	9924.19	1266.85
9929.31	1269.39	9934.42	1271.55	9967.43	1272.23	9968.65	1272.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8589.64	.05	9913.23	.035	9968.65	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9913.23 9968.65              500     500     500             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 8589.64 9784.64    1274       F
Left Levee      Station= 9497.31      Elevation= 1273.32
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*************************************************
 8689.64 9009.64    1274 9159.64 9489.64    1274

CROSS SECTION OUTPUT  Profile #24-hr
*****************************************************************************************
* E.G. Elev (ft)         * 1270.06  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.13  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)         * 1269.93  * Reach Len. (ft)         *          *          *          *
* Crit W.S. (ft)         * 1269.44  * Flow Area (sq ft)       *   77.45  *   34.24  *          *
* E.G. Slope (ft/ft)     *0.003316  * Area (sq ft)            *   77.45  *   34.24  *          *
* Q Total (cfs)          *  271.00  * Flow (cfs)              *  144.10  *  126.90  *          *
* Top Width (ft)         *   84.65  * Top Width (ft)          *   67.97  *   16.68  *          *
* Vel Total (ft/s)       *    2.43  * Avg. Vel. (ft/s)        *    1.86  *    3.71  *          *
* Max Chl Dpth (ft)      *    3.08  * Hydr. Depth (ft)        *    1.14  *    2.05  *          *
* Conv. Total (cfs)      *  4706.1  * Conv. (cfs)             *  2502.3  *  2203.8  *          *
* Length Wtd. (ft)       *          * Wetted Per. (ft)        *   68.32  *   18.34  *          *
* Min Ch El (ft)         * 1266.85  * Shear (lb/sq ft)        *    0.23  *    0.39  *          *
* Alpha                  *    1.41  * Stream Power (lb/ft s)  *    0.44  *    1.43  *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)    *          *          *          *
* C & E Loss (ft)        *          * Cum SA (acres)          *          *          *          *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #6-hr
*****************************************************************************************
* E.G. Elev (ft)         * 1270.13  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.12  * Wt. n-Val.              *   0.050  *   0.035  *          *
* W.S. Elev (ft)         * 1270.01  * Reach Len. (ft)         *          *          *          *
* Crit W.S. (ft)         * 1269.45  * Flow Area (sq ft)       *   82.92  *   35.59  *          *
* E.G. Slope (ft/ft)     *0.002930  * Area (sq ft)            *   82.92  *   35.59  *          *
* Q Total (cfs)          *  276.00  * Flow (cfs)              *  150.39  *  125.61  *          *
* Top Width (ft)         *   85.89  * Top Width (ft)          *   68.90  *   16.99  *          *
* Vel Total (ft/s)       *    2.33  * Avg. Vel. (ft/s)        *    1.81  *    3.53  *          *
* Max Chl Dpth (ft)      *    3.16  * Hydr. Depth (ft)        *    1.20  *    2.09  *          *
* Conv. Total (cfs)      *  5098.9  * Conv. (cfs)             *  2778.4  *  2320.5  *          *
* Length Wtd. (ft)       *          * Wetted Per. (ft)        *   69.26  *   18.70  *          *
* Min Ch El (ft)         * 1266.85  * Shear (lb/sq ft)        *    0.22  *    0.35  *          *
* Alpha                  *    1.38  * Stream Power (lb/ft s)  *    0.40  *    1.23  *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)    *          *          *          *
* C & E Loss (ft)        *          * Cum SA (acres)          *          *          *          *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #24-hr
*****************************************************************************************************************
*          * 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       * 9784.64   * 9913.23   *   144.10 *    77.45 *    68.32 *    53.17 *     1.14 *     1.86 *
* 2        * Chan      * 9913.23   * 9927.09   *   121.78 *    31.47 *    14.48 *    44.94 *     2.39 *     3.87 *
* 3        * Chan      * 9927.09   * 9940.94   *     5.12 *     2.77 *     3.87 *     1.89 *     0.79 *     1.85 *
*****************************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

  Profile #6-hr
*****************************************************************************************************************
*          * 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       * 9784.64   * 9913.23   *   150.39 *    82.92 *    69.26 *    54.49 *     1.20 *     1.81 *
* 2        * Chan      * 9913.23   * 9927.09   *   120.13 *    32.53 *    14.62 *    43.52 *     2.44 *     3.69 *
* 3        * Chan      * 9927.09   * 9940.94   *     5.48 *     3.06 *     4.07 *     1.99 *     0.83 *     1.79 *
*****************************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

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

SUMMARY OF MANNING'S N VALUES

River:Eastern Canal
*************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*************************************************************
*118            *    9.374       *      .05*     .035*      .05*
*118            *    9.280       *      .05*     .035*      .05*
*118            *    9.185       *      .05*     .035*      .05*
*118            *    9.090       *      .05*     .035*      .05*
```

SUMMARY OF REACH LENGTHS

River: Eastern Canal

Reach	River Sta.	Left	Channel	Right
118	9.374	628.77	535.15	500
118	9.280	507.03	501.46	500
118	9.185	588.64	523.56	500
118	9.090	500	500	500

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Eastern Canal

Reach	River Sta.	Contr.	Expan.
118	9.374	.1	.3
118	9.280	.1	.3
118	9.185	.1	.3
118	9.090	.1	.3

ES & EN.6 Special Problems

5S.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 and by utilizing the ineffective flow options available in HEC-RAS V.3.1.3.

5S.4.6 Supercritical Flow

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

5S.4.7 Floodway modeling

No floodway was delineated for this study.

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5S.4.8 Special problems encountered during the study

5S.4.8.1 100-yr, 6-hr vs. 100-yr, 24-hr Results

Normally, the 100-yr, 6-hr and 24-hr modeling results are compared and the model that produces the higher results is considered the base model for other dependant modeling, i.e. floodplain modeling. The Phase 1 – South watershed produced mixed results in regard to dominant resulting discharge and high water surface elevations. Generally, sub-basins north and west (PB Region 1) of the Santan Freeway alignment produced higher results for the 100-yr, 6-hr model compared to the 24-hr model and the sub-basins south of the Santan Freeway alignment (PB Regions 2 and 3) resulted in higher 24-hr results. Therefore, the 100-yr, 6-hr model is the base model for the floodplain mapping for PB Region 1 and the 100-yr, 24-hr model is the base model for PB Regions 2 and 3 of the Phase 1 – South watershed. See Section 4S in Volume 3 for more information about the HEC-1 modeling.

5S.4.8.2 Eastern Canal Tailwater Ditch

A tailwater ditch parallels the east bank of the Eastern Canal from the Union Pacific Railroad to Pecos Road. The ditch originally was intended to return tail water from agricultural fields to the Eastern Canal as part of the Roosevelt Conservation District (RWCD) canal system. Although not its primary purpose, the tailwater ditch can intercept and carry storm water runoff.

The tailwater ditch was analyzed as part of the delineation process to determine where the ponded floodplain and tailwater ditch are hydraulically connected and where they are independent. Places where there is a direct connection between the ponded floodplain, P208N for example, the tailwater ditch is modeled as part of the ponded area. In other locations, there is no interaction between the tailwater ditch and adjacent deeper ponding areas. Most often, there is little interaction and the two systems remain separate. In locations where the capacity of the tailwater ditch is exceeded, adjacent to P200 and P208S for example, overflow is added to the adjacent floodplain ponding area.

The analysis determines where it is appropriate to include the tailwater ditch in the floodplain delineation. Where there is no interaction between the floodplain zone AH ponds and the tailwater ditch, it was determined that the tailwater ditch was not part of the flood hazard. It would be inappropriate to delineate the tailwater ditch as a FEMA flood hazard since the tailwater flows are contained in the ditch on the RWCD property, and due to the ditch's short width the flood information would not even be legible on the FIRM panel.

HEC-RAS was used to determine the conveyance capacity and interaction with adjacent ponding areas. The tailwater ditch is a trapezoidal channel with a concrete bottom and sides. Manning's n value of 0.015 was used for the channel and an n-value of 0.035 was used for the overbanks to represent agricultural areas. Longitudinal slopes along the tailwater ditch are very flat, with the steepest grade less than 1%. The floodplain analysis was modeled as a subcritical flow regime. Since the geometry of the tailwater ditch does not vary much, cross-sections were spaced approximately 500 feet apart.

An assumed water surface elevation was used for the starting water surface conditions at the most downstream cross-section by adding one-foot of water to the lowest ground elevation at cross-section 5.633, located at Pecos Road. See Appendix ES.6, Special Problems, for tailwater ditch HEC-RAS model and cross-section location exhibit.

See Volume 3, *Section 4S.5.2, Special Problems*, in the Hydrology portion of this report for more information about the tailwater ditch.

5S.4.9 Calibration

No hydraulic calibration was performed during this study.

5S.5 Hydraulic analysis results

There are no hydraulic analysis for flows between basins in the southern portion of the study.

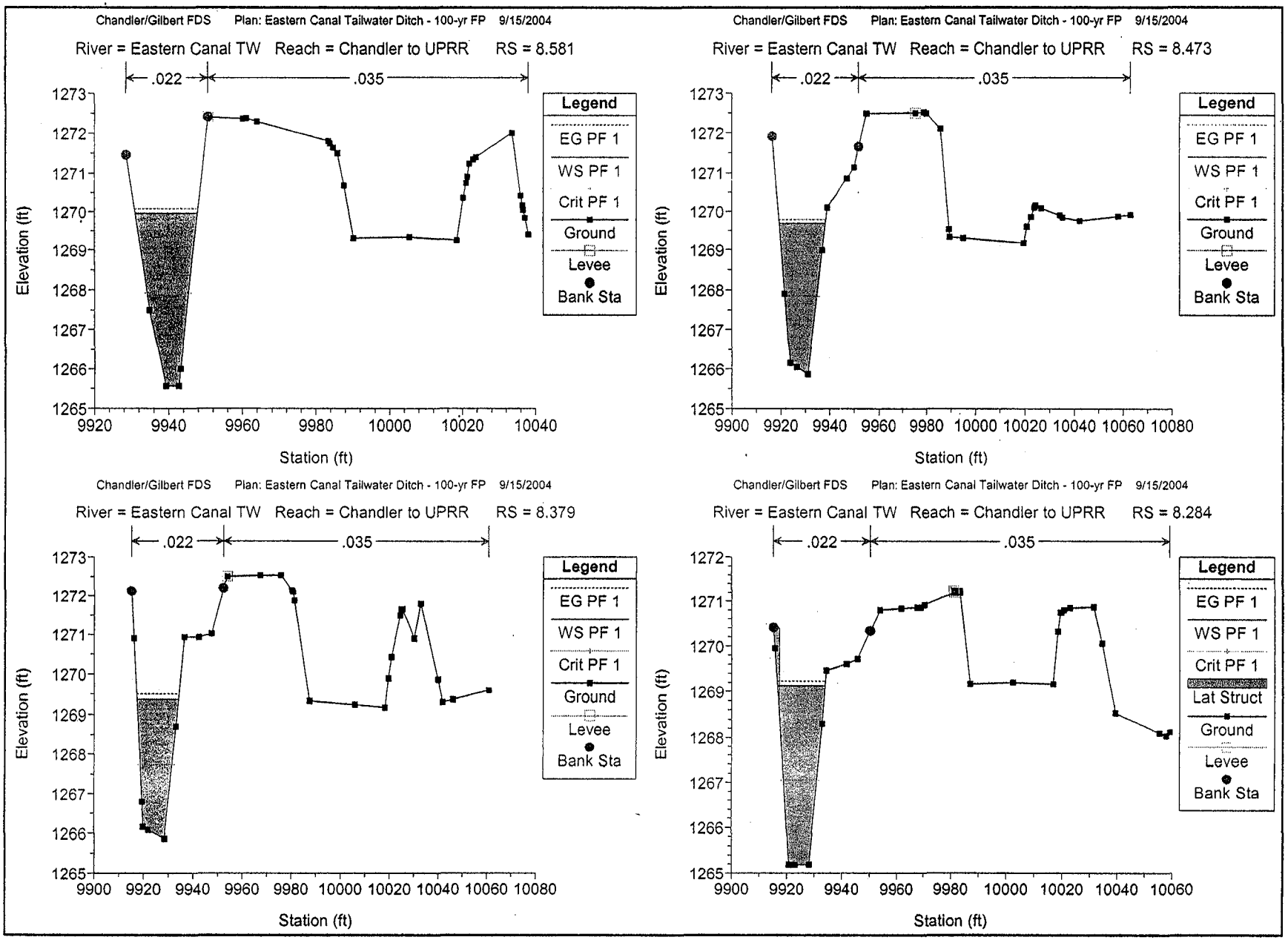
5S.6 References

1. *U.S. Army Corp of Engineers HEC-RAS Version. 3.1.2*, April 2004 (not for floodplain delineation)

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

HEC-RAS Plan: 100-yr FP Profile: PF 1

Reach	River Sta	Profile	Q Total	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Sta W.S. Lft	Sta W.S. Rgt	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)	
Pecos to Chandle	6.478	PF 1	236.00	1267.52	1264.57	1267.69	0.000259	3.33	70.91	18.28	9926.07	9944.35	0.30
Pecos to Chandle	6.477		Lat Struct										
Pecos to Chandle	6.370	PF 1	236.00	1267.34	1264.55	1267.52	0.000309	3.49	67.69	18.91	9926.69	9945.60	0.32
Pecos to Chandle	6.289	PF 1	236.00	1267.09	1264.72	1267.36	0.000469	4.10	57.49	16.45	9926.69	9943.14	0.39
Pecos to Chandle	6.194	PF 1	236.00	1266.90	1264.54	1267.13	0.000385	3.86	61.20	17.21	9919.61	9936.82	0.36
Pecos to Chandle	6.106	PF 1	236.00	1266.51	1264.84	1266.87	0.000741	4.79	49.32	16.23	9933.93	9950.16	0.48
Pecos to Chandle	6.013	PF 1	236.00	1266.09	1264.69	1266.47	0.000874	4.94	47.75	16.82	9932.71	9949.53	0.52
Pecos to Chandle	5.913	PF 1	236.00	1265.92	1263.94	1266.14	0.000370	3.78	62.37	18.94	9923.20	9942.14	0.37
Pecos to Chandle	5.864	PF 1	236.00	1265.76	1263.95	1266.03	0.000471	4.17	56.61	17.34	9926.32	9943.66	0.41
Pecos to Chandle	5.823	PF 1	236.00	1265.63	1263.83	1265.93	0.000520	4.34	54.32	16.39	9943.81	9960.20	0.42
Pecos to Chandle	5.728	PF 1	236.00	1265.05	1264.06	1265.55	0.001059	5.65	41.75	14.89	9946.52	9961.41	0.59
Pecos to Chandle	5.633	PF 1	236.00	1263.78	1263.78	1264.74	0.002996	7.87	30.00	15.62	9927.24	9942.85	1.00
Chandler to UPRR	8.581	PF 1	124.00	1269.96	1267.92	1270.07	0.000508	2.69	46.08	16.84	9930.97	9947.82	0.29
Chandler to UPRR	8.473	PF 1	124.00	1269.68	1267.84	1269.79	0.000488	2.59	47.94	18.85	9919.35	9938.21	0.29
Chandler to UPRR	8.379	PF 1	124.00	1269.37	1267.73	1269.50	0.000648	2.92	42.53	16.72	9917.40	9934.12	0.32
Chandler to UPRR	8.284	PF 1	124.00	1269.13	1267.05	1269.23	0.000437	2.55	48.67	17.33	9916.59	9933.91	0.27
Chandler to UPRR	8.237		Lat Struct										
Chandler to UPRR	8.189	PF 1	124.00	1269.01	1266.42	1269.07	0.000258	2.07	59.87	19.92	9916.37	9936.29	0.21
Chandler to UPRR	8.164		Lat Struct										
Chandler to UPRR	8.138	PF 1	124.00	1268.92	1265.12	1269.03	0.000072	2.69	46.01	22.17	9919.10	9941.28	0.20
Chandler to UPRR	8.125		Culvert										
Chandler to UPRR	8.112	PF 1	124.00	1268.84	1264.98	1268.95	0.000070	2.67	46.45	23.97	9917.52	9941.48	0.20
Chandler to UPRR	8.095	PF 1	124.00	1268.88	1264.78	1268.92	0.000060	1.66	74.72	17.48	9920.14	9937.62	0.14
Chandler to UPRR	8.048	PF 1	124.00	1268.82	1265.85	1268.89	0.000112	2.09	59.20	16.39	9914.60	9930.99	0.19
Chandler to UPRR	7.985	PF 1	124.00	1268.80	1265.17	1268.85	0.000084	1.89	65.54	15.54	9913.85	9929.38	0.16
Chandler to UPRR	7.892	PF 1	124.00	1268.68	1266.32	1268.79	0.000198	2.63	47.62	16.44	9908.71	9925.15	0.25
Chandler to UPRR	7.796	PF 1	124.00	1268.54	1266.52	1268.67	0.000278	2.91	42.62	14.64	9907.87	9924.55	0.30
Chandler to UPRR	7.702	PF 1	124.00	1268.40	1266.36	1268.53	0.000269	2.91	42.59	13.92	9913.60	9927.51	0.29
Chandler to UPRR	7.607	PF 1	124.00	1268.25	1266.42	1268.39	0.000309	3.04	40.77	13.91	9918.89	9932.80	0.31
Chandler to UPRR	7.513	PF 1	124.00	1268.06	1266.48	1268.22	0.000376	3.23	38.38	14.79	9931.65	9946.44	0.35
Chandler to UPRR	7.423	PF 1	124.00	1267.75	1266.40	1267.98	0.000559	3.84	32.72	16.18	9930.83	9947.01	0.42
Chandler to UPRR	7.396	PF 1	124.00	1267.84	1264.46	1267.91	0.000055	2.12	58.49	17.45	9936.59	9954.04	0.17
Chandler to UPRR	7.384		Culvert										
Chandler to UPRR	7.367	PF 1	124.00	1267.80	1264.30	1267.87	0.000051	2.07	59.92	18.77	9930.73	9949.50	0.16
Chandler to UPRR	7.332	PF 1	124.00	1267.77	1264.91	1267.85	0.000160	2.32	53.40	17.09	9932.00	9949.08	0.23
Chandler to UPRR	7.243	PF 1	124.00	1267.65	1265.25	1267.76	0.000227	2.67	46.41	15.55	9935.95	9951.49	0.27
Chandler to UPRR	7.149	PF 1	124.00	1267.50	1265.13	1267.63	0.000284	2.97	41.76	12.91	9938.51	9951.42	0.29
Chandler to UPRR	7.054	PF 1	124.00	1267.37	1265.11	1267.50	0.000259	2.86	43.30	13.83	9938.93	9952.76	0.29
Chandler to UPRR	6.953	PF 1	124.00	1267.22	1265.10	1267.36	0.000288	3.00	41.38	13.59	9931.84	9945.43	0.30
Chandler to UPRR	6.858	PF 1	124.00	1267.08	1265.06	1267.21	0.000274	2.91	42.61	14.77	9933.81	9948.58	0.30
Chandler to UPRR	6.822	PF 1	124.00	1266.89	1264.59	1267.16	0.000241	4.20	29.56	12.10	9924.20	9936.30	0.35
Chandler to UPRR	6.805		Culvert										
Chandler to UPRR	6.791	PF 1	124.00	1266.46	1263.55	1266.67	0.000158	3.71	33.44	12.22	9921.65	9933.87	0.29
Chandler to UPRR	6.762	PF 1	124.00	1266.50	1264.01	1266.60	0.000192	2.57	48.26	14.98	9931.00	9945.98	0.25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.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
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.035
Elevation (ft)
Station (ft)
Legend
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WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
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.022
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
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Elevation (ft)
Station (ft)
Legend
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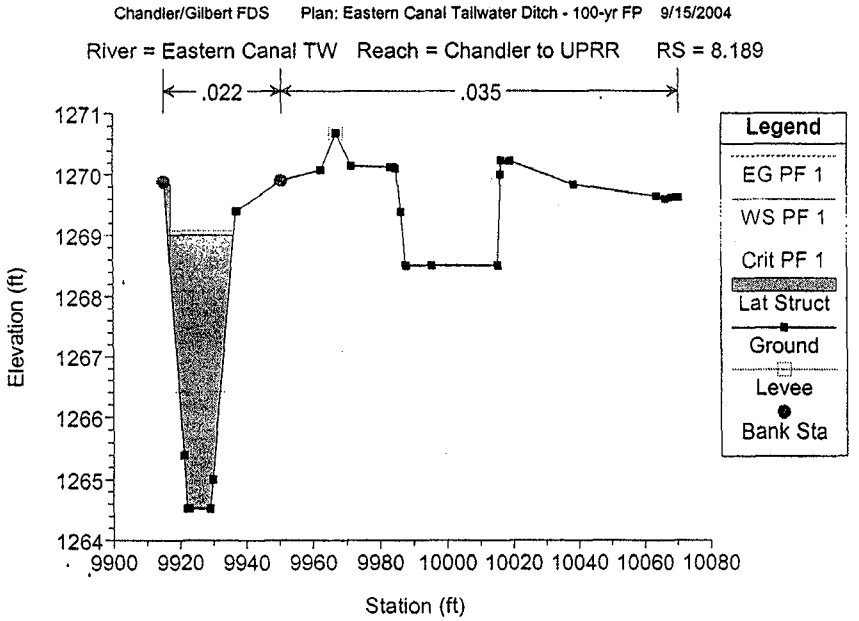
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta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Elevation (ft)
Station (ft)
Legend
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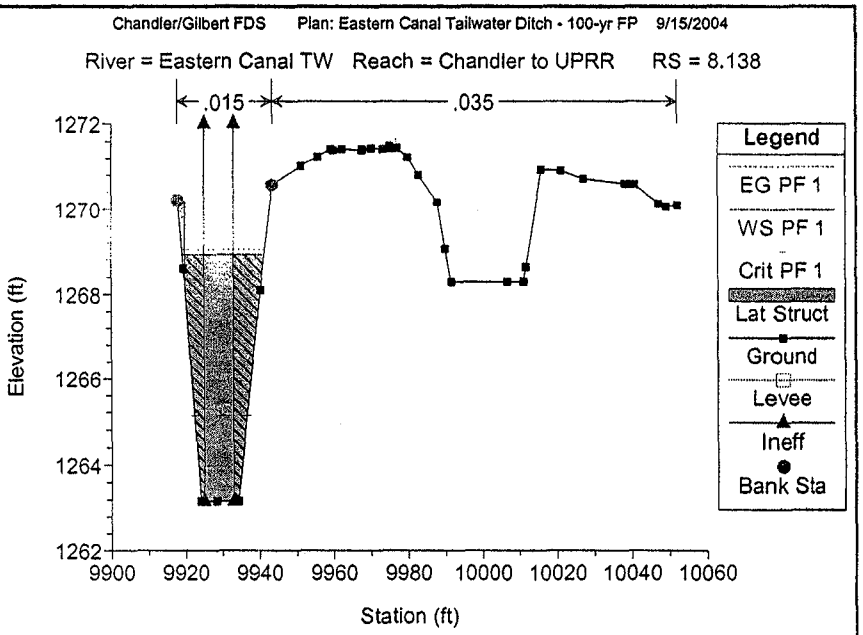
Lat Struct
Ground
Levee
Bank Sta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Elevation (ft)
Station (ft)
Legend
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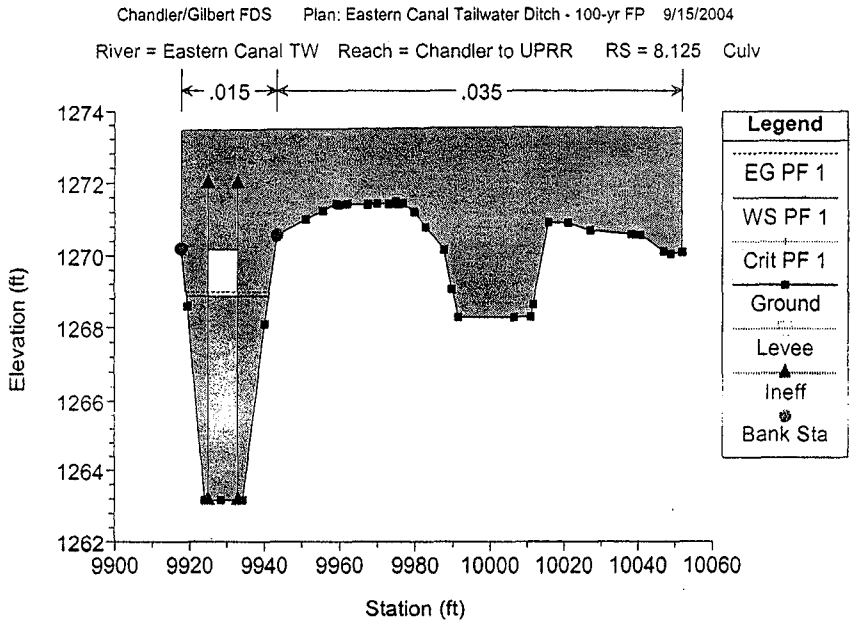
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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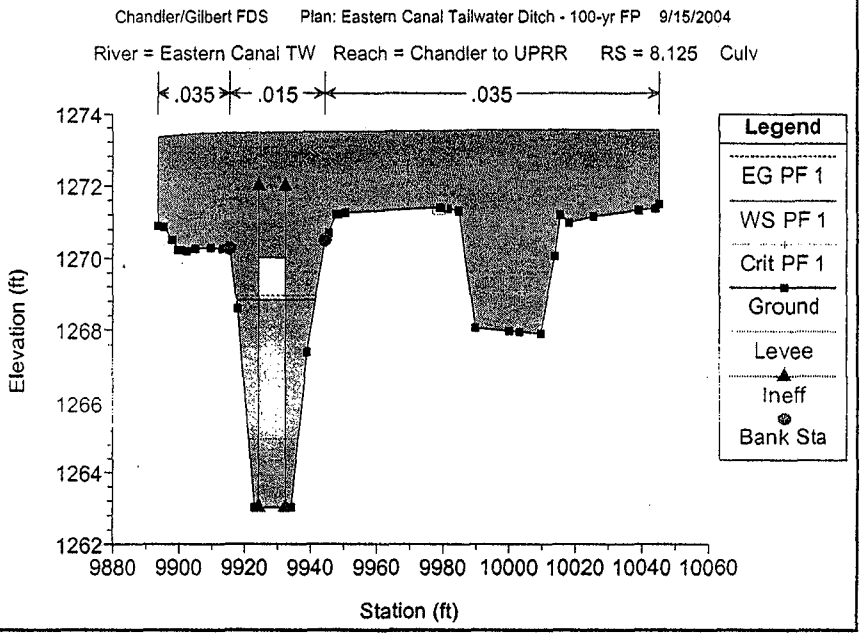
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta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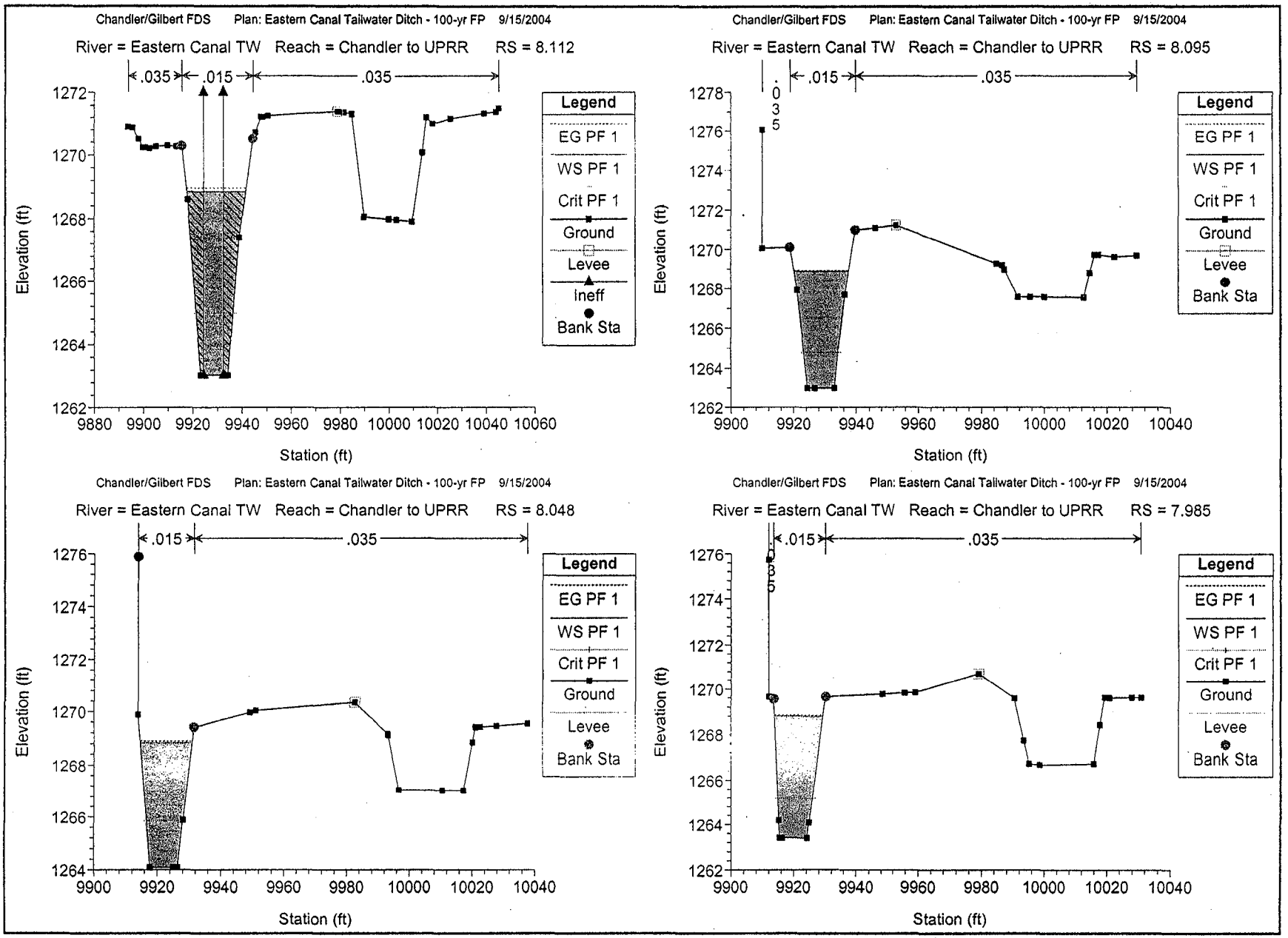
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta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.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
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River = Eastern Canal TW Reach = Chandler to UPRR RS = 8.095
.035
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 8.048
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
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River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.985
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.035
Elevation (ft)
Station (ft)
Legend
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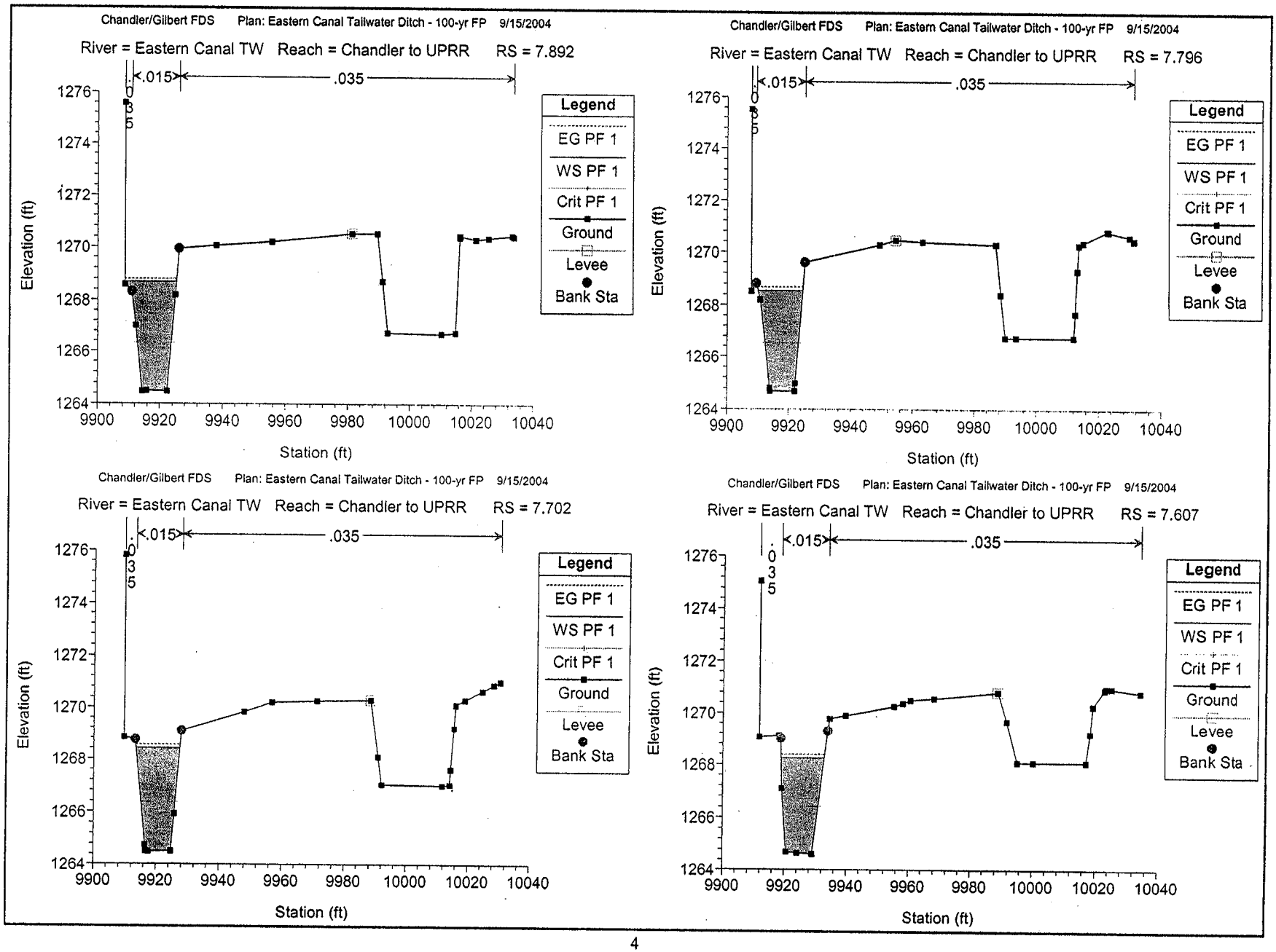
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta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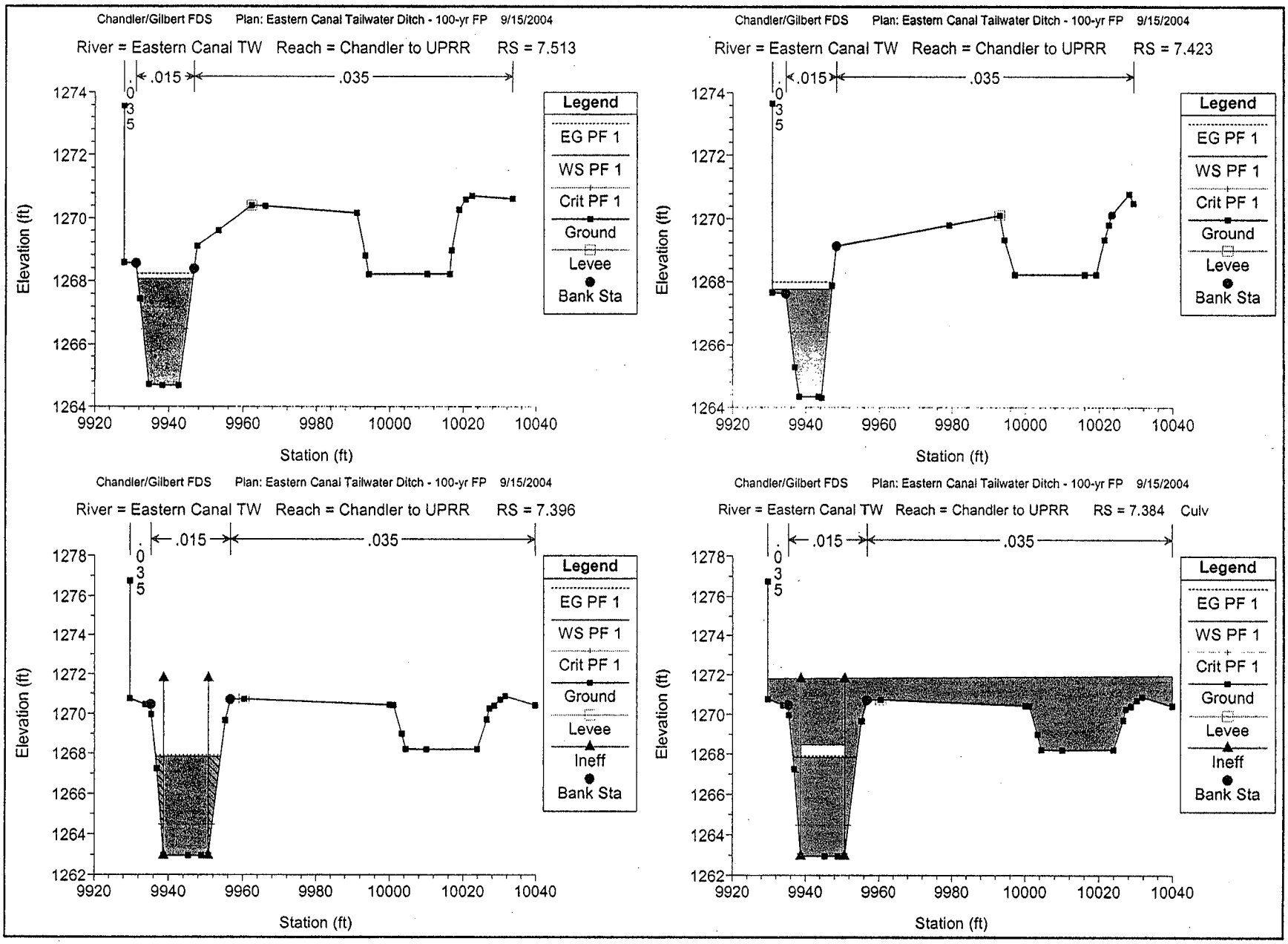
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.796
.015
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.702
.015
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.607
.015
.035
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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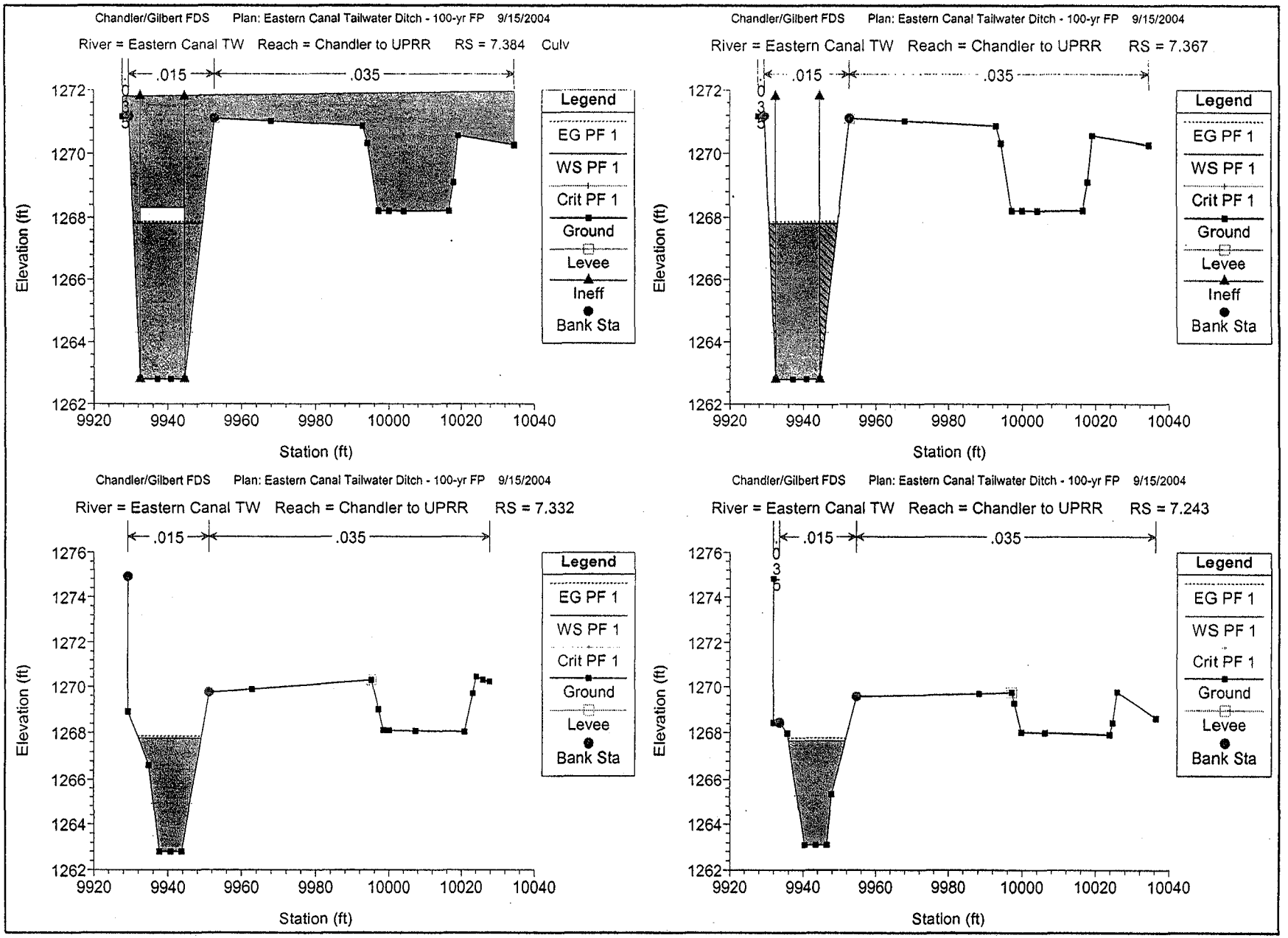
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.423
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.396
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.384 Culv
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta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River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.384 Culv
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.367
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.332
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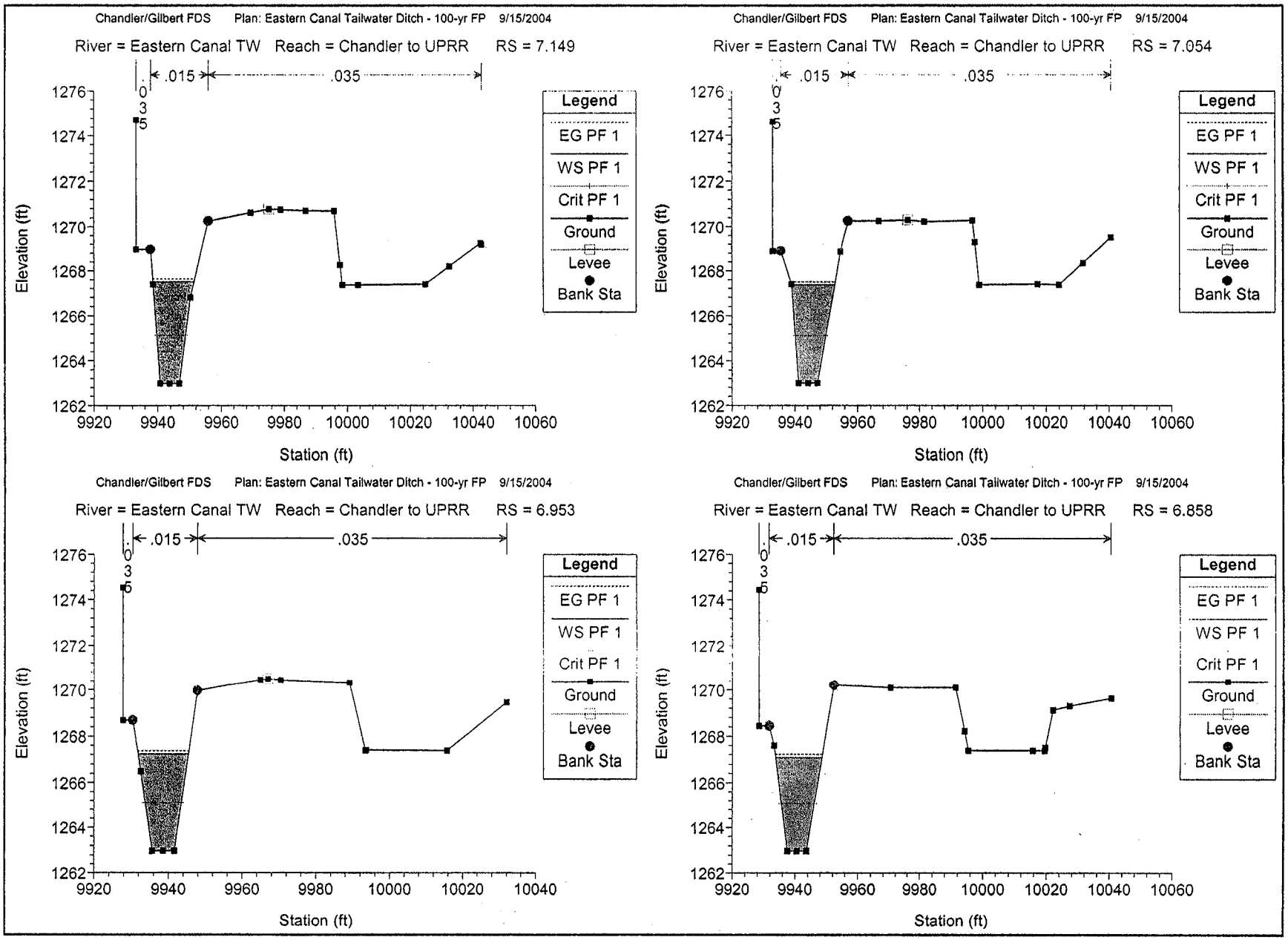
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.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 7.054
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.953
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.858
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.035
Elevation (ft)
Station (ft)
Legend
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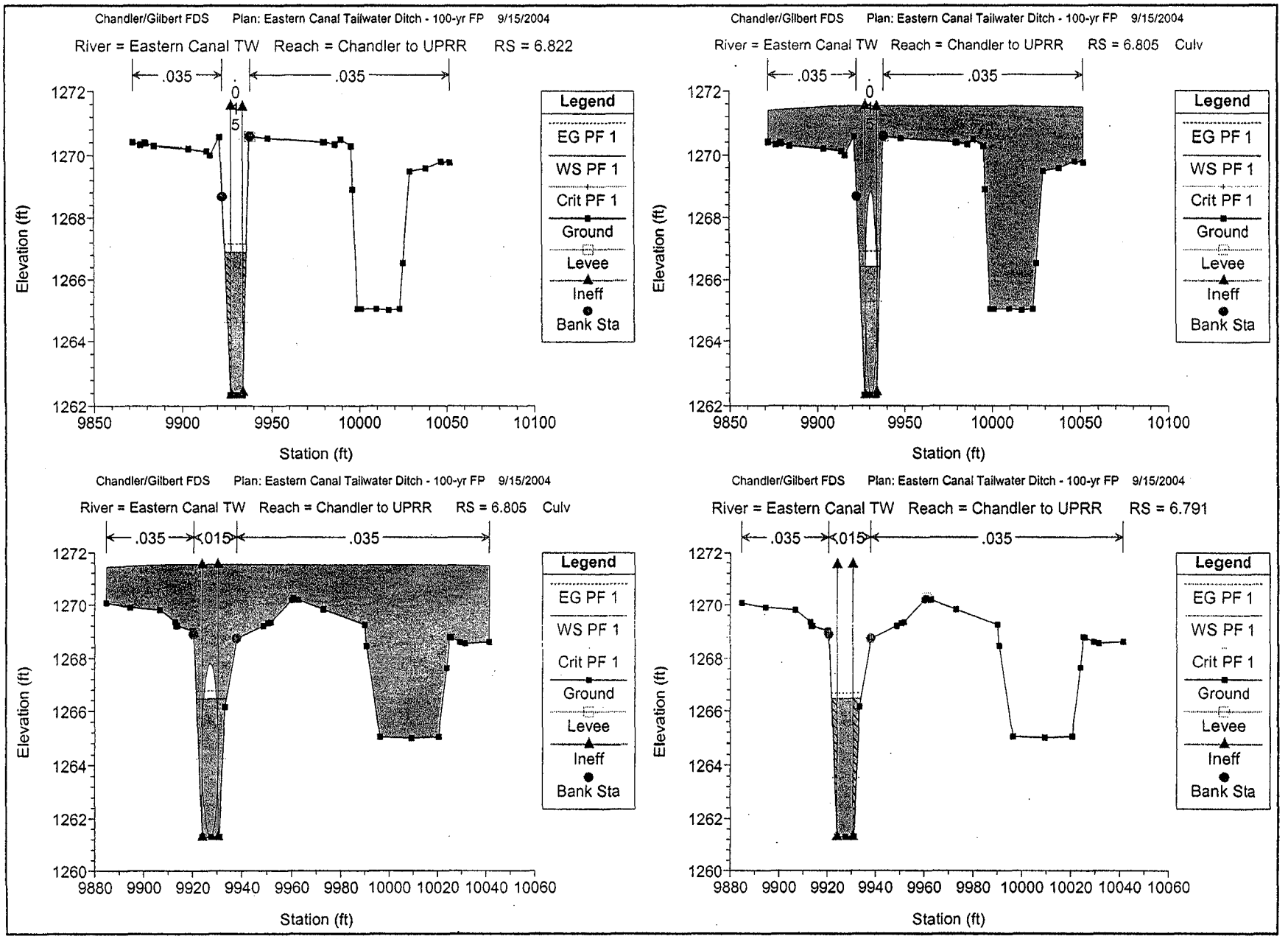
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta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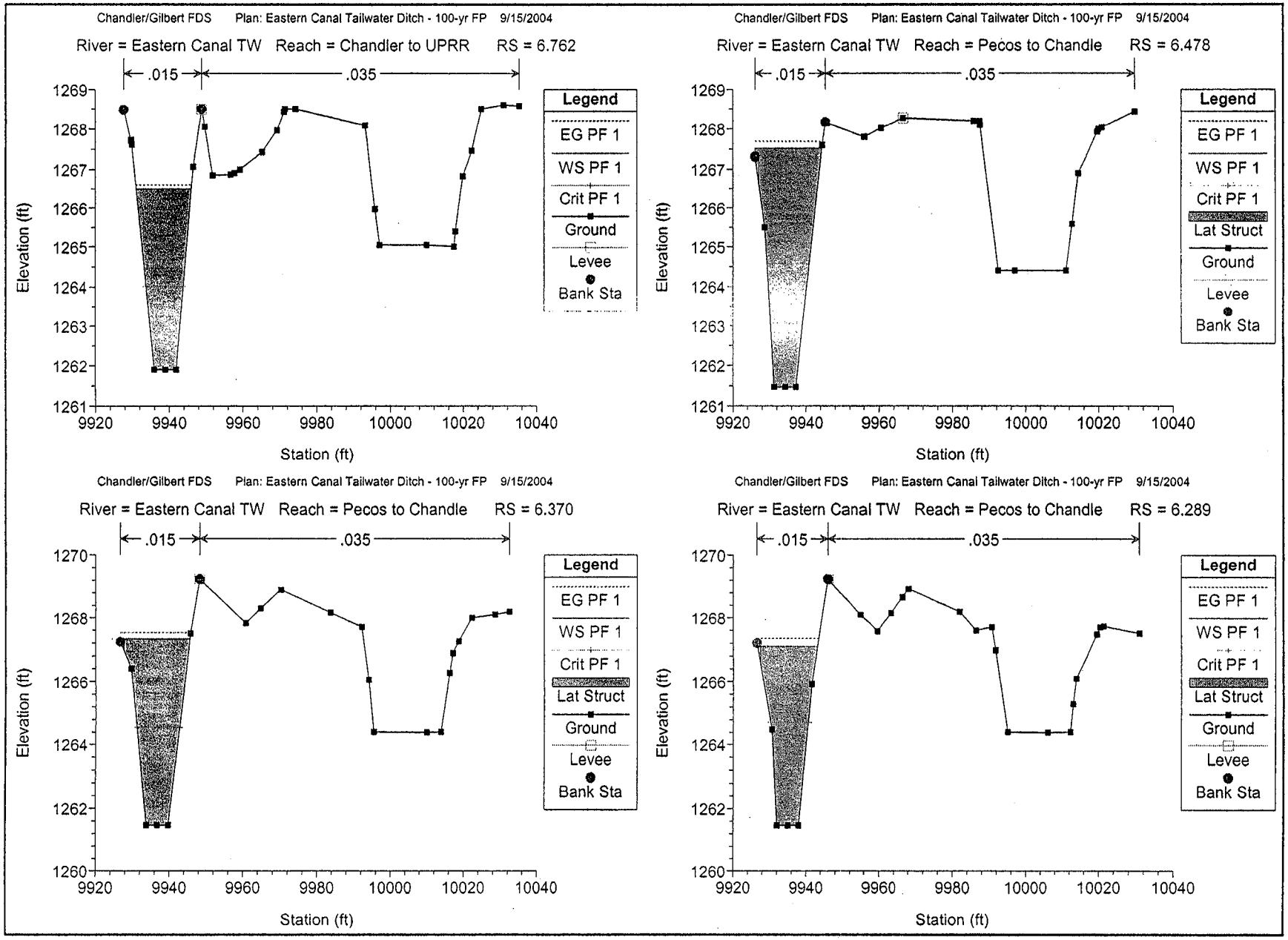
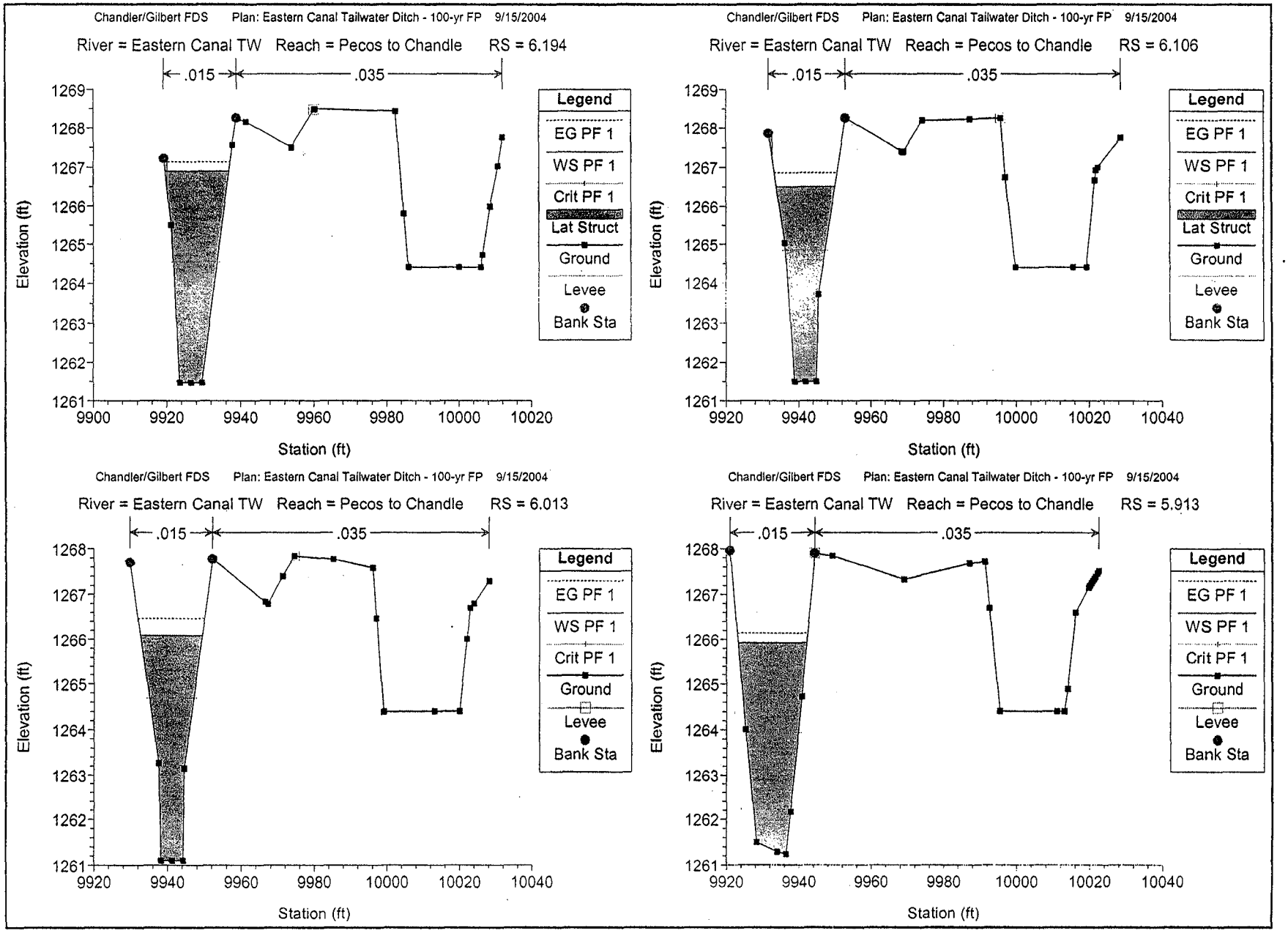
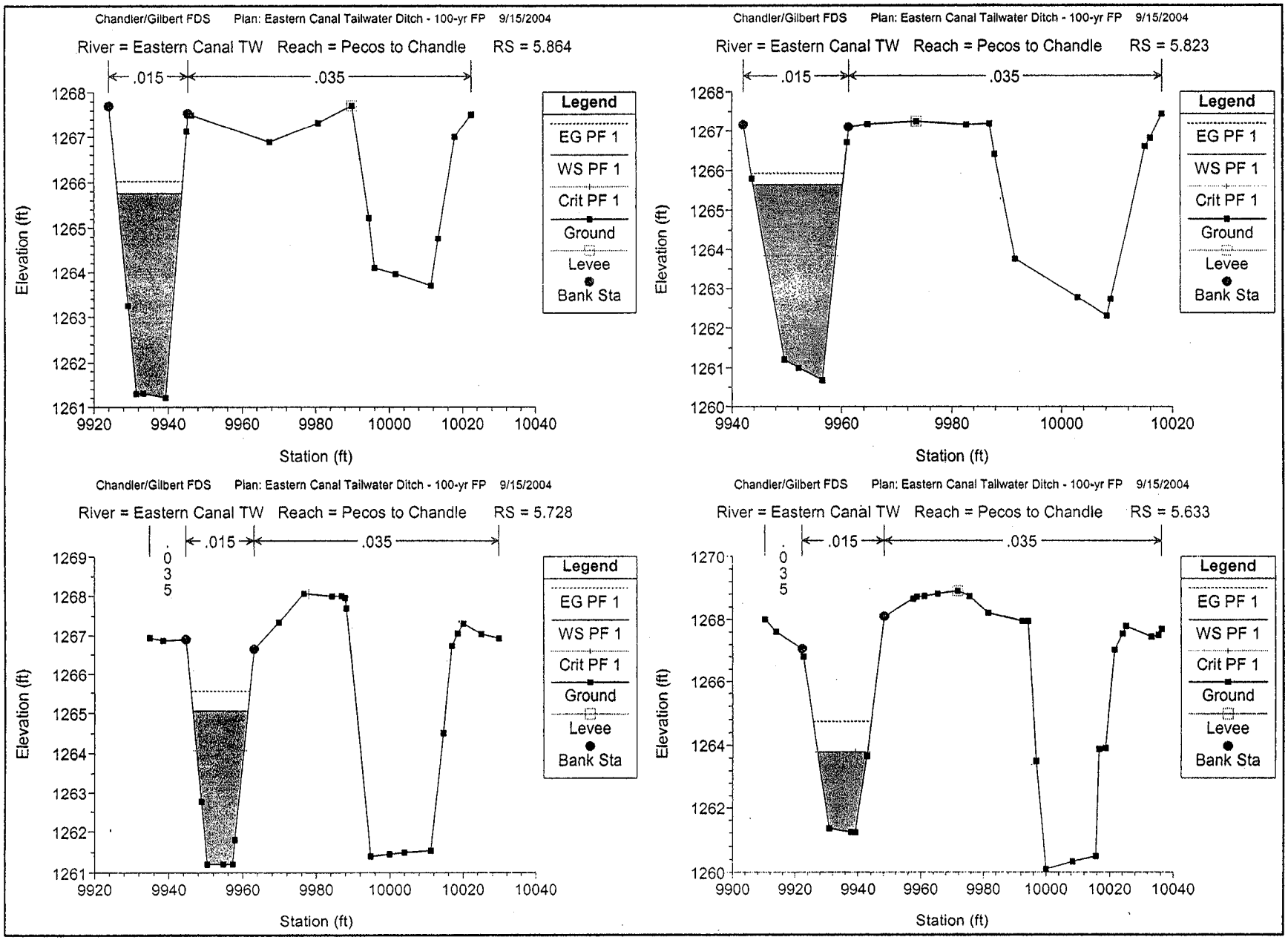
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.805 Culv
.035
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.805 Culv
.035
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.791
.035
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta


Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Chandler to UPRR RS = 6.762
.015
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.478
.015
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.370
.015
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.289
.015
.035
Legend
EG PF 1
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.194
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.106
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Lat Struct
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 6.013
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 5.913
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 5.864
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 5.823
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 5.728
.035
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Chandler/Gilbert FDS Plan: Eastern Canal Tailwater Ditch - 100-yr FP 9/15/2004
River = Eastern Canal TW Reach = Pecos to Chandle RS = 5.633
.035
.015
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

```
                    HEC-RAS Version 3.1.2 April 2004
                      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 - Tail Water Ditch
Project File : CGFDSP1_TW.prj
Run Date and Time: 3/31/2005 1:05:24 PM

Project in English units

Project Description:
Chandler/Gilbert FDS, Phase 1 South - Eastern Canal Watershed
FCD
2002C023

Date: 4/2005
David Evan's and Associates, Inc.
Modelers: Tami
Norton, E.I.T., CFM

Project Consists of:
100-year Floodplain Delineation
for Eastern Canal Tailwater Ditch and areas of Conveyance
Rating Table for
HEC-1

Station 10,000 corresponds to the Easten Canal centerline
alignment.
Cross sections are labled based on the location along the
centerline of the Canal in River Miles.


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

PLAN DATA

Plan Title: Eastern Canal Tailwater Ditch - 100-yr FP
Plan File : p:\Mari0000-0040\Engineering\MARI0040-SE\HEC-RAS\CGFDSP1_TW.p01

          Geometry Title: Eastern Canal Tailwater Ditch - 100-yr FP
          Geometry File : p:\Mari0000-0040\Engineering\MARI0040-SE\HEC-RAS\CGFDSP1_TW.g01

          Flow Title    : Eastern Canal Tailwater Ditch - 100-yr FP
          Flow File     : p:\Mari0000-0040\Engineering\MARI0040-SE\HEC-RAS\CGFDSP1_TW.f01

Plan Description:
Starting WSEL at Xsec 5.633, Reach Pecos to Chandler, = 1262.22, assuming one
foot of depth in the TWD.

Starting WSEL at Xsec 6.762, Reach Chandler to
UPRR, = 1266.5', the 100-yr,6-hr ponding elevation for P208N.

The 100-yr,
6-hr Flows were used in this model.


Plan Summary Information:
Number of:  Cross Sections =   38    Multiple Openings  =    0
            Culverts       =    3    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    3

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: Eastern Canal Tailwater Ditch - 100-yr FP
Flow File : p:\Mari0000-0040\Engineering\MARI0040-SE\HEC-RAS\CGFDSP1_TW.f01

Flow Data (cfs)
*************************************************************
* River          Reach              RS        *        PF 1 *
* Eastern Canal TWChandler to UPRR8.581        *          124 *
* Eastern Canal TWPecos to Chandle6.478        *          236 *
```

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

Boundary Conditions
*****************************************************************************************************
* River          Reach          Profile          *          Upstream                Downstream    *
*****************************************************************************************************
* Eastern Canal TWChandler to UPRRPF 1            *                                Known WS = 1266.5 *
* Eastern Canal TWPecos to ChandlePF 1            *                               Known WS = 1262.22 *
*****************************************************************************************************

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

GEOMETRY DATA

Geometry Title: Eastern Canal Tailwater Ditch - 100-yr FP
Geometry File : p:\Mari0000-0040\Engineering\MARI0040-SE\HEC-RAS\CGFDSP1_TW.g01

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.581

INPUT
Description: UPRR
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9928.58 1271.45 9934.93  1267.5 9939.23 1265.57 9942.64 1265.57 9942.75 1265.57
  9943.2    1266 9950.66  1272.4 9960.02 1272.36 9960.98 1272.37 9963.91 1272.29
 9983.37  1271.8 9983.77 1271.74 9984.65 1271.63 9985.81 1271.49 9987.61 1270.68
  9990.2  1269.310005.43 1269.3310018.41 1269.2510020.14 1270.3510020.99 1270.74
10021.33  1270.910021.84 1271.2310022.89 1271.3410022.96 1271.3310023.73 1271.39
10033.57    1272 10035.9 1270.42 10036.4 1270.1610036.59 1270.0410037.12 1269.83
10038.08  1269.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9928.58    .035 9928.58    .022 9950.66    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9928.58 9950.66           574.67  574.67  574.67            .1       .3
Right Levee     Station= 9950.66      Elevation=  1272.4

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.473

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9916.54 1271.91  9921.6  1267.9 9923.89 1266.16 9926.46 1266.05 9930.99 1265.86
 9936.91 1268.99 9938.99  1270.1 9946.98 1270.86  9949.9 1271.14 9951.77 1271.64
 9951.811271.651 9954.96 1272.49 9975.39  1272.5 9978.88 1272.52 9979.92 1272.48
 9985.72  1272.1 9989.26 1269.53 9989.49 1269.33  9995.1  1269.310019.61 1269.17
10020.91  1269.610022.56 1269.8510023.91  1270.110024.27 1270.15 10026.6 1270.08
10034.13  1269.910035.23 1269.8410042.29 1269.7510057.94 1269.8710063.12 1269.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9916.54    .035 9916.54    .022 9951.81    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9916.54 9951.81           498.84  498.84  498.84            .1       .3
Right Levee     Station= 9975.39      Elevation=  1272.5

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.379

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9915.2 1272.12 9916.15  1270.9  9919.5  1266.8 9919.94 1266.16 9922.06 1266.08
 9928.37 1265.86 9933.09  1268.7  9936.5 1270.93 9942.35 1270.93  9947.5 1271.02
 9952.43 1272.19 9954.03  1272.5  9967.5 1272.53 9975.87 1272.53 9980.44 1272.14
 9980.77  1272.1 9981.35 1271.87 9987.46 1269.3310005.95 1269.2410018.19 1269.17
10019.62  1269.910020.94 1270.4310024.45 1271.4910024.95 1271.6410025.34 1271.65
10030.25  1270.910032.84 1271.79   10040 1269.87 10041.9  1269.310046.14 1269.37
10060.97  1269.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  9915.2    .035  9915.2    .022 9952.43    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9915.2 9952.43           497.99  497.99  497.99            .1       .3
Right Levee     Station= 9954.03      Elevation=  1272.5

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.284
```

```
INPUT
Description:
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9915.22  1270.4 9915.71 1269.95 9920.79 1265.19 9923.02 1265.19 9928.07 1265.19
 9932.78  1268.3 9934.36 1269.46 9941.69 1269.61 9945.77 1269.72 9950.18 1270.33
 9953.76  1270.8 9961.77 1270.84  9967.7 1270.86 9968.93 1270.86 9970.35 1270.91
 9981.21  1271.2 9981.24 1271.23 9983.31 1271.23 9983.39 1271.19 9987.03 1269.17
10002.53  1269.210016.83 1269.1710018.53 1270.3210019.43 1270.7510019.77 1270.75
10020.66  1270.810022.93 1270.8510031.47 1270.8710034.55 1270.0610039.39 1268.54
 10055.5  1268.110057.98 1268.0410059.19 1268.12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9915.22    .035 9915.22    .022 9950.18    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9915.22 9950.18           448.34  448.34  448.34            .1       .3
Right Levee     Station= 9981.21      Elevation= 1271.23

LATERAL STRUCTURE


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.237

INPUT
Description: Weir along east bank TWD
Lateral structure position     = Left overbank
Distance from Upstream XS =       0
Deck/Roadway Width        =       2
Weir Coefficient          =       2
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        2
     Sta    Elev     Sta    Elev
*******************************
       0  1270.4  448.34 1269.88

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.189

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9915.22 1269.88  9921.1  1265.4 9922.15 1264.53 9922.76 1264.53 9929.05 1264.53
 9929.83 1265.01 9936.93  1269.4 9937.32 1269.41 9950.66  1269.9 9962.56 1270.08
 9966.93  1270.7 9971.53 1270.15 9983.35 1270.13 9984.22 1270.13 9984.82  1270.1
 9986.34 1269.39 9987.86 1268.51 9995.48 1268.5110015.37 1268.51 10016.3    1270
10016.48 1270.2410019.05 1270.2310038.52 1269.8410063.59 1269.6510066.19  1269.6
10068.17 1269.6310070.23 1269.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9915.22    .035 9915.22    .022 9950.66    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9915.22 9950.66           268.65  268.65  268.65            .1       .3
Right Levee     Station= 9966.93      Elevation=  1270.7

LATERAL STRUCTURE


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.164

INPUT
Description: Weir along east bank TWD
Lateral structure position     = Left overbank
Distance from Upstream XS =       0
Deck/Roadway Width        =       2
Weir Coefficient          =       2
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        2
     Sta    Elev     Sta    Elev
*******************************
       0 1269.88  268.65  1270.2

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.138

INPUT
Description: U/S Ray Road
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9917.8  1270.2 9919.43  1268.6 9924.07 1263.17 9928.39 1263.17 9934.27 1263.17
 9940.18  1268.1 9943.46 1270.56 9951.13 1271.01 9955.72 1271.24 9959.21 1271.43
 9959.95  1271.4 9962.24 1271.43 9967.57  1271.4  9967.6 1271.43 9970.08 1271.45
 9973.22 1271.43 9974.94  1271.5 9975.05 1271.45 9975.68 1271.44 9976.91 1271.46
```

```
 9979.85 1271.22  9982.8  1270.8  9987.7 1270.17 9989.85 1269.06 9991.47 1268.29
10006.56 1268.2910010.99  1268.310011.69 1268.6410015.81 1270.9310021.12 1270.91
10027.13 1270.7110038.16  1270.610039.38 1270.5810040.79 1270.5810047.08 1270.13
10048.99 1270.0610052.02  1270.1

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
***********************************************
  9917.8    .035  9917.8    .015 9943.46    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9917.8 9943.46           139.52  139.52  139.52             .1       .3
Ineffective Flow     num=       2
   Sta L    Sta R    Elev  Permanent
  9917.8 9924.98    1272       F
 9932.9810052.02    1272       F
Right Levee     Station= 9974.94      Elevation=  1271.5

CULVERT


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.125

INPUT
Description: 8 x 7' Box Culvert Under Ray Road
Distance from Upstream XS =    40.8
Deck/Roadway Width        =   81.23
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
 9803.01  1272.6         9906.71 1273.45         10003.9 1273.55
 10051.9 1273.53

Upstream Bridge Cross Section Data
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9917.8  1270.2 9919.43  1268.6 9924.07 1263.17 9928.39 1263.17 9934.27 1263.17
 9940.18  1268.1 9943.46 1270.56 9951.13 1271.01 9955.72 1271.24 9959.21 1271.43
 9959.95  1271.4 9962.24 1271.43 9967.57  1271.4  9967.6 1271.43 9970.08 1271.45
 9973.22 1271.43 9974.94  1271.5 9975.05 1271.45 9975.68 1271.44 9976.91 1271.46
 9979.85 1271.22  9982.8  1270.8  9987.7 1270.17 9989.85 1269.06 9991.47 1268.29
10006.56 1268.2910010.99  1268.310011.69 1268.6410015.81 1270.9310021.12 1270.91
10027.13 1270.7110038.16  1270.610039.38 1270.5810040.79 1270.5810047.08 1270.13
10048.99 1270.0610052.02  1270.1

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
***********************************************
  9917.8    .035  9917.8    .015 9943.46    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9917.8 9943.46             .1       .3
Ineffective Flow     num=       2
   Sta L    Sta R    Elev  Permanent
  9917.8 9924.98    1272       F
 9932.9810052.02    1272       F
Right Levee     Station= 9974.94      Elevation=  1271.5

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
 9803.01  1272.6         9906.71 1273.45         10003.9 1273.55
10045.16 1273.54

Downstream Bridge Cross Section Data
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9893.68  1270.9  9895.5 1270.87 9897.95 1270.51 9899.72 1270.23 9900.59 1270.23
 9902.41  1270.2 9904.97 1270.26 9909.73 1270.29  9913.3 1270.26 9915.56 1270.27
 9917.84  1268.6 9923.13 1263.03 9933.32 1263.03 9934.26 1263.03 9938.95  1267.4
 9944.42  1270.5 9945.47 1270.71 9947.68 1271.22 9948.33 1271.22 9950.48 1271.26
 9979.08  1271.4 9979.16  1271.4 9981.54 1271.37 9984.73 1271.32 9984.78 1271.32
 9984.82  1271.3  9989.8 1268.05   100001267.97410003.19 1267.9510009.61  1267.9
10013.82 1270.0610015.46  1271.210018.07 1270.9910025.39 1271.1610039.12 1271.33
10044.11 1271.3810045.16  1271.5

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
***********************************************
 9893.68    .035 9915.56    .015 9944.42    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       9915.56 9944.42             .1       .3
Ineffective Flow     num=       2
   Sta L    Sta R    Elev  Permanent
 9893.68 9924.43    1272       F
 9932.4310045.16    1272       F
Right Levee     Station= 9979.08      Elevation=  1271.4

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

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
```

```
8x7 Box                Box       7       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 2 - Wingwall flared 90 or 15 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                7.4     130     .015     .015        0                  .5                 1
Upstream   Elevation =  1263.17
           Centerline Station =  9928.98
Downstream Elevation =  1263.03
           Centerline Station =  9928.43

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.112

INPUT
Description: D/S Ray Road
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9893.68  1270.9  9895.5 1270.87 9897.95 1270.51 9899.72 1270.23 9900.59 1270.23
 9902.41  1270.2 9904.97 1270.26 9909.73 1270.29  9913.3 1270.26 9915.56 1270.27
 9917.84  1268.6 9923.13 1263.03 9933.32 1263.03 9934.26 1263.03 9938.95  1267.4
 9944.42  1270.5 9945.47 1270.71 9947.68 1271.22 9948.33 1271.22 9950.48 1271.26
 9979.08  1271.4 9979.16  1271.4 9981.54 1271.37 9984.73 1271.32 9984.78 1271.32
 9984.82  1271.3  9989.8 1268.05   100001267.97410003.19 1267.9510009.61  1267.9
10013.82 1270.0610015.46  1271.210018.07 1270.9910025.39 1271.1610039.12 1271.33
10044.11 1271.3810045.16  1271.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9893.68    .035 9915.56    .015 9944.42    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9915.56 9944.42            91.68   91.68   91.68            .1        .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9893.68 9924.43    1272       F
 9932.4310045.16    1272       F
Right Levee     Station= 9979.08      Elevation=  1271.4

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.095

INPUT
Description: A block wall is modeled on the east side of the TWD. END Wall.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9909.98 1276.06 9909.98 1270.06 9918.84  1270.1 9921.14 1267.93 9924.44    1263
 9926.74    1263 9933.04    1263 9936.35  1267.7 9939.89 1270.99 9946.12 1271.11
 9952.95 1271.26 9984.78 1269.27 9986.55  1269.2 9987.17 1268.97 9991.49 1267.59
 9995.43 1267.59   100001267.58210012.67 1267.5610014.62  1268.810016.17 1269.74
10017.06 1269.7310017.38 1269.7310022.44 1269.62 10029.4  1269.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9909.98    .035 9918.84    .015 9939.89    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9918.84 9939.89           342.25  342.25  342.25            .1        .3
Right Levee     Station= 9952.95      Elevation= 1271.26

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 8.048

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9913.91 1275.88 9913.91 1269.88  9917.7 1264.09 9924.99 1264.09 9926.36 1264.09
 9928.08 1265.88 9931.56  1269.4 9949.24 1269.96 9951.05 1270.04 9982.55 1270.34
 9993.01 1269.16 9993.11  1269.1 9996.51 1267.0510010.49 1267.0410017.14 1267.03
10020.11 1268.8410020.99  1269.410021.14 1269.4210022.51 1269.4210027.72 1269.46
10037.56 1269.55

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9913.91    .035 9913.91    .015 9931.56    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9913.91 9931.56           342.25  342.25  342.25            .1        .3
Right Levee     Station= 9982.55      Elevation= 1270.34

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.985

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*******************************************************************************
 9912.05 1275.75 9912.05 1269.65 9913.62 1269.55 9915.22 1264.19 9915.69 1263.42
 9916.41 1263.42  9924.3 1263.42 9924.96  1264.1 9930.19 1269.66 9948.19 1269.78
 9955.66 1269.83 9958.91 1269.85 9979.05  1270.7 9990.31 1269.59 9993.34 1267.74
    9995 1266.74 9998.48  1266.710015.79 1266.7410017.75 1268.4210019.22 1269.62
10020.39 1269.6210020.67  1269.610027.65 1269.6210030.71 1269.62

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9912.05    .035 9913.62    .015 9930.19    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9913.62 9930.19           495.35  495.35  495.35            .1       .3
Right Levee     Station= 9979.05      Elevation=  1270.7

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.892

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9908.71 1275.58 9908.71 1268.58 9910.94 1268.31 9912.16    1267 9914.32 1264.48
  9915.8  1264.5 9922.32 1264.48 9924.82 1268.18 9925.98 1269.93 9937.82 1270.05
 9955.62  1270.2 9981.26 1270.52 9989.43 1270.52  9991.1 1268.71 9992.76 1266.74
10010.15  1266.710014.76 1266.7410016.19 1270.3810016.21 1270.4310016.37 1270.43
 10021.4  1270.3 10025.4 1270.3510033.15 1270.4510033.63 1270.41

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9908.71    .035 9910.94    .015 9925.98    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9910.94 9925.98           500.44  500.44  500.44            .1       .3
Right Levee     Station= 9981.26      Elevation= 1270.52

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.796

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9907.87 1275.52 9907.87 1268.52 9909.451268.804 9910.71 1268.21 9910.79 1268.19
 9913.91  1264.8    9914 1264.68  9921.9 1264.68    9922 1264.68 9922.18 1264.97
 9925.26  1269.6 9949.26 1270.27 9954.47 1270.45 9963.18 1270.38 9986.88 1270.29
 9988.41  1268.4  9989.9 1266.75  9993.4 1266.75 10011.9 1266.7510012.35 1267.69
10013.03  1269.310013.56 1270.2710014.91 1270.3610022.63 1270.8110023.06  1270.8
 10029.8  1270.610031.13 1270.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9907.87    .035 9909.45    .015 9925.26    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9909.45 9925.26           502.04  502.04  502.04            .1       .3
Right Levee     Station= 9954.47      Elevation= 1270.45

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.702

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9909.71 1275.82 9909.71 1268.82 9913.33 1268.73 9916.54 1264.75  9916.7 1264.52
 9917.53  1264.5  9924.7 1264.52 9925.73 1265.92 9928.01 1269.09 9947.98 1269.84
 9956.76  1270.2 9971.19 1270.25 9988.46 1270.29 9990.95 1268.09 9992.15 1267.04
10011.75    126710014.16 1267.0410014.47 1267.6210015.54 1269.2110016.06 1270.11
10018.95  1270.310024.61 1270.6410028.37 1270.8910030.45    1271

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9909.71    .035 9913.33    .015 9928.01    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9913.33 9928.01           495.31  495.31  495.31            .1       .3
Right Levee     Station= 9988.46      Elevation= 1270.29

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.607

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
```

```
 9911.79 1275.05 9911.79 1269.05  9918.1  1269.1 9918.77    1269 9919.07 1267.09
 9920.64  1264.7 9924.19 1264.65 9929.01 1264.61 9933.89 1269.29 9934.43 1269.77
 9939.53  1269.9 9955.13 1270.25 9957.95 1270.36 9960.48 1270.49  9968.1 1270.55
 9988.78  1270.8 9991.66 1269.68 9995.07 1268.0910000.22 1268.0910017.08 1268.09
10018.35  1269.210019.21 1270.2710022.94  1270.910023.37 1270.9610025.18 1270.95
10034.46  1270.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9911.79    .035 9918.77    .015 9933.89    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9918.77 9933.89            497.37  497.37  497.37            .1       .3
Right Levee     Station= 9988.78      Elevation=  1270.8

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.513

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9927.96 1273.57 9927.96 1268.57 9931.18 1268.53 9932.26 1267.44 9934.66  1264.7
 9938.27 1264.67 9942.66 1264.67 9946.79 1268.37 9947.63 1269.09 9953.33  1269.6
 9962.28 1270.41    9966 1270.39 9990.95 1270.17 9993.35 1268.78  9994.3  1268.2
10010.12 1268.2110016.33 1268.21 10016.8 1268.9510018.79 1270.2710020.63  1270.6
10022.38 1270.72 10033.5 1270.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9927.96    .035 9931.18    .015 9946.79    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9931.18 9946.79            502.98  502.98  502.98            .1       .3
Right Levee     Station= 9962.28      Elevation= 1270.41

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.423

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9930.83 1273.66 9930.83 1267.66 9934.55 1267.62 9936.98 1265.28 9938.25 1264.34
 9943.46 1264.34 9944.32  1264.3  9947.1 1267.87 9948.37  1269.1 9979.16 1269.79
 9993.06 1270.11 9994.33  1269.3 9997.17 1268.2110016.02 1268.2110019.13 1268.21
10021.38 1269.31 10022.6  1269.810023.28 1270.1110023.61 1270.1510028.15 1270.79
 10029.3 1270.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9930.83    .035 9934.55    .015 9948.37    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9934.55 9948.37            162.82  162.82  162.82            .1       .3
Right Levee     Station= 9993.06      Elevation= 1270.11

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.396

INPUT
Description: U/S Val Vista Drive
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9929.68 1276.75 9929.68 1270.75 9933.81 1270.45 9935.29 1270.45 9935.47 1269.96
  9936.9 1267.25 9938.72 1262.97 9945.27 1262.97 9948.81 1262.97 9950.72 1262.97
 9955.28 1269.67 9956.61  1270.7 9960.35 1270.73   100001270.42910001.13 1270.42
10003.39 1269.01 10004.4 1268.2110009.97  1268.210023.81 1268.21 10026.5 1269.72
10027.17 1270.2710028.57  1270.410030.24  1270.710031.58 1270.8710039.79 1270.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9929.68    .035 9935.29    .015 9956.61    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9935.29 9956.61            151.41  151.41  151.41            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9929.68 9938.72  1271.8       F
 9950.7210039.79  1271.8       F
Right Levee     Station= 9960.35      Elevation= 1270.73

CULVERT


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.384

INPUT
Description: 12 x 5.5' Box Culvert under Val Vista Drive
```

```
Distance from Upstream XS =      10
Deck/Roadway Width        =   131.4
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 9452.41  1268.8         9647.27  1268.9         9734.73 1269.92
  9832.5 1270.96         9929.63  1271.8        10067.18    1272

Upstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9929.68 1276.75 9929.68 1270.75 9933.81 1270.45 9935.29 1270.45 9935.47 1269.96
  9936.9 1267.25 9938.72 1262.97 9945.27 1262.97 9948.81 1262.97 9950.72 1262.97
 9955.28 1269.67 9956.61  1270.7 9960.35 1270.73   100001270.42910001.13 1270.42
10003.39 1269.01 10004.4 1268.2110009.97  1268.210023.81 1268.21 10026.5 1269.72
10027.17 1270.2710028.57  1270.410030.24  1270.710031.58 1270.8710039.79 1270.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9929.68    .035 9935.29    .015 9956.61    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       9935.29 9956.61            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9929.68 9938.72  1271.8       F
 9950.7210039.79  1271.8       F
Right Levee     Station= 9960.35      Elevation= 1270.73

Downstream  Deck/Roadway Coordinates
    num=        5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 9647.27  1268.9         9734.73 1269.92          9832.5 1270.96
 9929.63  1271.8        10067.18    1272

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9927.8 1271.17 9929.53 1271.17 9932.51 1262.81 9937.22 1262.81 9940.84 1262.81
 9944.51 1262.81  9952.8  1271.1 9968.01 1271.01 9992.96 1270.86 9994.28 1270.31
 9997.22 1268.21   100001268.20610004.11  1268.210016.54 1268.2110017.89  1269.1
10019.22 1270.55 10034.6 1270.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9927.8    .035 9929.53    .015  9952.8    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       9929.53  9952.8            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  9927.8 9932.51  1271.8       F
 9944.51 10034.6  1271.8       F
Right Levee     Station=  9952.8      Elevation=  1271.1

Upstream Embankment side slope              =      0 horiz. to 1.0 vertical
Downstream Embankment side slope            =      0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 1270.96
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
12x5.5 Box          Box      5.5      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               5.66   133.1     .015     .015        0                  .4                 1
Upstream   Elevation =  1262.97
           Centerline Station =  9944.72
Downstream Elevation =  1262.81
           Centerline Station =  9938.51

CROSS SECTION


RIVER: Eastern Canal Tw
REACH: Chandler to UPRR   RS: 7.367

INPUT
Description: D/S Val Vista Drive
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9927.8 1271.17 9929.53 1271.17 9932.51 1262.81 9937.22 1262.81 9940.84 1262.81
 9944.51 1262.81  9952.8  1271.1 9968.01 1271.01 9992.96 1270.86 9994.28 1270.31
 9997.22 1268.21   100001268.20610004.11  1268.210016.54 1268.2110017.89  1269.1
10019.22 1270.55 10034.6 1270.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9927.8    .035 9929.53    .015  9952.8    .035

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

```
      9929.53  9952.8          187.74  187.74  187.74              .1       .3
Ineffective Flow     num=       2
  Sta L   Sta R    Elev  Permanent
  9927.8 9932.51  1271.8       F
 9944.51 10034.6  1271.8       F
Right Levee     Station=  9952.8      Elevation=  1271.1

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.332

INPUT
Description: Note: Stations 9937.70 and 9943.70 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      18
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9929.11  1274.9 9929.11  1268.9  9934.9 1266.63  9937.7  1262.8  9940.7  1262.8
  9943.7  1262.8 9951.23 1269.75 9962.81 1269.89 9995.26 1270.29 9997.15    1269
 9998.49  1268.1   100001268.09510007.39 1268.07 10020.8 1268.0410023.14 1269.71
10024.21 1270.4410026.05  1270.310027.82 1270.22

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9929.11    .035 9929.11    .015 9951.23    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9929.11 9951.23           468.36  468.36  468.36            .1       .3
Right Levee     Station= 9995.26      Elevation= 1270.29

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.243

INPUT
Description: Note: Stations 9940.43 and 9946.43 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      18
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9931.82 1274.81 9931.82 1268.43  9933.5 1268.43 9935.63 1267.97 9940.43 1263.11
 9943.43 1263.11 9946.43 1263.11  9947.8 1265.33 9954.55 1269.57 9988.19  1269.7
 9997.04 1269.75 9997.78 1269.26 9999.71 1268.0110006.11 1267.99 10023.7  1267.9
10024.53 1268.4210025.73 1269.77 10036.3 1268.62

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9931.82    .035  9933.5    .015 9954.55    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         9933.5 9954.55           498.96  498.96  498.96            .1       .3
Right Levee     Station= 9997.04      Elevation= 1269.75

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.149

INPUT
Description: Note: Stations 9940.74 and 9946.74 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      21
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9933.3 1274.72  9933.3 1268.97  9937.8 1268.97 9938.56 1267.39 9940.74 1262.98
 9943.74 1262.98 9946.74 1262.98 9950.28  1266.8 9955.96 1270.26 9969.35 1270.62
 9975.13 1270.77 9978.92 1270.75 9986.82  1270.7 9995.75 1270.69 9997.67 1268.26
 9998.41 1267.3610003.34 1267.3610024.75  1267.4 10032.4 1268.19 10042.4 1269.25
 10042.7 1269.19

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  9933.3    .035  9937.8    .015 9955.96    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         9937.8 9955.96           499.49  499.49  499.49            .1       .3
Right Levee     Station= 9975.13      Elevation= 1270.77

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 7.054

INPUT
Description: Note: Stations 9941.16 and 9947.16 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      19
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9933.03 1274.63 9933.03 1268.89 9935.57 1268.89 9938.91  1267.4 9941.16    1263
 9944.16    1263 9947.16    1263 9954.67 1268.86  9957.1 1270.26 9966.64 1270.26
 9976.35  1270.3  9981.6 1270.22 9996.85 1270.28 9997.61  1269.3 9998.94 1267.36
10017.29  1267.410024.04 1267.3610031.67 1268.3310040.66 1269.51
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9933.03    .035 9935.57    .015  9957.1    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9935.57  9957.1            501.1   501.1   501.1            .1        .3
Right Levee     Station= 9976.35      Elevation=  1270.3

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.953

INPUT
Description: Note: Stations 9935.62 and 9941.62 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
  9927.8 1274.53  9927.8 1268.68 9930.41 1268.68 9932.54  1266.5 9935.62 1262.98
 9938.62 1262.98 9941.62 1262.98  9947.9 1269.96 9964.91 1270.46 9967.02  1270.5
 9970.45 1270.45 9989.07 1270.32 9993.39 1267.38 9993.41 1267.37 9993.58  1267.4
10015.68 1267.3710032.06 1269.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
  9927.8    .035 9930.41    .015  9947.9    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9930.41  9947.9            498.07  498.07  498.07            .1        .3
Right Levee     Station= 9967.02      Elevation=  1270.5

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.858

INPUT
Description: Note: Stations 9937.60 and 9943.60 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.

A block wall is model on the east side of the TWD.
             Begin wall.
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 9928.48 1274.44 9928.48 1268.44 9931.68 1268.44 9933.33  1267.6  9937.6 1262.98
  9940.6 1262.98  9943.6 1262.98 9952.37 1270.21 9970.21  1270.1 9991.36  1270.1
 9994.19 1268.22 9995.39 1267.3710015.62 1267.37 10019.4 1267.3710019.58  1267.5
10021.99 1269.1210027.26  1269.310040.63 1269.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9928.48    .035 9931.68    .015 9952.37    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9931.68 9952.37            152.92  152.92  152.92            .1        .3
Right Levee     Station= 9952.37      Elevation= 1270.21

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.822

INPUT
Description: U/S Chandler Blvd.
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 9872.23 1270.419876.669 1270.349879.079  1270.4 9879.69 1270.38 9884.43  1270.3
 9904.06 1270.219914.409 1270.139916.251    1270  9921.5 1270.579923.001 1268.67
9927.259 1262.349930.759 1262.349934.259 1262.34 9937.97  1270.69938.389 1270.58
 9948.37 1270.529979.591 1270.419979.669 1270.41 9979.74  1270.49979.819 1270.41
9979.891 1270.419979.969 1270.41 9980.04 1270.419980.119  1270.49980.189 1270.41
9986.299 1270.34 9989.57 1270.49 9995.51 1270.29 9996.21  1268.99999.011 1265.04
10000.36 1265.0410001.13 1265.0410009.93 1265.0410017.01    126510023.28 1265.04
10025.06 1266.5310029.07 1269.4910038.08 1269.5910047.17  1269.810051.99 1269.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9872.23    .0359923.001    .0159938.389    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9923.0019938.389           160.34  160.34  160.34            .1        .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9872.23  9927.8 1271.54       F
  9934.310051.99 1271.51       F
Right Levee     Station= 9938.39      Elevation= 1270.58

CULVERT


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.805
```

```
INPUT
Description: 78" Pipe under Williams Field Road (Chandler Blvd)
Distance from Upstream XS =   33.69
Deck/Roadway Width        =      95
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        6
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*************************************************************************
9685.321 1269.91          9709.98  1270.2          9814.619 1271.17
  9910.1 1271.54         10014.08 1271.53          10051.99  1271.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9872.23 1270.419876.669 1270.349879.079  1270.4 9879.69 1270.38 9884.43  1270.3
 9904.06 1270.219914.409 1270.139916.251    1270  9921.5 1270.579923.001 1268.67
9927.259 1262.349930.759 1262.349934.259 1262.34 9937.97  1270.69938.389 1270.58
 9948.37 1270.529979.591 1270.419979.669 1270.41 9979.74  1270.49979.819 1270.41
9979.891 1270.419979.969 1270.41 9980.04 1270.419980.119  1270.49980.189 1270.41
9986.299 1270.34 9989.57 1270.49 9995.51 1270.29 9996.21  1268.99999.011 1265.04
10000.36 1265.0410001.13 1265.0410009.93 1265.0410017.01    126510023.28 1265.04
10025.06 1266.5310029.07 1269.4910038.08 1269.5910047.17  1269.810051.99 1269.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 9872.23    .0359923.001    .0159938.389    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
      9923.0019938.389            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9872.23  9927.8 1271.54       F
  9934.310051.99 1271.51       F
Right Levee     Station= 9938.39      Elevation= 1270.58

Downstream  Deck/Roadway Coordinates
    num=        6
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*************************************************************************
9685.321 1269.91          9709.98  1270.2          9814.619 1271.17
  9910.1 1271.54     .   10014.08 1271.53          10041.39  1271.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
9884.701 1270.07 9894.44  1269.9 9906.71 1269.819913.009 1269.359913.419  1269.2
 9913.86  1269.29920.219 1269.029920.329 1269.01 9920.53  1268.9 9924.01 1261.31
9927.511 1261.319931.011 1261.319933.311 1266.15 9938.07 1268.73 9948.62  1269.2
 9950.49  1269.3 9951.66 1269.34 9960.05 1270.179960.729 1270.25 9962.74  1270.2
9972.919 1269.839990.069 1269.25 9990.69 1268.469996.289 1265.0410009.19    1265
10020.44 1265.04 10023.8 1267.6410025.14  1268.810025.73 1268.7810029.37  1268.6
10031.31 1268.5510041.39 1268.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
9884.701    .035 9920.53    .015 9938.07    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       9920.53 9938.07            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
9884.701 9924.01 1271.54       F
 9930.5110041.39 1271.54       F
Right Levee     Station= 9960.73      Elevation= 1270.25

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 1271.17
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
78" pipe        Circular     6.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               3.95     148     .015     .015        0                  .5                  1
Upstream   Elevation =  1262.34
           Centerline Station =  9931.05
Downstream Elevation =  1261.31
           Centerline Station =  9927.26

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.791

INPUT
Description: D/S Chandler Blvd.
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
9884.701 1270.07 9894.44  1269.9 9906.71 1269.819913.009 1269.359913.419  1269.2
 9913.86  1269.29920.219 1269.029920.329 1269.01 9920.53  1268.9 9924.01 1261.31
9927.511 1261.319931.011 1261.319933.311 1266.15 9938.07 1268.73 9948.62  1269.2
```

```
 9950.49  1269.3 9951.66 1269.34 9960.05 1270.179960.729 1270.25 9962.74  1270.2
9972.919 1269.839990.069 1269.25 9990.69 1268.469996.289 1265.0410009.19    1265
10020.44 1265.04 10023.8 1267.6410025.14  1268.810025.73 1268.7810029.37  1268.6
10031.31 1268.5510041.39 1268.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
9884.701    .035 9920.53    .015 9938.07    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9920.53 9938.07            187.34  187.34  187.34            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
9884.701 9924.01 1271.54       F
 9930.5110041.39 1271.54       F
Right Levee     Station= 9960.73      Elevation= 1270.25

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Chandler to UPRR   RS: 6.762

INPUT
Description: Note: Stations 9935.90 and 9941.90 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9927.72 1268.48 9929.62  1267.7 9929.63 1267.73 9929.82 1267.61  9935.9  1261.9
  9938.9  1261.9  9941.9  1261.9 9946.49 1267.07 9948.77  1268.5 9949.62 1268.06
 9951.72 1266.85 9956.64 1266.87 9957.64 1266.91 9959.11    1267  9965.2 1267.43
 9969.24 1267.97 9971.13 1268.43 9971.39  1268.5 9974.24  1268.5 9993.13 1268.09
 9995.86 1265.97 9997.04 1265.0410010.01 1265.0410017.45    126510017.88  1265.4
10019.86 1266.8310022.28 1267.4610024.91  1268.510031.03  1268.610035.33 1268.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
 9927.72    .035 9927.72    .015 9948.77    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9927.72 9948.77              497     497     497            .1       .3
Right Levee     Station= 9948.77      Elevation=  1268.5

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.478

INPUT
Description: Note: Stations 9931.26 and 9937.26 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9926.07 1267.31 9928.71  1265.5 9931.26 1261.47 9934.26 1261.47 9937.26 1261.47
 9944.45  1267.6 9945.37 1268.17 9945.81 1268.15    9956  1267.8 9960.47 1268.02
 9966.67 1268.27 9985.77  1268.2 9987.41 1268.19 9987.54  1268.1 9992.44 1264.41
    9997 1264.4110011.06 1264.4110012.75 1265.5910014.56  1266.910019.62 1267.93
10019.89    126810020.83 1268.0410029.73 1268.43

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
 9926.07    .035 9926.07    .015 9945.37    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9926.07 9945.37            568.35   571.4  574.52            .1       .3
Right Levee     Station= 9966.67      Elevation= 1268.27

LATERAL STRUCTURE


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.477

INPUT
Description:
Lateral structure position     = Left overbank
Distance from Upstream XS =       0
Deck/Roadway Width        =       1
Weir Coefficient          =       2
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1267.31  568.35 1267.24 1000.01  1267.2 1500.02 1267.22 1994.02 1267.78

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.370

INPUT
Description: Note: Stations 9933.76 and 9939.76 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
```

```
Station Elevation Data     num=      23
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
 9926.69 1267.24 9929.68 1266.41 9933.76 1261.47 9936.76 1261.47 9939.76 1261.47
 9945.76  1267.5 9948.28 1269.23 9948.68 1269.19 9960.77 1267.83 9964.77  1268.3
 9970.26  1268.9 9983.75 1268.17 9992.17 1267.71  9994.1 1266.06 9995.51 1264.41
   10010 1264.410013.89 1264.4110016.25 1266.2810017.13 1266.8910018.77 1267.26
10022.38    126810028.61 1268.1110032.55  1268.2

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9926.69    .035 9926.69    .015 9948.28    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9926.69 9948.28            431.66  428.96  426.52            .1       .3
Right Levee     Station= 9948.28      Elevation= 1269.23

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.289

INPUT
Description: Note: Stations 9931.97 and 9937.97 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data     num=      25
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
 9926.53  1267.2 9930.64 1264.49 9931.97 1261.47 9934.97 1261.47 9937.97 1261.47
 9941.57 1265.93 9946.02 1269.23 9955.03  1268.1 9959.46 1267.57 9963.15 1268.15
 9966.46 1268.66 9968.18 1268.93 9981.91  1268.2 9986.35  1267.6 9990.66 1267.71
 9991.71 1266.98 9995.06 1264.41   10006 1264.410012.33 1264.4110013.11  1265.3
10014.02  1266.110019.44 1267.4810020.39 1267.710021.27 1267.7310030.92 1267.51

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9926.53    .035 9926.53    .015 9946.02    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9926.53 9946.02            500.01   502.5  505.07            .1       .3
Right Levee     Station= 9946.02      Elevation= 1269.23

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.194

INPUT
Description: Note: Stations 9923.56 and 9929.56 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data     num=      21
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
 9919.23 1267.22 9921.31  1265.5 9923.56 1261.47 9926.56 1261.47 9929.56 1261.47
  9937.7 1267.56 9938.91 1268.26 9941.54 1268.16  9953.8  1267.5 9960.16 1268.48
 9960.24  1268.5 9960.39  1268.5 9982.45 1268.44 9984.79  1265.8 9986.07 1264.41
   10000 1264.4110005.97 1264.4110006.56 1264.7310008.56    1266 10010.7 1267.03
10012.01 1267.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9919.23    .035 9919.23    .015 9938.91    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9919.23 9938.91              494     494     494            .1       .3
Right Levee     Station= 9960.16      Elevation= 1268.48

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 6.106

INPUT
Description: Note: Stations 9938.92 and 9944.92 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data     num=      21
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
 9931.78 1267.86 9936.29 1265.03 9938.92  1261.5 9941.92  1261.5 9944.92  1261.5
 9945.58 1263.71 9953.03 1268.26 9968.51 1267.41 9968.85 1267.39 9968.96  1267.4
 9974.31 1268.19 9987.39 1268.23 9995.86 1268.26 9997.05 1266.75 9999.82  1264.4
10015.52 1264.4110019.25 1264.4110021.59 1266.6810021.89 1266.9310022.41    1267
10028.71 1267.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9931.78    .035 9931.78    .015 9953.03    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9931.78 9953.03            501.01  492.23  484.27            .1       .3
Right Levee     Station= 9995.86      Elevation= 1268.26

CROSS SECTION


RIVER: Eastern Canal TW
```

```
REACH: Pecos to Chandle   RS: 6.013

INPUT
Description: Note: Stations 9938.34 and 9944.34 were added to better define the
             tailwater ditch through this section, with an assumed bottom width
             of 6 feet.
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9929.84  1267.7 9937.72 1263.27 9938.34  1261.1 9941.34  1261.1 9944.34  1261.1
 9944.63 1263.15 9952.33 1267.77 9966.52 1266.84 9967.29 1266.79 9971.31  1267.4
 9974.58 1267.84 9985.32 1267.77 9996.11 1267.58 9997.22 1266.47 9999.18  1264.4
10013.07 1264.4110020.03 1264.4110022.05 1266.0110023.01  1266.710024.06  1266.8
10028.18 1267.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9929.84    .035 9929.84    .015 9952.33    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9929.84 9952.33           509     509     509            .1        .3
Right Levee     Station= 9974.58      Elevation= 1267.84

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 5.913

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9920.98 1267.96 9925.28 1264.01 9928.39  1261.5 9934.13 1261.29 9936.52 1261.24
  9937.7 1262.16 9940.77 1264.72 9944.39  1267.9 9949.32 1267.84 9969.03 1267.33
 9987.17 1267.68  9991.3 1267.71 9992.61  1266.7 9995.46 1264.4110011.01 1264.41
10013.02 1264.4110013.91 1264.8910016.19  1266.610019.71 1267.1510019.94 1267.18
10020.19 1267.2110020.48 1267.25 10020.8  1267.310021.17 1267.3410021.61 1267.39
10022.13 1267.4610022.47 1267.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9920.98    .035 9920.98    .015 9944.39    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9920.98 9944.39           270     270  272.46            .1        .3
Right Levee     Station= 9944.39      Elevation=  1267.9

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 5.864

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9924.07  1267.7 9929.22 1263.25 9931.44  1261.3 9933.27 1261.31 9939.33 1261.21
 9944.97 1267.13 9945.36 1267.53 9946.24  1267.5 9967.43 1266.89  9980.7 1267.32
 9989.93 1267.71  9994.5 1265.22 9996.06  1264.110001.75 1263.9610011.36  1263.7
10013.27 1264.7610017.83    1267 10022.3  1267.510022.44 1267.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9924.07    .035 9924.07    .015 9945.36    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9924.07 9945.36           198.49  198.49  198.49            .1        .3
Right Levee     Station= 9989.93      Elevation= 1267.71

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 5.823

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9942.1 1267.16 9943.59  1265.8 9949.58 1261.21 9952.21    1261 9956.47 1260.68
 9961.01 1266.71 9961.35  1267.1 9964.67 1267.18 9973.62 1267.25  9982.7 1267.17
 9986.91 1267.19 9987.85  1266.4 9991.63 1263.76   10003 1262.7710008.14  1262.3
10008.83 1262.7310015.12  1266.610016.05 1266.8210018.12 1267.44

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9942.1    .035  9942.1    .015 9961.35    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         9942.1 9961.35           500.26  500.55  500.87            .1        .3
Right Levee     Station= 9973.62      Elevation= 1267.25

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 5.728
```

```
INPUT
Description:
Station Elevation Data     num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9934.85 1266.94 9938.53 1266.87 9944.65  1266.9 9948.82 1262.77 9950.37 1261.21
 9954.71 1261.21 9957.27 1261.21 9957.88  1261.8 9963.15 1266.65 9969.84 1267.33
 9976.66 1268.06 9984.29 1267.99 9986.93    1268 9987.94 1267.95 9988.21 1267.69
  9994.8 1261.41 9999.96 1261.4610003.99  1261.510011.19 1261.5410014.58 1264.51
10016.88 1266.73 10018.5 1267.0510020.04  1267.310025.03 1267.0410029.86 1266.93

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9934.85    .035 9944.65    .015 9963.15    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9944.65 9963.15            458.17  457.03  456.06            .1       .3
Right Levee     Station= 9976.66      Elevation= 1268.06

CROSS SECTION


RIVER: Eastern Canal TW
REACH: Pecos to Chandle   RS: 5.633

INPUT
Description: Pecos Road
Station Elevation Data     num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9910.36    1268 9913.87 1267.61  9922.3 1267.06 9922.69  1266.8  9930.9 1261.34
 9937.77 1261.23 9939.26 1261.22 9942.71 1263.66  9948.2  1268.1 9957.62 1268.65
 9958.73 1268.71 9961.17 1268.73 9965.37 1268.81 9971.76  1268.9 9975.51 1268.73
  9981.5 1268.21 9992.47 1267.95 9994.27 1267.95 9996.83  1263.5   10000  1260.1
10008.42 1260.3310015.64  1260.510016.66 1263.8710018.64  1263.9 10021.5 1267.02
10024.07 1267.5510025.12 1267.7810033.17 1267.4510035.37  1267.510036.29 1267.69

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9910.36    .035  9922.3    .015  9948.2    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9922.3  9948.2              0       0       0            .1       .3
Right Levee     Station= 9971.76      Elevation=  1268.9

Profile Output Table - FDS
*****************************************************************************************************************************
************************************
* Reach        * River Sta   * Profile     *     Q Total *W.S. Elev *Crit W.S. *E.G. Elev *E.G. Slope * Vel Chnl *Flow Area *Top Width *Sta
W.S. Lft *Sta W.S. Rgt *Froude # Chl *
*                *             *             *      (cfs) *    (ft) *    (ft) *    (ft) *  (ft/ft) *  (ft/s) * (sq ft) *    (ft) *
  (ft) *        (ft) *            *
*****************************************************************************************************************************
************************************
* Pecos to Chandle* 6.478       * PF 1        *      236.00 * 1267.52 * 1264.57 * 1267.69 * 0.000259 *    3.33 *   70.91 *   18.28 *
   9926.07 *     9944.35 *       0.30 *
* Pecos to Chandle* 6.477       *             *  Lat Struct *         *         *         *         *         *         *         *
          *             *             *
* Pecos to Chandle* 6.370       * PF 1        *      236.00 * 1267.34 * 1264.55 * 1267.52 * 0.000309 *    3.49 *   67.69 *   18.91 *
   9926.69 *     9945.60 *       0.32 *
* Pecos to Chandle* 6.289       * PF 1        *      236.00 * 1267.09 * 1264.72 * 1267.36 * 0.000469 *    4.10 *   57.49 *   16.45 *
   9926.69 *     9943.14 *       0.39 *
* Pecos to Chandle* 6.194       * PF 1        *      236.00 * 1266.90 * 1264.54 * 1267.13 * 0.000385 *    3.86 *   61.20 *   17.21 *
   9919.61 *     9936.82 *       0.36 *
* Pecos to Chandle* 6.106       * PF 1        *      236.00 * 1266.51 * 1264.84 * 1266.87 * 0.000741 *    4.79 *   49.32 *   16.23 *
   9933.93 *     9950.16 *       0.48 *
* Pecos to Chandle* 6.013       * PF 1        *      236.00 * 1266.09 * 1264.69 * 1266.47 * 0.000874 *    4.94 *   47.75 *   16.82 *
   9932.71 *     9949.53 *       0.52 *
* Pecos to Chandle* 5.913       * PF 1        *      236.00 * 1265.92 * 1263.94 * 1266.14 * 0.000370 *    3.78 *   62.37 *   18.94 *
   9923.20 *     9942.14 *       0.37 *
* Pecos to Chandle* 5.864       * PF 1        *      236.00 * 1265.76 * 1263.95 * 1266.03 * 0.000471 *    4.17 *   56.61 *   17.34 *
   9926.32 *     9943.66 *       0.41 *
* Pecos to Chandle* 5.823       * PF 1        *      236.00 * 1265.63 * 1263.83 * 1265.93 * 0.000520 *    4.34 *   54.32 *   16.39 *
   9943.81 *     9960.20 *       0.42 *
* Pecos to Chandle* 5.728       * PF 1        *      236.00 * 1265.05 * 1264.06 * 1265.55 * 0.001059 *    5.65 *   41.75 *   14.89 *
   9946.52 *     9961.41 *       0.59 *
* Pecos to Chandle* 5.633       * PF 1        *      236.00 * 1263.78 * 1263.78 * 1264.74 * 0.002996 *    7.87 *   30.00 *   15.62 *
   9927.24 *     9942.85 *       1.00 *
* Chandler to UPRR* 8.581       * PF 1        *      124.00 * 1269.96 * 1267.92 * 1270.07 * 0.000508 *    2.69 *   46.08 *   16.84 *
   9930.97 *     9947.82 *       0.29 *
* Chandler to UPRR* 8.473       * PF 1        *      124.00 * 1269.68 * 1267.84 * 1269.79 * 0.000488 *    2.59 *   47.94 *   18.85 *
   9919.35 *     9938.21 *       0.29 *
* Chandler to UPRR* 8.379       * PF 1        *      124.00 * 1269.37 * 1267.73 * 1269.50 * 0.000648 *    2.92 *   42.53 *   16.72 *
   9917.40 *     9934.12 *       0.32 *
* Chandler to UPRR* 8.284       * PF 1        *      124.00 * 1269.13 * 1267.05 * 1269.23 * 0.000437 *    2.55 *   48.67 *   17.33 *
   9916.59 *     9933.91 *       0.27 *
* Chandler to UPRR* 8.237       *             *  Lat Struct *         *         *         *         *         *         *         *
          *             *             *
* Chandler to UPRR* 8.189       * PF 1        *      124.00 * 1269.01 * 1266.42 * 1269.07 * 0.000258 *    2.07 *   59.87 *   19.92 *
   9916.37 *     9936.29 *       0.21 *
* Chandler to UPRR* 8.164       *             *  Lat Struct *         *         *         *         *         *         *         *
          *             *             *
* Chandler to UPRR* 8.138       * PF 1        *      124.00 * 1268.92 * 1265.12 * 1269.03 * 0.000072 *    2.69 *   46.01 *   22.17 *
   9919.10 *     9941.28 *       0.20 *
* Chandler to UPRR* 8.125       *             *     Culvert *         *         *         *         *         *         *         *
          *             *             *
* Chandler to UPRR* 8.112       * PF 1        *      124.00 * 1268.84 * 1264.98 * 1268.95 * 0.000070 *    2.67 *   46.45 *   23.97 *
   9917.52 *     9941.48 *       0.20 *
* Chandler to UPRR* 8.095       * PF 1        *      124.00 * 1268.88 * 1264.78 * 1268.92 * 0.000060 *    1.66 *   74.72 *   17.48 *
   9920.14 *     9937.62 *       0.14 *
* Chandler to UPRR* 8.048       * PF 1        *      124.00 * 1268.82 * 1265.85 * 1268.89 * 0.000112 *    2.09 *   59.20 *   16.39 *
   9914.60 *     9930.99 *       0.19 *
* Chandler to UPRR* 7.985       * PF 1        *      124.00 * 1268.80 * 1265.17 * 1268.85 * 0.000084 *    1.89 *   65.54 *   15.54 *
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  9913.85 *     9929.38 *       0.16 *
* Chandler to UPRR* 7.892      * PF 1       *     124.00 * 1268.68 * 1266.32 * 1268.79 * 0.000198 *    2.63 *   47.62 *   16.44
  9908.71 *     9925.15 *       0.25 *
* Chandler to UPRR* 7.796      * PF 1       *     124.00 * 1268.54 * 1266.52 * 1268.67 * 0.000278 *    2.91 *   42.62 *   14.64
  9907.87 *     9924.55 *       0.30 *
* Chandler to UPRR* 7.702      * PF 1       *     124.00 * 1268.40 * 1266.36 * 1268.53 * 0.000269 *    2.91 *   42.59 *   13.92 *
  9913.60 *     9927.51 *       0.29 *
* Chandler to UPRR* 7.607      * PF 1       *     124.00 * 1268.25 * 1266.42 * 1268.39 * 0.000309 *    3.04 *   40.77 *   13.91 *
  9918.89 *     9932.80 *       0.31 *
* Chandler to UPRR* 7.513      * PF 1       *     124.00 * 1268.06 * 1266.48 * 1268.22 * 0.000376 *    3.23 *   38.38 *   14.79 *
  9931.65 *     9946.44 *       0.35 *
* Chandler to UPRR* 7.423      * PF 1       *     124.00 * 1267.75 * 1266.40 * 1267.98 * 0.000559 *    3.84 *   32.72 *   16.18 *
  9930.83 *     9947.01 *       0.42 *
* Chandler to UPRR* 7.396      * PF 1       *     124.00 * 1267.84 * 1264.46 * 1267.91 * 0.000055 *    2.12 *   58.49 *   17.45 *
  9936.59 *     9954.04 *       0.17 *
* Chandler to UPRR* 7.384      *            *     Culvert *        *        *        *         *        *        *        *
          *             *            *
* Chandler to UPRR* 7.367      * PF 1       *     124.00 * 1267.80 * 1264.30 * 1267.87 * 0.000051 *    2.07 *   59.92 *   18.77 *
  9930.73 *     9949.50 *       0.16 *
* Chandler to UPRR* 7.332      * PF 1       *     124.00 * 1267.77 * 1264.91 * 1267.85 * 0.000160 *    2.32 *   53.40 *   17.09 *
  9932.00 *     9949.08 *       0.23 *
* Chandler to UPRR* 7.243      * PF 1       *     124.00 * 1267.65 * 1265.25 * 1267.76 * 0.000227 *    2.67 *   46.41 *   15.55 *
  9935.95 *     9951.49 *       0.27 *
* Chandler to UPRR* 7.149      * PF 1       *     124.00 * 1267.50 * 1265.13 * 1267.63 * 0.000284 *    2.97 *   41.76 *   12.91 *
  9938.51 *     9951.42 *       0.29 *
* Chandler to UPRR* 7.054      * PF 1       *     124.00 * 1267.37 * 1265.11 * 1267.50 * 0.000259 *    2.86 *   43.30 *   13.83 *
  9938.93 *     9952.76 *       0.29 *
* Chandler to UPRR* 6.953      * PF 1       *     124.00 * 1267.22 * 1265.10 * 1267.36 * 0.000288 *    3.00 *   41.38 *   13.59 *
  9931.84 *     9945.43 *       0.30 *
* Chandler to UPRR* 6.858      * PF 1       *     124.00 * 1267.08 * 1265.06 * 1267.21 * 0.000274 *    2.91 *   42.61 *   14.77 *
  9933.81 *     9948.58 *       0.30 *
* Chandler to UPRR* 6.822      * PF 1       *     124.00 * 1266.89 * 1264.59 * 1267.16 * 0.000241 *    4.20 *   29.56 *   12.10 *
  9924.20 *     9936.30 *       0.35 *
* Chandler to UPRR* 6.805      *            *     Culvert *        *        *        *         *        *        *        *
          *             *            *
* Chandler to UPRR* 6.791      * PF 1       *     124.00 * 1266.46 * 1263.55 * 1266.67 * 0.000158 *    3.71 *   33.44 *   12.22 *
  9921.65 *     9933.87 *       0.29 *
* Chandler to UPRR* 6.762      * PF 1       *     124.00 * 1266.50 * 1264.01 * 1266.60 * 0.000192 *    2.57 *   48.26 *   14.98 *
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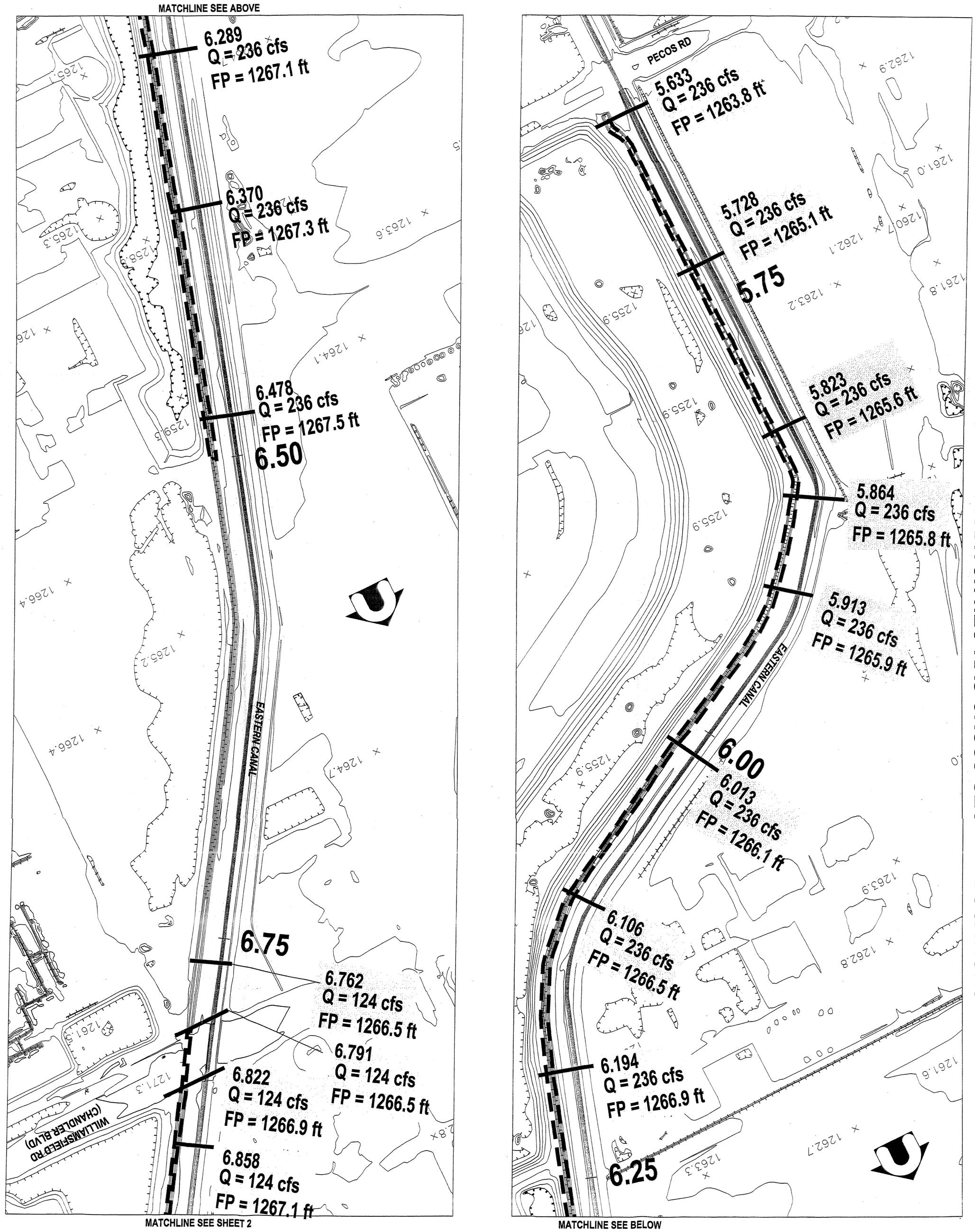
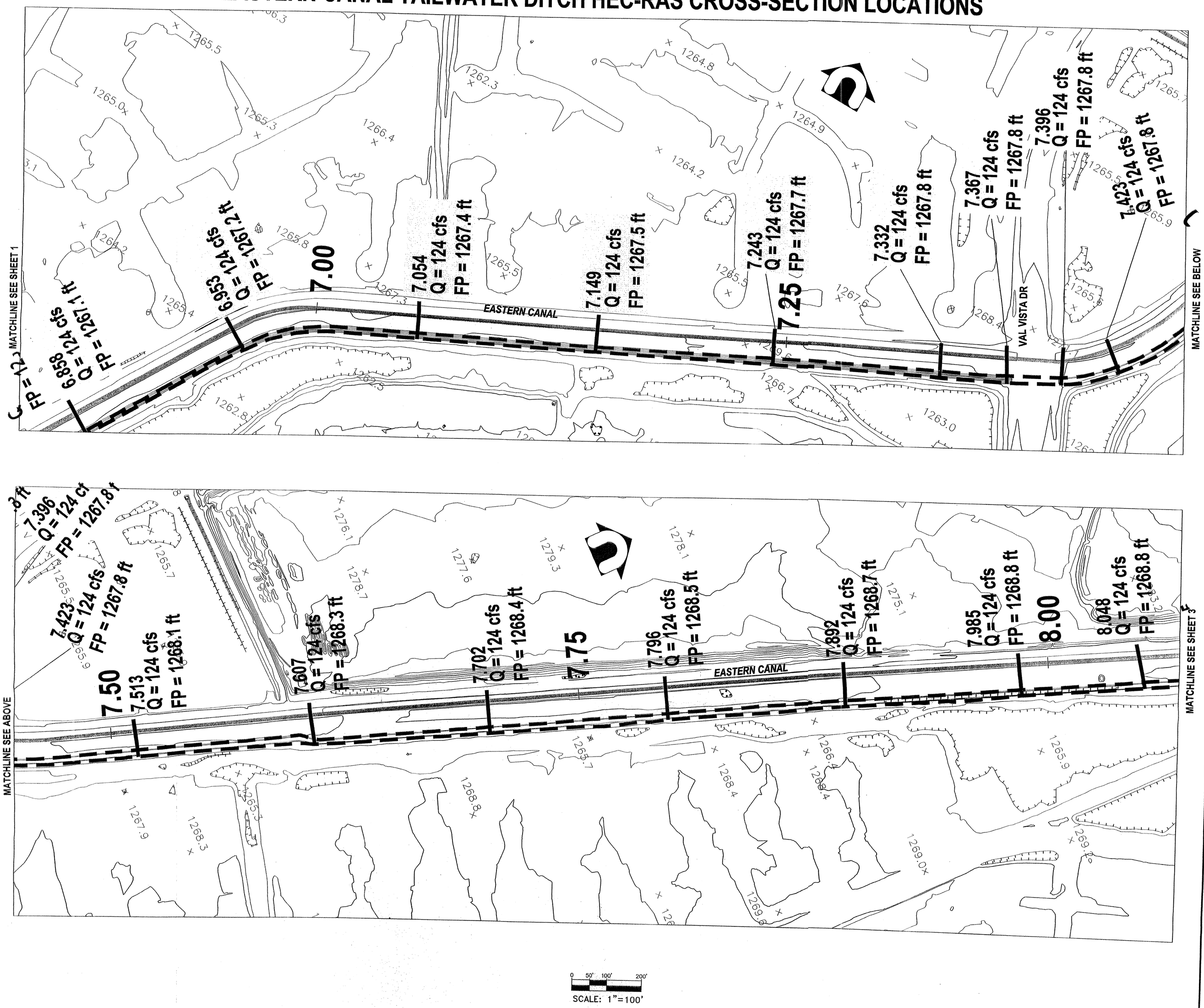


SHEET 1 OF 3

CHANDLER / GILBERT FDS PHASE 1 - SOUTH
EASTERN CANAL TAILWATER DITCH HEC-RAS CROSS-SECTION LOCATIONS