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MCMICKEN DAM
OUTLET CHANNEL ANALYSIS

June 2003

FCD NO. 2002C32

Submitted to

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

Submitted by
Michael Baker, Jr., Inc.
1313 East Osborn Road, Suite 150
Phoenix, Arizona 85014
Phone (602) 279-1234
Fax (602) 279-1411

Registered Professional Engineer (Civil)
CERTIFICATE NO. 28148
KOFI AWUMAH
Date Signed 6-26-03
ARIZONA U.S.A.

PRJ# 100744

Baker

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Executive Summary

This report documents the results of an engineering analysis to determine the channel capacity for the principal outlet channel for McMicken Dam. This study is to determine the channel capacity for the principal outlet channel of McMicken Dam, to delineate the inundation limits of the breakout discharge, and to determine modifications to the channel to restore it to its required conveyance capacity. Surveying has established that the outlet channel as well as the Dam structure has undergone substantial settlement due to subsidence. Subsidence has become a major factor affecting engineering structures in the region and their ability to function as designed and constructed. Also, channel geometry changes occur over time due to low flow events that result in sedimentation and erosion. Therefore, the outlet channel may have lost conveyance capacity due to either subsidence or sedimentation, or both.

In this analysis topographic mapping was used to establish changes to the outlet channel geometry. The ability of the outlet channel to convey the design principal outlet flows was evaluated using hydraulic modeling software, HEC-RAS version 3.1, November 2002.

The results indicate that the channel lacks conveyance capacity for the design flow and channel bank would be overtopped by as much as 2.5 feet at some locations. Flow breakout locations were determined and flooding outside of the McMicken Dam outlet channel was mapped. The study also provided information on how much the channel embankment should be raised to bring the conveyance capacity to the required level.

1.0 Introduction

Michael Baker Jr., has been contracted by the Flood Control District of Maricopa County (District) to determine the capacity for the McMicken Dam outlet channel. The scope of work for this work is shown in Appendix A. The outlet channel conveys flows from the impoundment area though the outlet structure northeasterly towards Agua Fria before flows start overtopping the principal spillway. This study is a result of a recent study (McMicken Dam Spillway Delineation Study, Ref. 1) for the District that concluded that the outlet channel may be under capacity for the design discharges. Due to increasing development within the watershed, and especially downstream of the dam, it is important to confirm if the outlet channel lacks capacity through a more detailed analysis and provide the necessary corrective action to reduce hazard from flooding or provide information for flood warning and emergency preparedness. The study results may also be used for the identification of any required drainage easements.

The limits of this study are from the dam outlet structure up to the Grand Avenue/US 60 Highway Bridge. The study location is shown in Figure 1.

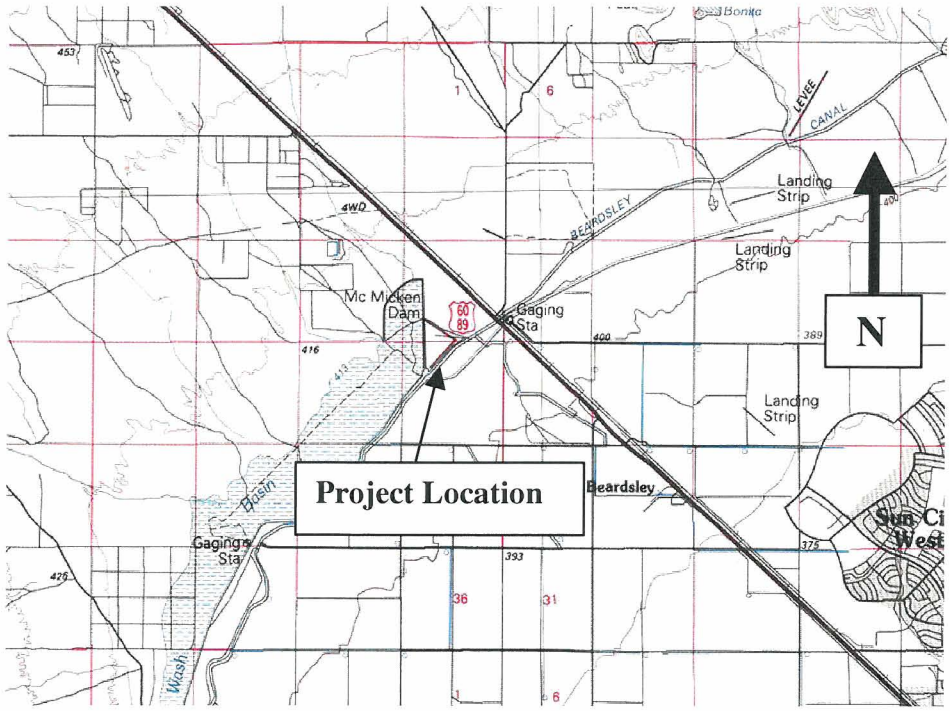


Figure 1: Location of Study Site

1.1 Purpose of Study

The purpose of the study is to determine whether there have been changes to the geometry of the outlet channel, and if so, determine the conveyance capacity for the given design discharge. If it is determined that there is inadequacy in channel conveyance capacity, the locations where flow will break out of the channel will be determined. After identification of the breakout locations, alternate solutions to contain flows will be evaluated and the best or acceptable solution will be adopted. The study should provide adequate information that will enable District construction staff perform the channel modification needed to improve the channel conveyance capacity.

1.2 Background Information

McMicken Dam, along with its spillway, outlet structure (see Photo 1), and outlet channel (see Photo 2), was designed by the Corps of Engineers in 1953, to provide flood protection for areas downstream of the dam. At the time of construction, the areas downstream of the dam were primarily agricultural. The dam was designed to detain floodwaters from about a 247 square-mile portion of the Trilby Wash watershed, which extends to the north and west of the dam (Ref. 2).

McMicken Dam is an earthen dam located north and west of the intersection of the Loop 303 Freeway and Grand Avenue. The dam receives runoff from about 247 square-mile portion of the Trilby Wash watershed, which extends to the north and west of the dam (Ref. 2). The principal outlet is located near the north end of the dam (see Figure 1). Flow from the principal outlet structure is conveyed northeast toward Grand Avenue within the McMicken Dam Outlet Channel. The outlet channel is an earthen channel that is unlined. The channel is well maintained and has little vegetation and weeds. The McMicken Dam Outlet Channel crosses under Grand Avenue (see Photo 3) and the Burlington Northern-Santa Fe Railroad. The emergency spillway runs north-south, and is located at the north end of the dam. Flows, which overtop the spillway flow to the east, then turn southeast, flowing along the south side of Grand Avenue and toward the McMicken Dam Outlet Channel. Appendix B provides more detailed information on the design of the dam and outlet structures.

Photo 1: McMicken Dam Outlet Structure

Photo 2: McMicken Dam Outlet Channel

Photo 3: McMicken Dam Outlet Channel at Grand Avenue

1.3 Survey and Mapping

At the direction of the District, this study utilized topographic mapping prepared the McMicken Dam Spillway Delineation Study (FCD 98-32, Ref. 1) of 2000. This mapping was flown on June 9, 2000 and was developed by Kenney Aerial Mapping, Inc. The elevation datum is North American Vertical Datum of 1988 (NAVD 88) and a horizontal datum North American Datum 1983 (NAD 83). This mapping was supplemented by survey data developed by the District staff in April 2003. This survey data is listed in Appendix F.

2.0 Hydrology

The discharge used in the analysis was taken from the stage - discharge information provided for the dam design (Ref. 2). The discharge through the outlet and the spillway is a function of the storage within the impoundment area.

McMicken Dam impounds Trilby Wash and a 247 square-mile portion of the Trilby Wash watershed, which extends north and west of the dam (Ref. 2). The McMicken Dam principal outlet and emergency spillway were designed by the US Army Corps of Engineers (USACE) to pass a combined Spillway Design Flood peak outflow of 22,000 cfs (Refs. 2 and 3). The Probable Maximum Flood (PMF) peak outflow for the combination of the principal outlet and emergency spillway is 95,000 cfs. Discharge rates at the principal outlet and the emergency spillway were determined using outflow hydrographs from the USACE design reports entitled *Design Memorandum No.1* (Ref. 2) and *Design Memorandum No.2* (Ref. 3). See Appendix C for a summary of hydraulic and design data obtained from the USACE reports. The outlet channel discharges proposed for use in this study are summarized in Table 1. This information was obtained from a recent hydrologic study conducted at the District to update the McMicken Dam outflows (Ref. 4). The objective of this study was to determine the channel capacity just after the emergency spillway starts to experience significant flows. This is due to the fact that, once the emergency spillway discharges flows downstream, the outlet channel becomes inundated and therefore becomes ineffective as flood control channel.

From the table, at elevation 1355, the emergency spillway discharges 5970 cfs at which point the dam outlet discharges 4700 cfs. The 4700 cfs is used as the design flow for the outlet channel.

Table 2.1 Outlet Design Discharges for the Present Configuration

	Discharge (cfs)			
Elevation	**Spillway (A)**	**Main Outlet (B)**	**Small Outlets (C)**	**Total**
1330	0	0	0	0
1335	0	0	35	35
1345	0	1940	60	2000
1353.9	0	4590	75	4660
1355	5970	4700	75	10750
1356	15890	4760	80	20730
1357	28030	4820	80	32930
1358	42510	4930	80	47520
1359	58800	5040	85	63920
1360	76840	5165	85	82090
1361	96950	5265	90	102310

(A): From Reference 3, Enclosure 2, Page 43 (B): From Reference 3, Enclosure 2, Page 5

(C): From station file for McMicken Dam, Flood Control Gage # 5448

3.0 Hydraulics

Hydraulics analyses were performed by step backwater calculations using the USACE's HEC-RAS version 3.1 (Reference 5).

3.1 Channel Cross Sections

Cross sections were developed manually from the recently completed survey by District staff (data is listed in Appendix F). Cross sections were laid out at intervals that vary depending on channel configuration and location of structures, ranging from about 45 feet (in channel bends) to about 350 feet (straight reaches). Cross section stationing was started 2700 feet downstream of Grand Avenue bridge. Cross sections were also located at locations where the channel banks appear to be dipped to ensure flow break-outs are not missed in the hydraulic modeling. Hydraulic baseline was based on engineering judgment and generally determined to be at channel centerline since the channel is symmetrical in geometry at most locations.

3.2 Starting Water Surface Elevations

Normal depth or slope-area method was used as downstream boundary condition for the hydraulic models. A slope of 0.00049 ft/ft was established as the energy slope for the downstream end of the flow.

3.3 Manning's 'n' Values and Expansion and Contraction Coefficients

The outlet channel is unlined earth channel that has little vegetation. The channel inverts can be characterized as smooth with bed material size smaller than 2-inch diameter (See Photo 4 of channel bottom). The channel is basically uniform in shape, being a man-made channel, with only one gradual bend in alignment, has very little obstruction and vegetation components. The Manning's 'n' values for the main channel was determined to be 0.035 and the overbanks have a value of 0.045.

The contraction and expansion coefficient was determined to be 0.1 and 0.3 respectively. At bridge locations, the values were the same since there was no expansion or contraction in channel geometry at the approaches to the bridges.

3.4 Bridges and Culverts

There are no culvert crossings for the outlet channel within the study reach. However, there are three bridges, two for Grand Avenue, one north bound and the other south bound, and the Burlington Northern-Santa Fe (BNSF) Railroad Bridge. All these bridges have piers. There was no survey information provided by the current survey work so bridge data was obtained from the recent Spillway Inundation Study for the District (Ref. 1).

Photo 4: A Close-up Look at the Outlet Channel Bed Material

4.0 Results of Hydraulic Analysis

The HEC-RAS model was prepared for the outlet channel and run using sub-critical flow regime. Channel flow velocities were low, in the range of 3 to 5 feet per second. The Froude number also indicated subcritical flow regime and was between 0.2 to 0.35 range. Flow depths ranged from 13.5 feet to about 15.5 feet.

The channel was first modeled to determine the maximum discharge without flow breakout. A discharge of 2950 cfs was determined as the channel capacity and this is about 62.8% of the design discharge. The channel then was modeled to contain the design flow of 4700 cfs and this was accomplished by artificially raising the banks where there is a break-out. The results indicated that there is a dip in the channel bank between river stations 79.29 (near the Outlet Structure) and 40.27 (about 3,900 feet downstream of the Outlet Structure). This results in as much as 2.5 feet of channel overtopping along the outlet channel in this reach. Table 4.1 below shows the results of channel overtopping.

The channel was raised at the flow breakout locations to contain the flows. The object of this study is also to prevent flows from breaking out and flowing south where there are new developments, therefore only the south banks were raised to contain the flows. At the request of the District, the fill volumes required from station to station were determined and total volume for construction derived. The fill volumes were determined from cross-sections plotted from station to station for the embankment and are shown in Appendix E. The District requested different levels for channel freeboard, 1.5 feet between stations 79.29 to station 56.8, 1.0 foot, between stations 53.78 and 50.53, and 0.5

feet between stations 47.82 and 44.39. Table 4.2 below provides this information. This can also be found on the plan sheet (Exhibit 2) in Appendix G. The total volume of material required is 703,702 cubic feet or 26,063 cubic yards. This included 25% increase to account for compaction.

Table 4.1 Summary of Channel Deficit Locations

Cross Section No.	Minimum Channel Elevation	Computed Water Surface Elev.	Flow Depth	Existing. Top of Bank	Free Board*
79.29	24.7	40.39	15.69	40.036	-0.354
78.17	26.35	40.32	13.97	39.898	-0.422
76.05	26.57	40.34	13.77	39.267	-1.073
73.75	26.67	40.2	13.53	38.322	-1.878
70.42	25.84	40.01	14.17	38.102	-1.908
67.46	25.7	39.9	14.2	37.959	-1.941
64.16	25.93	39.78	13.85	37.324	-2.456
62.09	26.02	39.69	13.67	37.119	-2.571
60.05	25.8	39.59	13.79	37.488	-2.102
56.8	26.12	39.42	13.3	37.809	-1.611
53.79	25.91	39.27	13.36	37.513	-1.757
50.53	25.86	39.11	13.25	37.717	-1.393
47.82	25.56	39	13.44	37.852	-1.148
44.39	25.66	38.83	13.17	37.88	-0.95
41.43	25.13	38.64	13.51	37.96	-0.68
40.27	25.53	38.58	13.05	40.204	1.624

Freeboard: '+' value indicate extra channel capacity, '-ve' indicates channel overtopping

For the proposed condition, the inundation area was delineated and this floodplain is shown in Appendix G. As can be seen all the inundation area is located on the north side of the channel, which is towards the dam structure and spillway.

Table 4.2 Channel Re-construction Data Table

Distance from End Sill (feet)	Cross Section No.	Computed Water Surface Elev.	Existing. Top of Bank	Design Top of Bank	Design Freeboard (ft)	Fill Area (ft^2)	Length (ft)	Fill Volume (cu. Ft)
27.4	79.29	1340.39	1340.036	1341.87	1.5	50.82	27	1372
139.1	78.17	1340.32	1339.898	1341.79	1.5	82.43	112	7462
353.8	76.05	1340.34	1339.267	1341.82	1.5	103.44	236	21933
580.4	73.75	1340.2	1338.322	1341.72	1.5	175.59	238	33205
914.5	70.42	1340.01	1338.102	1341.48	1.5	141.85	360	57139
1209.5	67.46	1339.9	1337.959	1341.37	1.5	194.95	305	51360
1539.7	64.16	1339.78	1337.324	1341.26	1.5	217.63	338	69724
1746.5	62.09	1339.69	1337.119	1341.2	1.5	218.99	220	48028
1949.5	60.05	1339.59	1337.488	1341.06	1.5	184.52	215	43377
2275.7	56.8	1339.42	1337.809	1340.92	1.5	160.57	327	56422
2577.1	53.79	1339.27	1337.513	1340.28	1.0	131.37	296	43207
2902.9	50.53	1339.11	1337.717	1340.12	1.0	137.43	333	44755
3163.8						130.00	261	34900
3173.8	47.82	1339	1337.852	1339.51	0.5	96.08	10	1130
3517.1	44.39	1338.83	1337.88	1339.34	0.5	60.92	343	26949
3527.1						60.00	10	605
3812.9	41.43	1338.64	1337.96	1339.66	1.0	59.58	288	17221
3928.8	40.27	1338.58	1340.204	1340.20	1.6	0.00	140	4171

5.0 References

1. Hoskin Engineering Consultants, Inc, in Association with DEI Professional Services, L.L.C., *McMicken Dam Spillway Delineation Study, Report and Technical Data Notebook*, Prepared for Flood Control District of Maricopa County, October 2001

2. United States Army Corps of Engineers, *Design Memorandum No.1: Hydrology and Hydraulic Design for Trilby Wash Detention Basin and Outlet Channel*, November 1953.

3. United States Army Corps of Engineers, *Design Memorandum No.2: Design Analysis for Trilby Wash Detention Basin and Outlet Channel*, March 1954.

4. Cruff, R.W., Flood Control District of Maricopa County, *Hydrologic Analysis for McMicken Dam*, March 6, 2000.

5. United States Army Corps of Engineers, Hydrologic Engineering Center, *HEC-RAS River Analysis System*, Version 3.1, November 2002.

6. United States Geological Survey, Water Resources Division, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona*, April, 1991.

Appendix A

Scope of Work of Study

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SCOPE OF WORK
OUTLET CHANNEL ANALYSIS FOR
MCMICKEN DAM
FCD 2002C32

GENERAL

This study is to determine the channel capacity for the principal outlet channel of McMicken Dam. If the design flow can not be contained, then alternative solutions to contain the design flow will be developed. The results of the HEC-RAS model must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results.

All work must be completed within 180 days from Notice to Proceed, which includes a minimum of 60 days for District reviews. However, the District does want the preliminary results within 60 days of notice to proceed.

TASK 1 – COORDINATION

1.1 The coordination efforts will be performed as specified in Section 2 of the District's Consultant Guidelines (August 1, 2000), with the exception of section 2.3. There will be no partnering or value engineering activities; therefore section 2.3 does not apply to this scope.

TASK 2 - DATA COLLECTION

2.1 Data collection shall be as called for in section 11.2 of the Consultant Guidelines.

2.2 The District will supply the topographic mapping to be used for this study. Since the Consultant will not be developing any topographic mapping for this study, Section 3 of the Consultant Guidelines does not apply to this scope.

2.3 The District will supply the hydrology for this study. This hydrology is the hydrology associated with the dam storage, principal outlet and emergency spillway discharges. Therefore, Sections 9 and 11.4 of the Consultant Guidelines do not apply to this study.

TASK 3 - HYDRAULICS

3.1 The detailed hydraulic analyses for the outlet channel will be done using the procedures called for in Sections 10.1, 10.2 and 10.3 of the Consultant Guidelines. The hydraulic analysis will be done using the most current version of HEC-RAS. The use of any other version of HEC-RAS, or other computer program will require approval from the District. The detailed study limits shall be from just east of the railroad bridge to McMicken Dam. However, the consultant must start their hydraulic model sufficiently downstream of the railroad bridge so that the starting conditions don't impact the model results at the railroad bridge.

3.2 The consultant will look at a range of flows and determine what is the maximum amount of flow contained in the channel in its present condition, and where flow overtops the channel. The results of this analysis will be conveyed to the District before beginning any work on alternative solutions.

3.3 If the design discharge is not contained within the existing channel, the consultant (working with the District) will develop several possible alternative solutions. The alternative solutions to any channel capacity problem will be formulated using procedures called for in Sections 12.3.1, 12.3.2, 12.3.4, and 12.3.5 of the Consultant Guidelines.

3.4 A pre-design for the most feasible alternative solution will be prepared using the procedures called for in Section 13 of the Consultant Guidelines. The consultant should make an estimate on the amount of earthwork (and possibly bank protection) that will be required, but does not need to do a detailed cost estimate.

TASK 4 – FINAL PRODUCTS

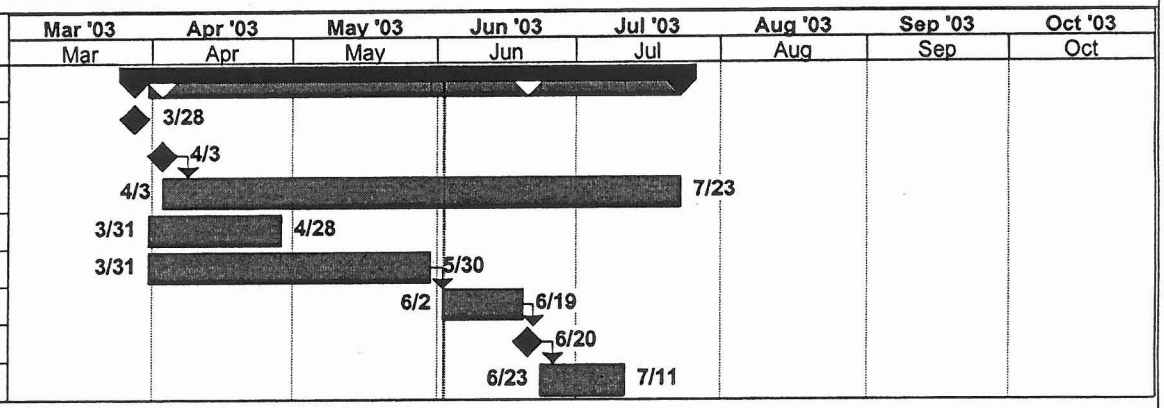
4.1 The Consultant will develop a Preliminary Design Report similar to what is called for in section 13.6.1 of the Consultant Guidelines. Environmental impacts and project permitting requirements do not have to be addressed. The District is not anticipating the need for any structure drawings, only such items as; plan, profile, and typical sections.

TASK 5 – Deliverables

5.1 The Consultant shall submit four copies of the Preliminary Design Report.

Flood Control District of Maricopa County
On-Call Contract 2002C032
Task 2
McMicken Dam Outlet Channel

ID	Task Name
0	**FDCMC- McMicken Dam Outlet Channel Analysis**
1	Notice to Proceed
2	Kick-Off Meeting
3	Coordination
4	Data Collection
5	Hydraulic Anaysis, Alternatives Analysis
6	FCD Review
7	Review Meeting
8	Final Products - Report



Project: FDCMC- McMicken Dam Outl
Date: Mon 6/2/03

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		External Milestone	
Summary		Split		Deadline	

Michael Baker Jr., Inc.

Appendix B

Dam and Outlet Structures

GILA RIVER AND TRIBUTARIES, ARIZONA

AGUA FRIA PROJECT

LOWER AGUA FRIA RIVER

TRILBY WASH DETENTION BASIN DAM AND APPURTENANCES

U.S. ARMY ENGINEER DISTRICT, LOS ANGELES
CORPS OF ENGINEERS

AS CONSTRUCTED

TO ACCOMPANY SPECIFICATIONS
ENG 04-353-55-14
DATED:

CENTRAL FILES
DRAWER # 34

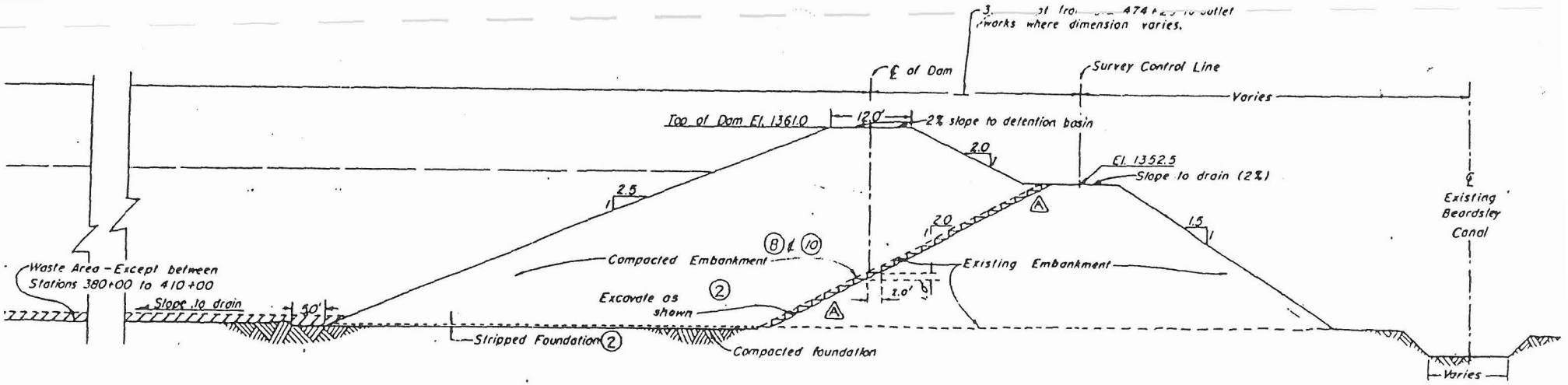
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE

missing Sl

TRILBY WASH DETENTION BASIN

AS BUILT
86-02-01

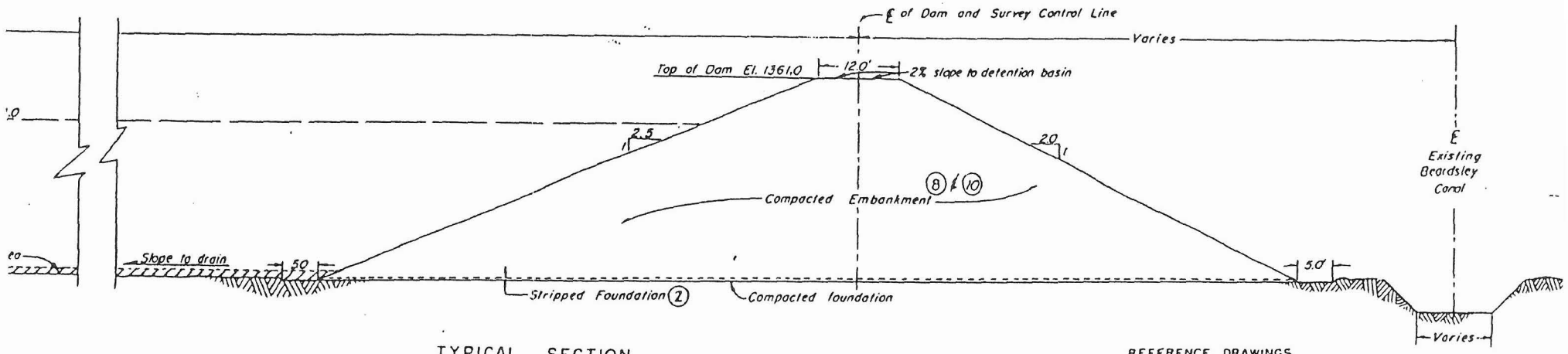
202



TYPICAL SECTION

STA. 357+00 TO OUTLET WORKS

EMBANKMENT



TYPICAL SECTION

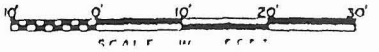
STA. 42+00 TO STA. 357+00; OUTLET WORKS TO STA. 505+70, & STA. 527+18 TO STA. 537+00

REFERENCE DRAWINGS

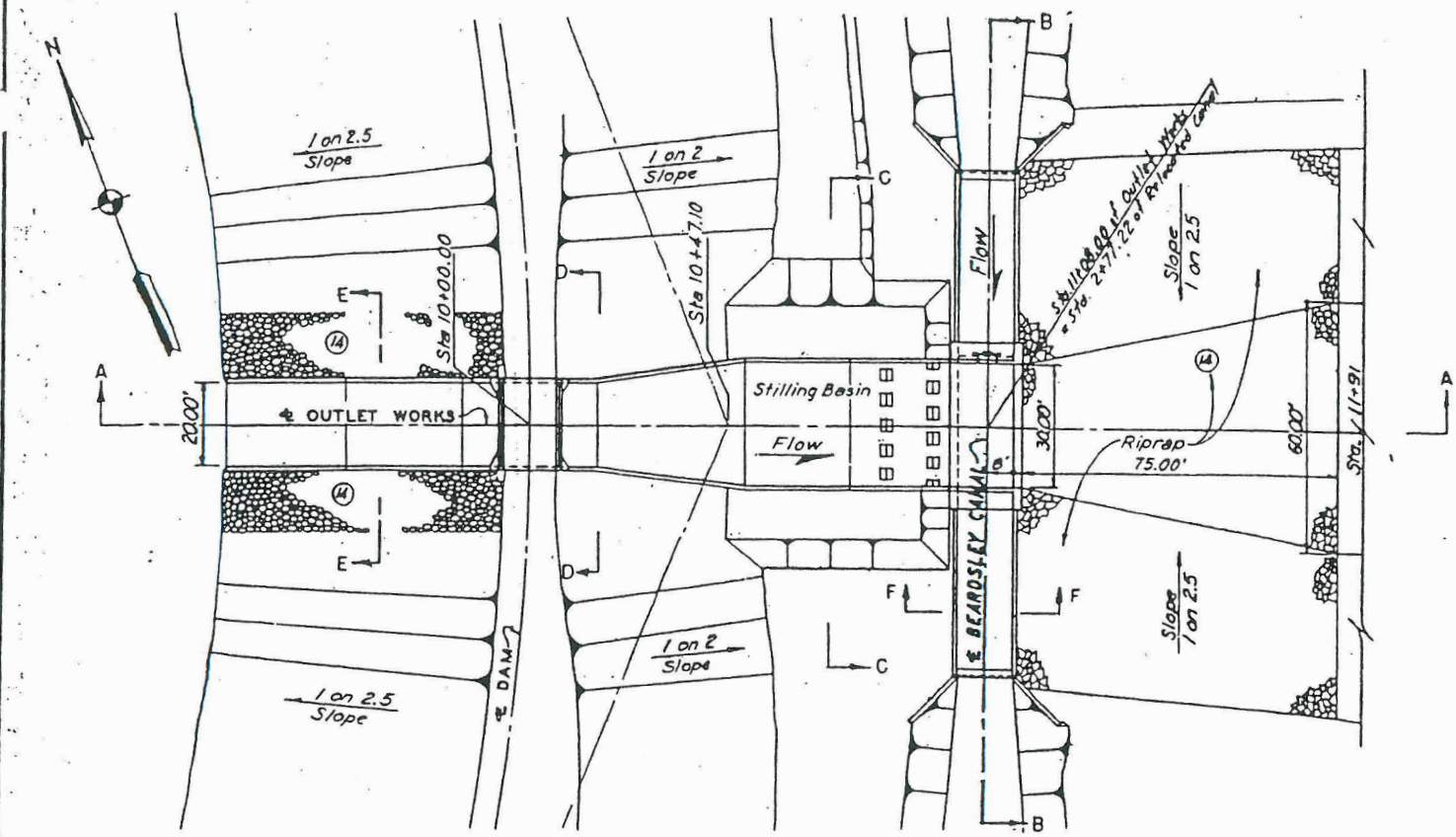
1. For General Plan see Sheet 2.
2. For Plan and Profile of Minor Flood Channel, see Sheets 7 and 8.

NOTES:

1. Embankment material is to be obtained from the excavation for the

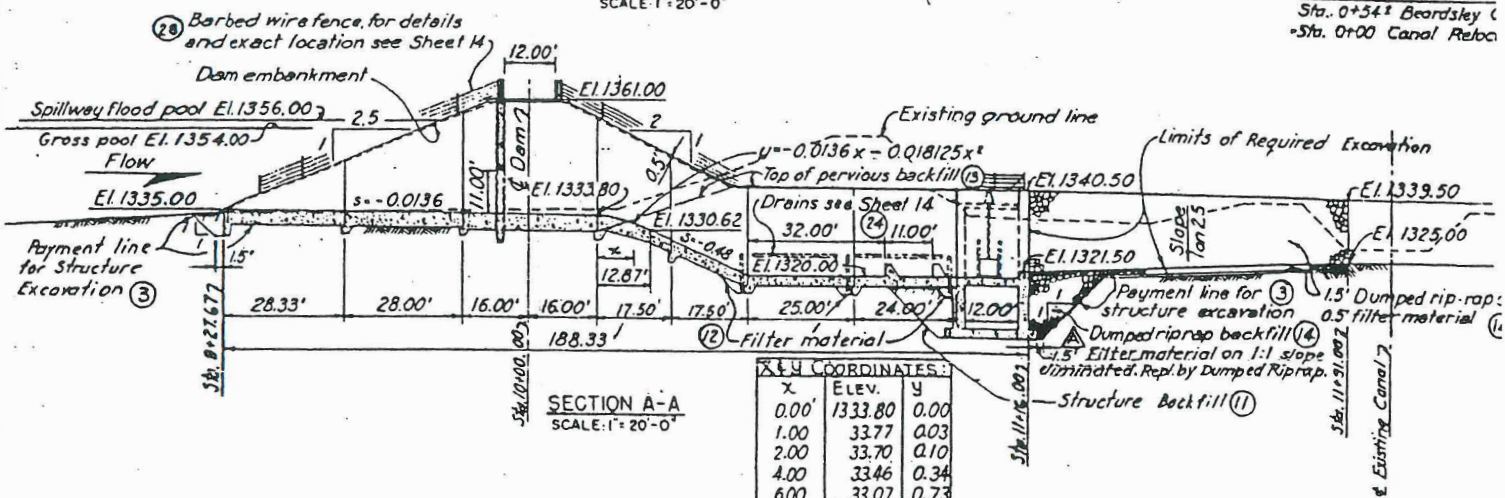


OUTLET WORKS



PLAN
SCALE: 1" = 20'-0"

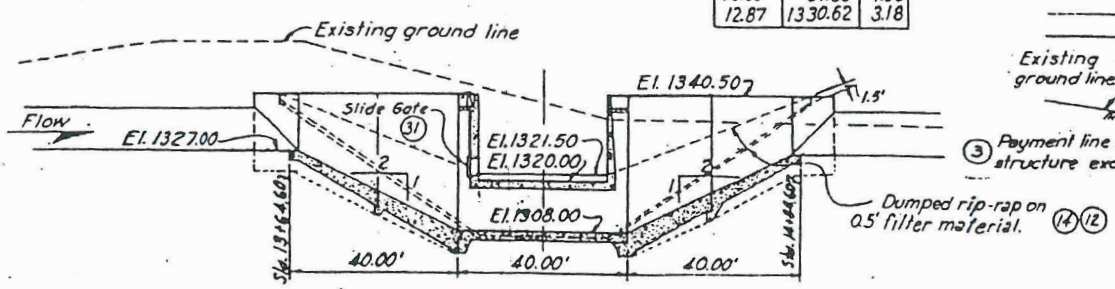
BEGINNING OF CANA
Sta. 0+54.2 Beardsley C
= Sta. 0+00 Canal Reloc



SECTION A-A
SCALE: 1" = 20'-0"

X & Y COORDINATES:

X	Elev.	Y
0.00'	1333.80	0.00
1.00	33.77	0.03
2.00	33.70	0.10
4.00	33.46	0.34
6.00	33.07	0.73
8.00	32.53	1.27
10.00	31.85	1.95
12.87	1330.62	3.18



SECTION B-B
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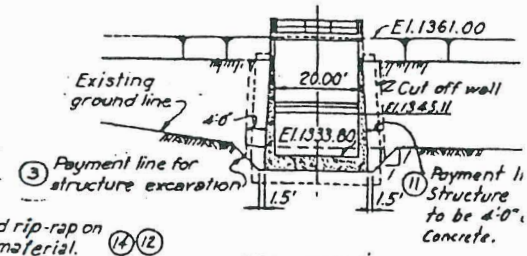
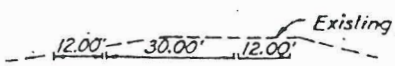
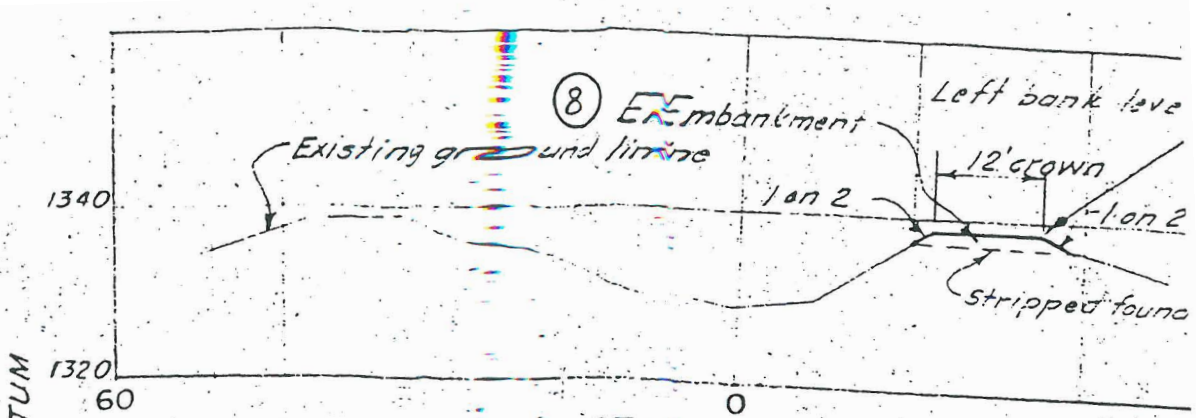


SECTION D-D
SCALE: 1" = 20'-0"

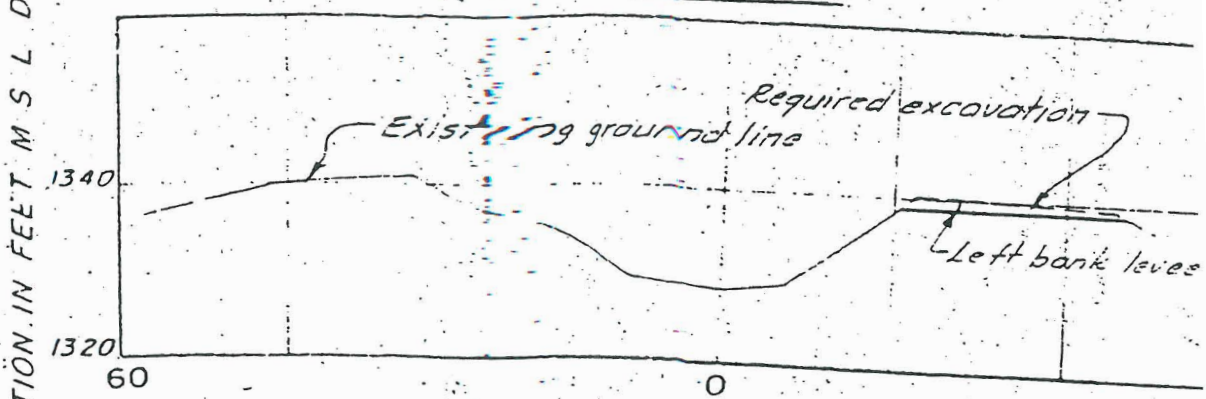
(8) This excavated material to be placed in dam



This excavated material



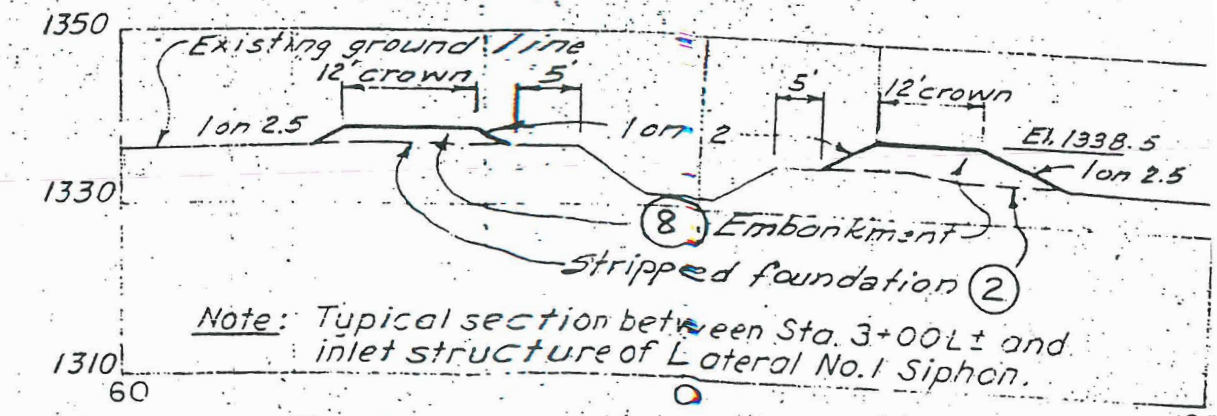
STA 16+00B



STA 28+00B

ELEVATION IN FEET M S L DATUM

TYPICAL SECTIONS BEARDSLEY CANAL



Note: Typical section between Sta. 3+00L± and inlet structure of Lateral No. 1 Siphon.

TYPICAL SECTION LATERAL No. 1

SCALE 1 IN. = 20 FT. HORIZ & VERT

RECORD DRAWING-AS

CONT. NO. 4376 REV. B DATE 2

CONT. NO. ..... REV. ..... DATE ...

CONT. NO. ..... REV. ..... DATE ...

4000 FEET

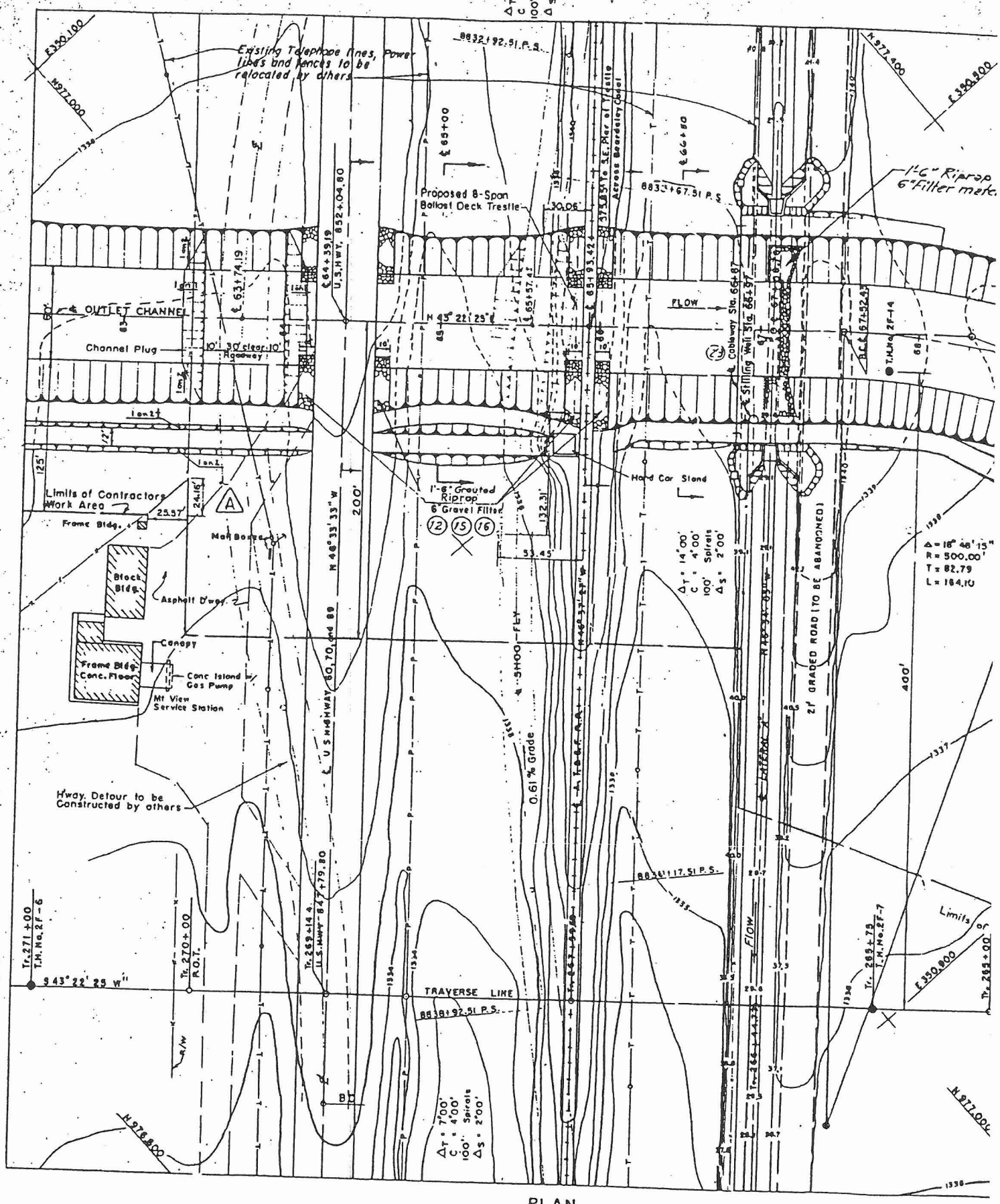
urve

Sta. 16+00

S = 0.000500

Sta. 244+00 C.C.
El. 1325.00

OUTLET CHANNEL AT GRAND AVENUE

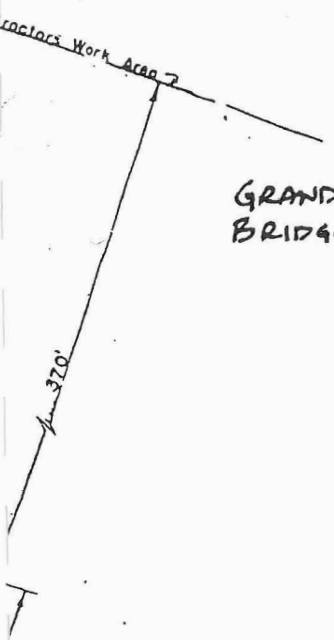


PLAN

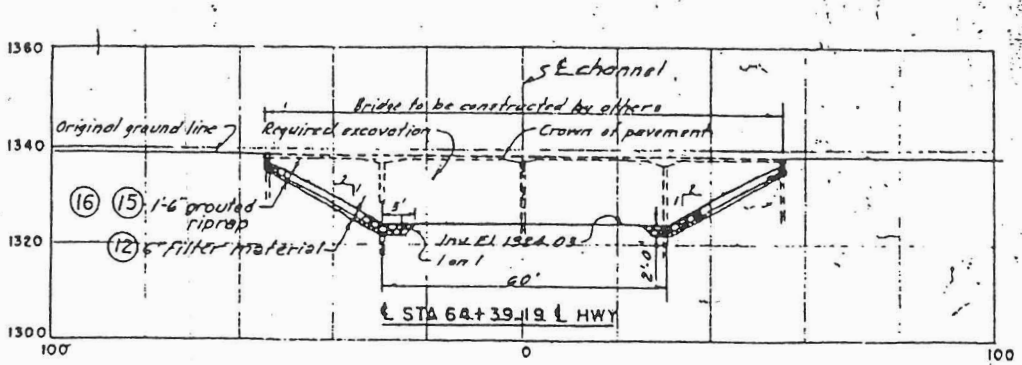
Scale 1" = 40'

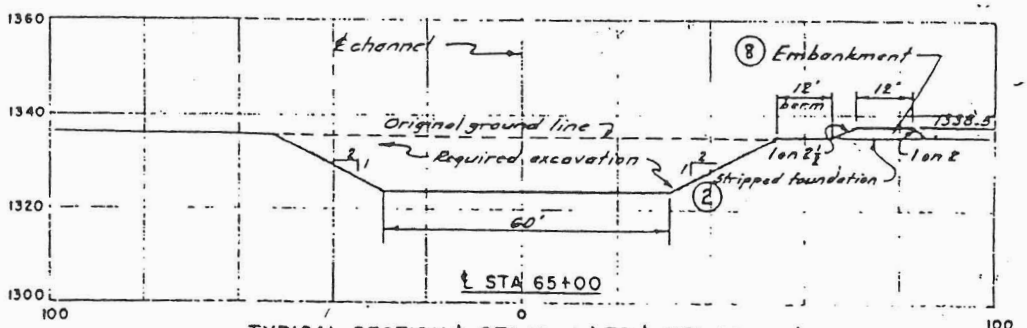
GRAPHIC SCALE

40 20 0 40 80 120 160 200



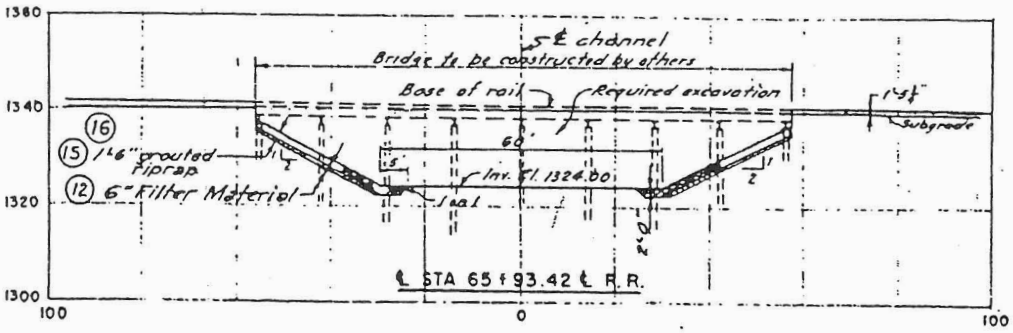
GRAND AVE. BRIDGE

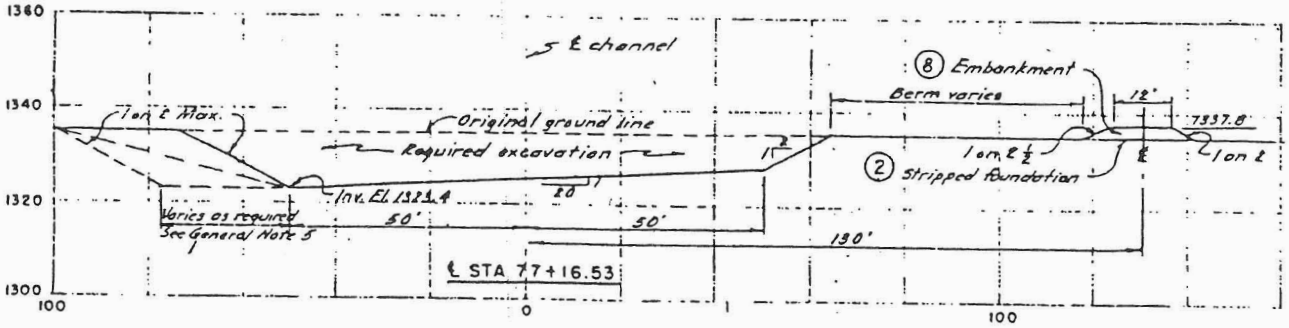




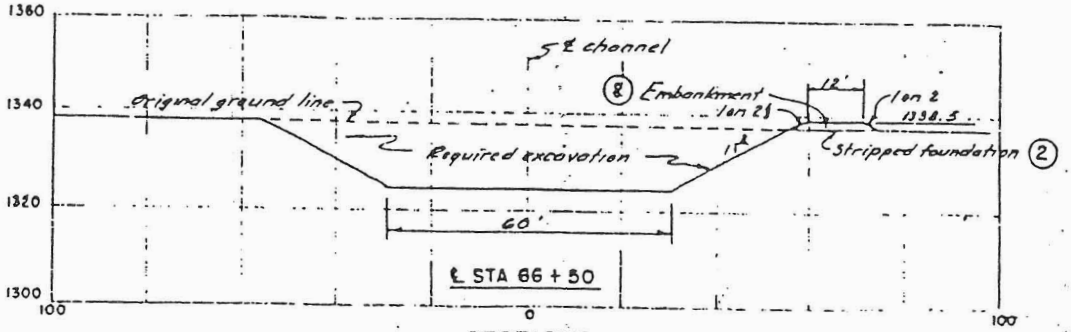
TYPICAL SECTION ℄ STA 12+41± TO ℄ STA 65+75±

RAILROAD BRIDGE





5. Soils Conservation
eral Adjustment
ercator Projection,
ed from the excavation
increased in width
hers, except
er which payment will be made



SECTIONS

SCALES 1 IN = 20 FT HORIZ & VERT

Appendix C

Summary of Hydraulic and Design Data from USACE Report

Table 2. - Outlet design discharges for the present configuration.

Elevation	Discharge, CFS			
	Spillway (A)	Main Outlet (B)	Small Outlets (2) (C)	Total
1330	0	0	0	0
1335	0	0	35	35
1345	0	1,940	60	2,000
1353.9	0	4,590	75	4.660
1355	5,970	4,700	75	10,750
1356	15,890	4,760	80	20,730
1357	28,030	4,820	80	32,930
1358	42,510	4,930	80	47,520
1359	58,800	5,040	85	63,920
1360	76,840	5,165	85	82,090
1361	96,950	5,265	90	102,310

(A): From Design Memorandum 2; Design Analysis for Trilby Wash Detention Basin and Outlet channel, by the U.S. Army Corps of Engineers, March 1954 from Inclosure 2, Page 43.

(B): From Design Memorandum 2; Design Analysis for Trilby Wash Detention Basin and Outlet channel, by the U.S. Army Corps of Engineers, March 1954 from Inclosure 2, Page 5.

(C): From Station file for McMicken Dam, Flood Control Gage # 5448.

Appendix D

HEC-RAS Output

```
                    HEC-RAS Version 3.1 November 2002
                      U.S. Army Corp of Engineers
                     Hydrologic Engineering Center
                       609 Second Street, Suite D
                      Davis, California 95616-4687
                            (916) 756-1104

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX

        X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: McMickenSurveyCrossSection
Project File : McMichenfinal2.prj
Run Date and Time: 05/30/2003 8:33:40 AM

Project in English units

Project Description:
McMICKEN DAM SPILLWAY OUTLET CHANNEL ANALYSIS

Q = 4700 CFS REFER McMICKEN
DAM SPILLWAY DELINEATION STUDY (FCD 98-32)

CROSS SECTION 12 AND DOWNSTREAM
OBTAINED FROM FCDMC'S NEW
TOPO AND DTM.

CROSS SECTION 12.54 TO 40.27
OBTAINED FROM FCDMC'S SURVEY DATA.

CROSS SECTION 79.29 TO 41.43 MODIFIED
FROM FCDMC'S SURVEY DATA.

NORMAL DEPTH METHOD WAS USED TO OBTAIN STARTING
WATER SURFACE ELEVATION. S= 0.00049

MICHAEL BAKER JR., INC MAY 2003

PLAN DATA

Plan Title: Outlet full flow 4700 cfs
Plan File : v:\Fcdoncall-2002\McMickenDam\Engfiles\Hecras\McMichenfinal2.p02

Geometry Title: Base Conditions Geometry
Geometry File : v:\Fcdoncall-2002\McMickenDam\Engfiles\Hecras\McMichenfinal2.G01

Flow Title : 1 Flow Profiles
Flow File : v:\Fcdoncall-2002\McMickenDam\Engfiles\Hecras\McMichenfinal2.F01

Plan Summary Information:

Number of:	Cross Sections =	38	Mulitple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	3	Lateral Structures =	0

Computational Information
Water surface calculation tolerance = 0.005
Critical depth calculaton tolerance = 0.01
Maximum number of interations = 40
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.0005

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: 1 Flow Profiles
Flow File : v:\Fcdoncall-2002\McMickenDam\Engfiles\Hecras\McMichenfinal2.F01

Flow Data (cfs)

River	Reach	RS	FULL FLOW
McMicken Outlet	Downstream	79.29	4700

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
McMicken Outlet	Downstream	FULL FLOW		Normal S = 0.00049

```
GEOMETRY DATA

Geometry Title: Base Conditions Geometry
Geometry File : v:\Fcdoncall-2002\McMickenDam\Engfiles\Hecras\McMichenfinal2.G01

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 79.29

INPUT
Description: Sta. 0+27.4
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100  1341.2   110.7  1341.2   151.7  1325.2   172.9  1324.7   195.6  1326.4
   229.4    1340     230  1340.2     233 1341.22  234.91 1341.87  246.91 1341.87
  266.91 1333.87

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   110.7    .035     233    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         110.7     233           111.78  111.78  111.78             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     235  266.91    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 78.17

INPUT
Description: STA. 1+39.1
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1340.61   110.6 1340.73   124.9 1337.79   132.9  1336.5   159.1 1327.26
   189.2 1326.35   207.6 1327.22   240.2 1338.69  249.46 1341.79  261.46 1341.79
   272.9 1337.21   277.2 1336.93   282.6  1337.3   306.7 1336.74   329.8 1335.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   110.6    .035  249.46    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         110.6  249.46           214.63  214.63  214.63             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     110    1341       F
     248   329.8    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 76.05

INPUT
Description: STA. 3+53.8
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      43  1340.3      52    1338      60    1336     100 1333.69   130.9 1327.86
   168.9 1326.57   191.7 1328.05   214.3 1333.29     225 1333.98   226.2 1334.06
   242.2 1339.27  249.81 1341.82  261.81 1341.82   280.3 1334.42   286.9 1334.18
   298.3 1332.41

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      43    .045      43    .035  249.81    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             43  249.81           226.62  226.62  226.62             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
      43      43    1341       F
     250   298.3    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 73.75

INPUT
Description: STA. 5+80.4
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100  1340.3   116.4 1335.92     129  1332.9   139.5 1333.34   164.5 1326.67
   204.5 1326.89   225.1 1331.63   235.5 1332.57   248.5 1338.32  258.68 1341.72
  270.68 1341.72   292.5 1332.99   301.2 1331.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035  258.68    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100  258.68            334.1   334.1   334.1             .1       .3
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
     100     100    1341       F
     255   301.2    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 70.42

INPUT
Description: STA. 9+14.5
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1333.19   109.2  1331.6     110    1340   111.6  1339.6     130 1333.98
   151.9 1326.84     176 1325.84   197.6 1327.25   218.7 1333.33   230.1 1333.94
     242  1338.1  252.09 1341.48  264.09 1341.48     290 1331.12   298.7 1331.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     110    .035  252.09    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           110  252.09           294.95  294.95  294.95             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     110  1340.5       F
     252   298.7  1340.5       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 67.46

INPUT
Description: STA. 12+09.5
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100    1340   130.9 1331.71   151.4 1326.41     171  1325.7   192.3 1326.83
   211.3 1330.72   221.6 1331.52   237.9 1337.96  248.15 1341.37  260.15 1341.37
     285 1331.43     298 1329.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035  248.15    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100  248.15           330.25  330.25  330.25             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     100  1340.5       F
     245     298  1340.5       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 64.16

INPUT
Description: STA. 15+39.7
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100    1340   132.5 1331.35   151.2 1326.75   173.5 1325.93   194.9 1326.57
     214 1330.31     224 1331.16   240.8 1337.32  252.61 1341.26  264.61 1341.26
     293  1329.9     300 1328.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035  252.61    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100  252.61           206.79  206.79  206.79             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     100  1340.5       F
     250     300  1340.5       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 62.09

INPUT
Description: STA. 17+46.5
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100  1339.7   129.8 1331.52   153.9  1326.3   176.3 1326.02   198.3 1327.25
   211.3 1330.33   222.2 1331.12     238 1337.12  250.24  1341.2  262.24  1341.2
     293 1328.89   311.3    1329     372    1329

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035  250.24    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100  250.24           202.96  202.96  202.96             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     100    1341       F
```

```
     248     372    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 60.05

INPUT
Description: STA. 1949.5
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1330.73     112  1339.8   136.9 1331.89   152.7 1326.94   178.1  1325.8
   198.7 1326.69   217.3 1330.26   226.2 1331.05   242.3 1337.44  253.13 1341.06
  265.13 1341.06     293 1329.91     297 1329.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     112    .035  253.13    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           112  253.13           326.24  326.24  326.24             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     112    1341       F
     250     297    1341       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 56.8

INPUT
Description: STA. 22+75.7
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1331.27     115  1339.5   135.1 1332.88   153.7 1326.93   179.4 1326.12
   201.1 1326.86   219.7 1331.59   230.4 1332.33   245.7 1337.81  255.01 1340.92
  267.01 1340.92     293 1330.52   313.9 1330.22

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     115    .035  255.01    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           115  255.01           301.37  301.37  301.37             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     115    1340       F
     255   313.9    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 53.79

INPUT
Description: STA. 25+77.1
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1331.94   113.5 1331.17     122 1338.68   122.7  1339.3   134.5  1333.2
   147.3 1328.13   180.1 1325.91   206.9 1327.42   222.7 1331.52   232.1 1331.85
   247.5 1337.51  255.82 1340.28  267.82 1340.28     293 1330.21   300.2 1330.23

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     122    .035  255.82    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           122  255.82           325.77  325.77  325.77             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     122    1340       F
     260   300.2    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 50.53

INPUT
Description: STA. 29+02.9
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100  1333.2   110.4 1331.96     120  1339.2   128.9  1334.4   142.9 1327.65
   176.1 1325.86   199.7 1326.65   216.2 1330.89   226.4 1331.24   243.2 1337.72
  250.36 1340.12  262.36 1340.12     290 1329.07   314.6 1328.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     120    .035  250.36    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           120  250.36           270.93  270.93  270.93             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     120    1340       F
     249   314.6    1340       F
```

```
CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 47.82

INPUT
Description: STA. 31+73.8
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      90  1339.1     108  1329.6   122.1 1326.43   151.8 1325.56   167.5 1326.14
   181.4 1328.69   192.1 1329.12   212.9 1337.85  217.88 1339.51  229.88 1339.51
     255 1329.46   269.2 1327.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      90    .045      90    .035  217.88    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           90  217.88           343.33  343.33  343.33             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
      90      90    1340       F
     216   269.2    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 44.39

INPUT
Description: STA. 35+17.1
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1331.98   114.2 1332.43     130    1339   141.1 1336.25   174.6 1326.37
   203.2 1325.66   218.7 1325.95   237.8 1330.35   247.6 1330.98   263.1 1337.88
  266.72 1339.34  278.72 1339.34     305 1328.83   315.5 1329.92

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     130    .035  266.72    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          130  266.72           295.79  295.79  295.79             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     130    1340       F
     270   315.5    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 41.43

INPUT
Description: STA. 38+12.9
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     1001333.769     115  1338.8   124.61335.171   142.61328.273   175.91325.132
   201.11326.827   226.61333.922   238.51334.625   239.71336.466   244.7 1337.96
  249.75 1339.66  261.75 1339.66     280 1332.36   299.61331.997

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     115    .035  249.75    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          115  249.75           115.87  115.87  115.87             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     115    1340       F
     250   299.6    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 40.27

INPUT
Description: STA. 39+28.8
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1337.23   111.2 1337.22   120.2 1337.19   131.2  1339.5   150.2 1338.71
   176.9 1327.77   208.8 1325.53   237.3 1327.35   295.1  1340.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   150.2    .035   295.1    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         150.2   295.1           198.69  198.69  198.69             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     100     131  1339.5

CROSS SECTION


RIVER: McMicken Outlet
```

```
REACH: Downstream         RS: 38.29

INPUT
Description: STA. 41+27.5
Station Elevation Data     num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1336.57     112  1338.5   115.5 1337.58   147.9 1326.31   173.6 1325.17
   194.5 1325.89   217.3 1335.51   230.5 1336.62     240 1339.62   255.2 1339.51
   262.6 1338.99   276.6 1336.33

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   115.5    .035     240    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         115.5     240           289.87  289.87  289.87             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     112    1340       F
     242   276.6    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 35.4

INPUT
Description: STA. 44+17.4
Station Elevation Data     num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1335.96     113  1338.5   118.5 1336.88   150.6 1326.21   174.5 1324.99
   202.9 1326.73   225.6 1335.33   234.6 1336.29   247.1 1340.51   263.6 1339.94
   266.9 1339.27     278 1339.29

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   118.5    .035   247.1    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         118.5   247.1           291.84  291.84  291.84             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     100     113    1340       F
     250     278    1340       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 32.45

INPUT
Description: STA. 47+09.2
Station Elevation Data     num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1336.35     114  1338.5   118.5 1336.83   151.5 1326.45   171.2 1325.21
   208.3 1327.82   227.7  1335.7   238.6 1337.08   248.3 1340.29   265.5 1339.35
   268.1 1338.93   280.9 1338.96

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   118.5    .035   248.3    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         118.5   248.3           308.88  308.88  308.88             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     100     114    1339       F

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 29.38

INPUT
Description: STA. 50+18.1
Station Elevation Data     num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1337.88   104.3 1338.54   119.9 1338.96   150.5 1326.56     171 1325.43
   201.1 1326.36   234.3 1336.89     244 1338.26   251.5 1340.34   263.9 1340.05
   318.3 1339.31

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   119.9    .035   251.5    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         119.9   251.5           124.78  124.78  124.78             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 28.13

INPUT
Description: STA. 51+42.9
Station Elevation Data     num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1338.27   125.6 1339.81   162.7 1326.89   169.8 1325.73   185.1 1325.86
```

```
   216.2 1326.94   247.8    1338   259.8 1339.74   322.8 1338.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   125.6    .035   259.8    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         125.6   259.8            64.58   64.58   64.58             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 27.48

INPUT
Description: STA. 52+07.4
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     113 1343.21   121.4 1342.92   163.8 1326.48   183.6 1325.86   217.1 1327.13
   257.7 1341.51     265 1342.02

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     113    .045   121.4    .035   257.7    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         121.4   257.7            54.13   54.13   54.13             .1       .3

BRIDGE


RIVER: McMicken Outlet
REACH: Downstream         RS: 27.3

INPUT
Description: Grand Ave Bridge
Distance from Upstream XS =       2
Deck/Roadway Width        =      42
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
     110    1342    1338     125    1342    1338     125    1342    1340
     250    1341    1339     250    1341    1339     270    1341    1339

Upstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     113 1343.21   121.4 1342.92   163.8 1326.48   183.6 1325.86   217.1 1327.13
   257.7 1341.51     265 1342.02

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     113    .045   121.4    .035   257.7    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
         121.4   257.7             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     110    1342    1338     125    1342    1338     125    1342    1340
     250    1341    1339     250    1341    1339     270    1341    1339

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   115.5 1344.14   155.9 1328.76     191 1325.83   226.3  1329.3   266.8 1342.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   115.5    .045   115.5    .035   266.8    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
         115.5   266.8             .1       .3

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 Piers =  3

Pier Data
Pier Station     Upstream=     156    Downstream=     156
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1340
Downstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1340

Pier Data
Pier Station     Upstream=     191    Downstream=     191
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1341
Downstream     num=       2
```

```
    Width   Elev    Width   Elev
       2    1325       2    1341

Pier Data
Pier Station     Upstream=     226    Downstream=     226
Upstream     num=        2
    Width   Elev    Width   Elev
       2    1325       2    1341
Downstream     num=        2
    Width   Elev    Width   Elev
       2    1325       2    1341

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =        2
       Yarnell                 KVal =     1.25
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #FULL FLOW

  E.G. US. (ft)                1337.86    Element                  Inside BR US  Inside BR DS
  W.S. US. (ft)                1337.44    E.G. Elev (ft)              1337.86       1337.77
  Q Total (cfs)                4700.00    W.S. Elev (ft)              1337.36       1337.27
  Q Bridge (cfs)               4700.00    Crit W.S. (ft)              1332.31       1332.81
  Q Weir (cfs)                            Max Chl Dpth (ft)             11.50         11.35
  Weir Sta Lft (ft)                       Vel Total (ft/s)               5.64          5.69
  Weir Sta Rgt (ft)                       Flow Area (sq ft)            833.78        826.17
  Weir Submerg                            Froude # Chl                   0.35          0.37
  Weir Max Depth (ft)                     Specif Force (cu ft)         4863.20       4521.41
  Min El Weir Flow (ft)        1341.01    Hydr Depth (ft)                8.00          7.48
  Min El Prs (ft)              1339.97    W.P. Total (ft)              160.13        168.75
  Delta EG (ft)                   0.13    Conv. Total (cfs)          106341.9      101128.4
  Delta WS (ft)                   0.14    Top Width (ft)               104.25        110.44
  BR Open Area (sq ft)         1066.37    Frctn Loss (ft)                0.09          0.02
  BR Open Vel (ft/s)              5.69    C & E Loss (ft)                0.00          0.02
  Coef of Q                               Shear Total (lb/sq ft)         0.63          0.66
  Br Sel Method            Energy only    Power Total (lb/ft s)          3.58          3.76


Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the
         downstream energy.  This is not physically possible, the momentum answer has been disregarded.

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 26.94

INPUT
Description: STA. 52+61.6
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   115.5 1344.14   155.9 1328.76     191 1325.83   226.3  1329.3   266.8 1342.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   115.5    .045   115.5    .035   266.8    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         115.5   266.8             46.79   46.79   46.79             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 26.52

INPUT
Description: STA. 53+12.3
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     130 1339.83   161.9 1326.87   191.6 1325.64   221.4 1326.14   253.1 1339.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     130    .045     130    .035   253.1    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           130   253.1               56      56      56             .1       .3

BRIDGE


RIVER: McMicken Outlet
REACH: Downstream         RS: 26.24

INPUT
Description: Grand Ave Bridge
Distance from Upstream XS =       2
Deck/Roadway Width        =      42
```

```
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
     110    1340  1337.5     125    1340  1337.5     125    1340  1337.5
     250    1341  1338.1     250    1341  1338.1     270    1341  1338.1

Upstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     130 1339.83   161.9 1326.87   191.6 1325.64   221.4 1326.14   253.1 1339.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     130    .045     130    .035   253.1    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
           130   253.1             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     110    1340  1337.5     125    1340  1337.5     125    1340  1337.5
     250    1341  1338.1     250    1341  1338.1     270    1341  1338.1

Downstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     125 1339.87     154 1328.73   161.2 1325.96   189.2 1325.26     223 1327.84
   247.9  1339.5     261 1339.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     125    .045     125    .035   247.9    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
           125   247.9             .1       .3

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 Piers =  3

Pier Data
Pier Station     Upstream=     156    Downstream=     156
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1340
Downstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1340

Pier Data
Pier Station     Upstream=     191    Downstream=     191
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1341
Downstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1341

Pier Data
Pier Station     Upstream=     226    Downstream=     226
Upstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1341
Downstream     num=       2
    Width   Elev    Width   Elev
       2    1325       2    1341

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =       2
       Yarnell                 KVal =    1.25
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #FULL FLOW

  E.G. US. (ft)              1337.67    Element                 Inside BR US  Inside BR DS
  W.S. US. (ft)              1337.29    E.G. Elev (ft)             1337.63       1337.52
  Q Total (cfs)              4700.00    W.S. Elev (ft)             1337.18       1337.07
  Q Bridge (cfs)             4700.00    Crit W.S. (ft)             1331.72       1331.71
  Q Weir (cfs)                          Max Chl Dpth (ft)            11.54         11.81
  Weir Sta Lft (ft)                     Vel Total (ft/s)              5.34          5.40
  Weir Sta Rgt (ft)                     Flow Area (sq ft)           880.92        870.66
```

Weir Submerg		Froude # Chl	0.33	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	5163.73	5099.68
Min El Weir Flow (ft)	1340.05	Hydr Depth (ft)	8.36	8.34
Min El Prs (ft)	1338.10	W.P. Total (ft)	166.35	165.49
Delta EG (ft)	0.17	Conv. Total (cfs)	113624.9	111811.9
Delta WS (ft)	0.18	Top Width (ft)	105.33	104.42
BR Open Area (sq ft)	948.21	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.40	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.57	0.58
Br Sel Method	Momentum	Power Total (lb/ft s)	3.02	3.13

CROSS SECTION

RIVER: McMicken Outlet
REACH: Downstream RS: 25.96

INPUT
Description: STA. 54+57.3
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
125	1339.87	154	1328.73	161.2	1325.96	189.2	1325.26	223	1327.84
247.9	1339.5	261	1339.25						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
125	.045	125	.035	247.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
125	247.9	93	93	93	.1	.3

CROSS SECTION

RIVER: McMicken Outlet
REACH: Downstream RS: 24.99

INPUT
Description: STA. 53+64.3
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
129	1340.89	162	1326.65	195	1324.98	218.1	1326.29	254.6	1339.55
267.1	1340.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
129	.045	129	.035	254.6	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129	254.6	49.11	49.11	49.11	.1	.3

BRIDGE

RIVER: McMicken Outlet
REACH: Downstream RS: 24.7

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 15
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
120	1339.5	1337.5	138	1339.5	1337.5	138	1339.5	1337.5
250	1340.2	1338.2	250	1340.2	1338.2	270	1340.2	1338.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
129	1340.89	162	1326.65	195	1324.98	218.1	1326.29	254.6	1339.55
267.1	1340.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
129	.045	129	.035	254.6	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
129	254.6	.1	.3

Downstream Deck/Roadway Coordinates
num= 6

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
120	1339.5	1337.5	138	1339.5	1337.5	138	1339.5	1337.5
250	1340.2	1338.2	250	1340.2	1338.2	270	1340.2	1338.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
129	1341.21	165	1326.31	190.6	1324.72	222.5	1326.42	257.4	1341.02
280.6	1340.04								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
129	.045	129	.035	257.4	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
129	257.4	.1	.3

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 Piers =  7

Pier Data
Pier Station     Upstream=   150.4    Downstream=   150.4
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=   164.7    Downstream=   164.7
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=     179    Downstream=     179
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=   193.3    Downstream=   193.3
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=   207.6    Downstream=   207.6
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=   221.9    Downstream=   221.9
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Pier Data
Pier Station     Upstream=   236.2    Downstream=   236.2
Upstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339
Downstream     num=       2
    Width   Elev    Width   Elev
       1    1325       1    1339

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =       2
       Yarnell                 KVal =    1.25
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #FULL FLOW

  E.G. US. (ft)               1337.42    Element                 Inside BR US  Inside BR DS
  W.S. US. (ft)               1337.01    E.G. Elev (ft)             1337.36       1337.11
  Q Total (cfs)               4700.00    W.S. Elev (ft)             1336.87       1336.61
  Q Bridge (cfs)              4700.00    Crit W.S. (ft)             1331.69       1331.49
  Q Weir (cfs)                           Max Chl Dpth (ft)            11.89         11.89
  Weir Sta Lft (ft)                      Vel Total (ft/s)              5.62          5.69
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           836.59        825.42
```

```
  Weir Submerg                          Froude # Chl                  0.35          0.35
  Weir Max Depth (ft)                   Specif Force (cu ft)        4944.42       4903.79
  Min El Weir Flow (ft)       1339.51   Hydr Depth (ft)               8.21          8.28
  Min El Prs (ft)             1338.20   W.P. Total (ft)             231.41        229.64
  Delta EG (ft)                  0.36   Conv. Total (cfs)          83662.7       82227.5
  Delta WS (ft)                  0.38   Top Width (ft)              101.91         99.74
  BR Open Area (sq ft)         938.53   Frctn Loss (ft)
  BR Open Vel (ft/s)             5.69   C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)        0.71          0.73
  Br Sel Method             Momentum    Power Total (lb/ft s)         4.00          4.17


CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 24.5

INPUT
Description: STA. 55+06.4
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     129 1341.21     165 1326.31   190.6 1324.72   222.5 1326.42   257.4 1341.02
   280.6 1340.04

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     129    .045     129    .035   257.4    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           129   257.4           200.07  200.07  200.07             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 22.48

INPUT
Description: STA. 57+06.5
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1339.13   121.6 1339.27   152.9 1326.82     181 1324.55   210.7 1326.55
   241.2 1340.08     260 1339.68   279.3 1342.41   321.1 1342.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   121.6    .035   241.2    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         121.6   241.2              233     233     233             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 20.15

INPUT
Description: STA. 59+39.5
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     1001339.686   119.51325.975   153.41324.853     1781325.456     2051335.584
   222.71337.229   233.81339.821   267.51339.673

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035   233.8    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100   233.8              305     305     305             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 17.1

INPUT
Description: STA. 62+44.5
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1339.54   104.6 1340.36   115.5 1340.74   151.3 1326.17   189.6 1324.51
   229.4 1326.75   260.7 1336.72   286.5 1337.85   296.9 1339.97   318.4 1339.82
   331.9 1339.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   115.5    .035   296.9    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         115.5   296.9              275     275     275             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 14.35

INPUT
Description: STA. 65+19.5
Station Elevation Data    num=       9
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     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1339.26   143.9 1324.48   181.9 1324.63   231.3 1328.05   259.4 1336.29
   293.7 1337.18   305.3  1339.7   324.3    1339   332.8 1338.57

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045     100    .035   305.3    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           100   305.3              181     181     181             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 12.54

INPUT
Description: STA. 67+00.5
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1338.96     4.5 1339.74    13.8 1339.86    49.1 1325.71    78.5 1323.98
     146 1327.91   171.5 1335.75     215 1336.82   225.8 1340.04   242.1 1338.98
   250.6 1338.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    13.8    .035   225.8    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          13.8   225.8               54      54      54             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 12

INPUT
Description: STA. 67+54.5
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1339.48  100.59 1339.45  106.97 1338.98  109.19 1338.82  110.43 1339.18
  114.27 1339.59   121.1 1339.88  124.28 1340.07   144.3 1332.72  164.41  1325.3
  189.77 1324.88  206.56 1324.36  206.63 1324.36  228.11 1325.46  228.26 1325.46
  228.43 1325.48  251.31 1327.86  280.49 1336.22  280.55 1336.24  280.64 1336.24
     300 1336.35

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045  124.28    .035  280.49    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        124.28  280.49              200     200     200             .1       .3

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 10

INPUT
Description: STA. 69+54.5
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1337.86  103.54 1337.68  105.46 1337.63  112.78 1338.34  113.25 1338.34
  114.22 1338.29  124.52 1338.14  149.45 1329.09  161.48 1325.33  162.38 1325.28
  199.96 1324.21  201.91 1324.18   208.9  1324.2  210.48 1324.29  228.87 1325.59
  249.28 1326.93  249.73 1326.96  251.67 1327.55  277.16 1336.17  291.36 1336.32
     300 1336.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045  124.52    .035  277.16    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        124.52  277.16              200     200     200             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     298     300  1336.5

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 8

INPUT
Description: STA. 71+54.5
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1337.11   107.2 1336.88  110.23  1337.5  111.65 1337.79  114.51 1337.84
  120.78 1338.05   131.2 1334.11  152.99 1326.38   156.4 1325.15   182.3 1324.43
  200.24 1324.32  200.26 1324.33  213.71 1325.16  222.28 1325.51  239.25 1326.29
  240.99 1326.38  247.13 1328.04  270.92 1334.53  275.16 1334.59  292.05    1335
  299.97 1335.29     300 1335.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045  120.78    .035     300    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
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        120.78     300              200     200     200             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     298     300    1336

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 6

INPUT
Description: STA. 73+54.5
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1335.99   104.7 1335.89  105.33 1335.94  111.24  1336.6  117.28  1336.8
  121.64 1336.74  153.64 1325.92  158.73 1324.24  162.87 1324.19  197.26 1324.22
  215.54 1324.93  216.81 1324.98  232.16 1325.65  234.51 1325.79  239.63 1327.11
  251.14  1330.1  264.48  1333.6  284.13 1334.05  293.17 1334.14  295.56 1334.33
     300  1334.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045  121.64    .035     300    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        121.64     300              200     200     200             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     298     300    1336

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 4

INPUT
Description: STA. 75+54.5
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1334.47  101.56 1334.46  104.12 1334.45  117.17 1334.94  118.07 1335.06
  118.81 1335.09  124.63 1335.28  128.13 1335.39  130.63 1334.47  158.27 1324.46
  192.88 1324.13  194.49 1324.15  196.43 1324.09   197.8 1324.13  224.11 1325.09
  235.77 1325.77  244.01 1326.32   269.1 1333.04  271.04 1333.55  275.27 1333.64
  298.88 1334.21     300 1334.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045  128.13    .035     300    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        128.13     300              200     200     200             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     100     126    1336     298     300    1336

CROSS SECTION


RIVER: McMicken Outlet
REACH: Downstream         RS: 2

INPUT
Description: STA. 77+54.5
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     100 1333.73  100.49 1333.73  105.92 1333.65  111.84 1333.41  115.53 1333.24
  116.68 1333.48  121.72 1334.46  129.15 1334.72   134.7 1334.91  156.02 1327.07
  163.88 1324.12  183.77 1324.11  203.97 1324.16  215.98 1324.62  229.32 1325.03
  246.55 1325.85  253.83 1326.29  258.53 1327.52  276.05 1332.75  278.79 1332.78
     300 1333.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     100    .045   134.7    .035     300    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         134.7     300              200     200     200             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     100     133    1336     298     300    1336


SUMMARY OF MANNING'S N VALUES

River:McMicken Outlet

      Reach          River Sta.       n1        n2        n3

 Downstream           79.29           .045      .035      .045
 Downstream           78.17           .045      .035      .045
 Downstream           76.05           .045      .035      .045
 Downstream           73.75           .045      .035      .045
 Downstream           70.42           .045      .035      .045
 Downstream           67.46           .045      .035      .045
 Downstream           64.16           .045      .035      .045
 Downstream           62.09           .045      .035      .045
 Downstream           60.05           .045      .035      .045
 Downstream           56.8            .045      .035      .045
 Downstream           53.79           .045      .035      .045
```

Downstream	50.53	.045	.035	.045
Downstream	47.82	.045	.035	.045
Downstream	44.39	.045	.035	.045
Downstream	41.43	.045	.035	.045
Downstream	40.27	.045	.035	.045
Downstream	38.29	.045	.035	.045
Downstream	35.4	.045	.035	.045
Downstream	32.45	.045	.035	.045
Downstream	29.38	.045	.035	.045
Downstream	28.13	.045	.035	.045
Downstream	27.48	.045	.035	.045
Downstream	27.3	Bridge		
Downstream	26.94	.045	.035	.045
Downstream	26.52	.045	.035	.045
Downstream	26.24	Bridge		
Downstream	25.96	.045	.035	.045
Downstream	24.99	.045	.035	.045
Downstream	24.7	Bridge		
Downstream	24.5	.045	.035	.045
Downstream	22.48	.045	.035	.045
Downstream	20.15	.045	.035	.045
Downstream	17.1	.045	.035	.045
Downstream	14.35	.045	.035	.045
Downstream	12.54	.045	.035	.045
Downstream	12	.045	.035	.045
Downstream	10	.045	.035	.045
Downstream	8	.045	.035	.045
Downstream	6	.045	.035	.045
Downstream	4	.045	.035	.045
Downstream	2	.045	.035	.045

SUMMARY OF REACH LENGTHS

River: McMicken Outlet

Reach	River Sta.	Left	Channel	Right
Downstream	79.29	111.78	111.78	111.78
Downstream	78.17	214.63	214.63	214.63
Downstream	76.05	226.62	226.62	226.62
Downstream	73.75	334.1	334.1	334.1
Downstream	70.42	294.95	294.95	294.95
Downstream	67.46	330.25	330.25	330.25
Downstream	64.16	206.79	206.79	206.79
Downstream	62.09	202.96	202.96	202.96
Downstream	60.05	326.24	326.24	326.24
Downstream	56.8	301.37	301.37	301.37
Downstream	53.79	325.77	325.77	325.77
Downstream	50.53	270.93	270.93	270.93
Downstream	47.82	343.33	343.33	343.33
Downstream	44.39	295.79	295.79	295.79
Downstream	41.43	115.87	115.87	115.87
Downstream	40.27	198.69	198.69	198.69
Downstream	38.29	289.87	289.87	289.87
Downstream	35.4	291.84	291.84	291.84
Downstream	32.45	308.88	308.88	308.88
Downstream	29.38	124.78	124.78	124.78
Downstream	28.13	64.58	64.58	64.58
Downstream	27.48	54.13	54.13	54.13
Downstream	27.3	Bridge		
Downstream	26.94	46.79	46.79	46.79
Downstream	26.52	56	56	56
Downstream	26.24	Bridge		
Downstream	25.96	93	93	93
Downstream	24.99	49.11	49.11	49.11
Downstream	24.7	Bridge		
Downstream	24.5	200.07	200.07	200.07
Downstream	22.48	233	233	233
Downstream	20.15	305	305	305
Downstream	17.1	275	275	275
Downstream	14.35	181	181	181
Downstream	12.54	54	54	54
Downstream	12	200	200	200
Downstream	10	200	200	200
Downstream	8	200	200	200
Downstream	6	200	200	200
Downstream	4	200	200	200
Downstream	2	200	200	200

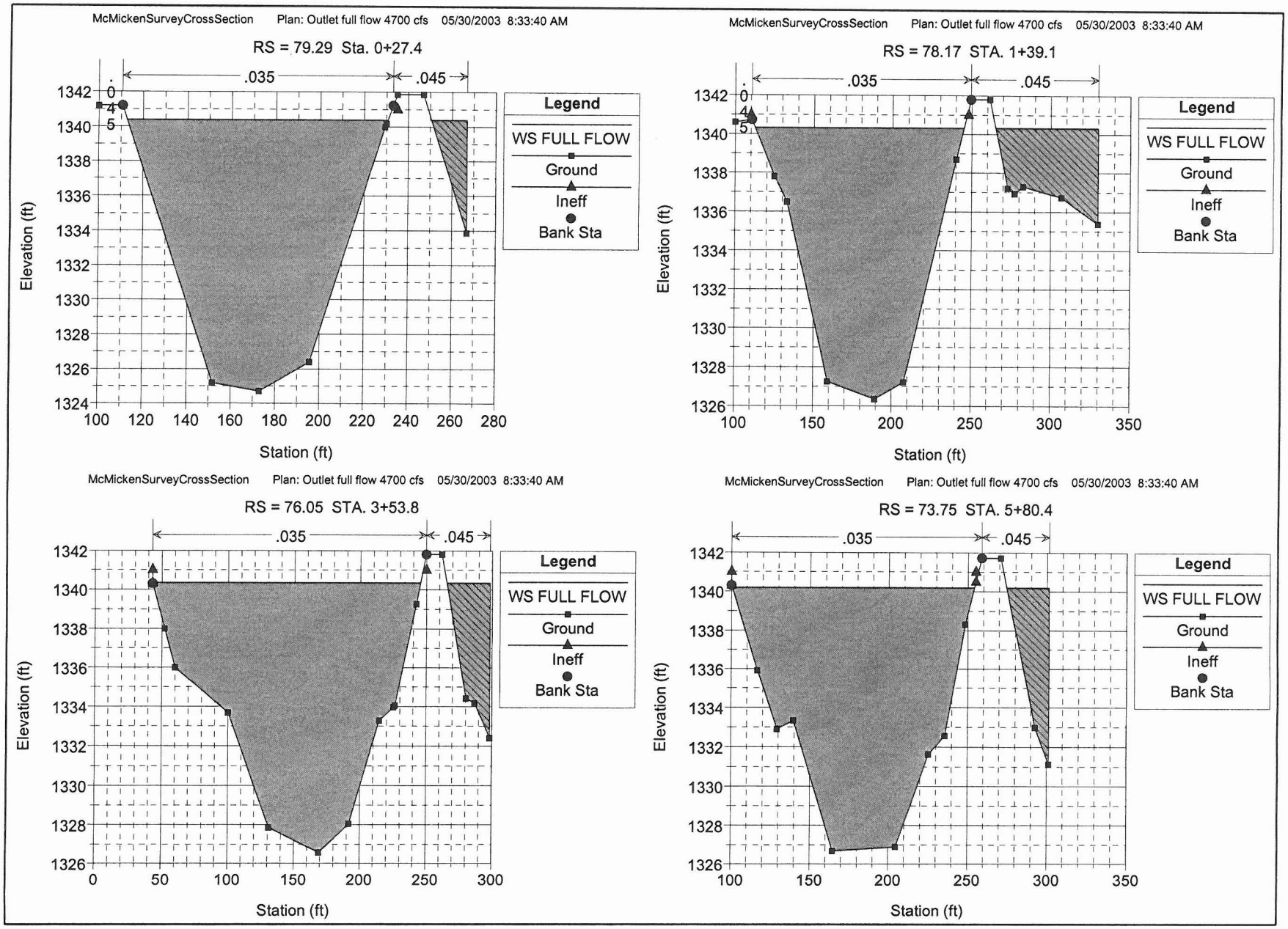
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: McMicken Outlet

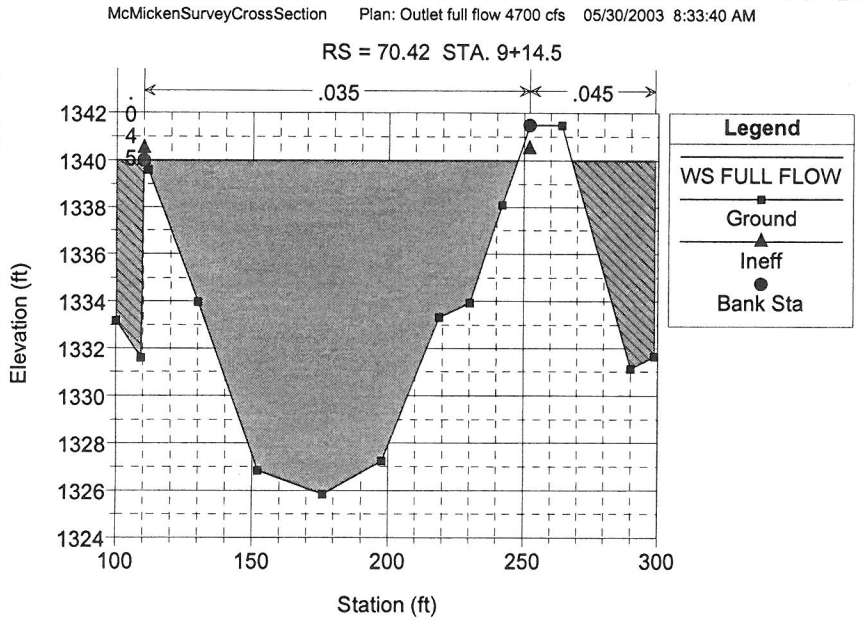
Reach	River Sta.	Contr.	Expan.
Downstream	79.29	.1	.3
Downstream	78.17	.1	.3
Downstream	76.05	.1	.3
Downstream	73.75	.1	.3
Downstream	70.42	.1	.3
Downstream	67.46	.1	.3
Downstream	64.16	.1	.3
Downstream	62.09	.1	.3
Downstream	60.05	.1	.3
Downstream	56.8	.1	.3
Downstream	53.79	.1	.3

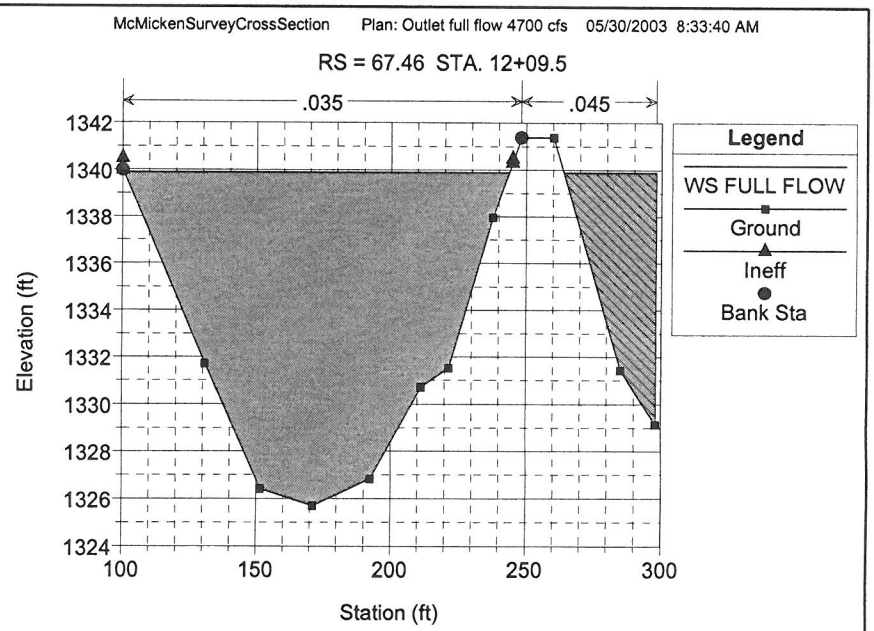
Downstream	50.53		.1	.3
Downstream	47.82		.1	.3
Downstream	44.39		.1	.3
Downstream	41.43		.1	.3
Downstream	40.27		.1	.3
Downstream	38.29		.1	.3
Downstream	35.4		.1	.3
Downstream	32.45		.1	.3
Downstream	29.38		.1	.3
Downstream	28.13		.1	.3
Downstream	27.48		.1	.3
Downstream	27.3	Bridge		
Downstream	26.94		.1	.3
Downstream	26.52		.1	.3
Downstream	26.24	Bridge		
Downstream	25.96		.1	.3
Downstream	24.99		.1	.3
Downstream	24.7	Bridge		
Downstream	24.5		.1	.3
Downstream	22.48		.1	.3
Downstream	20.15		.1	.3
Downstream	17.1		.1	.3
Downstream	14.35		.1	.3
Downstream	12.54		.1	.3
Downstream	12		.1	.3
Downstream	10		.1	.3
Downstream	8		.1	.3
Downstream	6		.1	.3
Downstream	4		.1	.3
Downstream	2		.1	.3

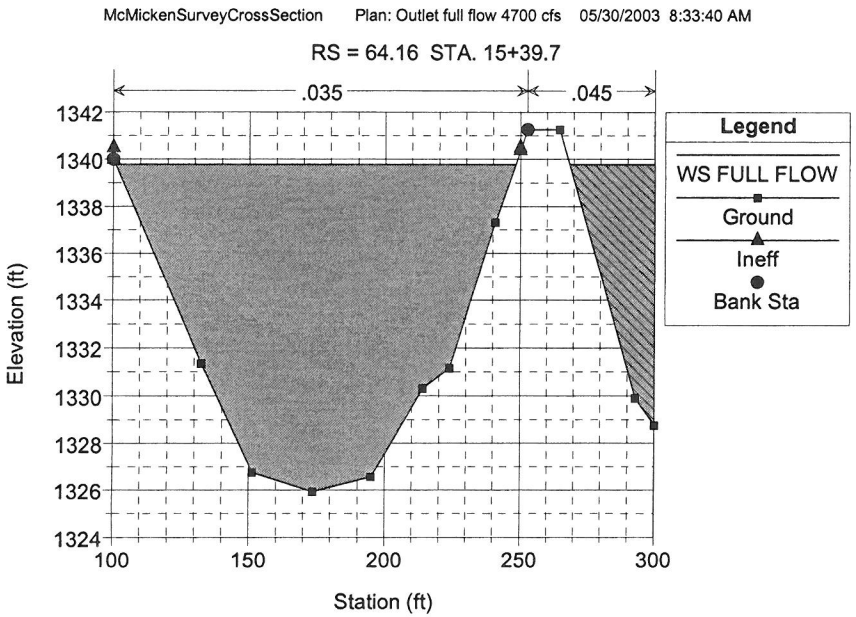
Profile Output Table - FCDTable 1

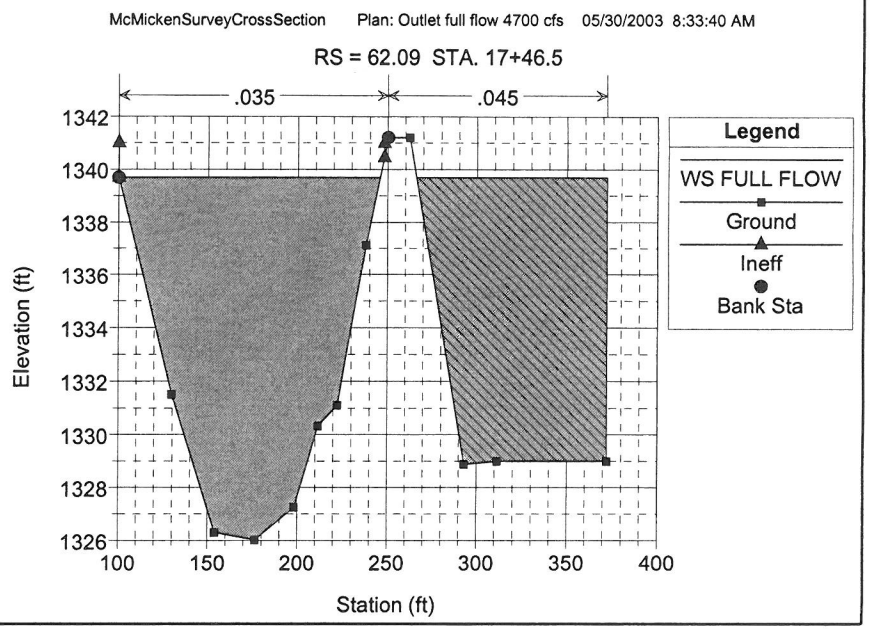
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Vel Head (ft)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Downstream	79.29	FULL FLOW	4700.00	1324.70	1340.39	1331.69	1340.63	0.000406	3.91	0.24	1203.40	134.11	0.22
Downstream	78.17	FULL FLOW	4700.00	1326.35	1340.32	1332.83	1340.58	0.000523	4.04	0.25	1162.36	197.17	0.24
Downstream	76.05	FULL FLOW	4700.00	1326.57	1340.34	1332.47	1340.46	0.000249	2.75	0.12	1707.64	235.20	0.17
Downstream	73.75	FULL FLOW	4700.00	1326.67	1340.20	1332.95	1340.38	0.000384	3.48	0.19	1349.35	180.44	0.21
Downstream	70.42	FULL FLOW	4700.00	1325.84	1340.01	1332.63	1340.24	0.000466	3.85	0.23	1220.66	178.63	0.23
Downstream	67.46	FULL FLOW	4700.00	1325.70	1339.90	1332.35	1340.10	0.000396	3.61	0.20	1300.84	177.55	0.21
Downstream	64.16	FULL FLOW	4700.00	1325.93	1339.78	1332.21	1339.97	0.000378	3.53	0.19	1332.69	179.04	0.21
Downstream	62.09	FULL FLOW	4700.00	1326.02	1339.69	1332.28	1339.89	0.000395	3.59	0.20	1309.47	251.69	0.21
Downstream	60.05	FULL FLOW	4700.00	1325.80	1339.59	1332.22	1339.81	0.000431	3.78	0.22	1243.41	175.94	0.22
Downstream	56.8	FULL FLOW	4700.00	1326.12	1339.42	1332.54	1339.66	0.000490	3.94	0.24	1193.09	193.22	0.23
Downstream	53.79	FULL FLOW	4700.00	1325.91	1339.27	1332.40	1339.51	0.000481	3.96	0.24	1186.50	182.51	0.23
Downstream	50.53	FULL FLOW	4700.00	1325.86	1339.11	1332.10	1339.35	0.000474	3.98	0.25	1180.33	196.75	0.23
Downstream	47.82	FULL FLOW	4700.00	1325.56	1339.00	1331.56	1339.23	0.000423	3.86	0.23	1216.56	164.18	0.22
Downstream	44.39	FULL FLOW	4700.00	1325.66	1338.83	1331.92	1339.07	0.000497	3.96	0.24	1186.53	199.82	0.24
Downstream	41.43	FULL FLOW	4700.00	1325.13	1338.64	1331.95	1338.91	0.000566	4.15	0.27	1131.60	181.15	0.25
Downstream	40.27	FULL FLOW	4700.00	1325.53	1338.58		1338.84	0.000558	4.07	0.26	1153.39	137.33	0.25
Downstream	38.29	FULL FLOW	4700.00	1325.17	1338.37	1331.84	1338.71	0.000735	4.65	0.34	1012.80	145.53	0.28
Downstream	35.4	FULL FLOW	4700.00	1324.99	1338.19	1331.60	1338.50	0.000646	4.46	0.31	1056.83	137.61	0.27
Downstream	32.45	FULL FLOW	4700.00	1325.21	1337.96	1331.91	1338.30	0.000749	4.65	0.34	1012.31	136.28	0.29
Downstream	29.38	FULL FLOW	4700.00	1325.43	1337.66		1338.04	0.000873	4.96	0.38	947.59	116.63	0.31
Downstream	28.13	FULL FLOW	4700.00	1325.73	1337.53		1337.93	0.000910	5.06	0.40	928.09	114.31	0.31
Downstream	27.48	FULL FLOW	4700.00	1325.86	1337.44	1332.11	1337.86	0.000989	5.26	0.43	894.21	110.65	0.33
Downstream	27.3		Bridge										
Downstream	26.94	FULL FLOW	4700.00	1325.83	1337.30		1337.73	0.001086	5.31	0.44	885.31	116.61	0.34
Downstream	26.52	FULL FLOW	4700.00	1325.64	1337.29	1331.51	1337.67	0.000824	4.95	0.38	950.12	111.85	0.30
Downstream	26.24		Bridge										
Downstream	25.96	FULL FLOW	4700.00	1325.26	1337.11		1337.51	0.000864	5.04	0.39	932.59	110.62	0.31
Downstream	24.99	FULL FLOW	4700.00	1324.98	1337.01	1331.41	1337.42	0.000908	5.14	0.41	914.99	109.63	0.31
Downstream	24.7		Bridge										
Downstream	24.5	FULL FLOW	4700.00	1324.72	1336.63		1337.06	0.000962	5.28	0.43	890.81	106.85	0.32
Downstream	22.48	FULL FLOW	4700.00	1324.55	1336.37		1336.85	0.001104	5.56	0.48	845.28	103.96	0.34
Downstream	20.15	FULL FLOW	4700.00	1324.85	1336.13		1336.59	0.001081	5.47	0.46	859.66	105.82	0.34
Downstream	17.1	FULL FLOW	4700.00	1324.51	1335.99		1336.29	0.000670	4.38	0.30	1072.76	131.24	0.27
Downstream	14.35	FULL FLOW	4700.00	1324.48	1335.87		1336.11	0.000541	3.93	0.24	1197.16	147.88	0.24
Downstream	12.54	FULL FLOW	4700.00	1323.98	1335.77		1336.01	0.000523	3.88	0.23	1211.73	148.50	0.24
Downstream	12	FULL FLOW	4700.00	1324.36	1335.72		1335.98	0.000583	4.07	0.26	1154.04	142.60	0.25
Downstream	10	FULL FLOW	4700.00	1324.18	1335.62		1335.86	0.000516	3.91	0.24	1202.27	144.09	0.24
Downstream	8	FULL FLOW	4700.00	1324.32	1335.51		1335.75	0.000631	3.89	0.23	1209.31	170.50	0.26
Downstream	6	FULL FLOW	4700.00	1324.19	1335.39		1335.62	0.000619	3.84	0.23	1222.95	172.37	0.25
Downstream	4	FULL FLOW	4700.00	1324.09	1335.28		1335.50	0.000563	3.76	0.22	1250.63	169.57	0.24
Downstream	2	FULL FLOW	4700.00	1324.11	1335.18	1328.90	1335.39	0.000490	3.65	0.21	1288.63	165.00	0.23

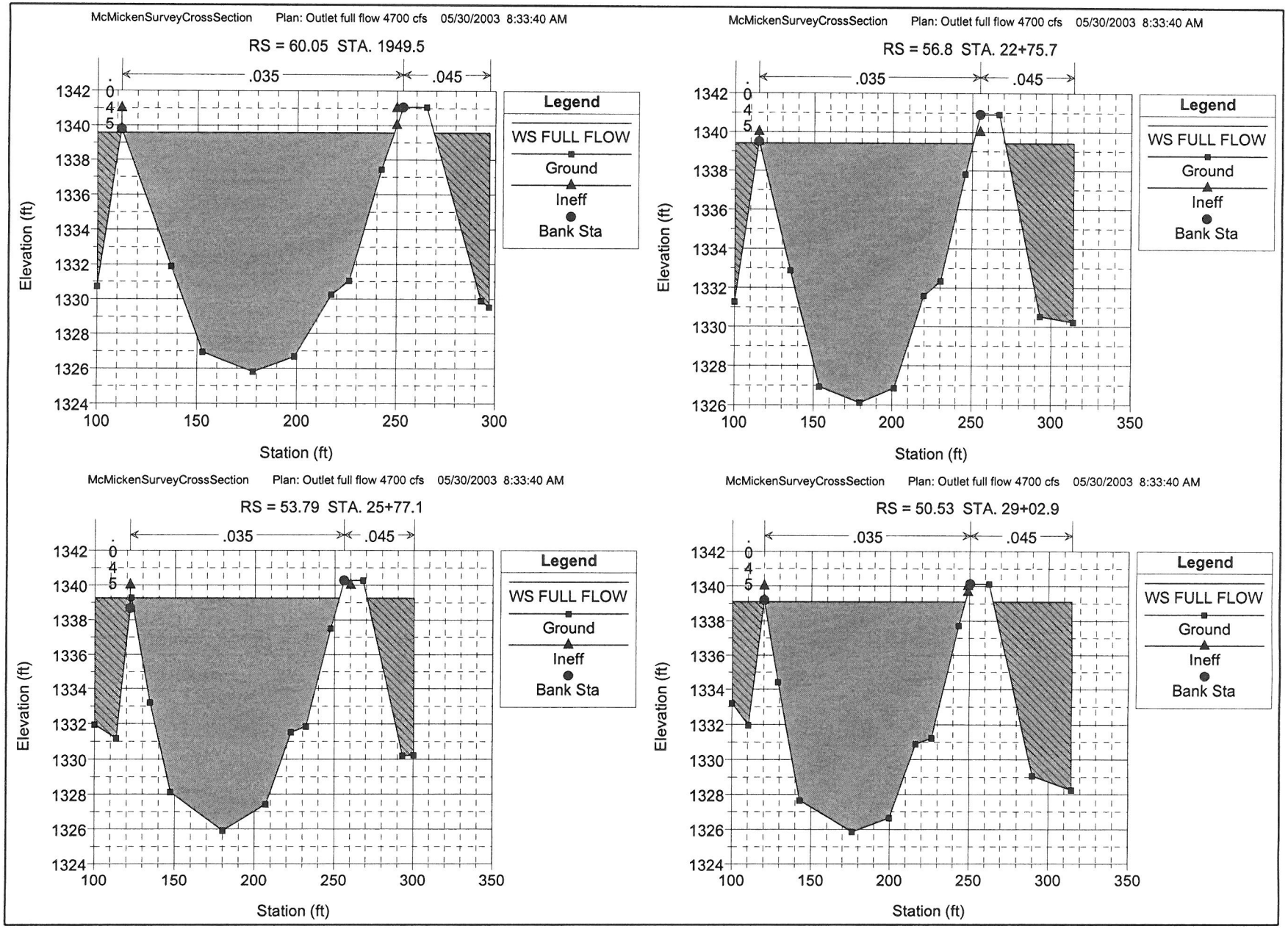

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 79.29 Sta. 0+27.4
.035
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 78.17 STA. 1+39.1
.035
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 76.05 STA. 3+53.8
.035
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 73.75 STA. 5+80.4
.035
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta

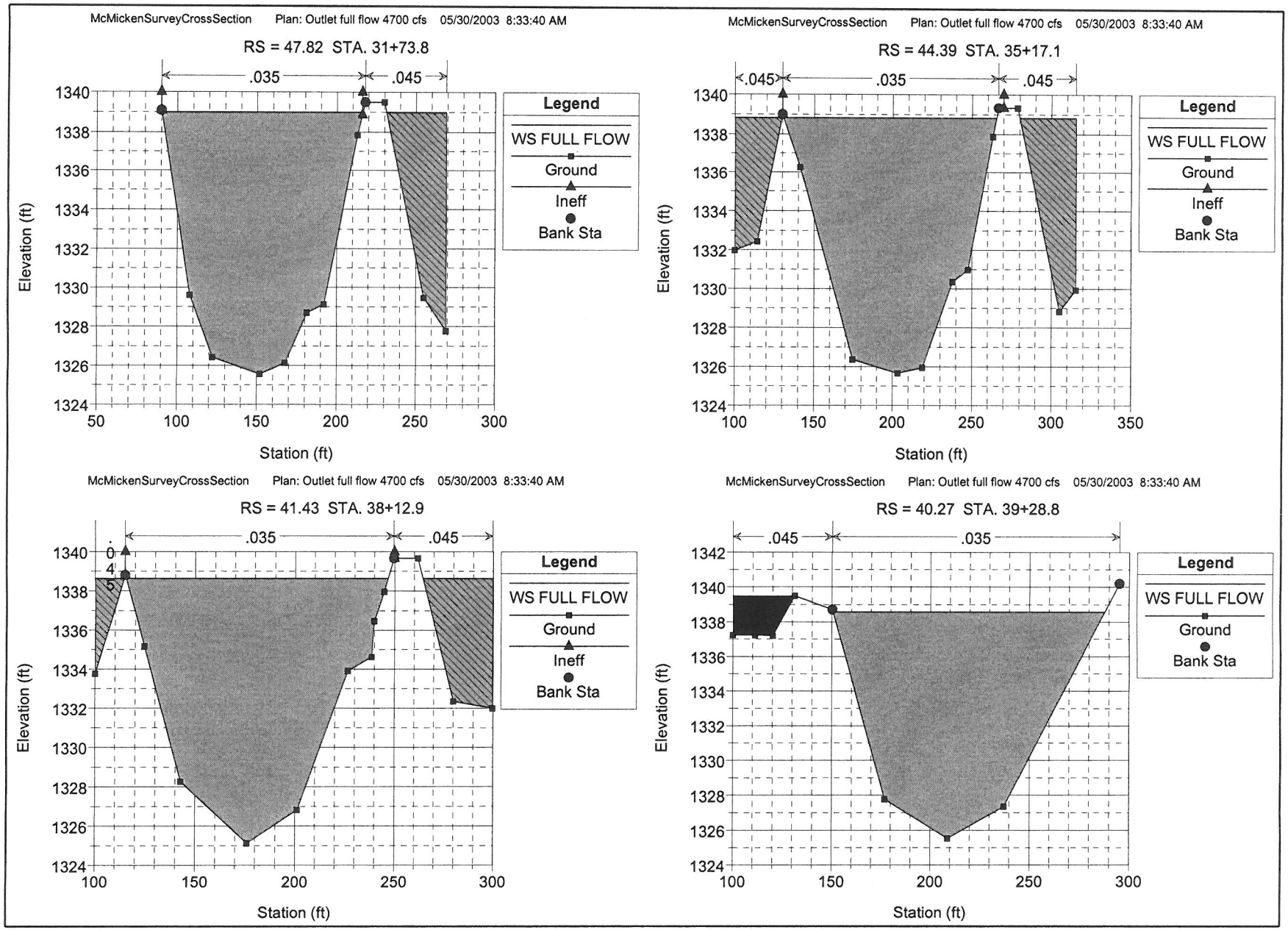

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 70.42 STA. 9+14.5
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

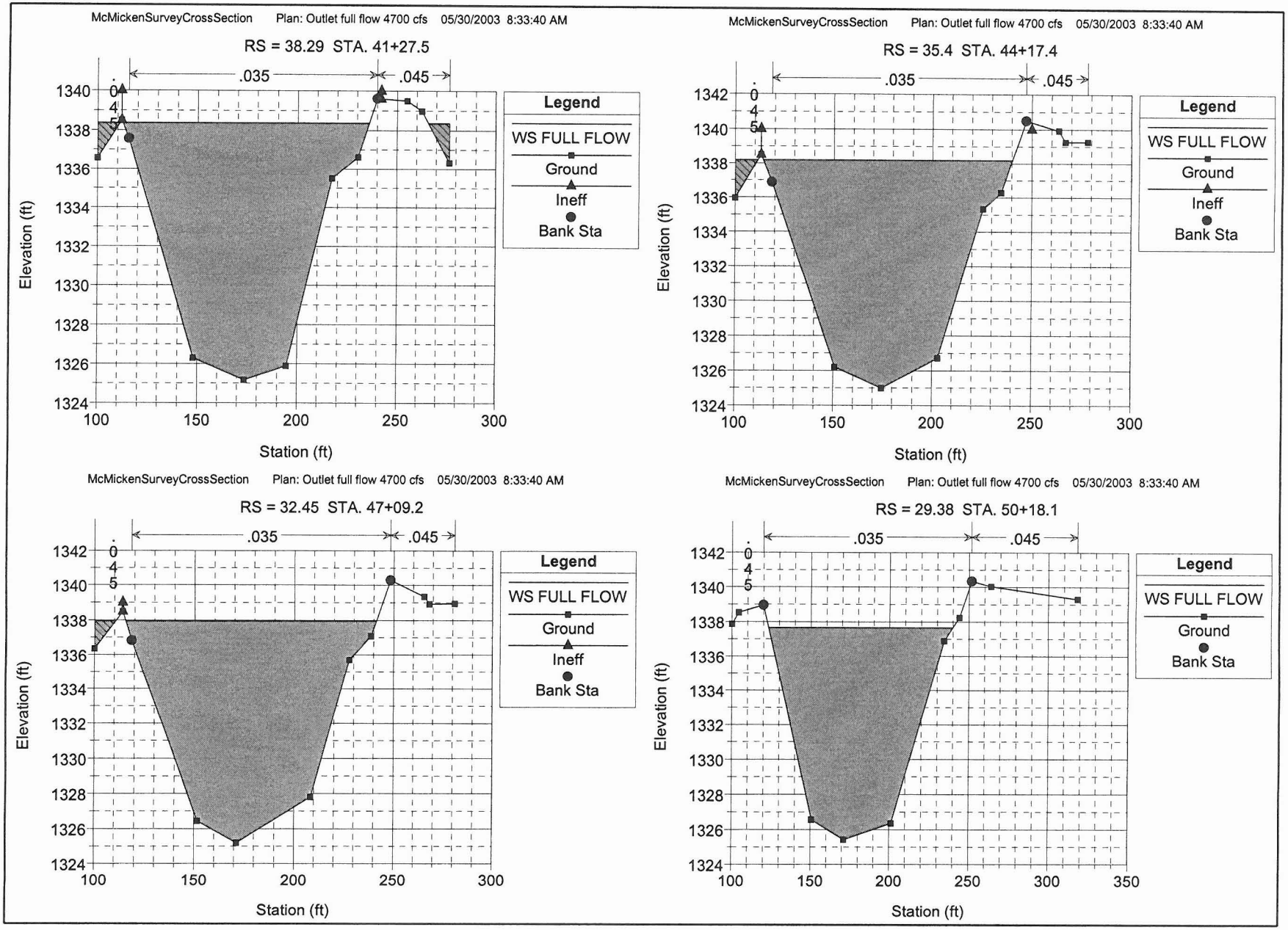

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 67.46 STA. 12+09.5
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

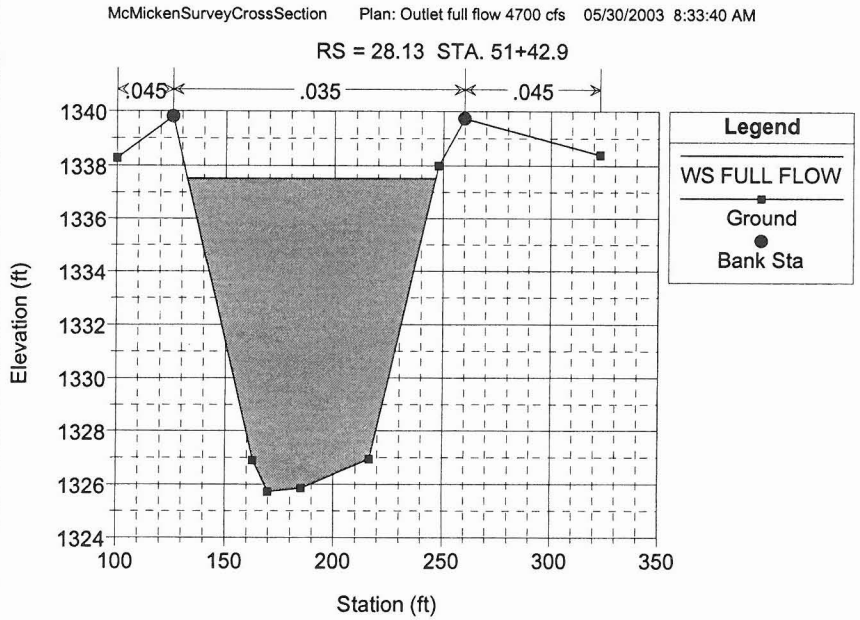

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 64.16 STA. 15+39.7
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

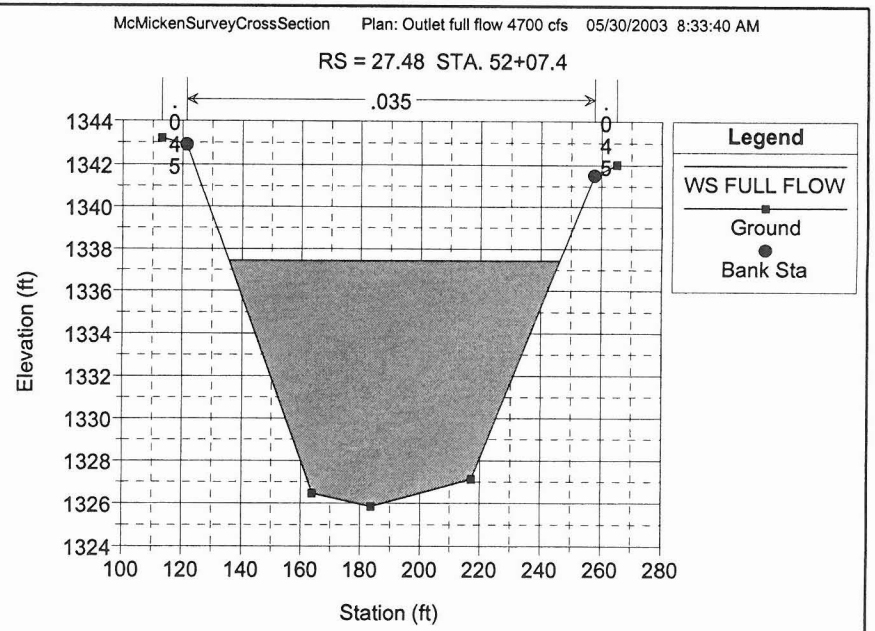

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 62.09 STA. 17+46.5
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

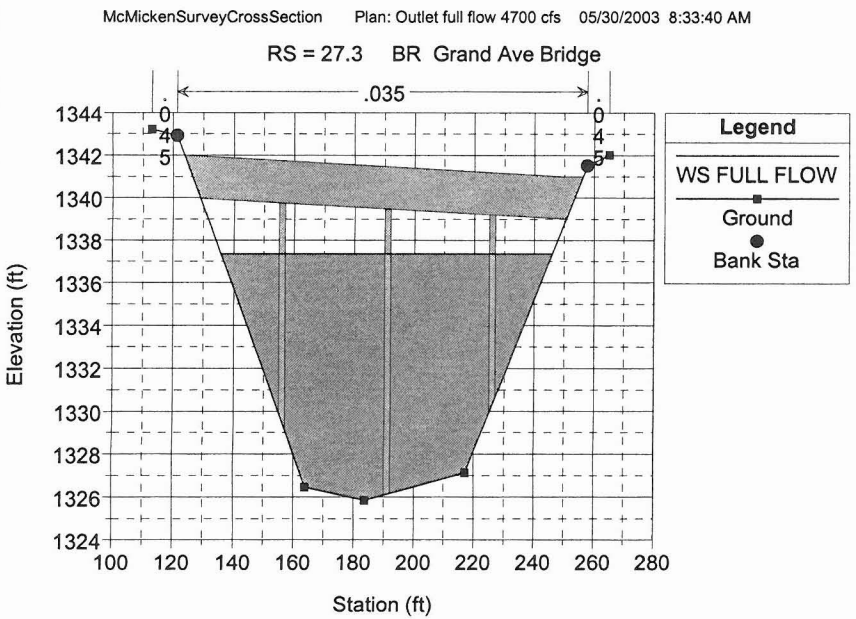

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 60.05 STA. 1949.5
.035
.045
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 56.8 STA. 22+75.7
.035
.045
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 53.79 STA. 25+77.1
.035
.045
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 50.53 STA. 29+02.9
.035
.045
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta

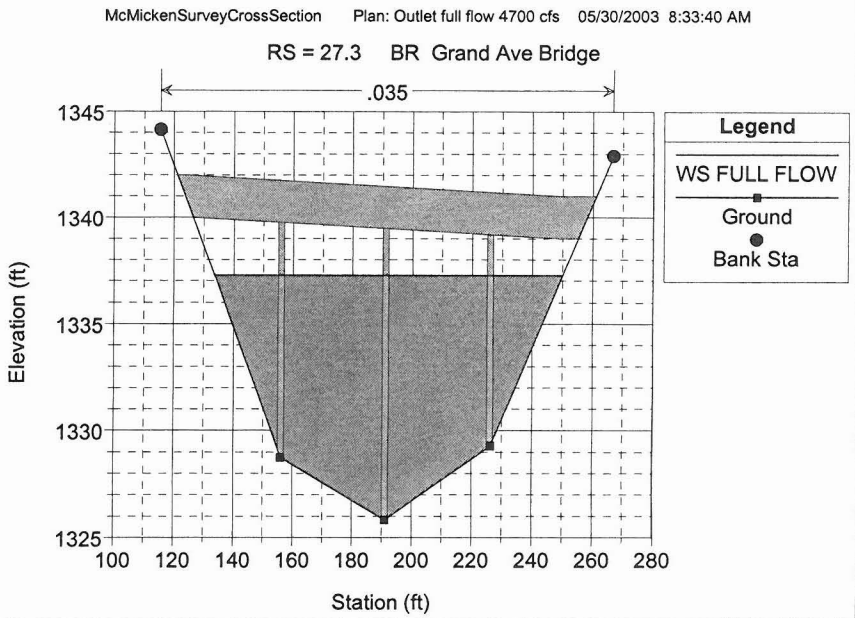

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 47.82 STA. 31+73.8
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 44.39 STA. 35+17.1
.045
.035
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 41.43 STA. 38+12.9
.035
.045
.045
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 40.27 STA. 39+28.8
.045
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

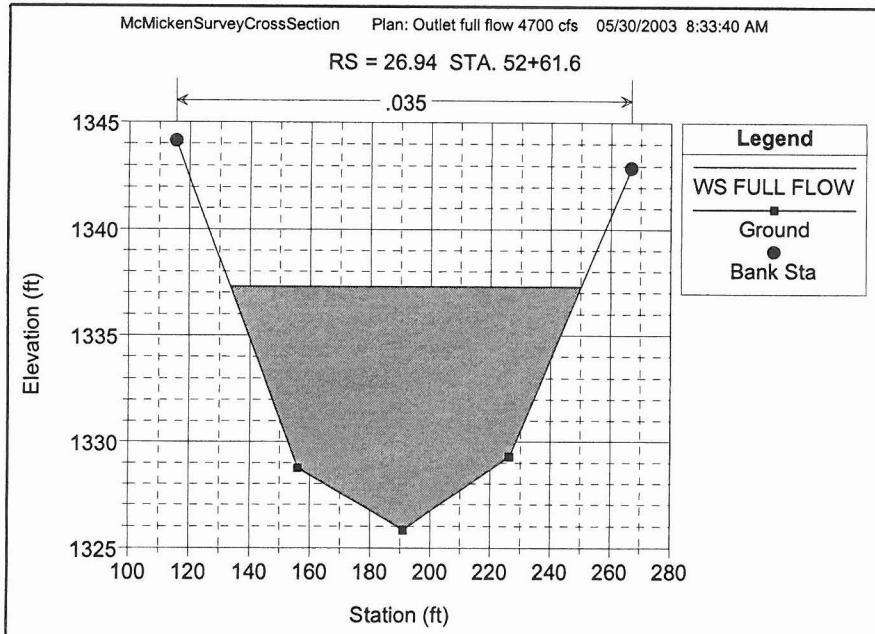

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 38.29 STA. 41+27.5
.035
.045
0.45
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 35.4 STA. 44+17.4
.035
.045
0.45
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 32.45 STA. 47+09.2
.035
.045
0.45
Legend
WS FULL FLOW
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 29.38 STA. 50+18.1
.035
.045
0.45
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

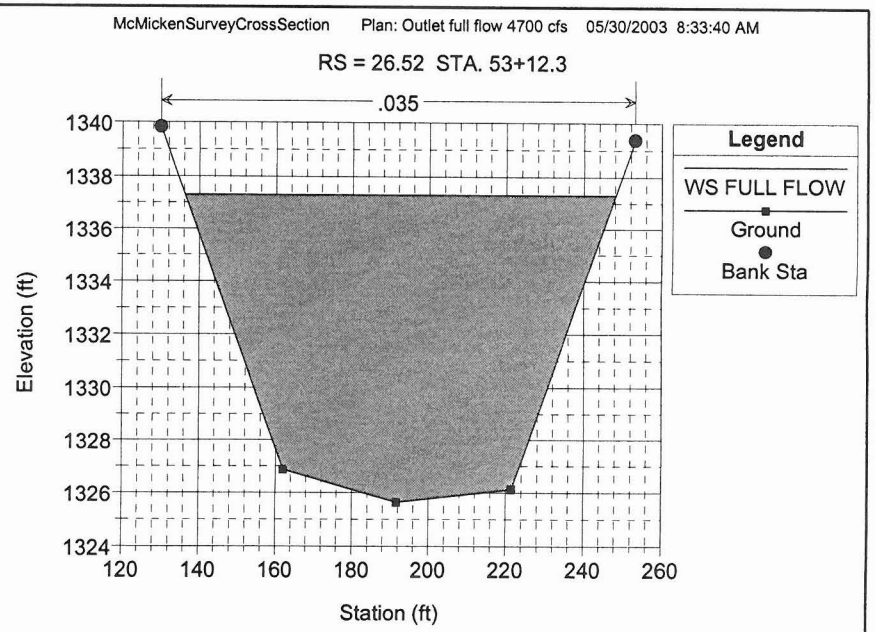

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 28.13 STA. 51+42.9
.045
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

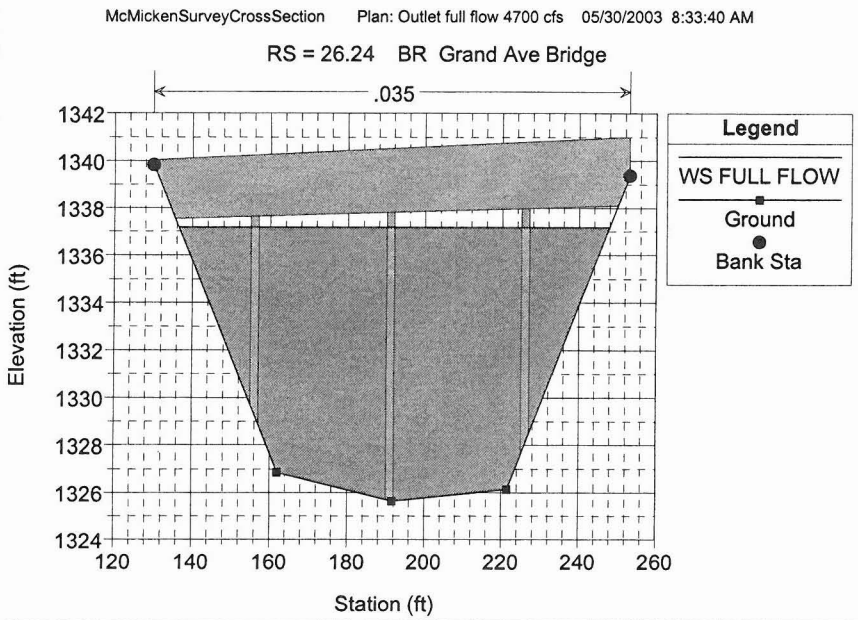

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 27.48 STA. 52+07.4
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

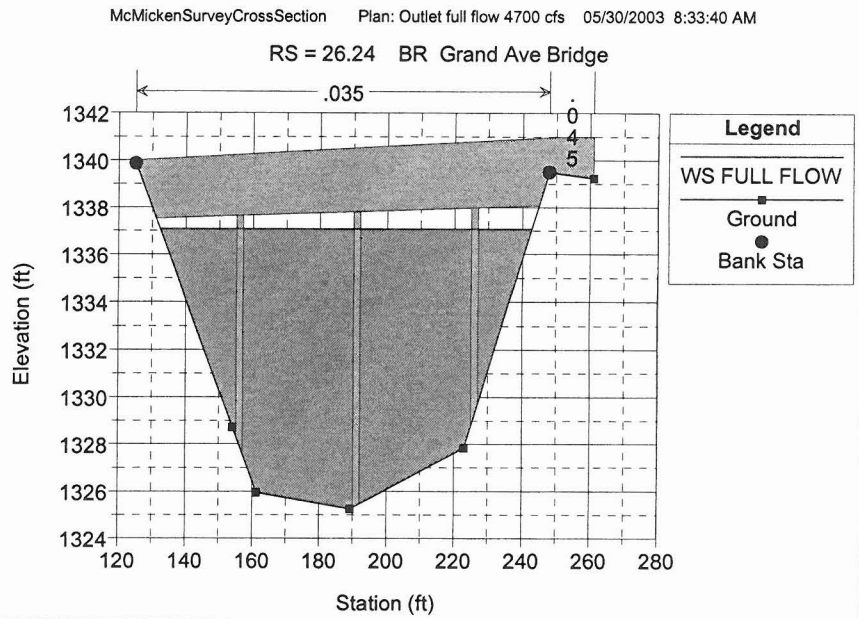

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 27.3 BR Grand Ave Bridge
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

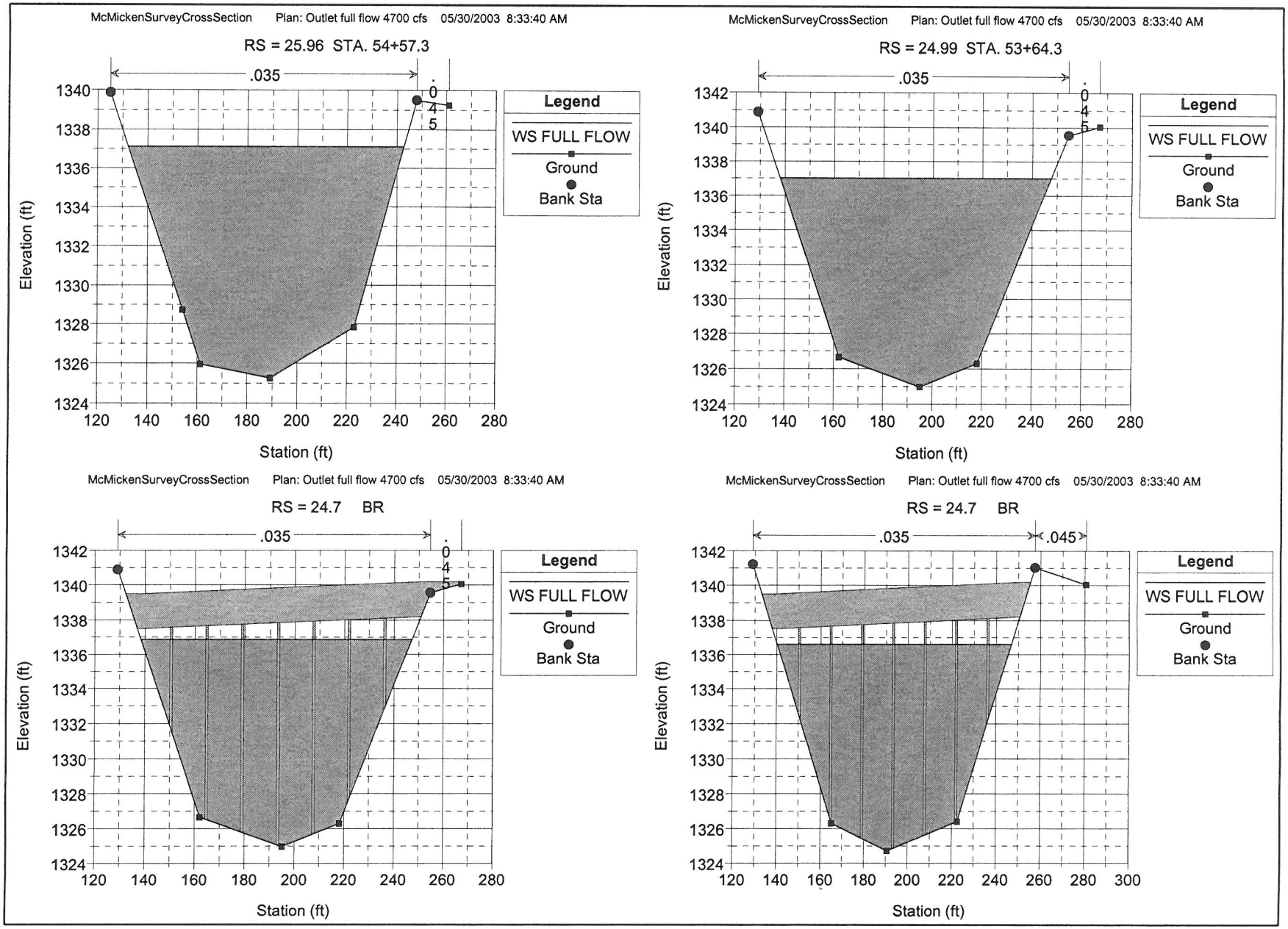

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 27.3 BR Grand Ave Bridge
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

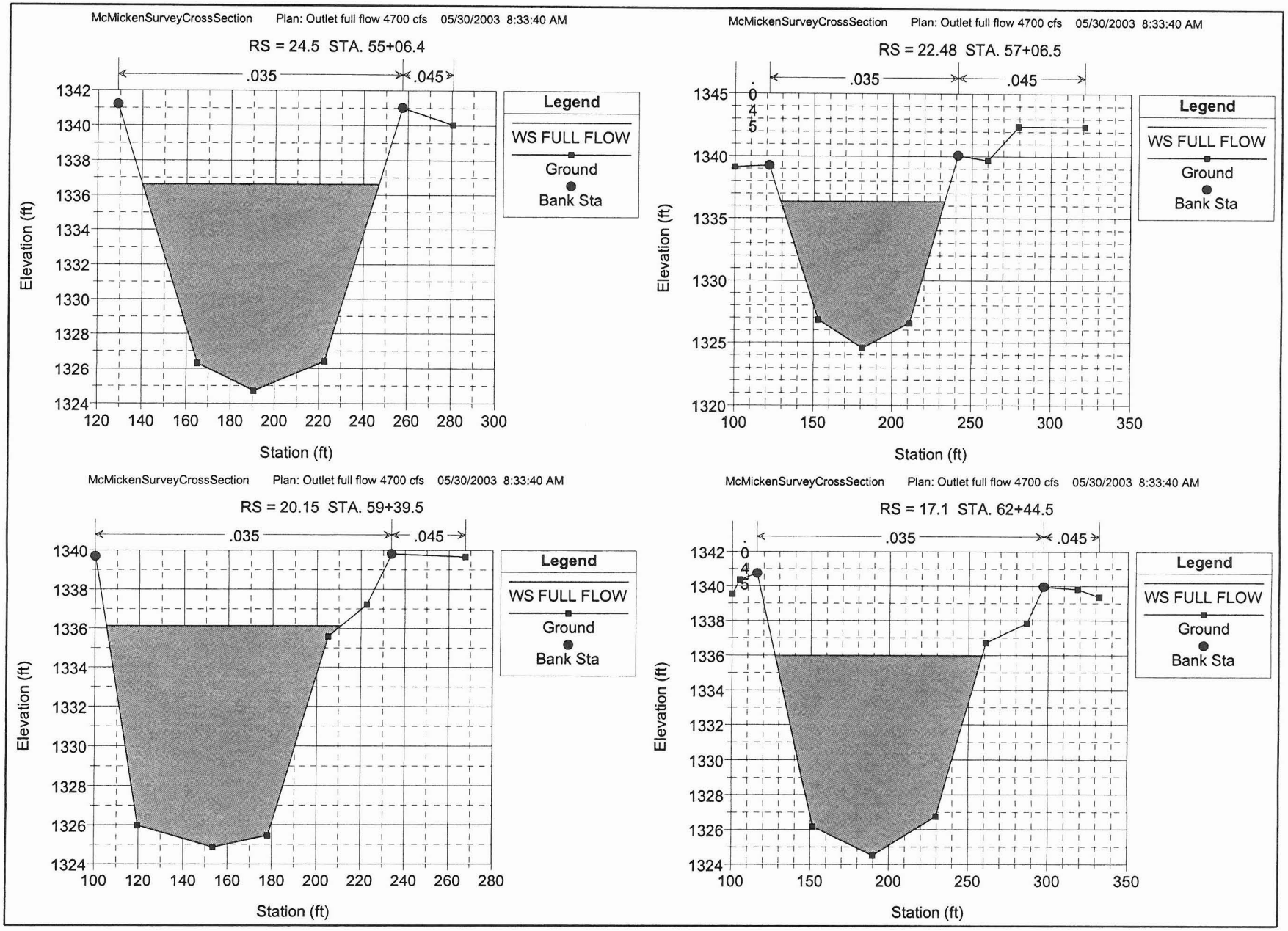

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 26.94 STA. 52+61.6
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

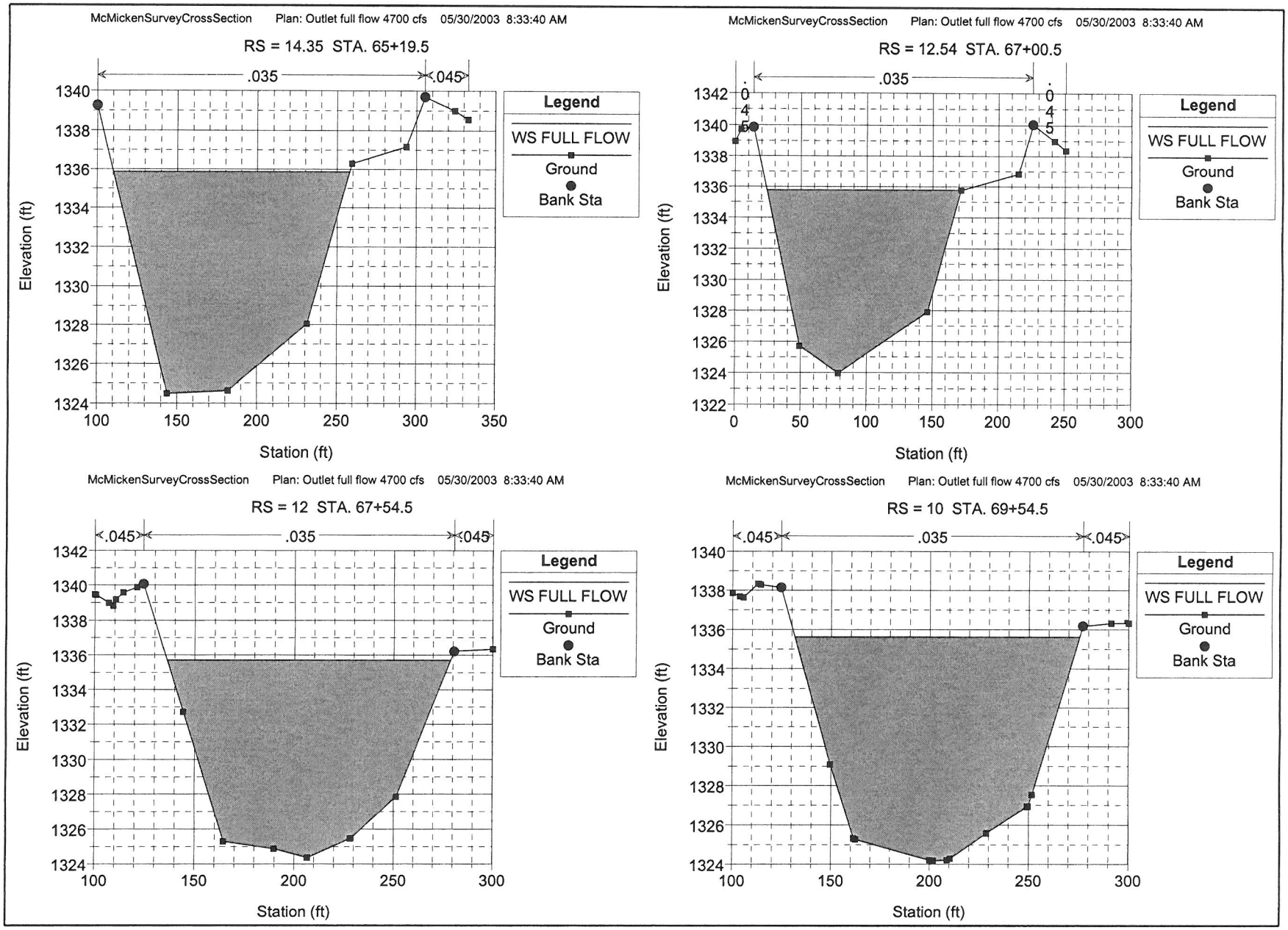

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 26.52 STA. 53+12.3
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

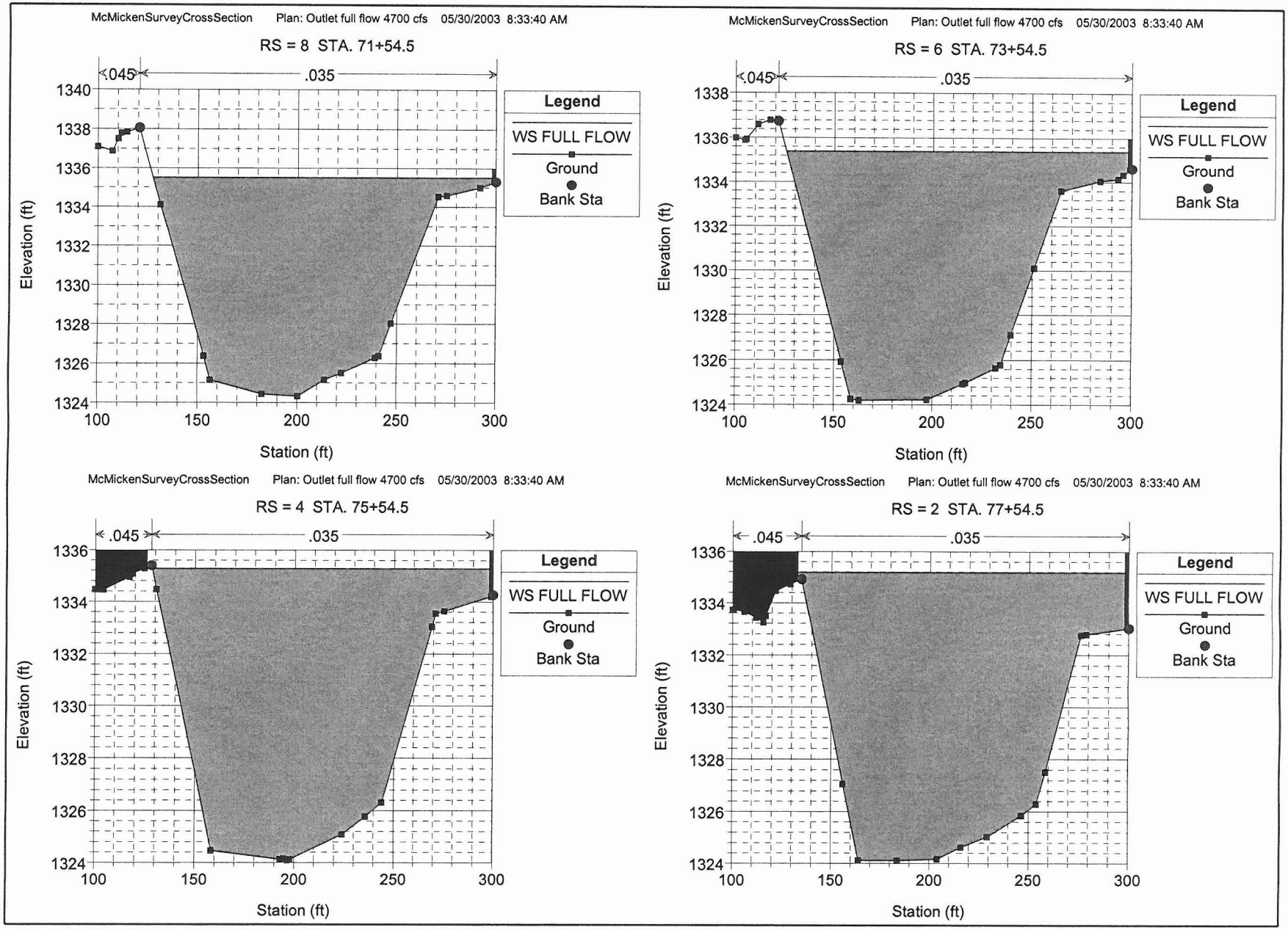

McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 26.24 BR Grand Ave Bridge
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 26.24 BR Grand Ave Bridge
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 25.96 STA. 54+57.3
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 24.99 STA. 53+64.3
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 24.7 BR
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 24.7 BR
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 24.5 STA. 55+06.4
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 22.48 STA. 57+06.5
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 20.15 STA. 59+39.5
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 17.1 STA. 62+44.5
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 14.35 STA. 65+19.5
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 12.54 STA. 67+00.5
.035
.045
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 12 STA. 67+54.5
.045
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 10 STA. 69+54.5
.045
.035
.045
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 8 STA. 71+54.5
.045
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 6 STA. 73+54.5
.045
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 4 STA. 75+54.5
.045
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)
McMickenSurveyCrossSection Plan: Outlet full flow 4700 cfs 05/30/2003 8:33:40 AM
RS = 2 STA. 77+54.5
.045
.035
Legend
WS FULL FLOW
Ground
Bank Sta
Elevation (ft)
Station (ft)

Appendix E

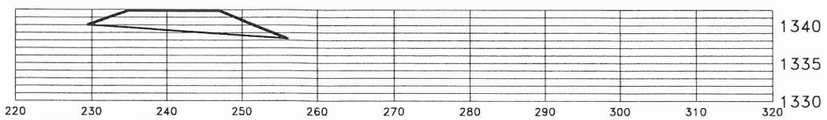
Plots of Cross Sections for Construction Area

CONSTRUCTION AREA

20 0 20 40

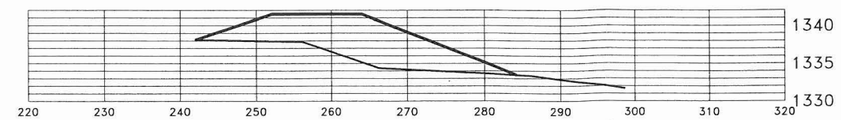
SCALE: 1" = 20'

79.29 (STA. 0+27.4)



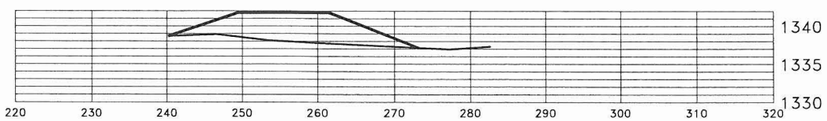
FLOW BASELINE INTERSECTION AT STA.161.1 ALONG CROSS SECTION

70.42 (STA. 9+14.5)



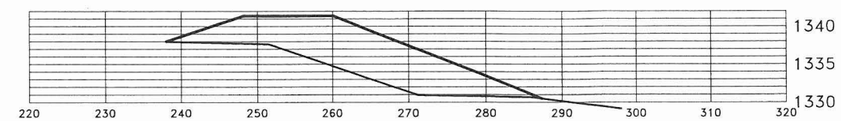
FLOW BASELINE INTERSECTION AT STA.173.3 ALONG CROSS SECTION

78.17 (STA. 1+39.1)



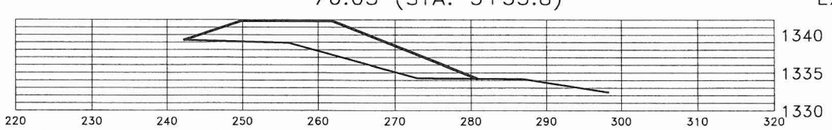
FLOW BASELINE INTERSECTION AT STA.181.4 ALONG CROSS SECTION

67.46 (STA. 12+09.5)



FLOW BASELINE INTERSECTION AT STA.173.8 ALONG CROSS SECTION

76.05 (STA. 3+53.8)

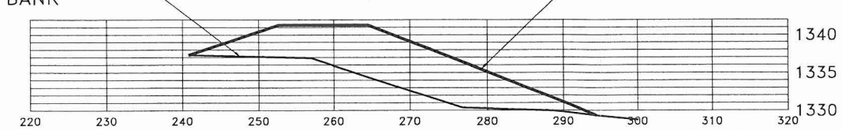


FLOW BASELINE INTERSECTION AT STA.158.6 ALONG CROSS SECTION

EXSITING TOP OF BANK

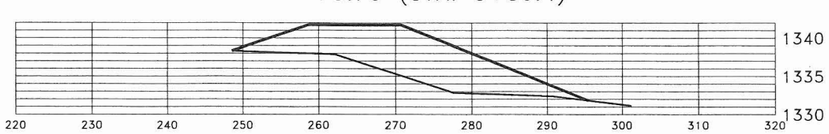
64.16 (STA. 15+39.7)

PROPOSED FILL LINE



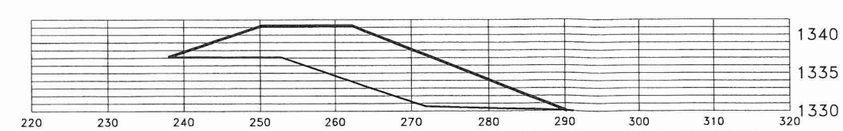
FLOW BASELINE INTERSECTION AT STA.176.1 ALONG CROSS SECTION

73.75 (STA. 5+80.4)



FLOW BASELINE INTERSECTION AT STA.180.2 ALONG CROSS SECTION

62.09 (STA. 17+46.5)



FLOW BASELINE INTERSECTION AT STA.171.3 ALONG CROSS SECTION

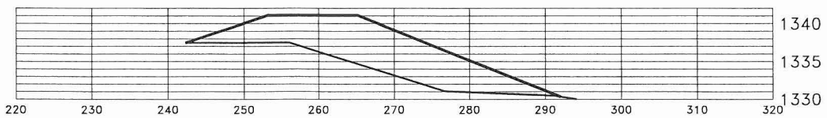
MCMICKEN DAM PRINCIPAL SPILLWAY OUTLET CHANNEL RIGHT BANK FILLING AREA. MICHAEL BAKER JR., INC MAY 2003

CONSTRUCTION AREA

20 0 20 40

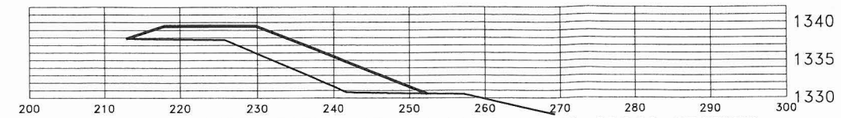
SCALE: 1" = 20'

60.05 (STA. 17+46.5)



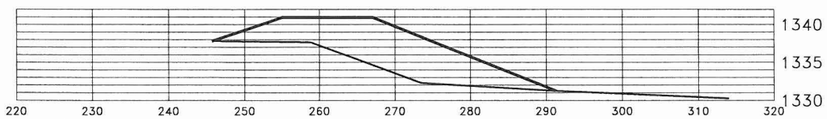
FLOW BASELINE INTERSECTION AT STA.174.8 ALONG CROSS SECTION

47.82 (STA. 31+72.0)



FLOW BASELINE INTERSECTION AT STA.149.2 ALONG CROSS SECTION

56.80 (STA. 22+75.7)

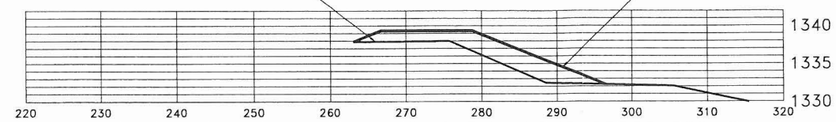


FLOW BASELINE INTERSECTION AT STA.180.2 ALONG CROSS SECTION

EXSITING TOP OF BANK

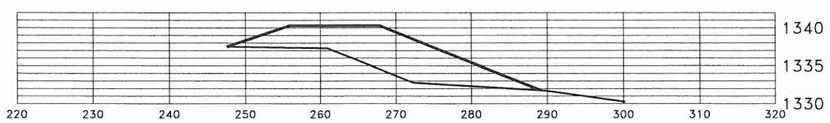
44.39 (STA. 35+17.1)

PROPOSED FILL LINE



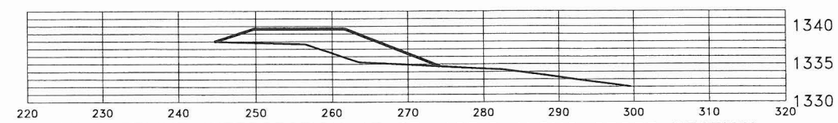
FLOW BASELINE INTERSECTION AT STA.203.9 ALONG CROSS SECTION

53.79 (STA. 25+771)



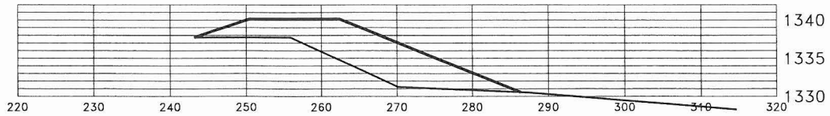
FLOW BASELINE INTERSECTION AT STA.180.9 ALONG CROSS SECTION

41.43 (STA. 38+12.9)



FLOW BASELINE INTERSECTION AT STA.183.8 ALONG CROSS SECTION

50.53 (STA. 29+02.9)



FLOW BASELINE INTERSECTION AT STA.176.2 ALONG CROSS SECTION

MCMICKEN DAM PRINCIPAL SPILLWAY OUTLET CHANNEL RIGHT BANK FILLING AREA. MICHAEL BAKER JR., INC MAY 2003

Appendix F

Survey Data

Points
Points

Project : TRILBY X.S
User namejumDate & Time4:08:53 PM 4/23/2003
Coordinate SystemUS State Plane 1983ZoneArizona Central 0202
Project DatumNAD 1983 (Conus)
Vertical DatumGeoid ModelGEOID99 (Conus)
Coordinate UnitsInternational feet
Distance UnitsInternational feet
Height UnitsInternational feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
7	977580.556	550015.200	1346.352	CP
8	976827.307	550167.344	1337.802	CP
9	980459.090	555608.501	1329.573	CP
6000	974265.365	546000.978	1341.541	CLTOPWINGWALLEND
6001	974277.665	545995.443	1341.656	CLTOPWINGWALL<PT
6002	974317.028	546011.525	1341.716	CLTOPWALLCOR C-20.5C-19.0
6003	974340.493	545951.988	1341.668	CLTOPWALL<PT C-20.5FL
6004	974341.717	545949.478	1341.731	CLTOPWALL<PT
6005	974357.834	545921.315	1357.618	CLTOPWALL<PT
6006	974360.511	545914.221	1360.603	CLTOPWALLEND
6007	974361.114	545911.679	1362.169	TOCEND
6008	974365.439	545900.726	1362.069	TOCEND
6009	974385.738	545908.603	1362.116	TOCEND
6010	974385.456	545908.677	1362.108	FNDCHISX
6011	974381.464	545919.629	1362.224	TOCEND
6012	974381.126	545919.243	1362.211	FNDCHISX
6013	974380.029	545921.867	1360.586	CLTOPWALLEND
6014	974377.265	545928.755	1357.664	CLTOPWALL<PT C-22.75FL
6015	974369.948	545960.126	1341.671	CLTOPWALL<PT
6016	974369.185	545963.117	1341.687	CLTOPWALL<PT C-20.5FL
6017	974346.155	546022.735	1341.690	CLTOPWALLCOR C-20.5C-19.0
6018	974385.234	546037.832	1341.684	CLTOPWALL<PT
6019	974390.525	546050.475	1336.156	CLWALLEND
6020	974384.253	546038.944	1337.422	TOB
6021	974344.038	546027.243	1323.669	TOE
6022	974333.369	546016.733	1321.188	FLEND
6023	974333.252	546017.024	1322.681	STEPTOC
6024	974316.329	546014.833	1323.572	TOE
6025	974281.851	545998.178	1339.133	TOB
6026	974243.008	546012.816	1338.246	TOE
6027	974268.795	546020.080	1340.036	TOB
6028	974300.724	546031.036	1326.414	TOE
6029	974321.706	546039.899	1324.689	FL
6030	974341.617	546047.036	1325.210	TOE
6031	974380.122	546061.108	1341.169	TOB
6032	974390.262	546064.603	1341.230	NG
6033	974359.638	546173.146	1340.605	NG
6034	974350.123	546168.470	1340.726	TOB
6035	974336.753	546163.502	1337.785	TOE
6036	974329.215	546160.825	1336.502	TOB

Point listing

Name	Northing	Easting	Elevation	Feature Code
6037	974304.486	546152.209	1327.256	TOE
6038	974276.060	546142.268	1326.354	FL
6039	974259.639	546133.982	1327.217	TOE
6040	974228.688	546123.764	1338.689	TOB
6041	974223.371	546120.141	1338.898	TOB
6042	974216.372	546118.146	1338.071	TOEEDGEROAD
6043	974194.561	546109.979	1336.926	TOEEDGEROAD
6044	974189.847	546107.200	1337.300	TOB
6045	974167.265	546098.861	1336.738	TOBEDGEROAD
6046	974145.787	546090.324	1335.368	TOE
6047	974135.362	546144.107	1333.724	TOE
6048	974146.975	546150.442	1335.594	TOBEDGEROAD
6049	974159.217	546154.866	1335.592	TOEEDGEROAD
6050	974169.521	546158.814	1338.276	TOB
6051	974180.654	546162.539	1338.511	TOB
6052	974189.398	546165.378	1335.324	TOEEDGEROAD
6053	974209.187	546173.325	1335.636	TOEEDGEROAD
6054	974214.270	546174.429	1336.162	TOB
6055	974239.033	546184.232	1327.339	TOE
6056	974281.678	546201.331	1326.961	TOE
6057	974305.840	546210.293	1334.611	TOB
6058	974312.861	546213.095	1335.495	TOE
6059	974324.979	546217.345	1339.376	TOB
6060	974337.378	546222.318	1339.123	NG
6061	974316.567	546275.053	1335.974	NG
6062	974296.537	546266.242	1336.180	TOB
6063	974290.450	546263.700	1334.709	TOE
6064	974283.040	546260.098	1333.121	TOB
6065	974265.383	546254.935	1326.939	TOE
6066	974221.947	546238.190	1327.033	TOE
6067	974203.047	546230.081	1334.965	TOB
6068	974196.681	546227.743	1333.538	TOEEDGEROAD
6069	974173.979	546220.179	1334.308	TOEEDGEROAD
6070	974164.193	546214.969	1339.086	TOB
6071	974152.839	546209.826	1338.898	TOB
6072	974140.899	546206.909	1334.827	TOEEDGEROAD
6073	974128.614	546202.324	1334.362	TOBEDGEROAD
6074	974118.179	546198.393	1332.936	TOE
6075	974094.681	546269.054	1332.703	TOE
6076	974105.345	546272.938	1334.381	TOBEDGEROAD
6077	974118.810	546277.634	1334.604	TOEEDGEROAD
6078	974132.954	546283.944	1338.870	TOB
6079	974146.298	546288.721	1339.260	TOB
6080	974171.481	546298.689	1331.014	TOEEDGEROAD
6081	974204.333	546311.240	1326.986	TOE
6082	974203.288	546294.801	1327.701	TOE
6083	974203.194	546292.211	1328.713	TOB
6084	974196.107	546265.651	1332.701	TOB
6085	974193.976	546265.054	1330.594	TOEEDGEROAD
6086	974226.424	546312.815	1326.368	FL
6087	974252.956	546317.038	1327.678	TOEEDGEROAD
6088	974266.535	546314.456	1332.728	TOB
6089	974277.824	546314.527	1329.149	TOEEDGEROAD
6090	974328.938	546295.372	1332.570	TOEEDGEROAD
6091	974324.894	546283.840	1334.898	TOB

Point listing

Name	Northing	Easting	Elevation	Feature Code
6092	974332.478	546319.335	1331.096	TOEEDGEROAD
6093	974330.858	546327.399	1334.699	TOB
6094	974276.779	546352.842	1333.686	TOB
6095	974271.218	546340.992	1328.559	TOEEDGEROAD
6096	974246.018	546355.392	1327.862	TOE
6097	974209.001	546346.711	1326.565	FL
6098	974187.340	546339.599	1328.047	TOE
6099	974165.426	546334.044	1333.290	TOBEDGEROAD
6100	974153.622	546332.366	1334.063	TOEEDGEROAD
6101	974138.209	546328.313	1339.267	TOB
6102	974124.669	546324.979	1338.922	TOB
6103	974108.295	546321.193	1334.292	TOEEDGEROAD
6104	974094.601	546318.499	1334.175	TOBEDGEROAD
6105	974083.286	546316.931	1332.409	TOE
6106	974075.955	546375.149	1332.257	TOE
6107	974085.872	546377.309	1333.476	TOBEDGEROAD
6108	974098.912	546382.686	1333.666	TOEEDGEROAD
6109	974115.515	546389.969	1338.432	TOB
6110	974128.302	546395.617	1339.061	TOB
6111	974143.221	546400.069	1333.882	TOEEDGEROAD
6112	974153.600	546404.395	1333.416	TOBEDGEROAD
6113	974175.204	546412.886	1326.921	TOE
6114	974200.463	546422.545	1326.158	FL
6115	974227.869	546429.645	1327.419	TOE
6116	974246.397	546437.439	1333.506	TOB
6117	974258.355	546442.925	1333.156	TOE
6118	974272.836	546448.973	1338.144	TOB
6119	974283.841	546454.277	1337.454	NG
6120	974248.750	546520.614	1336.840	TOB
6121	974234.174	546518.147	1333.026	TOE
6122	974221.429	546516.055	1333.653	TOB
6123	974202.220	546513.400	1326.702	TOE
6124	974182.017	546511.718	1326.353	FL
6125	974159.517	546507.322	1327.425	TOE
6126	974139.394	546504.441	1332.368	TOBEDGEROAD
6127	974128.680	546503.191	1332.977	TOEEDGEROAD
6128	974114.332	546500.917	1338.506	TOB
6129	974101.238	546498.683	1338.075	TOB
6130	974086.965	546497.664	1333.274	TOEEDGEROAD
6131	974072.183	546495.572	1332.899	TOBEDGEROAD
6132	974060.825	546493.866	1331.386	TOE
6133	974056.583	546553.925	1331.133	TOE
6134	974067.069	546554.845	1332.390	TOBEDGEROAD
6135	974079.933	546557.115	1332.850	TOEEDGEROAD
6136	974095.318	546559.410	1337.872	TOB
6137	974108.784	546560.933	1338.322	TOB
6138	974121.592	546563.132	1332.569	TOEEDGEROAD
6139	974131.937	546564.263	1331.626	TOBEDGEROAD
6140	974152.138	546568.415	1326.891	TOE
6141	974191.809	546573.218	1326.668	TOE
6142	974216.650	546576.317	1333.337	TOB
6143	974226.988	546578.183	1332.897	TOE
6144	974239.498	546579.189	1335.918	TOB
6145	974255.513	546582.773	1334.894	NG
6146	974210.410	546639.552	1333.533	TOB

Point listing

Name	Northing	Easting	Elevation	Feature Code
6147	974186.933	546638.395	1326.103	TOE
6148	974145.369	546638.123	1326.913	TOE
6149	974126.099	546638.284	1331.977	TOBEDGEROAD
6150	974114.431	546637.943	1333.098	TOEEDGEROAD
6151	974100.812	546638.708	1338.229	TOB
6152	974087.215	546638.628	1337.996	TOB
6153	974071.881	546637.613	1332.728	TOEEDGEROAD
6154	974058.134	546636.848	1332.291	TOBEDGEROAD
6155	974048.425	546636.063	1331.000	TOE
6156	974045.993	546695.083	1331.269	TOE
6157	974055.574	546695.388	1332.849	TOBEDGEROAD
6158	974069.730	546695.647	1332.944	TOEEDGEROAD
6159	974084.773	546696.007	1338.053	TOB
6160	974099.478	546696.155	1338.161	TOB
6161	974110.792	546698.651	1333.389	TOEEDGEROAD
6162	974123.104	546698.682	1332.127	TOBEDGEROAD
6163	974143.550	546697.982	1326.826	TOE
6164	974165.584	546699.294	1326.145	FL
6165	974186.050	546699.609	1326.662	TOE
6166	974210.028	546700.699	1333.389	TOB
6167	974244.915	546700.369	1333.086	NG
6168	974240.756	546767.852	1333.243	TOB
6169	974233.093	546768.448	1332.241	BTM
6170	974222.923	546768.641	1333.885	TOB
6171	974211.946	546769.269	1334.521	TOB
6172	974196.011	546770.099	1328.628	TOE
6173	974162.632	546772.872	1326.011	FL
6174	974144.106	546774.328	1327.043	TOE
6175	974121.263	546775.154	1333.426	TOBEDGEROAD
6176	974110.297	546775.576	1334.056	TOEEDGEROAD
6177	974099.683	546777.633	1338.174	TOB
6178	974085.396	546778.261	1338.144	TOB
6179	974071.243	546779.196	1333.457	TOEEDGEROAD
6180	974056.430	546779.908	1333.290	TOBEDGEROAD
6181	974046.113	546780.561	1331.830	TOE
6182	974049.124	546840.164	1332.215	TOE
6183	974058.655	546839.796	1333.690	TOBEDGEROAD
6184	974073.764	546839.270	1333.864	TOEEDGEROAD
6185	974088.758	546837.620	1338.187	TOB
6186	974103.920	546836.020	1338.143	TOB
6187	974114.121	546836.399	1334.246	TOEEDGEROAD
6188	974125.434	546834.979	1333.841	TOBEDGEROAD
6189	974147.508	546833.804	1327.012	TOE
6190	974166.816	546832.469	1326.020	FL
6191	974192.024	546831.007	1327.051	TOE
6192	974215.607	546829.577	1334.674	TOB
6193	974225.491	546829.305	1334.332	TOB
6194	974236.444	546828.559	1332.066	BTM
6195	974243.482	546828.933	1333.487	TOB
6196	974250.871	546894.060	1333.193	TOB
6197	974241.788	546895.284	1331.604	BTM
6198	974230.595	546896.611	1333.836	TOB
6199	974221.082	546897.839	1333.979	TOB
6200	974199.576	546901.775	1326.844	TOE
6201	974175.689	546904.730	1325.843	FL

Point listing

Name	Northing	Easting	Elevation	Feature Code
6202	974154.193	546906.897	1327.245	TOE
6203	974133.293	546909.898	1333.332	TOBEDGEROAD
6204	974122.218	546912.493	1333.942	TOEEDGEROAD
6205	974110.428	546914.129	1338.102	TOB
6206	974096.380	546915.968	1337.837	TOB
6207	974086.263	546917.244	1334.365	TOE
6208	974066.594	546920.339	1333.354	TOBEDGEROAD
6209	974054.424	546922.904	1331.661	TOE
6210	974067.249	546982.369	1331.299	TOE
6211	974076.035	546981.075	1332.641	TOBEDGEROAD
6212	974089.667	546979.149	1333.129	TOEEDGEROAD
6213	974105.967	546977.084	1337.587	TOB
6214	974119.868	546974.924	1338.082	TOB
6215	974132.248	546972.880	1333.336	TOEEDGEROAD
6216	974144.173	546970.507	1332.216	TOBEDGEROAD
6217	974167.181	546966.648	1326.767	TOE
6218	974187.220	546963.115	1325.895	FL
6219	974206.382	546959.932	1326.544	TOE
6220	974228.444	546957.681	1333.397	TOB
6221	974239.784	546956.585	1332.731	TOB
6222	974247.797	546955.827	1331.237	BTM
6223	974258.695	546956.994	1332.101	TOB
6224	974274.513	547033.638	1331.413	TOB
6225	974263.337	547036.185	1330.027	BTM
6226	974253.886	547037.951	1331.899	TOB
6227	974244.566	547040.253	1332.326	TOB
6228	974223.285	547045.346	1326.360	TOE
6229	974201.474	547050.513	1325.727	FL
6230	974183.800	547054.562	1326.541	TOE
6231	974163.782	547059.628	1331.302	TOBEDGEROAD
6232	974152.081	547062.878	1332.200	TOEEDGEROAD
6233	974139.051	547066.609	1338.222	TOB
6234	974125.750	547070.257	1337.937	TOB
6235	974107.837	547075.499	1331.719	TOEEDGEROAD
6236	974094.878	547079.702	1331.657	TOBEDGEROAD
6237	974083.741	547082.737	1330.053	TOE
6238	974097.433	547141.845	1329.569	TOE
6239	974107.970	547138.949	1331.180	TOBEDGEROAD
6240	974121.685	547135.936	1331.253	TOEEDGEROAD
6241	974140.874	547130.461	1338.136	TOB
6242	974153.597	547127.451	1338.209	TOB
6243	974167.779	547122.577	1331.706	TOEEDGEROAD
6244	974179.362	547119.826	1330.878	TOBEDGEROAD
6245	974199.163	547115.211	1326.599	TOE
6246	974217.359	547110.699	1325.778	FL
6247	974237.423	547106.047	1326.233	TOE
6248	974258.210	547101.406	1332.072	TOB
6249	974267.832	547098.991	1331.491	TOB
6250	974277.053	547094.979	1329.514	BTM
6251	974290.722	547092.280	1330.855	TOB
6252	974309.797	547170.041	1330.540	TOB
6253	974299.389	547172.924	1328.801	BTM
6254	974290.131	547175.973	1331.226	TOB
6255	974280.167	547178.832	1331.707	TOB
6256	974260.879	547185.808	1326.408	TOE

Point listing

Name	Northing	Easting	Elevation	Feature Code
6257	974242.098	547191.424	1325.696	FL
6258	974221.890	547197.946	1326.828	TOE
6259	974203.736	547203.623	1330.720	TOBEDGEROAD
6260	974193.929	547206.851	1331.520	TOEEDGEROAD
6261	974179.093	547213.633	1337.959	TOB
6262	974166.332	547218.225	1337.646	TOB
6263	974147.965	547225.392	1330.930	TOEEDGEROAD
6264	974134.469	547230.960	1330.664	TOBEDGEROAD
6265	974122.837	547234.705	1329.151	TOE
6266	974146.916	547305.700	1328.883	TOE
6267	974159.153	547301.174	1330.263	TOBEDGEROAD
6268	974172.015	547296.974	1330.458	TOEEDGEROAD
6269	974192.273	547290.359	1337.629	TOB
6270	974203.282	547286.111	1338.023	TOB
6271	974220.384	547282.108	1331.434	TOEEDGEROAD
6272	974231.192	547277.844	1330.670	TOBEDGEROAD
6273	974252.369	547270.319	1326.570	TOE
6274	974286.606	547256.282	1326.079	TOE
6275	974304.235	547250.767	1331.509	TOB
6276	974315.950	547246.285	1331.278	TOB
6277	974327.740	547249.438	1328.996	BTM
6278	974342.299	547248.858	1330.530	TOB
6279	974374.960	547328.447	1330.261	TOB
6280	974364.498	547332.526	1328.953	BTM
6281	974352.969	547337.938	1331.014	TOB
6282	974344.785	547342.177	1331.340	TOB
6283	974325.811	547350.077	1326.102	TOE
6284	974300.240	547361.574	1325.924	FL
6285	974288.919	547367.313	1326.744	TOE
6286	974271.350	547375.891	1330.651	TOBEDGEROAD
6287	974262.223	547380.541	1331.320	TOEEDGEROAD
6288	974246.632	547386.018	1337.791	TOB
6289	974233.562	547391.197	1337.469	TOB
6290	974214.477	547400.039	1330.493	TOEEDGEROAD
6291	974202.930	547406.272	1330.040	TOBEDGEROAD
6292	974187.148	547413.223	1328.157	TOE
6293	974223.832	547477.143	1328.246	TOE
6294	974232.981	547469.924	1330.181	TOBEDGEROAD
6295	974246.079	547463.246	1330.600	TOEEDGEROAD
6296	974264.945	547455.172	1337.151	TOB
6297	974277.525	547448.375	1337.527	TOB
6298	974293.833	547443.012	1331.215	TOEEDGEROAD
6299	974302.994	547437.817	1330.405	TOBEDGEROAD
6300	974319.714	547428.584	1326.543	TOE
6301	974337.097	547419.532	1325.844	FL
6302	974356.310	547409.938	1326.240	TOE
6303	974374.810	547400.428	1331.307	TOB
6304	974383.087	547396.300	1330.976	TOB
6305	974392.961	547390.759	1328.662	BTM
6306	974399.108	547374.313	1330.037	TOB
6307	974444.105	547456.420	1329.854	TOB
6308	974433.688	547461.622	1329.068	BTM
6309	974423.172	547467.297	1330.938	TOB
6310	974415.237	547471.381	1331.352	TOB
6311	974398.892	547480.391	1326.754	TOE

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Name	Northing	Easting	Elevation	Feature Code
6312	974379.168	547490.798	1325.925	FL
6313	974359.915	547500.169	1326.572	TOE
6314	974342.902	547508.850	1330.305	TOBEDGEROAD
6315	974333.844	547513.127	1331.156	TOEEDGEROAD
6316	974317.748	547517.898	1337.324	TOB
6317	974303.872	547526.172	1336.928	TOB
6318	974287.062	547536.541	1330.386	TOEEDGEROAD
6319	974276.987	547542.830	1329.958	TOBEDGEROAD
6320	974267.218	547548.813	1328.753	TOE
6321	974301.165	547612.191	1326.374	LOWSPOT
6322	974296.186	547604.952	1328.115	TOE
6323	974304.565	547618.835	1328.299	TOE
6324	974310.613	547606.800	1329.972	TOBEDGEROAD
6325	974327.429	547597.222	1330.477	TOEEDGEROAD
6326	974344.027	547588.212	1337.027	TOB
6327	974357.421	547580.116	1337.270	TOB
6328	974372.007	547574.905	1331.005	TOEER
6329	974380.219	547569.124	1330.309	TOBER
6330	974397.524	547560.162	1326.384	TOE
6331	974414.547	547549.018	1326.026	FL
6332	974433.672	547537.180	1326.740	TOE
6333	974451.551	547527.044	1331.406	TOB
6334	974468.130	547515.022	1329.317	BTM
6335	974482.086	547512.779	1330.306	TOB
6336	974513.502	547559.151	1329.777	NG
6337	974505.271	547565.570	1329.288	BTM
6338	974480.754	547566.609	1331.162	TOB
6339	974485.294	547572.284	1329.574	RIPRAPEND
6340	974492.496	547582.149	1329.537	RIPRAPEND
6341	974496.372	547587.448	1330.931	TOB
6342	974470.605	547600.581	1326.597	RIPRAPEND
6343	974461.861	547589.512	1326.495	RIPRAPEND
6344	974469.382	547592.405	1325.483	RIPRAPFL
6345	974459.560	547588.548	1326.261	TOE
6346	974465.346	547594.832	1326.516	TOE
6347	974473.154	547604.608	1326.606	TOE
6348	974437.085	547603.686	1326.444	FL
6349	974431.490	547609.099	1326.664	TOE
6350	974416.134	547621.451	1330.176	TOBER
6351	974408.650	547627.185	1330.961	TOEER
6352	974395.855	547635.867	1337.214	TOB
6353	974383.981	547645.624	1337.023	TOB
6354	974368.705	547657.178	1330.434	TOEER
6355	974356.770	547665.920	1329.989	TOBER
6356	974345.564	547674.079	1328.469	TOE
6357	974396.363	547734.134	1328.995	TOE
6358	974403.574	547727.408	1330.215	TOBER
6359	974415.289	547718.343	1330.605	TOEER
6360	974430.562	547707.040	1337.065	TOB
6361	974442.791	547698.627	1337.119	TOB
6362	974455.581	547689.421	1331.116	TOEER
6363	974464.661	547683.305	1330.329	TOBER
6364	974475.109	547675.624	1327.250	TOE
6365	974492.123	547661.702	1326.016	FL
6366	974510.741	547649.097	1326.297	TOE

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Name	Northing	Easting	Elevation	Feature Code
6367	974530.297	547635.073	1331.519	TOB
6368	974537.709	547629.888	1331.061	TOB
6369	974546.133	547622.810	1328.887	BTM
6370	974553.967	547617.023	1330.115	TOB
6371	974607.956	547676.811	1330.335	TOB
6372	974592.442	547677.632	1328.949	BTM
6373	974582.005	547681.391	1330.863	TOB
6374	974573.688	547687.162	1331.331	TOB
6375	974559.548	547698.509	1326.502	TOE
6376	974541.256	547714.320	1326.076	FL
6377	974523.207	547724.885	1326.546	TOE
6378	974510.110	547736.999	1330.095	TOBER
6379	974501.487	547742.868	1331.045	TOEER
6380	974487.919	547751.318	1337.326	TOB
6381	974476.876	547760.643	1337.240	TOB
6382	974460.672	547772.490	1330.947	TOEER
6383	974448.554	547783.043	1330.407	TOBER
6384	974443.211	547787.882	1329.243	TOE
6385	974492.833	547838.890	1329.443	TOE
6386	974497.609	547834.437	1330.395	TOBER
6387	974508.214	547824.373	1331.007	TOEER
6388	974522.677	547809.871	1337.486	TOB
6389	974532.994	547800.630	1337.395	TOB
6390	974543.961	547789.889	1330.988	TOEER
6391	974550.977	547782.137	1330.071	TOBER
6392	974564.736	547770.147	1326.665	TOE
6393	974578.852	547756.853	1326.026	FL
6394	974597.041	547741.420	1326.354	TOE
6395	974610.516	547728.965	1331.563	TOB
6396	974618.764	547721.331	1330.909	TOB
6397	974626.188	547714.489	1329.348	BTM
6398	974633.784	547703.331	1330.518	TOB
6399	974686.307	547754.248	1330.727	TOB
6400	974676.324	547764.609	1329.702	BTM
6401	974669.787	547772.188	1331.151	TOB
6402	974661.017	547781.140	1331.887	TOBPC
6403	974649.251	547791.609	1326.938	TOE
6404	974631.836	547810.180	1325.796	FL
6405	974618.120	547825.565	1326.690	TOE
6406	974605.175	547838.888	1330.261	TOBER
6407	974598.761	547845.011	1331.051	TOEER
6408	974587.547	547856.550	1337.443	TOBPC
6409	974577.830	547866.290	1337.488	TOBPC
6410	974563.267	547880.887	1331.046	TOEER
6411	974553.228	547891.190	1330.473	TOBER
6412	974549.021	547895.464	1329.542	TOE
6413	974790.327	548122.342	1330.215	TOE
6414	974794.009	548116.700	1331.266	TOBER
6415	974805.673	548104.462	1332.267	TOEER
6416	974814.865	548093.034	1337.631	TOB
6417	974822.994	548082.735	1337.809	TOB
6418	974833.447	548071.541	1332.334	TOEER
6419	974840.770	548063.780	1331.585	TOBER
6420	974853.624	548050.336	1326.860	TOE
6421	974868.572	548034.572	1326.119	FL

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Name	Northing	Easting	Elevation	Feature Code
6422	974886.050	548015.740	1326.925	TOE
6423	974897.924	548001.415	1332.880	TOB
6424	974905.447	547993.188	1332.102	TOB
6425	974913.635	547984.797	1330.544	BTM
6426	974921.636	547975.594	1331.265	TOB
6427	975137.151	548180.146	1331.943	TOB
6428	975130.650	548191.952	1331.169	BTM
6429	975124.278	548198.598	1332.671	TOB
6430	975116.200	548207.237	1333.195	TOB
6431	975108.247	548217.214	1328.133	TOE
6432	975087.064	548242.328	1325.911	FL
6433	975065.480	548258.155	1327.418	TOE
6434	975054.459	548269.431	1331.523	TOBER
6435	975047.877	548276.255	1331.854	TOEER
6436	975036.370	548286.460	1337.513	TOB
6437	975027.598	548296.513	1337.298	TOB
6438	975019.508	548304.501	1332.762	TOEER
6439	975007.479	548317.300	1331.708	TOBER
6440	975000.671	548325.147	1330.229	TOE
6441	975298.698	548333.749	1331.377	TOB
6442	975290.292	548341.463	1330.062	BTM
6443	975284.653	548349.642	1331.986	TOB
6444	975277.588	548358.046	1332.630	TOB
6445	975271.319	548365.458	1328.513	TOE
6446	975248.302	548390.451	1325.894	FL
6447	975232.689	548406.825	1326.313	TOE
6448	975218.508	548422.972	1330.788	TOBER
6449	975211.740	548430.019	1331.271	TOEER
6450	975201.240	548440.709	1337.368	TOB
6451	975192.150	548451.529	1337.282	TOB
6452	975181.959	548461.579	1331.444	TOEER
6453	975172.434	548472.785	1331.038	TOBER
6454	975168.097	548477.844	1329.516	TOE
6455	975241.729	548554.297	1328.253	TOE
6456	975248.332	548546.481	1330.500	TOBER
6457	975259.993	548533.896	1331.223	TOEER
6458	975269.977	548523.797	1337.723	TOB
6459	975278.872	548514.694	1337.717	TOB
6460	975290.240	548502.407	1331.242	TOEER
6461	975297.144	548494.885	1330.888	TOBER
6462	975308.545	548482.910	1326.651	TOE
6463	975324.310	548465.391	1325.861	FL
6464	975346.727	548440.885	1327.648	TOE
6465	975356.730	548431.060	1334.400	TOB
6466	975364.427	548423.371	1333.359	TOB
6467	975369.803	548418.015	1331.956	BTM
6468	975377.106	548410.607	1333.201	TOB
6469	975410.609	548444.172	1334.376	TOB
6470	975404.510	548451.949	1331.464	BTM
6471	975399.881	548457.142	1333.217	TOB
6472	975392.136	548466.019	1334.021	TOB
6473	975382.054	548474.607	1328.261	TOE
6474	975433.979	548534.037	1326.725	TOE
6475	975445.780	548520.718	1330.503	TOB
6476	975453.484	548512.847	1330.394	TOB

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Name	Northing	Easting	Elevation	Feature Code
6477	975461.464	548506.770	1329.725	BTM
6478	975472.737	548500.594	1329.831	NG
6479	975492.457	548522.822	1327.469	NGGB
6480	975463.108	548528.818	1331.229	TOB
6481	975447.557	548547.279	1326.734	TOE
6482	975458.213	548560.269	1326.044	TOEGB
6483	975482.776	548552.634	1330.343	TOB
6484	975469.028	548570.319	1326.654	TOE
6485	975504.717	548578.497	1329.411	TOB
6486	975508.257	548583.258	1326.571	BTM
6487	975500.096	548587.875	1327.803	TOE
6488	975504.029	548592.288	1327.166	GB
6489	975499.168	548598.270	1326.267	TOE
6490	975555.496	548542.035	1327.034	GB
6491	975545.525	548553.139	1329.646	TOB
6492	975542.399	548549.159	1325.837	BTM
6493	975540.636	548543.482	1329.452	TOB
6494	975526.547	548596.667	1329.589	TOB
6495	975513.497	548612.643	1326.019	TOE
6496	975551.778	548616.242	1329.389	NG
6497	975546.492	548622.301	1329.596	TOB
6498	975537.474	548633.082	1326.429	TOE
6499	975517.756	548655.236	1325.562	FL
6500	975507.039	548666.746	1326.137	TOE
6501	975497.680	548677.082	1328.691	TOBER
6502	975490.421	548684.916	1329.118	TOEER
6503	975476.731	548700.577	1337.852	TOB
6504	975468.046	548710.136	1337.677	TOB
6505	975457.528	548722.084	1330.716	TOEER
6506	975447.231	548733.502	1330.481	TOBER
6507	975439.665	548742.947	1327.777	TOE
6508	975590.874	548884.325	1328.751	TOE
6509	975599.690	548875.134	1331.384	TOBER
6510	975610.482	548863.607	1331.872	TOEER
6511	975619.986	548853.504	1337.990	TOB
6512	975628.283	548844.932	1337.989	TOB
6513	975642.897	548831.082	1329.637	TOEER
6514	975651.428	548822.348	1329.174	TOBER
6515	975662.030	548812.315	1326.023	TOE
6516	975675.686	548799.295	1326.185	FL
6517	975697.531	548779.878	1326.774	TOE
6518	975703.969	548771.991	1328.157	TOB
6519	975721.432	548784.343	1324.878	GB
6520	975714.374	548753.592	1330.380	NG
6521	975742.059	548767.910	1324.984	GB
6522	975708.331	548796.072	1324.642	GB
6523	975764.230	548775.996	1329.801	NG
6524	975754.112	548801.124	1329.855	TOB
6525	975732.438	548818.185	1326.829	TOE
6526	975786.258	548870.832	1326.367	TOE
6527	975805.594	548843.484	1336.248	TOB
6528	975816.667	548832.024	1334.787	TOB
6529	975823.346	548823.340	1332.433	TOE
6530	975834.527	548814.563	1331.976	NG
6531	975766.576	548891.621	1325.660	FL

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Name	Northing	Easting	Elevation	Feature Code
6532	975756.363	548903.246	1325.951	TOE
6533	975743.137	548916.976	1330.354	TOBER
6534	975736.067	548923.770	1330.976	TOEER
6535	975725.302	548934.915	1337.880	TOB
6536	975716.578	548944.079	1337.960	TOB
6537	975707.985	548953.621	1332.425	TOEER
6538	975696.893	548966.430	1332.034	TOBER
6539	975690.367	548973.958	1329.922	TOE
6540	975902.766	549178.974	1331.997	TOE
6541	975914.558	549166.800	1334.265	TOBER
6542	975927.429	549152.798	1335.231	TOEER
6543	975932.641	549147.876	1337.632	TOB
6544	975940.646	549139.235	1337.960	TOB
6545	975943.305	549135.095	1336.466	TOE
6546	975944.012	549134.092	1334.625	ER
6547	975951.904	549125.193	1333.922	TOBER
6548	975969.893	549107.151	1326.827	TOE
6549	975987.238	549088.770	1325.132	FL
6550	976011.326	549065.797	1328.273	TOE
6551	976023.827	549052.824	1335.171	TOB
6552	976033.427	549041.383	1333.670	TOE
6553	976040.228	549034.575	1333.769	NG
6554	976032.582	549059.090	1335.347	TOB
6555	976041.751	549070.735	1334.616	TOB
6556	976069.686	549076.494	1336.827	TOB
6557	976102.799	549070.312	1337.810	NG
6558	976079.740	549079.248	1334.923	TOEER
6559	976052.993	549076.039	1331.750	TOEER
6560	976033.558	549073.614	1329.552	TOEER
6561	975995.843	549099.548	1325.240	ER
6562	975978.074	549131.863	1328.970	ER
6563	975972.891	549136.285	1331.100	TOE
6564	975986.453	549166.997	1332.798	TOEER
6565	975997.345	549196.928	1337.628	TOBER
6566	975970.350	549138.151	1333.948	TOBER
6567	975958.831	549150.210	1335.756	TOEER
6568	975955.598	549154.415	1337.973	TOB
6569	975948.993	549163.681	1337.453	TOB
6570	976014.513	549200.934	1337.637	TOBER
6571	975996.859	549152.391	1330.912	ER
6572	976009.332	549108.889	1325.204	ER
6573	976044.558	549092.785	1330.149	ER
6574	976085.775	549095.837	1337.273	ER
6575	976112.217	549091.983	1339.771	ER
6576	976124.468	549081.512	1337.190	CL10"WWEND
6577	976126.049	549090.866	1337.252	CL10"WW<PT
6578	976122.204	549099.043	1337.239	CL10"WWCOR
6579	976125.398	549101.297	1337.191	CL10"WWCOR
6580	976131.669	549094.821	1337.223	CL10"WW<PT
6581	976142.638	549092.630	1337.231	CL10"WWEND
6582	976119.364	549110.526	1339.504	TOB
6583	976106.834	549124.774	1338.714	TOB
6584	976087.130	549142.728	1327.771	TOE
6585	976070.009	549169.688	1325.533	FL
6586	976050.999	549190.946	1327.353	TOE

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Name	Northing	Easting	Elevation	Feature Code
6587	976024.350	549265.131	1337.223	CL10"WWEND
6588	976022.187	549251.035	1337.236	CL10"WW<PT
6589	976026.001	549243.052	1340.204	CL10"WWCOR
6590	976022.756	549240.840	1340.217	CL10"WWCOR
6591	976016.540	549247.196	1337.245	CL10"WW<PT
6592	976002.754	549249.868	1337.239	CL10"WWEND
6593	975996.954	549245.360	1335.918	TOE
6594	976008.738	549228.984	1337.936	TOB
6595	976139.991	549378.250	1336.328	TOE
6596	976149.825	549368.350	1338.988	TOB
6597	976153.422	549374.194	1338.962	5`OSCLPP
6598	976150.440	549370.277	1338.956	10`OSCLPP
6599	976155.992	549364.230	1339.509	ER
6600	976166.324	549353.105	1339.624	TOBER
6601	976172.928	549346.304	1336.617	TOE
6602	976182.361	549336.973	1335.505	TOB
6603	976199.215	549321.668	1325.891	TOE
6604	976213.971	549306.854	1325.168	FL
6605	976230.126	549286.894	1326.314	TOE
6606	976251.738	549262.719	1337.584	TOB
6607	976262.449	549251.537	1336.571	NG
6608	976154.239	549172.345	1338.199	5`OSCLPP
6609	976150.663	549168.818	1338.132	10`OSCLPP
6610	976383.272	549383.264	1336.132	RIPRAPTOB
6611	976389.580	549388.645	1335.170	RIPRAP
6612	976394.086	549393.525	1335.997	RIPRAPTOB
6613	976370.519	549418.812	1326.118	RIPRAPTOE
6614	976364.835	549413.690	1324.787	RIPRAP
6615	976359.109	549408.965	1326.023	RIPRAPTOE
6616	976475.557	549449.812	1335.957	NG
6617	976463.079	549463.432	1336.875	TOB
6618	976441.244	549486.984	1326.206	TOE
6619	976425.469	549505.001	1324.987	FL
6620	976406.844	549526.333	1326.727	TOE
6621	976390.327	549541.950	1335.333	TOB
6622	976384.267	549548.615	1336.289	TOE
6623	976376.003	549557.972	1340.506	TOBER
6624	976364.413	549569.722	1339.937	TOBER
6625	976362.105	549572.075	1339.271	TOE
6626	976354.346	549580.064	1339.291	NG
6627	976567.867	549783.724	1338.959	NG
6628	976576.519	549774.339	1338.930	TOE
6629	976578.300	549772.325	1339.351	TOBER
6630	976590.233	549760.010	1340.294	TOBER
6631	976596.978	549752.971	1337.084	TOE
6632	976603.739	549744.503	1335.702	TOB
6633	976616.075	549729.505	1327.822	TOE
6634	976640.742	549701.767	1325.211	FL
6635	976654.817	549688.004	1326.453	TOE
6636	976677.336	549663.854	1336.831	TOB
6637	976689.601	549650.041	1336.346	NG
6638	976724.632	549705.895	1337.205	RIPRAPTOB
6639	976730.660	549710.048	1336.036	RIPRAP
6640	976735.627	549716.436	1337.054	RIPRAPTOB
6641	976711.136	549741.697	1326.364	RIPRAPTOE

Point listing

Name	Northing	Easting	Elevation	Feature Code
6642	976700.300	549732.836	1326.240	RIPRAPTOE
6643	976914.608	549856.232	1337.884	TOE
6644	976911.649	549859.322	1338.536	TOB
6645	976901.673	549871.347	1338.960	TOB
6646	976738.129	549719.838	1337.296	ENDFENCE
6647	976881.567	549894.355	1326.560	TOE
6648	976868.654	549910.310	1325.434	FL
6649	976848.290	549932.472	1326.361	TOE
6650	976827.111	549958.023	1336.889	TOB
6651	976820.039	549964.658	1338.255	TOE
6652	976650.416	549816.477	1340.533	ENDFENCE
6653	976813.716	549968.754	1340.344	TOBER
6654	976802.611	549974.269	1340.046	TPEPCOR
6655	976765.441	550013.951	1339.310	TPEP
6656	976780.783	550027.358	1339.265	TPEP
6657	976818.052	549989.110	1339.975	TPEPCOR
6658	976906.172	550052.379	1339.741	FENCECORTOB
6659	976863.121	550098.311	1338.387	FENCE
6660	976957.723	550100.521	1341.509	FENCEENDTOB
6661	976914.561	550043.808	1337.995	TOB
6662	976936.369	550020.941	1326.943	FENCETOE
6663	976957.462	549998.089	1325.859	FENCEENDFL
6664	976968.146	549987.084	1325.734	FENCEEND
6665	976972.994	549981.921	1326.892	TOE
6666	976998.693	549955.137	1339.812	FENCECORTOB
6667	977051.083	550002.242	1342.924	FENCEENDTOB
6668	977016.056	549936.348	1338.270	FENCENG
6669	977057.236	549996.455	1343.206	ENDBRIDGETOC
6670	977018.564	550029.454	1326.482	TOE
6671	977004.060	550042.805	1325.864	FL
6672	976981.328	550067.458	1327.127	TOE
6673	976965.574	550062.198	1325.782	CL24"WLENDFL
6674	976953.317	550106.272	1342.019	ENDBRIDGETOC
6675	977063.422	550190.492	1339.029	ENDBRIDGETOC
6676	977057.525	550201.644	1339.246	TP
6677	977067.751	550193.485	1339.501	TOB
6678	977086.224	550176.752	1327.836	TOE
6679	977111.128	550153.874	1325.256	FL
6680	977132.192	550135.387	1325.959	TOE
6681	977156.425	550108.547	1339.872	TOB
6682	977147.312	550101.844	1339.797	ENDBRIDGETOC
6683	977225.404	550172.777	1340.885	TOB
6684	977203.008	550197.011	1326.649	TOE
6685	977180.058	550220.659	1324.983	FL
6686	977163.678	550237.044	1326.291	TOE
6687	977138.882	550263.848	1339.547	TOB
6688	977129.926	550272.538	1340.057	NG
6689	977148.588	550291.077	1342.814	CLRR
6690	977159.427	550279.601	1342.866	CLRRENDBRIDGE
6691	977241.997	550192.419	1343.542	CLRRENDBRIDGE
6692	977254.164	550179.612	1343.647	CLRR
6693	977259.998	550203.187	1341.209	TOB
6694	977236.170	550230.189	1326.309	TOE
6695	977219.592	550249.616	1324.722	FL
6696	977199.118	550274.139	1326.422	TOE

Point listing

Name	Northing	Easting	Elevation	Feature Code
6697	977179.315	550302.855	1341.015	TOB
6698	977163.338	550319.651	1340.038	NG
6699	977213.218	550371.512	1337.024	CL10"WWEND
6700	977226.992	550371.026	1336.965	CL10"WW<PT
6701	977233.841	550365.237	1340.020	CL10"WWCOR
6702	977237.405	550368.528	1340.093	CL10"WWCOR
6703	977232.084	550375.684	1337.038	CL10"WW<PT
6704	977232.461	550389.452	1337.162	CL10"WWEND
6705	977233.291	550352.654	1339.7765	`OSCLWEATHERSTATION
6706	977229.462	550356.042	1339.60510	`OSCLWEATHERSTATION
6707	977244.829	550359.846	1339.711	TOB
6708	977271.175	550337.768	1325.743	TOE
6709	977285.390	550314.621	1325.140	TOCCLCANAL
6710	977304.532	550293.950	1326.988	TOE
6711	977300.964	550289.262	1327.908	CL36"SDENDFL
6712	977310.200	550297.646	1327.525	CL36"SDENDFL
6713	977325.901	550272.909	1340.344	TOB
6714	977340.139	550270.724	1341.701	TOCCOR
6715	977325.501	550257.309	1341.607	TOCCOR
6716	977332.185	550249.895	1341.618	TOCCOR
6717	977346.932	550263.388	1341.695	TOCCOR
6718	977419.414	550339.999	1339.129	NG
6719	977403.540	550354.662	1339.267	TOB
6720	977381.026	550376.441	1326.820	TOE
6721	977359.116	550393.965	1324.552	FL
6722	977336.354	550413.010	1326.554	TOE
6723	977314.084	550433.940	1340.079	TOB
6724	977299.320	550445.559	1339.684	NG
6725	977280.029	550446.173	1342.410	TXMS
6726	977241.540	550462.502	1342.385	TXMS
6727	977225.279	550423.914	1342.238	TXMS
6728	977263.768	550407.645	1342.420	TXMS
6729	977368.298	550501.147	1338.979	TOB
6730	977301.416	550486.115	1338.245	TOBER
6731	977299.830	550490.792	1337.740	TOEER
6732	977352.834	550508.506	1334.613	TOEER
6733	977394.925	550517.973	1328.525	TOEER
6734	977417.345	550506.581	1325.446	ER
6735	977430.557	550488.036	1325.578	ERFL
6736	977438.418	550461.809	1327.585	TOEER
6737	977439.624	550403.503	1334.025	TOEER
6738	977430.801	550404.024	1335.238	TOB
6739	977424.491	550380.965	1339.133	TOB
6740	977432.779	550375.819	1336.494	TOEER
6741	977432.711	550318.084	1338.905	ER
6742	977462.679	550320.996	1338.593	TOEER
6743	977465.964	550321.593	1340.113	TOB
6744	977461.916	550372.761	1340.066	TOB
6745	977473.708	550450.179	1339.853	TOB
6746	977502.088	550502.467	1340.072	TOB
6747	977456.482	550372.568	1335.834	TOEER
6748	977459.458	550433.157	1331.156	TOEER
6749	977464.632	550492.960	1326.601	TOE
6750	977435.512	550517.516	1325.259	ERFL
6751	977390.459	550540.997	1329.424	TOEER

Point listing

Name	Northing	Easting	Elevation	Feature Code
6752	977350.733	550531.525	1333.623	TOEER
6753	977315.554	550519.965	1335.900	TOEER
6754	977297.836	550526.347	1337.272	TOBER
6755	977327.933	550526.235	1338.489	TOB
6756	977349.990	550533.936	1338.961	TOB
6757	977386.235	550550.695	1337.254	TOB
6758	977379.410	550578.428	1339.629	TOB
6759	977385.549	550574.479	1338.193	TOE
6760	977398.576	550567.155	1336.631	TOB
6761	977421.832	550551.215	1326.789	TOE
6762	977535.948	550564.505	1339.686	TOBRIPRAP
6763	977540.567	550571.606	1337.881	RIPRAP
6764	977545.232	550579.529	1339.400	TOBRIPRAP
6765	977515.952	550596.577	1325.952	TOERIPRAP
6766	977505.006	550580.424	1325.975	TOERIPRAP
6767	977475.398	550596.859	1324.853	FL
6768	977453.849	550608.853	1325.456	TOE
6769	977429.761	550620.929	1335.584	TOB
6770	977414.013	550629.098	1337.229	TOE
6771	977403.978	550633.818	1339.821	TOB
6772	977373.771	550648.801	1339.673	NG
6773	977494.175	550922.206	1339.358	TOE
6774	977506.356	550916.407	1339.815	TOBER
6775	977525.929	550907.431	1339.967	TOBER
6776	977535.327	550903.171	1337.854	TOE
6777	977558.930	550892.717	1336.720	TOB
6778	977587.474	550879.806	1326.747	TOE
6779	977623.397	550862.655	1324.511	FL
6780	977655.472	550841.680	1326.172	TOE
6781	977687.005	550824.901	1340.736	TOB
6782	977696.589	550819.603	1340.357	TOB
6783	977700.628	550817.416	1339.535	TOE
6784	977821.968	551068.606	1339.575	TOBRIPRAP
6785	977826.483	551076.234	1337.819	RIPRAP
6786	977830.477	551083.769	1339.260	TOBRIPRAP
6787	977790.883	551098.404	1324.431	TOERIPRAP
6788	977787.302	551091.673	1324.478	TOERIPRAP
6789	977751.790	551105.146	1324.634	FL
6790	977707.070	551126.185	1328.052	TOE
6791	977681.216	551137.146	1336.286	TOB
6792	977650.140	551151.656	1337.179	TOE
6793	977639.316	551155.830	1339.699	TOBER
6794	977621.736	551163.177	1339.001	TOBER
6795	977614.309	551167.209	1338.568	TOE
6796	977639.747	551214.605	1338.644	TOE
6797	977646.297	551211.086	1339.145	TOBER
6798	977662.179	551203.617	1340.004	TOBER
6799	977671.123	551199.373	1337.344	TOE
6800	977707.263	551182.510	1336.034	TOB
6801	977670.314	551278.515	1338.530	TOE
6802	977678.528	551275.890	1339.172	TOBER
6803	977693.554	551269.275	1340.172	TOBER
6804	977703.775	551264.930	1337.066	TOE
6805	977741.380	551246.827	1335.698	TOB
6806	977763.629	551236.057	1327.913	TOE

Point listing

Name	Northing	Easting	Elevation	Feature Code
6807	977819.109	551207.714	1324.131	FL
6808	977848.776	551190.375	1325.398	TOE
6809	977879.816	551174.060	1339.641	TOB
6810	977888.962	551169.372	1339.384	TOB
6811	977892.394	551167.400	1338.647	TOE
6812	977918.483	551217.023	1338.964	TOE
6813	977914.995	551219.937	1339.738	TOB
6814	977906.872	551224.387	1339.862	TOB
6815	977876.522	551242.388	1325.712	TOE
6816	977851.410	551257.767	1323.983	FL
6817	977793.089	551291.622	1327.905	TOE
6818	977770.571	551303.605	1335.750	TOB
6819	977732.145	551323.976	1336.823	TOE
6820	977722.359	551328.508	1340.037	TOBER
6821	977708.197	551336.564	1338.977	TOBER
6822	977700.688	551340.631	1338.369	TOE
6823	977180.604	550274.067	1331.193	5`OSCLRRPIER
6824	977184.530	550277.238	1331.123	10`OSCLRRPIER
6825	977191.368	550265.758	1325.811	5`OSCLRRPIER
6826	977194.871	550269.237	1326.363	10`OSCLRRPIER
6827	977200.986	550255.388	1325.359	5`OSCLRRPIER
6828	977204.516	550258.975	1325.230	10`OSCLRRPIER
6829	977210.296	550244.934	1325.503	5`OSCLRRPIER
6830	977213.678	550248.362	1325.048	10`OSCLRRPIER
6831	977220.390	550234.635	1325.892	5`OSCLRRPIER
6832	977223.859	550238.041	1325.231	10`OSCLRRPIER
6833	977229.496	550223.765	1326.253	5`OSCLRRPIER
6834	977233.140	550227.179	1326.669	10`OSCLRRPIER
6835	977238.857	550213.214	1331.384	5`OSCLRRPIER
6836	977242.641	550216.389	1331.711	10`OSCLRRPIER
6837	977220.908	550196.708	1331.701	5`OSCLRRPIER
6838	977217.257	550193.271	1331.860	10`OSCLRRPIER
6839	977210.846	550206.770	1326.307	5`OSCLRRPIER
6840	977207.458	550203.273	1326.541	10`OSCLRRPIER
6841	977201.366	550216.800	1325.652	5`OSCLRRPIER
6842	977197.768	550213.365	1325.256	10`OSCLRRPIER
6843	977191.777	550226.753	1325.552	5`OSCLRRPIER
6844	977188.219	550223.219	1325.124	10`OSCLRRPIER
6845	977181.960	550237.277	1325.611	5`OSCLRRPIER
6846	977178.371	550233.729	1325.327	10`OSCLRRPIER
6847	977172.525	550247.218	1326.355	5`OSCLRRPIER
6848	977169.065	550243.959	1326.434	10`OSCLRRPIER
6849	977163.107	550257.880	1331.952	5`OSCLRRPIER
6850	977159.422	550254.565	1331.497	10`OSCLRRPIER
6851	977086.539	550168.858	1326.319	5`OSCLCOL
6852	977090.058	550172.430	1326.470	10`OSCLCOL
6853	977106.940	550147.246	1325.797	5`OSCLCOL
6854	977110.682	550150.587	1325.646	10`OSCLCOL
6855	977127.959	550125.225	1326.348	5`OSCLCOL
6856	977131.711	550128.651	1326.654	10`OSCLCOL
6857	977091.164	550091.525	1326.874	5`OSCLCOL
6858	977087.585	550088.105	1326.884	10`OSCLCOL
6859	977070.583	550112.938	1325.640	5`OSCLCOL
6860	977067.024	550109.507	1325.472	10`OSCLCOL
6861	977050.109	550134.539	1326.136	5`OSCLCOL

Point listing

Name	Northing	Easting	Elevation	Feature Code
6862	977046.475	550131.123	1326.217	10`OSCLCOL
6863	977030.049	550159.113	1339.380	TPENDBRIDGE
6864	977114.592	550069.885	1339.831	TOCENDBRIDGE
6865	977091.116	550028.585	1344.139	TOCENDBRIDGE
6866	976987.215	550138.509	1342.911	TOCENDBRIDGE
6867	977015.204	550109.328	1329.300	5`OSCLCOL
6868	977018.726	550112.678	1329.219	10`OSCLCOL
6869	977039.889	550084.038	1325.834	5`OSCLCOL
6870	977043.406	550087.204	1325.721	10`OSCLCOL
6871	977063.646	550058.150	1328.758	5`OSCLCOL
6872	977067.325	550061.727	1328.566	10`OSCLCOL
6873	977258.609	550327.140	1325.277	PRESSURE TRANSDUCER
6874	977255.931	550329.722	1326.774	PRESSURE TRANSDUCER

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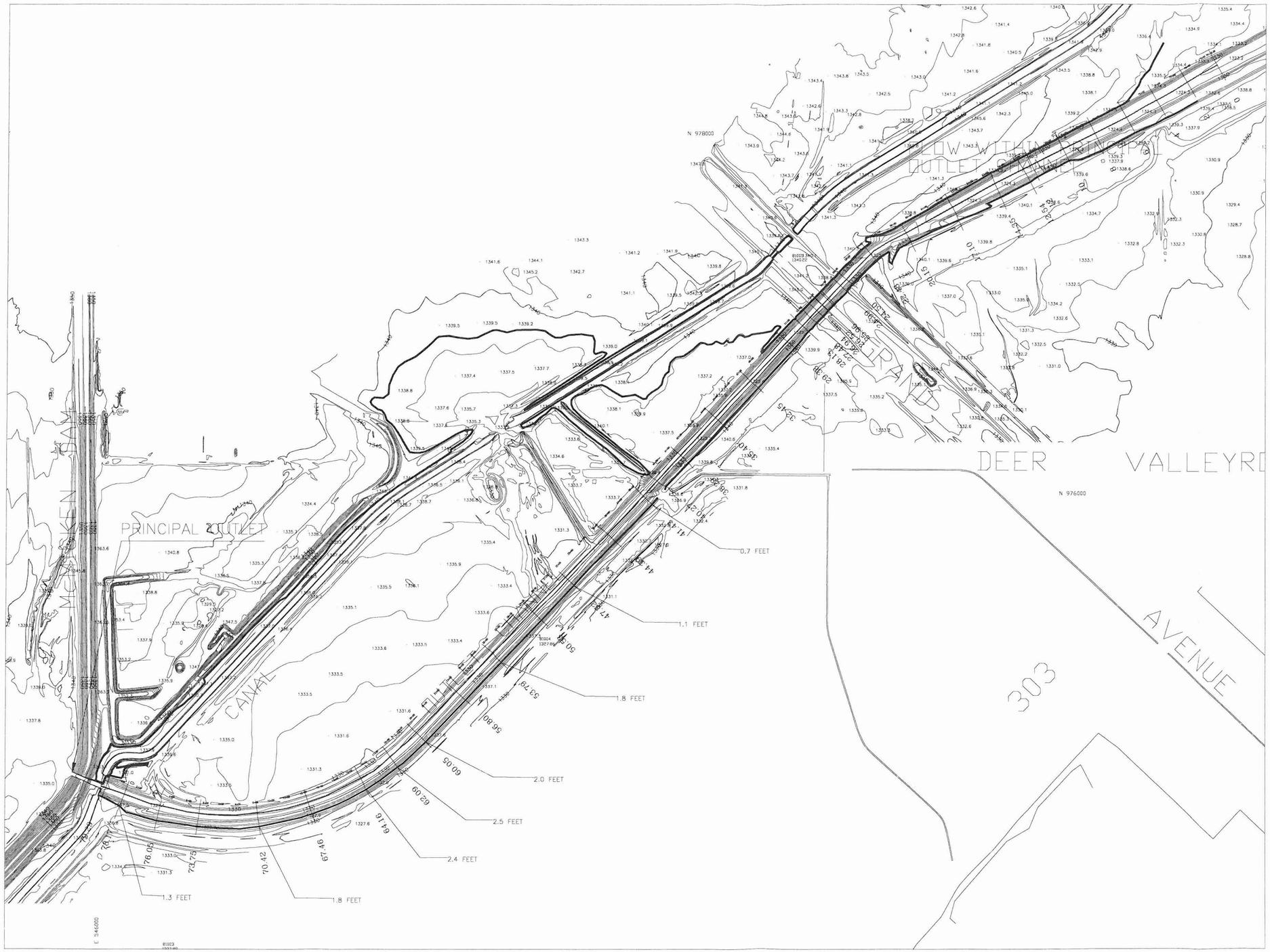
Appendix G

Proposed Condition Inundation Map



LEGEND

FLOOD INUNDATION BOUNDARY	
FLOW BASE LINE	
CROSS SECTION	12
RIGHT BANK HIGH POINT	
WATER DEPTH ON HIGH POINT	1.8 FEET

ELEVATION REFERENCE MARKS

NOTE: ELEVATIONS ARE BASED ON NAVD 1988

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION

NOTES

300' 0' 300' 600'

SCALE: 1" = 300 FEET
CONTOUR INTERVAL = 2 FEET

NO.	REVISION	BY	DATE
2			
1			

McMICKEN DAM OUTLET CHANNEL MARICOPA COUNTY, ARIZONA

EXHIBIT 1 McMICKEN DAM OUTLET CHANNEL
SURVEYED CROSS SECTIONS AND
FLOOD FLOW BASELINE
FCDMC (2002C32)

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed ARIZONA, U.S.A.

Baker
Michael Baker Jr., Inc.

	BY	DATE
DESIGN	W.C.	06/03/03
DESIGN CHK.	K.A.	06/03/03
PLANS	W.C.	06/03/03
PLANS CHK.	K.A.	06/03/03

SHEET 1 OF 2

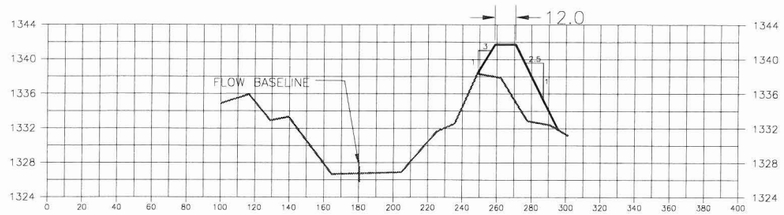
MAPPING PROVIDED BY FCDMC
FCD NUMBER: FCD 98-32
TOPO DATE: 6/09/2000

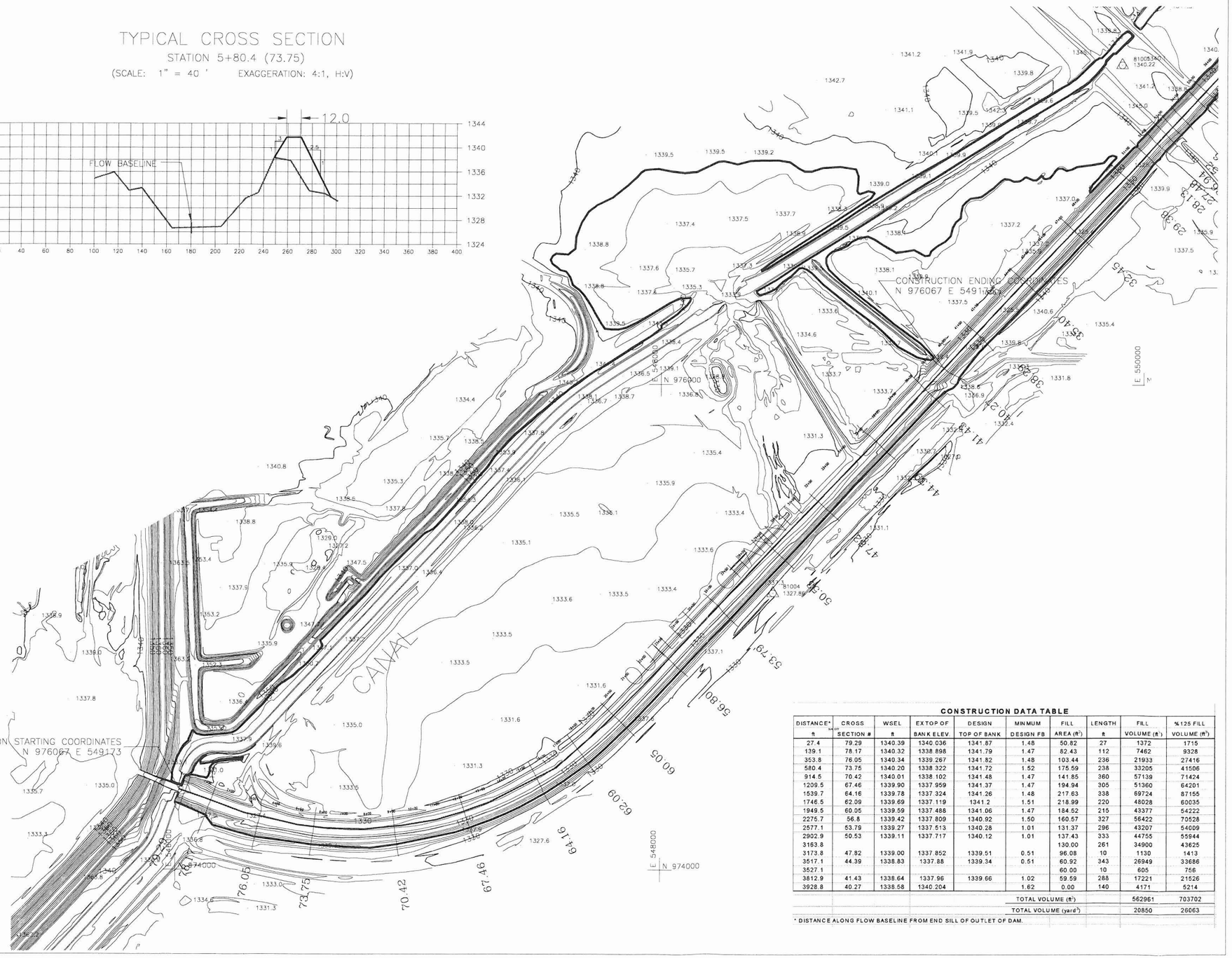
THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS. THE HORIZONTAL DATUM WAS NAD 83. VERTICAL DATUM: NAVD 88. MAPPING WAS DEVELOPED BY KENNEY AERIAL MAPPING, INC.

TYPICAL CROSS SECTION

STATION 5+80.4 (73.75)

(SCALE: 1" = 40 ' EXAGGERATION: 4:1, H:V)





LEGEND

FLOOD INUNDATION BOUNDARY	
FLOW BASELINE	
CROSS SECTION	73.75
STATION ALONG FLOW BASELINE	26+00

ELEVATION REFERENCE MARKS

NOTE: ELEVATIONS ARE BASED ON NAVD 1988

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION

NOTES

200' 0' 200' 400'

SCALE: 1" = 200 FEET

CONTOUR INTERVAL = 2 FEET

CONSTRUCTION DATA TABLE

DISTANCE* ft	CROSS SECTION #	WSEL ft	EXTOP OF BANK ELEV.	DESIGN TOP OF BANK	MINMUM DESIGN FB	FILL AREA (ft²)	LENGTH ft	FILL VOLUME (ft³)	%125 FILL VOLUME (ft³)
27.4	79.29	1340.39	1340.036	1341.87	1.48	50.82	27	1372	1715
139.1	78.17	1340.32	1338.898	1341.79	1.47	82.43	112	7462	9328
353.8	76.05	1340.34	1339.267	1341.82	1.48	103.44	236	21933	27416
580.4	73.75	1340.20	1338.322	1341.72	1.52	175.59	238	33205	41506
914.5	70.42	1340.01	1338.102	1341.48	1.47	141.85	360	57139	71424
1209.5	67.46	1339.90	1337.959	1341.37	1.47	194.94	305	51360	64201
1539.7	64.16	1339.78	1337.324	1341.26	1.48	217.63	338	69724	87155
1746.5	62.09	1339.69	1337.119	1341.2	1.51	218.99	220	48028	60035
1949.5	60.05	1339.59	1337.488	1341.06	1.47	184.52	215	43377	54222
2275.7	56.8	1339.42	1337.809	1340.92	1.50	160.57	327	56422	70528
2577.1	53.79	1339.27	1337.513	1340.28	1.01	131.37	296	43207	54009
2902.9	50.53	1339.11	1337.717	1340.12	1.01	137.43	333	44755	55944
3163.8						130.00	261	34900	43625
3173.8	47.82	1339.00	1337.852	1339.51	0.51	96.08	10	1130	1413
3517.1	44.39	1338.83	1337.88	1339.34	0.51	60.92	343	26949	33686
3527.1						60.00	10	605	756
3812.9	41.43	1338.64	1337.96	1339.66	1.02	59.59	288	17221	21526
3928.8	40.27	1338.58	1340.204		1.62	0.00	140	4171	5214
					TOTAL VOLUME (ft³)			562961	703702
					TOTAL VOLUME (yard³)			20850	26063

* DISTANCE ALONG FLOW BASELINE FROM END SILL OF OUTLET OF DAM.

NO	REVISION	BY	DATE
2			
1			

McMICKEN DAM OUTLET CHANNEL
MARICOPA COUNTY, ARIZONA

EXHIBIT 2 McMICKEN DAM OUTLET CHANNEL

PROPOSED CONDITION INUNDATION AREA

AND TYPICAL CROSS SECTION

FCDMC (2002C32)

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed ARIZONA, U.S.A.

Baker

Michael Baker Jr., Inc.

	BY	DATE
DESIGN	W.C.	06/03/03
DESIGN CHK.	K.A.	06/03/03
PLANS	W.C.	06/03/03
PLANS CHK.	K.A.	06/03/03

SHEET 2 OF 2

MAPPING PROVIDED BY FCDMC
FCD NUMBER: FCD 98-32
TOPO DATE: 6/09/2000

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS. THE HORIZONTAL DATUM WAS NAD 83. VERTICAL DATUM: NAVD 88. MAPPING WAS DEVELOPED BY KENNEY AERIAL MAPPING, INC.

LEGEND

FLOOD INUNDATION BOUNDARY	
FLOW BASE LINE	
CROSS SECTION	12
RIGHT BANK HIGH POINT	
WATER DEPTH ON HIGH POINT	1.8 FEET

ELEVATION REFERENCE MARKS

NOTE: ELEVATIONS ARE BASED ON NAVD 1988

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION

NOTES

300' 0' 300' 600'

SCALE: 1" = 300 FEET
CONTOUR INTERVAL = 2 FEET

NO.	REVISION	BY	DATE
2			
1			

McMICKEN DAM OUTLET CHANNEL MARICOPA COUNTY, ARIZONA

EXHIBIT 1 McMICKEN DAM OUTLET CHANNEL
SURVEYED CROSS SECTIONS AND
FLOOD FLOW BASELINE
FCDMC (2002C32)

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH DATE SIGNED 6-26-03 ARIZONA, U.S.A.

Baker
Michael Baker Jr., Inc.

	BY	DATE
DESIGN	W.C.	06/03/03
DESIGN CHK.	K.A.	06/03/03
PLANS	W.C.	06/03/03
PLANS CHK.	K.A.	06/03/03

SHEET 1 OF 2

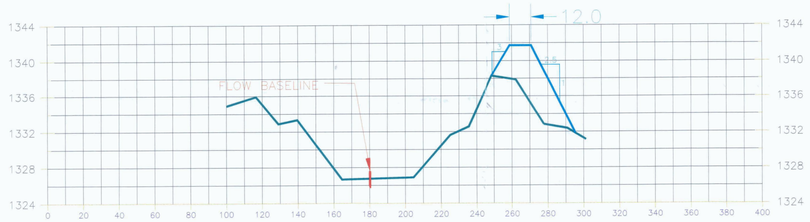
MAPPING PROVIDED BY FCDMC
FCD NUMBER: FCD 98-32
TOPO DATE: 6/09/2000

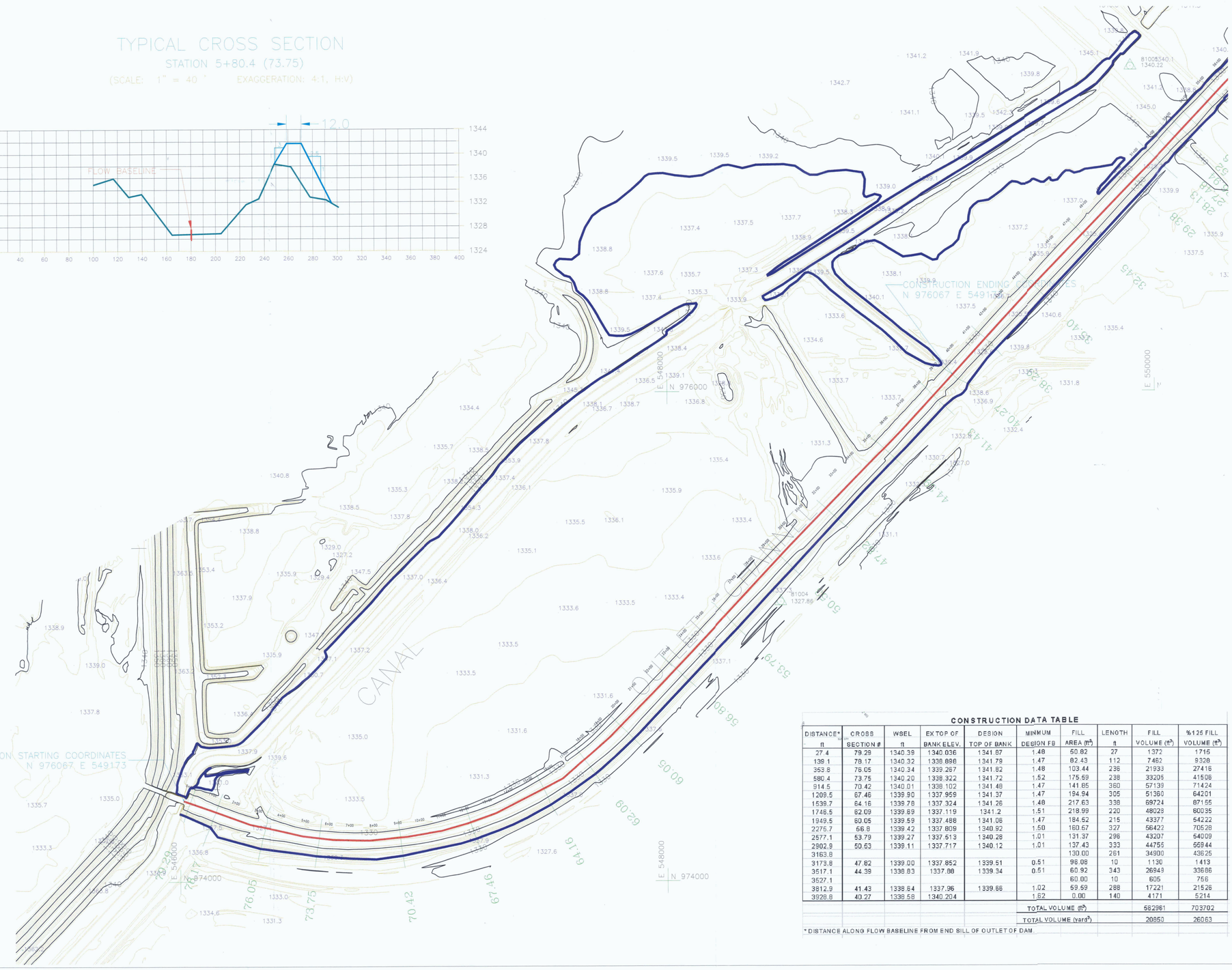
THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS. THE HORIZONTAL DATUM WAS NAD 83. VERTICAL DATUM: NAVD 88. MAPPING WAS DEVELOPED BY KENNEY AERIAL MAPPING, INC.

TYPICAL CROSS SECTION

STATION 5+80.4 (73.75)

(SCALE: 1" = 40 ' EXAGGERATION: 4:1, H:V)





CONSTRUCTION DATA TABLE

DISTANCE* ft	CROSS SECTION #	WSEL ft	EX TOP OF BANK ELEV.	DESIGN TOP OF BANK	MINIMUM DESIGN FB	FILL AREA (ft^2)	LENGTH ft	FILL VOLUME (ft^3)	%125 FILL VOLUME (ft^3)
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363.8	76.05	1340.34	1339.267	1341.82	1.48	103.44	236	21933	27416
580.4	73.75	1340.20	1338.322	1341.72	1.52	175.59	238	33205	41506
914.5	70.42	1340.01	1338.102	1341.48	1.47	141.85	360	57139	71424
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3926.8	40.27	1338.58	1340.204		1.62	0.00	140	4171	5214
					TOTAL VOLUME (ft^3)			562961	703702
					TOTAL VOLUME ($yard^3$)			20850	26063

* DISTANCE ALONG FLOW BASELINE FROM END SILL OF OUTLET OF DAM.

LEGEND

FLOOD INUNDATION BOUNDARY

FLOW BASELINE

CROSS SECTION 73.75

STATION ALONG FLOW BASELINE 26+00

ELEVATION REFERENCE MARKS

NOTE: ELEVATIONS ARE BASED ON NAVD 1988

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION

NOTES

200' 0' 200' 400'

SCALE: 1" = 200 FEET

CONTOUR INTERVAL = 2 FEET

NO.	REVISION	BY	DATE
2			
1			

McMICKEN DAM OUTLET CHANNEL MARICOPA COUNTY, ARIZONA

EXHIBIT 2 McMICKEN DAM OUTLET CHANNEL

PROPOSED CONDITION INUNDATION AREA

AND TYPICAL CROSS SECTION

FCDMC (2002C32)

Registered Professional Engineer (Civil) CERTIFICATE NO. 38148 KOFI ANUMAH Date Signed 6-26-03 ARIZONA, U.S.A.

Baker

Michael Baker Jr., Inc.

	BY	DATE
DESIGN	W.C.	06/03/03
DESIGN CHK.	K.A.	06/03/03
PLANS	W.C.	06/03/03
PLANS CHK.	K.A.	06/03/03

SHEET 2 OF 2

MAPPING PROVIDED BY FCDMC
FCD NUMBER: FCD 98-32
TOPO DATE: 6/09/2000

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS. THE HORIZONTAL DATUM WAS NAD 83. VERTICAL DATUM: NAVD 88. MAPPING WAS DEVELOPED BY KENNEY AERIAL MAPPING, INC.

Richard Harris - FCDX

From: Richard Harris - FCDX
Sent: Tuesday, June 24, 2003 5:33 PM
To: Larry Lambert - FCDX
Cc: Richard Harris - FCDX; 'wcui@mbakercorp.com'; 'kawumah@mbakercorp.com'
Subject: McMicken Dam Outlet Channel Draft Submittal

RevComments2.doc

Gentlemen,

Attached above are my review comments for the subject project Please review them in context with the Final Submittal.

Larry, please note my last review comment where I suggested that a new Assignment be given Baker to produce construction plans. My feeling is that without the construction plans, recommended features may not be constructed accurately. Therefore, the performance of constructed features may not meet the consultant's design intent.

At any rate, if my comments otherwise are addressed satisfactorily, then Baker will have met all Scope requirements and we should expect them to provide final deliverables and a final invoice, soon.

If you have any questions, please let me know.

Thanks,

Richard

Date: June 23, 2003

Re: McMicken Dam Spillway Outlet Channel, Second Draft Hydraulics Analysis and Plan

Wei/Kofi,

I have reviewed the subject materials. Please review my comments, and respond to each with an electronic response. The report and plan materials should be revised accordingly prior to submittal of the Final Deliverable.

My comments are as follows:

1. The final report should be Seal-Signed by a P.E. Please address. What is the number "100744" shown on the upper right hand corner of the report cover? Please remove the number or label it keeping it is considered critical to the final deliverable.

2. Within the Table of Contents, please expand the title of Section 1.1 so that it mirrors the title in the text to read "Purpose of Study". Also, the page number for section 3.4 should be changed to 11.

3. ON the second page of the Table of Contents, please check the font sizes used to ensure they are consistent.

4. I have red-lined the report test with numerous suggestions to improve spelling and grammar. To assist you in making refinements, I will provide you with a red-lined report copy, along with my comments.

5. To improve the appearance of Figure 1 and to improve orientation, I suggest that you move the scale bar away from the road name, add a north arrow to the drawing, and list the section(s), township and range to the title.

6. There is a description that the upstream Drainage area is 250 square miles above the dam within section 1.2. Later in the text the number is 247. Please rectify with a single value throughout.

7. Please check the spelling of the word "Inclosure" at the bottom of Table 2.1. I believe the correct spelling is "Enclosure" (the source may have misspelling, too).

8. Revision is needed badly for the text near the bottom of page 13. For one thing, the freeboard heights should be specified station-to-station, and reference to the "…table below" should be refined to read "Table 4.2". Since Table 4.1 precedes Table 4.2, a separate description is needed for Table 4.1, first. Please address.

9. The contents of Appendix E should be listed in the Results section (4.0). Also, the plots should be revised to be at a whole engineered scale of 1" = 20'. Please address.

10. Within Appendix B, the plans are currently upside-down. Please revise.

11. Within section 1.3 the vertical datum listed for the Kenney Aerial Mapping project should be changed to NAVD '88. The datum listed on the plan sheets should be changed accordingly.

12. The starting and ending State Plane Coordinates should be added to the plan. Please address.

13. The issue of who will build the new embankment, and how long will the rebuild be expected to last (construction quality), will need to be addressed. I prefer that the District offer Baker another assignment to go to the next level of design needed for construction by a contractor. The level of design normally needed should include larger size details of the construction area cross-sections to show a coordinately based construction line and setback distances to top of new embankment, top-of-new embankment elevations, etc. The plans would need to show all District Standard construction notes, as well as notes particular to the project construction. Control would need to be established and shown on the plans, complete with a project bench and TBM nearby (probably one or more have already been established nearby for related projects). A project construction cost estimate would also be needed, along with Construction Special Provisions for any construction other than MAG Standard. For more detailed information contact Michael Lopez, PE, at the District.

Discussed w/ Larry Lambert on 06/30/03. He said that District forces will be used for construction. Therefore, no need for construction plans, now.

RPH