McMICKEN DAM
SPILLWAY DELINEATION STUDY

(FCD 98-32)

Report and Technical Data Notebook

Submitted: October 2001

Prepared for:
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Prepared by:
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In Association With:
DEI Professional Services, LLC
6225 N. 24th Street, Suite 200
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McMicken Dam
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Executive Summary

This report documents the results of an engineering analysis to determine the extent of potential flooding downstream of the McMicken Dam spillway caused by the Probable Maximum Flood. Findings from this study show that flows discharged during such an event travel in a southeast direction toward the Dysart Drain and the Agua Fria River.

During the course of this study, Data Collection and Field Reconnaissance Appendices were prepared, and are included as a part of this report. The Data Collection Appendix documents existing studies and engineering plan sets which were obtained during the course of the study, and which provide some background to the study. The Field Reconnaissance Appendix documents existing conditions within the study area. It also provides the results of a Manning's "n" evaluation which was used in the hydraulic modeling of spillway flows. Spillway flows were modeled for the 1/3, 2/3, and Full PMF discharges using a combination of the HEC-RAS model and approximate hydraulic methods. The results from the HEC-RAS and hydraulic analysis are included in Appendices D and E.

The end product of the hydraulic analyses are spillway inundation maps for the 1/3, 2/3, and full spillway discharges. These maps summarize hydraulic data which includes average flow velocities, average flow depths, and average flow travel times.

1 Introduction

Hoskin Engineering Consultants, Inc., in association with DEI Professional Services, LLC, have been contracted by the Flood Control District of Maricopa County (District) to delineate the inundation limits for three discharges from the McMicken Dam emergency spillway. The study is intended primarily for use in flood warning, emergency preparedness and evacuation, and for the identification of potential drainage easements downstream of the spillway.

1.1 Purpose of Study

The purpose of the spillway delineation is to determine the inundation limits and the downstream impacts of the 1/3, 2/3, and Full Probable Maximum Flood (PMF) spillway discharges for McMicken Dam. The detailed study area covers a portion of north central Maricopa County, including portions of the cities of Surprise and El Mirage. The study limits are depicted in Figure 1.

1.2 Background

McMicken Dam, along with its spillway, outlet structure, and outlet channel, 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 the 247 square-mile portion of the Trilby Wash watershed which extends to the north and west of the dam (Ref. 9).

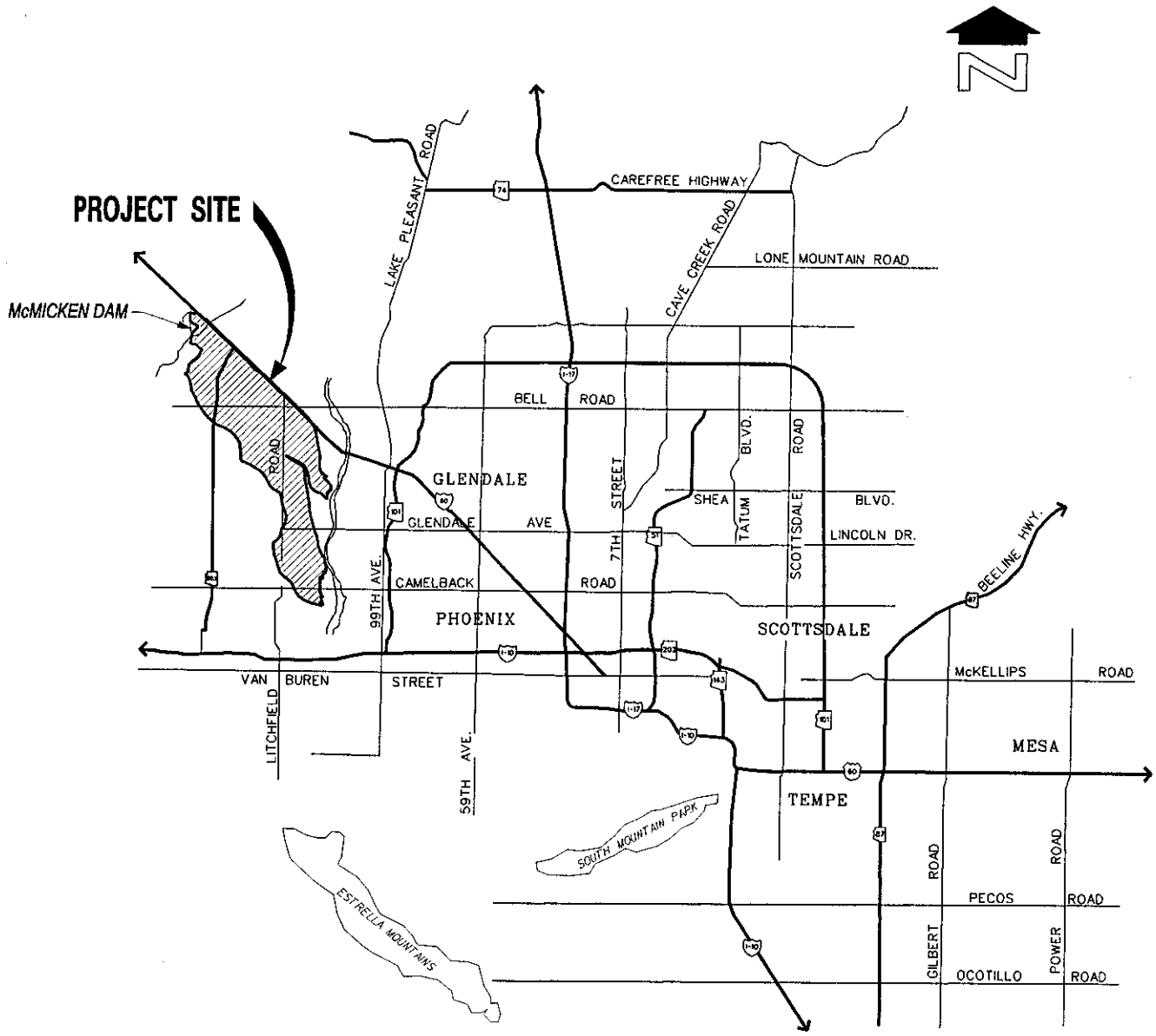
2 Area Studied

McMicken Dam is located northwest of the rapidly developing Sun City Grand area in the City of Surprise. Due to the large flow events studied and the flow splits through the area, the detailed portion of the study encompasses approximately 12 river miles downstream of the spillway.

2.1 Scope of Study

The scope of this study includes the delineation of three spillway discharges from McMicken Dam's emergency spillway. The upstream limits of this study occur just upstream of the crest of the emergency spillway, and at the dam's principal outlet. The downstream limits of the study occur where the spillway flows join the 100-year floodplain of the Agua Fria River.

Discharges were modeled for the 1/3, 2/3, and full spillway discharges, where the full discharge is the Probable Maximum Flood (PMF). Hydrology for the PMF was obtained from the United States Army Corps of Engineers (USACE) study (Ref. 9). A portion of the topography used in this study was originally produced for the *White Tanks/Agua Fria Area Drainage Master Study* (ADMS) (Ref. 14). Supplemental topographic mapping was produced for this study for areas surrounding the spillway and outlet channel, through Sun City Grand, and along Grand Avenue. Hydraulic models were prepared using HEC-RAS Version 2.2 (Ref. 11), and Version 3.0 (Ref. 12) for lateral weir calculations.



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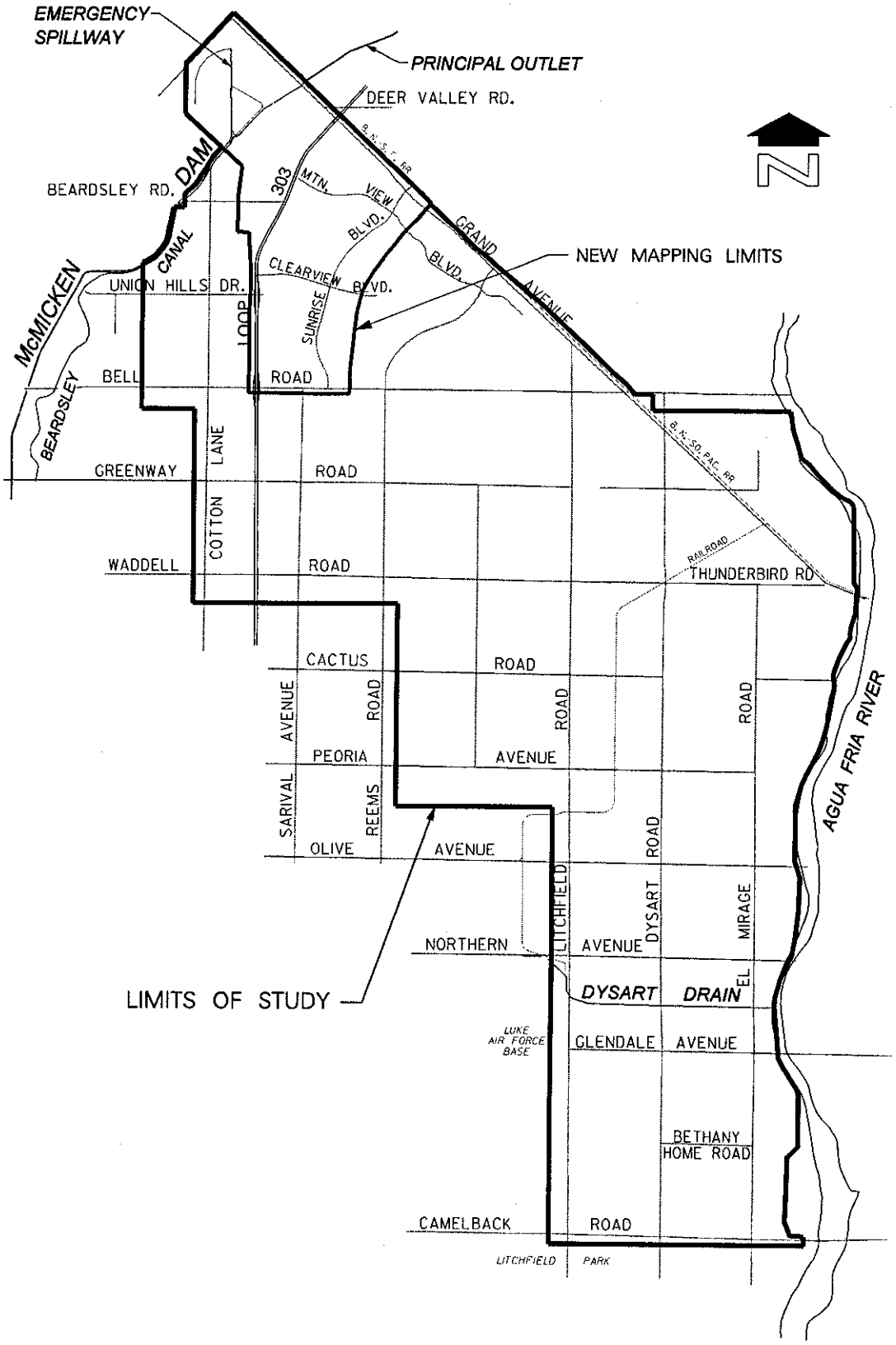
McMICKEN DAM SPILLWAY
LOCATION AND VICINITY MAP

FIGURE 1



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McMICKEN DAM SPILLWAY
STUDY LIMITS

FIGURE 2

Final deliverables include this report, a set of Spillway Delineation Maps, and the HEC-RAS data and mapping files on Compact Disc (CD). A complete scope of work is included in Appendix A.

2.2 Description of the Study Area

The study area is approximately bounded by McMicken Dam to the north, Grand Avenue and the Agua Fria River to the east, the Dysart Drain to the south, and the Loop 303 (Estrella) Freeway to the west (See Figure 1).

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 a 247 square-mile portion of the Trilby Wash watershed, which extends to the north and west of the dam (Ref. 9). The principal outlet is located near the north end of the dam. Flow from the principal outlet structure is conveyed northeast toward Grand Avenue within the McMicken Dam Outlet Channel. The McMicken Dam Outlet Channel crosses under Grand Avenue 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 crest the spillway flow to the east, then turn southeast, flowing along the south side of Grand Avenue and toward the McMicken Dam Outlet Channel. See Appendix B for more detailed information on the design of the dam and outlet structures.

The area immediately south and east of the spillway is currently undeveloped, however the area south of the Loop 303 Freeway is mostly urbanized, with a

combination of residential, industrial, and commercial developments. The area south and west of approximately Greenway and Dysart Roads is mostly farm fields.

Significant features within the study area include: the Loop 303 (Estrella) Freeway, Grand Avenue, Burlington Northern-Santa Fe Railroad, Sun City Grand, Beardsley Canal, and the Dysart Drain. Detailed information regarding each of these facilities is included in Appendix B.

Future construction within the study area which is of significance to this study includes the construction of the Loop 303 Freeway, development of the area between the spillway and Sun City Grand, Grand Avenue improvements, and the Loop 303 Freeway crossing.

Construction of the Loop 303 Freeway was in progress at the time of this study. Construction plans from the Maricopa County Department of Transportation (Ref. Plan Set Bibliography, Appendix B) were used to locate the freeway within the study area and determine locations of flow patterns. The *Estrella Roadway and Grade Separation, Phase 1*, construction is in progress between Union Hills Drive and Deer Valley Drive. Phase 1 construction transitions to the existing roadway between Union Hills Drive and Clearview Boulevard, located approximately ¼ mile north of Union Hills Drive. This transition is an interim connection until future phases of the freeway are constructed. At the northern end of Phase 1 construction, the freeway includes a bridged crossing of Grand Avenue and the Burlington Northern-Santa Fe Railroad.

At the time this analysis was prepared, the design concept for the freeway alignment south of Clearview Boulevard was in progress. Analysis provided in this report is based upon approved plans and does not consider the future phases of freeway construction. Future phases of freeway construction have the potential to impact the drainage patterns found in this report.

The area between the McMicken Dam Outlet Channel and the Loop 303 Freeway is primarily undeveloped desert. Development of the existing desert area between the Loop 303 Freeway and the outlet channel would impact the results of this study because the flow path assumptions would be altered.

2.2.1 Reach A – McMicken Dam Spillway to Loop 303 Freeway

Reach A extends from just upstream of the McMicken Dam spillway, along the west side of Grand Avenue and the Loop 303 Freeway, to Bell Road. Reach A also continues within Grand Avenue, south of the Loop 303 Freeway, to approximately Reems Road. The study area immediately downstream of the McMicken Dam spillway is currently undeveloped, however further downstream the study area contains several densely developed subdivisions, the Beardsley Canal, and a portion of the Loop 303 Freeway, which is currently under construction.

Flow over the spillway enters an undeveloped area immediately east of the spillway, then continues south and east toward Grand Avenue and Sun City Grand. Flow from the Principal Outlet enters the McMicken Dam Outlet Channel, which heads to the northeast and crosses Grand Avenue. The McMicken Dam Outlet

Channel is located partially below grade, however the flow is contained by an embankment (or levee) along its south bank.

It was estimated that flow from the spillway heads in a southeast direction, toward the outlet channel. The McMicken Dam Outlet Channel, therefore, acts as a barrier to discharge over the emergency spillway. From the spillway to the Loop 303 Freeway, the land is mostly undeveloped desert with no distinct natural channels. There are concentrated areas of dense vegetation growth upstream of the spillway and in the area immediately north of the outlet channel, however the magnitude of flows used for this study are not likely to be affected by locally dense vegetation. Photographs from the field visit are included in Appendix C, and were used to prepare a summary of 'n' values for use in this study, based upon the physical conditions which were observed and documented. A single 'n' value was applied along each cross-section taken in this area. See Section 3.3.1 for a description of the hydraulic models within Reach A, and Appendix D for the detailed hydraulic analysis.

2.2.2 Reach B – Loop 303 Freeway to Agua Fria River

Flow which reaches the Loop 303 Freeway and weirs into Sun City Grand enters Reach B. Reach B extends southeast along the south side of Grand Avenue to the Agua Fria River. A ridge in the topography tends to separate the flow into two flow paths. These were each modeled separately. The eastern flow path follows along the southern side of Grand Avenue, and joins the Agua Fria River at approximately Peoria Avenue. The area consists of mostly residential and

commercial development. The western flow path occurs through an area consisting mostly of farm fields, before it overtops the Dysart Drain, and joins the Agua Fria River near Bethany Home Road. See Section 3.3.2 for a description of the hydraulic models within Reach B, and Appendix E for the detailed hydraulic analysis.

3 Technical Analysis

3.1 Hydrology

McMicken Dam intercepts Trilby Wash and a 247 square-mile portion of the Trilby Wash watershed which extends north and west of the dam (Ref. 9). The McMicken Dam principal outlet and emergency spillway were designed by the USACE to pass a combined Spillway Design Flood peak outflow of 22,000 cfs (Refs. 9 and 10). 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. 9) and *Design Memorandum No.2* (Ref. 10). See Appendix B for a summary of hydraulic and design data obtained from the USACE reports. Spillway discharges proposed for use in this study are summarized in Table 1.

Table 1: Summary of Flood Discharge Rates

Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
Principal Outlet	5,000	5,000	5,000
Emergency Spillway	25,000	55,000	90,000
Total	30,000	60,000	95,000

The McMicken Dam Outlet Channel conveys flow from the Principal Outlet east under Grand Avenue and the Burlington Northern-Santa Fe Railroad. The Beardsley Canal and the McMicken Dam Outlet Channel act as barriers to flow overtopping the emergency spillway. The top of the McMicken Dam Outlet Channel embankment is higher than the Beardsley Canal, and varies in elevation along its length. Due to the distribution of flow upstream of the channel, differing water surface elevations are assumed to occur as flow overtops the channel's south embankment. This is particularly true for flows in the magnitude of this study.

Flow overtopping the outlet channel embankment continues southeast towards the Loop 303 Freeway and Grand Avenue. Future grading and construction within the area between the outlet channel's south embankment and the Loop 303 Freeway could act as a barrier to flow overtopping the outlet channel embankment. This would force flow to continue east and down Grand Avenue, where smaller increases in flow have a greater impact.

The depth of flow within the freeway causes it to weir into Sun City Grand, and continue in a southeast direction. A smaller portion of the flow continues southeast along Grand Avenue. Several flow splits occur within the study area, each

of which is addressed in Appendices D and E according to location within the study area. The following tables summarize the results of the flow split analysis:

Table 2: Flow Split North of McMicken Dam Outlet Channel

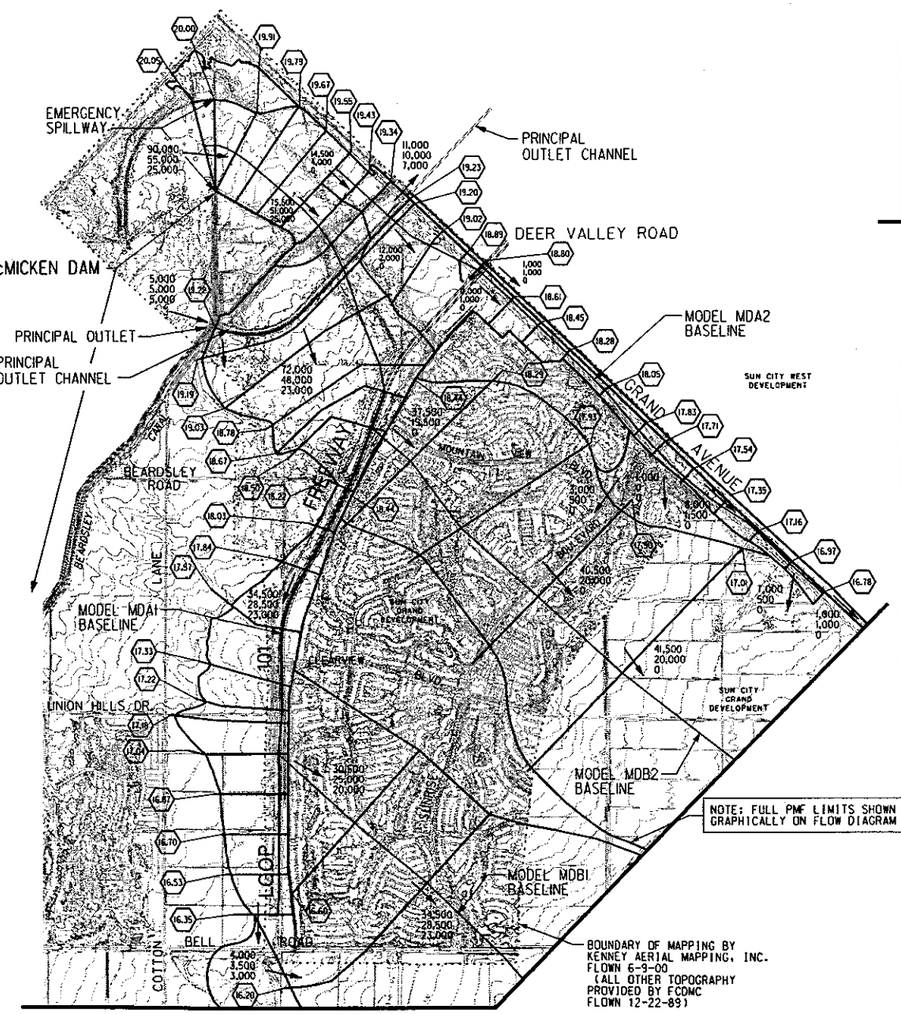
Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF	Principal Outlet Only
West Portion of Levee	21,000	46,000	70,000	0
East Portion of Levee	0	2,000	12,000	0
Flow in Outlet Channel	7,000	10,000	11,000	3,000
Flow South from Principal Outlet	2,000	2,000	2,000	2,000
Total	30,000	60,000	95,000	5,000

Table 3: Weir Flow to Sun City Grand

Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
First Weir – to Model MDB2	0	19,500	37,500
Second Weir – to Model MDB1	20,000	25,000	30,500
Toward Bell Road	3,000	3,500	4,000
Total	23,000	48,000	72,000

Table 4: Flow Splits Along Grand Avenue

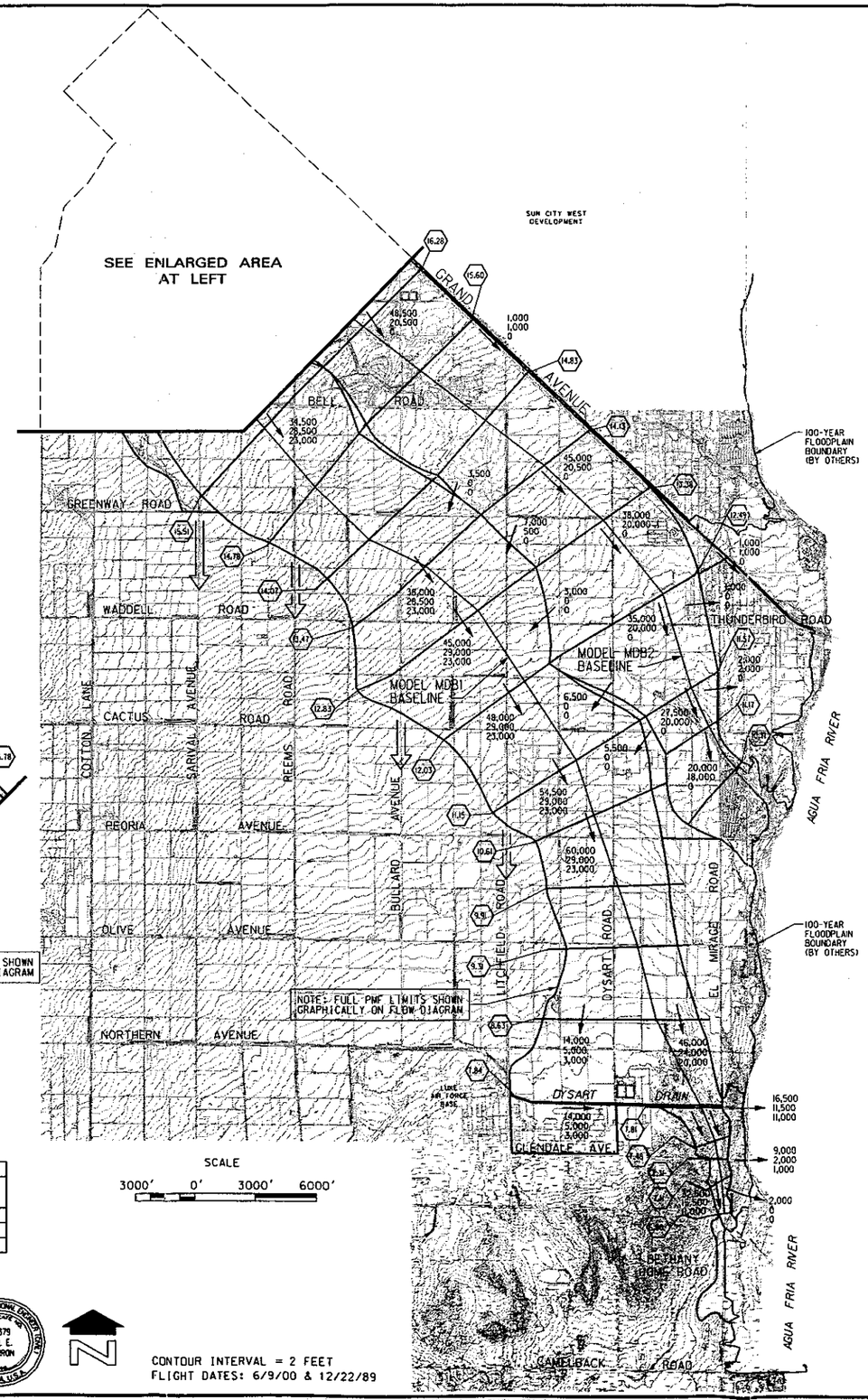
Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
Flow Confined to Channel Northeast of Railroad	0	1,000	1,000
Weir through View Fencing North of Sunrise Boulevard	0	500	3,000
Weir through View Fencing South of Sunrise Boulevard	0	0	1,000
Flow South Within Grand Avenue	0	500	7,000
Total	0	2,000	12,000



SCALE

1500' 0' 1500' 3000'

McMICKEN DAM FLOW VOLUMES			
FLOW	TOTAL (CFS)	PRINCIPAL OUTLET (CFS)	EMERGENCY SPILLWAY (CFS)
FULL PMF	95,000	5,000	90,000
2/3 PMF	60,000	5,000	55,000
1/3 PMF	30,000	5,000	25,000



SCALE

3000' 0' 3000' 6000'

CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 6/9/00 & 12/22/89

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

LEGEND

SPILLWAY FLOW, FULL PMF FLOODPLAIN BOUNDARY

FLOW VALUES — FULL FLOW Q= 34,500 CFS — 34,500; 2/3 FLOW Q= 28,500 CFS — 28,500; 1/3 FLOW Q= 23,000 CFS — 23,000

100-YEAR FLOODPLAIN BOUNDARY

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

BOUNDARY OF MAPPING BY KENNEY AERIAL MAPPING, INC. FLOWN 6-9-00 (ALL OTHER TOPOGRAPHY PROVIDED BY FCDMC FLOWN 12-22-89)

NO.	REVISION	BY	DATE
2			
1			

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEWER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

FLOW DIAGRAM
FIGURE 4

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

G:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\report exhibit\fig4-floodmap.dgn
10/22/2001

Table 5: Weir Flow Out of Model MDB2

Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
Initial Flow (from Model MDA1)	0	19,500	37,500
Additional Flow from Grand Avenue (from Model MDA2)	0	1,000	11,000
Weir Flow to the West (to Model MDB1)	0	500	25,500
Weir Flow to the East (to Agua Fria River)	0	2,000	3,000
Total at Southern End of Model MDB2	0	18,000	20,000

Table 6: Flow Split at Dysart Drain

Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
Flow South Toward Glendale Avenue	12,000	17,500	43,500
Flow East of El Mirage Road	11,000	11,500	16,500
Total	23,000	29,000	60,000

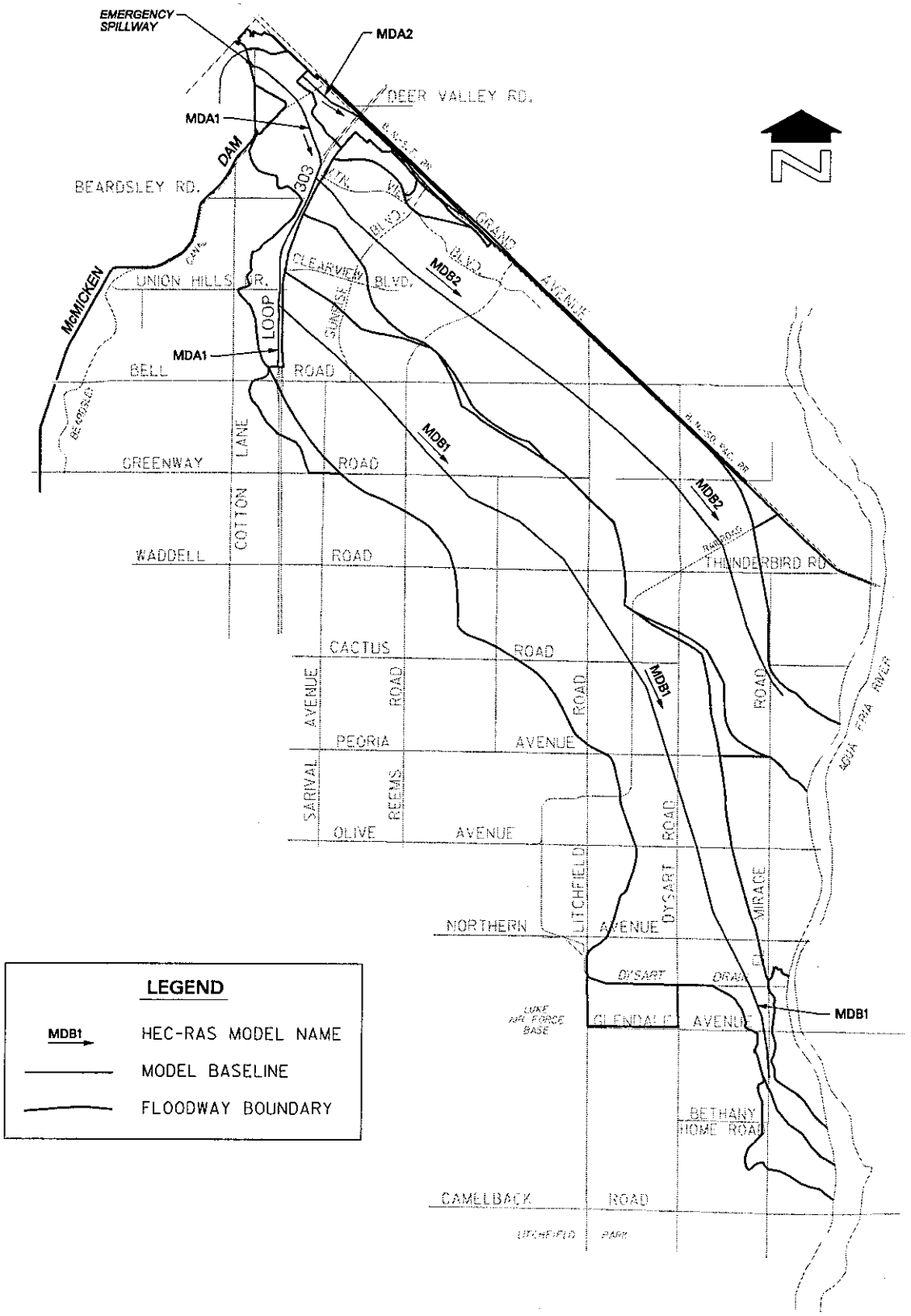
Table 7: Summary of Flows

Discharge (cfs)	1/3 PMF	2/3 PMF	Full PMF
Flow East Within McMicken Dam Outlet Channel	7,000	10,000	11,000
Flow to Agua Fria River from Model MDB1	23,000	29,000	60,000
Flow to Agua Fria River from Model MDB2	0	20,000	23,000
Flow East of Burlington Northern-Santa Fe Railroad	0	1000	1000
Total Flow	30,000	60,000	95,000

Note: See Section 3.3 for model descriptions.

3.2 Topography

Topography produced for the *White Tanks/Agua Fria ADMS* (Ref. 14) at a scale of 1 inch = 400 feet, with a 2-foot contour interval (Flight date: December 22, 1989), was used in this study. Since being mapped in 1989, there has been extensive



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McMICKEN DAM SPILLWAY
HEC-RAS INDEX MAP

FIGURE 3

residential and commercial construction in the area. Most notable is the master-planned community of Sun City Grand. Therefore, new topographic mapping for this area was produced by Kenney Aerial Mapping Company (Flight date: June 6, 2000). Mapping from both sources was used as a basis for the Spillway Delineation Maps presented in this report. See Figure 2 for the limits of the new mapping.

3.3 Hydraulic Analysis

This section of the report includes general descriptions of the HEC-RAS models, weir flow calculations, and split flow calculations within each of the two reaches, A and B. For detailed descriptions of the modeling and calculations, refer to Appendices D and E.

HEC-RAS Version 2.2 (Ref. 11) was used to model the 1/3, 2/3, and full flows downstream from the spillway. HEC-RAS Version 3.0 (Ref. 12) was used for analysis of lateral weirs which occur along Grand Avenue and within Reach B. Due to the fragmented nature of the flow path, the entire HEC-RAS analysis was broken into two reaches. They are as follows:

Reach A – McMicken Dam Spillway to Loop 303 Freeway
Reach B – Loop 303 Freeway to Agua Fria River

A combination of weir flow, split flow, and HEC-RAS analyses were used to model each reach. See Appendix D for Reach A hydraulics. See Appendix E for Reach B hydraulics.

Modeling proceeded from upstream to downstream. Flow paths were determined using the mapping described earlier. Stationing decreases in the

downstream direction, with the spillway crest assigned a river mile of 20.00. A hydraulic baseline station of 10,000 was used for each cross-section. Each reach was evaluated independently using HEC-RAS. The cross-section locations and floodplain delineations are shown on the reduced-scale Spillway Delineation Maps included in Appendix F, and on the full-size Spillway Delineation Maps provided separately.

Several split flow/weir flow calculations were performed to track flow through the study area. Calculations corresponding to each reach are included in Appendices D and E, and are accompanied by summary sheets detailing the methodology and results of the analysis. Flow splits were calculated using either the broad-crested weir flow equation ($Q = CLH^{3/2}$) and topographic cross-sections, or by the use of the lateral weir function in HEC-RAS Version 3.0. Water surface balancing at each of the flow splits was accomplished using an iterative process.

The resulting floodplain delineations for the 1/3, 2/3, and Full PMF discharges are shown on the 11"x17" delineation maps presented in Appendix F, and included on the full-size delineation maps provided separately.

3.3.1 Reach A – McMicken Dam Spillway to Loop 303 Freeway

Reach A extends from just upstream of the McMicken Dam spillway, along the west side of Grand Avenue and the Loop 303 Freeway, south to Bell Road. Reach A also continues within Grand Avenue, south of the Loop 303 Freeway, to approximately Reems Road. Two HEC-RAS models were

created for this reach, MDA1 and MDA2, as described below. Each model has a separate hydraulic baseline.

Model MDA1

Model MDA1 includes the area from the McMicken Dam spillway to the intersection of the Loop 303 Freeway and Bell Road. The model begins upstream of the McMicken Dam spillway at Section 20.05. After exiting the spillway (River Mile 20.00), flow travels southeast towards the McMicken Dam Outlet Channel, which acts as a levee due to a raised embankment. Flow overtops the levee and divides into two portions, with the western portion of the flow contributing to Model MDA1 and the eastern portion of the flow contributing to Model MDA2.

Flow in Model MDA1 travels southeast toward Loop 303, then south along the Loop 303 Freeway, against an elevated block wall along the western boundary of Sun City Grand. The flow depths are assumed deep enough to cause failure of the wall, and for flow to enter Sun City Grand at two locations. The first location occurs near Mountain View Boulevard, where a portion of the 2/3 PMF and Full PMF flow weirs into Sun City Grand and becomes the starting flows for HEC-RAS Model MDB2. The second location occurs between Clearview Boulevard and Bell Road, where a majority of the flow enters Sun City Grand and becomes the starting flow for HEC-RAS Model MDB1. The remainder of the flow travels south along the freeway toward Bell Road, where it is assumed to rejoin Model MDB1.

The wall failure/weir flow analyses are described in detail in Appendix D of this report. Detailed descriptions and HEC-RAS results for Model MDA1 are also included in Appendix D.

Model MDA2

Model MDA2 was created to model flow which heads southeast from the McMicken Dam Outlet Channel, through the Loop 303 Freeway overpass at Grand Avenue, and south within Grand Avenue. The model begins at Section 19.55, a common section with Model MDA1, and continues south along Grand Avenue to Section 16.78, near Reems Road. Flow at the upstream end of this model was determined by the methods described in Section 4 of Appendix D.

Between the outlet channel and the freeway, there is currently the potential for flow to rejoin Model MDA1. However, future residential development west of the freeway could potentially change this. Since a small increase in flow could have an impact downstream, the flow in model MDA2 was not reduced.

East of the freeway, the model continues along Grand Avenue. Flow within this portion of the model is generally divided between parallel structures: a wall east of the Burlington Northern-Santa Fe Railroad, Grand Avenue, and a wall along the southwest side of Grand Avenue. The railroad is elevated approximately 2 to 6 feet above the surrounding grades, therefore a portion of the flow is contained east of the railroad for the length of the

model. The wall to the west of Grand Avenue has view fencing immediately north and south of Sunrise Boulevard, thus allowing flow to enter the golf course within Sun City Grand. These two locations were analyzed using the lateral weir function of HEC-RAS Version 3.0. A detailed description of the analysis and results is included in Appendix D. The results from Model MDA2 are included in Appendix D.

3.3.2 Reach B: Loop 303 Freeway to Agua Fria River

Reach B encompasses the area starting at the Loop 303 Freeway, through Sun City Grand, and continuing southeast toward the Agua Fria River. Two HEC-RAS models were created for this reach, MDB1 and MDB2, as described below. Each model has a separate hydraulic baseline.

Model MDB1

Model MDB1 accepts flow from Model MDA1 which weirs into Sun City Grand between Clearview Boulevard and Bell Road. This model begins in Sun City Grand at Section 16.60, and continues southeast through the development. Under the same assumptions applied to the wall along the Loop 303 Freeway, flow within Sun City Grand causes the south boundary wall along Bell Road to fail. Flow then continues southeast toward the Dysart Drain.

A slight ridge in the topography divides flow between Models MDB1 and MDB2. However, higher flow depths in Model MDB2 along portions of

the reach cause flow to weir into Model MDB1. A detailed description of the weir flow entering the model is included in Appendix E.

Ponding occurs on the north side of the Dysart Drain, causing the flow to either continue east within the Dysart Drain, overtop a ridge along El Mirage Road to the east, or cross the Dysart Drain and continue southeast to the Agua Fria River. Between Dysart and El Mirage Roads, the Dysart Drain has a design capacity of 3,984 cfs, per the *Dysart Drain Improvement Project* (Ref. 7). Freeboard within the channel, including above the lining, increases the channel's capacity to approximately 17,350 cfs just east of the evaporation ponds, and approximately 11,110 cfs just west of El Mirage Road.

The model ends at Section 6.80, just north of the 100-year floodplain limits of the Agua Fria River. Results from Model MDB1 are included in Appendix D.

Model MDB2

Model MDB2 accepts flow from Model MDA1 which enters Sun City Grand near Mountain View Boulevard. Model MDB2 also accepts flow from Model MDA2, between Sunrise Boulevard and Reems Road. Model MDA2 begins at the weir location along the Sun City Grand wall, and continues southeast parallel to Grand Avenue, ending near Cactus Road and the Agua Fria River. Flow at the upstream end of the model was determined using weir flow analysis as described in Section 4 of Appendix D. The 1/3 PMF

profile has zero flow, due to the lack of weir flow into Sun City Grand, and was therefore not modeled. See Section 6 of Appendix D for the analysis of this additional flow.

The model's western boundary follows a minor ridge in the topography. Flow depths along portions of the boundary are greater than one foot above the ridge, indicating the potential for flow to overtop to Model MDB1. At the southern end of Model MDB2, flow is mostly contained within a depressed area, however a portion of the flow overtops a small ridge between Sections 12.49 and 11.17. Flow overtopping at these two locations was analyzed using the lateral weir option of HEC-RAS Version 3.0 (Ref. 12). The geometry for the lateral weirs between the cross-sections was defined using topographic mapping. Since removing flow from the downstream weir affects the amount of flow which can overtop at the upstream weir, an iterative process was used to determine the amount of flow weiring at each location, as described in Section 6 of Appendix E. After determining the outflow from each cross-section, the Model MDB2 discharges were reduced, and the corresponding flows were added to Model MDB1.

4 Conclusions

The ultimate outfall locations for flow overtopping the McMicken Dam emergency spillway are the Agua Fria River, the Dysart Drain, and the McMicken Dam Outlet Channel. See Table 7 for the flows reaching these locations.

Hydraulic analyses for Reaches A and B are included in Appendices D and E, respectively. Floodplain limits for the 1/3, 2/3, and Full PMF cases are shown on the spillway delineation maps included in the appendix and provided separately. Tables summarizing the flow depths, velocities, and travel times are shown on the Spillway Delineation Maps.

5 Study Limitations

Principal Outlet Channel

During the course of the study, the capacity of the McMicken Dam Principal Outlet Channel was evaluated. The Principal Outlet itself was determined to have a capacity of approximately 5,000 cfs before additional flow would start to overtop the Emergency Spillway. It was determined that the Outlet Channel, just downstream of the Principal Outlet, has a capacity of approximately 3,000 cfs. As a result, the Outlet Channel will first start to overtop as it makes a turn to the east. If failure of the embankment along the south side of the Outlet Channel were to occur, a majority of the 5,000 cfs, which exits from the Principal Outlet, may leave the channel and head in a southerly direction toward the Loop 303 freeway. Because of the magnitude of the three discharges that were modeled, this

would not have a major impact on the study results, however it does identify an area that may have an increased likelihood of flooding.

Overtopping of Beardsley Canal and McMicken Dam Outlet Channel

Both the Bearsdley Canal and the McMicken Dam Outlet Channel present a physical barrier to flow which exits from the Emergency Spillway. Initially, flow which reaches the Beardsley Canal will occur in an area where the canal crosses through an inverted siphon. Higher flows will cause ponding behind the canal embankment, possibly resulting in a failure of the canal bank. In conducting the hydraulic analysis, it is assumed that the flow will cross the canal in a uniform manner, and that a failure will not result. The canal is therefore assumed to have a rigid boundary. Failure of the canal bank may result in the focusing of flow at the location of failure, which may result in a change in the downstream flow distribution.

The McMicken Outlet Channel is partially excavated below grade, and also has an embankment on the southeast bank of the channel. This embankment is approximately 2 feet above natural grade on the downslope side. The hydraulic analysis assumes that the embankment will overtop, with a flow distribution consistent with the upstream cross-sections. Overtopping of the embankment is assumed to occur with differing water surfaces along its length. If failure of the embankment were to occur, a concentration of flow might occur, again resulting in a change in the downstream flow distribution. The amount of flow which is assumed to be diverted east under Grand Avenue, within the McMicken Dam Outlet Channel, was computed based upon a rating curve established for the bridge structures across Grand Avenue and the adjacent railroad. If the embankment were to be breached, the water

surface would probably decrease at the bridge structures, resulting in less flow being diverted east and away from the study area. An increase in discharge along Grand Avenue or through Sun City Grand would result.

Loop 303 Freeway Construction

At the time this analysis was prepared, the design concept for the freeway alignment south of Clearview Boulevard was in progress. Analysis provided in this report is based upon approved plans for the portion of the freeway from Clearview Boulevard, north to the Grand Avenue overpass. This freeway did not exist when the area was flown in June of 2000, so the freeway alignment and grades were determined from design plans. At the time of this report, the design concept for the Loop 303 vertical alignment south of Clearview Boulevard was unknown.

If the future design is for a depressed freeway with an overpass at Bell Road, then a significant increase in the flow that is diverted due south might result. If the freeway grade goes over Bell Road, then most of the assumptions made in this report for weir flow through Sun City Grand would remain valid. Some of the flow which is currently shown to reach Bell Road may flow through Sun City Grand, however the resulting change in the models would not be very significant.

The area between the McMicken Dam Outlet Channel and the Loop 303 Freeway is primarily undeveloped desert. Development of the existing desert area between the Loop 303 Freeway and the outlet channel would impact the results of this study because the flow path assumptions would be altered. Future grading and construction within the area between

the freeway and the outlet channel levee could force flow which reaches the area to continue southeast within Grand Avenue, where smaller increases in flow have a greater impact.

Sun City Grand

Flow which heads south along the Loop 303 Freeway is shown to enter Sun City Grand by overtopping the block walls which surround the development. In developing the rating curves for the overtopping flow, it was assumed that the walls would stand to an elevation of four (4) feet, at which point they would collapse from the hydrostatic pressure. It was assumed that they walls would collapse to a height of three (3) feet, and that the resulting weir would occur uniformly according to the grades obtained from the topographic mapping.

Flow through Sun City Grand was modeled assuming a Manning's "n" value of 0.1, with the cross-sections based upon ground grades. A major flow through this area would cause destruction of walls and possibly buildings. Initial flows will preference open space corridors such as the streets and golf courses. It was assumed that the major flows will ignore these patterns, and that the general flow will follow the natural drainage patterns in the area.

Dysart Drain

The Dysart Drain was designed to protect Luke Air Force Base from off-site flows, and to provide a drainage outfall. The channel is located approximately one-half mile north of Glendale Avenue, and drains east toward the Agua Fria River. The channel has a design capacity of 3,984 cfs, however there is additional flow capacity within the channel's

freeboard. The additional capacity was assumed to divert flow that reaches the channel east toward the Agua Fria River, thereby providing a measure of flood protection to the Base.

A flow distribution at the cross-sections upstream of the Dysart Drain was used to establish the flow which would enter the channel along its length. If this flow distribution yielded a greater flow along the west end of the channel, it might result in overwhelming the capacity of the Dysart Drain. If this were the case, a portion of the flow might enter Luke Air Force Base, west of Litchfield Road. For the Full discharge case, the flow depth might reach approximately two feet along the base perimeter wall. It was assumed that the block wall would be able to withstand a flow of two feet in depth. Therefore, the entire flow was assumed to flow east, with the majority of flow overtopping the banks of the Dysart Drain and continuing south toward the Agua Fria River.

Additionally, it was assumed that the channel lining and banks would remain intact with the flow overtopping. If the Dysart Drain were to breach, the flow would continue south instead of directly east to the Agua Fria River, as assumed in this study. The impact on the floodplain limits shown would not be significant.

6 References

Note: See Appendix B, "Data Collection," for the Plan Set Bibliography and excerpts from previously completed studies.

1. ASL Consulting Engineers, Arizona, Inc., for Maricopa County Department of Transportation, *Drainage Design Report for the Estrella Roadway & Grade Separation Project, Phase I*, July 5, 2000.

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

3. Flood Control District of Maricopa County, *Consultant Guideline*, October 1, 1998.

4. Kimley-Horn and Associates, Inc., *Grand Avenue Widening, Beardsley Canal to Thunderbird Road, Final Drainage Report*, Volume 1 of 3, Contract No. 87-09, Project No. SBM-022-2-301 PE 501C, August 1990.

5. Kimley-Horn and Associates, Inc., *Grand Avenue Widening, Beardsley Canal to Thunderbird Road, Final Drainage Report*, Volume 2 of 3, Contract No. 87-09, Project No. SBM-022-2-301 PE 501C, August 1990.

6. Kimley-Horn and Associates, Inc., *Grand Avenue Widening From Beardsley Canal to Thunderbird Road, Final Drainage Report*, Contract No. 87-09, Project No. SBM-022-2-301 PE, 501C, June 1988.

7. NBS Lowry Engineers and Planners, *Dysart Drain Improvement Project: 90% Plans Submittal Design Report*, September 1994.

8. Stanley Consultants, Inc., for Del E. Webb Development Co., L.P. and Del Webb Construction, Inc., *Master Drainage Report for Del Webb's Grand Avenue Property*, December 1994.

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

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

6 References (cont'd.)

11. United States Army Corps of Engineers, Hydrologic Engineering Center, *HEC-RAS River Analysis System*, Version 2.2, September 1998, with RASPATCH.

12. United States Army Corps of Engineers, *Hydrologic Engineering Center, HEC-RAS River Analysis System*, Version 3.0, March 2001.

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

14. WLB Group, Inc., *White Tanks/Agua Fria Area Drainage Master Study*, 1992.

15. WLB Group, Inc., *Wittman Area Drainage Master Study, Part B: Stormwater Management Plans*, excerpt, 1989.

McMICKEN DAM
SPILLWAY DELINEATION STUDY

(FCD 98-32)

APPENDIX A: GENERAL DOCUMENTATION

McMicken Dam
Spillway Delineation Study

Appendix A: General Documentation

Table of Contents

1 Scope of Work
2 Meeting Minutes

1 Scope of Work

SCOPE OF WORK

DELINEATION OF SPILLWAY FLOWS FOR THREE WEST SIDE STRUCTURES

CONTRACT FCD 98-32

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SCOPE OF WORK
DELINEATION OF SPILLWAY FLOWS FOR THREE WEST SIDE STRUCTURES
FCD 98-32

GENERAL

The study is to delineate the inundation limits of the 1/3, 2/3, and full spillway discharge values for Adobe Dam, McMicken Dam, and White Tanks #4 Flood Retarding Structure. The combined delineation project consists of approximately 50.5 linear miles of emergency spillway delineations as depicted on exhibits A-1, B-1, & C-1. The consultant will determine the inundation limits using the U.S. Army Corps of Engineers HEC-RAS computer model. The consultant must use sound engineering judgement in the development of the inundation limits. 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. A notice to proceed will be issued for each structure that will be assessed and completed prior to the initiation of a notice to proceed on the remaining structure(s).

All work must be completed within 910 days from Notice to Proceed, which includes a minimum of 150 days for District reviews. Each task will have its' own time length assigned to it. Work will proceed with Task C, then proceed to Task B and then Task A. The order that the Tasks are completed in may be changed with approval from the District's Project Manager. Work will not proceed on a subsequent Task until the preceding task has been completed to the satisfaction of District staff. The overall schedule covers a time period of 130 weeks. Approximate task completion dates are as follows:

Task Description	Time to Task Completion
Task A - Adobe Dam Study	30 weeks
Task B - McMicken Dam Study Phase I	24 weeks
Task B - McMicken Dam Study Phase II	34 weeks
Task B - McMicken Dam Study Phase III	46 weeks
Task C - White Tanks FRS # 4	24 weeks
Task A3 - Adobe Dam Mapping	16 weeks
Task B3 - McMicken Dam Mapping	20 weeks

TASK A6 - DELIVERABLES

1. One set of the inundation limit exhibits (full size) on mylar sealed by the engineer.

2. 4 copies of the Final Report sealed by the engineer, inundation limit exhibits, and copies of the final HEC-RAS models on diskette.

3. All of the CADD data called for in the Final Products Section.

4. Digital Terrain Model if any new topographic mapping is developed for this study.

TASK B - MCMICKEN DAM

No work is to begin on this Task until authorized by the District's Project Manager.

Introduction
The final outcome of the spillway inundation mapping is unknown at this stage. As a result, the study will be implemented in three phases. Study data will be reviewed with District staff, and authorization received, prior to proceeding onto the next phase. The phases of study are illustrated on Exhibit B-1 and as described below:

Phase I
Phase I consists of mapping the outlet the spillway discharges from the McMicken Dam outlet to the principal outlet channel and from there downstream in a southeasterly direction along Grand Avenue to the final point of discharge at the Agua Fria River. Included in this phase of study will be flow that may occur through the Sun City Grand development and which may rejoin the flow to the southeast along Grand Avenue.

The capacity of the principal outlet channel up to and including the bridge structures under Grand Avenue will be determined. Analysis of the principal outlet channel after it crosses Grand Avenue will not be included.

Phase I consist of approximately 9.3 river miles. Phase I will be authorized to proceed at the onset of Task B.

Phase II
Phase II consists of mapping spillway discharges south along the Loop 303 to Northern Avenue and east along the Dysart Drain to the Agua Fria River. Included in this phase of study will be flow that may occur through the Sun City Grand development and which may rejoin the flow to the south.

Phase II consists of approximately 11.7 river miles. Phase II will be authorized to proceed after the findings of a split flow analysis near Grand Avenue and the Loop 303 have been presented to District staff.

Phase III
Phase III consists of mapping spillway discharges south from Northern Avenue and Dysart Road to the Gila River.

Phase III consists of approximately 9.5 river miles. Phases III will be authorized to proceed after the findings of a split flow analysis near Northern Avenue and the Dysart Drain have been presented to District staff.

TASK B1 - COORDINATION

The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope during the proposal stage. The consultant shall update and resubmit this project schedule whenever changes in the schedule occur.

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

The consultant will obtain any necessary Rights of Entry. The consultant will furnish the District with a list of all property owners notified and a sample Right of Entry letter.

The consultant shall meet with officials from ADOT, the Cities of Glendale and Surprise, and other agencies in the study area. The purpose of this meeting is to notify them about the study and obtain information on current or planned public works projects in the study area.

TASK B2 - DATA COLLECTION

The District will supply some of the topographic mapping for this study in either a GIS or CADD format. The primary source for the topographic mapping data is the White Tanks/Agua Fria Area Drainage Master Study. This mapping was originally developed using aerial photogrammetry methods. The horizontal scale is 1" = 400' and the contour interval is two-feet. Also, a portion of the topographic mapping data from Wittmann Area Drainage Master Study might be needed for this study. The horizontal scale for this mapping is 1" = 400' and the contour interval is four feet.

The District will supply the 3 discharge values to be modeled. The consultant will conduct a field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimation of Manning's "n" values, photographic documentation of floodplain characteristics, determination of channel bank stations, observation of possible overflow and split flow areas. The results of the field reconnaissance will be included in the

Final Report. However, a draft version of the field reconnaissance results will be submitted to the District prior to beginning the hydraulic modeling. The field reconnaissance section of the Final Report will present the determination of channel and overbank "n" values along with color photographs (or color photocopies) of these areas. Photo locations, structures and "n" values will be displayed on reduced (usually 11" x 17") scale exhibit

TASK B3 – TOPOGRAPHIC MAPPING

This mapping will need to be augmented by new data because of the construction of State Route 303 and new development that was constructed after the mapping was developed. The supplemental topographic data and survey work will be at the same scale, and on the same horizontal and vertical datum as the supplied mapping. Any topographic mapping developed for this study will be developed using a Digital Terrain Model (DTM). The DTM will be developed and a copy delivered to the District following the guidelines stated in the District's Data Delivery Specifications: The Hydrologic Information System, Revision 3.1, June 1, 1998. The topographic mapping must also meet the quality control called for in FEMA-37, Flood Insurance Study Guidelines and Specifications for Study Contractors, January 1995.

Topographic mapping will be produced at a scale of 1" = 400' and a contour interval of two-feet to match the existing mapping produced for the White Tanks ADMS. Areas of mapping to be updated will be produced within the same border sheets as the current mapping and will be matched. Points of matching will be identified on the maps and described in a legend. The extent of mapping coverage is identified on Exhibit B-2.

TASK B4 - HYDRAULIC ANALYSIS

The hydraulic analysis will be preformed using the latest U.S. Army Corps of Engineers HEC-RAS River Analysis System computer model.

The initial location and alignment of cross sections and channel centerline will be submitted for the District's review and approval prior to the initial digitizing of the cross section data and should closely parallel the existing flood insurance study. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate closer spacing, and will extend the full width of the inundated area. The use of different cross section spacing will require approval from the District's Project Manager. The orientation of the cross sections may need to be altered after running the HEC-RAS model to ensure that cross sections are perpendicular to flow. Also, to ensure good hydraulic modeling of the spillway discharges, additional cross sections may need to be added, or the existing cross sections may need to be moved. Interpolated cross sections will not be used in the HEC-RAS model. Cross section stationing will be from left to right looking downstream with the thalweg at station 10,000.

Manning's n values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991.

Prior to the completion of the final hydraulic models all of the input data must be reviewed to ensure that it agrees with HEC-RAS model results. This includes: the location of the channel centerline, reach lengths, Manning's n values, ineffective flow limits, discharge values. etc...

The HEC-RAS models will usually be developed for subcritical flow. However, in some cases supercritical flow may be experienced and have to be modeled. The HEC-RAS model should be started far enough downstream to eliminate the affects of the starting conditions on the downstream limit of the study area; and reflect a minimized hazard from spillway flows.

For braided channels, each branch should be modeled with its highest anticipated discharge value. This might require more then one HEC-RAS model to delineate the inundation limits in these areas. A rating curve must be determined and the discharge contained within the channel. The percentage of discharge in each overbank and the main channel must be closely assessed within the split flow area, as well as upstream and downstream of it.

The consultant is to setup the HEC-RAS models so that the cross sections are broken into as many segments as practical for determining the maximum depth and velocity along the cross section. The consultant will need to calculate the time it takes for flows to travel from the spillway to each cross section.

Cross sections shall be plotted showing, computed water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing, and other pertinent information. The consultant is to make refinements to the HEC-RAS model based on review of the model by the District and other interested Agencies. Adjustments to the input parameters for obtaining the most realistic results are considered normal to the scope of work.

TASK B5 - FINAL PRODUCTS

Develop an inundation limit exhibit using the supplied topographic data on 24" x 36" size sheets. The use of any larger size sheets will require approval from the District's Project Manager, and the maximum size allowed is 33" x 46". This exhibit will use the District's standard border, title block, and legend format. Shown on this exhibit will be the inundation limits for the three discharges, cross section locations, thalweg location, supplied topographic data, consultant developed topographic data or revisions, major and appropriate minor road names, and elevation reference marks. This exhibit will be plotted at the same scale as the originally supplied topographic data. The use of a different scale will require approval from the District's Project Manager. A table must be included on this exhibit showing the computed water surface elevation of each cross section for each discharge modeled, and other pertinent information such as maximum depth, velocity, and travel time from the spillway to each cross section. In the case of split or braided flow the maximum inundation limit should be shown and the maximum water surface elevation for each portion of the cross section listed. At the end of the study one complete set of inundation limit exhibits will be submitted on non-erasable mylar (3 mil or thicker), and will be sealed by the engineer. No sticky backs or other types of tape products shall be applied to the mylars.

An overall Final Report for the study will be developed. This report will include, a narrative description of the purpose of this study, what steps were undertaken to complete this study, any assumptions made, minutes of meetings with officials from ADOT and the Cities, the field reconnaissance results, and a reduced size (11" x 17") copy of the inundation limit exhibit. Included as appendixes to this report should be printouts of the HEC-RAS models, plot of the cross sections, supporting calculations for any other hydraulic analysis done, and a copy of any supplemental survey work performed.

The electronic drawings developed for this study will be submitted in a CADD format that is suitable for translation into the District's Hydrologic Information System (HIS). The drawings will be prepared in conformance with the CADD Data Delivery Specifications portions (primarily Chapter 3 and Appendix C) of the District's HIS Data Delivery Specifications, Revision 3.1, for the following layers:

1. NDXPRJ (CP - 40)
2. PRJ (CP - 60)
3. DQ.TBL (CP - 410)
4. PRJDAT.TBL (CP - 430)
5. SPILLWAY BASELINE ROUTE SYSTEM (CP - 588)
6. SPILLWAY CROSS SECTION (CP - 590)
7. SPILLWAY ZONE (CP - 591)
8. HEC-RAS OUTPUT (CP - 599)

In addition to the above, any topographic data developed for this study by the consultant will also be prepared in conformance with the CADD Data Delivery Specifications portions of the District's HIS Data Delivery Specifications, Revision 3.1, for the following layers:

1. CARTOGRAPHIC FEATURES (CP - 110)
2. CORNERS (CP - 210)
3. MISCELLANEOUS CONTROL SURVEY POINTS (CP - 215)
4. STRUCTURE (CP - 360)
5. BRIDGE (CP - 608)
6. CANAL SYSTEM (CP - 610)
7. CULVERT (CP - 612)
8. FCD PROJECT FACILITY (CP - 620)
9. STREET DETAIL (CP - 660)
10. ELEVATION (LAND) (CP - 710)
11. RIVER SYSTEM (CP - 960)

The consultant is to only fill out those layers for which data is developed during the course of this study. If the consultant has data that doesn't fall into one of the above layers, the consultant shall contact the District in order to determine what to do with that data. The consultant must follow the applicable CADD specifications when developing their CADD files. The CADD files submitted by the consultant will be subject to a rigorous quality control (QC) check by District staff.

If any new topographic mapping is developed for this study then the Digital Terrain Model must also be submitted.

TASK B6 - DELIVERABLES

1. One set of the inundation limit exhibits (full size) on mylar sealed by the engineer.
2. 4 copies of the Final Report sealed by the engineer, inundation limit exhibits, and copies of the HEC-RAS models on diskette.
3. All of the CADD data called for in the Final Products Section.
4. Digital Terrain Model if any new topographic mapping is developed for this study.

TASK C - WHITE TANKS #4 FLOOD RETARDING STRUCTURE

No work is to begin on this Task until authorized by the District's Project Manager.

The study limits for the White Tanks FRS #4 study are illustrated on Exhibit 'C-1.' Two spillways will be analyzed for their downstream impacts. The study covers approximately 10 river miles.

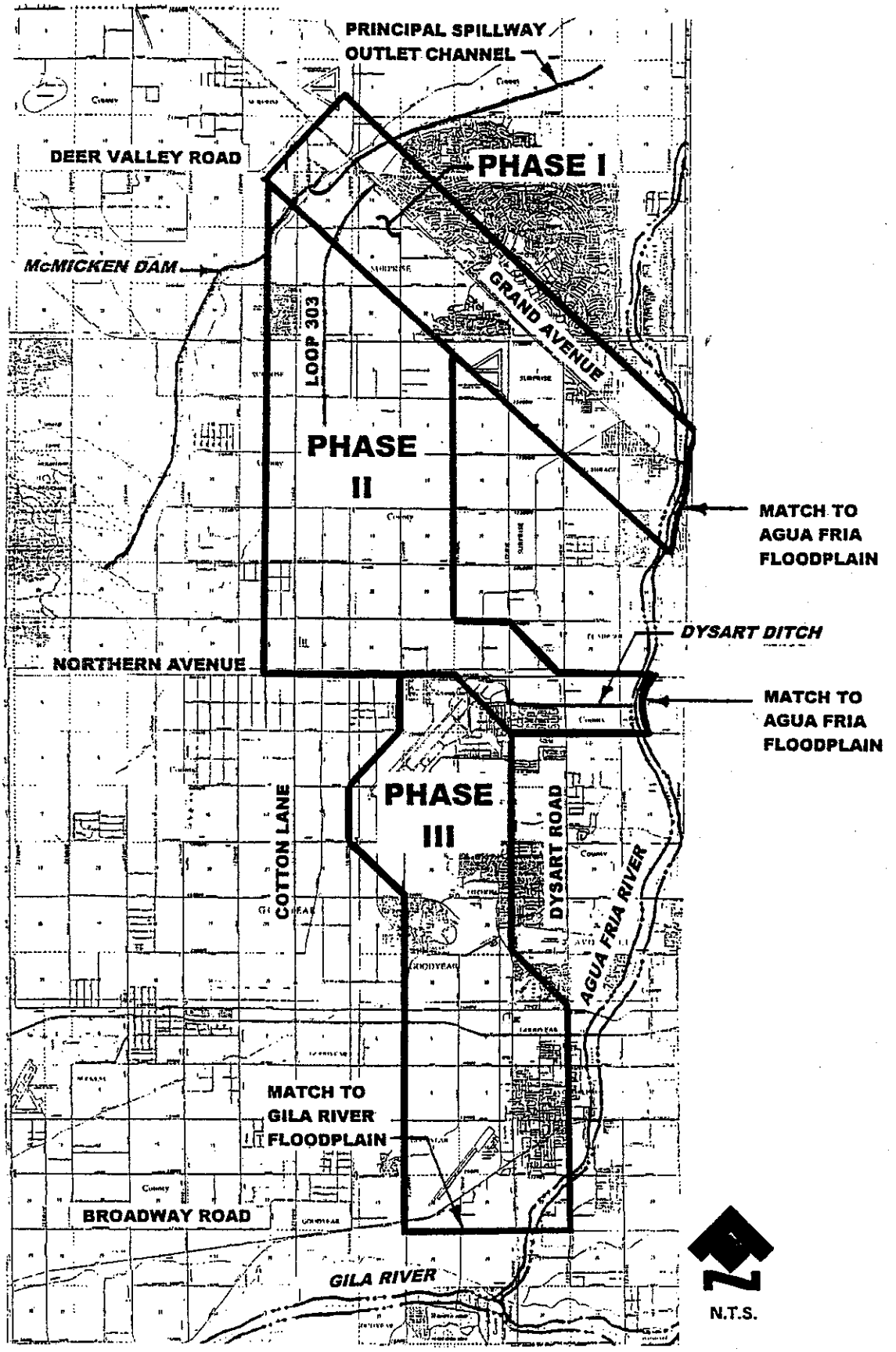
TASK C1 - COORDINATION

The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope during the proposal stage. The consultant shall update and resubmit this project schedule whenever changes in the schedule occur.

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

The consultant will obtain any necessary Rights of Entry or permits for access to private or public land. The consultant will furnish the District with a list of all property owners notified and a sample Right of Entry letter.

The consultant shall meet with officials from the City of Goodyear, the Town of Buckeye, and other agencies in the study areas. The purpose of this meeting is to notify them about the study and obtain information on current or planned public works projects in the study area.



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Engineering
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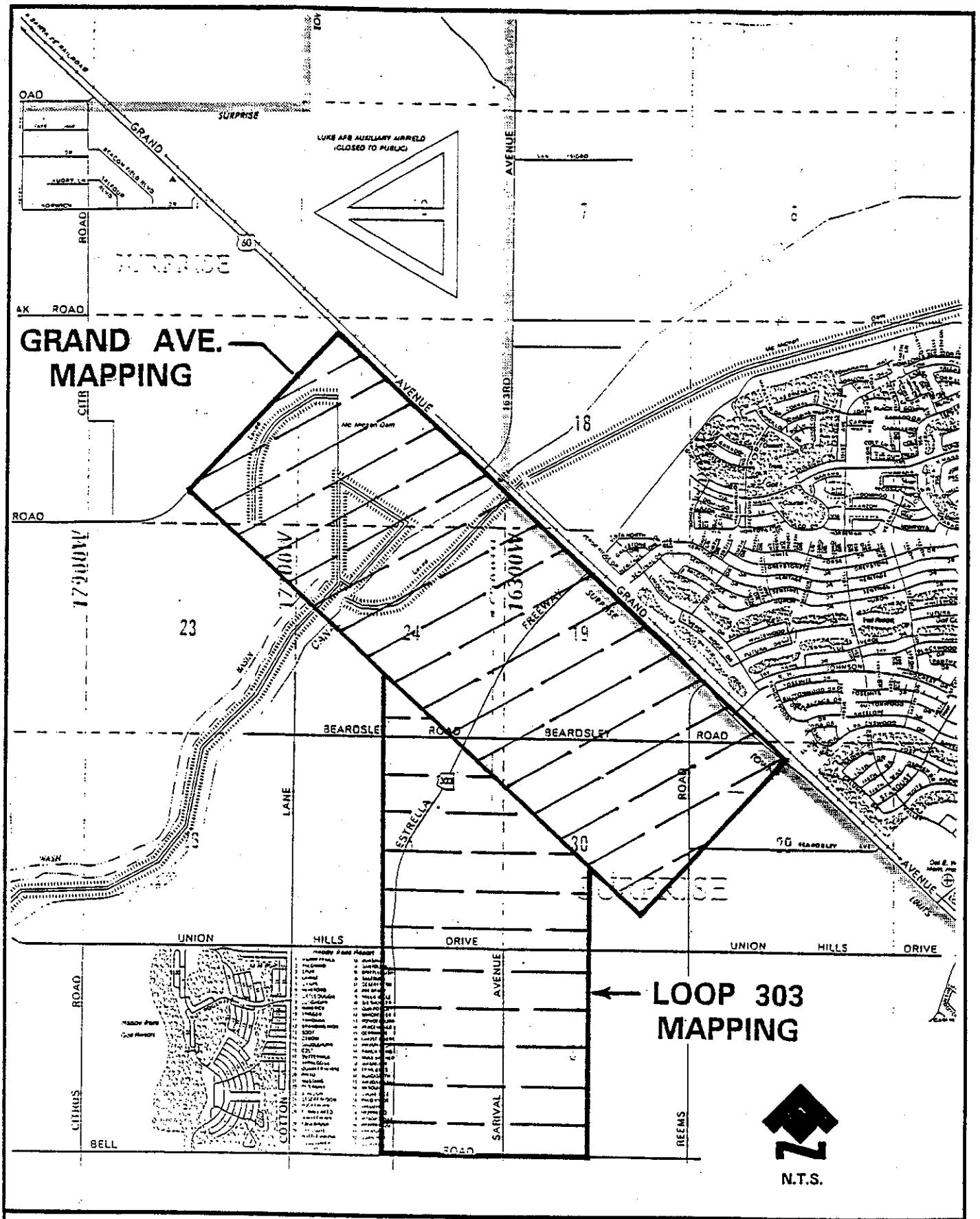
McMICKEN DAM
Study Limits
EXHIBIT 'B-1'



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McMICKEN DAM
Mapping Limits
EXHIBIT 'B-2'

2 Meeting Minutes

Hoskin Engineering Consultants, Inc.
323 W. Roosevelt, St., Ste. 200
Phoenix, AZ 85003
Tel. (602) 252-8384
Fax (602) 252-8385

Meeting Minutes

Date Prepared: Dec. 13, 2000

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: January 24 2000, 10:00 a.m.

Location: Offices of District

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

White Tanks #4

- The final invoice for payment of the withholding payments can be submitted. We need to include the Certificate of Performance. This holds the subs harmless, etc.

Adobe Dam

- For the Skunk Creek, we proposed to use the HEC-2 model instead of the HEC-RAS model. This is because the original model was prepared in HEC-2 and the two models can yield different results, particularly at the bridges.
- Tim sent the final comments on White Tanks #4 GIS to me. Paul should check to see if DEI received them. On checking, Hal did receive them.
- For the delineation along Skunk Creek, we should plot the BFEs every ½ mile or so. Detailed BFEs are not required more often.
- Elisa will complete a summary sheet for the Skunk Creek.
- The mapping is currently on the 1927 datum. We should check with Mark Brewer about the required shift.
- Check the flight date of the older mapping.
- Double check the spillway elevation and location as shown on the maps. Tim says the elevation is off by approx. 1 foot from that shown on the Corps plans.
- Still need to show the approximate flood zone downstream of the Arrowhead Lakes.
- The area between 51st Ave. and 55th Ave. should show average depth rather than the 0' to 3' currently shown. It can be explained in the report that the max. depth is in the street.

- The area west of 59th Avenue has been developed since the mapping was completed
- It may be possible to eliminate Sheet 9, etc. where there is no information shown.
- Still need to complete the Manning's 'n' evaluation for the area west of 55th Ave.
- Tim hopes to have comments sometime next week.

McMicken Dam

- In the Adobe Dam we used the digital photographs at a 4' resolution.
- Tim will authorize Phase 1 and 2, and hopes that Phase 3 will not be necessary.
- The District has a database of field photographs for the area.
- Greg Jones is the PM for the McMicken/Loop 303 ADMS.

The next meeting will be scheduled after talking with Tim about his progress on the Adobe submittal.

c. Attendees.

Hoskin Engineering Consultants, Inc.
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Tel. (602) 252-8384
Fax (602) 252-8385

Meeting Minutes

Date Prepared: June 15, 2000

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: May 18, 2000, 10:00 a.m.

Location: Flood Control District of Maricopa County

Attendees: Tim Murphy, FCD
John Cahoon, KAM
Gary Finney, KAM
Hal Marron, DEI
Elisa Canez, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss mapping for the Adobe Dam project and the aerial mapping contract for the McMicken Dam project.

Discussion:

- Currently the mapping submitted to HEC has holes in it where the new mapping is incomplete. This was pieced together from three CDs submitted on three different occasions. Kenney will re-submit the mapping on a single CD with all of the mapping in it.
- Work on the McMicken Dam project cannot be authorized until tentative approval has been reached for the Adobe Dam mapping. Kenney will coordinate the submittal with Mark Brewer of the District.
- Paul spoke to Chuck Gardner at Project Engineering Consultants to check on establishing a schedule for the ground control.
- Next meeting is scheduled for June 6, 2000 at 10:00a.m.
-

c. Attendees

Hoskin Engineering Consultants, Inc.
323 W. Roosevelt, St., Ste. 200
Phoenix, AZ 85003
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Fax (602) 252-8385

Meeting Minutes

Date Prepared: June 17, 2000

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: June 16, 2000, 10:00 a.m.

Location: Flood Control District of Maricopa County

Attendees: Tim Murphy, FCD
John Stock, FCD
John Cahoon, KAM
Gary Finney, KAM
Chuck Gardner, PEC
Hal Marron, DEI
Elisa Canez, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss mapping for the Adobe Dam project and the aerial mapping contract for the McMicken Dam project.

Discussion:

McMicken Dam

- For the McMicken Dam project, panels were set in the field by PEC. The flight was completed 6/9/00. Vertical control still needs to be established. This mapping contract has not yet been approved by the District. Further work will be halted until approval is reached which may be some time next week.
- John Stock discussed the County's new requirements for keeping field notebook records. He handed out a draft memorandum about the forthcoming changes.
- District will be making changes to the horizontal and vertical control datums. However, they are controlled by the requirements of FEMA. For now 1929 vertical with a conversion to 1988, and 1983 horizontal will be used. For LOMR projects, it will be necessary to hold to the original FEMA mapping datums.

- For the McMicken Dam mapping, the control will be the same as that used for the White Tanks and Wittman ADMS. New mapping will be cut into the old mapping.
- Mapping which is re-submitted to the District will include hydrologic and mapping label data. It will only be necessary for us to submit information that the District does not have. Labels will be submitted on the CARTO layer.

Adobe Dam

- A composite aerial photograph and topography has been compiled. Currently, it covers the entire watershed area and uses the lowest resolution photographs. The photograph does not reflect the recent channelization work which was completed as a part of the Simons and Li design.
- Data Collection is ongoing. We have prepared a summary of study information available. We still need to gather information for the Arrowhead Ranch drainage study and drainage structure design.
- Cross-section layout was presented for review. When the flow reaches the Arrowhead Ranch lakes it may inundate the surrounding houses. DEI needs the topography to be provided for areas extending west to the outfall channel. It may be necessary to model the lake system using the HEC-1 model. HEC-1 will be able to give the hydrograph timing as well. A flat topped hydrograph might be used.
- The outflows from the Principal and emergency spillways are 2360 cfs and 9620 cfs (total 11980 cfs). The following discharges are proposed for the different discharges:
-

Summary of Proposed Discharges (cfs) from Principal and Emergency Spillways.

	0	1/3	2/3	Full
Principal	1890	2100	2200	2360
Emergency	0	3200	6400	9620
Total	1890	5300	8600	11980

- For the area upstream of 51st Avenue (limits of SLA study) we will need to obtain hard copies of the CVL study
- The next meeting is scheduled for June 27 at 10:00 a.m. at the offices of DEI.

c. Attendees

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Meeting Minutes

Date Prepared: August 14, 2000

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: July 25, 2000, 10:00 a.m.

Location: Offices of District
Attendees: Tim Murphy, FCD
Hal Marron, DEI
Elisa Canez, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Adobe Dam project.

Discussion:

Skyline Wash

- For the final submittal of this project the engineer's seal will be required.

Adobe Dam

- HEC and DEI met last week and decided that it will be necessary to obtain field survey for the lake outflow structures at Arrowhead Lakes. Our research of "as-built" records still leaves some of the elevations unknown. PEC has been contacted and survey scheduled for several structures within the study area. We will obtain survey information for the lowest lake outlet at Beardsley Road, the invert of the box culverts, the elevation of the top of wall, and cross-sections along Beardsley Road. In addition, we will obtain the lake elevation for the first lake which flow will enter from the east, the size and inverts of the principal outlet box culvert crossing of Beardsley Road near 43rd Ave, and the cross-section of the Special Ditch 'J' along Beardsley Road.
- We will develop a HEC-1 model for the emergency spillway outlet using the hydrograph information presented in the Corps report. The 1/3 and 2/3 discharges

will be assumed to be pro-rated. This hydrograph will be used to route through the lake system. Flow diverts will be modeled at 51st Avenue and Beardsley Road.

- We will model the system assuming that the culverts at the outlet from Arrowhead Lakes are both not plugged with debris and also fully plugged.
- While we are waiting for the survey information, we will also put together HEC-RAS cross-sections for the 55th Avenue channel and also along Beardsley Road to 59th Avenue.

McMicken Dam

- This project is not authorized to proceed yet. The District wants to make sure that the White Tanks mapping and the new mapping are both on the 1983 horizontal datum. Possibly a mapping meeting will be held in two weeks on August 10, 2000.

- A meeting time and date was not established for the next regular meeting.

c. Attendees.

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Meeting Minutes

Date Prepared: Nov. 14, 2000

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: October 5, 2000, 10:00 a.m.

Location: District Offices

Attendees: Tim Murphy, FCD
Marta Dent, FCD
John Stock, FCD
Gary Finney, Kenney Aerial Mapping
John Cahoon, Kenney Aerial Mapping
Hal Marron, DEI
Tim Kelly, DEI
Elisa Canez, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the mapping for the McMicken Dam study and the ongoing study progress for the Adobe Dam study.

Discussion:

McMicken Dam

- Ground control has not yet been completed. All ground control will be in State Plane Coordinate System. Mapping Datum 1929 vertical datum.
- We should provide a copy of the White Tanks topography to Kenney. Tim will provide us with an electronic file and the photographs. Photos have a date of Jan. or Feb. of this year.
- The original White Tanks mapping was prepared with a datum of 1927 and was converted to 1988.
- Kenney will establish a schedule for delivery of the mapping. Originally they had indicated 4 months from the flight date. They currently estimate 35 working days.

- Cross-section checks for the Adobe Dam mapping have not yet been completed by PEC. PEC will get a new electronic file for the structures and will contact us in regards to the cross-section checks.
- Kenney will get back with us in regards to a schedule for the mapping.

Adobe Dam

- Check that our address has been updated with the District.
- Review the overflow area from the 55th Avenue channel.
- Evaluate the freeway storage in regards to flow that passes underneath the bridges. These will be treated like large culverts.
- use average depth and velocity calculations for the street because the hydraulic model can become too complex as the flood hazard becomes reduced.
-

c. Attendees.

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Meeting Minutes

Date Prepared: April 19, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: February 28 2001, 10:00 a.m.

Location: Offices of DEI

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

Adobe Dam

- The flow split analysis was reviewed.
- The spillway location has now been revised and the cross-section re-numbered accordingly.
- DEI plans on using the Cyrax Laser scanner on the Adobe Dam spillway, using it as a test project.
- The revised flow split analysis along the freeway indicates that 400 cfs will cross the freeway in the full discharge event. Three HEC-RAS models were prepared, and weir flow analysis was conducted for flow entering the median and for flow crossing the median to the south lanes. Elisa will prepare a write-up to summarize the methodology used in the analysis.
- The HEC-RAS velocities need to be added to the sheets.
- Kristyn has addressed Tim's comments on the report.

McMicken Dam

- A field visit is scheduled for March 9 at the District.
- We should contact Stanley Consultants for information along the Loop 303 (Cotton Lane) frontage road. Talk to Brad Novacek
- We need the McMicken Dam design reports.

- The mapping from Kenney Aerial has a narrow strip along Grand Avenue. We should talk to them about whether it is possible to get a little more mapping coverage.

The next meeting will be on March 9 at 10:00 a.m. at the offices of the District for a Field Reconnaissance.

c. Attendees.

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Meeting Minutes

Date Prepared: April 19, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: April 12 2001, 10:00 a.m.

Location: Offices of DEI

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Pat Moraca
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

Adobe Dam

- The Final Report was submitted to Tim. Tim does not have any new comments on the maps at this stage.
- The GIS mapping review still needs to be completed.
- The GIS conversion of the submittal will be completed by HEC after all of the District's comments have been received for the delineation and report.

McMicken Dam

- A field visit is scheduled for March 9 at the District.
- We should contact Stanley Consultnats for information along the Loop 303 (Cotton Lane) frontage road. Talk to Brad Novacek
- We need the McMicken Dam design reports.
- The mapping from Kenney Aerial has a narrow strip along Grand Avenue. We should talk to them about whether it is possible to get a little more mapping coverage

The next meeting will be on March 9 at 10:00 a.m. at the offices of the District for a Field Reconnaissance.

c. Attendees.

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Meeting Minutes

Date Prepared: May 9, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: May 8, 10:00 a.m.

Location: Offices of DEI

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- Preliminary versions of the Data Collection and Field Reconnaissance appendices were submitted to the District.
- A HEC-RAS model of Phase I, Reach A was reviewed. The model was run for a range of flows between 35,000 and 95,000 cfs, and indicated that only the 95,000 cfs flow is not contained between the spillway embankments. The model also indicated the tendency for the majority of the spillway flow to head west, toward Union Hills Drive along the Estrella Freeway.
- Flow values to be used in the study have not been determined by the District.
- Tim will get copies of the spillway rating curve from the Alert System group at the District, and of the data collection from the District's structure assessment.

c. Attendees

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Meeting Minutes

Date Prepared: June 20, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: June 13, 10:00 a.m.

Location: Offices of HEC

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Pat Moracca, DEI
Kristyn Van Meter, HEC
Paul Hoskin, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- The flow split analysis has been completed upstream of the Loop 303 freeway. This was reviewed. There are possible changes to the discharge numbers as a result of assessing an area of overtopping where flow could possibly rejoin the flow which heads to the south.
- The new and detailed topography ends within the Sun City Grand area which is now under construction. A review of the topography suggests that flow within Grand Avenue has the potential to leave Grand Avenue and enter the golf course on the north and south sides of the Sun City Grand entrance.
- A review by Pat of the flow along Loop 303 indicates that ponding will occur in the area of the Clearview overpass. A block wall along the south east side of the freeway will impede the flow of water. Once overtopped, flow will enter the subdivisions and flow southeasterly. It was decided to complete the HEC-RAS model and cross-sections south to Bell Road, assuming that there is an infinitely high block wall, so as to determine the areas of potential overtopping.
- Manning's 'n' values will change in the area of the freeway. As follows: Freeway n=0.020, Grand Ave. n = 0.020, composite approx. 0.023

Adobe Dam

- The District requires a new certificate of Insurnace
- GIS submittal to be made tomorrow.
- Invoice for June by July3
- Next meeting to be Wednesday, June 20 at 10:00 a.m. at the offices of HEC

c. Attendees

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Meeting Minutes

Date Prepared: July 11, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: July 11, 10:00 a.m.

Location: Offices of HEC

Attendees: Elisa Canez, DEI
Hal Marron, DEI
Pat Moracca, DEI
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- HEC-RAS models for Reach B, from the freeway south to Northern Avenue, have been set up. Through Sun City Grand, sections were created from trends in the topography, versus individual contours.
- A weighted Manning's 'n' value will be assigned to the sections in Reach B.
- Modifications will be made to cross-sections in model MDA1, which may impact the flow split to Sun City Grand.
- Pat is obtaining information on the Dysart Drain.
- Next meeting to be Wednesday, July 18 at 10:00 a.m., at DEI.

c. Attendees

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Meeting Minutes

Date Prepared: July 25, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: July 25, 10:00 a.m.

Location: Offices of DEI

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Pat Moracca, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- The weir at the Loop 303 freeway was used to commence the upstream end of the HEC-RAS model. The geometry for this cross-section should be adjusted by – 3 feet to account for the actual ground elevation at that cross-section.
- Sheet breakouts for scales of 500, 600 and 800 were reviewed. We should send an example of the 600 scale to Tim. The 800 scale does not seem to be a good scale. We would like to make a decision about the scale and sheet breakout by the end of the week.
- Delineations of the floodplains have been developed for the two HEC-RAS models. Areas of islands will be shown as areas of potential flooding.
- We will depict the boundary between the two HEC-RAS models with a dashed line, and callout.
- The drainage channel on the north side of Grand Avenue will be used as the flood limits.
- There is a difference of water surface elevation between the two HEC-RAS models of up to 2.5 feet, with the higher elevation adjacent to Grand Avenue. The weir flow option will be used to determine the flow which will pass from the north model to the south model.

- At the lower end of the north model, there is an area where the majority of the flow takes a path that is in a southeasterly direction. A side weir will be used here also to account for some flow that occurs back in the direction of Grand Avenue.
- At each of the major mile streets there is the potential for a portion of the flow to be directed south. The magnitude of this flow will not be accounted for, however, a note will be added to the plans to state that there is the potential for this flow to occur.
- Islands between the two models will be shown as potential flood hazards.
- Next meeting to be Wednesday, August 1 at 10:00 a.m., at HEC.

c. Attendees

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Meeting Minutes

Date Prepared: August 8, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: August 1 2001, 10:00 a.m.

Location: Offices of HEC

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Pat Moraca, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- A 600-scale sheet and sample sheet breakout was reviewed for acceptance of the final map product. The scale and sheet breakout appear to be acceptable. We need to make a note about the mapping source. On the second sheet, which will show the flow distributions, we will also show the mapping sources.
- After reviewing the potential flow split which occurs at the southern end of the hydraulic model adjacent to Grand Avenue (HEC model), it was decided to prepare a rating curve to model the side weirs that can occur both to the north and the south.
- The DEI flood delineations have been completed to date for the upper model. Flow split changes, which result from the aforementioned splits, will have some minor impact on the lower reach model.
- The Dysart Drain plans were reviewed. The Dysart Drain is very flat, and may influence the flow distribution at the low end of the model. Currently, a majority of the flow is being forced to cross through a natural low area, due to the 200-scale mapping. The design plans show that conditions differ at the Dysart Drain. It was decided to use the top of the north embankment of the Dysart Drain as the HEC-RAS cross-section. Flow block outs will be used if the south side of the Drain embankment poses an obstruction to flow.
- Pat will write a description about the Dysart Drain.

- Tim will provide topography for the area downstream of the Dysart Drain so that an approximate analysis of the floodplain downstream can be evaluated.
- The Field Reconnaissance needs to be updated to include areas at the lower end of the study. This will not be completed by next week, so that time can be focused on completion of the rest of the study.
- The next meeting will be held at HEC on Wednesday August 8 at 10:00 a.m.

c. Attendees

Hoskin Engineering Consultants, Inc.
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Meeting Minutes

Date Prepared: August 28, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: August 22 2001, 10:00 a.m.

Location: Offices of HEC

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- DEI prepared a backwater analysis along the Dysart channel, which confirms that the channel has a capacity of 15,000 cfs to the east, the maximum flow that would reach it under full flow conditions.
- We will add 2-3 additional cross-sections downstream of the Dysart channel so that the model is completed to the Agua Fria River. In continuing the HEC-RAS model, the water surface elevation across the weir at Dysart channel will be set at a computed water surface elevation. This will allow the model to be continuous across the channel.
- Overtopping into the base is only likely to occur during the full flow condition, and it cannot be quantified. The model will assume that 100% will flow east along the channel, however, it will be noted that the possibility of flow entering the base exists. We will call out a reference to the report on the plans.
- Flow splits will be shown at Dysart Road on sheet 2.
- The two main HEC-RAS models have been modified to remove a sliver of land that would otherwise exist between the two models. The geometry for the cross-sections was modified so that the end of one cross-section matches the beginning of the adjacent cross-section, and the break point was established as the point where the full flow water surface intersects the natural ground on model MDB1.

- The current channel calculations for the Principal outlet channel indicate that it has insufficient capacity to handle a full flow through the principal outlet. Therefore, the area immediately downstream has a high flood potential. This should be noted on the approximate area which will be delineated just downstream of the outlet.
- Hal is currently reviewing the field reconnaissance section of the report.

c. Attendees

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Meeting Minutes

Date Prepared: Sept. 5, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: August 28 2001, 10:00 a.m.

Location: Offices of HEC

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Hal Marron, DEI
Paul Hoskin, HEC
Kristyn Van Meter, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- The area downstream of the Dysart Channel was reviewed. Glendale Road acts as a flood barrier, and may pond flow to the north and divert some flow east to the river. This will be reviewed.
- We have being doing a review of the cross-section s data from a GIS compliance standpoint. There are some cases where the cross-sections do not meet, or their alignment is slightly off. This will be reviewed.
- The area south of the principal outlet was discussed. The "mixed flow" model was resulting in a switch between subcritical and supercritical flow just downstream of the embankment for the outlet channel. This condition results because of the steep grade change, but results in floodplain limits that do not truly depict the extent of flooding for the full and /23 flow conditions. The model was changed to a subcritical flow model, and this corrected the situation.
- There are locations just downstream of the outlet channel, where the 1/3 and full floodplains cross. This situation needs to be corrected, possibly by re-aligning the cross-sections.
- We will use Version 2.2 of HEC-RAS because the report generator feature does not work in Version 3.0.
- Adjust Cross-section 14.78 to allow a butt match. The 1/3 and 2/3 flow areas will be adjusted to reflect the results of the road flow diversion.

- All models will be run with “mixed flow” for all models except for the upper reach.
- The next meeting will be September 5 at the offices of HEC.

c. Attendees

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Meeting Minutes

Date Prepared: Sept. 19, 2001

Project: Contract FCD 98-32
Delineation of Spillway Flows for Three West Side Structures

Date: September 12 2001, 10:00 a.m.

Location: Offices of HEC

Attendees: Tim Murphy, FCD
Elisa Canez, DEI
Pat Moraca, DEI
Kristyn Van Meter, HEC
Paul Hoskin, HEC

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

McMicken Dam

- Add DEI logo to the plans
- Spell out the name Thunderbird
- Field Reconnaissance Report photos have been reduced to 70. Check the reference in the appendix, and add the Figure nos. to the Table of Contents.
- Call Chuck Gardner to verify that they have sent info. to the GIS Dept.
- The GIS reviewer will be Eric.
- Submit report to Tim by next Wednesday.
- Need to submit mylars for Adobe Dam, and complete a Certificate of Performance.

c. Attendees

McMICKEN DAM
SPILLWAY DELINEATION STUDY

(FCD 98-32)

APPENDIX B: DATA COLLECTION

McMicken Dam
Spillway Delineation Study

Appendix B: Data Collection

Table of Contents

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Figure B-1: Existing Facilities Map

Excerpts from Previously Completed Studies
Survey Report:
  Aerial Panels
  Flood Control Files
  Check Sections
  Survey Notes
  NGS Data

1 Introduction

The data collection phase of the spillway delineation includes identifying known floodplain locations, collecting hydrologic and hydraulic data used in the design of McMicken Dam, and collecting information regarding the design of existing structures within the study area. The purpose of this Data Collection Report is to describe the data gathering process and to present the findings. Results from this report are used in later phases of the study.

2 Methods of Data Collection

2.1 Existing Studies

Existing studies and "as-built" plan sets were researched for McMicken Dam, the Estrella (Loop 303) Freeway, Grand Avenue, Sun City Grand, and for contributing areas within the watershed. The bibliography provides a list of available studies, reports, study references, and plan sets. Information was obtained through the Flood Control District of Maricopa County, the Arizona Department of Transportation (ADOT), and the Maricopa County Department of Transportation (MCDOT).

2.2 Field Reconnaissance

A field reconnaissance was conducted to investigate the principal outlet, outlet channel, and spillway of McMicken Dam, and the downstream area which could potentially be affected by any spillway flows. Results from the field reconnaissance phase of the study are included in Appendix C.

3 Previously Completed Studies

The following are brief summaries of information presented in previously completed hydraulic and hydrologic studies of McMicken Dam. Excerpts from a few of the studies are included at the end of this appendix.

Design Memorandum No.1: Hydrology and Hydraulic Design for Trilby Wash Detention Basin and Outlet Channel. This report presents the hydrology used to size the McMicken Dam structures, including the dam, spillway, and outlet structure. Included are the methodology for determining the Standard Project Flood, the Maximum Probable Flood, and the Design Flood, as well as inflow/outflow reservoir routing hydrographs. Pertinent data from the report are included in Section 4.1 of this appendix. Excerpts from this report are included at the end of this appendix.

Design Memorandum No. 2: Design Analysis for Trilby Wash Detention Basin and Outlet Channel. This report presents the hydraulic calculations and design for the emergency spillway and principal outlet structure, including the outlet channel. Pertinent data from the report is included in Section 4.1 of this appendix, and a portion of the report is reproduced at the end of this appendix.

Hydrologic Analysis for McMicken Dam. This report presents hydraulic analyses for several remedial design measures, including increased spillway lengths and the removal of heavy vegetation immediately upstream of the spillway. A portion of the report is reproduced at the end of this appendix.

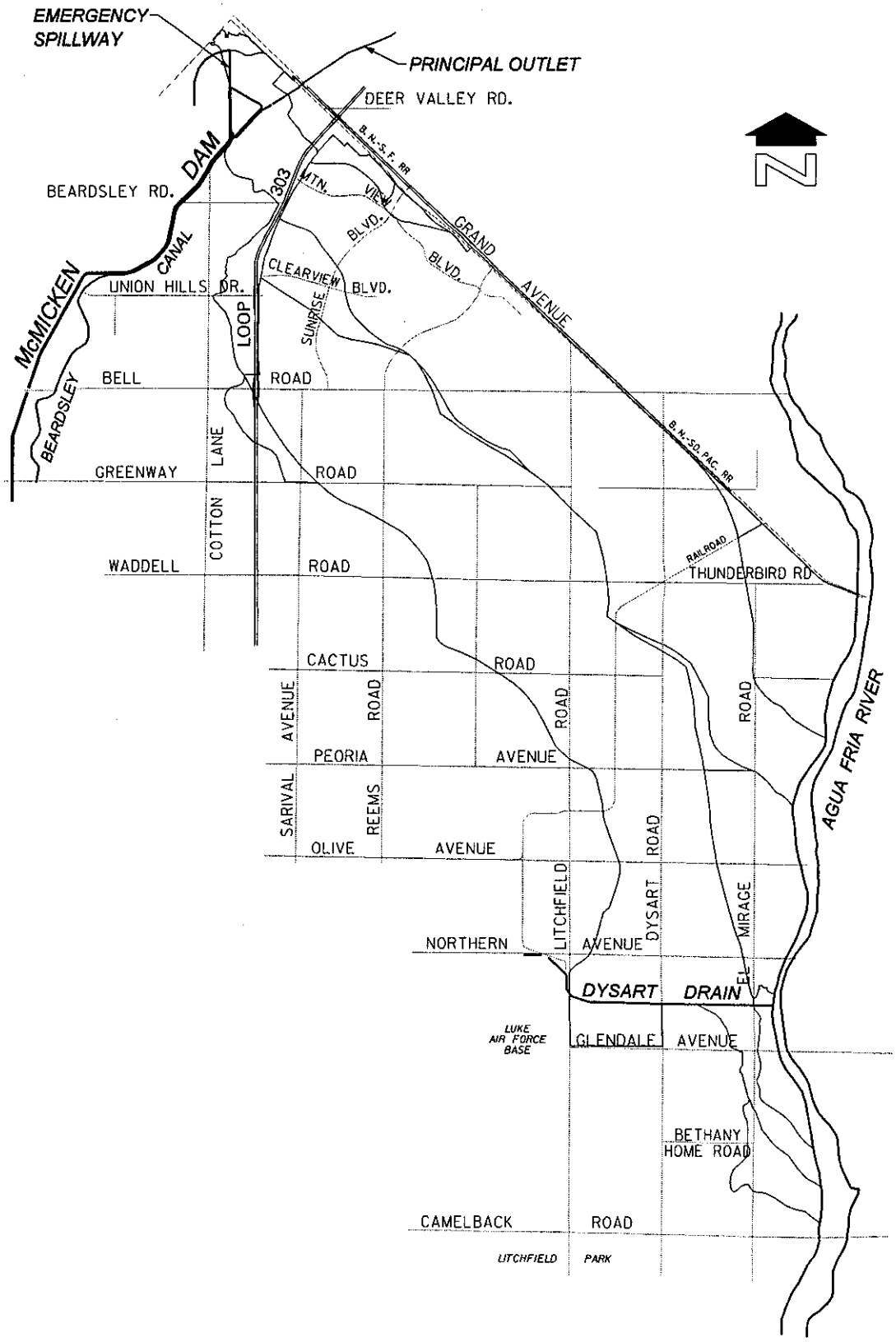
4 Existing Facilities

Major existing facilities within the study area include: McMicken Dam, the Estrella Freeway (Loop 303), Grand Avenue, the Burlington Northern-Santa Fe Railroad, the master planned community of Sun City Grand, the Beardsley Canal, and the Dysart Drain. Sizes of culverts and channels were determined using "as-built" plans. Locations of each of the listed existing facilities are illustrated on Figure B-1. Brief descriptions of the major existing facilities follow:

4.1 McMicken Dam

McMicken Dam is located west of Grand Avenue, spanning between approximately Peoria Avenue to the south and Grand Avenue to the north. See Figure B-1 for location of the dam, spillway, outlet structure, and outlet channel. The dam, along with its spillway, outlet structure, and outlet channel, were designed by the Corps of Engineers in 1953, to provide flood protection for areas downstream of the dam. At the time, the areas downstream were primarily agricultural. The dam was designed to detain floodwaters from the 247 square-mile portion of the Trilby Wash watershed north and west of the dam (Ref. 9).

The principal outlet, which is located near the northern end of the dam, discharges to the outlet channel. Flow is conveyed in a north-easterly direction toward Grand Avenue, and around the north boundary of Sun City West to the Agua Fria River. The emergency spillway runs north-south from the northern end of the dam. Flow east over the spillway turns to the southeast, parallel to Grand Avenue, toward the outlet channel.



HEC creative engineering solutions
Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85003-1136
Tel: (602) 252-8384
Fax: (602) 252-8385
DEI Professional Services, LLC

McMICKEN DAM SPILLWAY
EXISTING FACILITIES MAP

FIGURE B-1

Data collected for the dam, spillway, and outlet structure includes design reports and hydrologic and hydraulic studies provided by several agencies. See the end of this appendix for excerpts from previously completed studies. The design reports prepared by the Corps of Engineers entitled *Design Memorandum No.1* and *Design Memorandum No.2* (Refs. 9 and 10), and the analysis prepared by the District entitled *Hydrologic Analysis for McMicken Dam* (Ref. 2) present the following hydraulic and design data:

Dam Geometry
- Crest Elevation ..... 1361 ft
- Crest Length ..... 49,500 ft
- Maximum Height ..... 34 ft
- Top Crest Width ..... 12 ft

Principal Outlet Geometry
- Section ..... 20'high x 10'wide
- Elevation ..... 1335 ft

Spillway Geometry (broad-crested weir)
- Crest Elevation ..... 1354 ft
- Crest Length ..... 2,000 ft

Standard Project Flood
- Peak Inflow ..... 35,000 cfs
- Peak Outflow (principal outlet) ..... 4,450 cfs
- Max. Water Surface ..... 1354 ft

Spillway Design Flood
- Peak Inflow ..... 52,000 cfs
- Peak Outflow (combined spillway and outlet) ..... 22,000 cfs
- Max. Water Surface ..... 1356 ft

Probable Maximum Flood
- Peak Inflow ..... 120,000 cfs
- Peak Outflow (combined spillway and outlet) ..... 95,000 cfs
- Max. Water Surface ..... 1360 ft

4.2 Estrella Freeway (Loop 303)

The Estrella Freeway (Loop 303) is currently under construction between Bell Road and Deer Valley Drive. The freeway alignment is north-south mid-section between Cotton Lane and Sarival Avenue, until it reaches Union Hills Drive. North of Union Hills Drive it curves to the northeast, crossing Grand Avenue and the Burlington Northern Santa-Fe Railroad, then continuing to the east (Figure B-1). Between Mountain View and Clearview Boulevards, the freeway will primarily be at or below grade. Prior to the Grand Avenue overpass, the freeway goes above grade, and presents an obstruction to flow that would otherwise flow directly towards Sun City Grand and southeast along Grand Avenue. Because the topography was flown prior to construction, bid documents from the Maricopa County Department of Transportation were obtained to evaluate the impacts the freeway will have on the drainage patterns. Plan and Profile sheets were evaluated to determine the freeway grades.

Data collected for the Loop 303 freeway includes the *Drainage Design Report for the Estrella Roadway & Grade Separation Project* by ASL Consulting Engineers (Ref. 1), and the *Estrella Roadway & Grade Separation* plan set by the Maricopa County Department of Transportation (Ref. Plan Set Bibliography). Excerpts from the plans are included at the end of this appendix.

4.3 Grand Avenue

Grand Avenue runs in a northwest-southeast direction, and crosses the McMicken Dam Outlet Channel at bridged crossings located at approximately the

Deer Valley Drive alignment (Figure B-1). Grand Avenue improvements at the Estrella Freeway crossing include additional lanes for Grand Avenue, and a bridged crossing for the freeway overpass.

Data collected for Grand Avenue includes the *Final Drainage Report, Grand Avenue Widening, Beardsley Canal to Thunderbird Road* by Kimley-Horn and Associates (Refs. 4, 5, 6), and the *U.S. 60 – Deer Valley to Beardsley Road* plans by Dibble and Associates (Ref. Plan Set Bibliography). Excerpts from the plans are included at the end of this appendix.

4.4 Burlington Northern-Santa Fe Railroad

The Burlington Northern-Santa Fe Railroad runs parallel to Grand Avenue, and crosses the McMicken Dam Outlet Channel at a bridged crossing at approximately the Deer Valley Drive Alignment (Figure B-1). It is elevated several feet above the adjacent Grand Avenue.

4.5 Sun City Grand

Sun City Grand is a residential master-planned community located southwest of Grand Avenue (Figure B-1). The Loop 303 freeway borders the development's north and west boundaries.

4.6 Beardsley Canal

The Beardsley Canal flows from the northeast to the southwest through the study area. The canal is typically elevated above grade. Two siphons are located along the canal. The first canal siphon which crosses the McMicken Dam Outlet

Channel is located at the downstream side of the McMicken Dam Principal Outlet. The second is a dirt roadway crossing southeast of the existing shooting range.

4.7 Dysart Drain

The Dysart Drain originates at the Dysart Drain Detention Basin, located within the Falcon Dunes Golf Course at the northeast corner of Northern Avenue and Reems Road. The basin provides flood protection for Luke Air Force Base and the surrounding area. Runoff collected in the basin is released via the Dysart Drain, which runs east along Northern Avenue, southeast past 143rd Avenue to Litchfield Road, and then east along the Orangewood Avenue alignment to the Agua Fria River. The drain, which was designed for the 100-year storm event, is a large concrete-lined trapezoidal channel, with side slopes varying from 1.5:1 to 2:1 (Ref. 7).

Data collected for the Dysart Drain includes the *Dysart Drain Improvement Project 90% Plans Submittal Design Report* by NBS Lowry Engineers and Planners (Ref. 7), and the *Plans of Construction of: Dysart Drain Improvements Project, Reems Road to Agua Fria River Channel Improvements* by the Flood Control District of Maricopa County (Ref. Plan Set Bibliography).

5 Proposed Facilities

Proposed improvements in the region include the currently under-construction Loop 303 freeway, and the Grand Avenue improvements for the Loop 303 freeway overpass. Please refer to the sections above for additional information.

6 References

1. ASL Consulting Engineers, Arizona, Inc., for Maricopa County Department of Transportation, *Drainage Design Report for the Estrella Roadway & Grade Separation Project, Phase I*, July 5, 2000.

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

3. Flood Control District of Maricopa County, *Consultant Guideline*, October 1, 1998.

4. Kimley-Horn and Associates, Inc., *Grand Avenue Widening, Beardsley Canal to Thunderbird Road, Final Drainage Report*, Volume 1 of 3, Contract No. 87-09, Project No. SBM-022-2-301 PE 501C, August 1990.

5. Kimley-Horn and Associates, Inc., *Grand Avenue Widening, Beardsley Canal to Thunderbird Road, Final Drainage Report*, Volume 2 of 3, Contract No. 87-09, Project No. SBM-022-2-301 PE 501C, August 1990.

6. Kimley-Horn and Associates, Inc., *Grand Avenue Widening From Beardsley Canal to Thunderbird Road, Final Drainage Report*, Contract No. 87-09, Project No. SBM-022-2-301 PE, 501C, June 1988.

7. NBS Lowry Engineers and Planners, *Dysart Drain Improvement Project: 90% Plans Submittal Design Report*, September 1994.

8. Stanley Consultants, Inc., for Del E. Webb Development Co., L.P. and Del Webb Construction, Inc., *Master Drainage Report for Del Webb's Grand Avenue Property*, December 1994.

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

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

11. WLB Group, Inc., *White Tanks/Agua Fria Area Drainage Master Study*, 1992.

12. WLB Group, Inc., *Wittman Area Drainage Master Study, Part B: Stormwater Management Plans*, excerpt, 1989.

7 Plan Set Bibliography

Dibble & Associates, *US 60 – Deer Valley Road to Beardsley Road,* Sheets 9-16, February 2001.

Flood Control District of Maricopa County, *Delineation of Spillway Flows for Three West Side Structures*, Contract FCD 98-32 (C-69-99-080-5), March 22, 1999.

Flood Control District of Maricopa County, *McMicken Dam Break Study, Sheet 1: Breach at Outlet Channel.*

Flood Control District of Maricopa County, *McMicken Dam Break Study, Sheet 2: Breach at Trilby Wash.*

Flood Control District of Maricopa County, *McMicken Dam Break Study, Sheet 3: Breach South of Trilby Wash.*

Flood Control District of Maricopa County, *Plans for the Construction of: Dysart Drain Improvement Project: Reems Road to Agua Fria River Channel Improvements, Project No. FCD 94-38*, November 1999.

Kaminski Hubbard, *ACDC ADMS*, Sheets 13-15, 22-26, 34-38, and 48-49, July 11, 1994.

Kenney Aerial Mapping, Inc., *McMicken Dam*, contact prints, flight date June 9, 2000.

Kenney Aerial Mapping, Inc., *McMicken Wash*, mapping, flight date June 9, 2000.

Maricopa County Department of Transportation, *Plans for the Construction of: Estrella Roadway & Grade Separation Phase I*, Project No. 69005, June 8, 2000.

Sergent, Hauskins, & Beckwith, for Flood Control District of Maricopa County, *McMicken Dam Restoration*, July 19, 1983.

Stanley Consultants, Inc., for Del Webb Home Construction, Inc., *Granite Falls North Golf Course As-Built for Recharge System and Irrigation Main, and Reems Road Buffer As-Built for Recharge System.*

United States Army Corps of Engineers, *Trilby Wash Detention Basin, Dam and Appurtenances, As Constructed*, February 19, 1954.

7 Plan Set Bibliography (cont'd.)

WLB Group, Inc., *White Tanks/Agua Fria Area Drainage Master Study, Drainage Area Map*, 1989.

WLB Group, Inc., *White Tanks/Agua Fria Area Drainage Master Study, Floodplain Map*, 1989.

WLB Group, Inc., *Wittman ADMS*, Sheets 1, 29, and 33.

Excerpts from Previously Completed Studies

Dysart Drain Improvements Project, Reems Road to Agua Fria River

by Flood Control District of Maricopa County

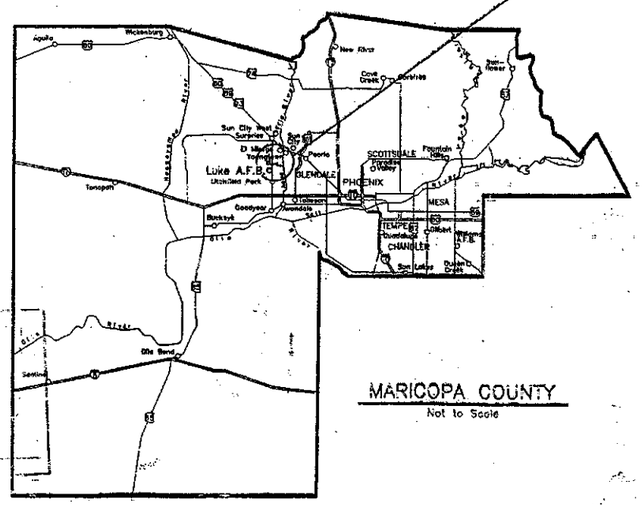
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PLANS FOR THE CONSTRUCTION OF:

DYSART DRAIN IMPROVEMENTS PROJECT
REEMS ROAD TO AGUA FRIA RIVER
CHANNEL IMPROVEMENTS

PROJECT NO. FCD 94-38
LAFB NO. 87-3002

PROJECT NO. FCD 94-38



MARICOPA COUNTY
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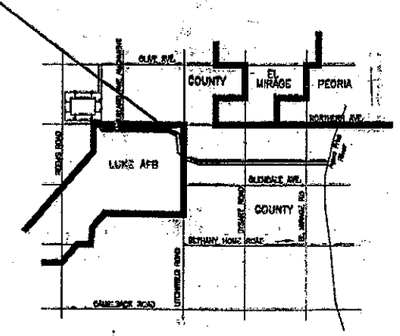

VICINITY MAP
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"AS-BUILT DRAWING"
I HEREBY CERTIFY THAT THE "AS-BUILT DRAWING" MEASUREMENTS AS SHOWN FOR THIS WORK WERE UNDER MY SUPERVISION AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REDUCED SET
NTS

263-100

NBS LOWRY
ENGINEERS & PLANNERS
2800 North 44th Street, Ste. 100
Phoenix, Arizona 85008-1599
(602) 468-1600 FAX 954-4330

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER AND GENERAL MANAGER — DATE

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

TOM RAWLES - CHAIRMAN

DISTRICT 1 - TOM RAWLES
DISTRICT 2 - DON STAPLEY
DISTRICT 3 - BETSEY BAYLESS
DISTRICT 4 - EDWARD KING
DISTRICT 5 - MARY ROSE GARRIDO WILCOX

NBS/LOWRY PROJECT NO. P81-154.016 | SHEET G01/7

49

DYSART DRAIN IMPROVEMENTS
REEMS RD. TO AGUA FRIA
CHANNEL IMPROVEMENTS
AS BUILTS
FCD 94-38

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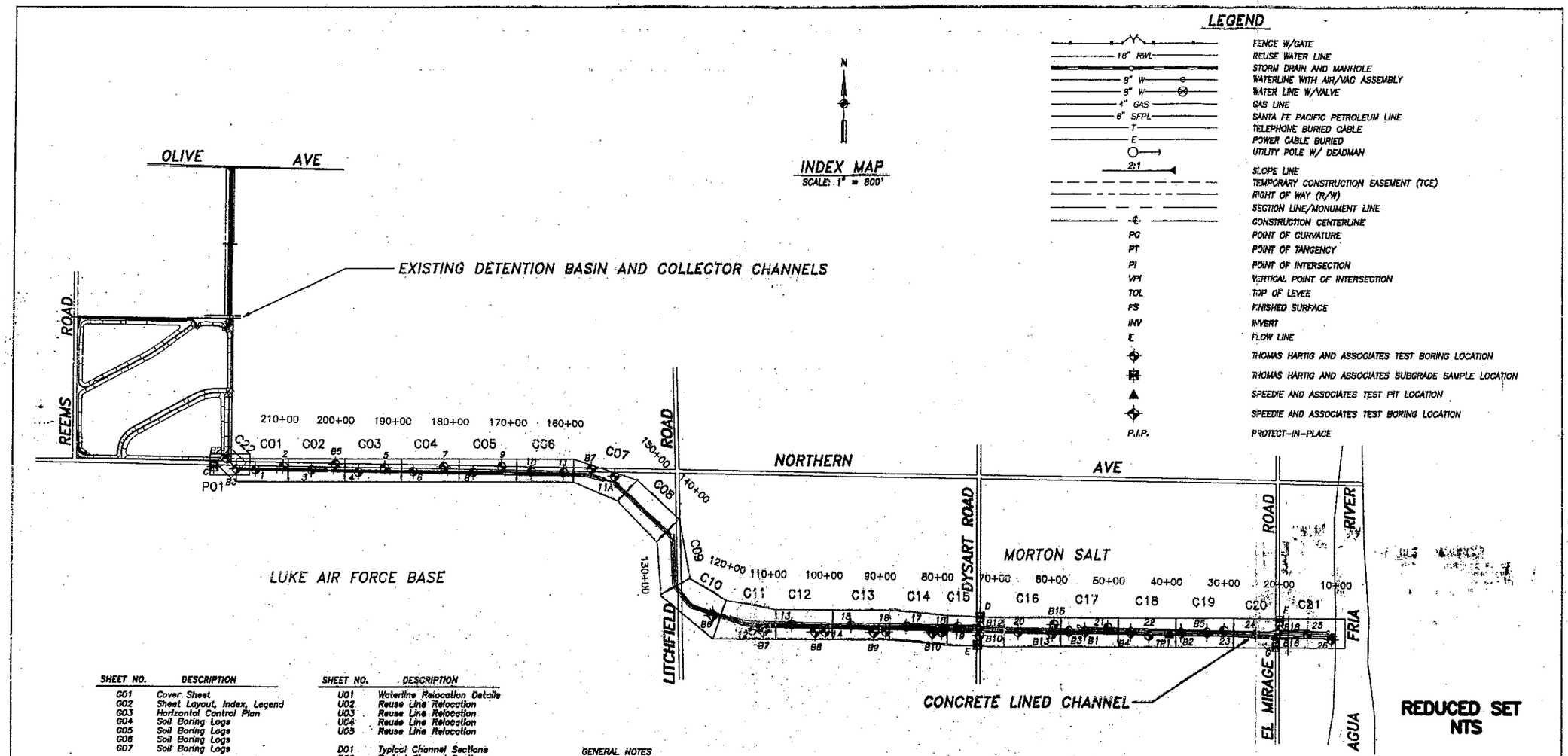

LEGEND

	FENCE W/GATE
16" RWL	REUSE WATER LINE
	STORM DRAIN AND MANHOLE
8" W	WATERLINE WITH AIR/VAC ASSEMBLY
8" W	WATER LINE W/VALVE
4" GAS	GAS LINE
6" SFPL	SANTA FE PACIFIC PETROLEUM LINE
T	TELEPHONE BURIED CABLE
E	POWER CABLE BURIED
	UTILITY POLE W/ DEADMAN
2:1	SLOPE LINE
	TEMPORARY CONSTRUCTION EASEMENT (TCE)
	RIGHT OF WAY (R/W)
	SECTION LINE/MONUMENT LINE
℄	CONSTRUCTION CENTERLINE
PC	POINT OF CURVATURE
PT	POINT OF TANGENCY
PI	POINT OF INTERSECTION
VPI	VERTICAL POINT OF INTERSECTION
TOL	TOP OF LEVEE
FS	FINISHED SURFACE
INV	INVERT
℄	FLOW LINE
	THOMAS HARTIG AND ASSOCIATES TEST BORING LOCATION
	THOMAS HARTIG AND ASSOCIATES SUBGRADE SAMPLE LOCATION
	SPEEDIE AND ASSOCIATES TEST PIT LOCATION
	SPEEDIE AND ASSOCIATES TEST BORING LOCATION
P.I.P.	PROTECT-IN-PLACE

REDUCED SET
NTS

SHEET NO.	DESCRIPTION
G01	Cover Sheet
G02	Sheet Layout, Index, Legend
G03	Horizontal Control Plan
G04	Soil Boring Logs
G05	Soil Boring Logs
G06	Soil Boring Logs
G07	Soil Boring Logs
C01	Channel Plan & Profile
C02	Channel Plan & Profile
C03	Channel Plan & Profile
C04	Channel Plan & Profile
C05	Channel Plan & Profile
C06	Channel Plan & Profile
C07	Channel Plan & Profile
C08	Channel Plan & Profile
C09	Channel Plan & Profile
C10	Channel Plan & Profile
C11	Channel Plan & Profile
C12	Channel Plan & Profile
C13	Channel Plan & Profile
C14	Channel Plan & Profile
C15	Channel Plan & Profile
C16	Channel Plan & Profile
C17	Channel Plan & Profile
C18	Channel Plan & Profile
C19	Channel Plan & Profile
C20	Channel Plan & Profile
C21	Channel Plan & Profile
C22	Outfall Channel Plan & Profile
P01	Northern Ave. Paving Plan

SHEET NO.	DESCRIPTION
U01	Waterline Relocation Details
U02	Reuse Line Relocation
U03	Reuse Line Relocation
U04	Reuse Line Relocation
U05	Reuse Line Relocation
D01	Typical Channel Sections
D02	Typical Channel Sections
D03	Typical Channel Sections
D04	Details
D05	Details
D06	Details
D07	Details
D08	Details
D09	Details
D10	Details
D11	Details
D12	Details
D13	Details
D14	Details
D15	Details
D16	Details
S01	Structural Details
S02	Structural Details
S03	Structural Details
S04	Structural Details
S05	Structural Details
S06	Structural Details
X01	Cross Sections
X02	Cross Sections
X03	Cross Sections
X04	Cross Sections
X05	Cross Sections

GENERAL NOTES

1. THIS PROJECT HAS BEEN DESIGNED USING THE HYDRAULIC DESIGN MANUAL (SEPTEMBER 1992) OF THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.
2. THE INFORMATION ON THESE DRAWINGS CONCERNING THE TYPE, SIZE AND LOCATION OF UTILITIES HAS BEEN SHOWN BASED ON THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES IN PLACE UNLESS OTHERWISE NOTED OR SPECIFIED. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
3. THE ENGINEER WILL NOT GUARANTEE ANY ELEVATIONS OR LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS.
4. THE CONTRACTOR SHALL CALL BLUE STAKE (263-1100) FOR THE LOCATION OF ALL UNDERGROUND UTILITIES TWO (2) WORKING DAYS BEFORE DIGGING.
5. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST MAG, MCDOT OR ADOT STANDARDS AND SPECIFICATIONS OR AS SPECIFIED ON THE PLANS AND IN THE PROJECT SUPPLEMENTARY GENERAL CONDITIONS AND SPECIAL PROVISIONS.
6. TRAFFIC CONTROL SHALL CONFORM TO SECTION 401 OF THE SPECIAL PROVISIONS
7. EXTREME CAUTION IS TO BE USED WHEN OPERATING EQUIPMENT AROUND LOCATIONS OF HIGH VOLTAGE LINES.
8. THE CONTRACTOR WILL OBTAIN NECESSARY MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION PERMITS PRIOR TO CONSTRUCTION WITHIN COUNTY RIGHT OF WAY.
9. THE CONTRACTOR SHALL NOTIFY THE MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION AT LEAST 24 HOURS IN ADVANCE OF ANY CONSTRUCTION WITHIN ROAD RIGHT OF WAY.

"AS-BUILT DRAWINGS"
I HEREBY CERTIFY THAT THESE "AS-BUILT DRAWINGS" MEASUREMENTS AS SHOWN THEREON WERE MADE UNDER MY SUPERVISION AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.
7/1/97

263-1100

NO.	REVISION	DATE
3		
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FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
SHEET LAYOUT, INDEX, AND LEGEND

	BY	DATE
DESIGNED	C. GOPPERTON	9/94
DRAWN	C. SWEATLAND	9/94
CHECKED	C. GOPPERTON	1/95

NBS LOWRY

NBS/LOWRY PROJECT NO. P81-194-019

SHEET G02/7

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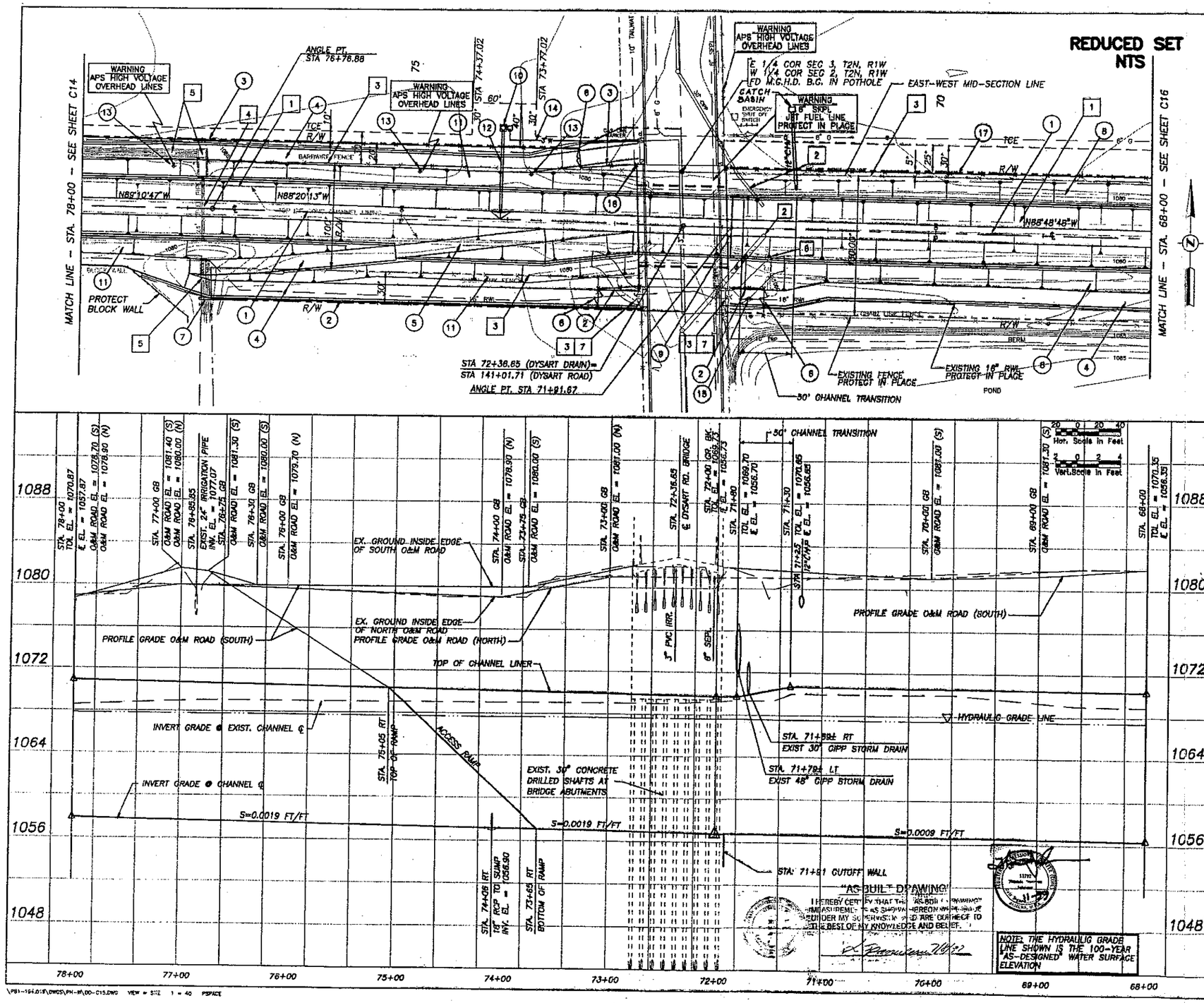

REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. CUT AND REMOVE EXISTING CIPP, CONNECT TO CHANNEL PER PER DETAIL 21 AND 17.
3. REMOVE EXISTING FENCE
4. REMOVE EXISTING 24" PIPE CROSSING
5. REMOVE EXISTING CONCRETE LINED DITCH AND CONCRETE JUNCTION STRUCTURE
6. REMOVE EXISTING 18" CMP
7. REMOVE EXISTING GATE.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL NO. 8. ADD CORROSION INHIBITING ADMIXTURE FROM STA 68+00 TO 72+00
2. CONSTRUCT NEW 8' CHAIN LINK FENCE ADOT STD. NO. C-12.20 TYPE 1.
3. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL NO. 35.
4. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL NO. 30.
5. CONSTRUCT NEW MAINTENANCE ACCESS RAMP PER DETAIL NO. 3.
6. CONSTRUCT NEW 14 FT BARBED WIRE DOUBLE GATE AT 40' BACK FROM R/W LINE, PER DETAIL NO. 38.
7. CONSTRUCT NEW HEADWALL, STA 76+80, 83' LT, PER DETAIL NO. 24.
8. CONSTRUCT NEW SHOTCRETE SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL NO. 4.
9. CONSTRUCT NEW CUTOFF WALL PER DETAIL NO. 12.
10. CONSTRUCT NEW SUMP PER DETAIL NO. 28.
11. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL NO. 5.
12. CONSTRUCT 18" RCP SUMP CONNECTOR PIPE PER DETAIL NO. 28.
13. EXISTING POWER POLE, PROTECT IN PLACE.
14. INSTALL 3" PVC IRRIGATION LINE AT 24" DEPTH. CONNECT TO 3" PVC AT EAST END, AND CAP AT WEST END NEAR SUMP. WRAP WITH LOCATOR TAPE. SEE DETAIL NO. 28.
15. ADJUST EXISTING AIR/VAC VAULT TO GRADE.
16. TIE NEW FENCE INTO EXISTING FENCE ON BOTH SIDES OF BRIDGE, AT ALL FOUR CORNERS (TYP.).
17. CONSTRUCT NEW 6' CHAIN LINK FENCE ADOT STD. NO. C-12.20 TYPE 1. STA. 71+97 TO 59+60.

NO.	REVISION	DATE
3		
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FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 78+00 TO STATION 68+00

	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. GOPPERTON	5/95

NBS LOWRY

NBS/LOWRY PROJECT NO. P81-194-019

SHEET C15/22

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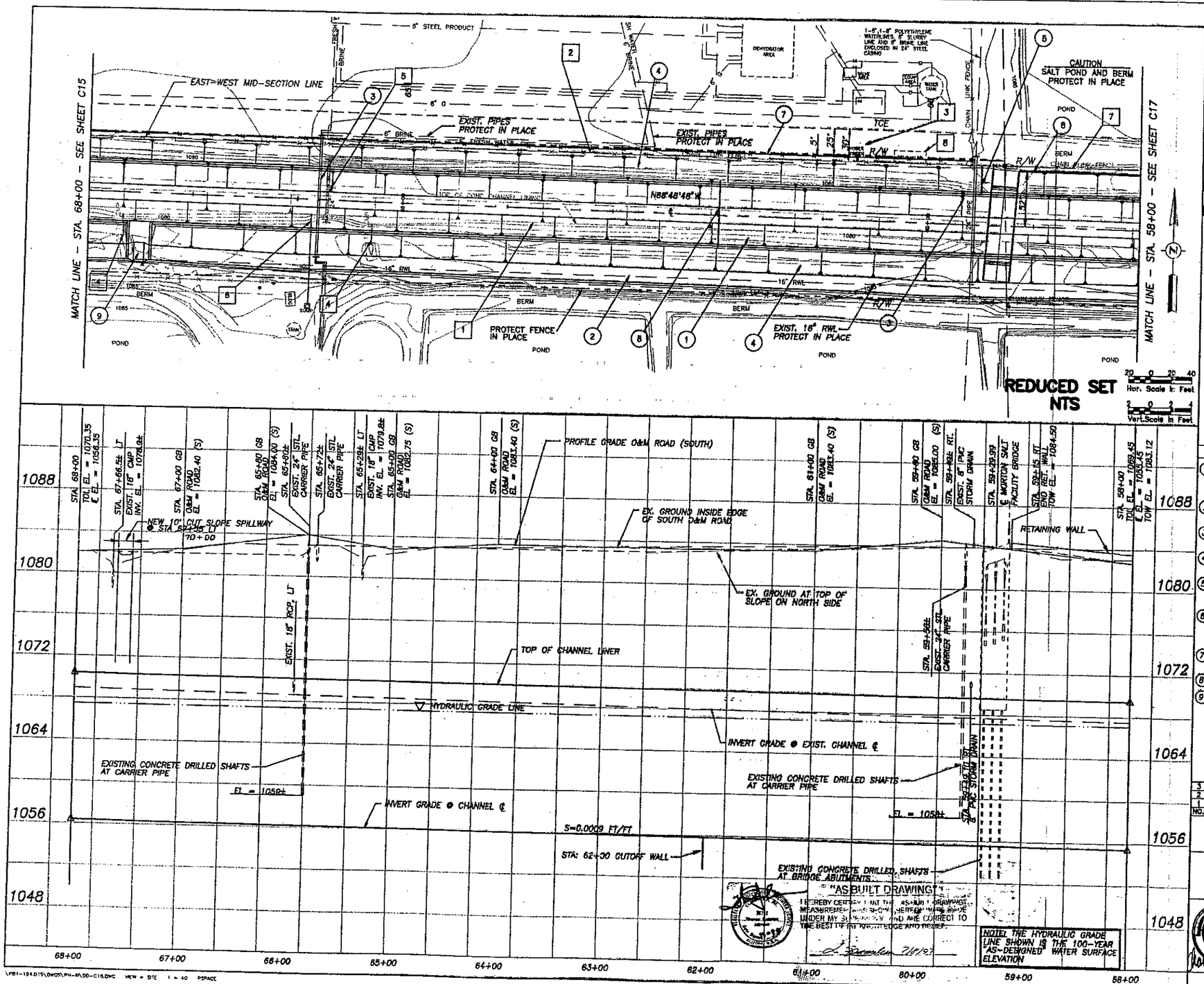

REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL.
2. REMOVE EXISTING CHAIN LINK FENCE, STA 59+60 TO 71+97.
3. RELOCATE ELECTRICAL FACILITIES (BY OTHERS).
4. REMOVE EXISTING 18" CMP.
5. REMOVE EXISTING ABANDONED CARRIER PIPE.
6. CUT AND PLUG EXIST. SUMP PIPE, PER MAG STD. DETAIL NO. 427.
7. REMOVE AND REINSTALL AS REQUIRED EXISTING CHAIN LINK FENCE AND GATE STA 59+60 TO 55+25.
8. REMOVE AND DISPOSE OF CONCRETE SLAB.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL NO. 6. ADD CORROSION INHIBITING ADMIXTURE FROM STA 58+00 TO STA 68+00
2. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL NO. 30.
3. CARRIER PIPES WITH UTILITY PIPING, PROTECT IN PLACE, SEE DETAIL 43.
4. CONSTRUCT NEW SHOTCRETE SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL NO. 4.
5. CONSTRUCT NEW 8" PVC STORM DRAIN EXTENSION. CONNECT TO EXISTING DRAIN AND CONNECT TO CHANNEL PER DETAIL 21.
6. CONSTRUCT NEW RETAINING WALL PER DETAIL NO. 13, STA. 58+00 TO 59+15. TOP OF WALL ELEV TO MATCH TOP OF BRIDGE RETAINING WALL.
7. CONSTRUCT NEW 8' CHAIN LINK FENCE, PER ADOT STD. NO. C-12.20, TYPE 1, STA 59+60 TO 71+97.
8. CONSTRUCT NEW CUTOFF WALL PER DETAIL 12.
9. CONSTRUCT NEW CUT SLOPE SPILLWAY WITH O&M ROAD CROSSING, STA ~~67+03~~ 70+00, L=38 FT, W=10 FT, D= 0.5 FT, ELEV "A" = 1061.70 PER DETAIL NO. 10.

263-100

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 68+00 TO STATION 58+00

	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. COPPERTON	5/95

NBS LOWRY

NBS/LOWRY PROJECT NO. PB1-194-019

SHEET C16/22

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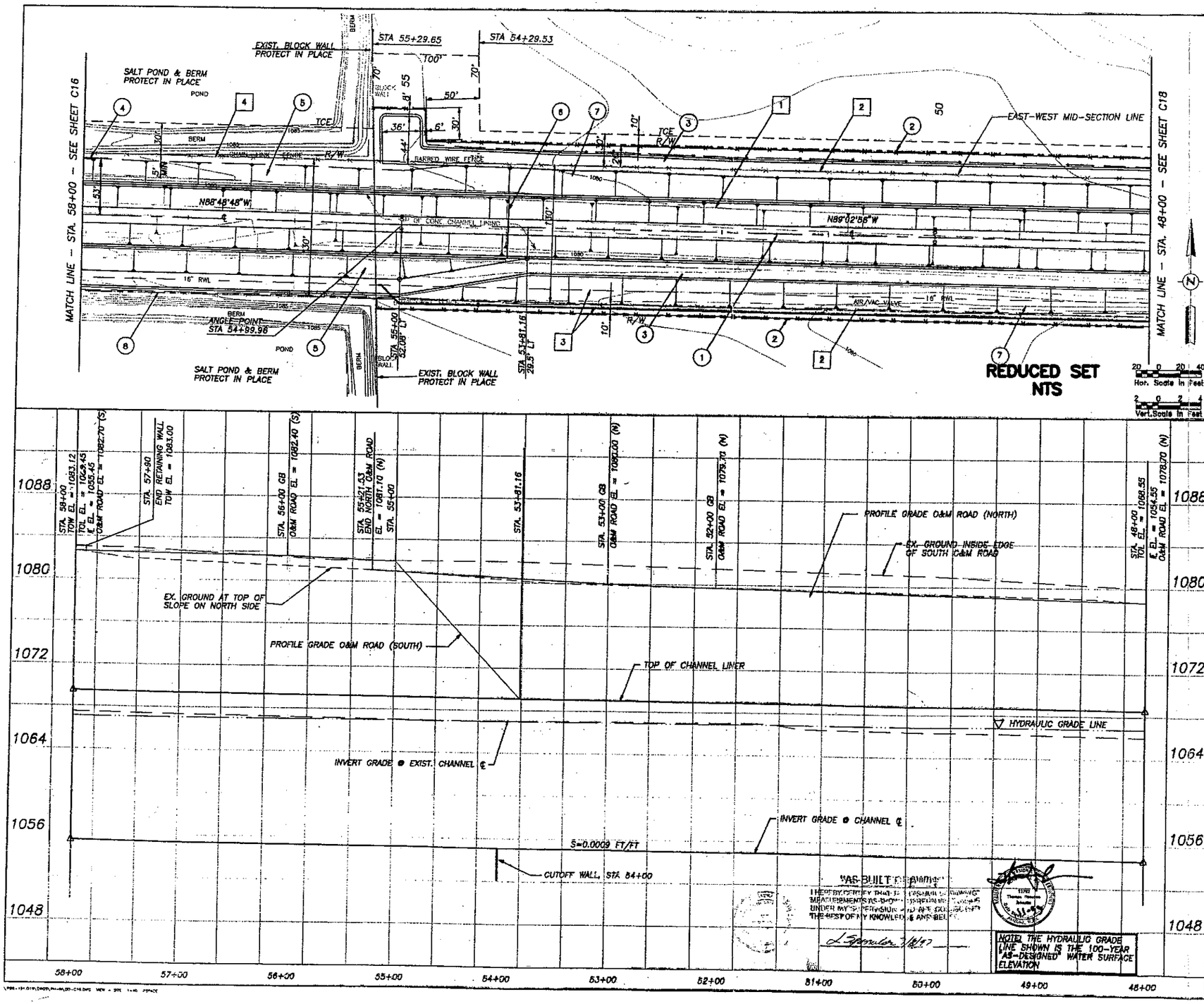

REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. REMOVE EXISTING FENCE, END AT BLOCK WALL STA 55+25±.
3. REMOVE AND RELOCATE EXISTING REUSE WATER LINE, SEE REUSE WATER LINE PLANS.
4. REMOVE AND REINSTALL AS REQUIRED EXISTING CHAIN LINK FENCE AND GATE, STA 59+60 TO 55+25.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL 6.
2. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL 35, END AT BLOCK WALL, STA 55+25±.
3. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL 30.
4. CONSTRUCT NEW RETAINING WALL PER DETAIL 13 FROM STA 57+90 TO ST 58+00.
5. CONSTRUCT NEW SHOTCRETE SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL 4.
6. CONSTRUCT NEW CUTOFF WALL PER DETAIL 12.
7. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION, PER TYPICAL SECTIONS AND DETAIL 5.
8. EXISTING FENCE. PIP.

263-1100

NO.	REVISION	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

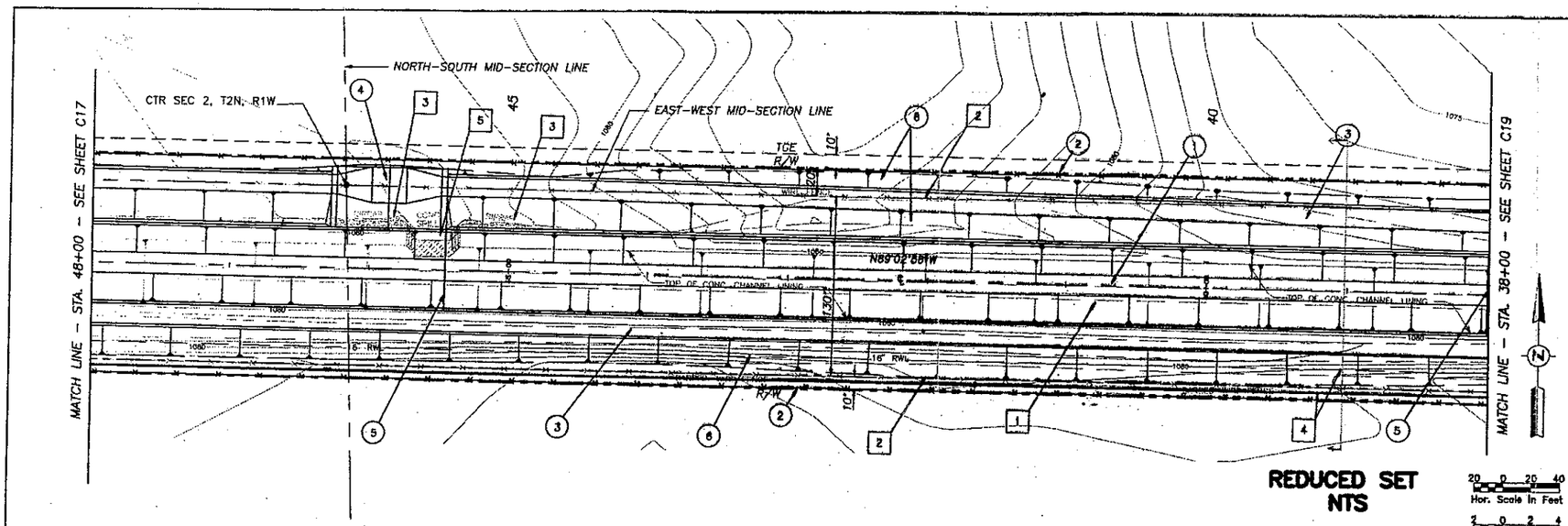
DYBART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 58+00 TO STATION 48+00

	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	G. GOPPERTON	5/95

NBS LOWRY

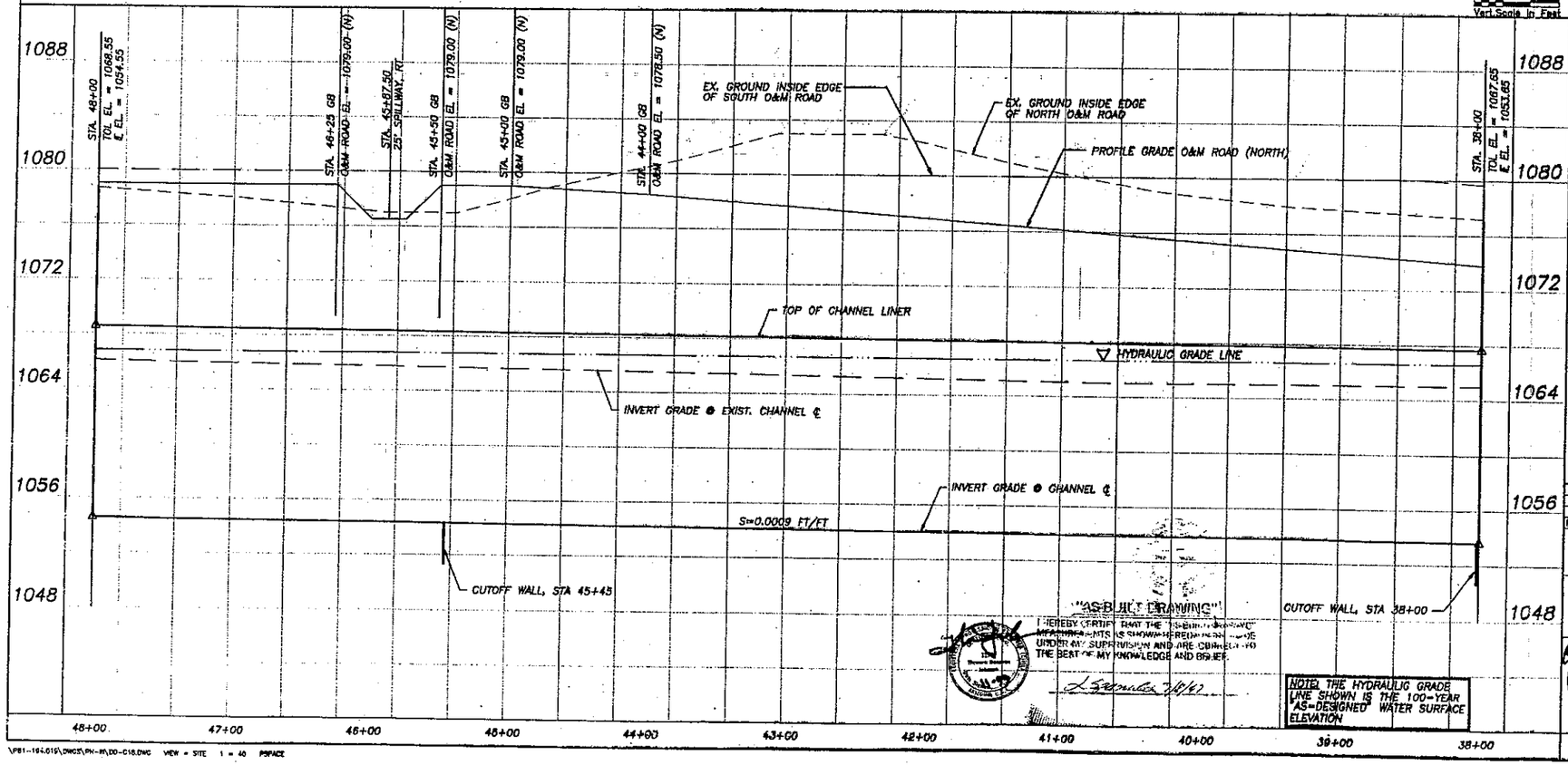
NBS/LOWRY PROJECT NO. P61-194-019

SHEET C17/22



REDUCED SET
NTS

Hor. Scale In Feet (20 0 20 40)
Vert. Scale In Feet (2 0 2 4)



"AS-BUILT DRAWING"
I HEREBY CERTIFY THAT THE "AS-BUILT DRAWING" MEASUREMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NOTE: THE HYDRAULIC GRADE LINE SHOWN IS THE 100-YEAR "AS-DESIGNED" WATER SURFACE ELEVATION

REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. REMOVE EXISTING BARBED WIRE FENCE
3. REMOVE EXISTING RIP RAP
4. REMOVE AND RELOCATE EXISTING REUSE WATER LINE, SEE REUSE WATER LINE PLANS.
5. REMOVE EXISTING CONCRETE SPILLWAY.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL 6.
2. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL 35.
3. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL 30.
4. CONSTRUCT NEW SPILLWAY, STA 45+87.50, DETAIL 8.
5. CONSTRUCT NEW CUTOFF WALL PER DETAIL 12.
6. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION, PER TYPICAL SECTIONS AND DETAIL 5.

263-1100

NO.	REVISION	DATE
3		
2		
1		

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 48+00 TO STATION 38+00

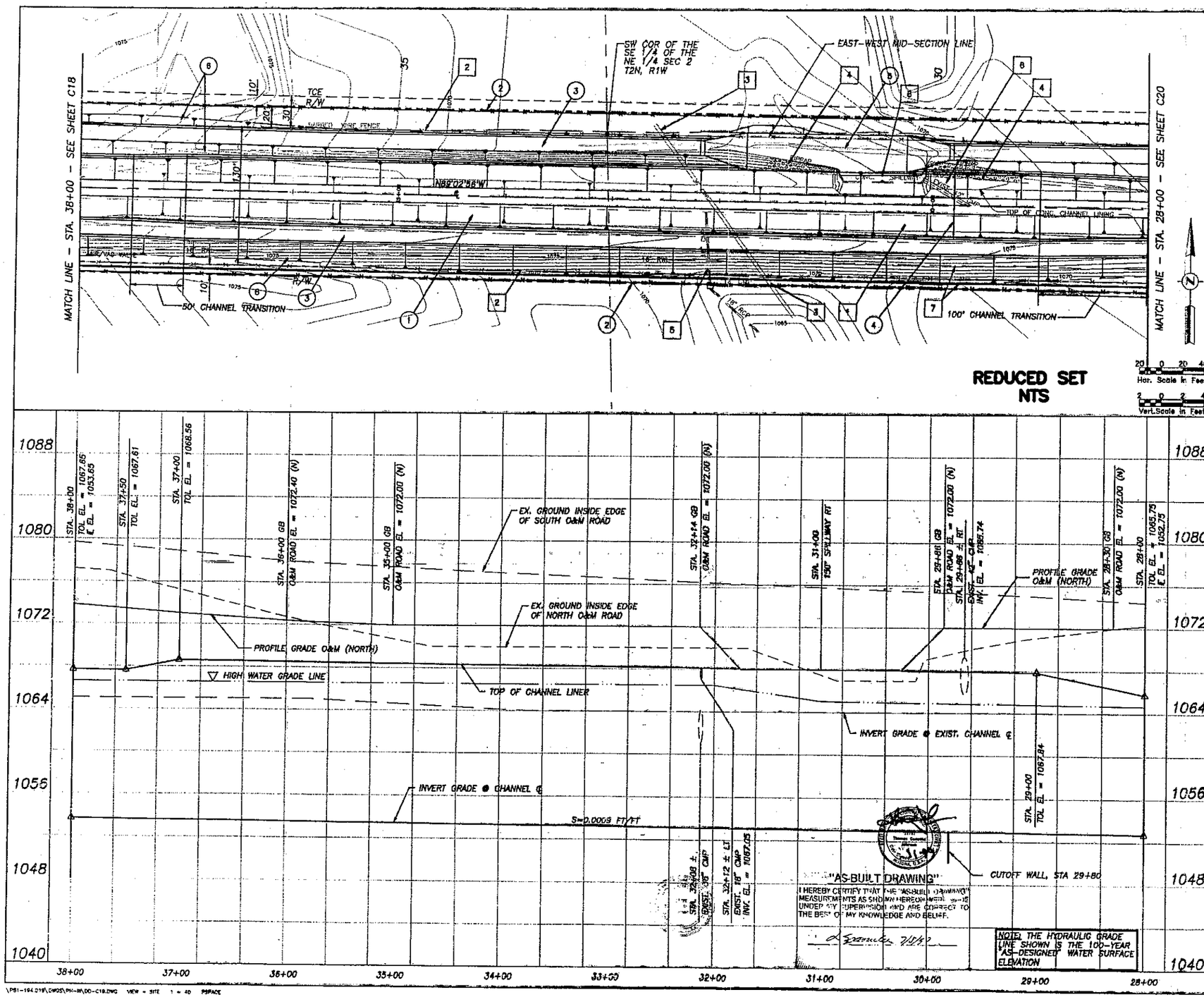
	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. GOPPERTON	5/95

NBS LOWRY

NBS/LOWRY PROJECT NO. P81-194-019

SHEET C18/22

\P81-194-019\DWGS\PH-III\DD-C18.DWG VIEW = SITE 1 = 40 PSPACE



REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. REMOVE EXISTING BARBED WIRE FENCE
3. CUT AND PLUG EXISTING 36" CMP 5' OUTSIDE EXCAVATION LIMITS PER MAG STD 427
4. REMOVE EXISTING RIP RAP
5. CUT AND PLUG EXISTING 18" CMP 5' OUTSIDE EXCAVATION LIMITS PER MAG STD 427
6. REMOVE EXISTING 42" CMP
7. REMOVE AND RELOCATE EXISTING REUSE WATER LINE, SEE REUSE WATER LINE PLANS
8. REMOVE EXISTING CONCRETE SPILLWAY.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL 6.
2. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL 35.
3. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL 30.
4. CONSTRUCT NEW CUTOFF WALL PER DETAIL 12.
5. CONSTRUCT NEW SPILLWAY, STA 31+00, DETAIL 7.
6. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL 5.

263+100

NO.	REVISION	DATE
3		
2		
1		

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 38+00 TO STATION 28+00

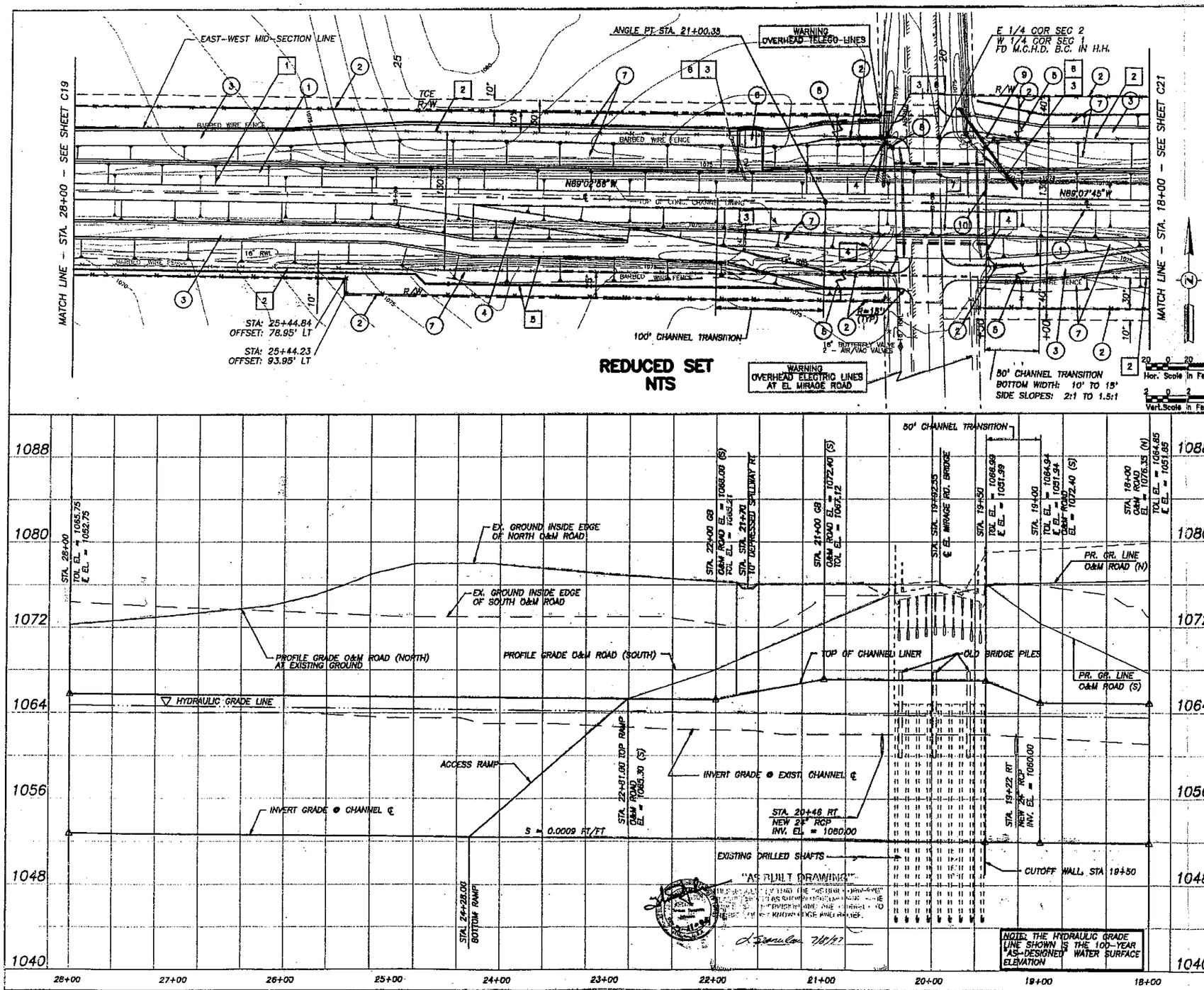
	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. GOPPERTON	12/94

NBS/LOWRY

NBS/LOWRY PROJECT NO. PB1-194-019

SHEET C19/22

\PB1-194.019\DWGS\PH-IM\DD-C19.DWG VIEW = SITE 1 = 40 PSPACE



REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. REMOVE EXISTING BARBED WIRE FENCE
3. REMOVE EXISTING PIPES.
4. REMOVE EXISTING GATES.
5. REMOVE AND RELOCATE EXISTING REUSE WATER LINE, SEE REUSE WATER LINE PLANS.
6. REMOVE CONCRETE DRAINAGE BOX.
7. REMOVE FOUNDATION PILES OF OLD BRIDGE AS REQUIRED. EXISTING TOP OF PILES ARE AT ELEV 1068±.

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL 6.
2. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL 35.
3. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL 30.
4. CONSTRUCT NEW MAINTENANCE ACCESS RAMP PER DETAIL 3.
5. CONSTRUCT NEW 14 FT BARBED WIRE DOUBLE GATE AT 40' BACK FROM R/W LINE, PER DETAIL 36.
6. CONSTRUCT NEW CUT SLOPE SPILLWAY WITH O & M ROAD CROSSING, STA 21+70, EL. = 1075.70, W=10 FT, L=40 FT, D=0.5 FT, PER DETAIL 10.
7. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL 5.
8. CONSTRUCT NEW 24" X 68' RCP, MITER OUTLET END PER DETAIL 16; NEW STRAIGHT HEADWALL, MAG STD 501-1, STA 20+42.5, 85' RT INVERT = 1073.5
9. CONSTRUCT NEW 24" X 91' RCP, MITER OUTLET END DETAIL 16; NEW STRAIGHT HEADWALL, MAG STD 501-1, STA 19+76.1, 88.5' RT INVERT = 1074.5
10. CONSTRUCT NEW CUTOFF WALL PER DETAIL 12.

283-100

NO.	REVISION	DATE
3		
2		
1		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 28+00 TO STATION 18+00

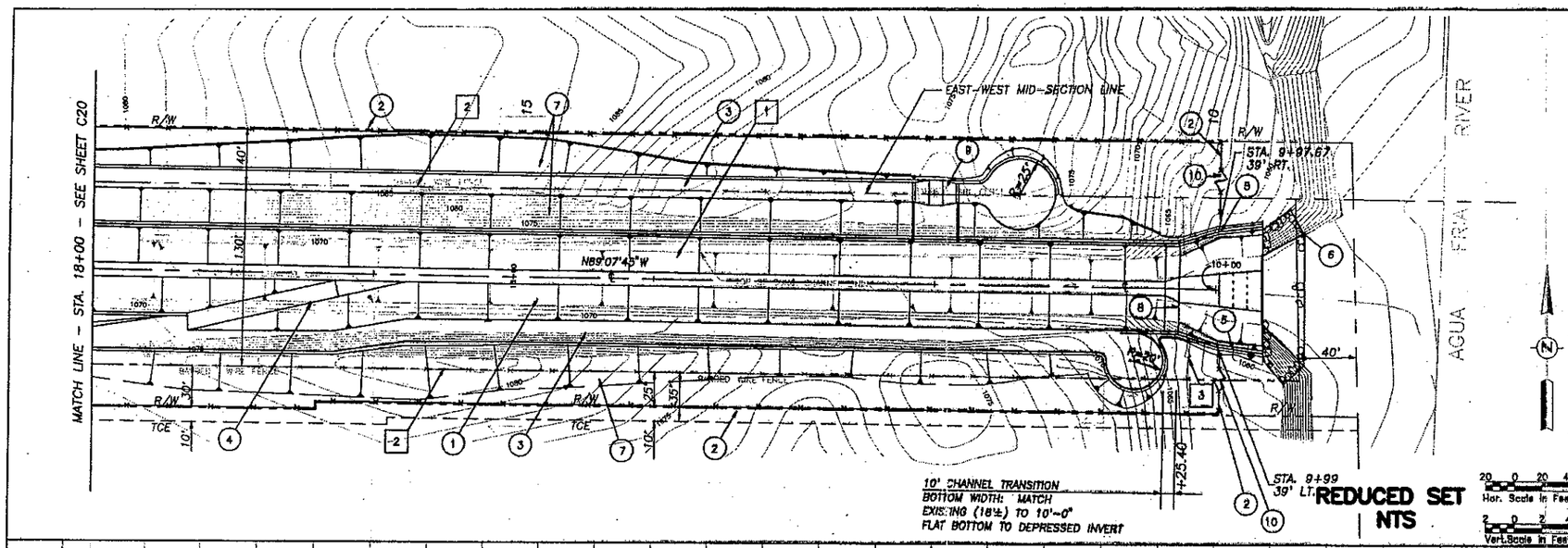
	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. GOPPERTON	5/95

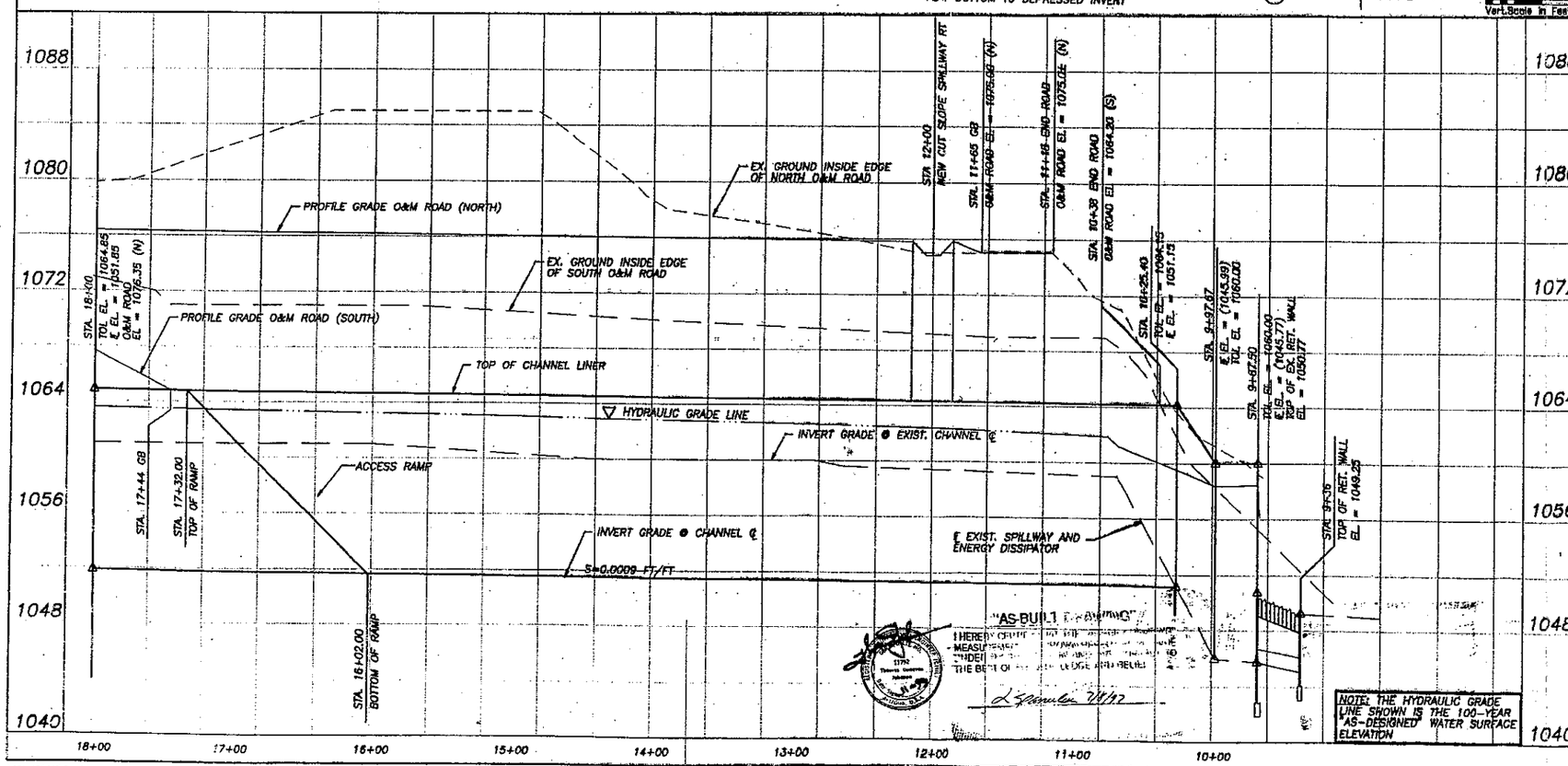
NBS LOWRY

NBS/LOWRY PROJECT NO. P81-194-019

SHEET C20/22

\P81-194.019\DWGS\PH-III\DD-C20.DWG VIEW = STIC 1 = 40 PSPACE





REMOVE

1. REMOVE EXISTING CONCRETE CHANNEL
2. REMOVE EXISTING BARBED WIRE FENCE
3. REMOVE EXISTING GATE

CONSTRUCT

1. CONSTRUCT NEW REINFORCED CONCRETE CHANNEL PER TYPICAL SECTIONS AND DETAIL 6.
2. CONSTRUCT NEW BARBED WIRE FENCE PER DETAIL 35. TERMINATE AT STA. 10+00.
3. CONSTRUCT NEW O&M ROAD PER TYPICAL SECTIONS AND DETAIL 30.
4. CONSTRUCT NEW MAINTENANCE ACCESS RAMP PER DETAIL 3.
5. EXTEND CHANNEL LINING PER DETAIL 1 AND DETAIL 18, STA. 9+68 TO STA 10+25.40
6. CONSTRUCT NEW GROUTED RIP RAP TYPE II OUTLET PROTECTION PER DETAIL 18.
7. CONSTRUCT GRAVEL MULCH SLOPE PROTECTION PER TYPICAL SECTIONS AND DETAIL 5.
8. SAWCUT EXISTING CHANNEL, STA 10+25.40; TIE NEW LINING INTO EXISTING CHANNEL LINING PER DETAIL 2.
9. CONSTRUCT NEW CUT SLOPE SPILLWAY WITH O&M ROAD CROSSING, STA 12+00, L=44 FT, W=10 FT, D=1.0 FT, ELEV. "A" = 1074.80, DETAIL 10.
10. CONSTRUCT NEW 14' DOUBLE BARBED WIRE GATE ON BOTH SIDES AS SHOWN AND PER DETAIL 38.

2S3-100

NO.	REVISION	DATE
3		
2		
1		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
CHANNEL PLAN AND PROFILE
STATION 18+00 TO STATION 9+36

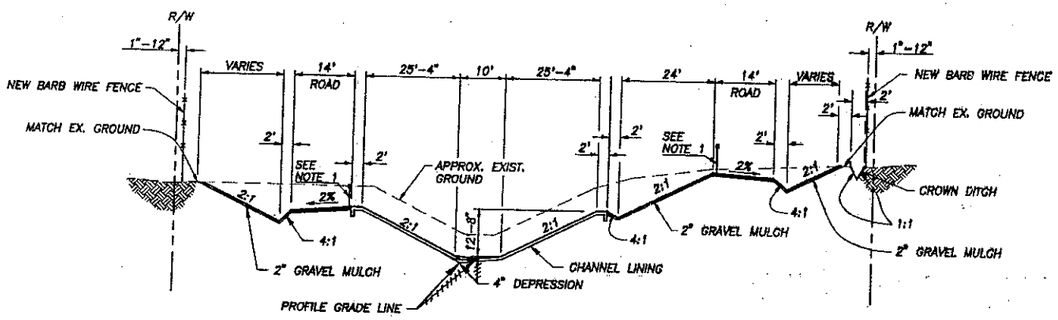
	BY	DATE
DESIGNED	S. YINGLING	9/94
DRAWN	S. YINGLING	9/94
CHECKED	C. GOPPERTON	5/95

NBS LOWRY

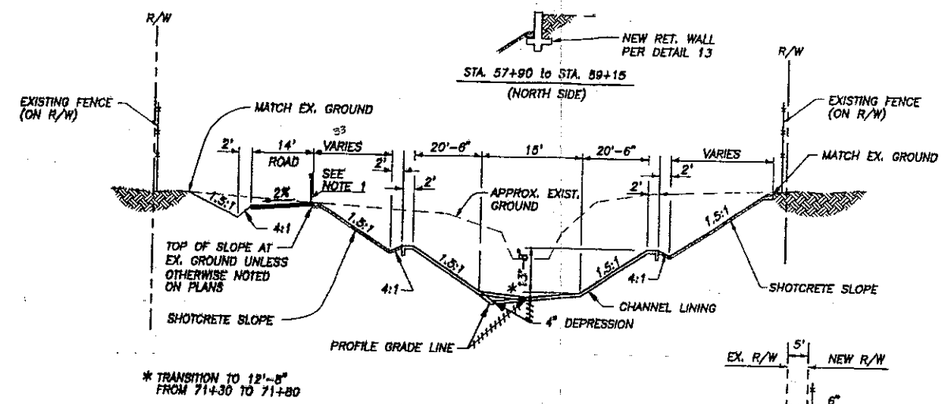
NBS/LOWRY PROJECT NO. PB1-194-019

SHEET C21/22

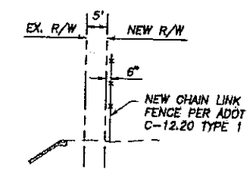
\PB1-194.01B\DWGS\PH-IV\DD-C21.DWG VIEW = SITE 1 = 40 PSPACE



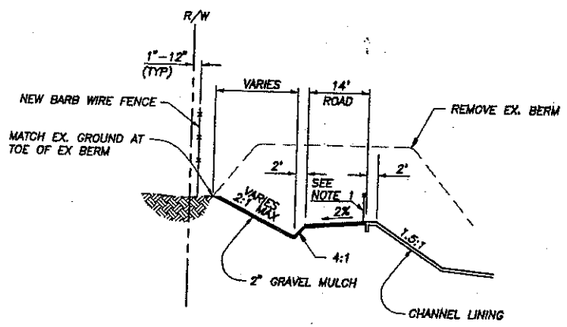
TYPICAL SECTION NO. 1
STA. 10+35.40 TO STA. 19+00
NO SCALE



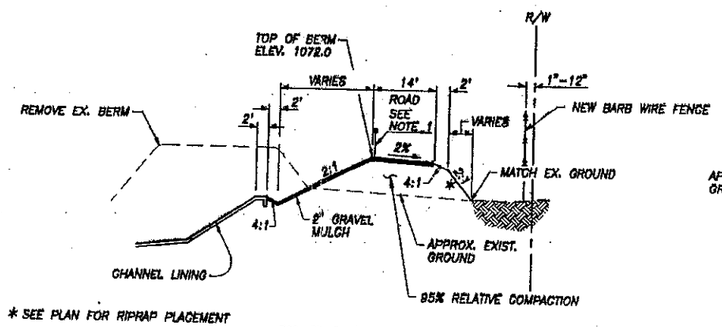
TYPICAL SECTION NO. 3
STA. 55+00 TO STA. 71+80
NO SCALE



STA. 59+60 to STA. 71+97
(NORTH SIDE)

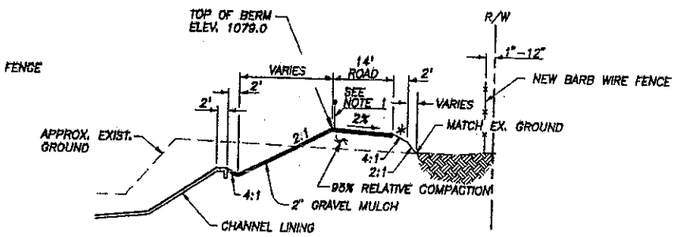


STA. 27+00 to STA. 37+00
(SOUTH SIDE)



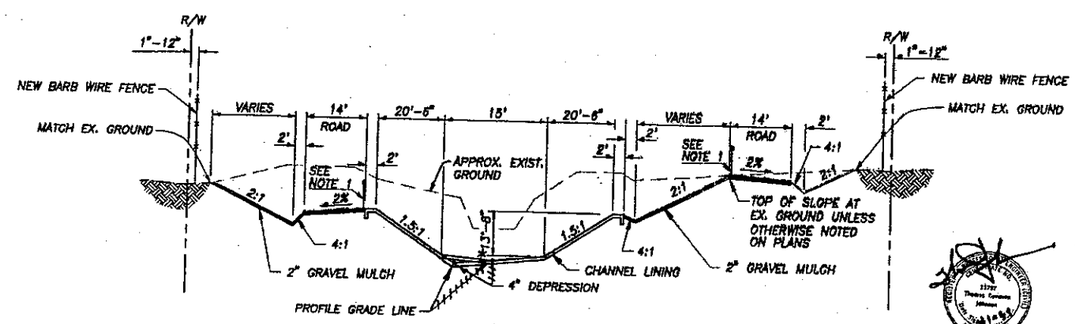
* SEE PLAN FOR RIPRAP PLACEMENT

STA. 28+30 to STA. 35+70
(NORTH SIDE)



* SEE PLAN FOR RIPRAP PLACEMENT

STA. 44+70 to STA. 48+70
(NORTH SIDE)



* 12'-8" - 22+00 TO 28+00
14'-8" - 19+50 TO 21+00
14'-8" - 29+00 TO 37+00

TYPICAL SECTION NO. 2
STA. 19+50 TO STA. 55+00
NO SCALE

REDUCED SET
NTS

293-1100

"AS BUILT DRAWING"
I HEREBY CERTIFY THAT THIS "AS BUILT DRAWING" MEETS THE INTENT OF THE ENGINEER MADE UNDER THE PROVISIONS OF THE CONTRACT DOCUMENTS AND THE KNOWLEDGE AND BELIEF.
L. Samuelson 7/11/03

NOTES:
1. NEW REFLECTOR PER DETAIL 25 PLACED AT 50 FOOT INTERVALS.

NO.	REVISION	DATE
3		
2		
1		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL IMPROVEMENTS
TYPICAL SECTIONS
SECTIONS NO. 1 THROUGH NO. 3

	BY	DATE
DESIGNED	S. YINGLING	4/94
DRAWN	S. YINGLING	4/94
CHECKED	C. GOPPERTON	5/95

CERTIFICATE NO. 22297 CHARLES V. GOPPERTON

NBS LOWRY

NBS/LOWRY PROJECT NO. P81-194-019

SHEET D01/16

\P81-194.019\DWGS\PH-IA\DD-D01.DWG VIEW = SITE 1 = 20 MSPACE

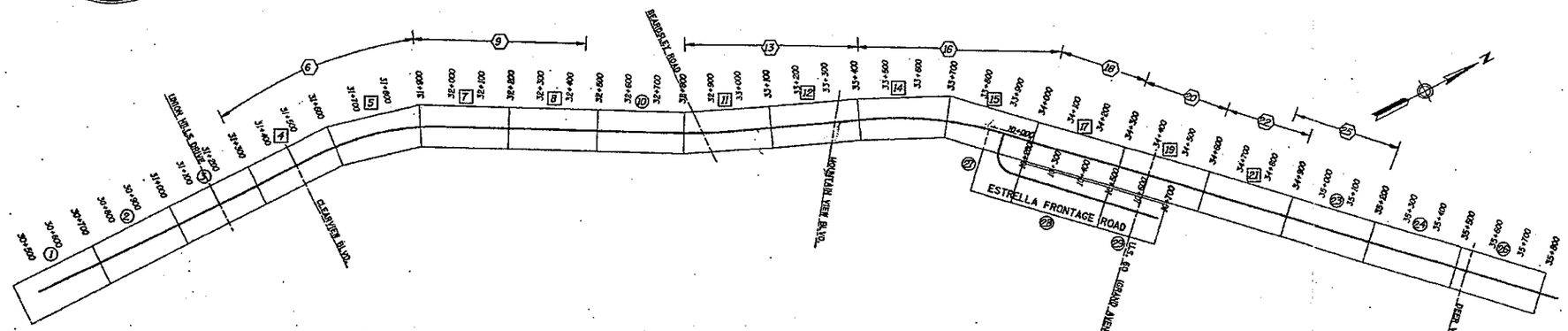
Estrella Roadway and Grade Separation Phase I,

by Maricopa County Department of Transportation

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

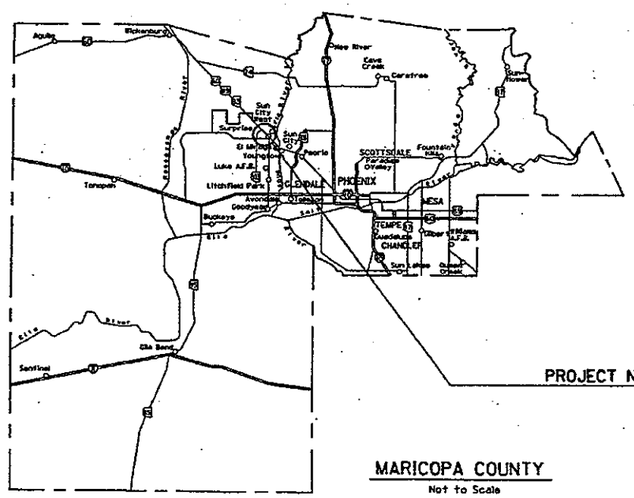
PLANS FOR THE CONSTRUCTION OF:
ESTRELLA ROADWAY & GRADE SEPARATION PHASE I

PROJECT NO. 69005



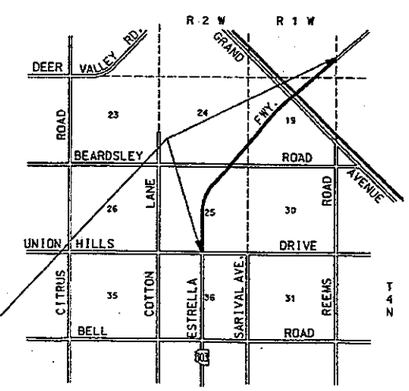
KEY MAP
Not to Scale

(6) PLAN & PROFILE SHEET NUMBER
[9] PLAN SHEET NUMBER
(11) PROFILE SHEET NUMBER



MARICOPA COUNTY
Not to Scale

PROJECT NO. 69005



VICINITY MAP
Not to Scale

REDUCED SET
NTS

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

ISSUED FOR PUBLIC BIDDING BY:

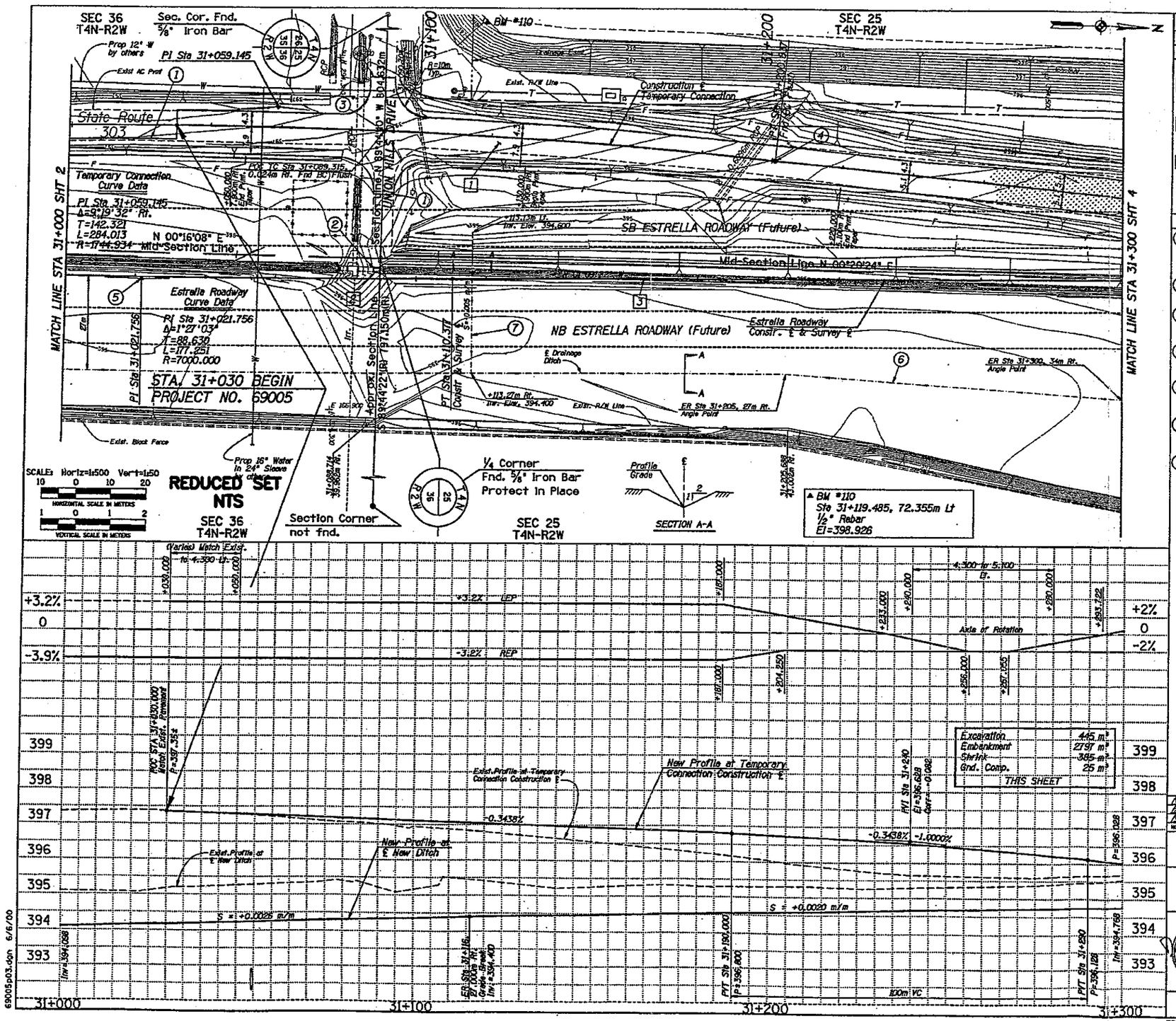
Lamon B. Smith — PROJECT MANAGER
6-8-05 — DATE

COUNTY BOARD OF SUPERVISORS

ANDREW KUNASEK - CHAIRMAN

DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	ANDREW KUNASEK
DISTRICT 4	JANICE K. BREWER
DISTRICT 5	MARY ROSE WILCOX

69005F.DGN



F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	15	142	

☐ REMOVAL/RELOCATE ☐

REMOVE ASPHALT CONCRETE PAVEMENT

1 Lt. TC Sta 31+030 to Lt. TC Sta 31+300 2,486m²

REMOVE HEADWALL

2 Lt. ER Sta 31+088 1 ea.

REMOVE CONCRETE DITCH LINING

3 Lt. ER Sta 31+090 to Lt. ER Sta 31+300 210m

Note: TC Sta = Temporary Connection Station
ER Sta = Estrella Roadway Station

CONSTRUCTION

1. Sawcut Pavement
   TC Sta. 31+960 to Sta. 31+030 37.9m
   TC Sta. 31+089, 55.5m Lt. 7.0m
   TC Sta. 31+089, 29.8m Lt. 5.5m
2. ER Sta 31+088.000, 2.616m Lt.
   Plug exist. 600mm pipe, MAG Std. Det. 427
3. TC Sta 31+089.315, 0.024m Rt.
   New survey monument, MAG Std. Det. 120-2, Type D
4. TC Sta 31+200.637
   New survey monument, MAG Std. Det. 120-2, Type D
5. ER PI Sta 31+021.756
   New survey monument MAG Std. Det. 120-2, Type D
6. ER Sta 31+000, 27m Rt. to ER Sta 31+300, 34m Rt.
   New drainage ditch
7. ER Sta 31+116, 13m Lt. to ER Sta 31+116, 27m Rt.
   New drainage ditch

TWO WORKING DAYS BEFORE YOU DIG CALL 262-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	DH, MR	6/00
DRAWN	DF	6/00
CHECKED	DH, MR	6/00

Cannon & Associates, Inc.
Consulting Engineers CA97026-1

PLAN AND PROFILE
STA. 31+000 TO STA. 31+300

SHEET 3 OF 32

TRACS NO.

TO ACCOMPANY ADDENDUM NO.2

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	16	142	

☐ REMOVAL/RELOCATE ☐

REMOVE ASPHALT CONCRETE PAVEMENT

1	Lt. TC Sta 31+300 to Lt. TC Sta 31+412	1,363m²
2	Lt. ER Sta 31+454 to Lt. ER Sta 31+600	1,785m²

REMOVE CONCRETE DITCH LINING

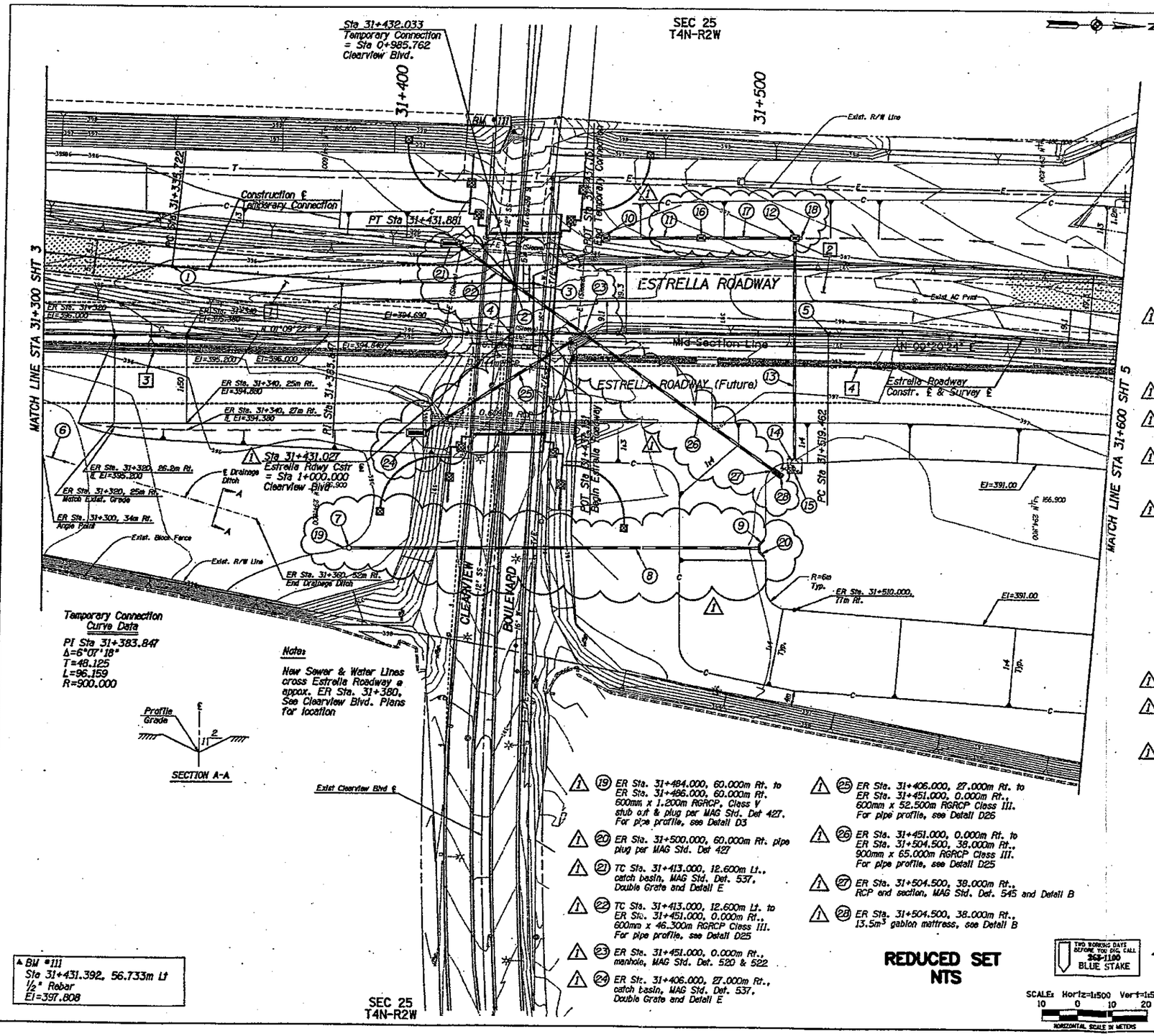
3	Rt. TC Sta 31+300 to Rt. TC Sta 31+413	113m
4	Rt. TC Sta 31+448 to Rt. ER Sta 31+600	152

Notes:

1. For removals and relocations on Clearview Blvd., See Clearview Blvd. Roadway Plans
2. TC Sta = Temporary Connection Station
   ER Sta = Estrella Roadway Station

CONSTRUCTION

1. TC PC Sta. 31+335.722, survey monument, MAG Std. Det. 120-2, Type D
2. TC PT Sta. 31+431.881, survey monument, MAG Std. Det. 120-2, Type D
3. TC Sta. 31+437.151, survey monument, MAG Std. Det. 120-2, Type D
4. ER Sta. 31+431.027, survey monument, MAG Std. Det. 120-2, Type D
5. ER PC Sta. 31+519.462, survey monument, MAG Std. Det. 120-2, Type D
6. ER Sta. 31+300, 34.000m Rt. to ER Sta. 31+360, 52.000m Rt., drainage ditch
7. ER Sta. 31+386.000, 60.000m Rt., manhole, MAG Std. Det. 520 & 522
8. ER Sta. 31+386.000, 60.000m Rt., to ER Sta. 31+500.000, 60.000m Rt. 60mm x 114.000 RGRCP, Class V. For pipe profile, see Detail D3
9. ER Sta. 31+500.000, 60.000m Rt., headwall, MAG Std. Det. 501-1, Type U
10. ER Sta. 31+457.000, 26.500m Lt., catch basin, MAG Std. Det. 535 and Detail A
11. ER Sta. 31+457.000, 26.500m Lt., to ER Sta. 31+484.000, 26.500m Lt., 450mm x 27.000m RGRCP, Class V. For pipe profile, see Detail D4
12. ER Sta. 31+510.000, 26.500m Lt., catch basin, MAG Std. Det. 535 and Detail A
13. ER Sta. 31+510.000, 26.500m Lt. to ER Sta. 31+510.000, 33.600m Rt 600mm x 60.100m RGRCP, Class III. For pipe profile, see Detail D4
14. ER Sta. 31+510.000, 33.600m Rt., RCP end section, MAG Std. Det. 545 and Detail B
15. ER Sta. 31+510.000, 33.600m Rt., 7.5m³ gabion mattress, see Detail B
16. ER Sta. 31+484.000, 26.500m Lt., catch basin, MAG Std. Det. 535 and Detail A
17. ER Sta. 31+484.000, 26.500m Lt. to ER Sta. 31+510.000, 26.500m Lt. 450mm x 26.000m RGRCP, Class V. For pipe profile, see Detail D4
18. ER Sta. 31+510.000, 26.500m Lt. to ER Sta. 31+512.000, 26.500m Lt. 450mm x 2.000m RGRCP, Class V with plug per MAG Std. Det 427. For pipe profile, see Detail D4
19. ER Sta. 31+484.000, 60.000m Rt. to ER Sta. 31+486.000, 60.000m Rt. 600mm x 1.200m RGRCP, Class V stub out & plug per MAG Std. Det 427. For pipe profile, see Detail D3
20. ER Sta. 31+500.000, 60.000m Rt. pipe plug per MAG Std. Det 427
21. TC Sta. 31+413.000, 12.600m Lt., catch basin, MAG Std. Det. 537, Double Grate and Detail E
22. TC Sta. 31+413.000, 12.600m Lt. to ER Sta. 31+451.000, 0.000m Rt., 600mm x 46.300m RGRCP Class III. For pipe profile, see Detail D25
23. ER Sta. 31+451.000, 0.000m Rt., manhole, MAG Std. Det. 520 & 522
24. ER Sta. 31+406.000, 27.000m Rt., catch basin, MAG Std. Det. 537, Double Grate and Detail E
25. ER Sta. 31+406.000, 27.000m Rt. to ER Sta. 31+451.000, 0.000m Rt., 600mm x 52.500m RGRCP Class III. For pipe profile, see Detail D26
26. ER Sta. 31+451.000, 0.000m Rt. to ER Sta. 31+504.500, 38.000m Rt., 900mm x 65.000m RGRCP Class III. For pipe profile, see Detail D25
27. ER Sta. 31+504.500, 38.000m Rt., RCP end section, MAG Std. Det. 545 and Detail B
28. ER Sta. 31+504.500, 38.000m Rt., 13.5m³ gabion mattress, see Detail B



REDUCED SET
NTS

TWO WORKING DAYS BEFORE YOU DIG CALL 263-1100 BLUE STAKE

SCALE: Horiz=1:500 Vert=1:50
10 0 10 20
HORIZONTAL SCALE IN METERS

NO.	REVISION	BY	DATE
1	Pipe Location, Added Catch Basins, Pipes & Stub Out	DH/DF	6/26/00

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	DH, MR	6/00
DRAWN	DF	6/00
CHECKED	DH, MR	6/00

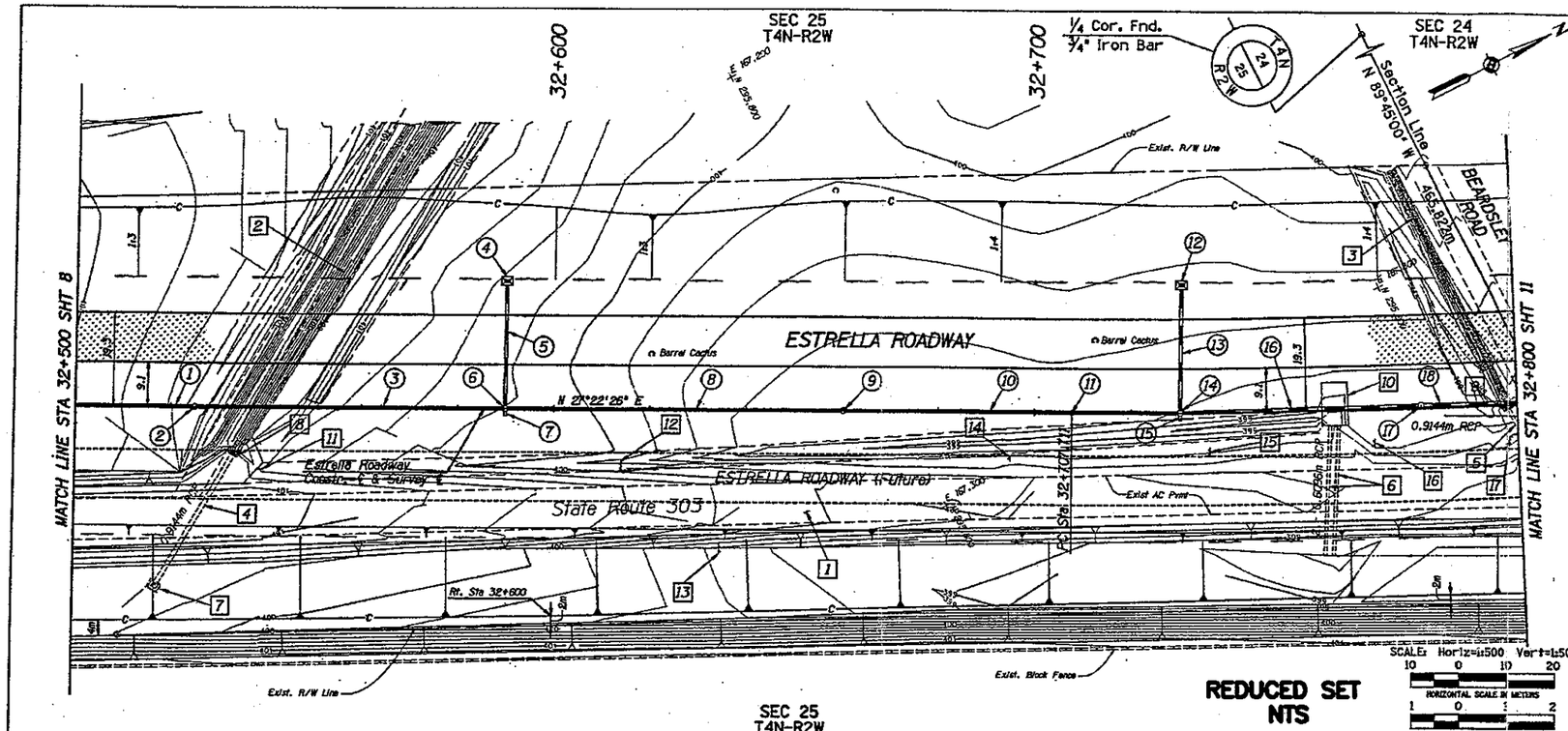
Cannon & Associates, Inc.
Consulting Engineers CA97026-1

PLAN
STA. 31+300 TO STA. 31+600

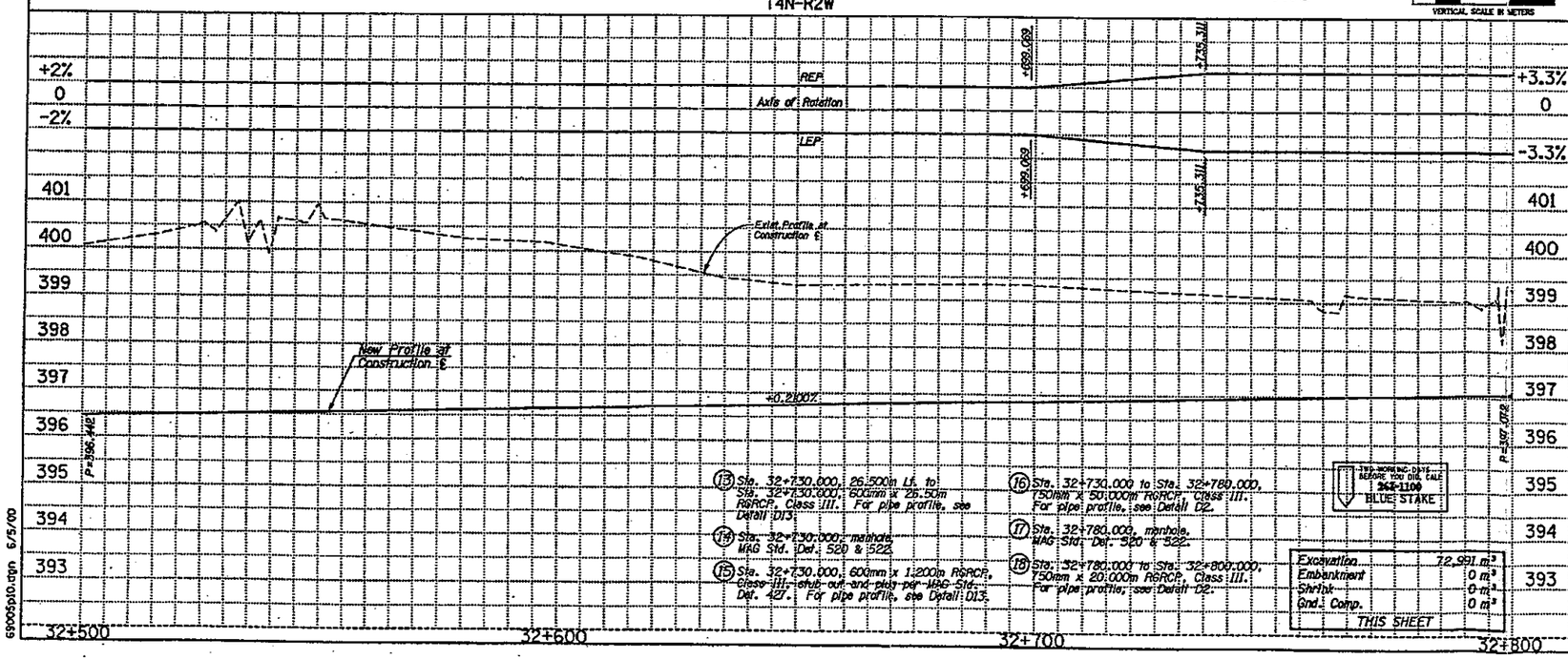
SHEET 4 OF 32

TRACS NO.

69005p04_A.dgn 6/29/00



REDUCED SET
NTS



(13) Sta. 32+730.000, 26.500m Lt. to Sta. 32+730.000, 600mm x 26.50m RGRCP, Class III. For pipe profile, see Detail D13.

(14) Sta. 32+730.000, manhole, MAG Std. Def. 520 & 522.

(15) Sta. 32+730.000, 600mm x 1.200m RGRCP, Class III, stub out and plug per MAG Std. Def. 427. For pipe profile, see Detail D13.

(16) Sta. 32+730.000 to Sta. 32+780.000, 750mm x 50.000m RGRCP, Class III. For pipe profile, see Detail D2.

(17) Sta. 32+780.000, manhole, MAG Std. Def. 520 & 522.

(18) Sta. 32+780.000 to Sta. 32+800.000, 750mm x 20.000m RGRCP, Class III. For pipe profile, see Detail D2.

BLUE STAKE

Excavation	72,991 m³
Embankment	0 m³
Shrink	0 m³
Gnd. Comp.	0 m³

THIS SHEET

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	22	142	

☐ REMOVAL/RELOCATE ☐

	REMOVE ASPHALT CONCRETE PAVEMENT	
1	Rt. Sta 32+500 to Rt. Sta 32+800	2,560m²
	REMOVE CONCRETE DITCH LINING	
2	Rt. Sta 32+534 to Lt. Sta 32+566	64m
3	Lt. Sta 32+775 to Rt. Sta 32+798	55mm
	REMOVE 900mm DIA. PIPE	
4	Rt. Sta 32+517 to Rt. Sta 32+533	54m
5	Rt. Sta 32+798 to Rt. Sta 32+800	32m
	REMOVE 600mm DIA. PIPE	
6	Rt. Sta 32+762	55m
	REMOVE HEADWALL	
7	Rt. Sta 32+517	1 ea.
8	Rt. Sta 32+533	1 ea.
9	Rt. Sta 32+798	1 ea.
	REMOVE GUNITE APRON	
10	Sta 32+762	45m²
	REMOVE SIGN	
11	Sta 32+538.5, 13m Rt.	1 ea.
12	Sta 32+614, 12m Rt.	1 ea.
13	Sta 32+634.5, 29m Rt.	1 ea.
14	Sta 32+695, 10m Rt.	1 ea.
15	Sta 32+736, 8m Rt.	1 ea.
16	Sta 32+770, 7m Rt.	1 ea.
17	Sta 32+799, 6m Rt.	1 ea.

CONSTRUCTION

(1) Sta 32+500.000 to Sta. 32+525.000, 750mm x 25.000m RGRCP, Class III. For pipe profile, see Detail D1.

(2) Sta 32+525.000, manhole, MAG Std. Def. 520 & 522.

(3) Sta 32+525.000 to Sta. 32+590.000, 750mm x 65.00m RGRCP, Class III. For pipe profile, see Detail D1 and D2.

(4) Sta 32+590.000, 26.500m Lt. to Sta. 32+590.000, catch basin, MAG Std. Def. 535 and Detail A.

(5) Sta 32+590.000, 26.500 m Lt. to Sta. 32+590.000, 600mm x 26.500m RGRCP, Class III. For pipe profile, see Detail D12.

(6) Sta 32+590.000, manhole, MAG Std. Def. 520 & 522.

(7) Sta 32+590.000, 600mm x 1.200m RGRCP, Class III, stub out and plug per MAG Std. Def. 427. For pipe profile, see Detail D12.

(8) Sta 32+590.000 to Sta. 32+660.000, 750mm x 70.000m RGRCP, Class III. For pipe profile, see Detail D2.

(9) Sta 32+660.000, manhole, MAG Std. Def. 520 & 522.

(10) Sta 32+660.000 to Sta. 32+730.000, 750mm x 70.000m RGRCP, Class III. For pipe profile, see Detail D2.

(11) Sta 32+707.711, survey monument, MAG Std. Def. 120-2, Type D

(12) Sta 32+730.000, 26.500m Lt., catch basin, MAG Std. Def. 535 and Detail A.

NO.	REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

16

ESTRELLA ROADWAY & GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	DH, MR	6/00
DRAWN	DF	6/00
CHECKED	DH, MR	6/00

Cannon & Associates, Inc.
Consulting Engineers CA97026-i

PLAN AND PROFILE
STA. 32+500 TO STA. 32+800

SHEET 10 OF 32

TRACS NO.

69005p10.dgn 6/5/00

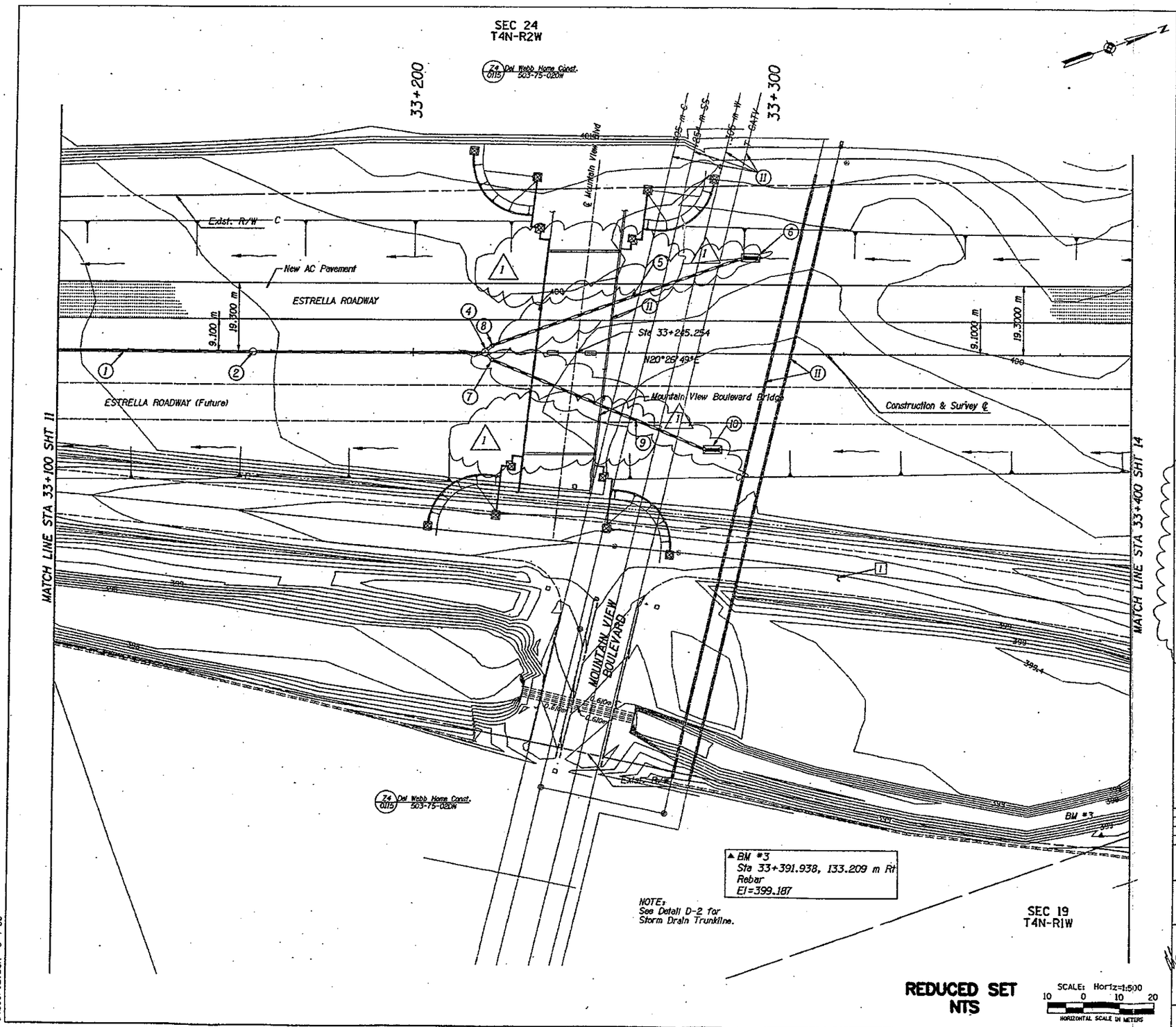
TO ACCOMPANY ADDENDUM No. 2

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	24	142	

☐ REMOVAL/RELOCATE ☐

REMOVE EXISTING PAVEMENT

1 Sta 33+100 to Sta 33+400 — 3767 SqM



REDUCED SET
NTS

SCALE: Horiz=1:500
10 0 10 20
HORIZONTAL SCALE IN METERS

CONSTRUCTION

1. Sta 33+100.000, 0.000m Lt to Sta 33+155.000, 0.000m Lt. Install 55.000m 600mm RGRCP, Class III.
2. Sta 33+155.000, 0.000m Lt. Install New Storm Drain Manhole per MAG Std Details 520 and 522.
3. Sta 33+155.000, 0.000m Lt to Sta 33+220.000, 0.000m Lt. Install 65.000m 600mm RGRCP, Class III.
4. ER Sta 33+220.000, 0.000m Rt. ER Sta 33+292.000, 26.800m Lt Details 520 and 522.
5. Sta 33+220.000, 0.000m Lt to Sta 33+220.000, 25.000m Lt. Install 25.000m 600mm RGRCP, Class III. New 600mm x 76.800 RGRCP III
6. ER Sta 33+292.000, 26.800m Lt. Install New Catch Basin, MAG Std Detail 537, Double Grate & Detail E.
7. ER Sta 33+222.000, 2.000m Rt. Install New Concrete Pipe Collar, MAG Std Detail 505.
8. ER Sta 33+222.000, 2.000m Lt. Install New Concrete Pipe Collar, MAG Std Detail 505.
9. ER Sta 33+220.000, 0.000m Rt to ER Sta 33+282.000, 27.500m Rt New 600mm x 67.800m RGRCP Class III
10. ER Sta 33+282.000m, 27.500m Rt Install New Catch Basin MAG Std Det. 537, Double Grate & Detail E.
11. Water, Sewer, Gas and Telephone Will be Relocated as Needed by Others. See Mountain View Overpass Construction Plans for Location; MCDOT Project No. 69005

Note:
See Detail D-2 for
Storm Drain Trunkline.

TWO WORKING DAYS BEFORE YOU DIG, CALL (602) 263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1	DELETE CHANNEL AND REVISE SD PIPE	RDB	6/29/00
2			
3			
4			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	ML, JA	6/12/00
DRAWN	DK, JB	6/12/00
CHECKED	RB, JA, ML	6/12/00

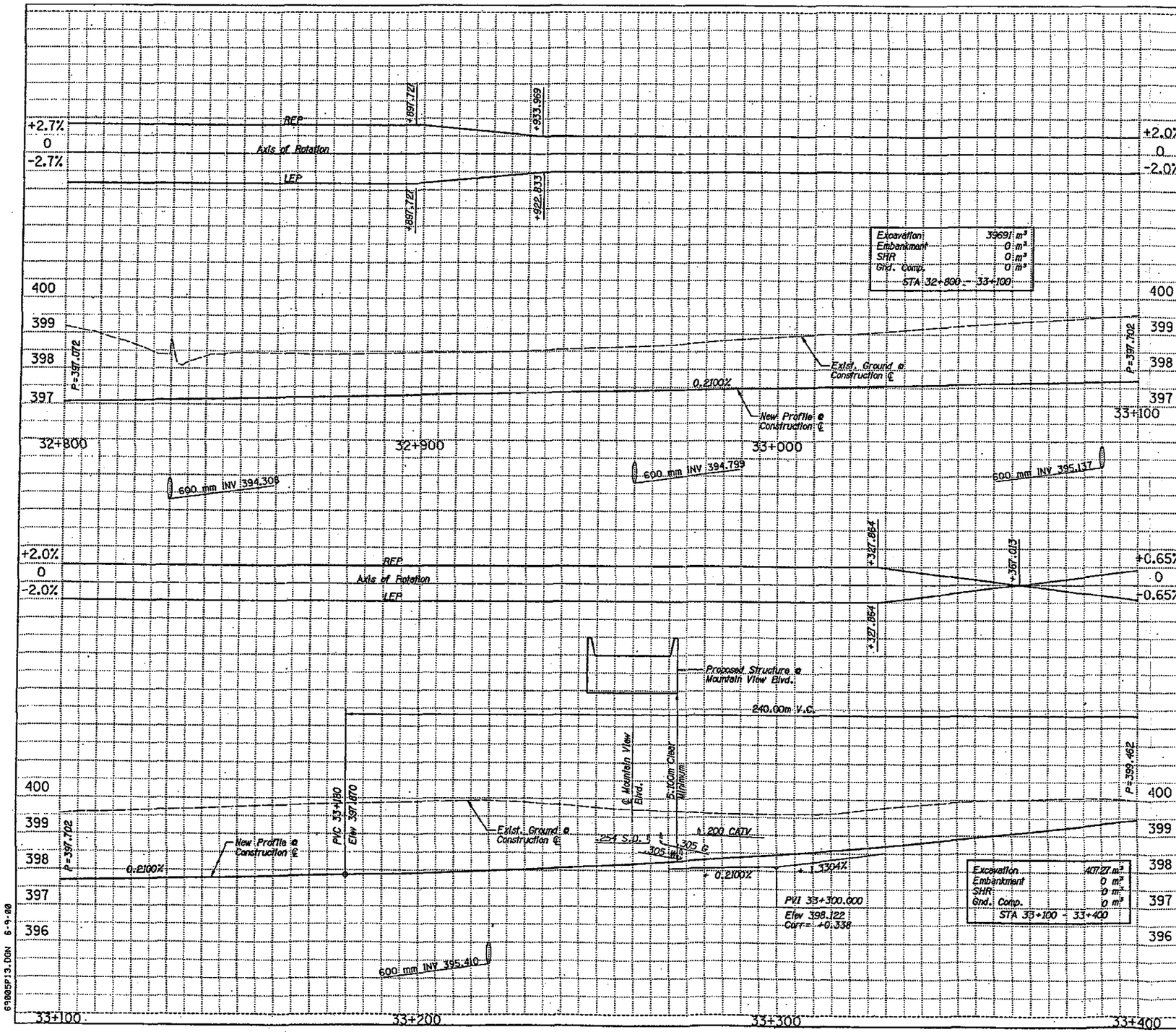
ASL
501 N. 44th Street, Suite 125
Phoenix, Arizona 85008-6596
Ph: (602) 244-2624
FAX: (602) 244-1164
CONSULTING ENGINEERS

PLAN
STA. 33+100 TO STA 33+400

SHEET 12 OF 32

69005P12.DGN 6-9-00

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	25	142	



SCALE: Horiz=1:500 Vert=1:50

10 0 10 20
HORIZONTAL SCALE IN METERS

1 0 1 2
VERTICAL SCALE IN METERS

TWO WORKING DAYS BEFORE YOU DIG, CALL (602) 263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	ML	6/7/00
DRAWN	DK	6/7/00
CHECKED	RTB, JA, ML	6/7/00

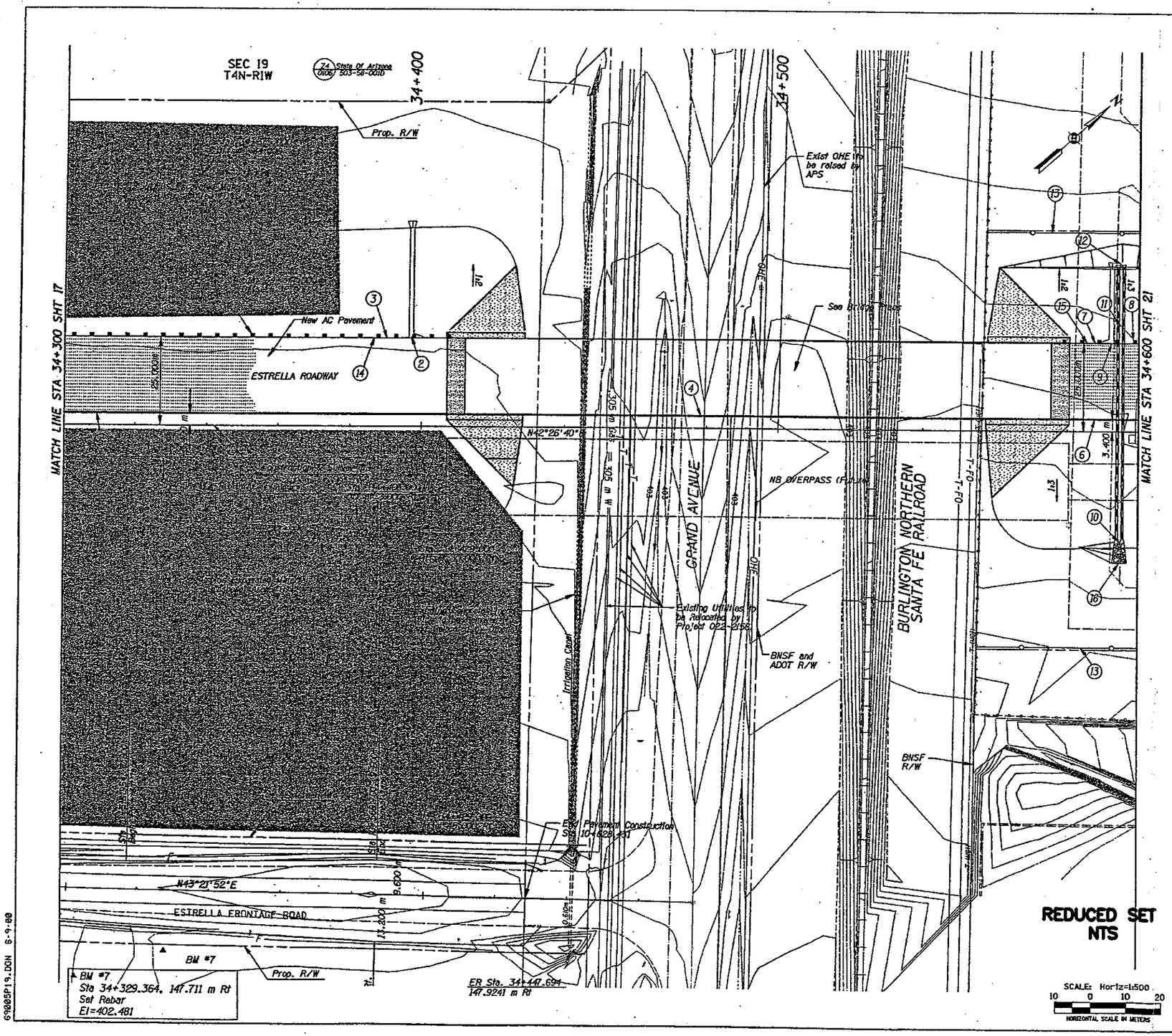
ASL CONSULTING ENGINEERS
501 N. 44th Street, Suite 125
Phoenix, Arizona 85008-6536
PH: (602) 244-0024
FAX: (602) 244-1184

FULL PROFILE
STA. 32+800 TO STA 33+400

SHEET 13 OF 32

TRACS NO.

69005P13.DGN 6-9-00



F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	31	142	

☐ REMOVAL/RELOCATE ☐

○ CONSTRUCTION ○

1. Sta 34+300 to Sta 34+397.540, 25.000m Lt. Install Guardrail (Type A) Timber Post, per ADOT Std Detail C-10.01
2. Sta 34+395.955, 25.000m Lt. Const Spillway per MAG Std Detail 550.
3. Sta 34+397.540 to Sta 34+405.719, 25m Lt. Install Three Beam Guardrail Transition System per ADOT Std Deatail SD-1.03.
4. See Bridge Plans for Bridge Barrier Soundwall Construction.
5. Sta 34+300 to Sta 34+405.500, 3.400m Lt. Const Concrete Sound Barrier Wall, see Sound Wall Sheets.
6. Sta 34+583.150 to Sta 34+600.000, 3.400m Lt. Const Concrete Sound Barrier Wall, see Sound Wall Sheets.
7. Sta 34+581.931 to Sta 590.110, 25.000m Lt. Install Tree Beam Guardrail Transition System, per ADOT Std SD-1.03.
8. Sta 34+590.110 to Sta 34+600.000, 25.000 m Lt. Install Guardrail (Type A) Timber Post, per ADOT Std Detail C-10.01
9. Sta 34+591.705, 25.000m Lt. Const Spillway per MAG Std Detail 550.
10. Sta 34+595, 29.828m Rt. Install 2 End Sections per MAG Std Detail 545.
11. Sta 34+595, 45.961m Lt to Sta 34+595, 28.828m Rt. Install 2-75.790, 600mm RGRCP, Class V. See Detail D-20
12. Sta 34+595, 45.961m Lt. Install 2 End Sections per MAG Std Detail 545.
13. Install Woven Wire Fence per ADOT Std C-12.10. Place on R/W Line as noted on plans.
14. Sta 34+395.000 to Sta 34+405.719, 25.000m Lt. Construct Extruder Embankment Curb, per MAG Std Detail 550. NPI
15. Sta 34+581.931 to Sta 34+595.000, 25.000m Lt. Construct Extruded Embankment Curb, per MAG Std Detail 550. NPI
16. Sta 34+595, 31.000m Rt. Install Rip Rap per Detail D.

TWO WORKING DAYS BEFORE YOU DIG, CALL (602) 263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	ML, JA	6/7/00
DRAWN	DK, JB	6/7/00
CHECKED	RB, JA, ML	6/7/00

22851 RANDALL B. BECK, JR. REGISTERED ARIZONA

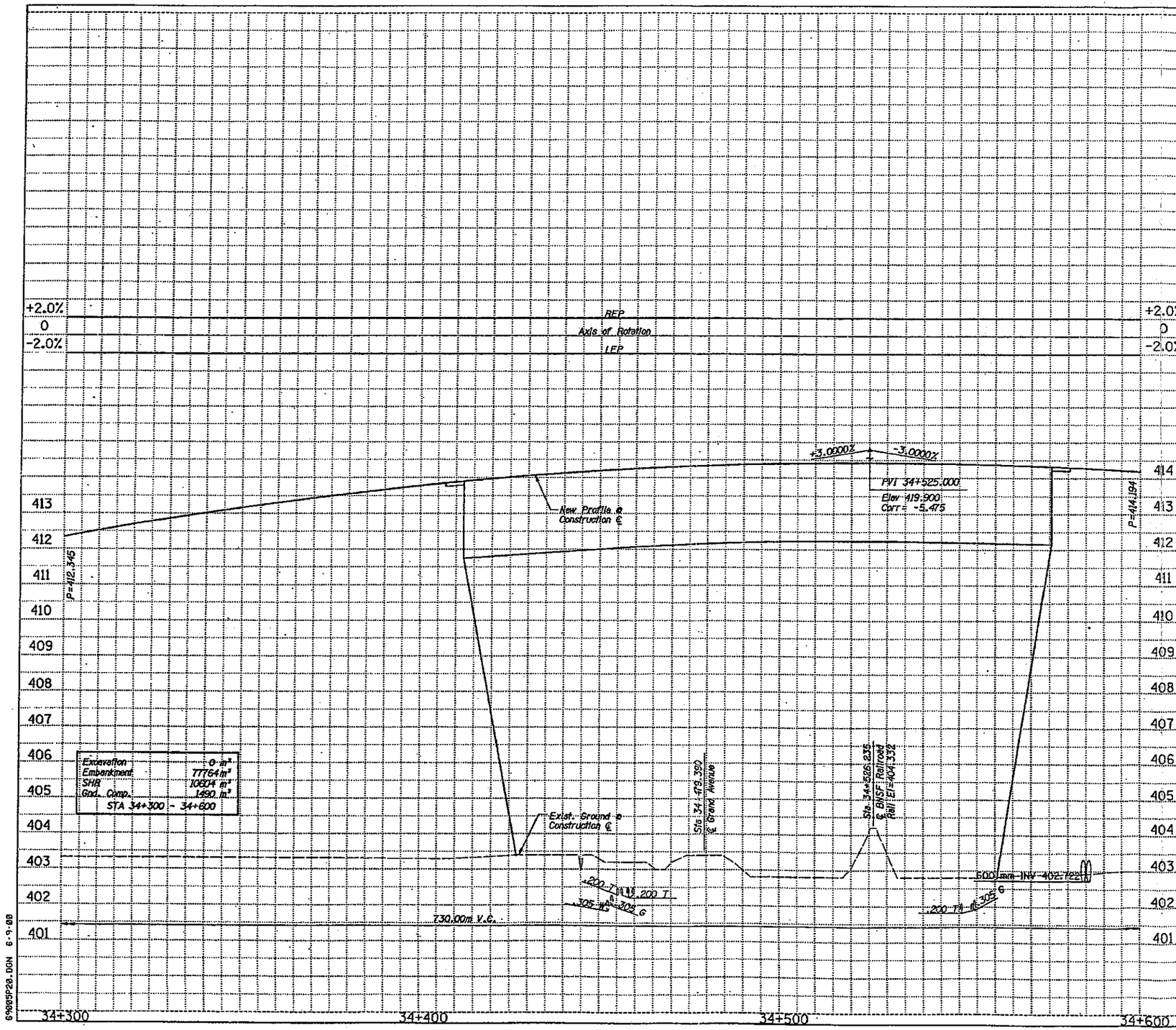
ASL CONSULTING ENGINEERS
501 N. 44th Street, Suite 125
Phoenix, Arizona 85008-6036
PH: (602) 244-2024
FAX: (602) 244-1164

PLAN
STA. 34+300 TO STA 34+600

SHEET 19 OF 32

TRACS NO.

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	69005	29	142	



Excavation	0 m³
Embankment	77764 m³
SHR	10604 m³
Grnd. Comp.	1490 m³
STA 34+300 - 34+600	

69005P20.DGN 6-9-00

REDUCED SET
NTS

SCALES: Horiz=1:500 Vert=1:50

10 0 10 20
HORIZONTAL SCALE IN METERS
1 0 1 2
VERTICAL SCALE IN METERS

TWO WORKING DAYS BEFORE YOU DIG, CALL (602) 263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ESTRELLA ROADWAY &
GRADE SEPARATION PHASE I
PROJECT NO. 69005

	BY	DATE
DESIGNED	ML	6/7/00
DRAWN	DK	6/7/00
CHECKED	RTB, JA, ML	6/7/00

RANDALL D. BETZ 22851 ARIZONA, U.S.A.

ASL
501 N. 44th Street, Suite 125
Phoenix, Arizona 85008-6596
PH: (602) 244-2624
FAX: (602) 244-1164
CONSULTING ENGINEERS

PROFILE
STA. 34+300 TO STA 34+600

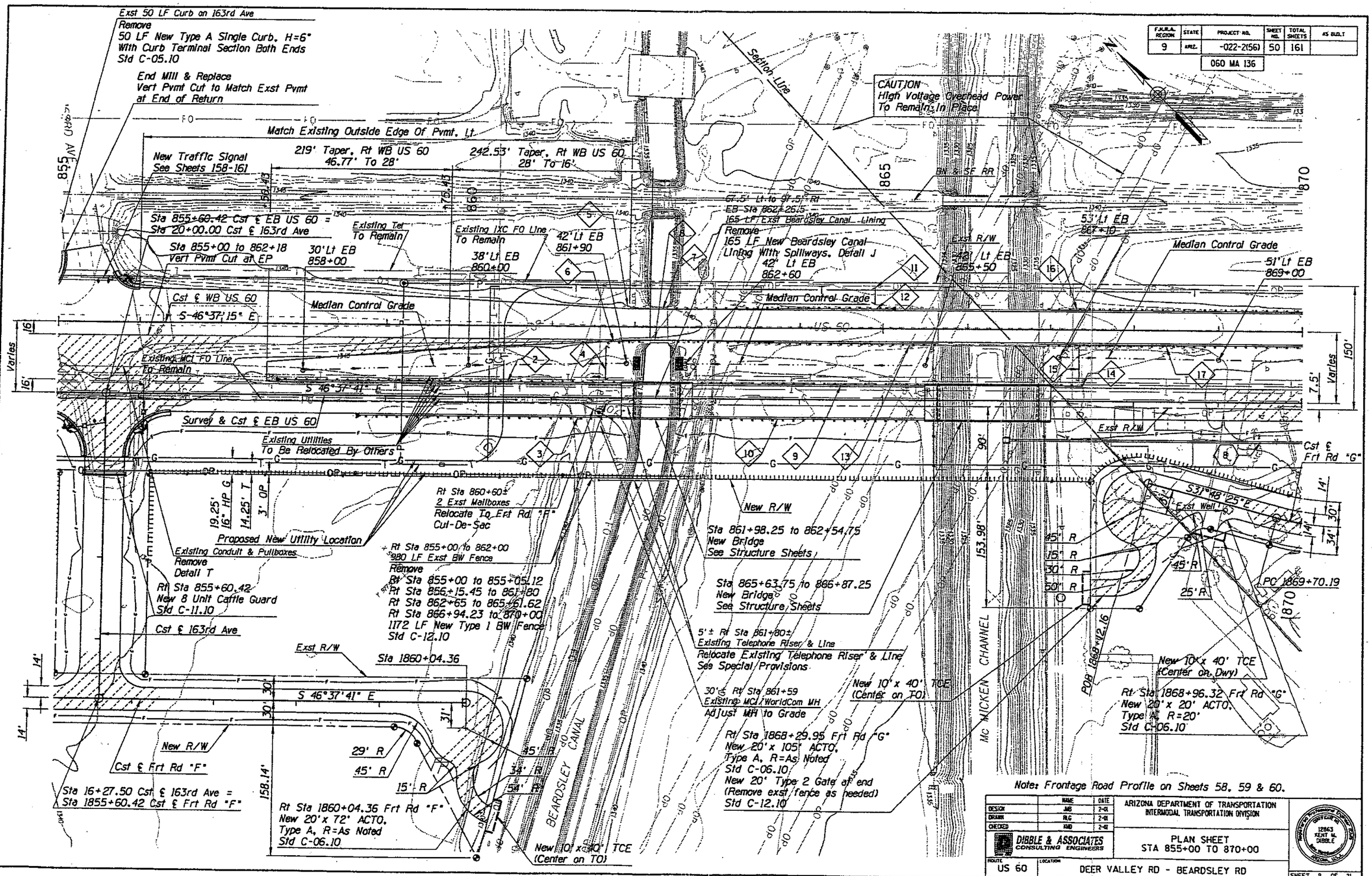
SHEET 20 OF 32

TRACS NO.

US 60 – Deer Valley Road to Beardsley Road

by Dibble & Associates

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-022-2(156)	50	161	
		060 MA 136			



	NAME	DATE
DESIGN	JMB	2-01
DRAWN	RLG	2-01
CHECKED	KMD	2-01

DIBBLE & ASSOCIATES CONSULTING ENGINEERS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PLAN SHEET
STA 855+00 TO 870+00

ROUTE: US 60 | LOCATION: DEER VALLEY RD - BEARDSLEY RD

SHEET 9 OF 21

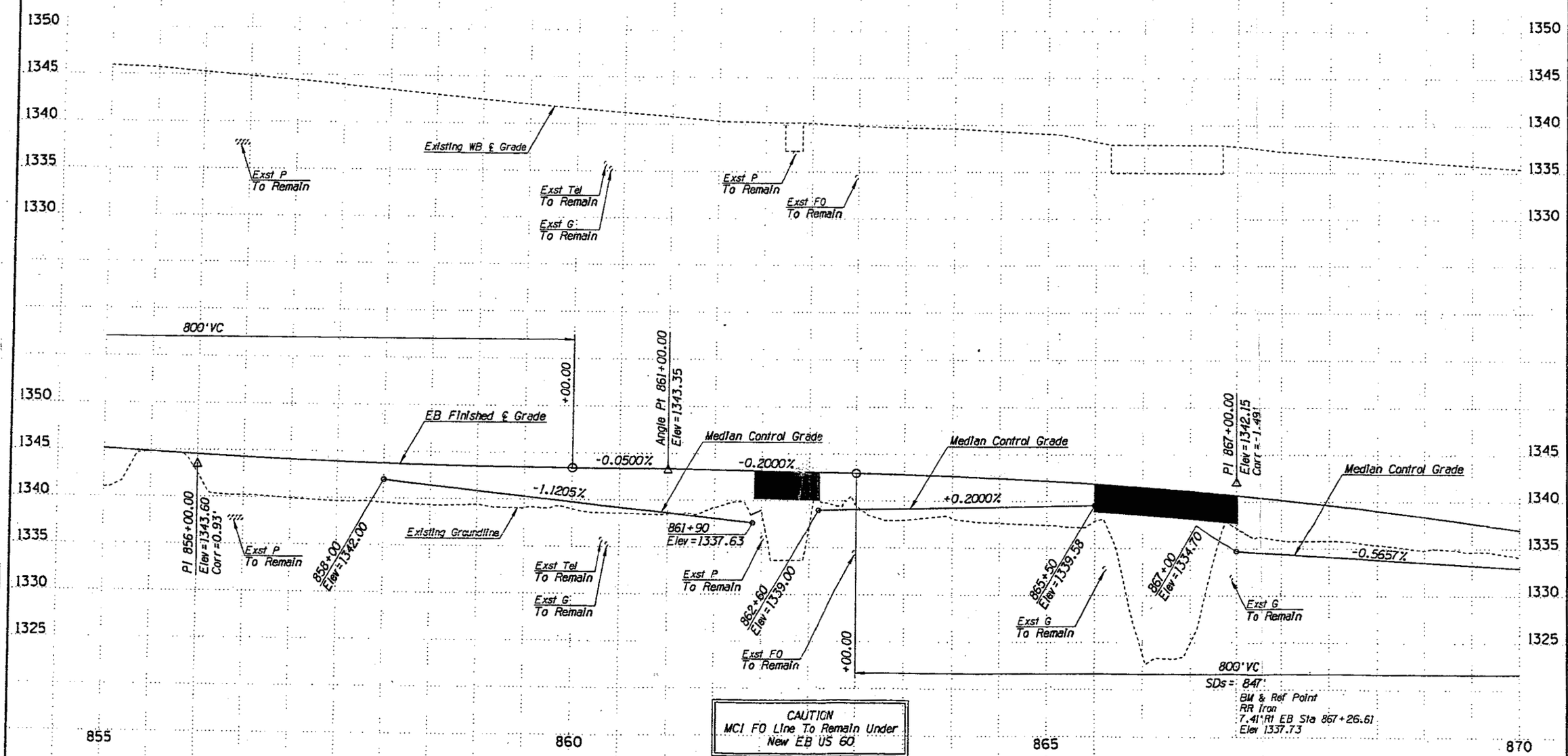
TRACS NO. H4573 01C | -022-2(156) | OF

727/ustn/mlp152.dgn Mar. 30, 2001 09:06:46

CONSTRUCTION DISPLAY ON

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-022-2(56)	51	161	

060 MA 136



CAUTION
MCI FO Line To Remain Under
New EB US 60

CONSTRUCTION DISPLAY ON

	NAME	DATE
DESIGN	JAB	2-01
DRAWN	RLG	2-01
CHECKED	RWD	2-01

DIBBLE & ASSOCIATES CONSULTING ENGINEERS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PROFILE SHEET
STA 855+00 TO STA 870+00

ROUTE: US 60
LOCATION: DEER VALLEY RD - BEARDSLEY RD

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 12863 KENT M. DIBBLE ARIZONA, U.S.A.

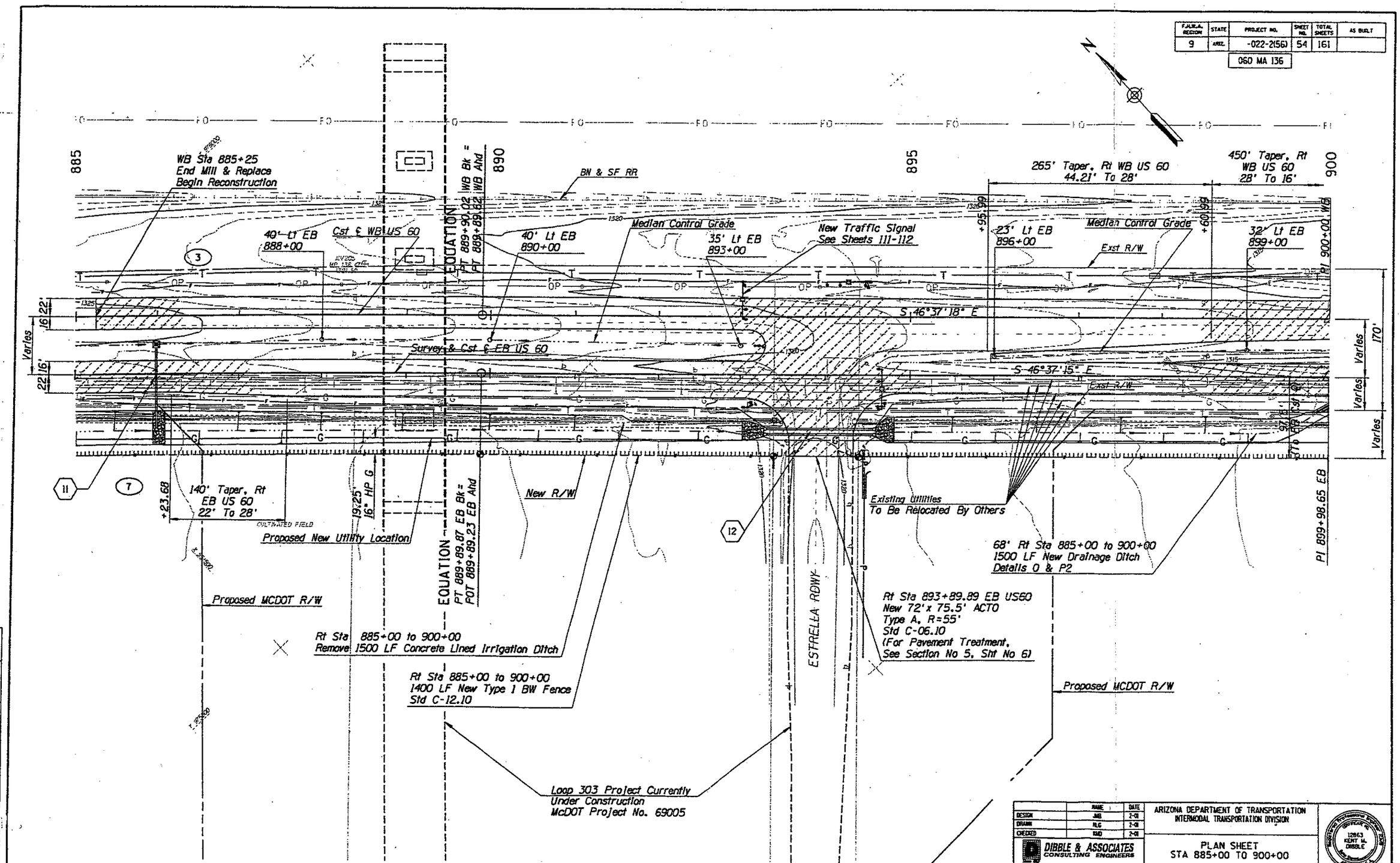
SHEET 10 OF 21

TRACS NO. H4573 01C | -022-2(56) | ___ OF ___

727/ustn/mlpr52.dgn Mar. 30, 2001 09:06:49

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-022-2(56)	54	161	

060 MA 136



	NAME	DATE
DESIGN	JMB	2-01
DRAWN	RLG	2-01
CHECKED	RMD	2-01

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PLAN SHEET
STA 885+00 TO 900+00

ROUTE: US 60
LOCATION: DEER VALLEY RD - BEARDSLEY RD

SHEET 13 OF 21

TRACS NO. H4573 01C | -022-2(56) | ___ OF ___

9727/ustn/mlp154.dgn Mar. 30, 2001 09:07:14

CONSTRUCTION DISPLAY ON

Trilby Wash Detention Basin, Dam, and Appurtenances

by USACE

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

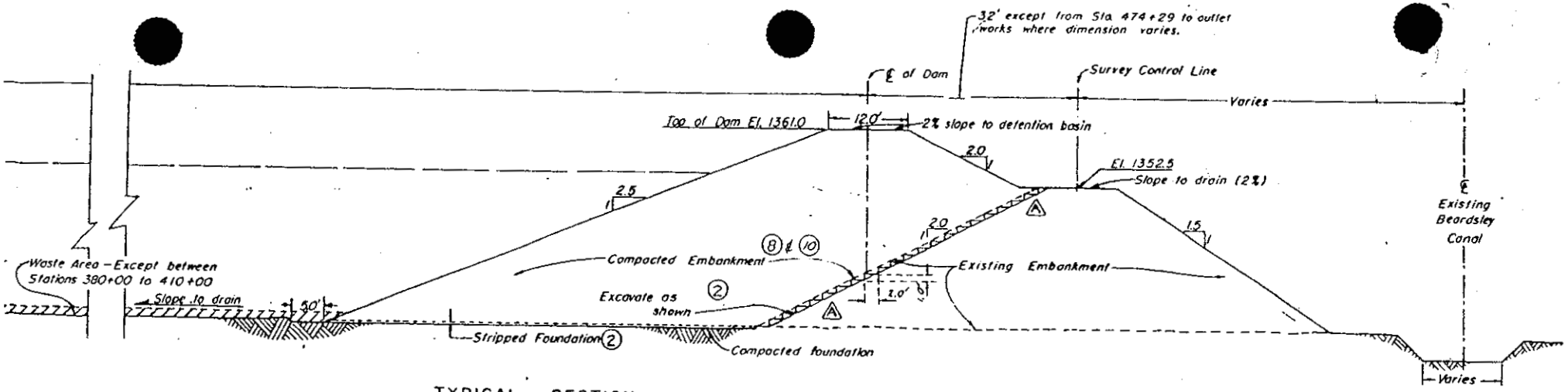
missing Sl

TRILBY WASH DETENTION BASIN

AS BUILT

86-02-01

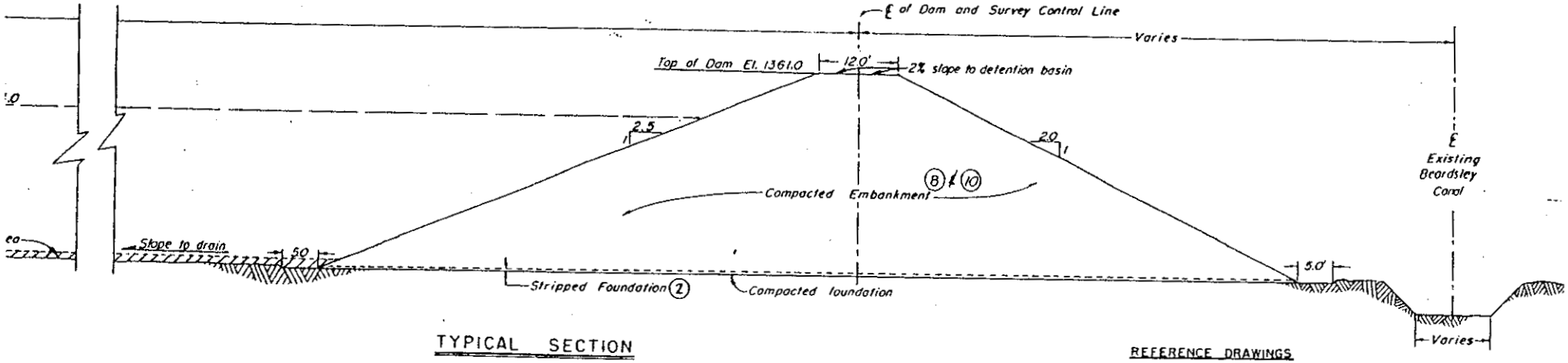
202



TYPICAL SECTION

STA. 357+00 TO OUTLET WORKS

McMicken Dam Embankment



TYPICAL SECTION

STA. 43+00 TO STA. 357+00; OUTLET WORKS TO STA. 505+70, & STA. 527+18 TO STA. 537+00

REFERENCE DRAWINGS

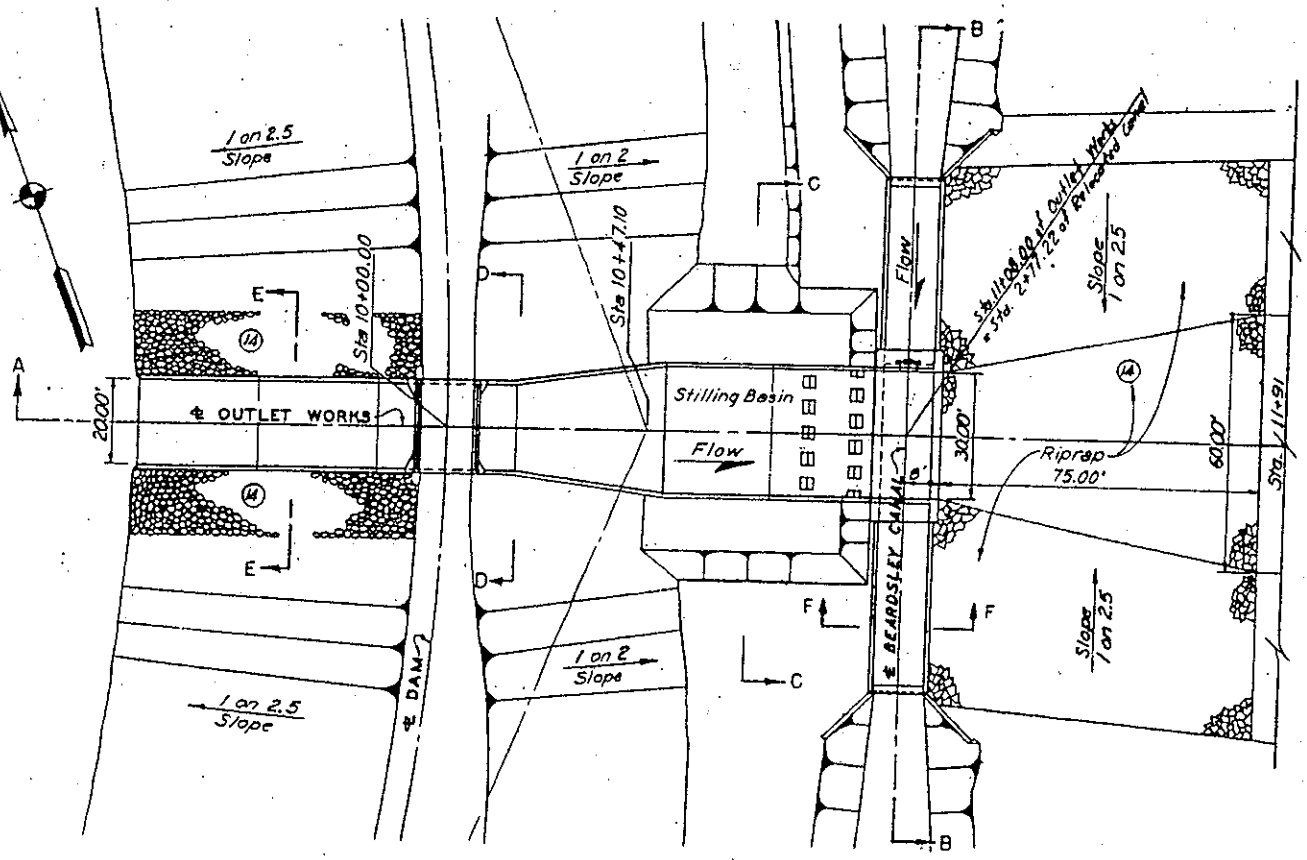
1. For General Plan see Sheet 2.
2. For Plan and Profile of Minor Flood Channel, see Sheets 7 and 8.

NOTES:

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

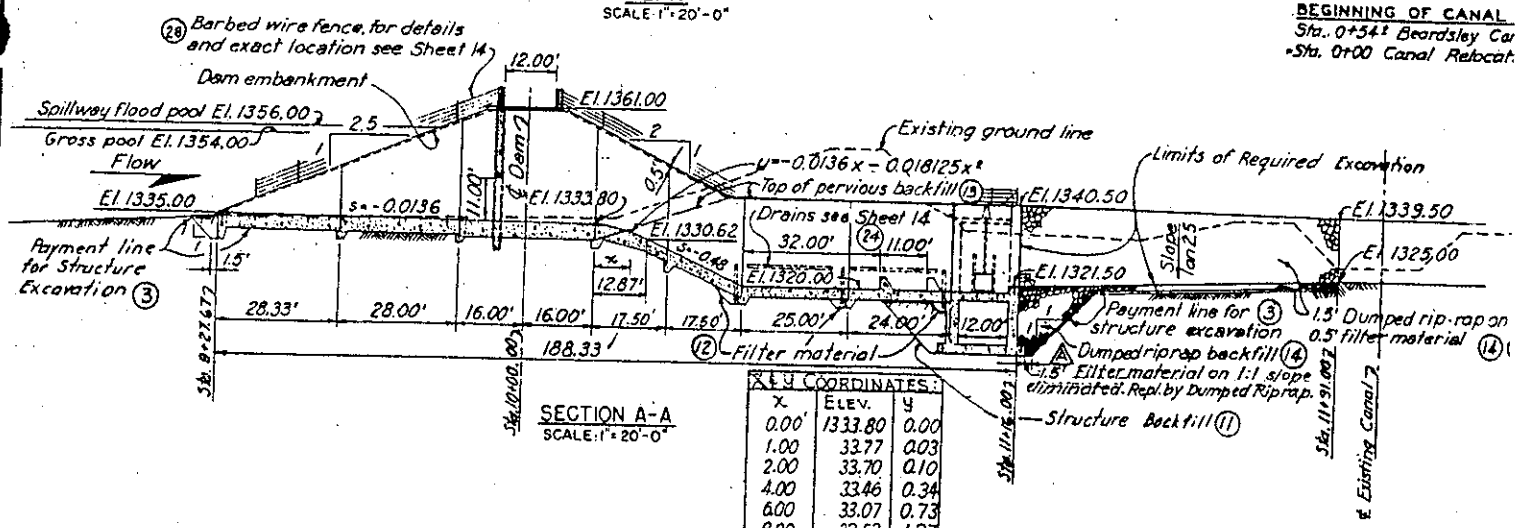
10' 0' 10' 20' 30'
SCALE IN FEET

OUTLET WORKS



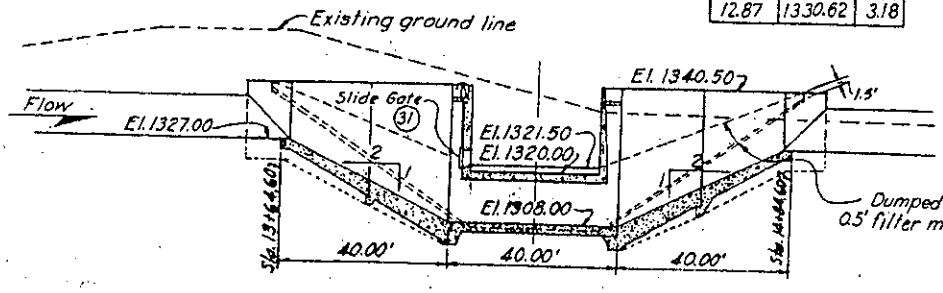
PLAN
SCALE: 1" = 20'-0"

BEGINNING OF CANAL
Sta. 0+54± Beardsley Ca
= Sta. 0+00 Canal Relocat.

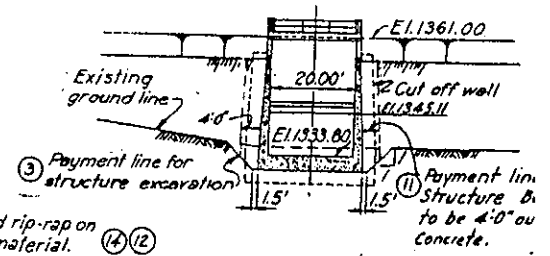


SECTION A-A
SCALE: 1" = 20'-0"

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

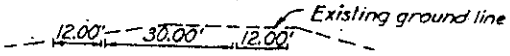


SECTION B-B
SCALE: 1" = 20'-0"



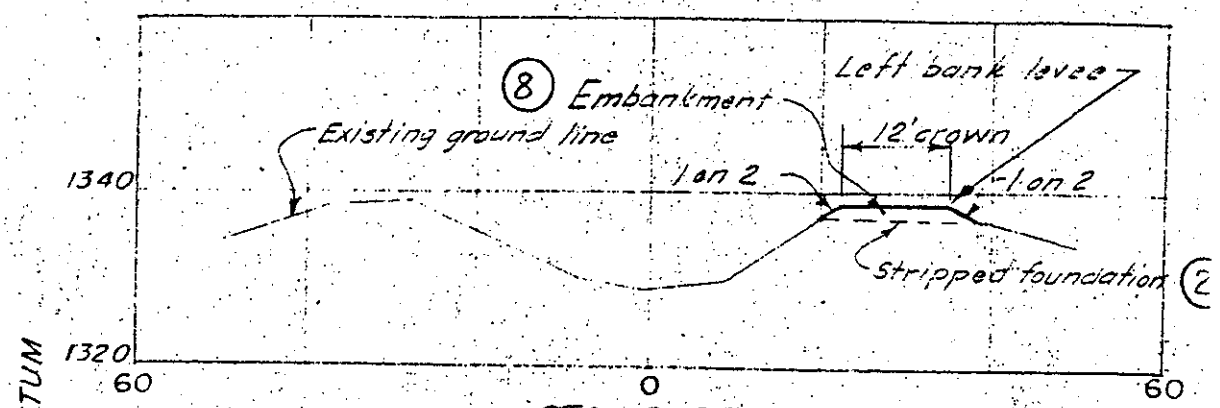
SECTION D-D
SCALE: 1" = 20'-0"

(8) This excavated material to be placed in dam

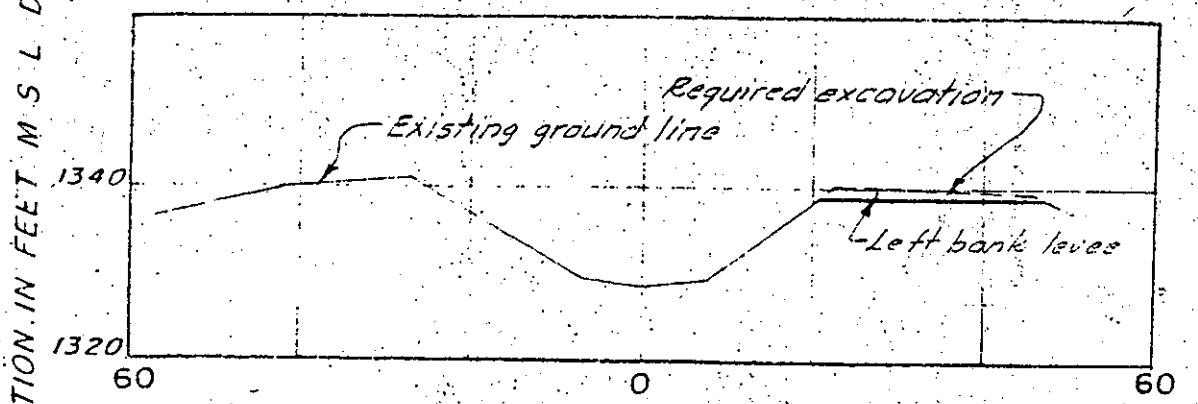


This excavated material

directed by



STA 16+00B

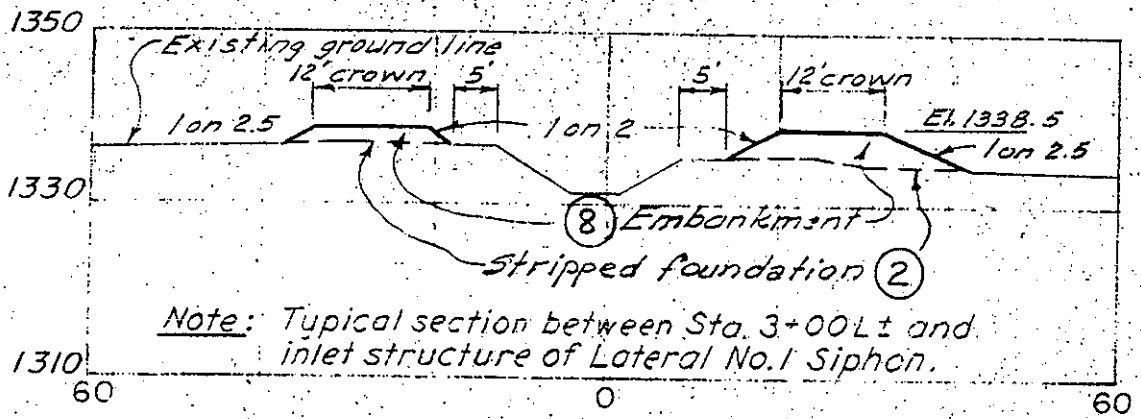


STA 28+00B

ELEVATION IN FEET M S L DATUM

4000 FEET

TYPICAL SECTIONS BEARDSLEY CANAL



TYPICAL SECTION LATERAL No. 1

SCALE 1 IN. = 20 FT. HORIZ & VERT

RECORD DRAWING-AS C(

CONT. NO. 43.76 REV. B DATE 27

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

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

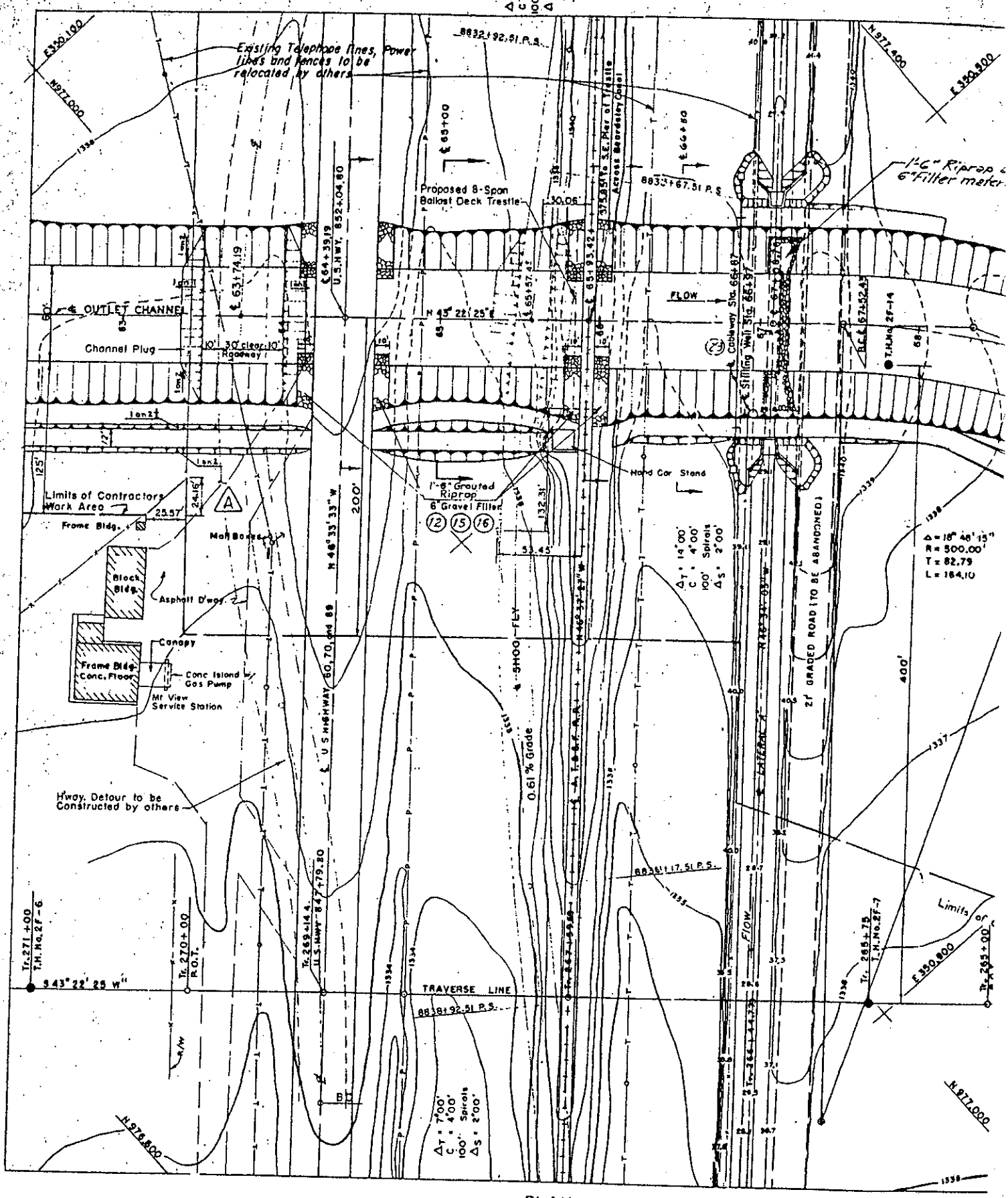
urve

Sta. 16+00

S = 0.000500

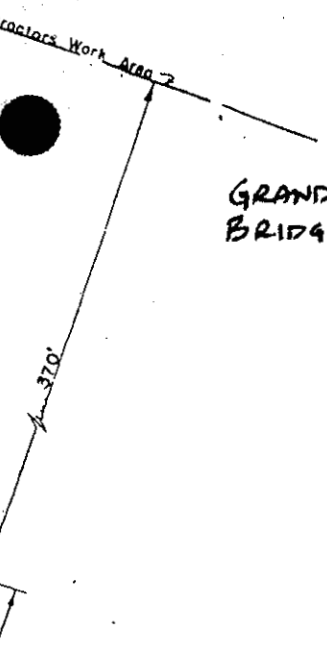
Sta. 244+00 C.C.
El. 1325.00

OUTLET CHANNEL AT GRAND AVENUE

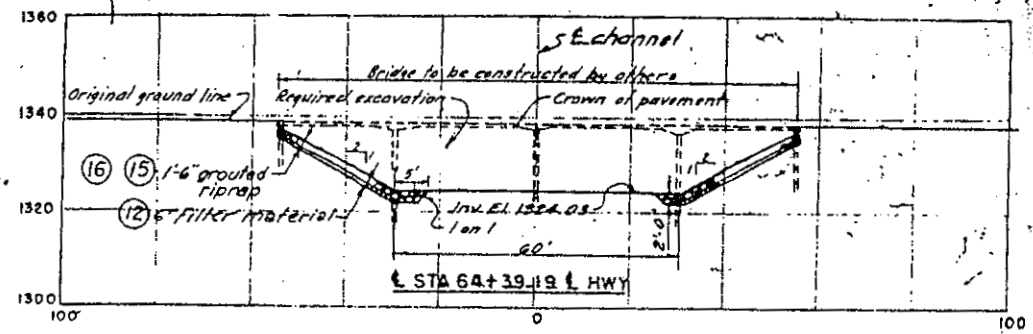


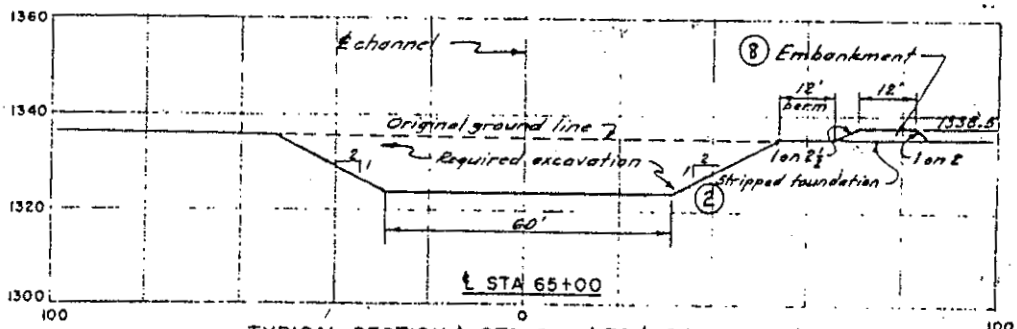
PLAN
Scale 1" = 40'

GRAPHIC SCALE



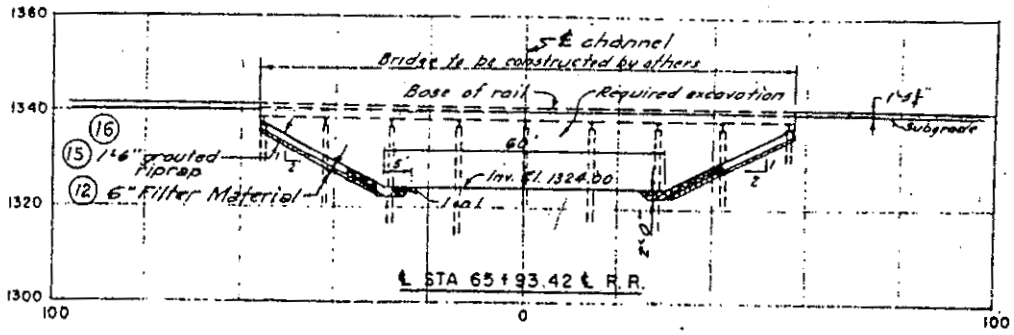
GRAND AVE. BRIDGE

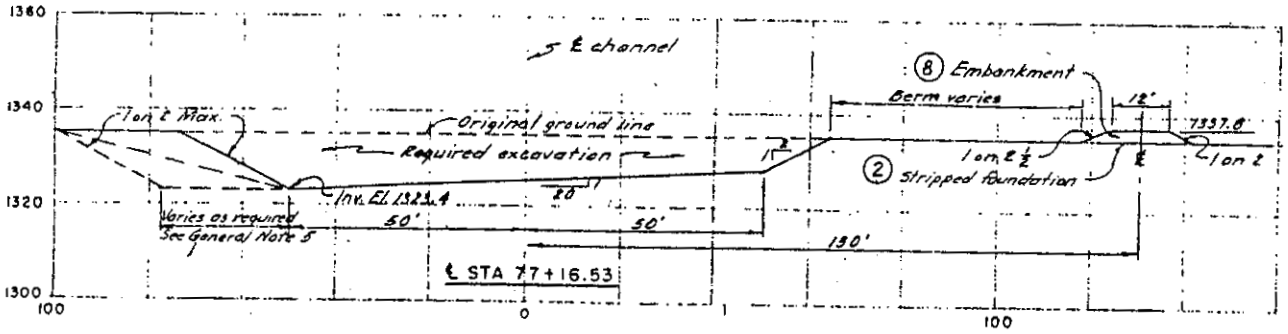




TYPICAL SECTION ℄ STA 12+41± TO ℄ STA 65+75±

RAILROAD BRIDGE





S. Soils Conservation
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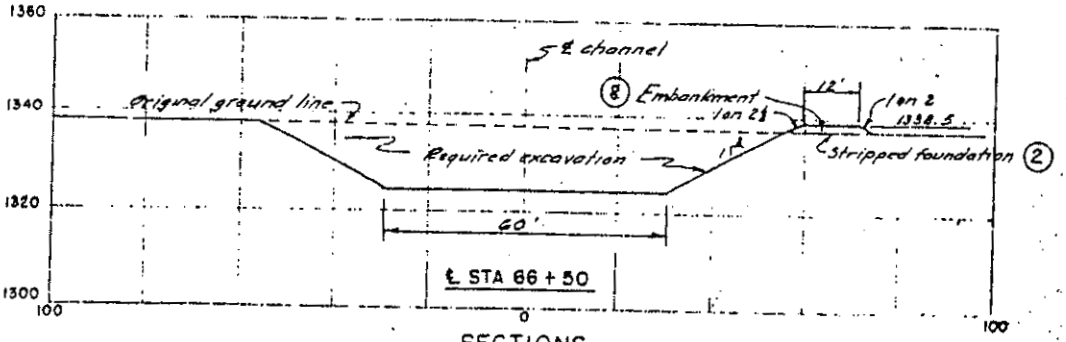
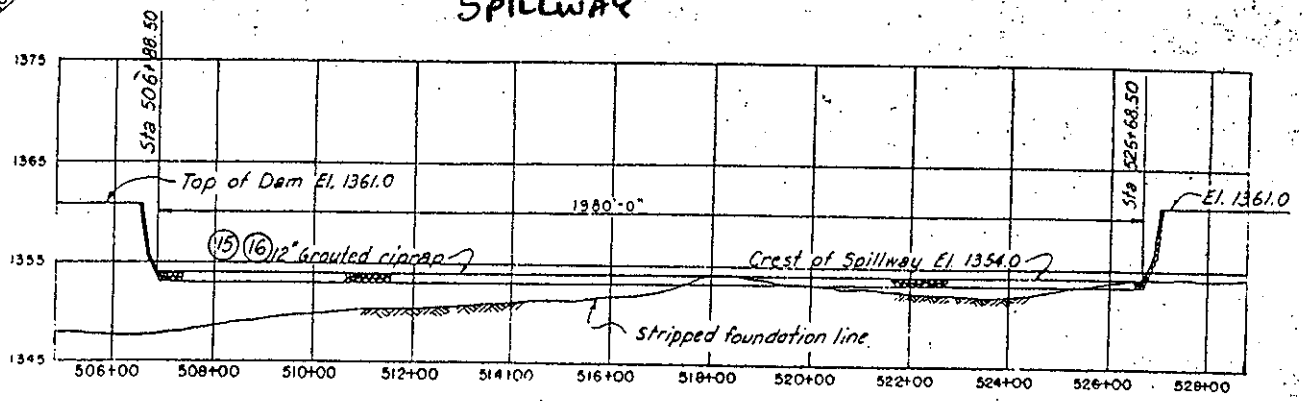


SECTIONS

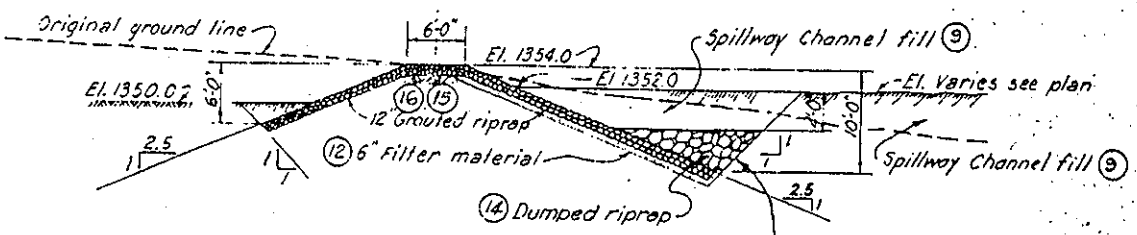
SCALES 1 IN = 20 FT HORIZ & VERT

SPILLWAY



PROFILE ON ℄ OF SPILLWAY

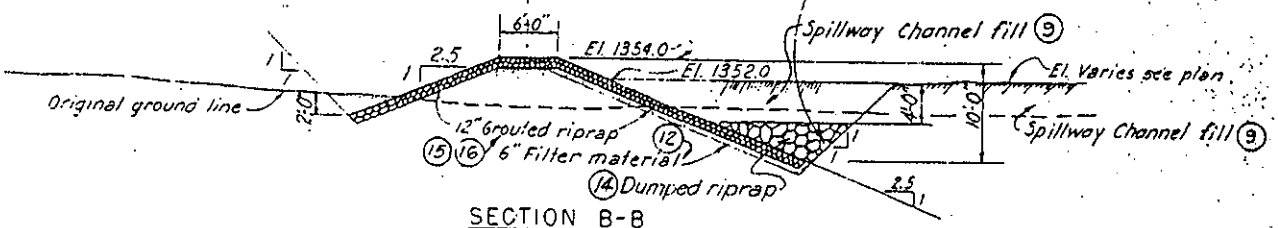
SCALES VERT 1" = 10'-0" HORIZ. 1" = 200'-0"



SECTION A-A

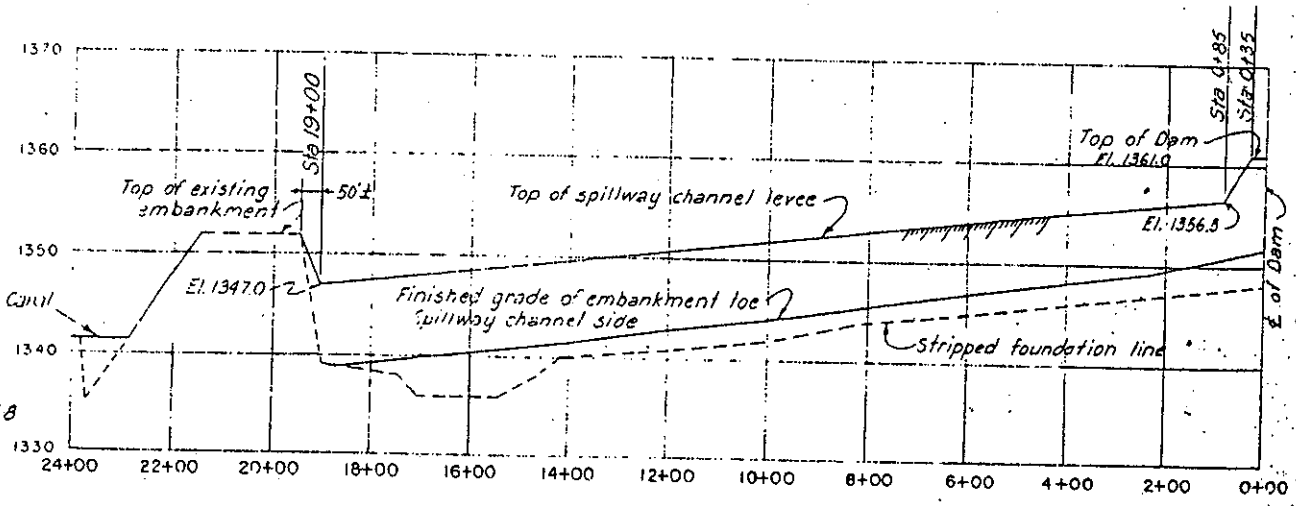
SCALE 1" = 10'-0"

Filter material eliminated on 1:1 slope under dumped Riprap. (A) Replaced with dumped Riprap.



SECTION B-B

SCALE 1" = 10'-0"



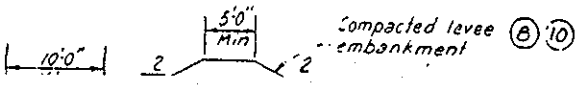
PROFILE OF RIGHT SPILLWAY CHANNEL LEVEE

SCALES VERT. 1" = 10'-0" HORIZ. 1" = 200'-0"

℄ Levee Sta 0+00 = ℄ Dam Sta 506+50

existing Beardsley Canal (bank)

structure #1 (4) es to be removed vaged, see sheet #8



GRAPHIC SCALES

Design Memorandum No. 1: Hydrology and Hydraulic Design

by USACE

CORPS OF ENGINEERS, U. S. ARMY

LOS ANGELES DISTRICT

MAY 22 '78

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REMARKS

DESIGN MEMORANDUM NO. 1

HYDROLOGY AND HYDRAULIC DESIGN

FOR

TRILBY WASH DETENTION BASIN AND OUTLET CHANNEL

NOVEMBER 1953

PREPARED UNDER THE DIRECTION OF

ARTHUR H. FRIE, JR.
COLONEL, CORPS OF ENGINEERS
DISTRICT ENGINEER

flow of about 34,000 cubic feet per second. The volume was estimated at 10,600 acre-feet. The peak discharge at Luke Air Force Base was estimated at 5,000 cubic feet per second by the United States Geological Survey. This occurrence is the largest observed flood from this drainage area.

Synthesis of Standard Project Flood

12. General.--The standard project flood is defined in Circular Letter No. 4262, Civil Works No. 65, dated 20 November 1946, from Office, Chief of Engineers. The letter reads in part as follows:

> * * * The "Standard Project Flood" is intended to represent a flood that would be exceeded in magnitude only on rare occasions, and thus to constitute a standard for design of structures that would provide a high degree of flood protection as determined by flood potentialities of the drainage system involved, without regard to localized economic or other practical limitations of individual projects. * * * In most cases, the Standard Project Flood should equal or approximate the flood that would result under existing or specified conditions of basin development, if the most critical storm of record in the region should occur over the drainage area involved when hydrologic conditions were reasonably favorable for flood run-off. * * *

Studies of available hydrologic data for the lower Agua Fria River area and adjacent southwest areas have shown that the storm of record with potentially the most critical flood-producing characteristics for the project area was the storm of 26-29 August 1951.

13. Standard project storm.--The storm of 26-29 August 1951 was used as the standard project storm, transposed slightly to center over the drainage area.

a. Storm transposition.--The transposition of the August 1951 storm over the project area was accomplished by: (1) expressing the actual rainfall amounts in the 1951 storm as percentages of the mean rainfall amounts for the period June through September; (2) constructing an isopercentual map based on those percentages (see pl. 3); and (3) transposing the isopercentual lines to such a position over the basin as would result in more critical amounts of rainfall over the drainage area. Although the mean precipitation for the months of June through September (pl. 4) includes precipitation from both local and general summer storms, the use of this mean precipitation for derivation of the isopercentuals was considered justifiable in view of the short distance of transposition and the over-all quality of data; the result is an increase in conservativeness.

b. Rainfall-intensity pattern.--One hour was selected as the smallest time interval for which rainfall intensities would be required in developing the standard project flood. The pattern of

Synthesis of Maximum Probable Flood

23. General.--The maximum probable flood is defined as the flood that would result if the maximum possible storm rainfall over the drainage area were to occur at a time when ground conditions in the area were conducive to maximum runoff. The maximum probable flood as developed in the December 1952 report has been revised. The revision is based on the maximum possible rainfall estimate made by the United States Weather Bureau for the area above Alamo Dam site on the Bill Williams River, Arizona, northwest of the project area.

24. Maximum possible storm.--The Hydrometeorological Section of the United States Weather Bureau developed average maximum possible rainfall depths for the Bill Williams River Basin by adjusting the maximum possible rainfall that had been previously developed for the Pecos Basin of New Mexico. Because of the considerable distance between the Pecos region and the Bill Williams area, the estimates for that area are considered to have been very conservative. The source of air mass was from the Gulf of Mexico for the Pecos storms. As the moist air in the August 1951 storm was of Gulf of Mexico origin and as the Trilby Wash area is just southeast of the Alamo area, the transposition of the Alamo maximum possible rainfall to the Trilby Wash area was considered reasonable. The maximum possible dew point and average height of barrier for the two areas were investigated and were found to be approximately equal. Therefore, in transposing the Alamo storm to the Trilby Wash area the depth-duration values needed to be adjusted only for size of area. Based on the Pecos storm area-depth-duration curves, the Alamo maximum possible rainfall for 4,770 square miles was increased on the average of 180 percent to apply to the 247-square-mile area above Trilby Wash detention basin. A storm of this magnitude applied to the Trilby Wash area may perhaps be too large but should nonetheless serve to define an extreme limit of flood possibilities for consideration of project adequacy. The rainfall pattern developed for the standard project storm was adjusted to the maximum possible rates as developed to arrive at the maximum possible storm for the project area.

25. Rainfall-loss rates and base flow.--Ground conditions conducive to maximum runoff would be reflected in minimum rainfall-loss rates. The loss rates for the subareas are shown in the paragraph on loss rates under a preceding heading titled "Synthesis of Standard Project Flood." For the maximum probable flood, a constant loss rate equal to the minimum was assumed for periods when the rainfall-intensity rates exceed the minimum loss rate. As in the analysis of loss rates for the standard project flood, the assumption appeared reasonable that the loss rate during periods with rainfall intensity rates of less than the minimum loss rate would be only 90 percent of the rainfall-intensity rate. Base flow was considered a negligible factor and was not included in the maximum probable flood synthesis.

26. Development of the maximum probable flood.--The development of the maximum probable flood was similar to the development of the standard project flood. Hydrographs were developed by using the distribution graphs used in the computations of the standard project flood hydrograph. The resulting maximum probable flood peak for the project area is 120,000 cubic feet per second.

Synthesis of Recommended Spillway Design Flood

27. General.--The basic flood estimates in planning and design of projects as given in Civil Engineer Bulletin No. 52-8, subject, "Standard Project Flood Determinations," and dated 26 March 1952 reads in part as follows:

> * * * Maximum probable (or maximum possible) flood estimates are applicable to projects where consideration is to be given to virtually complete security against potential floods. Applications of such estimates are usually confined to the determination of spillway requirements for high dams, but in unusual cases may constitute the design flood for local protection works where an exceptionally high degree of protection is advisable and economically obtainable. * * *

As the proposed dam is not only relatively low and in an agricultural area where loss of life would not be expected to occur even in the improbable event of dam failure, and as the basin shape, which closely resembles a leveed channel, is such that a destructive "wall of water" would not likely form if the dam were breached, a flood of lesser magnitude than the maximum probable is recommended for spillway design. The development of this flood is given in the following paragraph.

28. Spillway design storm and flood.--The recommended spillway design flood was derived as a more conservative estimate of the standard project flood. The standard project storm was retained, but the rainfall-loss rates were reduced. The rates are the same as those used for the maximum probable flood with the exception that in the first four periods of high intensity the loss rates were decreased from an initial 0.30 inch per hour to the 0.20-inch-per-hour minimum used for the maximum probable flood. The development of the spillway design flood was similar to that of the standard project flood. The spillway design flood hydrograph (peak flow 52,000 cubic feet per second) is shown on plate 8.

Adequacy of Floods

29. Standard project flood.--The estimate of the standard project flood, as developed, is considered satisfactory for a flood that would be exceeded only on rare occasions. A comparison of flood magnitudes is difficult because of inadequate data. The magnitude and relative rarity of the standard project flood may perhaps best be judged from the fact that the August 1951 storm on which the flood estimate is based is

the largest observed general summer storm of record for comparable areas in Arizona, insofar as can be determined from rainfall records and available accounts for the past 75 years (see table 2). The standard-project-flood peak of 35,000 cubic feet per second is slightly larger than the total nonsynchronized flow of 34,000 cubic feet per second estimated for the August 1951 flood, and the standard-project-flood volume of 32,800 acre-feet is more than three times the estimated volume of 10,600 acre-feet in the observed flood. A comparison of the standard-project-flood peak discharge per square mile with peak discharges per square mile of floods of record in Arizona and New Mexico and also with Creager's enveloping curve of maximum floods is shown on plate 9. The relatively low plotted position of the project flood, which is based on a general storm, is to be expected because that part of the enveloping curve is based on floods of high peak (and low volume) that resulted from local storms. Also, the elongated shape of the area and the relatively flat slopes, which result in a comparatively longer time of concentration, tend to produce a relatively low plotting position.

30. Maximum probable flood.--The magnitude of the maximum probable flood is best indicated by the severity of the various hydrologic factors (storm magnitude and pattern, loss rate, and time distribution of runoff) on which the flood estimate is based. A further indication of the severity of the maximum probable flood is the fact that it is about 3.5 times as large as the standard project flood. A comparison of the maximum-probable-flood peak discharge per square mile with major floods in Arizona and New Mexico, and with Creager's enveloping curve of maximum floods, is shown on plate 9.

31. Recommended spillway design flood.--The adequacy of the recommended spillway design flood is best indicated by the magnitude of the storm and the severity of the rainfall-loss rates. The loss rates averaged only slightly higher than those used for the maximum possible storm. The peak flow (52,000 cubic feet per second) and the total volume (44,000 acre-feet) of the recommended spillway design flood are about 1.5 and 1.3 times, respectively, as large as corresponding values of the standard project flood. A comparison of the spillway-design peak discharge per square mile with major floods in Arizona and New Mexico, and with Creager's enveloping curve of maximum floods, is shown on plate 9.

HYDRAULIC DESIGN

Detention Basin and Spillway

32. General.--The plan for Trilby Wash detention basin and outlet channel corresponds generally to the plan recommended in the 1952 survey report, except that the dam embankment would be 2.5 feet lower. In the final design, on which work has been initiated, minor functional design revisions will be considered, including possible modifications for protecting the embankment at inflow concentration points and

Table 7

Summary of pertinent data, Trilby Wash detention basin, Arizona

Item	Unit	Quantity
Drainage area	Square miles	247
Dam (earth-, sand-, and gravel-fill):		
Crest elevation	Feet, m.s.l.	1,361.0
Height above streambed	Feet	31.5
Average height	...do	20.5
Length at crest	...do	49,500
Freeboard	...do	5.0
Spillway, on left abutment (broad crest - grouted stone):		
Crest length	...do	2,000
Crest elevation	Feet, m.s.l.	1,354.0
Outlets:		
Flood control (ungated):		
10'x10' double box	Number	1
Invert elevation at intake	Feet, m.s.l.	1,335.0
Conduit length	Feet	110
Drainage (gated):		
24" diameter pipes	Number	6
Standard project flood (design flood):		
Peak inflow	C.f.s	35,000
Peak outflow	...do	4,450
Volume (3.5 days)	Acre-feet	32,800
Spillway design flood:		
Peak inflow	C.f.s	52,000
Peak outflow	...do	22,000
Volume (3.5 days)	Acre-feet	44,000
Storage allocation:		
Flood control	Acre-feet	16,800
Sediment	...do	2,500
Total	...do	19,300
Spillway:		
Crest elevation	Feet, m.s.l.	1,354.0
Area	Acres	2,230
Maximum water surface:		
Elevation	Feet, m.s.l.	1,356.0
Area	Acres	2,520
Capacity (Gross)	Acre-feet	23,800

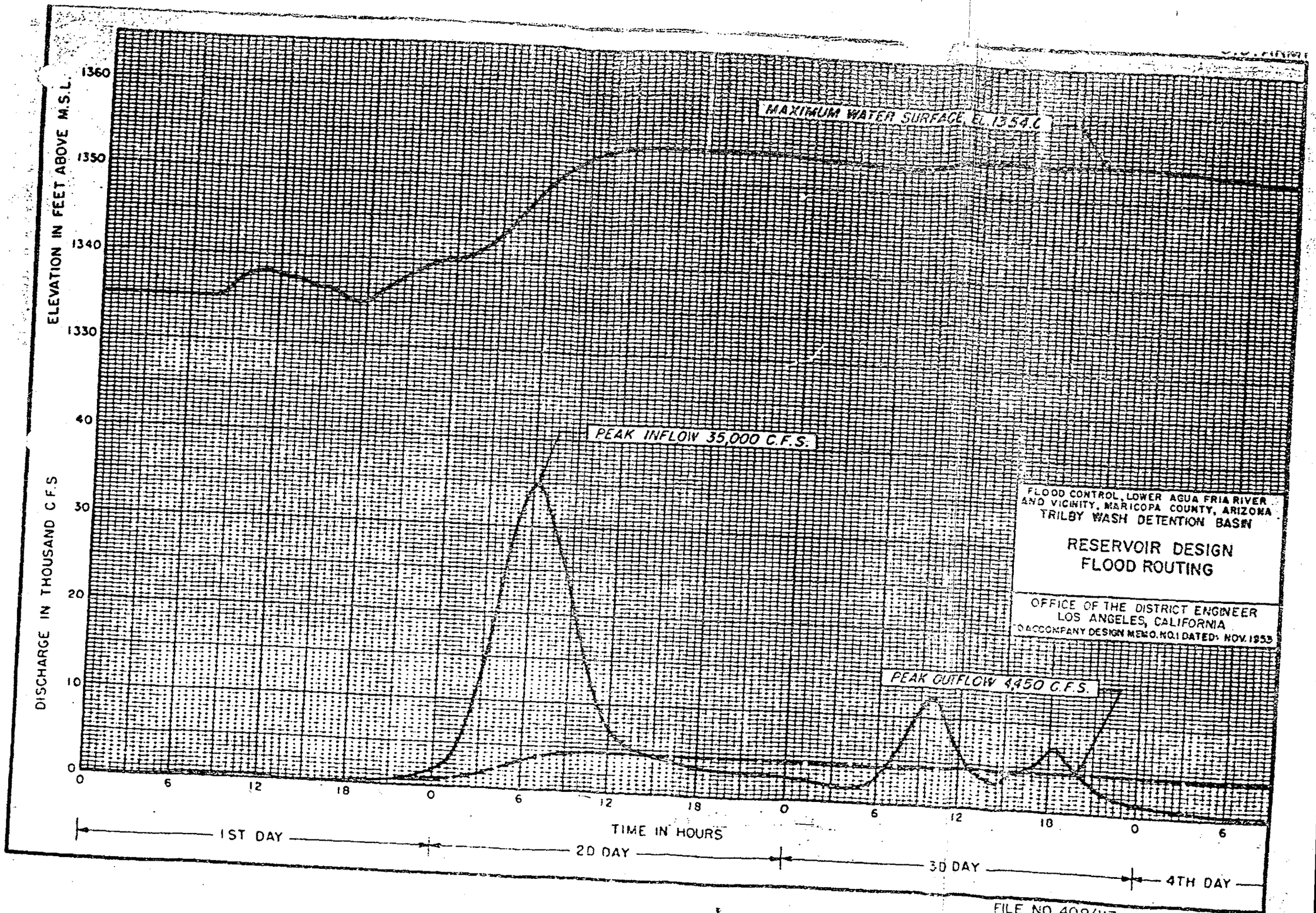

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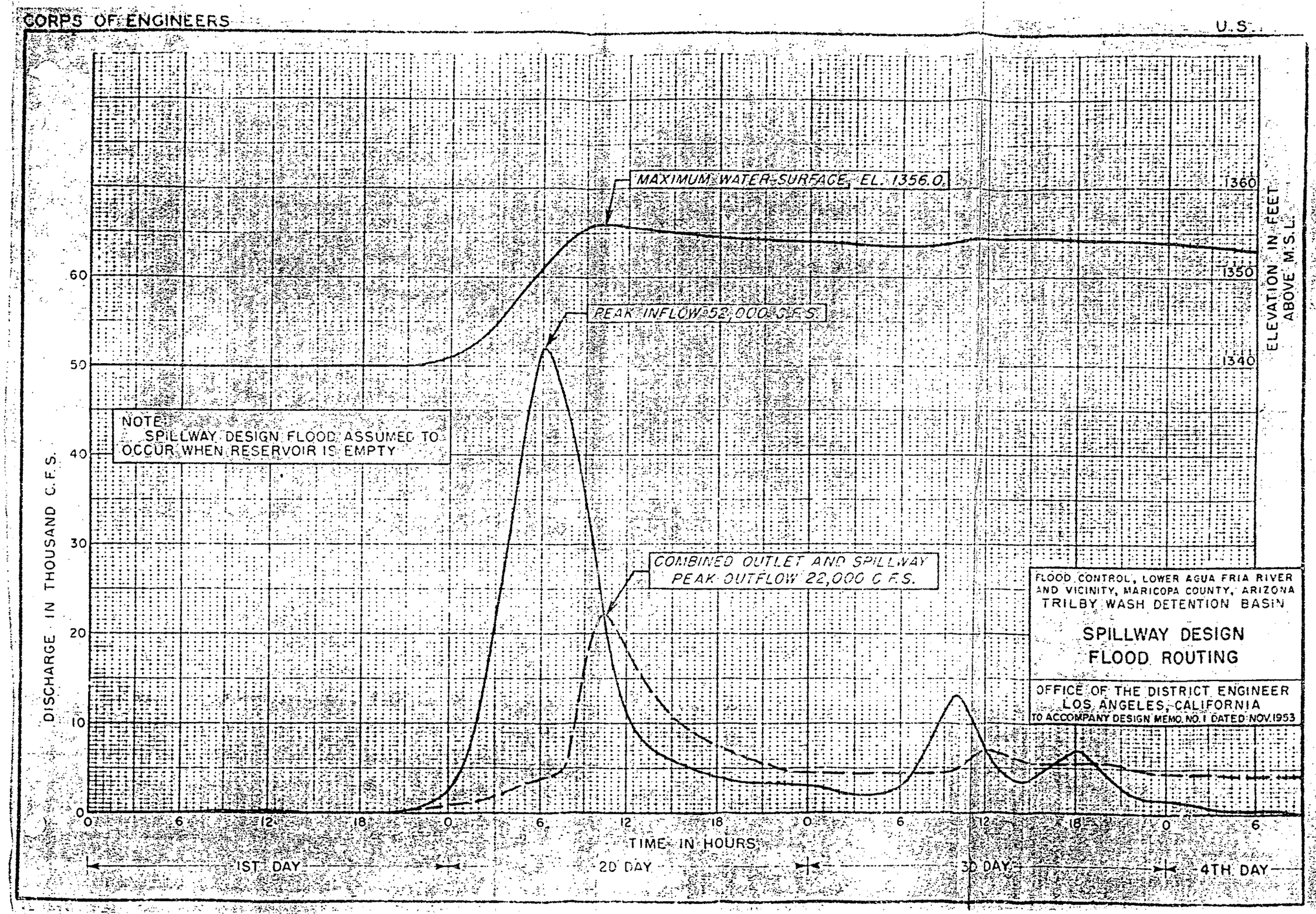
PLATE 15


CORPS OF ENGINEERS
U.S.
MAXIMUM WATER SURFACE, EL. 1356.0.
PEAK INFLOW 52,000 C.F.S.
COMBINED OUTLET AND SPILLWAY PEAK OUTFLOW 22,000 C.F.S.
NOTE:
SPILLWAY DESIGN FLOOD ASSUMED TO OCCUR WHEN RESERVOIR IS EMPTY
DISCHARGE IN THOUSAND C.F.S.
0
10
20
30
40
50
60
ELEVATION IN FEET ABOVE M.S.L.
1340
1350
1360
0
6
12
18
0
6
12
18
0
6
12
18
0
6
TIME IN HOURS
1ST DAY
2D DAY
3D DAY
4TH DAY
FLOOD CONTROL, LOWER AGUA FRIA RIVER AND VICINITY, MARICOPA COUNTY, ARIZONA
TRILBY WASH DETENTION BASIN
SPILLWAY DESIGN FLOOD ROUTING
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA
TO ACCOMPANY DESIGN MEMO. NO. 1 DATED NOV. 1953

Design Memorandum No. 2, Design Analysis

by USACE

McMicken Dam
Spillway Delineation Study
FCD 98-32

Hoskin Engineering Consultants, Inc.
DEI Professional Services, LLC
October 2001

07-21

FLOOD CONTROL

LOWER AGUA FRIA RIVER AND VICINITY

MARICOPA COUNTY, ARIZ.

DESIGN MEMORANDUM NO. 2

DESIGN ANALYSIS

FOR 07-21

TRILBY WASH DETENTION BASIN

AND

OUTLET CHANNEL

MARCH 1954

SACRAMENTO DISTRICT

CORPS OF ENGINEERS

U. S. ARMY

SACRAMENTO, CALIFORNIA

CHAPTER III - HYDRAULIC DESIGN

17. Outlet structure. - Details of the outlet structures are shown on sheets 2 and 3 of Inclosure 6. The Survey Report of the Los Angeles District, Corps of Engineers, indicated the outlet works should have a capacity of 4,450 c.f.s., at gross pool elevation 1354.00, to meet the requirement for the reservoir design flood. Hydraulic studies indicated this requirement could be met by an ungated, 20-foot wide, rectangular flume and vertical breast wall control with its bottom edge set at elevation 1344.10 to give an opening of 10-feet high by 20-feet wide between the invert of the flume and the bottom of the breast wall. The invert of the flume is at elevation 1335.00 at the upstream end and has a slope of 0.0136 to elevation 1333.80 at the downstream end.

18. The hydraulic computations are based on standard methods of computing flow in open channels and orifices. Manning's formula is used in the computation of open channel flow. The general formula, $Q = CA\sqrt{2gh}$, is used for orifice flow. A friction coefficient of $n = 0.012$ is used for the concrete flume and a coefficient of $C = 0.878$ for orifice flows. Computations for the discharge rating are shown on pages 1, 2, and 3 of Inclosure 2. The discharge rating curve is shown on page 4 of Inclosure 2.

19. Further study on the discharge rating was made by hydraulic model studies conducted by the Los Angeles District. These studies were authorized by letter file No. SPDGT (Agua Fria River) from South Pacific Division to Los Angeles District, subject, "Flood Protection, Luke Air Force Base, Model Study", dated 11 December 1953. The model was constructed to a scale of 1 to 18 and consisted of part of the reservoir, the outlet works, stilling basin, and about 300 feet of the return channel. For free flow or open channel conditions the model discharge was about 10 per cent less than the computed discharge due to the fact that entrance contraction was greater than contemplated. For controlled orifice flow the entrance contraction combined with a considerable vortical action at the breast wall made it necessary to increase the size of the orifice to obtain the desired discharge of 4,450 c.f.s. at gross pool elevation 1354. This was accomplished by raising the bottom of the breast wall to elevation 1345.10, giving an 11 by 20-foot opening. A table giving model discharges for various pool elevations is shown on page 5 of Inclosure 2. The results are plotted on page 4 in comparison with computed discharges.

20. Measurements of model velocities along the dam embankment at the entrance to the outlet works indicated a maximum velocity of 11 feet per second at the retaining walls and 5 feet per second 15 feet from the walls. Therefore, the embankments were riprapped for a width of 15 feet from the walls for protection against erosion.

21. A concrete jump basin is provided at the downstream end of the outlet flume in order to dissipate the energy of outlet flows up to 4,450 c.f.s. by means of a hydraulic jump. A 35-foot long rectangular shaped ramp connects the flume to the basin. The ramp varies in width from 20 feet at the upstream end to 30 feet at the floor of the jump basin. In order to maintain positive pressures on the invert of the ramp and to aid in the spread of the flow, a trajectory curve based on an initial velocity of 29.80 feet per second is incorporated into the design of the ramp. The maximum slope of the ramp is S = 0.48. The basin is 30-feet wide by 65-feet long with floor at elevation 1320.00. The basin is designed for 4,450 c.f.s. with reservoir pool at gross pool elevation 1354. The basin walls are set at the elevation 1340.5 which is based on a spillway flood pool flow of 4,860 c.f.s., allowing 3 feet of freeboard. Two rows of baffle blocks, 3-feet wide by 3-feet high spaced at 6-foot centers are provided on transverse axes 32 feet and 43 feet, respectively, from the upstream end of the basin. An end sill 1.5-feet high is provided at the downstream end of the basin. Water surface profile studies for the outlet channel described in paragraph 23 indicated that with the use of baffle blocks and end sill there is sufficient depth of tailwater at the jump basin to maintain an hydraulic jump for both project design conditions and for a steady flow of 4,450 c.f.s. in the outlet channel. Computations for the jump basin are shown on pages 6, 7, and 8 of Inclosure 2. Hydraulic model studies described in paragraph 19 indicated operation of the stilling basin would be very satisfactory for project design conditions. For a discharge of 4,900 c.f.s. at spillway design flood pool elevation 1356 the operation was still satisfactory.

22. Outlet channel. - Plan and profile of the outlet channel are shown on sheets 8 and 9 of Inclosure 6. A trapezoidal transition channel, flaring from a bottom width of 30 feet at Station 11+16 to 60 feet at Station 11+91 with 2-1/2 side slopes is provided at the downstream end of the jump basin. To furnish bank protection the water side of the transition side slopes are riprapped. From Station 11+91 to Station 12+41 the side slopes in cut are warped from 1 on 2-1/2 side slopes to 1 on 2 side slopes. The water side of the embankments have slopes of 1 on 2-1/2. The right levee is provided with a berm of about 12 feet beginning at Station 12+41. The left levee is tied into the left bank of the

Beardsley Canal: The ezoidal 60-foot channel has an invert slope of S = 0.000185, begi g at Station 11+91 and ending at Station 69+16.53. At Station 50+43.30, y 3-foot concrete siphon for lateral 1, with top of siphon at chan invert, crosses the channel. At Station 64+39.19 the channel es under a 40-foot wide bridge on U. S. High- ways 60, 70, and 89. Station 65+93.42 the channel passes under a bridge on the AT&SF R oad. The side slopes under the bridges are paved with riprap for idth of 10 feet on each side of the bridges to protect the abutme from erosion. At Station 67+08.76 a 4 by 4- foot concrete siphon lateral A, with top of siphon at channel invert, crosses the el. The concrete siphons serve as a control against degradation e channel bottom. From Station 69+16.53 to Station 77+16.53 the nel transitions from a 60-foot trapezodial channel into a chann th a maximum bottom width of 100 feet as shown on sheet 9 of sure 6. At Station 324+44 the outflow channel empties into a wash, h in turn runs southerly into the Agua Fria River.

23. Hydrologic es from Design Memorandum No. 1 indicated that, for project de conditions, the outflow channel would inter- cept the flows of th ashes between the outlet wash to the Agua Fria River at Static +44 and Station 66+13 in addition to carry- ing the project desi ow of 4,450 c.f.s. from the outlet structure. Flows for various ra of the outlet channel are listed on page 9 of Inclosure 2. Ma s formula is used for computation of water surface profiles wit 0.025 for channel areas and n = 0.030 for overbank areas. To the water surface profile it was found that critical flow would at Station 319+79 where the water spreads out to enter the ou wash to the Agua Fria River. Velocities in the channel vary fr 1 to 10.8 feet per second between the outlet wash and the downsta end of the 60-foot channel at Station 77+16.53. In the channel at t teral A siphon and under the bridges the velocities vary fro to 4.9 feet per second. Velocities in the channel between U. ghways 60, 70 and 89 and the upstream end of the 60-foot structu ry from 4.1 to 1.1 feet per second. In the transition from the ream end of the 60-foot channel at Station 11+91 to the end si the outlet structure the velocities vary from 10.7 to 4.6 fe r second. Computations for the water sur- face profile are sh n pages 10 through 17 of Inclosure 2. Typical cross secti nd corresponding area and hydraulic radii curves are shown on s 18 through 37 of Inclosure 2. The water surface profile is on sheet 8 of Inclosure 6.

24. The projec sign discharge for the outlet wash is 14,000 c. f.s. Hydraulic stu indicated that the downstream control would be located at Stati 69+58 where the wash drops into a deep gully. In the study for th ter surface profile it was found that critical flow occurs in seve other locations. Velocities vary from 4.2 to 12.2 feet per secon Computations for the water surface profile in the outlet wash are wn on pages 38 and 39 of Inclosure 2. Cross sections and area a ydraulic radii curves are not included. The water surface profi s shown on sheet 8 of Inclosure 6.

25. Spillway. - The spillway consists of a 6-foot wide broad-crested weir with crest elevation 1354 and 1 on 2-1/2 side slopes. The crest length at elevation 1354 is 1980 feet. In order to decrease velocities around the abutments, the ends slope up 1 on 10 to elevation 1356 and then 1 on 2-1/2 to the top of the dam at elevation 1361. The approach is excavated to elevation 1350 on a radius of 2,000 feet with center at the right abutment. The return channel is graded sloping from each side to the centerline so that normal drainage will be carried over the siphon of the Beardsley Canal into the outlet channel. See sheet 4 of Inclosure 6 for details of the spillway.

26. The standard weir formula, $Q = C\ L\ H^{3/2}$, is used for rating the broadcrested weir just upstream from the beginning of drawdown with $C = 3.09$. Since the length of the crest is long in comparison to the depth of water, the spillway is rated as a rectangular weir with "L" equal to the flow area of the trapezoid at critical depth divided by the assumed critical depth. Water surface profiles are computed for the approach channel for various discharges and new values of "C" were obtained to incorporate approach losses. These values of "C" vary from 3.09 with no flow to 2.60 with a discharge of 76,800 c.f.s. Hydraulic studies indicated that there would be very little rise in the water surface from the downstream to the upstream end of the reservoir excluding approach losses. Computations are shown on pages 40 through 44 of Inclosure 2. The discharge rating is shown on page 45. The spillway design flood routing is shown on pages 46 through 51.

27. A water surface profile is computed for the return channel assuming that, with initial conditions, critical flow would occur over the right bank of the Beardsley Canal which is at elevation 1338.5. Computations are shown on page 52 of Inclosure 2. The right spillway levee is provided with 3 feet of freeboard. No levee is provided on the left side of the spillway channel.

28. Siphons. - The concrete siphon for the Beardsley Canal is 10-feet high and 12-feet wide and is made a component part of the cut-off wall for the jump basin. Hydraulic studies indicated the loss through the siphon would be about 0.5 feet, but the embankments on the Beardsley Canal are sufficiently high to provide over one foot of freeboard for the design flow of 100 c.f.s. Computations for the siphon loss is shown on page 53 of Inclosure 2.

29. The concrete siphon for lateral No. 1, crossing the outlet channel at Station 50+43.29, is 3 by 3 feet in cross section. Computations indicated the loss through the siphon would be about 0.8 feet, but the backwater will have no effect on the discharge at the turnout on Beardsley Canal. Computations for head loss through lateral 1 siphon are shown on page 54 of Inclosure 2.

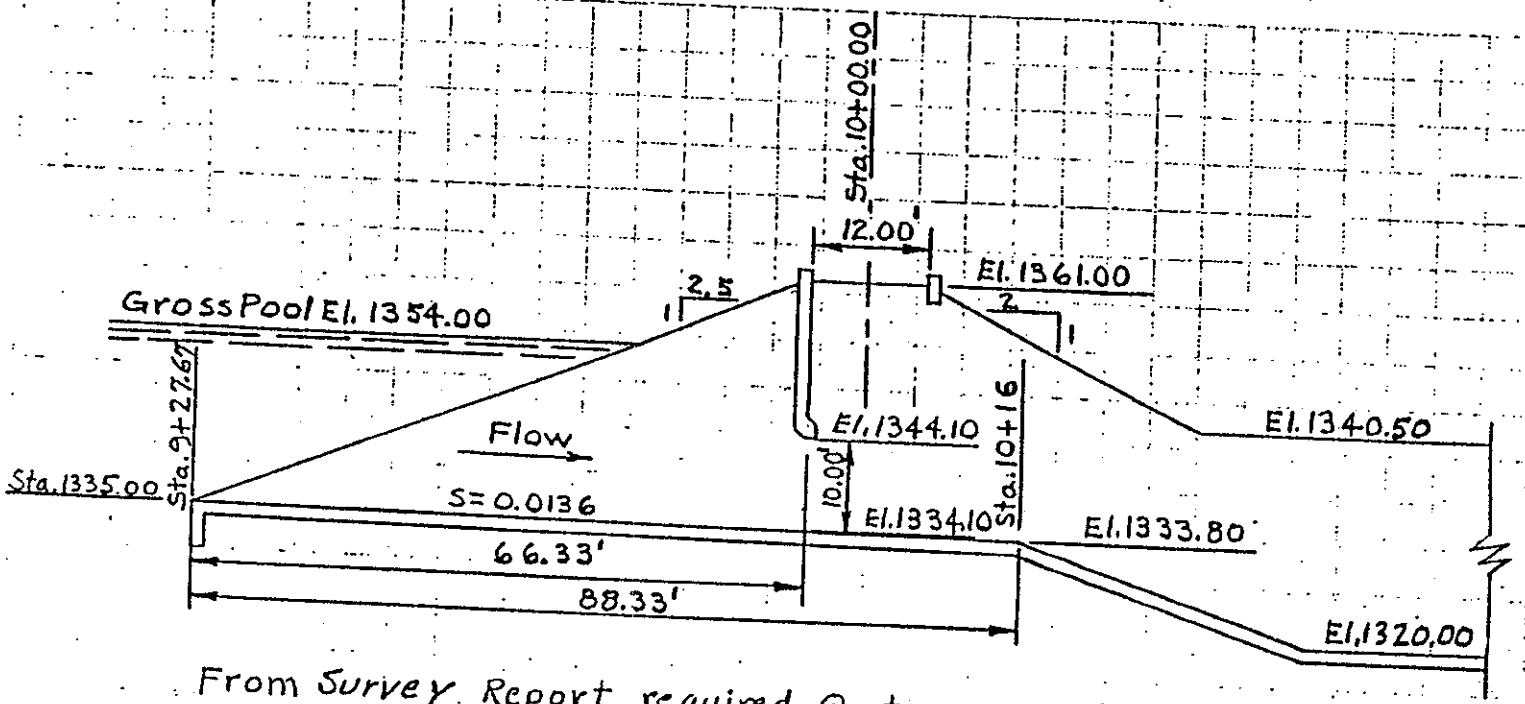
30. The concrete siphon for lateral A, crossing the outlet channel about 115 feet downstream from the AT&SF Railroad, is 4 by 4 feet in cross section. Computations indicated the loss through the siphon would be about 1.3 feet, but canal embankments are high so there will be a freeboard of more than one foot. Hydraulic studies indicated that backwater, due to the loss of head through the siphon, would have no effect on the discharge through the 2-36 inch pipes at the Beardsley Canal turnout to lateral A. Computations for head loss through lateral A Siphon are shown on Page 55 of Inclosure 2.

CORPS OF ENGINEERS
SACRAMENTO DISTRICT OFFICE

Subject: Tilby Wash Detention Basin
Computation: Outlet Works - Discharge Rating
Computed by: JMG Checked by: AKL Date: Dec. 1953
Sheet 1 of 5 sheets
Page 1

Open Channel Outlet with Curtain Wall Control

Q = Orifice Flow



From Survey Report required Q at gross pool = 4,450 c.f.s.
Orifice is suppressed on 2 sides and bottom with rounded top edge.
Assume $K_e = 0.30$; $C = \frac{1}{\sqrt{K_e+1}} = \frac{1}{\sqrt{1.30}} = 0.878$ (Allows for entrance loss, contraction loss, and possible vortex loss)

$Q = CA\sqrt{2gh} = 0.878 \times A \times 8.02\sqrt{1354.00 - 1344.10}$

$A = \frac{4,450}{22.15} = 200.9$ sq. ft. (Use 10' x 20' opening)

$Q = 0.878 \times 2.00 \times 8.02\sqrt{h} = 14.10\sqrt{h}$

At pool El. 1354, $Q = 14.10\sqrt{9.9} = 4,440$ c.f.s.

Subject: Trilby Wash Detention Basin
Computation: Outlet Works - Discharge Rating — Sheet 2 of 5 sheets
Computed by: JMG — Checked by: AKL — Date: Dec. 1953

Orifice Flow

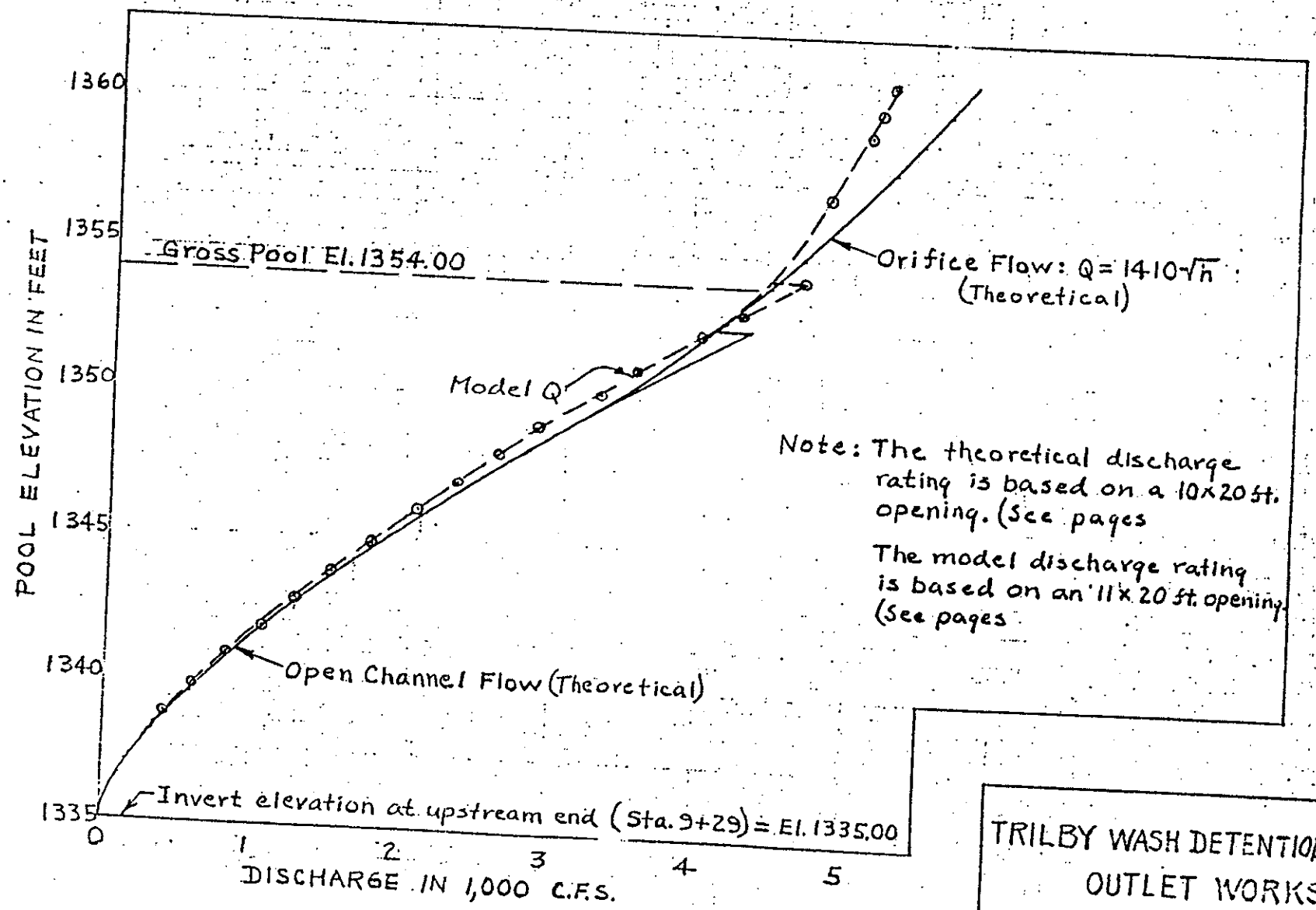
Pool El.	h (Control El = 1344.10)	$\sqrt{h}$	$Q = 1410\sqrt{h}$
1345.0	0.9	0.949	1338
1346.0	1.9	1.378	1943
1347.0	2.9	1.703	2401
1348.0	3.9	1.975	2785
1349.0	4.9	2.214	3122
1350.0	5.9	2.429	3425
1351.0	6.9	2.627	3704
1352.0	7.9	2.811	3964
1353.0	8.9	2.983	4206
1354.0	9.9	3.146	4436
1355.0	10.9	3.302	4656
1356.0	11.9	3.450	4865
1357.0	12.9	3.592	5065
1358.0	13.9	3.73	52.60
1361.0	16.9	4.11	5800

Free Flow

Critical depth flows:

Control section is at Sta. 9+27.7 for Q = 0 c.f.s. and moves dwnstr. as Q increas

d_c	d_c^3	$d_c^3 g$	$q = \sqrt{d_c^3 g}$	$Q = 20q$
0.5	0.125	4.0	2.0	40
1.0	1.000	32.2	5.67	113
2.0	8.000	257.6	16.05	321
3.0	27.000	869	29.48	590
4.0	64.00	2061	45.40	908
5.0	125.0	4025	63.44	1269
6.0	216.0	6955	83.40	1668
7.0	343.0	11045	105.10	2102
9.0	729.0	23474	153.21	3064
11.0	1331.0	42858	2[illegible].02	4140



Note: The theoretical discharge rating is based on a 10x20 ft. opening. (See pages

The model discharge rating is based on an 11x20 ft. opening. (See pages

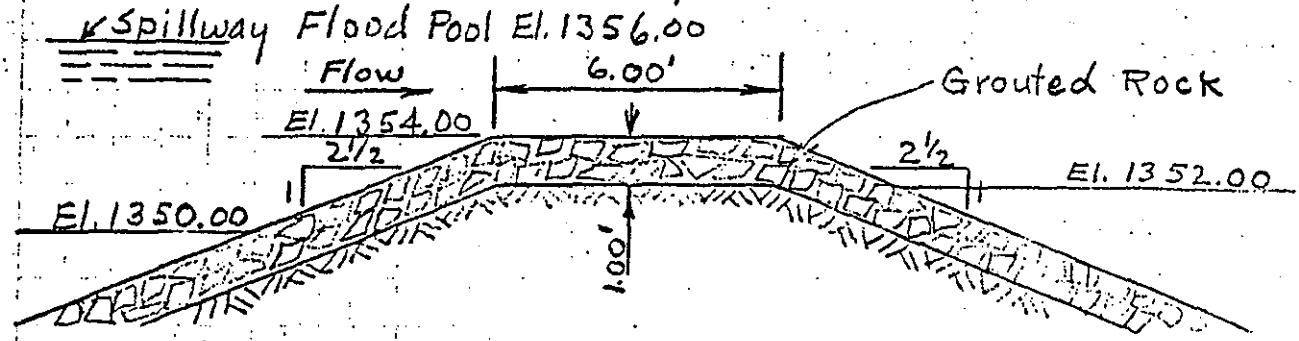
TRILBY WASH DETENTION BASIN
OUTLET WORKS
DISCHARGE RATING

JMG ✓AKL Dec. 1952
Sheet 4 of 5

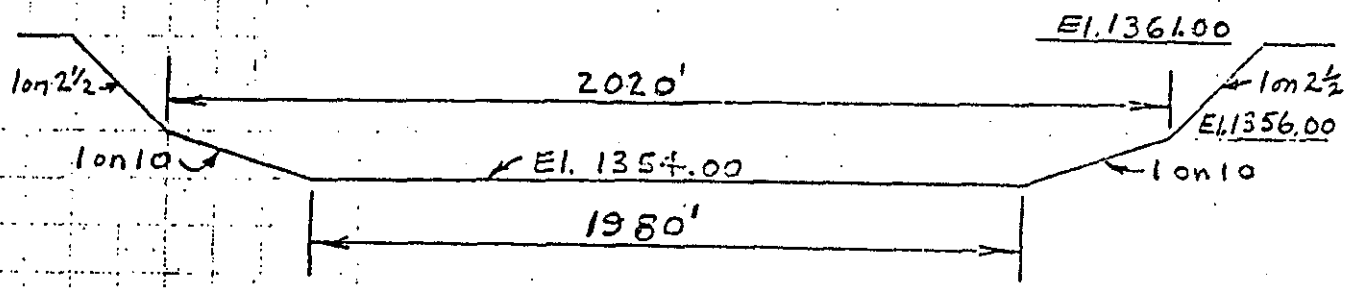
Page 4

Subject: Trilby Wash Detention Basin
Computation: Spillway Discharge Rating — Sheet 1 of 6 sheets
Computed by: JMG — Checked by: AKL — Date: Jan. 1954

For Plan see dwg. file No. 1269/69 sheets 8 and 20.



SECTION THRU SPILLWAY CREST



ELEVATION ALONG SPILLWAY CREST

In order to decrease the end velocities at the spillway abutments, the abutments at each end are sloped 1 on 10 from El. 1354.00 to El. 1356.00. From El. 1356.00 to 1361.00 the end slopes are 1 on 2½.

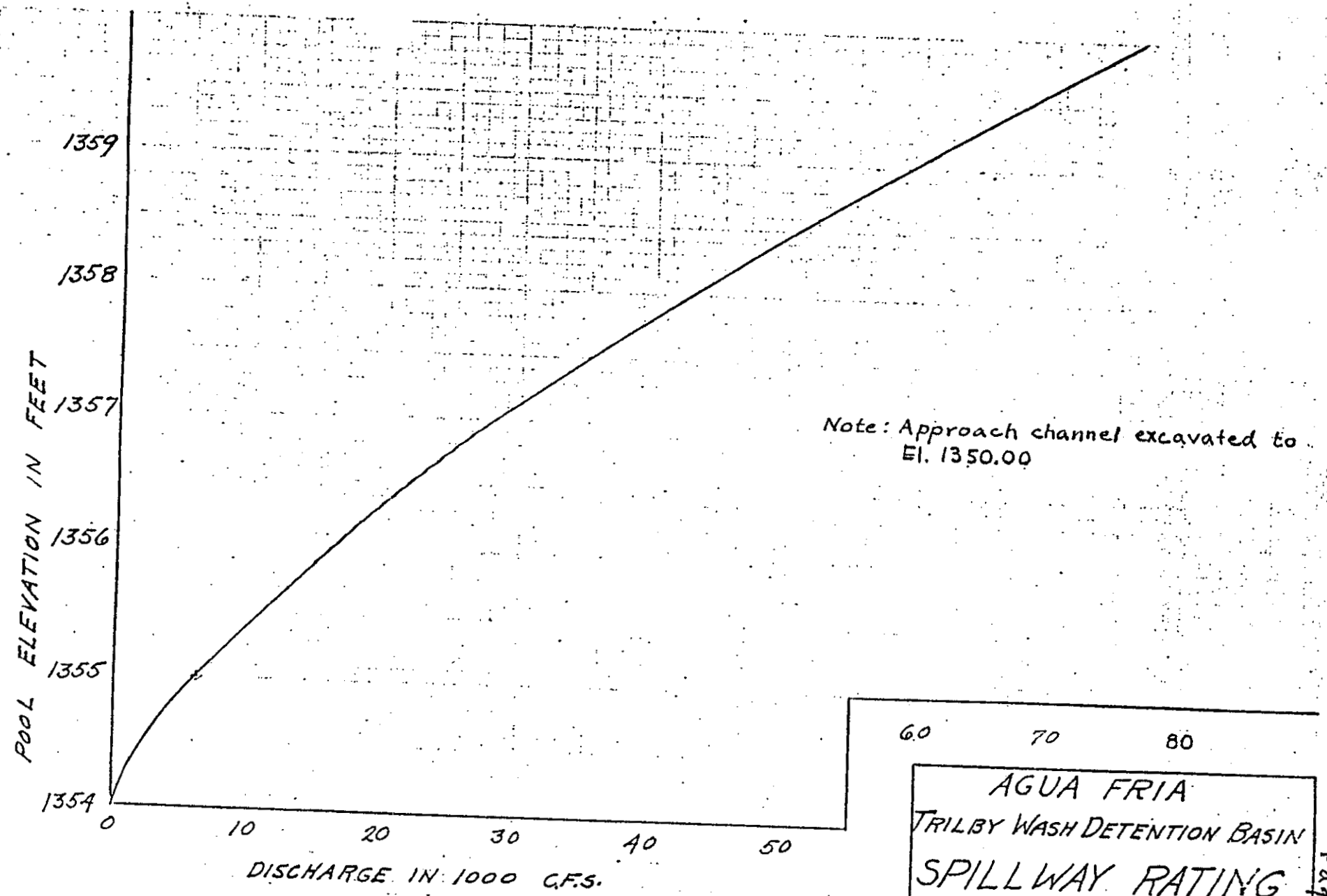
Assume flow conditions for a rectangular broad crested weir with $Q = 3.09\,L\,H^{3/2}$ where L = Ave. length.

From Energy El. 1354 to 1357 $L = 2080 + \frac{20H}{3}$ since $d_c = \frac{2H}{3}$

From Energy El. 1357 to 1361 $L = \frac{A\text{ (at critical depth)}}{d_c}$

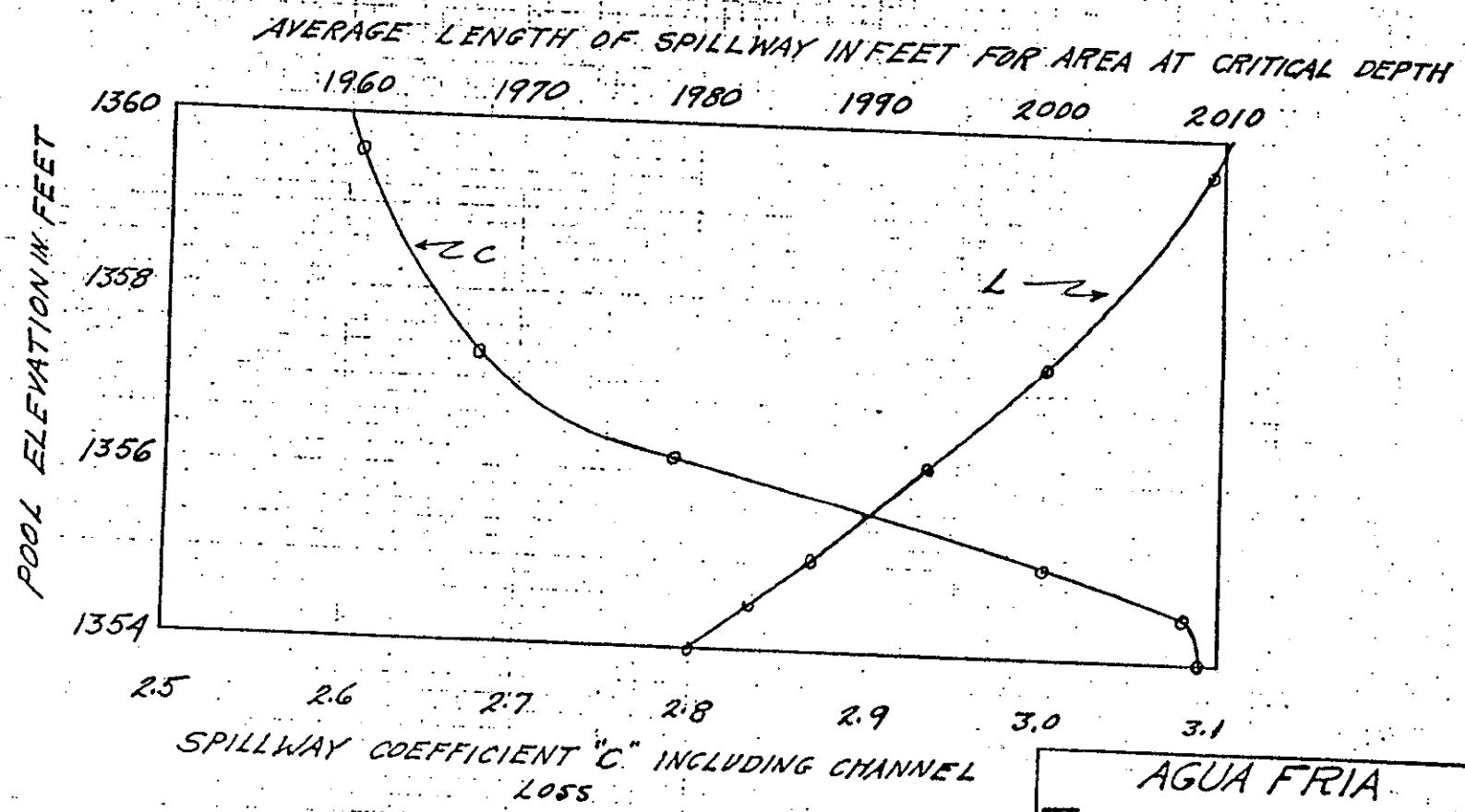
Energy El.	H	$\frac{2}{3}H$	L	$H^{3/2}$	$Q = 3.09\,L\,H^{3/2}$
1354.00	0.00	0.000	1980	0.0000	0
.25	0.25	0.167	1982	0.1250	765
.50	0.50	0.333	1983	0.3536	2,160
1355.00	1.00	0.667	1987	1.0000	6,140
.50	1.50	1.000	1990	1.837	11,300
1356.00	2.00	1.333	1993	2.828	17,400
.50	2.50	1.667	1997	3.953	24,400
1357.00	3.00	2.000	2000	5.196	32,100
.50	3.50	2.333	2003	6.548	40,500
1358.00	4.00	2.667	2005	8.000	49,600
1359.00	5.00	3.333	2009	11.18	69,400

* Note: Energy Elev. is just upstream from crest before drawdown.



AGUA FRIA
TRILBY WASH DETENTION BASIN
SPILLWAY RATING

JAN '54 by AKL sheet 6 of 6



AGUA FRIA
TRILBY WASH DETENTION BASIN
SPILLWAY COEFFICIENT AND LENGTH
JAN. '54 by AKL Sheet 5 of 6

Hydrologic Analysis for McMicken Dam

by Russ Cruff for FCDMC

McMicken Dam
Spillway Delineation Study
FCD 98-32

Hoskin Engineering Consultants, Inc.
DEI Professional Services, LLC
October 2001

Hydrologic Analysis

For

McMicken Dam

Prepared by

R.W. Cruff, P.E.

Flood Control District of Maricopa County

Engineering Division

Registered Professional Engineer
CERTIFICATE NO.
25301
RUSSELL W.
CRUFF
Date Signed 3-14-2000
ARIZONA, U.S.A.

March 6, 2000

1. Introduction

The growth of vegetation above the emergency spillway of McMicken Dam has become a concern. The vegetation may be affecting the ability of the emergency spillway to properly release excess storage water.

The purpose of this report is to document the hydrologic analysis for various modification alternatives for the Emergency spillway for McMicken Dam. The 72-hour Probable Maximum Precipitation (PMP) general storm was used in this hydrologic analysis. More specifically, the hydrologic analysis is conducted to investigate and compare the effects of clearing the vegetation, or moving or enlarging the emergency spillway of McMicken Dam. The results of the analysis are documented in Tables 1A, 1B, 1C, and 1D.

The HEC-1 models are developed by modifying a previous HEC-1 model (Zhao, 1996). The U.S. Army corps of Engineers HEC-1 (version 4.1, July 1997) is used to run the models. The results can be found in the HEC-1 output files in the attached computer diskette.

2. Previous Hydrologic Analysis

McMicken Dam is an earthen flood control structure designed and built by the U.S. Army corps of Engineers in 1955 and currently operated and maintained by the Flood Control District of Maricopa County. See Design Memorandum No. 2, Design Analysis for Trilby Wash Detention Basin and Outlet Channel, March 1954. It has a contributing watershed of 247 square miles. Design Memorandum No. 1, Hydrology and Hydraulic Design for Trilby Wash Detention Basin and Outlet Channel November 1953 prepared by the U.S. Army corps of Engineers was the basis for the design. Design Memorandum No. 1 shows that the peak inflow for the Standard Project Flood to be 35,000 cubic feet per second (cfs) and states that the Maximum Probable Flood is about 3.5 times as great as the Standard Project Flood.

In1983, Sergent, Hauskins & Beckwith, Consulting Geotechnical Engineers prepared a report for the Flood Control District of Maricopa County entitled "Surface Water Hydrologic Report, McMicken Dam Restoration Study, Maricopa County, Arizona". This study used HEC-1 (version 1981) model to determine a more detail analysis of the inflows to McMicken Dam and the outflows from the dam. This study used 8 hydrologic sub-basins in the analysis and developed a Maximum Probable Flood peak inflow of 120,000 cfs, with the peak outflow of 95,000 cfs at a reservoir elevation of 1360.0 feet.

Rumann and Sutko of the Flood Control District performed a more detailed hydrologic analysis, in 1987. They used 44 hydrologic sub-basins in their analysis. In their analysis the HAESTAD 900-ordinate HEC-1 (version 3.2c, 1985) was used and in future studies is designated PMP1.DAT. Their study developed a Probable Maximum Precipitation Flood inflow of 114,850 cfs, with an outflow of 90,105 cfs at a reservoir elevation of 1360.43 feet.

Bing Zhao of the Flood Control District, prepared a report dated December 30 1996, entitled "Hydrologic Analysis for McMicken Dam". In this report he updated the Rumann and Sutko 44 sub-basin HEC-1 model with an updated elevation-capacity curve for the McMicken Dam reservoir. He used the HAESTAD 900-ordinate HEC-1 model as was used by Rumann and Sutko, which is, designated PMP2.DAT. He also Developed Models for the addition of diverting flows from the south. These models have 46 sub-basins and a drainage area of 259 square miles. The 46 sub-basin HEC-1 models were run for the old elevation-capacity curve (PMP3.DAT) and the new elevation-capacity curve (PMP4.DAT). The results of the four HEC-1 models are compared on table 1 of the report.

3. Current Hydrologic Analysis

Problem

A notice of deficiencies-monthly status, was received by the Flood Control District of Maricopa County from the Arizona Department of Water Resources, Dam Safety Section, dated October 6, 1999. Copy enclosed as Appendix A. This notice identified the heavy vegetation obstructing the emergency spillway approach channel. It called for removal of the vegetation.

R.W. Cruff of the Flood Control District performed a HECRAS (step backwater) analysis of the approach channel to the emergency spillway and determined that the vegetation has a large affect on the spillway operation. See Appendix B for a copy of this analysis dated November 30, 1999. Based on this analysis of the vegetation, it was decided that various alternatives needed to be analyzed as possible alternatives to removal of the vegetation.

Alternatives

The U.S Army Corps of Engineers HEC-1 model (version 4.1, July 1997) was used for all alternatives studied in this analysis. The results of the various alternatives analyzed are presented in Tables 1A, 1B, 1C, and 1D.

1.) Model PMP2.DAT was run using the newer version of HEC-1 and was found to give slightly different results. This model is designated PMP2A.DAT. See Table 1A.

TABLE 1A - HYDROLOGIC ANALYSIS FOR MCMICKEN DAM WITH 72-hour PMP

Results for present Weir location.

	Using Weir Analysis			HECRAS Analysis	
	12/30/96 1985 HEC-1	12/30/96 1997 HEC-1	Modified Outflow Rating	Upper end channel Present Condition	Upper end channel "n"=0.030
HEC-1 Filename	pmp2	PMP2A	PMP2A1	PMP2CP	PMP2C03
Maximum W.S. Elev, ft	1360.17	1360.61	1360.67	1361.43	1360.77
Maximum Depth over Dam, ft	0	0	0	0.43	0
Maximum Storage ac-ft	36,991	38,251	38,428	40,633	38,731
Maximum Outflow, cfs	85,897	95,522	95,589	109,095	94,900
Duration of Overflow, Hrs	0	0	0	4.92	0
Time of Maximum Outrflow	19.92	19.58	19.58	18.92	19.58
Outflow at top of Dam Cfs	104,200	104,200	102,310	61,360	99,360

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.

Survey Report

McMicken Dam
Spillway Delineation Study
FCD 98-32

Hoskin Engineering Consultants, Inc.
DEI Professional Services, LLC
October 2001

McMicken Dam
FCD 98-32

Survey Report

Project Engineering Consultants, Ltd.
2310 West Mission Lane, Suite 4
Phoenix, Arizona 85021

August 15, 2001

Project Engineering Consultants, Ltd.

Larry Maldonado, P.E., L.S., Steven L. Mortensen, P.E., L.S.
John Berghian, P.E., R.A.

August 15, 2001

McMicken Dam
FCD 98-32

Basis of Datum:
Accuracy and Order

The unit of measurement for this project is International Feet as defined by executive order of the United States on July 1, 1959.

The vertical datum is based on NGVD29 and meets the minimum 3rd Order vertical accuracy as defined in the Federal Geodetic Control Committee report titled "Standards and Specifications for Geodetic Control Networks", dated September 1984, and as required by FEMA Document 37 "Flood Insurance Study Guidelines and Specifications for Study Contractors," dated January 1995.

The horizontal datum is based on NAD83 Arizona State Plane Coordinates (Central Zone), which complies with Arizona Revised Statutes 33-131and 33-132 and meets first order accuracy as defined in the Federal Geodetic Control Committee report titled "Standards and Specifications for Geodetic Control Networks", dated September 1984.

Larry Maldonado

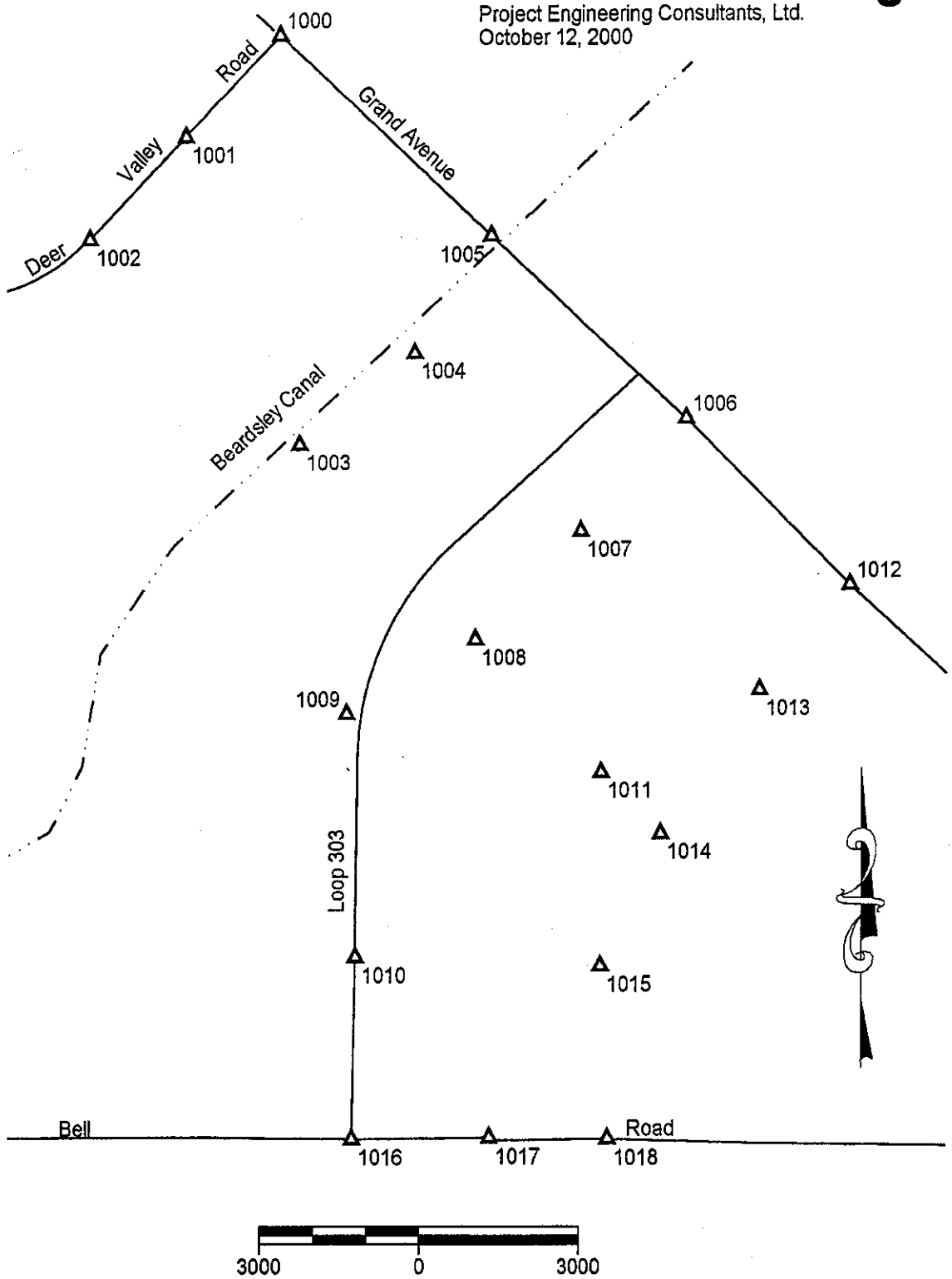
REGISTERED LAND SURVEYOR
CERTIFICATE NO.
16863
LARRY M.
MALDONADO
Date Signed 8-15-01
ARIZONA, U.S.A.

Engineers • Planners • Surveyors
2320 W. Peoria Avenue, Suite C-122 Phoenix, Arizona 85029 (602) 906-1901 Fax (602) 906-3080
E-Mail: projengin@MCI2000.com

Aerial Panels

McMicken Wash Aerial Panel Diagram

Project Engineering Consultants, Ltd.
October 12, 2000



McMicken Wash Aerial Panel Data
Project Engineering Consultants, Ltd.
October 12, 2000

Horizontal Datum - NAD83 SPC
Vertical Datum - NGVD29

1000,	981079.30700,	545944.06900,	1367.38794,HV Panel
1001,	979198.51100,	544162.12100,	1366.73206,HV Panel
1002,	977285.09500,	542354.79800,	1366.93604,HV Panel
1003,	973408.43200,	546313.75800,	1327.89404,HV Panel
1004,	975140.21000,	548467.53100,	1327.85803,HV Panel
1005,	977324.05400,	549904.10500,	1340.22302,HV Panel
1006,	973896.83300,	553554.72100,	1309.52795,HV Panel
1007,	971754.52600,	551599.17900,	1302.14197,HV Panel
1008,	969719.54000,	549618.70000,	1303.95300,HV Panel
1009,	968324.84500,	547201.96300,	1308.16296,HV Panel
1010,	963726.61800,	547374.19600,	1294.71802,HV Panel
1011,	967209.60600,	551989.39000,	1288.97302,HV Panel
1012,	970739.96400,	556642.20200,	1285.90906,HV Panel
1013,	968763.59900,	554962.01500,	1278.83203,HV Panel
1014,	966050.35100,	553099.53600,	1280.13794,HV Panel
1015,	963556.28800,	551974.49900,	1275.36401,HV Panel
1016,	960335.18600,	547308.34100,	1282.63098,HV Panel
1017,	960358.61600,	549894.61300,	1266.78503,HV Panel
1018,	960337.38400,	552117.69400,	1257.75903,HV Panel

Flood Control Files

McMicken Dam
Spillway Delineation Study
FCD 98-32

Hoskin Engineering Consultants, Inc.
DEI Professional Services, LLC
October 2001

Project Engineering Consultants
Survey GIS File: ctrl.xls 10/22/2001

TYP_LID	HOR_LID	VER_LID	XNAD27	YNAD27	XNAD83	YNAD83	NGVD29	NAVD88	MNT_LID	PNTNUM	DESC
22	4	13	353925.476	971157.102	553709.599	971204.543	1294.881	1296.777	3	2	Set ½" Rebar flush w/ground
22	4	13	352925.654	971250.559	552709.755	971298.001	1295.983	1297.879	31	3	Set 60d Nail
22	4	13	352076.817	971173.737	551860.900	971221.178	1299.080	1300.980	31	4	Set 60d Nail
22	4	13	351246.160	971351.346	551030.223	971398.789	1302.559	1304.462	31	6	Set 60d Nail
6	4	13	346160.410	981032.340	545944.245	981079.885	1367.388	1369.347	17	1000	Set PK Nail in pavement on east shoulder of Grand Avenue @ Deer Valley Road
6	4	13	344378.423	979151.582	544162.240	979199.107	1366.729	1368.688	17	1001	Set PK Nail in pavement in center of Deer Valley Road +/-½ mile west of Grand Avenue
6	4	13	342571.134	977238.086	542354.934	977285.590	1366.936	1368.895	17	1002	Set PK Nail in pavement in center of Deer Valley Road +/-1 mile west of Grand Avenue
6	4	13	346530.070	973361.445	546314.005	973408.908	1327.894	1329.820	3	1003	Set ½" Rebar flush w/ground
6	4	13	348683.825	975093.243	548467.787	975140.725	1327.854	1329.780	3	1004	Set ½" Rebar flush w/ground
6	4	13	350120.401	977277.118	549904.369	977324.623	1340.223	1342.149	17	1005	Set PK Nail in pavement on east shoulder of Grand Avenue @ McMicken Wash
6	4	13	353770.971	973849.915	553555.060	973897.385	1309.528	1311.434	17	1006	Set PK Nail in pavement on east shoulder of Grand Avenue +/-100' north of Milepost 339
6	4	13	351815.429	971707.570	551599.500	971755.017	1302.139	1304.042	7	1007	Brass Cap flush w/pavement at intersection of Boulder and La Paloma
6	4	13	349834.967	969672.565	549619.019	969719.990	1303.953	1305.853	7	1008	Brass Cap flush w/pavement at intersection of Hearthstone and Trovas
6	4	13	347418.238	968277.837	547202.254	968325.247	1308.163	1310.069	3	1009	Set ½" Rebar flush w/ground
6	4	13	347590.449	963679.595	547374.524	963726.956	1294.718	1296.604	17	1010	Set PK Nail in pavement in center of Loop 303 +/-0.66 mile north of Bell Road
6	4	13	352205.660	967162.641	551989.792	967210.040	1288.973	1290.859	17	1011	Set PK Nail in pavement in intersection of Remington and Sunrise
6	4	13	356858.424	970693.074	556642.617	970740.511	1285.906	1287.792	17	1012	Set PK Nail in pavement on east shoulder of Grand Avenue +/-1000' south of R.H. Johnson Boulevard
6	4	13	355178.244	968716.669	554962.423	968764.085	1278.829	1280.712	3	1013	Set ½" Rebar flush w/ground
6	4	13	353315.771	966003.367	553099.941	966050.754	1280.137	1282.017	7	1014	Brass Cap flush w/pavement in new unnamed cul-de-sac (Camelot Court
6	4	13	352190.748	963509.305	551974.922	963556.665	1275.361	1277.234	7	1015	Brass Cap flush w/pavement at intersection of Rancho Vista and Cherry Creek
6	4	13	347524.556	960288.136	547308.670	960335.460	1282.631	1284.511	7	1016	Brass Cap flush w/pavement at intersection of Bell Road and Loop 303
6	4	13	350110.850	960311.636	549895.018	960358.962	1266.785	1268.658	17	1017	Set PK Nail in pavement
6	4	13	352333.916	960290.373	552118.131	960337.699	1257.756	1259.626	17	1018	Set PK Nail in pavement
999	4	13	360186.539	960156.830	559970.921	960204.158	1227.064	1228.918	11	2000	Brass Cap in Handhole in center of Bell Road
999	4	13	357551.256	960183.841	557335.582	960231.168	1237.654	1239.511	11	2001	Brass Cap in Handhole in center of Bell Road
999	4	13	354914.502	960210.731	554698.772	960258.057	1248.061	1249.925	11	2002	Brass Cap in Handhole at intersection of Bell Road and Reems Road
999	4	13	351694.726	960244.018	551478.928	960291.343	1259.941	1261.811	7	2003	Brass Cap flush w/pavement at intersection of Bell Road and Sunrise Road
999	4	13	350256.746	960259.307	550040.918	960306.632	1265.420	1267.293	11	2004	Brass Cap in Handhole at intersection of Bell Road and Sarival Avenue
999	4	13	344982.844	960314.126	544766.904	960361.450	1288.540	1290.423	11	2005	Brass Cap in Handhole at intersection of Bell Road and Cotton Lane
999	4	13	339694.331	960316.288	539478.280	960363.610	1308.553	1310.446	11	2006	Brass Cap in Handhole at intersection of Bell Road
999	4	13	352324.570	971164.252	552108.659	971211.693	1298.310	1300.210	7	2009	Brass Cap flush w/pavement at intersection of Mountain View and Windsong
999	4	13	354827.752	970477.730	554611.903	970525.165	1294.938	1296.828	7	2011	Brass Cap flush w/pavement at intersection of Mountain View and Clear Canyon
999	4	13	351776.005	966013.524	551560.141	966060.911	1283.278	1285.161	7	2029	Brass Cap flush w/pavement at intersection of Clearview and Sunrise
999	4	13	351019.396	962859.691	550803.553	962907.044	1274.308	1276.185	7	2037	Brass Cap flush w/pavement at intersection of Sunrise and Gold Canyon
999	4	13	348475.033	966674.699	548259.091	966722.092	1299.137	1301.033	7	2069	Brass Cap flush w/pavement at intersection of Clearview and Papago Drive
999	4	13	349224.763	966701.998	549008.837	966749.391	1295.384	1297.277	7	2071	Brass Cap flush w/pavement at intersection of Clearview and Gold Canyon
999	4	13	349068.053	965447.773	548852.138	965495.153	1290.692	1292.582	7	2079	Brass Cap flush w/pavement at intersection of Goldwater Canyon and Scarlet Canyon
999	4	13	353065.660	971223.946	552849.764	971271.388	1295.883	1297.779	7	2091	Brass Cap flush w/pavement at intersection of Mountain View and Joshua Tree
999	4	13	350575.487	971707.981	550359.531	971755.428	1305.184	1307.090	7	2096	Brass Cap flush w/pavement at intersection of Mountain View and Shadow Mountain
999	3	13	352095.664	958749.934	551879.892	958797.244	1252.989	1254.751	29	4001	Metal Rod in Handhole; MCDOT GDACS Pt "4GC1"
999	3	13	335136.902	976162.170	534920.551	976209.662	1391.286	1393.045	29	4011	Metal Rod in Handhole; MCDOT GDACS Pt "4HD1"
999	3	13	350173.415	991477.001	549957.218	991524.656	1420.912	1422.798	29	4021	Metal Rod in Handhole; MCDOT GDACS Pt "4IC1"
999	4	13	350364.842	978707.795	550148.799	978755.315	1343.875	1345.807	11	5000	Brass Cap in Handhole in center of 163rd Avenue
999	4	13	350381.194	981341.191	550165.120	981388.740	1355.491	1357.430	11	5001	Brass Cap in Handhole at intersection of 163rd Avenue and Pinnacle Peak Road
999	4	13	347745.883	981362.608	547529.750	981410.156	1369.081	1371.033	3	5002	Fd. 5/8" rebar
999	4	13	345110.912	981383.671	544894.719	981431.220	1367.759	1369.724	999	5003	Fd. 1" x 1" iron bar
999	4	13	350348.395	976074.476	550132.383	976121.969	1335.472	1337.395	1	5004	Fd. 1" iron pipe by southeast corner of 9' block wall
999	4	13	350317.082	977316.532	550101.054	977364.038	1340.568	1342.494	20	5005	USGS Brass Cap "Sara"
999	4	13	348651.150	978725.377	548435.069	978772.898	1350.249	1352.188	20	5006	USGS Brass Cap "PHN4"
999	4	13	345076.519	976118.288	544860.389	976165.781	1349.278	1351.220	32	5007	4" Aluminum Cap stamped "A S L Phoenix
999	4	13	345066.821	976117.993	544850.691	976165.486	1349.386	1351.328	3	5008	Fd. ½" rebar"
999	4	13	342457.748	976132.672	542241.560	976180.165	1358.264	1360.219	7	5009	Fd. 2" Brass Cap"
999	4	13	347653.787	975793.671	547437.718	975841.161	1339.311	1341.243	9	5010	Fd. 1½" Iron Pipe w/plastic cap
999	4	10	346226.661	974267.318	546010.579	974314.791	1339.925	1341.857	20	5011	USC&G Brass Cap "H 366"
999	5	10	352938.088	974725.736	552722.149	974773.215	1315.767	1317.676	20	5023	USGS Brass Cap "Y 23"
999	4	10	349907.099	977325.674	549691.062	977373.180	1339.163	1341.092	20	9366	USGS Brass Cap "G 366"

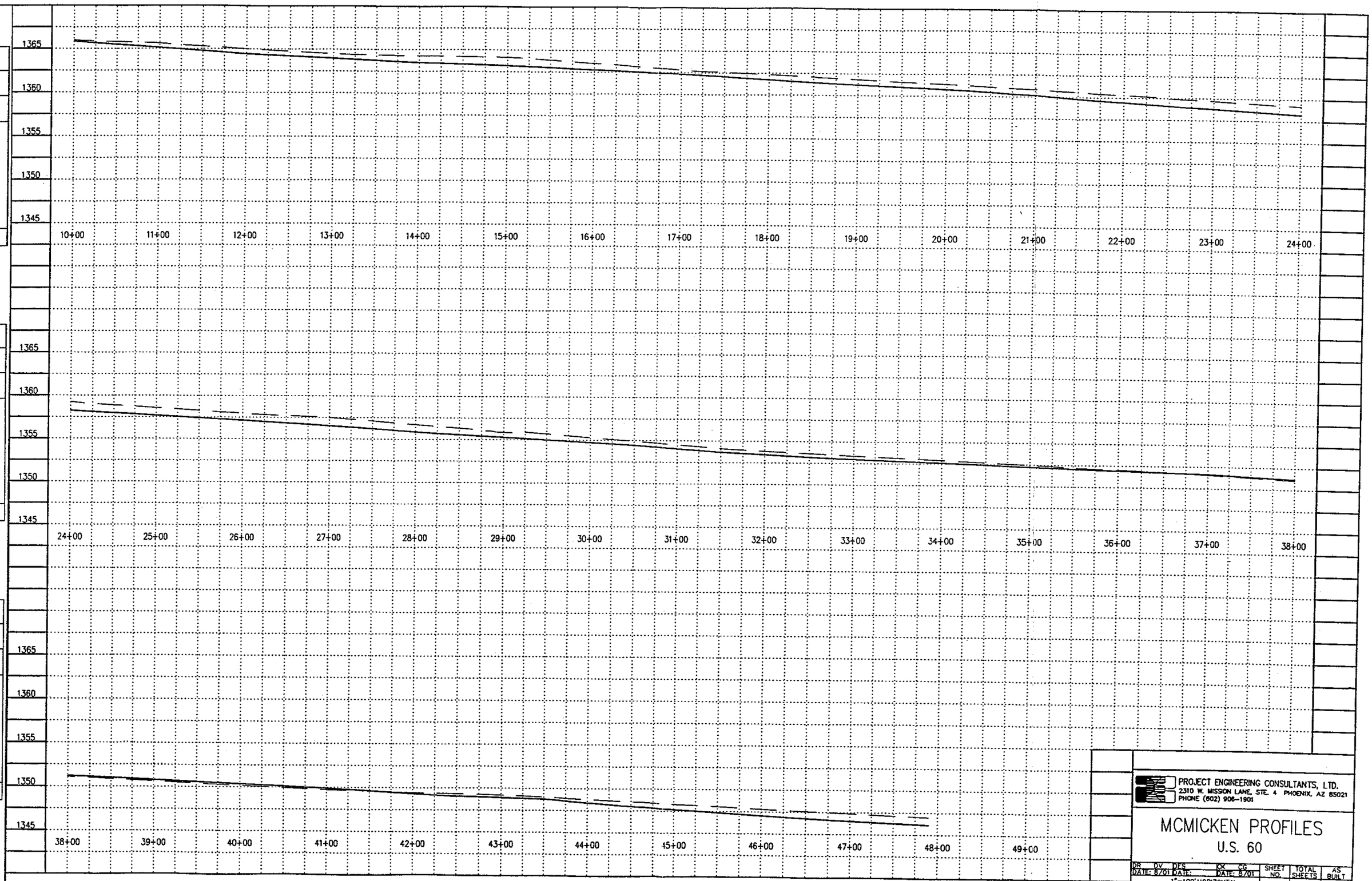
Project Engineering Consultants
Survey GIS File: fpctlfcd.xls 10/22/2001

HOR_LID	VER_LID	XNAD27	YNAD27	XNAD83	YNAD83	NGVD29	NAVD88	MNT_LID	RMNUM	DESC
4	13	349834.967	969672.565	549619.019	969719.990	1303.953	1305.853	7	ERM1008	Brass Cap flush w/pavement at intersection of Hearthstone and Trovas
4	13	353315.771	966003.367	553099.941	966050.754	1280.14	1282.017	7	ERM1014	Brass Cap flush w/pavement in new unnamed cul-de-sac (Camelot Court south of N. Rim Road)
4	13	350256.746	960259.307	550040.918	960306.632	1265.420	1267.293	11	ERM2004	Brass Cap in Handhole at intersection of Bell Road and Sarival Avenue
4	13	344982.844	960314.126	544766.904	960361.450	1288.540	1290.423	11	ERM2005	Brass Cap in Handhole at intersection of Bell Road and Cotton Lane
4	13	351019.396	962859.691	550803.553	962907.044	1274.31	1276.185	7	ERM2037	Brass Cap flush w/pavement at intersection of Sunrise and Gold Canyon
4	13	349224.763	966701.998	549008.837	966749.391	1295.38	1297.277	7	ERM2071	Brass Cap flush w/pavement at intersection of Clearview and Gold Canyon
4	13	350364.842	978707.795	550148.799	978755.315	1343.875	1345.807	11	ERM5000	Brass Cap in Handhole in center of 163rd Avenue +/-½ mile south of Pinnacle Peak Road
4	13	350348.395	976074.476	550132.383	976121.969	1335.472	1337.395	1	ERM5004	Fd. 1" iron pipe by southeast corner of 9' block wall
4	13	350317.082	977316.532	550101.054	977364.038	1340.568	1342.494	20	ERM5005	USGS Brass Cap ""Sara"
4	13	348651.150	978725.377	548435.069	978772.898	1350.249	1352.188	20	ERM5006	USGS Brass Cap ""PHN4"
4	13	345076.519	976118.288	544860.389	976165.781	1349.278	1351.220	32	ERM5007	4" Aluminum Cap stamped "A S L Phoenix Arizona LS 8902"
4	10	346226.661	974267.318	546010.579	974314.791	1339.925	1341.857	20	ERM5011	USC&G Brass Cap "H 366"
5	10	352938.088	974725.736	552722.149	974773.215	1315.767	1317.676	20	ERM5023	USGS Brass Cap "Y 23"
4	10	349907.099	977325.674	549691.062	977373.180	1339.163	1341.092	20	ERM9366	USGS Brass Cap "G 366"

From: Project Engineering Consultants
Filename: corners.xls
08/16/2001

TYP_LID	HOR_LID	VER_LID	XNAD27	YNAD27	XNAD83	YNAD83	NGVD29	NAVD88	MNT_LID	CNRNAME	TWNSHP	RNG	SCTN	AGENCY	PNTNUM	DESC
1	4	13	350256.746	960259.307	550040.918	960306.632	1265.420	1267.293	11	SCOR NE	T03N	R02W	1		2004	Brass Cap in Handhole at intersection of Bell Road and Sarival Avenue
1	4	13	344982.844	960314.126	544766.904	960361.450	1288.540	1290.423	11	SCOR NE	T03N	R02W	2		2005	Brass Cap in Handhole at intersection of Bell Road and Cotton Lane
1	4	13	350364.842	978707.795	550148.799	978755.315	1343.875	1345.807	11	QCOR E	T04N	R02W	13		5000	Brass Cap in Handhole in center of 163rd Avenue +/-½ mile south of Pinna
1	4	13	350348.395	976074.476	550132.383	976121.969	1335.472	1337.395	1	SCOR NE	T04N	R02W	24		5004	Fd. 1" iron pipe by southeast corner of 9' block wall
1	4	13	345076.519	976118.288	544860.389	976165.781	1349.278	1351.220	32	SCOR NE	T04N	R02W	23		5007	4" Aluminum Cap stamped "A S L Phoenix Arizona LS 8902"

Check Sections



REVISIONS

NO.	DESCRIPTION	REV BY	CKL

REVISIONS

NO.	DESCR.	REV BY	CKD BY	DATE

REVISIONS

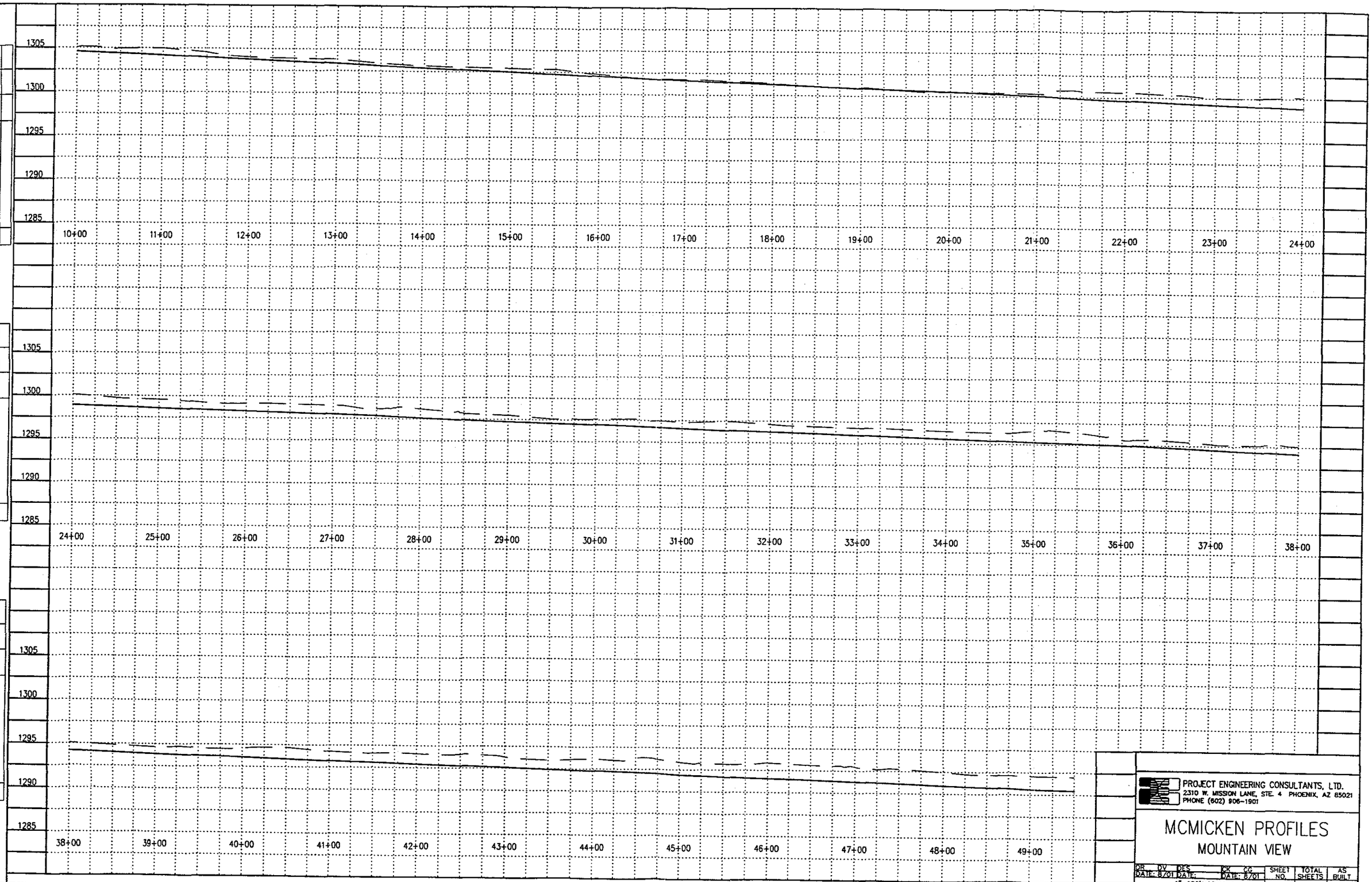
DESCRIPTION	REV BY	CKD BY	DATE

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

MCMICKEN PROFILES
U.S. 60

DR. DV	DES.	CK. CG	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 8/01	DATE:	DATE: 8/01			

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL



REVISIONS

NO.	DESCRIPTION	REV BY	CK.

REVISIONS

NO.	DESCR.	REV BY	CKD BY	DATE

REVISIONS

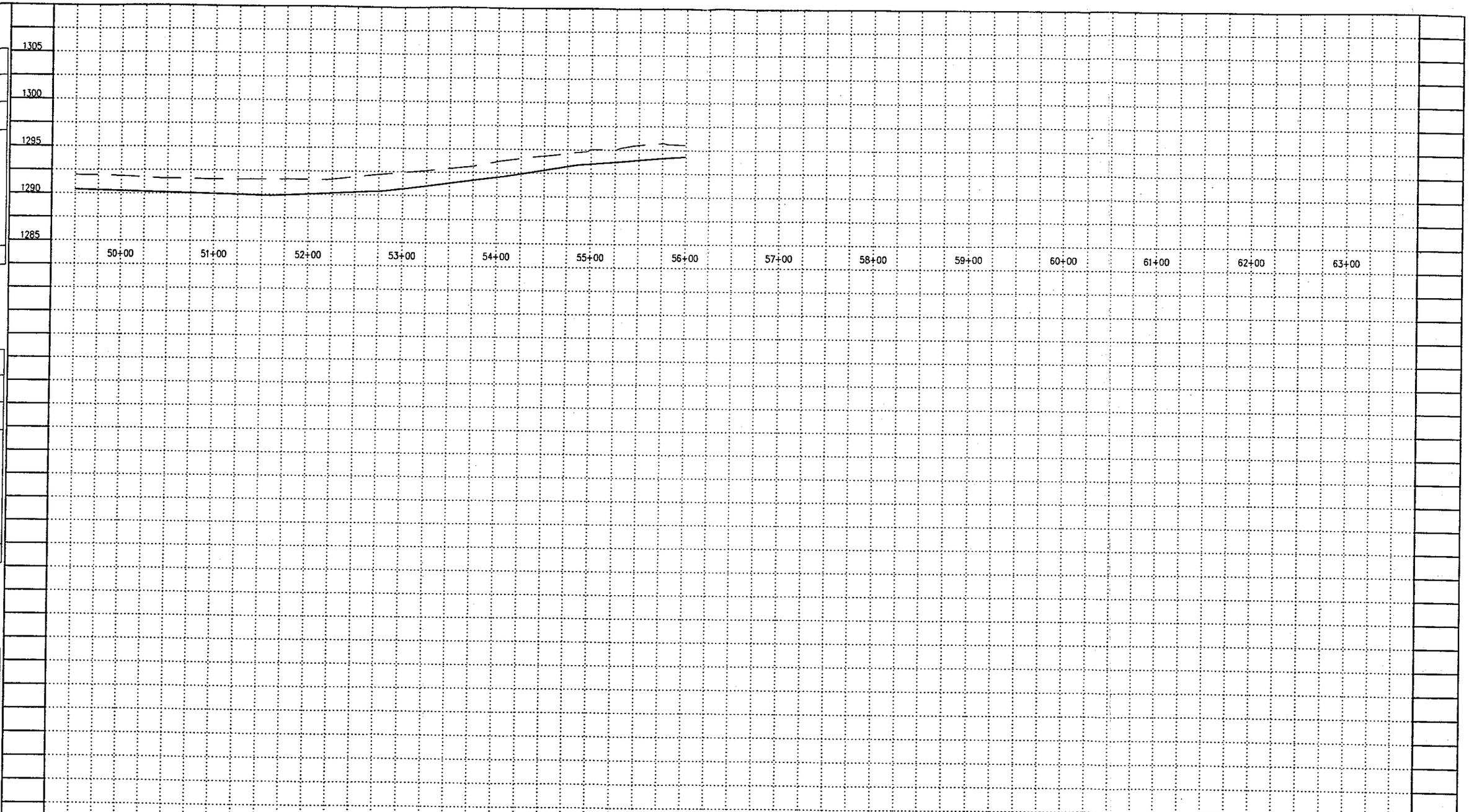
NO.	DESCRIPTION	REV BY	CKD BY	DATE

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

MCMICKEN PROFILES
MOUNTAIN VIEW

DR. DV.	DES.	CK. CG	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 8/01	DATE:	DATE: 8/01			

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL



REVISIONS

NO.	DESCRIPTION	REV BY	CKD.

REVISIONS

NO.	DESCR.	REV BY	CKD BY	DATE

REVISIONS

DESCRIPTION	REV BY	CKD BY	DATE

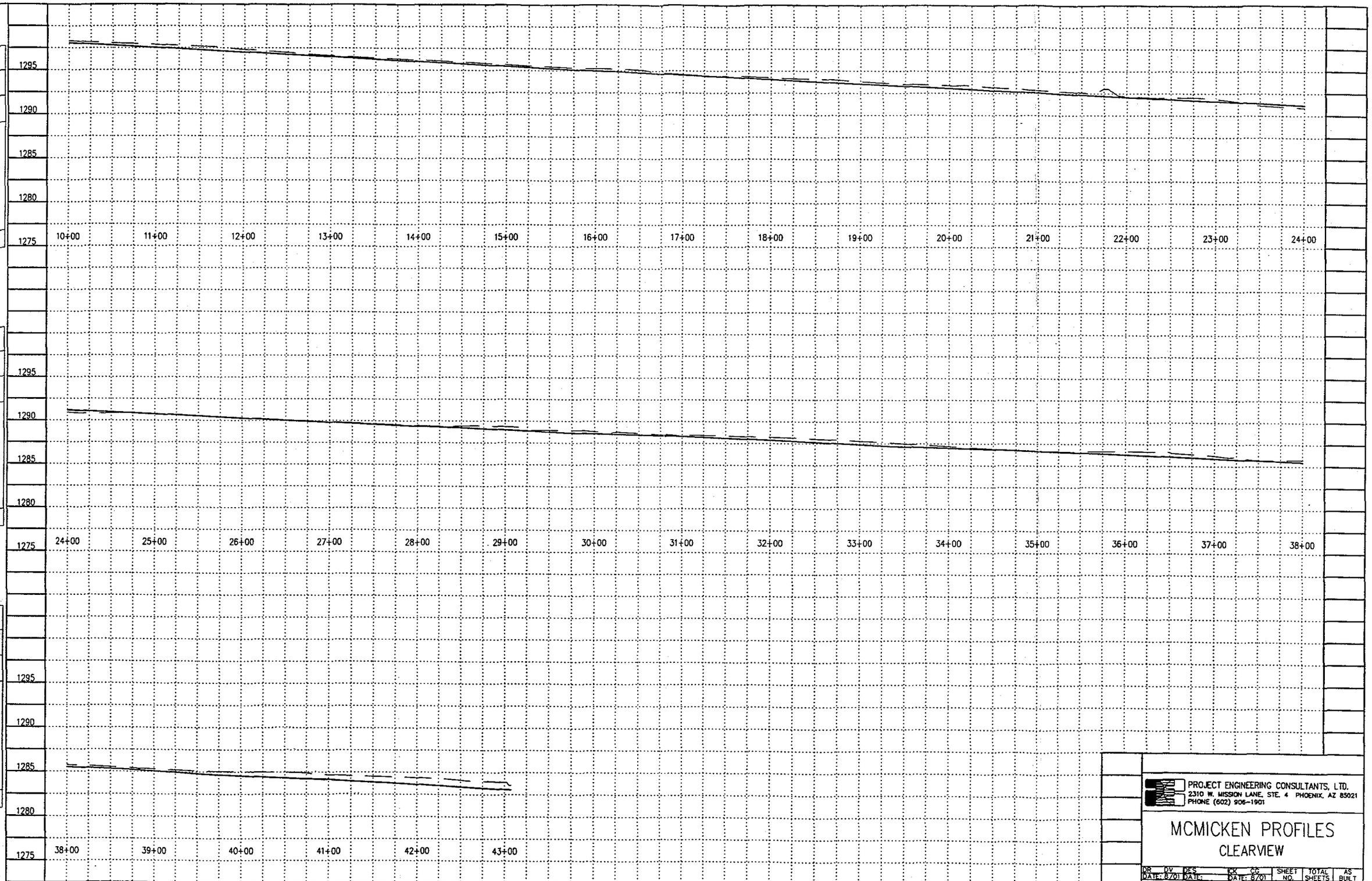
PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

MCMICKEN PROFILES

MOUNTAIN VIEW

DR. DV. DATE: 8/01	DES. DATE:	CK. CG. DATE: 8/01	SHEET NO.	TOTAL SHEETS	AS BUILT

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL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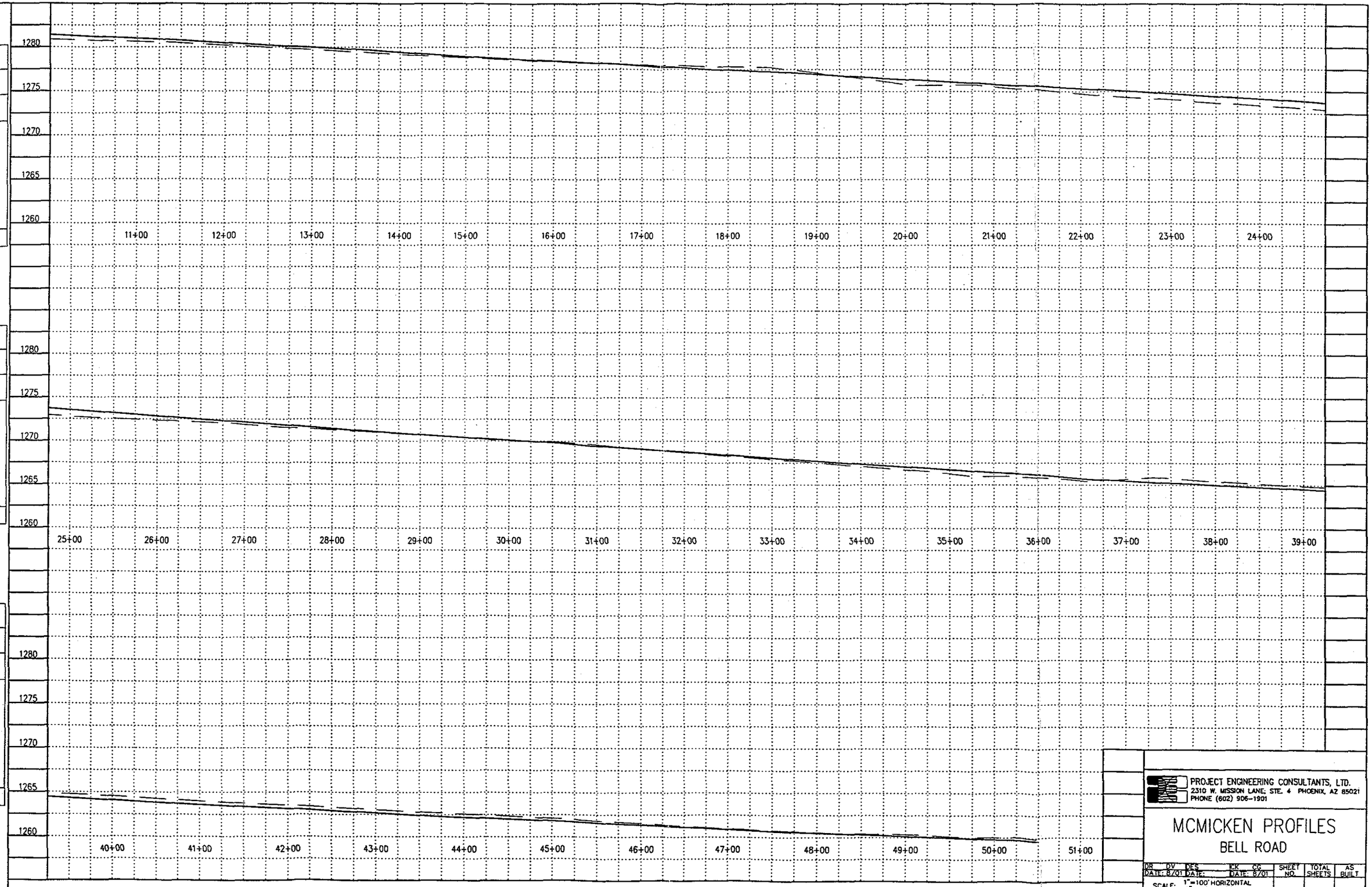
REVISIONS
NO.
DESCRIPTION
REV BY
CKD BY
DATE
PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901
MCMICKEN PROFILES
CLEARVIEW
DR DV DATE: 8/01
DES DATE:
CK CG DATE: 8/01
SHEET NO.
TOTAL SHEETS
AS BUILT
SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL



REVISIONS

NO.	DESCRIPTION	REV BY	CK.	E

REVISIONS

NO.	DESC.	REV BY	CKD BY	DATE

REVISIONS

DESCRIPTION	REV BY	CKD BY	DATE

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PHONE (602) 906-1901

MCMICKEN PROFILES

BELL ROAD

DR. DV.	DES.	CK. CG	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 8/01	DATE:	DATE: 8/01			

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL

Survey Notes

$T = \tan \frac{1}{2} I$

$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin. } \frac{1}{2} D}$

$\text{Sin. } \frac{1}{2} D = \frac{50}{R}$

$\text{Sin. } \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$

$R = T \cot. \frac{1}{2} I$

$R = \frac{50}{\text{Sin. } \frac{1}{2} D}$

$E = R \text{ ex. sec } \frac{1}{2} I$

$E = T \tan \frac{1}{4} I$

$\text{Chord def.} = \frac{\text{chord}^2}{R}$

$\text{No. chords} = \frac{I}{D}$

$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

GENERAL DATA

Right Angle Triangles. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875$ = Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574\ d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3} d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean = $\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1/16	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Elan Publishing Co., Inc. Meredith, N.H. 03253

99007

McMACKIN WASH

1[illegible]	SET PK E. SHOULDER GRAND @ 1000'± S. OF RH JOHNSON BLVD			
1006	SET PK E. SHOULDER GRAND @ 100'± N. OF MP 339			
1005	SET PK E. SHOULDER GRAND @ MCMICKEN WASH			
1000	SET PK E. SHOULDER GRAND @ DEER VALLEY ROAD			
1001	SET PK ℄ DEER VALLEY RD @ ½ MILE± W. OF GRAND AVE			
1002	SET PK ℄ DEER VALLEY RD @ 1 MILE± W. OF GRAND AVE			
1018	SET PK	N. LANE	W. BOUND	BELL RD
1017	SET PK	N. LANE	W. BOUND	BELL RD
1016	BCF	INTER.	BELL RD	⅊ LOOP 303

1016	SET PIL ℄ LOOP 303 @ 0.66± MILE N. OF BELL
1009 ✓	Set rebar 400'± W OF LOOP 303
1003 ✓	SET REBAR
1004 ✓	SET REBAR
1007 ✓	BCF BOULDER & LA PALOMA
1008 ✓	BCF HEARTHSTONE & TROVAS
1011	SET PIL REMINGTON & SUNRISE
✓ 1013	SET REBAR IN NEW SUBDIVISION CONSTRUCTION
1014 ✓	BCF ℄ UNNAMED NEW CUL-DE-SAC (CAMELOT CT.) ~ S. OF N. RIM RD
1015 ✓	BCF @ RANCHO VISTA & CHERRY CREEK

1.484

STA	ROD	OPER	UNIT	EPOCHS	
Y23	1.484	JR	"A"	STATIC	
1013	2.028	JR	"B"	STATIC	
LITCH	2.149	JR	ROVER	120	
FIELD	"	"	"	6	
1012	"	"	"	6	
1006	"	"	"	6	
1005	2.149	JR	ROVER	6	
1000	"	"	"	6	
1001	"	"	"	6	
1002	"	"	"	6	
1004	2.149	"	"	6	
1003	"	"	"	6	
1009	"	"		6	
1008	"	JR	ROVER	6	
1007	"	"	"	6	
1010	"	JR	"	6	
1016		"	"	6	
1018	2.149	"	"	6	
1017	2.149	"	ROVER	6	
1015	"	"	"	6	
1014	"	JR	"	6	
2000	2.149	JR	"	6	
2001	"	JR	"	6	
2002	"	JR	"	6	
2003	"	JR	"	6	
2004	2.149	JR	ROVER	6	

BCHH & BELL 1 mi ± W. OF LITCHFIELD

BCHH & BELL 1½ mi ± W. OF LITCHFIELD

BCHH & BELL & REEMS RD

BCF @ BELL & SUNRISE BLVD

BCHH BELL & SARNAL

STA	ROD	DPBTR	UNIT	SPOCKS
2005	2.149	JR	ROVER	6
2006	2.149	JR	"	6
L366	2.149	JR	"	120
~~to~~				

BCAH @ BELL RD & COTTON LANE

BCHH @ BELL RD 1 MI W. OF COTTON LANE

BC L366

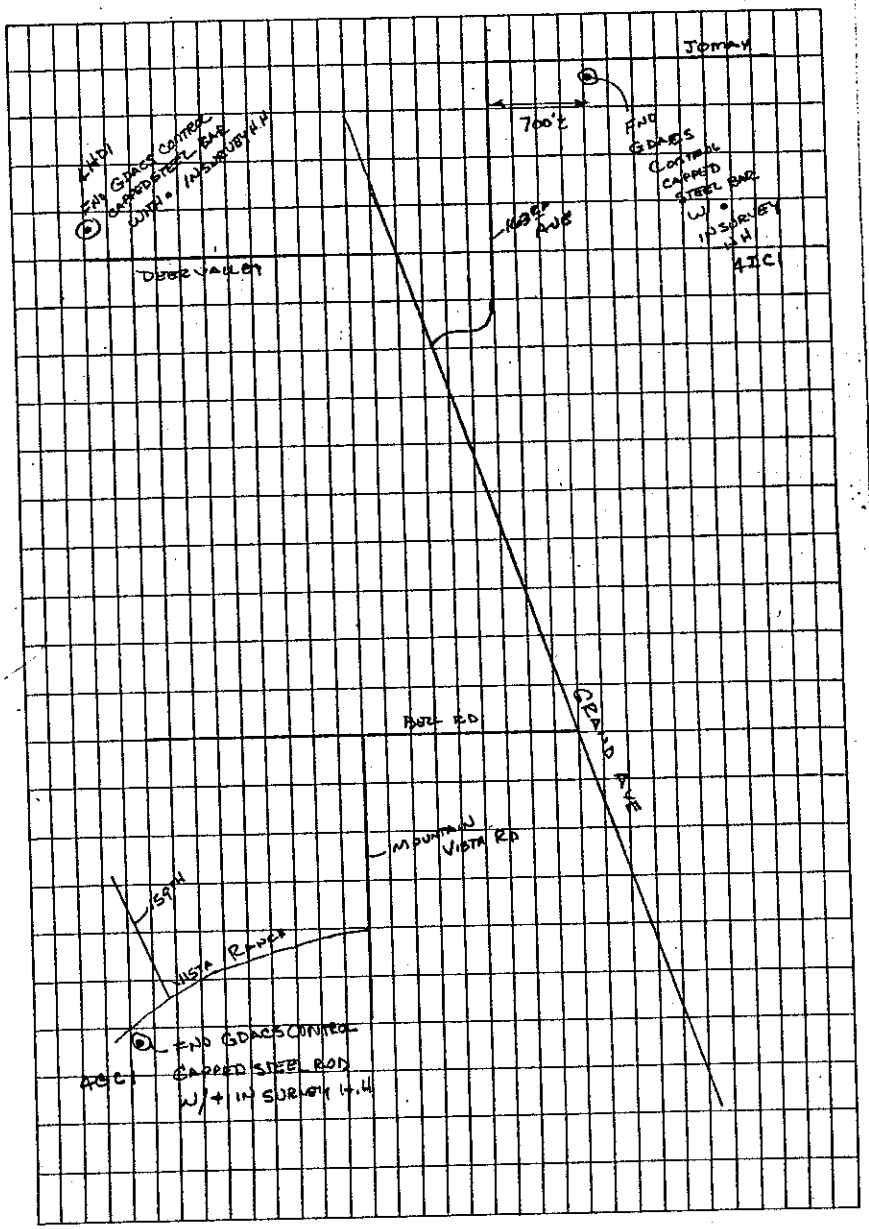
"A" 10-10-2000

STA	OPER	TIME ON	TIME OFF	SESSION	ROD
4HD1	GHA	10:01		A-STATIC	2.122
4IC1	JKR	10:18		A-STATIC	1.693
				EPOCHS	
L366	JKR	10:37	10.47	120 EPOCHS	2.034
4GC1	JKR	11:00	11.10	120	2.034
1012 PANG	JKR	11:24	11:34	120	2.034
Y23	"	11:40	11:50	120	2.034

FRM CHLD "H" N.W. COR SPRINKLING BOX @ S.E. CORNER OF SUNRISE & CLEARCANYON

FRM	BCF	@	CLEARVIEW & SUNRISE
"	"	"	GOLDWATER CANYON & SUNRISE
"	"	"	BELL & SUNRISE
"	"	"	CLEARVIEW & GOLDWATER CANYON
"	"	"	GOLDWATER CANYON & SCARLET CANYON (PAPAGO)

10-10-2000
JR
GA



JR BH

T.	STA	+	−	ELEV	
0	BM Y23			1315.767	
		2.385			
1			6.461		
		3.666			
2			6.581		
		3.107			
3			6.349		
		3.687			
4			6.279	1308.941	
		3.849			
5			6.306		
		4.092			
6			7.310		
		3.772			
7			6.502		
		3.690			
8			6.935		
		4.744			
9			1.536	1294.499	
		7.986			
10			0.672		
		8.271			
11			1.914		
		6.703			
12			8.012		

Y23 USC&GS CAP IN CONC

SET NAIL

SET NAIL

SET NAIL

~~SET NAIL~~ ADOT BC (SUR ℄ 92+74.48 74 LT EL 1302.49)

SET NAIL

SET NAIL

SET NAIL

SET NAIL

TOP N.W BOLT OF TRAF. SIG. POLE & LIGHT POLE @ N. RETURN OF N.E. CORNER GRAND & SUNRISE (RHJOHNSON)

PAINT TC

PAINT TC

PAINT TC

STA	PT#	+	−	ELEV	
		2.299			
13			8.457		
		2.406			
14			8.610		
		1.225			
15			5.747	1289.977	
		3.726			
16			6.507		
		4.091			
17			5.150		
		6.142			
18			4.452		
		5.513			
19			6.190		
		5.240			
20			6.180		
		4.208			
21			4.979		
		5.847			
22			4.254		
		5.361			
23			6.517		
		6.044			
24			4.646		
		6.106			

PAINT TC

PAINT TC

CHISLED "T" N.W. COR. SEP. STRUCT. @ S.E. COR. OF SUNRISE & MT VIEW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

ST	PT#	+	−	ELEV	
25			4.999		
		5.761			
26			5.948		
		4.362			
27			6.562		
		4.091			
28			6.104		
		4.490			
29			5.192	1283.278	
		6.303			
30			1.507		
		6.531			
31			8.448		
		2.027			
32			7.937		
		5.858			
33			6.774		
		5.846			
34			5.901		
		2.404			
35			6.021		
		4.594			
36			5.846		
		4.951			
37			5.050	1274.303	

PAINT SW

PAINT SW

PAINT SW

PAINT SW

BCF @ SUNRISE & CLEARVIEW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT SW

PAINT TC

PAINT TC

BCF @ SUNRISE & GOLDWATER CANYON

ST	PT#	+	−	ELEV	
		4.007			
38			5.789		
		4.481			
39			6.019		
		4.596			
40			5.804		
		5.888			
41			4.587		
		5.904			
42			6.259		
		3.001			
43			8.457		
		1.207			
44			6.427	1260.010	
		5.663			
45			4.233		
		6.930			
46			4.895		
		6.943			
47			5.318		
		5.733			
48	2004		5.473	1265.420	
		7.358			
49			4.243		
		6.681			
50			3.999		

PAINT TC

PAINT TC

PAINT TC

PAINT TC

PAINT TC

PAINT TC

B&F @ BELL RD & SUNRISE

PAINT TC

PAINT TC

PAINT TC

BC IN HH ± 1/2 MILE W. OF SUNRISE

PAINT TC

PAINT TC

STA	PT #	+	−	ELEV	
		6.989			
51			3.758		
		6.692			
52			4.168		
		5.297			
53			3.331		
		4.261			
54			2.053		
		6.386			
55			4.901	1282.631	
	START 4-4-01				
55					
		4.486			
56			3.694		
		5.621			
57			2.580		
		6.307			
58			5.518		
		5.955			
59			4.306		
		4.561			
60			4.580		
		7.859			
61			4.561		
		5.696			
62			2.584		

PAINT SW

PAINT SW

PAINT SW

PAINT TC

ALUM. CAP FLUSH @ BASE & 303 GOOD

EP

EP

EP

EP

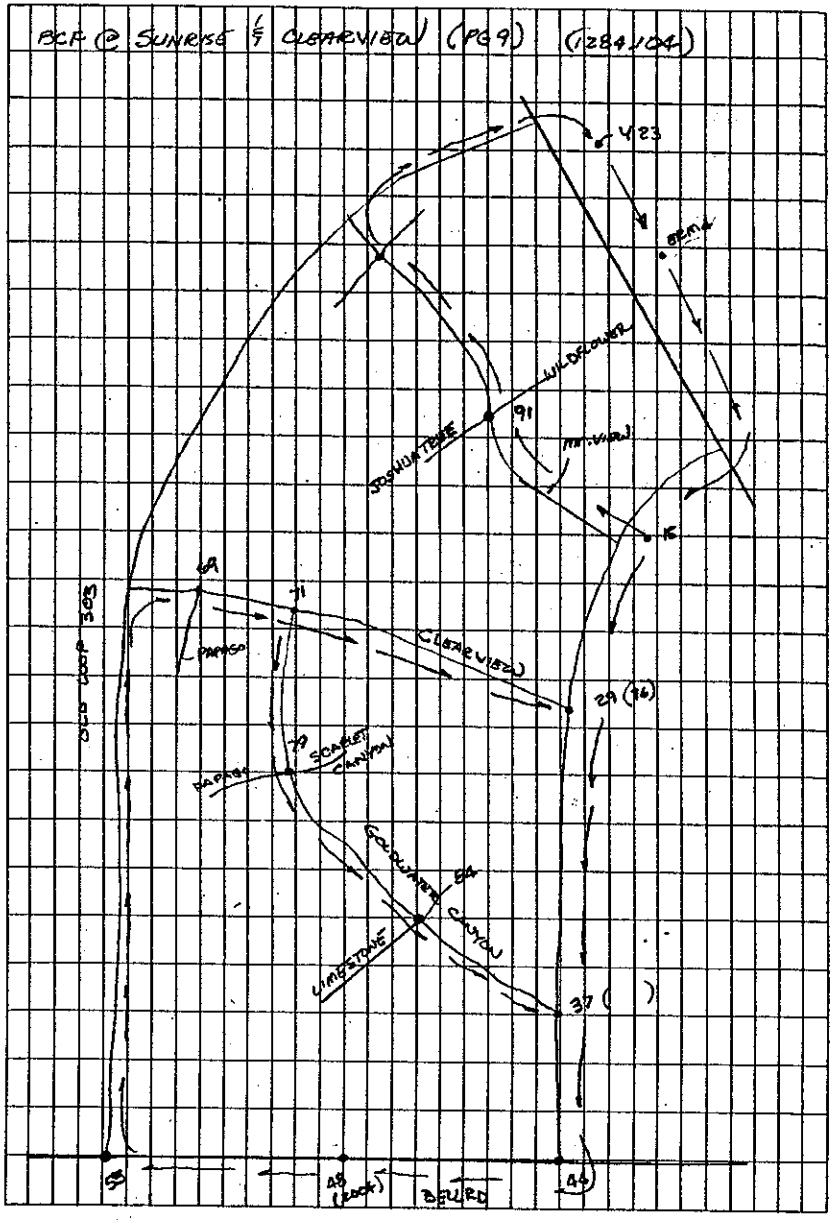
EP

EP

EP

ST	PT #	+	−	ELEV	
		5.002			
76	ETEM 29		7.211	1283.278	

PARTIAL SKETCH PENCIL LOOP



STA	PT#	+	−	ELEV	
71					
		4.109 ~~4.996~~			
77			5.859 ~~6.745~~		
		3.759 ~~3.551~~			
78			5.907 ~~6.700~~		
		4.520 ~~3.934~~			
79			5.314 ~~4.828~~	1290.692	
		6.069 ~~6.122~~			
80			8.354 ~~8.382~~		
		4.345 ~~4.647~~			
81			6.623 ~~5.599~~		
		3.402 ~~3.653~~			
82			5.424 ~~5.688~~		
		4.125			
83			6.446		
		4.918			
84			7.302		
		6.802			
85			5.842		
		0.338 ~~1.122~~			
86			6.394 ~~5.302~~	1274.308	

TC

TC

BCF @ GOLDWATER CANYON & SCARLET CANYON

TC

TC

TC

TC

BCF @ GOLDWATER CANYON & LIMESTONE DRIVE

TC

BCF @ SUNRISE & GOLDWATER CANYON (1279.695)

	PT#	+	−	ELEV	
13				1289.977	
		6.992			
87			3.359		
		1.125			
88			5.001		
		5.240			
89			3.679		
		6.053			
90			4.102		
		5.398			
91	ERM91		2.761	1295.883 [redacted]	
		5.764			
92			4.011		
		5.099			
93			3.897		
		5.347			
94			2.600		
		5.109			
95			3.010		
		4.609			
96			3.100	1305.184	

Desc.

BCF @ Mtn View & Joshua Tree

BCF @ Mtn. View & Shadow Mtn.

J.W.
D.W
K.W.

4/6/01
FRI

CLOUDY
COLD
65-70°

TP	PT	BS	FS	Elev	Adj Elev
96	ERM 96	—	—		
		6.141			
97			2.525		
		5.285			
98			3.946		
		5.385			
99			3.338		
		5.559			
100			2.101		
		7.271			
101			0.705		
		6.326			
102			6.322		
		2.761			
103			5.083		
		5.896			
104			5.864		
		3.589			
105			5.733		
		4.094			
106			6.124		

Desc.

BCF @ Mtn. View & Shadow Mtn. 1306534

BC-Conc. Y-23

-15 -96 (Elec.)

TP	PTM	+ BS	− FS	Elev.	Adj. Elev
0	#15			1289.977	
		6.450			
1			1.279		
		2.327			
2			4.633		
		3.931			
3			3.140		
		5.030			
4			3.544		
		5.288			
5	#91		4.525	1295.882	
		5.864			
6			4.033		
		6.094			
7			3.927		
		5.462			
8			4.638		
		6.527			
9			4.664		
		6.249	~~3.6~~		
10			4.302		
		5.531			
11	#96		4.862	1305.183	
12					

JW
DW
KW

ERM #15 "□" in Conc NE corn. Mtn. View & Sunrise on Irr. Structure.

ERM #91 @ BCF @ Mtn. View & Joshua Tree

ERM #96 @ BCF @ Mtn. View & Shadow Mtn.

GPS 4-6-01 JR BH

Po.	Rod	Time	Desc.
Y23	2,147	10 min	
2005	"	"	TP#5 Erm#5
2015	"	"	TP#15 Erm#15
2091	"	5 min	TP 91
2096	"	10 min	TP96
2069	"	10 min	TP69
2071	"	10 min	TP71
2079	"	10 min	TP 79

" SESSION B "

8/6/01

PT	UNIT	ROD	TIME ON	TIME OFF	OPER
L-366	"3"	2.276	6:37	11:50	GHA
4HDL	A	1.757	7:02	11:45	GHA
		120 EPOCHS			
Y 23	ROVER	2.035	7:38	7:48	JLW
Y 23	ROVER	2.035	7.52	8:02	JLW
		12 EPOCHS			
1009 ~~2009~~	ROVER	2035	8:17	8:18	JLW
1007 ~~2007~~	ROV	2.035	8:22	8:23	JLW
1011 ~~2011~~	ROV	2.035	8:31	8:32	JLW
2029	ROV	2.035	9:28	9:29	JLW
2037 ✓	ROV	2.035	9:03	9:04	JLW
1008 ~~2008~~	ROV	2.035	9:16	9:17	JLW
1010 ~~2010~~	ROV	2.035	9:52	9:53	JLW
1012 ~~2012~~	ROV	2.035	10:05	10:06	JLW
1013 ~~2013~~	ROV	2.035	10:53	10:54	JLW
		120 EPOCHS			
Y23	ROV	2.035	11:31	11:41	JLW

DESC

BCHH STAMPED L-366 1967
SS ROD IN HH

ELEV. NO GOOD; RESET PT
BCC HH ↑ Y23 SE/OF 303 BRIDGE 1933

BCF MT VIEW & WINDSONG 1009 C.O.S
BCF PANEL IT C.O.S. BOULDER & LAPALOMA 1007
BCF C.O.S. & MT VIEW & CLEAR CANYON 1011
BCF C.O.S. & CLEARVIEW & SUNRISE FRM 29
BCF FRM #37 COS BCF SUNRISE & GOLDEN CANYON
BCF COS PANEL HEARTHSTONE TROVAS
FND PK/PANEL .66m N OF BELL RD. ON/303 FRX

FND 5/8" RBR .5' ON HOLE IN AMTR

NGS Data

DATASHEETS

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 The NGS Data Sheet
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 6.52
1        National Geodetic Survey,   Retrieval Date = AUGUST  7, 2001
 AJ3860 ***********************************************************************
 AJ3860  DESIGNATION -  4HD1
 AJ3860  PID         -  AJ3860
 AJ3860  STATE/COUNTY-  AZ/MARICOPA
 AJ3860  USGS QUAD   -  MC MICKEN DAM (1981)
 AJ3860
 AJ3860                          *CURRENT SURVEY CONTROL
 AJ3860
 AJ3860* NAD 83(1992)-  33 40 56.22517(N)    112 27 33.63628(W)     ADJUSTED
 AJ3860* NAVD 88     -       424.68   (meters)    1393.3    (feet)  GPS OBS
 AJ3860
 AJ3860  X           -  -2,029,794.508 (meters)                     COMP
 AJ3860  Y           -  -4,910,209.461 (meters)                     COMP
 AJ3860  Z           -   3,517,395.007 (meters)                     COMP
 AJ3860  LAPLACE CORR-          -0.19  (seconds)                    DEFLEC99
 AJ3860  ELLIP HEIGHT-         394.70  (meters)                     GPS OBS
 AJ3860  GEOID HEIGHT-         -29.94  (meters)                     GEOID99
 AJ3860
 AJ3860  HORZ ORDER  -  B
 AJ3860  ELLP ORDER  -  THIRD     CLASS II
 AJ3860
 AJ3860.The horizontal coordinates were established by GPS observations
 AJ3860.and adjusted by the National Geodetic Survey in April 2001.
 AJ3860
 AJ3860.The orthometric height was determined by GPS observations and a
 AJ3860.high-resolution geoid model using precise GPS observation and
 AJ3860.processing techniques.
 AJ3860
 AJ3860.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AJ3860
 AJ3860.The Laplace correction was computed from DEFLEC99 derived deflections.
 AJ3860
 AJ3860.The ellipsoidal height was determined by GPS observations
 AJ3860.and is referenced to NAD 83.
 AJ3860
 AJ3860.The geoid height was determined by GEOID99.
 AJ3860
 AJ3860;                    North         East     Units   Scale      Converg.
 AJ3860;SPC AZ C     -   297,548.705   163,043.784   MT  0.99993120 -0 18 03.5
 AJ3860;UTM  12      - 3,727,884.775   364,727.461   MT  0.99982559 -0 48 34.0
 AJ3860
 AJ3860                          SUPERSEDED SURVEY CONTROL
 AJ3860
 AJ3860.No superseded survey control is available for this station.
 AJ3860
 AJ3860_MARKER: I = METAL ROD
```

```
AJ3860_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AJ3860_STAMPING: 4HD1 1999
AJ3860_MARK LOGO: MCDOT
AJ3860_PROJECTION: FLUSH
AJ3860_MAGNETIC: B = BAR MAGNET IMBEDDED IN MONUMENT
AJ3860_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AJ3860+STABILITY: POSITION/ELEVATION WELL
AJ3860_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AJ3860+SATELLITE: SATELLITE OBSERVATIONS - 1999
AJ3860_ROD/PIPE-DEPTH:  4.4 meters
AJ3860_SLEEVE-DEPTH  :  0.8 meters
AJ3860
AJ3860  HISTORY     - Date     Condition        Report By
AJ3860  HISTORY     - 1999     MONUMENTED       MCDOT
AJ3860
AJ3860                          STATION DESCRIPTION
AJ3860
AJ3860'DESCRIBED BY MARICOPA CO DOT 1999 (JJR)
AJ3860'THE STATION IS LOCATED WITHIN THE CITY OF SURPRISE, TOWNSHIP 4 NORTH,
AJ3860'RANGE 2 WEST, SECTION 15
AJ3860'OWNERSHIP - MARICOPA COUNTY
AJ3860'TO REACH THE STATION FROM THE JUNCTION OF U.S.  60 (GRAND AVENUE) AND
AJ3860'DEER VALLEY ROAD, DRIVE SOUTHWEST THEN WEST ON DEER VALLEY ROAD 2.5 MI
AJ3860'(4.0 KM) TO THE STATION ON THE RIGHT (NORTH) 95 FT (29.0 M) FROM THE
AJ3860'CENTERLINE OF THE ROAD
AJ3860'THE STATION IS MARKED BY AN ALUMINUM CAP COMPRESSED ON A 14.4 FOOT
AJ3860'(4.4 M) STAINLESS STEEL ROD DRIVEN TO REFUSAL, ENCASED IN A 1 INCH
AJ3860'GREASED PVC SLEEVE ENCLOSED IN A 5 INCH PVC PIPE WITH A COUNTY LOGO
AJ3860'ACCESS COVER STAMPED 4HD1 1999, SURROUNDED WITH A CONCRETE COLLAR
AJ3860'FLUSH WITH THE GROUND, WITNESSED BY A WHITE CARSONITE MARKER
AJ3860'STATION TIES -
AJ3860'95 FT (29.0 M) NORTH OF THE CENTERLINE OF THE CENTERLINE OF DEER
AJ3860'VALLEY ROAD
AJ3860'220 FT (67.1 M) EAST OF A BOX CULVERT UNDER DEER VALLEY ROAD
AJ3860'FOR A TO REACH MAP, STATION IMAGES AND ADDITIONAL INFORMATION, YOU CAN
AJ3860'VISIT-WWW.MCDOT.MARICOPA.GOV       SEARCH KEYWORD  GDACS

*** retrieval complete.
Elapsed Time = 00:00:03
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DATASHEETS

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 The NGS Data Sheet
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 6.52
1        National Geodetic Survey,   Retrieval Date = AUGUST  7, 2001
 AJ3867 ***********************************************************************
 AJ3867  DESIGNATION -  4IC1
 AJ3867  PID         -  AJ3867
 AJ3867  STATE/COUNTY-  AZ/MARICOPA
 AJ3867  USGS QUAD   -  MC MICKEN DAM (1981)
 AJ3867
 AJ3867                        *CURRENT SURVEY CONTROL
 AJ3867
 AJ3867* NAD 83(1992)-  33 43 28.48869(N)    112 24 36.55679(W)     ADJUSTED
 AJ3867* NAVD 88     -       433.97   (meters)    1423.8    (feet)  GPS OBS
 AJ3867
 AJ3867  X           -  -2,024,588.827 (meters)                     COMP
 AJ3867  Y           -  -4,909,550.764 (meters)                     COMP
 AJ3867  Z           -   3,521,303.256 (meters)                     COMP
 AJ3867  LAPLACE CORR-           1.53  (seconds)                    DEFLEC99
 AJ3867  ELLIP HEIGHT-         404.12  (meters)                     GPS OBS
 AJ3867  GEOID HEIGHT-         -29.81  (meters)                     GEOID99
 AJ3867
 AJ3867  HORZ ORDER  -  B
 AJ3867  ELLP ORDER  -  THIRD     CLASS II
 AJ3867
 AJ3867.The horizontal coordinates were established by GPS observations
 AJ3867.and adjusted by the National Geodetic Survey in April 2001.
 AJ3867
 AJ3867.The orthometric height was determined by GPS observations and a
 AJ3867.high-resolution geoid model using precise GPS observation and
 AJ3867.processing techniques.
 AJ3867
 AJ3867.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AJ3867
 AJ3867.The Laplace correction was computed from DEFLEC99 derived deflections.
 AJ3867
 AJ3867.The ellipsoidal height was determined by GPS observations
 AJ3867.and is referenced to NAD 83.
 AJ3867
 AJ3867.The geoid height was determined by GEOID99.
 AJ3867
 AJ3867;                    North         East     Units   Scale      Converg.
 AJ3867;SPC AZ C     -   302,216.715   167,626.960   MT  0.99992578 -0 16 26.4
 AJ3867;UTM  12      - 3,732,511.393   369,351.395   MT  0.99981043 -0 46 58.9
 AJ3867
 AJ3867                          SUPERSEDED SURVEY CONTROL
 AJ3867
 AJ3867.No superseded survey control is available for this station.
 AJ3867
 AJ3867_MARKER: I = METAL ROD
```

```
AJ3867_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AJ3867_STAMPING: 4IC1 1999
AJ3867_MARK LOGO: MCDOT
AJ3867_PROJECTION: FLUSH
AJ3867_MAGNETIC: B = BAR MAGNET IMBEDDED IN MONUMENT
AJ3867_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AJ3867+STABILITY: POSITION/ELEVATION WELL
AJ3867_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AJ3867+SATELLITE: SATELLITE OBSERVATIONS - 1999
AJ3867_ROD/PIPE-DEPTH: 10.9 meters
AJ3867_SLEEVE-DEPTH  :  0.8 meters
AJ3867
AJ3867  HISTORY     - Date     Condition        Report By
AJ3867  HISTORY     - 1999     MONUMENTED       MCDOT
AJ3867
AJ3867                          STATION DESCRIPTION
AJ3867
AJ3867'DESCRIBED BY MARICOPA CO DOT 1999 (JJR)
AJ3867'THE STATION IS LOCATED ABOUT 12 MI (19.3 KM) NORTHWEST OF SUN CITY
AJ3867'WEST, TOWNSHIP 4 NORTH, RANGE 2 WEST, SECTION 1
AJ3867'OWNERSHIP - MARICOPA COUNTY
AJ3867'TO REACH THE STATION FROM THE JUNCTION OF U.S.  60 (GRAND AVENUE) AND
AJ3867'163RD AVENUE, DRIVE NORTH ON 163RD AVENUE 2.6 MI (4.2 KM) TO THE
AJ3867'INTERSECTION OF JOMAX ROAD AND 163RD AVENUE, THENCE TURN RIGHT (EAST)
AJ3867'ONTO JOMAX ROAD AND DRIVE 0.1 MI (0.2 KM) TO THE STATION ON THE RIGHT
AJ3867'43 FT (13.1 M) SOUTH OF JOMAX ROAD
AJ3867'THE STATION IS MARKED BY AN ALUMINUM CAP COMPRESSED ON A 35.8 FOOT
AJ3867'(10.9 M) STAINLESS STEEL ROD DRIVEN TO REFUSAL, ENCASED IN A 1 INCH
AJ3867'GREASED PVC SLEEVE ENCLOSED IN A 5 INCH PVC PIPE WITH A COUNTY LOGO
AJ3867'ACCESS COVER STAMPED 4IC1 1999, SURROUNDED WITH A CONCRETE COLLAR
AJ3867'FLUSH WITH THE GROUND, WITNESSED BY A WHITE CARSONITE MARKER
AJ3867'STATION TIES -
AJ3867'43 FT (13.1 M) SOUTH OF JOMAX ROAD
AJ3867'0.1 MI (0.2 KM) EAST OF 163RD AVENUE
AJ3867'FOR A TO REACH MAP, STATION IMAGES AND ADDITIONAL INFORMATION, YOU CAN
AJ3867'VISIT-WWW.MCDOT.MARICOPA.GOV       SEARCH KEYWORD  GDACS

*** retrieval complete.
Elapsed Time = 00:00:03
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DATASHEETS

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 The NGS Data Sheet
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 6.52
1        National Geodetic Survey,   Retrieval Date = AUGUST  7, 2001
 AJ3867 ***********************************************************************
 AJ3867  DESIGNATION -  4IC1
 AJ3867  PID         -  AJ3867
 AJ3867  STATE/COUNTY-  AZ/MARICOPA
 AJ3867  USGS QUAD   -  MC MICKEN DAM (1981)
 AJ3867
 AJ3867                         *CURRENT SURVEY CONTROL
 AJ3867
 AJ3867* NAD 83(1992)-  33 43 28.48869(N)    112 24 36.55679(W)     ADJUSTED
 AJ3867* NAVD 88     -       433.97   (meters)    1423.8    (feet)  GPS OBS
 AJ3867
 AJ3867  X           -  -2,024,588.827 (meters)                     COMP
 AJ3867  Y           -  -4,909,550.764 (meters)                     COMP
 AJ3867  Z           -   3,521,303.256 (meters)                     COMP
 AJ3867  LAPLACE CORR-           1.53  (seconds)                    DEFLEC99
 AJ3867  ELLIP HEIGHT-         404.12  (meters)                     GPS OBS
 AJ3867  GEOID HEIGHT-         -29.81  (meters)                     GEOID99
 AJ3867
 AJ3867  HORZ ORDER  -  B
 AJ3867  ELLP ORDER  -  THIRD     CLASS II
 AJ3867
 AJ3867.The horizontal coordinates were established by GPS observations
 AJ3867.and adjusted by the National Geodetic Survey in April 2001.
 AJ3867
 AJ3867.The orthometric height was determined by GPS observations and a
 AJ3867.high-resolution geoid model using precise GPS observation and
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 AJ3867
 AJ3867.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AJ3867
 AJ3867.The Laplace correction was computed from DEFLEC99 derived deflections.
 AJ3867
 AJ3867.The ellipsoidal height was determined by GPS observations
 AJ3867.and is referenced to NAD 83.
 AJ3867
 AJ3867.The geoid height was determined by GEOID99.
 AJ3867
 AJ3867;                    North         East     Units   Scale      Converg.
 AJ3867;SPC AZ C     -   302,216.715   167,626.960   MT  0.99992578 -0 16 26.4
 AJ3867;UTM  12      - 3,732,511.393   369,351.395   MT  0.99981043 -0 46 58.9
 AJ3867
 AJ3867                         SUPERSEDED SURVEY CONTROL
 AJ3867
 AJ3867.No superseded survey control is available for this station.
 AJ3867
 AJ3867_MARKER: I = METAL ROD
```

```
AJ3867_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AJ3867_STAMPING: 4IC1 1999
AJ3867_MARK LOGO: MCDOT
AJ3867_PROJECTION: FLUSH
AJ3867_MAGNETIC: B = BAR MAGNET IMBEDDED IN MONUMENT
AJ3867_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AJ3867+STABILITY: POSITION/ELEVATION WELL
AJ3867_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AJ3867+SATELLITE: SATELLITE OBSERVATIONS - 1999
AJ3867_ROD/PIPE-DEPTH: 10.9 meters
AJ3867_SLEEVE-DEPTH  :  0.8 meters
AJ3867
AJ3867  HISTORY     - Date     Condition        Report By
AJ3867  HISTORY     - 1999     MONUMENTED       MCDOT
AJ3867
AJ3867                          STATION DESCRIPTION
AJ3867
AJ3867'DESCRIBED BY MARICOPA CO DOT 1999 (JJR)
AJ3867'THE STATION IS LOCATED ABOUT 12 MI (19.3 KM) NORTHWEST OF SUN CITY
AJ3867'WEST, TOWNSHIP 4 NORTH, RANGE 2 WEST, SECTION 1
AJ3867'OWNERSHIP - MARICOPA COUNTY
AJ3867'TO REACH THE STATION FROM THE JUNCTION OF U.S.  60 (GRAND AVENUE) AND
AJ3867'163RD AVENUE, DRIVE NORTH ON 163RD AVENUE 2.6 MI (4.2 KM) TO THE
AJ3867'INTERSECTION OF JOMAX ROAD AND 163RD AVENUE, THENCE TURN RIGHT (EAST)
AJ3867'ONTO JOMAX ROAD AND DRIVE 0.1 MI (0.2 KM) TO THE STATION ON THE RIGHT
AJ3867'43 FT (13.1 M) SOUTH OF JOMAX ROAD
AJ3867'THE STATION IS MARKED BY AN ALUMINUM CAP COMPRESSED ON A 35.8 FOOT
AJ3867'(10.9 M) STAINLESS STEEL ROD DRIVEN TO REFUSAL, ENCASED IN A 1 INCH
AJ3867'GREASED PVC SLEEVE ENCLOSED IN A 5 INCH PVC PIPE WITH A COUNTY LOGO
AJ3867'ACCESS COVER STAMPED 4IC1 1999, SURROUNDED WITH A CONCRETE COLLAR
AJ3867'FLUSH WITH THE GROUND, WITNESSED BY A WHITE CARSONITE MARKER
AJ3867'STATION TIES -
AJ3867'43 FT (13.1 M) SOUTH OF JOMAX ROAD
AJ3867'0.1 MI (0.2 KM) EAST OF 163RD AVENUE
AJ3867'FOR A TO REACH MAP, STATION IMAGES AND ADDITIONAL INFORMATION, YOU CAN
AJ3867'VISIT-WWW.MCDOT.MARICOPA.GOV       SEARCH KEYWORD  GDACS

*** retrieval complete.
Elapsed Time = 00:00:03
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DATASHEETS

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 The NGS Data Sheet
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 6.52
1        National Geodetic Survey,   Retrieval Date = AUGUST  7, 2001
 DV0095 ***********************************************************************
 DV0095  DESIGNATION -  L 366
 DV0095  PID         -  DV0095
 DV0095  STATE/COUNTY-  AZ/MARICOPA
 DV0095  USGS QUAD   -  MC MICKEN DAM (1981)
 DV0095
 DV0095                          *CURRENT SURVEY CONTROL
 DV0095  ______________________________________________________________________
 DV0095* NAD 83(1992)-  33 40 20.89661(N)    112 25 36.49396(W)     ADJUSTED
 DV0095* NAVD 88     -       407.359  (meters)    1336.48   (feet)  ADJUSTED
 DV0095  ______________________________________________________________________
 DV0095  LAPLACE CORR-          -0.07  (seconds)                    DEFLEC99
 DV0095  GEOID HEIGHT-         -29.96  (meters)                     GEOID99
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DV0095'HIGHWAY 93 FROM THE POST OFFICE AT EL MIRAGE, THENCE 1.3 MILES
DV0095'SOUTHWEST ALONG CANAL ROAD WHICH PARALLELS THE EAST SIDE OF THE
DV0095'BEARDSLEY CANAL, IN SECTION 23, T 4 N, R 2 W, 0.4 MILE SOUTHWEST OF
DV0095'THE MCMICKEN DAM OUTLET STRUCTURE, AT THE JUNCTION OF CANAL ROAD AND A
DV0095'GRAVELED ROAD WHICH LEADS SOUTH, 22 FEET SOUTHEAST OF THE CENTER LINE
DV0095'OF CANAL ROAD, 32 FEET WEST OF THE CENTER LINE OF THE GRAVELED ROAD, 5
DV0095'1/2 FEET WEST OF A POWER POLE, 1.7 FEET SOUTH OF A METAL WITNESS POST,
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 DV0087.and adjusted by the National Geodetic Survey in June 1991.
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 DV0087.The geoid height was determined by GEOID99.
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 DV0087.The dynamic height is computed by dividing the NAVD 88
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DV0087  HISTORY     - 1981     GOOD             NGS
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DV0087                          STATION DESCRIPTION
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DV0087'DESCRIBED BY COAST AND GEODETIC SURVEY 1967
DV0087'7.0 MI NW FROM EL MIRAGE.
DV0087'ABOUT 7.0 MILES NORTHWEST ALONG U.S. HIGHWAYS 60, 70 AND 89 AND STATE
DV0087'HIGHWAY 93 FROM THE POST OFFICE AT EL MIRAGE, IN SECTION 13, T 4 N, R
DV0087'2 W, 67 YARDS WEST OF THE CENTER OF THE INTERSECTION OF U.S. HIGHWAYS
DV0087'60, 70 AND 89, STATE HIGHWAY 93 AND CANAL ROAD, 95 1/2 FEET SOUTHWEST
DV0087'OF THE CENTER LINE OF THE HIGHWAYS, 130 FEET WEST OF THE NORTHWEST END
DV0087'OF THE SOUTHWEST CONCRETE HEAD WALL OF A CULVERT UNDER THE HIGHWAYS,
DV0087'18 1/2 FEET SOUTHEAST OF A POWER POLE WHICH IS BRACED BY A GUY WIRE,
DV0087'1.7 FEET NORTHEAST OF A METAL WITNESS POST, ABOUT 1 1/2 FEET BELOW THE
DV0087'LEVEL OF THE HIGHWAYS, AND ON THE TOP OF A 5/8-INCH COPPER COATED ROD
DV0087'THAT IS DRIVEN TO A DEPTH OF 18 FEET AND IS ENCASED IN A 5-INCH IRON
DV0087'PIPE WHICH PROJECTS 8 INCHES.
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DV0087                          STATION RECOVERY (1981)
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Elapsed Time = 00:00:01
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 DV0259  ______________________________________________________________________
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 DV0259.and adjusted by the National Geodetic Survey in August 1993.
 DV0259.No horizontal observational check was made to the station.
 DV0259
 DV0259.The orthometric height was determined by differential leveling
 DV0259.and adjusted by the National Geodetic Survey in June 1991.
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 DV0259.The Laplace correction was computed from DEFLEC99 derived deflections.
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 DV0259.The geoid height was determined by GEOID99.
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 DV0259.The dynamic height is computed by dividing the NAVD 88
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 DV0259.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
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 DV0259.The modeled gravity was interpolated from observed gravity values.
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DV0259  HISTORY     - 1981     GOOD             NGS
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DV0259                          STATION DESCRIPTION
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DV0259'DESCRIBED BY COAST AND GEODETIC SURVEY 1933
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DATASHEETS

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 DV0094.an estimated accuracy of +/- 6 seconds.
 DV0094
 DV0094.The orthometric height was determined by differential leveling
 DV0094.and adjusted by the National Geodetic Survey in June 1991.
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 DV0094.The geoid height was determined by GEOID99.
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 DV0094.The dynamic height is computed by dividing the NAVD 88
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 DV0094.See file dsdata.txt to determine how the superseded data were derived.
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DV0094  HISTORY     - 1981     GOOD             NGS
DV0094
DV0094                          STATION DESCRIPTION
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DV0094'DESCRIBED BY COAST AND GEODETIC SURVEY 1967
DV0094'7.9 MI NW FROM EL MIRAGE.
DV0094'ABOUT 7.0 MILES NORTHWEST ALONG U.S. HIGHWAYS 60, 70 AND 89 AND STATE
DV0094'HIGHWAY 93 FROM THE POST OFFICE AT EL MIRAGE, THENCE 0.9 MILE
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DV0094'BEARDSLEY CANAL, IN SECTION 24, T 4 N, R 2 W, 118 FEET NORTHWEST OF
DV0094'THE CENTER LINE OF THE ROAD, SET IN THE TOP OF THE EAST END OF THE
DV0094'SOUTH WALL OF THE CONCRETE SPILLWAY AT THE MCMICKEN DAM OUTLET
DV0094'STRUCTURE, 3 FEET SOUTH OF THE NORTHEAST CORNER OF THE WALL, AND ABOUT
DV0094'3 1/2 FEET ABOVE THE LEVEL OF THE ROAD.
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DV0094'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1981
DV0094'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:02
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McMICKEN DAM
SPILLWAY DELINEATION STUDY

(FCD 98-32)

APPENDIX C: FIELD RECONNAISSANCE

McMicken Dam
Spillway Delineation Study

Appendix C: Field Reconnaissance

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1 Introduction

The purpose of the field reconnaissance phase is to present information gained from field visits, as well as to evaluate and justify the estimation of Manning's 'n' values selected for use in hydraulic modeling. There are several different land types within each reach, and calculations for each reach are presented in Section 3 of this appendix.

2 Manning's 'n' Estimation Methodology

The procedure presented in the report entitled *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona* (Ref. 1) was used for the estimation of Manning's 'n' values. The procedure consists of selecting a base 'n' for both the channel and overbank areas, and applying an adjustment factor to account for the roughness associated with channel irregularity, obstructions, vegetation, and channel meandering. Tables 1 and 2 of that report give a range of base 'n' values and adjustment factors. The composite Manning's 'n' value can be computed as follows:

$$n = m\,(n_b + n_1 + n_2 + n_3)$$

Where: n = composite 'n'
n_b = base 'n' for a straight uniform channel
n_1 = surface irregularities component
n_2 = obstruction component
n_3 = vegetation component
m = meandering factor

Base Component (n_b)

A wide range of base 'n_b' values, as reported by Benson & Darymple, and by Chow, are given in Table 1 of Reference 1. The values given by Chow represent the smoothest channel attainable in a given material.

Irregularity Component (n_1)

The adjustment for irregularity is based upon the degree of erosion or scour of the overbank or channel banks.

Obstruction Component (n_2)

The obstruction component is considered to be a factor only for the developed and/or residential areas of this study, and was determined based upon the percentage of cross-section area occupied by obstructions. For desert/agricultural areas, this factor was considered negligible due to the magnitude of the spillway flows.

Vegetation Component (n_3)

The vegetation component of the Manning's 'n' value varies according to the density of growth and the ratio of flow depth to vegetation height.

Meandering Factor (m)

The meandering factor applies only to flow meandering within the channel limits, and is based on the ratio of the meander length to the straight length of the channel. The spillway flows presented in this study inundate both the channel and overbank areas of the cross-sections, therefore a meandering factor of 1.00 was chosen for every land type.

3 Manning's 'n' Calculations

The following sections include calculations for each land type within each reach. A description of each reach and manning's 'n' calculations for each land type are included. A representative photograph is shown with each land type, along with the chosen Manning's 'n' components.

3.1 Reach A – McMicken Dam Spillway to Loop 303 Freeway

Reach A extends from just upstream of the McMicken Dam spillway, along the south side of Grand Avenue to the Loop 303 freeway, and also along Grand Avenue south of the Loop 303 freeway. The area immediately downstream of the emergency spillway is currently undeveloped, however, further downstream the study area contains several densely developed subdivisions, the Beardsley Canal, and a portion of the Loop 303 freeway which is currently under construction.

A field reconnaissance trip was made on March 13, 2001. It is estimated that flow from the spillway would head in a southeasterly direction, toward Sun City Grand and the Loop 303 freeway. From the spillway to the freeway, the land is mostly undeveloped desert with no distinct natural channels. Spillway flows would cross the Beardsley Canal and the McMicken Dam Outlet Channel. Within this reach, the potential flow width is constrained by Grand Avenue and the Burlington Northern-Santa Fe Railroad to the northeast, and a dike surrounding the shooting range to the southwest.

There are concentrated areas of dense vegetation growth upstream of the spillway, and in the area immediately north of the McMicken Dam Outlet Channel, however the magnitude of flows used for this study are not likely to be affected by locally dense vegetation. Therefore, a single 'n' value was applied along each cross-section taken in this area. Southeast of the Loop 303 Freeway, there are residential developments along Grand Avenue.

The following pages present descriptions of each land type and the corresponding Manning's 'n' components selected. Table 1 summarizes the Manning's 'n' components and composite values chosen for Reach A.

Table 1: Reach A – Manning's 'n' Calculations Summary

Land Type	Manning's 'n' Components				Meandering m	Composite n
	Base n_b	Irregularity n_1	Obstruction n_2	Vegetation n_3		
Undeveloped Desert	0.027	0.003	0.000	0.010	1.00	0.040
Outlet Channel	0.027	0.003	0.000	0.005	1.00	0.035
Freeway	0.020	0.001	0.001	0.000	1.00	0.022
Undeveloped – b/t McMicken Dam Outlet Channel and Freeway	0.027	0.001	0.000	0.002	1.00	0.030
Grand Avenue South of Freeway	0.022	0.001	0.000	0.002	1.00	0.025

From: *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County*, prepared for the Flood Control District of Maricopa County by the U.S. Geological Survey in April 1991.

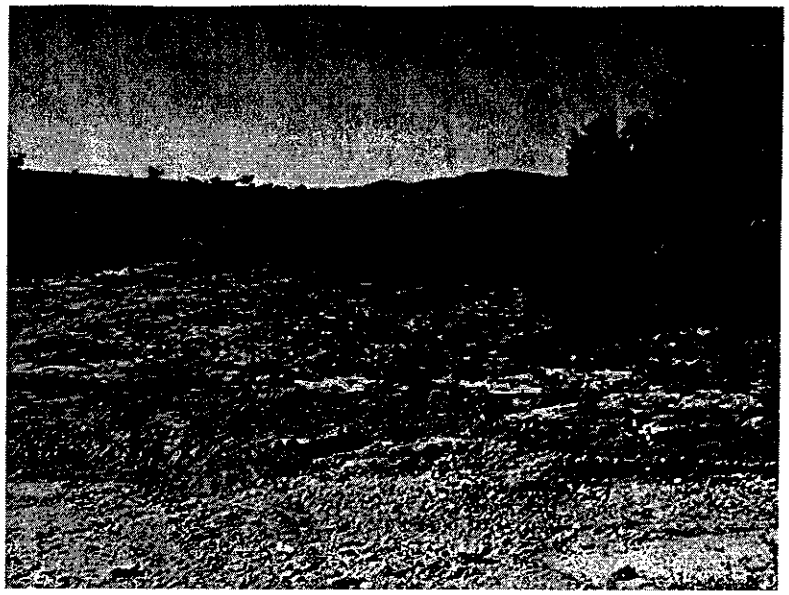
Undeveloped Desert: MD-21 – McMicken Dam emergency spillway, view north from the south end of the spillway, undeveloped desert area shown to the right of the spillway, n = 0.040.

3.1.1 Undeveloped Desert

A base 'n_b' value of 0.027 was assigned for the undeveloped desert area, which consists of a fine gravel base material. Bank erosion is minor due to the breadth of flow across each cross-section, therefore the irregularities component is low. The amount of obstructions is negligible. Just downstream of the spillway, the vegetation is sparse and moderate in height and the approximated flow depth is twice the maximum vegetation height. There is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.027
Irregularities Component, n_1 =	0.003
Obstruction Component, n_2 =	0.000
Vegetation Component, n_3 =	0.010
Meandering Factor, m =	1
Composite n =	**0.040**

Outlet Channel: MD-20 – looking upstream along the northwest face of the outlet channel levee; grasses and small shrubs within channel and along levee, n = 0.035.

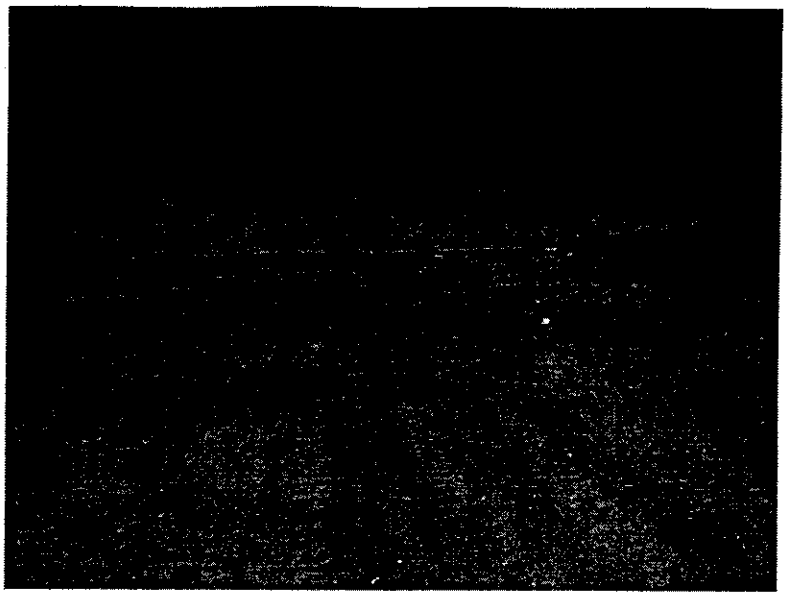


3.1.2 Outlet Channel

A base 'n_b' value of 0.027 was assigned for the undeveloped desert area and the outlet channel, which consist of a fine gravel base material. A low value for n_1 was selected for all areas, due to the uniformity within each area. Within the outlet channel, the vegetation consists mostly of low weeds and grasses, with sporadic low bushes. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.027
Irregularities Component, n_1 =	0.003
Obstruction Component, n_2 =	0.000
Vegetation Component, n_3 =	0.005
Meandering Factor, m =	1
Composite n =	**0.035**

Freeway: MD-25 - the Estrella Freeway (Loop 303) is currently under construction, n = 0.022.

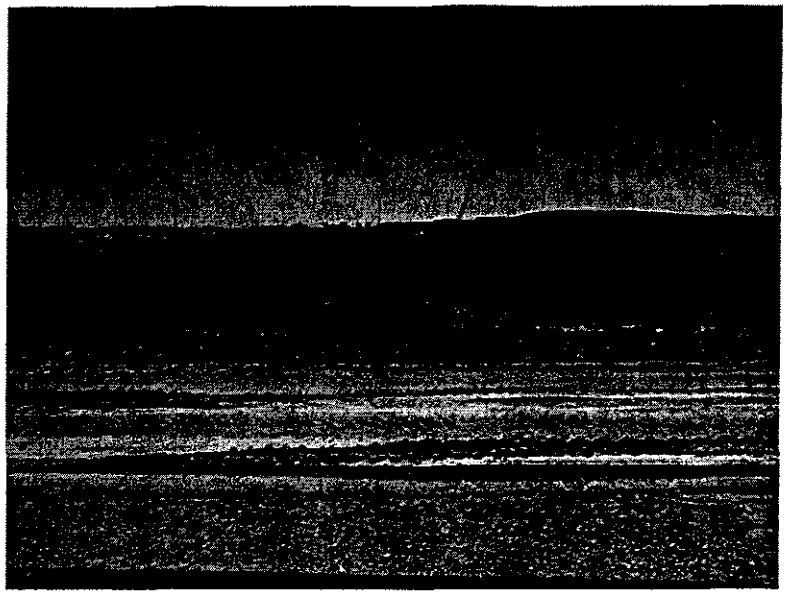


3.1.3 Freeway

A base value of 0.020 was chosen for the freeway, which will have concrete as the base material. A low value for n_1 was selected for all areas, due to the uniformity within each area. For the freeway section, the amount of obstructions is negligible. Vegetation within the freeway median was considered negligible. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.020
Irregularities Component, n_1 =	0.001
Obstruction Component, n_2 =	0.001
Vegetation Component, n_3 =	0.000
Meandering Factor, m =	1
Composite n =	**0.022**

Undeveloped – Between Outlet Channel and Freeway: MD-23 – looking southeast toward the Loop 303 crossing of Grand Avenue, n = 0.030.



3.1.4 Undeveloped – Between Outlet Channel and Freeway

A base 'n_b' value of 0.027 was assigned for the undeveloped desert area and the outlet channel, which consists of a firm soil/coarse sand base material. A low value for n_1 was chosen for all areas, due to the uniformity of the area. For the undeveloped desert area, the amount of obstructions is negligible. Flow depth in the channel was approximated to be at least twice the vegetation height. The vegetation consists mostly of low weeds and grasses. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.027
Irregularities Component, n_1 =	0.001
Obstruction Component, n_2 =	0.000
Vegetation Component, n_3 =	0.002
Meandering Factor, m =	1
Composite n =	**0.030**

Grand Avenue: M-34 – Grand Avenue south of Sunrise Boulevard, view southeast, n = 0.025.

3.1.5 Grand Avenue

A weighted base value of 0.022 was chosen for the Grand Avenue cross-sections. A low value for n_1 was chosen for all areas, due to the uniformity within each area. Across the section, the amount of obstructions is minimal, and a low obstruction component was selected. Vegetation along Grand Avenue consists of very low occasional grasses at the north end, and sporadic low bushes in the overbanks, therefore a low vegetation component was selected. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.022
Irregularities Component, n_1 =	0.001
Obstruction Component, n_2 =	0.000
Vegetation Component, n_3 =	0.002
Meandering Factor, m =	1
Composite n =	**0.025**

3.2 Reach B – Loop 303 Freeway to Agua Fria River

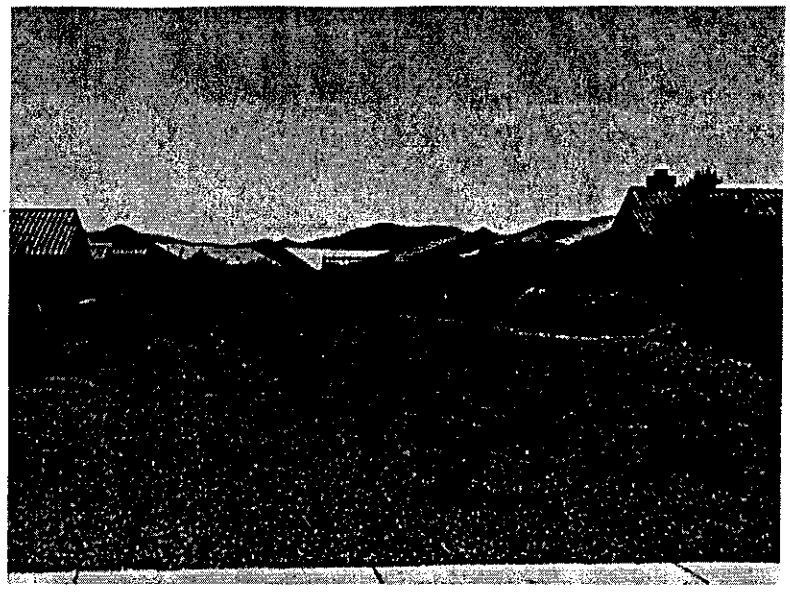
Reach B extends from the Loop 303 freeway along the south side of Grand Avenue, to the Agua Fria River. Two distinct land types are found in this reach; developed/residential and farm fields. Each type is described and the corresponding Manning's 'n' components selected are shown in the following sections. Table 2 summarized the Manning's 'n' components and composite values chosen for Reach B.

Table 2: Reach B – Manning's 'n' Calculations Summary

Land Type	Manning's 'n' Components				Meandering m	Composite n
	Base n_b	Irregularity n_1	Obstruction n_2	Vegetation n_3		
Developed/Residential	0.030	0.010	0.040	0.020	1.00	0.100
Agricultural Areas	0.030	0.005	0.030	0.015	1.00	0.080

From: *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County*, prepared for the Flood Control District of Maricopa County by the U.S. Geological Survey in April 1991.

Developed/Residential: MD-55, Sun City Grand Development, Sandia Drive between Monteverde Drive and Escalante Drive, n = 0.100.



3.2.1 Developed/Residential

For the developed areas of the study, a base 'n_b' value of 0.030 was assigned. A low value for n_1 was selected for all areas, due to the uniformity within each area. For areas of housing/development, the amount of obstructions is appreciable, approximately one-third of the total cross-section area. Within the developed/residential areas, the vegetation varies in density and height, therefore a medium-range vegetation component was selected. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.030
Irregularities Component, n_1 =	0.010
Obstruction Component, n_2 =	0.040
Vegetation Component, n_3 =	0.020
Meandering Factor, m =	1
Composite n =	**0.100**

3.2.2 Agricultural Areas

For the agricultural areas of the study, a base 'n_b' value of 0.030 was assigned. A low value for n_1 was chosen for all areas, due to the uniformity within each area. For farm fields, the amount of obstructions is appreciable. Depending on the stage the crops are at, the vegetation varies in density and height, therefore a medium-range vegetation component was selected. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

Base, n_b =	0.030
Irregularities Component, n_1 =	0.005
Obstruction Component, n_2 =	0.030
Vegetation Component, n_3 =	0.015
Meandering Factor, m =	1
Composite n =	**0.080**

4 References

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

5 Field Visit Photos

McMicken Dam
Spillway Delineation Study

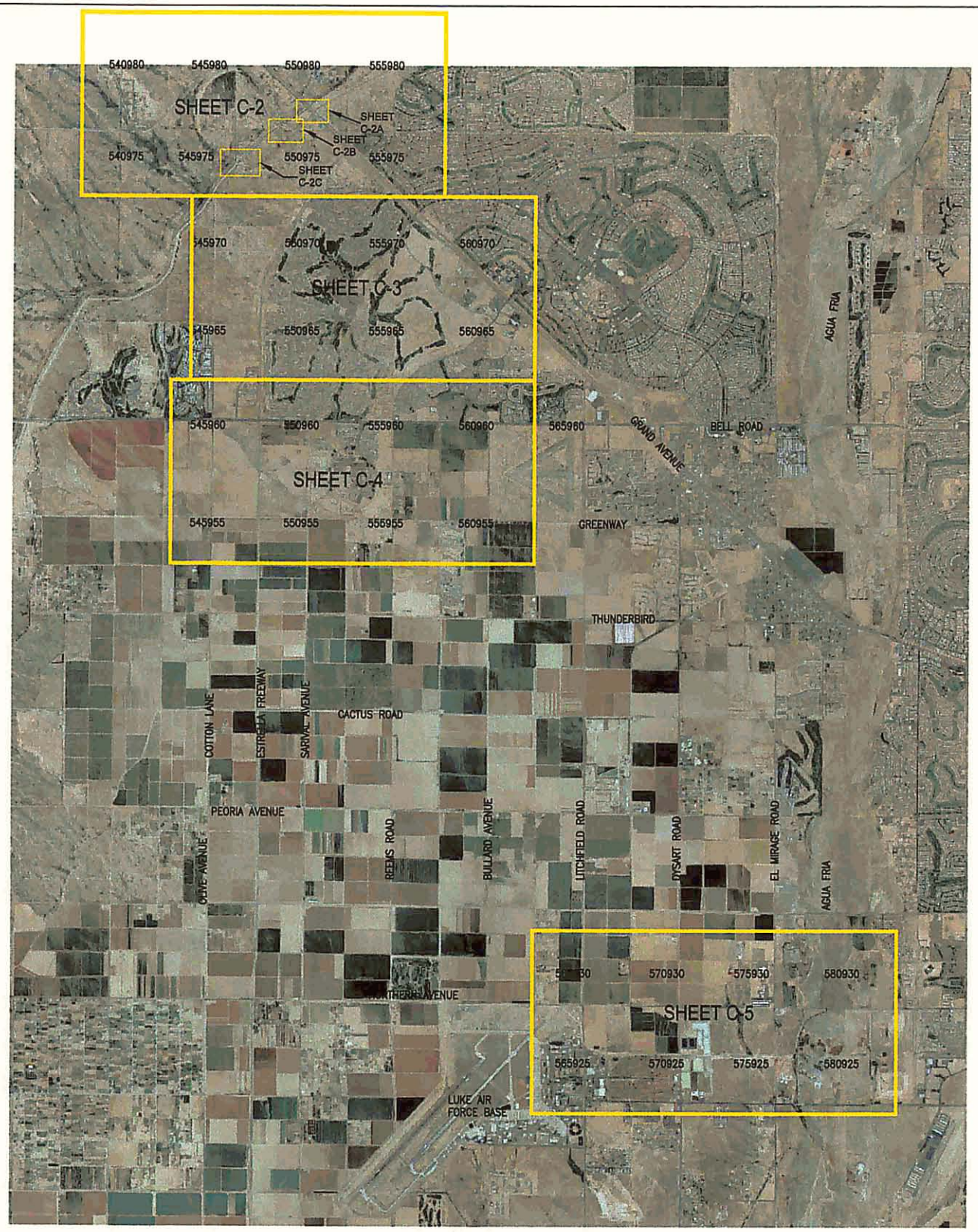
Appendix C: Field Reconnaissance

Photographs

MD-1 McMicken Dam Outlet Channel at Grand Avenue, view east of railroad crossing
MD-2 McMicken Dam Outlet Channel at Grand Avenue, view east from Grand Avenue
MD-3 McMicken Dam Outlet Channel at Grand Avenue, view west towards Grand Avenue
MD-4 McMicken Dam Outlet Channel at Grand Avenue, view south along Grand Avenue
MD-5 McMicken Dam Outlet Channel at Grand Avenue, view northwest from Grand Avenue
MD-6 McMicken Dam Outlet Channel at Grand Avenue, view northwest from Grand Avenue
MD-7 McMicken Dam Principal Outlet, view southeast from north of levee
MD-8 McMicken Dam Principal Outlet, view southeast from structure
MD-9 McMicken Dam Principal Outlet, view northwest from structure
MD-10 McMicken Dam Principal Outlet, view southeast from top of levee
MD-11 McMicken Dam Principal Outlet, view southeast from top of levee (siphon walls perpendicular to view)
MD-12 McMicken Dam Principal Outlet, view southeast from top of levee
MD-13 Beardsley Canal at access road and siphon, view east
MD-14 Beardsley Canal at access road and siphon, view southeast
MD-15 Beardsley Canal at access road and siphon, view northwest
MD-16 Beardsley Canal at access road, view south
MD-17 Vegetation south of Beardsley Canal
MD-18 Beardsley Canal at access road, view east
MD-19 McMicken Dam Outlet Channel, view northeast along north bank
MD-20 McMicken Dam Outlet Channel, view southwest along north bank
MD-21 McMicken Dam spillway, view north from south end of spillway
MD-22 McMicken Dam Outlet Channel, view north and west from top of levee
MD-23 View southeast toward the Loop 303 Freeway construction, from west of Grand Avenue
MD-24 View southwest toward the Loop 303 Freeway construction, from west of Grand Avenue
MD-25 View west along north side of Loop 303 Freeway construction, from west of Grand Avenue
MD-26 Loop 303 at Grand Avenue, view southeast from west of Grand Avenue
MD-27 Area west of Grand Avenue, looking south from south of Loop 303 Freeway
MD-28 Area west of Grand Avenue, looking north from south of Loop 303 Freeway
MD-29 Area west of Grand Avenue, looking northwest from south of Loop 303 Freeway
MD-30 Grand Avenue, view south from north of Sunrise Boulevard
MD-31 View fence area northwest of Sunrise Boulevard and Grand Avenue, view southeast
MD-32 View fence northwest of Sunrise Boulevard and Grand Avenue, view northwest
MD-33 View fence southwest of Sunrise Boulevard and Grand Avenue, view southwest
MD-34 Grand Avenue south of Sunrise Boulevard, view southeast
MD-35 Golf course southwest of Sunrise Boulevard and Grand Avenue, view north
MD-36 Golf course and lake northwest of Sunrise Boulevard and Grand Avenue, view east
MD-37 Goldwater Ridge Drive and golf course east of Sunrise Boulevard, view northwest
MD-38 Goldwater Ridge Drive and golf course south of Sunrise Boulevard, view south
MD-39 Sunrise Boulevard and golf course south of Clearview Boulevard, view northeast
MD-40 Goldwater Canyon Drive and golf course south of Clearview Boulevard, view west

Photographs (cont'd.)

MD-41 Goldwater Canyon Drive and golf course south of Clearview Boulevard, view east
MD-42 Limestone Drive and golf course east of Estrella Vista Drive, view south
MD-43 Limestone Drive and golf course east of Estrella Vista Drive, view north
MD-44 Estrella Vista Drive north of Limestone Drive, view west
MD-45 Goldwater Canyon west of Saddle Ridge Drive, view southwest
MD-46 Goldwater Canyon west of Saddle Ridge Drive, view north
MD-47 Clearview Boulevard and golf course east of Sunrise Boulevard, view north
MD-48 Goldwater Ridge east of Havasupai Drive, view northwest
MD-49 Sunrise Boulevard north of Bell Road, view southeast
MD-50 Sunrise Boulevard north of Bell Road, view northeast
MD-51 Sunrise Boulevard north of Bell Road, view southeast
MD-52 Sandia Drive between Monte Verde Drive and Escalante Drive, view northwest
MD-53 Sandia Drive between Monte Verde Drive and Escalante Drive, view northwest
MD-54 Intersection of Park Drive and Saddle Ridge Drive view southeast
MD-55 Saddle Ridge Drive between Red Rock Drive and Casa Bonita Street, view west
MD-56 Havasupai Drive west of Linksview Drive, view northeast
MD-57 Havasupai Drive east of Linksview Drive, view southwest
MD-58 Channel along Reems Road, view north
MD-59 Dysart Drain at Litchfield Road, view south
MD-60 Dysart Drain at Litchfield Road, view southwest
MD-61 North side of Dysart Drain, west of Dysart Road, view east
MD-62 North side of Dysart Drain, west of Dysart Road, view west
MD-63 Dysart Drain at Dysart Road, view west
MD-64 Dysart Drain at Dysart Road, view east
MD-65 Dysart Drain at El Mirage Road, view west
MD-66 El Mirage Road at Dysart Drain, view south
MD-67 North of Dysart Drain at El Mirage Road, view west
MD-68 El Mirage Road and Glendale Avenue, view northwest
MD-69 El Mirage Road and Olive Avenue, view northwest
MD-70 Dysart Road and Olive Avenue, view northwest



LEGEND

540980	FCDMC ORTHOPHOTOS 2001
PEORIA AVENUE	STREET/LANDMARK REFERENCE
SHEET C-3	SHEET REFERENCE

4000' 0' 4000' 8000'

SCALE: 1"= 8000 FEET
AERIAL = DIGIAIR

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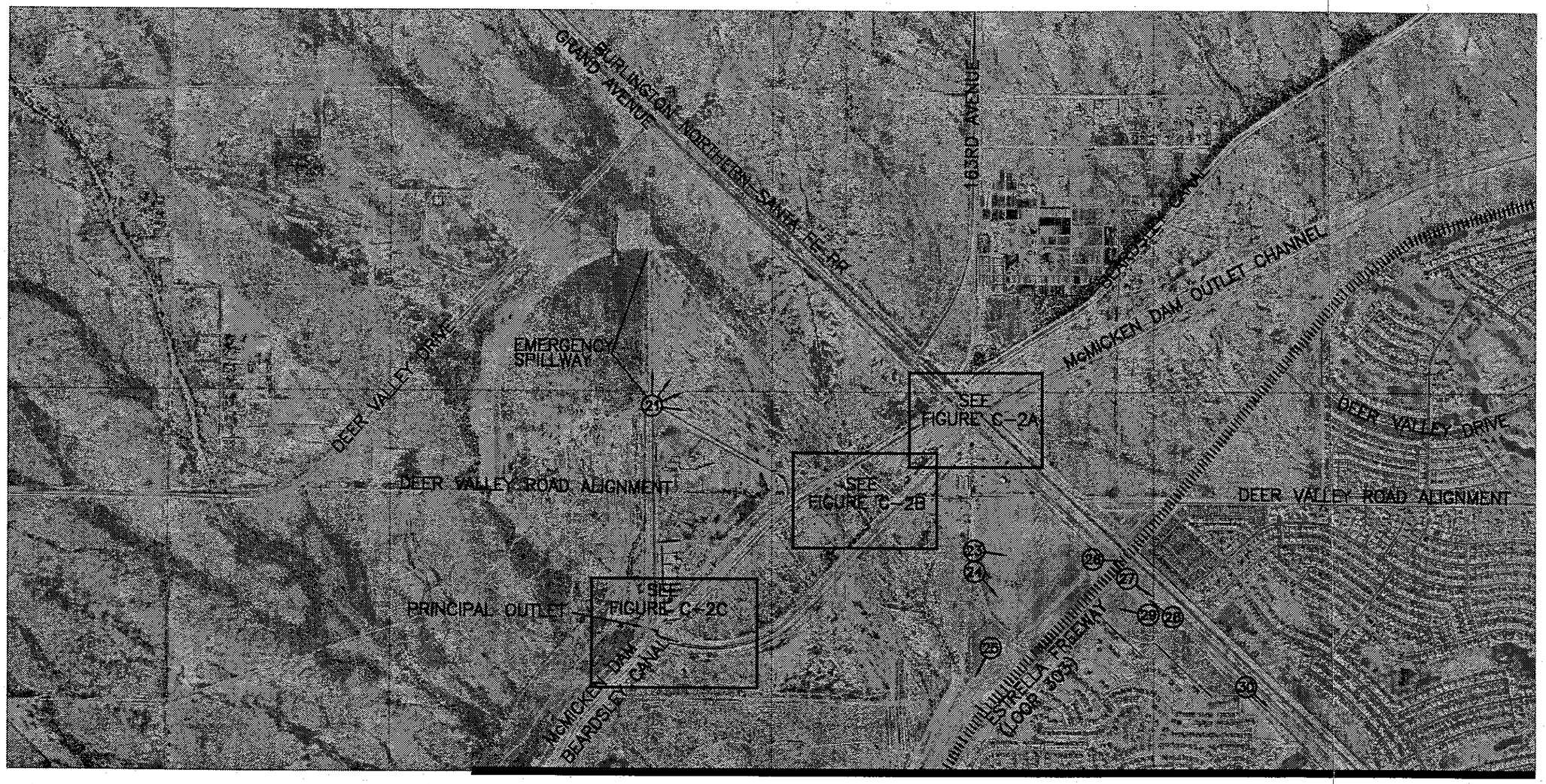
DEI Professional Services, LLC

McMICKEN DAM SPILLWAY
PHOTO LOCATION
SHEET INDEX
FIGURE C-1



MATCH SHEET C-3

750' 0' 750' 1500'
SCALE: 1"= 1500 FEET
AERIAL = FCDMC ORTHOPHOTOS 2001

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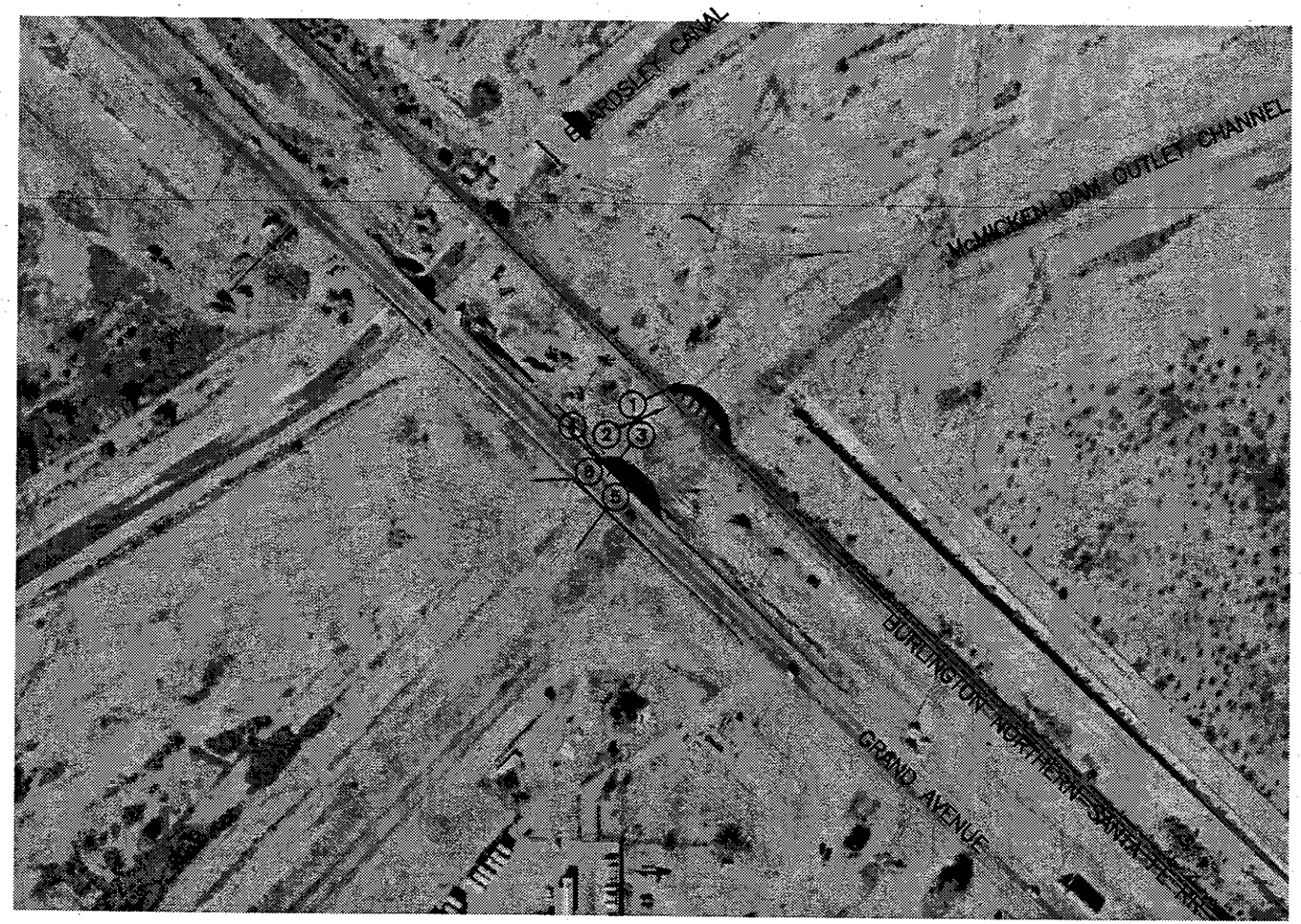
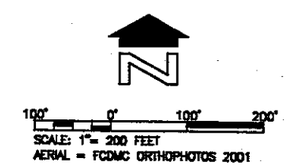
McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-2





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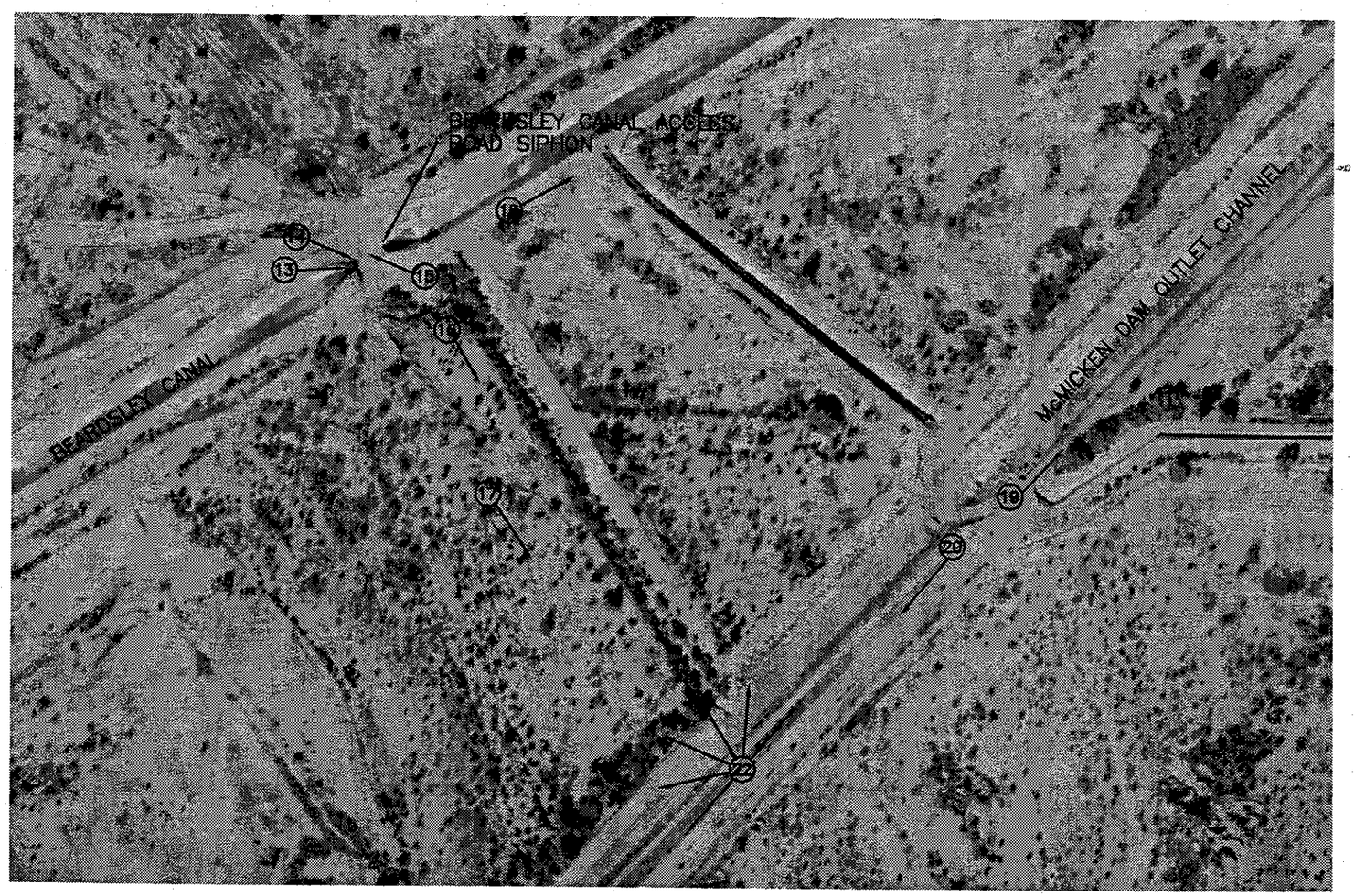
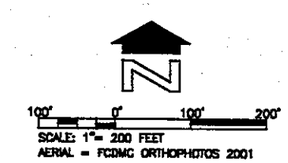
McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-2A





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McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-2B

N

100' 0' 100' 200'

SCALE: 1" = 200 FEET
AERIAL = FCDMC ORTHOPHOTOS 2001

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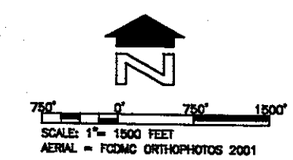
McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-2C

MATCH SHEET C-2

MATCH SHEET C-4



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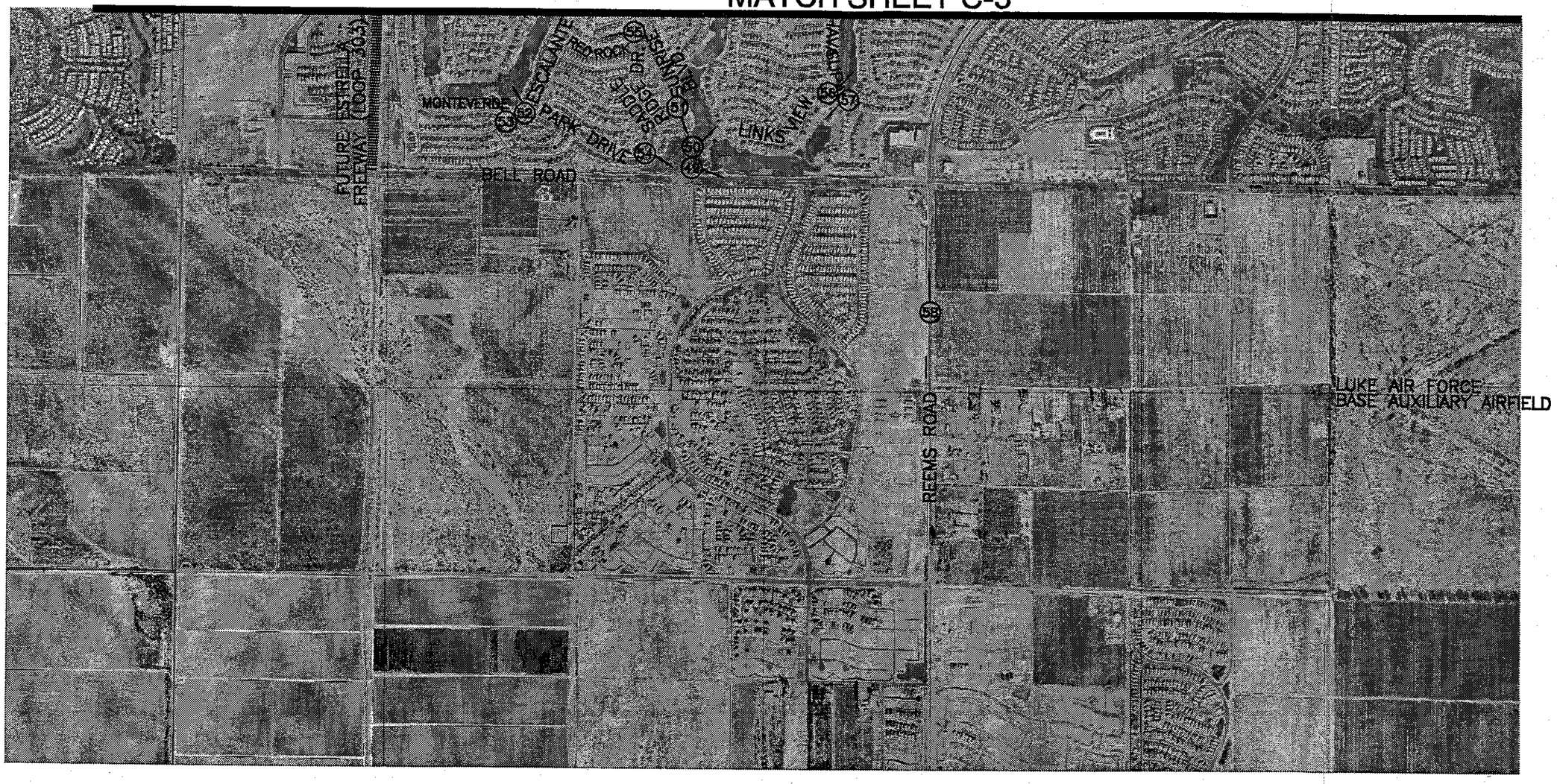
McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-3

MATCH SHEET C-3



N

750' 0' 750' 1500'
SCALE: 1"= 1500 FEET
AERIAL - FCDMC ORTHOPHOTOS 2001

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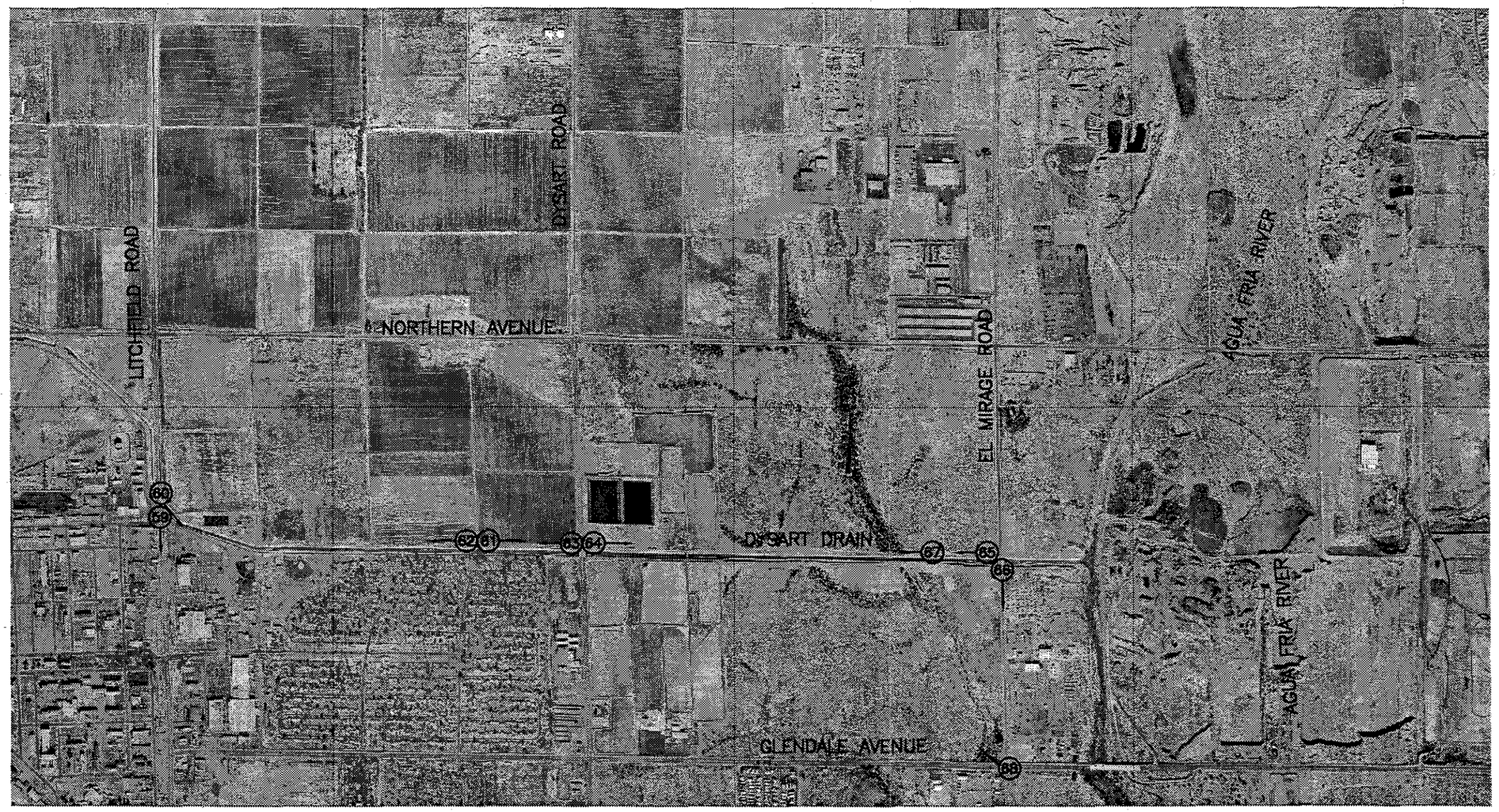
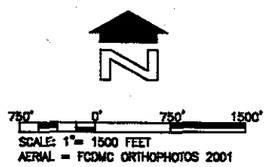
McMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-4





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DEI Professional Services, LLC

MCMICKEN DAM SPILLWAY
PHOTO LOCATION MAP
FIGURE C-5

MD-01 – McMicken Dam Outlet Channel at Grand Avenue, view east of railroad crossing

MD-02 – McMicken Dam Outlet Channel at Grand Avenue, view east from Grand Avenue

MD-03 – McMicken Dam Outlet Channel at Grand Avenue, view west towards Grand Avenue

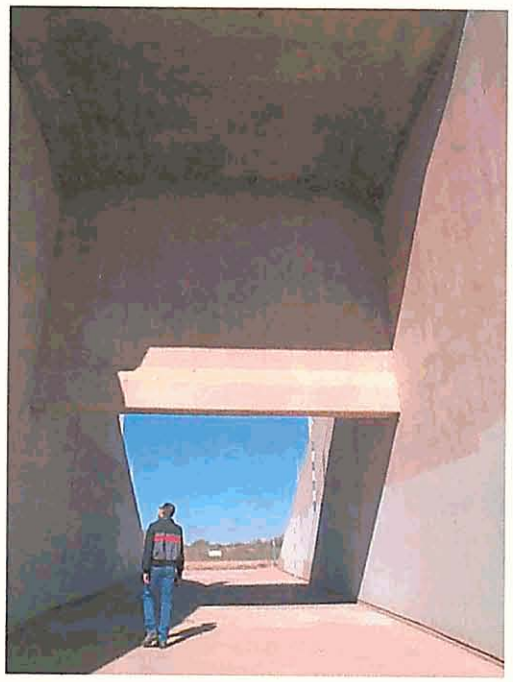
MD-04 – McMicken Dam Outlet Channel at Grand Avenue, view south along Grand Avenue

MD-05 – McMicken Dam Outlet Channel at Grand Avenue, view northwest from Grand Avenue

MD-06 – McMicken Dam Outlet Channel at Grand Avenue, view northwest from Grand Avenue

MD-07 – McMicken Dam Principal Outlet, view southeast from north of levee

MD-08 – McMicken Dam Principal Outlet, view southeast from structure



MD-09 – McMicken Dam Principal Outlet, view northwest from structure

MD-10 – McMicken Dam Principal Outlet, view southeast from top of levee

MD-11 – McMicken Dam Principal Outlet, view southeast from top of levee (siphon wall perpendicular to view)

MD-12 – McMicken Dam Principal Outlet, view southeast from top of levee

MD-13 – Beardsley Canal at access road and siphon, view east

MD-14 – Beardsley Canal at access road and siphon, view southeast

MD-15 – Beardsley Canal at access road and siphon, view northwest

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MD-18 – Beardsley Canal at access road, view east

MD-19 – McMicken Dam Outlet Channel, view northeast along north bank

MD-20 – McMicken Dam Outlet Channel, view southwest along north bank

MD-21 – McMicken Dam spillway, view north from south end of spillway

MD-22 – McMicken Dam Outlet Channel, view north and west from top of levee

MD-23 – View southeast toward the Loop 303 Freeway construction, from west of Grand Avenue

MD-24 – View southwest toward the Loop 303 Freeway construction, from west of Grand Avenue

MD-25 – View west along north side of Loop 303 construction, from west of Grand Avenue

MD-26 – Loop 303 at Grand Avenue, view southeast from west of Grand Avenue

MD-27 – Area west of Grand Avenue, looking south from south of Loop 303 Freeway

MD-28 – Area west of Grand Avenue, looking north from south of Loop 303 Freeway

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MD-30 – Grand Avenue, view south from north of Sunrise Boulevard

MD-31 – View fence area northwest of Sunrise Boulevard and Grand Avenue, view southeast

MD-32 – View fence northwest of Sunrise Boulevard and Grand Avenue, view northwest

MD-33 – View fence southwest of Sunrise Boulevard and Grand Avenue, view southwest

MD-34 – Grand Avenue south of Sunrise Boulevard, view southeast

MD-35 – Golf course southwest of Sunrise Boulevard and Grand Avenue, view north

MD-36 – Golf course and lake northwest of Sunrise Boulevard and Grand Avenue, view east

MD-37 – Goldwater Ridge Drive and golf course east of Sunrise Boulevard, view northwest

MD-38 – Goldwater Ridge Drive and golf course south of Sunrise Boulevard, view south

MD-39 – Sunrise Boulevard and golf course south of Clearview Boulevard, view northeast

MD-40 – Goldwater Canyon Drive and golf course south of Clearview Boulevard, view west

MD-41 – Goldwater Canyon Drive and golf course south of Clearview Boulevard, view east

MD-42 – Limestone Drive and golf course east of Estrella Vista Drive, view south

MD-43 – Limestone Drive and golf course east of Estrella Vista Drive, view north

MD-44 – Estrella Vista Drive north of Limestone Drive, view west

MD-45 – Goldwater Canyon west of Saddle Ridge Drive, view southwest

MD-46 – Goldwater Canyon west of Saddle Ridge Drive, view north

MD-47 – Clearview Boulevard and golf course east of Sunrise Boulevard, view north

MD-48 – Goldwater Ridge east of Havasupai Drive, view northwest

MD-49 – Sunrise Boulevard north of Bell Road, view southeast

MD-50 – Sunrise Boulevard north of Bell Road, view northeast

MD-51 – Sunrise Boulevard north of Bell Road, view southeast

MD-52 – Sandia Drive between Monte Verde Drive and Escalante Drive, view northwest

MD-53 – Sandia Drive between Monte Verde Drive and Escalante Drive, view northwest

MD-54 – Intersection of Park Drive and Saddle Ridge Drive, view southeast

MD-55 – Saddle Ridge Drive between Red Rock Drive and Casa Bonita Street, view west

MD-56 – Havasupai Drive west of Linksview Drive, view northeast

MD-57 – Havasupai Drive east of Linksview Drive, view southwest

MD-58 – Channel along Reems Road, view north

MD-59 – Dysart Drain at Litchfield Road, view south

MD-60 – Dysart Drain at Litchfield Road, view southwest

MD-61 – North side of Dysart Drain, west of Dysart Road, view east

MD-62 – North side of Dysart Drain, west of Dysart Road, view west

MD-63 – Dysart Drain at Dysart Road, view west

MD-64 – Dysart Drain at Dysart Road, view east

MD-65 – Dysart Drain at El Mirage Road, view west

MD-66 – El Mirage Road at Dysart Drain, view south

MD-67 – North of Dysart Drain at El Mirage Road, view west

MD-68 – El Mirage Road and Glendale Avenue, view northwest

MD-69 – El Mirage Road and Olive Avenue, view northwest

MD-70 – Dysart Road and Olive Avenue, view northwest

McMICKEN DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX D: REACH A HYDRAULICS
McMICKEN DAM SPILLWAY TO LOOP 303 FREEWAY

McMicken Dam
Spillway Delineation Study

Appendix D: Reach A Hydraulics
McMicken Dam Spillway to Loop 303 Freeway

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1 Flow Split North of McMicken Dam

Outlet Channel

Summary Sheet for Flow Split North of McMicken Dam Outlet Channel

Description

The McMicken Dam Outlet Channel conveys flow from the Principal Outlet east under Grand Avenue and the Burlington-Northern Santa Fe Railroad. The outlet channel acts as a levee, creating a barrier to flow which overtops the spillway and flows to the south. The top of the levee varies in elevation along its length, and differing water surface elevations are assumed to occur as flow overtops the levee, particularly for flows of the magnitude of this study.

A HEC-RAS model of the outlet channel was prepared by Dibble & Associates, as part of a previous study. The model prepared by Dibble was extended upstream along the channel, and run for a range of flows to create a rating curve for the channel. A copy of the HEC-RAS output is included following this summary.

A HEC-RAS model prepared for the spillway flow, from the spillway to the McMicken Dam Outlet Channel, was run for flow east of the flow divide (MDA_SE) and for flow west of the flow divide (MDA_SW).

See the included flow diagrams and calculations.

Assumptions

- Flow begins to split at Section 19.67, with water surface elevations across the entire flow assumed to match at Section 19.55.

Method of Analysis

1. The target flow (1/3, 2/3, or Full) was reduced by 5,000 cfs, the capacity of the Principal Outlet.
2. According to the modified/extended outlet channel HEC-RAS model, the outlet channel has 3,000 cfs capacity just downstream of the Principal Outlet, therefore 2,000 cfs was assumed to overtop the McMicken Dam Outlet Channel just downstream of the Principal Outlet.
3. HEC-RAS models MDA_SE and MDA_SW were run for a range of flows. The water surface elevation/flow data from each model was combined to create a rating flow/water surface elevation rating curve for Section 19.55. For each of the target flows (1/3, 2/3, and Full PMF), the corresponding flow in each of the east and west models were interpolated.
4. For the east and the west models, the water surface elevations generated at Section 19.22 by the flow determined in Step 3 were used to determine the amount of flow within the outlet channel. West of the flow split, Section 3684 of the outlet channel HEC-RAS model was used to determine the amount of flow within the channel, which was subtracted from the flow in the west split model. East of the flow split, Section 2684 was used to determine the amount of flow within the channel. The additional capacity in the outlet channel east of the flow split was subtracted from the flow in the east split model.

Method of Analysis (cont'd.)

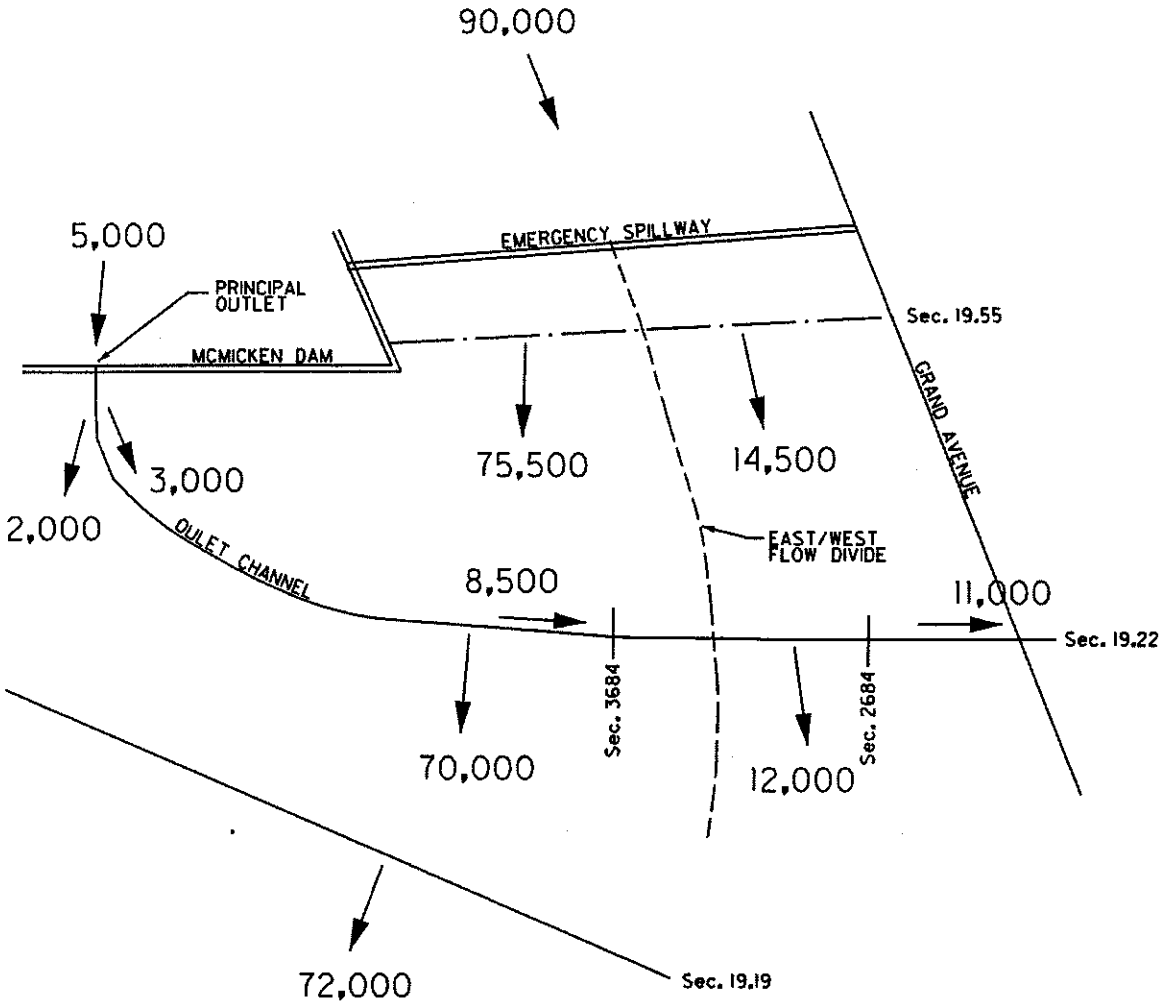
5. The 2,000 cfs overtopping the outlet channel just downstream of the Principal Outlet is re-added to Model MDA1 at Section 19.19.

Results

Below are tables indicating the results of the analysis:

Summary of Flow Split Analysis North of McMicken Dam Outlet Channel

	1/3 Flow	**2/3 Flow**	**Full Flow**
Flow Over West Portion of Levee	21,000	46,000	70,000
Flow Over East Portion of Levee	0	2,000	12,000
Flow in Outlet Channel	7,000	10,000	11,000
Flow South from Principal Outlet, overtopping Levee	2,000	2,000	2,000
Total	**30,000**	**60,000**	**95,000**



FLOW SPLIT ANALYSIS
McMICKEN DAM OUTLET CHANNEL
FULL PMF=95,000 cfs

Flow Split North of McMicken Dam Outlet Channel
Analysis for Full PMF

Full PMF = 95,000 cfs

1. Principal Outlet Flow = 5,000 cfs
   From outlet channel extended rating curve model (channel.prj),
   capacity of channel just downstream of outlet = 3,000 cfs
   Therefore, overflow just downstream of outlet = 2,000 cfs

2A. Spillway = 90,000 cfs
   From combined rating curve of west and east split flow models (MDA_SW.prj and MDA_SE.prj),
   the flow split at Section 19.55: East = 14,500 cfs
   West = 75,500 cfs
   WS Elev = 1346.67

B. Model MDA_SW.prj, Section 19.22: 75,500 cfs ---> 1339.63 WS Elev.

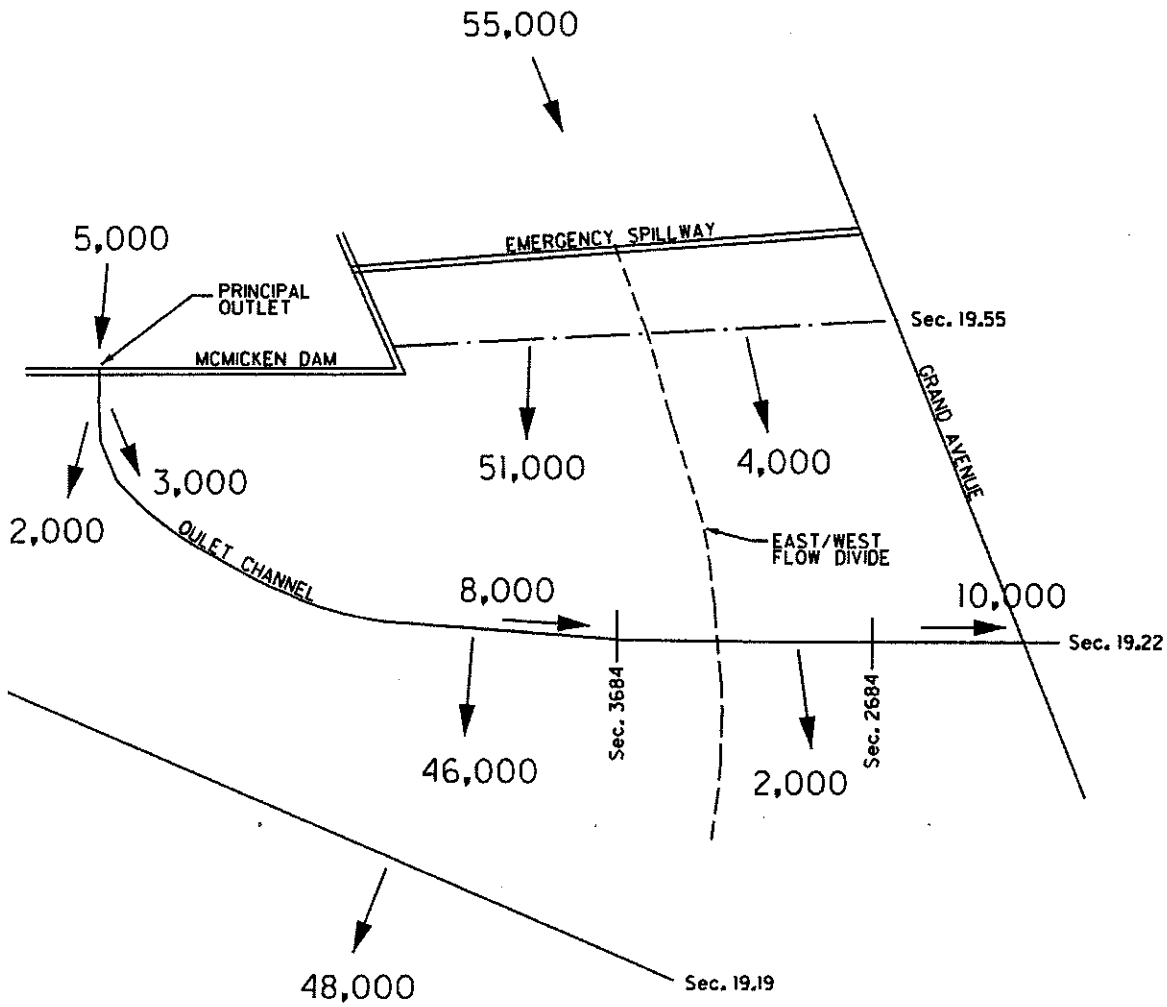
   Flow in outlet channel from west to east split sections,
   Model channel.prj, Section 3684: 1339.63 WS Elev ----> 8,500 cfs

   Flow over west levee = 75,500 - (8,500 - 3,000) = 70,000 cfs ---> 1339.51 WS Elev

C. Model MDA_SE.prj, Section 19.22: 14,500 cfs ---> 1341.28 WS Elev.

   Flow in outlet channel at existing Grand Avenue bridge,
   Model channel.prj, Section 2684: 1341.28 WS Elev ----> 11,000 cfs

   Flow over east levee = 14,500 - (11,000 - 8,500) = 12,000 cfs ---> 1341.09 WS Elev



FLOW SPLIT ANALYSIS
McMICKEN DAM OUTLET CHANNEL
2/3 PMF=60,000 cfs

Flow Split North of McMicken Dam Outlet Channel
Analysis for 2/3 PMF

2/3 PMF = 60,000 cfs

1. Principal Outlet = 5,000 cfs
   From outlet channel extended rating curve model (channel.prj),
   capacity of channel just downstream of outlet = 3,000 cfs
   Therefore, overflow just downstream of outlet = 2,000 cfs

2A. Spillway = 55,000 cfs
   From combined rating curve of west and east split flow models (MDA_SW.prj and MDA_SE.prj),
   the flow split at Section 19.55: East = 4,000 cfs
   West = 51,000 cfs
   WS Elev = 1345.20

B. Model MDA_SW.prj, Section 19.22: 51,000 cfs ---> 1339.08 WS Elev.

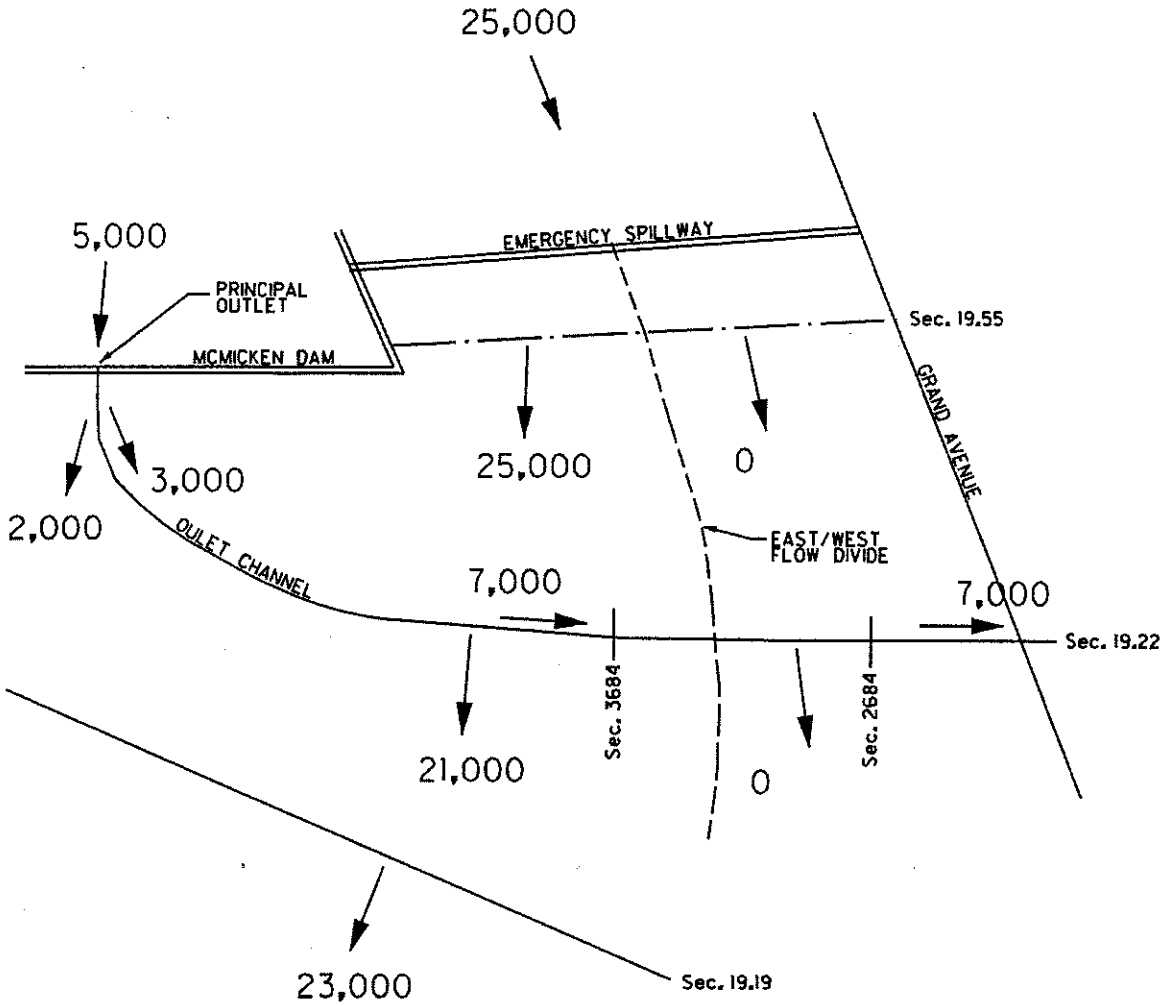
   Flow in outlet channel from west to east split sections,
   Model channel.prj, Section 3684: 1339.08 WS Elev ----> 8,000 cfs

   Flow over west levee = 51,000 - (8,000-3,000) = 46,000 cfs ---> 1338.95 WS Elev

C. Model MDA_SE.prj, Section 19.22: 4,000 cfs ---> 1340.35 WS Elev.

   Flow in outlet at existing Grand Avenue bridge,
   Model channel.prj, Section 2684: 1340.35 WS Elev ----> 10,000 cfs

   Flow over east levee = 4,000 - (10,000 - 8,000) = 2,000 cfs ---> 1340.1 WS Elev



FLOW SPLIT ANALYSIS
McMICKEN DAM OUTLET CHANNEL
1/3 PMF=30,000 cfs

Flow Split North of McMicken Dam Outlet Channel
Analysis for 1/3 PMF

1/3 PMF = 30,000 cfs

1. Principal Outlet = 5,000 cfs
   From outlet channel extended rating curve model (channel.prj),
   capacity of channel just downstream of outlet = 3,000 cfs
   Therefore, overflow just downstream of outlet = 2,000 cfs

2A. Spillway = 25,000 cfs
   From combined rating curve of west and east split flow models (MDA_SW.prj and MDA_SE.prj),
   the flow split at Section 19.55: East = - cfs
   West = 25,000 cfs
   WS Elev = 1342.95

B. Model MDA_SW.prj, Section 19.22: 25,000 cfs ---> 1338.38 WS Elev.

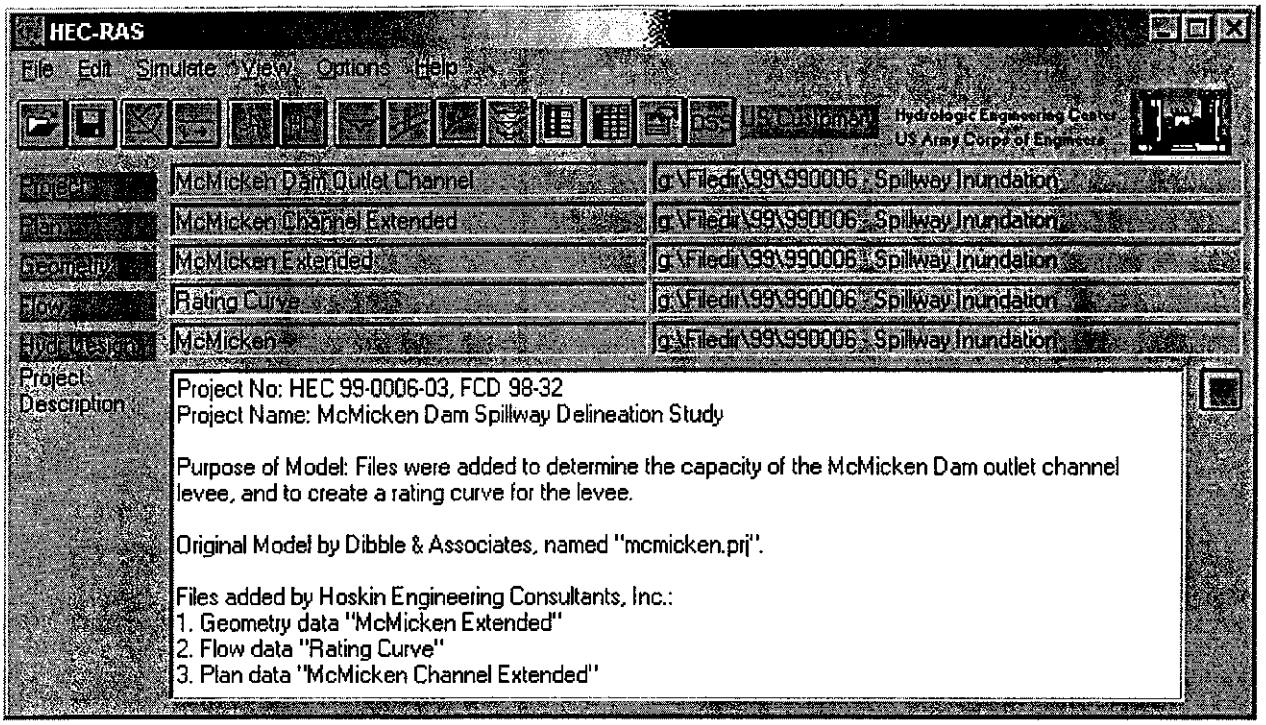
   Flow in outlet channel from west to east split sections,
   Model channel.prj, Section 3684: 1338.38 WS Elev ----> 7,000 cfs

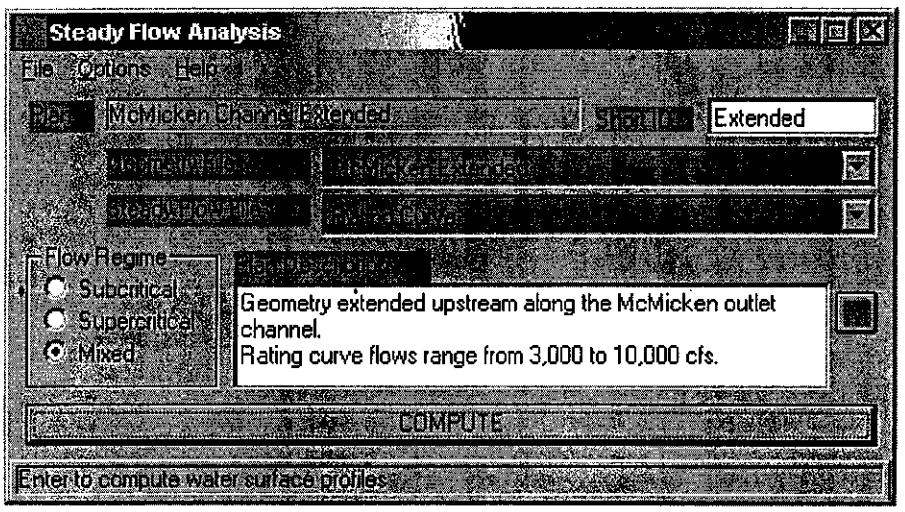
   Flow over west levee = 25,000 - (7,000-3,000) = 21,000 cfs ---> 1338.25 WS Elev

C. Model MDA_SE.prj, Section 19.22: Minimum elevation of lev 1338.00

   Capacity of outlet channel at Grand Ave. bridge = 8,000 cfs > 7,000 cfs Flow in outlet channel

OUTLET CHANNEL HEC-RAS:





HEC-RAS Plan: Extended River: MC MICKEN Reach: MAIN

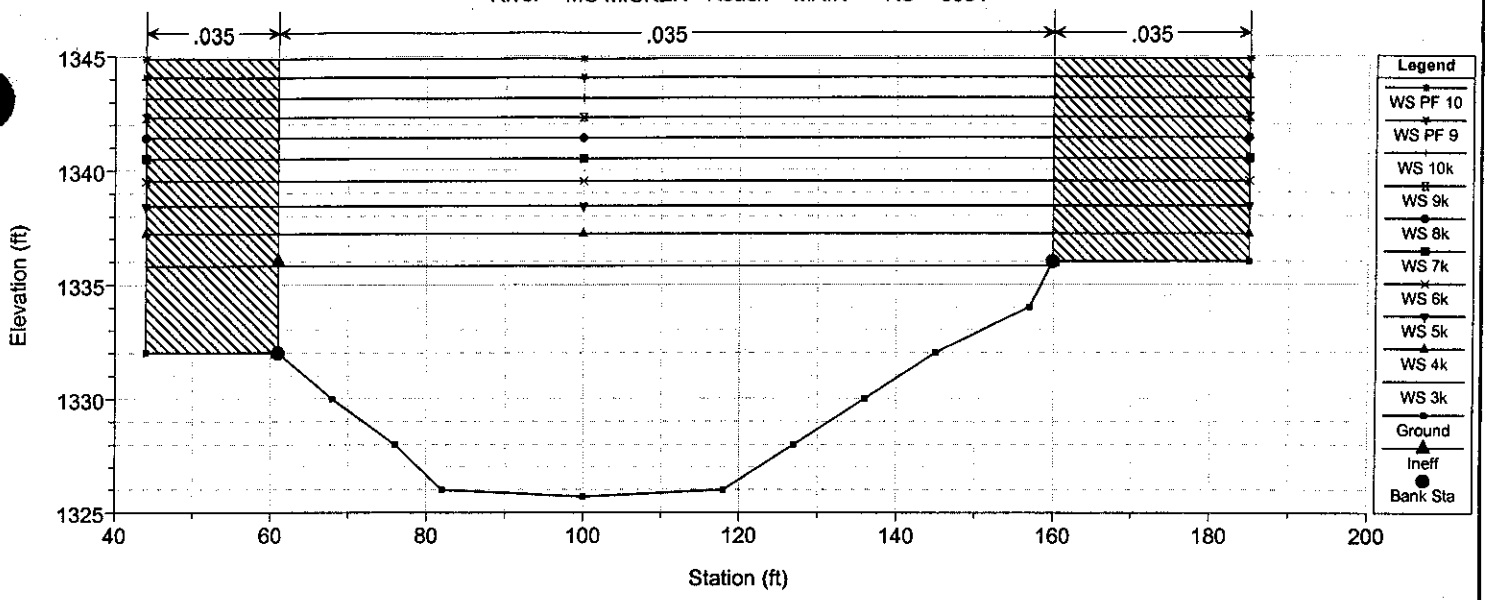
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	6684	3000.00	1325.70	1335.81		1336.08	0.000702	4.17	719.76	115.72	0.27
MAIN	6684	4000.00	1325.70	1337.22		1337.55	0.000696	4.66	858.92	141.00	0.28
MAIN	6684	5000.00	1325.70	1338.44		1338.84	0.000701	5.10	979.79	141.00	0.29
MAIN	6684	6000.00	1325.70	1339.52		1339.99	0.000716	5.52	1086.35	141.00	0.29
MAIN	6684	7000.00	1325.70	1340.50		1341.04	0.000731	5.91	1184.02	141.00	0.30
MAIN	6684	8000.00	1325.70	1341.41		1342.02	0.000748	6.28	1274.19	141.00	0.31
MAIN	6684	9000.00	1325.70	1342.30		1342.97	0.000758	6.61	1361.65	141.00	0.31
MAIN	6684	10000.00	1325.70	1343.14		1343.88	0.000768	6.92	1445.03	141.00	0.32
MAIN	6684	11000.00	1325.70	1344.04		1344.84	0.000761	7.17	1534.33	141.00	0.32
MAIN	6684	12000.00	1325.70	1344.87		1345.73	0.000760	7.42	1616.88	141.00	0.32
MAIN	5684	3000.00	1325.00	1335.11		1335.39	0.000692	4.18	717.52	102.34	0.27
MAIN	5684	4000.00	1325.00	1336.52		1336.85	0.000707	4.67	856.45	123.00	0.28
MAIN	5684	5000.00	1325.00	1337.73		1338.14	0.000710	5.11	978.19	123.00	0.29
MAIN	5684	6000.00	1325.00	1338.79		1339.27	0.000725	5.53	1084.31	123.00	0.30
MAIN	5684	7000.00	1325.00	1339.76		1340.31	0.000742	5.93	1181.31	123.00	0.30
MAIN	5684	8000.00	1325.00	1340.66		1341.27	0.000760	6.30	1270.59	123.00	0.31
MAIN	5684	9000.00	1325.00	1341.53		1342.21	0.000771	6.63	1357.81	123.00	0.32
MAIN	5684	10000.00	1325.00	1342.36		1343.11	0.000780	6.94	1441.07	123.00	0.32
MAIN	5684	11000.00	1325.00	1343.27		1344.07	0.000770	7.18	1532.30	123.00	0.32
MAIN	5684	12000.00	1325.00	1344.11		1344.97	0.000767	7.43	1615.91	123.00	0.33
MAIN	4684	3000.00	1324.00	1334.59		1334.79	0.000484	3.53	850.47	131.49	0.23
MAIN	4684	4000.00	1324.00	1335.99		1336.23	0.000505	3.96	1011.12	134.97	0.24
MAIN	4684	5000.00	1324.00	1337.22		1337.51	0.000507	4.33	1154.87	140.00	0.24
MAIN	4684	6000.00	1324.00	1338.28		1338.62	0.000519	4.69	1278.95	140.00	0.25
MAIN	4684	7000.00	1324.00	1339.25		1339.64	0.000532	5.03	1392.26	140.00	0.26
MAIN	4684	8000.00	1324.00	1340.14		1340.58	0.000547	5.35	1496.38	140.00	0.26
MAIN	4684	9000.00	1324.00	1341.01		1341.50	0.000555	5.63	1598.84	140.00	0.27
MAIN	4684	10000.00	1324.00	1341.85		1342.39	0.000562	5.89	1696.79	140.00	0.27
MAIN	4684	11000.00	1324.00	1342.78		1343.36	0.000552	6.09	1806.02	140.00	0.27
MAIN	4684	12000.00	1324.00	1343.63		1344.25	0.000550	6.30	1905.50	140.00	0.28
MAIN	3684	3000.00	1324.00	1333.75		1334.08	0.001089	4.60	652.88	107.20	0.33
MAIN	3684	4000.00	1324.00	1335.14		1335.52	0.001025	4.96	806.96	116.85	0.33
MAIN	3684	5000.00	1324.00	1336.39		1336.82	0.000957	5.27	949.23	132.00	0.32
MAIN	3684	6000.00	1324.00	1337.44		1337.93	0.000923	5.61	1070.43	132.00	0.32
MAIN	3684	7000.00	1324.00	1338.39		1338.94	0.000908	5.93	1180.24	132.00	0.33
MAIN	3684	8000.00	1324.00	1339.27		1339.87	0.000903	6.25	1280.46	132.00	0.33
MAIN	3684	9000.00	1324.00	1340.13		1340.79	0.000892	6.53	1379.27	132.00	0.33
MAIN	3684	10000.00	1324.00	1340.97		1341.69	0.000877	6.77	1476.99	132.00	0.33
MAIN	3684	11000.00	1324.00	1341.92		1342.67	0.000837	6.94	1585.91	132.00	0.33
MAIN	3684	12000.00	1324.00	1342.78		1343.57	0.000814	7.12	1684.72	132.00	0.33
MAIN	2684	3000.00	1323.29	1332.71		1333.04	0.000989	4.66	643.23	95.57	0.32
MAIN	2684	4000.00	1323.29	1334.08		1334.49	0.001057	5.12	781.36	106.08	0.33
MAIN	2684	5000.00	1323.29	1335.32		1335.78	0.001141	5.42	922.19	161.31	0.35
MAIN	2684	6000.00	1323.29	1336.43		1336.93	0.001088	5.65	1061.09	166.52	0.34
MAIN	2684	7000.00	1323.29	1337.42		1337.96	0.001057	5.89	1188.69	180.71	0.34
MAIN	2684	8000.00	1323.29	1338.31		1338.90	0.001042	6.12	1307.14	197.43	0.35
MAIN	2684	9000.00	1323.29	1339.22		1339.84	0.000983	6.30	1429.60	200.00	0.34
MAIN	2684	10000.00	1323.29	1340.12		1340.77	0.000925	6.45	1551.10	200.00	0.34
MAIN	2684	11000.00	1323.29	1341.14		1341.80	0.000842	6.51	1689.32	200.00	0.32
MAIN	2684	12000.00	1323.29	1342.05		1342.73	0.000793	6.62	1811.90	200.00	0.32
MAIN	2484	3000.00	1323.21	1332.49		1332.84	0.000993	4.71	636.39	93.11	0.32
MAIN	2484	4000.00	1323.21	1333.85		1334.27	0.001046	5.22	766.95	99.96	0.33
MAIN	2484	5000.00	1323.21	1335.07		1335.55	0.001108	5.59	894.81	109.77	0.34
MAIN	2484	6000.00	1323.21	1336.17		1336.70	0.001139	5.88	1020.41	141.85	0.35
MAIN	2484	7000.00	1323.21	1337.14		1337.73	0.001189	6.14	1139.53	175.52	0.36
MAIN	2484	8000.00	1323.21	1338.03		1338.66	0.001171	6.37	1256.10	189.26	0.36
MAIN	2484	9000.00	1323.21	1338.96		1339.62	0.001105	6.53	1379.16	199.50	0.36
MAIN	2484	10000.00	1323.21	1339.87		1340.56	0.001027	6.66	1501.82	199.50	0.35
MAIN	2484	11000.00	1323.21	1340.92		1341.62	0.000922	6.70	1642.01	199.50	0.34
MAIN	2484	12000.00	1323.21	1341.84		1342.56	0.000863	6.80	1765.22	199.50	0.33
MAIN	2284	3000.00	1323.33	1332.26		1332.62	0.001110	4.86	617.24	93.96	0.33

HEC-RAS Plan: Extended River: MC MICKEN Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	2284	4000.00	1323.33	1333.61		1334.05	0.001135	5.35	748.08	100.02	0.34
MAIN	2284	5000.00	1323.33	1334.81		1335.32	0.001158	5.73	872.29	106.42	0.35
IN	2284	6000.00	1323.33	1335.90		1336.47	0.001189	6.05	991.94	113.85	0.36
MAIN	2284	7000.00	1323.33	1336.86		1337.48	0.001225	6.34	1104.42	154.64	0.37
MAIN	2284	8000.00	1323.33	1337.74		1338.42	0.001257	6.59	1214.39	193.65	0.38
MAIN	2284	9000.00	1323.33	1338.68		1339.39	0.001167	6.74	1334.56	198.49	0.37
MAIN	2284	10000.00	1323.33	1339.61		1340.34	0.001082	6.88	1454.04	198.49	0.36
MAIN	2284	11000.00	1323.33	1340.68		1341.42	0.000970	6.91	1591.23	198.49	0.35
MAIN	2284	12000.00	1323.33	1341.61		1342.37	0.000907	7.01	1710.66	198.49	0.34
MAIN	2267.7	3000.00	1323.05	1332.25	1328.07	1332.60	0.001065	4.79	626.06	94.39	0.33
MAIN	2267.7	4000.00	1323.05	1333.60	1328.93	1334.03	0.001097	5.28	757.67	100.63	0.34
MAIN	2267.7	5000.00	1323.05	1334.80	1329.68	1335.30	0.001117	5.67	882.49	106.67	0.35
MAIN	2267.7	6000.00	1323.05	1335.89	1330.36	1336.44	0.001154	5.99	1002.29	114.29	0.36
MAIN	2267.7	7000.00	1323.05	1336.85	1331.00	1337.46	0.001169	6.28	1114.95	143.51	0.36
MAIN	2267.7	8000.00	1323.05	1337.73	1331.60	1338.40	0.001146	6.55	1221.40	191.87	0.36
MAIN	2267.7	9000.00	1323.05	1338.66	1332.16	1339.37	0.001081	6.75	1333.86	198.64	0.36
MAIN	2267.7	10000.00	1323.05	1339.58	1332.70	1340.33	0.001021	6.92	1445.64	198.64	0.35
MAIN	2267.7	11000.00	1323.05	1340.65	1333.21	1341.40	0.000930	6.99	1574.19	198.64	0.34
MAIN	2267.7	12000.00	1323.05	1341.57	1333.68	1342.36	0.000880	7.12	1686.03	198.64	0.34
MAIN	2238	Bridge									
MAIN	2210.6	3000.00	1322.06	1332.16		1332.46	0.000828	4.42	679.14	95.29	0.29
MAIN	2210.6	4000.00	1322.06	1333.51		1333.88	0.000892	4.93	811.13	101.69	0.31
MAIN	2210.6	5000.00	1322.06	1334.70		1335.14	0.000934	5.34	936.17	107.60	0.32
MAIN	2210.6	6000.00	1322.06	1335.77		1336.28	0.000968	5.69	1054.71	113.09	0.33
MAIN	2210.6	7000.00	1322.06	1336.72		1337.28	0.001009	6.01	1164.77	128.11	0.34
MAIN	2210.6	8000.00	1322.06	1337.60		1338.21	0.001013	6.30	1270.10	173.10	0.34
MAIN	2210.6	9000.00	1322.06	1338.53		1339.19	0.000967	6.51	1382.42	199.19	0.34
MAIN	2210.6	10000.00	1322.06	1339.45		1340.15	0.000921	6.69	1494.10	199.19	0.34
IN	2210.6	11000.00	1322.06	1340.39		1341.12	0.000872	6.84	1608.23	199.19	0.33
AIN	2210.6	12000.00	1322.06	1341.20		1341.97	0.000853	7.03	1705.83	199.19	0.33

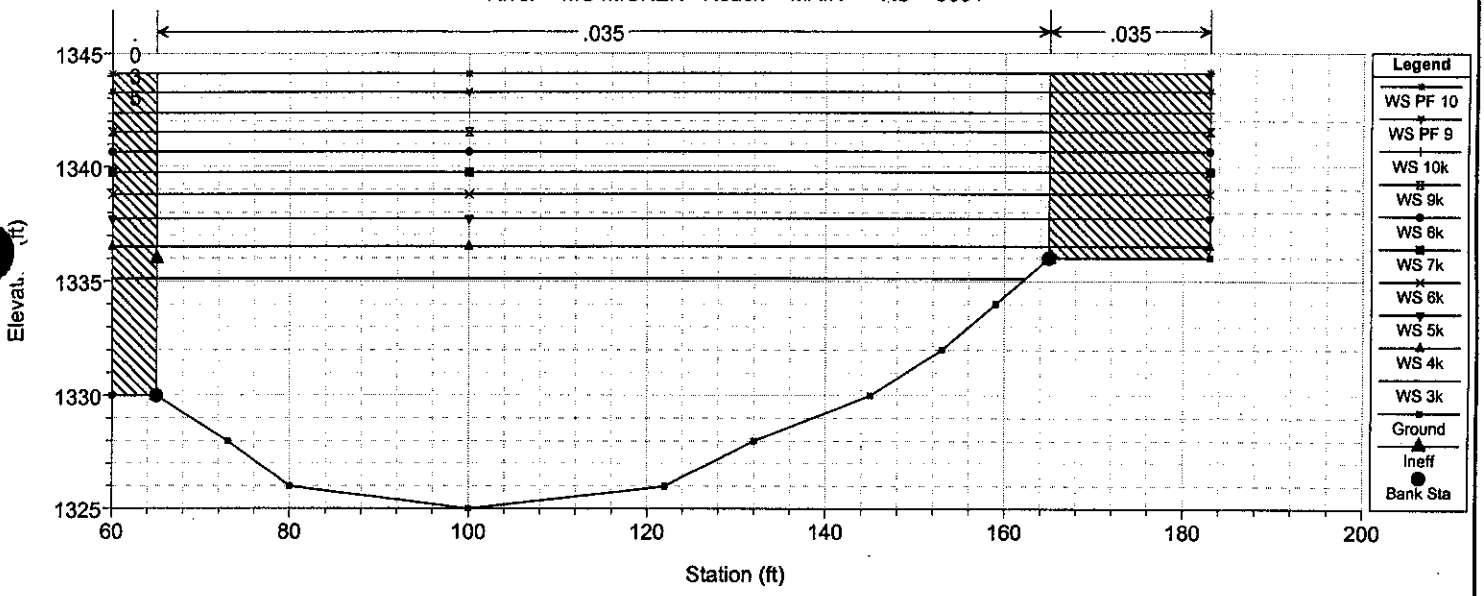
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 6684



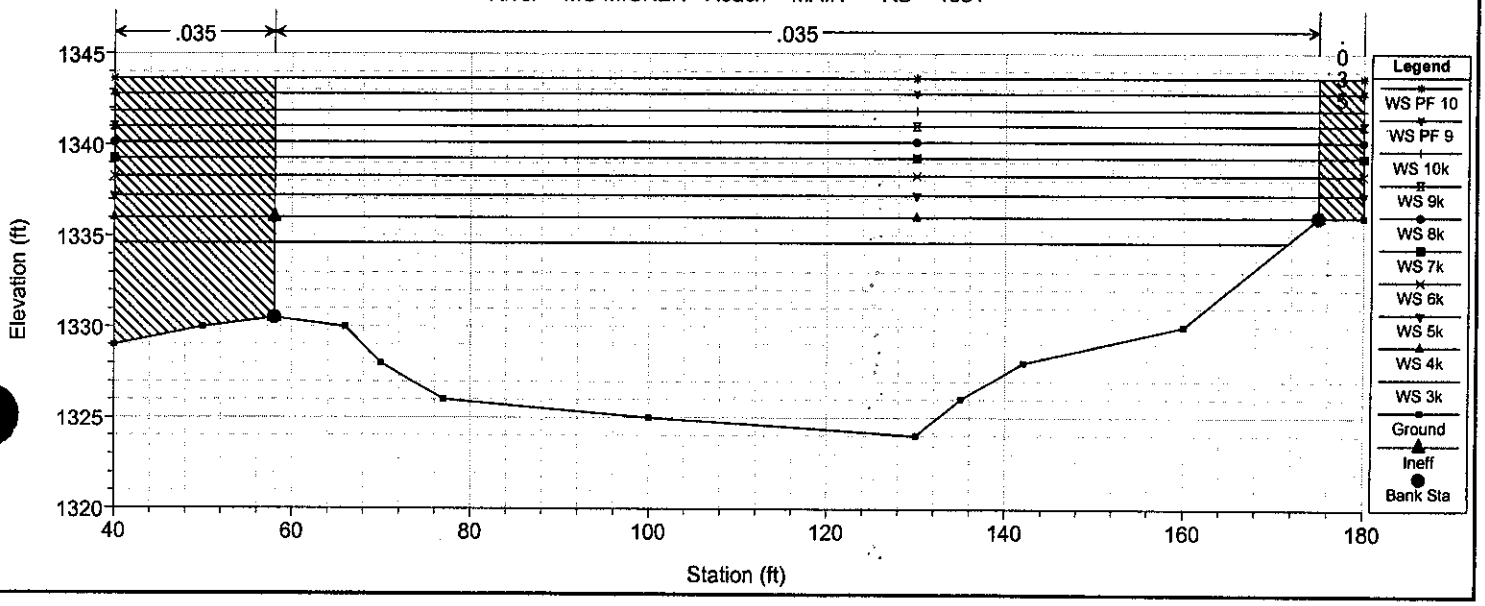
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 5684



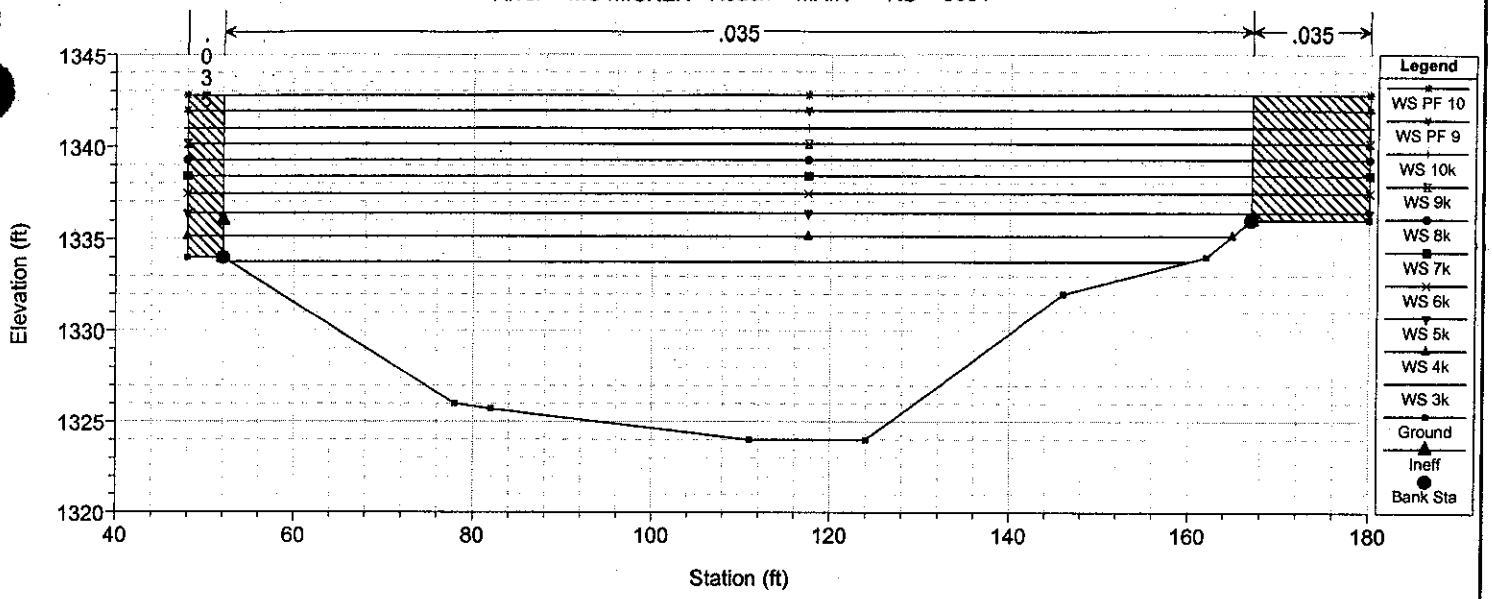
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 4684



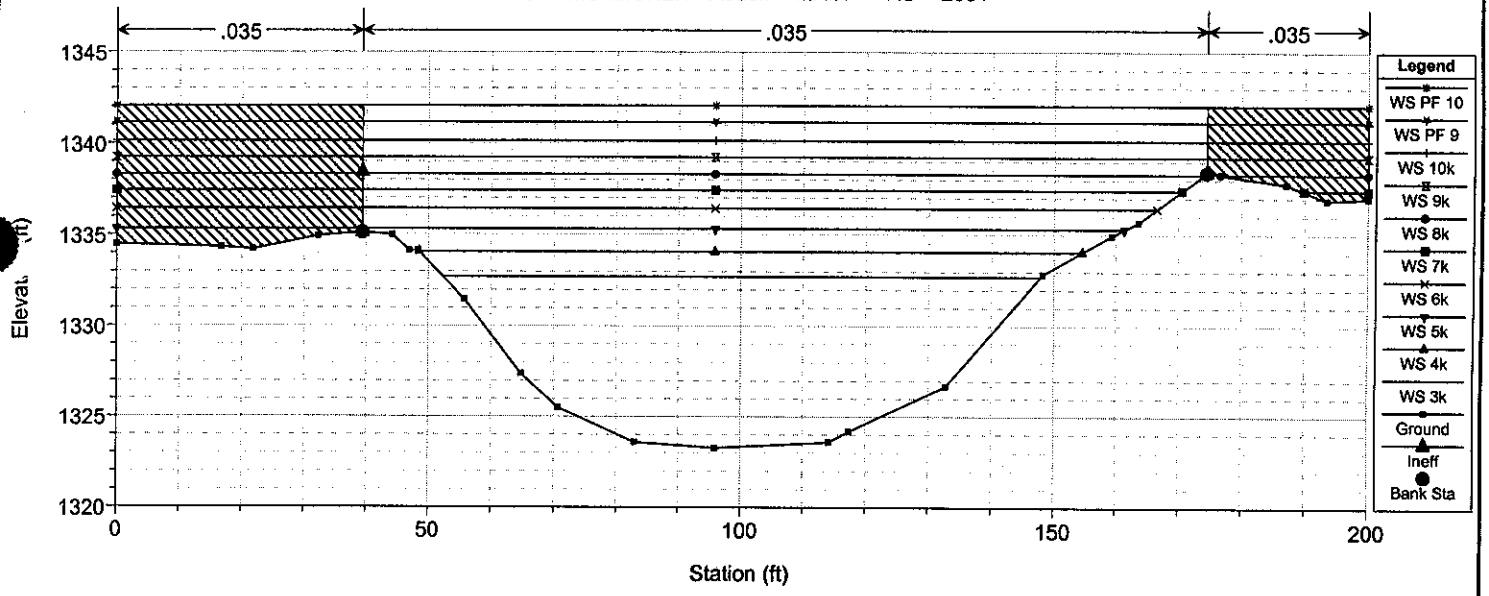
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 3684



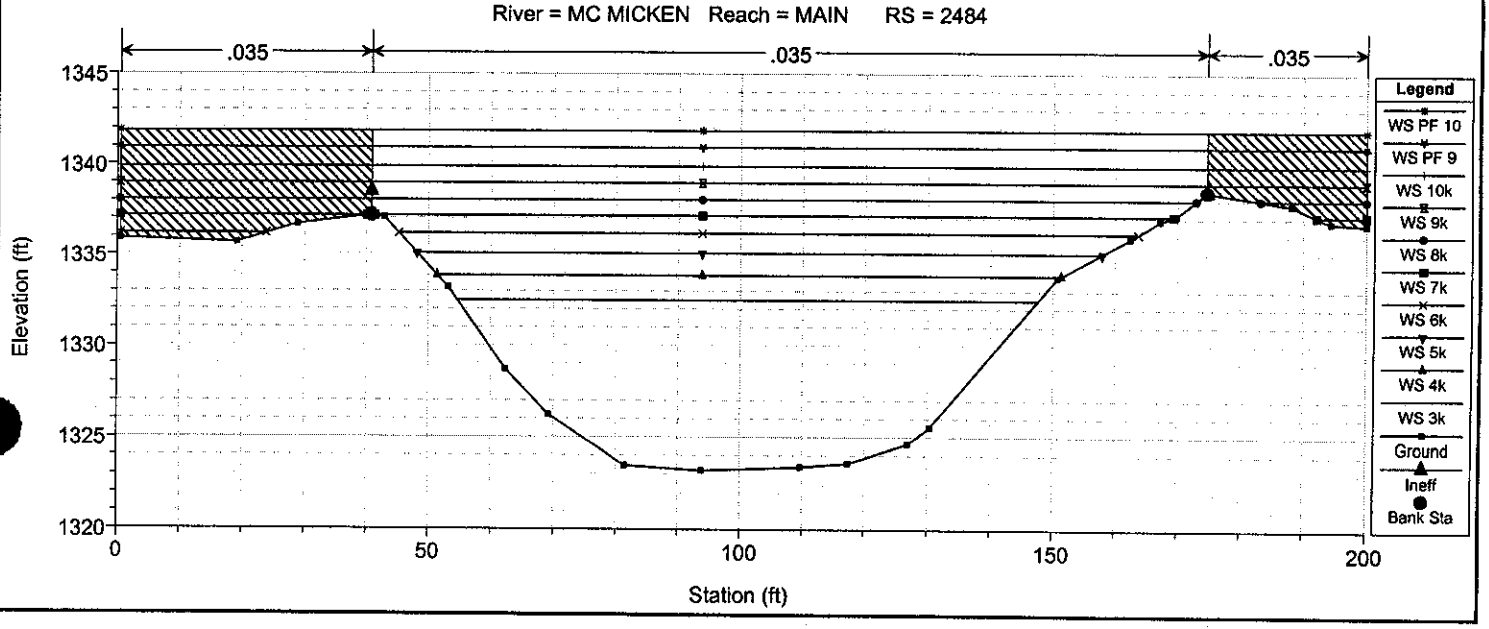
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2684



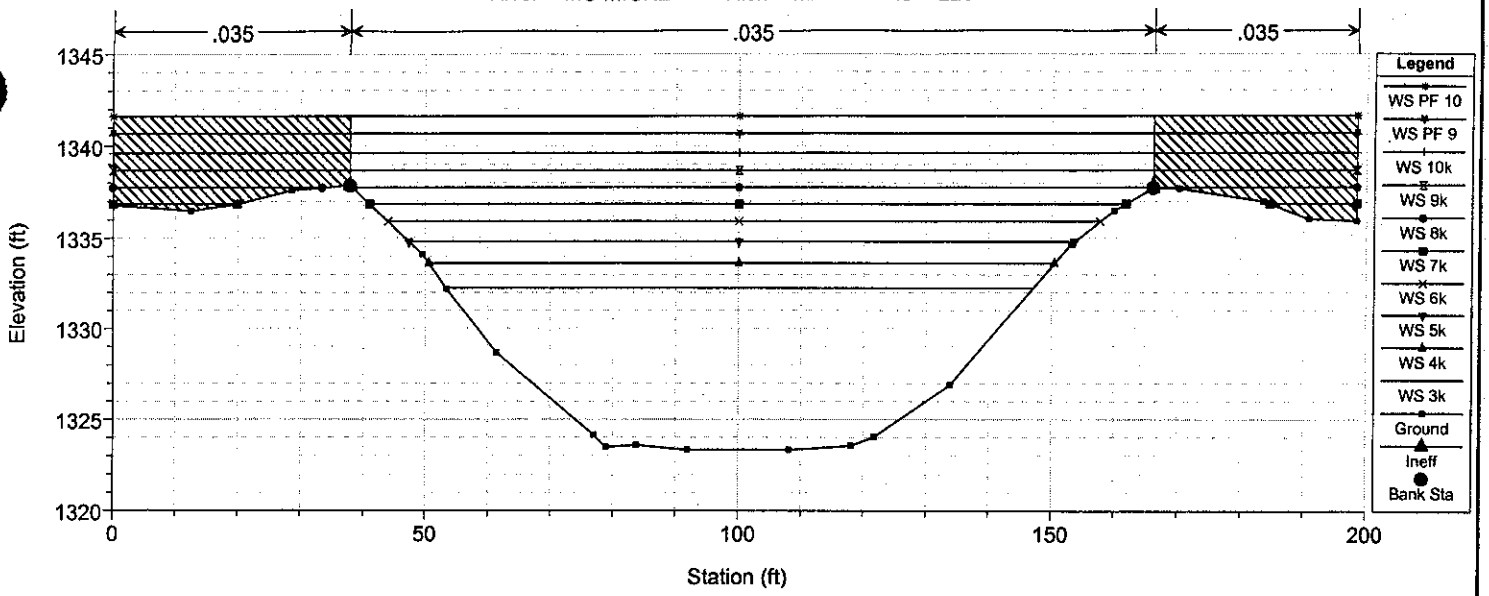
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2484



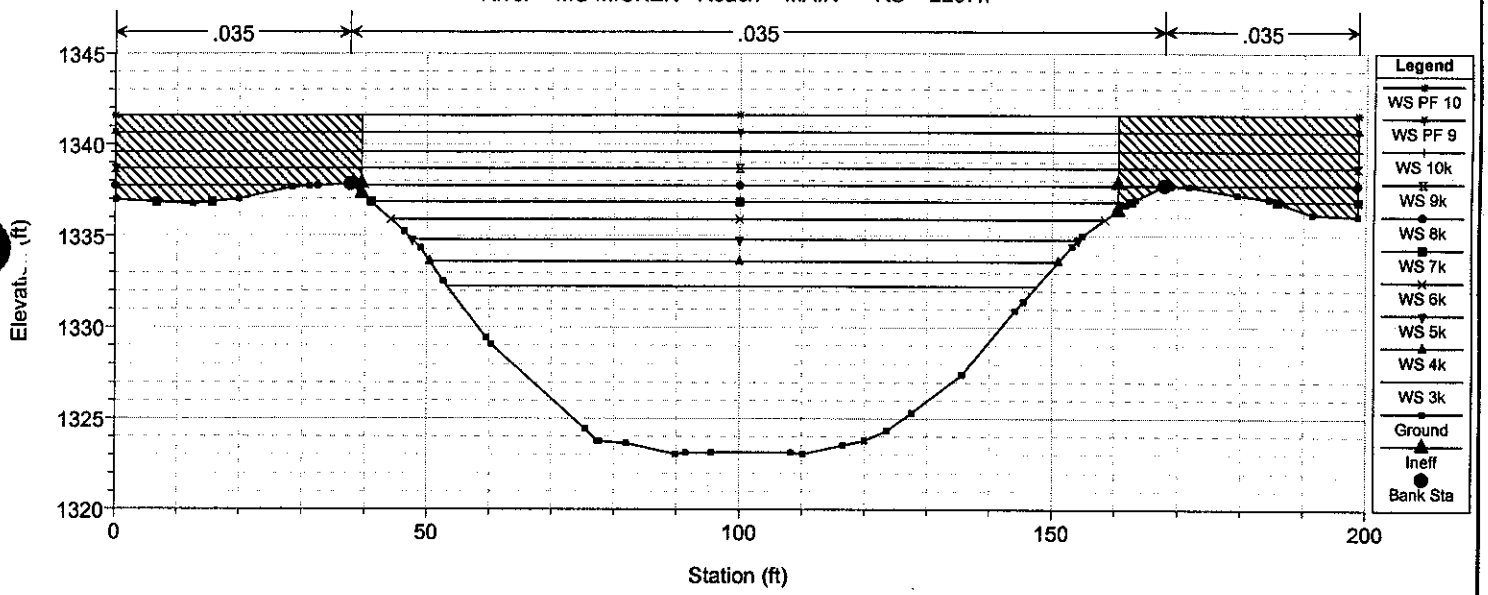
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2284



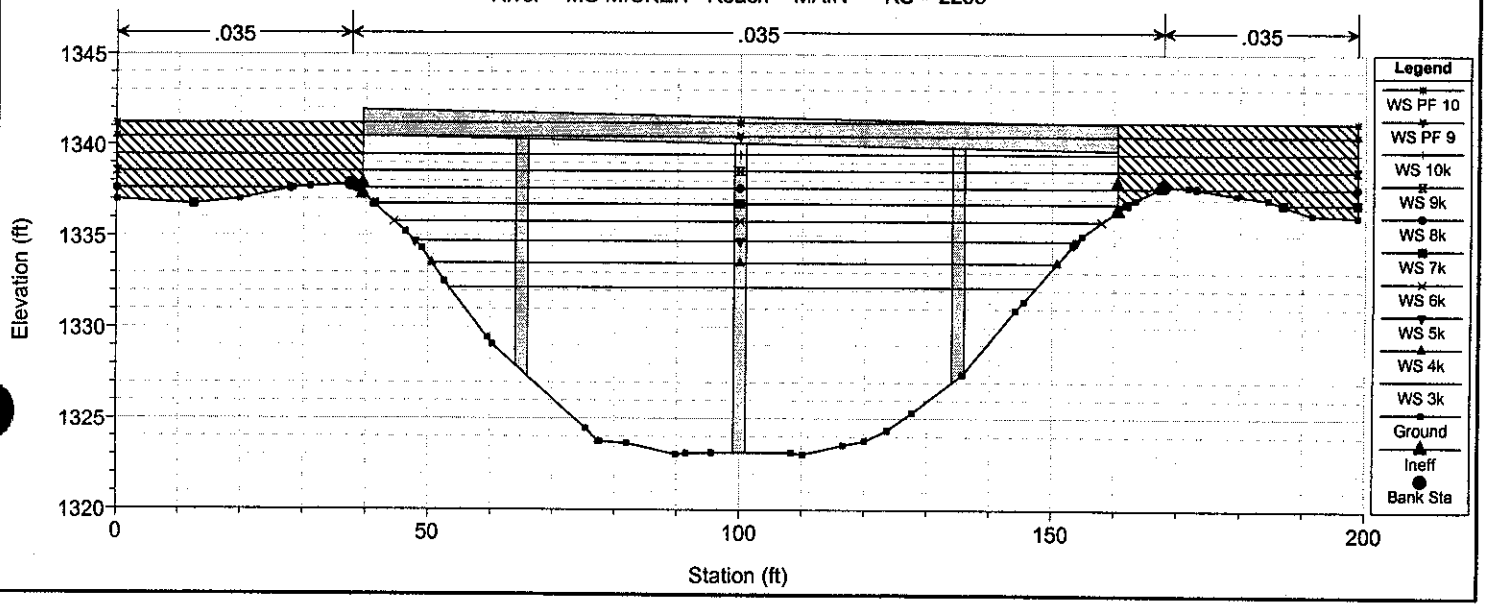
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2267.7



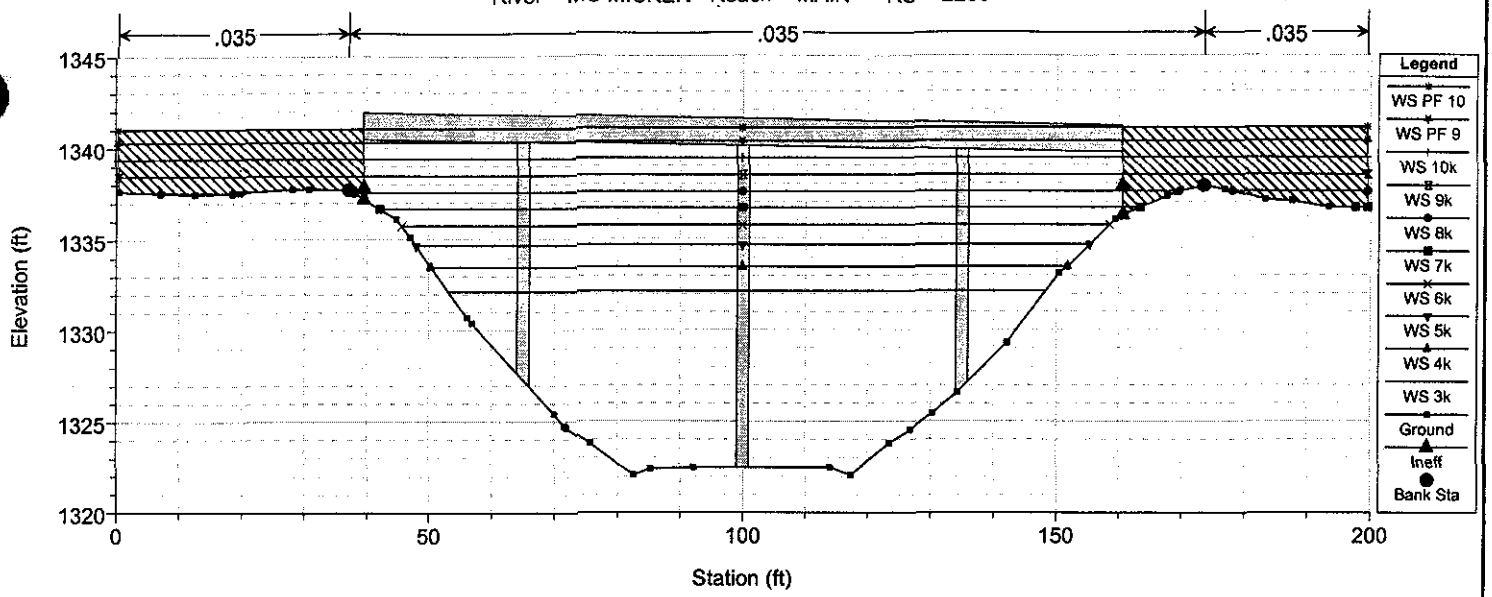
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2238



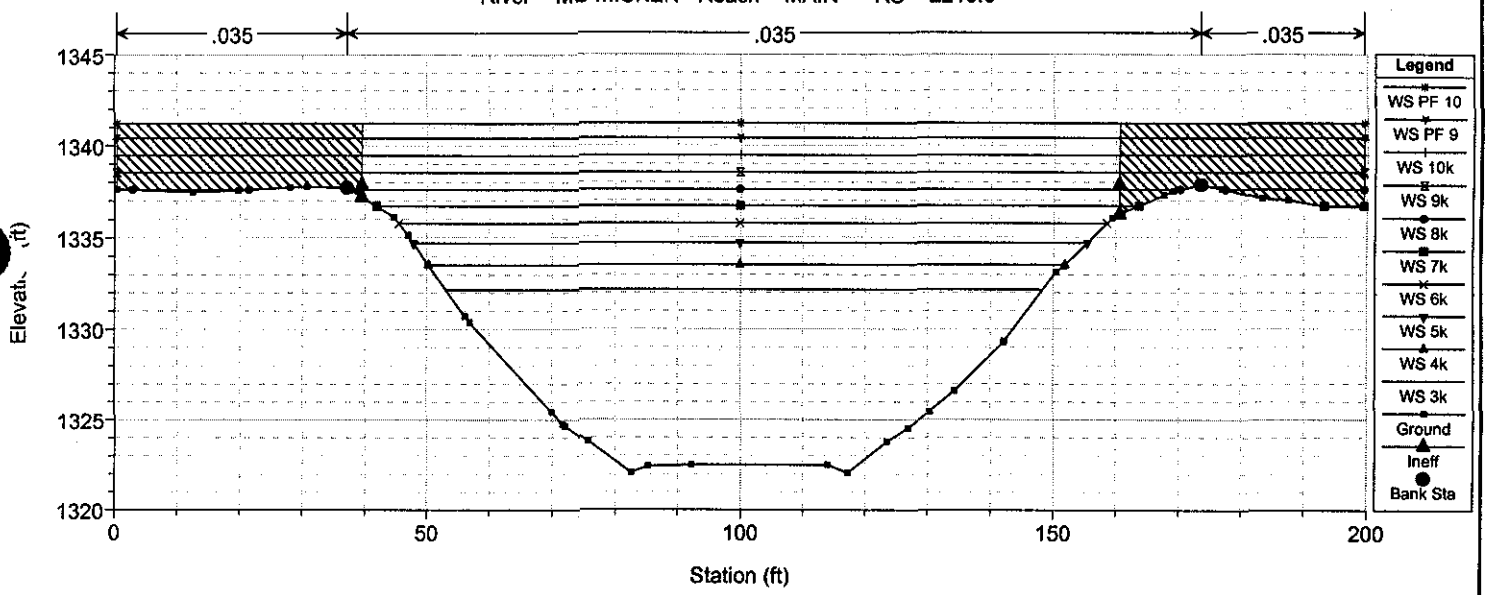
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2238



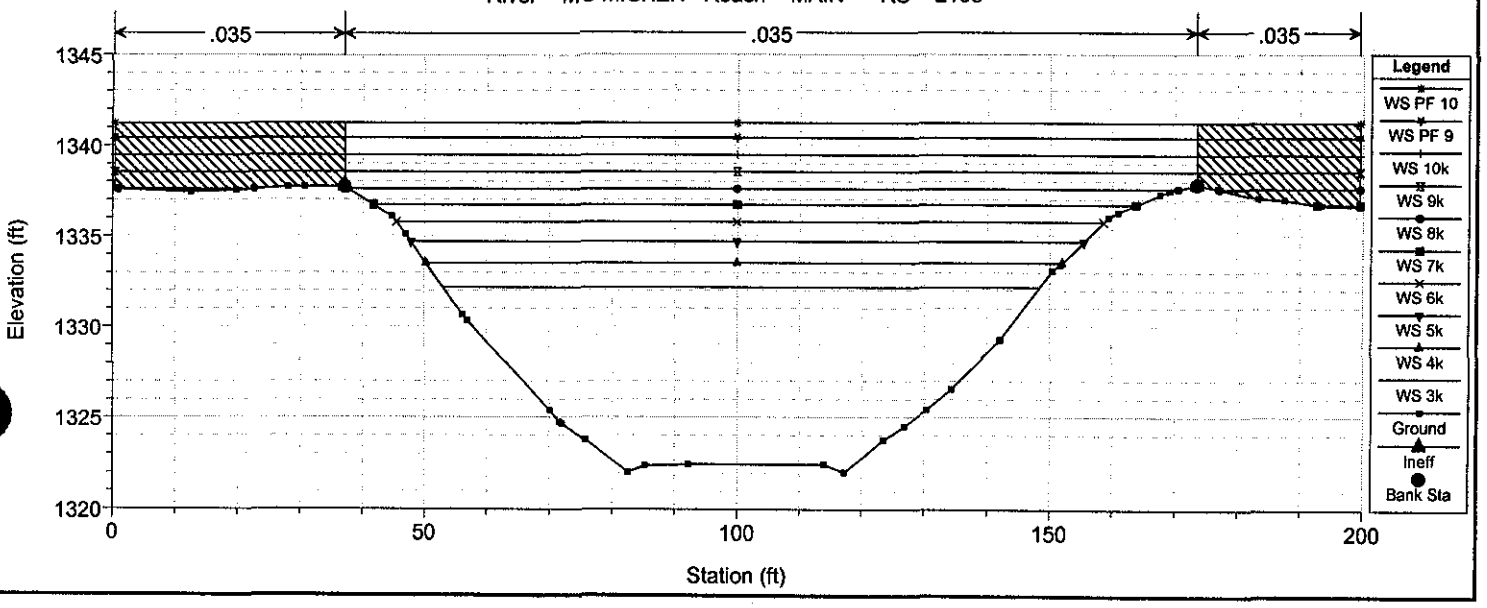
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2210.6



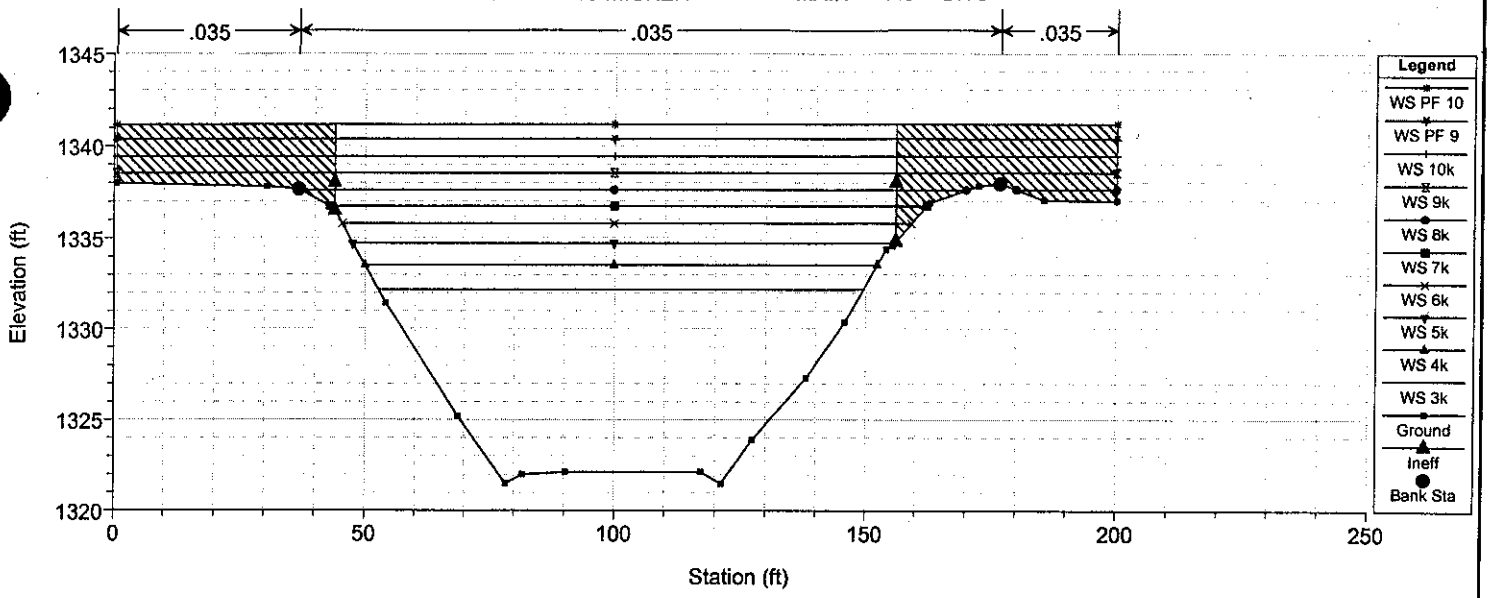
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2195



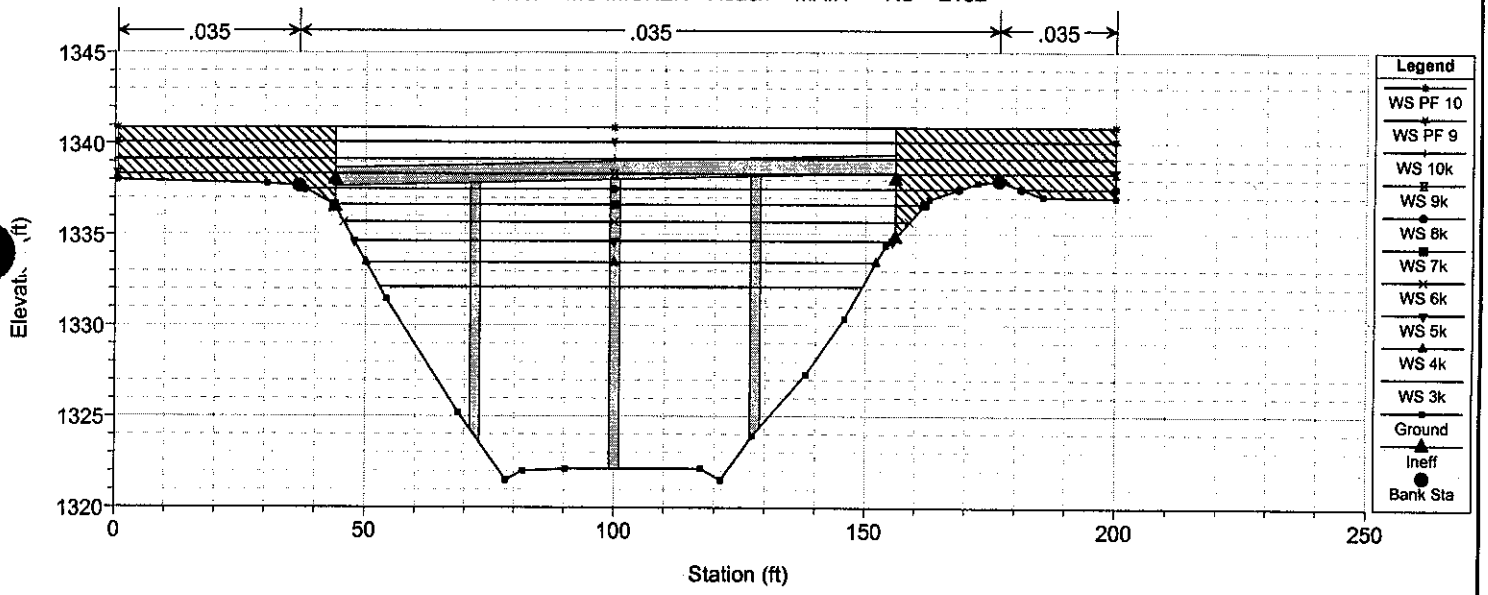
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 2178



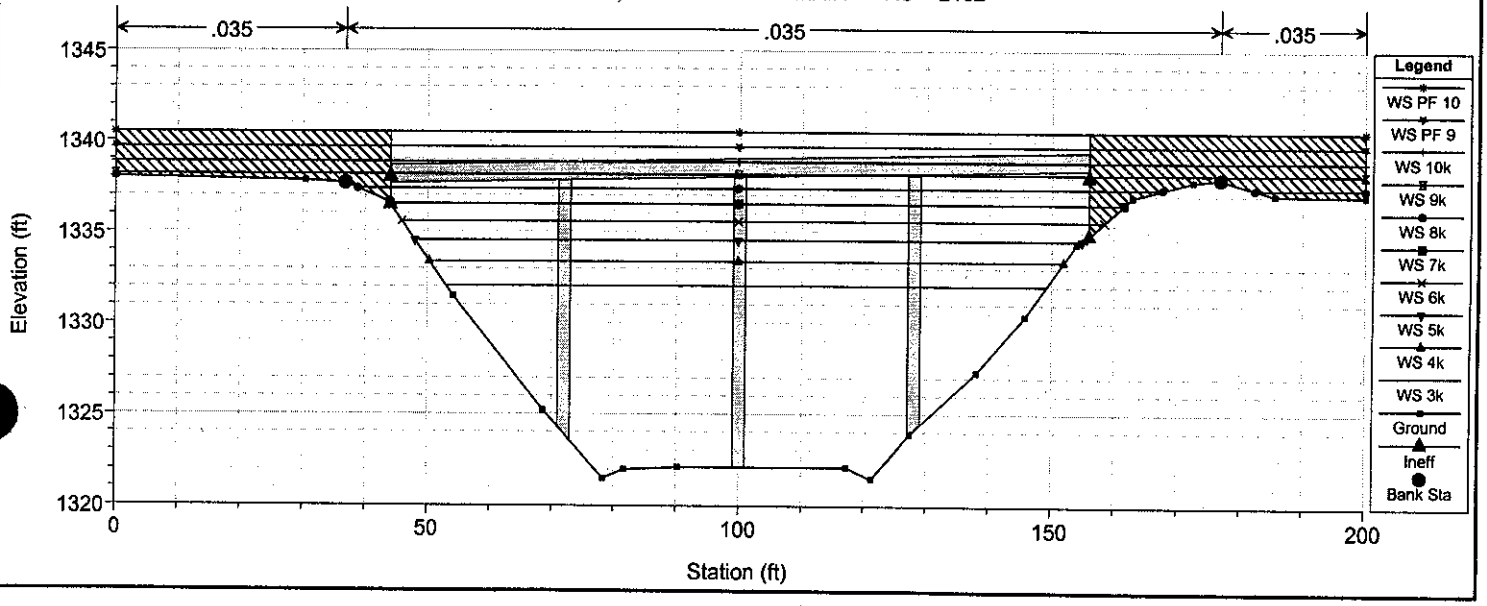
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

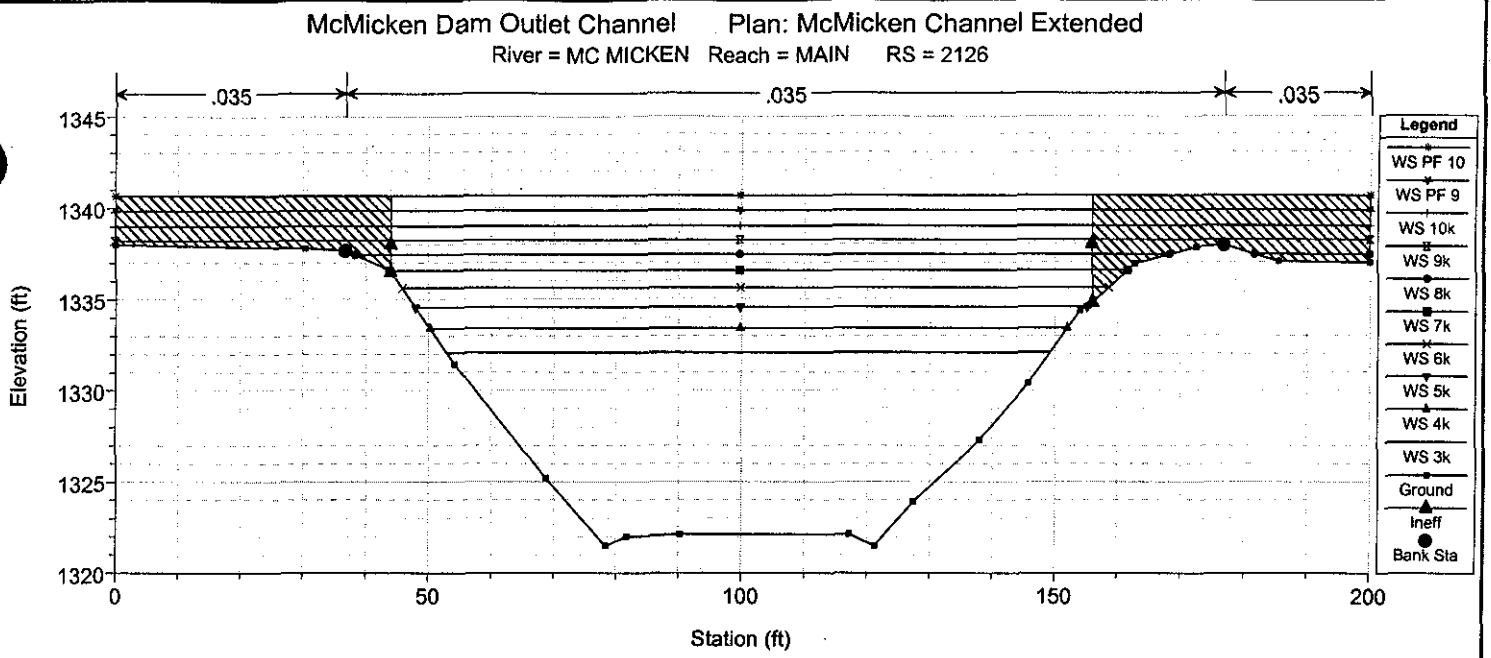
River = MC MICKEN Reach = MAIN RS = 2152

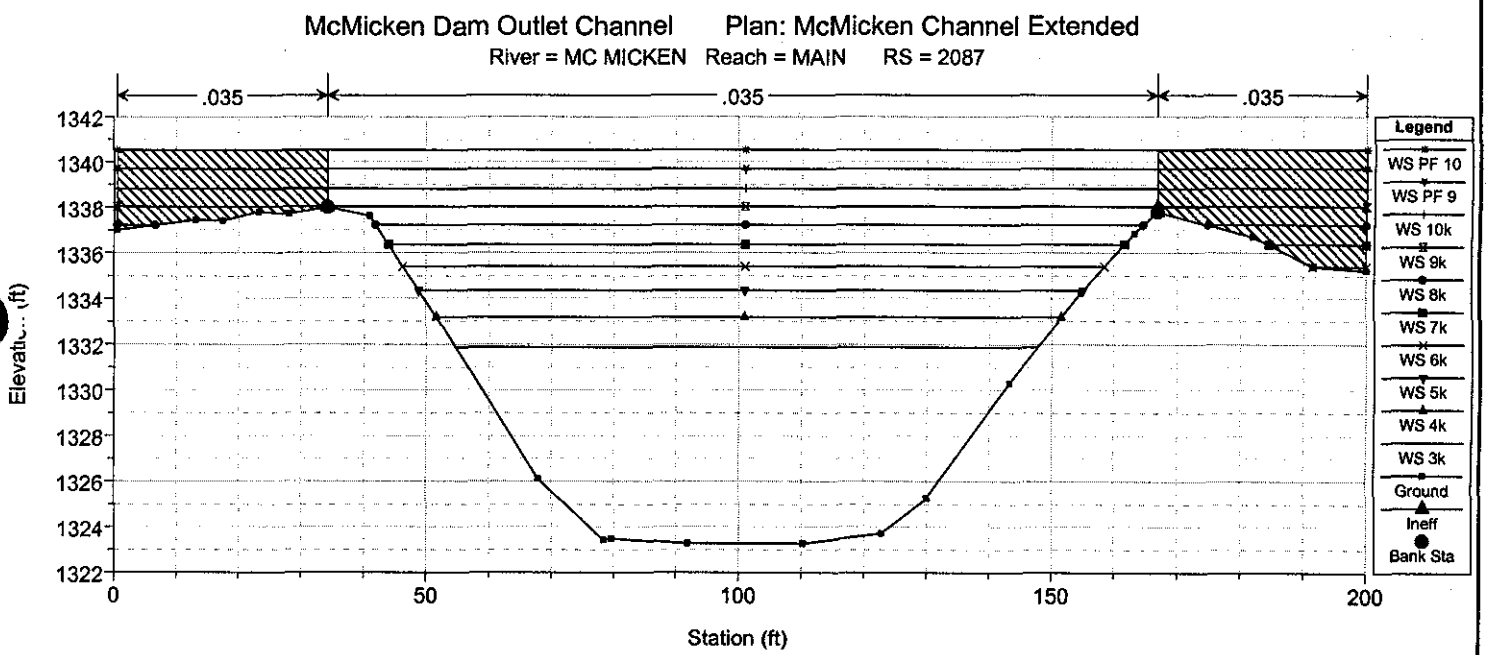


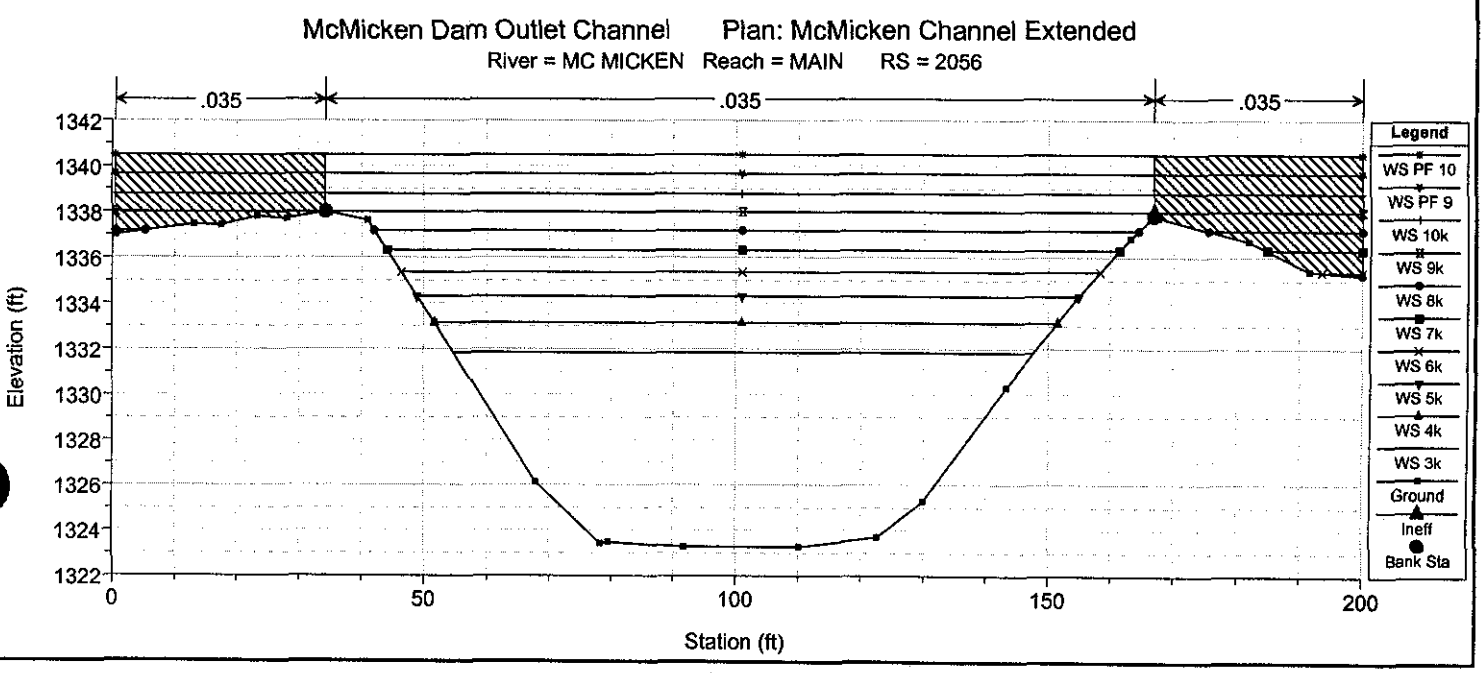
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

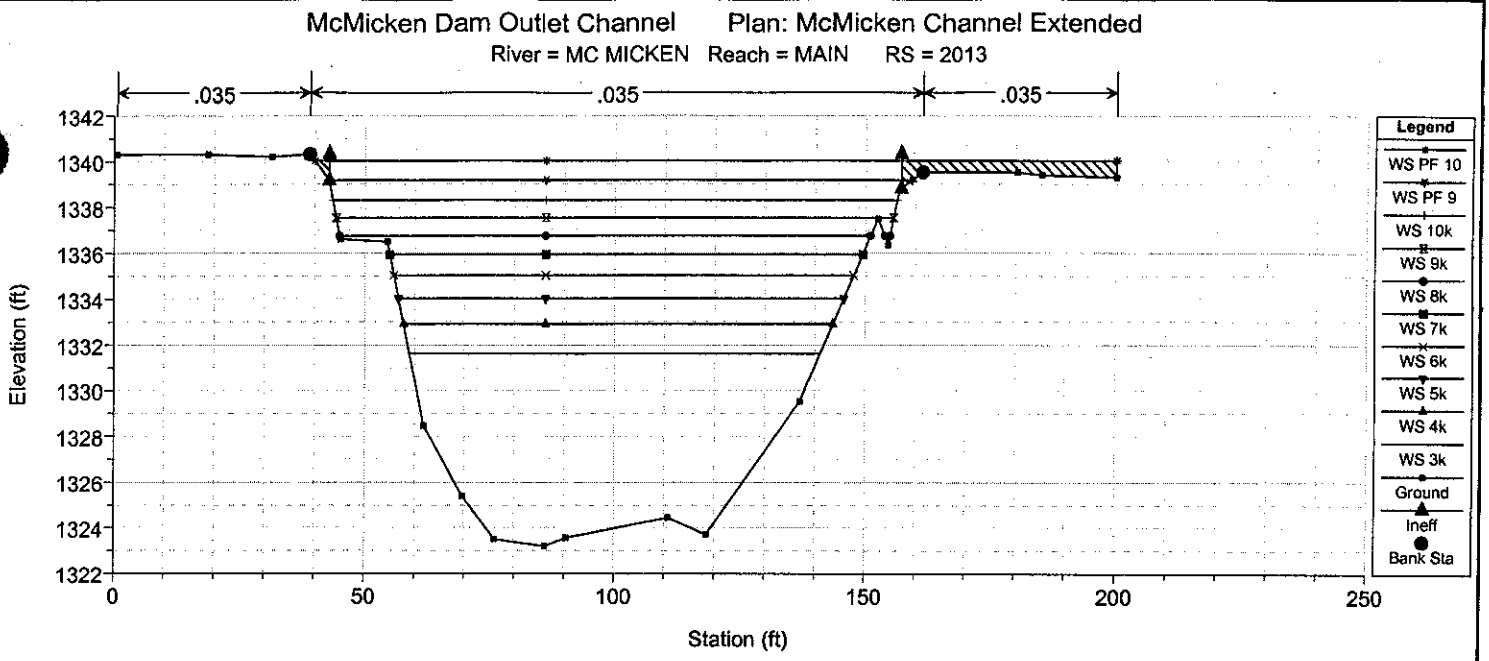
River = MC MICKEN Reach = MAIN RS = 2152

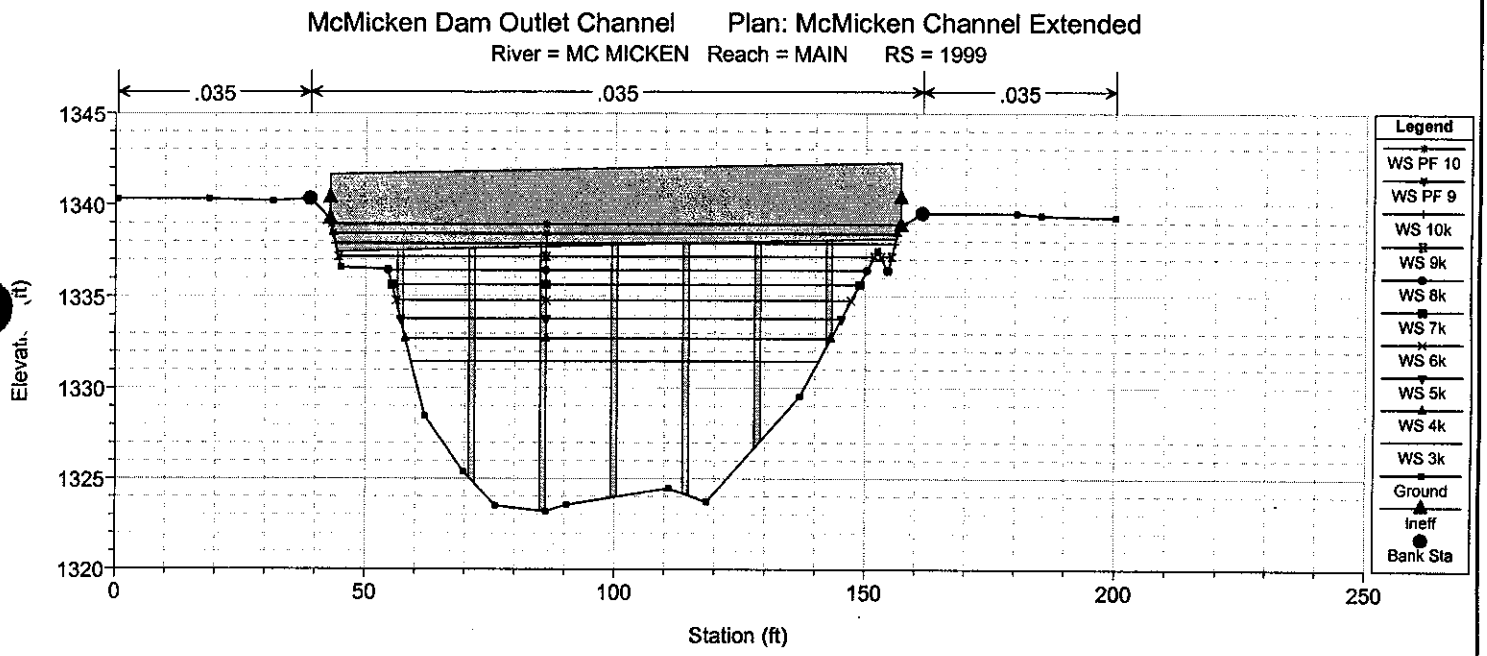


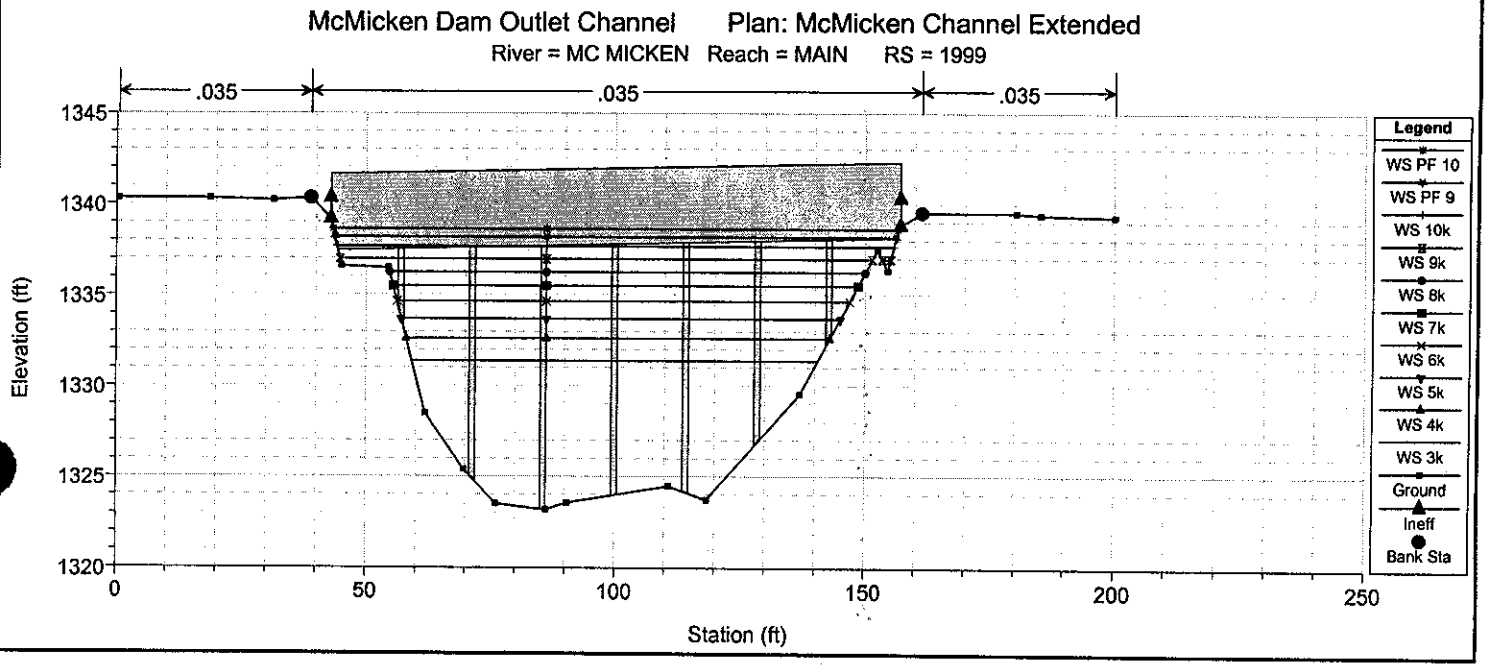

McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 2126
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta


McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 2087
.035
.035
.035
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta


McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 2056
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta

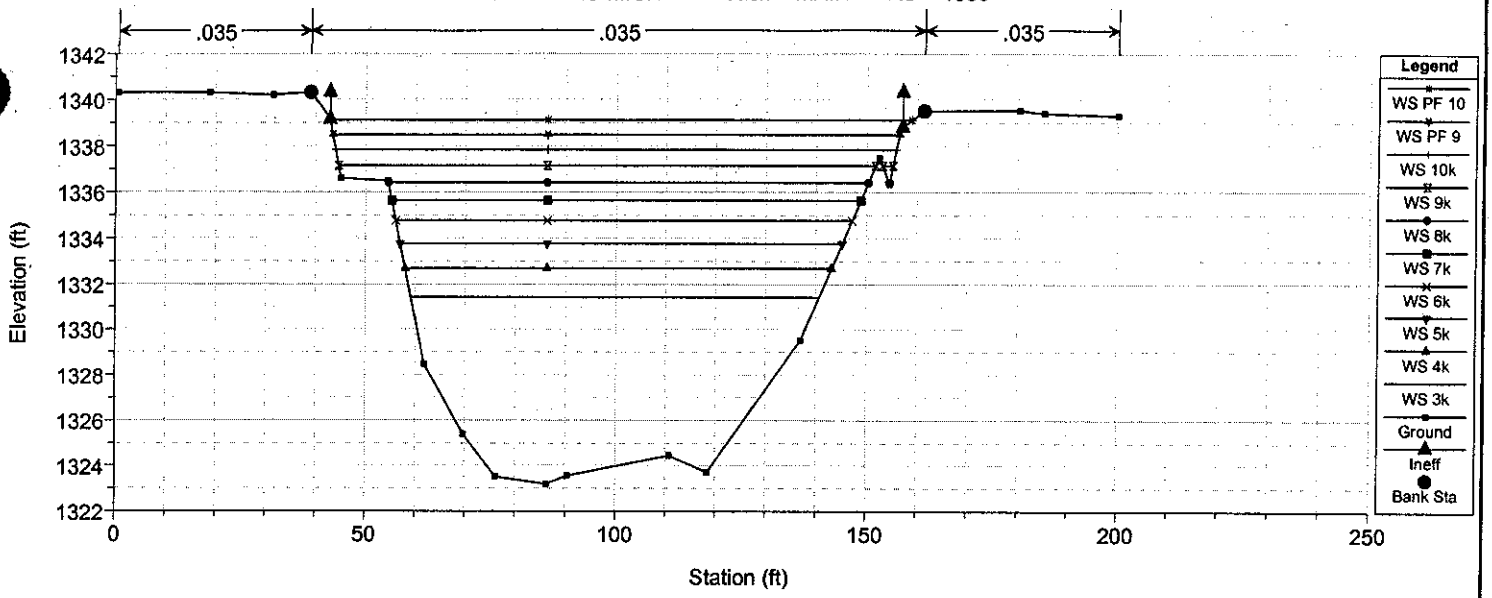

McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 2013
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta


McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1999
.035
.035
.035
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta


McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1999
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta

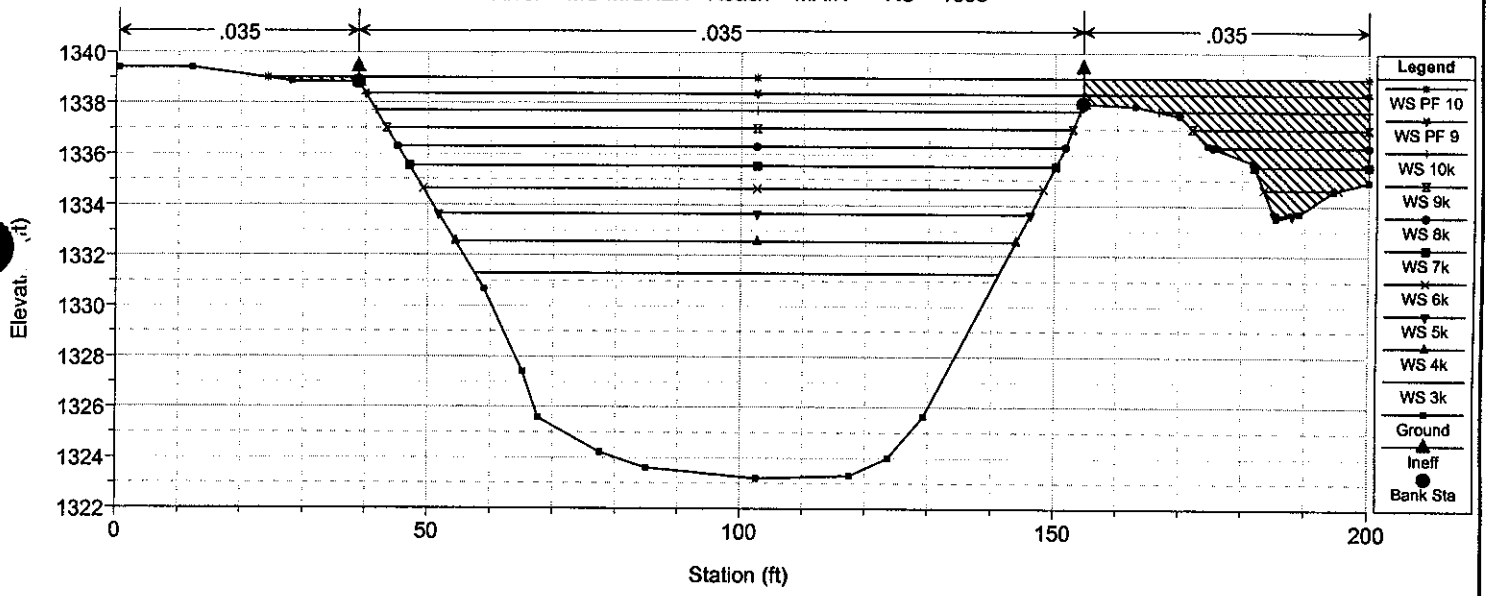
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

River = MC MICKEN Reach = MAIN RS = 1988



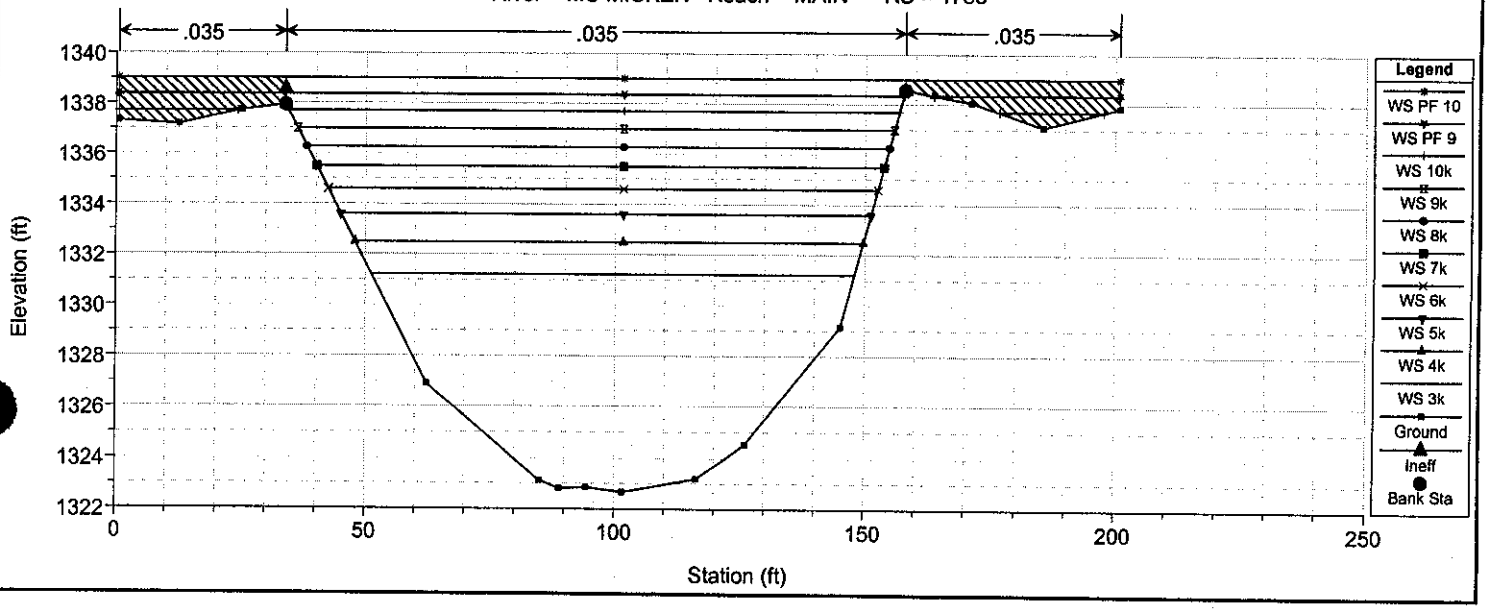
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

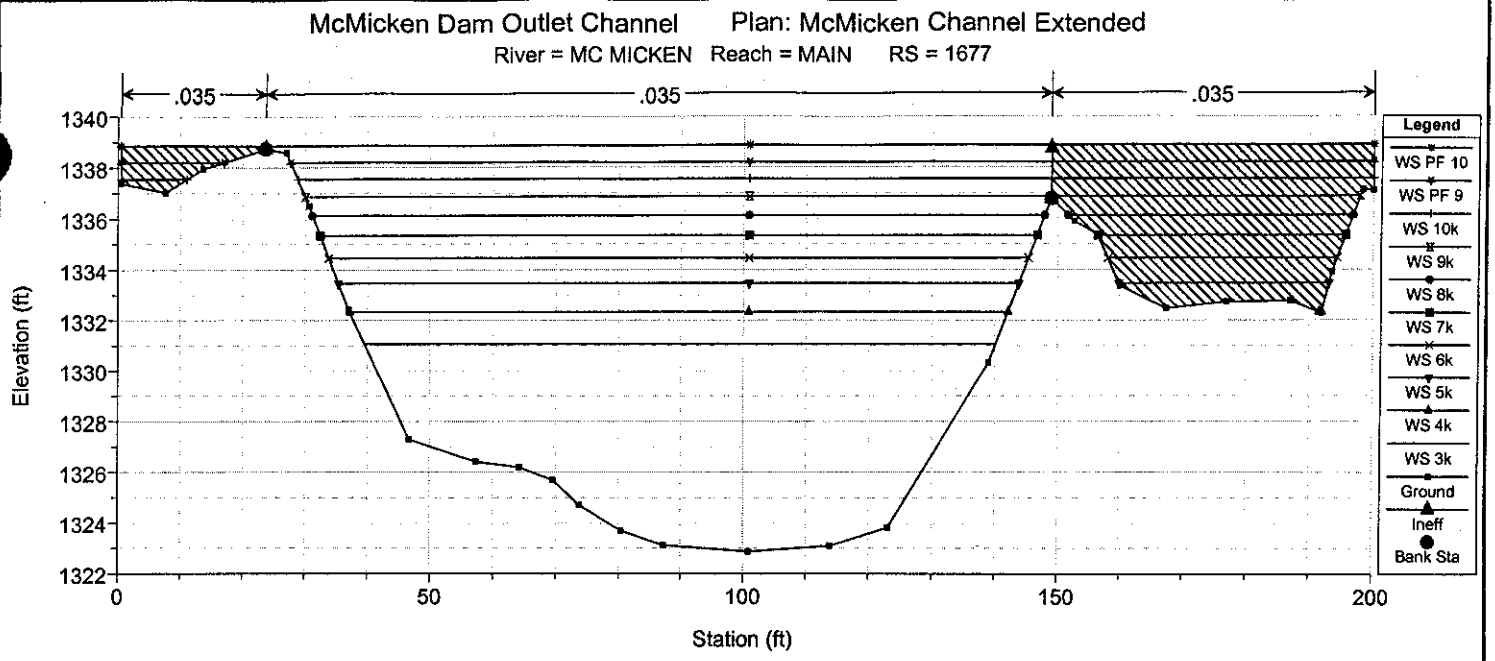
River = MC MICKEN Reach = MAIN RS = 1888

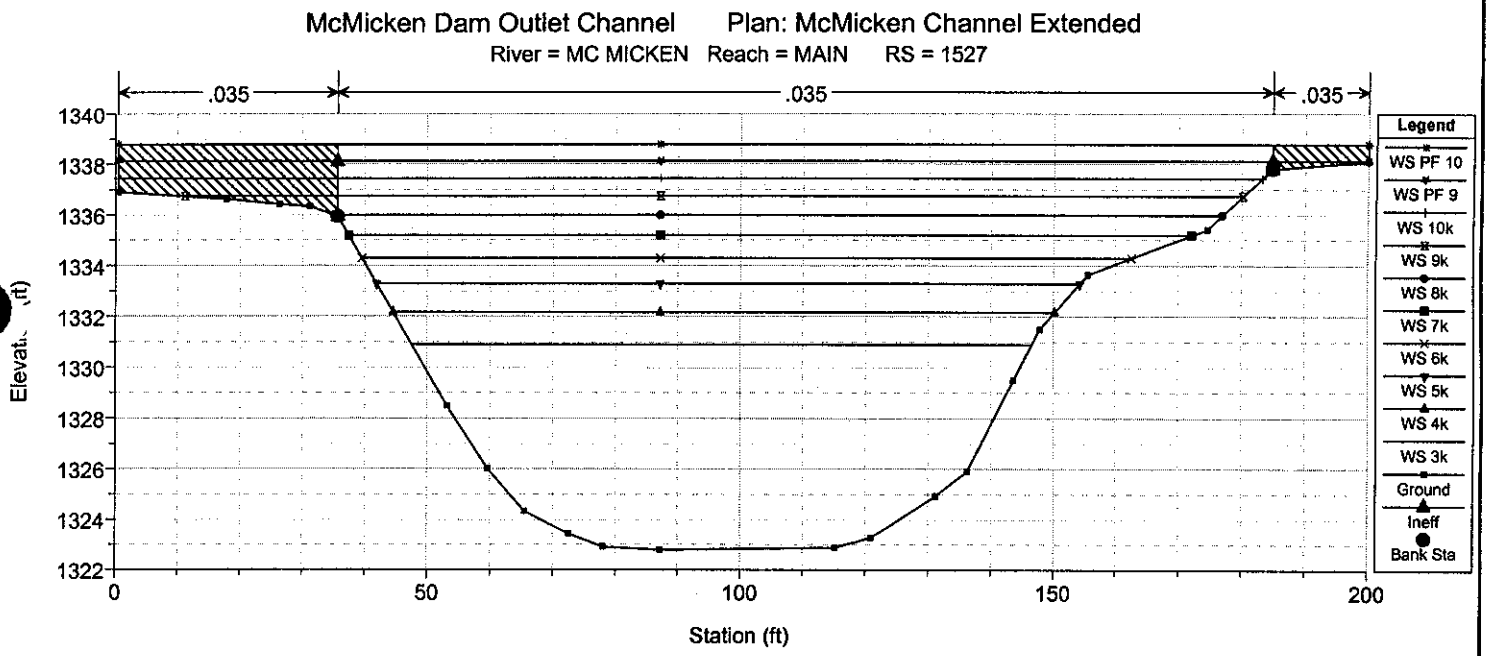


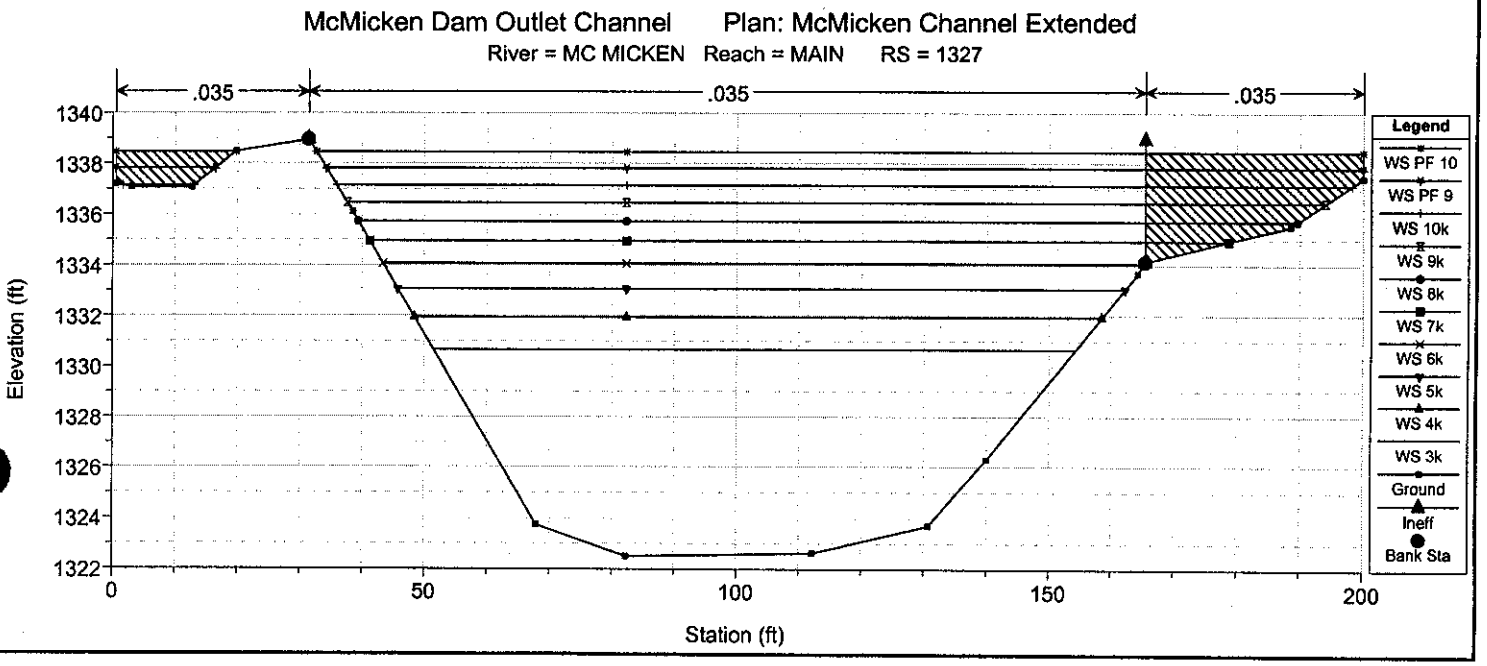
McMicken Dam Outlet Channel Plan: McMicken Channel Extended

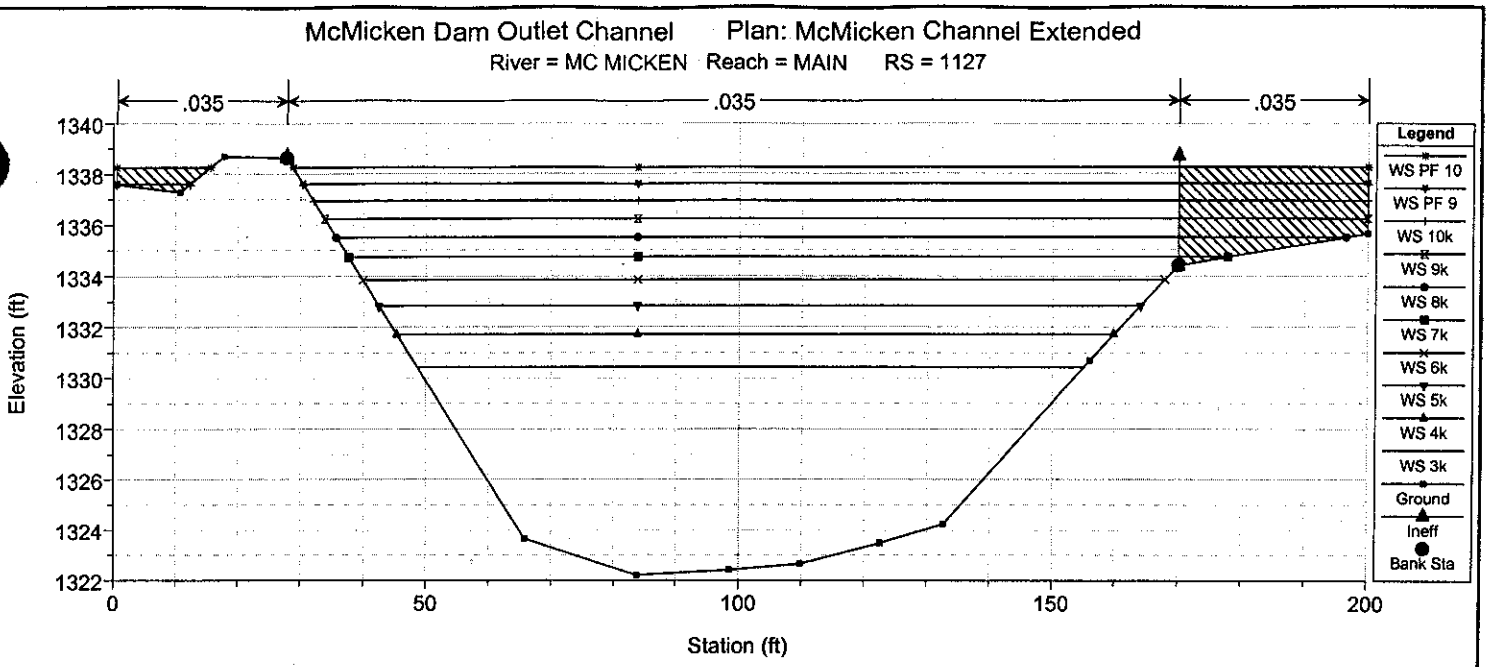
River = MC MICKEN Reach = MAIN RS = 1788




McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1677
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta

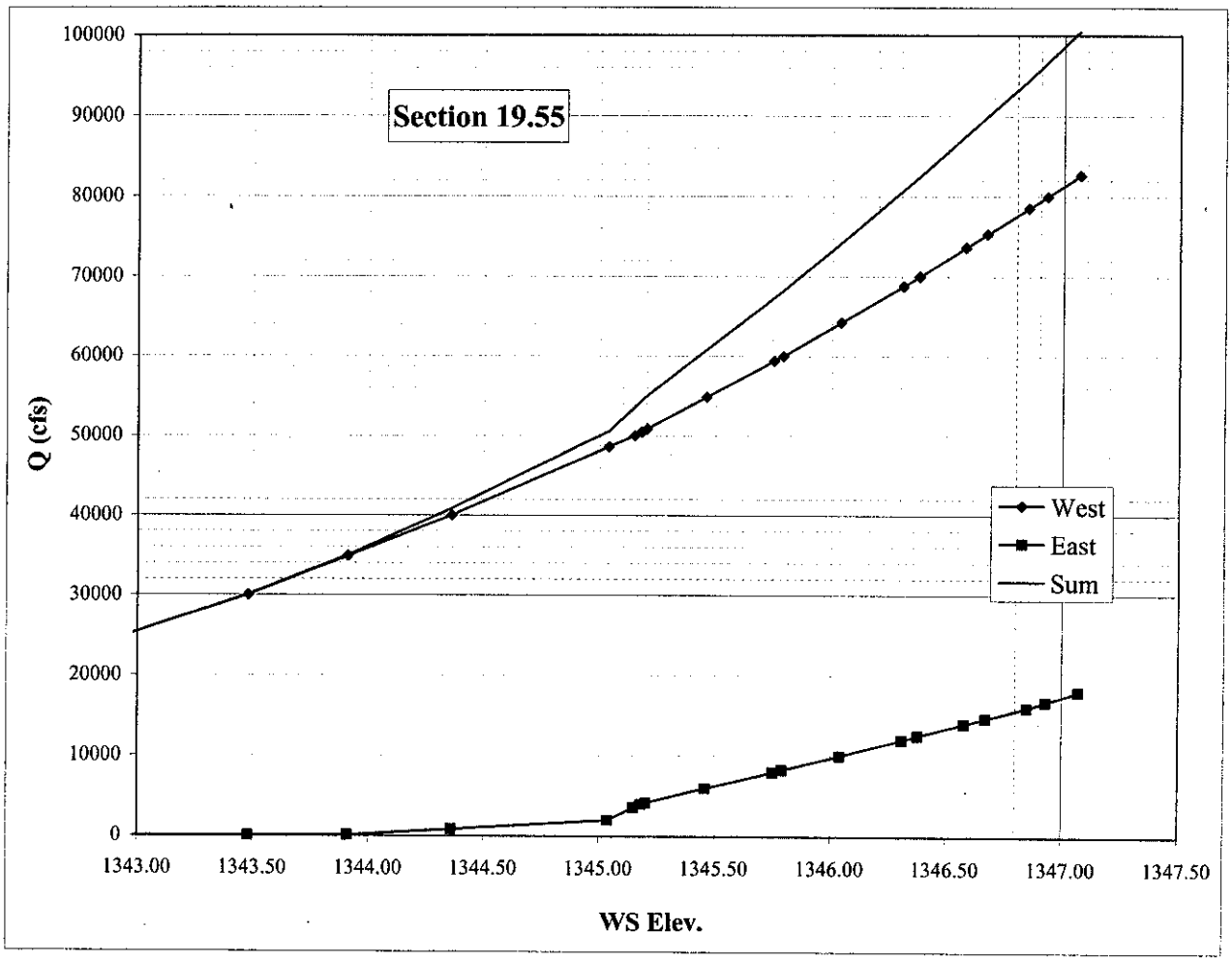

McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1527
.035
.035
.035
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta


McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1327
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta

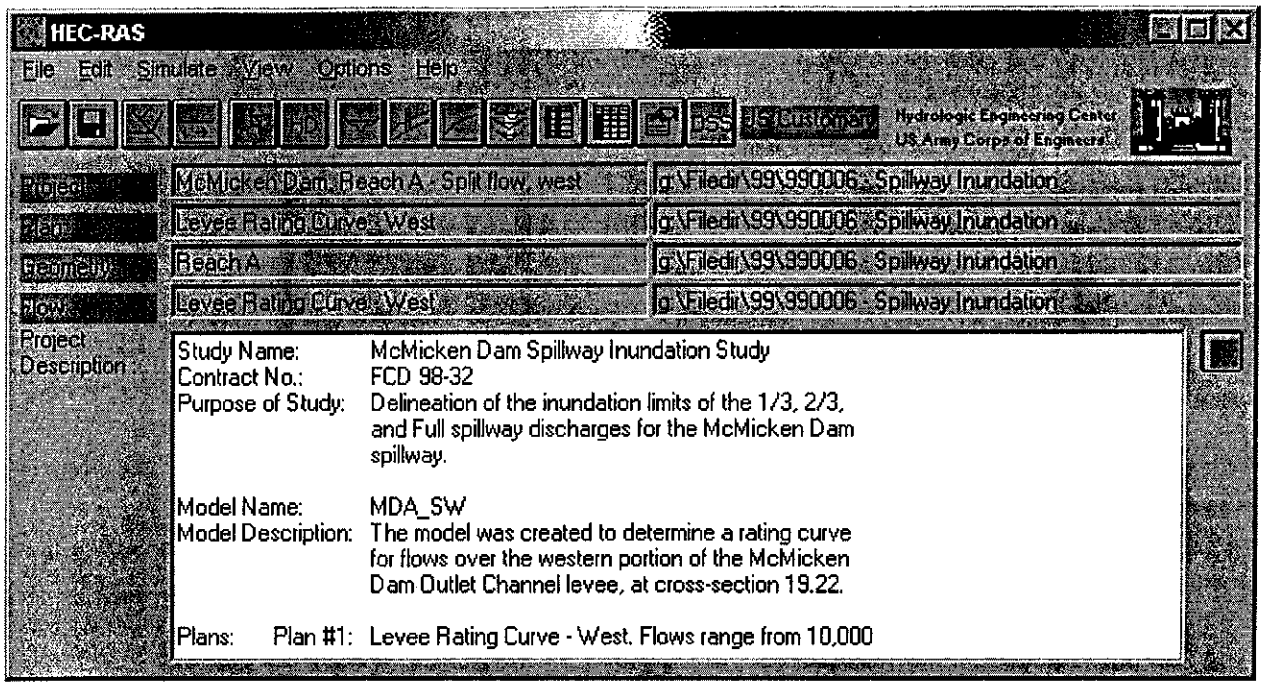

McMicken Dam Outlet Channel Plan: McMicken Channel Extended
River = MC MICKEN Reach = MAIN RS = 1127
.035
.035
.035
Elevation (ft)
1340
1338
1336
1334
1332
1330
1328
1326
1324
1322
0
50
100
150
200
Station (ft)
Legend
WS PF 10
WS PF 9
WS 10k
WS 9k
WS 8k
WS 7k
WS 6k
WS 5k
WS 4k
WS 3k
Ground
Ineff
Bank Sta

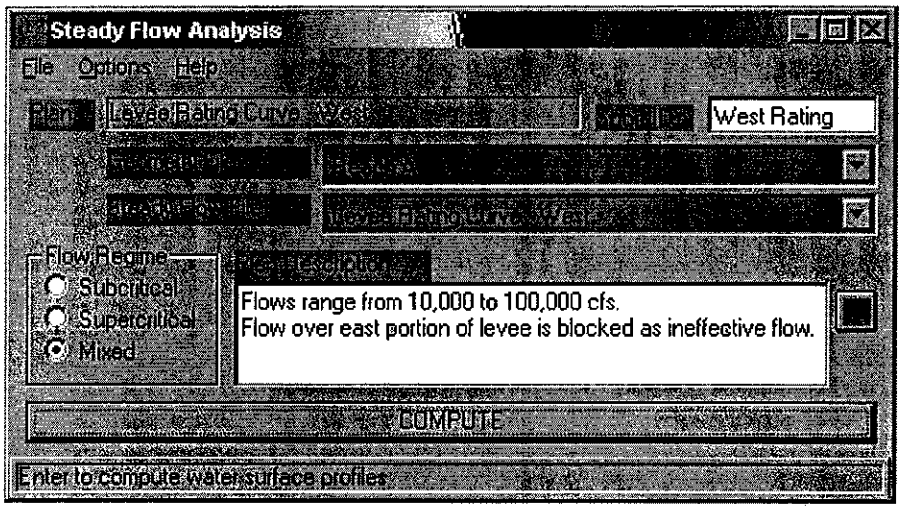
SECTION 19.55
RATING CURVE

West (MDA_SW)		East (MDA_SE)		Total Q	
Q (cfs)	WS ELEV	Q (cfs)	WS ELEV	Q (cfs)	WS ELEV
10000	1340.98	0		10000	1340.98
17034		0	1342.00	17034	1342.00
20000	1342.43	5		20005	1342.43
24000		10	1342.85	24010	1342.85
24981		19		25000	1342.95
30000	1343.48	63		30063	1343.48
34886		100	1343.91	34986	1343.91
40000	1344.36	857		40857	1344.36
48608		2000	1345.04	50608	1345.04
50000	1345.15	3571		53571	1345.15
50469		4000	1345.18	54469	1345.18
50833		4167		55000	1345.20
54844		6000	1345.46	60844	1345.46
59375		8000	1345.75	67375	1345.75
60000	1345.79	8276		68276	1345.79
64237		10000	1346.04	74237	1346.04
68814		12000	1346.31	80814	1346.31
70000	1346.38	12519		82519	1346.38
73636		14000	1346.58	87636	1346.58
75316		14684		90000	1346.67
78545		16000	1346.85	94545	1346.85
80000	1346.93	16727		96727	1346.93
82642		18000	1347.07	100642	1347.07
90000	1347.46				



SOUTHWEST FLOW HEC-RAS (MDA_SW):

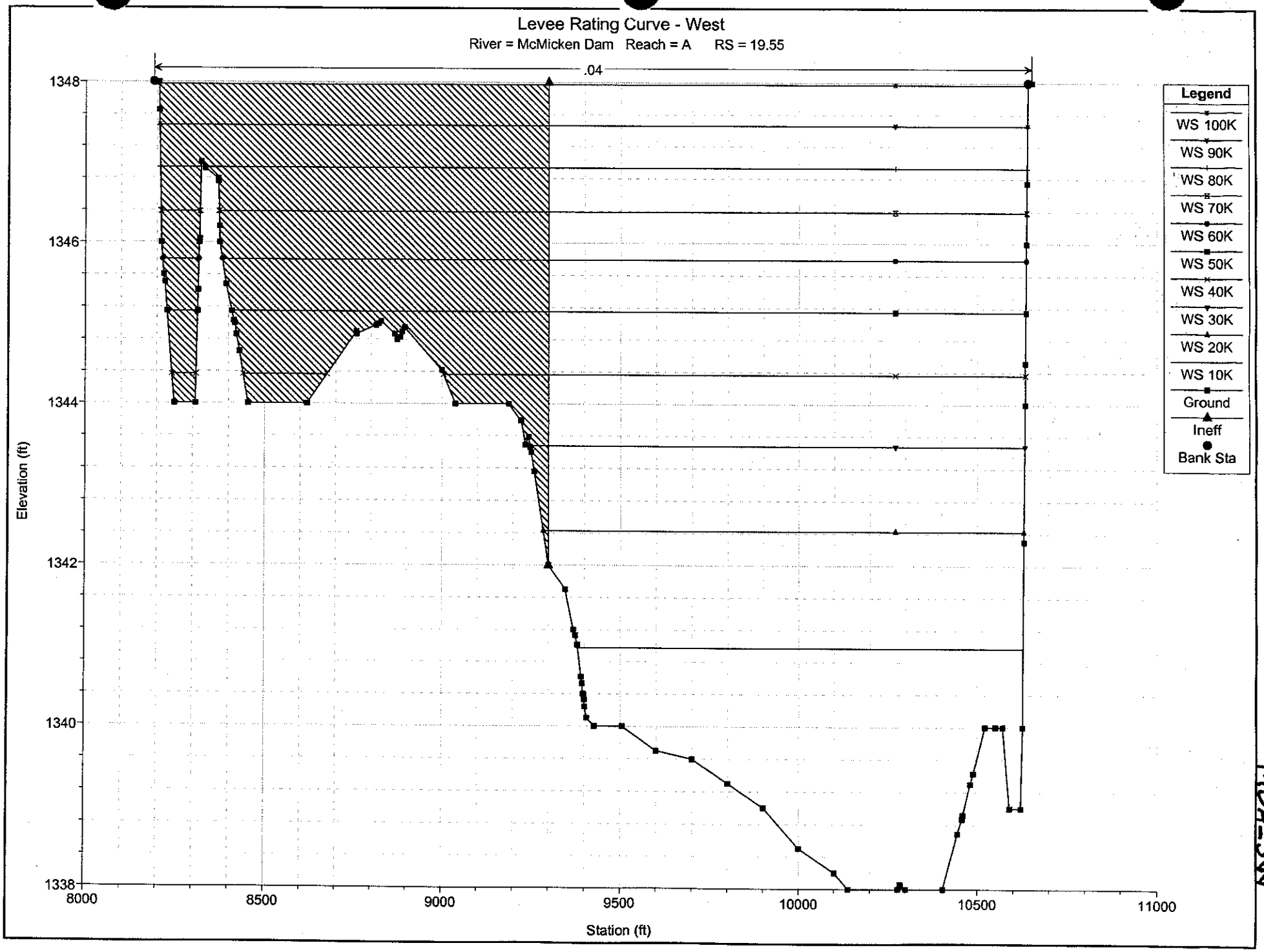




HEC-RAS Plan: West Rating River: McMicken Dam Reach: A

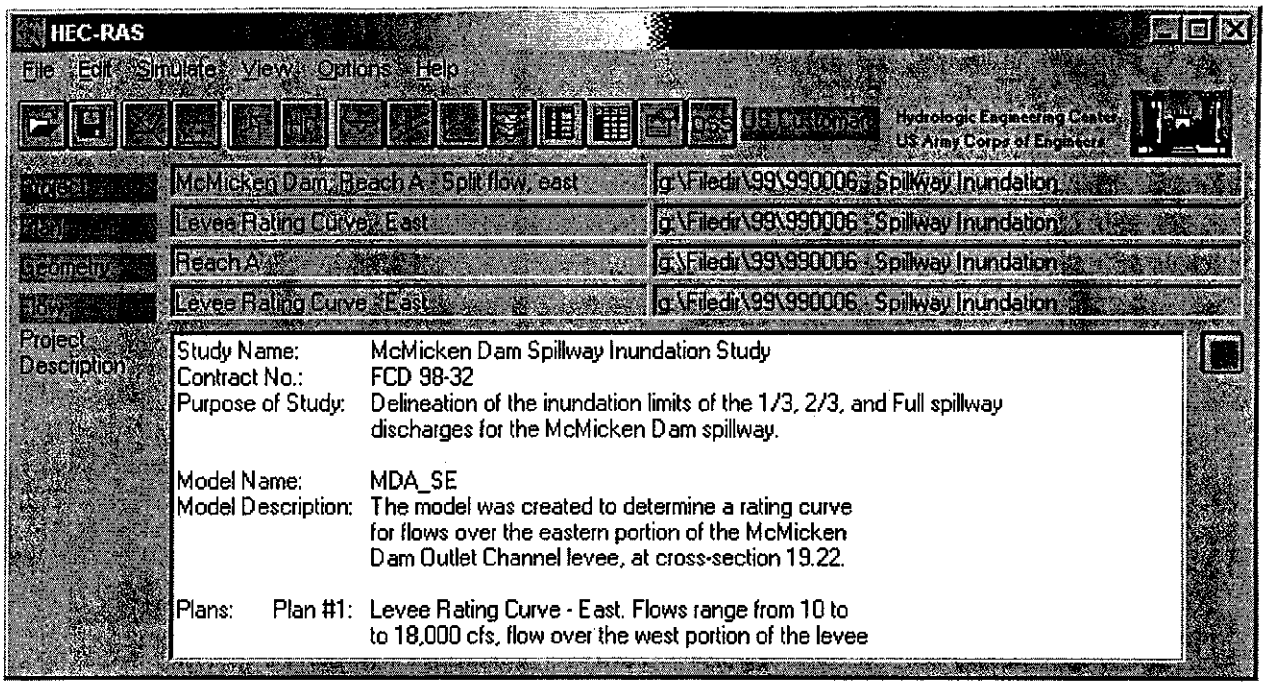
MDA_SW

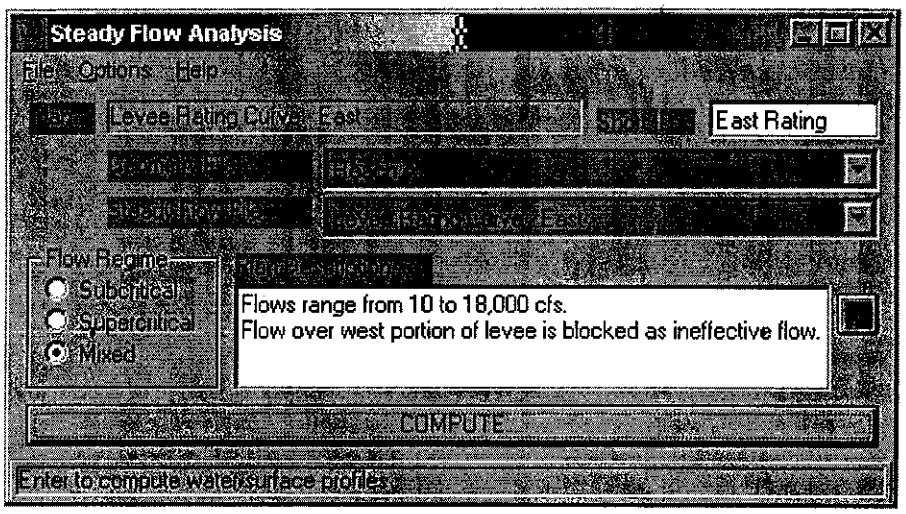
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A	19.55	10000.00	1338.00	1340.98	1340.25	1341.24	0.004941	4.09	2444.19	1245.75	0.51
A	19.55	20000.00	1338.00	1342.43	1341.01	1342.76	0.003241	4.63	4316.46	1344.94	0.45
A	19.55	30000.00	1338.00	1343.48	1341.64	1343.90	0.002866	5.25	5717.07	1385.28	0.45
A	19.55	40000.00	1338.00	1344.36	1342.21	1344.89	0.002727	5.80	6900.73	1931.66	0.45
A	19.55	50000.00	1338.00	1345.15	1342.71	1345.76	0.002665	6.29	7947.50	2312.06	0.45
A	19.55	60000.00	1338.00	1345.79	1343.15	1346.51	0.002728	6.81	8808.37	2356.19	0.47
A	19.55	70000.00	1338.00	1346.38	1343.59	1347.21	0.002791	7.29	9600.35	2374.84	0.48
A	19.55	80000.00	1338.00	1346.93	1344.00	1347.86	0.002855	7.74	10335.31	2421.23	0.49
A	19.55	90000.00	1338.00	1347.46	1344.38	1348.49	0.002900	8.15	11044.65	2434.02	0.50
A	19.55	100000.00	1338.00	1347.97	1344.76	1349.10	0.002933	8.52	11730.39	2436.85	0.51


Levee Rating Curve - West
River = McMicken Dam Reach = A RS = 19.55
.04
Elevation (ft)
1348
1346
1344
1342
1340
1338
8000
8500
9000
9500
10000
10500
11000
Station (ft)
Legend
WS 100K
WS 90K
WS 80K
WS 70K
WS 60K
WS 50K
WS 40K
WS 30K
WS 20K
WS 10K
Ground
Ineff
Bank Sta

MDA-SVN

SOUTHEAST FLOW HEC-RAS (MDA_SE):

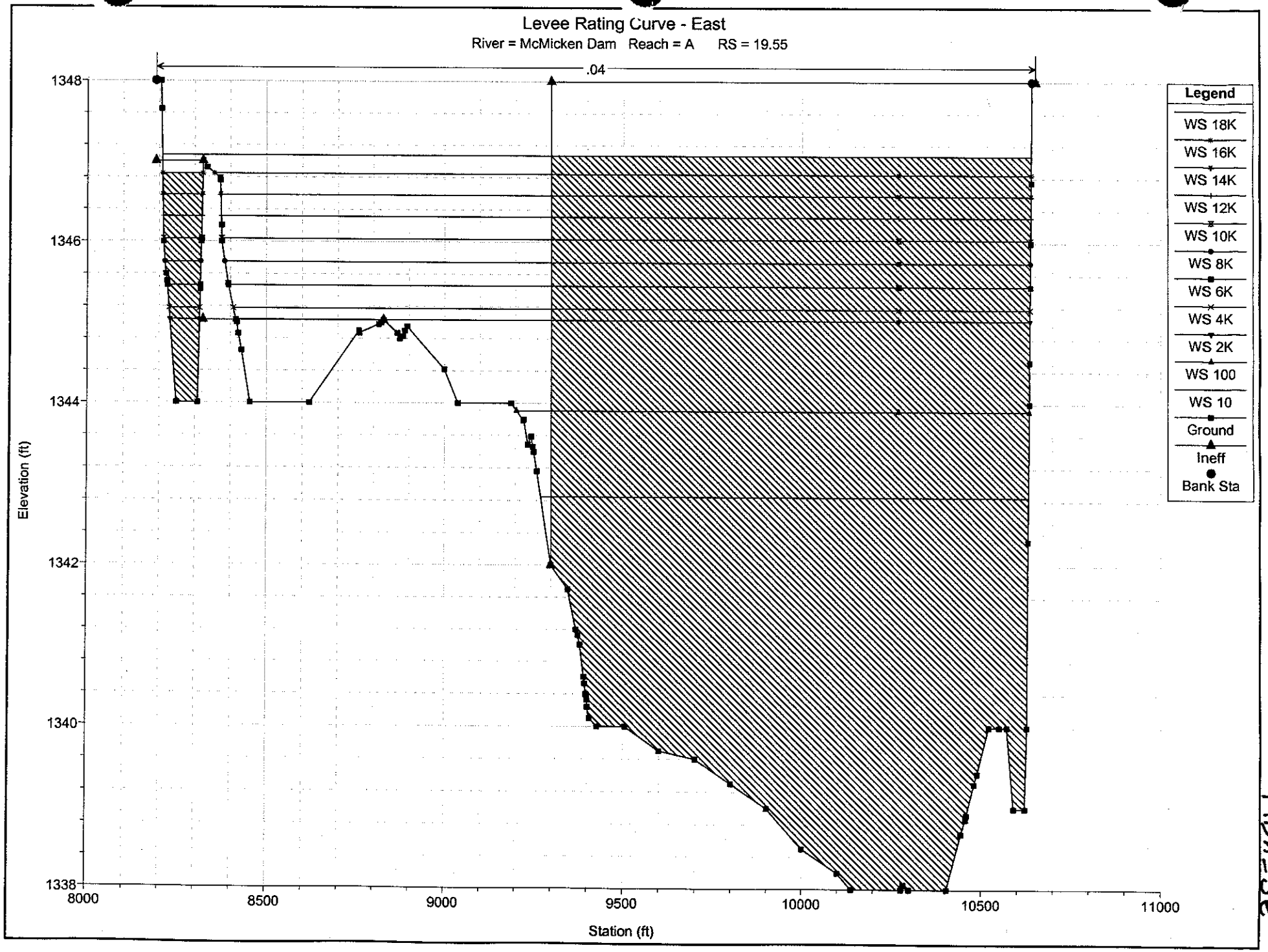




HEC-RAS Plan: East Rating River: McMicken Dam Reach: A

MDA_SE

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A	19.55	10.00	1338.00	1342.85	1342.46	1342.86	0.001483	0.81	12.39	1360.52	0.22
A	19.55	100.00	1338.00	1343.91	1343.16	1343.94	0.002346	1.44	69.52	1431.02	0.30
A	19.55	2000.00	1338.00	1345.04	1344.94	1345.16	0.007849	2.83	706.41	2304.05	0.56
A	19.55	4000.00	1338.00	1345.18	1345.09	1345.54	0.018534	4.82	829.85	2314.00	0.88
A	19.55	6000.00	1338.00	1345.46	1345.36	1345.93	0.017382	5.53	1085.37	2334.33	0.89
A	19.55	8000.00	1338.00	1345.75	1345.60	1346.30	0.015173	5.93	1349.62	2353.81	0.86
A	19.55	10000.00	1338.00	1346.04	1345.82	1346.63	0.013251	6.20	1613.15	2369.31	0.83
A	19.55	12000.00	1338.00	1346.31	1346.01	1346.95	0.011716	6.42	1868.53	2373.71	0.80
A	19.55	14000.00	1338.00	1346.58	1346.21	1347.26	0.010580	6.62	2114.58	2377.91	0.77
A	19.55	16000.00	1338.00	1346.85	1346.38	1347.56	0.009778	6.77	2363.30	2398.01	0.75
A	19.55	18000.00	1338.00	1347.07	1346.56	1347.69	0.007875	6.28	2867.71	2431.68	0.68


Levee Rating Curve - East
River = McMicken Dam Reach = A RS = 19.55
.04
Elevation (ft)
1348
1346
1344
1342
1340
1338
8000
8500
9000
9500
10000
10500
11000
Station (ft)
Legend
WS 18K
WS 16K
WS 14K
WS 12K
WS 10K
WS 8K
WS 6K
WS 4K
WS 2K
WS 100
WS 10
Ground
Ineff
Bank Sta

MDA-SE

2 HEC-RAS Model MDA1

Summary Sheet for Model MDA1

Description

Model MDA1 includes the area from the McMicken Dam spillway to the intersection of Estrella Freeway (Loop 303) and Bell Road. The model begins at the interior of the McMicken Dam principal spillway with section 20.05. The flow reaches the spillway at section 20.00. After exiting the spillway, the flow travels southeast towards the principal outlet channel, which acts as a levee. A flow split occurs at section 19.55, where the west flow remains part of Model MDA1, while the east portion is the start of Model MDA2. The flow reaches the principal outlet channel at section 19.22. Flows exceeding the capacity of the principal outlet channel travel south and contribute to the flow in Model MDA1 at section 19.19. Flows travel southeast towards the Loop 303 freeway and Sun City Grand. A summary detailing the procedure used to determine the weir flow amount is located in Section 4 of this appendix.

At the time this study was conducted, the Loop 303 construction was in progress per the *Estrella Roadway and Grade Separation Phase I Improvement Plans*. Plans for the Loop 303 south of Union Hills Drive were under concept design and not taken into account for this project. An elevated block wall surrounds Sun City Grand, east of the freeway. Once the amount of flow weiring into the freeway section was determined, the ponding elevation within the freeway section was computed. Flow assumptions include that the flow must pond against the wall a minimum of four (4) feet before the wall fails. Following failure, the resulting rubble would form a weir with a crest elevation of three (3) feet. Under these assumptions, the walls would fail between sections 18.80 and 18.24, allowing flow to enter Sun City Grand for the 2/3 and Full Flow conditions. This flow will join the downstream model MDB2.

Between sections 18.24 and 17.59 the freeway is below natural grade, allowing the flow to travel south without causing the Sun City Grand wall to fail. Heading south, the freeway begins to meet the natural grade south of Clearview Boulevard. A second and third section of wall will fail in a similar manner between sections 17.57 and 16.35 for the 1/3, 2/3 and Full Flow, allowing for flow to weir into Sun City Grand. This flow will join the downstream model MDB1. The remainder of the flow travels south along the Loop 303 freeway alignment, and joins Model MDB1 south of Bell Road. Model MDA1 ends at section 16.35, north of Bell Road.

Assumptions

- The flow can pond to a level of four (4) feet above the base of wall before causing the wall to fail.
- Three (3) feet of rubble will be produced by the failing wall.
- The flow that enters Sun City Grand does not re-enter Model MDA1

Method of Analysis

A HEC-RAS model was developed to model the area described above.

Results

The flow travels out of the McMicken Dam spillway and travels south towards the Loop 303 freeway and Sun City Grand. The flow will flow along, and pond against, the Sun City Grand boundary wall, causing it to fail in three separate areas. Flow entering Sun City Grand will join either Model MDB1 or MDB2. Flow that does not enter Sun City Grand will continue to travel south along the Sun City Grand boundary wall toward Bell Road, joining Model MDB1 south of Bell Road.

HEC-RAS Plan: A1 River: MCMICKEN DAM Reach: A1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A1	20.05	25000.00	1350.00	1356.85		1356.91	0.000321	1.99	12564.19	2034.60	0.14
A1	20.05	55000.00	1350.00	1358.69		1358.87	0.000656	3.37	16335.79	2055.89	0.21
A1	20.05	90000.00	1350.00	1360.37		1360.69	0.000936	4.54	19817.91	2087.00	0.26
A1	20.00	25000.00	1354.00	1356.03		1356.62	0.010700	6.15	4068.29	2011.22	0.76
A1	20.00	55000.00	1354.00	1357.20		1358.34	0.011427	8.57	6414.23	2020.72	0.85
A1	20.00	90000.00	1354.00	1358.40		1360.01	0.010521	10.16	8857.82	2033.26	0.86
A1	19.91	25000.00	1348.40	1351.95		1352.41	0.006689	5.45	4585.98	1907.93	0.62
A1	19.91	55000.00	1348.40	1353.69		1354.43	0.005395	6.92	7952.44	1970.11	0.61
A1	19.91	90000.00	1348.40	1355.08		1356.17	0.005424	8.39	10724.42	1995.59	0.64
A1	19.79	25000.00	1344.77	1349.03		1349.38	0.003789	4.73	5282.51	1773.52	0.48
A1	19.79	55000.00	1344.77	1350.99		1351.55	0.004042	6.00	9173.22	2267.03	0.53
A1	19.79	90000.00	1344.77	1352.73		1353.42	0.003551	6.67	13500.97	2582.24	0.51
A1	19.67	25000.00	1341.48	1345.56	1344.82	1346.14	0.007035	6.12	4083.20	1606.01	0.65
A1	19.67	55000.00	1341.48	1347.50	1346.32	1348.45	0.005811	7.80	7047.47	2136.30	0.64
A1	19.67	90000.00	1341.48	1349.01	1347.64	1350.44	0.006041	9.60	9377.08	2400.30	0.69
A1	19.55	25000.00	1338.00	1343.21		1343.55	0.002469	4.66	5359.88	1332.14	0.41
A1	19.55	51000.00	1338.00	1345.34		1345.94	0.002501	6.21	8206.90	1336.67	0.44
A1	19.55	75500.00	1338.00	1346.83		1347.68	0.002676	7.41	10191.83	1340.18	0.47
A1	19.43	25000.00	1333.17	1338.87	1338.87	1340.36	0.016056	9.80	2550.24	848.22	1.00
A1	19.43	51000.00	1333.17	1340.92	1340.92	1342.82	0.014309	11.04	4618.61	1178.33	0.98
A1	19.43	75500.00	1333.17	1342.18	1342.18	1344.39	0.014495	11.93	6329.99	1451.26	1.01
A1	19.34	25000.00	1324.99	1339.23	1334.78	1339.31	0.000399	2.22	11236.19	2155.84	0.17
A1	19.34	51000.00	1324.99	1340.66	1336.05	1340.85	0.000801	3.52	14501.92	2361.38	0.25
A1	19.34	75500.00	1324.99	1341.65	1337.08	1341.96	0.001090	4.47	16876.79	2413.58	0.30
A1	19.22	21000.00	1336.00	1338.13	1338.13	1338.61	0.018421	5.54	3787.33	4048.09	1.01
A1	19.22	46000.00	1336.00	1338.79	1338.79	1339.57	0.015323	7.11	6465.91	4141.08	1.00
A1	19.22	70000.00	1336.00	1339.30	1339.30	1340.33	0.014044	8.14	8598.96	4213.68	1.00
A1	19.19	23000.00	1324.00	1330.09		1330.24	0.002719	3.09	7436.53	3683.72	0.38
A1	19.19	48000.00	1324.00	1331.16		1331.43	0.003073	4.16	11525.29	4002.94	0.43
A1	19.19	72000.00	1324.00	1331.87		1332.26	0.003466	4.97	14472.93	4213.14	0.47
A1	19.03	23000.00	1321.00	1325.66	1325.24	1326.08	0.010383	5.23	4400.59	2710.92	0.72
A1	19.03	48000.00	1321.00	1326.83		1327.31	0.008157	5.56	8636.81	4049.45	0.67
A1	19.03	72000.00	1321.00	1327.64		1328.20	0.006602	6.00	11994.17	4274.86	0.63
A1	18.78	23000.00	1314.00	1321.11	1319.25	1321.26	0.001877	3.03	7588.50	3622.08	0.34
A1	18.78	47000.00	1314.00	1322.47	1320.50	1322.72	0.001939	4.01	11722.97	3755.47	0.37
A1	18.78	69500.00	1314.00	1323.47	1321.13	1323.81	0.002009	4.64	14973.82	3927.53	0.38
A1	18.67	20000.00	1309.61	1320.15	1318.33	1320.27	0.001337	2.79	7171.43	3229.15	0.29
A1	18.67	39500.00	1309.61	1321.38	1319.16	1321.61	0.001615	3.87	10289.50	3381.73	0.33
A1	18.67	58000.00	1309.61	1322.32	1319.79	1322.64	0.001751	4.61	12774.24	3458.38	0.36
A1	18.50	17500.00	1302.52	1317.56	1317.04	1318.02	0.008289	5.44	3215.96	2177.66	0.67
A1	18.50	31500.00	1302.52	1318.70	1317.83	1319.30	0.006257	6.22	5066.77	2253.50	0.62
A1	18.50	44500.00	1302.52	1319.76	1318.44	1320.42	0.004796	6.51	6833.13	2303.64	0.57
A1	18.22	23000.00	1299.43	1310.37		1312.50	0.002286	11.73	1960.53	279.96	0.78
A1	18.22	28500.00	1299.43	1311.56		1313.94	0.002150	12.39	2299.35	288.52	0.77
A1	18.22	34500.00	1299.43	1313.33		1315.50	0.002129	11.81	2920.95	391.88	0.76
A1	18.03	23000.00	1292.95	1308.66		1310.41	0.001664	10.62	2165.75	277.31	0.67
A1	18.03	28500.00	1292.95	1309.86		1311.86	0.001751	11.34	2513.26	303.29	0.69
A1	18.03	34500.00	1292.95	1311.14		1313.28	0.002203	11.74	2937.63	365.46	0.73
A1	17.84	23000.00	1295.16	1308.72		1309.13	0.000533	5.10	4510.41	600.58	0.33
A1	17.84	28500.00	1295.16	1309.91		1310.37	0.000657	5.40	5278.96	692.43	0.34
A1	17.84	34500.00	1295.16	1310.97		1311.47	0.000861	5.64	6117.05	830.92	0.37
A1	17.57	23000.00	1296.00	1308.04		1308.31	0.000553	4.19	5488.15	923.87	0.30
A1	17.57	28500.00	1296.00	1308.86		1309.17	0.001011	4.44	6419.52	1315.64	0.35

HEC-RAS Plan: A1 River: MCMICKEN DAM Reach: A1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A1	17.57	34500.00	1296.00	1309.58		1309.91	0.001315	4.62	7473.87	1620.21	0.38
A1	17.33	22000.00	1295.01	1307.43		1307.56	0.000602	2.84	7732.94	1617.53	0.23
A1	17.33	27000.00	1295.01	1307.90		1308.05	0.000748	3.17	8520.46	1762.81	0.25
A1	17.33	32500.00	1295.01	1308.38		1308.56	0.000858	3.46	9402.20	1875.93	0.27
A1	17.22	20500.00	1294.03	1307.12		1307.23	0.000517	2.58	7943.38	1673.63	0.21
A1	17.22	25000.00	1294.03	1307.51		1307.64	0.000638	2.90	8616.13	1770.83	0.23
A1	17.22	29500.00	1294.03	1307.94		1308.10	0.000726	3.14	9400.69	1877.84	0.25
A1	17.17	20000.00	1293.23	1306.83	1303.67	1306.91	0.003555	2.24	8918.44	2542.61	0.21
A1	17.17	23500.00	1293.23	1307.18	1303.95	1307.27	0.003587	2.39	9824.26	2557.39	0.22
A1	17.17	28000.00	1293.23	1307.58	1304.28	1307.68	0.003705	2.58	10839.93	2573.86	0.22
A1	17.04	18000.00	1296.00	1302.33		1302.92	0.011635	6.13	2936.81	1363.98	0.74
A1	17.04	21000.00	1296.00	1302.64		1303.24	0.011814	6.22	3376.18	1461.20	0.72
A1	17.04	24500.00	1296.00	1303.01		1303.61	0.011604	6.23	3933.40	1575.89	0.69
A1	16.87	17000.00	1286.98	1294.77		1295.06	0.006401	4.34	3916.81	1460.67	0.47
A1	16.87	19500.00	1286.98	1295.12		1295.42	0.006246	4.40	4428.90	1479.13	0.45
A1	16.87	22500.00	1286.98	1295.50		1295.81	0.006280	4.50	4998.65	1508.13	0.44
A1	16.70	13500.00	1284.00	1291.08		1291.22	0.002758	3.05	4426.01	1367.11	0.30
A1	16.70	15500.00	1284.00	1291.38		1291.54	0.002872	3.20	4846.56	1404.52	0.30
A1	16.70	17500.00	1284.00	1291.66		1291.83	0.002977	3.34	5247.15	1439.24	0.31
A1	16.53	6500.00	1282.00	1288.34	1286.86	1288.55	0.003442	3.69	1761.06	1235.97	0.54
A1	16.53	7500.00	1282.00	1288.58	1287.12	1288.78	0.003497	3.65	2055.37	1270.20	0.51
A1	16.53	8500.00	1282.00	1288.79	1288.00	1289.00	0.003543	3.64	2333.37	1301.71	0.48
A1	16.35	3000.00	1280.00	1283.16	1283.16	1283.62	0.028223	5.45	550.60	605.14	1.01
A1	16.35	3500.00	1280.00	1283.28	1283.28	1283.76	0.028151	5.61	624.14	640.69	1.00
A1	16.35	4000.00	1280.00	1283.38	1283.38	1283.90	0.028540	5.78	691.57	671.51	1.00

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                HEC-RAS September 1998 Version 2.2
                  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
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PROJECT DATA
Project Title: McMicken Dam, Reach A1
Project File : MDA1.prj
Run Date and Time: 9/24/2001 10:53:17 AM

Project in English units

Study Name: McMicken Dam Spillway Inundation Study
Contract No.: FCD 98-32
Purpose of Study: Delineation of the inundation limits of the 1/3, 2/3, and Full spillway discharges for the McMicken Dam spillway.

Model Name: MDA1
Model Description: Models flow from the McMicken Dam spillway south to Bell Road. Upstream boundary is section 20.05. Downstream boundary is section 16.35.

Flow Profiles: Profile #1, 1/3 Flow
Sections 20.05 to 19.34, Q= 25,000 cfs
Section 19.22, Q= 21,000 cfs
Sections 19.19 to 18.78, Q= 23,000 cfs
Section 18.67, Q=20,000 cfs
Section 18.50, Q=17,500 cfs
Section 18.22 to 17.33, Q=23,000
Section 17.22, Q= 20,500 cfs
Section 17.17, Q= 20,000 cfs
Section 17.04, Q= 18,000 cfs
Section 16.87, Q= 17,000 cfs
Section 16.70, Q= 13,500 cfs
Section 16.53, Q= 6,500 cfs
Section 16.35, Q= 3,000 cfs

Profile #2, 2/3 Flow
Sections 20.05 to 19.67, Q= 55,000 cfs
Sections 19.55 to 19.34, Q= 51,000 cfs
Section 19.22, Q= 46,000 cfs
Sections 19.19 to 19.03, Q= 48,000 cfs
Section 18.78, Q= 47,000 cfs
Section 18.67, Q=39,500 cfs
Section 18.50, Q= 31,500 cfs
Sections 18.22 to 17.59, Q= 28,500 cfs
Section 17.33, Q= 27,000 cfs
Section 17.22, Q= 25,000 cfs
Section 17.17, Q= 23,500 cfs
Section 17.04, Q= 21,000 cfs
Section 16.87, Q= 19,500 cfs
Section 16.70, Q= 15,500 cfs
Section 16.53, Q= 7,500 cfs
Section 16.35, Q= 3,500 cfs

Profile #3, Full Flow
Sections 20.05 to 19.67, Q= 90,000 cfs
Sections 19.55 to 19.34, Q= 75,500 cfs
Section 19.22, Q= 70,000 cfs
Sections 19.19 to 19.03, Q= 72,000 cfs
Section 18.78, Q=69,500 cfs
Section 18.67, Q= 58,000 cfs
Section 18.50, Q= 44,500 cfs
Sections 18.22 to 17.57, Q= 34,500 cfs
Section 17.33, Q= 32,500 cfs
Section 17.22, Q= 29,500 cfs
Section 17.17, Q= 28,000 cfs
Section 17.04, Q= 24,500 cfs

Section 16.87, Q= 22,500 cfs
Section 16.70, Q= 17,500 cfs
Section 16.53, Q= 8,500 cfs
Section 16.35, Q= 4,00 cfs

HEC-RAS Version: Version 2.2, September 1998

Consultants: Hoskin Engineering Consultants, Inc.
323 W. Roosevelt Street, Suite 200
Phoenix, AZ 85003
(602) 252-8384 Phone
(602) 252-8385 Fax
HEC 990006-03

DEI Professional Services, LLC
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Phoenix, AZ 85016
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PLAN DATA

Plan Title: Reach A1
Plan File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A1\MDA1.p01

Geometry Title: Reach A1
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A1\MDA1.g01

Flow Title : Reach A1
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A1\MDA1.f01

Plan Description:
Models flow which continues southwest from the McMicken Dam Outlet Channel levee, along the Loop 303 Freeway.

Plan Summary Information:
Number of: Cross Sections = 26 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: Reach A1
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A1\MDA1.f01

Flow Data (cfs)

River	Reach	RS	1/3	2/3	Full
MCMICKEN DAM	A1	20.05	25000	55000	90000
MCMICKEN DAM	A1	19.55	25000	51000	75500
MCMICKEN DAM	A1	19.22	21000	46000	70000
MCMICKEN DAM	A1	19.19	23000	48000	72000
MCMICKEN DAM	A1	18.78	23000	47000	69500
MCMICKEN DAM	A1	18.67	20000	39500	58000
MCMICKEN DAM	A1	18.50	17500	31500	44500
MCMICKEN DAM	A1	18.22	23000	28500	34500
MCMICKEN DAM	A1	17.33	22000	27000	32500
MCMICKEN DAM	A1	17.22	20500	25000	29500
MCMICKEN DAM	A1	17.17	20000	23500	28000
MCMICKEN DAM	A1	17.04	18000	21000	24500
MCMICKEN DAM	A1	16.87	17000	19500	22500
MCMICKEN DAM	A1	16.70	13500	15500	17500

MCMICKEN DAM	A1	16.53	6500	7500	8500
MCMICKEN DAM	A1	16.35	3000	3500	4000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MCMICKEN DAM	A1	1/3	Critical	Critical
MCMICKEN DAM	A1	2/3	Critical	Critical
MCMICKEN DAM	A1	Full	Critical	Critical

GEOMETRY DATA

Geometry Title: Reach A1
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A1\MDA1.g01

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 20.05

INPUT
Description: Upper limit of Model ADA1. Cross section located inside spillway exit.

1/3 Flow: 25,000 cfs
2/3 Flow: 55,000 cfs
Full
Flow: 90,000 cfs
Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8954	1360	8965	1360	8967	1359.7	8977	1358.3	8979	1358
8981	1357.64	8982	1357.54	8984	1357.11	8988	1355.94	8989	1355.83
8996	1354.38	8999	1354	9002	1353.59	9004	1353.01	9006	1352.6
9007	1352	9009	1352	9017	1351.23	9022	1351.18	9024	1351.25
9027	1351.3	9029	1351.27	9035	1351.44	9038	1351.46	9040	1351.45
9050	1351.4	9053	1351.44	9064	1351.57	9067	1351.55	9068	1351.53
9071	1351.4	9073	1351.4	9077	1351.31	9092	1351.26	9096	1351.2
9098	1351.47	9100	1351.58	9101	1351.6	9111	1351.6	9115	1351.65
9119	1351.57	9123	1351.43	9127	1351.36	9127	1351.4	9134	1351.04
9135	1351.09	9142	1352	9292	1352	9312	1351.8	9330	1351.6
9339	1351.5	9349	1351.36	9352	1351.32	9355	1351.3	9364	1351.15
9445	1350	9582	1350.41	9590	1350.42	9598	1350.4	9606	1350.43
9615	1350.44	9626	1350.44	9635	1350.45	9738	1350	10266	1350
10377	1350.88	10395	1350.9	10400	1350.9	10418	1350.92	10482	1350
10501	1350	10505	1350.02	10505	1350	10506	1350.02	10514	1350.01
10517	1350	10520	1350.06	10524	1350	10561	1350	10563	1350.17
10567	1350.28	10577	1350.58	10591	1350.9	10594	1350.96	10596	1351.06
10607	1350.87	10608	1350.9	10646	1350	10729	1350	10732	1350.26
10734	1350.3	10737	1350.3	10737	1350.32	10738	1350.32	10740	1350.34
10777	1351	10787	1351.1	10798	1351.19	10839	1350.45	10840	1350.41
10842	1350.4	10844	1350.46	10845	1350.46	10857	1350	10881	1350
10884	1350.12	10890	1350.27	10893	1350.35	10895	1350.38	10898	1350.5
10900	1350.61	10908	1350.92	10919	1351.11	10922	1351.14	10923	1351.2
10923	1351.17	10931	1351.3	10932	1351.36	10934	1351.42	10937	1351.5
10955	1351.83	10956	1351.85	10964	1352	10985	1352	10988	1352.3
10991	1352.69	10994	1353.01	11002	1354	11014	1356	11027	1358
11036	1360	11041	1360						

Manning's n Values num= 1

Sta	n Val
8954	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8965	11041	500.3	251.598	180	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1356.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.045	
W.S. Elev (ft)	1356.85	Reach Len. (ft)	500.30	251.60	180.00
Crit W.S. (ft)		Flow Area (sq ft)		12564.19	
E.G. Slope (ft/ft)	0.000321	Area (sq ft)		12564.19	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	2034.60	Top Width (ft)		2034.60	
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)		1.99	
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)		6.18	
Conv. Total (cfs)	1395818.1	Conv. (cfs)		1395818.1	
Length Wtd. (ft)	251.60	Wetted Per. (ft)		2035.95	
Min Ch El (ft)	1350.00	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.25	

Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	1.52	2442.39	0.01
C & E Loss (ft)	0.05	Cum SA (acres)	2.76	744.40	0.18

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1358.87	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.045	
W.S. Elev (ft)	1358.69	Reach Len. (ft)	500.30	251.60	180.00
Crit W.S. (ft)		Flow Area (sq ft)		16335.79	
E.G. Slope (ft/ft)	0.000656	Area (sq ft)		16335.79	
Q Total (cfs)	55000.00	Flow (cfs)		55000.00	
Top Width (ft)	2055.89	Top Width (ft)		2055.89	
Vel Total (ft/s)	3.37	Avg. Vel. (ft/s)		3.37	
Max Chl Dpth (ft)	8.69	Hydr. Depth (ft)		7.95	
Conv. Total (cfs)	2146734.5	Conv. (cfs)		2146734.5	
Length Wtd. (ft)	251.60	Wetted Per. (ft)		2057.58	
Min Ch El (ft)	1350.00	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		1.10	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	20.83	3280.13	1.18
C & E Loss (ft)	0.10	Cum SA (acres)	13.28	826.29	1.71

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1360.69	Element			
Vel Head (ft)	0.32	Wt. n-Val.	0.045	0.045	
W.S. Elev (ft)	1360.37	Reach Len. (ft)	500.30	251.60	180.00
Crit W.S. (ft)		Flow Area (sq ft)	4.11	19813.80	
E.G. Slope (ft/ft)	0.000936	Area (sq ft)	4.11	19813.80	
Q Total (cfs)	90000.00	Flow (cfs)	2.11	89997.90	
Top Width (ft)	2087.00	Top Width (ft)	11.00	2076.00	
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)	0.51	4.54	
Max Chl Dpth (ft)	10.37	Hydr. Depth (ft)	0.37	9.54	
Conv. Total (cfs)	2941715.0	Conv. (cfs)	68.8	2941646.3	
Length Wtd. (ft)	251.60	Wetted Per. (ft)	11.37	2078.30	
Min Ch El (ft)	1350.00	Shear (lb/sq ft)	0.02	0.56	
Alpha	1.00	Stream Power (lb/ft s)	0.01	2.53	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	46.46	4017.64	3.27
C & E Loss (ft)	0.13	Cum SA (acres)	19.08	874.97	2.48

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8965.00	9380.20	3402.55	1980.25	396.11	13.61	5.01	1.72
9380.20	9795.40	5660.98	2738.74	415.21	22.64	6.60	2.07
9795.40	10210.60	6022.95	2842.48	415.20	24.09	6.85	2.12
10210.60	10625.80	5468.47	2682.60	415.26	21.87	6.46	2.04
10625.80	RB 11041.00	4445.06	2320.11	394.17	17.78	5.89	1.92

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8965.00	9380.20	8116.08	2718.02	406.97	14.76	6.69	2.99
9380.20	9795.40	12232.00	3504.47	415.21	22.24	8.44	3.49
9795.40	10210.60	12841.62	3608.21	415.20	23.35	8.69	3.56
10210.60	10625.80	11906.21	3448.33	415.26	21.65	8.31	3.45
10625.80	RB 11041.00	9904.08	3056.77	404.94	18.01	7.56	3.24

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8954.00	8956.20	0.39	0.82	2.57	0.00	0.37	0.47
8956.20	8958.40	0.43	0.82	2.20	0.00	0.37	0.52
8958.40	8960.60	0.43	0.82	2.20	0.00	0.37	0.52
8960.60	8962.80	0.43	0.82	2.20	0.00	0.37	0.52
8962.80	8965.00	0.43	0.82	2.20	0.00	0.37	0.52
LB 8965.00	9380.20	13947.81	3410.93	416.28	15.50	8.22	4.09
9380.20	9795.40	19790.41	4203.34	415.21	21.99	10.12	4.71
9795.40	10210.60	20611.44	4307.08	415.20	22.90	10.37	4.79
10210.60	10625.80	19350.29	4147.21	415.26	21.50	9.99	4.67
10625.80	RB 11041.00	16297.93	3745.24	416.35	18.11	9.02	4.35

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 20.00

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 55,000 cfs
Full Flow: 90,000 cfs

Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8977	1360	8983	1358.89	8987	1358	8988	1358	8992	1357.19
8995	1356.48	8996	1356	9000	1354.73	9005	1354.5	9008	1354
9015	1354	9289	1354	9439	1354	9521	1354	10071	1354
10995	1354	11000	1355.04	11003	1355.5	11007	1356	11010	1356.7
11017	1358	11020	1358.84	11025	1360	11029	1360		

Manning's n Values num= 1

Sta	n Val
8977	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8977	11029	1004.4	500.615	360	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1356.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.040	
W.S. Elev (ft)	1356.03	Reach Len. (ft)	1004.40	500.61	360.00
Crit W.S. (ft)		Flow Area (sq ft)		4068.29	
E.G. Slope (ft/ft)	0.010700	Area (sq ft)		4068.29	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	2011.22	Top Width (ft)		2011.22	
Vel Total (ft/s)	6.15	Avg. Vel. (ft/s)		6.15	
Max Chl Dpth (ft)	2.03	Hydr. Depth (ft)		2.02	
Conv. Total (cfs)	241687.2	Conv. (cfs)		241687.2	
Length Wtd. (ft)	500.61	Wetted Per. (ft)		2011.65	
Min Ch El (ft)	1354.00	Shear (lb/sq ft)		1.35	
Alpha	1.00	Stream Power (lb/ft s)		8.30	
Frctn Loss (ft)	4.17	Cum Volume (acre-ft)	1.52	2394.36	0.01
C & E Loss (ft)	0.04	Cum SA (acres)	2.76	732.71	0.18

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1358.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.14	Wt. n-Val.		0.040	
W.S. Elev (ft)	1357.20	Reach Len. (ft)	1004.40	500.61	360.00
Crit W.S. (ft)		Flow Area (sq ft)		6414.23	
E.G. Slope (ft/ft)	0.011427	Area (sq ft)		6414.23	
Q Total (cfs)	55000.00	Flow (cfs)		55000.00	
Top Width (ft)	2020.72	Top Width (ft)		2020.72	
Vel Total (ft/s)	8.57	Avg. Vel. (ft/s)		8.57	
Max Chl Dpth (ft)	3.20	Hydr. Depth (ft)		3.17	
Conv. Total (cfs)	514516.8	Conv. (cfs)		514516.8	

Length Wtd. (ft)	500.61	Wetted Per. (ft)		2021.46	
Min Ch El (ft)	1354.00	Shear (lb/sq ft)		2.26	
Alpha	1.00	Stream Power (lb/ft s)		19.41	
Frctn Loss (ft)	3.79	Cum Volume (acre-ft)	20.83	3214.43	1.18
C & E Loss (ft)	0.12	Cum SA (acres)	13.28	814.52	1.71

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1360.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.60	Wt. n-Val.		0.040	
W.S. Elev (ft)	1358.40	Reach Len. (ft)	1004.40	500.61	360.00
Crit W.S. (ft)		Flow Area (sq ft)		8857.82	
E.G. Slope (ft/ft)	0.010521	Area (sq ft)		8857.82	
Q Total (cfs)	90000.00	Flow (cfs)		90000.00	
Top Width (ft)	2033.26	Top Width (ft)		2033.26	
Vel Total (ft/s)	10.16	Avg. Vel. (ft/s)		10.16	
Max Chl Dpth (ft)	4.40	Hydr. Depth (ft)		4.36	
Conv. Total (cfs)	877427.0	Conv. (cfs)		877427.0	
Length Wtd. (ft)	500.61	Wetted Per. (ft)		2034.25	
Min Ch El (ft)	1354.00	Shear (lb/sq ft)		2.86	
Alpha	1.00	Stream Power (lb/ft s)		29.06	
Frctn Loss (ft)	3.68	Cum Volume (acre-ft)	46.44	3934.84	3.27
C & E Loss (ft)	0.15	Cum SA (acres)	19.02	863.11	2.48

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8977.00	9387.40	4814.23	786.94	391.72	19.26	2.01	6.12
9387.40	9797.80	5150.39	834.88	410.40	20.60	2.03	6.17
9797.80	10208.20	5150.40	834.88	410.40	20.60	2.03	6.17
10208.20	10618.60	5150.39	834.88	410.40	20.60	2.03	6.17
10618.60	RB 11029.00	4734.60	776.72	388.73	18.94	2.00	6.10

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8977.00	9387.40	10605.33	1244.56	395.88	19.28	3.15	8.52
9387.40	9797.80	11313.56	1312.56	410.40	20.57	3.20	8.62
9797.80	10208.20	11313.59	1312.56	410.40	20.57	3.20	8.62
10208.20	10618.60	11313.56	1312.56	410.40	20.57	3.20	8.62
10618.60	RB 11029.00	10453.96	1232.00	394.38	19.01	3.13	8.49

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8977.00	9387.40	17335.65	1725.19	402.78	19.26	4.29	10.05
9387.40	9797.80	18499.21	1807.27	410.40	20.55	4.40	10.24
9797.80	10208.20	18499.25	1807.27	410.40	20.55	4.40	10.24
10208.20	10618.60	18499.21	1807.27	410.40	20.55	4.40	10.24
10618.60	RB 11029.00	17166.70	1710.81	400.27	19.07	4.28	10.03

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.91

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 55,000 cfs
Full Flow: 90,000 cfs

Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8943	1358	8952	1356.8	8960	1356	8966	1355.26	8969	1354.76
8975	1354	8977	1354	9022	1352.51	9030	1352.25	9033	1352.16
9038	1352	9068	1351.13	9105	1350	9112	1349.9	9118	1349.7
9168	1349.7	9172	1349.74	9184	1349.7	9314	1349.7	9318	1349.75
9330	1349.75	9352	1349.81	9357	1349.82	9399	1349.9	9502	1350
9577	1350	9586	1349.83	9587	1349.8	9590	1349.74	9692	1348.43
9748	1348.44	9752	1348.44	9766	1348.4	9767	1348.43	9782	1348.44
9785	1348.43	9801	1348.45	9807	1348.4	9838	1348.45	9844	1348.47
9863	1348.49	9869	1348.51	9891	1348.5	9897	1348.56	9920	1348.59
9929	1348.62	9962	1348.66	9972	1348.7	9984	1348.71	9993	1348.74
10003	1348.77	10017	1348.81	10027	1348.8	10044	1348.89	10062	1348.95
10070	1348.95	10279	1349.7	10353	1349.7	10486	1349.63	10498	1349.6
10505	1349.65	10521	1349.66	10541	1349.66	10547	1349.68	10570	1349.7
10594	1349.68	10599	1349.7	10685	1349.82	10697	1349.83	10710	1349.8
10711	1349.85	10787	1350	10879	1350	10895	1350.31	10897	1350.35
10900	1350.43	10907	1350.7	10916	1351.01	10933	1351.58	10934	1351.42
10936	1351.15	10940	1351.4	10945	1351.56	10948	1352	10950	1352
10951	1352.4	10958	1354	10965	1355.62	10966	1356	10970	1356.9
10974	1358	10977	1358.56	10982	1360				

Manning's n Values num= 1

Sta	n Val
8943	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8943	10982	961.1	607.058	504.4	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1352.41	Element			
Vel Head (ft)	0.46	Wt. n-Val.		0.040	
W.S. Elev (ft)	1351.95	Reach Len. (ft)	961.10	607.06	504.40
Crit W.S. (ft)		Flow Area (sq ft)		4585.98	
E.G. Slope (ft/ft)	0.006689	Area (sq ft)		4585.98	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	1907.93	Top Width (ft)		1907.93	
Vel Total (ft/s)	5.45	Avg. Vel. (ft/s)		5.45	
Max Chl Dpth (ft)	3.55	Hydr. Depth (ft)		2.40	
Conv. Total (cfs)	305674.7	Conv. (cfs)		305674.7	
Length Wtd. (ft)	607.06	Wetted Per. (ft)		1908.07	
Min Ch El (ft)	1348.40	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		5.47	
Frctn Loss (ft)	2.99	Cum Volume (acre-ft)	1.52	2344.63	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	2.76	710.19	0.18

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1354.43	Element			
Vel Head (ft)	0.74	Wt. n-Val.		0.040	
W.S. Elev (ft)	1353.69	Reach Len. (ft)	961.10	607.06	504.40
Crit W.S. (ft)		Flow Area (sq ft)		7952.44	
E.G. Slope (ft/ft)	0.005395	Area (sq ft)		7952.44	
Q Total (cfs)	55000.00	Flow (cfs)		55000.00	
Top Width (ft)	1970.11	Top Width (ft)		1970.11	
Vel Total (ft/s)	6.92	Avg. Vel. (ft/s)		6.92	
Max Chl Dpth (ft)	5.29	Hydr. Depth (ft)		4.04	
Conv. Total (cfs)	748830.9	Conv. (cfs)		748830.9	
Length Wtd. (ft)	607.06	Wetted Per. (ft)		1970.51	
Min Ch El (ft)	1348.40	Shear (lb/sq ft)		1.36	
Alpha	1.00	Stream Power (lb/ft s)		9.40	
Frctn Loss (ft)	2.82	Cum Volume (acre-ft)	20.83	3131.87	1.18
C & E Loss (ft)	0.06	Cum SA (acres)	13.28	791.58	1.71

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1356.17	Element			
Vel Head (ft)	1.09	Wt. n-Val.		0.040	
W.S. Elev (ft)	1355.08	Reach Len. (ft)	961.10	607.06	504.40
Crit W.S. (ft)		Flow Area (sq ft)		10724.42	

E.G. Slope (ft/ft)	0.005424	Area (sq ft)		10724.42	
Q Total (cfs)	90000.00	Flow (cfs)		90000.00	
Top Width (ft)	1995.59	Top Width (ft)		1995.59	
Vel Total (ft/s)	8.39	Avg. Vel. (ft/s)		8.39	
Max Chl Dpth (ft)	6.68	Hydr. Depth (ft)		5.37	
Conv. Total (cfs)	1222038.4	Conv. (cfs)		1222038.4	
Length Wtd. (ft)	607.06	Wetted Per. (ft)		1996.23	
Min Ch El (ft)	1348.40	Shear (lb/sq ft)		1.82	
Alpha	1.00	Stream Power (lb/ft s)		15.27	
Frctn Loss (ft)	2.64	Cum Volume (acre-ft)	46.44	3822.32	3.27
C & E Loss (ft)	0.12	Cum SA (acres)	19.02	839.96	2.48

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8943.00	9350.80	2848.76	610.84	311.10	11.40	1.96	4.66
9350.80	9758.60	5467.41	1006.53	407.81	21.87	2.47	5.43
9758.60	10166.40	8509.74	1312.51	407.80	34.04	3.22	6.48
10166.40	10574.20	4951.22	948.38	407.80	19.80	2.33	5.22
10574.20	RB 10982.00	3222.86	707.72	373.55	12.89	1.90	4.55

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8943.00	9350.80	7141.58	1197.34	364.35	12.98	3.29	5.96
9350.80	9758.60	12047.36	1714.16	407.81	21.90	4.20	7.03
9758.60	10166.40	15841.03	2020.14	407.80	28.80	4.95	7.84
10166.40	10574.20	11374.09	1656.00	407.80	20.68	4.06	6.87
10574.20	RB 10982.00	8595.93	1364.80	382.74	15.63	3.57	6.30

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8943.00	9350.80	12742.75	1724.15	383.87	14.16	4.49	7.39
9350.80	9758.60	19545.12	2283.24	407.81	21.72	5.60	8.56
9758.60	10166.40	24103.21	2589.23	407.80	26.78	6.35	9.31
10166.40	10574.20	18722.81	2225.09	407.80	20.80	5.46	8.41
10574.20	RB 10982.00	14886.11	1902.71	388.95	16.54	4.90	7.82

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.79

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 55,000 cfs
Full Flow: 90,000 cfs
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8272	1353.55	8289	1352.69	8289	1352.8	8301	1352	8383	1351.7
8436	1351.23	8522	1351.26	8537	1351.21	8553	1351.2	8567	1351.1
8583	1351.05	8598	1351	8705	1350.7	8718	1350.7	8732	1350.61
8762	1350.49	8785	1350.38	8817	1350.22	8820	1350.2	8860	1350.05
8864	1350.04	8879	1350	8905	1349.93	8915	1349.9	8967	1349.74
9001	1349.65	9022	1349.59	9026	1349.57	9036	1349.5	9043	1349.5
9137	1348.56	9159	1348.25	9177	1348	9186	1346.5	9190	1346
9252	1346	9258	1346.2	9263	1346.39	9300	1346.7	9400	1346.9
9500	1347.2	9600	1346.8	9700	1346.1	9732	1346	9918	1344.82
9932	1344.8	9945	1344.8	9959	1344.77	10007	1344.84	10019	1344.85
10031	1344.88	10046	1344.9	10059	1344.94	10072	1344.97	10086	1345
10105	1345.03	10120	1345	10143	1345.08	10155	1345.11	10202	1345.12
10228	1345.17	10239	1345.2	10257	1345.19	10280	1345.27	10291	1345.25
10301	1345.3	10311	1345.3	10323	1345.39	10330	1345.39	10364	1345.54
10405	1345.74	10408	1345.8	10456	1346	10457	1346.01	10645	1346.11
10653	1346.1	10672	1346	10684	1345.94	10795	1345.9	10800	1346

10805	1346	10835	1346.83	10839	1346.9	10842	1347	10861	1348
10865	1350	10869	1352	10875	1353.7				

Manning's n Values num= 1

Sta	n Val
8272	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8272	10875	1245.3	638.209	559.5	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1349.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.		0.040	
W.S. Elev (ft)	1349.03	Reach Len. (ft)	1245.30	638.21	559.50
Crit W.S. (ft)		Flow Area (sq ft)		5282.51	
E.G. Slope (ft/ft)	0.003789	Area (sq ft)		5282.51	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	1773.52	Top Width (ft)		1773.52	
Vel Total (ft/s)	4.73	Avg. Vel. (ft/s)		4.73	
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)		2.98	
Conv. Total (cfs)	406164.9	Conv. (cfs)		406164.9	
Length Wtd. (ft)	638.21	Wetted Per. (ft)		1773.99	
Min Ch El (ft)	1344.77	Shear (lb/sq ft)		0.70	
Alpha	1.00	Stream Power (lb/ft s)		3.33	
Frctn Loss (ft)	3.22	Cum Volume (acre-ft)	1.52	2275.87	0.01
C & E Loss (ft)	0.02	Cum SA (acres)	2.76	684.54	0.18

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1351.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.		0.040	
W.S. Elev (ft)	1350.99	Reach Len. (ft)	1245.30	638.21	559.50
Crit W.S. (ft)		Flow Area (sq ft)		9173.22	
E.G. Slope (ft/ft)	0.004042	Area (sq ft)		9173.22	
Q Total (cfs)	55000.00	Flow (cfs)		55000.00	
Top Width (ft)	2267.03	Top Width (ft)		2267.03	
Vel Total (ft/s)	6.00	Avg. Vel. (ft/s)		6.00	
Max Chl Dpth (ft)	6.22	Hydr. Depth (ft)		4.05	
Conv. Total (cfs)	865061.5	Conv. (cfs)		865061.5	
Length Wtd. (ft)	638.21	Wetted Per. (ft)		2267.96	
Min Ch El (ft)	1344.77	Shear (lb/sq ft)		1.02	
Alpha	1.00	Stream Power (lb/ft s)		6.12	
Frctn Loss (ft)	3.07	Cum Volume (acre-ft)	20.83	3012.54	1.18
C & E Loss (ft)	0.04	Cum SA (acres)	13.28	762.06	1.71

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1353.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.		0.040	
W.S. Elev (ft)	1352.73	Reach Len. (ft)	1245.30	638.21	559.50
Crit W.S. (ft)		Flow Area (sq ft)		13500.97	
E.G. Slope (ft/ft)	0.003551	Area (sq ft)		13500.97	
Q Total (cfs)	90000.00	Flow (cfs)		90000.00	
Top Width (ft)	2582.24	Top Width (ft)		2582.24	
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)		6.67	
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)		5.23	
Conv. Total (cfs)	1510297.8	Conv. (cfs)		1510297.8	
Length Wtd. (ft)	638.21	Wetted Per. (ft)		2583.58	
Min Ch El (ft)	1344.77	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)		7.72	
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)	46.44	3653.51	3.27
C & E Loss (ft)	0.07	Cum SA (acres)	19.02	808.06	2.48

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8792.60	9313.20	1363.38	410.88	223.82	5.45	1.84	3.32
9313.20	9833.80	5231.19	1290.48	520.61	20.92	2.48	4.05

9833.80	10354.40	11486.92	2068.76	520.60	45.95	3.97	5.55
10354.40	RB 10875.00	6918.50	1512.40	508.96	27.67	2.97	4.57

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8272.00	8792.60	51.06	55.07	192.64	0.09	0.29	0.93
8792.60	9313.20	4503.54	1204.99	520.77	8.19	2.31	3.74
9313.20	9833.80	13333.91	2310.83	520.61	24.24	4.44	5.77
9833.80	10354.40	21630.66	3089.12	520.60	39.33	5.93	7.00
10354.40	RB 10875.00	15480.83	2513.21	513.34	28.15	4.90	6.16

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8272.00	8792.60	2120.48	783.67	503.34	2.36	1.56	2.71
8792.60	9313.20	10779.36	2107.40	520.77	11.98	4.05	5.12
9313.20	9833.80	21777.83	3213.24	520.61	24.20	6.17	6.78
9833.80	10354.40	31261.52	3991.53	520.60	34.74	7.67	7.83
10354.40	RB 10875.00	24060.81	3405.14	518.26	26.73	6.58	7.07

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.67

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 55,000 cfs
Full Flow: 90,000 cfs
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8324	1349.85	8328	1349.8	8346	1349.34	8359	1349.1	8362	1348.97
8366	1348.89	8388	1348.32	8402	1348.24	8415	1348	8565	1348
8586	1347.8	8598	1347.71	8615	1347.54	8623	1347.45	8673	1346.9
8718	1346.5	8762	1346.5	8774	1346	8780	1346	8787.55	1345.86
8850.47	1345.86	8875	1346	8898	1346	8913.4	1345.8	8989.93	1345.8
8998.43	1346	9006.93	1346	9015	1345.85	9020	1345.76	9026	1345.64
9033	1345.48	9064	1344.73	9065	1344.7	9065	1344.72	9066	1344.7
9114	1344.82	9119	1344.91	9128	1345.1	9133	1345.19	9143	1345.4
9161	1345.67	9167	1345.74	9179	1346	9215	1346	9247	1346
9266	1345.56	9279	1345.32	9305	1345.09	9343	1344.52	9344	1344.52
9378	1344	9569	1344	9576	1343.93	9577	1343.9	9596	1343.71
9599	1343.72	9619	1343.48	9859	1342	9968	1342	10055	1341.51
10065	1341.5	10086	1341.49	10092	1341.48	10201	1341.65	10242	1341.83
10243	1341.83	10286	1342	10339	1342.24	10374	1342.37	10402	1342.5
10424	1342.58	10429	1342.62	10447	1342.72	10458	1342.77	10472	1342.9
10484	1342.94	10495	1342.99	10503	1343.02	10596	1343.2	10601	1343.1
10605	1343.14	10612	1343.06	10621	1342.97	10633	1342.84	10635	1342.8
10672	1342.44	10676	1342.4	10679	1342.37	10684	1342.25	10689	1342
10703	1342	10729	1343.31	10737	1343.67	10742	1344	10744	1344.59
10750	1346	10754	1347.28	10757	1348	10761	1348.9	10765	1350
10772	1350								

Manning's n Values num= 1

Sta	n Val
8324	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9215 10772 694.9 647.249 619 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
8324	9215	1350

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1346.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.		0.040	
W.S. Elev (ft)	1345.56	Reach Len. (ft)	694.90	647.25	619.00

Crit W.S. (ft)	1344.82	Flow Area (sq ft)		4083.20	
E.G. Slope (ft/ft)	0.007035	Area (sq ft)	68.19	4083.20	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	1606.01	Top Width (ft)	123.98	1482.03	
Vel Total (ft/s)	6.12	Avg. Vel. (ft/s)		6.12	
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)		2.76	
Conv. Total (cfs)	298063.6	Conv. (cfs)		298063.6	
Length Wtd. (ft)	647.25	Wetted Per. (ft)		1482.31	
Min Ch El (ft)	1341.48	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		7.41	
Frctn Loss (ft)	2.52	Cum Volume (acre-ft)	0.54	2207.26	0.01
C & E Loss (ft)	0.07	Cum SA (acres)	0.99	660.69	0.18

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1348.45	Element			
Vel Head (ft)	0.95	Wt. n-Val.		0.040	
W.S. Elev (ft)	1347.50	Reach Len. (ft)	694.90	647.25	619.00
Crit W.S. (ft)	1346.32	Flow Area (sq ft)		7047.47	
E.G. Slope (ft/ft)	0.005811	Area (sq ft)	935.20	7047.47	
Q Total (cfs)	55000.00	Flow (cfs)		55000.00	
Top Width (ft)	2136.30	Top Width (ft)	596.39	1539.91	
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		7.80	
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)		4.58	
Conv. Total (cfs)	721472.3	Conv. (cfs)		721472.3	
Length Wtd. (ft)	647.25	Wetted Per. (ft)		1540.48	
Min Ch El (ft)	1341.48	Shear (lb/sq ft)		1.66	
Alpha	1.00	Stream Power (lb/ft s)		12.95	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)	7.46	2893.71	1.18
C & E Loss (ft)	0.10	Cum SA (acres)	4.76	734.17	1.71

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1350.44	Element			
Vel Head (ft)	1.43	Wt. n-Val.		0.040	
W.S. Elev (ft)	1349.01	Reach Len. (ft)	694.90	647.25	619.00
Crit W.S. (ft)	1347.64	Flow Area (sq ft)		9377.08	
E.G. Slope (ft/ft)	0.006041	Area (sq ft)	2085.12	9377.08	
Q Total (cfs)	90000.00	Flow (cfs)		90000.00	
Top Width (ft)	2400.30	Top Width (ft)	853.90	1546.40	
Vel Total (ft/s)	9.60	Avg. Vel. (ft/s)		9.60	
Max Chl Dpth (ft)	7.53	Hydr. Depth (ft)		6.06	
Conv. Total (cfs)	1157963.9	Conv. (cfs)		1157963.9	
Length Wtd. (ft)	647.25	Wetted Per. (ft)		1547.14	
Min Ch El (ft)	1341.48	Shear (lb/sq ft)		2.29	
Alpha	1.00	Stream Power (lb/ft s)		21.94	
Frctn Loss (ft)	2.59	Cum Volume (acre-ft)	16.63	3485.92	3.27
C & E Loss (ft)	0.17	Cum SA (acres)	6.81	777.81	2.48

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9215.00	9526.40	1058.49	315.80	260.32	4.23	1.21	3.35
9526.40	9837.80	4055.57	759.55	311.41	16.22	2.44	5.34
9837.80	10149.20	8378.10	1173.84	311.40	33.51	3.77	7.14
10149.20	10460.60	7251.33	1076.39	311.40	29.01	3.46	6.74
10460.60	RB 10772.00	4256.52	757.62	287.78	17.03	2.64	5.62

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9215.00	9526.40	5055.89	901.89	311.42	9.19	2.90	5.61
9526.40	9837.80	10074.71	1363.99	311.41	18.32	4.38	7.39
9837.80	10149.20	15675.45	1778.28	311.40	28.50	5.71	8.81
10149.20	10460.60	14270.13	1680.83	311.40	25.95	5.40	8.49
10460.60	RB 10772.00	9923.82	1322.48	294.85	18.04	4.49	7.50

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9215.00	9526.40	10488.74	1372.00	311.42	11.65	4.41	7.64
9526.40	9837.80	17015.53	1834.09	311.41	18.91	5.89	9.28
9837.80	10149.20	23892.77	2248.38	311.40	26.55	7.22	10.63
10149.20	10460.60	22191.93	2150.94	311.40	24.66	6.91	10.32
10460.60	RB 10772.00	16411.03	1771.68	301.51	18.23	5.89	9.26

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.55

INPUT
Description: Flow spilits into two models, Model ADA1 and ADA2 for the 2/3 Flow and Full Flow.

1/3 Flow: 25,000 cfs
2/3 Flow: 51,000 cfs
Full Flow: 75,500 cfs
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9300	1342	9347	1341.7	9370	1341.2	9375	1341.13	9381	1341.01
9392	1340.61	9394	1340.53	9397	1340.4	9399	1340.39	9400	1340.33
9401	1340.24	9407	1340.1	9428	1340	9505	1340	9600	1339.7
9700	1339.6	9800	1339.3	9900	1339	10000	1338.5	10100	1338.2
10139	1338	10278	1338	10284	1338.06	10285	1338.05	10300	1338
10404	1338	10444	1338.69	10457	1338.87	10459	1338.92	10480	1339.3
10489	1339.43	10521	1340	10550	1340	10570	1340	10590	1339
10620	1339	10626	1340	10630	1342.3	10634	1344	10635	1344.52
10638	1346	10640	1346.75	10643	1348	10653	1348		

Manning's n Values num= 1

Sta	n Val
9300	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9300	10643	602.9	602.443	470.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9300	9300	

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1343.55	Element			
Vel Head (ft)	0.34	Wt. n-Val.		0.040	
W.S. Elev (ft)	1343.21	Reach Len. (ft)	602.90	602.44	470.50
Crit W.S. (ft)		Flow Area (sq ft)		5359.88	
E.G. Slope (ft/ft)	0.002469	Area (sq ft)		5359.88	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	1332.14	Top Width (ft)		1332.14	
Vel Total (ft/s)	4.66	Avg. Vel. (ft/s)		4.66	
Max Chl Dpth (ft)	5.21	Hydr. Depth (ft)		4.02	
Conv. Total (cfs)	503142.4	Conv. (cfs)		503142.4	
Length Wtd. (ft)	602.44	Wetted Per. (ft)		1334.30	
Min Ch El (ft)	1338.00	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		2.89	
Frctn Loss (ft)	3.07	Cum Volume (acre-ft)		2137.10	0.01
C & E Loss (ft)	0.12	Cum SA (acres)		639.78	0.18

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1345.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.040	
W.S. Elev (ft)	1345.34	Reach Len. (ft)	602.90	602.44	470.50
Crit W.S. (ft)		Flow Area (sq ft)		8206.90	
E.G. Slope (ft/ft)	0.002501	Area (sq ft)		8206.90	
Q Total (cfs)	51000.00	Flow (cfs)		51000.00	
Top Width (ft)	1336.67	Top Width (ft)		1336.67	
Vel Total (ft/s)	6.21	Avg. Vel. (ft/s)		6.21	
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)		6.14	
Conv. Total (cfs)	1019808.3	Conv. (cfs)		1019808.3	
Length Wtd. (ft)	602.44	Wetted Per. (ft)		1341.44	
Min Ch El (ft)	1338.00	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)		5.94	
Frctn Loss (ft)	3.00	Cum Volume (acre-ft)		2780.38	1.18
C & E Loss (ft)	0.13	Cum SA (acres)		712.80	1.71

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1347.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.85	Wt. n-Val.		0.040	
W.S. Elev (ft)	1346.83	Reach Len. (ft)	602.90	602.44	470.50
Crit W.S. (ft)		Flow Area (sq ft)		10191.83	
E.G. Slope (ft/ft)	0.002676	Area (sq ft)		10191.83	
Q Total (cfs)	75500.00	Flow (cfs)		75500.00	
Top Width (ft)	1340.18	Top Width (ft)		1340.18	
Vel Total (ft/s)	7.41	Avg. Vel. (ft/s)		7.41	
Max Chl Dpth (ft)	8.83	Hydr. Depth (ft)		7.60	
Conv. Total (cfs)	1459367.6	Conv. (cfs)		1459367.6	
Length Wtd. (ft)	602.44	Wetted Per. (ft)		1346.75	
Min Ch El (ft)	1338.00	Shear (lb/sq ft)		1.26	
Alpha	1.00	Stream Power (lb/ft s)		9.37	
Frctn Loss (ft)	3.15	Cum Volume (acre-ft)		3340.53	3.27
C & E Loss (ft)	0.14	Cum SA (acres)		756.37	2.48

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9300.00	9568.60	2498.12	720.73	269.84	9.99	2.68	3.47
9568.60	9837.20	4237.55	987.82	268.60	16.95	3.68	4.29
9837.20	10105.80	6018.25	1219.24	268.60	24.07	4.54	4.94
10105.80	10374.40	7538.00	1395.60	268.60	30.15	5.20	5.40
10374.40	RB 10643.00	4708.08	1036.49	258.66	18.83	4.02	4.54

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9300.00	9568.60	6723.00	1293.77	271.97	13.18	4.82	5.20
9568.60	9837.20	9268.64	1560.86	268.60	18.17	5.81	5.94
9837.20	10105.80	11670.44	1792.28	268.60	22.88	6.67	6.51
10105.80	10374.40	13646.52	1968.64	268.60	26.76	7.33	6.93
10374.40	RB 10643.00	9691.40	1591.35	263.67	19.00	6.07	6.09

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9300.00	9568.60	10878.17	1692.14	273.45	14.41	6.30	6.43
9568.60	9837.20	14054.67	1959.23	268.60	18.62	7.29	7.17
9837.20	10105.80	16929.09	2190.66	268.60	22.42	8.16	7.73
10105.80	10374.40	19261.03	2367.02	268.60	25.51	8.81	8.14
10374.40	RB 10643.00	14377.04	1982.78	267.49	19.04	7.46	7.25

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.43

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 51,000 cfs
Full Flow: 75,500 cfs
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9220	1341	9227	1341	9275	1340.61	9276	1340.62	9280	1340.65
9281	1340.66	9283	1340.6	9284	1340.64	9326	1340	9329	1340
9331	1339.9	9332	1339.92	9346	1339.56	9362	1339.19	9369	1339.1
9377	1338.96	9381	1338.9	9403	1338.92	9404	1338.92	9476	1338.6
9478	1338.5	9479	1338.49	9496	1338	9547	1338	9550	1337.96
9555	1337.9	9560	1337.82	9562	1337.81	9607	1337.2	9608	1337.18
9625	1336.96	9750	1336	9795	1336	9825	1335.58	9826	1335.6
9850	1335.42	9863	1335.34	9865	1335.33	9891	1335.13	9894	1335.1
9899	1335.11	9903	1335.11	9908	1335.1	9923	1334.94	10042	1334.2
10064	1334	10066	1334	10073	1333.94	10097	1333.79	10108	1333.7
10124	1333.17	10125	1333.22	10128	1333.4	10129	1333.23	10140	1333.6
10158	1333.42	10159	1333.44	10163	1333.3	10171	1333.4	10185	1333.56
10198	1333.51	10201	1333.65	10204	1333.89	10206	1334	10216	1334.82
10219	1335.05	10222	1335.28	10223	1335.34	10234	1336.11	10235	1336.24
10241	1337.05	10247	1337.84	10248	1337.91	10250	1338	10259	1338.5
10260	1338.59	10262	1338.73	10265	1338.98	10273	1340	10278	1340
10282	1340.24	10300	1340.8	10304	1340.96	10308	1341.3	10332	1342
10376	1342	10431	1341	10552.2	1341	10569	1340.6	10580	1340
10584	1339.78	10592	1339.11	10596	1338.9	10598	1339.06	10601	1339.33
10602	1339.4	10607	1339.1	10608	1339.22	10609	1339.27	10611	1339.49
10621	1340	10665	1340	10670	1342	10671	1342.05	10675	1344
10679	1345.54	10680	1346	10683	1347.14	10685	1348	10688	1349.27
10695	1350	10703	1352						

Manning's n Values num= 1

Sta	n Val
9220	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9220	10703	509.9	505.746	686.2	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9220	9220	

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1340.36	Element			
Vel Head (ft)	1.49	Wt. n-Val.		0.040	
W.S. Elev (ft)	1338.87	Reach Len. (ft)	509.90	505.75	686.20
Crit W.S. (ft)	1338.87	Flow Area (sq ft)		2550.24	
E.G. Slope (ft/ft)	0.016056	Area (sq ft)		2550.24	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	848.22	Top Width (ft)		848.22	
Vel Total (ft/s)	9.80	Avg. Vel. (ft/s)		9.80	
Max Chl Dpth (ft)	5.70	Hydr. Depth (ft)		3.01	
Conv. Total (cfs)	197298.0	Conv. (cfs)		197298.0	

Length Wtd. (ft)	505.75	Wetted Per. (ft)	848.53	
Min Ch El (ft)	1333.17	Shear (lb/sq ft)	3.01	
Alpha	1.00	Stream Power (lb/ft s)	29.53	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	2082.40	0.01
C & E Loss (ft)	0.42	Cum SA (acres)	624.71	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1342.82	Element			
Vel Head (ft)	1.89	Wt. n-Val.		0.040	
W.S. Elev (ft)	1340.92	Reach Len. (ft)	509.90	505.75	686.20
Crit W.S. (ft)	1340.92	Flow Area (sq ft)		4618.61	
E.G. Slope (ft/ft)	0.014309	Area (sq ft)		4618.61	
Q Total (cfs)	51000.00	Flow (cfs)		51000.00	
Top Width (ft)	1178.33	Top Width (ft)		1178.33	
Vel Total (ft/s)	11.04	Avg. Vel. (ft/s)		11.04	
Max Chl Dpth (ft)	7.75	Hydr. Depth (ft)		3.92	
Conv. Total (cfs)	426349.3	Conv. (cfs)		426349.3	
Length Wtd. (ft)	505.75	Wetted Per. (ft)		1179.05	
Min Ch El (ft)	1333.17	Shear (lb/sq ft)		3.50	
Alpha	1.00	Stream Power (lb/ft s)		38.64	
Frctn Loss (ft)	1.06	Cum Volume (acre-ft)		2691.69	1.18
C & E Loss (ft)	0.51	Cum SA (acres)		695.41	1.71

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1344.39	Element			
Vel Head (ft)	2.21	Wt. n-Val.		0.040	
W.S. Elev (ft)	1342.18	Reach Len. (ft)	509.90	505.75	686.20
Crit W.S. (ft)	1342.18	Flow Area (sq ft)		6329.99	
E.G. Slope (ft/ft)	0.014495	Area (sq ft)		6329.99	
Q Total (cfs)	75500.00	Flow (cfs)		75500.00	
Top Width (ft)	1451.26	Top Width (ft)		1451.26	
Vel Total (ft/s)	11.93	Avg. Vel. (ft/s)		11.93	
Max Chl Dpth (ft)	9.01	Hydr. Depth (ft)		4.36	
Conv. Total (cfs)	627107.9	Conv. (cfs)		627107.9	
Length Wtd. (ft)	505.75	Wetted Per. (ft)		1453.44	
Min Ch El (ft)	1333.17	Shear (lb/sq ft)		3.94	
Alpha	1.00	Stream Power (lb/ft s)		47.01	
Frctn Loss (ft)	1.36	Cum Volume (acre-ft)		3226.28	3.27
C & E Loss (ft)	0.57	Cum SA (acres)		737.06	2.48

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9220.00	9516.60	81.75	37.68	101.16	0.33	0.37	2.17
9516.60	9813.20	4213.22	616.88	296.61	16.85	2.08	6.83
9813.20	10109.80	13431.80	1236.84	296.61	53.73	4.17	10.86
10109.80	10406.40	7273.22	658.84	154.15	29.09	4.28	11.04

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9220.00	9516.60	2239.98	431.32	280.06	4.39	1.54	5.19
9516.60	9813.20	12293.66	1225.84	296.61	24.11	4.13	10.03
9813.20	10109.80	24318.39	1845.79	296.61	47.68	6.22	13.18
10109.80	10406.40	11715.01	1004.11	193.63	22.97	5.20	11.67
10406.40	RB 10703.00	432.97	111.56	112.14	0.85	1.00	3.88

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9220.00	9516.60	6195.88	802.81	297.81	8.21	2.71	7.72
9516.60	9813.20	19572.81	1698.25	296.61	25.92	5.39	12.25
9813.20	10109.80	33800.05	2218.20	296.61	44.77	7.48	15.24
10109.80	10406.40	13619.84	1286.42	297.00	18.04	4.34	10.59
10406.40	RB 10703.00	2311.42	424.30	265.41	3.06	1.60	5.45

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.34

INPUT
Description: 1/3 Flow: 25,000 cfs
2/3 Flow: 51,000 cfs
Full Flow: 75,500 cfs
Station Elevation Data num= 142

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8980	1342	8995	1342	9000	1341.9	9001	1341.85	9013	1341.58
9014	1341.6	9019	1341.46	9022	1341.42	9030	1341.16	9036	1341.1
9037	1341.02	9038	1340.98	9049	1340.84	9050	1340.86	9063	1340.6
9065	1340.55	9067	1340.53	9072	1340.35	9074	1340.3	9076	1340.2
9076	1340.23	9080	1340.17	9083	1340.1	9093	1340.21	9097	1340.21

9100	1340.19	9109	1340	9113	1339.96	9120	1339.92	9131	1339.87
9133	1339.86	9135	1339.9	9137	1339.83	9150	1339.77	9151	1339.76
9164	1339.69	9165	1339.7	9169	1339.65	9173	1339.6	9178	1339.59
9195	1339.4	9196	1339.44	9214	1339.4	9222	1339.38	9229	1339.38
9237	1339.4	9250	1339.28	9269	1339.08	9273	1338.99	9275	1338.98
9284	1338.9	9291	1338.77	9297	1338.72	9316	1338	9355	1338
9357	1337.9	9358	1337.94	9532	1336	9570	1336	9587	1337.4
9598	1338	9625	1338	9627	1337.21	9629	1336	9630	1335.1
9632	1334	9633	1333.26	9636	1332.8	9637	1332.67	9640	1333.73
9641	1334	9646	1335.76	9647	1336	9649	1336.96	9651	1337.4
9666	1337.43	9677	1336.79	9677	1336.8	9678	1336.73	9679	1336.66
9683	1336.49	9690	1336.12	9693	1336	9696	1335.17	9700	1334
9703	1333.36	9707	1332.85	9715	1332.2	9716	1332.18	9718	1332
9913	1332	9915	1332.4	9926	1333.49	9927	1333.5	9937	1332
9944	1332	9952	1330.81	9956	1330	9965	1328.43	9968	1328
9970	1327.7	9971	1327.43	9979	1326	9984	1324.99	9985	1325
9996	1325.74	9997	1326	10000	1327.31	10001.6	132810006.24		1330
10010.86	133210047.13	133210077.91		133110270.07		133210273.54			1332
10279.05	133010290.45	1330	10328.1	133210334.71		133410376.32			1336
10385.08	133610419.46	133410647.79		1333.63	10706.9	133410719.63			1334.13
10729.25	133410960.56	1333.6611190.57		133411203.24		133611220.67			1338
11247.37	133811263.81	133611307.41		1334	11311.7	133211349.21			1332
11353.64	133411357.91	133611368.64		133611386.83		133611395.34			1338
11420.22	134011439.28	1350							

Manning's n Values num= 1

Sta	n Val
8980	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
898	11439.28	664.7	611.442	1880.6	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8980	8980	

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1339.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.040	
W.S. Elev (ft)	1339.23	Reach Len. (ft)	664.70	611.44	1880.60
Crit W.S. (ft)	1334.78	Flow Area (sq ft)		11236.19	
E.G. Slope (ft/ft)	0.000399	Area (sq ft)		11236.19	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	2155.84	Top Width (ft)		2155.84	
Vel Total (ft/s)	2.22	Avg. Vel. (ft/s)		2.22	
Max Chl Dpth (ft)	14.24	Hydr. Depth (ft)		5.21	
Conv. Total (cfs)	1251737.3	Conv. (cfs)		1251737.3	
Length Wtd. (ft)	611.44	Wetted Per. (ft)		2163.62	
Min Ch El (ft)	1324.99	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.29	
Frctn Loss (ft)	0.65	Cum Volume (acre-ft)		2002.37	0.01
C & E Loss (ft)	0.04	Cum SA (acres)		607.27	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1340.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.040	
W.S. Elev (ft)	1340.66	Reach Len. (ft)	664.70	611.44	1880.60
Crit W.S. (ft)	1336.05	Flow Area (sq ft)		14501.92	
E.G. Slope (ft/ft)	0.000801	Area (sq ft)		14501.92	
Q Total (cfs)	51000.00	Flow (cfs)		51000.00	
Top Width (ft)	2361.38	Top Width (ft)		2361.38	
Vel Total (ft/s)	3.52	Avg. Vel. (ft/s)		3.52	
Max Chl Dpth (ft)	15.67	Hydr. Depth (ft)		6.14	
Conv. Total (cfs)	1802540.5	Conv. (cfs)		1802540.5	
Length Wtd. (ft)	611.44	Wetted Per. (ft)		2369.40	
Min Ch El (ft)	1324.99	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.08	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)		2580.70	1.18
C & E Loss (ft)	0.06	Cum SA (acres)		674.86	1.71

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1341.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.040	
W.S. Elev (ft)	1341.65	Reach Len. (ft)	664.70	611.44	1880.60
Crit W.S. (ft)	1337.08	Flow Area (sq ft)		16876.79	
E.G. Slope (ft/ft)	0.001090	Area (sq ft)		16876.79	
Q Total (cfs)	75500.00	Flow (cfs)		75500.00	
Top Width (ft)	2413.58	Top Width (ft)		2413.58	
Vel Total (ft/s)	4.47	Avg. Vel. (ft/s)		4.47	
Max Chl Dpth (ft)	16.66	Hydr. Depth (ft)		6.99	
Conv. Total (cfs)	2287279.0	Conv. (cfs)		2287279.0	
Length Wtd. (ft)	611.44	Wetted Per. (ft)		2421.86	
Min Ch El (ft)	1324.99	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.12	
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)		3091.56	3.27
C & E Loss (ft)	0.07	Cum SA (acres)		714.63	2.48

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9471.86	258.60	298.03	217.09	1.03	1.37	0.87
9471.86	9963.71	5273.39	2530.26	495.10	21.09	5.14	2.08
9963.71	10455.57	9604.62	3623.46	494.32	38.42	7.37	2.65
10455.57	10947.42	5748.96	2657.80	491.86	23.00	5.40	2.16
10947.42	RB 11439.28	4114.43	2126.63	465.25	16.46	4.59	1.93

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9471.86	1178.25	783.63	411.84	2.31	1.90	1.50
9471.86	9963.71	11059.42	3232.92	495.10	21.69	6.57	3.42
9963.71	10455.57	17990.01	4326.12	494.32	35.27	8.80	4.16
10455.57	10947.42	11847.93	3360.46	491.86	23.23	6.83	3.53
10947.42	RB 11439.28	8924.39	2798.78	476.28	17.50	5.90	3.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9471.86	2683.41	1219.61	462.15	3.55	2.64	2.20
9471.86	9963.71	16455.44	3721.83	495.10	21.80	7.57	4.42
9963.71	10455.57	25303.08	4815.04	494.32	33.51	9.79	5.26
10455.57	10947.42	17482.44	3849.37	491.86	23.16	7.83	4.54
10947.42	RB 11439.28	13575.62	3270.94	478.42	17.98	6.87	4.15

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.22

INPUT
Description: Railroad at 7835; Grand Avenue 7970-8010; southern edge Beardsley Canal 13380. Flow exits Model ADA1. Flow travels east along outlet channel.

1/3 Flow: 21,000 cfs
2/3 Flow: 46,000

```
            cfs
Full Flow:  70,000 cfs
Station Elevation Data     num=      22
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 9174.19 1339.51     9385     1338     9400     1337     9430     1337     9470     1338
    9505     1338     9885     1337    11821     1337    12950     133813075.93     1338
13236.91     133613266.48     133613350.92     133613354.25     1334 13356.7     1332
13387.21     1332 13388.5     133413393.52     133613413.91     133813419.02     1340
13424.25     134213429.52     1344

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
 9174.19    .03513350.92     .0113393.52    .035

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9174.1913429.52             151.5 159.042   602.9            .1        .3
Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
13350.9213429.52    1336

CROSS SECTION OUTPUT     Profile #1/3

  E.G. Elev (ft)            1338.61   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.48   Wt. n-Val.                            0.035
  W.S. Elev (ft)            1338.13   Reach Len. (ft)            151.50     159.04     602.90
  Crit W.S. (ft)            1338.13   Flow Area (sq ft)                    3787.33
  E.G. Slope (ft/ft)       0.018421   Area (sq ft)                         3787.33
  Q Total (cfs)            21000.00   Flow (cfs)                          21000.00
  Top Width (ft)            4048.09   Top Width (ft)                       4048.09
  Vel Total (ft/s)             5.54   Avg. Vel. (ft/s)                        5.54
  Max Chl Dpth (ft)            2.13   Hydr. Depth (ft)                        0.94
  Conv. Total (cfs)        154725.9   Conv. (cfs)                         154725.9
  Length Wtd. (ft)           159.04   Wetted Per. (ft)                     4048.27
  Min Ch El (ft)            1336.00   Shear (lb/sq ft)                        1.08
  Alpha                        1.00   Stream Power (lb/ft s)                  5.97
  Frctn Loss (ft)              0.87   Cum Volume (acre-ft)                 1896.93       0.01
  C & E Loss (ft)              0.10   Cum SA (acres)                        563.73       0.18

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT     Profile #2/3

  E.G. Elev (ft)            1339.57   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.79   Wt. n-Val.                            0.035
  W.S. Elev (ft)            1338.79   Reach Len. (ft)            151.50     159.04     602.90
  Crit W.S. (ft)            1338.79   Flow Area (sq ft)                    6465.91
  E.G. Slope (ft/ft)       0.015323   Area (sq ft)                         6465.91
  Q Total (cfs)            46000.00   Flow (cfs)                          46000.00
  Top Width (ft)            4141.08   Top Width (ft)                       4141.08
  Vel Total (ft/s)             7.11   Avg. Vel. (ft/s)                        7.11
  Max Chl Dpth (ft)            2.79   Hydr. Depth (ft)                        1.56
  Conv. Total (cfs)        371603.4   Conv. (cfs)                         371603.4
  Length Wtd. (ft)           159.04   Wetted Per. (ft)                     4141.39
  Min Ch El (ft)            1336.00   Shear (lb/sq ft)                        1.49
  Alpha                        1.00   Stream Power (lb/ft s)                 10.63
  Frctn Loss (ft)              0.92   Cum Volume (acre-ft)                 2433.53       1.18
  C & E Loss (ft)              0.15   Cum SA (acres)                        629.22       1.71

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT     Profile #Full

  E.G. Elev (ft)            1340.33   Element                    Left OB    Channel   Right OB
```

Vel Head (ft)	1.03	Wt. n-Val.		0.035	
W.S. Elev (ft)	1339.30	Reach Len. (ft)	151.50	159.04	602.90
Crit W.S. (ft)	1339.30	Flow Area (sq ft)		8598.96	
E.G. Slope (ft/ft)	0.014044	Area (sq ft)		8598.96	
Q Total (cfs)	70000.00	Flow (cfs)		70000.00	
Top Width (ft)	4213.68	Top Width (ft)		4213.68	
Vel Total (ft/s)	8.14	Avg. Vel. (ft/s)		8.14	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		2.04	
Conv. Total (cfs)	590689.2	Conv. (cfs)		590689.2	
Length Wtd. (ft)	159.04	Wetted Per. (ft)		4214.08	
Min Ch El (ft)	1336.00	Shear (lb/sq ft)		1.79	
Alpha	1.00	Stream Power (lb/ft s)		14.56	
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)		2912.76	3.27
C & E Loss (ft)	0.19	Cum SA (acres)		668.11	2.48

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9174.19	10025.26	1952.14	475.39	659.13	9.30	0.72	4.11
10025.26	10876.32	5365.76	965.86	851.07	25.55	1.13	5.56
10876.32	11727.39	5365.76	965.86	851.07	25.55	1.13	5.56
11727.39	12578.45	3226.10	711.78	851.07	15.36	0.84	4.53
12578.45	RB 13429.52	5090.24	668.44	835.94	24.24	0.80	7.62

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9174.19	10025.26	5304.14	936.42	750.46	11.53	1.25	5.66
10025.26	10876.32	10966.24	1522.61	851.07	23.84	1.79	7.20
10876.32	11727.39	10966.22	1522.61	851.07	23.84	1.79	7.20
11727.39	12578.45	8089.22	1268.52	851.07	17.59	1.49	6.38
12578.45	RB 13429.52	10674.18	1215.75	837.73	23.20	1.45	8.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9174.19	10025.26	8779.05	1337.80	821.75	12.54	1.63	6.56
10025.26	10876.32	16169.69	1957.18	851.07	23.10	2.30	8.26
10876.32	11727.39	16169.67	1957.18	851.07	23.10	2.30	8.26
11727.39	12578.45	12824.71	1703.10	851.07	18.32	2.00	7.53
12578.45	RB 13429.52	16056.88	1643.71	839.13	22.94	1.96	9.77

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 19.19

INPUT
Description: 2,000 cfs traveling south from prinicpal outlet combines with Model ADA1 at Cross Section 19.19 for 1/3, 2/3 and Full Flow.

1/3 Flow: 23,000 cfs
2/3 Flow: 48,000 cfs
Full Flow:
72,000 cfs

Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9577.97	1328.98	9665	1328	9745	1328	9850	1328.6	9877	1328
9951	1328	10000	1325.5	10060	1324	10096	1326	10283	1326
10308	1329.5	10313	1329.7	10340	1329	10377	1329.5	10445	1328
10580	1327.6	10728	1329	10829	1328	10894	1327.7	11120	1328
11240	1327.5	11292	1328.1	11445	1327.2	11530	1327.9	11615	1327
11683	1327.4	11755	1326.8	11881	1327.7	11935	1327.6	11960	1327.4
12136	1327.6	12188	1327.6	12430	1330.3	12513	1331.9	12533	1332
12543	1328	12553	1332	12565	1332	12627	1330	12673	1330
12782	1328	12808	1328	12817	1330	12868	1330	12915	1329.1
13070	1328.8	13444.9	1330	13855.04	1332	13938.53	1334		

Manning's n Values num= 1

Sta	n Val
9577.97	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9577.9713938.53 970 867.821 770 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
9577.97	9577.97	

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1330.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.040	
W.S. Elev (ft)	1330.09	Reach Len. (ft)	970.00	867.82	770.00
Crit W.S. (ft)		Flow Area (sq ft)		7436.53	
E.G. Slope (ft/ft)	0.002719	Area (sq ft)		7436.53	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	3683.72	Top Width (ft)		3683.72	
Vel Total (ft/s)	3.09	Avg. Vel. (ft/s)		3.09	
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)		2.02	
Conv. Total (cfs)	441048.4	Conv. (cfs)		441048.4	
Length Wtd. (ft)	867.82	Wetted Per. (ft)		3686.37	
Min Ch El (ft)	1324.00	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		1.06	
Frctn Loss (ft)	4.13	Cum Volume (acre-ft)		1876.44	0.01
C & E Loss (ft)	0.03	Cum SA (acres)		549.61	0.18

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1331.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.040	
W.S. Elev (ft)	1331.16	Reach Len. (ft)	970.00	867.82	770.00
Crit W.S. (ft)		Flow Area (sq ft)		11525.29	
E.G. Slope (ft/ft)	0.003073	Area (sq ft)		11525.29	
Q Total (cfs)	48000.00	Flow (cfs)		48000.00	
Top Width (ft)	4002.94	Top Width (ft)		4002.94	
Vel Total (ft/s)	4.16	Avg. Vel. (ft/s)		4.16	

Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)	2.88	
Conv. Total (cfs)	865901.6	Conv. (cfs)	865901.6	
Length Wtd. (ft)	867.82	Wetted Per. (ft)	4007.09	
Min Ch El (ft)	1324.00	Shear (lb/sq ft)	0.55	
Alpha	1.00	Stream Power (lb/ft s)	2.30	
Frctn Loss (ft)	4.09	Cum Volume (acre-ft)	2400.69	1.18
C & E Loss (ft)	0.02	Cum SA (acres)	614.35	1.71

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1332.26	Element			
Vel Head (ft)	0.38	Wt. n-Val.		0.040	
W.S. Elev (ft)	1331.87	Reach Len. (ft)	970.00	867.82	770.00
Crit W.S. (ft)		Flow Area (sq ft)		14472.93	
E.G. Slope (ft/ft)	0.003466	Area (sq ft)		14472.93	
Q Total (cfs)	72000.00	Flow (cfs)		72000.00	
Top Width (ft)	4213.14	Top Width (ft)		4213.14	
Vel Total (ft/s)	4.97	Avg. Vel. (ft/s)		4.97	
Max Chl Dpth (ft)	7.87	Hydr. Depth (ft)		3.44	
Conv. Total (cfs)	1223030.6	Conv. (cfs)		1223030.6	
Length Wtd. (ft)	867.82	Wetted Per. (ft)		4218.30	
Min Ch El (ft)	1324.00	Shear (lb/sq ft)		0.74	
Alpha	1.00	Stream Power (lb/ft s)		3.69	
Frctn Loss (ft)	4.04	Cum Volume (acre-ft)		2870.64	3.27
C & E Loss (ft)	0.02	Cum SA (acres)		652.73	2.48

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9577.97	10450.08	8093.03	2345.73	873.65	35.19	2.69	3.45
10450.08	11322.19	5410.16	1840.92	872.13	23.52	2.11	2.94
11322.19	12194.31	7956.16	2320.22	872.13	34.59	2.66	3.43
12194.31	13066.42	1178.99	664.44	670.94	5.13	0.99	1.77
13066.42	RB 13938.53	361.66	265.21	397.51	1.57	0.67	1.36

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9577.97	10450.08	15271.82	3272.78	874.72	31.82	3.75	4.67
10450.08	11322.19	11574.12	2767.96	872.13	24.11	3.17	4.18
11322.19	12194.31	15103.77	3247.27	872.13	31.47	3.72	4.65
12194.31	13066.42	4191.60	1433.66	772.61	8.73	1.86	2.92
13066.42	RB 13938.53	1858.69	803.62	615.50	3.87	1.31	2.31

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9577.97	10450.08	21789.43	3898.54	875.43	30.26	4.47	5.59
10450.08	11322.19	17336.66	3393.73	872.13	24.08	3.89	5.11
11322.19	12194.31	21606.75	3873.03	872.13	30.01	4.44	5.58
12194.31	13066.42	7446.33	2009.58	835.96	10.34	2.41	3.71
13066.42	RB 13938.53	3820.83	1298.04	762.64	5.31	1.70	2.94

```
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.

CROSS SECTION          RIVER: MCMICKEN DAM
REACH: A1                 RS: 19.03

INPUT
Description: 1/3 Flow:  23,000 cfs
2/3 Flow:  48,000 cfs
Full Flow:  72,000
            cfs
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    9200    1330    9225    1328    9260    1328    9313    1326    9380    1324
    9437    1323    9465    1322    9490    1322    9515    1324    9527    1324
    9560    1322    9580    1322    9595    1322    9615    1322    9640  1322.1
    9660    1322    9713    1322    9720    1322    9740    1322    9752    1322
    9772    1324    9780    1326    9800    1326    9938    1326    9950    1328
    9955    1328    9980    1324   10000    1322   10040    1321   10050  1321.5
   10060    1322   10100  1322.2   10155    1322   10220  1322.5   10258  1322.1
   10300  1322.4   10426  1323.7   10495    1324   10595  1324.6   10720  1325.4
   10773  1325.6   10870  1325.7   10905  1325.7   10985  1325.4   11090  1324.7
   11163  1324.5   11250  1324.3   11327  1324.3   11407  1324.4   11480  1324.5
   11520  1324.6   11630  1324.6   11708  1324.6   11772  1324.5   11900    1325
   12000    1326   12057    1326   12080    1326   12150  1325.9   12200  1325.8
   12235    1326   12344  1326.1   12405  1326.1   12466    1326   12605    1324
12617.45    132412816.33    132612821.74    132612841.86  1324.7 12873.7    1326
12878.63    132612883.24    1324 12884.9    132412897.25    132612931.34    1326
12952.03    132613160.17    132613641.54    1328 13713.6    1330

Manning's n Values        num=       1
     Sta   n Val
    9200     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9200 13713.6            1782.71281.522   786.7            .1       .3

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1326.08   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.42   Wt. n-Val.                           0.040
  W.S. Elev (ft)            1325.66   Reach Len. (ft)          1782.70   1281.52     786.70
  Crit W.S. (ft)            1325.24   Flow Area (sq ft)                  4400.59
  E.G. Slope (ft/ft)       0.010383   Area (sq ft)                       4400.59
  Q Total (cfs)            23000.00   Flow (cfs)                        23000.00
  Top Width (ft)            2710.92   Top Width (ft)                     2710.92
  Vel Total (ft/s)             5.23   Avg. Vel. (ft/s)                      5.23
  Max Chl Dpth (ft)            4.66   Hydr. Depth (ft)                      1.62
  Conv. Total (cfs)        225717.8   Conv. (cfs)                       225717.8
  Length Wtd. (ft)          1281.52   Wetted Per. (ft)                   2712.26
  Min Ch El (ft)            1321.00   Shear (lb/sq ft)                      1.05
  Alpha                        1.00   Stream Power (lb/ft s)                5.50
  Frctn Loss (ft)              4.74   Cum Volume (acre-ft)               1758.53       0.01
  C & E Loss (ft)              0.08   Cum SA (acres)                      485.91       0.18

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

CROSS SECTION OUTPUT    Profile #2/3

  E.G. Elev (ft)            1327.31   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.48   Wt. n-Val.                           0.040
  W.S. Elev (ft)            1326.83   Reach Len. (ft)          1782.70   1281.52     786.70
  Crit W.S. (ft)                      Flow Area (sq ft)                  8636.81
  E.G. Slope (ft/ft)       0.008157   Area (sq ft)                       8636.81
  Q Total (cfs)            48000.00   Flow (cfs)                        48000.00
  Top Width (ft)            4049.45   Top Width (ft)                     4049.45
  Vel Total (ft/s)             5.56   Avg. Vel. (ft/s)                      5.56
  Max Chl Dpth (ft)            5.83   Hydr. Depth (ft)                      2.13
  Conv. Total (cfs)        531462.6   Conv. (cfs)                       531462.6
  Length Wtd. (ft)          1281.52   Wetted Per. (ft)                   4051.14
  Min Ch El (ft)            1321.00   Shear (lb/sq ft)                      1.09
  Alpha                        1.00   Stream Power (lb/ft s)                6.03
  Frctn Loss (ft)              4.52   Cum Volume (acre-ft)               2199.85       1.18
  C & E Loss (ft)              0.07   Cum SA (acres)                      534.14       1.71
```

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1328.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.		0.040	
W.S. Elev (ft)	1327.64	Reach Len. (ft)	1782.70	1281.52	786.70
Crit W.S. (ft)		Flow Area (sq ft)		11994.17	
E.G. Slope (ft/ft)	0.006602	Area (sq ft)		11994.17	
Q Total (cfs)	72000.00	Flow (cfs)		72000.00	
Top Width (ft)	4274.86	Top Width (ft)		4274.86	
Vel Total (ft/s)	6.00	Avg. Vel. (ft/s)		6.00	
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		2.81	
Conv. Total (cfs)	886095.0	Conv. (cfs)		886095.0	
Length Wtd. (ft)	1281.52	Wetted Per. (ft)		4276.69	
Min Ch El (ft)	1321.00	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)		6.94	
Frctn Loss (ft)	4.32	Cum Volume (acre-ft)		2607.00	3.27
C & E Loss (ft)	0.07	Cum SA (acres)		568.18	2.48

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9200.00	10102.72	12129.28	1745.03	588.05	52.74	2.97	6.95
10102.72	11005.44	6558.32	1375.96	816.55	28.51	1.69	4.77
11005.44	11908.16	3467.40	977.15	902.72	15.08	1.08	3.55
11908.16	12810.88	762.28	269.66	350.37	3.31	0.77	2.83
12810.88	RB 13713.60	82.72	32.78	54.57	0.36	0.61	2.52

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9200.00	10102.72	17531.45	2592.01	793.35	36.52	3.27	6.76
10102.72	11005.44	14448.95	2430.45	902.74	30.10	2.69	5.94
11005.44	11908.16	10739.92	2034.15	902.72	22.37	2.25	5.28
11908.16	12810.88	4172.29	1153.48	902.75	8.69	1.28	3.62
12810.88	RB 13713.60	1107.39	426.73	549.58	2.31	0.78	2.60

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9200.00	10102.72	22938.56	3243.77	824.75	31.86	3.94	7.07
10102.72	11005.44	20661.13	3158.62	902.74	28.70	3.50	6.54
11005.44	11908.16	16524.17	2762.32	902.72	22.95	3.06	5.98
11908.16	12810.88	8714.09	1881.65	902.75	12.10	2.08	4.63
12810.88	RB 13713.60	3162.05	947.82	743.73	4.39	1.28	3.34

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 18.78

INPUT
Description: Flow begins to weir into Estrella Freeway section for the 2/3 and Full Flow.

1/3 Flow: 23,000 cfs
2/3 Flow: 47,000 cfs
Full Flow: 69,500 cfs

Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8986.3	1325.23	8986.3	1319.23	9019.11	1315.62	9043.72	1314.3	9106.05	1314.3
9473.51	1314.3	9480.07	1316.32	9497.79	1319.27	9504.68	1319.62	9538.14	1320.29
9545.03	1320.42	9568	1319.11	9597.85	1320.42	9620.82	1320.29	9654.28	1319.62
9661.17	1319.27	9678.89	1316.32	9688.73	1315.62	9713.34	1318.9	9755.99	1314.8
9775.67	1314.3	9785.9	1315.11	9790.9	1314	9842.9	1314	9856.9	1315.33
9863.9	1316	9870.9	1316.54	9871.9	1316.57	9877.9	1316.96	9880.9	1317.14
9903.9	1316.57	9908.9	1316	9911.9	1315.34	9913.9	1315.1	9916.9	1314.58
9930.9	1315.06	9938.9	1315.57	9945.9	1314.31	9946.9	1314.1	9968.9	1314
10003.9	1314.4	10015.9	1314.89	10020.9	1315.54	10021.9	1315.53	10024.9	1316
10098.9	1316	10148.9	1316.2	10300.9	1316.9	10301.9	1316.94	10306.9	1316.93
10308.9	1316.94	10315.9	1316.94	10321.9	1316.9	10327.9	1316.94	10341.9	1317.05
10361.9	1317.28	10365.9	1317.28	10401.9	1317.9	10402.9	1317.92	10405.9	1318
10431.2	1317.91	10455.79	1318	10708.22	1319.19	10857.92	1319	10897.69	1317.91
10959.11	1318	11447.01	1320	11513.07	1320.46	11899.37	1320	11955.1	1319.3
12120.93	1320	12174.98	1320	12279.86	1319.45	12415.75	1320	12540.66	1320
12662.18	1322	13004.08	1324						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8986.3	.04	9480.07	.022	9688.73	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8986.3	13004.08	849.9	616.3	591.6276	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8986.3	9597.85	1324

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1321.26	Element			
Vel Head (ft)	0.14	Wt. n-Val.		0.039	
W.S. Elev (ft)	1321.11	Reach Len. (ft)	849.90	616.30	591.63
Crit W.S. (ft)	1319.25	Flow Area (sq ft)		7588.50	
E.G. Slope (ft/ft)	0.001877	Area (sq ft)		11013.58	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	3622.08	Top Width (ft)		3622.08	
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)		3.03	
Max Chl Dpth (ft)	7.11	Hydr. Depth (ft)		2.52	
Conv. Total (cfs)	530818.3	Conv. (cfs)		530818.3	
Length Wtd. (ft)	616.30	Wetted Per. (ft)		3012.00	
Min Ch El (ft)	1314.00	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		0.90	
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)		1531.79	0.01
C & E Loss (ft)	0.01	Cum SA (acres)		392.76	0.18

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1322.72	Element			
Vel Head (ft)	0.25	Wt. n-Val.		0.039	
W.S. Elev (ft)	1322.47	Reach Len. (ft)	849.90	616.30	591.63
Crit W.S. (ft)	1320.50	Flow Area (sq ft)		11722.97	
E.G. Slope (ft/ft)	0.001939	Area (sq ft)		15974.23	
Q Total (cfs)	47000.00	Flow (cfs)		47000.00	
Top Width (ft)	3755.47	Top Width (ft)		3755.47	
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)		4.01	
Max Chl Dpth (ft)	8.47	Hydr. Depth (ft)		3.73	
Conv. Total (cfs)	1067253.4	Conv. (cfs)		1067253.4	
Length Wtd. (ft)	616.26	Wetted Per. (ft)		3145.40	
Min Ch El (ft)	1314.00	Shear (lb/sq ft)		0.45	
Alpha	1.00	Stream Power (lb/ft s)		1.81	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)		1837.83	1.18
C & E Loss (ft)	0.01	Cum SA (acres)		419.33	1.71

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1323.81	Element			
Vel Head (ft)	0.33	Wt. n-Val.		0.039	
W.S. Elev (ft)	1323.47	Reach Len. (ft)	849.90	616.30	591.63
Crit W.S. (ft)	1321.13	Flow Area (sq ft)		14973.82	
E.G. Slope (ft/ft)	0.002009	Area (sq ft)		19840.58	

Q Total (cfs)	69500.00	Flow (cfs)	69500.00	
Top Width (ft)	3927.53	Top Width (ft)	3927.53	
Vel Total (ft/s)	4.64	Avg. Vel. (ft/s)	4.64	
Max Chl Dpth (ft)	9.47	Hydr. Depth (ft)	4.52	
Conv. Total (cfs)	1550703.1	Conv. (cfs)	1550703.1	
Length Wtd. (ft)	616.18	Wetted Per. (ft)	3317.46	
Min Ch El (ft)	1314.00	Shear (lb/sq ft)	0.57	
Alpha	1.00	Stream Power (lb/ft s)	2.63	
Frctn Loss (ft)	1.16	Cum Volume (acre-ft)	2138.71	3.27
C & E Loss (ft)	0.00	Cum SA (acres)	447.52	2.48

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8986.30	9789.86	2625.63	674.20	192.84	11.42	3.51	3.89
9789.86	10593.41	14101.49	3731.88	804.15	61.31	4.64	3.78
10593.41	11396.97	4282.54	1825.01	803.58	18.62	2.27	2.35
11396.97	12200.52	1260.22	876.01	803.57	5.48	1.09	1.44
12200.52	RB 13004.08	730.12	481.37	407.87	3.17	1.18	1.52

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8986.30	9789.86	5013.29	933.59	192.84	10.67	4.86	5.37
9789.86	10593.41	23764.04	4817.45	804.15	50.56	6.00	4.93
10593.41	11396.97	10265.91	2910.58	803.58	21.84	3.62	3.53
11396.97	12200.52	5318.37	1961.58	803.57	11.32	2.44	2.71
12200.52	RB 13004.08	2638.39	1099.76	541.27	5.61	2.03	2.40

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8986.30	9789.86	7153.25	1126.83	192.84	10.29	5.87	6.35
9789.86	10593.41	31793.53	5626.20	804.15	45.75	7.00	5.65
10593.41	11396.97	15957.37	3719.33	803.58	22.96	4.63	4.29
11396.97	12200.52	9766.61	2770.33	803.57	14.05	3.45	3.53
12200.52	RB 13004.08	4829.24	1731.09	713.32	6.95	2.43	2.79

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 18.67

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 18.80 and 18.68 and continues to fail until the flow reaches a point between cross section 18.68 and 18.24. This failure will allow flow to enter Sun City Grand for the 2/3 and Full Flow. This model models the ponding level as the flow wiers into the freeway.

1/3
Flow: 20,000 cfs
2/3 Flow: 39,500 cfs
Full Flow: 58,000 cfs
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530.84	1318.34	9530.84	1312.34	9550.53	1311.02	9757.22	1312.34	9913.06	1312.01
9919.62	1309.61	9937.34	1312.56	9944.23	1312.91	9977.69	1313.58	9984.58	1313.71
10007.55	1312.4	10037.4	1313.71	10060.37	1313.58	10093.83	1312.91	10100.72	1312.56
10118.44	1309.61	10144.69	1312.66	10167.41	1314	10185.49	1315	10196.01	1314
10207.84	1312	10251.77	1312	10264.04	1314	10274.82	1316	10298.44	1318
10305.49	1318	10318.11	1316	10327.44	1316	10346.64	1316.54	10363.14	1316
10443.51	1316	10474.1	1316.22	10570.34	1316	10626.63	1315.46	10713.64	1316
10891.64	1316.37	11415.53	1318	11517.33	1318.61	1579.19	1318	11762.64	1316.89
11915.2	1318	11918.72	1318	11924.75	1316	11936.79	1316	12438.44	1318
12741.53	1320	12989.22	1322						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9530.84	.02	210144.69	.04

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9530.8412741.53             874.5   861.8  281.37          .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 9530.8410305.49    1325
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1320.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.040	0.040
W.S. Elev (ft)	1320.15	Reach Len. (ft)	874.50	861.80	281.37
Crit W.S. (ft)	1318.33	Flow Area (sq ft)		7170.05	1.38
E.G. Slope (ft/ft)	0.001337	Area (sq ft)		13073.98	1.38
Q Total (cfs)	20000.00	Flow (cfs)		19999.67	0.33
Top Width (ft)	3229.15	Top Width (ft)		3210.69	18.46
Vel Total (ft/s)	2.79	Avg. Vel. (ft/s)		2.79	0.24
Max Chl Dpth (ft)	10.54	Hydr. Depth (ft)		2.94	0.07
Conv. Total (cfs)	546966.0	Conv. (cfs)		546956.9	9.0
Length Wtd. (ft)	861.79	Wetted Per. (ft)		2436.57	18.46
Min Ch El (ft)	1309.61	Shear (lb/sq ft)		0.25	0.01
Alpha	1.00	Stream Power (lb/ft s)		0.69	0.00
Frctn Loss (ft)	2.22	Cum Volume (acre-ft)		1361.39	0.00
C & E Loss (ft)	0.03	Cum SA (acres)		344.42	0.06

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1321.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.040	0.040
W.S. Elev (ft)	1321.38	Reach Len. (ft)	874.50	861.80	281.37
Crit W.S. (ft)	1319.16	Flow Area (sq ft)		10171.39	118.11
E.G. Slope (ft/ft)	0.001615	Area (sq ft)		17029.73	118.11
Q Total (cfs)	39500.00	Flow (cfs)		39362.26	137.74
Top Width (ft)	3381.73	Top Width (ft)		3210.69	171.04
Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)		3.87	1.17
Max Chl Dpth (ft)	11.77	Hydr. Depth (ft)		4.18	0.69
Conv. Total (cfs)	983030.4	Conv. (cfs)		979602.6	3427.9
Length Wtd. (ft)	860.67	Wetted Per. (ft)		2436.57	171.05
Min Ch El (ft)	1309.61	Shear (lb/sq ft)		0.42	0.07
Alpha	1.01	Stream Power (lb/ft s)		1.63	0.08
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)		1604.35	0.38
C & E Loss (ft)	0.04	Cum SA (acres)		370.05	0.55

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1322.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.040	0.040
W.S. Elev (ft)	1322.32	Reach Len. (ft)	874.50	861.80	281.37
Crit W.S. (ft)	1319.79	Flow Area (sq ft)		12448.33	325.91
E.G. Slope (ft/ft)	0.001751	Area (sq ft)		20030.74	325.91
Q Total (cfs)	58000.00	Flow (cfs)		57392.29	607.71
Top Width (ft)	3458.38	Top Width (ft)		3210.69	247.69
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)		4.61	1.86
Max Chl Dpth (ft)	12.71	Hydr. Depth (ft)		5.11	1.32
Conv. Total (cfs)	1386253.8	Conv. (cfs)		1371728.9	14524.9
Length Wtd. (ft)	858.36	Wetted Per. (ft)		2436.57	248.01
Min Ch El (ft)	1309.61	Shear (lb/sq ft)		0.56	0.14
Alpha	1.02	Stream Power (lb/ft s)		2.57	0.27
Frctn Loss (ft)	2.19	Cum Volume (acre-ft)		1856.66	1.05
C & E Loss (ft)	0.03	Cum SA (acres)		397.03	0.80

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta	Right Sta	Flow	Area	W.P.	% Conv.	Hydr D.	Velocity

(ft)	(ft)	(cfs)	(sq ft)	(ft)		(ft)	(ft/s)
10172.98	10815.12	7131.20	2106.24	509.81	35.66	4.13	3.39
10815.12	11457.25	5297.67	1932.65	642.14	26.49	3.01	2.74
11457.25	12099.39	4813.89	1825.11	642.47	24.07	2.84	2.64
12099.39	RB 12741.53	2756.90	1306.04	642.15	13.78	2.03	2.11
12741.53	12791.07	0.33	1.38	18.46	0.00	0.07	0.24

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
10172.98	10815.12	12302.69	2734.13	509.81	31.15	5.36	4.50
10815.12	11457.25	10481.93	2723.80	642.14	26.54	4.24	3.85
11457.25	12099.39	9797.96	2616.26	642.47	24.80	4.07	3.75
12099.39	RB 12741.53	6779.68	2097.19	642.15	17.16	3.27	3.23
12741.53	12791.07	82.97	58.51	49.54	0.21	1.18	1.42
12791.07	12840.61	41.65	38.69	49.54	0.11	0.78	1.08
12840.61	12890.14	12.59	18.88	49.54	0.03	0.38	0.67
12890.14	12939.68	0.52	2.03	22.43	0.00	0.09	0.26

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
10172.98	10815.12	16832.06	3210.48	509.81	29.02	6.30	5.24
10815.12	11457.25	15292.28	3324.00	642.14	26.37	5.18	4.60
11457.25	12099.39	14471.67	3216.46	642.47	24.95	5.01	4.50
12099.39	RB 12741.53	10796.28	2697.39	642.15	18.61	4.20	4.00
12741.53	12791.07	243.02	104.81	49.54	0.42	2.12	2.32
12791.07	12840.61	171.37	85.00	49.54	0.30	1.72	2.02
12840.61	12890.14	110.11	65.18	49.54	0.19	1.32	1.69
12890.14	12939.68	60.19	45.37	49.54	0.10	0.92	1.33
12939.68	12989.22	23.02	25.55	49.86	0.04	0.52	0.90

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 18.50

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 18.80 and 18.68 and continues to fail until the flow reaches a point between cross section 18.68 and 18.24. This failure will allow flow to enter Sun City Grand for the 2/3 and Full Flow. This model models the ponding level as the flow wiers into the freeway.

1/3
Flow: 17,500 cfs
2/3 Flow: 31,500 cfs
Full Flow: 44,500 cfs
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9665.92	1315.8	9665.92	1309.71	9889.02	1309.71	9930.03	1302.52	9936.59	1302.52
9954.31	1305.48	9961.2	1305.82	9994.66	1306.4910001.55	1306.6310024.52	1305.32		
10054.37	1306.6310077.34	1306.4910087.84	1305.8210094.73	1305.4810112.44	1302.52				
10145.25	1311.55 10182.3	131410193.53	1316 10273.2	1317.6710357.28	1316				
10378.87	131410412.97	131410509.08	1313.8710581.73	131410728.17	1316				
10935.26	1316 11393.5	1315.211742.96	131611886.04	131811980.92	1320				
12283.83	1322								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9665.92	.02210145.25		.04

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

```
      9665.9212283.83          1531.51477.866 820.094          .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 9665.92 10273.2    1322
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1318.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.46	Wt. n-Val.		0.040	
W.S. Elev (ft)	1317.56	Reach Len. (ft)	1531.50	1477.87	820.09
Crit W.S. (ft)	1317.04	Flow Area (sq ft)		3215.96	
E.G. Slope (ft/ft)	0.008289	Area (sq ft)		8230.33	
Q Total (cfs)	17500.00	Flow (cfs)		17500.00	
Top Width (ft)	2177.66	Top Width (ft)		2177.66	
Vel Total (ft/s)	5.44	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	15.04	Hydr. Depth (ft)		2.04	
Conv. Total (cfs)	192213.0	Conv. (cfs)		192213.0	
Length Wtd. (ft)	1477.87	Wetted Per. (ft)		1575.82	
Min Ch El (ft)	1302.52	Shear (lb/sq ft)		1.06	
Alpha	1.00	Stream Power (lb/ft s)		5.75	
Frctn Loss (ft)	5.35	Cum Volume (acre-ft)		1150.64	
C & E Loss (ft)	0.17	Cum SA (acres)		291.12	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1319.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.040	
W.S. Elev (ft)	1318.70	Reach Len. (ft)	1531.50	1477.87	820.09
Crit W.S. (ft)	1317.83	Flow Area (sq ft)		5066.77	
E.G. Slope (ft/ft)	0.006257	Area (sq ft)		10776.04	
Q Total (cfs)	31500.00	Flow (cfs)		31500.00	
Top Width (ft)	2253.50	Top Width (ft)		2253.50	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)		6.22	
Max Chl Dpth (ft)	16.18	Hydr. Depth (ft)		3.08	
Conv. Total (cfs)	398232.1	Conv. (cfs)		398232.1	
Length Wtd. (ft)	1477.87	Wetted Per. (ft)		1646.36	
Min Ch El (ft)	1302.52	Shear (lb/sq ft)		1.20	
Alpha	1.00	Stream Power (lb/ft s)		7.47	
Frctn Loss (ft)	5.18	Cum Volume (acre-ft)		1329.29	
C & E Loss (ft)	0.18	Cum SA (acres)		316.00	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1320.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.040	
W.S. Elev (ft)	1319.76	Reach Len. (ft)	1531.50	1477.87	820.09
Crit W.S. (ft)	1318.44	Flow Area (sq ft)		6833.13	
E.G. Slope (ft/ft)	0.004796	Area (sq ft)		13184.23	
Q Total (cfs)	44500.00	Flow (cfs)		44500.00	
Top Width (ft)	2303.64	Top Width (ft)		2303.64	
Vel Total (ft/s)	6.51	Avg. Vel. (ft/s)		6.51	
Max Chl Dpth (ft)	17.24	Hydr. Depth (ft)		4.03	
Conv. Total (cfs)	642583.2	Conv. (cfs)		642583.2	
Length Wtd. (ft)	1477.87	Wetted Per. (ft)		1696.51	
Min Ch El (ft)	1302.52	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		7.85	
Frctn Loss (ft)	4.77	Cum Volume (acre-ft)		1528.09	
C & E Loss (ft)	0.15	Cum SA (acres)		342.48	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
10189.50	10713.08	7672.04	1198.98	434.41	43.84	2.76	6.40
10713.08	11236.67	4176.88	897.04	523.58	23.87	1.71	4.66
11236.67	11760.25	5498.32	1057.89	523.58	31.42	2.02	5.20
11760.25	RB 12283.83	152.75	62.06	94.24	0.87	0.66	2.46

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
10189.50	10713.08	11974.01	1702.23	440.01	38.01	3.87	7.03
10713.08	11236.67	8602.27	1496.42	523.58	27.31	2.86	5.75
11236.67	11760.25	10197.89	1657.27	523.58	32.37	3.17	6.15
11760.25	RB 12283.83	725.82	210.84	159.19	2.30	1.32	3.44

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
10189.50	10713.08	15709.95	2167.14	440.01	35.30	4.93	7.25
10713.08	11236.67	12750.48	2049.79	523.58	28.65	3.91	6.22
11236.67	11760.25	14461.25	2210.64	523.58	32.50	4.22	6.54
11760.25	RB 12283.83	1578.33	405.56	209.34	3.55	1.94	3.89

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 18.22

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 18.80 and 18.68 and continues to fail until the flow reaches a point between cross section 18.68 and 18.24. This failure will allow flow to enter Sun City Grand for the 2/3 and Full Flow. This model models the ponding level as the flow wiers into the freeway.

1/3
Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500 cfs
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9840.61	1316.27	9845.53	1315.62	9868.5	1308.4	9875.06	1308.4	9916.07	1299.43
9922.63	1299.43	9940.35	1302.38	9947.24	1302.72	9980.7	1303.39	9987.59	1303.53
10010.56	1302.22	10040.41	1303.53	10063.38	1303.39	10073.88	1302.72	10080.77	1302.38
10098.49	1299.43	10150.98	1312.56	10173.94	1312.31	10237.09	1312	10240.09	1312.58
10244.09	1313.21	10248.09	1314	10271.09	1314	10285.09	1314.41	10291.09	1314.44
10295.09	1314.52	10296.09	1314.56	10303.09	1314.66	10305.09	1314.71	10311.09	1314.81
10315.09	1314.91	10317.09	1314.91	10341.09	1316	10497.09	1316	10501.09	1316.26

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9840.61	.04	9845.53	.022

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9840.61	10501.09	1215.41	8.097	1151.7	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1312.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.14	Wt. n-Val.		0.022	
W.S. Elev (ft)	1310.37	Reach Len. (ft)	1215.40	1018.10	1151.70
Crit W.S. (ft)		Flow Area (sq ft)		1960.53	
E.G. Slope (ft/ft)	0.002286	Area (sq ft)		1960.53	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	279.96	Top Width (ft)		279.96	
Vel Total (ft/s)	11.73	Avg. Vel. (ft/s)		11.73	
Max Chl Dpth (ft)	10.94	Hydr. Depth (ft)		7.00	
Conv. Total (cfs)	481010.7	Conv. (cfs)		481010.7	
Length Wtd. (ft)	1018.10	Wetted Per. (ft)		283.18	
Min Ch El (ft)	1299.43	Shear (lb/sq ft)		0.99	
Alpha	1.00	Stream Power (lb/ft s)		11.59	
Frctn Loss (ft)	1.97	Cum Volume (acre-ft)		977.77	
C & E Loss (ft)	0.12	Cum SA (acres)		249.43	

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1313.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.39	Wt. n-Val.		0.022	
W.S. Elev (ft)	1311.56	Reach Len. (ft)	1215.40	1018.10	1151.70
Crit W.S. (ft)		Flow Area (sq ft)		2299.35	
E.G. Slope (ft/ft)	0.002150	Area (sq ft)		2299.35	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	288.52	Top Width (ft)		288.52	
Vel Total (ft/s)	12.39	Avg. Vel. (ft/s)		12.39	
Max Chl Dpth (ft)	12.13	Hydr. Depth (ft)		7.97	
Conv. Total (cfs)	614601.3	Conv. (cfs)		614601.3	
Length Wtd. (ft)	1018.10	Wetted Per. (ft)		292.07	
Min Ch El (ft)	1299.43	Shear (lb/sq ft)		1.06	
Alpha	1.00	Stream Power (lb/ft s)		13.10	
Frctn Loss (ft)	1.97	Cum Volume (acre-ft)		1107.49	
C & E Loss (ft)	0.12	Cum SA (acres)		272.88	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1315.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.022	
W.S. Elev (ft)	1313.33	Reach Len. (ft)	1215.40	1018.10	1151.70
Crit W.S. (ft)		Flow Area (sq ft)		2920.95	
E.G. Slope (ft/ft)	0.002129	Area (sq ft)		2920.95	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	391.88	Top Width (ft)		391.88	
Vel Total (ft/s)	11.81	Avg. Vel. (ft/s)		11.81	
Max Chl Dpth (ft)	13.90	Hydr. Depth (ft)		7.45	
Conv. Total (cfs)	747632.1	Conv. (cfs)		747632.1	
Length Wtd. (ft)	1018.10	Wetted Per. (ft)		395.95	
Min Ch El (ft)	1299.43	Shear (lb/sq ft)		0.98	
Alpha	1.00	Stream Power (lb/ft s)		11.58	
Frctn Loss (ft)	2.20	Cum Volume (acre-ft)		1254.89	
C & E Loss (ft)	0.01	Cum SA (acres)		296.75	

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9840.61	9972.71	8784.18	765.00	111.99	38.19	6.93	11.48
9972.71	10104.80	12685.87	1020.53	132.63	55.16	7.73	12.43
10104.80	10236.90	1529.95	174.99	38.56	6.65	4.68	8.74

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9840.61	9972.71	10867.83	898.93	115.96	38.13	7.87	12.09
9972.71	10104.80	15593.63	1177.99	132.63	54.71	8.92	13.24
10104.80	10236.90	2038.54	222.42	43.47	7.15	5.27	9.17

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9840.61	9972.71	13316.54	1106.45	121.87	38.60	9.23	12.04
9972.71	10104.80	18900.65	1412.14	132.63	54.78	10.69	13.38
10104.80	10236.90	2272.11	397.20	133.52	6.59	3.01	5.72
10236.90	10368.99	10.70	5.15	7.92	0.03	0.66	2.08

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 18.03

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500
cfs
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9803.02	1317.01	9807.04	1316	9815.05	1314	9821.11	1311.02	9830.95	1311.024
9896.57	1292.95	9896.57	1297.29	9903.13	1297.29	9920.85	1300.25	9927.74	1300.59
9961.2	1301.26	9968.09	1301.4	9991.06	1300.09	10020.91	1301.41	10043.88	1301.26
10054.38	1300.59	10061.27	1300.25	10078.98	1297.29	10126.56	1312.56	10139.68	1308.5
10180.71	1312	10203.41	1314	10206.68	1314	10211.82	1312	10217.15	1310
10218.4	1309.86	10220.43	1310	10252.55	1312	10417.19	1314		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9803.02	.04	9815.05	.022	10180.71	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9803.02	10417.19	1218	1014.085	1014.6	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1310.41	Element			
Vel Head (ft)	1.75	Wt. n-Val.		0.022	
W.S. Elev (ft)	1308.66	Reach Len. (ft)	1218.00	1014.09	1014.60
Crit W.S. (ft)		Flow Area (sq ft)		2165.75	
E.G. Slope (ft/ft)	0.001664	Area (sq ft)		2165.75	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	277.31	Top Width (ft)		277.31	
Vel Total (ft/s)	10.62	Avg. Vel. (ft/s)		10.62	
Max Chl Dpth (ft)	15.71	Hydr. Depth (ft)		7.81	
Conv. Total (cfs)	563828.6	Conv. (cfs)		563828.6	
Length Wtd. (ft)	1014.09	Wetted Per. (ft)		286.19	
Min Ch El (ft)	1292.95	Shear (lb/sq ft)		0.79	
Alpha	1.00	Stream Power (lb/ft s)		8.35	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)		929.55	
C & E Loss (ft)	0.40	Cum SA (acres)		242.91	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The composite Mannings n value for the channel was larger than the largest entered n value or smaller than the smallest entered n value.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1311.86	Element			
Vel Head (ft)	2.00	Wt. n-Val.		0.022	
W.S. Elev (ft)	1309.86	Reach Len. (ft)	1218.00	1014.09	1014.60
Crit W.S. (ft)		Flow Area (sq ft)		2513.26	
E.G. Slope (ft/ft)	0.001751	Area (sq ft)		2513.26	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	303.29	Top Width (ft)		303.29	
Vel Total (ft/s)	11.34	Avg. Vel. (ft/s)		11.34	
Max Chl Dpth (ft)	16.91	Hydr. Depth (ft)		8.29	
Conv. Total (cfs)	681028.5	Conv. (cfs)		681028.5	
Length Wtd. (ft)	1014.09	Wetted Per. (ft)		312.75	

Min Ch El (ft)	1292.95	Shear (lb/sq ft)	0.88
Alpha	1.00	Stream Power (lb/ft s)	9.96
Frctn Loss (ft)	1.03	Cum Volume (acre-ft)	1051.25
C & E Loss (ft)	0.46	Cum SA (acres)	265.96

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The composite Mannings n value for the channel was larger than the largest entered n value or smaller than the smallest entered n value.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1313.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.14	Wt. n-Val.		0.023	
W.S. Elev (ft)	1311.14	Reach Len. (ft)	1218.00	1014.09	1014.60
Crit W.S. (ft)		Flow Area (sq ft)		2937.63	
E.G. Slope (ft/ft)	0.002203	Area (sq ft)		2937.63	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	365.46	Top Width (ft)		365.46	
Vel Total (ft/s)	11.74	Avg. Vel. (ft/s)		11.74	
Max Chl Dpth (ft)	18.19	Hydr. Depth (ft)		8.04	
Conv. Total (cfs)	735029.8	Conv. (cfs)		735029.8	
Length Wtd. (ft)	1014.08	Wetted Per. (ft)		375.82	
Min Ch El (ft)	1292.95	Shear (lb/sq ft)		1.08	
Alpha	1.00	Stream Power (lb/ft s)		12.63	
Frctn Loss (ft)	1.32	Cum Volume (acre-ft)		1186.43	
C & E Loss (ft)	0.49	Cum SA (acres)		287.90	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9803.02	9925.85	8060.61	739.52	93.04	35.05	8.57	10.90
9925.85	10048.69	10121.59	947.66	122.92	44.01	7.71	10.68
10048.69	10171.52	4817.80	478.58	70.23	20.95	7.02	10.07

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The composite Mannings n value for the channel was larger than the largest entered n value or smaller than the smallest entered n value.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9803.02	9925.85	9699.85	845.46	97.55	34.03	9.32	11.47
9925.85	10048.69	12789.13	1094.69	122.92	44.87	8.91	11.68
10048.69	10171.52	6011.02	573.11	92.28	21.09	6.38	10.49

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The composite Mannings n value for the channel was larger than the largest entered n value or smaller than the smallest entered n value.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9803.02	9925.85	11398.32	965.96	112.06	33.04	9.20	11.80
9925.85	10048.69	16518.18	1252.30	122.92	47.88	10.20	13.19
10048.69	10171.52	6564.75	703.18	115.92	19.03	6.22	9.34
10171.52	10294.36	18.75	16.19	24.92	0.05	0.66	1.16

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 17.84

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500 cfs
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9665.3	1316	9665.3	1310	9673.75	1308	9682.06	1306	9683.24	1305.12
9722.61	1306.43	9761	1296	9809.55	1282.81	9862.04	1282.81	9914.53	1295.16
9917.2	1296	9926.02	1298.11	9932.91	1298.46	9966.37	1299.13	9973.26	1299.27
9996.23	1297.95	10003.12	1299.27	10026.08	1299.13	10059.55	1298.46	10072.44	1298.11
10084.15	1295.16	10143.21	1312.56	10205.55	1308.51	10221.09	1308	10237.95	1308
10244.78	1310	10252.06	1312	10275.54	1312	10288.24	1312	10301.07	1308
10376.99	1308	10436.98	1310	10477.18	1310	10489.38	1310	10498.81	1311.73
10507.49	1310	10511.97	1308.87	10522.09	1310	10528.66	1310.31	10529.62	1310
10531.63	1308.56	10533.98	1310	10535.01	1310.58	10562.42	1310	10573.1	1312
10599.63	1311.75	10609.55	1312	10611.06	1312	10615.96	1311.52	10619.85	1312
10727.49	1312								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9665.3	.04	9761	.001	9917.2	.02	10221.09	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9665.31	10727.49	1798.31	1430.89	2 1159.6	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9665.3	9917.2	1296

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1309.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.026	
W.S. Elev (ft)	1308.72	Reach Len. (ft)	1798.30	1430.89	1159.60
Crit W.S. (ft)		Flow Area (sq ft)		4510.41	
E.G. Slope (ft/ft)	0.000533	Area (sq ft)		4510.41	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	600.58	Top Width (ft)		600.58	
Vel Total (ft/s)	5.10	Avg. Vel. (ft/s)		5.10	
Max Chl Dpth (ft)	13.56	Hydr. Depth (ft)		7.51	
Conv. Total (cfs)	996278.7	Conv. (cfs)		996278.7	
Length Wtd. (ft)	1430.89	Wetted Per. (ft)		605.66	
Min Ch El (ft)	1295.16	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		1.26	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)		851.84	
C & E Loss (ft)	0.04	Cum SA (acres)		232.70	

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1310.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.027	
W.S. Elev (ft)	1309.91	Reach Len. (ft)	1798.30	1430.89	1159.60
Crit W.S. (ft)		Flow Area (sq ft)		5278.96	
E.G. Slope (ft/ft)	0.000657	Area (sq ft)		5278.96	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	692.43	Top Width (ft)		692.43	
Vel Total (ft/s)	5.40	Avg. Vel. (ft/s)		5.40	
Max Chl Dpth (ft)	14.75	Hydr. Depth (ft)		7.62	
Conv. Total (cfs)	1111660.6	Conv. (cfs)		1111660.6	

Length Wtd. (ft)	1430.89	Wetted Per. (ft)	699.04
Min Ch El (ft)	1295.16	Shear (lb/sq ft)	0.31
Alpha	1.00	Stream Power (lb/ft s)	1.67
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	960.55
C & E Loss (ft)	0.04	Cum SA (acres)	254.37

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1311.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.029	
W.S. Elev (ft)	1310.97	Reach Len. (ft)	1798.30	1430.89	1159.60
Crit W.S. (ft)		Flow Area (sq ft)		6117.05	
E.G. Slope (ft/ft)	0.000861	Area (sq ft)		6117.05	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	830.92	Top Width (ft)		830.92	
Vel Total (ft/s)	5.64	Avg. Vel. (ft/s)		5.64	
Max Chl Dpth (ft)	15.81	Hydr. Depth (ft)		7.36	
Conv. Total (cfs)	1175807.6	Conv. (cfs)		1175807.6	
Length Wtd. (ft)	1430.89	Wetted Per. (ft)		839.49	
Min Ch El (ft)	1295.16	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		2.21	
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)		1081.03	
C & E Loss (ft)	0.05	Cum SA (acres)		273.98	

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9665.30	9877.74	16579.20	1908.89	209.07	72.08	9.22	8.69
9877.74	10090.18	6360.81	2280.28	213.50	27.66	10.73	2.79
10090.18	10302.61	57.65	259.50	86.39	0.25	3.07	0.22
10302.61	10515.05	2.34	61.70	96.10	0.01	0.64	0.04
10515.05	RB 10727.49	0.00	0.04	0.59	0.00	0.08	0.01

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9665.30	9877.74	20507.32	2158.33	214.24	71.96	10.18	9.50
9877.74	10090.18	7894.34	2533.15	213.50	27.70	11.92	3.12
10090.18	10302.61	84.09	380.34	120.88	0.30	3.21	0.22
10302.61	10515.05	14.08	202.17	139.19	0.05	1.45	0.07
10515.05	RB 10727.49	0.16	4.97	11.23	0.00	0.48	0.03

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9665.30	9877.74	24775.83	2383.36	215.59	71.81	11.22	10.40
9877.74	10090.18	9560.59	2758.19	213.50	27.71	12.98	3.47
10090.18	10302.61	123.72	522.01	151.72	0.36	3.50	0.24
10302.61	10515.05	37.53	408.37	204.90	0.11	2.00	0.09
10515.05	RB 10727.49	2.33	45.13	53.78	0.01	0.86	0.05

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 17.57

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500
cfs

Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9581.13	1312	9581.13	1306	9585.86	1306	9596.79	1304	9599.95	1301.84
9667.21	1302.08	9691.54	1296	9744.31	1282.81	9883.74	1282.81	9915.84	1296
9916.55	1296.29	9928.03	1299.24	9934.92	1299.59	9968.39	1300.26	9975.28	1300.39
9998.24	1299.08	10005.13	1300.39	10028.1	1300.26	10061.56	1299.59	10068.45	1299.24
10086.17	1296.29	10145.23	1312.56	10207.56	1308.51	10260.72	1308	10270.74	1310
10279.65	1312	10301	1312	10310.54	1310	10321.05	1308	10329.55	1306
10371.49	1304.21	10407.78	1306	10429.33	1308	10441.01	1308	10530.86	1306.89
10677.38	1308	11466.97	1310	11539.29	1312				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9581.13	.04	9599.95	.022	9691.54	.001	9915.84	.02	10260.72	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9581.13	11539.29	1242.31	1235.175	1655.3	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9581.13	9915.84	1296

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.31	Element			
Vel Head (ft)	0.27	Wt. n-Val.		0.027	
W.S. Elev (ft)	1308.04	Reach Len. (ft)	1242.30	1235.18	1655.30
Crit W.S. (ft)		Flow Area (sq ft)		5488.15	
E.G. Slope (ft/ft)	0.000553	Area (sq ft)		5488.15	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	923.87	Top Width (ft)		923.87	
Vel Total (ft/s)	4.19	Avg. Vel. (ft/s)		4.19	
Max Chl Dpth (ft)	12.04	Hydr. Depth (ft)		5.94	
Conv. Total (cfs)	978063.8	Conv. (cfs)		978063.8	
Length Wtd. (ft)	1235.18	Wetted Per. (ft)		930.39	
Min Ch El (ft)	1296.00	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.85	
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)		687.62	
C & E Loss (ft)	0.04	Cum SA (acres)		207.66	

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.17	Element			
Vel Head (ft)	0.31	Wt. n-Val.		0.030	
W.S. Elev (ft)	1308.86	Reach Len. (ft)	1242.30	1235.18	1655.30
Crit W.S. (ft)		Flow Area (sq ft)		6419.52	
E.G. Slope (ft/ft)	0.001011	Area (sq ft)		6419.52	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	1315.64	Top Width (ft)		1315.64	
Vel Total (ft/s)	4.44	Avg. Vel. (ft/s)		4.44	
Max Chl Dpth (ft)	12.86	Hydr. Depth (ft)		4.88	
Conv. Total (cfs)	896313.1	Conv. (cfs)		896313.1	
Length Wtd. (ft)	1235.18	Wetted Per. (ft)		1323.27	
Min Ch El (ft)	1296.00	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.36	
Frctn Loss (ft)	1.07	Cum Volume (acre-ft)		768.41	
C & E Loss (ft)	0.05	Cum SA (acres)		221.39	

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.91	Element			
Vel Head (ft)	0.33	Wt. n-Val.		0.032	
W.S. Elev (ft)	1309.58	Reach Len. (ft)	1242.30	1235.18	1655.30
Crit W.S. (ft)		Flow Area (sq ft)		7473.87	
E.G. Slope (ft/ft)	0.001315	Area (sq ft)		7473.87	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	1620.21	Top Width (ft)		1620.21	
Vel Total (ft/s)	4.62	Avg. Vel. (ft/s)		4.62	
Max Chl Dpth (ft)	13.58	Hydr. Depth (ft)		4.61	
Conv. Total (cfs)	951299.9	Conv. (cfs)		951299.9	
Length Wtd. (ft)	1235.18	Wetted Per. (ft)		1628.82	

Min Ch El (ft)	1296.00	Shear (lb/sq ft)	0.38
Alpha	1.00	Stream Power (lb/ft s)	1.74
Frctn Loss (ft)	1.31	Cum Volume (acre-ft)	857.81
C & E Loss (ft)	0.04	Cum SA (acres)	233.72

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9581.13	9972.76	22651.87	3878.35	395.71	98.49	9.90	5.84
9972.76	10364.39	337.26	1313.74	206.21	1.47	6.44	0.26
10364.39	10756.03	10.88	296.06	328.47	0.05	0.90	0.04

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9581.13	9972.76	28080.61	4201.43	396.54	98.53	10.73	6.68
9972.76	10364.39	381.38	1516.85	272.57	1.34	5.62	0.25
10364.39	10756.03	36.18	614.06	391.79	0.13	1.57	0.06
10756.03	11147.66	1.83	87.18	262.37	0.01	0.33	0.02

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9581.13	9972.76	33920.21	4482.72	397.26	98.32	11.45	7.57
9972.76	10364.39	489.08	1718.33	293.84	1.42	5.90	0.28
10364.39	10756.03	74.79	895.36	391.79	0.22	2.29	0.08
10756.03	11147.66	15.43	347.32	391.63	0.04	0.89	0.04
11147.66	RB 11539.29	0.49	30.16	154.30	0.00	0.20	0.02

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 17.33

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 17.57 and 17.33 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 17.04 and 16.87. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 22,000 cfs
2/3 Flow: 27,000 cfs
Full Flow: 32,500 cfs
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9791.87	1308.58	9791.87	1302.58	9793.53	1302	9799.41	1300	9803.23	1297.9
9875.41	1295.01	10014.85	1296.59	10024.69	1296.59	10050.94	1299.77	10067.67	1300.99
10084.4	1299.77	10100.81	1295.93	10117.21	1299.21	10159.86	1299.87	10180.89	1302
10189.15	1304	10197.7	1306	10206.1	1308	10223.13	1308	10231.56	1306
10239.79	1304	10247.79	1302	10301.56	1302	10343.17	1300	10476.02	1302
10851.3	1304	10997.32	1306	11604.1	1308	11941.19	1310		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9791.87	.04	9803.23	.02	10180.89	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9791.87	11941.19	533.1	577.497	832.5	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1307.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.036	
W.S. Elev (ft)	1307.43	Reach Len. (ft)	533.10	577.50	832.50
Crit W.S. (ft)		Flow Area (sq ft)		7732.94	
E.G. Slope (ft/ft)	0.000602	Area (sq ft)		7732.94	
Q Total (cfs)	22000.00	Flow (cfs)		22000.00	
Top Width (ft)	1617.53	Top Width (ft)		1617.53	
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)		2.84	
Max Chl Dpth (ft)	12.42	Hydr. Depth (ft)		4.78	
Conv. Total (cfs)	896932.1	Conv. (cfs)		896932.1	
Length Wtd. (ft)	577.50	Wetted Per. (ft)		1625.95	
Min Ch El (ft)	1295.01	Shear (lb/sq ft)		0.18	
Alpha	1.00	Stream Power (lb/ft s)		0.51	
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		500.17	
C & E Loss (ft)	0.01	Cum SA (acres)		171.63	

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1308.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.037	
W.S. Elev (ft)	1307.90	Reach Len. (ft)	533.10	577.50	832.50
Crit W.S. (ft)		Flow Area (sq ft)		8520.46	
E.G. Slope (ft/ft)	0.000748	Area (sq ft)		8520.46	
Q Total (cfs)	27000.00	Flow (cfs)		27000.00	
Top Width (ft)	1762.81	Top Width (ft)		1762.81	
Vel Total (ft/s)	3.17	Avg. Vel. (ft/s)		3.17	
Max Chl Dpth (ft)	12.89	Hydr. Depth (ft)		4.83	
Conv. Total (cfs)	986946.4	Conv. (cfs)		986946.4	
Length Wtd. (ft)	577.50	Wetted Per. (ft)		1771.81	
Min Ch El (ft)	1295.01	Shear (lb/sq ft)		0.22	
Alpha	1.00	Stream Power (lb/ft s)		0.71	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		556.59	
C & E Loss (ft)	0.01	Cum SA (acres)		177.75	

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1308.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.037	
W.S. Elev (ft)	1308.38	Reach Len. (ft)	533.10	577.50	832.50
Crit W.S. (ft)		Flow Area (sq ft)		9402.20	
E.G. Slope (ft/ft)	0.000858	Area (sq ft)		9402.20	
Q Total (cfs)	32500.00	Flow (cfs)		32500.00	
Top Width (ft)	1875.93	Top Width (ft)		1875.93	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)		3.46	
Max Chl Dpth (ft)	13.37	Hydr. Depth (ft)		5.01	
Conv. Total (cfs)	1109316.9	Conv. (cfs)		1109316.9	
Length Wtd. (ft)	577.50	Wetted Per. (ft)		1885.43	
Min Ch El (ft)	1295.01	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.92	
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)		618.54	
C & E Loss (ft)	0.01	Cum SA (acres)		184.15	

Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9791.87	10221.73	16803.12	3931.71	419.52	76.38	9.55	4.27
10221.73	10651.60	3792.89	2344.82	426.79	17.24	5.50	1.62
10651.60	11081.46	1331.45	1254.81	429.88	6.05	2.92	1.06
11081.46	11511.33	72.54	201.61	349.76	0.33	0.58	0.36

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9791.87	10221.73	20099.10	4124.06	422.00	74.44	9.97	4.87
10221.73	10651.60	4799.74	2543.80	428.80	17.78	5.94	1.89
10651.60	11081.46	1888.75	1455.10	429.88	7.00	3.39	1.30

11081.46	11511.33	211.63	391.32	429.87	0.78	0.91	0.54
11511.33	RB 11941.19	0.77	6.18	61.26	0.00	0.10	0.12

Warning: Divided flow computed for this cross-section.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9791.87	10221.73	23528.19	4329.53	438.56	72.39	10.07	5.43
10221.73	10651.60	5923.24	2750.75	430.65	18.23	6.40	2.15
10651.60	11081.46	2561.36	1662.21	429.88	7.88	3.87	1.54
11081.46	11511.33	466.69	598.44	429.87	1.44	1.39	0.78
11511.33	RB 11941.19	20.52	61.28	156.47	0.06	0.39	0.33

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 17.22

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 17.57 and 17.33 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 17.04 and 16.87. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 20,500 cfs
2/3 Flow: 25,000 cfs
Full Flow: 29,500 cfs

Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9855.34	1306	9855.34	1300	9859.38	1300	9865.93	1298	9866.25	1297.41
9912.18	1294.03	9915.46	1295.28	10046.7	1295.9310056.54	1295.9310109.03	1301.74		
10134.95	1302.5610149.06	1303.0210153.98	1302.79	10167.1	1299.2110196.43	1302			
10206.13	1304	10215.6	130610224.29	130810240.99	130810249.56	1306			
10256.84	130410264.39	130210378.21	1300	10635.3	130211054.13	1304			
11288.34	130611377.11	1306.3911763.82	130811971.46	1310					

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9855.34	.04	9866.25	.02210196.43		.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9855.3411971.46		289	292.67	455.32	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1307.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.037	
W.S. Elev (ft)	1307.12	Reach Len. (ft)	289.00	292.67	455.32
Crit W.S. (ft)		Flow Area (sq ft)		7943.38	
E.G. Slope (ft/ft)	0.000517	Area (sq ft)		7943.38	
Q Total (cfs)	20500.00	Flow (cfs)		20500.00	
Top Width (ft)	1673.63	Top Width (ft)		1673.63	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	13.09	Hydr. Depth (ft)		4.75	
Conv. Total (cfs)	901441.6	Conv. (cfs)		901441.6	
Length Wtd. (ft)	292.67	Wetted Per. (ft)		1683.96	
Min Ch El (ft)	1294.03	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.39	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		396.26	
C & E Loss (ft)	0.01	Cum SA (acres)		149.81	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1307.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.037	
W.S. Elev (ft)	1307.51	Reach Len. (ft)	289.00	292.67	455.32
Crit W.S. (ft)		Flow Area (sq ft)		8616.13	
E.G. Slope (ft/ft)	0.000638	Area (sq ft)		8616.13	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	1770.83	Top Width (ft)		1770.83	

Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)	2.90
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)	4.87
Conv. Total (cfs)	989396.6	Conv. (cfs)	989396.6
Length Wtd. (ft)	292.67	Wetted Per. (ft)	1781.64
Min Ch El (ft)	1294.03	Shear (lb/sq ft)	0.19
Alpha	1.00	Stream Power (lb/ft s)	0.56
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	443.00
C & E Loss (ft)	0.01	Cum SA (acres)	154.32

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1308.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.037	
W.S. Elev (ft)	1307.94	Reach Len. (ft)	289.00	292.67	455.32
Crit W.S. (ft)		Flow Area (sq ft)		9400.69	
E.G. Slope (ft/ft)	0.000726	Area (sq ft)		9400.69	
Q Total (cfs)	29500.00	Flow (cfs)		29500.00	
Top Width (ft)	1877.84	Top Width (ft)		1877.84	
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)		3.14	
Max Chl Dpth (ft)	13.91	Hydr. Depth (ft)		5.01	
Conv. Total (cfs)	1095084.5	Conv. (cfs)		1095084.5	
Length Wtd. (ft)	292.67	Wetted Per. (ft)		1889.18	
Min Ch El (ft)	1294.03	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		0.71	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		493.90	
C & E Loss (ft)	0.01	Cum SA (acres)		159.27	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9855.34	10278.56	13740.56	3375.34	409.25	67.03	8.46	4.07
10278.56	10701.79	4445.40	2526.89	423.25	21.68	5.97	1.76
10701.79	11125.01	2068.71	1596.81	423.23	10.09	3.77	1.30
11125.01	11548.24	245.32	444.30	423.23	1.20	1.05	0.55
11548.24	RB 11971.46	0.00	0.05	5.00	0.00	0.01	0.03

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9855.34	10278.56	16345.21	3531.84	413.10	65.38	8.78	4.63
10278.56	10701.79	5483.53	2692.21	423.25	21.93	6.36	2.04
10701.79	11125.01	2705.74	1762.13	423.23	10.82	4.16	1.54
11125.01	11548.24	461.31	609.62	423.23	1.85	1.44	0.76
11548.24	RB 11971.46	4.20	20.33	98.83	0.02	0.21	0.21

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9855.34	10278.56	18776.95	3705.66	417.34	63.65	9.13	5.07
10278.56	10701.79	6528.68	2874.22	423.25	22.13	6.79	2.27
10701.79	11125.01	3402.90	1944.14	423.23	11.54	4.59	1.75
11125.01	11548.24	761.21	791.63	423.23	2.58	1.87	0.96
11548.24	RB 11971.46	30.25	85.05	202.13	0.10	0.42	0.36

```
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION          RIVER: MCMICKEN DAM
REACH: A1                 RS: 17.17

INPUT
Description: It is estimated that the wall located on the east boundary of Sun
             City Grand will begin to fail between cross section 17.57 and
             17.33 and continues to fail until the flow does not pond against
             the wall more than 4-ft, between cross sections 17.04 and 16.87.
             This failure will allow flow to enter Sun City Grand for the 1/3,
             2/3, and Full Flow.

1/3 Flow:  20,000 cfs
2/3 Flow:  23,500
           cfs
Full Flow:  28,000 cfs
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9830.73 1305.08 9830.73 1299.08 9836.25    1298 9839.42 1297.41 9841.36  1295.7
 9877.45 1293.23 9884.01 1296.5110084.14 1304.4610123.51 1303.1810139.92 1301.18
 10200.8    130210239.68    130210562.76 1301.6910652.85    130211213.23    1304
11537.75 1304.4812338.91    130612422.14    130812498.85    1310

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9830.73     .04 9841.36    .022 10200.8      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9830.7312498.85             676.1 689.225  522.15              .1       .3

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1306.91   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.08   Wt. n-Val.                              0.091
  W.S. Elev (ft)            1306.83   Reach Len. (ft)             676.10     689.22     522.15
  Crit W.S. (ft)            1303.67   Flow Area (sq ft)                     8918.44
  E.G. Slope (ft/ft)       0.003555   Area (sq ft)                          8918.44
  Q Total (cfs)            20000.00   Flow (cfs)                           20000.00
  Top Width (ft)            2542.61   Top Width (ft)                        2542.61
  Vel Total (ft/s)             2.24   Avg. Vel. (ft/s)                         2.24
  Max Chl Dpth (ft)           13.60   Hydr. Depth (ft)                         3.51
  Conv. Total (cfs)        335437.0   Conv. (cfs)                          335437.0
  Length Wtd. (ft)           689.22   Wetted Per. (ft)                      2552.34
  Min Ch El (ft)            1293.23   Shear (lb/sq ft)                         0.78
  Alpha                        1.00   Stream Power (lb/ft s)                   1.74
  Frctn Loss (ft)              3.94   Cum Volume (acre-ft)                  339.61
  C & E Loss (ft)              0.05   Cum SA (acres)                        135.65


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT    Profile #2/3

  E.G. Elev (ft)            1307.27   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                              0.091
  W.S. Elev (ft)            1307.18   Reach Len. (ft)             676.10     689.22     522.15
  Crit W.S. (ft)            1303.95   Flow Area (sq ft)                     9824.26
  E.G. Slope (ft/ft)       0.003587   Area (sq ft)                          9824.26
  Q Total (cfs)            23500.00   Flow (cfs)                           23500.00
  Top Width (ft)            2557.39   Top Width (ft)                        2557.39

  Vel Total (ft/s)             2.39   Avg. Vel. (ft/s)                         2.39
  Max Chl Dpth (ft)           13.95   Hydr. Depth (ft)                         3.84
  Conv. Total (cfs)        392365.7   Conv. (cfs)                          392365.7
  Length Wtd. (ft)           689.22   Wetted Per. (ft)                      2567.48
  Min Ch El (ft)            1293.23   Shear (lb/sq ft)                         0.86
  Alpha                        1.00   Stream Power (lb/ft s)                   2.05
  Frctn Loss (ft)              3.98   Cum Volume (acre-ft)                  381.05
  C & E Loss (ft)              0.05   Cum SA (acres)                        139.78

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1307.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.091	
W.S. Elev (ft)	1307.58	Reach Len. (ft)	676.10	689.22	522.15
Crit W.S. (ft)	1304.28	Flow Area (sq ft)		10839.93	
E.G. Slope (ft/ft)	0.003705	Area (sq ft)		10839.93	
Q Total (cfs)	28000.00	Flow (cfs)		28000.00	
Top Width (ft)	2573.86	Top Width (ft)		2573.86	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	14.35	Hydr. Depth (ft)		4.21	
Conv. Total (cfs)	459998.6	Conv. (cfs)		459998.6	
Length Wtd. (ft)	689.22	Wetted Per. (ft)		2584.36	
Min Ch El (ft)	1293.23	Shear (lb/sq ft)		0.97	
Alpha	1.00	Stream Power (lb/ft s)		2.51	
Frctn Loss (ft)	4.02	Cum Volume (acre-ft)		425.91	
C & E Loss (ft)	0.05	Cum SA (acres)		144.31	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9830.73	10364.35	15051.79	3198.94	543.34	75.26	5.99	4.71
10364.35	10897.98	2738.50	2525.31	533.63	13.69	4.73	1.08
10897.98	11431.60	1348.35	1650.78	533.63	6.74	3.09	0.82
11431.60	11965.23	672.57	1087.55	533.62	3.36	2.04	0.62
11965.23	RB 12498.85	188.79	455.85	408.12	0.94	1.12	0.41

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9830.73	10364.35	17321.45	3388.50	543.70	73.71	6.35	5.11
10364.35	10897.98	3246.97	2714.87	533.63	13.82	5.09	1.20
10897.98	11431.60	1698.48	1840.33	533.63	7.23	3.45	0.92
11431.60	11965.23	923.87	1277.11	533.62	3.93	2.39	0.72
11965.23	RB 12498.85	309.23	603.44	422.91	1.32	1.43	0.51

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9830.73	10364.35	20197.27	3599.75	544.09	72.13	6.75	5.61
10364.35	10897.98	3898.33	2926.12	533.63	13.92	5.48	1.33
10897.98	11431.60	2157.12	2051.58	533.63	7.70	3.84	1.05
11431.60	11965.23	1263.49	1488.36	533.62	4.51	2.79	0.85
11965.23	RB 12498.85	483.80	774.12	439.39	1.73	1.76	0.62

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 17.04

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 17.57 and 17.33 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 17.04 and 16.87. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 18,000 cfs
2/3 Flow: 21,000 cfs
Full Flow: 24,500 cfs

Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9768.36	1304	9768.36	1298	9769.1	1298	9776.29	1296	9844.44	1296
9878.25	1296	9886.21	1296	9909.75	1296.87	9913.49	1296	9914.11	1296
9916.49	1298	9955.97	1300	9969.89	1302	9975.36	1302	9984.34	1301.4
9999.54	1301.4	510013.77	1301.5	610018.42	1302	10020.23	1302.1	510021.21	1302
10038.21	1300	10075.21	1300	10093.14	1298	10096.74	1297.5	510099.77	1298
10121.81	1300	10125.07	1300	10167.11	1298.7	810232.58	1298.9	710313.84	1300
10753.72	1302	11109.47	1304	11594.13	1300	11604.97	1300.4	111653.48	1304
12026.9	1305.11								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9768.36	.04	9984.34	.02	210018.42	.04	10093.14	.04	10125.07	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9768.36	12026.9	914.8	912.875	685.33	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.92	Element			
Vel Head (ft)	0.58	Wt. n-Val.		0.051	
W.S. Elev (ft)	1302.33	Reach Len. (ft)	914.80	912.88	685.33
Crit W.S. (ft)		Flow Area (sq ft)		2936.81	
E.G. Slope (ft/ft)	0.011635	Area (sq ft)		2936.81	
Q Total (cfs)	18000.00	Flow (cfs)		18000.00	
Top Width (ft)	1363.98	Top Width (ft)		1363.98	
Vel Total (ft/s)	6.13	Avg. Vel. (ft/s)		6.13	
Max Chl Dpth (ft)	6.33	Hydr. Depth (ft)		2.15	
Conv. Total (cfs)	166877.5	Conv. (cfs)		166877.5	
Length Wtd. (ft)	912.88	Wetted Per. (ft)		1370.18	
Min Ch El (ft)	1296.00	Shear (lb/sq ft)		1.56	
Alpha	1.00	Stream Power (lb/ft s)		9.54	
Frctn Loss (ft)	7.77	Cum Volume (acre-ft)		245.82	
C & E Loss (ft)	0.09	Cum SA (acres)		104.74	

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1303.24	Element			
Vel Head (ft)	0.60	Wt. n-Val.		0.052	
W.S. Elev (ft)	1302.64	Reach Len. (ft)	914.80	912.88	685.33
Crit W.S. (ft)		Flow Area (sq ft)		3376.18	
E.G. Slope (ft/ft)	0.011814	Area (sq ft)		3376.18	
Q Total (cfs)	21000.00	Flow (cfs)		21000.00	
Top Width (ft)	1461.20	Top Width (ft)		1461.20	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)		6.22	
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		2.31	
Conv. Total (cfs)	193205.1	Conv. (cfs)		193205.1	
Length Wtd. (ft)	912.87	Wetted Per. (ft)		1467.72	
Min Ch El (ft)	1296.00	Shear (lb/sq ft)		1.70	
Alpha	1.00	Stream Power (lb/ft s)		10.55	
Frctn Loss (ft)	7.74	Cum Volume (acre-ft)		276.62	
C & E Loss (ft)	0.09	Cum SA (acres)		107.99	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1303.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.054	
W.S. Elev (ft)	1303.01	Reach Len. (ft)	914.80	912.88	685.33
Crit W.S. (ft)		Flow Area (sq ft)		3933.40	
E.G. Slope (ft/ft)	0.011604	Area (sq ft)		3933.40	
Q Total (cfs)	24500.00	Flow (cfs)		24500.00	
Top Width (ft)	1575.89	Top Width (ft)		1575.89	
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)		6.23	
Max Chl Dpth (ft)	7.01	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	227436.5	Conv. (cfs)		227436.5	
Length Wtd. (ft)	912.88	Wetted Per. (ft)		1582.80	
Min Ch El (ft)	1296.00	Shear (lb/sq ft)		1.80	
Alpha	1.00	Stream Power (lb/ft s)		11.21	
Frctn Loss (ft)	7.71	Cum Volume (acre-ft)		309.03	
C & E Loss (ft)	0.09	Cum SA (acres)		111.48	

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9768.36	10220.07	15378.32	1689.39	457.81	85.44	3.74	9.10
10220.07	10671.78	1905.67	817.38	451.72	10.59	1.81	2.33
10671.78	11123.48	42.45	52.36	141.11	0.24	0.37	0.81
11123.48	11575.19	476.65	286.95	263.71	2.65	1.09	1.66
11575.19	RB 12026.90	196.90	90.73	55.84	1.09	1.63	2.17

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9768.36	10220.07	17458.60	1829.89	458.12	83.14	4.05	9.54
10220.07	10671.78	2493.97	957.87	451.72	11.88	2.12	2.60
10671.78	11123.48	108.84	104.86	196.44	0.52	0.53	1.04
11123.48	11575.19	683.80	374.84	301.39	3.26	1.24	1.82
11575.19	RB 12026.90	254.79	108.73	60.05	1.21	1.81	2.34

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9768.36	10220.07	19743.31	1995.64	458.49	80.58	4.42	9.89
10220.07	10671.78	3215.87	1123.63	451.72	13.13	2.49	2.86
10671.78	11123.48	236.99	188.91	261.71	0.97	0.72	1.25
11123.48	11575.19	975.39	493.58	345.86	3.98	1.43	1.98
11575.19	RB 12026.90	328.43	131.64	65.02	1.34	2.03	2.49

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 16.87

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 16.87 and 16.70 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 16.53 and 16.35. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 17,000 cfs
2/3 Flow: 19,500 cfs
Full Flow: 22,500 cfs

```
Station Elevation Data     num=       28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9792.22 1298.85 9792.22 1292.85 9796.82    1292 9805.93    1290 9838.75    1288
 9866.75 1286.98 9886.39    1288 9926.11    1290 9933.31 1290.41 9935.62    1290
 9937.87 1288.99  9939.9    1290 9963.11    1292 9974.83    1294 9983.42 1295.29
10000.83 1295.6510011.87 1295.710021.17    129410032.34    1292 10101.7    1290
10108.93 1288.2510134.08 1289.8210137.78    129010212.97    129210511.22    1292
11258.45    129411340.14    129611484.59  1297.2

Manning's n Values         num=        2
     Sta   n Val     Sta   n Val
 9792.22     .0410134.08      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9792.2211484.59            900.01 900.014  897.82              .1       .3

CROSS SECTION OUTPUT     Profile #1/3

  E.G. Elev (ft)            1295.06   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.29   Wt. n-Val.                            0.057
  W.S. Elev (ft)            1294.77   Reach Len. (ft)             900.01    900.01     897.82
  Crit W.S. (ft)                      Flow Area (sq ft)                    3916.81
  E.G. Slope (ft/ft)        0.006401  Area (sq ft)                         3916.81
  Q Total (cfs)            17000.00   Flow (cfs)                          17000.00
  Top Width (ft)            1460.67   Top Width (ft)                       1460.67
  Vel Total (ft/s)             4.34   Avg. Vel. (ft/s)                        4.34
  Max Chl Dpth (ft)            7.79   Hydr. Depth (ft)                        2.68
  Conv. Total (cfs)        212487.6   Conv. (cfs)                         212487.6
  Length Wtd. (ft)          900.01    Wetted Per. (ft)                     1464.44
  Min Ch El (ft)            1286.98   Shear (lb/sq ft)                        1.07
  Alpha                        1.00   Stream Power (lb/ft s)                  4.64
  Frctn Loss (ft)              3.80   Cum Volume (acre-ft)                  174.01
  C & E Loss (ft)              0.04   Cum SA (acres)                         75.14

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

CROSS SECTION OUTPUT     Profile #2/3

  E.G. Elev (ft)            1295.42   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.30   Wt. n-Val.                            0.059
  W.S. Elev (ft)            1295.12   Reach Len. (ft)             900.01    900.01     897.82
  Crit W.S. (ft)                      Flow Area (sq ft)                    4428.90
  E.G. Slope (ft/ft)        0.006246  Area (sq ft)                         4428.90
  Q Total (cfs)            19500.00   Flow (cfs)                          19500.00
  Top Width (ft)            1479.13   Top Width (ft)                       1479.13
  Vel Total (ft/s)             4.40   Avg. Vel. (ft/s)                        4.40
  Max Chl Dpth (ft)            8.14   Hydr. Depth (ft)                        2.99
  Conv. Total (cfs)        246737.5   Conv. (cfs)                         246737.5
  Length Wtd. (ft)          900.01    Wetted Per. (ft)                     1483.30
  Min Ch El (ft)            1286.98   Shear (lb/sq ft)                        1.16
  Alpha                        1.00   Stream Power (lb/ft s)                  5.13
  Frctn Loss (ft)              3.84   Cum Volume (acre-ft)                  194.83
  C & E Loss (ft)              0.04   Cum SA (acres)                         77.18

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

CROSS SECTION OUTPUT     Profile #Full

  E.G. Elev (ft)            1295.81   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.31   Wt. n-Val.                            0.061
  W.S. Elev (ft)            1295.50   Reach Len. (ft)             900.01    900.01     897.82
  Crit W.S. (ft)                      Flow Area (sq ft)                    4998.65
  E.G. Slope (ft/ft)        0.006280  Area (sq ft)                         4998.65
  Q Total (cfs)            22500.00   Flow (cfs)                          22500.00
  Top Width (ft)            1508.13   Top Width (ft)                       1508.13
  Vel Total (ft/s)             4.50   Avg. Vel. (ft/s)                        4.50
  Max Chl Dpth (ft)            8.52   Hydr. Depth (ft)                        3.31
  Conv. Total (cfs)        283932.0   Conv. (cfs)                         283932.0
  Length Wtd. (ft)          900.01    Wetted Per. (ft)                     1512.74
  Min Ch El (ft)            1286.98   Shear (lb/sq ft)                        1.30
  Alpha                        1.00   Stream Power (lb/ft s)                  5.83
  Frctn Loss (ft)              3.94   Cum Volume (acre-ft)                  215.44
  C & E Loss (ft)              0.04   Cum SA (acres)                         79.17

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.22	10130.69	11760.74	1437.50	305.18	69.18	4.77	8.18
10130.69	10469.17	2605.35	1028.20	338.51	15.33	3.04	2.53
10469.17	10807.64	1722.50	819.96	338.47	10.13	2.42	2.10
10807.64	11146.12	795.21	515.69	338.48	4.68	1.52	1.54
11146.12	RB 11484.59	116.20	115.48	143.79	0.68	0.80	1.01

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.22	10130.69	12973.32	1543.26	309.82	66.53	5.05	8.41
10130.69	10469.17	3082.24	1146.12	338.51	15.81	3.39	2.69
10469.17	10807.64	2133.08	937.88	338.47	10.94	2.77	2.27
10807.64	11146.12	1109.51	633.61	338.48	5.69	1.87	1.75
11146.12	RB 11484.59	201.85	168.05	158.02	1.04	1.06	1.20

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.22	10130.69	14312.46	1661.83	323.65	63.61	5.21	8.61
10130.69	10469.17	3689.38	1275.41	338.51	16.40	3.77	2.89
10469.17	10807.64	2655.88	1067.16	338.47	11.80	3.15	2.49
10807.64	11146.12	1517.97	762.89	338.48	6.75	2.25	1.99
11146.12	RB 11484.59	324.32	231.38	173.63	1.44	1.33	1.40

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 16.70

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 16.87 and 16.70 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 16.53 and 16.35. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 13,500 cfs
2/3 Flow: 15,500 cfs
Full Flow: 17,500 cfs
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9792.29	1293.76	9792.29	1287.76	9799.48	1286	9809.43	1284	9852.2	1284
9935.97	1285.92	9953.82	1286	9970.68	1288	9983.54	1290	9985.2	1290.1
9999.9	1290.12	10013.55	1290.04	10014.74	1290	10025.61	1288	10105.07	1286
10113.51	1284	10136.12	1284	10231.01	1284	10240.55	1286	10396.36	1288
11026.72	1290	11273.22	1292	11283.96	1294				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9792.29	.04	10136.12	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9792.29	11283.96	900.14	900.003	806.29	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1291.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.058	
W.S. Elev (ft)	1291.08	Reach Len. (ft)	900.14	900.00	806.29
Crit W.S. (ft)		Flow Area (sq ft)		4426.01	
E.G. Slope (ft/ft)	0.002758	Area (sq ft)		4426.01	
Q Total (cfs)	13500.00	Flow (cfs)		13500.00	
Top Width (ft)	1367.11	Top Width (ft)		1367.11	
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)		3.05	

Max Chl Dpth (ft)	7.08	Hydr. Depth (ft)	3.24
Conv. Total (cfs)	257074.5	Conv. (cfs)	257074.5
Length Wtd. (ft)	900.00	Wetted Per. (ft)	1371.81
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	0.56
Alpha	1.00	Stream Power (lb/ft s)	1.69
Frctn Loss (ft)	2.66	Cum Volume (acre-ft)	87.82
C & E Loss (ft)	0.01	Cum SA (acres)	45.93

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1291.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.059	
W.S. Elev (ft)	1291.38	Reach Len. (ft)	900.14	900.00	806.29
Crit W.S. (ft)		Flow Area (sq ft)		4846.56	
E.G. Slope (ft/ft)	0.002872	Area (sq ft)		4846.56	
Q Total (cfs)	15500.00	Flow (cfs)		15500.00	
Top Width (ft)	1404.52	Top Width (ft)		1404.52	
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)		3.20	
Max Chl Dpth (ft)	7.38	Hydr. Depth (ft)		3.45	
Conv. Total (cfs)	289245.7	Conv. (cfs)		289245.7	
Length Wtd. (ft)	900.00	Wetted Per. (ft)		1409.52	
Min Ch El (ft)	1284.00	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		1.97	
Frctn Loss (ft)	2.75	Cum Volume (acre-ft)		99.01	
C & E Loss (ft)	0.00	Cum SA (acres)		47.39	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1291.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.060	
W.S. Elev (ft)	1291.66	Reach Len. (ft)	900.14	900.00	806.29
Crit W.S. (ft)		Flow Area (sq ft)		5247.15	
E.G. Slope (ft/ft)	0.002977	Area (sq ft)		5247.15	
Q Total (cfs)	17500.00	Flow (cfs)		17500.00	
Top Width (ft)	1439.24	Top Width (ft)		1439.24	
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)		3.34	
Max Chl Dpth (ft)	7.66	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	320721.2	Conv. (cfs)		320721.2	
Length Wtd. (ft)	900.00	Wetted Per. (ft)		1444.52	
Min Ch El (ft)	1284.00	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)		2.25	
Frctn Loss (ft)	2.83	Cum Volume (acre-ft)		109.59	
C & E Loss (ft)	0.00	Cum SA (acres)		48.72	

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.29	10090.62	7103.18	1399.00	302.56	52.62	4.69	5.08
10090.62	10388.96	4719.13	1623.50	298.79	34.96	5.44	2.91
10388.96	10687.29	1092.28	783.91	298.34	8.09	2.63	1.39
10687.29	10985.63	518.39	501.25	298.34	3.84	1.68	1.03
10985.63	RB 11283.96	67.02	118.34	173.78	0.50	0.68	0.57

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.29	10090.62	8066.58	1489.53	302.87	52.04	4.99	5.42
10090.62	10388.96	5274.57	1714.03	298.79	34.03	5.75	3.08

10388.96	10687.29	1341.48	874.44	298.34	8.65	2.93	1.53
10687.29	10985.63	699.80	591.79	298.34	4.51	1.98	1.18
10985.63	RB 11283.96	117.58	176.75	211.19	0.76	0.84	0.67

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9792.29	10090.62	9014.59	1573.58	303.15	51.51	5.27	5.73
10090.62	10388.96	5817.28	1798.08	298.79	33.24	6.03	3.24
10388.96	10687.29	1595.17	958.50	298.34	9.12	3.21	1.66
10687.29	10985.63	891.04	675.84	298.34	5.09	2.27	1.32
10985.63	RB 11283.96	181.92	241.14	245.91	1.04	0.98	0.75

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 16.53

INPUT
Description: It is estimated that the wall located on the east boundary of Sun City Grand will begin to fail between cross section 16.87 and 16.70 and continues to fail until the flow does not pond against the wall more than 4-ft, between cross sections 16.53 and 16.35. This failure will allow flow to enter Sun City Grand for the 1/3, 2/3, and Full Flow.

1/3 Flow: 6,500 cfs
2/3 Flow: 7,500 cfs
Full Flow: 8,500 cfs
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9782.56	1288.1	9782.56	1282.1	9935.69	1284	9937.81	1284	9940.66	1282
9942.07	1282	9943.65	1284	9973.49	1286	9986.69	1286.96	10003.29	1287.46
10016.23	1287.56	10031.36	1286	10038.03	1286	10085.52	1286.53	10121.37	1286
10132.77	1286	10148.77	1288	10151.12	1288	10666.84	1287.51	0968.54	1288
11260.03	1290								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9782.56	.04	10151.12	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9782.56	11260.03	900.11	900.856	900	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1288.55	Element			
Vel Head (ft)	0.21	Wt. n-Val.		0.043	
W.S. Elev (ft)	1288.34	Reach Len. (ft)	900.11	900.86	900.00
Crit W.S. (ft)	1286.86	Flow Area (sq ft)		1761.06	
E.G. Slope (ft/ft)	0.003442	Area (sq ft)		1761.06	
Q Total (cfs)	6500.00	Flow (cfs)		6500.00	
Top Width (ft)	1235.97	Top Width (ft)		1235.97	
Vel Total (ft/s)	3.69	Avg. Vel. (ft/s)		3.69	
Max Chl Dpth (ft)	6.34	Hydr. Depth (ft)		1.42	
Conv. Total (cfs)	110785.3	Conv. (cfs)		110785.3	
Length Wtd. (ft)	900.86	Wetted Per. (ft)		1244.15	
Min Ch El (ft)	1282.00	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		1.12	
Frctn Loss (ft)	4.91	Cum Volume (acre-ft)		23.90	
C & E Loss (ft)	0.02	Cum SA (acres)		19.04	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1288.78	Element			
Vel Head (ft)	0.21	Wt. n-Val.		0.044	

W.S. Elev (ft)	1288.58	Reach Len. (ft)	900.11	900.86	900.00
Crit W.S. (ft)	1287.12	Flow Area (sq ft)		2055.37	
E.G. Slope (ft/ft)	0.003497	Area (sq ft)		2055.37	
Q Total (cfs)	7500.00	Flow (cfs)		7500.00	
Top Width (ft)	1270.20	Top Width (ft)		1270.20	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	6.58	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	126819.4	Conv. (cfs)		126819.4	
Length Wtd. (ft)	900.86	Wetted Per. (ft)		1278.62	
Min Ch El (ft)	1282.00	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		1.28	
Frctn Loss (ft)	4.99	Cum Volume (acre-ft)		27.71	
C & E Loss (ft)	0.03	Cum SA (acres)		19.76	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1289.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.045	
W.S. Elev (ft)	1288.79	Reach Len. (ft)	900.11	900.86	900.00
Crit W.S. (ft)	1288.00	Flow Area (sq ft)		2333.37	
E.G. Slope (ft/ft)	0.003543	Area (sq ft)		2333.37	
Q Total (cfs)	8500.00	Flow (cfs)		8500.00	
Top Width (ft)	1301.71	Top Width (ft)		1301.71	
Vel Total (ft/s)	3.64	Avg. Vel. (ft/s)		3.64	
Max Chl Dpth (ft)	6.79	Hydr. Depth (ft)		1.79	
Conv. Total (cfs)	142798.3	Conv. (cfs)		142798.3	
Length Wtd. (ft)	900.86	Wetted Per. (ft)		1310.34	
Min Ch El (ft)	1282.00	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		1.43	
Frctn Loss (ft)	5.07	Cum Volume (acre-ft)		31.28	
C & E Loss (ft)	0.03	Cum SA (acres)		20.40	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9782.56	10078.05	5759.77	1130.40	303.54	88.61	3.83	5.10
10078.05	10373.55	493.17	237.63	295.62	7.59	0.80	2.08
10373.55	10669.04	138.97	207.41	295.49	2.14	0.70	0.67
10669.04	10964.54	105.36	175.67	295.49	1.62	0.59	0.60
10964.54	RB 11260.03	2.74	9.96	54.00	0.04	0.18	0.27

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9782.56	10078.05	6429.69	1199.80	303.78	85.73	4.06	5.36
10078.05	10373.55	647.07	307.03	295.62	8.63	1.04	2.11
10373.55	10669.04	227.36	276.81	295.49	3.03	0.94	0.82
10669.04	10964.54	185.59	245.07	295.49	2.47	0.83	0.76
10964.54	RB 11260.03	10.30	26.66	88.23	0.14	0.30	0.39

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9782.56	10078.05	7067.94	1263.68	303.99	83.15	4.28	5.59

10078.05	10373.55	808.99	370.92	295.62	9.52	1.26	2.18
10373.55	10669.04	324.17	340.69	295.49	3.81	1.15	0.95
10669.04	10964.54	275.41	308.95	295.49	3.24	1.05	0.89
10964.54	RB 11260.03	23.49	49.14	119.74	0.28	0.41	0.48

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A1 RS: 16.35

INPUT
Description: End of Model. North of Bell Road

1/3 Flow: 3,000 cfs
2/3
Flow: 3,500 cfs
Full Flow: 4,000 cfs
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9657.95	1289.2	9657.95	1283.2	9662.36	1282	9819.19	1281.57	9890.23	1282
9911.83	1282	9913.39	1280	9913.56	1280	9916.13	1282	9984.83	1283.49
10001.43	1284	10014.48	1284.48	10022.3	1284	10153.3	1284	10181.11	1284
10196.75	1282	10688.61	1284	11000	1284.6				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9657.95	.04	10196.75	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9657.95	11000	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1283.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.46	Wt. n-Val.		0.046	
W.S. Elev (ft)	1283.16	Reach Len. (ft)			
Crit W.S. (ft)	1283.16	Flow Area (sq ft)		550.60	
E.G. Slope (ft/ft)	0.028223	Area (sq ft)		550.60	
Q Total (cfs)	3000.00	Flow (cfs)		3000.00	
Top Width (ft)	605.14	Top Width (ft)		605.14	
Vel Total (ft/s)	5.45	Avg. Vel. (ft/s)		5.45	
Max Chl Dpth (ft)	3.16	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	17857.5	Conv. (cfs)		17857.5	
Length Wtd. (ft)		Wetted Per. (ft)		607.04	
Min Ch El (ft)	1280.00	Shear (lb/sq ft)		1.60	
Alpha	1.00	Stream Power (lb/ft s)		8.71	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1283.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.046	
W.S. Elev (ft)	1283.28	Reach Len. (ft)			
Crit W.S. (ft)	1283.28	Flow Area (sq ft)		624.14	
E.G. Slope (ft/ft)	0.028151	Area (sq ft)		624.14	
Q Total (cfs)	3500.00	Flow (cfs)		3500.00	
Top Width (ft)	640.69	Top Width (ft)		640.69	
Vel Total (ft/s)	5.61	Avg. Vel. (ft/s)		5.61	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	20860.3	Conv. (cfs)		20860.3	
Length Wtd. (ft)		Wetted Per. (ft)		642.69	
Min Ch El (ft)	1280.00	Shear (lb/sq ft)		1.71	
Alpha	1.00	Stream Power (lb/ft s)		9.57	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1283.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.047	
W.S. Elev (ft)	1283.38	Reach Len. (ft)			
Crit W.S. (ft)	1283.38	Flow Area (sq ft)		691.57	
E.G. Slope (ft/ft)	0.028540	Area (sq ft)		691.57	

Q Total (cfs)	4000.00	Flow (cfs)	4000.00
Top Width (ft)	671.51	Top Width (ft)	671.51
Vel Total (ft/s)	5.78	Avg. Vel. (ft/s)	5.78
Max Chl Dpth (ft)	3.38	Hydr. Depth (ft)	1.03
Conv. Total (cfs)	23677.4	Conv. (cfs)	23677.4
Length Wtd. (ft)		Wetted Per. (ft)	673.62
Min Ch El (ft)	1280.00	Shear (lb/sq ft)	1.83
Alpha	1.00	Stream Power (lb/ft s)	10.58
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9657.95	9926.36	2618.46	360.40	270.08	87.28	1.34	7.27
9926.36	10194.77	84.12	23.38	50.28	2.80	0.47	3.60
10194.77	10463.18	297.23	166.14	268.43	9.91	0.62	1.79
10463.18	10731.59	0.18	0.68	18.26	0.01	0.04	0.27

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9657.95	9926.36	2989.46	392.08	270.31	85.41	1.46	7.62
9926.36	10194.77	114.80	29.69	56.66	3.28	0.52	3.87
10194.77	10463.18	393.47	197.82	268.43	11.24	0.74	1.99
10463.18	10731.59	2.27	4.55	47.29	0.06	0.10	0.50

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9657.95	9926.36	3355.79	419.67	270.42	83.89	1.56	8.00
9926.36	10194.77	147.66	35.79	62.21	3.69	0.58	4.13
10194.77	10463.18	489.42	225.41	268.43	12.24	0.84	2.17
10463.18	10731.59	7.13	10.70	72.57	0.18	0.15	0.67

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:MCMICKEN DAM

Reach	River Sta.	n1	n2	n3	n4	n5
A1	20.05	.045				
A1	20.00	.04				
A1	19.91	.04				
A1	19.79	.04				
A1	19.67	.04				
A1	19.55	.04				
A1	19.43	.04				
A1	19.34	.04				
A1	19.22	.035	.01	.035		
A1	19.19	.04				
A1	19.03	.04				
A1	18.78	.04	.022	.04		
A1	18.67	.022	.04			
A1	18.50	.022	.04			
A1	18.22	.04	.022			
A1	18.03	.04	.022	.04		
A1	17.84	.04	.001	.022	.04	
A1	17.57	.04	.022	.001	.022	.04
A1	17.33	.04	.022	.04		
A1	17.22	.04	.022	.04		
A1	17.17	.04	.022	.1		
A1	17.04	.04	.022	.04	.04	.1
A1	16.87	.04	.1			
A1	16.70	.04	.1			
A1	16.53	.04	.1			
A1	16.35	.04	.1			

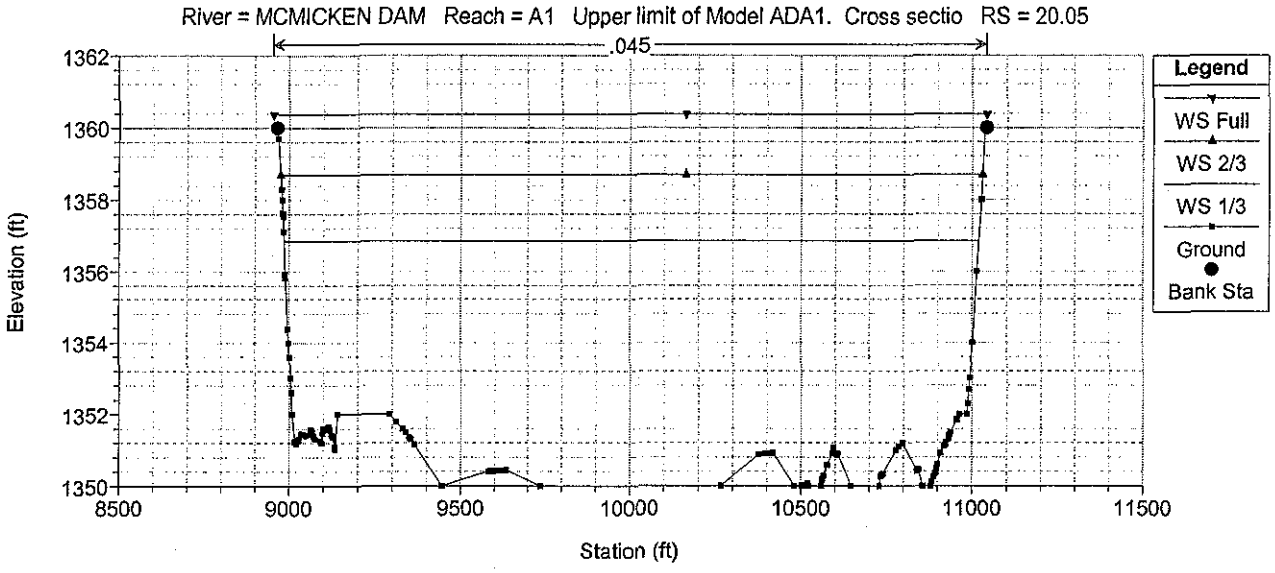
SUMMARY OF REACH LENGTHS

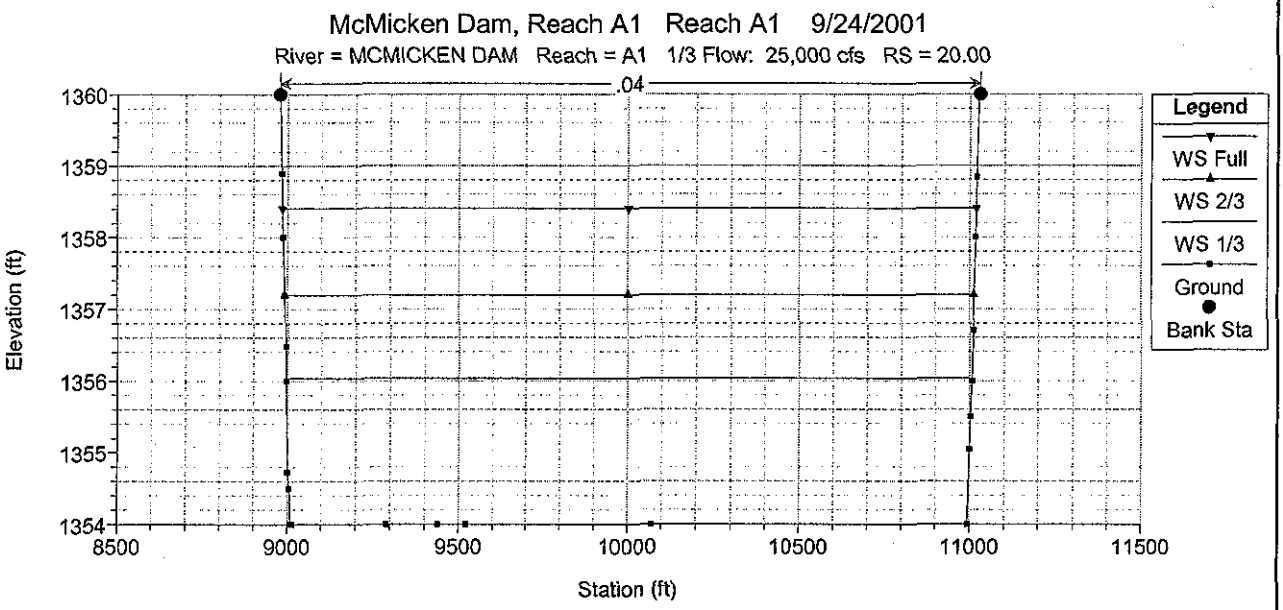
River: MCMICKEN DAM

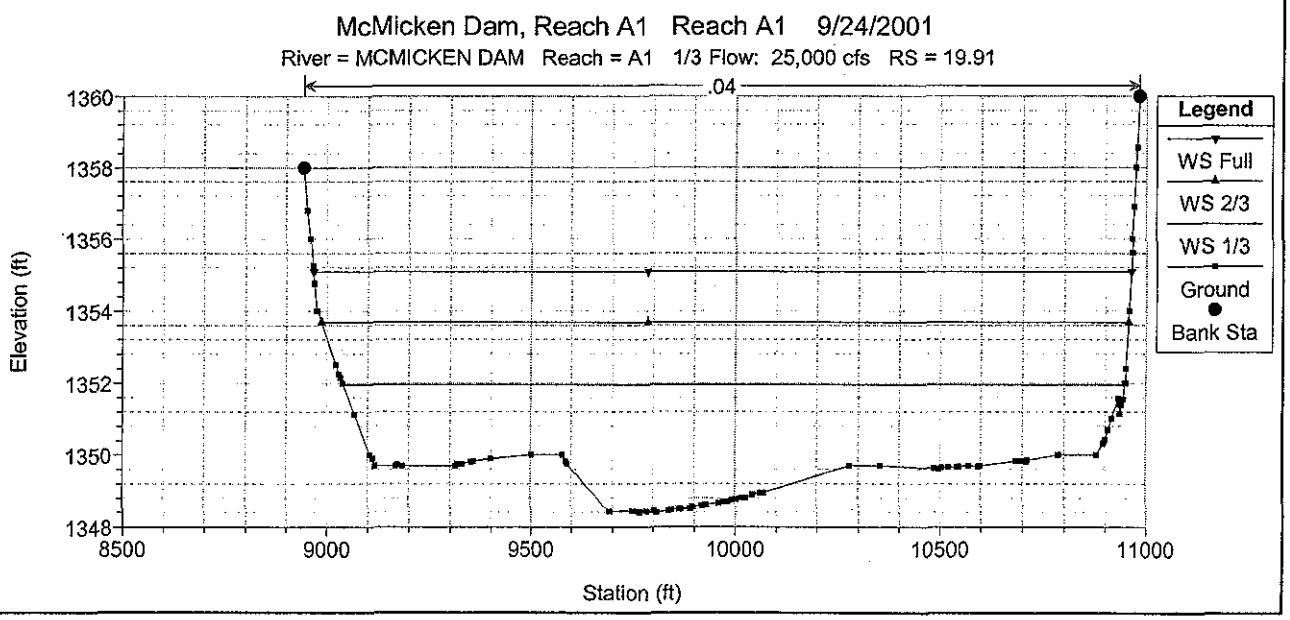
Reach	River Sta.	Left	Channel	Right
A1	20.05	500.3	251.598	180
A1	20.00	1004.4	500.615	360
A1	19.91	961.1	607.058	504.4
A1	19.79	1245.3	638.209	559.5
A1	19.67	694.9	647.249	619
A1	19.55	602.9	602.443	470.5
A1	19.43	509.9	505.746	686.2
A1	19.34	664.7	611.442	1880.6
A1	19.22	151.5	159.042	602.9
A1	19.19	970	867.821	770
A1	19.03	1782.7	1281.522	786.7
A1	18.78	849.9	616.3	591.6276
A1	18.67	874.5	861.8	281.37
A1	18.50	1531.5	1477.866	820.094
A1	18.22	1215.4	1018.097	1151.7
A1	18.03	1218	1014.085	1014.6
A1	17.84	1798.3	1430.892	1159.6
A1	17.57	1242.3	1235.175	1655.3
A1	17.33	533.1	577.497	832.5
A1	17.22	289	292.67	455.32
A1	17.17	676.1	689.225	522.15
A1	17.04	914.8	912.875	685.33
A1	16.87	900.01	900.014	897.82
A1	16.70	900.14	900.003	806.29
A1	16.53	900.11	900.856	900
A1	16.35	0	0	0

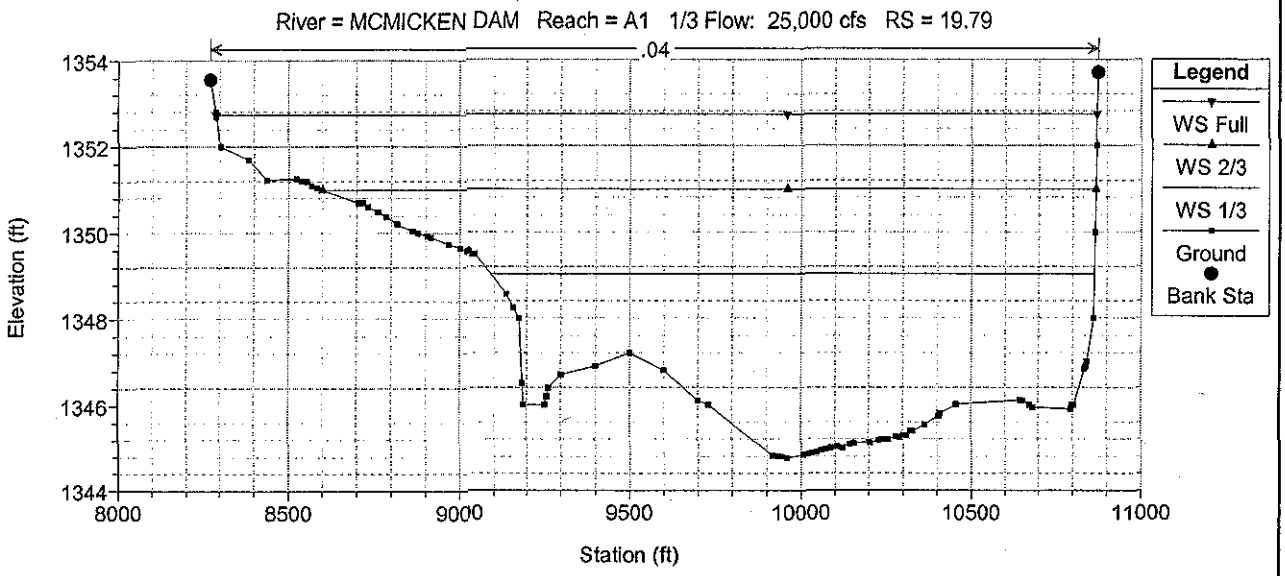
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: MCMICKEN DAM

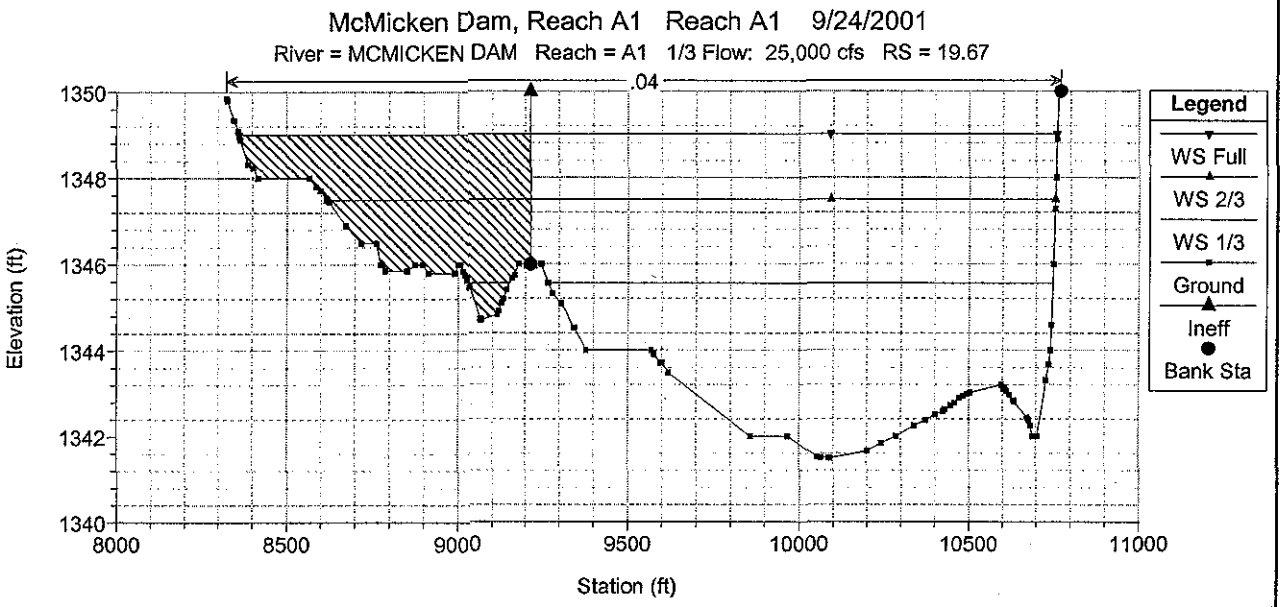
Reach	River Sta.	Contr.	Expan.
A1	20.05	.1	.3
A1	20.00	.1	.3
A1	19.91	.1	.3
A1	19.79	.1	.3
A1	19.67	.1	.3
A1	19.55	.1	.3
A1	19.43	.1	.3
A1	19.34	.1	.3
A1	19.22	.1	.3
A1	19.19	.1	.3
A1	19.03	.1	.3
A1	18.78	.1	.3
A1	18.67	.1	.3
A1	18.50	.1	.3
A1	18.22	.1	.3
A1	18.03	.1	.3
A1	17.84	.1	.3
A1	17.57	.1	.3
A1	17.33	.1	.3
A1	17.22	.1	.3
A1	17.17	.1	.3
A1	17.04	.1	.3
A1	16.87	.1	.3
A1	16.70	.1	.3
A1	16.53	.1	.3
A1	16.35	.1	.3

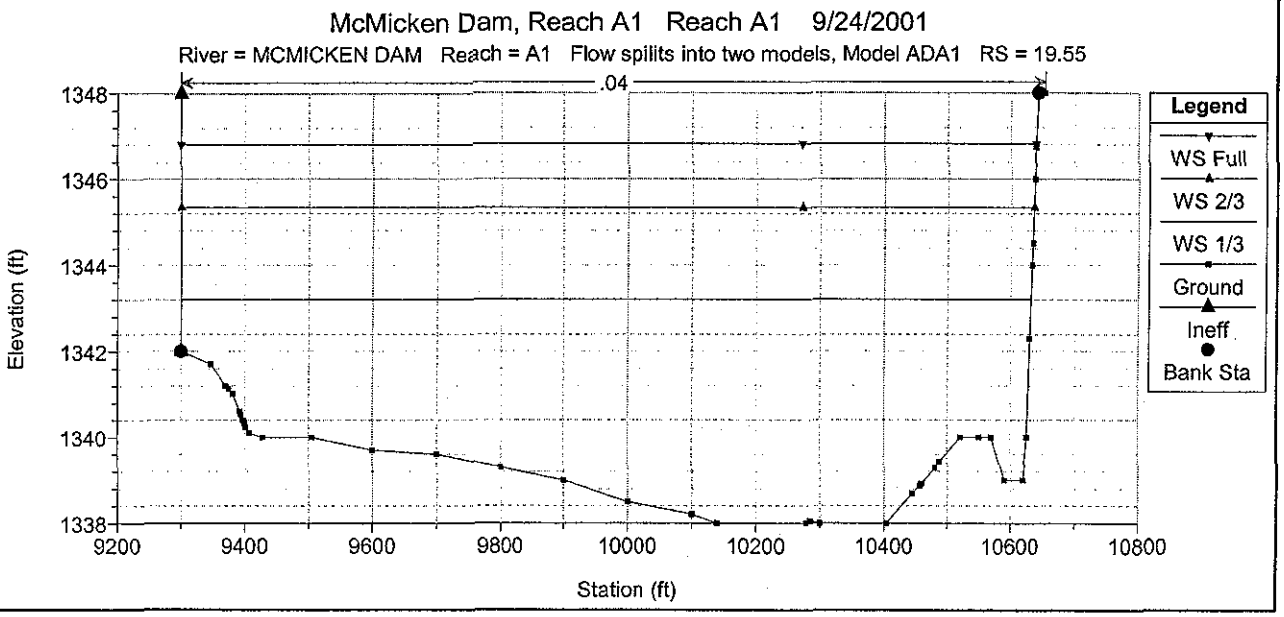

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 Upper limit of Model ADA1. Cross sectio RS = 20.05
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

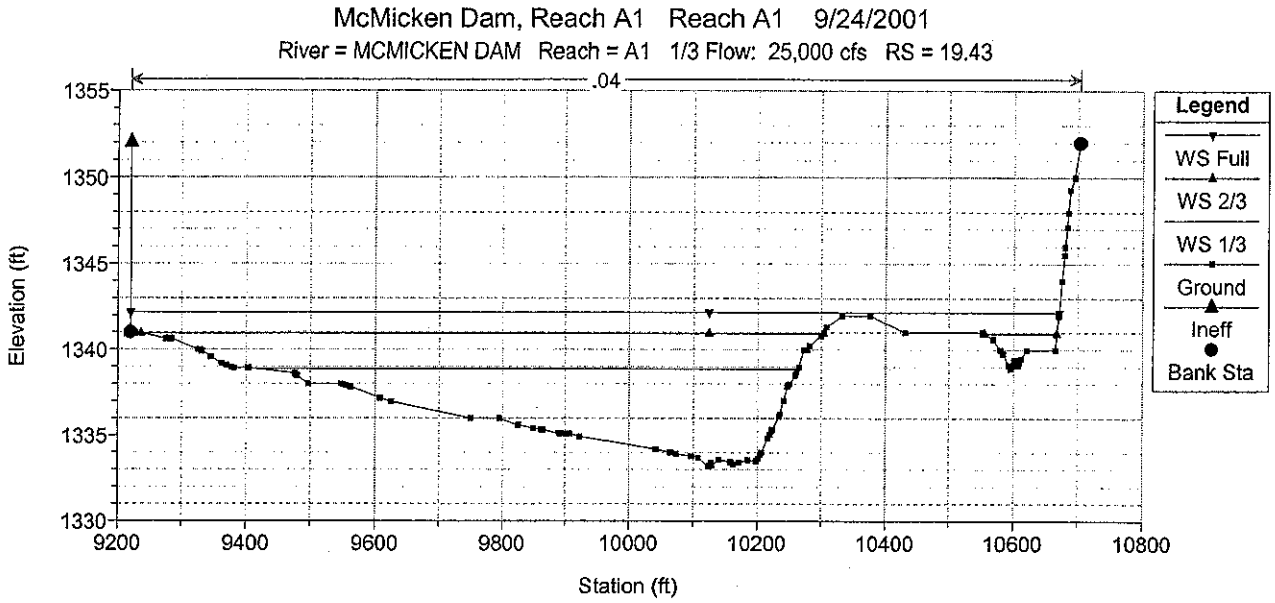

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 20.00
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

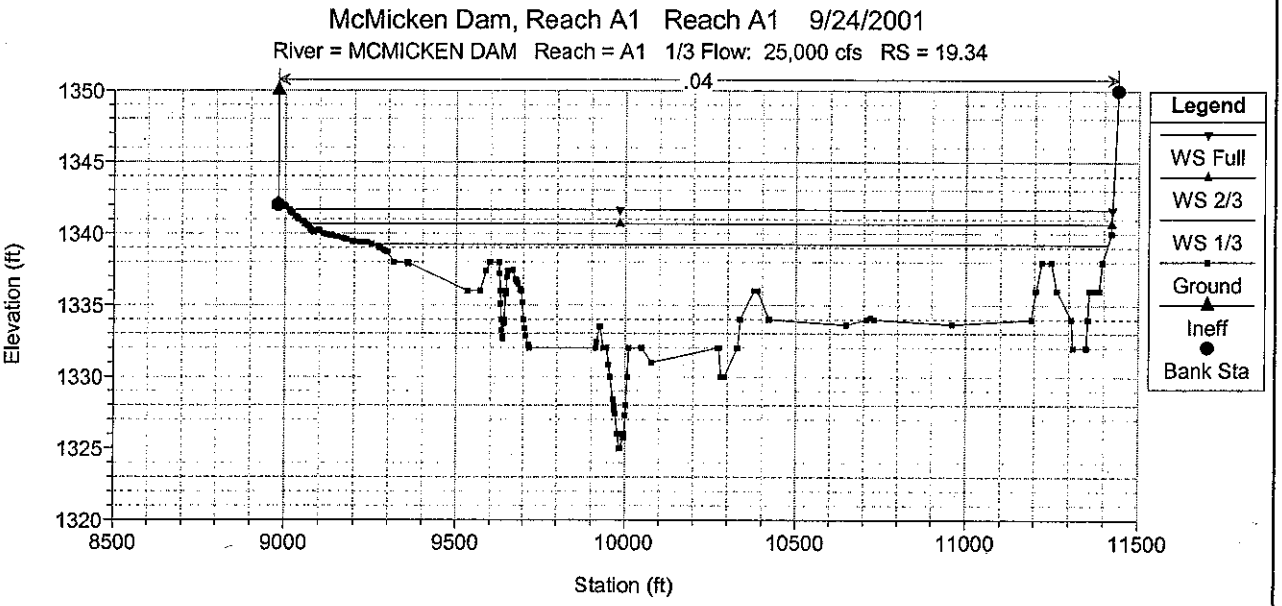

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 19.91
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

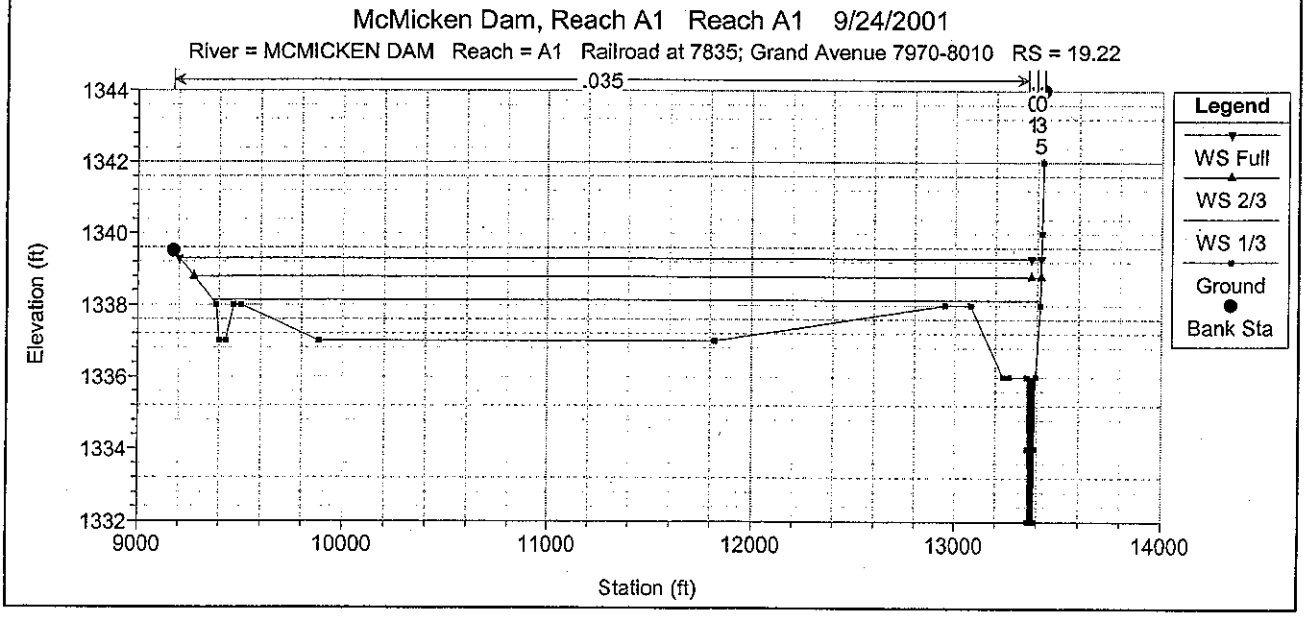

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 19.79
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

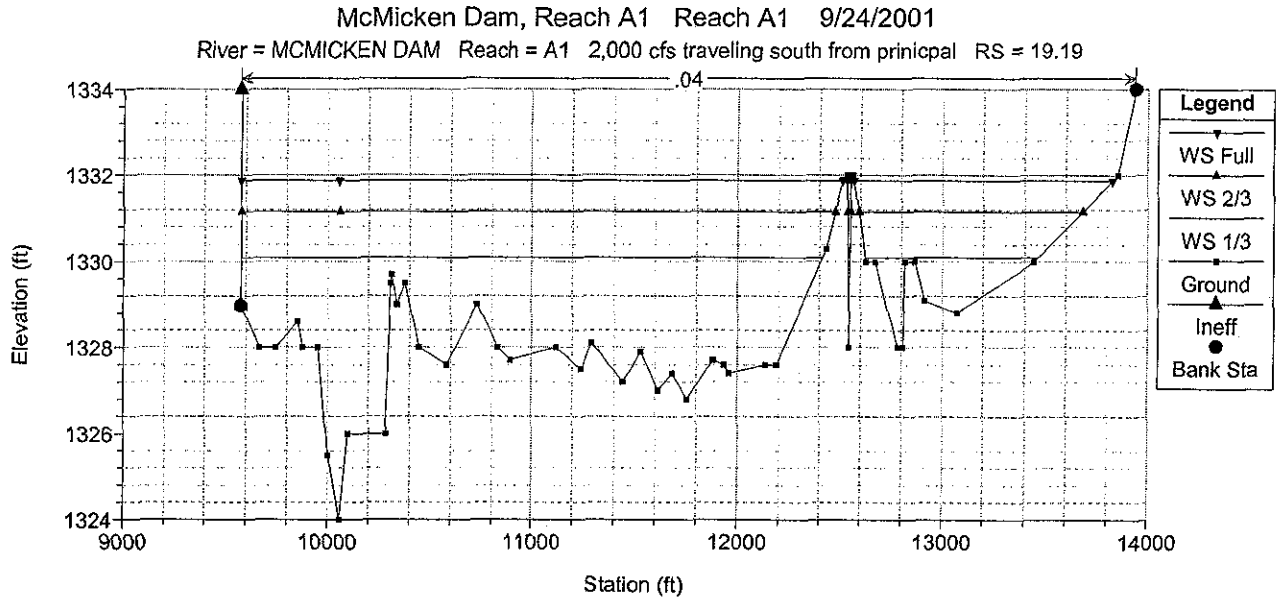

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 19.67
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

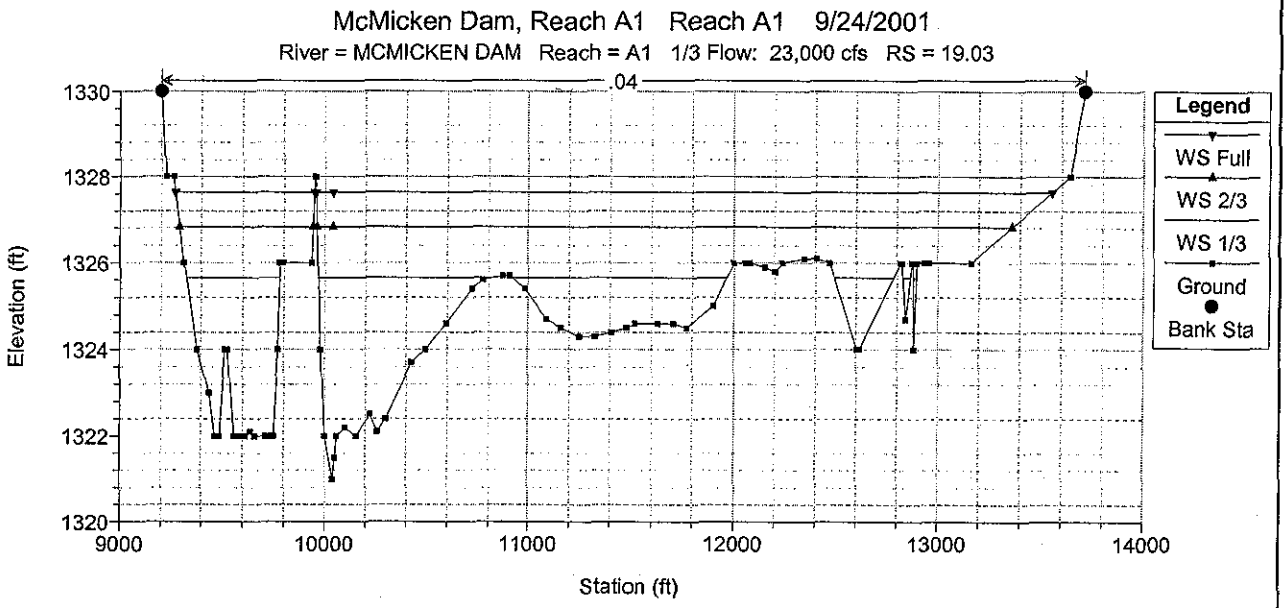

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 Flow spilits into two models, Model ADA1 RS = 19.55
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

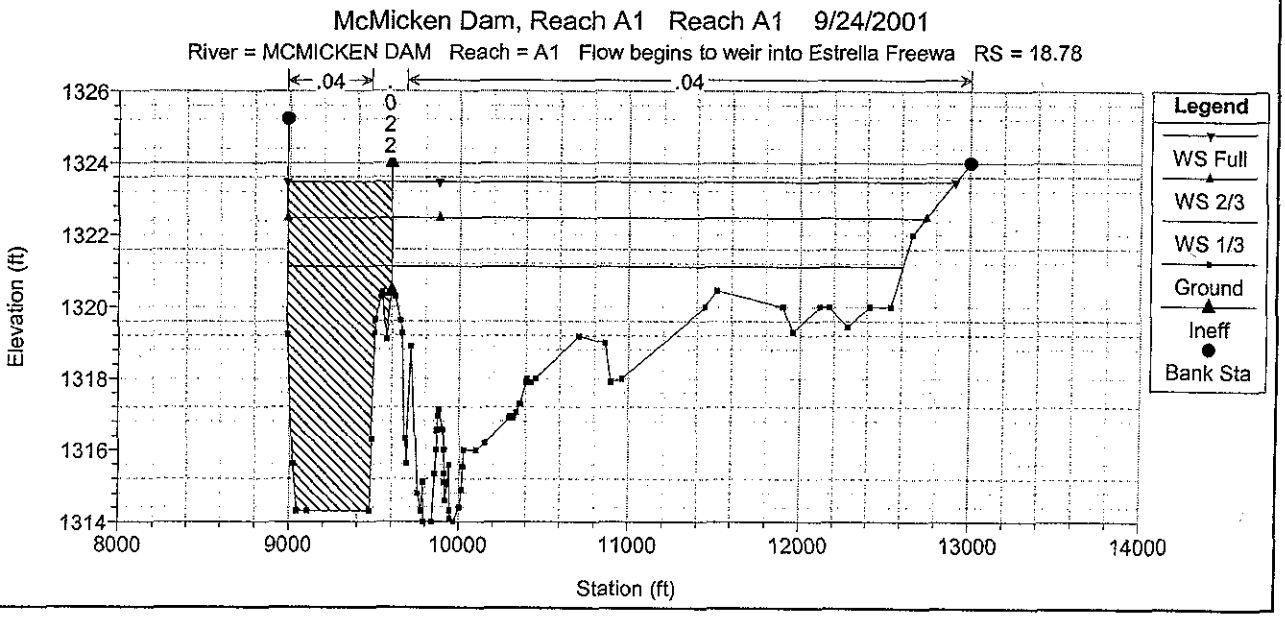

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 19.43
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

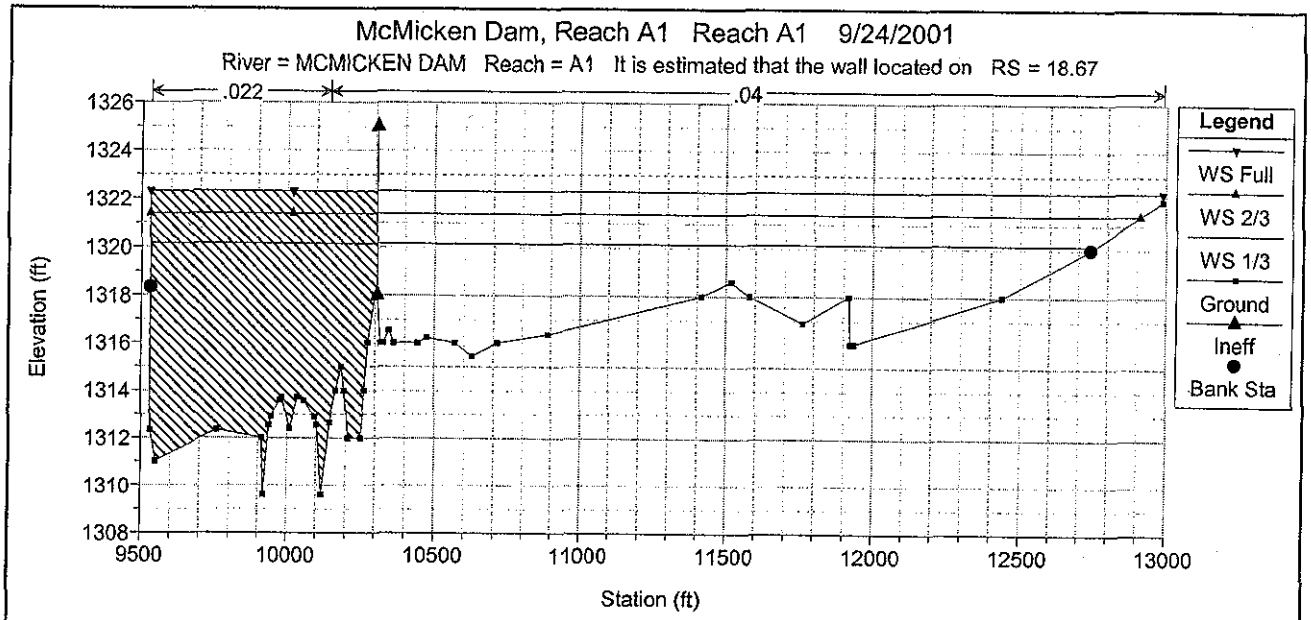

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 25,000 cfs RS = 19.34
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

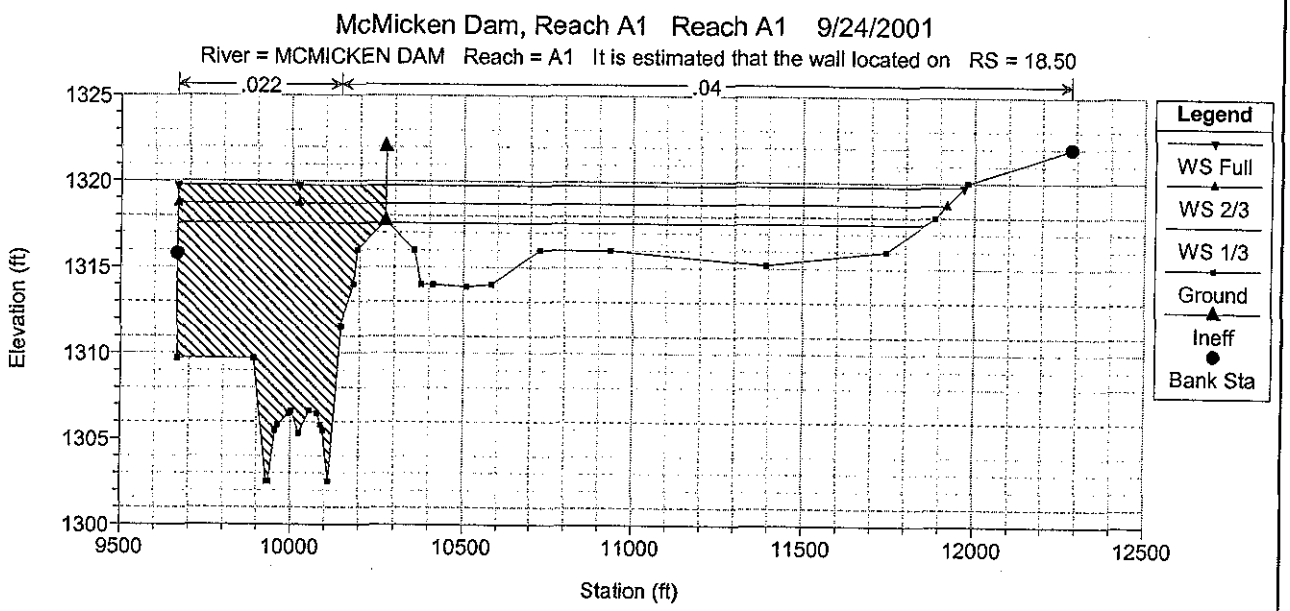

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 Railroad at 7835; Grand Avenue 7970-8010 RS = 19.22
.035
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

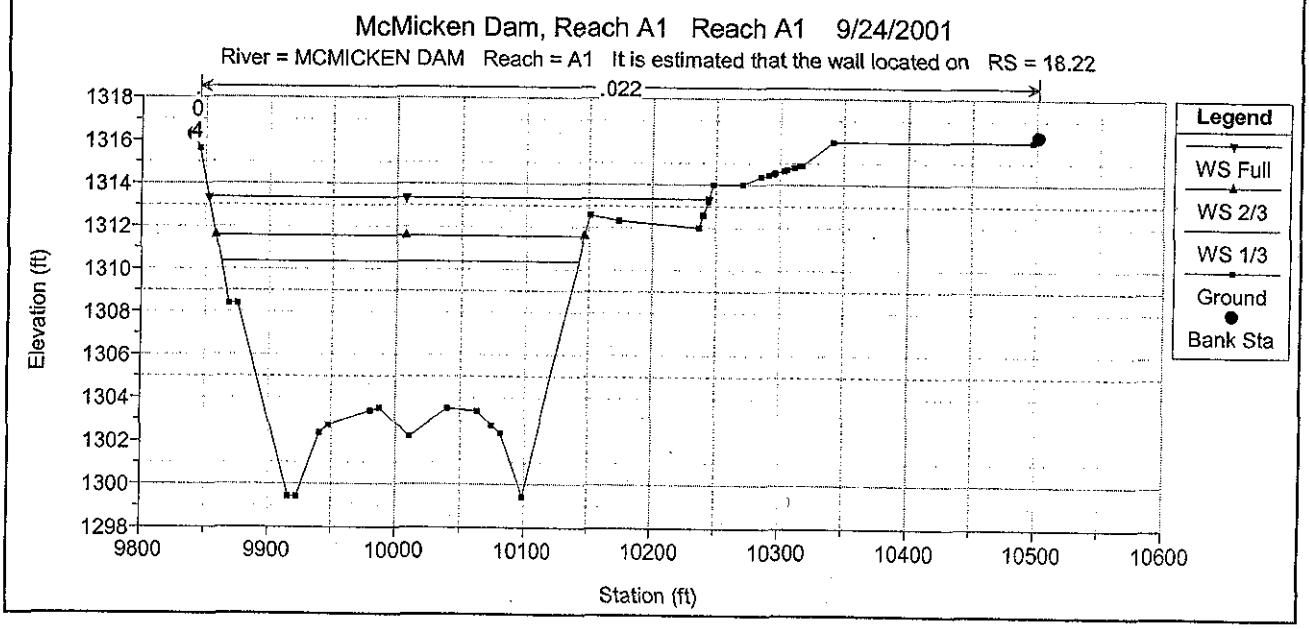

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 2,000 cfs traveling south from prinicpal RS = 19.19
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1334
1332
1330
1328
1326
1324
9000
10000
11000
12000
13000
14000
Station (ft)

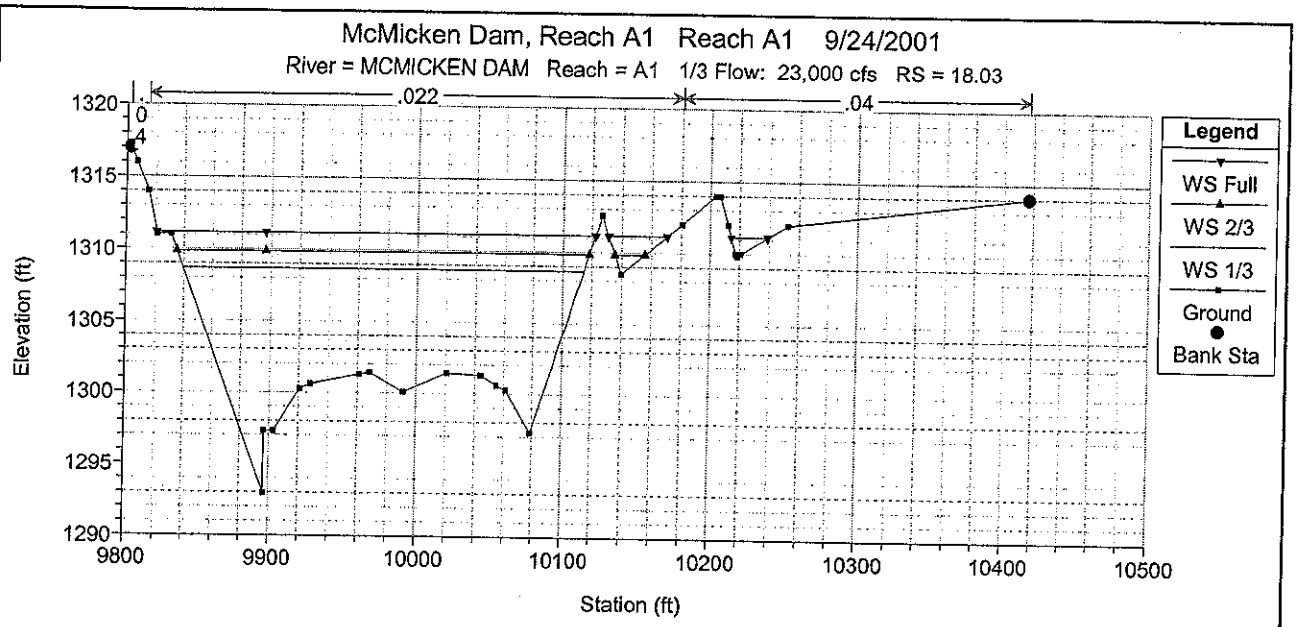

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 23,000 cfs RS = 19.03
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1330
1328
1326
1324
1322
1320
9000
10000
11000
12000
13000
14000
Station (ft)

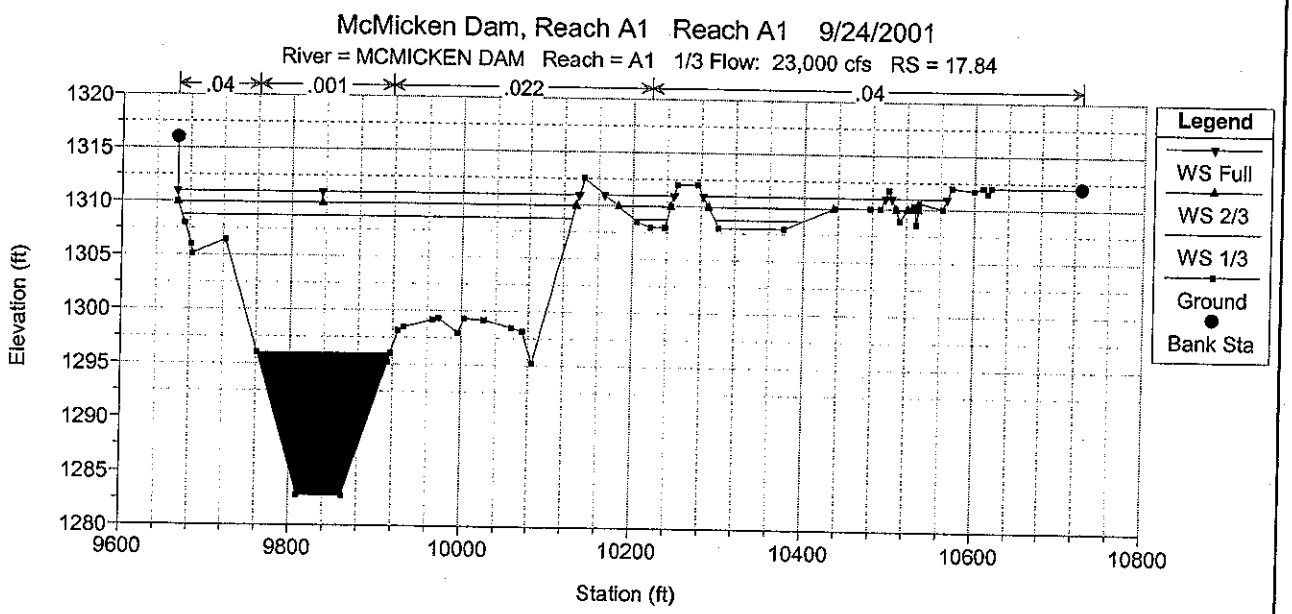

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 Flow begins to weir into Estrella Freewa RS = 18.78
.04
.04
0
2
2
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1326
1324
1322
1320
1318
1316
1314
8000
9000
10000
11000
12000
13000
14000
Station (ft)

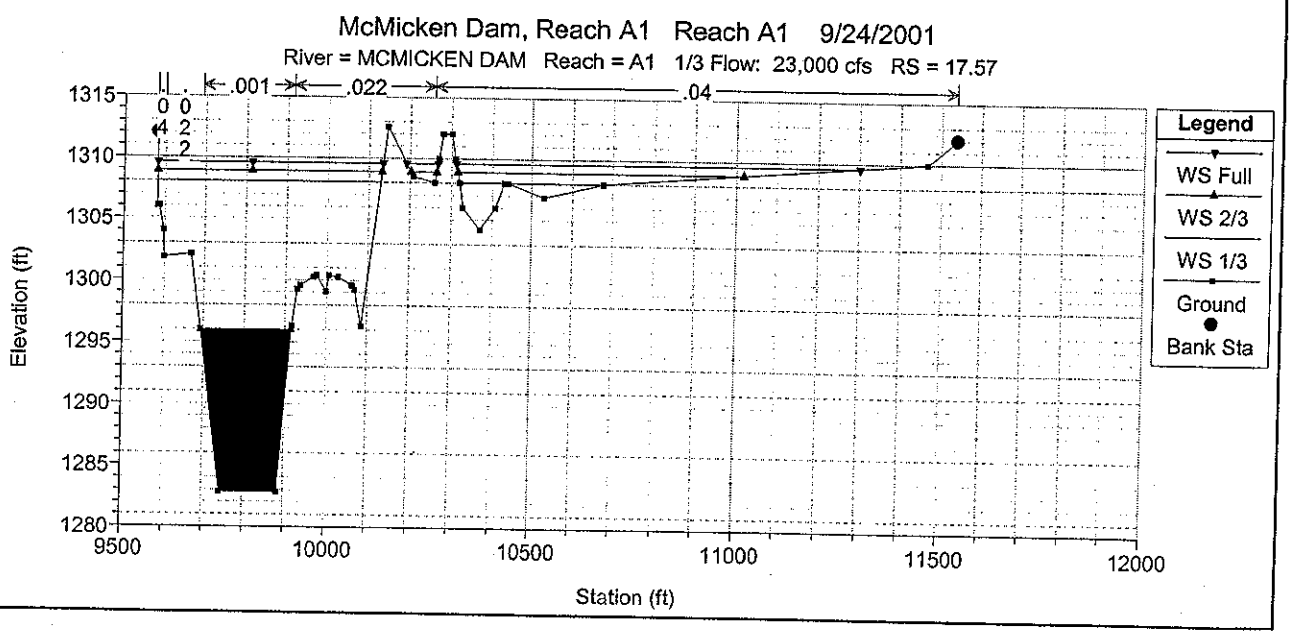

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 18.67
.022
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 18.50
.022
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 18.22
.022
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

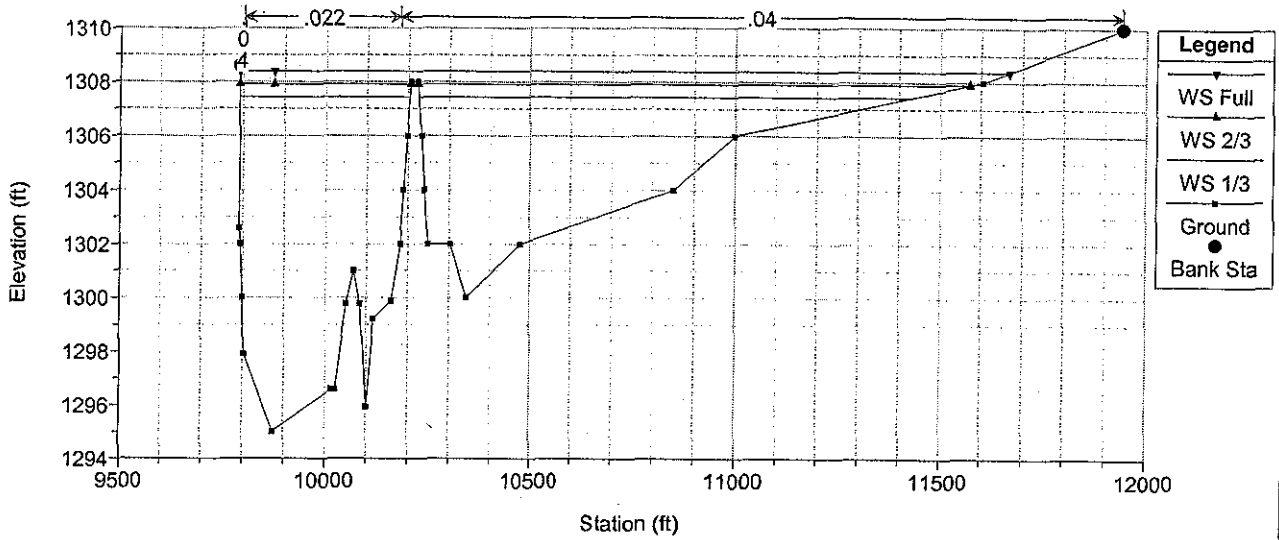

McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 23,000 cfs RS = 18.03
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 23,000 cfs RS = 17.84
.04
.001
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 1/3 Flow: 23,000 cfs RS = 17.57
.001
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)

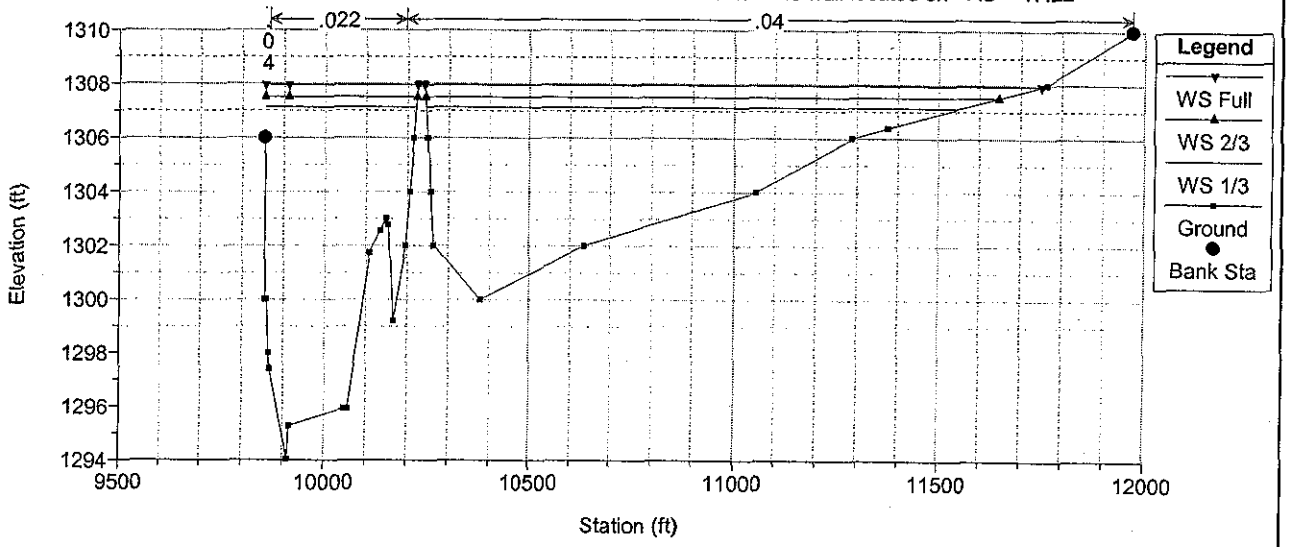
McMicken Dam, Reach A1 Reach A1 9/24/2001

River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 17.33



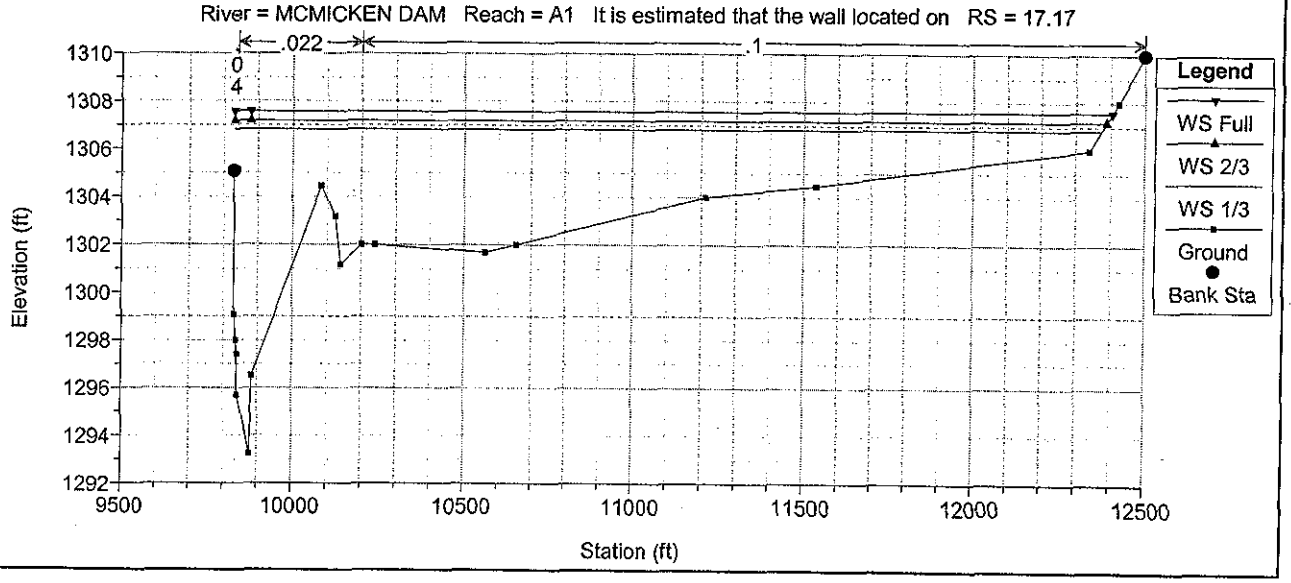
McMicken Dam, Reach A1 Reach A1 9/24/2001

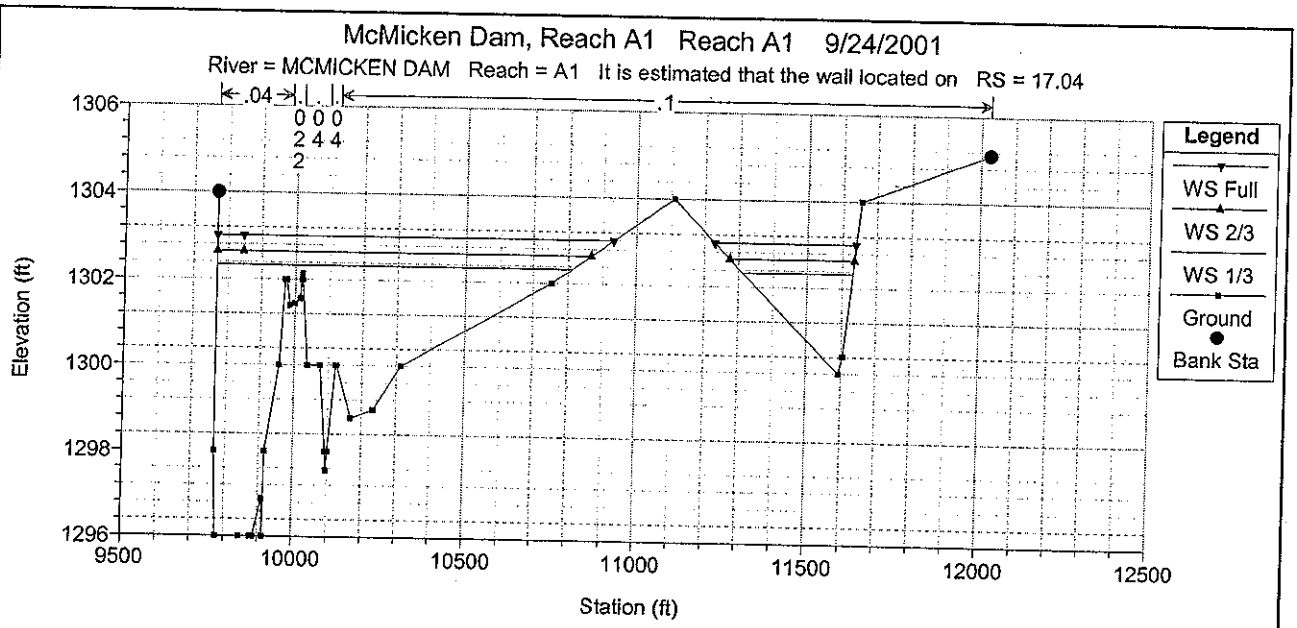
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 17.22

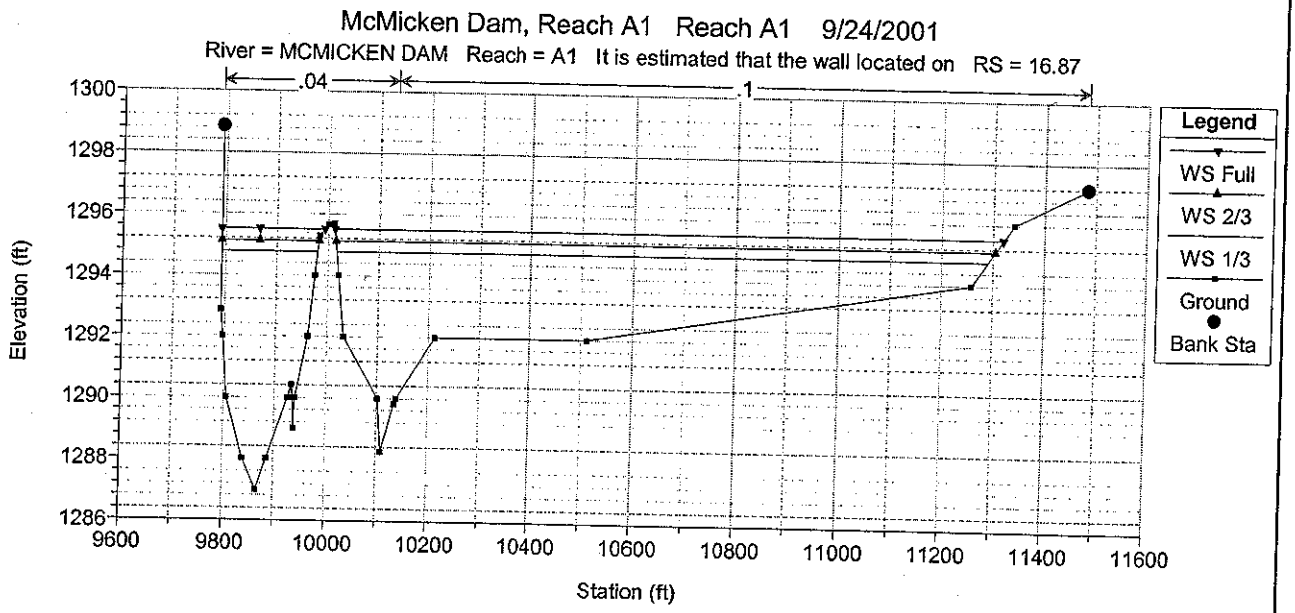


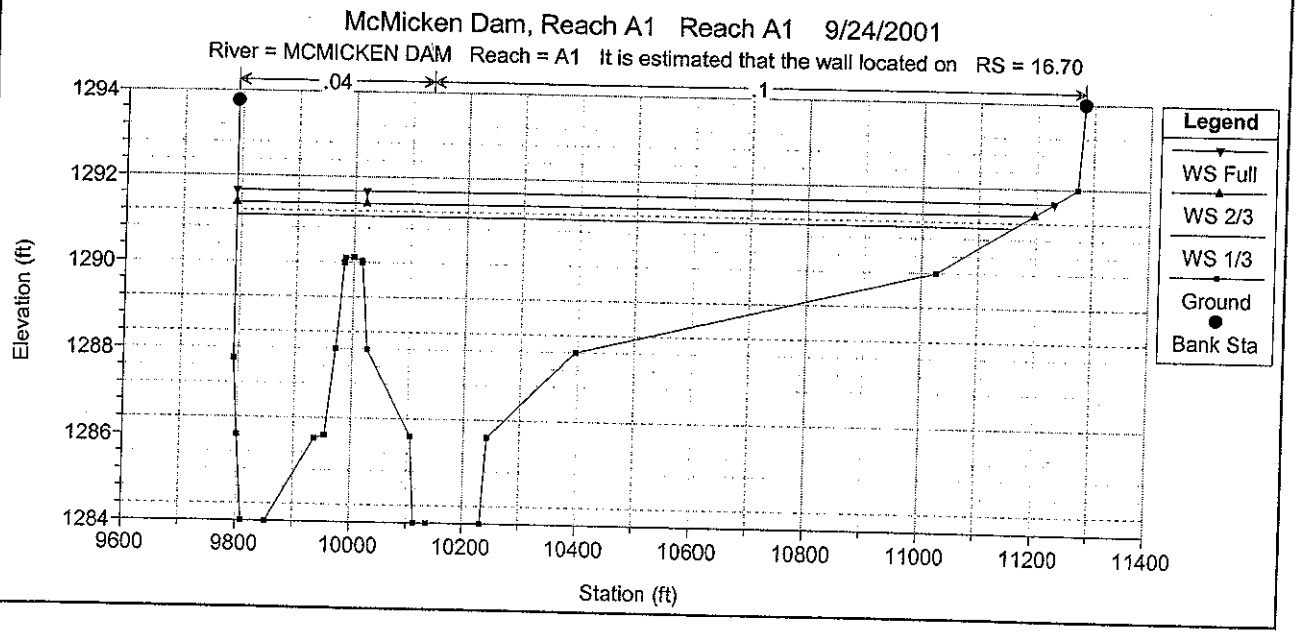
McMicken Dam, Reach A1 Reach A1 9/24/2001

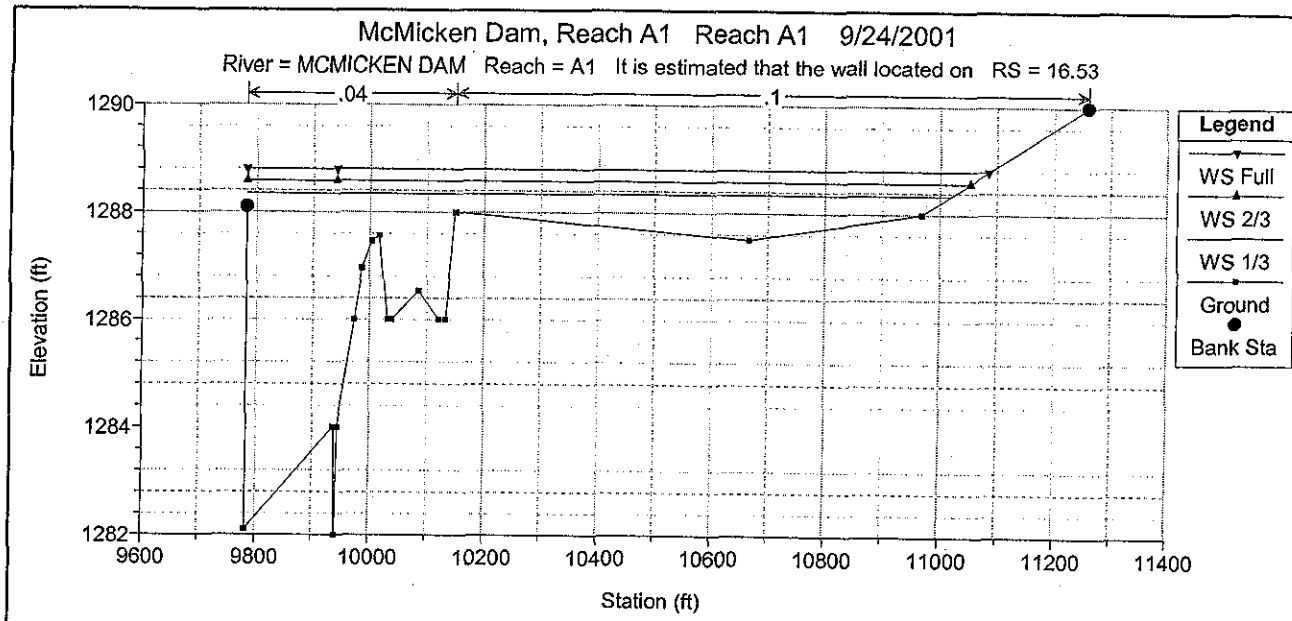
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 17.17

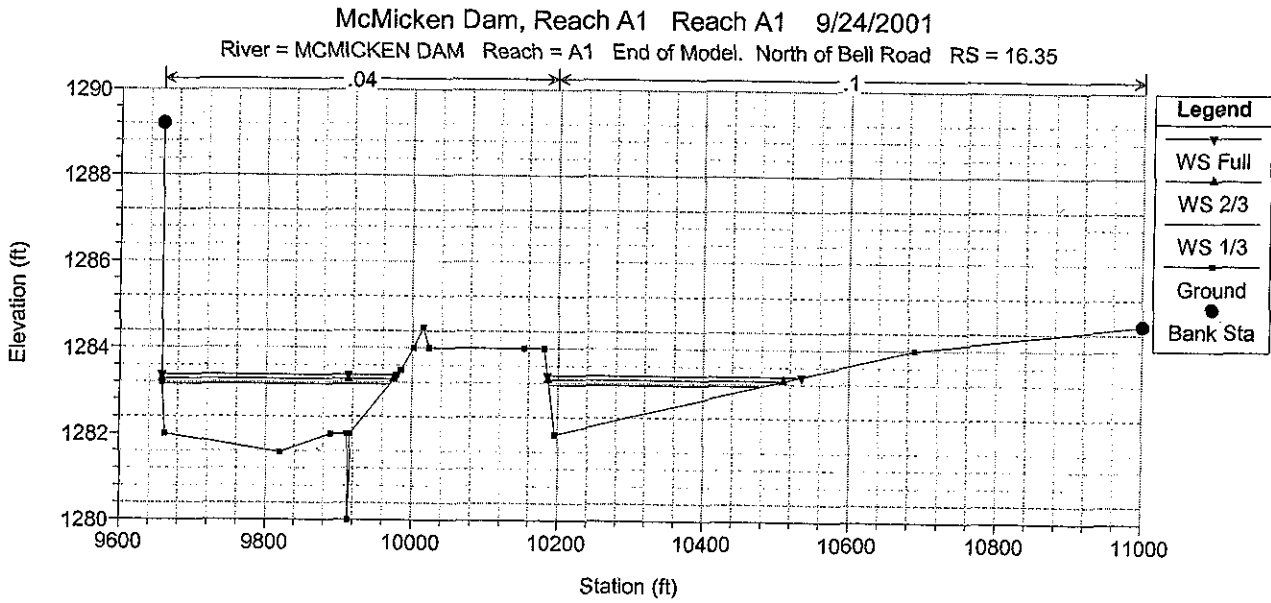



McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 17.04
.04
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 16.87
.04
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 16.70
.04
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 It is estimated that the wall located on RS = 16.53
.04
.1
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1290
1288
1286
1284
1282
9600
9800
10000
10200
10400
10600
10800
11000
11200
11400
Station (ft)


McMicken Dam, Reach A1 Reach A1 9/24/2001
River = MCMICKEN DAM Reach = A1 End of Model. North of Bell Road RS = 16.35
.04
.1
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1290
1288
1286
1284
1282
1280
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)

3 Weir Flow to Loop 303 Freeway

Depressed Section

Summary Sheet for Weir Flow to Loop 303 Freeway Depressed Section

Description

A weir analysis was used to estimate ponding water surface elevations for cross-sections 19.19, 19.03, 18.78, 18.67, and 18.50 for the 1/3, 2/3 and Full Flows. Flow enters the freeway north of cross-section 18.78 for the 1/3, 2/3 and Full Flows. At Section 18.78, the freeway has enough capacity to carry the entire flow for the 1/3 flow model. The flow continues to weir into the freeway for the remainder of the cross-sections mentioned above. An estimate of the flow weiring into the freeway for each of the above mentioned cross-sections was determined for the three flow conditions. An evaluation of the difference in water surface elevations for the flow in the freeway and the flow weiring into the freeway was computed. This determined if the flow in the freeway would pond over four (4) feet, causing the boundary wall at Sun City Grand to fail.

Assumptions

- At cross-section 18.24, the entire flow will have completely weired into the freeway.

Method of Analysis

The HEC-RAS Model MDA1 was used to determine the water surface elevations and corresponding hydraulic head at each cross-section. This was done by indicating a normal ineffective flow area at the point in which the flow begins to enter the freeway. The amount of flow that potentially could weir into the freeway between each cross-section was then determined using the broad-crested weir equation $Q=CLH^{3/2}$, where the weir coefficient used was 2.8. This process was performed in an iterative manner until a balance of flow and water surface elevation was reached between the weir equation and the HEC-RAS output. Attached is a spreadsheet indicating the results of the weir analysis. This weir analysis was used to determine the flow distribution and delineation limits in the model for cross-sections 19.19 to 18.52. It also aided in determining the ponding water surface elevation within the freeway section.

Results

1/3 Flow

Weir Location	Weir Length (ft)	Amount Weiring into 303 Freeway	Water Surface Elevation (feet)	
			West of Freeway 303	Within Freeway 303
Approximately 400 ft north of 18.78	400	0 cfs	1321.11	1314.49
18.78 to 18.67	580	3,000 cfs	1320.15	1313.76
18.67 to 18.50	844	2,500 cfs	1317.56	1313.68
18.50 to 18.22	-	17,500 cfs	-	1310.36

2/3 Flow

Weir Location	Weir Length (ft)	Amount Weiring into 303 Freeway	Water Surface Elevation (feet)	
			West of Freeway 303	In Freeway 303
Approximately 400 ft north of 18.78	400	1,000 cfs	1322.47	1318.92
18.78 to 18.67	580	7,500 cfs	1321.38	1318.84
18.67 to 18.50	844	8,000 cfs	1318.70	1318.68
18.50 to 18.22	-	31,500 cfs	-	1311.49

Full Flow

Weir Location	Weir Length (ft)	Amount Weiring into 303 Freeway	Water Surface Elevation (feet)	
			West of Freeway 303	In Freeway 303
Approximately 400 ft north of 18.78	400	2,500 cfs	1323.47	1321.95
18.78 to 18.67	580	11,500 cfs	1322.32	1321.87
18.67 to 18.50	844	13,500 cfs	1319.76	1321.63
18.50 to 18.22	-	44,500 cfs	-	1313.30

MAXIMUM POTENTIAL CROSSING

FLOW TRAVELING INTO LOOP 303 CS 19.03 CS 18.78

1/3 FLOW 23000

L	WS ELE	CS HIGH POINT	H	Q	Q in 18.78
300	1321.11	1320.42	0.69	170	22830

0 cfs crosses before CS 18.78

2/3 FLOW 48000

L	WS ELE	CS HIGH POINT	H	Q	Q in 18.78
400	1322.47	1320.42	2.05	1162	46838

1000 cfs crosses before CS 18.78

FULL FLOW 72000

L	WS ELE	CS HIGH POINT	H	Q	Q in 18.78
500	1323.47	1320.42	3.05	2637	69363

2,500 cfs crosses before CS 18.78

FLOW TRAVELING INTO LOOP 303 CS 18.78- CS 18.67

1/3 FLOW 23,000 cfs in CS 18.78

L	CS 18.78			CS 18.67			Q	Q in 18.67
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
580	1320.42	1321.11	0.69	1318	1320.15	2.15	2748	20252

3000 cfs crosses from 18.78 to 18.67

2/3 FLOW 47,000 cfs in CS 18.78

L	CS 18.78			CS 18.67			Q	Q in 18.67
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
580	1320.42	1322.47	2.05	1318	1321.38	3.38	7265.09	39735

7,500 cfs crosses from 18.78 to 18.67

FULL FLOW 69500 cfs in CS 18.78

L	CS 18.78			CS 18.67			Q	Q in 18.67
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
580	1320.42	1323.47	3.05	1318	1322.32	4.32	11487.9	58012

11,500 cfs crosses from 18.78 to 18.67

FLOW TRAVELING INTO LOOP 303 CS 18.67- CS 18.50

1/3 FLOW 20,000 cfs in CS 18.67

L	CS 18.67			CS 18.50			Q	Q in 18.50
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
844	1318	1320.15	2.15	1317.67	1317.56	-0.11	2434	17566

2,500 cfs crosses from 18.67 to 18.50

2/3 FLOW 39,500 cfs in CS 18.67

L	CS 18.67			CS 18.50			Q	Q in 18.50
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
844	1318	1321.38	3.38	1317.67	1318.7	1.03	7737.73	31762

8,000 cfs crosses from 18.67 to 18.50

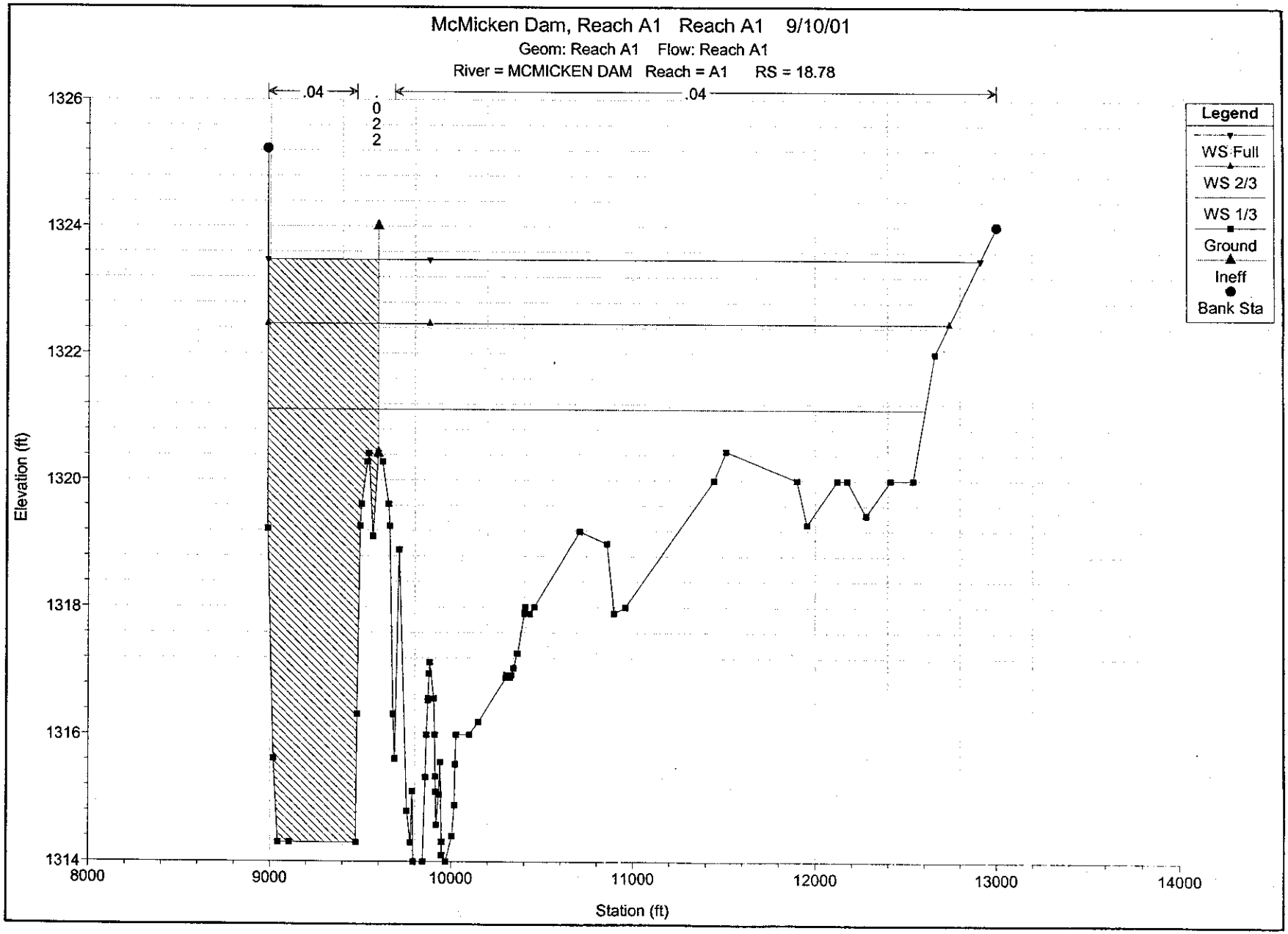
FULL FLOW 58,000 cfs in CS 18.67

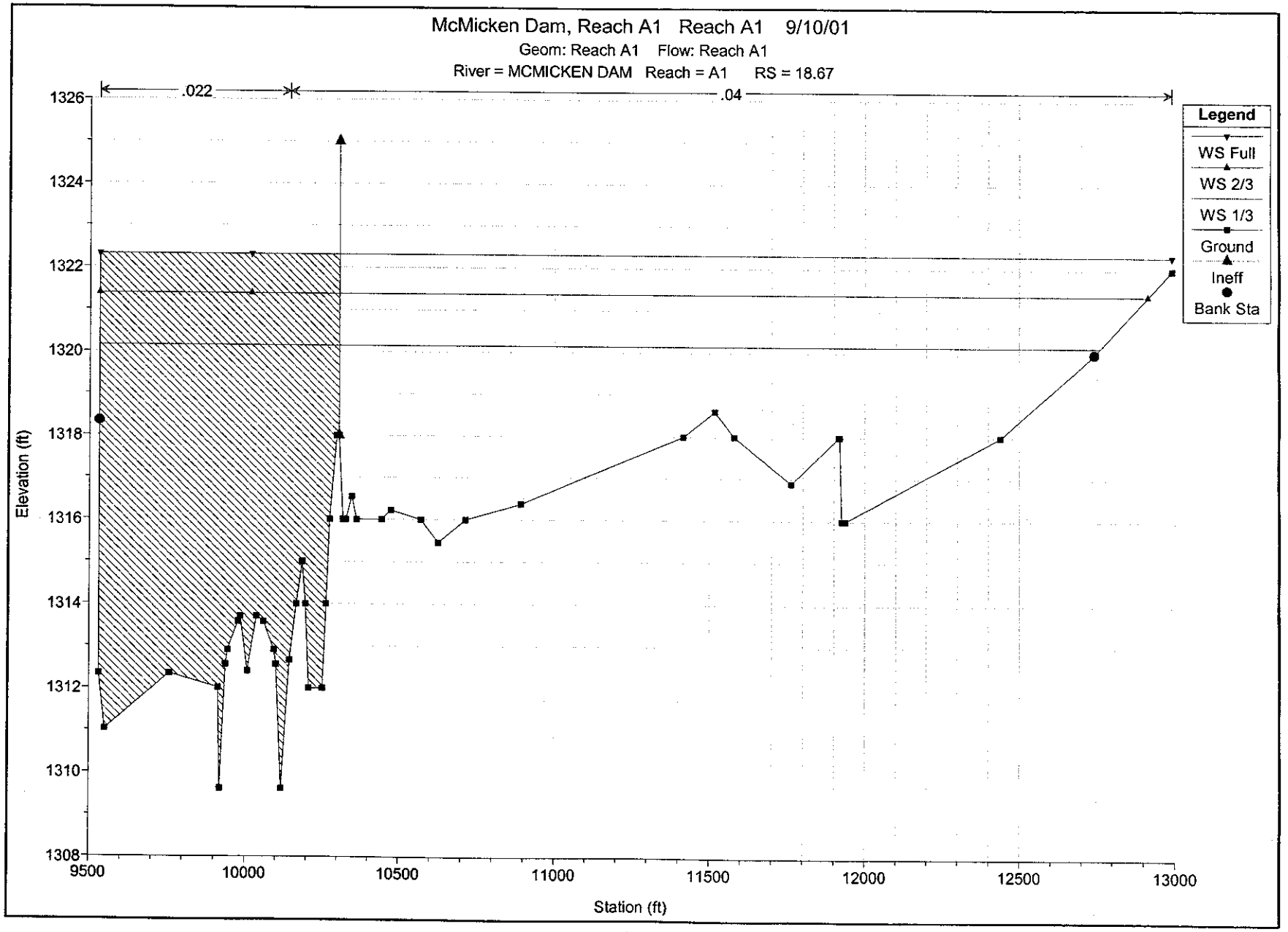
L	CS 18.67			CS 18.50			Q	Q in 18.50
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)	(cfs)
844	1318	1322.32	4.32	1317.67	1319.77	2.1	13591.2	44409

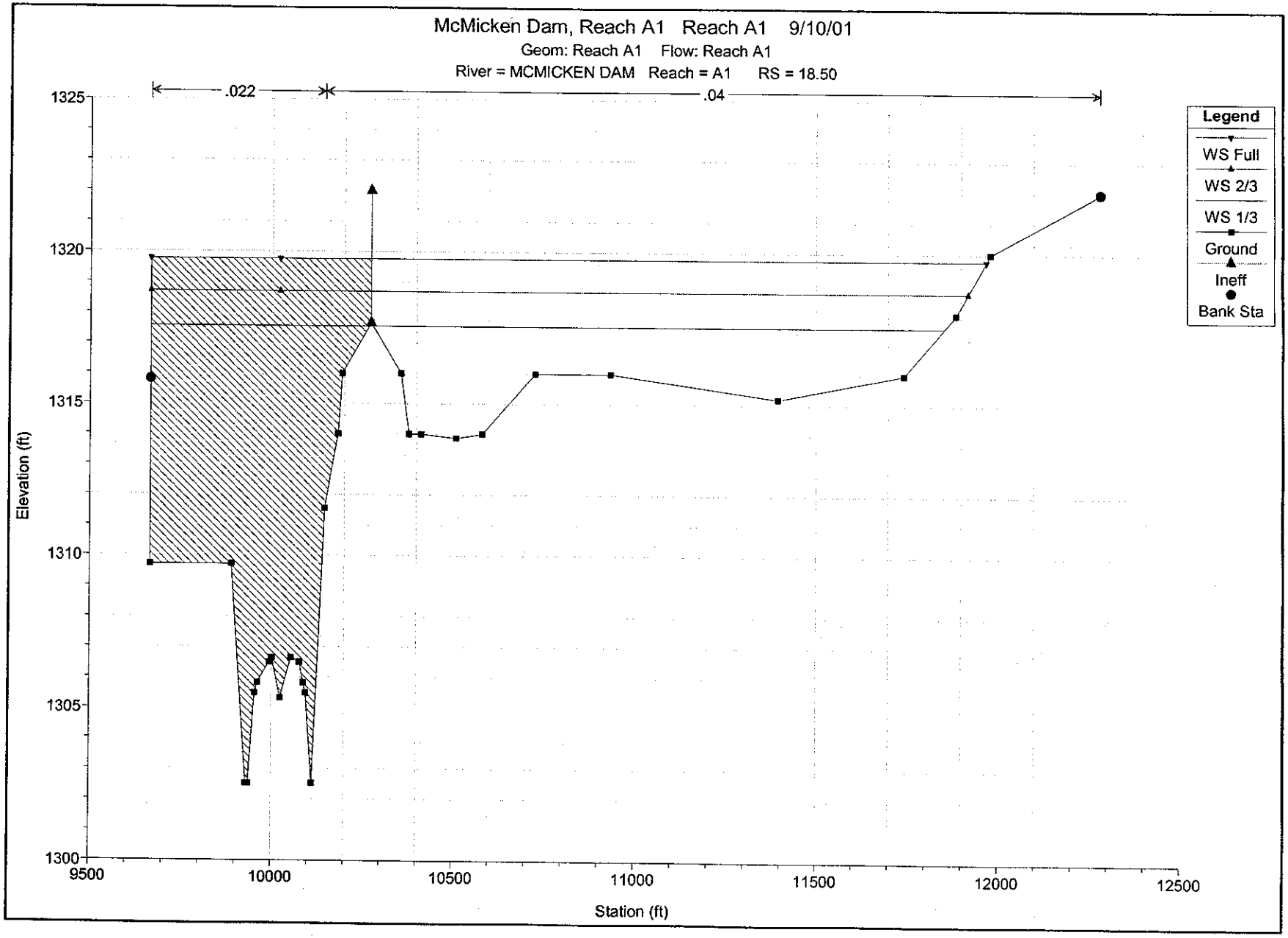
13,500 cfs crosses form 18.67 to 18.50

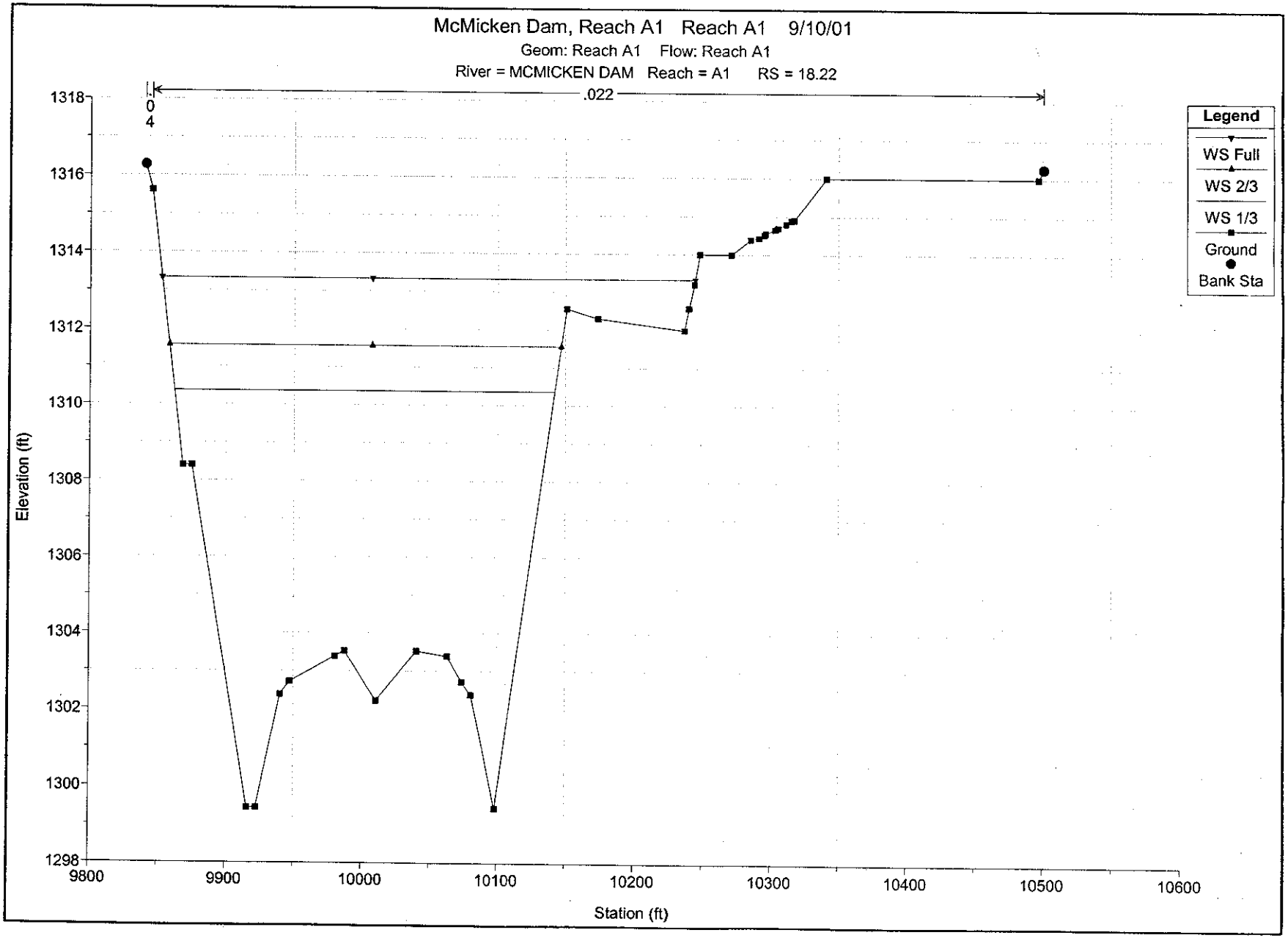
SUMMARY

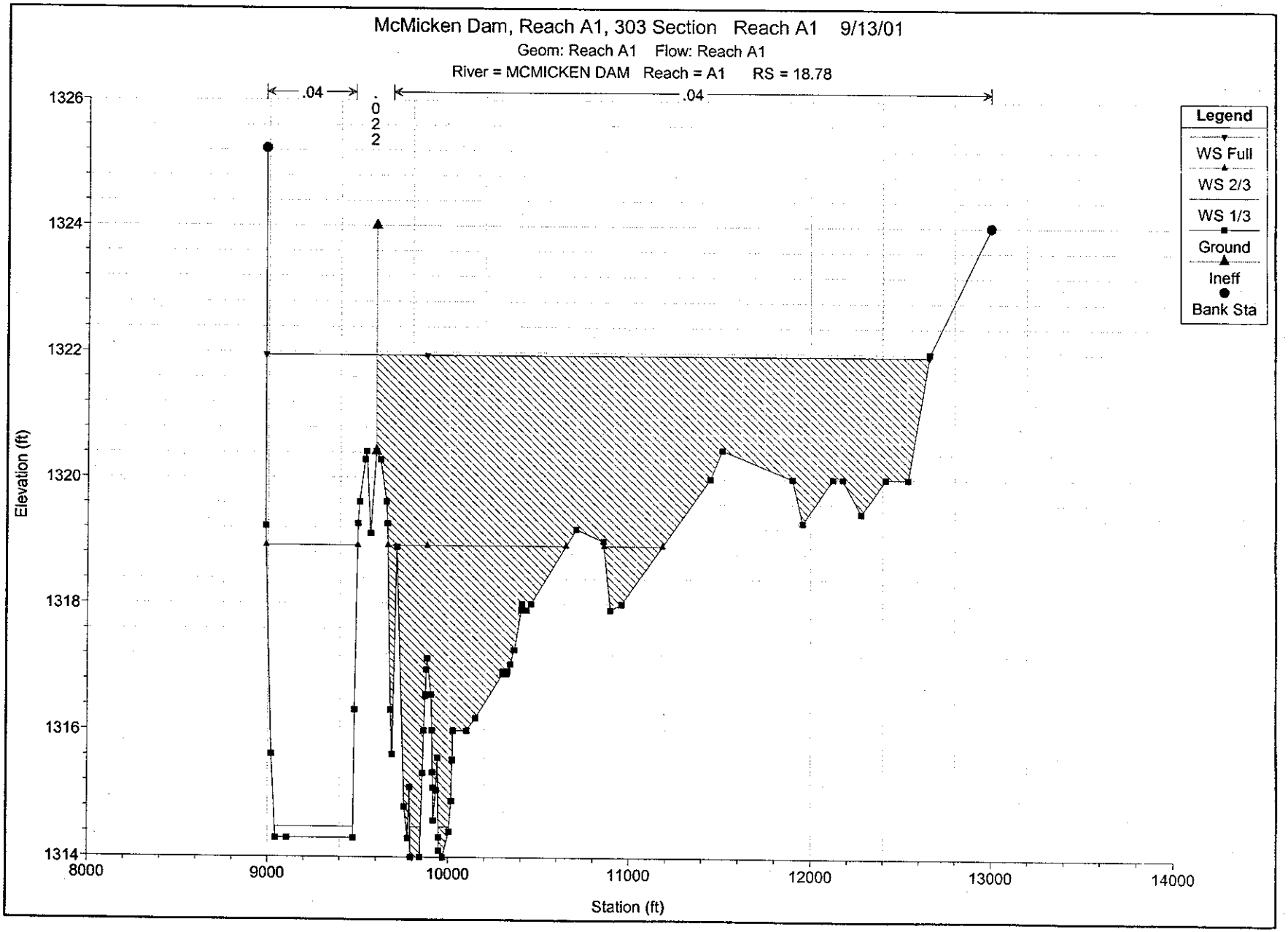
CS	HighPoint	West of Loop 101 WSE			Loop 101 WSE			Base of Wall	Weiring into SCG		
		1/3 Flow	2/3 Flow	Full Flow	1/3 Flow	2/3 Flow	Full Flow		1/3 Flow	2/3 Flow	Full Flow
18.78	1320.42	1321.11	1322.47	1323.47	1314.49	1318.92	1321.95	1319.23	No	No	No
18.67	1318	1320.15	1321.38	1322.32	1313.76	1318.84	1321.87	1312.34	No	Yes	Yes
18.5	1317.67	1317.56	1318.7	1319.77	1313.68	1318.68	1321.63	1309.71	No	Yes	Yes

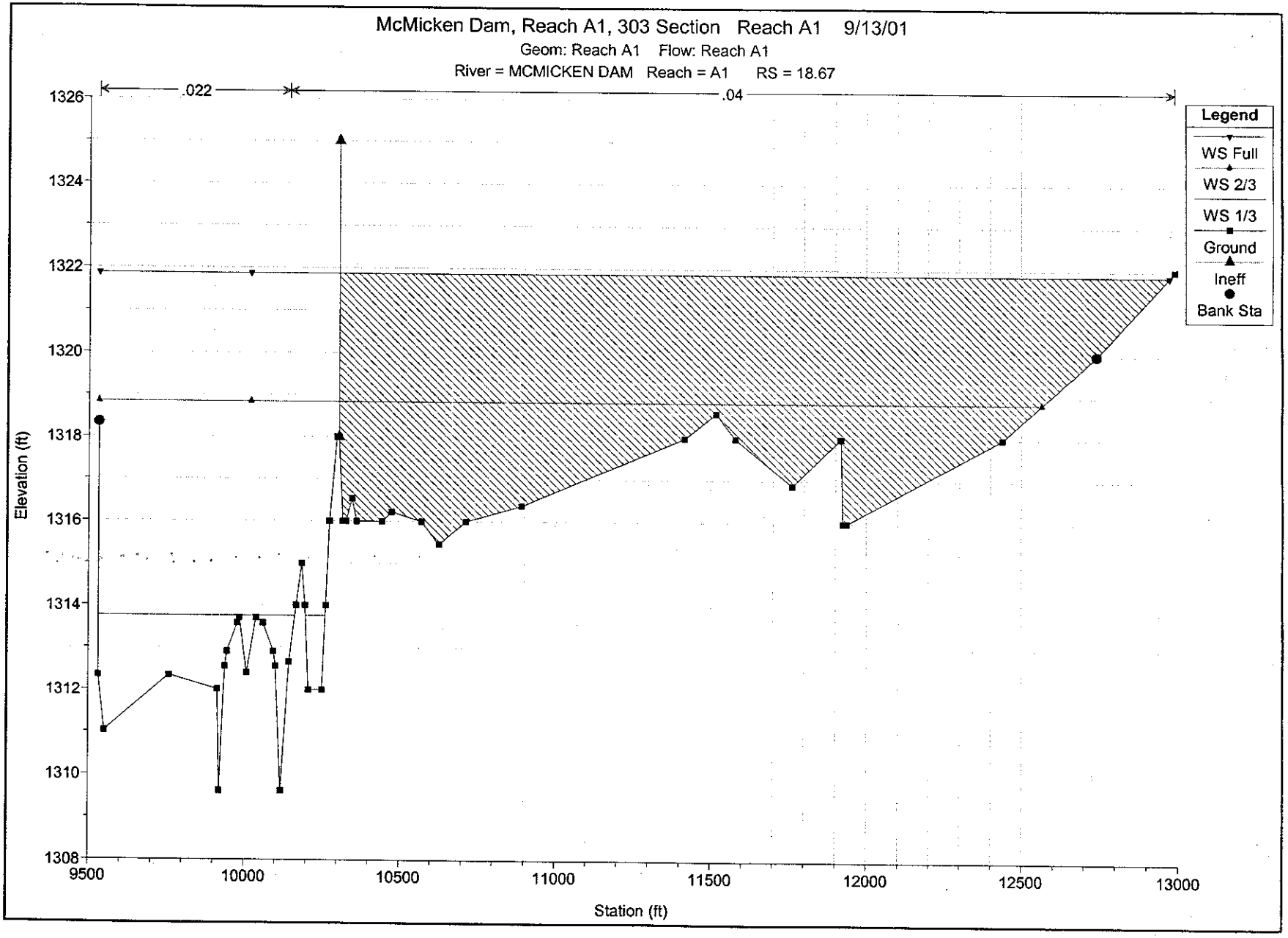

McMicken Dam, Reach A1 Reach A1 9/10/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.78
.04
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1326
1324
1322
1320
1318
1316
1314
8000
9000
10000
11000
12000
13000
14000
Station (ft)

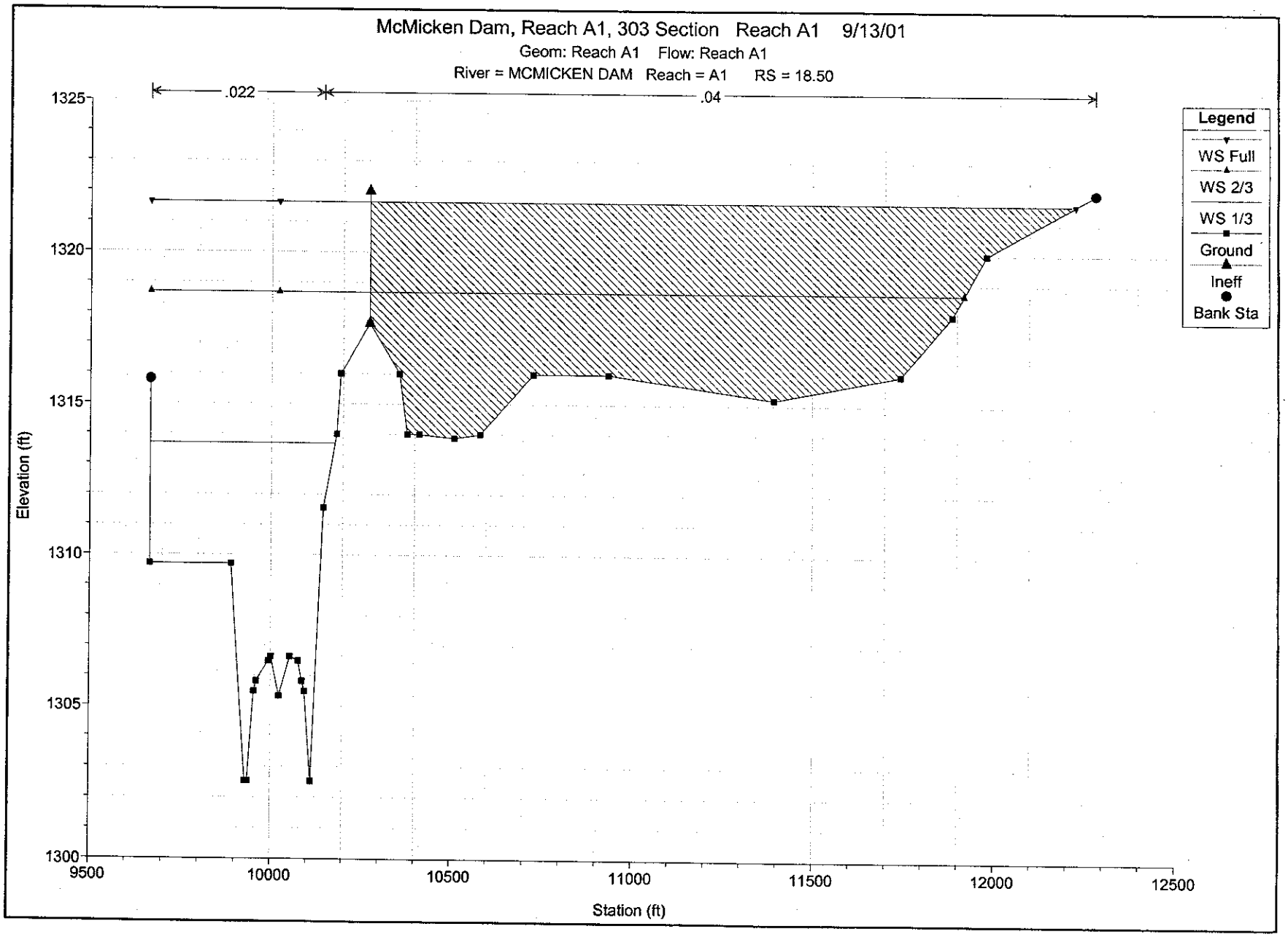

McMicken Dam, Reach A1 Reach A1 9/10/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.67
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1326
1324
1322
1320
1318
1316
1314
1312
1310
1308
9500
10000
10500
11000
11500
12000
12500
13000
Station (ft)


McMicken Dam, Reach A1 Reach A1 9/10/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.50
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1325
1320
1315
1310
1305
1300
9500
10000
10500
11000
11500
12000
12500
Station (ft)


McMicken Dam, Reach A1 Reach A1 9/10/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.22
.022
0
4
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1318
1316
1314
1312
1310
1308
1306
1304
1302
1300
1298
9800
9900
10000
10100
10200
10300
10400
10500
10600
Station (ft)


McMicken Dam, Reach A1, 303 Section Reach A1 9/13/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.78
.04
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1326
1324
1322
1320
1318
1316
1314
8000
9000
10000
11000
12000
13000
14000
Station (ft)


McMicken Dam, Reach A1, 303 Section Reach A1 9/13/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.67
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1326
1324
1322
1320
1318
1316
1314
1312
1310
1308
9500
10000
10500
11000
11500
12000
12500
13000
Station (ft)


McMicken Dam, Reach A1, 303 Section Reach A1 9/13/01
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 18.50
.022
.04
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1325
1320
1315
1310
1305
1300
9500
10000
10500
11000
11500
12000
12500
Station (ft)

4 Model MDA1 Sun City Grand

Flow Split Analysis

Summary Sheet for Model MDA1 Sun City Grand Flow Split Analysis

Description

Flows have been determined to pond against the wall surrounding Sun City Grand before reaching cross-section 18.80. Flows will pond to a depth greater than four (4) feet above the base of the wall between cross-sections 18.80 and 18.68 for the 2/3 and Full Flow. At this point, the wall is assumed to fail and leave three (3) feet of rubble at the base of the wall. Flow will weir over the rubble, enter Sun City Grand, and become the initial flows for Model MDB2. The weir lengths were determined to be 1,900-ft and 2,060-ft for the 2/3 and Full Flows, respectively. The 1/3 flow does not weir into Sun City Grand at this area.

The remaining flow on the west side of the Sun City Grand Wall will travel south along the Loop 303 freeway. Between cross-sections 18.24 and 17.59, the freeway is below grade and is capable of carrying the flow without exceeding four (4) feet in depth, measured from the base of the wall. South of cross-section 17.59, the freeway quickly rises in elevation. This causes the flow to exceed four (4) feet in depth above the base of the wall. A second wall failure then occurs, similar to the one described above. A third wall failure occurs downstream of cross-section 16.88. The flow entering Sun City Grand from these two weirs will become the initial flows for Model MDB1.

Assumptions

- Flow depths of less than four (4) feet in depth against the Sun City Grand west boundary wall will be conveyed without wall failure. Flows greater than four (4) feet in depth against the wall are assumed to cause the wall to fail.
- After wall failure, three (3) feet of rubble is assumed to occur at the base of the wall. The wall will act as a broad-crested weir, allowing flow to enter into Sun City Grand.
- A rectangular weir with an even flow distribution over the length of the weir was assumed.

Method of Analysis

An elevation-discharge curve was calculated to determine a range of flows that could travel south along the freeway. The most constricting cross-section was used, where the flow was found to pond to four (4) feet above the base of the wall. Cross-sections 18.50, 17.04, and 16.35 were used to determine the weir flow depths at the appropriate locations. The broad-crested weir equation $Q=CLH^{3/2}$ was used to determine the amount of flow that could weir into Sun City Grand. A C value of 2.2 was used for the weir calculations. The assumption that an even amount of flow would weir throughout this section was used, therefore, a simple ratio of length was used to determine the amount of flow between each cross-section. Following are the results of the analysis, as well as elevation versus flow curves.

Results

1/3 Flow

Weir Location	Amount of Flow Weiring into Sun City Grand	Amount of Flow Remaining in Model MDA1
17.57 to 16.87	6,000 cfs	17,000 cfs
16.87 to 16.35	14,000 cfs	3,000 cfs

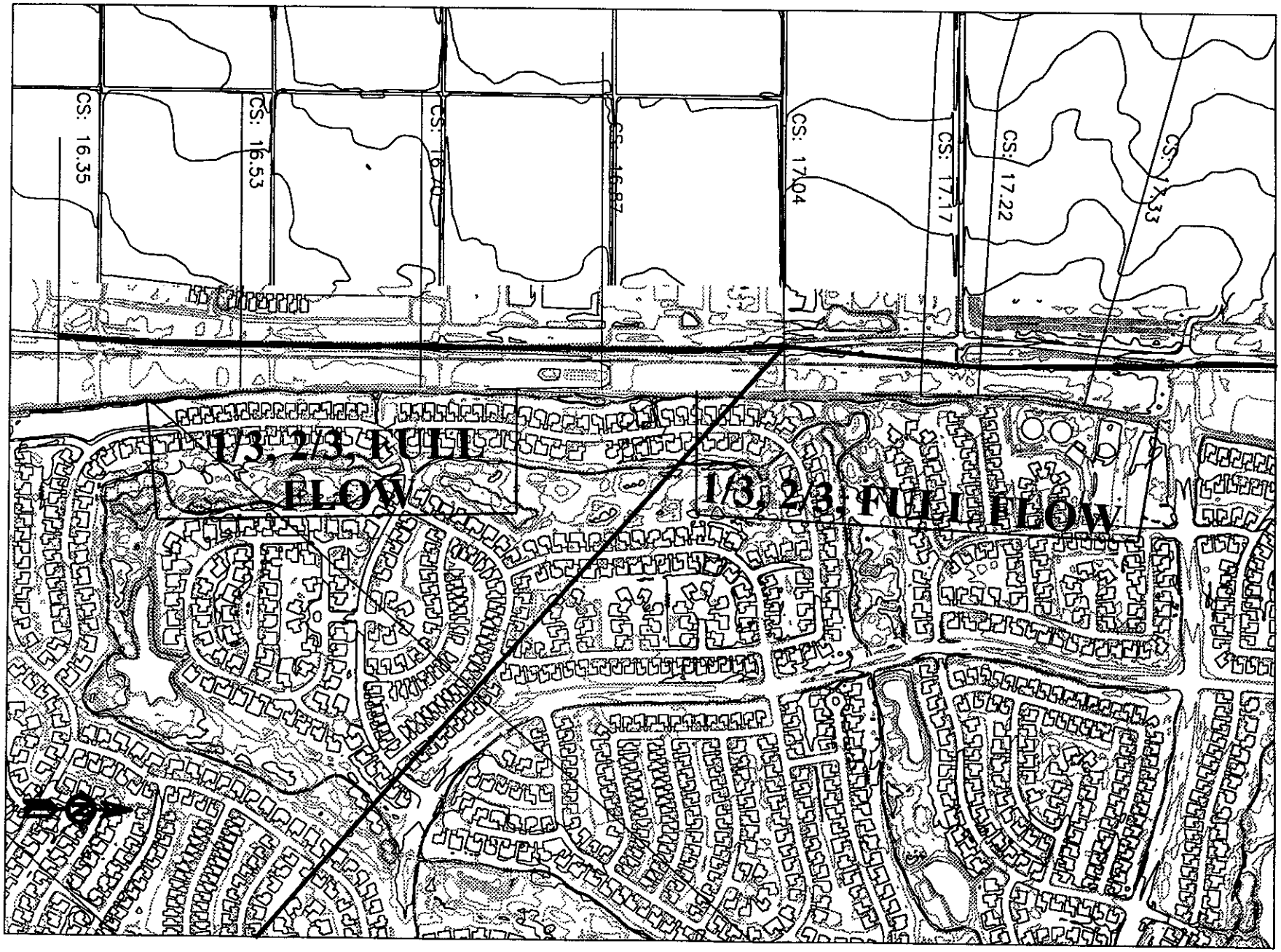
2/3 Flow

Weir Location	Amount of Flow Weiring into Sun City Grand	Amount of Flow Remaining in Model MDA1
18.78 to 18.22	19,500 cfs	28,500 cfs
17.57 to 16.87	9,000 cfs	19,500 cfs
16.87 to 16.35	16,000 cfs	3,500 cfs

Full Flow

Weir Location	Amount of Flow Weiring into Sun City Grand	Amount of Flow Remaining in Model MDA1
18.78 to 18.22	37,500 cfs	34,500 cfs
17.57 to 16.87	12,000 cfs	22,500 cfs
16.87 to 16.35	18,500 cfs	4,000 cfs

CS: 19.03
CS: 18.78
CS: 18.67
CS: 18.50
CS: 18.0
CS: 17.84
2/3 HOW
HULL FLOW
N


CS: 16.35
CS: 16.53
CS: 16.70
CS: 16.87
CS: 17.04
CS: 17.17
CS: 17.22
CS: 17.33
1/3, 2/3, FULL FLOW
1/3, 2/3, FULL FLOW

Weir Estimates into Sun City Grand: Full Flow

CS 18.77 to 18.38

Weir Section

Qtot	72000
L	2060
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=18.52	Qtotal
1312.71	0	0	3	17200	17,200
1312.8	0.09	122	3.09	17500	17,622
1313.1	0.39	1104	3.39	19000	20,104
1313.4	0.69	2598	3.69	20300	22,898
1313.7	0.99	4464	3.99	21600	26,064
1314	1.29	6640	4.29	23000	29,640
1314.3	1.59	9086	4.59	24200	33,286
1314.6	1.89	11776	4.89	25500	37,276
1314.9	2.19	14688	5.19	26500	41,188
1315.2	2.49	17807	5.49	28000	45,807
1315.5	2.79	21120	5.79	28700	49,820
1315.8	3.09	24617	6.09	29700	54,317
1316.1	3.39	28287	6.39	31000	59,287
1316.4	3.69	32124	6.69	32250	64,374
1316.7	3.99	36120	6.99	34000	70,120
1317	4.29	40269	7.29	35500	75,769
1317.3	4.59	44567	7.59	37000	81,567

RESULTS: 34,500 Stays in Channel, 37,500 Weirs into SCG

Weir Estimates into Sun City Grand: 2/3 Flow

CS 18.74 to 18.38

Weir Section

Qtot	48000
L	1900
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=18.52	Qtotal
1312.71	0	0	3	17200	17,200
1312.8	0.09	112.86	3.09	17500	17,613
1313.1	0.39	1018.06	3.39	19000	20,018
1313.4	0.69	2395.796	3.69	20300	22,696
1313.7	0.99	4117.457	3.99	21600	25,717
1314	1.29	6124.362	4.29	23000	29,124
1314.3	1.59	8380.539	4.59	24200	32,581
1314.6	1.89	10860.98	4.89	25500	36,361
1314.9	2.19	13546.98	5.19	26500	40,047
1315.2	2.49	16423.86	5.49	28000	44,424
1315.5	2.79	19479.71	5.79	28700	48,180
1315.8	3.09	22704.61	6.09	29700	52,405
1316.1	3.39	26090.11	6.39	31000	57,090
1316.4	3.69	29628.92	6.69	32250	61,879
1316.7	3.99	33314.68	6.99	34000	67,315
1317	4.29	37141.74	7.29	35500	72,642
1317.3	4.59	41105.06	7.59	37000	78,105

RESULTS: 28,500 Stays in Channel, 19,500 Weirs into SCG

Weir Estimates into Sun City Grand: 1/3

CS 17.42 to 16.97

Weir Section

Qtot	23000
L	2376
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=17.05	Qtotal
1301	0	0	3	8300	8,300
1301.1	0.1	165	3.1	9100	9,265
1301.2	0.2	468	3.2	9600	10,068
1301.3	0.3	859	3.3	10300	11,159
1301.4	0.4	1322	3.4	10900	12,222
1301.5	0.5	1848	3.5	11600	13,448
1301.6	0.6	2429	3.6	12300	14,729
1301.7	0.7	3061	3.7	13200	16,261
1301.8	0.8	3740	3.8	14000	17,740
1301.9	0.9	4463	3.9	15100	19,563
1302	1	5227	4	15600	20,827
1302.1	1.1	6031	4.1	16500	22,531
1302.2	1.2	6871	4.2	17700	24,571

RESULTS: 17,000 Stays in Channel, 6,000 Weirs into SCG

Weir Estimates into Sun City Grand: 1/3

CS 16.80 to 16.46

Weir Section

Qtot	17000
L	1795
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=16.54	Qtotal
1285.1	0	0	3	600	600
1312.86	0.15	229	3.15	700	929
1313.11	0.4	999	3.4	850	1,849
1313.36	0.65	2069	3.65	1050	3,119
1313.61	0.9	3372	3.9	1250	4,622
1313.86	1.15	4870	4.15	1450	6,320
1314.11	1.4	6542	4.4	1650	8,192
1314.36	1.65	8370	4.65	1850	10,220
1314.61	1.9	10342	4.9	2100	12,442
1314.86	2.15	12449	5.15	2570	15,019
1315.11	2.4	14683	5.4	3000	17,683

RESULTS: 3,000 Stays in Channel, 14,000 Weirs into SCG

Weir Estimates into Sun City Grand: 2/3

CS 17.42 to 16.97

Weir Section

Qtot	28500
L	2376
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=17.05	Qtotal
1301	0	0	3	8300	8,300
1301.1	0.1	165	3.1	9100	9,265
1301.2	0.2	468	3.2	9600	10,068
1301.3	0.3	859	3.3	10300	11,159
1301.4	0.4	1322	3.4	10900	12,222
1301.5	0.5	1848	3.5	11600	13,448
1301.6	0.6	2429	3.6	12300	14,729
1301.7	0.7	3061	3.7	13200	16,261
1301.8	0.8	3740	3.8	14000	17,740
1301.9	0.9	4463	3.9	15100	19,563
1302	1	5227	4	15600	20,827
1302.1	1.1	6031	4.1	16500	22,531
1302.2	1.2	6871	4.2	17700	24,571
1302.3	1.3	7748	4.3	18500	26,248
1302.4	1.4	8659	4.4	19700	28,359
1302.5	1.5	9603	4.5	20250	29,853
1302.6	1.6	10579	4.6	21500	32,079
1302.7	1.7	11586	4.7	22250	33,836
1302.8	1.8	12623	4.8	23000	35,623

RESULTS: 19,500 Stays in Channel, 9,000 Weirs into SCG

Weir Estimates into Sun City Grand: 2/3

CS 16.80 to 16.46

Weir Section

Qtot	19500
L	1795
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=16.54	Qtotal
1285.1	0	0	3	600	600
1312.86	0.15	229	3.15	700	929
1313.11	0.4	999	3.4	850	1,849
1313.36	0.65	2069	3.65	1050	3,119
1313.61	0.9	3372	3.9	1250	4,622
1313.86	1.15	4870	4.15	1450	6,320
1314.11	1.4	6542	4.4	1650	8,192
1314.36	1.65	8370	4.65	1850	10,220
1314.61	1.9	10342	4.9	2100	12,442
1314.86	2.15	12449	5.15	2570	15,019
1315.11	2.4	14683	5.4	3000	17,683
1315.36	2.65	17036	5.65	3480	20,516
1315.61	2.9	19502	5.9	3900	23,402
1315.86	3.15	22078	6.15	4600	26,678
1316.11	3.4	24757	6.4	5700	30,457

RESULTS: 3,500 Stays in Channel, 16,000 Weirs into SCG

Weir Estimates into Sun City Grand: Full

CS 17.42 to 16.97

Weir Section

Qtot	34500
L	2376
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=17.05	Qtotal
1301	0	0	3	8300	8,300
1301.1	0.1	165	3.1	9100	9,265
1301.2	0.2	468	3.2	9600	10,068
1301.3	0.3	859	3.3	10300	11,159
1301.4	0.4	1322	3.4	10900	12,222
1301.5	0.5	1848	3.5	11600	13,448
1301.6	0.6	2429	3.6	12300	14,729
1301.7	0.7	3061	3.7	13200	16,261
1301.8	0.8	3740	3.8	14000	17,740
1301.9	0.9	4463	3.9	15100	19,563
1302	1	5227	4	15600	20,827
1302.1	1.1	6031	4.1	16500	22,531
1302.2	1.2	6871	4.2	17700	24,571
1302.3	1.3	7748	4.3	18500	26,248
1302.4	1.4	8659	4.4	19700	28,359
1302.5	1.5	9603	4.5	20250	29,853
1302.6	1.6	10579	4.6	21500	32,079
1302.7	1.7	11586	4.7	22250	33,836
1302.8	1.8	12623	4.8	23000	35,623

RESULTS: 22,500 Stays in Channel, 12,000 Weirs into SCG

Weir Estimates into Sun City Grand: Full

CS 16.80 to 16.46

Weir Section

Qtot	22500
L	1795
C	2.2

Elevation	Weir Head	Qweir	Channel Depth	Qchannel CS=16.54	Qtotal
1285.1	0	0	3	600	600
1312.86	0.15	229	3.15	700	929
1313.11	0.4	999	3.4	850	1,849
1313.36	0.65	2069	3.65	1050	3,119
1313.61	0.9	3372	3.9	1250	4,622
1313.86	1.15	4870	4.15	1450	6,320
1314.11	1.4	6542	4.4	1650	8,192
1314.36	1.65	8370	4.65	1850	10,220
1314.61	1.9	10342	4.9	2100	12,442
1314.86	2.15	12449	5.15	2570	15,019
1315.11	2.4	14683	5.4	3000	17,683
1315.36	2.65	17036	5.65	3480	20,516
1315.61	2.9	19502	5.9	3900	23,402
1315.86	3.15	22078	6.15	4600	26,678
1316.11	3.4	24757	6.4	5700	30,457

RESULTS: 4,000 Stays in Channel, 18,500 Weirs into SCG

Amount Weiring per Cross Section

CS 17.42 to 16.97

	Flow in Section 17.59	Total Flow Weiring
2/3 Full	23000	6000
2/3 Full	28500	9000
Full	34500	12000

From	To	Percentage	1/3 Flow	2/3 Flow	Full Flow
17.42	17.35	16	22,067	27,100	32,633
17.35	17.24	40	20,600	24,900	29,700
17.24	17.18	53	19,800	23,700	28,100
17.18	17.05	82	18,067	21,100	24,633
17.05	16.97	100	17,000	19,500	22,500

CS 18.77 to 18.38

	Flow in Section 18.80	Total Flow Weiring
Full	72000	37500

From	To	Percentage	Full Flow
18.77	18.68	21	63964
18.68	18.52	60	49679
18.52	18.35	100	34500

CS 18.74 to 18.38

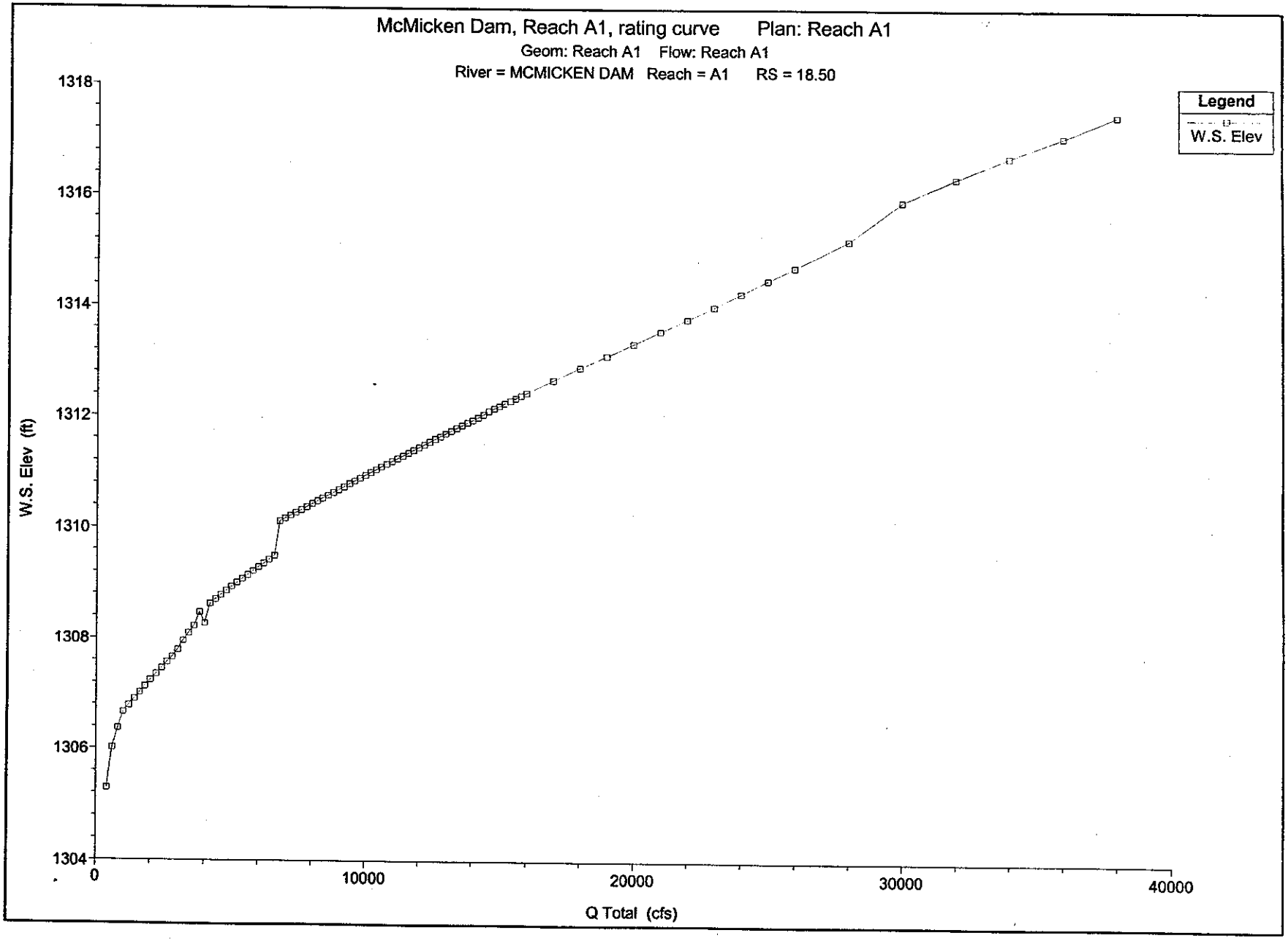
	Flow in Section 18.80	Total Flow Weiring
2/3 Full	48000	19500

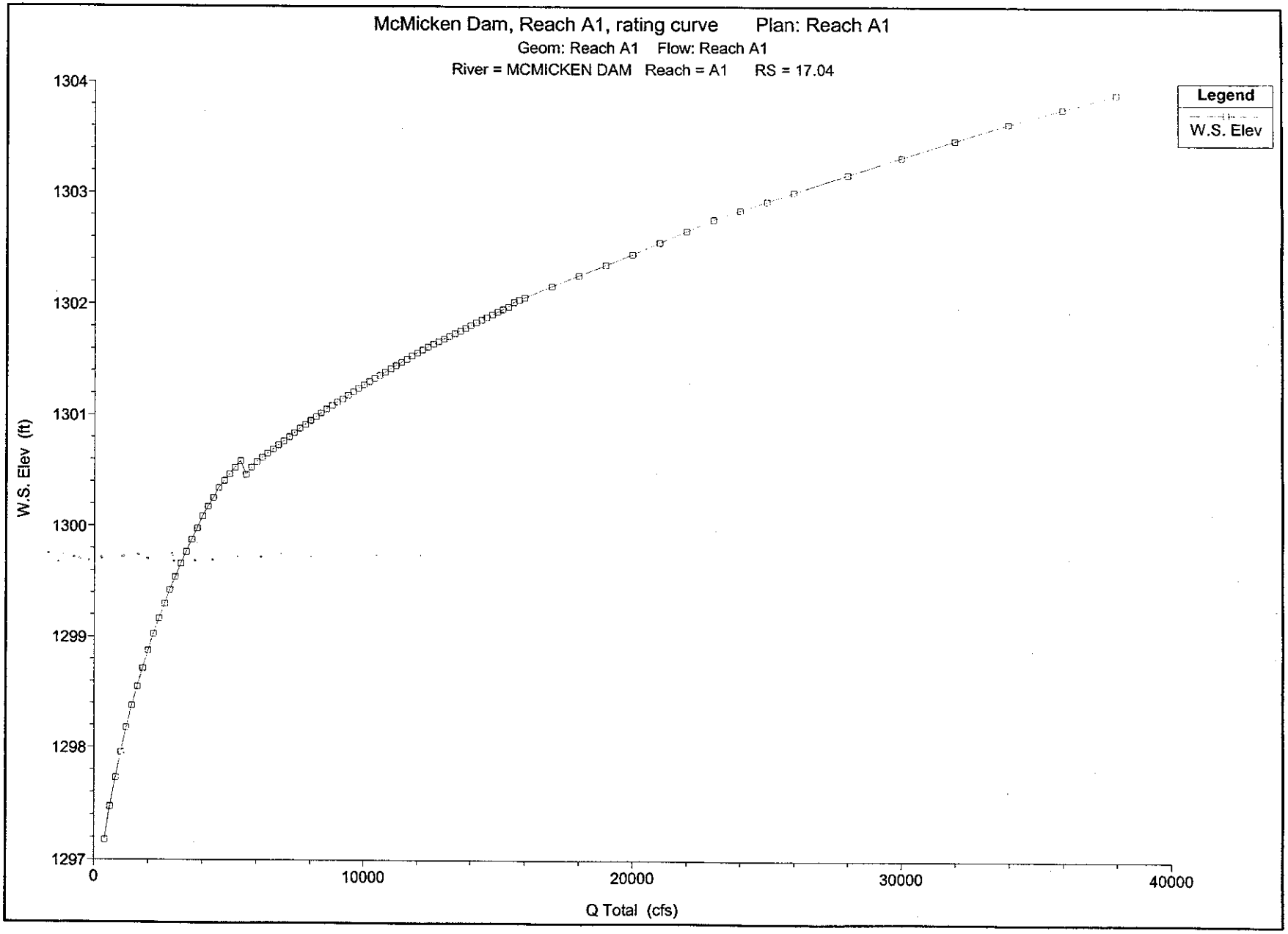
From	To	Percentage	2/3 Flow
18.74	18.68	15	45000
18.68	18.52	56	37000
18.52	18.35	100	28500

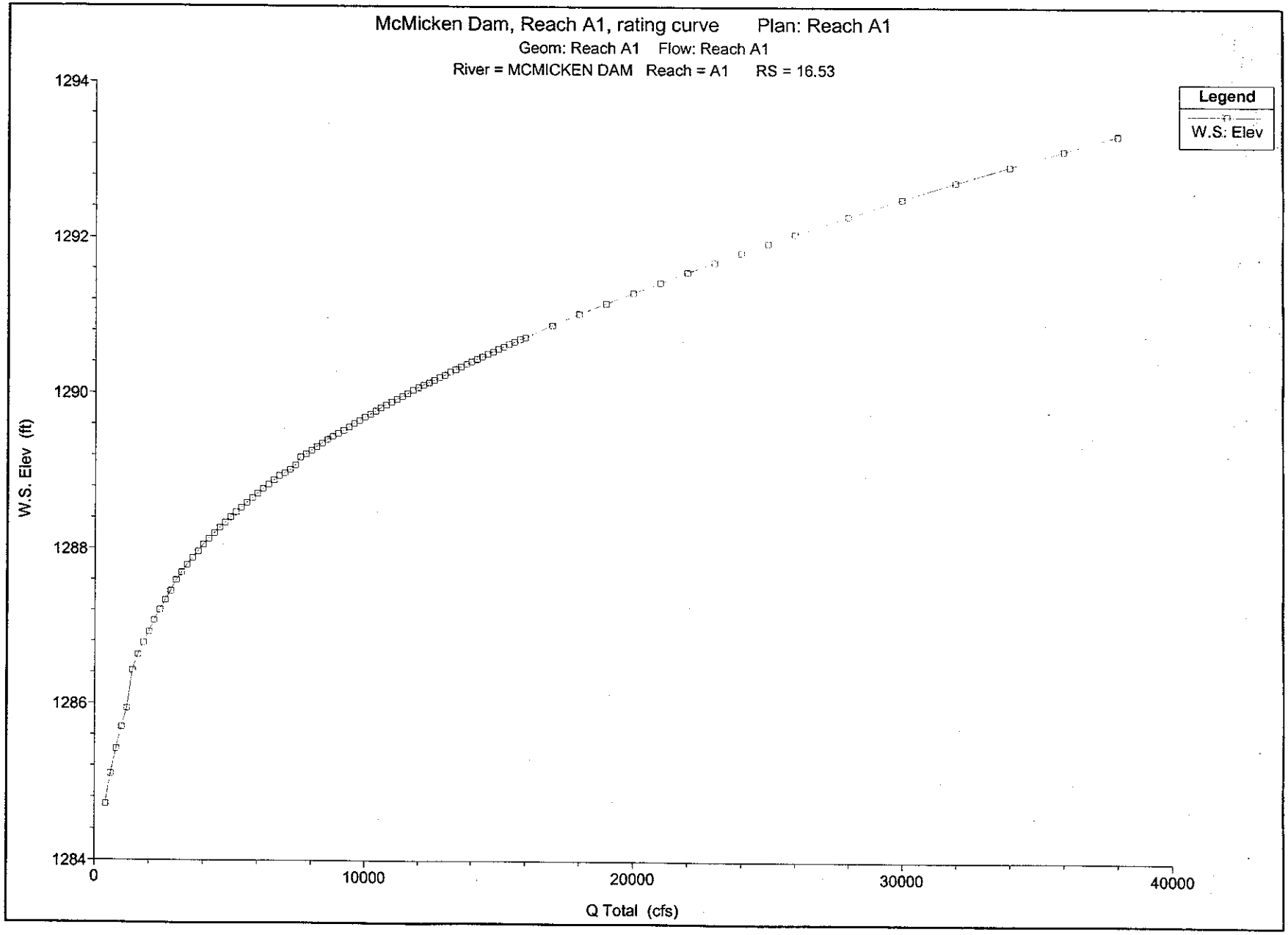
CS 16.88 to 16.46

	Flow in Section 16.88	Total Flow Weiring
1/3 Full	17000	14000
2/3 Full	19500	16000
Full	22500	18500

From	To	Percentage	1/3 Flow	2/3 Flow	Full Flow
16.80	16.71	26	13294	15265	17603
16.71	16.54	76	6294	7265	8353
16.54	16.46	100	3000	3500	4000


McMicken Dam, Reach A1, rating curve
Plan: Reach A1
Geom: Reach A1
Flow: Reach A1
River = MCMICKEN DAM
Reach = A1
RS = 18.50
Legend
W.S. Elev
W.S. Elev (ft)
1318
1316
1314
1312
1310
1308
1306
1304
0
10000
20000
30000
40000
Q Total (cfs)


McMicken Dam, Reach A1, rating curve Plan: Reach A1
Geom: Reach A1 Flow: Reach A1
River = MCMICKEN DAM Reach = A1 RS = 17.04
Legend
W.S. Elev
W.S. Elev (ft)
1304
1303
1302
1301
1300
1299
1298
1297
0
10000
20000
30000
40000
Q Total (cfs)


McMicken Dam, Reach A1, rating curve
Plan: Reach A1
Geom: Reach A1
Flow: Reach A1
River = MCMICKEN DAM
Reach = A1
RS = 16.53
Legend
W.S. Elev
W.S. Elev (ft)
1294
1292
1290
1288
1286
1284
0
10000
20000
30000
40000
Q Total (cfs)

5 HEC-RAS Model MDA2

Summary Sheet for HEC-RAS Model MDA2

Description/Method of Analysis

HEC-RAS model MDA2 was created to model flow which overtops the McMicken Dam Outlet Channel and heads in a southeast direction. The model begins at Section 19.55, upstream of the outlet channel, and continues south along Grand Avenue to Section 16.78, at approximately the end of the wall along the west side of Grand Avenue. Model MDA2 has a separate hydraulic baseline from Model MDA1. The Loop 303 Freeway runs perpendicular to the model at Section 18.80, where the freeway crosses over Grand Avenue and the railroad. Flow at the upstream end of this model was determined by the methods described in Section 1 of this appendix.

Between the outlet channel levee and the freeway, there is currently the potential for flow to cross to the west. However, future residential and freeway development in that area could potentially force the flow to remain to the east, where smaller increases in flow will have a greater impact. Therefore, flow in model MDA2 was not reduced north of the freeway.

South of the freeway, the model runs along Grand Avenue. Flow within this portion of the model is generally divided between parallel structures: a wall east of the railroad, the Burlington-Northern/Santa Fe Railroad, Grand Avenue, and a wall along the west side of Grand Avenue. The railroad is elevated approximately 2 to 6 feet above the surrounding grades, therefore a portion of the flow is contained east of the railroad for the length of the model. Using the method described in Section 6 of this appendix, it was determined that approximately 1000 cfs is contained to the east of the railroad. The flow values in model MDA2 were reduced by 1000 cfs at Section 18.80 to account for this flow, and the portion of the cross-sections east of the railroad was removed from the effective flow area.

The wall parallel to and east of the railroad is continuous through the length of the model. The wall along the west side of Grand Avenue is continuous to approximately Section 16.78, with the exception of view fencing immediately north and south of Sunrise Boulevard (Sections 17.83 to 17.54). The view fencing creates a sideweir which allows flow into the golf course of Sun City Grand. The amount of flow weiring into the golf course at the weirs north and south of the road was determined using the method described in Section 2 of this appendix, and was removed from Model MDA2 at Section 17.71 for the north weir, and at Section 17.54 for the south weir.

Results

The resulting inundation limits for the 2/3 and Full flow events are shown on the Spillway Delineation Maps presented in Appendix F.

HEC-RAS Plan: MDA2 River: MCMICKEN DAM Reach: A2

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A2	19.55	4000.00	1342.00	1345.36	1345.09	1345.61	0.010268	4.02	996.00	900.42	0.67
A2	19.55	14500.00	1342.00	1346.70	1346.25	1347.36	0.009620	6.51	2227.22	927.67	0.74
A2	19.43	4000.00	1340.00	1342.10	1341.31	1342.24	0.003474	2.97	1345.98	849.92	0.42
A2	19.43	14500.00	1340.00	1344.34	1342.59	1344.65	0.002447	4.43	3276.48	873.02	0.40
A2	19.34	4000.00	1335.06	1341.31	1338.64	1341.39	0.000976	2.23	1795.32	828.49	0.24
A2	19.34	14500.00	1335.06	1343.47	1341.07	1343.68	0.001498	3.71	3912.51	942.39	0.32
A2	19.23	2000.00	1338.00	1340.08	1340.08	1340.31	0.026325	3.83	521.69	1325.33	1.05
A2	19.23	12000.00	1338.00	1341.08	1341.08	1341.79	0.016208	6.76	1775.66	1338.87	1.01
A2	19.20	2000.00	1333.60	1335.26	1335.09	1335.51	0.013774	4.00	500.59	1067.52	0.75
A2	19.20	12000.00	1333.60	1336.16	1336.57	1337.57	0.062038	9.53	1259.34	1701.83	1.64
A2	19.02	2000.00	1327.00	1329.60		1329.69	0.003509	2.35	852.88	1324.68	0.49
A2	19.02	12000.00	1327.00	1331.11	1330.35	1331.33	0.002543	3.79	3168.77	1885.23	0.49
A2	18.89	2000.00	1324.50	1326.52		1326.71	0.004778	3.46	578.67	570.12	0.60
A2	18.89	12000.00	1324.50	1329.49		1329.84	0.001644	4.78	2510.32	682.39	0.44
A2	18.60	1000.00	1322.30	1324.17	1323.96	1324.44	0.005639	4.11	243.16	381.18	0.77
A2	18.60	11000.00	1322.30	1326.80	1326.80	1328.46	0.006261	10.34	1064.27	452.03	1.01
A2	18.61	1000.00	1314.20	1317.23	1317.16	1317.41	0.008547	3.44	290.56	585.36	0.86
A2	18.61	11000.00	1314.20	1318.59	1318.82	1319.74	0.011977	8.61	1277.75	837.44	1.23
A2	18.45	1000.00	1308.90	1311.70	1311.53	1311.87	0.005406	3.34	299.83	448.46	0.72
A2	18.45	11000.00	1308.90	1314.70	1313.44	1315.12	0.001567	5.21	2109.35	634.00	0.50
A2	18.28	1000.00	1304.00	1307.74	1307.04	1307.97	0.003446	3.90	256.33	216.07	0.63
A2	18.28	11000.00	1304.00	1310.97	1310.73	1312.68	0.004827	10.50	1047.37	255.00	0.91
A2	18.05	1000.00	1298.00	1301.13	1301.13	1301.62	0.009320	5.61	178.41	184.01	1.00
A2	18.05	11000.00	1298.00	1304.52	1304.52	1306.31	0.005996	10.75	1022.97	282.47	1.00
A2	17.83	1000.00	1292.60	1296.59	1294.73	1296.63	0.000202	1.56	642.98	256.39	0.17
A2	17.83	11000.00	1292.60	1300.13	1298.04	1300.72	0.001444	6.15	1788.99	395.74	0.51
A2	17.71	500.00	1295.00	1296.09	1296.09	1296.37	0.007038	4.25	117.66	208.97	1.00
A2	17.71	8000.00	1295.00	1298.26	1298.26	1299.37	0.004510	8.46	945.08	425.63	1.00
A2	17.54	500.00	1282.10	1285.64	1286.47	1287.49	0.014487	10.94	45.72	22.94	1.37
A2	17.54	7000.00	1282.10	1288.57	1289.41	1291.36	0.029281	13.43	521.35	341.95	1.92
A2	17.35	500.00	1276.00	1278.46	1278.46	1278.78	0.011695	4.53	110.36	287.97	1.04
A2	17.35	7000.00	1276.00	1280.39	1280.39	1281.45	0.007140	8.27	846.64	397.60	1.00
A2	17.16	500.00	1270.00	1272.52	1272.17	1272.75	0.003253	3.89	128.55	206.92	0.62
A2	17.16	7000.00	1270.00	1275.54	1274.39	1276.13	0.001986	6.15	1138.31	317.11	0.57
A2	16.97	500.00	1265.70	1267.70	1267.59	1268.16	0.006762	5.41	92.43	79.25	0.88
A2	16.97	7000.00	1265.70	1271.28	1271.28	1272.75	0.006454	9.72	719.80	243.00	1.00
A2	16.78	500.00	1259.80	1261.52	1261.34	1261.96	0.005701	5.31	94.09	72.80	0.82
A2	16.78	7000.00	1259.80	1264.35	1264.21	1265.33	0.005701	7.95	880.98	370.61	0.91

```
                    HEC-RAS September 1998 Version 2.2
                      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
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PROJECT DATA
Project Title: McMicken Dam, Reach A2
Project File : MDA2.prj
Run Date and Time: 9/24/2001 10:53:50 AM

Project in English units

Study Name: McMicken Dam Spillway Inundation Study
Contract No.: FCD 98-32
Purpose of Study: Delineation of the inundation limits of the 1/3, 2/3, and Full spillway discharges for the McMicken Dam spillway.

Model Name: MDA2
Model Description: Models flow from the McMicken Dam spillway south to approximately Reems Road, along Grand Avenue. Upstream boundary is Section 19.55. Downstream boundary is Section 16.78.

Flow Profiles: Note: 1/3 PMF = 0 cfs, and therefore was not modeled.
Profile #1, 2/3 Flow
Sections 19.55 to 19.34, Q = 4,000 cfs
Sections 19.23 to 18.89, Q = 2,000 cfs
Sections 18.80 to 17.83, Q = 1,000 cfs
Sections 17.71 to 16.78, Q = 500 cfs.
Profile #2, Full Flow
Sections 19.55 to 19.34, Q = 14,500 cfs
Sections 19.23 to 18.89, Q = 12,000 cfs
Sections 18.80 to 17.83, Q = 11,000 cfs
Section 17.71, Q = 8,000 cfs
Sections 17.54 to 16.78, Q = 7,000 cfs.

HEC-RAS Version: Version 2.2, September 1998, with RASPATCH

Consultants: Hoskin Engineering Consultants, Inc.
323 W. Roosevelt Street, Suite 200
Phoenix, AZ 85003
(602) 252-8384 Phone
(602) 252-8385 Fax
HEC 990006-03

DEI Professional Services, LLC
6225 N. 24th Street, Suite 200
Phoenix, AZ 85016
(602) 954-0038 Phone
(602) 944-8605 Fax

PLAN DATA

Plan Title: Reach A2
Plan File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A2\MDA2.p01

Geometry Title: Reach A2
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A2\MDA2.g01

Flow Title : Reach A2
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A2\MDA2.f01

Plan Description:
Models flow which continues southeast from the McMicken Dam Outlet Channel levee, along Grand Avenue. The model begins at Section 19.55, upstream of the Outlet Channel levee, and ends at Section 16.78, at approximately Reems Road. Flow weirs to Sun City Grand through view fencing north and south of Sunrise Boulevard, as well as along Grand Avenue north of Reems Road.

Plan Summary Information:

Number of:	Cross Sections =	19	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	0		

Computational Information

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

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:	Mixed Flow

FLOW DATA

Flow Title: Reach A2
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A2\MDA2.f01

Flow Data (cfs)

River	Reach	RS	2/3	Full
MCMICKEN DAM	A2	19.55	4000	14500
MCMICKEN DAM	A2	19.23	2000	12000
MCMICKEN DAM	A2	18.80	1000	11000
MCMICKEN DAM	A2	17.71	500	8000
MCMICKEN DAM	A2	17.54	500	7000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MCMICKEN DAM	A2	2/3	Known WS = 1345.36	Normal S = .0057
MCMICKEN DAM	A2	Full	Known WS = 1346.69	Normal S = .0057

GEOMETRY DATA

Geometry Title: Reach A2
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach A\Model A2\MDA2.g01

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.55

INPUT
Description: Upstream end of Model MDA2;
2/3 PMF = 4,000 cfs
Full PMF =
14,500 cfs
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9496	1347	9507	1346.92	9543	1346.79	9544	1346.76	9547	1346.2
9548	1346	9566	1345.48	9587	1345.03	9590	1345	9594	1344.86
9603	1344.65	9627	1344	9792	1344	9931	1344.9	9932	1344.87
9987	1344.98	9994	1345	10000	1345.03	10039	1344.87	10046	1344.8
10055	1344.83	10060	1344.9	10067	1344.95	10172	1344.42	10210	1344
10360	1344	10394	1343.79	10395	1343.8	10407	1343.49	10416	1343.59
10420	1343.46	10423	1343.4	10432	1343.16	10472	1342		

Manning's n Values num= 1

Sta	n Val
9496	.04

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

```
        9496   10472          602.69  602.69  602.69          .1       .3
Ineffective Flow     num=        2
  Sta L   Sta R    Elev   Sta L   Sta R    Elev
   9496    9496    1347   10472   10472
```

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1345.61	Element			
Vel Head (ft)	0.25	Wt. n-Val.		0.040	
W.S. Elev (ft)	1345.36	Reach Len. (ft)	602.69	602.69	602.69
Crit W.S. (ft)	1345.09	Flow Area (sq ft)		996.00	
E.G. Slope (ft/ft)	0.010268	Area (sq ft)		996.00	
Q Total (cfs)	4000.00	Flow (cfs)		4000.00	
Top Width (ft)	900.42	Top Width (ft)		900.42	
Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)		4.02	
Max Chl Dpth (ft)	3.36	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	39473.9	Conv. (cfs)		39473.9	
Length Wtd. (ft)	602.69	Wetted Per. (ft)		903.84	
Min Ch El (ft)	1342.00	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		2.84	
Frctn Loss (ft)	3.34	Cum Volume (acre-ft)	3.67	141.30	20.96
C & E Loss (ft)	0.03	Cum SA (acres)	1.78	137.42	7.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1347.36	Element			
Vel Head (ft)	0.66	Wt. n-Val.		0.040	
W.S. Elev (ft)	1346.70	Reach Len. (ft)	602.69	602.69	602.69
Crit W.S. (ft)	1346.25	Flow Area (sq ft)		2227.22	
E.G. Slope (ft/ft)	0.009620	Area (sq ft)		2227.22	
Q Total (cfs)	14500.00	Flow (cfs)		14500.00	
Top Width (ft)	927.67	Top Width (ft)		927.67	
Vel Total (ft/s)	6.51	Avg. Vel. (ft/s)		6.51	
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		2.40	
Conv. Total (cfs)	147833.6	Conv. (cfs)		147833.6	
Length Wtd. (ft)	602.69	Wetted Per. (ft)		932.50	
Min Ch El (ft)	1342.00	Shear (lb/sq ft)		1.43	
Alpha	1.00	Stream Power (lb/ft s)		9.34	
Frctn Loss (ft)	2.61	Cum Volume (acre-ft)	8.85	515.03	27.37
C & E Loss (ft)	0.11	Cum SA (acres)	2.12	198.86	7.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9496.00	9691.20	435.47	122.95	119.64	10.89	1.03	3.54
9691.20	9886.40	936.24	236.72	195.20	23.41	1.21	3.96
9886.40	10081.60	196.33	92.72	195.20	4.91	0.48	2.12
10081.60	10276.80	701.03	198.99	195.20	17.53	1.02	3.52
10276.80	RB 10472.00	1730.93	344.63	198.59	43.27	1.77	5.02

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9496.00	9691.20	1814.43	308.78	146.97	12.51	2.10	5.88
9691.20	9886.40	3331.39	498.06	195.20	22.98	2.55	6.69
9886.40	10081.60	1886.39	354.07	195.20	13.01	1.81	5.33
10081.60	10276.80	2921.56	460.34	195.20	20.15	2.36	6.35
10276.80	RB 10472.00	4546.24	605.98	199.93	31.35	3.10	7.50

Warning: The cross-section end points had to be extended vertically for the computed water surface.

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.43

INPUT
Description: 2/3 PMF = 4,000 cfs
Full PMF = 14,500 cfs
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9564	1346.18	9565	1346	9568	1345.13	9578	1344	9580	1343.8
9581	1343.72	9586	1343.2	9596	1342.33	9599	1342	9601	1342
9624	1341.74	9630	1341.7	9644	1341.69	9653	1341.61	9682	1341.64
9687	1341.64	9693	1341.6	9700	1341.39	9709	1341.36	9710	1341.31
9711	1341.28	9723	1341.2	9730	1341.2	9731	1341.21	9732	1341.2
9748	1340.6	9751	1340.6	9752	1340.59	9756	1340.23	9759	1340.2
9760	1340.12	9762	1340.33	9765	1340.6	9769	1340.85	9772	1341.07
9779	1340.65	9786	1340.79	9871	1340.7	9903	1340.44	9944	1340.16
9945	1340.16	9961	1340.05	9975	1340	9997	1340	10015	1340.05
10041	1340.11	10073	1340.17	10077	1340.16	10194	1340.02	10198	1340
10357	1340	10383	1340.9	10440	1341	10448	1341		

Manning's n Values num= 1

Sta	n Val
9564	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9564	10448	497.5	497.5	497.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9564	9564	1346.18	10448	10448	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1342.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.040	
W.S. Elev (ft)	1342.10	Reach Len. (ft)	497.50	497.50	497.50
Crit W.S. (ft)	1341.31	Flow Area (sq ft)		1345.98	
E.G. Slope (ft/ft)	0.003474	Area (sq ft)		1345.98	
Q Total (cfs)	4000.00	Flow (cfs)		4000.00	
Top Width (ft)	849.92	Top Width (ft)		849.92	
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)		2.97	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		1.58	
Conv. Total (cfs)	67868.5	Conv. (cfs)		67868.5	
Length Wtd. (ft)	497.50	Wetted Per. (ft)		851.14	
Min Ch El (ft)	1340.00	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		1.02	
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)	3.67	125.10	20.96
C & E Loss (ft)	0.02	Cum SA (acres)	1.78	125.31	7.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1344.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.040	
W.S. Elev (ft)	1344.34	Reach Len. (ft)	497.50	497.50	497.50
Crit W.S. (ft)	1342.59	Flow Area (sq ft)		3276.48	
E.G. Slope (ft/ft)	0.002447	Area (sq ft)		3276.48	
Q Total (cfs)	14500.00	Flow (cfs)		14500.00	
Top Width (ft)	873.02	Top Width (ft)		873.02	
Vel Total (ft/s)	4.43	Avg. Vel. (ft/s)		4.43	
Max Chl Dpth (ft)	4.34	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	293145.3	Conv. (cfs)		293145.3	
Length Wtd. (ft)	497.50	Wetted Per. (ft)		876.59	
Min Ch El (ft)	1340.00	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)		2.53	
Frctn Loss (ft)	0.94	Cum Volume (acre-ft)	8.85	476.95	27.37
C & E Loss (ft)	0.03	Cum SA (acres)	2.12	186.41	7.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9564.00	9740.80	104.61	76.81	142.74	2.62	0.54	1.36
9740.80	9917.60	671.96	255.46	176.88	16.80	1.44	2.63

9917.60	10094.40	1149.38	352.47	176.80	28.73	1.99	3.26
10094.40	10271.20	1210.34	363.57	176.80	30.26	2.06	3.33
10271.20	RB 10448.00	863.71	297.68	177.92	21.59	1.68	2.90

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9564.00	9740.80	1428.60	423.10	165.95	9.85	2.55	3.38
9740.80	9917.60	2811.39	651.51	176.88	19.39	3.69	4.32
9917.60	10094.40	3544.19	748.52	176.80	24.44	4.23	4.73
10094.40	10271.20	3632.23	759.62	176.80	25.05	4.30	4.78
10271.20	RB 10448.00	3083.59	693.73	180.16	21.27	3.92	4.44

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.34

INPUT
Description: 2/3 PMF = 4,000 cfs
Full PMF = 14,500 cfs
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9384	1343.75	9394	1342	9397	1341.65	9410	1340	9457	1340
9485	1339.6	9504	1340	9508	1340	9511	1340.47	9516	1341.21
9533	1341.01	9559	1341.38	9569	1340.4	9573	1340.18	9575	1340.14
9578	1340	9698	1340	9712	1341.44	9713	1341.51	9714	1341.55
9720	1342	9769	1342	9782	1341	9783	1340.88	9787	1340.63
9788	1340.56	9791	1340.37	9793	1340.4	9794	1340.43	9802	1340
9813	1339.42	9815	1339.3	9837	1338	9852	1338	9855	1338.12
9858	1338.29	9882	1340	9975	1340	9978	1339.74	9994	1338
10006	1336.42	10010	1336	10012	1335.78	10015	1335.35	10016	1335.06
10017	1335.06	10019	1335.1	10019	1335.09	10022	1335.13	10031	1335.19
10035	1335.2	10044	1335.28	10046	1335.3	10055	1335.36	10061	1335.4
10063	1335.4	10064	1335.42	10067	1335.45	10072	1335.49	10078	1335.54
10080	1335.6	10081	1335.57	10084	1335.59	10089	1335.61	10092	1335.63
10096	1335.7	10101	1335.69	10118	1335.82	10121	1335.85	10124	1335.87
10127	1335.9	10139	1336	10143	1336.33	10158	1338	10164	1338.56
10175	1339.6	10197	1339.11	10213	1338.73	10215	1338.66	10223	1338.43
10241	1338	10244	1337.93	10248	1337.84	10253	1337.76	10255	1337.88
10256	1338	10260	1338.36	10266	1338.76	10274	1339.4	10283	1340
10288	1340.4	10310	1342	10328	1342				

Manning's n Values num= 1

Sta	n Val
9384	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9384	10328	579.4	579.4	579.4	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9384	9559	1341.38	10328	10328	

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10975	10999	1337.4

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1341.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.040	
W.S. Elev (ft)	1341.31	Reach Len. (ft)	579.40	579.40	579.40
Crit W.S. (ft)	1338.64	Flow Area (sq ft)		1795.32	
E.G. Slope (ft/ft)	0.000976	Area (sq ft)		1952.65	
Q Total (cfs)	4000.00	Flow (cfs)		4000.00	
Top Width (ft)	828.49	Top Width (ft)		828.49	
Vel Total (ft/s)	2.23	Avg. Vel. (ft/s)		2.23	
Max Chl Dpth (ft)	6.25	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	128062.0	Conv. (cfs)		128062.0	
Length Wtd. (ft)	579.40	Wetted Per. (ft)		674.72	
Min Ch El (ft)	1335.06	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.36	
Frctn Loss (ft)	1.06	Cum Volume (acre-ft)	3.67	106.26	20.96
C & E Loss (ft)	0.02	Cum SA (acres)	1.78	115.73	7.12

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1343.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.040	
W.S. Elev (ft)	1343.47	Reach Len. (ft)	579.40	579.40	579.40
Crit W.S. (ft)	1341.07	Flow Area (sq ft)		3912.51	
E.G. Slope (ft/ft)	0.001498	Area (sq ft)		3912.51	
Q Total (cfs)	14500.00	Flow (cfs)		14500.00	
Top Width (ft)	942.39	Top Width (ft)		942.39	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	8.41	Hydr. Depth (ft)		4.15	
Conv. Total (cfs)	374681.4	Conv. (cfs)		374681.4	
Length Wtd. (ft)	579.40	Wetted Per. (ft)		945.25	
Min Ch El (ft)	1335.06	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		1.43	
Frctn Loss (ft)	1.84	Cum Volume (acre-ft)	8.85	435.90	27.37
C & E Loss (ft)	0.05	Cum SA (acres)	2.12	176.04	7.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9384.00	9572.80	5.98	8.13	13.18	0.15	0.62	0.74
9572.80	9761.60	202.68	172.37	138.05	5.07	1.25	1.18
9761.60	9950.40	461.89	308.99	172.66	11.55	1.79	1.49
9950.40	10139.20	2544.94	892.20	189.13	63.62	4.73	2.85
10139.20	RB 10328.00	784.51	413.62	161.71	19.61	2.56	1.90

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9384.00	9572.80	1540.02	554.50	187.59	10.62	2.96	2.78
9572.80	9761.60	1499.39	547.19	188.90	10.34	2.90	2.74
9761.60	9950.40	2299.68	707.43	189.00	15.86	3.75	3.25
9950.40	10139.20	6327.23	1298.77	189.13	43.64	6.88	4.87
10139.20	RB 10328.00	2833.68	804.61	190.63	19.54	4.26	3.52

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.23

INPUT
Description: McMicken Dam Outlet Channel Levee;
2/3 PMF = 2,000 cfs
Full PMF
= 12,000 cfs
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9395	1341.1	9410	1340	9425	1338	9526.6	1338	9530	1339
9570	1339	9630	1340	9902	1340	9915	1339.5	9930	1340
9985	1340	10025	1339.5	10070	1340	10100	1340	10230	1339.5
10350	1340	10370	1340	10420	1339.5	10470	1340	10595	1340
10610	1339.5	10625	1340	10665	1340	10734.19	1339.51		

```
Manning's n Values          num=       1
     Sta    n Val
    9395    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9395   10665            146.68  146.68  146.68          .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   1066510734.19
```

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1340.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.035	
W.S. Elev (ft)	1340.08	Reach Len. (ft)	146.68	146.68	146.68
Crit W.S. (ft)	1340.08	Flow Area (sq ft)		521.69	
E.G. Slope (ft/ft)	0.026325	Area (sq ft)		521.69	22.75
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	1325.33	Top Width (ft)		1256.14	69.19
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)		3.83	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		0.42	
Conv. Total (cfs)	12326.7	Conv. (cfs)		12326.7	
Length Wtd. (ft)	146.68	Wetted Per. (ft)		1256.48	
Min Ch El (ft)	1338.00	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)		2.62	
Frctn Loss (ft)	2.72	Cum Volume (acre-ft)	3.67	89.80	20.81
C & E Loss (ft)	0.00	Cum SA (acres)	1.78	101.86	6.66

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1341.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.		0.035	
W.S. Elev (ft)	1341.08	Reach Len. (ft)	146.68	146.68	146.68
Crit W.S. (ft)	1341.08	Flow Area (sq ft)		1775.66	
E.G. Slope (ft/ft)	0.016208	Area (sq ft)		1775.66	91.45
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	1338.87	Top Width (ft)		1269.68	69.19
Vel Total (ft/s)	6.76	Avg. Vel. (ft/s)		6.76	
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	94256.8	Conv. (cfs)		94256.8	
Length Wtd. (ft)	146.68	Wetted Per. (ft)		1270.05	
Min Ch El (ft)	1338.00	Shear (lb/sq ft)		1.41	
Alpha	1.00	Stream Power (lb/ft s)		9.56	
Frctn Loss (ft)	2.68	Cum Volume (acre-ft)	8.85	398.07	26.76
C & E Loss (ft)	0.00	Cum SA (acres)	2.12	161.33	6.66

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9395.00	9649.00	1645.81	313.36	240.43	82.29	1.30	5.25
9649.00	9903.00	17.95	21.29	254.00	0.90	0.08	0.84
9903.00	10157.00	89.28	55.75	254.02	4.46	0.22	1.60
10157.00	10411.00	183.64	85.93	254.00	9.18	0.34	2.14
10411.00	RB 10665.00	63.33	45.37	254.02	3.17	0.18	1.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates

that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9395.00	9649.00	4881.42	558.53	254.01	40.68	2.20	8.74
9649.00	9903.00	1484.98	273.49	254.00	12.37	1.08	5.43
9903.00	10157.00	1809.63	307.95	254.02	15.08	1.21	5.88
10157.00	10411.00	2114.87	338.13	254.00	17.62	1.33	6.25
10411.00	RB 10665.00	1709.10	297.57	254.02	14.24	1.17	5.74

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.20

INPUT
Description: 2/3 PMF = 2,000 cfs
Full PMF = 12,000 cfs
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9404	1340	9425	1338	9436	1336	9503	1334	9583	1338
9619	1336	9926	1336	9993	1335.5	10199	1335.4	10223	1335
10261	1334.7	10352	1335	10444	1334.8	10465	1334	10507	1334
10615	1333.6	10710	1334	10748	1332	10788	1332	10859	1332
10954	1334	11024	1334	11116	1330	11206.97	1328.98		

Manning's n Values num= 1

Sta	n Val
9404	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9404	10710	910	929.9	1000	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10710	11206.97	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1335.51	Element			
Vel Head (ft)	0.25	Wt. n-Val.		0.040	
W.S. Elev (ft)	1335.26	Reach Len. (ft)	910.00	929.90	1000.00
Crit W.S. (ft)	1335.09	Flow Area (sq ft)		500.59	
E.G. Slope (ft/ft)	0.013774	Area (sq ft)		500.59	1577.83
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	1067.52	Top Width (ft)		570.55	496.97
Vel Total (ft/s)	4.00	Avg. Vel. (ft/s)		4.00	
Max Chl Dpth (ft)	6.28	Hydr. Depth (ft)		0.88	
Conv. Total (cfs)	17041.4	Conv. (cfs)		17041.4	
Length Wtd. (ft)	929.90	Wetted Per. (ft)		570.62	
Min Ch El (ft)	1333.60	Shear (lb/sq ft)		0.75	
Alpha	1.00	Stream Power (lb/ft s)		3.01	
Frctn Loss (ft)	5.78	Cum Volume (acre-ft)	3.67	88.08	18.11
C & E Loss (ft)	0.05	Cum SA (acres)	1.78	98.79	5.70

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1337.57	Element			
Vel Head (ft)	1.41	Wt. n-Val.		0.040	
W.S. Elev (ft)	1336.16	Reach Len. (ft)	910.00	929.90	1000.00
Crit W.S. (ft)	1336.57	Flow Area (sq ft)		1259.34	
E.G. Slope (ft/ft)	0.062038	Area (sq ft)		1259.34	2021.53
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	1701.83	Top Width (ft)		1204.86	496.97
Vel Total (ft/s)	9.53	Avg. Vel. (ft/s)		9.53	
Max Chl Dpth (ft)	7.18	Hydr. Depth (ft)		1.05	
Conv. Total (cfs)	48178.3	Conv. (cfs)		48178.3	

Length Wtd. (ft)	929.90	Wetted Per. (ft)		1204.98	
Min Ch El (ft)	1333.60	Shear (lb/sq ft)		4.05	
Alpha	1.00	Stream Power (lb/ft s)		38.57	
Frctn Loss (ft)	4.15	Cum Volume (acre-ft)	8.85	392.96	23.20
C & E Loss (ft)	0.07	Cum SA (acres)	2.12	157.16	5.70

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9404.00	9665.20	117.16	42.79	67.72	5.86	0.63	2.74
9665.20	10187.60						
10187.60	10448.80	179.14	91.84	241.69	8.96	0.38	1.95
10448.80	RB 10710.00	1703.70	365.96	261.21	85.19	1.40	4.66

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9404.00	9665.20	834.25	131.68	160.16	6.95	0.82	6.34
9665.20	9926.40	86.69	41.16	261.20	0.72	0.16	2.11
9926.40	10187.60	871.59	164.40	261.20	7.26	0.63	5.30
10187.60	10448.80	2685.01	322.92	261.21	22.38	1.24	8.31
10448.80	RB 10710.00	7522.46	599.17	261.21	62.69	2.29	12.55

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 19.02

INPUT
Description: 2/3 PMF = 2,000 cfs
Full PMF = 12,000 cfs
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9547	1334	9560	1332	9568	1330	9610	1330	9650	1329.8
9665	1329.9	9676	1330	9680	1331	9682	1330.9	9723	1330
9735	1329	9749	1330	9766	1330.1	9800	1330.1	9840	1330.1
9890	1330	9905	1329.7	9920	1330	9925	1330.8	9934	1330.8
9940	1330	9970	1329.6	10000	1329.5	10057	1329.5	10170	1329.5
10193	1329	10246	1328.9	10330	1329	10400	1329.2	10465	1329.3
10520	1329.3	10580	1329.2	10625	1329.3	10670	1329.2	10705	1329
10750	1328.8	10845	1328	10880	1327.9	10935	1327.9	10980	1327.95
11005	1328	11038	1328.5	11055	1328.5	11080	1328.8	11086	1328.8
11096	1328	11100	1328	11130	1328	11152	1330	11170	1330
11205	1329.9	11230	1330	11285	1332	11300	1332	11340	1332
11400	1330	11520	1328	11555	1327				

Manning's n Values num= 1

Sta	n Val
9547	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9547	11555	690	729.97	800	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
11285	11555	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1329.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.030	
W.S. Elev (ft)	1329.60	Reach Len. (ft)	690.00	729.97	800.00
Crit W.S. (ft)		Flow Area (sq ft)		852.88	
E.G. Slope (ft/ft)	0.003509	Area (sq ft)		1003.54	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	1324.68	Top Width (ft)		1324.68	
Vel Total (ft/s)	2.35	Avg. Vel. (ft/s)		2.35	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	33761.7	Conv. (cfs)		33761.7	
Length Wtd. (ft)	729.97	Wetted Per. (ft)		1193.68	
Min Ch El (ft)	1327.00	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.37	
Frctn Loss (ft)	2.97	Cum Volume (acre-ft)	3.67	72.03	
C & E Loss (ft)	0.01	Cum SA (acres)	1.78	78.56	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1331.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.030	
W.S. Elev (ft)	1331.11	Reach Len. (ft)	690.00	729.97	800.00
Crit W.S. (ft)	1330.35	Flow Area (sq ft)		3168.77	
E.G. Slope (ft/ft)	0.002543	Area (sq ft)		3566.70	
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	1885.23	Top Width (ft)		1885.23	
Vel Total (ft/s)	3.79	Avg. Vel. (ft/s)		3.79	
Max Chl Dpth (ft)	4.11	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	237941.3	Conv. (cfs)		237941.3	
Length Wtd. (ft)	729.97	Wetted Per. (ft)		1697.58	
Min Ch El (ft)	1327.00	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		1.12	
Frctn Loss (ft)	1.47	Cum Volume (acre-ft)	8.85	341.45	
C & E Loss (ft)	0.01	Cum SA (acres)	2.12	124.18	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9547.00	9948.60	5.00	4.72	15.72	0.25	0.30	1.06
9948.60	10350.20	146.35	128.19	380.42	7.32	0.34	1.14
10350.20	10751.80	218.86	166.78	401.60	10.94	0.42	1.31
10751.80	11153.40	1629.79	553.17	395.94	81.49	1.40	2.95

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9547.00	9948.60	975.60	404.83	385.51	8.13	1.05	2.41
9948.60	10350.20	2537.89	730.30	401.61	21.15	1.82	3.48
10350.20	10751.80	2783.29	771.88	401.60	23.19	1.92	3.61
10751.80	11153.40	5461.89	1156.85	401.73	45.52	2.88	4.72
11153.40	RB 11555.00	241.33	104.91	107.13	2.01	0.98	2.30

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.89

INPUT
Description: 2/3 PMF = 2,000 cfs
Full PMF = 12,000 cfs
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9745	1329.4	9757	1328	9775	1326	9780	1325.5	9790	1325.7
9835	1325.6	9850	1325.4	9867	1326	9882	1327	9920	1326.7
9930	1326	9940	1326	9950	1326.1	9956	1326	9963	1325.9
9968	1326	9984	1326.1	10000	1326.1	10016	1328	10018	1326.8
10020	1328	10033	1326	10057	1325.9	10093	1325.8	10147	1325.6
10210	1325.4	10245	1325.2	10275	1325.1	10305	1325.1	10320	1325
10405	1324.5	10500	1345.67						

Manning's n Values num= 1

Sta	n Val
9745	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9745	10500	455	447.95	400	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10016	10020	1328

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1326.71	Element			
Vel Head (ft)	0.19	Wt. n-Val.		0.030	
W.S. Elev (ft)	1326.52	Reach Len. (ft)	455.00	447.95	400.00
Crit W.S. (ft)		Flow Area (sq ft)		578.67	
E.G. Slope (ft/ft)	0.004778	Area (sq ft)		578.67	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	570.12	Top Width (ft)		570.12	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)		3.46	
Max Chl Dpth (ft)	2.02	Hydr. Depth (ft)		1.02	
Conv. Total (cfs)	28934.7	Conv. (cfs)		28934.7	
Length Wtd. (ft)	447.95	Wetted Per. (ft)		570.52	
Min Ch El (ft)	1324.50	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		1.05	
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	3.67	58.77	
C & E Loss (ft)	0.01	Cum SA (acres)	1.78	62.68	

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1329.84	Element			
Vel Head (ft)	0.35	Wt. n-Val.		0.030	
W.S. Elev (ft)	1329.49	Reach Len. (ft)	455.00	447.95	400.00
Crit W.S. (ft)		Flow Area (sq ft)		2510.32	
E.G. Slope (ft/ft)	0.001644	Area (sq ft)		2510.32	
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	682.39	Top Width (ft)		682.39	
Vel Total (ft/s)	4.78	Avg. Vel. (ft/s)		4.78	
Max Chl Dpth (ft)	4.99	Hydr. Depth (ft)		3.68	
Conv. Total (cfs)	295953.4	Conv. (cfs)		295953.4	
Length Wtd. (ft)	447.95	Wetted Per. (ft)		683.59	
Min Ch El (ft)	1324.50	Shear (lb/sq ft)		0.38	
Alpha	1.00	Stream Power (lb/ft s)		1.80	
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	8.85	290.53	
C & E Loss (ft)	0.13	Cum SA (acres)	2.12	102.67	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9745.00	9896.00	233.21	85.10	104.66	11.66	0.81	2.74
9896.00	10047.00	85.28	45.43	98.55	4.26	0.46	1.88
10047.00	10198.00	351.47	126.03	151.00	17.57	0.83	2.79
10198.00	10349.00	815.35	208.81	151.00	40.77	1.38	3.90
10349.00	RB 10500.00	514.68	113.31	65.31	25.73	1.74	4.54

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9745.00	9896.00	2127.19	489.41	151.35	17.73	3.24	4.35
9896.00	10047.00	1949.44	464.37	151.29	16.25	3.08	4.20
10047.00	10198.00	2777.77	573.85	151.00	23.15	3.80	4.84
10198.00	10349.00	3477.20	656.63	151.00	28.98	4.35	5.30
10349.00	RB 10500.00	1668.40	326.05	78.94	13.90	4.16	5.12

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.80

INPUT
Description: Upstream face of Loop 303 Freeway bridge;
2/3 PMF = 1,000
cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9714	1350.9	9760	1322.7	9796	1321.6	9814	1321.6	9820	1321.9
9852	1322	9863	1324	9877	1326	9880	1326.2	9883	1326
9895	1324	9908	1322.3	9950	1322.3	9960	1322.5	9975	1322.5
9990	1322.4	10000	1323	10010	1324	10015	1324.2	10050	1324
10060	1323.9	10082	1323.5	10130	1323.5	10137	1324	10143	1325
10146	1323.8	10149	1325	10160	1324.3	10172	1324	10200	1323.7
10249	1352.2								

Manning's n Values num= 1

Sta	n Val
9714	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9880	10249	1000	1018.74	1000	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9714	9880	

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10143	10149	1325

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1324.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.025	
W.S. Elev (ft)	1324.17	Reach Len. (ft)	1000.00	1018.74	1000.00
Crit W.S. (ft)	1323.96	Flow Area (sq ft)		243.16	
E.G. Slope (ft/ft)	0.005639	Area (sq ft)	219.66	243.16	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	381.18	Top Width (ft)	106.62	274.56	
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)		4.11	
Max Chl Dpth (ft)	2.57	Hydr. Depth (ft)		0.89	
Conv. Total (cfs)	13316.7	Conv. (cfs)		13316.7	
Length Wtd. (ft)	1018.74	Wetted Per. (ft)		274.93	
Min Ch El (ft)	1322.30	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.28	
Frctn Loss (ft)	7.00	Cum Volume (acre-ft)	2.52	54.54	
C & E Loss (ft)	0.02	Cum SA (acres)	1.22	58.34	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1328.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.66	Wt. n-Val.		0.025	
W.S. Elev (ft)	1326.80	Reach Len. (ft)	1000.00	1018.74	1000.00

Crit W.S. (ft)	1326.80	Flow Area (sq ft)		1064.27
E.G. Slope (ft/ft)	0.006261	Area (sq ft)	529.71	1064.27
Q Total (cfs)	11000.00	Flow (cfs)		11000.00
Top Width (ft)	452.03	Top Width (ft)	126.69	325.33
Vel Total (ft/s)	10.34	Avg. Vel. (ft/s)		10.34
Max Chl Dpth (ft)	5.20	Hydr. Depth (ft)		3.27
Conv. Total (cfs)	139019.1	Conv. (cfs)		139019.1
Length Wtd. (ft)	1018.74	Wetted Per. (ft)		326.66
Min Ch El (ft)	1322.30	Shear (lb/sq ft)		1.27
Alpha	1.00	Stream Power (lb/ft s)		13.16
Frctn Loss (ft)	7.02	Cum Volume (acre-ft)	6.08	272.15
C & E Loss (ft)	0.23	Cum SA (acres)	1.45	97.48

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9880.00	9953.80	516.57	99.06	59.97	51.66	1.66	5.21
9953.80	10027.60	356.99	83.75	68.60	35.70	1.22	4.26
10027.60	10101.40	55.34	28.18	73.81	5.53	0.38	1.96
10101.40	10175.20	55.52	23.53	46.82	5.55	0.50	2.36
10175.20	RB 10249.00	15.58	8.64	25.74	1.56	0.34	1.80

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9880.00	9953.80	3109.88	277.33	74.08	28.27	3.76	11.21
9953.80	10027.60	3123.37	277.74	73.87	28.39	3.76	11.25
10027.60	10101.40	2155.42	222.24	73.81	19.59	3.01	9.70
10101.40	10175.20	1882.32	205.02	73.93	17.11	2.78	9.18
10175.20	RB 10249.00	729.01	81.94	30.97	6.63	2.72	8.90

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.61

INPUT
Description: 2/3 PMF = 1,000 cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9903	1319.4	9913	1319.2	9922	1318	9932	1316	9950	1316
9970	1316.1	9980	1316.5	9990	1316	9995	1315	10000	1314.2
10005	1315.2	10010	1316	10035	1317.7	10045	1317.7	10085	1317.6
10094	1316	10099	1315.4	10105	1316	10115	1318	10123	1318.1
10149	1318	10162	1318	10170	1318.5	10173	1317.5	10176	1318.5
10184	1317.3	10218	1316.5	10294	1316.7	10348	1316.9	10395	1316.9
10467	1317.2	10522	1317.1	10570	1317	10625	1316.9	10663	1317.5
10685	1317.7	10710	1318	10743	1318.1	10755	1318		

Manning's n Values num= 1

Sta	n Val
9903	.025

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

```
          9903   10755          827.16  827.16  827.16            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    9903    9903
Right Levee     Station=   10755      Elevation=    1324
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
   10170   10176  1318.5
```

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1317.41	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.025	
W.S. Elev (ft)	1317.23	Reach Len. (ft)	827.16	827.16	827.16
Crit W.S. (ft)	1317.16	Flow Area (sq ft)		290.56	
E.G. Slope (ft/ft)	0.008547	Area (sq ft)		290.56	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	585.36	Top Width (ft)		585.36	
Vel Total (ft/s)	3.44	Avg. Vel. (ft/s)		3.44	
Max Chl Dpth (ft)	3.03	Hydr. Depth (ft)		0.50	
Conv. Total (cfs)	10816.8	Conv. (cfs)		10816.8	
Length Wtd. (ft)	827.16	Wetted Per. (ft)		586.18	
Min Ch El (ft)	1314.20	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		0.91	
Frctn Loss (ft)	5.54	Cum Volume (acre-ft)		48.30	
C & E Loss (ft)	0.00	Cum SA (acres)		48.28	

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1319.74	Element			
Vel Head (ft)	1.15	Wt. n-Val.		0.025	
W.S. Elev (ft)	1318.59	Reach Len. (ft)	827.16	827.16	827.16
Crit W.S. (ft)	1318.82	Flow Area (sq ft)		1277.75	
E.G. Slope (ft/ft)	0.011977	Area (sq ft)		1277.75	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	837.44	Top Width (ft)		837.44	
Vel Total (ft/s)	8.61	Avg. Vel. (ft/s)		8.61	
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	100512.2	Conv. (cfs)		100512.2	
Length Wtd. (ft)	827.16	Wetted Per. (ft)		839.21	
Min Ch El (ft)	1314.20	Shear (lb/sq ft)		1.14	
Alpha	1.00	Stream Power (lb/ft s)		9.80	
Frctn Loss (ft)	8.57	Cum Volume (acre-ft)		244.76	
C & E Loss (ft)	0.15	Cum SA (acres)		83.89	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9903.00	10073.40	586.86	122.45	102.77	58.69	1.20	4.79
10073.40	10243.80	176.61	54.23	81.25	17.66	0.67	3.26
10243.80	10414.20	182.54	74.38	170.40	18.25	0.44	2.45
10414.20	10584.60	28.00	24.15	170.40	2.80	0.14	1.16
10584.60	RB 10755.00	26.00	15.35	61.36	2.60	0.25	1.69

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9903.00	10073.40	3098.75	309.79	156.48	28.17	1.99	10.00
10073.40	10243.80	1662.14	220.84	170.92	15.11	1.30	7.53
10243.80	10414.20	2874.13	306.38	170.40	26.13	1.80	9.38
10414.20	10584.60	2132.46	256.14	170.40	19.39	1.50	8.33
10584.60	RB 10755.00	1232.52	184.60	171.00	11.20	1.08	6.68

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.45

INPUT
Description: 2/3 PMF = 1,000 cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9893	1314	9912	1314	9918	1313	9924	1312.1	9958	1311
9991	1310.1	9993	1310.1	9999	1308.9	10000	1308.9	10003	1308.9
10008	1310	10013	1311	10022	1312	10101	1312	10132	1311.3
10170	1311.2	10172	1310	10175	1312	10307	1311	10355	1310.5
10372	1310.6	10434	1311	10521	1311.7	10527	1311.7		

Manning's n Values num= 1

Sta	n Val
9893	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9893	10527	913.53	913.53	913.53	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9893	9893	

Right Levee Station= 10527 Elevation= 1317.7

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1311.87	Element			
Vel Head (ft)	0.17	Wt. n-Val.		0.025	
W.S. Elev (ft)	1311.70	Reach Len. (ft)	913.53	913.53	913.53
Crit W.S. (ft)	1311.53	Flow Area (sq ft)		299.83	
E.G. Slope (ft/ft)	0.005406	Area (sq ft)		299.83	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	448.46	Top Width (ft)		448.46	
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)		3.34	
Max Chl Dpth (ft)	2.80	Hydr. Depth (ft)		0.67	
Conv. Total (cfs)	13600.3	Conv. (cfs)		13600.3	
Length Wtd. (ft)	913.53	Wetted Per. (ft)		449.72	
Min Ch El (ft)	1308.90	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		0.75	
Frctn Loss (ft)	3.89	Cum Volume (acre-ft)		42.70	
C & E Loss (ft)	0.01	Cum SA (acres)		38.47	

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1315.12	Element			
Vel Head (ft)	0.42	Wt. n-Val.		0.025	
W.S. Elev (ft)	1314.70	Reach Len. (ft)	913.53	913.53	913.53
Crit W.S. (ft)	1313.44	Flow Area (sq ft)		2109.35	
E.G. Slope (ft/ft)	0.001567	Area (sq ft)		2109.35	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	634.00	Top Width (ft)		634.00	
Vel Total (ft/s)	5.21	Avg. Vel. (ft/s)		5.21	
Max Chl Dpth (ft)	5.80	Hydr. Depth (ft)		3.33	
Conv. Total (cfs)	277885.8	Conv. (cfs)		277885.8	
Length Wtd. (ft)	913.53	Wetted Per. (ft)		639.23	
Min Ch El (ft)	1308.90	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		1.68	
Frctn Loss (ft)	2.31	Cum Volume (acre-ft)		212.61	
C & E Loss (ft)	0.13	Cum SA (acres)		69.92	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9893.00	10019.80	387.59	92.30	83.20	38.76	1.11	4.20
10019.80	10146.60	16.67	9.55	32.17	1.67	0.30	1.74
10146.60	10273.40	51.94	28.16	87.15	5.19	0.33	1.84
10273.40	10400.20	406.56	112.42	126.80	40.66	0.89	3.62
10400.20	RB 10527.00	137.24	57.39	120.39	13.72	0.48	2.39

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9893.00	10019.80	2091.45	410.93	128.06	19.01	3.24	5.09
10019.80	10146.60	1719.94	364.02	126.82	15.64	2.87	4.72
10146.60	10273.40	2026.95	402.88	127.74	18.43	3.18	5.03
10273.40	10400.20	2854.41	493.29	126.80	25.95	3.89	5.79
10400.20	RB 10527.00	2307.25	438.24	129.80	20.97	3.46	5.26

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.28

INPUT
Description: 2/3 PMF = 1,000 cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9900	1310	9905	1310	9912	1308	9920	1306	9928	1305.6
9943	1305.6	9975	1305.9	9988	1306	9998	1304	10000	1304
10003	1304	10013	1306	10019	1307	10059	1307.9	10076	1307.4
10097	1307.4	10137	1307.4	10146	1308	10155	1310		

Manning's n Values num= 1

Sta	n Val
9900	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9900 10155 1186.06 1186.06 1186.06 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
9900	9900	

Right Levee Station= 10155 Elevation= 1316

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1307.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.025	
W.S. Elev (ft)	1307.74	Reach Len. (ft)	1186.06	1186.06	1186.06
Crit W.S. (ft)	1307.04	Flow Area (sq ft)		256.33	
E.G. Slope (ft/ft)	0.003446	Area (sq ft)		256.33	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	216.07	Top Width (ft)		216.07	
Vel Total (ft/s)	3.90	Avg. Vel. (ft/s)		3.90	
Max Chl Dpth (ft)	3.74	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	17035.0	Conv. (cfs)		17035.0	
Length Wtd. (ft)	1186.06	Wetted Per. (ft)		216.79	
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.99	
Frctn Loss (ft)	6.32	Cum Volume (acre-ft)		36.87	
C & E Loss (ft)	0.03	Cum SA (acres)		31.50	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1312.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.71	Wt. n-Val.		0.025	
W.S. Elev (ft)	1310.97	Reach Len. (ft)	1186.06	1186.06	1186.06
Crit W.S. (ft)	1310.73	Flow Area (sq ft)		1047.37	
E.G. Slope (ft/ft)	0.004827	Area (sq ft)		1047.37	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	255.00	Top Width (ft)		255.00	
Vel Total (ft/s)	10.50	Avg. Vel. (ft/s)		10.50	
Max Chl Dpth (ft)	6.97	Hydr. Depth (ft)		4.11	
Conv. Total (cfs)	158334.5	Conv. (cfs)		158334.5	
Length Wtd. (ft)	1186.06	Wetted Per. (ft)		258.21	
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		1.22	
Alpha	1.00	Stream Power (lb/ft s)		12.84	
Frctn Loss (ft)	6.36	Cum Volume (acre-ft)		179.50	
C & E Loss (ft)	0.01	Cum SA (acres)		60.60	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9900.00	9951.00	296.52	70.32	38.17	29.65	1.85	4.22
9951.00	10002.00	531.51	112.26	51.20	53.15	2.20	4.73
10002.00	10053.00	142.77	50.52	49.98	14.28	1.02	2.83
10053.00	10104.00	13.80	11.31	39.41	1.38	0.29	1.22
10104.00	RB 10155.00	15.41	11.91	38.04	1.54	0.31	1.29

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9900.00	9951.00	2224.88	214.88	52.50	20.23	4.21	10.35
9951.00	10002.00	3457.34	277.12	51.20	31.43	5.43	12.48
10002.00	10053.00	2268.57	215.37	51.29	20.62	4.22	10.53
10053.00	10104.00	1612.97	175.13	51.01	14.66	3.43	9.21
10104.00	RB 10155.00	1436.24	164.87	52.21	13.06	3.23	8.71

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 18.05

INPUT
Description: 2/3 PMF = 1,000 cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9886	1305.8	9888	1305.4	9892	1304	9897	1303	9906	1301
9911	1300.3	9916	1300	9989	1300	9998	1298	10000	1298
10010	1298	10023	1302	10027	1302.8	10065	1302.5	10082	1301
10104	1301	10140	1300.7	10169	1302	10173	1302		

Manning's n Values num= 1

Sta	n Val
9886	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9886 10173 1200.15 1200.15 1200.15 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
9886	9886	

Right Levee Station= 10173 Elevation= 1308

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1301.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.025	
W.S. Elev (ft)	1301.13	Reach Len. (ft)	1200.15	1200.15	1200.15
Crit W.S. (ft)	1301.13	Flow Area (sq ft)		178.41	
E.G. Slope (ft/ft)	0.009320	Area (sq ft)		178.41	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	184.01	Top Width (ft)		184.01	
Vel Total (ft/s)	5.61	Avg. Vel. (ft/s)		5.61	
Max Chl Dpth (ft)	3.13	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	10358.4	Conv. (cfs)		10358.4	
Length Wtd. (ft)	1200.15	Wetted Per. (ft)		184.79	
Min Ch El (ft)	1298.00	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)		3.15	
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)		30.95	
C & E Loss (ft)	0.14	Cum SA (acres)		26.05	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1306.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.80	Wt. n-Val.		0.025	
W.S. Elev (ft)	1304.52	Reach Len. (ft)	1200.15	1200.15	1200.15
Crit W.S. (ft)	1304.52	Flow Area (sq ft)		1022.97	
E.G. Slope (ft/ft)	0.005996	Area (sq ft)		1022.97	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	282.47	Top Width (ft)		282.47	
Vel Total (ft/s)	10.75	Avg. Vel. (ft/s)		10.75	
Max Chl Dpth (ft)	6.52	Hydr. Depth (ft)		3.62	
Conv. Total (cfs)	142056.2	Conv. (cfs)		142056.2	
Length Wtd. (ft)	1200.15	Wetted Per. (ft)		286.45	
Min Ch El (ft)	1298.00	Shear (lb/sq ft)		1.34	
Alpha	1.00	Stream Power (lb/ft s)		14.37	
Frctn Loss (ft)	3.12	Cum Volume (acre-ft)		151.32	
C & E Loss (ft)	0.36	Cum SA (acres)		53.28	

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9886.00	9943.40	175.42	38.47	38.08	17.54	1.01	4.56
9943.40	10000.80	448.26	79.72	57.62	44.83	1.39	5.62
10000.80	10058.20	349.01	44.80	19.86	34.90	2.31	7.79
10058.20	10115.60	6.55	5.18	35.13	0.66	0.15	1.26
10115.60	RB 10173.00	20.76	10.23	34.11	2.08	0.30	2.03

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta	Right Sta	Flow	Area	W.P.	% Conv.	Hydr D.	Velocity

(ft)	(ft)	(cfs)	(sq ft)	(ft)		(ft)	(ft/s)
LB 9886.00	9943.40	2059.88	192.98	53.34	18.73	3.65	10.67
9943.40	10000.80	3504.75	273.79	57.62	31.86	4.77	12.80
10000.80	10058.20	1805.29	184.48	58.08	16.41	3.21	9.79
10058.20	10115.60	1732.65	179.22	57.47	15.75	3.12	9.67
10115.60	RB 10173.00	1897.43	192.49	59.95	17.25	3.35	9.86

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 17.83

INPUT
Description: 2/3 PMF = 1,000 cfs
Full PMF = 11,000 cfs
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9761	1299	9767	1299	9774	1298	9787	1294	9987	1294
10000	1293	10003	1292.8	10005	1292.6	10012	1292.7	10014	1293.7
10024	1296	10033	1296.5	10070	1298.2	10090	1298	10110	1298.6
10148	1300	10151	1300.4	10163	1299.8	10170	1302		

Manning's n Values num= 1

Sta	n Val
9761	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9761	10170	598.09	598.09	598.09	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9761	9761	

Right Levee Station= 10170 Elevation= 1308

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1296.63	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.025	
W.S. Elev (ft)	1296.59	Reach Len. (ft)	598.09	598.09	598.09
Crit W.S. (ft)	1294.73	Flow Area (sq ft)		642.98	
E.G. Slope (ft/ft)	0.000202	Area (sq ft)		642.98	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	256.39	Top Width (ft)		256.39	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)		2.51	
Conv. Total (cfs)	70366.5	Conv. (cfs)		70366.5	
Length Wtd. (ft)	598.09	Wetted Per. (ft)		257.35	
Min Ch El (ft)	1292.60	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)		19.63	
C & E Loss (ft)	0.02	Cum SA (acres)		19.99	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1300.72	Element			
Vel Head (ft)	0.59	Wt. n-Val.		0.025	
W.S. Elev (ft)	1300.13	Reach Len. (ft)	598.09	598.09	598.09
Crit W.S. (ft)	1298.04	Flow Area (sq ft)		1788.99	
E.G. Slope (ft/ft)	0.001444	Area (sq ft)		1788.99	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	395.74	Top Width (ft)		395.74	
Vel Total (ft/s)	6.15	Avg. Vel. (ft/s)		6.15	
Max Chl Dpth (ft)	7.53	Hydr. Depth (ft)		4.52	
Conv. Total (cfs)	289484.8	Conv. (cfs)		289484.8	
Length Wtd. (ft)	598.09	Wetted Per. (ft)		398.26	
Min Ch El (ft)	1292.60	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		2.49	
Frctn Loss (ft)	1.29	Cum Volume (acre-ft)		112.58	
C & E Loss (ft)	0.05	Cum SA (acres)		43.93	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9761.00	9842.80	233.66	155.46	64.61	23.37	2.42	1.50
9842.80	9924.60	334.57	211.91	81.80	33.46	2.59	1.58
9924.60	10006.40	373.01	226.26	81.86	37.30	2.77	1.65
10006.40	10088.20	58.77	49.35	29.08	5.88	1.73	1.19

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9761.00	9842.80	2464.40	414.24	83.61	22.40	5.06	5.95
9842.80	9924.60	3441.48	501.74	81.80	31.29	6.13	6.86
9924.60	10006.40	3605.46	516.10	81.86	32.78	6.31	6.99
10006.40	10088.20	1322.02	283.36	82.35	12.02	3.46	4.67
10088.20	RB 10170.00	166.64	73.54	68.64	1.51	1.07	2.27

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 17.71

INPUT
Description: 2/3 PMF = 500 cfs
Full PMF = 8,000 cfs
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9725	1296.3	9735	1296.3	9915	1296	9920	1295.7	9932	1295.1
9970	1295	10000	1295.2	10028	1295.4	10068	1296.1	10110	1297
10144	1298	10220	1301	10235	1301.6				

Manning's n Values num= 1

Sta	n Val
9725	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9725 10235 894.97 894.97 894.97 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
9725	9725	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1296.37	Element			
Vel Head (ft)	0.28	Wt. n-Val.		0.020	
W.S. Elev (ft)	1296.09	Reach Len. (ft)	894.97	894.97	894.97
Crit W.S. (ft)	1296.09	Flow Area (sq ft)		117.66	
E.G. Slope (ft/ft)	0.007038	Area (sq ft)		117.66	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	208.97	Top Width (ft)		208.97	
Vel Total (ft/s)	4.25	Avg. Vel. (ft/s)		4.25	
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)		0.56	
Conv. Total (cfs)	5960.0	Conv. (cfs)		5960.0	
Length Wtd. (ft)	894.97	Wetted Per. (ft)		209.00	
Min Ch El (ft)	1295.00	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		1.05	
Frctn Loss (ft)	5.64	Cum Volume (acre-ft)		14.41	
C & E Loss (ft)	0.00	Cum SA (acres)		16.79	

Warning: The energy equation could not be balanced within the specified number of iterations. The

program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1299.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.		0.020	
W.S. Elev (ft)	1298.26	Reach Len. (ft)	894.97	894.97	894.97
Crit W.S. (ft)	1298.26	Flow Area (sq ft)		945.08	
E.G. Slope (ft/ft)	0.004510	Area (sq ft)		945.08	
Q Total (cfs)	8000.00	Flow (cfs)		8000.00	
Top Width (ft)	425.63	Top Width (ft)		425.63	
Vel Total (ft/s)	8.46	Avg. Vel. (ft/s)		8.46	
Max Chl Dpth (ft)	3.26	Hydr. Depth (ft)		2.22	
Conv. Total (cfs)	119128.3	Conv. (cfs)		119128.3	
Length Wtd. (ft)	894.97	Wetted Per. (ft)		427.65	
Min Ch El (ft)	1295.00	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		5.27	
Frctn Loss (ft)	4.94	Cum Volume (acre-ft)		93.81	
C & E Loss (ft)	0.00	Cum SA (acres)		38.30	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9827.00	9929.00	12.24	9.43	70.33	2.45	0.13	1.30
9929.00	10031.00	460.48	96.47	102.01	92.10	0.95	4.77
10031.00	10133.00	27.28	11.75	36.66	5.46	0.32	2.32

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9725.00	9827.00	1564.04	207.14	103.96	19.55	2.03	7.55
9827.00	9929.00	1881.79	229.71	102.02	23.52	2.25	8.19
9929.00	10031.00	3229.11	317.59	102.01	40.36	3.11	10.17
10031.00	10133.00	1312.90	185.09	102.03	16.41	1.81	7.09
10133.00	RB 10235.00	12.15	5.53	17.64	0.15	0.31	2.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 17.54

INPUT
Description: 2/3 PMF = 500 cfs
Full PMF = 7,000 cfs
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9726	1291.1	9736	1290	9746	1290	9754	1288	9838	1287.9

9854	1287.6	9902	1286.3	9947	1286	9970	1286	9980	1286.4
9993	1286	10000	1283	10002	1282.1	10005	1282.1	10018	1286
10025	1286.9	10028	1288	10066	1288.6	10074	1288	10078	1288
10104	1288.8	10136	1290	10145	1290.5	10168	1291		

Manning's n Values num= 1

Sta	n Val
9726	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9726	10168	1016.46	1016.46	1016.46	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9726	9726		10028	10168	1288

Right Levee Station= 10168 Elevation= 1297

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1287.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.86	Wt. n-Val.		0.025	
W.S. Elev (ft)	1285.64	Reach Len. (ft)	1016.46	1016.46	1016.46
Crit W.S. (ft)	1286.47	Flow Area (sq ft)		45.72	
E.G. Slope (ft/ft)	0.014487	Area (sq ft)		45.72	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	22.94	Top Width (ft)		22.94	
Vel Total (ft/s)	10.94	Avg. Vel. (ft/s)		10.94	
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)		1.99	
Conv. Total (cfs)	4154.1	Conv. (cfs)		4154.1	
Length Wtd. (ft)	1016.46	Wetted Per. (ft)		24.19	
Min Ch El (ft)	1282.10	Shear (lb/sq ft)		1.71	
Alpha	1.00	Stream Power (lb/ft s)		18.69	
Frctn Loss (ft)	8.73	Cum Volume (acre-ft)		12.73	
C & E Loss (ft)	0.16	Cum SA (acres)		14.41	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1291.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.80	Wt. n-Val.		0.025	
W.S. Elev (ft)	1288.57	Reach Len. (ft)	1016.46	1016.46	1016.46
Crit W.S. (ft)	1289.41	Flow Area (sq ft)		521.35	
E.G. Slope (ft/ft)	0.029281	Area (sq ft)		521.35	
Q Total (cfs)	7000.00	Flow (cfs)		7000.00	
Top Width (ft)	341.95	Top Width (ft)		341.95	
Vel Total (ft/s)	13.43	Avg. Vel. (ft/s)		13.43	
Max Chl Dpth (ft)	6.47	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	40907.5	Conv. (cfs)		40907.5	
Length Wtd. (ft)	1016.46	Wetted Per. (ft)		343.72	
Min Ch El (ft)	1282.10	Shear (lb/sq ft)		2.77	
Alpha	1.00	Stream Power (lb/ft s)		37.23	
Frctn Loss (ft)	7.85	Cum Volume (acre-ft)		78.75	
C & E Loss (ft)	0.17	Cum SA (acres)		30.41	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9991.20	10079.60	500.00	45.72	24.19	100.00	1.99	10.94

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9726.00	9814.40	235.11	36.94	62.73	3.36	0.59	6.36
9814.40	9902.80	1113.52	107.74	88.42	15.91	1.22	10.34
9902.80	9991.20	3541.05	215.69	88.41	50.59	2.44	16.42
9991.20	10079.60	2094.45	156.66	87.38	29.92	1.83	13.37
10079.60	RB 10168.00	15.87	4.32	16.77	0.23	0.26	3.67

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 17.35

INPUT
Description: 2/3 PMF = 500 cfs
Full PMF = 7,000 cfs
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9816	1283.4	9821	1283.3	9830	1282.2	9843	1280.3	9863	1276
9876	1276	9882	1277.8	9901	1278.4	9917	1278.4	9935	1278.2
9955	1278	10000	1278	10031	1278	10045	1279	10064	1279
10109	1279	10131	1279	10144	1278	10159	1278	10173	1278.3
10197	1278.3	10240	1278						

Manning's n Values num= 1

Sta	n Val
9816	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9816 10240 1011.79 1011.79 1011.79 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9816	9816		10045	10240	1279

Right Levee Station= 10240 Elevation= 1284

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1278.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.025	
W.S. Elev (ft)	1278.46	Reach Len. (ft)	1011.79	1011.79	1011.79
Crit W.S. (ft)	1278.46	Flow Area (sq ft)		110.36	
E.G. Slope (ft/ft)	0.011695	Area (sq ft)		140.49	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	287.97	Top Width (ft)		287.97	
Vel Total (ft/s)	4.53	Avg. Vel. (ft/s)		4.53	
Max Chl Dpth (ft)	2.46	Hydr. Depth (ft)		0.59	
Conv. Total (cfs)	4623.5	Conv. (cfs)		4623.5	
Length Wtd. (ft)	1011.79	Wetted Per. (ft)		186.50	
Min Ch El (ft)	1276.00	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		1.96	
Frctn Loss (ft)	5.64	Cum Volume (acre-ft)		10.56	
C & E Loss (ft)	0.03	Cum SA (acres)		10.78	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates

that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1281.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.		0.025	
W.S. Elev (ft)	1280.39	Reach Len. (ft)	1011.79	1011.79	1011.79
Crit W.S. (ft)	1280.39	Flow Area (sq ft)		846.64	
E.G. Slope (ft/ft)	0.007140	Area (sq ft)		846.64	
Q Total (cfs)	7000.00	Flow (cfs)		7000.00	
Top Width (ft)	397.60	Top Width (ft)		397.60	
Vel Total (ft/s)	8.27	Avg. Vel. (ft/s)		8.27	
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	82843.9	Conv. (cfs)		82843.9	
Length Wtd. (ft)	1011.79	Wetted Per. (ft)		400.81	
Min Ch El (ft)	1276.00	Shear (lb/sq ft)		0.94	
Alpha	1.00	Stream Power (lb/ft s)		7.78	
Frctn Loss (ft)	3.45	Cum Volume (acre-ft)		62.79	
C & E Loss (ft)	0.14	Cum SA (acres)		21.78	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9816.00	9900.80	374.51	62.41	49.79	74.90	1.27	6.00
9900.80	9985.60	58.76	25.42	84.80	11.75	0.30	2.31
9985.60	10070.40	66.73	22.54	51.90	13.35	0.43	2.96

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9816.00	9900.80	1629.24	165.82	59.14	23.27	2.84	9.83
9900.80	9985.60	1587.90	188.61	84.80	22.68	2.22	8.42
9985.60	10070.40	1336.29	170.09	84.84	19.09	2.01	7.86
10070.40	10155.20	913.54	135.39	84.84	13.05	1.60	6.75
10155.20	RB 10240.00	1533.03	186.73	87.19	21.90	2.20	8.21

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: MCMICKEN DAM

REACH: A2 RS: 17.16

INPUT
Description: 2/3 PMF = 500 cfs
Full PMF = 7,000 cfs
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9946	1276.5	9954	1276.3	9977	1271.8	9988	1270	10000	1270
10011	1270	10029	1272	10075	1272	10080	1273	10103	1273
10147	1273	10170	1273	10180	1270.9	10196	1271	10213	1271
10242	1271.6	10275	1271.8						

Manning's n Values num= 1

Sta	n Val
9946	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9946 10275 1001.45 1001.45 1001.45 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9946	9946		10080	10275	1273

Right Levee Station= 10275 Elevation= 1277.8

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1272.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.025	
W.S. Elev (ft)	1272.52	Reach Len. (ft)	1001.45	1001.45	1001.45
Crit W.S. (ft)	1272.17	Flow Area (sq ft)		128.55	
E.G. Slope (ft/ft)	0.003253	Area (sq ft)		247.70	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	206.92	Top Width (ft)		206.92	
Vel Total (ft/s)	3.89	Avg. Vel. (ft/s)		3.89	
Max Chl Dpth (ft)	2.52	Hydr. Depth (ft)		1.23	
Conv. Total (cfs)	8766.3	Conv. (cfs)		8766.3	
Length Wtd. (ft)	1001.45	Wetted Per. (ft)		104.61	
Min Ch El (ft)	1270.00	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.97	
Frctn Loss (ft)	4.57	Cum Volume (acre-ft)		6.05	
C & E Loss (ft)	0.02	Cum SA (acres)		5.03	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1276.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.025	
W.S. Elev (ft)	1275.54	Reach Len. (ft)	1001.45	1001.45	1001.45
Crit W.S. (ft)	1274.39	Flow Area (sq ft)		1138.31	
E.G. Slope (ft/ft)	0.001986	Area (sq ft)		1138.31	
Q Total (cfs)	7000.00	Flow (cfs)		7000.00	
Top Width (ft)	317.11	Top Width (ft)		317.11	
Vel Total (ft/s)	6.15	Avg. Vel. (ft/s)		6.15	
Max Chl Dpth (ft)	5.54	Hydr. Depth (ft)		3.59	
Conv. Total (cfs)	157075.8	Conv. (cfs)		157075.8	
Length Wtd. (ft)	1001.45	Wetted Per. (ft)		321.79	
Min Ch El (ft)	1270.00	Shear (lb/sq ft)		0.44	
Alpha	1.00	Stream Power (lb/ft s)		2.70	
Frctn Loss (ft)	3.29	Cum Volume (acre-ft)		39.73	
C & E Loss (ft)	0.09	Cum SA (acres)		13.48	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9946.00	10011.80	377.67	78.90	38.68	75.53	2.05	4.79
10011.80	10077.60	122.33	49.66	65.93	24.47	0.75	2.46

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9946.00	10011.80	1444.51	218.52	54.42	20.64	4.05	6.61
10011.80	10077.60	1575.40	248.60	65.96	22.51	3.78	6.34
10077.60	10143.40	817.65	167.62	65.85	11.68	2.55	4.88
10143.40	10209.20	1451.24	236.74	66.02	20.73	3.60	6.13
10209.20	RB 10275.00	1711.21	266.84	69.55	24.45	4.06	6.41

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 16.97

INPUT
Description: 2/3 PMF = 500 cfs
Full PMF = 7,000 cfs
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9921	1270.6	9927	1270.6	9933	1270	9961	1267.4	9991	1265.9
10000	1265.8	10007	1265.7	10037	1267.7	10040	1269.3	10062	1269.3
10107	1269.3	10133	1269.3	10164	1268				

Manning's n Values num= 1

Sta	n Val
9921	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9921	10164	1000.04	1000.04	1000.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9921	9921		10040	10164	1269.3

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1268.16	Element			
Vel Head (ft)	0.45	Wt. n-Val.		0.025	
W.S. Elev (ft)	1267.70	Reach Len. (ft)	1000.04	1000.04	1000.04
Crit W.S. (ft)	1267.59	Flow Area (sq ft)		92.43	
E.G. Slope (ft/ft)	0.006762	Area (sq ft)		92.43	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	79.25	Top Width (ft)		79.25	
Vel Total (ft/s)	5.41	Avg. Vel. (ft/s)		5.41	
Max Chl Dpth (ft)	2.00	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	6080.4	Conv. (cfs)		6080.4	
Length Wtd. (ft)	1000.04	Wetted Per. (ft)		79.37	
Min Ch El (ft)	1265.70	Shear (lb/sq ft)		0.49	
Alpha	1.00	Stream Power (lb/ft s)		2.66	
Frctn Loss (ft)	6.19	Cum Volume (acre-ft)		2.14	
C & E Loss (ft)	0.00	Cum SA (acres)		1.75	

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1272.75	Element			
Vel Head (ft)	1.47	Wt. n-Val.		0.025	
W.S. Elev (ft)	1271.28	Reach Len. (ft)	1000.04	1000.04	1000.04
Crit W.S. (ft)	1271.28	Flow Area (sq ft)		719.80	
E.G. Slope (ft/ft)	0.006454	Area (sq ft)		719.80	
Q Total (cfs)	7000.00	Flow (cfs)		7000.00	
Top Width (ft)	243.00	Top Width (ft)		243.00	
Vel Total (ft/s)	9.72	Avg. Vel. (ft/s)		9.72	
Max Chl Dpth (ft)	5.58	Hydr. Depth (ft)		2.96	
Conv. Total (cfs)	87134.3	Conv. (cfs)		87134.3	

Length Wtd. (ft)	1000.04	Wetted Per. (ft)	247.64
Min Ch El (ft)	1265.70	Shear (lb/sq ft)	1.17
Alpha	1.00	Stream Power (lb/ft s)	11.39
Frctn Loss (ft)	6.06	Cum Volume (acre-ft)	18.38
C & E Loss (ft)	0.15	Cum SA (acres)	7.04

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9921.00	9969.60	12.16	4.93	11.87	2.43	0.42	2.46
9969.60	10018.20	449.54	75.68	48.65	89.91	1.56	5.94
10018.20	10066.80	38.30	11.82	18.85	7.66	0.63	3.24

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9921.00	9969.60	922.39	117.36	49.44	13.18	2.41	7.86
9969.60	10018.20	3277.57	249.52	48.65	46.82	5.13	13.14
10018.20	10066.80	1250.75	140.43	49.04	17.87	2.89	8.91
10066.80	10115.40	669.49	96.17	48.60	9.56	1.98	6.96
10115.40	RB 10164.00	879.80	116.32	51.91	12.57	2.39	7.56

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: A2 RS: 16.78

INPUT
Description: Downstream End of Model MDA2;
2/3 PMF = 500 cfs
Full PMF = 7,000
cfs

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9942	1265	9947	1265	9955	1264.3	9959	1263.7	9964	1262.2
9969	1261.4	9975	1260	10000	1259.8	10020	1260	10060	1262.9
10084	1262.9	10126	1262.9	10150	1262.9	10232	1262	10270	1261.9
10325	1261.6								

Manning's n Values num= 1

Sta	n Val
9942	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9942	10325	0	0	0	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9942	9942		10060	10325	1262.9

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1261.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.025	
W.S. Elev (ft)	1261.52	Reach Len. (ft)			
Crit W.S. (ft)	1261.34	Flow Area (sq ft)		94.09	

E.G. Slope (ft/ft)	0.005701	Area (sq ft)	94.09
Q Total (cfs)	500.00	Flow (cfs)	500.00
Top Width (ft)	72.80	Top Width (ft)	72.80
Vel Total (ft/s)	5.31	Avg. Vel. (ft/s)	5.31
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)	1.29
Conv. Total (cfs)	6622.1	Conv. (cfs)	6622.1
Length Wtd. (ft)		Wetted Per. (ft)	73.02
Min Ch El (ft)	1259.80	Shear (lb/sq ft)	0.46
Alpha	1.00	Stream Power (lb/ft s)	2.44
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1265.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.98	Wt. n-Val.		0.025	
W.S. Elev (ft)	1264.35	Reach Len. (ft)			
Crit W.S. (ft)	1264.21	Flow Area (sq ft)		880.98	
E.G. Slope (ft/ft)	0.005701	Area (sq ft)		880.98	
Q Total (cfs)	7000.00	Flow (cfs)		7000.00	
Top Width (ft)	370.61	Top Width (ft)		370.61	
Vel Total (ft/s)	7.95	Avg. Vel. (ft/s)		7.95	
Max Chl Dpth (ft)	4.55	Hydr. Depth (ft)		2.38	
Conv. Total (cfs)	92706.2	Conv. (cfs)		92706.2	
Length Wtd. (ft)		Wetted Per. (ft)		373.96	
Min Ch El (ft)	1259.80	Shear (lb/sq ft)		0.84	
Alpha	1.00	Stream Power (lb/ft s)		6.66	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9942.00	10018.60	431.70	75.93	50.55	86.34	1.51	5.69
10018.60	10095.20	68.30	18.16	22.48	13.66	0.81	3.76

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9942.00	10018.60	2422.63	237.41	64.70	34.61	3.70	10.20
10018.60	10095.20	1280.85	173.38	76.71	18.30	2.26	7.39
10095.20	10171.80	636.60	113.92	76.60	9.09	1.49	5.59
10171.80	10248.40	1129.74	160.72	76.60	16.14	2.10	7.03
10248.40	RB 10325.00	1530.19	195.55	79.35	21.86	2.55	7.83

SUMMARY OF MANNING'S N VALUES

River:MCMICKEN DAM

Reach	River Sta.	n1
A2	19.55	.04
A2	19.43	.04
A2	19.34	.04
A2	19.23	.035
A2	19.20	.04
A2	19.02	.03
A2	18.89	.03
A2	18.80	.025
A2	18.61	.025
A2	18.45	.025
A2	18.28	.025
A2	18.05	.025
A2	17.83	.025
A2	17.71	.02
A2	17.54	.025
A2	17.35	.025
A2	17.16	.025
A2	16.97	.025
A2	16.78	.025

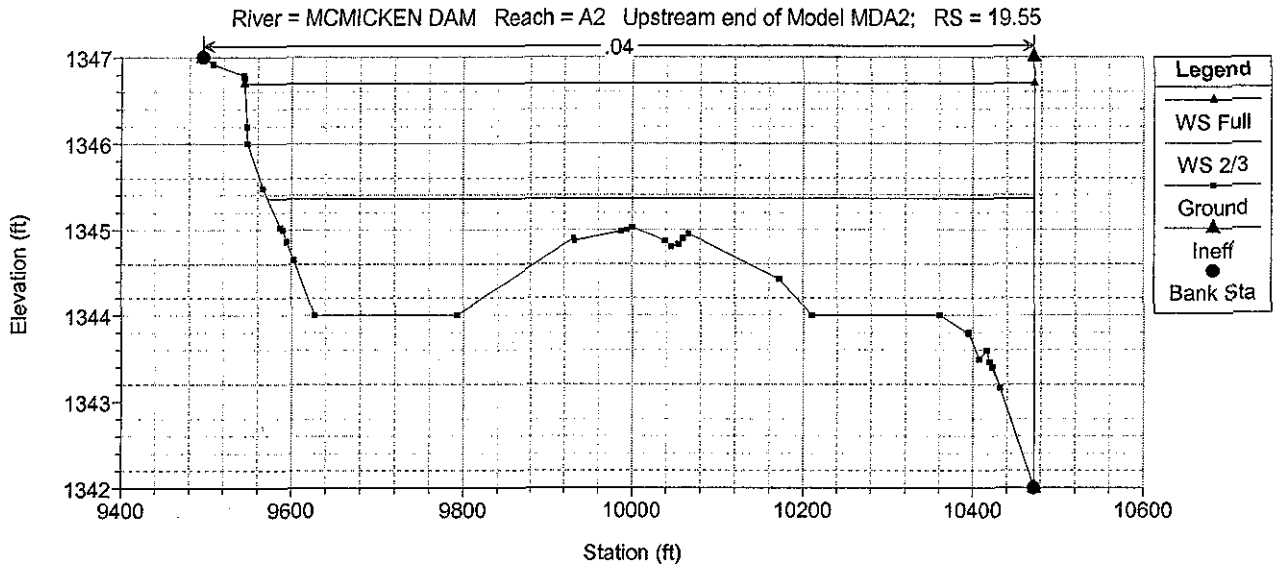
SUMMARY OF REACH LENGTHS

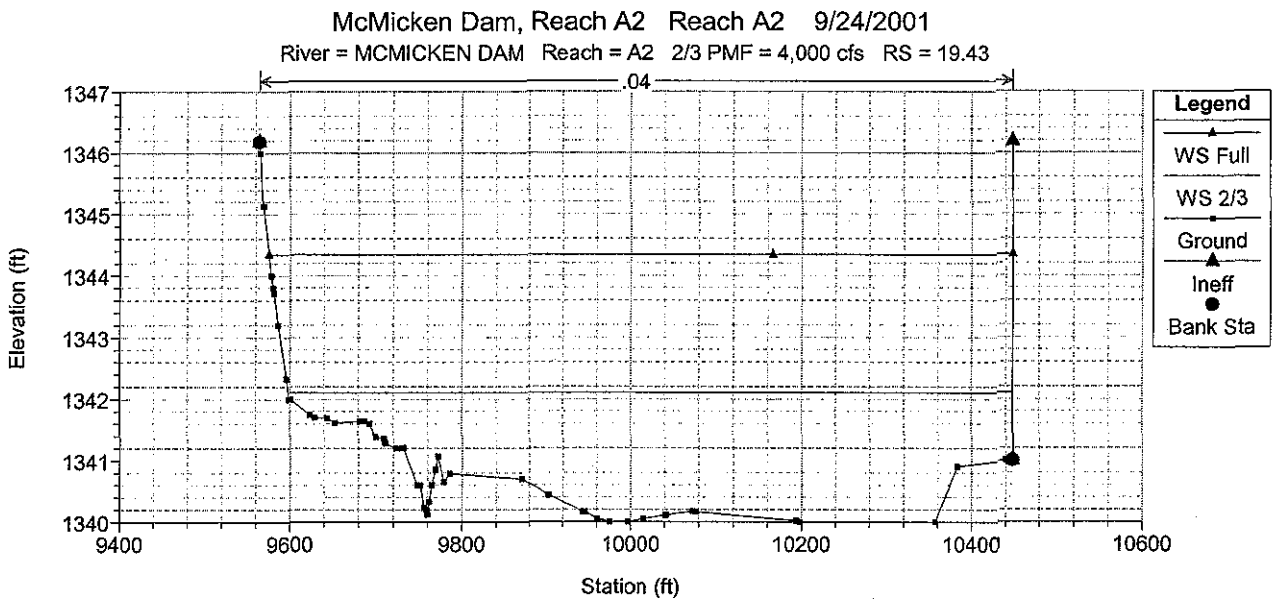
River: MCMICKEN DAM

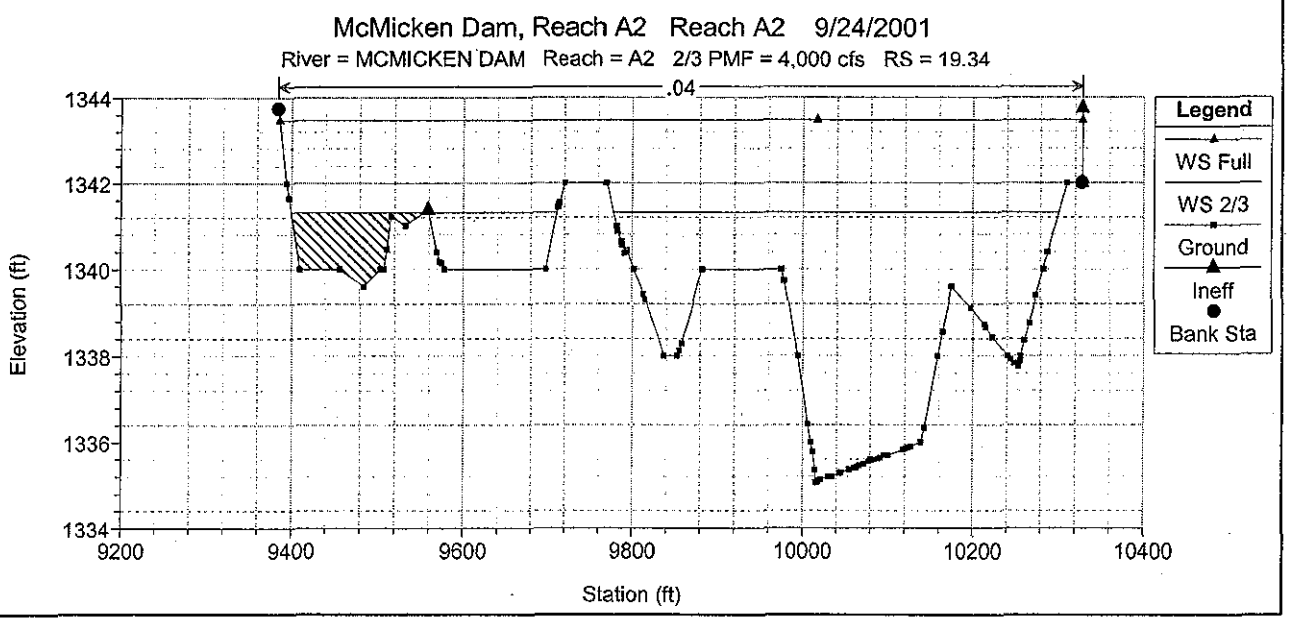
Reach	River Sta.	Left	Channel	Right
A2	19.55	602.69	602.69	602.69
A2	19.43	497.5	497.5	497.5
A2	19.34	579.4	579.4	579.4
A2	19.23	146.68	146.68	146.68
A2	19.20	910	929.9	1000
A2	19.02	690	729.97	800
A2	18.89	455	447.95	400
A2	18.80	1000	1018.74	1000
A2	18.61	827.16	827.16	827.16
A2	18.45	913.53	913.53	913.53
A2	18.28	1186.06	1186.06	1186.06
A2	18.05	1200.15	1200.15	1200.15
A2	17.83	598.09	598.09	598.09
A2	17.71	894.97	894.97	894.97
A2	17.54	1016.46	1016.46	1016.46
A2	17.35	1011.79	1011.79	1011.79
A2	17.16	1001.45	1001.45	1001.45
A2	16.97	1000.04	1000.04	1000.04
A2	16.78	0	0	0

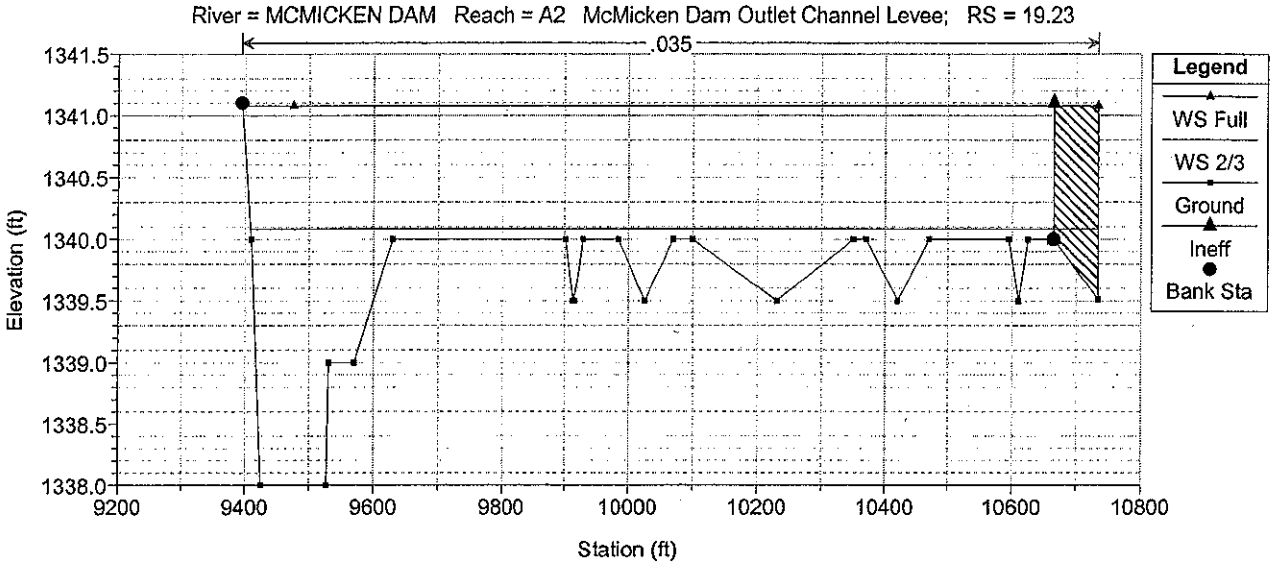
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: MCMICKEN DAM

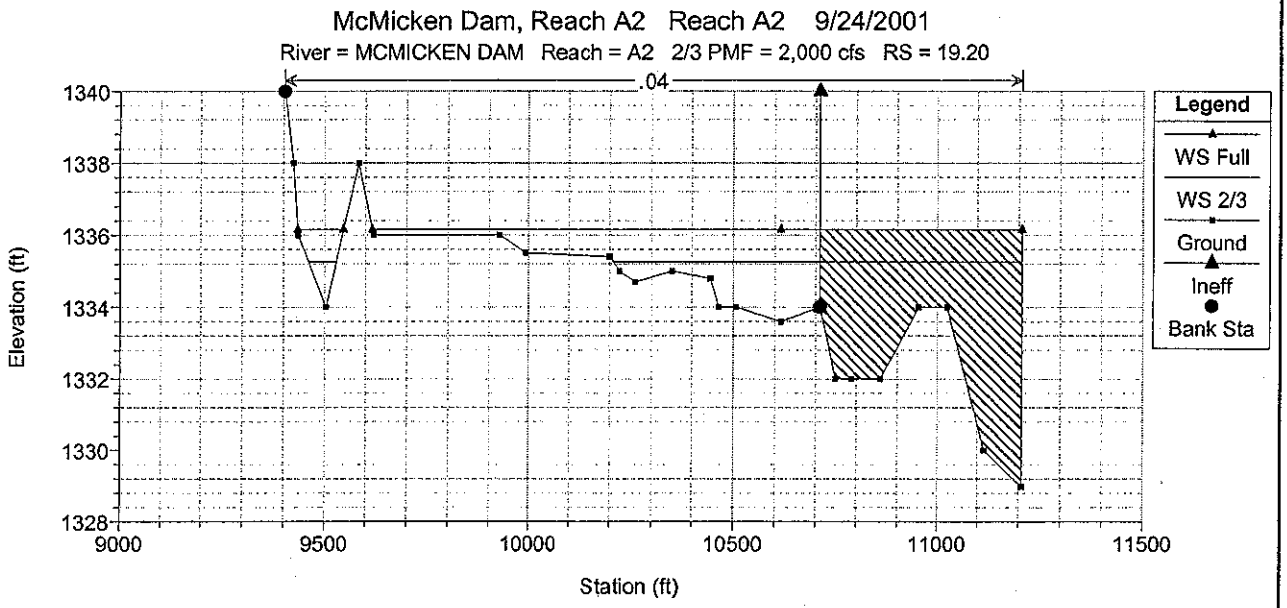
Reach	River Sta.	Contr.	Expan.
A2	19.55	.1	.3
A2	19.43	.1	.3
A2	19.34	.1	.3
A2	19.23	.1	.3
A2	19.20	.1	.3
A2	19.02	.1	.3
A2	18.89	.1	.3
A2	18.80	.1	.3
A2	18.61	.1	.3
A2	18.45	.1	.3
A2	18.28	.1	.3
A2	18.05	.1	.3
A2	17.83	.1	.3
A2	17.71	.1	.3
A2	17.54	.1	.3
A2	17.35	.1	.3
A2	17.16	.1	.3
A2	16.97	.1	.3
A2	16.78	.1	.3

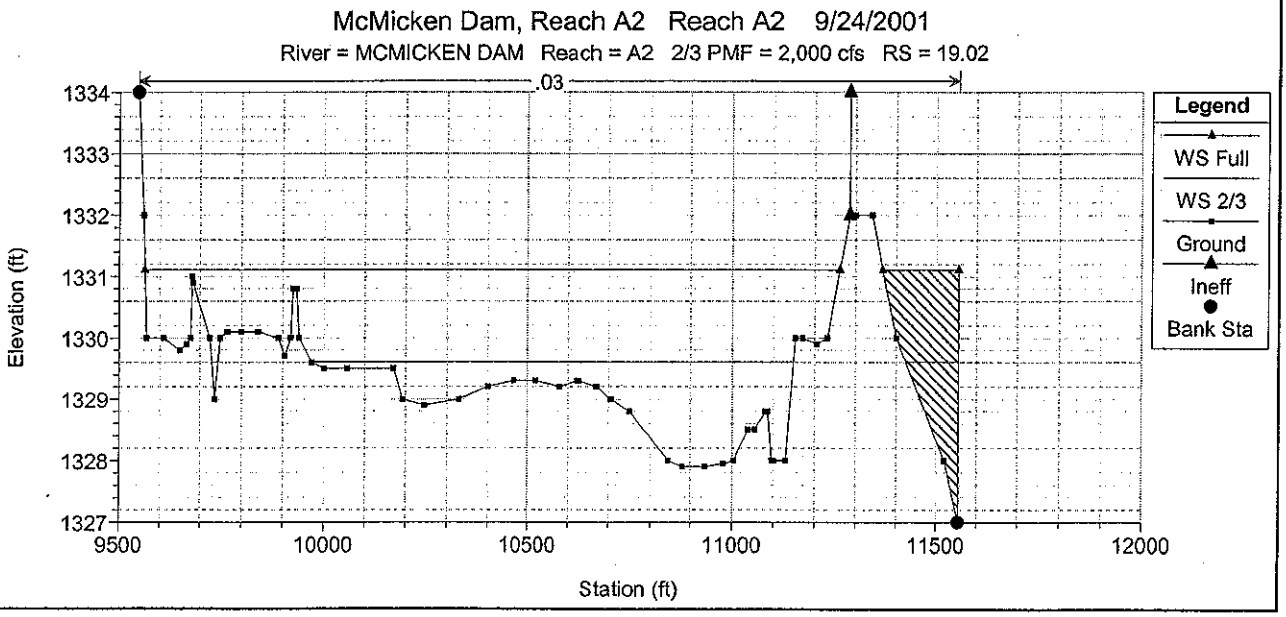

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 Upstream end of Model MDA2; RS = 19.55
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

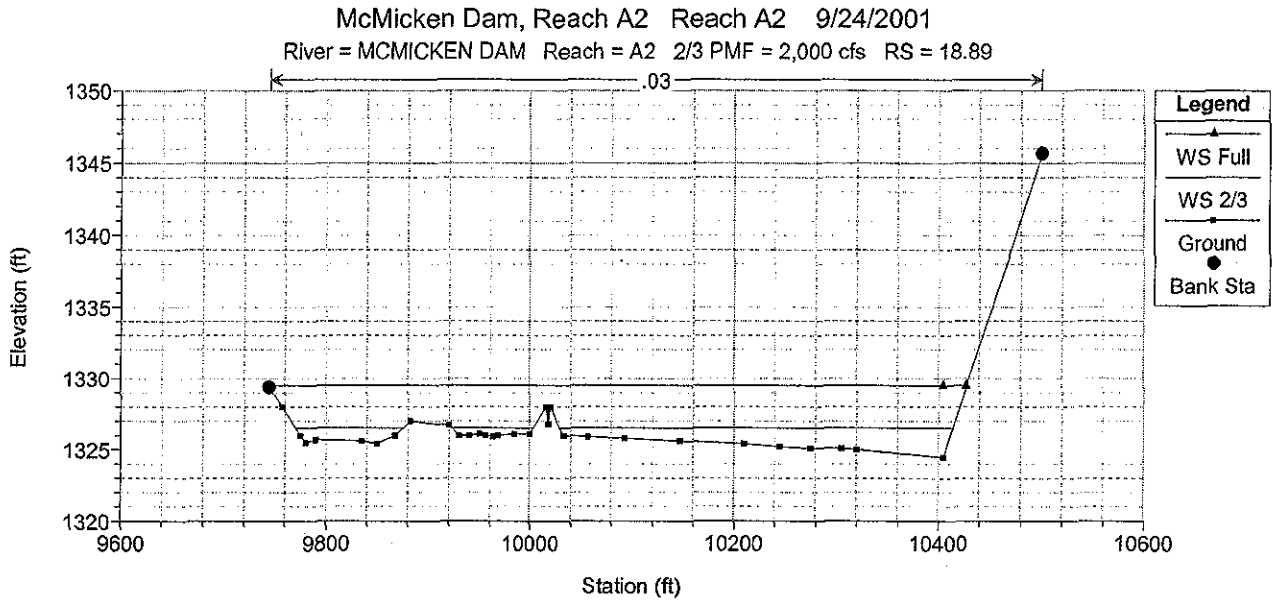

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 4,000 cfs RS = 19.43
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

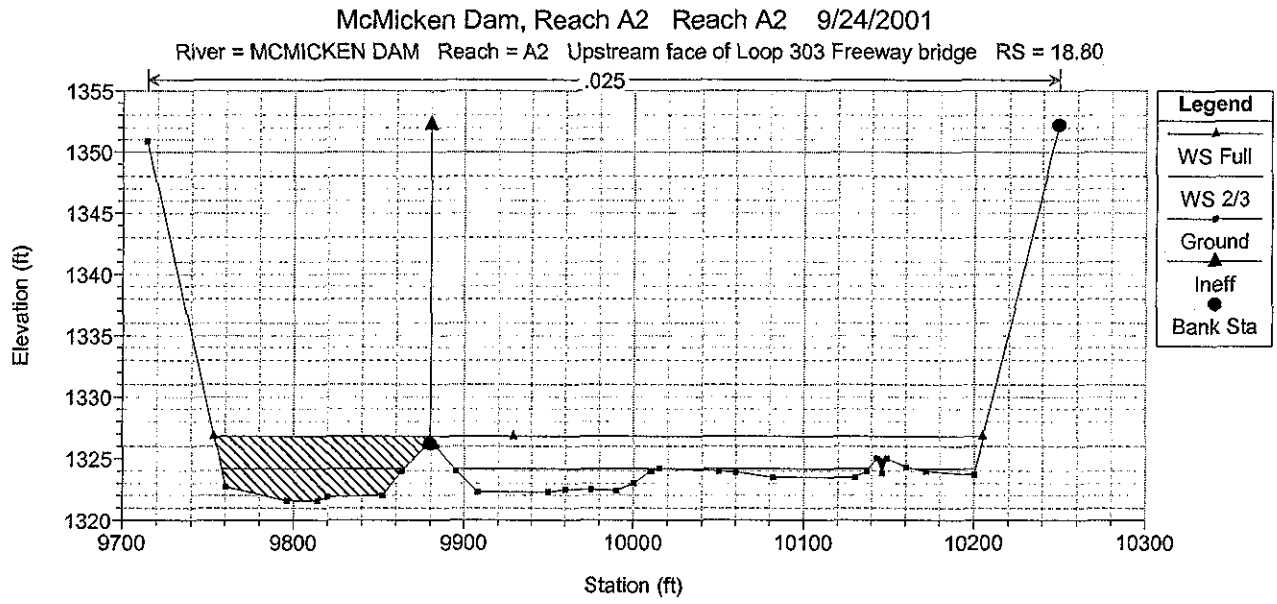

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 4,000 cfs RS = 19.34
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

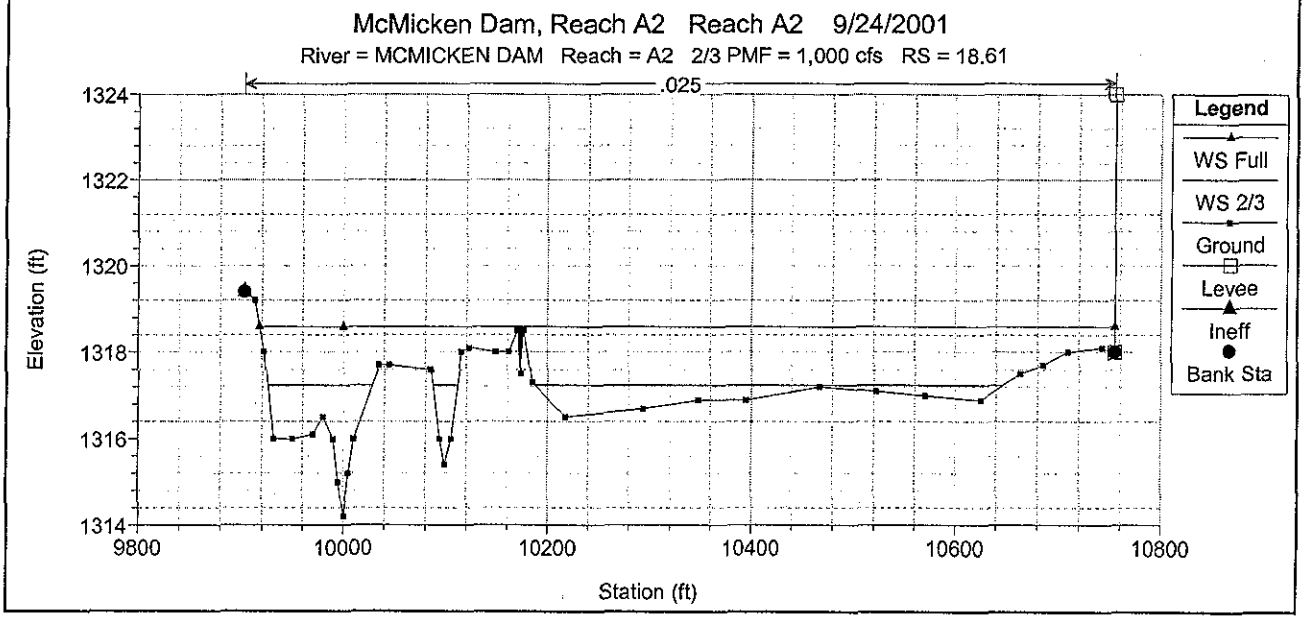

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 McMicken Dam Outlet Channel Levee; RS = 19.23
.035
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

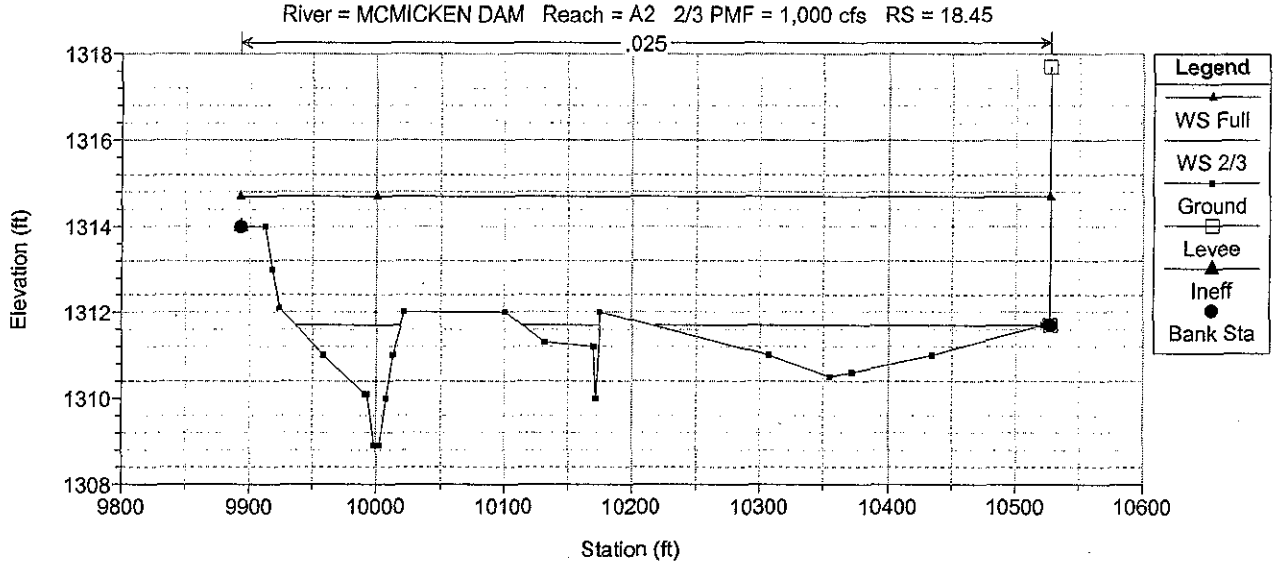

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 2,000 cfs RS = 19.20
.04
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

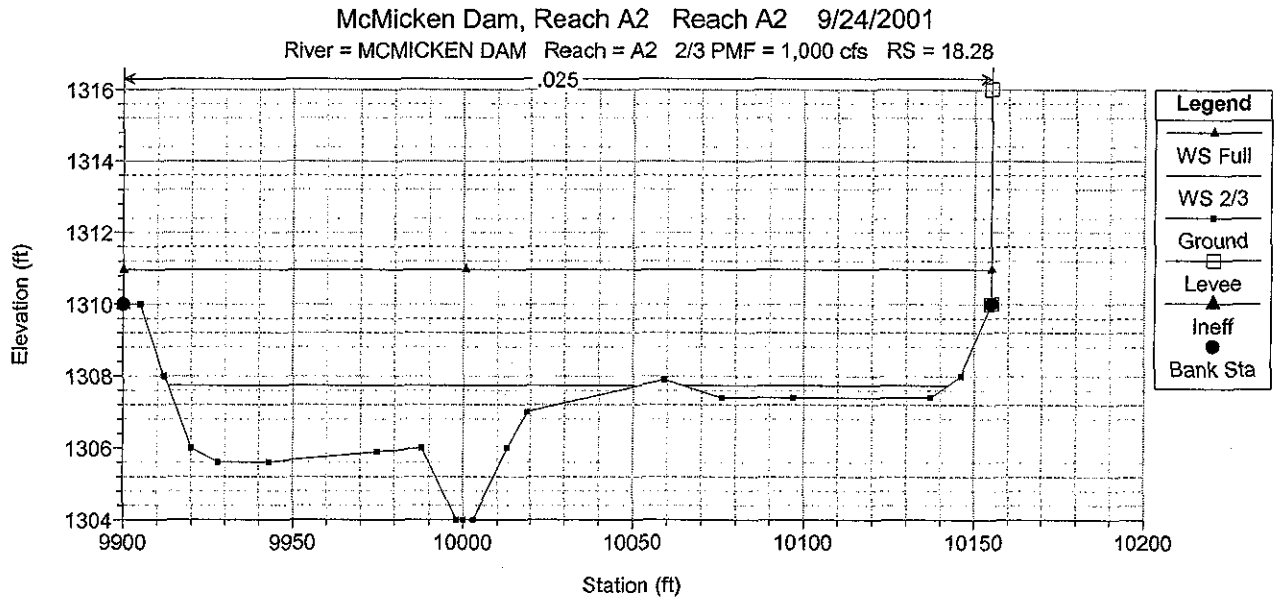

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 2,000 cfs RS = 19.02
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

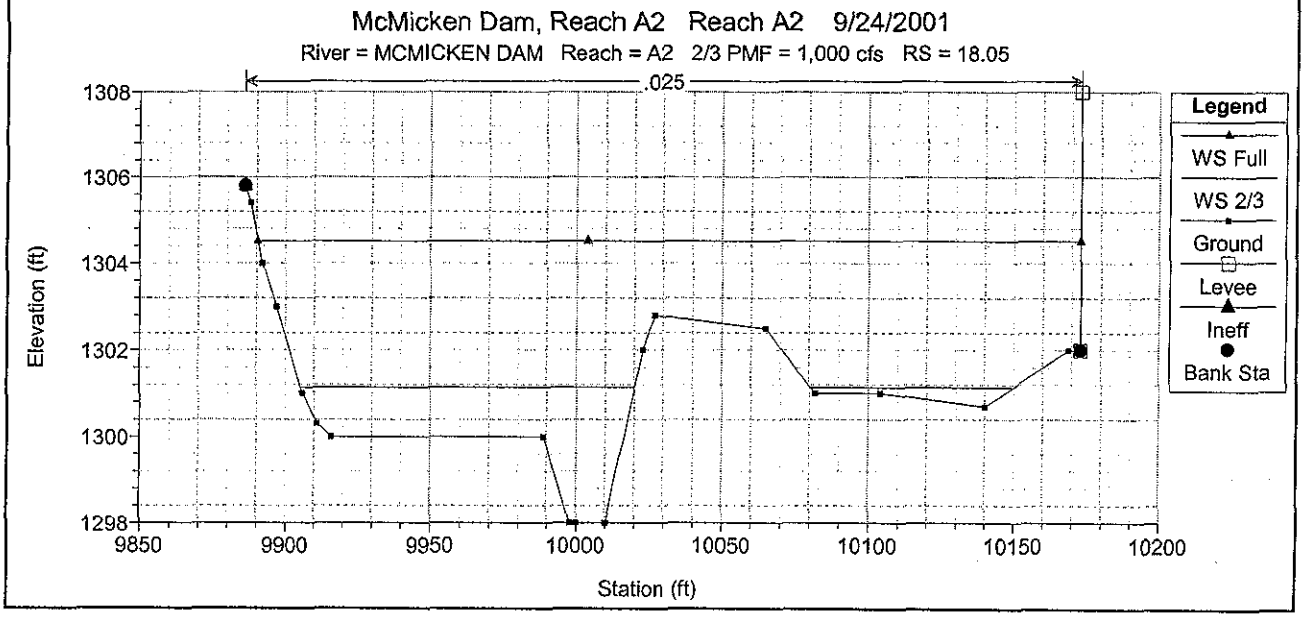

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 2,000 cfs RS = 18.89
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Bank Sta

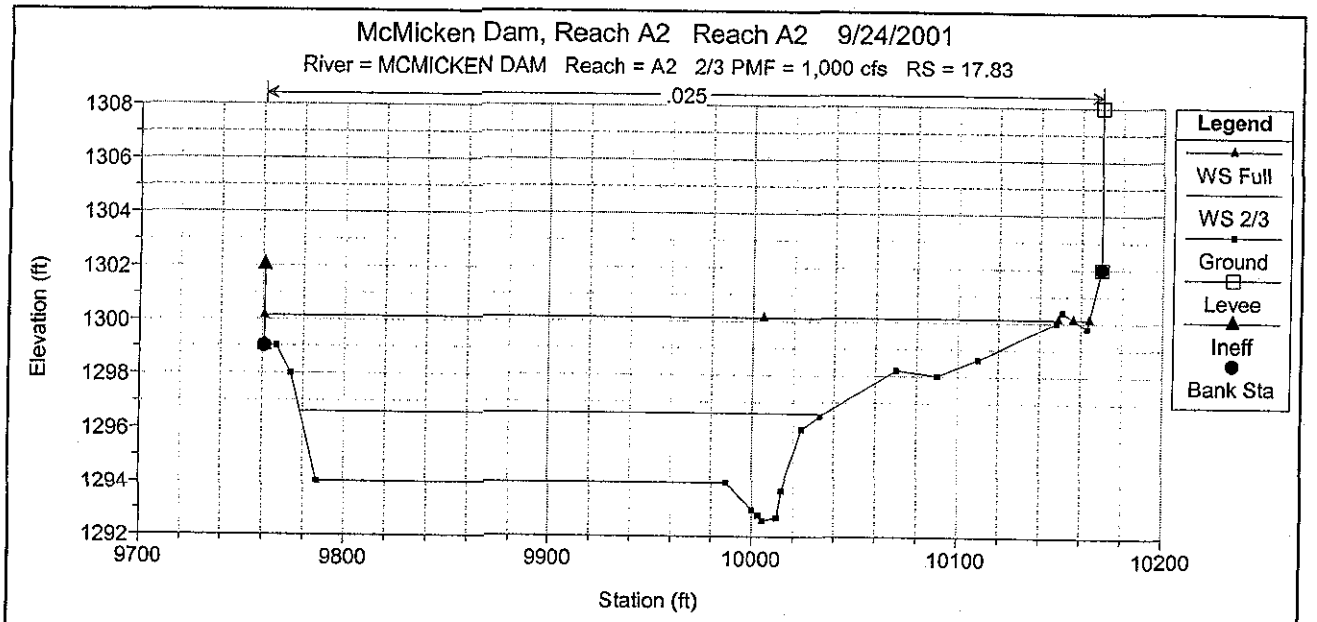

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 Upstream face of Loop 303 Freeway bridge RS = 18.80
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

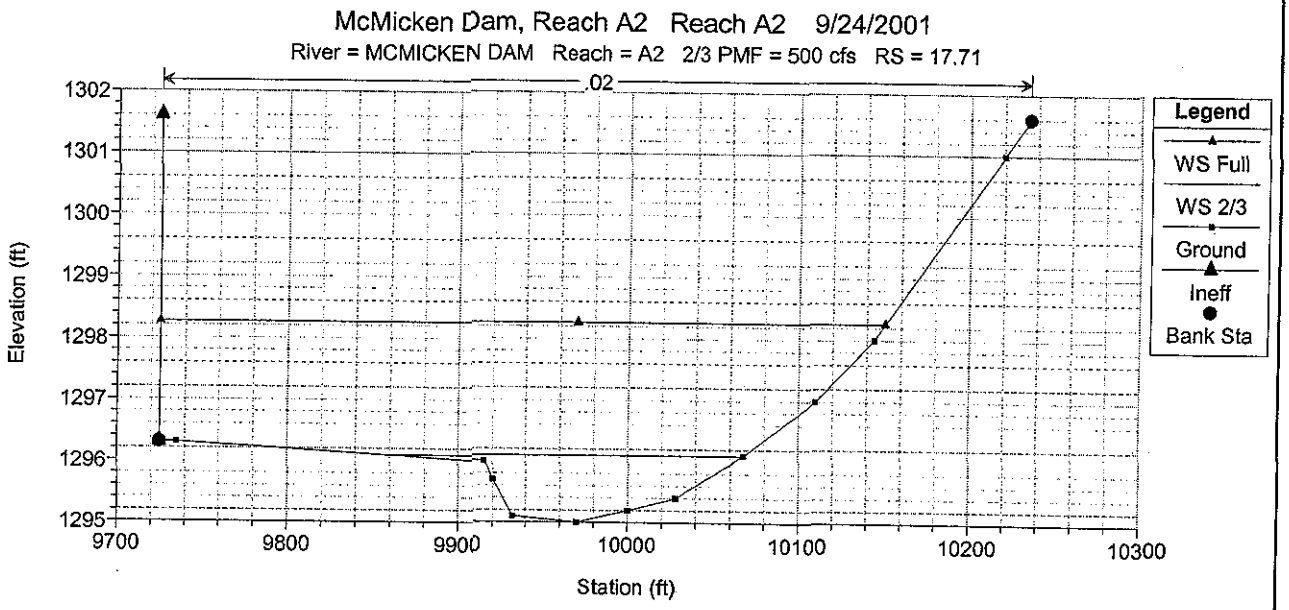

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 1,000 cfs RS = 18.61
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta

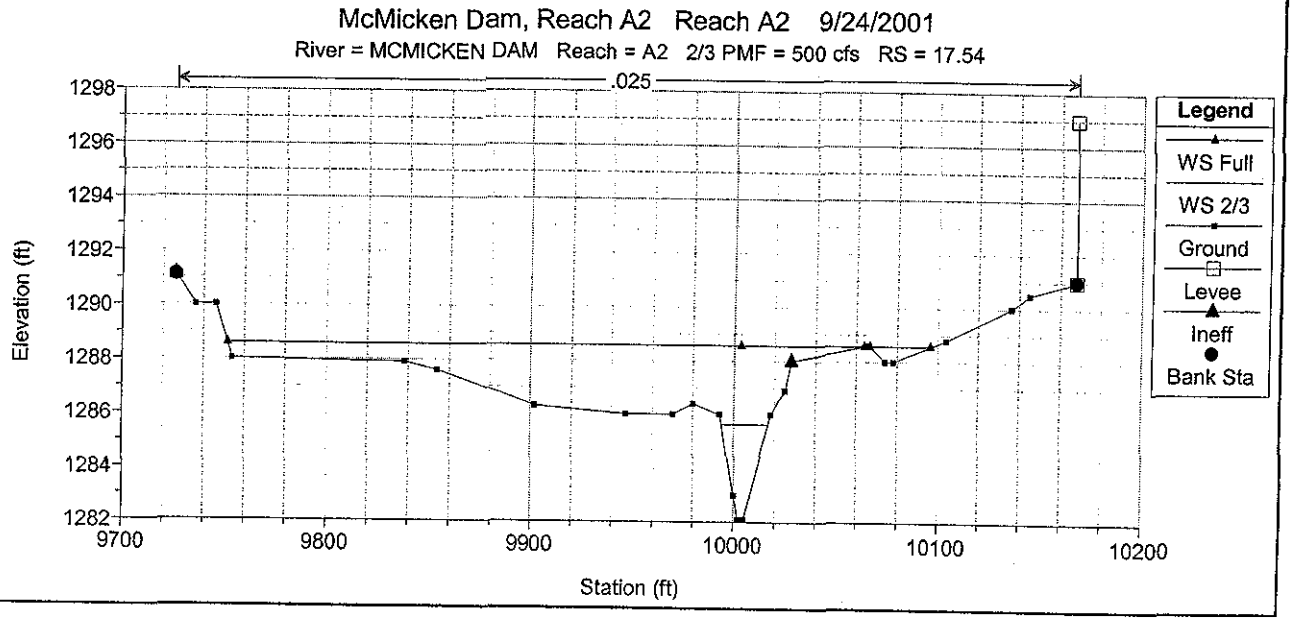

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 1,000 cfs RS = 18.45
.025
Elevation (ft)
1318
1316
1314
1312
1310
1308
9800
9900
10000
10100
10200
10300
10400
10500
10600
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta

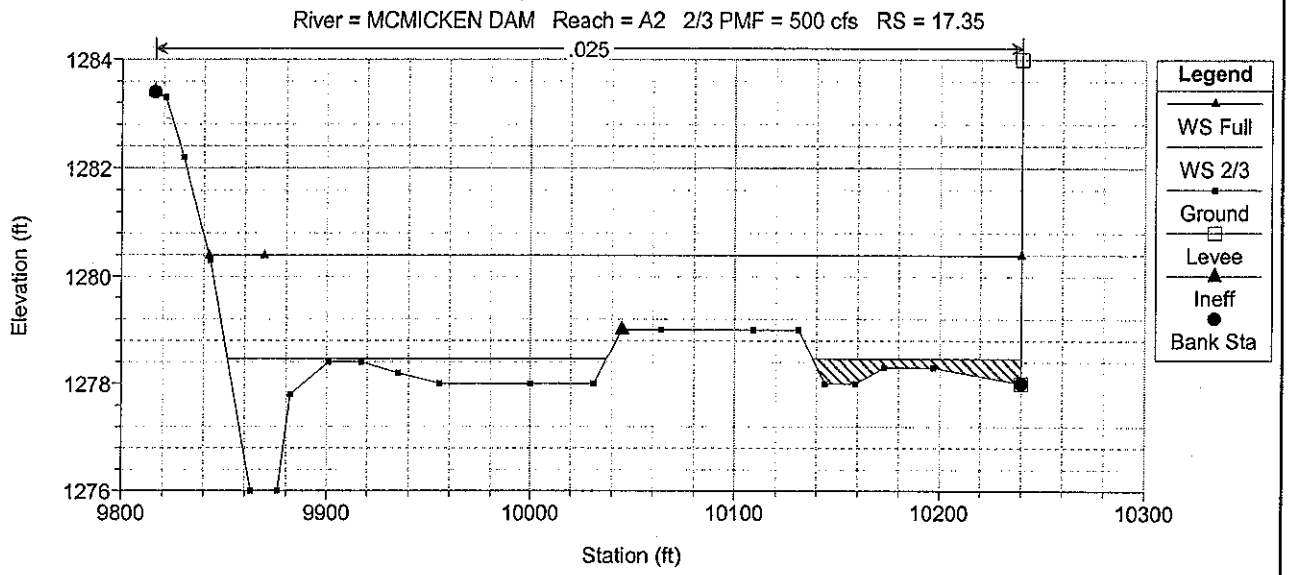

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 1,000 cfs RS = 18.28
.025
Elevation (ft)
1316
1314
1312
1310
1308
1306
1304
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta

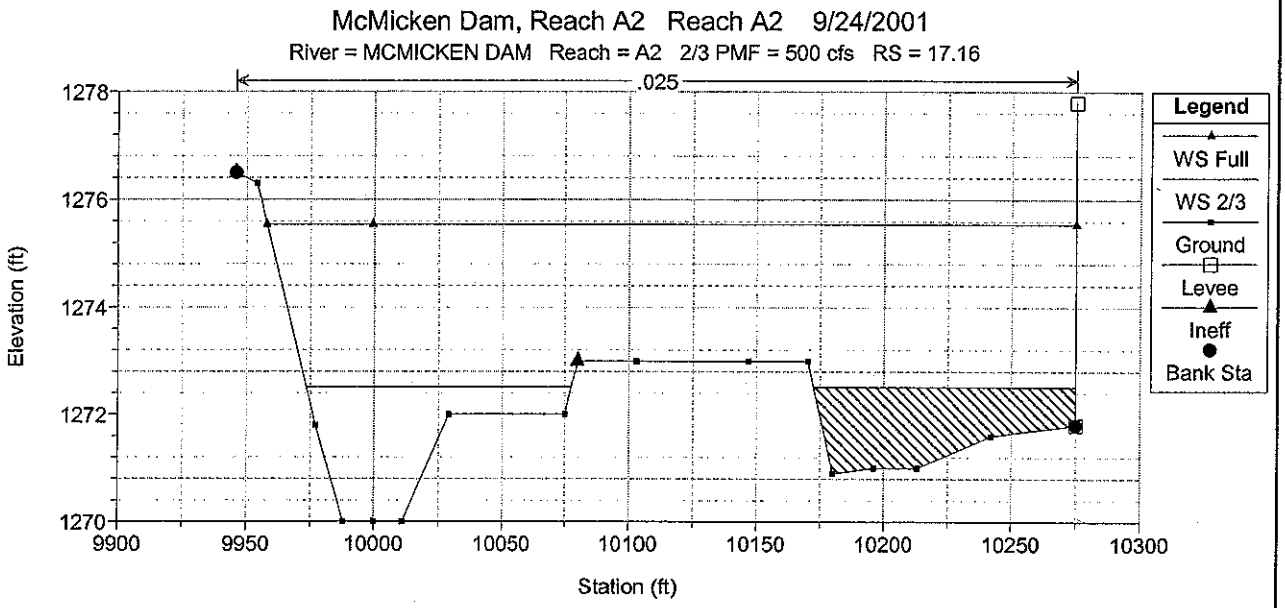

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 1,000 cfs RS = 18.05
.025
Elevation (ft)
1308
1306
1304
1302
1300
1298
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta

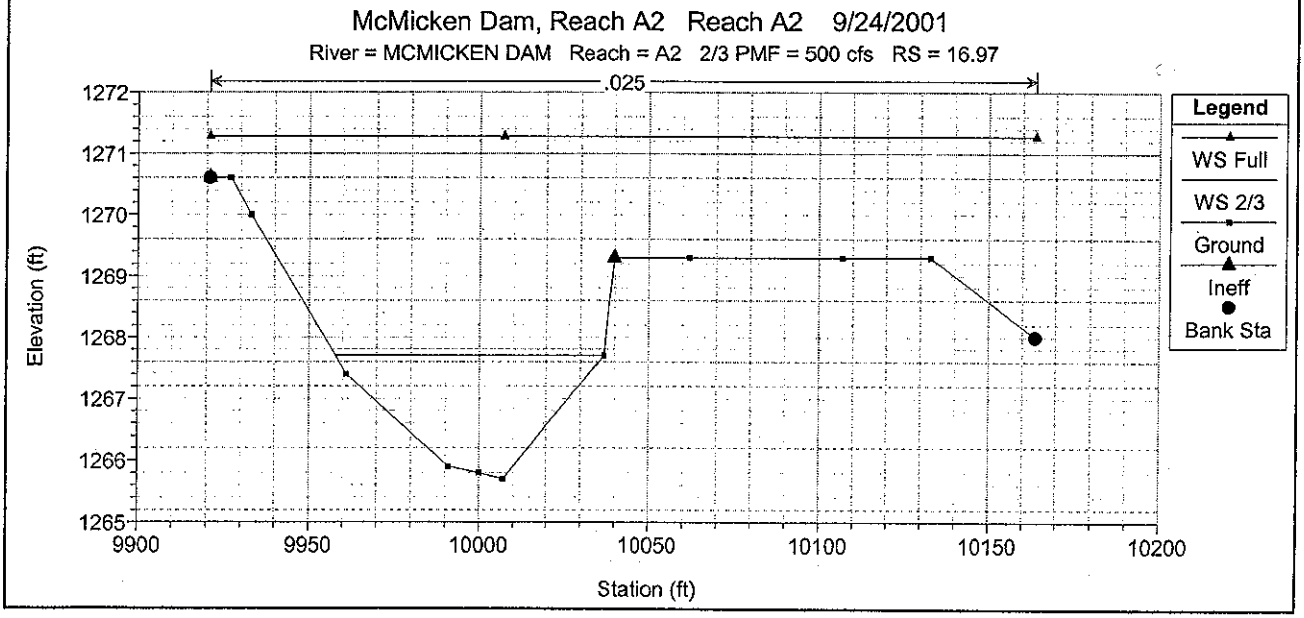

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 1,000 cfs RS = 17.83
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta

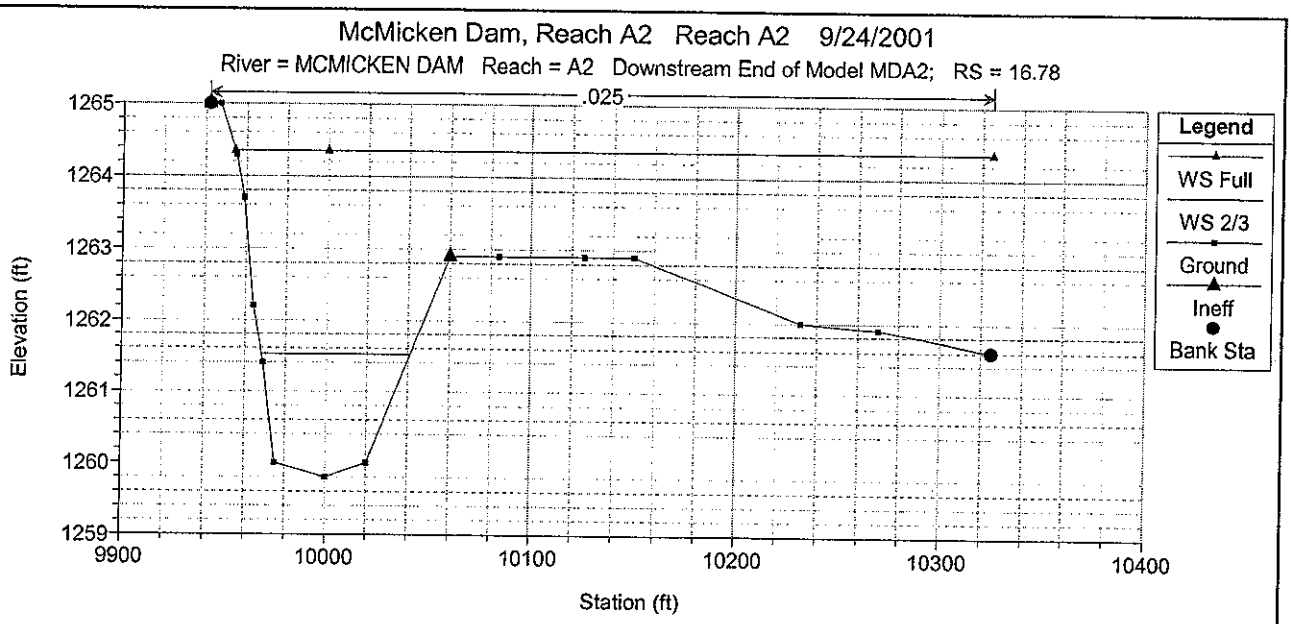

McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 500 cfs RS = 17.71
.02
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 500 cfs RS = 17.54
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta


McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 500 cfs RS = 17.35
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta


McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 500 cfs RS = 17.16
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Levee
Ineff
Bank Sta


McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 2/3 PMF = 500 cfs RS = 16.97
.025
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach A2 Reach A2 9/24/2001
River = MCMICKEN DAM Reach = A2 Downstream End of Model MDA2; RS = 16.78
.025
Elevation (ft)
1265
1264
1263
1262
1261
1260
1259
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

6 Model MDA2 Flow Splits

Summary Sheet for Model MDA2 Flow Splits

Description

HEC-RAS model MDA2 was created to model flow which heads in a southeast direction from the McMicken Dam outlet channel levee to Grand Avenue. A more detailed description of the model itself is included in Section 5 of this appendix. Flow within Model MDA2 is generally divided between a wall along the east side of Grand Avenue, the Burlington-Northern/Santa Fe Railroad, Grand Avenue, and a wall along the west side of Grand Avenue. The railroad is elevated approximately 2 to 6 feet above the surrounding grades, therefore a portion of the flow is contained east of the railroad for the length of the model. View fencing north and south of Sunrise Boulevard, along the west side of Grand Avenue, creates a sideweir for flow to enter the golf course within Sun City Grand. Further south, the wall along the west side of Grand Avenue ends, and flow not contained between the railroad and Grand Avenue can overtop Grand Avenue and continue to the southwest. Flow split diagrams follow this summary sheet.

Method of Analysis

1. The amount of flow west of the railroad was determined by running the HEC-RAS model MDA2 for a range of flows, while setting the railroad and the wall east of the railroad as the effective flow limits. The minimum amount of flow contained between the railroad and the wall at any cross-section is 1000 cfs. For the final model MDA2, the area east of the railroad was removed from the effective flow limits, and the flows were reduced by 1000 cfs at Section 18.80.

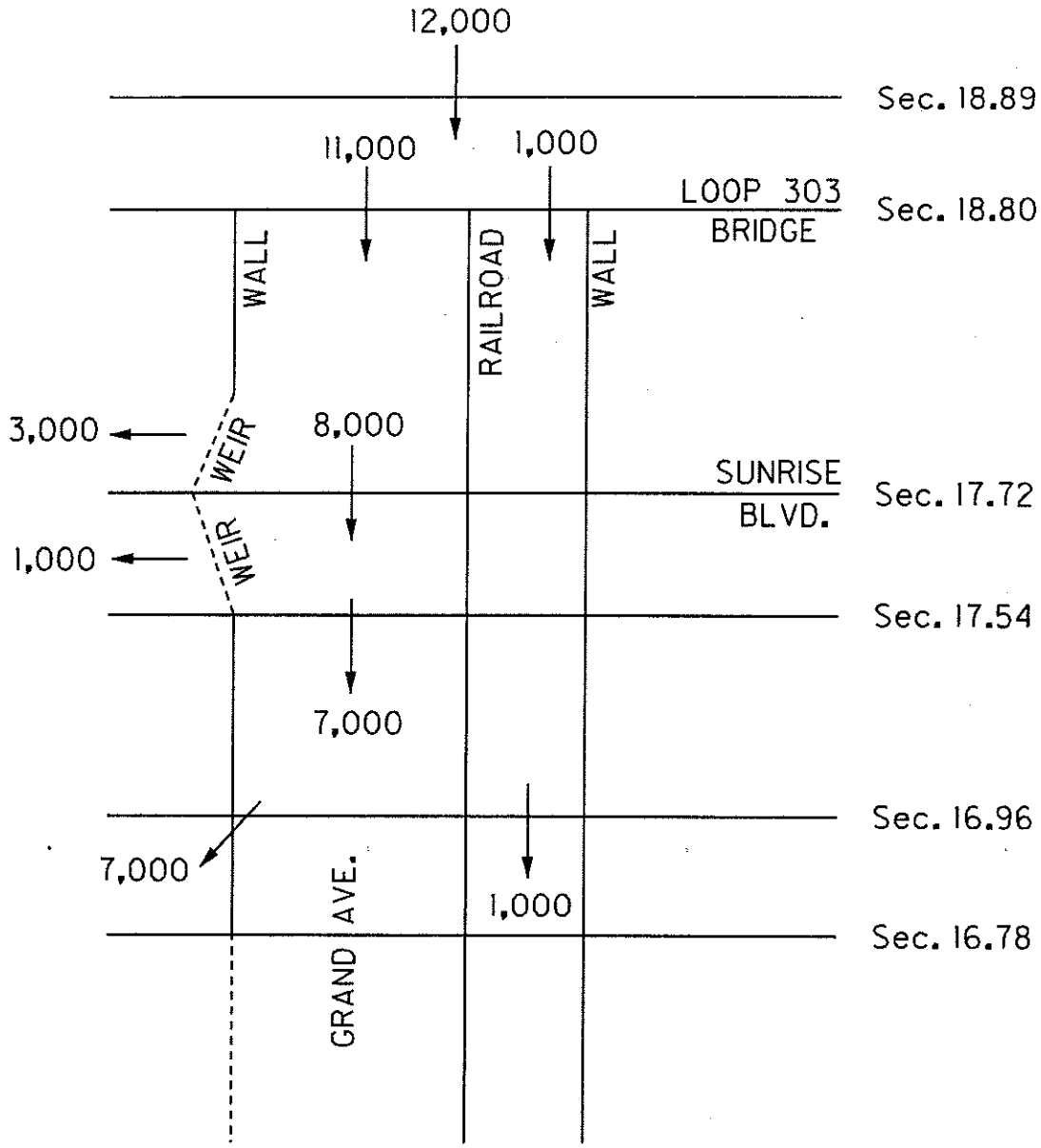
2. Flow west of the railroad continues south along Grand Avenue. The wall along the west side of Grand Avenue changes to view fencing north and south of Sunrise Boulevard, and then resumes to the south, creating two sideweir locations where flow can enter the golf course within Sun City Grand. To determine the amount of flow which weirs into the golf course, lateral weirs were added to a copy of model MDA2. The resulting split flows were then removed from Model MDA2 by decreasing the flow at Section 17.71 for the sideweir north of Sunrise Boulevard, and at Section 17.54 for the sideweir south of Sunrise Boulevard.

Results

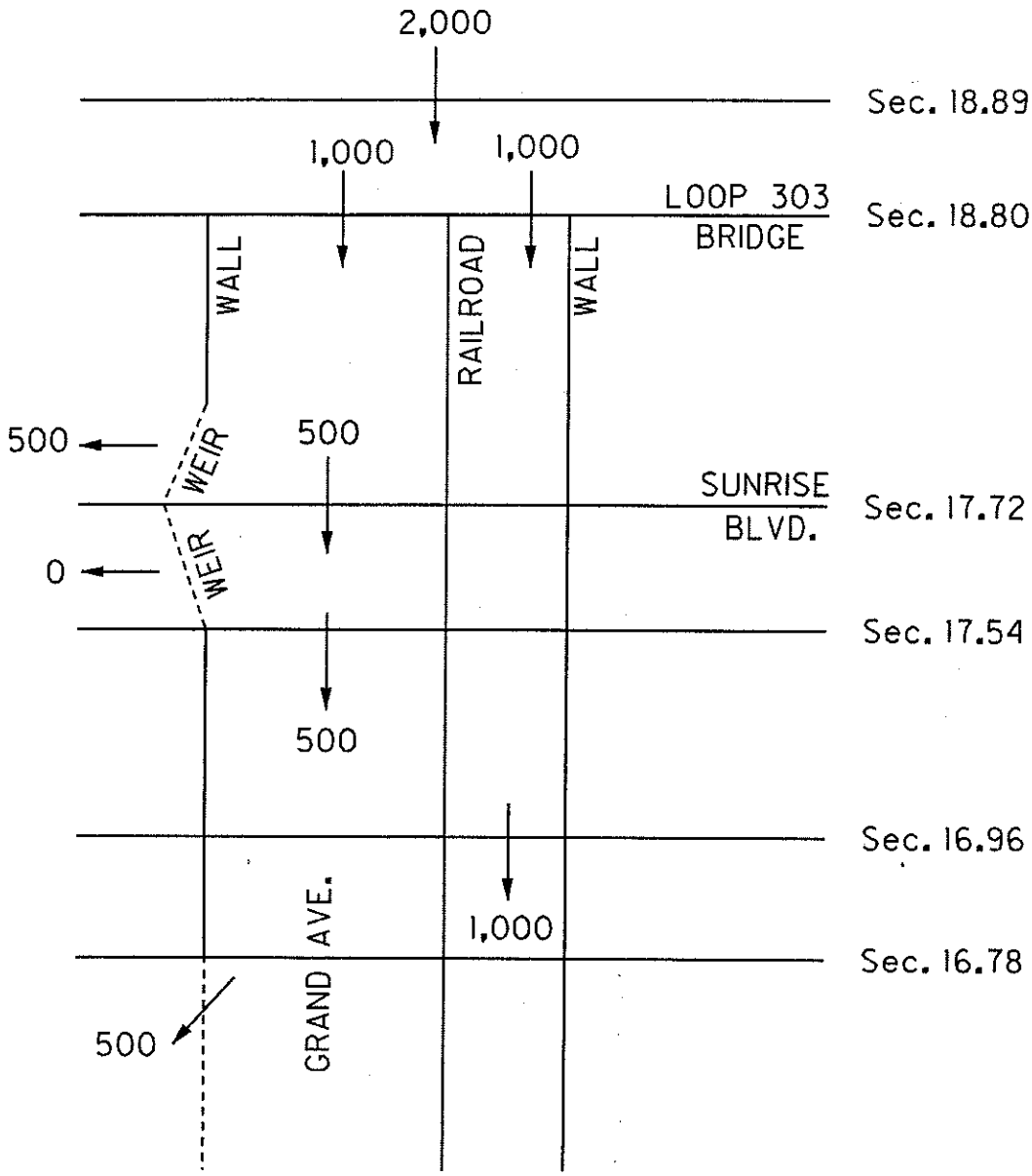
The flow contained east of the railroad and the flows weiring into the Golf Course within Sun City Grand were removed from HEC-RAS Model MDA2, and the area east of the railroad was removed from the effective flow limits. The following flow split diagrams summarize the flows removed from the model.

Model MDA2 Flow Summary

Description	Cross-Section	Full Q (cfs)	2/3 Q (cfs)	1/3 Q (cfs)
Upstream End of Model	19.55	14,500	4,000	0
Outlet Channel Levee	19.23	12,000	2,000	0
East of Railroad	18.80	11,000	1,000	0
Downstream of North Weir	17.71	8,000	500	0
Downstream of South Weir	17.54	7,000	500	0

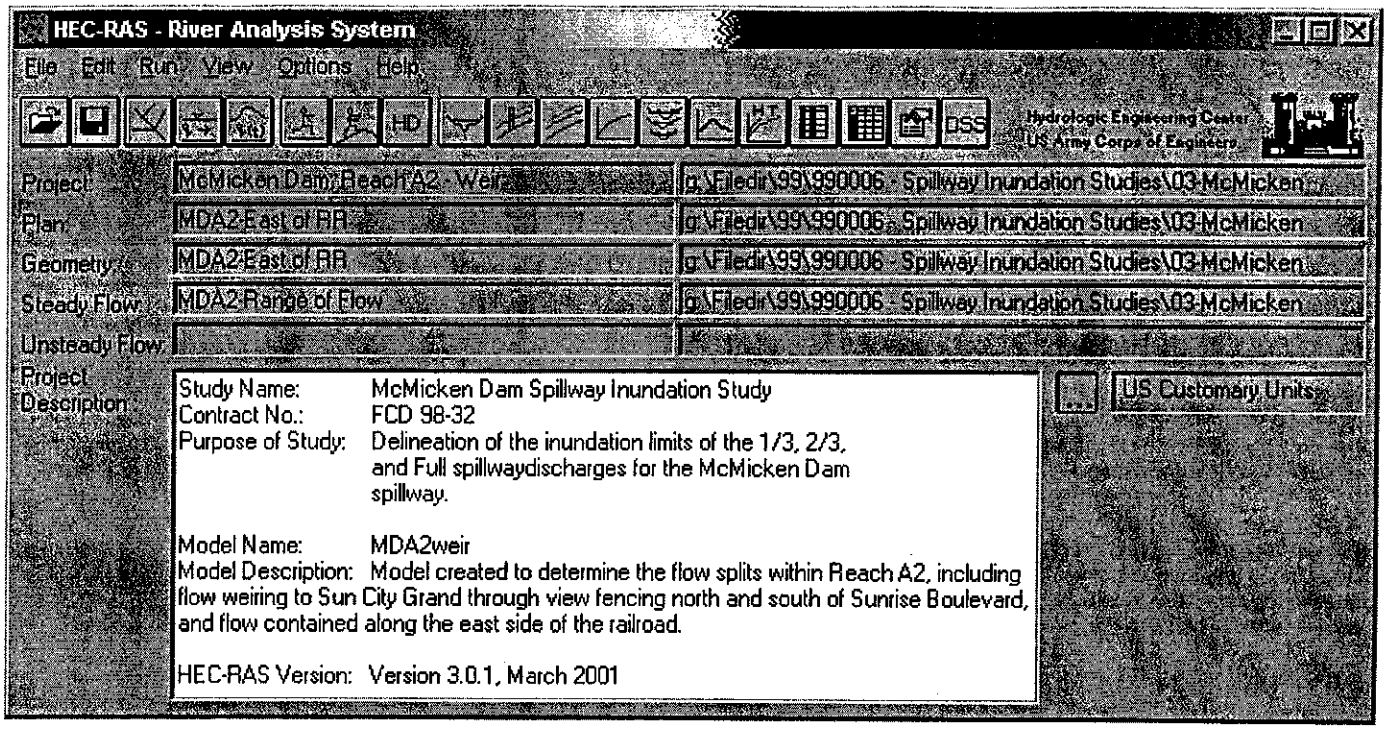


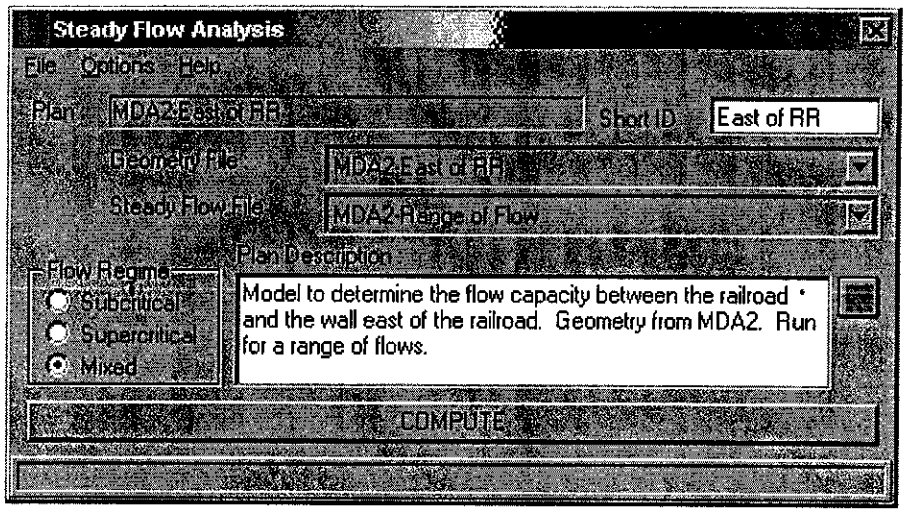
FLOW SPLIT ANALYSIS
HEC-RAS MODEL MDA2
FULL PMF



FLOW SPLIT ANALYSIS
HEC-RAS MODEL MDA2
2/3 PMF

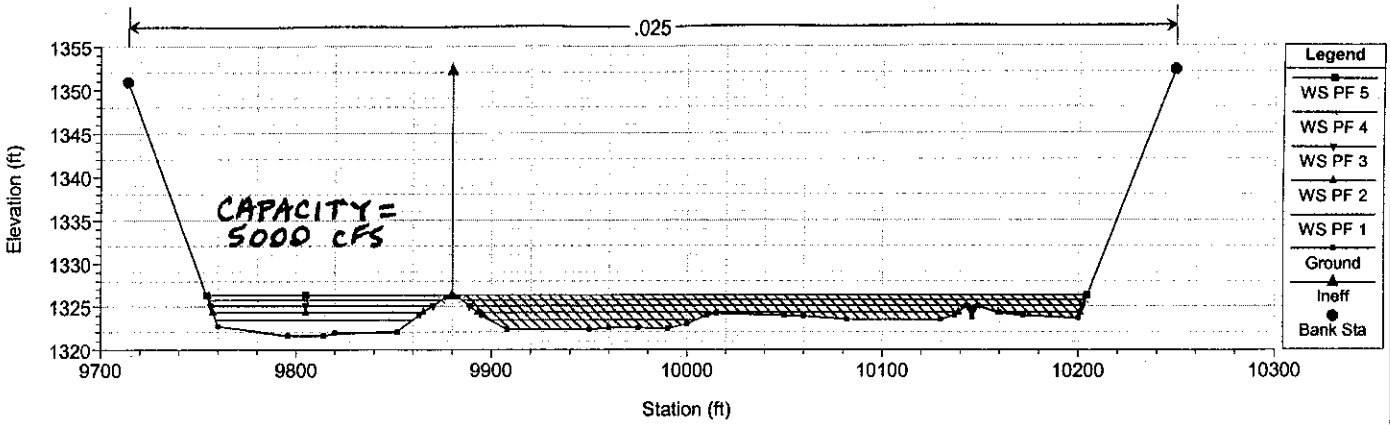
FLOW EAST OF RAILROAD:





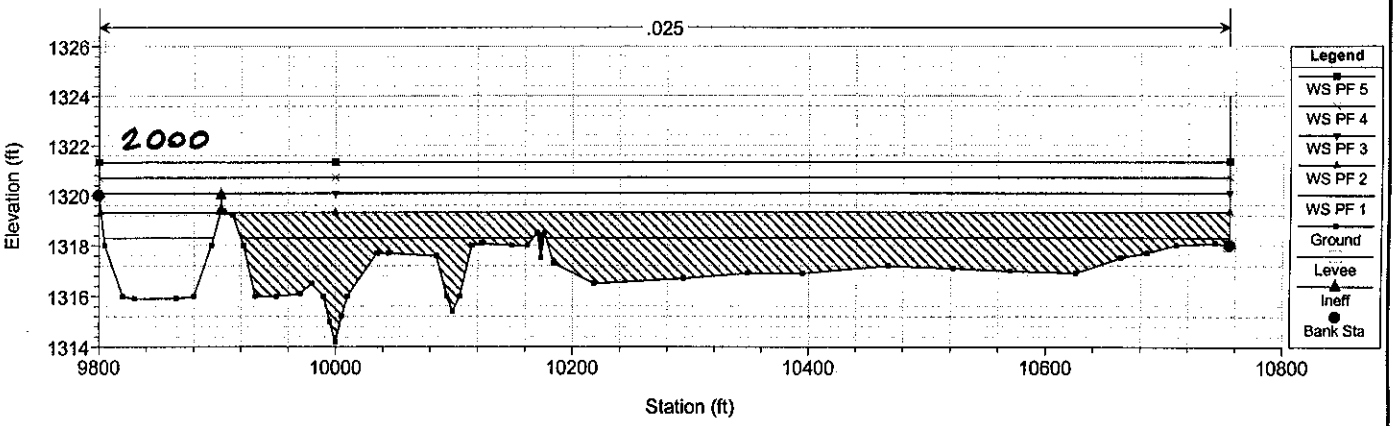
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 18.80



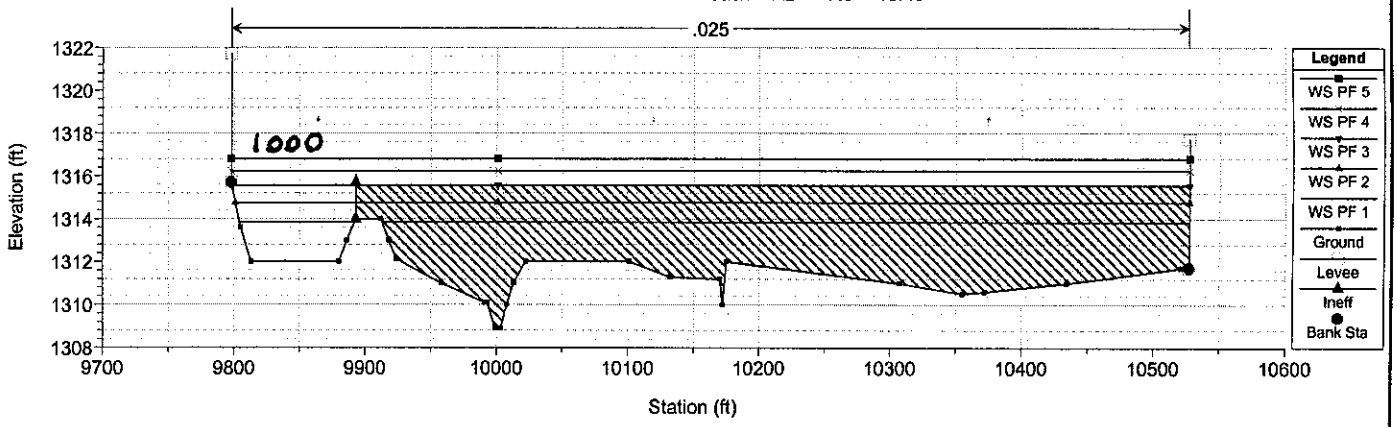
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 18.61



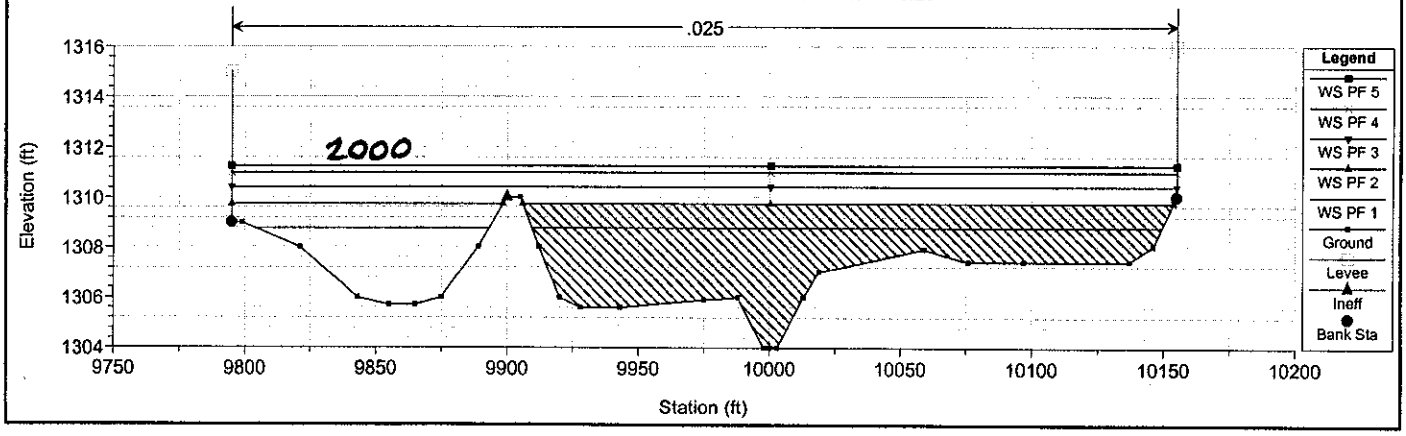
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 18.45



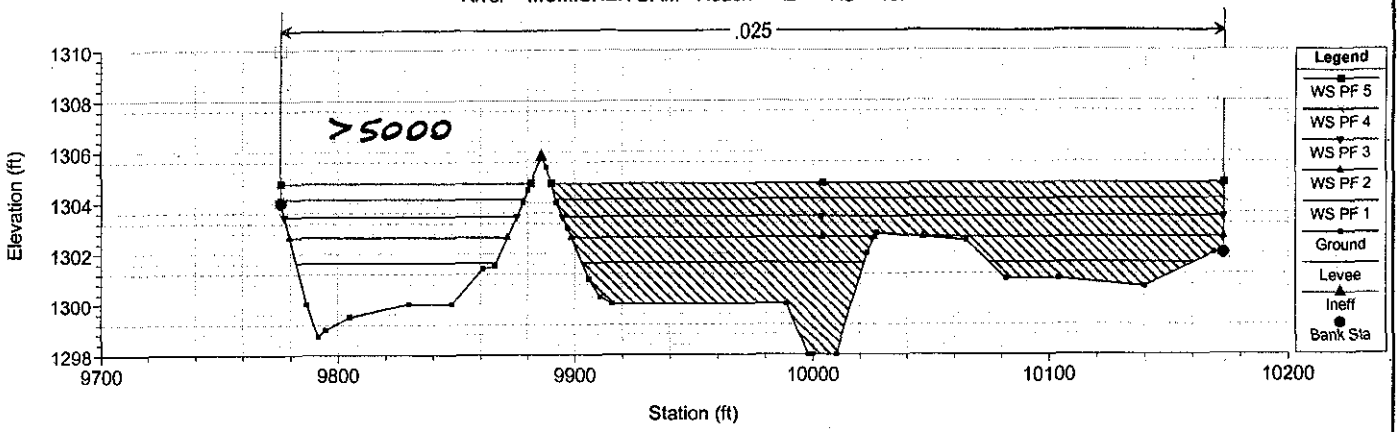
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 18.28



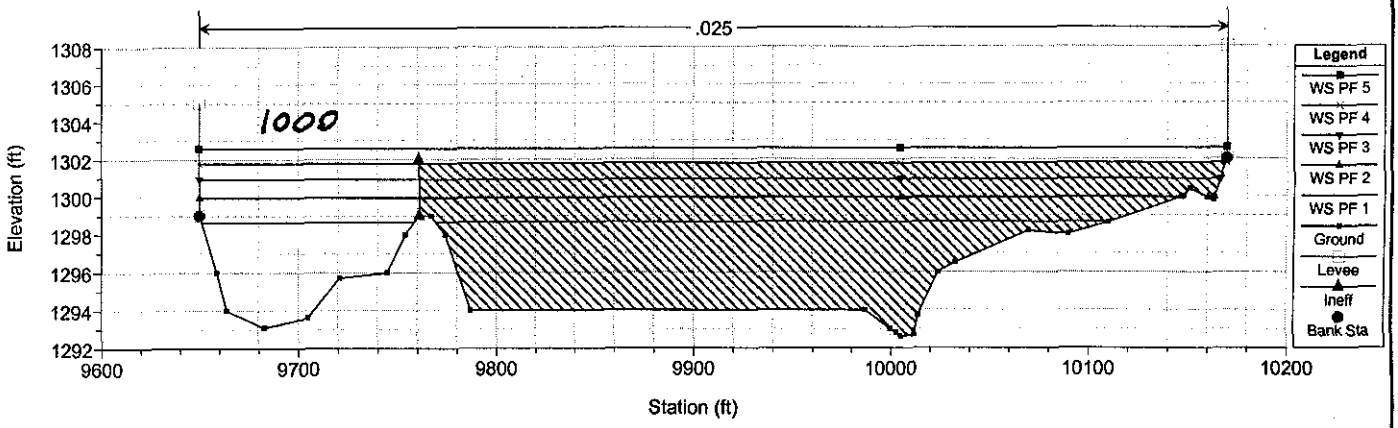
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 18.06



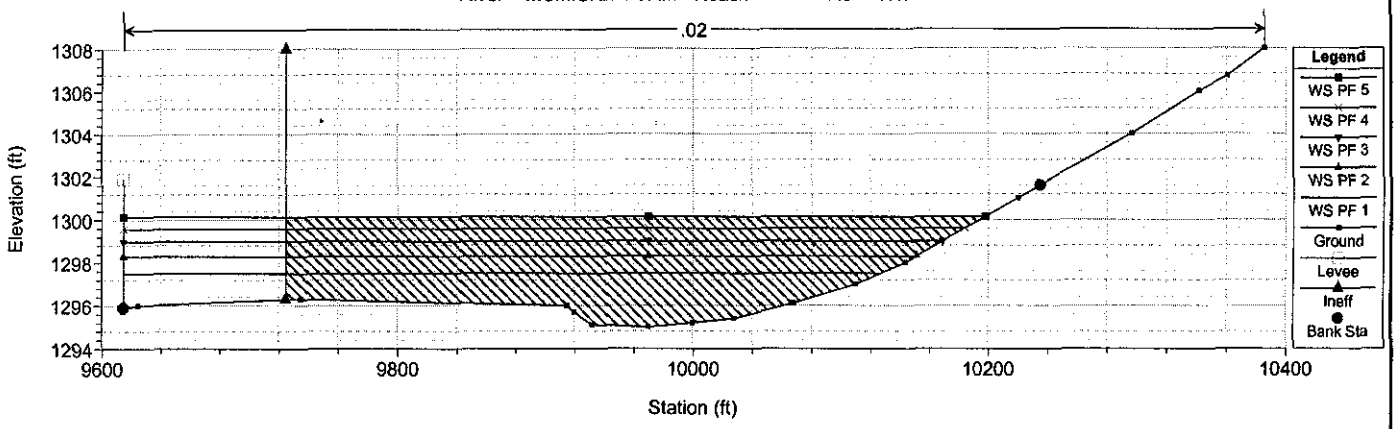
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

River = MCMICKEN DAM Reach = A2 RS = 17.83



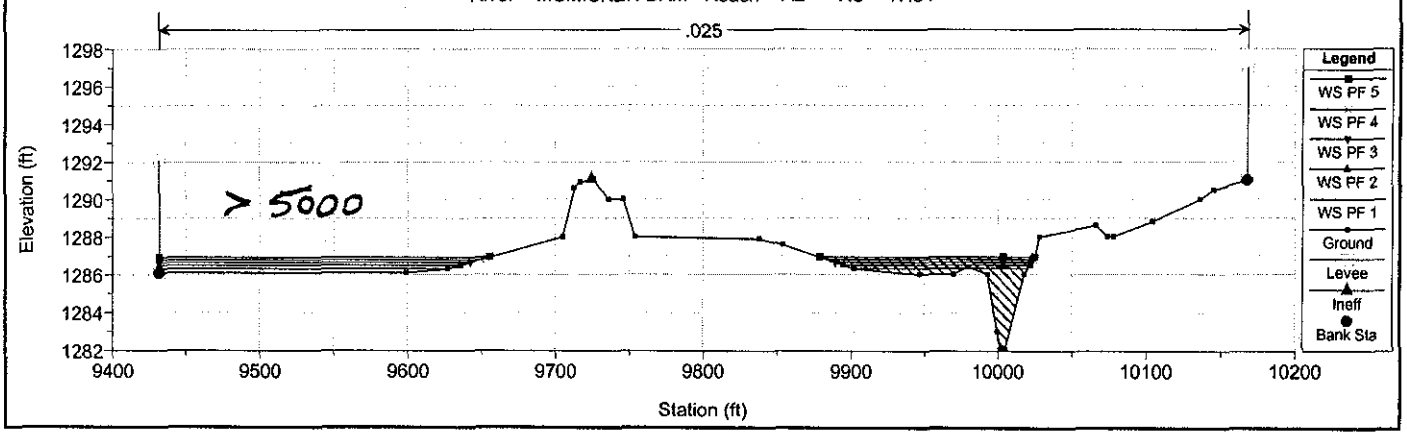
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

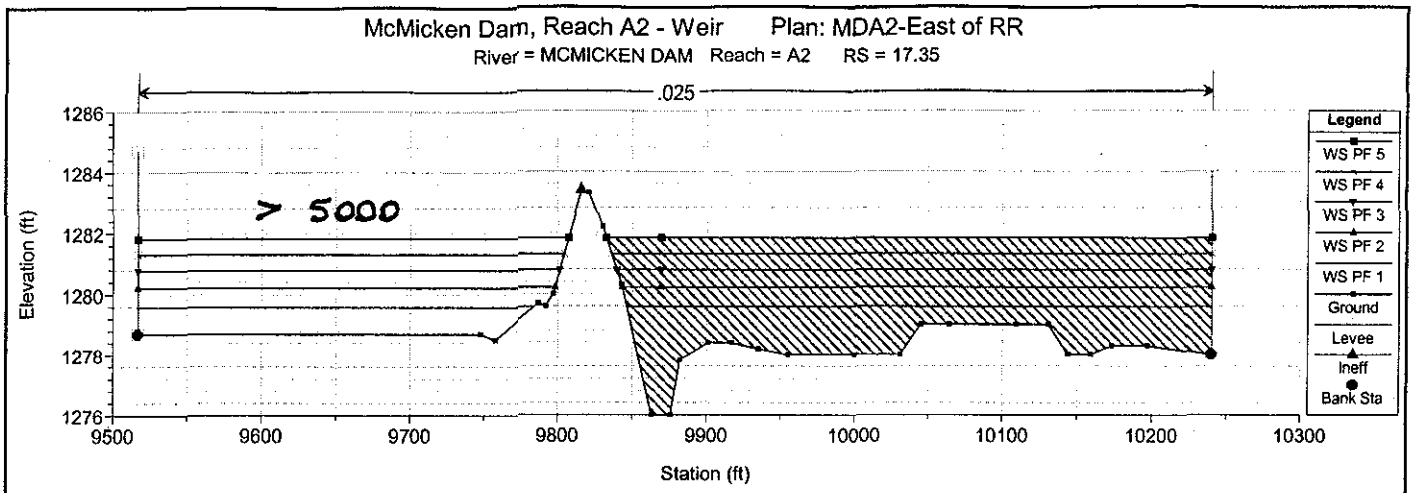
River = MCMICKEN DAM Reach = A2 RS = 17.72

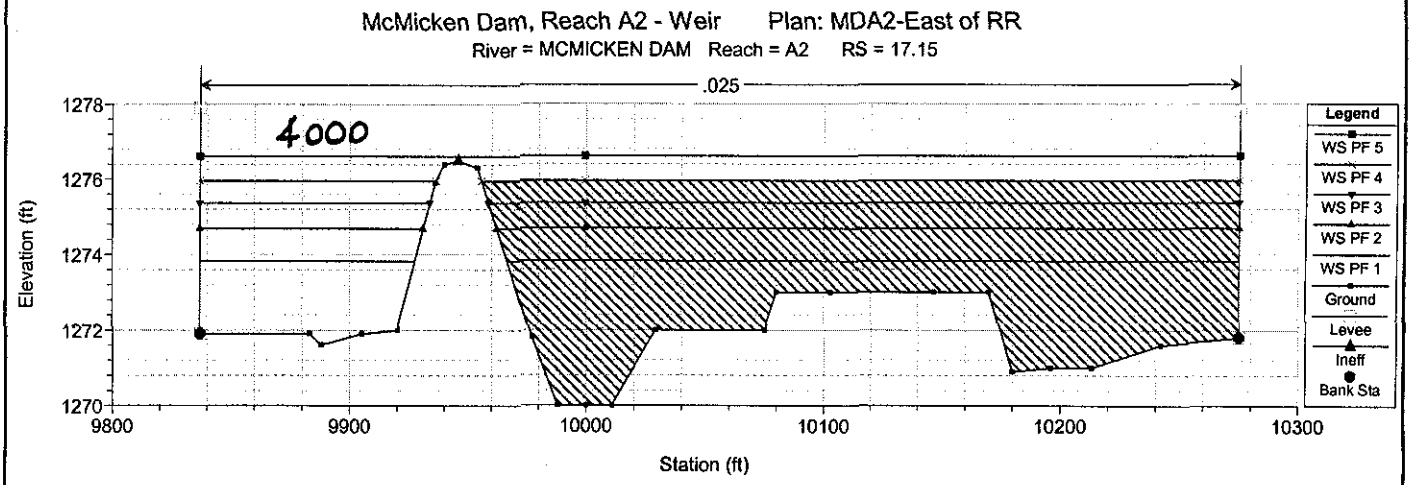


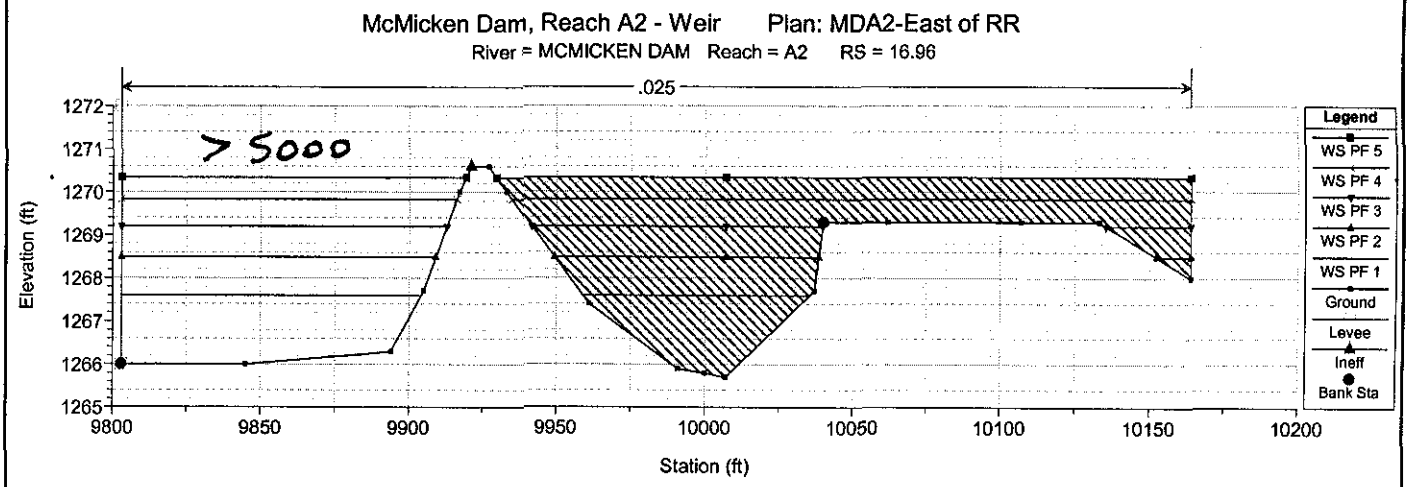
McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR

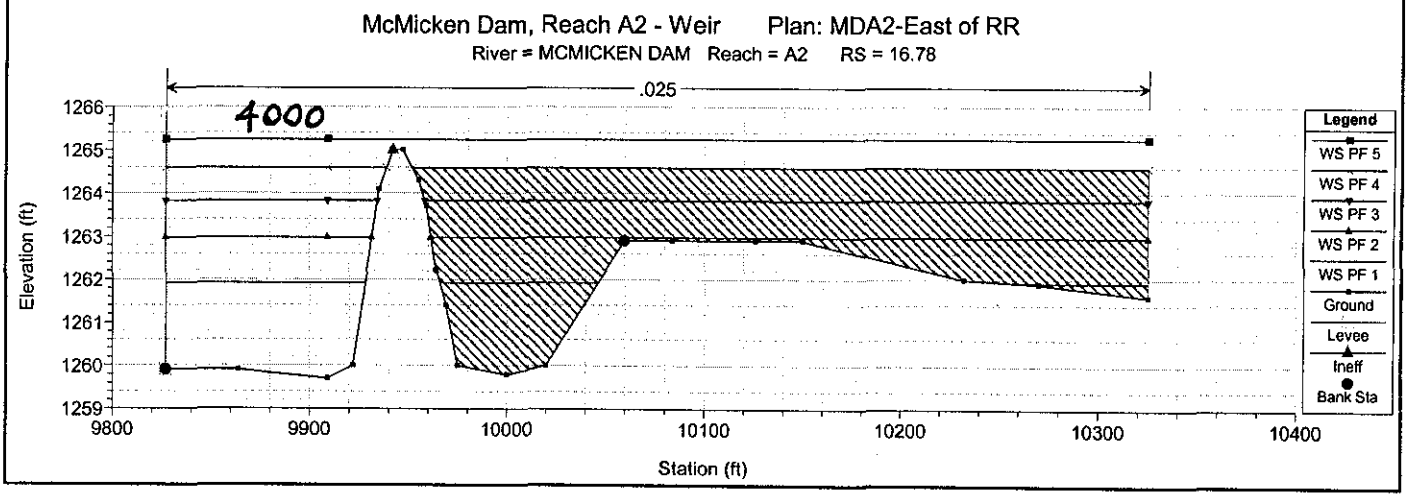
River = MCMICKEN DAM Reach = A2 RS = 17.54

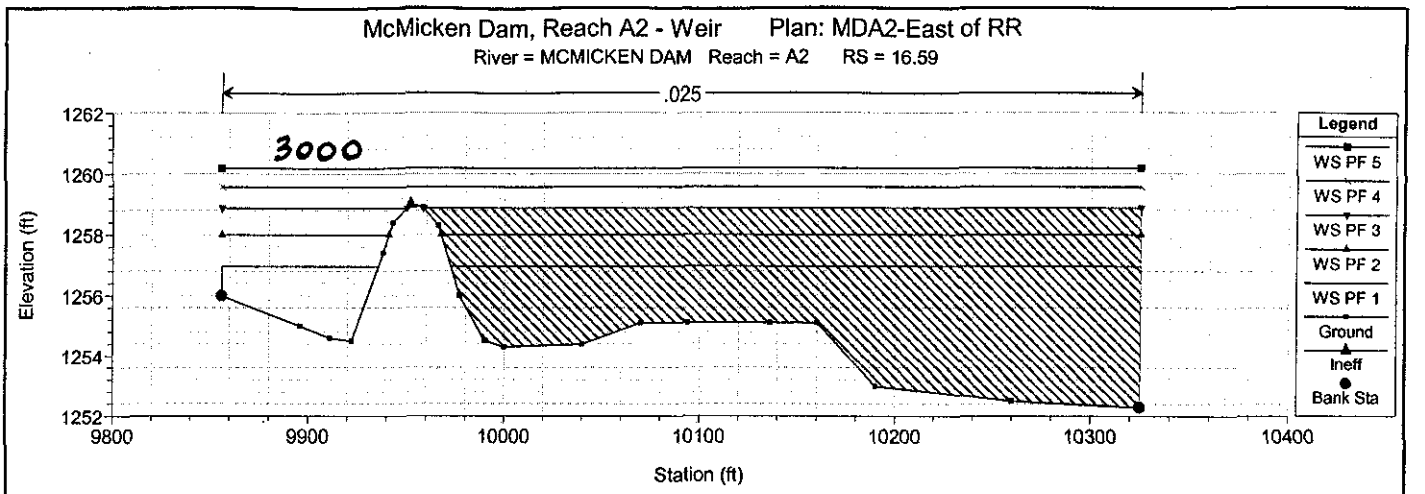


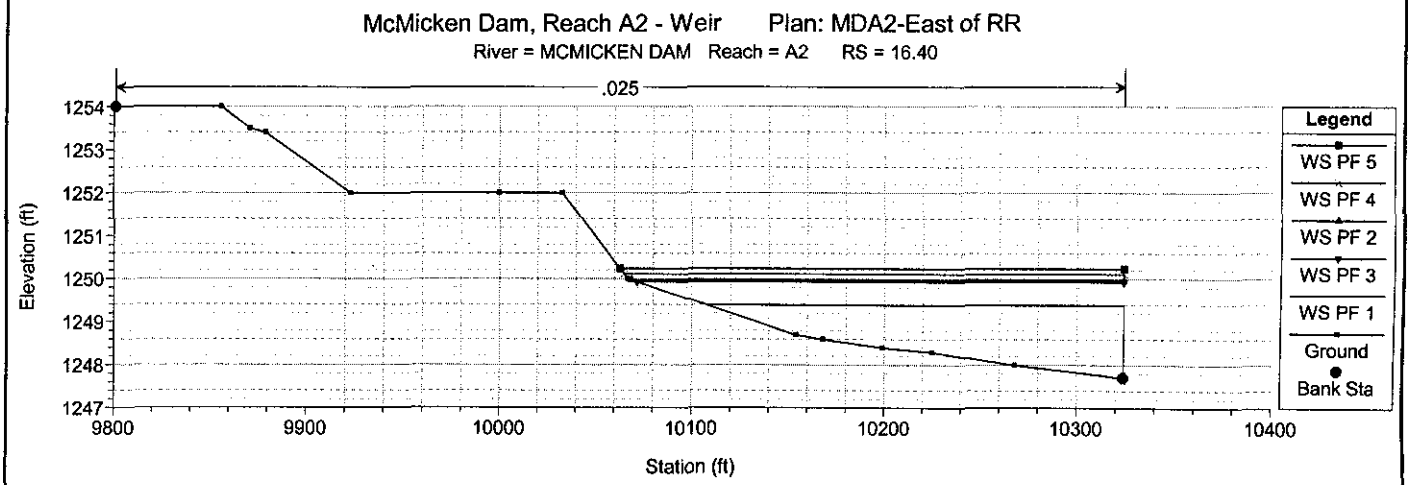

McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 17.35
.025
> 5000
Elevation (ft)
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Levee
Ineff
Bank Sta


McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 17.15
.025
4000
Elevation (ft)
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Levee
Ineff
Bank Sta

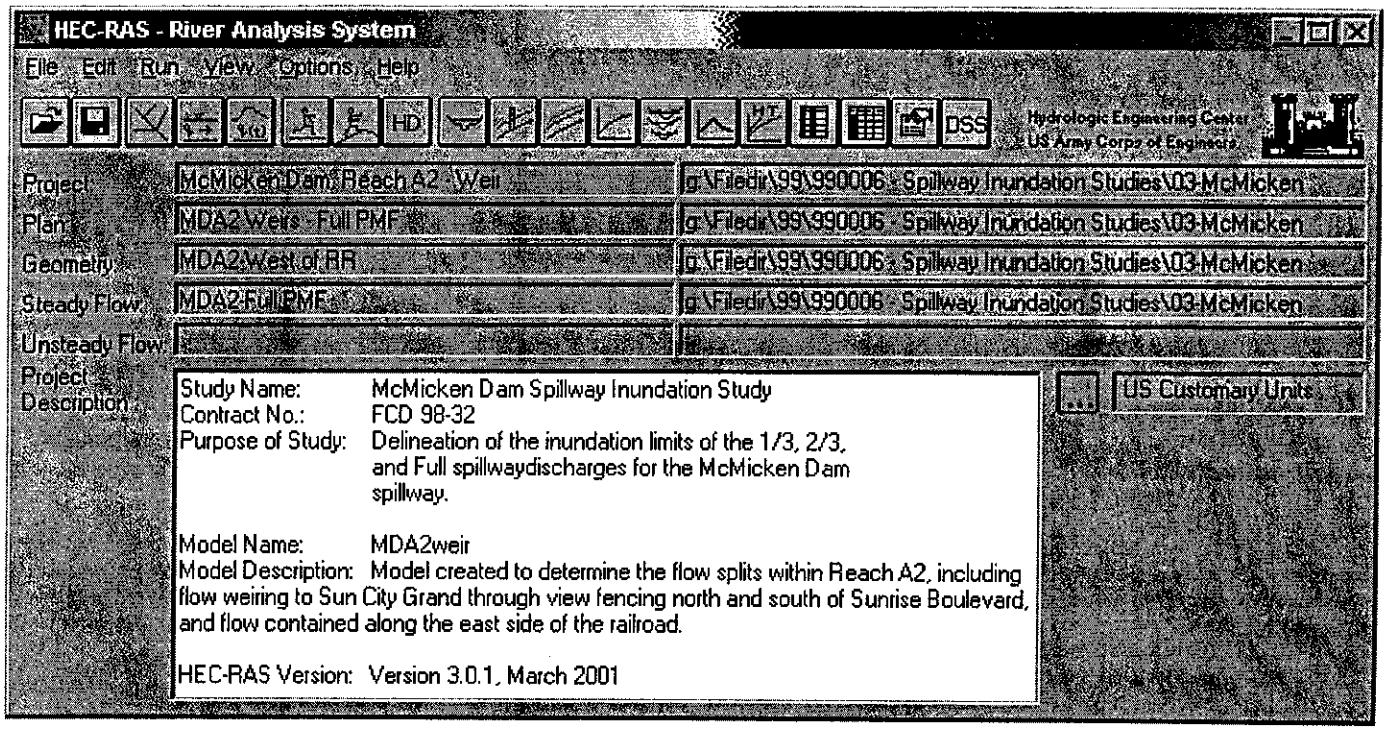

McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 16.96
.025
> 5000
Elevation (ft)
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Levee
Ineff
Bank Sta

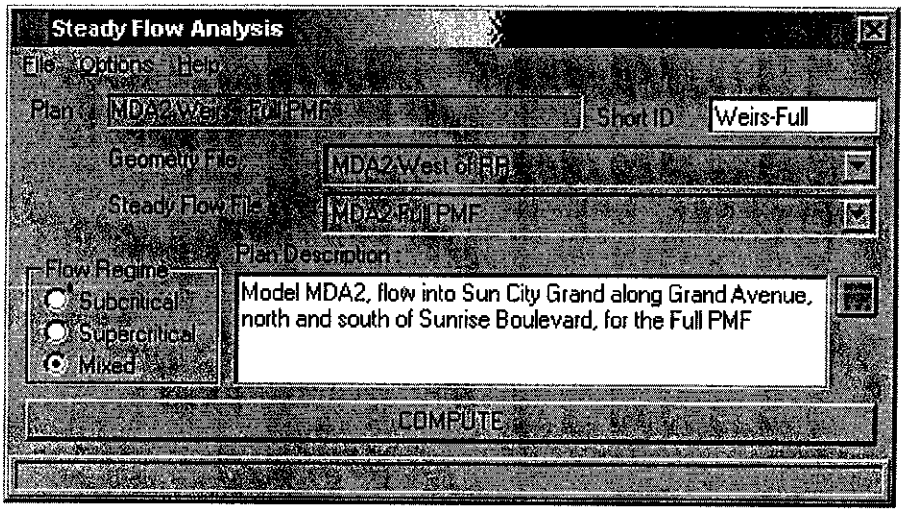

McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 16.78
.025
4000
Elevation (ft)
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Levee
Ineff
Bank Sta

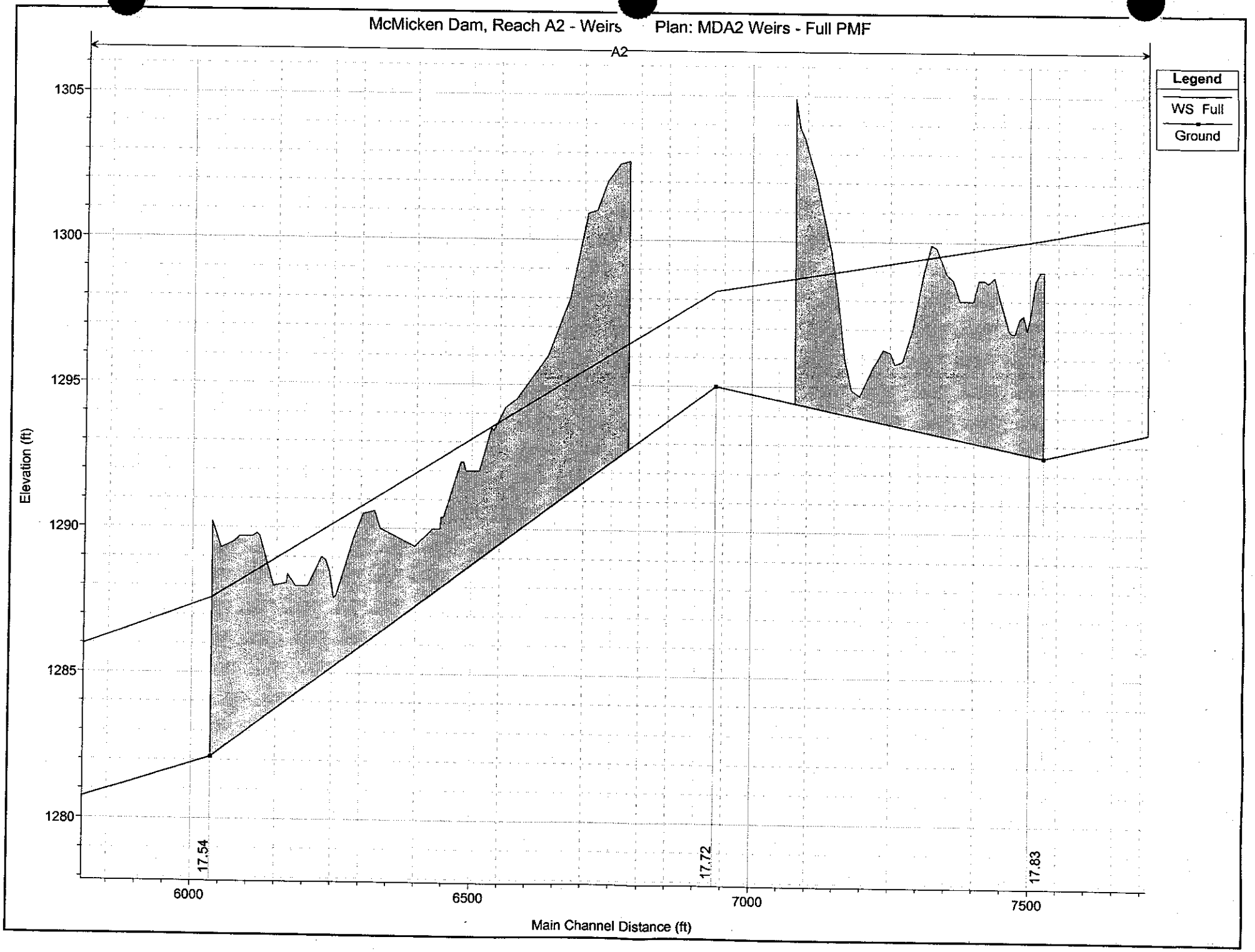

McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 16.59
.025
3000
Elevation (ft)
1262
1260
1258
1256
1254
1252
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 3
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta


McMicken Dam, Reach A2 - Weir Plan: MDA2-East of RR
River = MCMICKEN DAM Reach = A2 RS = 16.40
.025
Elevation (ft)
1254
1253
1252
1251
1250
1249
1248
1247
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 5
WS PF 4
WS PF 2
WS PF 3
WS PF 1
Ground
Bank Sta

WEIRS TO SUN CITY GRAND, FULL PMF:



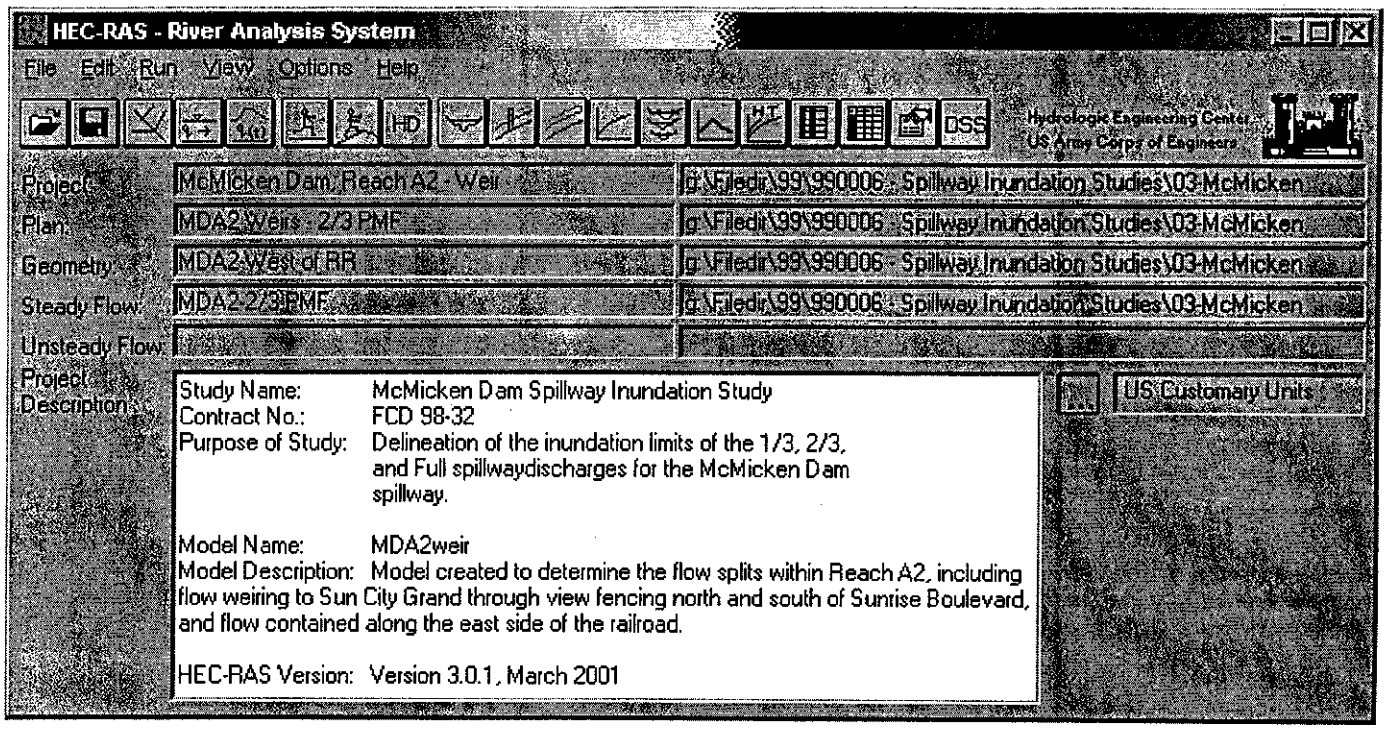


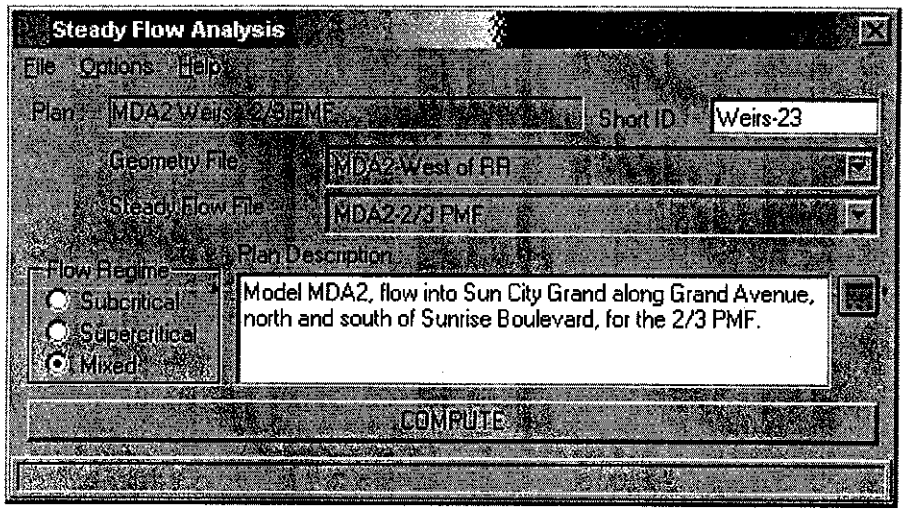

McMicken Dam, Reach A2 - Weirs
Plan: MDA2 Weirs - Full PMF
A2
Legend
WS Full
Ground
1305
1300
1295
1290
1285
1280
Elevation (ft)
17.54
17.72
17.83
6000
6500
7000
7500
Main Channel Distance (ft)

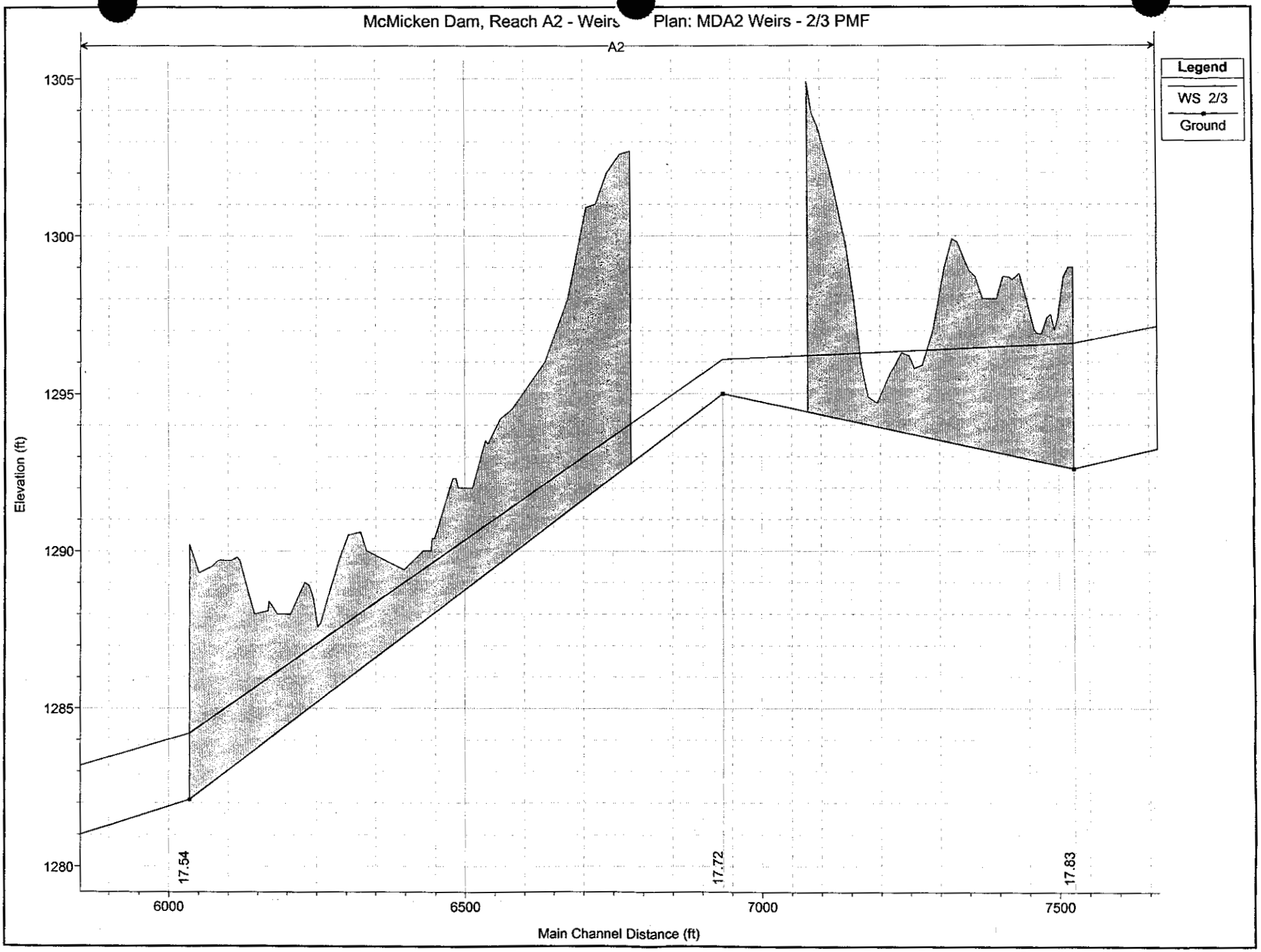
HEC-RAS Plan: Weirs-Full River: MCMICKEN DAM Reach: A2 Profile: Full

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A2	19.55	14500.00	1338.00	1346.69	1346.26	1347.35	0.009674	6.53	2218.95	2379.69	0.74
A2	19.43	14500.00	1333.17	1344.34	1342.59	1344.65	0.002436	4.43	3275.84	2421.00	0.40
	19.34	14500.00	1324.99	1343.46	1341.08	1343.67	0.001505	3.71	3904.11	3335.90	0.32
A2	19.23	12000.00	1337.00	1341.08	1341.08	1341.79	0.015959	6.73	1784.16	5115.00	1.00
A2	19.20	12000.00	1324.00	1336.18	1336.57	1337.53	0.057573	9.31	1288.32	5194.90	1.59
A2	19.02	12000.00	1327.90	1331.07	1330.36	1331.30	0.002744	3.88	3096.50	1695.61	0.51
A2	18.89	12000.00	1324.50	1329.51		1329.86	0.001610	4.75	2526.56	682.50	0.44
A2	18.80	11000.00	1321.60	1326.80	1326.80	1328.46	0.006295	10.35	1062.52	452.01	1.01
A2	18.61	11000.00	1314.20	1318.58	1318.82	1319.75	0.012323	8.68	1266.81	932.10	1.24
A2	18.45	11000.00	1308.90	1314.71	1313.44	1315.13	0.001547	5.20	2116.48	725.71	0.50
A2	18.28	11000.00	1304.00	1310.97	1310.73	1312.68	0.004816	10.51	1046.47	360.00	0.91
A2	18.06	11000.00	1298.00	1304.51	1304.51	1306.31	0.006020	10.77	1021.73	386.51	1.00
A2	17.83	11000.00	1292.60	1300.11	1298.03	1300.70	0.001461	6.18	1779.38	506.00	0.51
A2	17.77	Lat. Weir									
A2	17.72	8000.00	1295.00	1298.27	1298.27	1299.37	0.004420	8.43	949.23	535.88	0.99
A2	17.63	Lat. Weir									
A2	17.54	7000.00	1282.10	1287.58	1289.42	1298.40	0.112269	26.40	265.14	425.83	3.75
A2	17.35	7000.00	1276.00	1280.40	1280.40	1281.45	0.007043	8.23	850.18	679.88	0.99
A2	17.15	7000.00	1270.00	1275.48	1274.40	1276.09	0.002096	6.25	1119.55	414.08	0.59
A2	16.96	7000.00	1265.70	1271.41	1271.41	1272.88	0.005091	10.56	752.48	361.00	0.94
A2	16.78	7000.00	1259.70	1263.85	1264.38	1265.70	0.010710	12.79	696.00	474.22	1.30
A2	16.59	7000.00	1252.30	1256.68	1256.23	1257.49	0.003891	7.23	968.57	429.30	0.77
A2	16.40	7000.00	1247.70	1251.59	1251.44	1252.79	0.005701	8.82	793.49	283.94	0.93

WEIRS TO SUN CITY GRAND, 2/3 PMF:






McMicken Dam, Reach A2 - Weirs Plan: MDA2 Weirs - 2/3 PMF
A2
Legend
WS 2/3
Ground
Elevation (ft)
1305
1300
1295
1290
1285
1280
17.54
17.72
17.83
6000
6500
7000
7500
Main Channel Distance (ft)

HEC-RAS Plan: Weirs-23 River: MCMICKEN DAM Reach: A2 Profile: 2/3

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A2	19.55	4000.00	1338.00	1345.36	1345.09	1345.61	0.010210	4.02	996.22	2327.29	0.67
A2	19.43	4000.00	1333.17	1342.10	1341.30	1342.24	0.003477	2.97	1344.95	2377.65	0.42
[illegible]	19.34	4000.00	1324.99	1341.30	1338.64	1341.38	0.000992	2.24	1785.87	3167.25	0.24
A2	19.23	2000.00	1337.00	1340.10	1340.10	1340.31	0.023022	3.68	543.17	5101.51	0.99
A2	19.20	2000.00	1324.00	1335.34	1335.11	1335.55	0.010571	3.67	545.30	4568.38	0.67
A2	19.02	2000.00	1327.90	1329.58	1329.17	1329.67	0.003957	2.44	820.35	1184.93	0.52
A2	18.89	2000.00	1324.50	1326.54	1326.21	1326.72	0.004590	3.41	585.98	570.86	0.59
A2	18.80	1000.00	1321.60	1324.16	1323.96	1324.43	0.005825	4.17	239.66	377.82	0.78
A2	18.61	1000.00	1314.20	1317.23	1317.16	1317.42	0.008520	3.44	290.85	663.90	0.86
A2	18.45	1000.00	1308.90	1311.70	1311.53	1311.87	0.005324	3.30	303.37	456.57	0.71
A2	18.28	1000.00	1304.00	1307.73	1307.03	1307.97	0.003475	3.91	255.51	278.87	0.63
A2	18.06	1000.00	1298.00	1301.14	1301.14	1301.62	0.009182	5.58	179.29	258.92	1.00
A2	17.83	1000.00	1292.60	1296.59	1294.74	1296.63	0.000202	1.56	642.82	346.80	0.17
A2	17.77	Lat. Weir									
A2	17.72	500.00	1295.00	1296.08	1296.08	1296.37	0.007152	4.32	115.62	240.46	1.01
A2	17.63	Lat. Weir									
A2	17.54	500.00	1282.10	1284.21	1286.48	1295.29	0.158354	26.72	18.71	14.83	4.19
A2	17.35	500.00	1276.00	1278.51	1278.48	1278.78	0.009232	4.21	118.69	289.98	0.93
A2	17.15	500.00	1270.00	1272.42	1272.17	1272.70	0.004170	4.21	118.89	290.27	0.69
A2	16.96	500.00	1265.70	1267.84	1267.59	1268.20	0.004793	4.84	103.39	183.71	0.75
A2	16.78	500.00	1259.70	1261.35	1261.35	1261.93	0.008494	6.10	81.92	168.75	0.99
A2	16.59	500.00	1252.30	1255.11	1255.11	1255.13	0.000299	1.18	423.08	373.91	0.19
A2	16.40	500.00	1247.70	1248.25	1248.83	1253.47	0.487707	18.33	27.28	92.46	5.94

McMICKEN DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX E: REACH B HYDRAULICS
LOOP 303 FREEWAY TO AGUA FRIA RIVER

McMicken Dam
Spillway Delineation Study

Appendix E: Reach B Hydraulics
Loop 303 Freeway to Agua Fria River

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1 HEC-RAS Model MDB1

Summary Sheet for Model MDB1

Description

Model MDB1 begins in the interior of Sun City Grand at cross-section 16.60. The flow consists of the weir overflow from the second and third wall failures described in Model MDA1 (Appendix D). The flow travels through Sun City Grand in a southeasterly direction. Cross-sections 16.60 and 16.20 model the flow traveling through this subdivision. The flow which continues south along the wall within the Loop 303 freeway in Model MDA1 will re-combine with the flow in Model MDB1 at cross-section 16.20. The flow within Sun City Grand is likely to cause the Sun City Grand south boundary wall along Bell Road to fail. Flow will then continue to the southeast.

Flow from Model MDB2 weirs into Model MDB1 between cross-sections 14.07 and 10.61 for the Full Flow and between cross-sections 13.47 and 12.83 for the 2/3 Flow. This interchange of flow is described in Section 5 of this appendix. The model continues south to the Dysart Drain. At the Dysart Drain, a portion of the flow travels east, exiting the model either by conveyance within the drain, or by overtopping of El Mirage Road. Any flow that does not travel east will overtop the drain and continue in a southeasterly direction. A portion of the flow exits the model after cross-section 7.31, located along Glendale Avenue, for the 1/3, 2/3 and Full Flows and again after cross-section 7.11 for the Full Flow. The flow that exits the model travels east towards the Agua Fria River after it overtops the ridge east of El Mirage Road. The model ends at cross-section 6.80, just north of the Agua Fria floodplain.

Assumptions

- Models MDB1 and MDB2 will exchange flow if the difference in model water surface elevations is greater than one (1) foot.
- The flow located on the left overbank of cross-sections 7.48 to 6.90 exits the model and travels east towards the Agua Fria River.

Method of Analysis

A HEC-RAS analysis was used to determine the flow paths for the 1/3, 2/3 and Full Flow.

Results

Flow travels through Sun City Grand beginning at the second and third weir sections in Model MDA1. The flow was found to cause the southern Sun City Grand wall to fail, which allows the flow to exit the community and travel south towards the Dysart Drain. The flow traveling south along the Loop 303 freeway in Model MDA1 combines with the flow in Model MDB1 at cross-section 16.20. Due to a difference in model water surface elevations, Model MDB1 accepts flow from Model MDB2 between cross-sections 14.07 and 10.61. The flow at cross-section 10.61 for the 1/3, 2/3 and Full Flows are 23,000 cfs, 29,000 cfs, and 60,000 cfs, respectively. These flows travel south towards the Dysart Drain. A portion of the flow will travel east to the Agua Fria River, either

in the Dysart Drain or by overtopping a ridge along El Mirage Road. The remainder of the flow will travel across the Dysart Drain and continue southeast, with portions of the flow exiting the model to the east. The model ends at cross-section 6.80, just north of the Agua Fria River floodplain.

PPM
9/21/94

DYSART DRAIN IMPROVEMENT PROJECT

90% PLANS SUBMITTAL
DESIGN REPORT

FLOOD CONTROL DISTRICT
RECEIVED
SEP 21

	CHENG		P & PM
	DEP		HYDRO
	ADMIN		LMGT
	FINANCE		FILE
	C & O		
	ENGR		

REMARKS

NBS LOWRY

ENGINEERS & PLANNERS

A470.608

Summary of Design (100-Year) Peak Flows (cfs) at Various Concentration Points

Dysart Drain Improvement Project

	Det. Vol. Needed	Basin Highwater Elev.	Basin Outflow	11193	CP194	CP195	D195	CP196	D196	CP202	CP204	CP205	CP206
Model dated December 8, 1993, by WLB with designed 160-acre basin in place	407.9 ac. ft.	1099.9	446	596	448	1772	1772	2300	2300	2287	3984	3979	3978

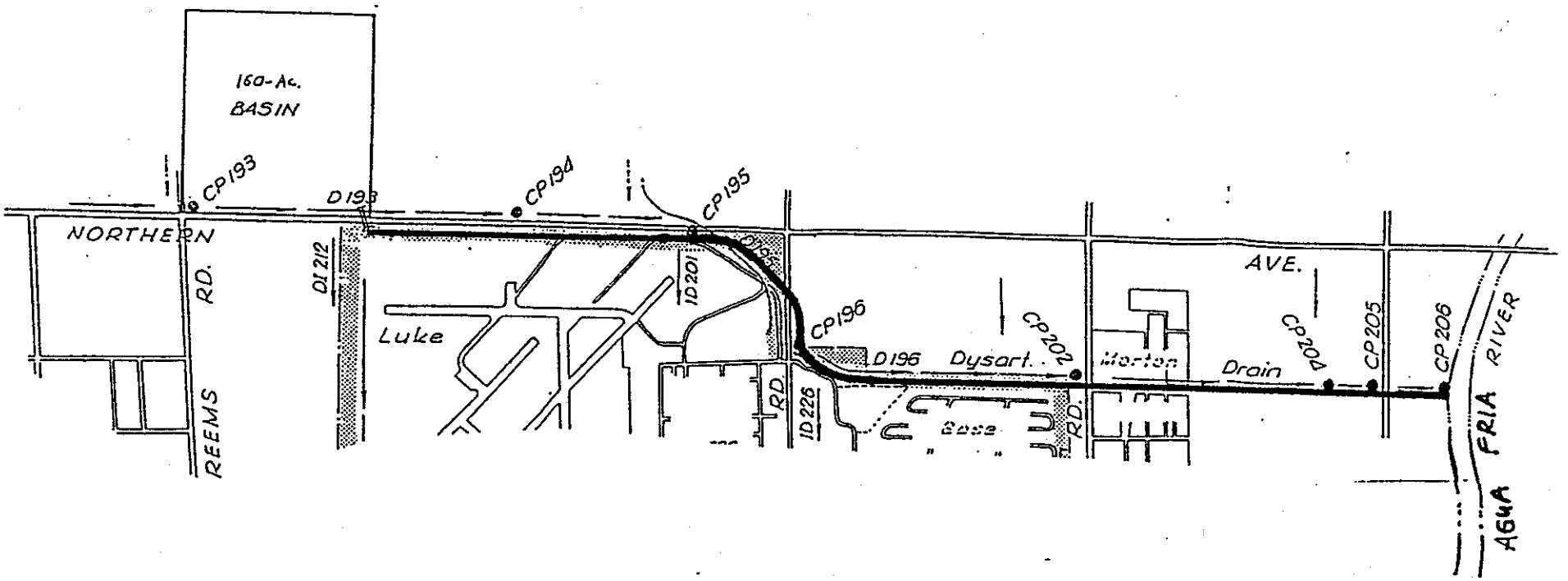

FIGURE 3

6.0 CHANNEL DESIGN

6.1 Design Criteria

Channel design is performed in accordance with the Drainage Design Manual for Maricopa County, Volume II, Hydraulics. The Dysart Drain Improvements are designed for the as constructed condition and analyzed for the future subsided condition to ensure performance during a 100 year storm event. The channel design criteria used for the Dysart Drain are summarized as follows:

Flow Conditions

Froude numbers for subcritical channel flow are to be less than or equal to 0.86. Froude numbers for supercritical flow are to be greater than or equal to 1.13 but less than 2.0. A minimum channel velocity of 2.0 feet per second is required to prevent deposition of fine sediments.

Channel Curvature

Changes in horizontal channel alignment are made with curves having a minimum radius of 3.0 times the water surface topwidth.

Freeboard

According to the Hydraulics Manual a minimum freeboard of 0.25 times the sum of the flow depth and velocity head is required, or a minimum of 1 foot for subcritical flow and 2 feet for supercritical flow, whichever is greater. In addition to the freeboard requirement from the Hydraulics Manual, the FEMA minimum freeboard criteria of 3 feet is provided where the channel lining is constructed on berms where the 100 year water surface elevation is above the adjacent natural ground.

Exceptions to the minimum freeboard requirement have been approved where surface runoff is required to flow into the channel via side spillways along the north side to prevent upstream ponding. The spillway elevation is set based on the adjacent ground elevation regardless of whether the freeboard criteria is met. The extent of lining without the required freeboard is limited by designing spillway sections to accept the side inflows. The channel lining beyond the limits of the spillways provides the minimum required freeboard.

The channel is designed to meet the freeboard criteria in the as constructed condition. The subsided condition is also checked and the channel lining extended to ensure that the 100 year discharge is contained within the channel lining with no freeboard requirement.

HEC-RAS Plan: MDB1 River: MCMICKEN DAM Reach: B1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
B1	16.60	20000.00	1276.19	1284.82	1282.31	1284.87	0.003415	1.71	11713.80	4246.60	0.18
B1	16.60	25000.00	1276.19	1285.17	1282.54	1285.22	0.003622	1.90	13177.21	4261.69	0.19
B1	16.60	30500.00	1276.19	1285.55	1282.76	1285.62	0.003660	2.06	14824.38	4278.60	0.19
B1	16.20	23000.00	1268.00	1272.44	1271.56	1272.59	0.010916	2.46	8163.74	4883.26	0.31
B1	16.20	28500.00	1268.00	1272.76		1272.91	0.010110	2.54	9739.59	5122.93	0.30
B1	16.20	34500.00	1268.00	1273.01	1271.94	1273.18	0.010235	2.71	11043.55	5273.22	0.31
B1	15.51	23000.00	1245.50	1250.38		1250.42	0.003722	1.48	15497.41	7397.98	0.18
B1	15.51	28500.00	1245.50	1250.70		1250.74	0.003889	1.59	17967.16	8021.34	0.19
B1	15.51	34500.00	1245.50	1251.04		1251.09	0.003836	1.66	20809.42	8604.61	0.19
B1	14.78	23000.00	1225.00	1228.74	1227.27	1228.82	0.009325	2.32	9920.82	4830.73	0.29
B1	14.78	28500.00	1225.00	1229.14	1227.45	1229.23	0.008648	2.39	11914.09	5230.58	0.28
B1	14.78	34500.00	1225.00	1229.58	1227.63	1229.67	0.008725	2.38	14496.70	6456.74	0.28
B1	14.07	23000.00	1202.60	1207.57	1205.19	1207.63	0.003787	1.98	11624.47	5103.79	0.23
B1	14.07	28500.00	1202.60	1207.89	1205.49	1207.96	0.004004	2.14	13315.38	5525.93	0.24
B1	14.07	34500.00	1202.60	1208.29	1205.75	1208.36	0.003995	2.20	15661.04	6092.88	0.24
B1	13.47	23000.00	1186.50	1189.47	1188.33	1189.55	0.009856	2.31	9948.27	7086.09	0.34
B1	13.47	28500.00	1186.50	1189.73	1188.53	1189.82	0.009117	2.40	11886.05	7560.61	0.34
B1	13.47	38000.00	1186.50	1190.10	1188.88	1190.20	0.008742	2.58	14757.01	8173.14	0.34
B1	12.83	23000.00	1166.90	1169.97		1170.01	0.003749	1.54	14928.04	9467.04	0.22
B1	12.83	29000.00	1166.90	1170.21		1170.25	0.003982	1.68	17273.31	10076.32	0.23
B1	12.83	45000.00	1166.90	1170.71		1170.77	0.004225	2.01	22414.41	10452.71	0.24
B1	12.03	23000.00	1144.70	1147.45	1146.42	1147.55	0.008257	2.50	9190.47	5090.29	0.33
B1	12.03	29000.00	1144.70	1147.81	1146.58	1147.92	0.007431	2.62	11057.23	5274.00	0.32
B1	12.03	48000.00	1144.70	1148.78	1147.02	1148.91	0.006456	2.88	16645.05	6196.79	0.31
B1	11.15	23000.00	1123.70	1128.42	1126.29	1128.45	0.002442	1.51	15258.18	7249.52	0.18
B1	11.15	29000.00	1123.70	1128.71	1126.47	1128.76	0.002608	1.66	17469.69	7545.61	0.19
B1	11.15	54500.00	1123.70	1129.76	1127.10	1129.83	0.002945	2.10	25972.56	8646.75	0.21
B1	10.61	23000.00	1112.00	1115.30	1114.29	1115.45	0.011239	3.06	7504.25	3864.40	0.39
B1	10.61	29000.00	1112.00	1115.74	1114.49	1115.89	0.009521	3.15	9217.70	4030.19	0.37
B1	10.61	60000.00	1112.00	1117.91		1118.05	0.005926	3.01	19938.84	6530.95	0.30
B1	9.91	23000.00	1098.90	1104.72		1104.75	0.001289	1.40	16404.18	5381.22	0.14
B1	9.91	29000.00	1098.90	1105.13		1105.17	0.001375	1.56	18644.20	5493.39	0.15
B1	9.91	60000.00	1098.90	1106.62		1106.69	0.001863	2.21	27173.25	5945.86	0.18
B1	9.31	23000.00	1087.70	1091.12	1091.12	1091.77	0.088812	6.45	3565.51	2834.08	1.01
B1	9.31	29000.00	1087.70	1091.56	1091.36	1092.11	0.058158	5.95	4871.41	3179.37	0.85
B1	9.31	60000.00	1087.70	1093.72		1093.99	0.014461	4.13	14510.33	5760.56	0.46
B1	8.63	23000.00	1079.50	1085.16	1081.12	1085.17	0.000468	0.97	23752.86	6346.26	0.09
B1	8.63	29000.00	1079.50	1085.67		1085.68	0.000501	1.07	27020.65	6511.46	0.09
B1	8.63	60000.00	1079.50	1087.91		1087.94	0.000576	1.40	42994.59	7758.73	0.10
B1	7.84	20000.00	1073.91	1079.07	1077.94	1079.34	0.014968	4.19	4771.09	6745.50	0.47
B1	7.84	24000.00	1073.91	1079.43	1078.16	1079.73	0.014392	4.40	5456.38	6991.98	0.46
B1	7.84	46000.00	1073.91	1082.08	1079.18	1082.26	0.006669	3.45	13341.32	9988.53	0.33
B1	7.81	12000.00	1072.00	1075.85	1075.42	1076.37	0.041585	5.82	2063.59	1084.54	0.74
B1	7.81	17500.00	1072.00	1077.24	1075.96	1077.57	0.016430	4.57	3826.68	1435.93	0.49
B1	7.81	43500.00	1072.00	1081.06	1077.67	1081.29	0.007082	3.81	11428.04	3001.97	0.34
B1	7.48	12000.00	1059.75	1070.23		1070.29	0.001163	1.96	6130.02	1126.62	0.15
B1	7.48	17500.00	1059.75	1071.48		1071.56	0.001429	2.29	7638.57	1294.63	0.17
B1	7.48	43500.00	1059.75	1074.95		1075.12	0.002112	3.30	13243.38	1862.93	0.21
B1	7.31	12000.00	1062.90	1066.77	1066.26	1067.26	0.030754	5.79	2170.99	1020.61	0.66
B1	7.31	17500.00	1062.90	1067.65		1068.15	0.023032	5.84	3108.94	1120.88	0.60
B1	7.31	43500.00	1062.90	1070.48		1071.04	0.013572	6.41	7501.83	1825.12	0.50
B1	7.11	11000.00	1053.75	1060.52		1060.62	0.002412	2.56	4303.90	917.41	0.21
B1	7.11	15500.00	1053.75	1061.60		1061.73	0.002494	2.91	5359.32	1087.40	0.22

HEC-RAS Plan: MDB1 River: MCMICKEN DAM Reach: B1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
B1	7.11	34500.00	1053.75	1064.77		1064.97	0.002813	3.68	9981.48	1724.31	0.24
B1	6.80	11000.00	1044.00	1048.10	1048.10	1049.29	0.071069	8.73	1259.87	537.81	1.01
B1	6.80	15500.00	1044.00	1048.72	1048.72	1050.18	0.066429	9.69	1599.34	554.90	1.01
B1	6.80	32500.00	1044.00	1050.67	1050.67	1052.86	0.057747	11.88	2736.56	629.99	1.00

```
HEC-RAS September 1998 Version 2.2
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
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PROJECT DATA
Project Title: McMicken Dam, Reach B1
Project File : MDB1.prj
Run Date and Time: 11/6/2001 3:09:10 PM

Project in English units

Study Name: McMicken Dam Spillway Inundation Study
Contract No.: FCD 98-32
Purpose of Study: Delineation of the inundation limits of the 1/3, 2/3, and Full spillway discharges for the McMicken Dam spillway.

Model Name: MDB1
Model Description: Model flows from Sun City Grand west wall to the Agua Fria Floodplain. Upstream boundary is section 16.60. Downstream boundary is section 6.80.

Flow Profiles: Profile #1, 1/3 Flow
Section 16.60, Q=20,000 cfs
Sections 16.20 to 8.63, Q=23,000 cfs
Section 7.84, Q=20,000 cfs
Sections 7.81 to 7.31, Q=12,000 cfs
Sections 7.11 to 6.80, Q=11,000 cfs

Profile #2, 2/3 Flow
Section 16.60, Q=25,000 cfs
Sections 16.20 to 13.47, Q=28,500 cfs
Sections 12.83 to 8.63, Q=29,000 cfs
Section 7.84, Q=24,000 cfs
Sections 7.81 to 7.31, Q=17,500 cfs
Sections 7.11 to 6.80, Q=15,500 cfs

Profile #3, Full Flow
Section 16.60, Q=30,500 cfs
Sections 16.20 to 14.07, Q=34,500 cfs
Section 13.47, Q=38,000 cfs
Sections 12.83, Q=45,00 cfs
Sections 12.03, Q=48,000 cfs
Sections 11.15, Q=54,500 cfs
Sections 10.61 to 8.63, Q=60,000 cfs
Section 7.84, Q=46,000 cfs
Sections 7.81 to 7.31, Q=43,500
Section 7.11, Q=34,500 cfs
Section 6.80, Q=32,500 cfs

HEC-RAS Version: Version 2.2, September 1998

Consultants: Hoskin Engineering Consultants, Inc.
323 W. Roosevelt Street, Suite 200
Phoenix, AZ 85003
(602) 252-8384 Phone
(602) 252-8385 Fax
HEC 990006-03

DEI Professional Services, LLC
6225 N. 24th Street, Suite 200
Phoenix, AZ 85016
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(602) 944-8605 Fax

PLAN DATA

Plan Title: Reach B1
Plan File : C:\Documents and Settings\Kristyn.HEC\Desktop\MDB1\MDB1.p01

Geometry Title: Reach B1
Geometry File : C:\Documents and Settings\Kristyn.HEC\Desktop\MDB1\MDB1.g01

Flow Title : Reach B1
Flow File : C:\Documents and Settings\Kristyn.HEC\Desktop\MDB1\MDB1.f01

Plan Description:
Model flows from Sun City Grand west wall to the Dysart Drain. Upstream

boundary is section 16.61. Downstream boundary is section 7.85.

Plan Summary Information:
Number of: Cross Sections = 19 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: Reach B1
Flow File : C:\Documents and Settings\Kristyn.HEC\Desktop\MDB1\MDB1.f01

Flow Data (cfs)

River	Reach	RS	1/3	2/3	Full
MCMICKEN DAM	B1	16.60	20000	25000	30500
MCMICKEN DAM	B1	16.20	23000	28500	34500
MCMICKEN DAM	B1	15.51	23000	28500	34500
MCMICKEN DAM	B1	13.47	23000	28500	38000
MCMICKEN DAM	B1	12.83	23000	29000	45000
MCMICKEN DAM	B1	12.03	23000	29000	48000
MCMICKEN DAM	B1	11.15	23000	29000	54500
MCMICKEN DAM	B1	10.61	23000	29000	60000
MCMICKEN DAM	B1	7.84	20000	24000	46000
MCMICKEN DAM	B1	7.81	12000	17500	43500
MCMICKEN DAM	B1	7.31	12000	17500	43500
MCMICKEN DAM	B1	7.11	11000	15500	34500
MCMICKEN DAM	B1	6.80	11000	15500	32500

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MCMICKEN DAM	B1	1/3	Critical	Critical
MCMICKEN DAM	B1	2/3	Critical	Critical
MCMICKEN DAM	B1	Full	Critical	Critical

GEOMETRY DATA

Geometry Title: Reach B1
Geometry File : C:\Documents and Settings\Kristyn.HEC\Desktop\MDB1\MDB1.g01

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 16.60

INPUT
Description: Upstream boundary. Flow traveling from weirs along Sun City Grand
west wall through Sun City Grand.
1/3 Flow: 20,000 cfs

2/3
flow: 25, 000 cfs
Full Flow: 30,500 cfs
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7816.24	1286	7858.88	1286	7946.58	1284	8061.78	1282	8112.74	1282
8139.45	1284	8175.82	1284	8300.27	1282	8313.72	1282	8517.51	1284
8908.15	1284	8979.12	1282	8989.24	1282	9232.49	1284	9409.17	1282
9478.26	1282	9614.57	1284	9679.25	1284	9726.95	1282	9819.72	1282
10000	1283.1410139.42		128410240.85		128210383.93		128210516.48		1282
10560.24	1281.6910641.45		128210653.54		1282.2510693.62		128211096.65		1280
11161.49	128011255.53		128111353.41		128011396.07		128011428.99		1278
11453.46	1276.1911506.99		127811568.48		128011619.93		1278.9811674.72		1280
11753.31	128211888.02		128211962.11		128011968.92		128012108.01		1280
12140.97	128012149.63		1282 12157.1		1283.5 12157.1		1289.5		

Manning's n Values num= 1

Sta	n Val
7816.24	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7816.24	12157.1	2099.0912	099.0912	099.091	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
7816.24	7858.88	1286

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1284.87	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1284.82	Reach Len. (ft)	2099.09	2099.09	2099.09
Crit W.S. (ft)	1282.31	Flow Area (sq ft)		11713.80	
E.G. Slope (ft/ft)	0.003415	Area (sq ft)		11713.80	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	4246.60	Top Width (ft)		4246.60	
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)		1.71	
Max Chl Dpth (ft)	8.63	Hydr. Depth (ft)		2.76	
Conv. Total (cfs)	342224.7	Conv. (cfs)		342224.7	
Length Wtd. (ft)	2099.09	Wetted Per. (ft)		4248.84	
Min Ch El (ft)	1276.19	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		1.00	
Frctn Loss (ft)	12.27	Cum Volume (acre-ft)	6.44	13261.88	1005.76
C & E Loss (ft)	0.01	Cum SA (acres)	5.02	6050.93	523.26

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1285.22	Element			
Vel Head (ft)	0.06	Wt. n-Val.		0.100	
W.S. Elev (ft)	1285.17	Reach Len. (ft)	2099.09	2099.09	2099.09
Crit W.S. (ft)	1282.54	Flow Area (sq ft)		13177.21	
E.G. Slope (ft/ft)	0.003622	Area (sq ft)		13177.21	
Q Total (cfs)	25000.00	Flow (cfs)		25000.00	
Top Width (ft)	4261.69	Top Width (ft)		4261.69	
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)		1.90	
Max Chl Dpth (ft)	8.98	Hydr. Depth (ft)		3.09	
Conv. Total (cfs)	415404.0	Conv. (cfs)		415404.0	
Length Wtd. (ft)	2099.09	Wetted Per. (ft)		4264.28	
Min Ch El (ft)	1276.19	Shear (lb/sq ft)		0.70	
Alpha	1.00	Stream Power (lb/ft s)		1.33	
Frctn Loss (ft)	12.30	Cum Volume (acre-ft)	12.20	15519.07	1190.46
C & E Loss (ft)	0.01	Cum SA (acres)	9.37	6399.68	545.73

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1285.62	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.100	
W.S. Elev (ft)	1285.55	Reach Len. (ft)	2099.09	2099.09	2099.09
Crit W.S. (ft)	1282.76	Flow Area (sq ft)		14824.38	
E.G. Slope (ft/ft)	0.003660	Area (sq ft)		14824.38	
Q Total (cfs)	30500.00	Flow (cfs)		30500.00	
Top Width (ft)	4278.60	Top Width (ft)		4278.60	
Vel Total (ft/s)	2.06	Avg. Vel. (ft/s)		2.06	

Max Chl Dpth (ft)	9.36	Hydr. Depth (ft)		3.46	
Conv. Total (cfs)	504142.5	Conv. (cfs)		504142.5	
Length Wtd. (ft)	2099.09	Wetted Per. (ft)		4281.58	
Min Ch El (ft)	1276.19	Shear (lb/sq ft)		0.79	
Alpha	1.00	Stream Power (lb/ft s)		1.63	
Prctn Loss (ft)	12.42	Cum Volume (acre-ft)	83.19	23010.87	2400.53
C & E Loss (ft)	0.01	Cum SA (acres)	36.05	7627.54	587.18

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7816.24	8684.41	1294.09	1220.96	774.04	6.47	1.58	1.06
8684.41	9552.58	1636.76	1471.84	868.23	8.18	1.70	1.11
9552.58	10420.76	2194.13	1754.82	868.25	10.97	2.02	1.25
10420.76	11288.93	5899.30	3176.46	868.19	29.50	3.66	1.86
11288.93	RB 12157.10	8975.73	4089.73	870.14	44.88	4.71	2.19

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7816.24	8684.41	1869.52	1489.78	789.13	7.48	1.89	1.25
8684.41	9552.58	2338.98	1770.49	868.23	9.36	2.04	1.32
9552.58	10420.76	2994.63	2053.46	868.25	11.98	2.37	1.46
10420.76	11288.93	7197.20	3475.11	868.19	28.79	4.00	2.07
11288.93	RB 12157.10	10599.68	4388.37	870.48	42.40	5.05	2.42

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7816.24	8684.41	2574.12	1797.39	806.05	8.44	2.23	1.43
8684.41	9552.58	3188.56	2105.38	868.23	10.45	2.43	1.51
9552.58	10420.76	3934.31	2388.35	868.25	12.90	2.75	1.65
10420.76	11288.93	8569.01	3810.00	868.19	28.10	4.39	2.25
11288.93	RB 12157.10	12234.00	4723.26	870.87	40.11	5.44	2.59

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 16.20

INPUT
Description: Flow increased by 3,000 cfs in the 1/3, 3,500 in the 2/3 and 4,000 in the Full Flow. Flow traveling south along Estrella Freeway and Sun City Grand Wall in Model MDA1 combines with flow travelling through and exiting Sun City Grand.
1/3 Flow: 11,000 cfs
2/3
Flow: 15,500 cfs
Full Flow: 33,500 cfs
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7840.92	1276	7954.31	1274	8010.49	1272	8195.87	1272	8265.22	1272.75
8319.94	1272	8335.17	1270	8385.71	1270	8407.96	1272	8422.98	1272.38
8440.09	1272	8473.86	1270	8498.79	1272	8517.28	1274	8808.67	1274
8831.88	1272	8850.88	1272	9011.62	1274	9151.95	1272	9338.4	1270
9364.01	1270	9382.98	1272	9514.98	1274	9527.34	1274	9541.37	1272
9642.76	1272	9716.97	1272	9869.94	127010	014.16	127010	192.15	1272
10364.69	127010	428.05	127010	518.11	1271.49	10612.59	127010	829.68	1268
10943.94	126811	135.57	1268	11253.1	126811	304.58	127011	813.43	1271.5

```
11843.51    127011859.99    126811883.39    126811888.46    127011896.89 1270.35
11896.89 1276.3511903.56  1276.411903.56  1270.411934.88    127012011.78 1270.82
12055.88 1270.2112101.31    127012120.91    127012440.36    127212622.11  1271.1
12815.35 1271.8913041.23 1271.23 13479.3    127214132.51    1274

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
 7840.92      .111896.89    .02212101.31     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
       7840.9211896.89           4051.83670.321  4051.8              .1        .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev
 7840.92 7840.92
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1272.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.100	0.043
W.S. Elev (ft)	1272.44	Reach Len. (ft)	4051.80	3670.32	4051.80
Crit W.S. (ft)	1271.56	Flow Area (sq ft)		6299.44	1864.30
E.G. Slope (ft/ft)	0.010916	Area (sq ft)		6299.44	1864.30
Q Total (cfs)	23000.00	Flow (cfs)		15469.18	7530.82
Top Width (ft)	4883.26	Top Width (ft)		3163.24	1720.03
Vel Total (ft/s)	2.82	Avg. Vel. (ft/s)		2.46	4.04
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)		1.99	1.08
Conv. Total (cfs)	220140.3	Conv. (cfs)		148060.5	72079.9
Length Wtd. (ft)	3732.79	Wetted Per. (ft)		3166.57	1722.09
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		1.36	0.74
Alpha	1.18	Stream Power (lb/ft s)		3.33	2.98
Frctn Loss (ft)	22.14	Cum Volume (acre-ft)	6.44	12827.86	960.85
C & E Loss (ft)	0.03	Cum SA (acres)	5.02	5872.39	481.82

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1272.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.100	0.046
W.S. Elev (ft)	1272.76	Reach Len. (ft)	4051.80	3670.32	4051.80
Crit W.S. (ft)		Flow Area (sq ft)		7317.39	2422.20
E.G. Slope (ft/ft)	0.010110	Area (sq ft)		7317.39	2422.20
Q Total (cfs)	28500.00	Flow (cfs)		18576.27	9923.73
Top Width (ft)	5122.93	Top Width (ft)		3300.05	1822.89
Vel Total (ft/s)	2.93	Avg. Vel. (ft/s)		2.54	4.10
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)		2.22	1.33
Conv. Total (cfs)	283445.4	Conv. (cfs)		184749.4	98696.0
Length Wtd. (ft)	3736.74	Wetted Per. (ft)		3303.76	1825.27
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		1.40	0.84
Alpha	1.17	Stream Power (lb/ft s)		3.55	3.43
Frctn Loss (ft)	22.14	Cum Volume (acre-ft)	12.20	15025.27	1132.10
C & E Loss (ft)	0.04	Cum SA (acres)	9.37	6217.48	501.81

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1273.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.100	0.048
W.S. Elev (ft)	1273.01	Reach Len. (ft)	4051.80	3670.32	4051.80
Crit W.S. (ft)	1271.94	Flow Area (sq ft)		8153.79	2889.76
E.G. Slope (ft/ft)	0.010235	Area (sq ft)		8153.79	2889.76
Q Total (cfs)	34500.00	Flow (cfs)		22080.38	12419.62
Top Width (ft)	5273.22	Top Width (ft)		3368.40	1904.82
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)		2.71	4.30
Max Chl Dpth (ft)	5.01	Hydr. Depth (ft)		2.42	1.52
Conv. Total (cfs)	341019.9	Conv. (cfs)		218256.5	122763.4
Length Wtd. (ft)	3738.99	Wetted Per. (ft)		3372.42	1907.45
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		1.54	0.97
Alpha	1.16	Stream Power (lb/ft s)		4.18	4.16
Frctn Loss (ft)	22.06	Cum Volume (acre-ft)	83.19	22457.23	2330.90
C & E Loss (ft)	0.04	Cum SA (acres)	36.05	7443.29	541.28

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7840.92	8652.11	455.50	371.85	454.21	1.98	0.82	1.22
8652.11	9463.31	584.06	389.36	350.96	2.54	1.11	1.50
9463.31	10274.50	1669.05	983.27	736.29	7.26	1.34	1.70
10274.50	11085.70	7535.75	2525.25	811.23	32.76	3.11	2.98
11085.70	RB 11896.89	5224.83	2029.72	813.87	22.72	2.50	2.57
11896.89	12344.01	5858.78	854.40	442.51	25.47	1.94	6.86
12344.01	12791.14	701.55	402.10	447.13	3.05	0.90	1.74
12791.14	13238.26	749.53	418.38	447.13	3.26	0.94	1.79
13238.26	13685.39	220.95	189.42	385.32	0.96	0.49	1.17

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7840.92	8652.11	720.20	524.82	516.98	2.53	1.02	1.37
8652.11	9463.31	788.08	511.16	422.83	2.77	1.21	1.54
9463.31	10274.50	2301.94	1215.49	738.52	8.08	1.65	1.89
10274.50	11085.70	8588.58	2780.73	811.23	30.14	3.43	3.09
11085.70	RB 11896.89	6177.47	2285.20	814.19	21.68	2.82	2.70
11896.89	12344.01	7164.85	993.11	442.83	25.14	2.25	7.21
12344.01	12791.14	1114.70	542.92	447.13	3.91	1.21	2.05
12791.14	13238.26	1170.96	559.20	447.13	4.11	1.25	2.09
13238.26	13685.39	472.48	324.39	447.13	1.66	0.73	1.46
13685.39	14132.51	0.74	2.58	41.06	0.00	0.06	0.29

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7840.92	8652.11	1047.41	655.58	526.37	3.04	1.25	1.60
8652.11	9463.31	1026.74	624.37	480.08	2.98	1.30	1.64
9463.31	10274.50	2958.25	1400.95	740.30	8.57	1.89	2.11
10274.50	11085.70	9815.02	2984.22	811.23	28.45	3.68	3.29
11085.70	RB 11896.89	7232.96	2488.69	814.44	20.97	3.07	2.91
11896.89	12344.01	8505.49	1103.60	443.08	24.65	2.51	7.71
12344.01	12791.14	1529.43	655.08	447.13	4.43	1.47	2.33
12791.14	13238.26	1593.30	671.36	447.13	4.62	1.50	2.37
13238.26	13685.39	777.63	436.55	447.13	2.25	0.98	1.78
13685.39	14132.51	13.77	23.16	122.99	0.04	0.19	0.59

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 15.51

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500 cfs
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5780	1250.2	5880	1250	6170	1249	6380	1248	6590	1250
6690	1250	6910	1246	6990	1246	7050	1247.2	7190	1247.1
7510	1247.3	7750	1248	7770	1250	7810	1250	7930	1250

8030	1250	8360	1250	8520	1249	8610	1248	8720	1248
9260	1247.4	9630	1247	9900	1246.7	10000	1246.6	10460	1246
10590	1245.5	10780	1246	11100	1247	11240	1248	11580	1248
11790	1250	11880	1250.3	12120	1250	12230	1249.7	12410	1250
13910	1251	13980	1250	14200	1250.5	14710	1252		

Manning's n Values num= 1

Sta	n Val
5780	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5780	14710	3549.6	3860.292	4133.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5780	5780	

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1250.42	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.100	
W.S. Elev (ft)	1250.38	Reach Len. (ft)	3549.60	3860.29	4133.50
Crit W.S. (ft)		Flow Area (sq ft)		15497.41	
E.G. Slope (ft/ft)	0.003722	Area (sq ft)		15497.41	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	7397.98	Top Width (ft)		7397.98	
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)		1.48	
Max Chl Dpth (ft)	4.88	Hydr. Depth (ft)		2.09	
Conv. Total (cfs)	376996.1	Conv. (cfs)		376996.1	
Length Wtd. (ft)	3860.29	Wetted Per. (ft)		7398.36	
Min Ch El (ft)	1245.50	Shear (lb/sq ft)		0.49	
Alpha	1.00	Stream Power (lb/ft s)		0.72	
Frctn Loss (ft)	21.59	Cum Volume (acre-ft)	6.44	11909.57	874.14
C & E Loss (ft)	0.00	Cum SA (acres)	5.02	5427.45	401.82

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1250.74	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.100	
W.S. Elev (ft)	1250.70	Reach Len. (ft)	3549.60	3860.29	4133.50
Crit W.S. (ft)		Flow Area (sq ft)		17967.16	
E.G. Slope (ft/ft)	0.003889	Area (sq ft)		17967.16	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	8021.34	Top Width (ft)		8021.34	
Vel Total (ft/s)	1.59	Avg. Vel. (ft/s)		1.59	
Max Chl Dpth (ft)	5.20	Hydr. Depth (ft)		2.24	
Conv. Total (cfs)	457022.8	Conv. (cfs)		457022.8	
Length Wtd. (ft)	3860.29	Wetted Per. (ft)		8022.04	
Min Ch El (ft)	1245.50	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		0.86	
Frctn Loss (ft)	21.51	Cum Volume (acre-ft)	12.20	13960.05	1019.45
C & E Loss (ft)	0.00	Cum SA (acres)	9.37	5740.52	417.03

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1251.09	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.100	
W.S. Elev (ft)	1251.04	Reach Len. (ft)	3549.60	3860.29	4133.50
Crit W.S. (ft)		Flow Area (sq ft)		20809.42	
E.G. Slope (ft/ft)	0.003836	Area (sq ft)		20809.42	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	8604.61	Top Width (ft)		8604.61	
Vel Total (ft/s)	1.66	Avg. Vel. (ft/s)		1.66	
Max Chl Dpth (ft)	5.54	Hydr. Depth (ft)		2.42	
Conv. Total (cfs)	557064.9	Conv. (cfs)		557064.9	
Length Wtd. (ft)	3860.29	Wetted Per. (ft)		8605.65	
Min Ch El (ft)	1245.50	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)		0.96	
Frctn Loss (ft)	21.41	Cum Volume (acre-ft)	83.19	21237.02	2196.50

C & E Loss (ft) 0.00 Cum SA (acres) 36.05 6938.87 452.70

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5780.00	7566.00	4811.40	3748.02	1786.24	20.92	2.10	1.28
7566.00	9352.00	3395.25	3040.53	1786.11	14.76	1.70	1.12
9352.00	11138.00	13470.49	6950.98	1786.00	58.57	3.89	1.94
11138.00	12924.00	1313.12	1719.49	1786.01	5.71	0.96	0.76
12924.00	RB 14710.00	9.74	38.39	253.98	0.04	0.15	0.25

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5780.00	7566.00	6164.44	4319.88	1786.56	21.63	2.42	1.43
7566.00	9352.00	4576.20	3612.39	1786.11	16.06	2.02	1.27
9352.00	11138.00	15541.77	7522.84	1786.00	54.53	4.21	2.07
11138.00	12924.00	2142.96	2291.35	1786.01	7.52	1.28	0.94
12924.00	RB 14710.00	74.63	220.71	877.34	0.26	0.25	0.34

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5780.00	7566.00	7620.25	4928.37	1786.91	22.09	2.76	1.55
7566.00	9352.00	5887.50	4220.88	1786.11	17.07	2.36	1.39
9352.00	11138.00	17560.82	8131.33	1786.00	50.90	4.55	2.16
11138.00	12924.00	3149.41	2899.83	1786.01	9.13	1.62	1.09
12924.00	RB 14710.00	282.02	629.02	1460.62	0.82	0.43	0.45

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 14.78

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500 cfs
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6574.16	1229.59	6610	1229.5	6780	1229	7350	1230	7430	1229.7
7483.17	1228.5	7590	1229.5	8250	1229.2	8370	1229	8680	1228.2
8940	1228	9110	1227.6	9180	1228	9470	1226	9720	1225.7
10000	1225.2	10100	1225	10510	1225	10700	1226	10820	1227
10960	1227	11110	1226	11250	1225.4	11370	1225.4	11480	1226
11670	1226	11700	1227.3	11960	1226.9	12080	1227	12290	1227
12680	1227	13020	1228	13130	1228.1	13280	1228.8	13340	1230
13480	1229.5	13610	1230	13780	1231				

Manning's n Values num= 1

Sta	n Val

```
 6574.16       .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      6574.16   13780            4363.93748.181  3098.5            .1        .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev
 6574.16 6574.16
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1228.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1228.74	Reach Len. (ft)	4363.90	3748.18	3098.50
Crit W.S. (ft)	1227.27	Flow Area (sq ft)		9920.82	
E.G. Slope (ft/ft)	0.009325	Area (sq ft)		9920.82	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	4830.73	Top Width (ft)		4830.73	
Vel Total (ft/s)	2.32	Avg. Vel. (ft/s)		2.32	
Max Chl Dpth (ft)	3.74	Hydr. Depth (ft)		2.05	
Conv. Total (cfs)	238175.1	Conv. (cfs)		238175.1	
Length Wtd. (ft)	3748.18	Wetted Per. (ft)		4830.78	
Min Ch El (ft)	1225.00	Shear (lb/sq ft)		1.20	
Alpha	1.00	Stream Power (lb/ft s)		2.77	
Frctn Loss (ft)	21.18	Cum Volume (acre-ft)	6.44	10783.29	874.14
C & E Loss (ft)	0.01	Cum SA (acres)	5.02	4885.60	401.82

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1229.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.100	
W.S. Elev (ft)	1229.14	Reach Len. (ft)	4363.90	3748.18	3098.50
Crit W.S. (ft)	1227.45	Flow Area (sq ft)		11914.09	
E.G. Slope (ft/ft)	0.008648	Area (sq ft)		11914.09	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	5230.58	Top Width (ft)		5230.58	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	4.14	Hydr. Depth (ft)		2.28	
Conv. Total (cfs)	306473.4	Conv. (cfs)		306473.4	
Length Wtd. (ft)	3748.18	Wetted Per. (ft)		5230.65	
Min Ch El (ft)	1225.00	Shear (lb/sq ft)		1.23	
Alpha	1.00	Stream Power (lb/ft s)		2.94	
Frctn Loss (ft)	21.26	Cum Volume (acre-ft)	12.20	12636.01	1019.45
C & E Loss (ft)	0.01	Cum SA (acres)	9.37	5153.32	417.03

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1229.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.100	
W.S. Elev (ft)	1229.58	Reach Len. (ft)	4363.90	3748.18	3098.50
Crit W.S. (ft)	1227.63	Flow Area (sq ft)		14496.70	
E.G. Slope (ft/ft)	0.008725	Area (sq ft)		14496.70	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	6456.74	Top Width (ft)		6456.74	
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)		2.38	
Max Chl Dpth (ft)	4.58	Hydr. Depth (ft)		2.25	
Conv. Total (cfs)	369344.0	Conv. (cfs)		369344.0	
Length Wtd. (ft)	3748.18	Wetted Per. (ft)		6456.82	
Min Ch El (ft)	1225.00	Shear (lb/sq ft)		1.22	
Alpha	1.00	Stream Power (lb/ft s)		2.91	
Frctn Loss (ft)	21.30	Cum Volume (acre-ft)	83.19	19672.61	2196.50
C & E Loss (ft)	0.00	Cum SA (acres)	36.05	6271.50	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6574.16	8015.33	1.33	4.26	35.89	0.01	0.12	0.31
8015.33	9456.50	1125.58	914.21	984.76	4.89	0.93	1.23
9456.50	10897.66	12870.37	4593.32	1441.18	55.96	3.19	2.80
10897.66	12338.83	7328.87	3276.41	1441.20	31.86	2.27	2.24
12338.83	RB 13780.00	1673.85	1132.63	927.75	7.28	1.22	1.48

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6574.16	8015.33	15.33	39.28	221.31	0.05	0.18	0.39
8015.33	9456.50	1815.83	1341.00	1168.92	6.37	1.15	1.35
9456.50	10897.66	14968.37	5169.65	1441.18	52.52	3.59	2.90
10897.66	12338.83	9169.57	3852.73	1441.20	32.17	2.67	2.38
12338.83	RB 13780.00	2530.90	1511.43	958.04	8.88	1.58	1.67

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6574.16	8015.33	156.67	314.39	1110.85	0.45	0.28	0.50
8015.33	9456.50	2753.70	1948.22	1441.18	7.98	1.35	1.41
9456.50	10897.66	16991.15	5805.26	1441.18	49.25	4.03	2.93
10897.66	12338.83	11066.03	4488.35	1441.20	32.08	3.11	2.47
12338.83	RB 13780.00	3532.45	1940.48	1022.42	10.24	1.90	1.82

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 14.07

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 34,500 cfs

Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5420	1210.3	5480	1210	5710	1208	5790	1207.7	5880	1208
6120	1210	6210	1210.2	6290	1210	6600	1208	7080	1206
7190	1205.7	7360	1206	7480	1206	7630	1206.3	7770	1206
7890	1210	8080	1210	8230	1206	8320	1204	8630	1202.6
8830	1203.1	9040	1203.4	9140	1203.3	9930	1204	10000	1204.2
10110	1204	10340	1205.2	10600	1205.4	10860	1206	11270	1207
11380	1208	11430	1208.5	11470	1208	11530	1206.8	11730	1207
12030	1207	12140	1208	12330	1207	12540	1208	12670	1208
12960	1209	13130	1209.5	13180	1209.6	13330	1209.9	13470	1210
13620	1210.3								

Manning's n Values num= 1

Sta	n Val
5420	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
5420 13620 2912.13130.181 2736.49 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5420	6600	1208

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1207.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.080	
W.S. Elev (ft)	1207.57	Reach Len. (ft)	2912.10	3130.18	2736.49
Crit W.S. (ft)	1205.19	Flow Area (sq ft)		11624.47	
E.G. Slope (ft/ft)	0.003787	Area (sq ft)		11624.47	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	5103.79	Top Width (ft)		5103.79	
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)		1.98	
Max Chl Dpth (ft)	4.97	Hydr. Depth (ft)		2.28	
Conv. Total (cfs)	373760.4	Conv. (cfs)		373760.4	
Length Wtd. (ft)	3130.18	Wetted Per. (ft)		5103.89	
Min Ch El (ft)	1202.60	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		1.07	
Frctn Loss (ft)	18.08	Cum Volume (acre-ft)	6.44	9856.34	874.14
C & E Loss (ft)	0.00	Cum SA (acres)	5.02	4458.19	401.82

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1207.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.080	
W.S. Elev (ft)	1207.89	Reach Len. (ft)	2912.10	3130.18	2736.49
Crit W.S. (ft)	1205.49	Flow Area (sq ft)		13315.38	
E.G. Slope (ft/ft)	0.004004	Area (sq ft)		13325.66	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	5525.93	Top Width (ft)		5525.93	
Vel Total (ft/s)	2.14	Avg. Vel. (ft/s)		2.14	
Max Chl Dpth (ft)	5.29	Hydr. Depth (ft)		2.46	
Conv. Total (cfs)	450398.7	Conv. (cfs)		450398.7	
Length Wtd. (ft)	3130.18	Wetted Per. (ft)		5418.08	
Min Ch El (ft)	1202.60	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)		1.31	
Frctn Loss (ft)	18.14	Cum Volume (acre-ft)	12.20	11550.11	1019.45
C & E Loss (ft)	0.00	Cum SA (acres)	9.37	4690.55	417.03

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1208.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.080	
W.S. Elev (ft)	1208.29	Reach Len. (ft)	2912.10	3130.18	2736.49
Crit W.S. (ft)	1205.75	Flow Area (sq ft)		15661.04	
E.G. Slope (ft/ft)	0.003995	Area (sq ft)		15661.04	
Q Total (cfs)	34500.00	Flow (cfs)		34500.00	
Top Width (ft)	6092.88	Top Width (ft)		6092.88	
Vel Total (ft/s)	2.20	Avg. Vel. (ft/s)		2.20	
Max Chl Dpth (ft)	5.69	Hydr. Depth (ft)		2.57	
Conv. Total (cfs)	545822.3	Conv. (cfs)		545822.3	
Length Wtd. (ft)	3130.18	Wetted Per. (ft)		6093.02	
Min Ch El (ft)	1202.60	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		1.41	
Frctn Loss (ft)	18.16	Cum Volume (acre-ft)	83.19	18375.12	2196.50
C & E Loss (ft)	0.00	Cum SA (acres)	36.05	5731.58	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5420.00	7060.00	212.60	264.89	356.59	0.92	0.74	0.80
7060.00	8700.00	5427.67	3091.17	1285.99	23.60	2.40	1.76
8700.00	10340.00	15258.62	6334.42	1640.00	66.34	3.86	2.41
10340.00	11980.00	2048.67	1822.94	1481.07	8.91	1.23	1.12
11980.00	RB 13620.00	52.44	111.04	340.24	0.23	0.33	0.47

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5420.00	7060.00	370.96	391.89	433.72	1.30	0.90	0.95
7060.00	8700.00	6859.15	3507.96	1307.69	24.07	2.68	1.96
8700.00	10340.00	18043.54	6861.54	1640.00	63.31	4.18	2.63
10340.00	11980.00	3069.51	2307.23	1532.50	10.77	1.51	1.33
11980.00	RB 13620.00	156.86	246.74	504.16	0.55	0.49	0.64

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5420.00	7060.00	616.00	664.55	742.65	1.79	0.89	0.93
7060.00	8700.00	8418.76	4034.16	1334.59	24.40	3.02	2.09
8700.00	10340.00	20694.52	7514.77	1640.00	59.98	4.58	2.75
10340.00	11980.00	4377.07	2931.17	1602.01	12.69	1.83	1.49
11980.00	RB 13620.00	393.64	516.38	773.77	1.14	0.67	0.76

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 13.47

INPUT
Description: Flow increased by 3,500 cfs for the full flow. Flow begins to weir into cross section 13.47 from Model MDB2.

1/3 Flow:
23,000 cfs
2/3 Flow: 28,500 cfs
Full Flow: 38,000 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6200	1190	6260	1188.7	6330	1189	6400	1189.4	6740	1188.5
7210	1188.2	7420	1188.3	7530	1188	7820	1187.2	8130	1187.3
8550	1186.8	10000	1186.5	10210	1188	10430	1188.1	11690	1189.7
11760	1188.7	11810	1190	11860	1190	12040	1190.5	12110	1190
12350	1189	12985	1188.7	13620	1189	14340	1190	14550	1190
14760	1190.9								

Manning's n Values num= 1

Sta	n Val
6200	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6200	14760	3768.8	3401.326	3074.9	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
6200	6200		14760	14760	1190.9

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1189.55	Element			
Vel Head (ft)	0.08	Wt. n-Val.		0.080	
W.S. Elev (ft)	1189.47	Reach Len. (ft)	3768.80	3401.33	3074.90
Crit W.S. (ft)	1188.33	Flow Area (sq ft)		9948.27	
E.G. Slope (ft/ft)	0.009856	Area (sq ft)		9948.27	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	7086.09	Top Width (ft)		7086.09	
Vel Total (ft/s)	2.31	Avg. Vel. (ft/s)		2.31	
Max Chl Dpth (ft)	2.97	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	231674.7	Conv. (cfs)		231674.7	
Length Wtd. (ft)	3401.33	Wetted Per. (ft)		7086.13	
Min Ch El (ft)	1186.50	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		2.00	
Frctn Loss (ft)	19.53	Cum Volume (acre-ft)	6.44	9081.24	874.14
C & E Loss (ft)	0.01	Cum SA (acres)	5.02	4020.21	401.82

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1189.82	Element			
Vel Head (ft)	0.09	Wt. n-Val.		0.080	
W.S. Elev (ft)	1189.73	Reach Len. (ft)	3768.80	3401.33	3074.90
Crit W.S. (ft)	1188.53	Flow Area (sq ft)		11886.05	
E.G. Slope (ft/ft)	0.009117	Area (sq ft)		11886.05	
Q Total (cfs)	28500.00	Flow (cfs)		28500.00	
Top Width (ft)	7560.61	Top Width (ft)		7560.61	
Vel Total (ft/s)	2.40	Avg. Vel. (ft/s)		2.40	
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)		1.57	
Conv. Total (cfs)	298488.7	Conv. (cfs)		298488.7	
Length Wtd. (ft)	3401.33	Wetted Per. (ft)		7560.66	
Min Ch El (ft)	1186.50	Shear (lb/sq ft)		0.89	
Alpha	1.00	Stream Power (lb/ft s)		2.15	
Frctn Loss (ft)	19.56	Cum Volume (acre-ft)	12.20	10644.27	1019.45
C & E Loss (ft)	0.01	Cum SA (acres)	9.37	4220.35	417.03

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1190.20	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.080	
W.S. Elev (ft)	1190.10	Reach Len. (ft)	3768.80	3401.33	3074.90
Crit W.S. (ft)	1188.88	Flow Area (sq ft)		14757.01	
E.G. Slope (ft/ft)	0.008742	Area (sq ft)		14757.01	
Q Total (cfs)	38000.00	Flow (cfs)		38000.00	
Top Width (ft)	8173.14	Top Width (ft)		8173.14	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	406416.5	Conv. (cfs)		406416.5	
Length Wtd. (ft)	3401.33	Wetted Per. (ft)		8173.29	
Min Ch El (ft)	1186.50	Shear (lb/sq ft)		0.99	
Alpha	1.00	Stream Power (lb/ft s)		2.54	
Frctn Loss (ft)	19.42	Cum Volume (acre-ft)	83.19	17282.22	2196.50
C & E Loss (ft)	0.01	Cum SA (acres)	36.05	5219.01	452.70

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6200.00	7912.00	3313.15	1927.65	1687.48	14.41	1.14	1.72
7912.00	9624.00	13386.92	4481.24	1712.00	58.20	2.62	2.99
9624.00	11336.00	5396.11	2598.00	1712.01	23.46	1.52	2.08
11336.00	13048.00	502.48	517.21	1065.41	2.18	0.49	0.97
13048.00	RB 14760.00	401.33	424.19	909.24	1.74	0.47	0.95

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6200.00	7912.00	4558.21	2375.02	1699.67	15.99	1.40	1.92
7912.00	9624.00	15340.71	4933.48	1712.00	53.83	2.88	3.11
9624.00	11336.00	6883.55	3050.24	1712.01	24.15	1.78	2.26
11336.00	13048.00	941.82	837.82	1337.55	3.30	0.63	1.12
13048.00	RB 14760.00	775.71	689.49	1099.43	2.72	0.63	1.13

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6200.00	7912.00	6657.11	3001.99	1712.12	17.52	1.75	2.22
7912.00	9624.00	18607.48	5562.10	1712.00	48.97	3.25	3.35
9624.00	11336.00	9342.81	3678.86	1712.01	24.59	2.15	2.54
11336.00	13048.00	1918.09	1353.80	1511.89	5.05	0.90	1.42
13048.00	RB 14760.00	1474.51	1160.25	1525.27	3.88	0.76	1.27

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 12.83

INPUT
Description: Flow increased by 7,000 cfs and 500 cfs for the Full and 2/3 Flow respectively. Flow is continuing to weir into Model MDB1 from MDB2

1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs
Full Flow: 45,000 cfs

Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6450	1170.3	6530	1170	6590	1169	6680	1170	6750	1170
7600	1168	8180	1167	8650	1167.1	9150	1166.9	9830	1167.7
10000	1168	10100	1168.1	10330	1168.4	10530	1168	10740	1167
10880	1167.2	10960	1168	11030	1169	11070	1168	11120	1167.5
11140	1168	11420	1168.7	11880	1170	13200	1168	13740	1168.5
14090	1168.6	14380	1168.5	14640	1169.1	14750	1168	14780	1167.5
14810	1168	15200	1170.1	15430	1170	15793.28	1169.12	16406.44	1170
17200	1171.13								

Manning's n Values num= 1

Sta	n Val
6450	.08

Bank Sta: Left 6450 Right 17200 Lengths: Left 4389.54 Channel 4204.675 Right 4490.7 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6450	6450	

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1170.01	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.080	
W.S. Elev (ft)	1169.97	Reach Len. (ft)	4389.50	4204.67	4490.70
Crit W.S. (ft)		Flow Area (sq ft)		14928.04	
E.G. Slope (ft/ft)	0.003749	Area (sq ft)		14928.04	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	9467.04	Top Width (ft)		9467.04	
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		1.54	
Max Chl Dpth (ft)	3.07	Hydr. Depth (ft)		1.58	
Conv. Total (cfs)	375633.5	Conv. (cfs)		375633.5	
Length Wtd. (ft)	4204.67	Wetted Per. (ft)		9467.12	
Min Ch El (ft)	1166.90	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		0.57	
Frctn Loss (ft)	22.45	Cum Volume (acre-ft)	6.44	8110.02	874.14
C & E Loss (ft)	0.01	Cum SA (acres)	5.02	3373.94	401.82

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

CROSS-SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1170.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.080	
W.S. Elev (ft)	1170.21	Reach Len. (ft)	4389.50	4204.67	4490.70
Crit W.S. (ft)		Flow Area (sq ft)		17273.31	
E.G. Slope (ft/ft)	0.003982	Area (sq ft)		17273.31	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	10076.32	Top Width (ft)		10076.32	
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)		1.68	
Max Chl Dpth (ft)	3.31	Hydr. Depth (ft)		1.71	
Conv. Total (cfs)	459544.4	Conv. (cfs)		459544.4	
Length Wtd. (ft)	4204.67	Wetted Per. (ft)		10076.40	
Min Ch El (ft)	1166.90	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		0.72	
Frctn Loss (ft)	22.33	Cum Volume (acre-ft)	12.20	9505.83	1019.45
C & E Loss (ft)	0.01	Cum SA (acres)	9.37	3531.77	417.03

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1170.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.080	
W.S. Elev (ft)	1170.71	Reach Len. (ft)	4389.50	4204.67	4490.70
Crit W.S. (ft)		Flow Area (sq ft)		22414.41	
E.G. Slope (ft/ft)	0.004225	Area (sq ft)		22414.41	
Q Total (cfs)	45000.00	Flow (cfs)		45000.00	
Top Width (ft)	10452.71	Top Width (ft)		10452.71	
Vel Total (ft/s)	2.01	Avg. Vel. (ft/s)		2.01	
Max Chl Dpth (ft)	3.81	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	692284.6	Conv. (cfs)		692284.6	
Length Wtd. (ft)	4204.67	Wetted Per. (ft)		10453.19	
Min Ch El (ft)	1166.90	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)		1.14	
Frctn Loss (ft)	21.85	Cum Volume (acre-ft)	83.19	15830.98	2196.50
C & E Loss (ft)	0.01	Cum SA (acres)	36.05	4491.82	452.70

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6450.00	8600.00	5478.77	3553.53	1981.91	23.82	1.79	1.54
8600.00	10750.00	10076.50	5291.49	2150.00	43.81	2.46	1.90
10750.00	12900.00	2673.20	2372.54	2118.11	11.62	1.12	1.13
12900.00	15050.00	4514.41	3268.54	2150.02	19.63	1.52	1.38
15050.00	RB 17200.00	257.13	441.90	1067.08	1.12	0.41	0.58

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6450.00	8600.00	6692.63	4048.95	2125.02	23.08	1.91	1.65
8600.00	10750.00	12097.58	5802.75	2150.00	41.72	2.70	2.08
10750.00	12900.00	3770.97	2883.30	2150.04	13.00	1.34	1.31
12900.00	15050.00	5921.36	3779.80	2150.02	20.42	1.76	1.57
15050.00	RB 17200.00	517.46	758.50	1501.32	1.78	0.51	0.68

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6450.00	8600.00	10326.70	5123.56	2150.42	22.95	2.38	2.02
8600.00	10750.00	16874.26	6878.54	2150.00	37.50	3.20	2.45
10750.00	12900.00	6720.24	3959.08	2150.04	14.93	1.84	1.70
12900.00	15050.00	9443.48	4855.59	2150.02	20.99	2.26	1.94

15050.00	RB 17200.00	1635.34	1597.62	1852.71	3.63	0.86	1.02

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 12.03

INPUT
Description: Flow increased by 3,000 cfs for the full flow. Flow continues to weir into Model MDB1 from Model MDB2.

1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs
Full Flow: 48,000 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8492.84	1148.79	8670	1148	8880	1148	9700	1146	10000	1145.6
10180	1145.6	10470	1146	10600	1146.3	10690	1146	10870	1145.6
11000	1146	11070	1146	11240	1146	12160	1144.7	12500	1145
12670	1146	12730	1146.5	12770	1146	12820	1145.5	13310	1144.8
13730	1144.8	13960	1146	14050	1146	14250	1148	14370	1148.3
14970	1149.2								

Manning's n Values num= 1

Sta	n Val
8492.84	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8492.84	14970	5076.85	4654.204	4360.7	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8492.84	8492.84	

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1147.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.080	
W.S. Elev (ft)	1147.45	Reach Len. (ft)	5076.85	4654.20	4360.70
Crit W.S. (ft)	1146.42	Flow Area (sq ft)		9190.47	
E.G. Slope (ft/ft)	0.008257	Area (sq ft)		9190.47	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	5090.29	Top Width (ft)		5090.29	
Vel Total (ft/s)	2.50	Avg. Vel. (ft/s)		2.50	
Max Chl Dpth (ft)	2.75	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	253107.5	Conv. (cfs)		253107.5	
Length Wtd. (ft)	4654.20	Wetted Per. (ft)		5090.31	
Min Ch El (ft)	1144.70	Shear (lb/sq ft)		0.93	
Alpha	1.00	Stream Power (lb/ft s)		2.33	
Frctn Loss (ft)	19.08	Cum Volume (acre-ft)	6.44	6945.99	874.14
C & E Loss (ft)	0.02	Cum SA (acres)	5.02	2671.36	401.82

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1147.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.080	
W.S. Elev (ft)	1147.81	Reach Len. (ft)	5076.85	4654.20	4360.70
Crit W.S. (ft)	1146.58	Flow Area (sq ft)		11057.23	
E.G. Slope (ft/ft)	0.007431	Area (sq ft)		11057.23	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	5274.00	Top Width (ft)		5274.00	
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)		2.62	
Max Chl Dpth (ft)	3.11	Hydr. Depth (ft)		2.10	
Conv. Total (cfs)	336424.2	Conv. (cfs)		336424.2	
Length Wtd. (ft)	4654.20	Wetted Per. (ft)		5274.03	
Min Ch El (ft)	1144.70	Shear (lb/sq ft)		0.97	
Alpha	1.00	Stream Power (lb/ft s)		2.55	
Frctn Loss (ft)	19.14	Cum Volume (acre-ft)	12.20	8138.51	1019.45
C & E Loss (ft)	0.02	Cum SA (acres)	9.37	2790.92	417.03

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

section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1148.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.080	
W.S. Elev (ft)	1148.78	Reach Len. (ft)	5076.85	4654.20	4360.70
Crit W.S. (ft)	1147.02	Flow Area (sq ft)		16645.05	
E.G. Slope (ft/ft)	0.006456	Area (sq ft)		16645.05	
Q Total (cfs)	48000.00	Flow (cfs)		48000.00	
Top Width (ft)	6196.79	Top Width (ft)		6196.79	
Vel Total (ft/s)	2.88	Avg. Vel. (ft/s)		2.88	
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)		2.69	
Conv. Total (cfs)	597403.4	Conv. (cfs)		597403.4	
Length Wtd. (ft)	4654.20	Wetted Per. (ft)		6196.82	
Min Ch El (ft)	1144.70	Shear (lb/sq ft)		1.08	
Alpha	1.00	Stream Power (lb/ft s)		3.12	
Frctn Loss (ft)	19.06	Cum Volume (acre-ft)	83.19	13945.85	2196.50
C & E Loss (ft)	0.02	Cum SA (acres)	36.05	3688.27	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8492.84	9788.27	809.38	565.25	683.40	3.52	0.83	1.43
9788.27	11083.70	4687.58	2094.18	1295.44	20.38	1.62	2.24
11083.70	12379.14	7346.18	2742.09	1295.43	31.94	2.12	2.68
12379.14	13674.57	8223.48	2934.13	1295.44	35.75	2.26	2.80
13674.57	RB 14970.00	1933.38	854.81	520.60	8.41	1.64	2.26

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8492.84	9788.27	1298.36	838.03	831.10	4.48	1.01	1.55
9788.27	11083.70	6214.67	2560.83	1295.44	21.43	1.98	2.43
11083.70	12379.14	9050.55	3208.74	1295.43	31.21	2.48	2.82
12379.14	13674.57	9971.17	3400.79	1295.44	34.38	2.63	2.93
13674.57	RB 14970.00	2465.25	1048.83	556.62	8.50	1.88	2.35

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8492.84	9788.27	3597.43	1944.92	1293.66	7.49	1.50	1.85
9788.27	11083.70	11060.79	3817.84	1295.44	23.04	2.95	2.90
11083.70	12379.14	14363.07	4465.75	1295.43	29.92	3.45	3.22
12379.14	13674.57	15407.11	4657.79	1295.44	32.10	3.60	3.31
13674.57	RB 14970.00	3571.61	1758.74	1016.85	7.44	1.73	2.03

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 11.15

INPUT
Description: Flow increased by 6,500 cfs for the full flow. Flow continues to weir into Model MDB1 from Model MDB2.

1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs

Full Flow: 54,500 cfs
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5850	1130	5960	1129.5	6080	1130	6240	1129.6	7230	1128
7380	1126	7790	1126	7950	1124	8080	1124	8190	1123.8
8200	1124	8300	1124	8450	1123.7	8660	1124	9750	1126
9820	1126	10000	1126.4	10170	1126	10390	1125.8	10830	1125.6
11080	1126	12060	1128	12350	1128	12500	1128	12560	1127
12830	1126	13320	1128	13450	1128.3	13600	1128	13800	1128
13940	1127.6	14040	1128	14130	1129	14180	1127.8	14200	1128
14440	1129	14620	1129.3	14740	1130	14880	1130	15000	1130.5

Manning's n Values num= 1

Sta	n Val
5850	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5850	15000	3444.52	856.789	2730.8	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5850	5850		15000	15000	1130.5

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1128.45	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.080	
W.S. Elev (ft)	1128.42	Reach Len. (ft)	3444.50	2856.79	2730.80
Crit W.S. (ft)	1126.29	Flow Area (sq ft)		15258.18	
E.G. Slope (ft/ft)	0.002442	Area (sq ft)		15258.18	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	7249.52	Top Width (ft)		7249.52	
Vel Total (ft/s)	1.51	Avg. Vel. (ft/s)		1.51	
Max Chl Dpth (ft)	4.72	Hydr. Depth (ft)		2.10	
Conv. Total (cfs)	465444.6	Conv. (cfs)		465444.6	
Length Wtd. (ft)	2856.79	Wetted Per. (ft)		7249.58	
Min Ch El (ft)	1123.70	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		0.48	
Frctn Loss (ft)	12.99	Cum Volume (acre-ft)	6.44	5639.87	874.14
C & E Loss (ft)	0.01	Cum SA (acres)	5.02	2012.14	401.82

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1128.76	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.080	
W.S. Elev (ft)	1128.71	Reach Len. (ft)	3444.50	2856.79	2730.80
Crit W.S. (ft)	1126.47	Flow Area (sq ft)		17469.69	
E.G. Slope (ft/ft)	0.002608	Area (sq ft)		17469.69	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	7545.61	Top Width (ft)		7545.61	
Vel Total (ft/s)	1.66	Avg. Vel. (ft/s)		1.66	
Max Chl Dpth (ft)	5.01	Hydr. Depth (ft)		2.32	
Conv. Total (cfs)	567869.2	Conv. (cfs)		567869.2	
Length Wtd. (ft)	2856.79	Wetted Per. (ft)		7545.68	
Min Ch El (ft)	1123.70	Shear (lb/sq ft)		0.38	
Alpha	1.00	Stream Power (lb/ft s)		0.63	
Frctn Loss (ft)	12.85	Cum Volume (acre-ft)	12.20	6614.52	1019.45
C & E Loss (ft)	0.01	Cum SA (acres)	9.37	2106.06	417.03

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1129.83	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.080	
W.S. Elev (ft)	1129.76	Reach Len. (ft)	3444.50	2856.79	2730.80
Crit W.S. (ft)	1127.10	Flow Area (sq ft)		25972.56	
E.G. Slope (ft/ft)	0.002945	Area (sq ft)		25972.56	
Q Total (cfs)	54500.00	Flow (cfs)		54500.00	
Top Width (ft)	8646.75	Top Width (ft)		8646.75	
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)		2.10	
Max Chl Dpth (ft)	6.06	Hydr. Depth (ft)		3.00	
Conv. Total (cfs)	1004289.0	Conv. (cfs)		1004289.0	

Length Wtd. (ft)	2856.79	Wetted Per. (ft)		8646.83	
Min Ch El (ft)	1123.70	Shear (lb/sq ft)		0.55	
Alpha	1.00	Stream Power (lb/ft s)		1.16	
Frctn Loss (ft)	11.77	Cum Volume (acre-ft)	83.19	11669.09	2196.50
C & E Loss (ft)	0.01	Cum SA (acres)	36.05	2895.28	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5850.00	7680.00	957.02	990.15	706.90	4.16	1.40	0.97
7680.00	9510.00	13544.01	7102.88	1830.02	58.89	3.88	1.91
9510.00	11340.00	6418.01	4537.59	1830.00	27.90	2.48	1.41
11340.00	13170.00	1873.80	2167.81	1830.01	8.15	1.18	0.86
13170.00	RB 15000.00	207.16	459.73	1052.65	0.90	0.44	0.45

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5850.00	7680.00	1240.67	1229.12	891.88	4.28	1.38	1.01
7680.00	9510.00	16180.66	7649.96	1830.02	55.80	4.18	2.12
9510.00	11340.00	8191.00	5084.67	1830.00	28.24	2.78	1.61
11340.00	13170.00	2878.40	2714.89	1830.01	9.93	1.48	1.06
13170.00	RB 15000.00	509.28	791.03	1163.76	1.76	0.68	0.64

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 5850.00	7680.00	3020.29	2519.84	1627.20	5.54	1.55	1.20
7680.00	9510.00	25825.76	9571.55	1830.02	47.39	5.23	2.70
9510.00	11340.00	15354.23	7006.25	1830.00	28.17	3.83	2.19
11340.00	13170.00	7716.07	4636.47	1830.01	14.16	2.53	1.66
13170.00	RB 15000.00	2583.65	2238.41	1529.60	4.74	1.46	1.15

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 10.61

INPUT
Description: Flow increased by 5,500 cfs for the full flow. Flow continues to weir into Model MDB1 from Model MDB2.

1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs
Full Flow: 60,000 cfs
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6070	1120	6190	1119	6400	1118	6990	1117	7140	1117.3
7320	1117.5	7470	1117.8	7760	1118	7920	1117	8270	1116
8500	1114.7	8760	1114	8940	1114	9010	1114	9260	1112.8
9570	1114	9690	1113.5	10000	1112.6	10230	1112	10520	1112.2
11890	1114	11950	1114	11990	1114	12400	1116	12790	1117
13160	1118	13340	1118.5						

Manning's n Values num= 1

Sta	n Val
6070	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6070	13340	5109.53	3705.168	1624.08	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1115.45	Element			
Vel Head (ft)	0.15	Wt. n-Val.		0.080	
W.S. Elev (ft)	1115.30	Reach Len. (ft)	5109.50	3705.17	1624.08
Crit W.S. (ft)	1114.29	Flow Area (sq ft)		7504.25	
E.G. Slope (ft/ft)	0.011239	Area (sq ft)		7504.25	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	3864.40	Top Width (ft)		3864.40	
Vel Total (ft/s)	3.06	Avg. Vel. (ft/s)		3.06	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	216951.0	Conv. (cfs)		216951.0	
Length Wtd. (ft)	3705.17	Wetted Per. (ft)		3864.42	
Min Ch El (ft)	1112.00	Shear (lb/sq ft)		1.36	
Alpha	1.00	Stream Power (lb/ft s)		4.18	
Frctn Loss (ft)	10.67	Cum Volume (acre-ft)	6.44	4893.46	874.14
C & E Loss (ft)	0.03	Cum SA (acres)	5.02	1647.69	401.82

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1115.89	Element			
Vel Head (ft)	0.15	Wt. n-Val.		0.080	
W.S. Elev (ft)	1115.74	Reach Len. (ft)	5109.50	3705.17	1624.08
Crit W.S. (ft)	1114.49	Flow Area (sq ft)		9217.70	
E.G. Slope (ft/ft)	0.009521	Area (sq ft)		9217.70	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	4030.19	Top Width (ft)		4030.19	
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)		3.15	
Max Chl Dpth (ft)	3.74	Hydr. Depth (ft)		2.29	
Conv. Total (cfs)	297206.6	Conv. (cfs)		297206.6	
Length Wtd. (ft)	3705.17	Wetted Per. (ft)		4030.20	
Min Ch El (ft)	1112.00	Shear (lb/sq ft)		1.36	
Alpha	1.00	Stream Power (lb/ft s)		4.28	
Frctn Loss (ft)	10.69	Cum Volume (acre-ft)	12.20	5739.41	1019.45
C & E Loss (ft)	0.03	Cum SA (acres)	9.37	1726.47	417.03

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1118.05	Element			
Vel Head (ft)	0.14	Wt. n-Val.		0.080	
W.S. Elev (ft)	1117.91	Reach Len. (ft)	5109.50	3705.17	1624.08
Crit W.S. (ft)		Flow Area (sq ft)		19938.84	
E.G. Slope (ft/ft)	0.005926	Area (sq ft)		19938.84	
Q Total (cfs)	60000.00	Flow (cfs)		60000.00	
Top Width (ft)	6530.95	Top Width (ft)		6530.95	
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)		3.01	
Max Chl Dpth (ft)	5.91	Hydr. Depth (ft)		3.05	
Conv. Total (cfs)	779386.3	Conv. (cfs)		779386.3	
Length Wtd. (ft)	3705.17	Wetted Per. (ft)		6530.98	
Min Ch El (ft)	1112.00	Shear (lb/sq ft)		1.13	
Alpha	1.00	Stream Power (lb/ft s)		3.40	
Frctn Loss (ft)	11.34	Cum Volume (acre-ft)	83.19	10163.59	2196.50
C & E Loss (ft)	0.02	Cum SA (acres)	36.05	2397.58	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7524.00	8978.00	1031.27	564.93	584.97	4.48	0.97	1.83
8978.00	10432.00	10855.10	3338.26	1454.01	47.20	2.30	3.25

10432.00	11886.00	10599.83	3290.93	1454.00	46.09	2.26	3.22
11886.00	RB 13340.00	513.79	310.13	371.44	2.23	0.83	1.66

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7524.00	8978.00	1680.62	835.52	661.77	5.80	1.26	2.01
8978.00	10432.00	13351.05	3969.42	1454.01	46.04	2.73	3.36
10432.00	11886.00	13086.81	3922.09	1454.00	45.13	2.70	3.34
11886.00	RB 13340.00	881.52	490.68	460.43	3.04	1.07	1.80

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6070.00	7524.00	357.07	494.96	1071.43	0.60	0.46	0.72
7524.00	8978.00	6053.12	2931.54	1310.51	10.09	2.24	2.06
8978.00	10432.00	24831.34	7127.86	1454.01	41.39	4.90	3.48
10432.00	11886.00	24557.21	7080.52	1454.00	40.93	4.87	3.47
11886.00	RB 13340.00	4201.25	2303.95	1241.04	7.00	1.86	1.82

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 9.91

INPUT
Description: 1/3 Flow: 23,300 cfs
2/3 Flow: 29,000 cfs
Full Flow: 60,000 cfs

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6730	1110	7190	1108	7480	1106	7630	1104	7950	1102
8650	1100	8800	1099.8	8950	1100	9020	1100.2	9160	1100.5
9280	1100	10000	1098.9	10160	1100	10200	1099.5	10230	1100
10250	1100.4	10270	1100	10340	1100	10450	1100.6	10700	1101.4
10800	1102	11170	1102.6	11390	1102.7	11530	1103	11560	1102.7
11710	1103.1	12410	1104	12780	1104	12850	1104	13000	1105
13150	1105.5	13250	1106	13460	1107.5	13530	1108		

Manning's n Values num= 1

Sta	n Val
6730	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6730	13530	3080.6	3144.326	2269.3	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1104.75	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.080	
W.S. Elev (ft)	1104.72	Reach Len. (ft)	3080.60	3144.33	2269.30
Crit W.S. (ft)		Flow Area (sq ft)		16404.18	
E.G. Slope (ft/ft)	0.001289	Area (sq ft)		16404.18	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	5381.22	Top Width (ft)		5381.22	
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)		1.40	
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)		3.05	
Conv. Total (cfs)	640579.5	Conv. (cfs)		640579.5	
Length Wtd. (ft)	3144.33	Wetted Per. (ft)		5381.27	
Min Ch El (ft)	1098.90	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.34	
Frctn Loss (ft)	12.91	Cum Volume (acre-ft)	6.44	3876.65	874.14
C & E Loss (ft)	0.06	Cum SA (acres)	5.02	1254.48	401.82

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1105.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.080	
W.S. Elev (ft)	1105.13	Reach Len. (ft)	3080.60	3144.33	2269.30
Crit W.S. (ft)		Flow Area (sq ft)		18644.20	
E.G. Slope (ft/ft)	0.001375	Area (sq ft)		18644.20	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	5493.39	Top Width (ft)		5493.39	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.39	
Conv. Total (cfs)	782075.4	Conv. (cfs)		782075.4	
Length Wtd. (ft)	3144.33	Wetted Per. (ft)		5493.44	
Min Ch El (ft)	1098.90	Shear (lb/sq ft)		0.29	
Alpha	1.00	Stream Power (lb/ft s)		0.45	
Frctn Loss (ft)	13.01	Cum Volume (acre-ft)	12.20	4554.45	1019.45
C & E Loss (ft)	0.05	Cum SA (acres)	9.37	1321.44	417.03

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1106.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.080	
W.S. Elev (ft)	1106.62	Reach Len. (ft)	3080.60	3144.33	2269.30
Crit W.S. (ft)		Flow Area (sq ft)		27173.25	
E.G. Slope (ft/ft)	0.001863	Area (sq ft)		27173.25	
Q Total (cfs)	60000.00	Flow (cfs)		60000.00	
Top Width (ft)	5945.86	Top Width (ft)		5945.86	
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)		2.21	
Max Chl Dpth (ft)	7.72	Hydr. Depth (ft)		4.57	
Conv. Total (cfs)	1389935.6	Conv. (cfs)		1389935.6	
Length Wtd. (ft)	3144.33	Wetted Per. (ft)		5945.93	
Min Ch El (ft)	1098.90	Shear (lb/sq ft)		0.53	
Alpha	1.00	Stream Power (lb/ft s)		1.17	
Frctn Loss (ft)	12.69	Cum Volume (acre-ft)	83.19	8159.94	2196.50
C & E Loss (ft)	0.02	Cum SA (acres)	36.05	1866.95	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6730.00	8090.00	870.38	976.87	513.75	3.78	1.90	0.89
8090.00	9450.00	9194.60	5932.60	1360.00	39.98	4.36	1.55
9450.00	10810.00	10468.23	6412.86	1360.02	45.51	4.72	1.63
10810.00	12170.00	2205.63	2519.09	1360.00	9.59	1.85	0.88
12170.00	RB 13530.00	261.16	562.80	787.48	1.14	0.71	0.46

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6730.00	8090.00	1234.59	1195.16	544.69	4.26	2.19	1.03
8090.00	9450.00	11264.07	6493.56	1360.00	38.84	4.77	1.73
9450.00	10810.00	12686.37	6973.82	1360.02	43.75	5.13	1.82
10810.00	12170.00	3249.54	3080.06	1360.00	11.21	2.26	1.06

12170.00	RB 13530.00	565.42	901.62	868.71	1.95	1.04	0.63

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6730.00	8090.00	3227.48	2102.02	699.50	5.38	3.01	1.54
8090.00	9450.00	21337.13	8517.29	1360.00	35.56	6.26	2.51
9450.00	10810.00	23379.57	8997.55	1360.02	38.97	6.62	2.60
10810.00	12170.00	9087.72	5103.79	1360.00	15.15	3.75	1.78
12170.00	RB 13530.00	2968.10	2452.62	1166.40	4.95	2.10	1.21

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 9.31

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs
Full Flow: 60,000 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7445.22	1097	7595.22	1094	8055.22	1093	8945.22	1092	9145.22	1090
9455.22	1089.9	9875.22	1087.7	10045.22	1089.8	11015.22	1089.9	11085.22	1090
11175.22	1092	11205.22	1090	12475.22	1092	13645.22	1094	13775.22	1094.4
14395.22	1096								

Manning's n Values num= 1

Sta	n Val
7445.22	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7445.22	14395.22	3833.53	3735.754	3432.6	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1091.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.		0.080	
W.S. Elev (ft)	1091.12	Reach Len. (ft)	3833.50	3735.75	3432.60
Crit W.S. (ft)	1091.12	Flow Area (sq ft)		3565.51	
E.G. Slope (ft/ft)	0.088812	Area (sq ft)		3565.51	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	2834.08	Top Width (ft)		2834.08	
Vel Total (ft/s)	6.45	Avg. Vel. (ft/s)		6.45	
Max Chl Dpth (ft)	3.42	Hydr. Depth (ft)		1.26	
Conv. Total (cfs)	77177.8	Conv. (cfs)		77177.8	
Length Wtd. (ft)	3735.75	Wetted Per. (ft)		2834.16	
Min Ch El (ft)	1087.70	Shear (lb/sq ft)		6.98	
Alpha	1.00	Stream Power (lb/ft s)		45.00	
Frctn Loss (ft)	6.08	Cum Volume (acre-ft)	6.44	3155.90	874.14
C & E Loss (ft)	0.19	Cum SA (acres)	5.02	957.98	401.82

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1092.11	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.55	Wt. n-Val.		0.080	
W.S. Elev (ft)	1091.56	Reach Len. (ft)	3833.50	3735.75	3432.60
Crit W.S. (ft)	1091.36	Flow Area (sq ft)		4871.41	
E.G. Slope (ft/ft)	0.058158	Area (sq ft)		4871.41	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	3179.37	Top Width (ft)		3179.37	
Vel Total (ft/s)	5.95	Avg. Vel. (ft/s)		5.95	
Max Chl Dpth (ft)	3.86	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	120252.4	Conv. (cfs)		120252.4	
Length Wtd. (ft)	3735.75	Wetted Per. (ft)		3179.47	
Min Ch El (ft)	1087.70	Shear (lb/sq ft)		5.56	
Alpha	1.00	Stream Power (lb/ft s)		33.12	
Frctn Loss (ft)	6.27	Cum Volume (acre-ft)	12.20	3705.73	1019.45
C & E Loss (ft)	0.16	Cum SA (acres)	9.37	1008.42	417.03

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1093.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.080	
W.S. Elev (ft)	1093.72	Reach Len. (ft)	3833.50	3735.75	3432.60
Crit W.S. (ft)		Flow Area (sq ft)		14510.33	
E.G. Slope (ft/ft)	0.014461	Area (sq ft)		14510.33	
Q Total (cfs)	60000.00	Flow (cfs)		60000.00	
Top Width (ft)	5760.56	Top Width (ft)		5760.56	
Vel Total (ft/s)	4.13	Avg. Vel. (ft/s)		4.13	
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)		2.52	
Conv. Total (cfs)	498943.9	Conv. (cfs)		498943.9	
Length Wtd. (ft)	3735.75	Wetted Per. (ft)		5760.68	
Min Ch El (ft)	1087.70	Shear (lb/sq ft)		2.27	
Alpha	1.00	Stream Power (lb/ft s)		9.40	
Frctn Loss (ft)	5.98	Cum Volume (acre-ft)	83.19	6655.50	2196.50
C & E Loss (ft)	0.07	Cum SA (acres)	36.05	1444.44	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8835.22	10225.22	15019.68	2044.17	1192.49	65.30	1.71	7.35
10225.22	11615.22	7836.21	1448.52	1337.53	34.07	1.08	5.41
11615.22	13005.22	144.11	72.84	304.14	0.63	0.24	1.98

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8835.22	10225.22	17348.48	2571.52	1235.92	59.82	2.08	6.75
10225.22	11615.22	11001.41	2035.08	1363.61	37.94	1.49	5.41
11615.22	13005.22	650.11	264.84	579.94	2.24	0.46	2.45

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7445.22	8835.22	1876.35	1026.01	1112.59	3.13	0.92	1.83
8835.22	10225.22	26675.58	5514.53	1390.03	44.46	3.97	4.84
10225.22	11615.22	22939.39	5037.29	1390.09	38.23	3.62	4.55
11615.22	13005.22	8301.18	2737.29	1390.00	13.84	1.97	3.03
13005.22	RB 14395.22	207.50	195.25	477.97	0.35	0.41	1.06

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 8.63

INPUT
Description: 1/3 Flow: 23,000 cfs
2/3 Flow: 29,000 cfs
Full Flow: 60,000 cfs
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7385.69	1090	7755.69	1088	8065.69	1086	8255.69	1084	8485.69	1082
8725.69	1080	8785.69	1079.5	8995.69	1079.5	9085.69	1080	9225.69	1082
9435.69	1082	9645.69	1080	9705.69	1079.7	10295.69	1079.7	10415.69	1080
10585.69	1080	10735.69	1080	10785.69	1079.9	10985.69	1079.8	12005.69	1080
12055.69	1082	12115.69	1082	12155.69	1080.5	12705.69	1082	12835.69	1082
13525.69	1084	14225.69	1084	14685.69	1086	14825.69	1088	14925.69	1086.5
15345.69	1086.7	15555.69	1088	16015.69	1090				

Manning's n Values num= 1

Sta	n Val
7385.69	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
7385.69 16015.69 3143.8 4723.81 5770.63 .1 .3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1085.17	Element			
Vel Head (ft)	0.01	Wt. n-Val.		0.080	
W.S. Elev (ft)	1085.16	Reach Len. (ft)	3143.80	4723.81	5770.63
Crit W.S. (ft)	1081.12	Flow Area (sq ft)		23752.86	
E.G. Slope (ft/ft)	0.000468	Area (sq ft)		23752.86	
Q Total (cfs)	23000.00	Flow (cfs)		23000.00	
Top Width (ft)	6346.26	Top Width (ft)		6346.26	
Vel Total (ft/s)	0.97	Avg. Vel. (ft/s)		0.97	
Max Chl Dpth (ft)	5.66	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	1063524.1	Conv. (cfs)		1063524.1	
Length Wtd. (ft)	4723.81	Wetted Per. (ft)		6346.39	
Min Ch El (ft)	1079.50	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	5.80	Cum Volume (acre-ft)	6.44	1984.48	874.14
C & E Loss (ft)	0.03	Cum SA (acres)	5.02	564.32	401.82

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1085.68	Element			
Vel Head (ft)	0.02	Wt. n-Val.		0.080	
W.S. Elev (ft)	1085.67	Reach Len. (ft)	3143.80	4723.81	5770.63
Crit W.S. (ft)		Flow Area (sq ft)		27020.65	
E.G. Slope (ft/ft)	0.000501	Area (sq ft)		27020.65	
Q Total (cfs)	29000.00	Flow (cfs)		29000.00	
Top Width (ft)	6511.46	Top Width (ft)		6511.46	
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)		1.07	
Max Chl Dpth (ft)	6.17	Hydr. Depth (ft)		4.15	
Conv. Total (cfs)	1296005.9	Conv. (cfs)		1296005.9	
Length Wtd. (ft)	4723.81	Wetted Per. (ft)		6511.59	
Min Ch El (ft)	1079.50	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.14	

Frctn Loss (ft)	5.93	Cum Volume (acre-ft)	12.20	2338.18	1019.45
C & E Loss (ft)	0.03	Cum SA (acres)	9.37	592.88	417.03

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1087.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.080	
W.S. Elev (ft)	1087.91	Reach Len. (ft)	3143.80	4723.81	5770.63
Crit W.S. (ft)		Flow Area (sq ft)		42994.59	
E.G. Slope (ft/ft)	0.000576	Area (sq ft)		42994.59	
Q Total (cfs)	60000.00	Flow (cfs)		60000.00	
Top Width (ft)	7758.73	Top Width (ft)		7758.73	
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)		1.40	
Max Chl Dpth (ft)	8.41	Hydr. Depth (ft)		5.54	
Conv. Total (cfs)	2500699.3	Conv. (cfs)		2500699.3	
Length Wtd. (ft)	4723.81	Wetted Per. (ft)		7758.90	
Min Ch El (ft)	1079.50	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	5.66	Cum Volume (acre-ft)	83.19	4189.66	2196.50
C & E Loss (ft)	0.02	Cum SA (acres)	36.05	864.73	452.70

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7385.69	9111.69	3344.44	3686.33	966.01	14.54	3.82	0.91
9111.69	10837.69	8872.62	8349.45	1726.02	38.58	4.84	1.06
10837.69	12563.69	8921.88	8377.33	1726.07	38.79	4.85	1.07
12563.69	14289.69	1841.96	3250.82	1726.00	8.01	1.88	0.57
14289.69	RB 16015.69	19.11	88.95	202.28	0.08	0.44	0.21

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7385.69	9111.69	4175.92	4189.62	1014.30	14.40	4.13	1.00
9111.69	10837.69	10921.76	9226.78	1726.02	37.66	5.35	1.18
10837.69	12563.69	10976.61	9254.65	1726.07	37.85	5.36	1.19
12563.69	14289.69	2858.49	4128.14	1726.00	9.86	2.39	0.69
14289.69	RB 16015.69	67.21	221.48	319.19	0.23	0.69	0.30

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7385.69	9111.69	8236.98	6812.82	1341.92	13.73	5.08	1.21
9111.69	10837.69	20702.45	13098.05	1726.02	34.50	7.59	1.58
10837.69	12563.69	20775.56	13125.93	1726.07	34.63	7.60	1.58
12563.69	14289.69	9101.46	7999.42	1726.00	15.17	4.63	1.14
14289.69	RB 16015.69	1183.54	1958.38	1238.88	1.97	1.58	0.60

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

CROSS SECTION RIVER: MCMICKEN DAM

REACH: B1 RS: 7.84

INPUT
Description: Cross section located north of Dysart Drain. The area located west of Dysart Road modeled as ineffective flow. The flow in this section only includes the flow that is located east of Dysart Road in cross section 8.63.

1/3 Flow: 20,000 cfs
2/3 Flow: 24,000 cfs
Full Flow: 46,000 cfs
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7843.91	1086	8130.08	1084	8413.14	1082	8661.29	1080	8831.2	1078
8919.35	1076	8966.8	1076	9086.8	1076	9406.8	1078	9566.8	1074
9726.8	1072.5	9756.8	1072	9912.8	1072	9951.8	1068	10101.8	1068
10140.8	1072	10426.8	1072	10526.8	1072.4	10726.8	1074.8	11326.8	1078.5
11426.8	1079	11476.8	1079	11501.8	1076.5	11526.8	1076.5	11551.8	1079
11726.8	1078.7	12126.8	108012448.33		1081.1	12726.8	1082.7	12906.8	1084
13026.8	1083.5	13186.8	1083.1	13386.8	1083	13498.8	1082.9	13511.8	1082
13729.8	1082	13789.8	1082	13929.8	1081	14157.8	1081	14229.8	1081
14329.8	1078.9	14529.8	1079.7	14629.8	1080	14729.8	1078.9	15229.8	1077.9
15529.8	1076	15729.8	1076	16329.8	1076	16729.8	1077	16929.8	1076
17729.8	1076.7	18029.8	1077	18129.8	1076.2	18229.8	1077	18329.8	1076
18429.8	1076.7	18529.8	1076.9	18629.8	1077	18729.8	1077.2	18829.8	1077.2
18929.8	1077.4	19029.8	1077.4	19129.8	1077.4	19229.8	1077.6	19329.8	1078.2
19429.8	1078.6	19529.8	1079.2	19578.8	1079.6619616.45		1081.6		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7843.91	.08	7843.91	.08	14157.8	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7843.91	14157.8	125	141.87	1454.38	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
12906.8	19616.45	1084

Blocked Obstructions num= 13

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
9576.8	9726.8	1074.1	9726.8	9912.8	1074.9	9912.8	10140.8	1075.75
10140.8	10726.8	1077.85	10726.8	11016.8	1080	11016.8	11156.8	1081.5
11156.8	11234.8	1083	11234.8	11346.8	1081.5	11346.8	11726.8	1080
11726.8	12306.8	1081	12306.8	12448.33	1082	12448.33	12526.8	1082.2
12526.8	12726.8	1082.7						

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1079.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.080	
W.S. Elev (ft)	1079.07	Reach Len. (ft)	125.00	141.87	1454.38
Crit W.S. (ft)	1077.94	Flow Area (sq ft)		4771.09	
E.G. Slope (ft/ft)	0.014968	Area (sq ft)		4771.09	10540.48
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	6745.50	Top Width (ft)		1900.26	4845.24
Vel Total (ft/s)	4.19	Avg. Vel. (ft/s)		4.19	
Max Chl Dpth (ft)	5.17	Hydr. Depth (ft)		2.51	
Conv. Total (cfs)	163472.6	Conv. (cfs)		163472.6	
Length Wtd. (ft)	141.87	Wetted Per. (ft)		1904.30	
Min Ch El (ft)	1073.91	Shear (lb/sq ft)		2.34	
Alpha	1.00	Stream Power (lb/ft s)		9.81	
Frctn Loss (ft)	2.95	Cum Volume (acre-ft)	6.44	437.85	175.96
C & E Loss (ft)	0.03	Cum SA (acres)	5.02	117.18	80.89

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1079.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.080	
W.S. Elev (ft)	1079.43	Reach Len. (ft)	125.00	141.87	1454.38
Crit W.S. (ft)	1078.16	Flow Area (sq ft)		5456.38	
E.G. Slope (ft/ft)	0.014392	Area (sq ft)		5456.38	12292.66
Q Total (cfs)	24000.00	Flow (cfs)		24000.00	
Top Width (ft)	6991.98	Top Width (ft)		1963.40	5028.58
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)		4.40	
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)		2.78	
Conv. Total (cfs)	200053.5	Conv. (cfs)		200053.5	
Length Wtd. (ft)	141.87	Wetted Per. (ft)		1967.44	

Min Ch El (ft)	1073.91	Shear (lb/sq ft)		2.49	
Alpha	1.00	Stream Power (lb/ft s)		10.96	
Frctn Loss (ft)	2.16	Cum Volume (acre-ft)	12.20	577.22	205.21
C & E Loss (ft)	0.00	Cum SA (acres)	9.37	133.35	83.95

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

CROSS SECTION OUTPUT Profile #Full

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1082.26				
Vel Head (ft)	0.18	Wt. n-Val.		0.080	
W.S. Elev (ft)	1082.08	Reach Len. (ft)	125.00	141.87	1454.38
Crit W.S. (ft)	1079.18	Flow Area (sq ft)		13341.32	
E.G. Slope (ft/ft)	0.006669	Area (sq ft)		13690.38	26485.67
Q Total (cfs)	46000.00	Flow (cfs)		46000.00	
Top Width (ft)	9988.53	Top Width (ft)		4529.88	5458.65
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)		3.45	
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)		3.44	
Conv. Total (cfs)	563270.3	Conv. (cfs)		563270.3	
Length Wtd. (ft)	141.87	Wetted Per. (ft)		3892.95	
Min Ch El (ft)	1073.91	Shear (lb/sq ft)		1.43	
Alpha	1.00	Stream Power (lb/ft s)		4.92	
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)	83.19	1116.09	442.15
C & E Loss (ft)	0.00	Cum SA (acres)	36.05	198.42	91.13

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7843.91	9106.69	2963.09	805.56	366.55	14.82	2.20	3.68
9106.69	10369.47	16480.86	3703.95	1266.78	82.40	2.93	4.45
10369.47	11632.24	556.04	261.60	270.97	2.78	0.97	2.13

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7843.91	9106.69	3571.96	940.92	396.69	14.88	2.37	3.80
9106.69	10369.47	19553.65	4151.90	1266.78	81.47	3.29	4.71
10369.47	11632.24	874.40	363.57	303.97	3.64	1.20	2.41

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7843.91	9106.69	6968.45	2376.64	704.77	15.15	3.37	2.93
9106.69	10369.47	32015.36	7501.68	1266.78	69.60	5.94	4.27
10369.47	11632.24	5852.68	2638.40	1188.95	12.72	2.23	2.22
11632.24	12895.02	1163.52	824.59	732.46	2.53	1.13	1.41

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 7.81

INPUT
Description: Cross section located south of Dysart Drain. A portion of the flow has ponded within Dysart Drain and/or has overtopped El

Mirage Road and is traveling towards the east. This flow will continue to travel east into the Agua Fria flood plain therefore, it has been removed from the model.

1/3 Flow: 12,000 cfs
2/3
Flow 17,500 cfs
Full Flow 43,500 cfs
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8980	1076	8983	1075	9040	1075	9087	1072	9140	1072
9180	1073	9420	1073	9740	1074.5	9920	1075.3	10000	1075.6
10340	1076.9	10540	1077.8	10740	1079.5	10782	1080	11740	1080
11960	1081	12320	1082	12495	1082.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8980	.08	8980	.08	12495	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8980	12495	1463.08	1739.28	3152.13	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8980	8980	1085

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1076.37	Element			
Vel Head (ft)	0.53	Wt. n-Val.		0.080	
W.S. Elev (ft)	1075.85	Reach Len. (ft)	1463.08	1739.28	3152.13
Crit W.S. (ft)	1075.42	Flow Area (sq ft)		2063.59	
E.G. Slope (ft/ft)	0.041585	Area (sq ft)		2063.59	
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	1084.54	Top Width (ft)		1084.54	
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)		5.82	
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)		1.90	
Conv. Total (cfs)	58845.2	Conv. (cfs)		58845.2	
Length Wtd. (ft)	1739.28	Wetted Per. (ft)		1084.80	
Min Ch El (ft)	1072.00	Shear (lb/sq ft)		4.94	
Alpha	1.00	Stream Power (lb/ft s)		28.72	
Frctn Loss (ft)	5.94	Cum Volume (acre-ft)	6.44	426.72	
C & E Loss (ft)	0.14	Cum SA (acres)	5.02	112.32	

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1077.57	Element			
Vel Head (ft)	0.32	Wt. n-Val.		0.080	
W.S. Elev (ft)	1077.24	Reach Len. (ft)	1463.08	1739.28	3152.13
Crit W.S. (ft)	1075.96	Flow Area (sq ft)		3826.68	
E.G. Slope (ft/ft)	0.016430	Area (sq ft)		3826.68	
Q Total (cfs)	17500.00	Flow (cfs)		17500.00	
Top Width (ft)	1435.93	Top Width (ft)		1435.93	
Vel Total (ft/s)	4.57	Avg. Vel. (ft/s)		4.57	
Max Chl Dpth (ft)	5.24	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	136525.4	Conv. (cfs)		136525.4	
Length Wtd. (ft)	1739.28	Wetted Per. (ft)		1437.45	
Min Ch El (ft)	1072.00	Shear (lb/sq ft)		2.73	
Alpha	1.00	Stream Power (lb/ft s)		12.49	
Frctn Loss (ft)	5.93	Cum Volume (acre-ft)	12.20	562.10	
C & E Loss (ft)	0.07	Cum SA (acres)	9.37	127.82	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1081.29	Element			
Vel Head (ft)	0.22	Wt. n-Val.		0.080	
W.S. Elev (ft)	1081.06	Reach Len. (ft)	1463.08	1739.28	3152.13
Crit W.S. (ft)	1077.67	Flow Area (sq ft)		11428.04	
E.G. Slope (ft/ft)	0.007082	Area (sq ft)		11428.04	
Q Total (cfs)	43500.00	Flow (cfs)		43500.00	
Top Width (ft)	3001.97	Top Width (ft)		3001.97	
Vel Total (ft/s)	3.81	Avg. Vel. (ft/s)		3.81	

Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)		3.81
Conv. Total (cfs)	516897.2	Conv. (cfs)		516897.2
Length Wtd. (ft)	1739.18	Wetted Per. (ft)		3007.33
Min Ch El (ft)	1072.00	Shear (lb/sq ft)		1.68
Alpha	1.00	Stream Power (lb/ft s)		6.40
Frctn Loss (ft)	6.15	Cum Volume (acre-ft)	83.19	1075.19
C & E Loss (ft)	0.02	Cum SA (acres)	36.05	186.15

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9683.00	11152.73	1768.43	702.79	92.94	2.52	6.31
9683.00	10386.00	847.27	295.17	382.00	7.06	0.77	2.87

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9683.00	14460.15	2747.80	704.52	82.63	3.91	5.26
9683.00	10386.00	3039.14	1076.86	703.01	17.37	1.53	2.82
10386.00	11089.00	0.71	2.01	29.93	0.00	0.07	0.35

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8980.00	9683.00	25739.13	5432.80	708.33	59.17	7.73	4.74
9683.00	10386.00	14019.89	3761.85	703.01	32.23	5.35	3.73
10386.00	11089.00	2759.41	1418.56	703.01	6.34	2.02	1.95
11089.00	11792.00	932.32	739.76	703.00	2.14	1.05	1.26
11792.00	RB 12495.00	49.25	75.07	189.97	0.11	0.40	0.66

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 7.48

INPUT
Description: 1/3 Flow: 12,000 cfs
2/3 Flow 17,500 cfs
Full Flow 43,500 cfs
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8738.65	1076	8960.32	1076	9230	1074	9415.28	1072	9464.93	1070
9490	1068	9520	1066	9640	1064	9760	1062	9980	1060
10000	1059.75	10020	1060	10080	1062	10110	1064	10230	1066
10270	1060	10330	1070	10470	1072	10550	1072	10600	1070
10830	1070	10860	1072	10900	1072	10950	1074	10980	1076
11000	1078	11020	1080	11033.59	1080	11070	1080	11160	1078
11410	1078	11590	1080	11660	1082	11800	1084	12030	1086
12100	1088	12170	1090						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8738.65	.08	9230	.08	11033.59	.08

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

923011033.59 1166.22 902.77 618.19 .1 .3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1070.29	Element			
Vel Head (ft)	0.06	Wt. n-Val.		0.080	
W.S. Elev (ft)	1070.23	Reach Len. (ft)	1166.22	902.77	618.19
Crit W.S. (ft)		Flow Area (sq ft)		6130.02	
E.G. Slope (ft/ft)	0.001163	Area (sq ft)		6130.02	
Q Total (cfs)	12000.00	Flow (cfs)		12000.00	
Top Width (ft)	1126.62	Top Width (ft)		1126.62	
Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)		1.96	
Max Chl Dpth (ft)	10.48	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	351893.5	Conv. (cfs)		351893.5	
Length Wtd. (ft)	915.00	Wetted Per. (ft)		1128.22	
Min Ch El (ft)	1059.75	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		0.77	
Frctn Loss (ft)	2.99	Cum Volume (acre-ft)	6.44	263.15	
C & E Loss (ft)	0.04	Cum SA (acres)	5.02	68.17	

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1071.56	Element			
Vel Head (ft)	0.08	Wt. n-Val.		0.080	
W.S. Elev (ft)	1071.48	Reach Len. (ft)	1166.22	902.77	618.19
Crit W.S. (ft)		Flow Area (sq ft)		7638.57	
E.G. Slope (ft/ft)	0.001429	Area (sq ft)		7638.57	
Q Total (cfs)	17500.00	Flow (cfs)		17500.00	
Top Width (ft)	1294.63	Top Width (ft)		1294.63	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29	
Max Chl Dpth (ft)	11.73	Hydr. Depth (ft)		5.90	
Conv. Total (cfs)	462858.8	Conv. (cfs)		462858.8	
Length Wtd. (ft)	919.64	Wetted Per. (ft)		1296.33	
Min Ch El (ft)	1059.75	Shear (lb/sq ft)		0.53	
Alpha	1.00	Stream Power (lb/ft s)		1.20	
Frctn Loss (ft)	3.37	Cum Volume (acre-ft)	12.20	333.20	
C & E Loss (ft)	0.04	Cum SA (acres)	9.37	73.30	

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1075.12	Element			
Vel Head (ft)	0.17	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1074.95	Reach Len. (ft)	1166.22	902.77	618.19
Crit W.S. (ft)		Flow Area (sq ft)	61.34	13182.04	
E.G. Slope (ft/ft)	0.002112	Area (sq ft)	61.34	13182.04	
Q Total (cfs)	43500.00	Flow (cfs)	31.96	43468.04	
Top Width (ft)	1862.93	Top Width (ft)	128.62	1734.31	
Vel Total (ft/s)	3.28	Avg. Vel. (ft/s)	0.52	3.30	
Max Chl Dpth (ft)	15.20	Hydr. Depth (ft)	0.48	7.60	
Conv. Total (cfs)	946541.6	Conv. (cfs)	695.5	945846.1	
Length Wtd. (ft)	930.55	Wetted Per. (ft)	128.62	1736.14	
Min Ch El (ft)	1059.75	Shear (lb/sq ft)	0.06	1.00	
Alpha	1.01	Stream Power (lb/ft s)	0.03	3.30	
Frctn Loss (ft)	4.04	Cum Volume (acre-ft)	82.16	583.87	
C & E Loss (ft)	0.04	Cum SA (acres)	33.89	91.60	

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9230.00	9590.72	574.11	469.73	131.76	4.78	3.57	1.22
9590.72	9951.44	6087.56	2897.93	360.75	50.73	8.03	2.10
9951.44	10312.15	5315.62	2674.81	361.87	44.30	7.42	1.99
10312.15	10672.87	15.37	50.37	113.20	0.13	0.45	0.31

10672.87	RB 11033.59	7.34	37.18	160.65	0.06	0.23	-0.20

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9230.00	9590.72	956.22	652.99	162.72	5.46	4.02	1.46
9590.72	9951.44	8571.40	3347.42	360.75	48.98	9.28	2.56
9951.44	10312.15	7624.74	3124.30	361.87	43.57	8.66	2.44
10312.15	10672.87	167.96	264.87	231.61	0.96	1.14	0.63
10672.87	RB 11033.59	179.67	249.00	179.38	1.03	1.39	0.72

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9033.46	9131.73	0.61	3.42	30.35	0.00	0.11	0.18
9131.73	9230.00	31.35	57.93	98.27	0.07	0.59	0.54
LB 9230.00	9590.72	3248.05	1621.07	360.92	7.47	4.49	2.00
9590.72	9951.44	18482.64	4600.46	360.75	42.49	12.75	4.02
9951.44	10312.15	16977.83	4377.35	361.87	39.03	12.14	3.88
10312.15	10672.87	2738.58	1463.48	361.02	6.30	4.06	1.87
10672.87	RB 11033.59	2020.94	1119.68	291.57	4.65	3.84	1.80

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 7.31

INPUT
Description: Cross section 7.31 is located along of Glendale Avenue. The left overbank is along the ridge located along El Mirage Road. Flow in the left overbank will be removed from the model at the downstream cross section. This flow is assumed to have overtopped the ridge and will travel east towards the Agua Fria Flood Plain.

1/3
Flow: 12,000 cfs
2/3 Flow 17,500 cfs
Full Flow 43,500 cfs
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8649.42	1072	8795.61	1070	9077.72	1068	9282.92	1068	9325.6	1066
9535.6	1064.84	9863.47	1064	10000	1062.91	10111.02	1064	10257.94	1066
10444.2	1068	10562.71	1070	10659.84	1072	10802.93	1074	11020.35	1075.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8649.42	.08	9535.6	.08	11020.35	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9535.6	11020.35	766.51	1069.92	1799.3	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1067.26	Element			
Vel Head (ft)	0.49	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1066.77	Reach Len. (ft)	766.51	1069.92	1799.30
Crit W.S. (ft)	1066.26	Flow Area (sq ft)	290.08	1880.91	
E.G. Slope (ft/ft)	0.030754	Area (sq ft)	290.08	1880.91	
Q Total (cfs)	12000.00	Flow (cfs)	1114.40	10885.60	
Top Width (ft)	1020.61	Top Width (ft)	226.46	794.16	
Vel Total (ft/s)	5.53	Avg. Vel. (ft/s)	3.84	5.79	
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)	1.28	2.37	
Conv. Total (cfs)	68427.9	Conv. (cfs)	6354.7	62073.2	
Length Wtd. (ft)	1055.22	Wetted Per. (ft)	226.48	794.18	

Min Ch El (ft)	1062.90	Shear (lb/sq ft)	2.46	4.55
Alpha	1.04	Stream Power (lb/ft s)	9.45	26.32
Frctn Loss (ft)	6.53	Cum Volume (acre-ft)	2.55	180.13
C & E Loss (ft)	0.12	Cum SA (acres)	1.99	48.27

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1068.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1067.65	Reach Len. (ft)	766.51	1069.92	1799.30
Crit W.S. (ft)		Flow Area (sq ft)	496.64	2612.30	
E.G. Slope (ft/ft)	0.023032	Area (sq ft)	496.64	2612.30	
Q Total (cfs)	17500.00	Flow (cfs)	2241.17	15258.83	
Top Width (ft)	1120.88	Top Width (ft)	245.15	875.73	
Vel Total (ft/s)	5.63	Avg. Vel. (ft/s)	4.51	5.84	
Max Chl Dpth (ft)	4.75	Hydr. Depth (ft)	2.03	2.98	
Conv. Total (cfs)	115310.3	Conv. (cfs)	14767.5	100542.9	
Length Wtd. (ft)	1049.16	Wetted Per. (ft)	245.19	875.77	
Min Ch El (ft)	1062.90	Shear (lb/sq ft)	2.91	4.29	
Alpha	1.02	Stream Power (lb/ft s)	13.14	25.05	
Frctn Loss (ft)	6.31	Cum Volume (acre-ft)	5.55	226.98	
C & E Loss (ft)	0.11	Cum SA (acres)	6.09	50.81	

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1071.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1070.48	Reach Len. (ft)	766.51	1069.92	1799.30
Crit W.S. (ft)		Flow Area (sq ft)	2143.59	5358.24	
E.G. Slope (ft/ft)	0.013572	Area (sq ft)	2143.59	5358.24	
Q Total (cfs)	43500.00	Flow (cfs)	9140.35	34359.65	
Top Width (ft)	1825.12	Top Width (ft)	774.85	1050.27	
Vel Total (ft/s)	5.80	Avg. Vel. (ft/s)	4.26	6.41	
Max Chl Dpth (ft)	7.58	Hydr. Depth (ft)	2.77	5.10	
Conv. Total (cfs)	373392.9	Conv. (cfs)	78458.4	294934.5	
Length Wtd. (ft)	1026.97	Wetted Per. (ft)	774.91	1050.33	
Min Ch El (ft)	1062.90	Shear (lb/sq ft)	2.34	4.32	
Alpha	1.08	Stream Power (lb/ft s)	9.99	27.72	
Frctn Loss (ft)	5.96	Cum Volume (acre-ft)	52.64	391.75	
C & E Loss (ft)	0.11	Cum SA (acres)	21.79	62.74	

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

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9181.13	9358.36	86.14	34.57	49.24	0.72	0.70	2.49
9358.36	9535.60	1028.29	255.51	177.24	8.57	1.44	4.02
LB 9535.60	9832.55	3678.21	686.41	296.95	30.65	2.31	5.36
9832.55	10129.50	6383.06	955.48	296.96	53.19	3.22	6.68
10129.50	10426.45	824.30	239.01	200.27	6.87	1.19	3.45

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9181.13	9358.36	274.45	85.88	67.95	1.57	1.26	3.20
9358.36	9535.60	1966.76	410.77	177.24	11.24	2.32	4.79
LB 9535.60	9832.55	5415.94	946.53	296.95	30.95	3.19	5.72
9832.55	10129.50	8217.90	1215.61	296.96	46.96	4.09	6.76

10129.50	10426.45	1624.95	450.16	281.85	9.29	1.60	3.61

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8649.42	8826.66	26.80	26.54	65.91	0.06	0.40	1.01
8826.66	9003.89	525.00	234.88	177.24	1.21	1.33	2.24
9003.89	9181.13	1381.26	419.68	177.24	3.18	2.37	3.29
9181.13	9358.36	2168.56	550.17	177.28	4.99	3.10	3.94
9358.36	9535.60	5038.73	912.32	177.24	11.58	5.15	5.52
LB 9535.60	9832.55	11880.66	1786.85	296.95	27.31	6.02	6.65
9832.55	10129.50	15009.38	2055.93	296.96	34.50	6.92	7.30
10129.50	10426.45	6895.57	1289.25	296.97	15.85	4.34	5.35
10426.45	10723.40	574.03	226.21	159.45	1.32	1.42	2.54

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 7.11

INPUT
Description: Cross section 7.11 is located south of Glendale Avenue. Flow exits the model between section 7.31 and 7.11. The left overbank is along the ridge located along El Mirage Road. Flow in the left overbank will be removed from the model at the downstream cross section. This flow is assumed to have overtopped the ridge and will travel east towards the Agua Fria Flood Plain.

1/3 Flow:
11,000 cfs
2/3 Flow 15,500 cfs
Full Flow 34,500 cfs
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8839.55	1066	8990.94	1064	9025.03	1064	9066	1064.51	9085.88	1064
9105.69	1062	9222.52	1061	9322.82	1062	9429.88	1062	9478.54	1062
9521.42	1060	9590	1058	9670	1058	9720	1056	9790	1054
9930	1054	10000	1053.75	10060	1054	10310	1056	10330	1058
10400	1058	10420	1060	10450	1062	10630	1064	10700	1066
10760	1066	10790	1066	10810	1068	10880	1070	10920	1070
10990	1072	11030	1074	11060	1076	11090	1078	11130	1080
11220	1082	11260	1084	11330	1084	11510	1084	11540	1086
11570	1088	11610	1090	11710	1092	11930	1094		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8839.55	.08	9429.88	.08	10920	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9429.88	10920	1857.4	1631.27	1496.68	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1060.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.080	
W.S. Elev (ft)	1060.52	Reach Len. (ft)	1857.40	1631.27	1496.68
Crit W.S. (ft)		Flow Area (sq ft)		4303.90	
E.G. Slope (ft/ft)	0.002412	Area (sq ft)		4303.90	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	917.41	Top Width (ft)		917.41	
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)		2.56	
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)		4.69	
Conv. Total (cfs)	223972.9	Conv. (cfs)		223972.9	
Length Wtd. (ft)	1631.27	Wetted Per. (ft)		917.74	
Min Ch El (ft)	1053.75	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		1.80	
Frctn Loss (ft)	11.22	Cum Volume (acre-ft)		104.18	
C & E Loss (ft)	0.11	Cum SA (acres)		27.25	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1061.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1061.60	Reach Len. (ft)	1857.40	1631.27	1496.68
Crit W.S. (ft)		Flow Area (sq ft)	39.21	5320.11	
E.G. Slope (ft/ft)	0.002494	Area (sq ft)	39.21	5320.11	
Q Total (cfs)	15500.00	Flow (cfs)	16.32	15483.68	
Top Width (ft)	1087.40	Top Width (ft)	130.49	956.92	
Vel Total (ft/s)	2.89	Avg. Vel. (ft/s)	0.42	2.91	
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)	0.30	5.56	
Conv. Total (cfs)	310356.2	Conv. (cfs)	326.7	310029.5	
Length Wtd. (ft)	1631.39	Wetted Per. (ft)	130.49	957.32	
Min Ch El (ft)	1053.75	Shear (lb/sq ft)	0.05	0.87	
Alpha	1.01	Stream Power (lb/ft s)	0.02	2.52	
Frctn Loss (ft)	11.42	Cum Volume (acre-ft)	0.84	129.56	
C & E Loss (ft)	0.13	Cum SA (acres)	2.78	28.31	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1064.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.080	0.080	
W.S. Elev (ft)	1064.77	Reach Len. (ft)	1857.40	1631.27	1496.68
Crit W.S. (ft)		Flow Area (sq ft)	1121.73	8859.75	
E.G. Slope (ft/ft)	0.002813	Area (sq ft)	1121.73	8859.75	
Q Total (cfs)	34500.00	Flow (cfs)	1900.61	32599.39	
Top Width (ft)	1724.31	Top Width (ft)	497.24	1227.08	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)	1.69	3.68	
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)	2.26	7.22	
Conv. Total (cfs)	650427.9	Conv. (cfs)	35832.1	614595.8	
Length Wtd. (ft)	1637.68	Wetted Per. (ft)	497.36	1227.52	
Min Ch El (ft)	1053.75	Shear (lb/sq ft)	0.40	1.27	
Alpha	1.08	Stream Power (lb/ft s)	0.67	4.66	
Frctn Loss (ft)	11.92	Cum Volume (acre-ft)	23.92	217.13	
C & E Loss (ft)	0.20	Cum SA (acres)	10.60	34.77	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9429.88	9727.90	785.20	520.62	217.64	7.14	2.39	1.51
9727.90	10025.93	5512.23	1900.85	298.05	50.11	6.38	2.90
10025.93	10323.95	4383.81	1656.89	298.10	39.85	5.56	2.65
10323.95	10621.98	318.76	225.54	103.94	2.90	2.17	1.41

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9075.68	9193.75	2.06	7.35	41.44	0.01	0.18	0.28
9193.75	9311.81	14.26	31.86	89.05	0.09	0.36	0.45
9311.81	9429.88						
LB 9429.88	9727.90	1445.75	769.14	240.92	9.33	3.19	1.88
9727.90	10025.93	7362.67	2224.01	298.05	47.50	7.46	3.31

10025.93	10323.95	6065.73	1980.05	298.10	39.13	6.64	3.06
10323.95	10621.98	609.53	346.92	120.25	3.93	2.89	1.76

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8839.55	8957.62	1.06	4.12	24.97	0.00	0.16	0.26
8957.62	9075.68	41.63	69.41	118.07	0.12	0.59	0.60
9075.68	9193.75	527.78	318.71	118.17	1.53	2.70	1.66
9193.75	9311.81	777.08	401.83	118.07	2.25	3.40	1.93
9311.81	9429.88	553.07	327.66	118.07	1.60	2.78	1.69
LB 9429.88	9727.90	4800.42	1692.51	298.14	13.91	5.68	2.84
9727.90	10025.93	13653.44	3168.50	298.05	39.58	10.63	4.31
10025.93	10323.95	11945.33	2924.55	298.10	34.62	9.81	4.08
10323.95	10621.98	2190.90	1057.27	298.23	6.35	3.55	2.07
10621.98	RB 10920.00	9.29	16.92	34.99	0.03	0.48	0.55

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B1 RS: 6.80

INPUT
Description: End of cross sections. Flow has decreased for the Full Flow model by 2,000. This flow has crested over El Mirage Road to the east before reaching cross section 6.80. The remainder of the flow in the models will combine with the flow in the Agua Fria River.

1/3 Flow: 12,000 cfs
2/3 Flow 17,500 cfs
Full Flow 39,500 cfs

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8790	1062	8830	1060	8890	1058	8940	1058	9000	1060
9120	1060	9150	1058	9240	1056	9370	1054	9430	1054
9470	1056	9590	1056	9610	1054	9644	1053.15	9650	1053
9670	1052	9700	1050	9710	1048	9720	1048	9740	1046
9980	1046	10000	1044	10200	1046	10290	1050	10380	1052
10410	1052	10460	1054	10610	1054	10620	1052	10650	1052
10670	1054	10790	1054	10970	1054	11130	1056	11310	1058
11360	1060	11400	1062	11410	1062.5	11440	1064	11580	1066
11620	1068	11700	1070	11780	1072	11960	1074	12020	1076
12090	1078	12150	1080						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8790	.08	9644	.08	11410	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9644	11410	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1049.29	Element			
Vel Head (ft)	1.18	Wt. n-Val.		0.080	
W.S. Elev (ft)	1048.10	Reach Len. (ft)			
Crit W.S. (ft)	1048.10	Flow Area (sq ft)		1259.87	
E.G. Slope (ft/ft)	0.071069	Area (sq ft)		1259.87	
Q Total (cfs)	11000.00	Flow (cfs)		11000.00	
Top Width (ft)	537.81	Top Width (ft)		537.81	
Vel Total (ft/s)	8.73	Avg. Vel. (ft/s)		8.73	
Max Chl Dpth (ft)	4.10	Hydr. Depth (ft)		2.34	
Conv. Total (cfs)	41262.1	Conv. (cfs)		41262.1	
Length Wtd. (ft)		Wetted Per. (ft)		538.08	
Min Ch El (ft)	1044.00	Shear (lb/sq ft)		10.39	
Alpha	1.00	Stream Power (lb/ft s)		90.70	

Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1050.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.		0.080	
W.S. Elev (ft)	1048.72	Reach Len. (ft)			
Crit W.S. (ft)	1048.72	Flow Area (sq ft)		1599.34	
E.G. Slope (ft/ft)	0.066429	Area (sq ft)		1599.34	
Q Total (cfs)	15500.00	Flow (cfs)		15500.00	
Top Width (ft)	554.90	Top Width (ft)		554.90	
Vel Total (ft/s)	9.69	Avg. Vel. (ft/s)		9.69	
Max Chl Dpth (ft)	4.72	Hydr. Depth (ft)		2.88	
Conv. Total (cfs)	60138.6	Conv. (cfs)		60138.6	
Length Wtd. (ft)		Wetted Per. (ft)		555.24	
Min Ch El (ft)	1044.00	Shear (lb/sq ft)		11.95	
Alpha	1.00	Stream Power (lb/ft s)		115.77	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1052.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.19	Wt. n-Val.		0.080	
W.S. Elev (ft)	1050.67	Reach Len. (ft)			
Crit W.S. (ft)	1050.67	Flow Area (sq ft)		2736.56	
E.G. Slope (ft/ft)	0.057747	Area (sq ft)		2736.56	
Q Total (cfs)	32500.00	Flow (cfs)		32500.00	
Top Width (ft)	629.99	Top Width (ft)		629.99	
Vel Total (ft/s)	11.88	Avg. Vel. (ft/s)		11.88	
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		4.34	
Conv. Total (cfs)	135243.7	Conv. (cfs)		135243.7	
Length Wtd. (ft)		Wetted Per. (ft)		630.52	
Min Ch El (ft)	1044.00	Shear (lb/sq ft)		15.65	
Alpha	1.00	Stream Power (lb/ft s)		185.83	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

FLOW DISTRIBUTION OUTPUT Profile #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9644.00	9997.20	4504.80	578.60	287.91	40.95	2.01	7.79
9997.20	10350.40	6495.20	681.27	250.17	59.05	2.72	9.53

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9644.00	9997.20	6835.30	758.33	291.08	44.10	2.61	9.01
9997.20	10350.40	8664.70	841.01	264.17	55.90	3.18	10.30

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9644.00	9997.20	15854.44	1335.01	307.60	48.78	4.35	11.88
9997.20	10350.40	16645.56	1401.55	322.91	51.22	4.34	11.88

SUMMARY OF MANNING'S N VALUES

River:MCMICKEN DAM

Reach	River Sta.	n1	n2	n3
B1	16.60	.1		
B1	16.20	.1	.022	.08
B1	15.51	.1		
B1	14.78	.1		
B1	14.07	.08		
B1	13.47	.08		
B1	12.83	.08		
B1	12.03	.08		
B1	11.15	.08		

B1	10.61	.08		
B1	9.91	.08		
B1	9.31	.08		
B1	8.63	.08		
B1	7.84	.08	.08	.08
B1	7.81	.08	.08	.08
B1	7.48	.08	.08	.08
B1	7.31	.08	.08	.08
B1	7.11	.08	.08	.08
B1	6.80	.08	.08	.08

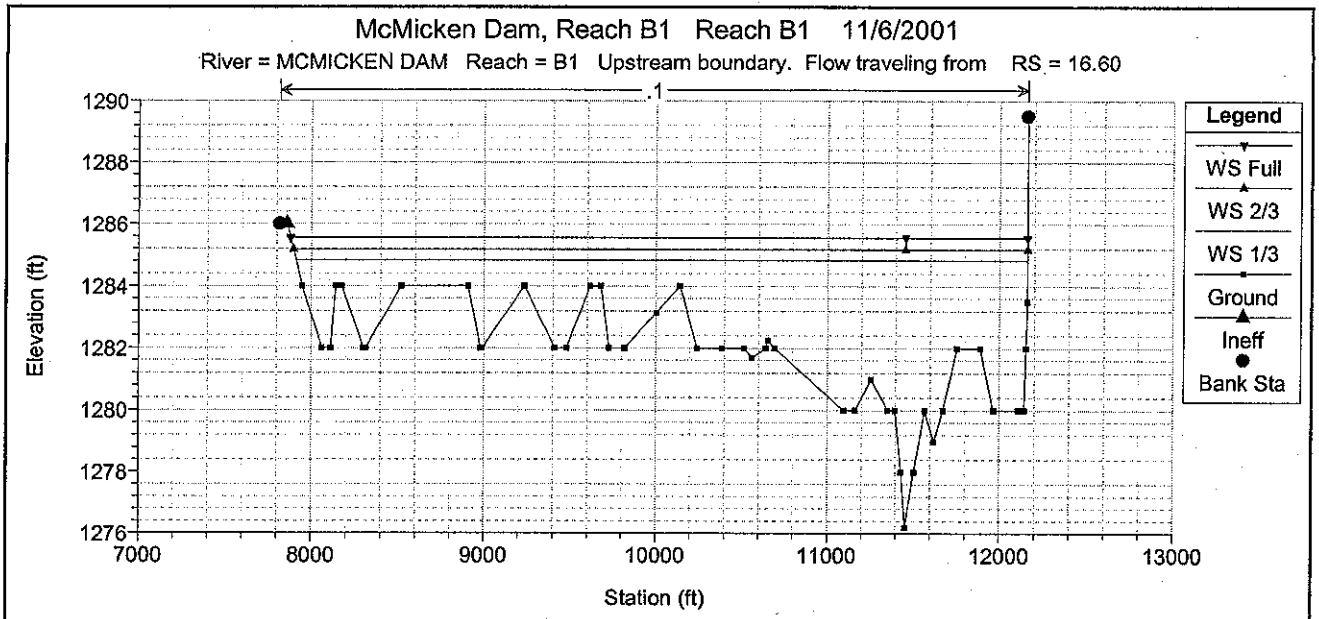
SUMMARY OF REACH LENGTHS

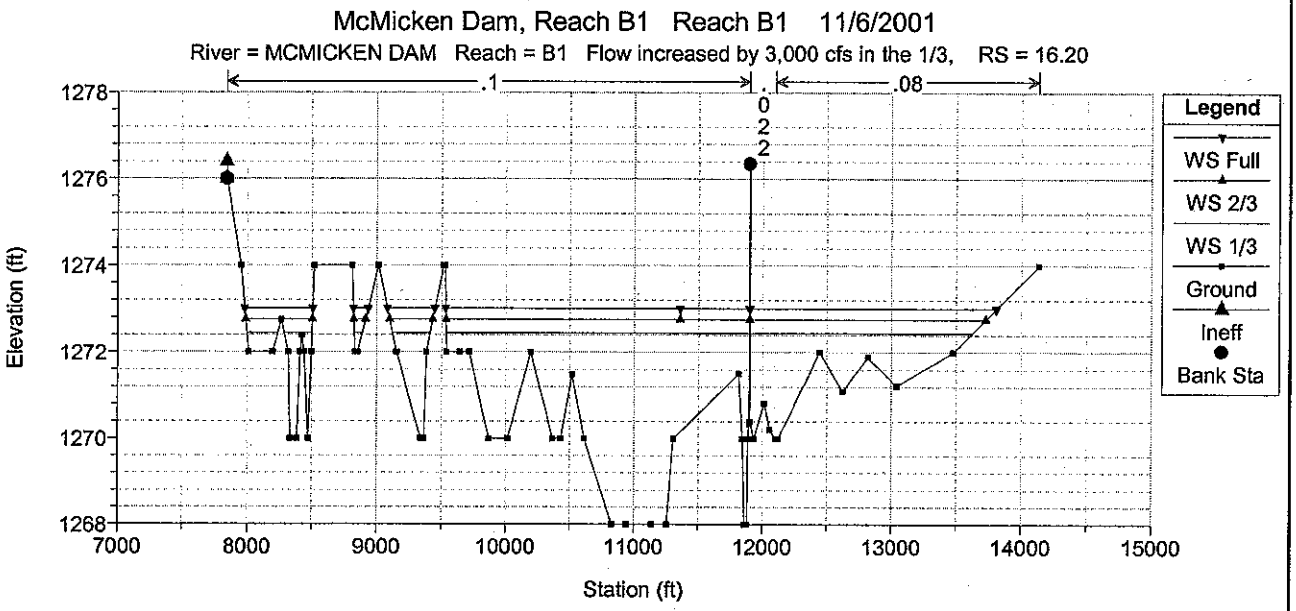
River: MCMICKEN DAM

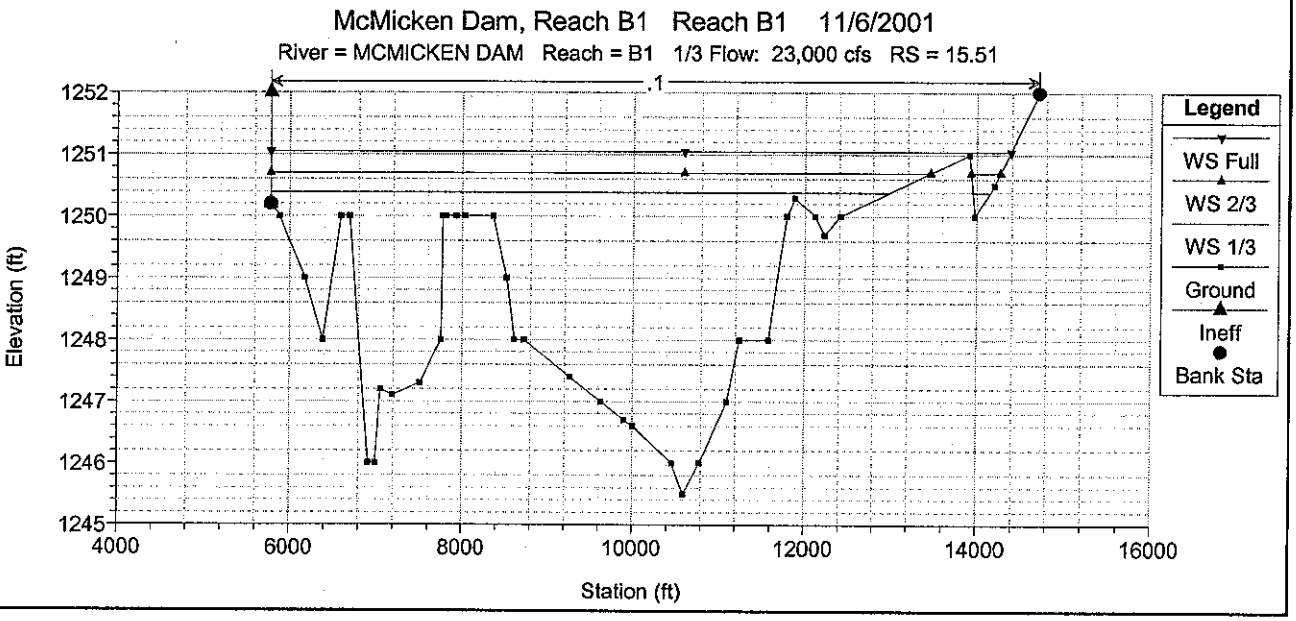
Reach	River Sta.	Left	Channel	Right
B1	16.60	2099.091	2099.091	2099.091
B1	16.20	4051.8	3670.321	4051.8
B1	15.51	3549.6	3860.292	4133.5
B1	14.78	4363.9	3748.181	3098.5
B1	14.07	2912.1	3130.181	2736.49
B1	13.47	3768.8	3401.326	3074.9
B1	12.83	4389.5	4204.675	4490.7
B1	12.03	5076.85	4654.204	4360.7
B1	11.15	3444.5	2856.789	2730.8
B1	10.61	5109.5	3705.168	1624.08
B1	9.91	3080.6	3144.326	2269.3
B1	9.31	3833.5	3735.754	3432.6
B1	8.63	3143.8	4723.81	5770.63
B1	7.84	125	141.87	1454.38
B1	7.81	1463.08	1739.28	3152.13
B1	7.48	1166.22	902.77	618.19
B1	7.31	766.51	1069.92	1799.3
B1	7.11	1857.4	1631.27	1496.68
B1	6.80	0	0	0

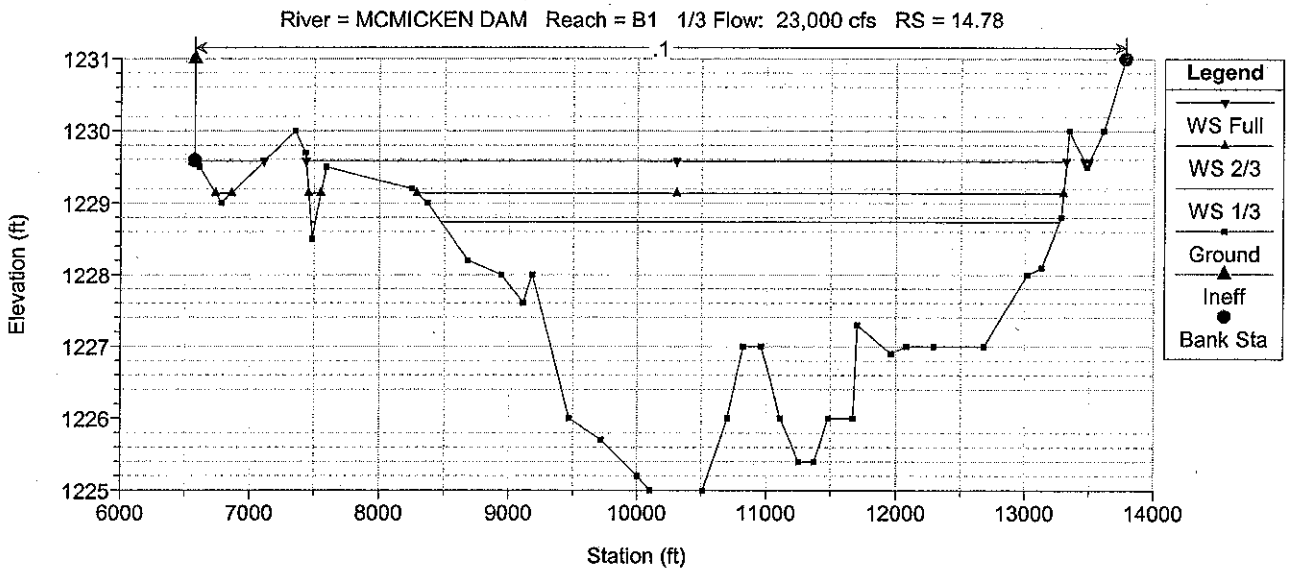
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: MCMICKEN DAM

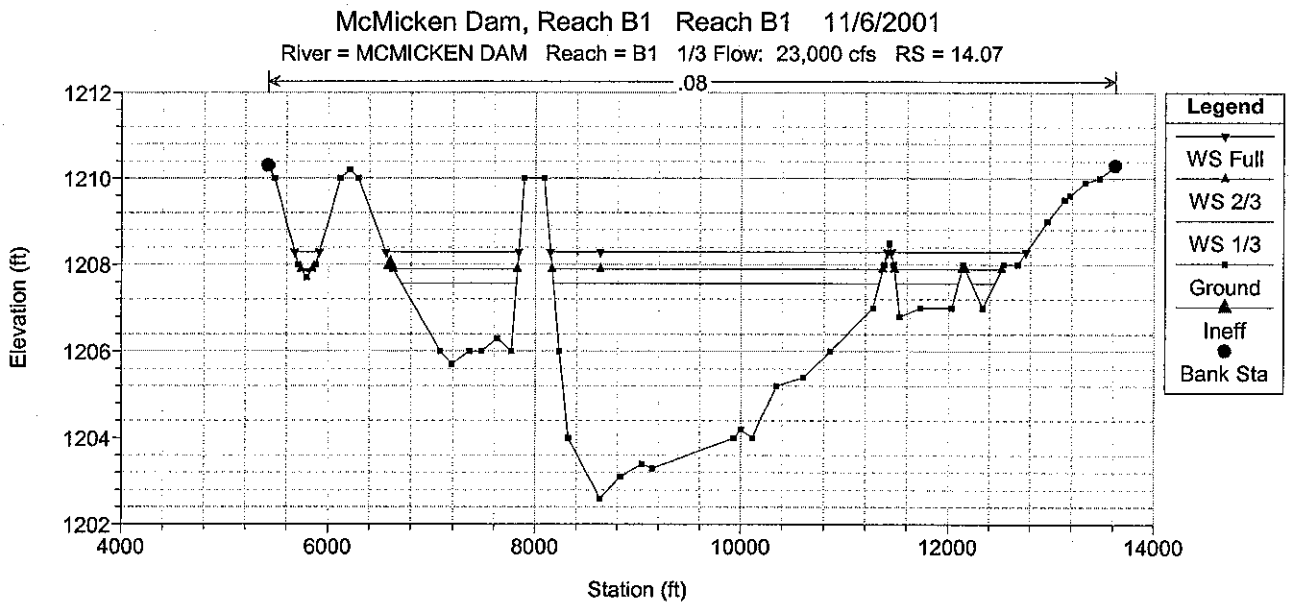
Reach	River Sta.	Contr.	Expan.
B1	16.60	.1	.3
B1	16.20	.1	.3
B1	15.51	.1	.3
B1	14.78	.1	.3
B1	14.07	.1	.3
B1	13.47	.1	.3
B1	12.83	.1	.3
B1	12.03	.1	.3
B1	11.15	.1	.3
B1	10.61	.1	.3
B1	9.91	.1	.3
B1	9.31	.1	.3
B1	8.63	.1	.3
B1	7.84	.1	.3
B1	7.81	.1	.3
B1	7.48	.1	.3
B1	7.31	.1	.3
B1	7.11	.1	.3
B1	6.80	.1	.3

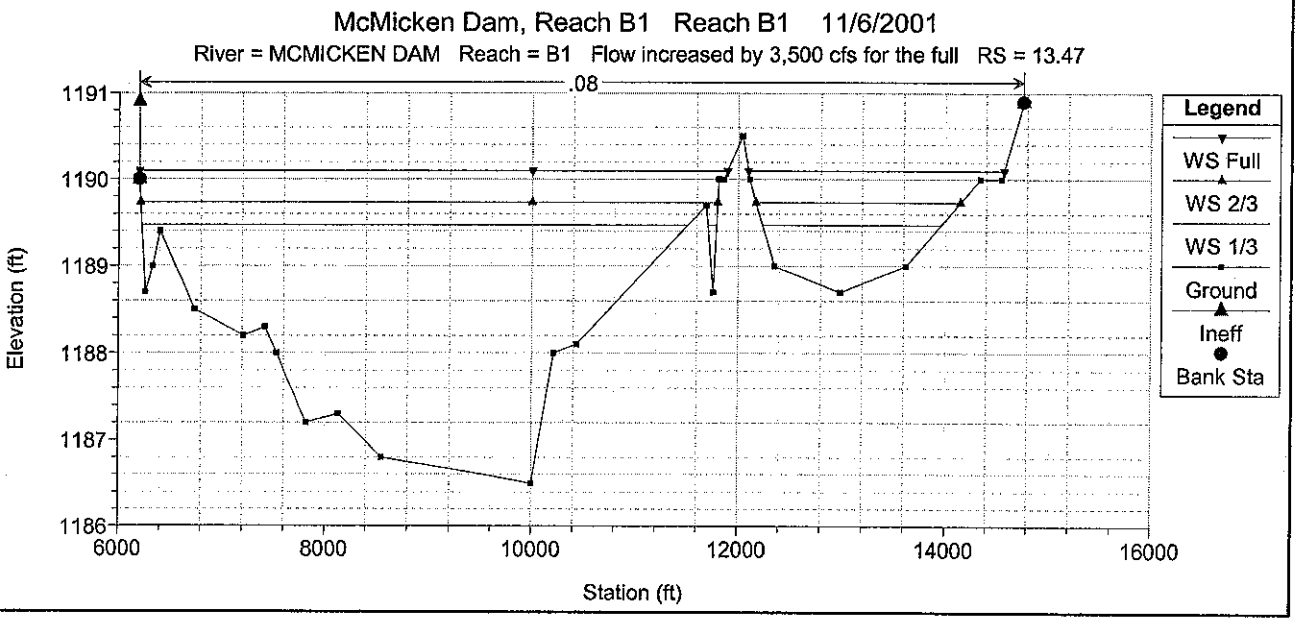

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Upstream boundary. Flow traveling from RS = 16.60
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

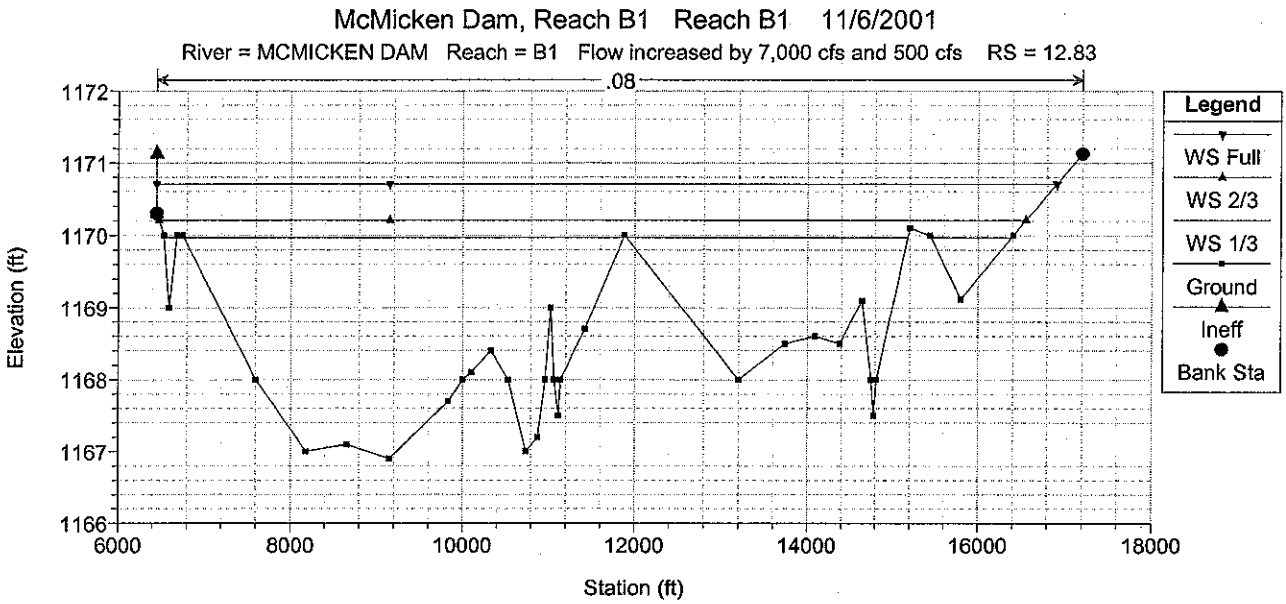

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 3,000 cfs in the 1/3, RS = 16.20
.1
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

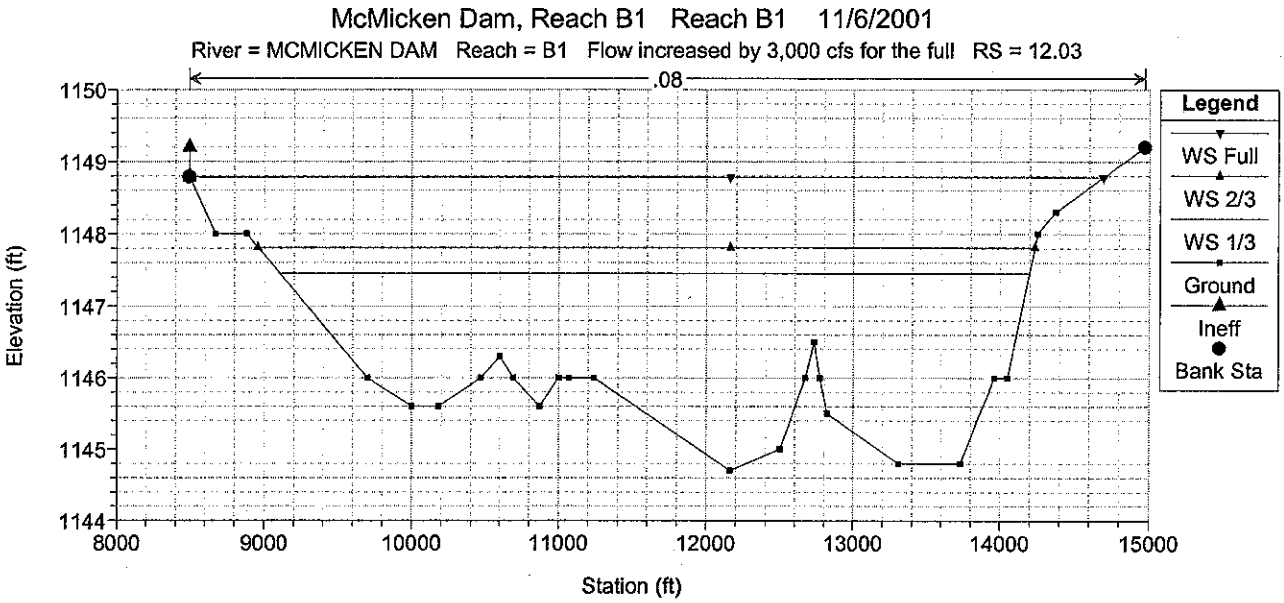

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,000 cfs RS = 15.51
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

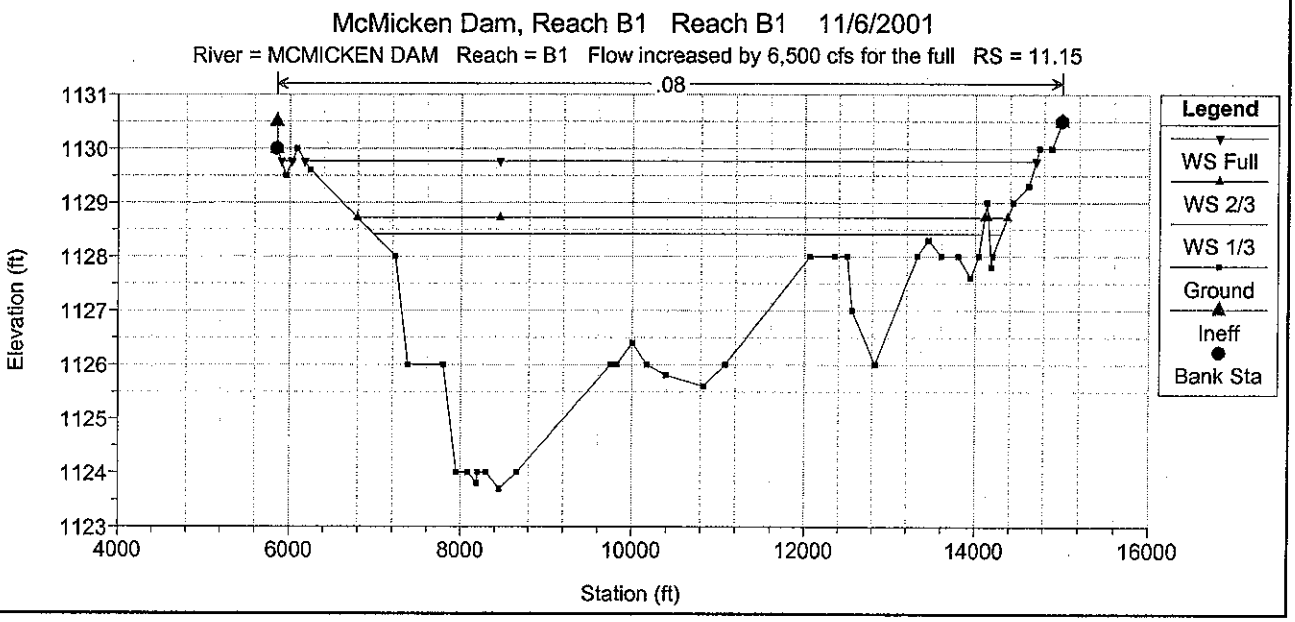

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,000 cfs RS = 14.78
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

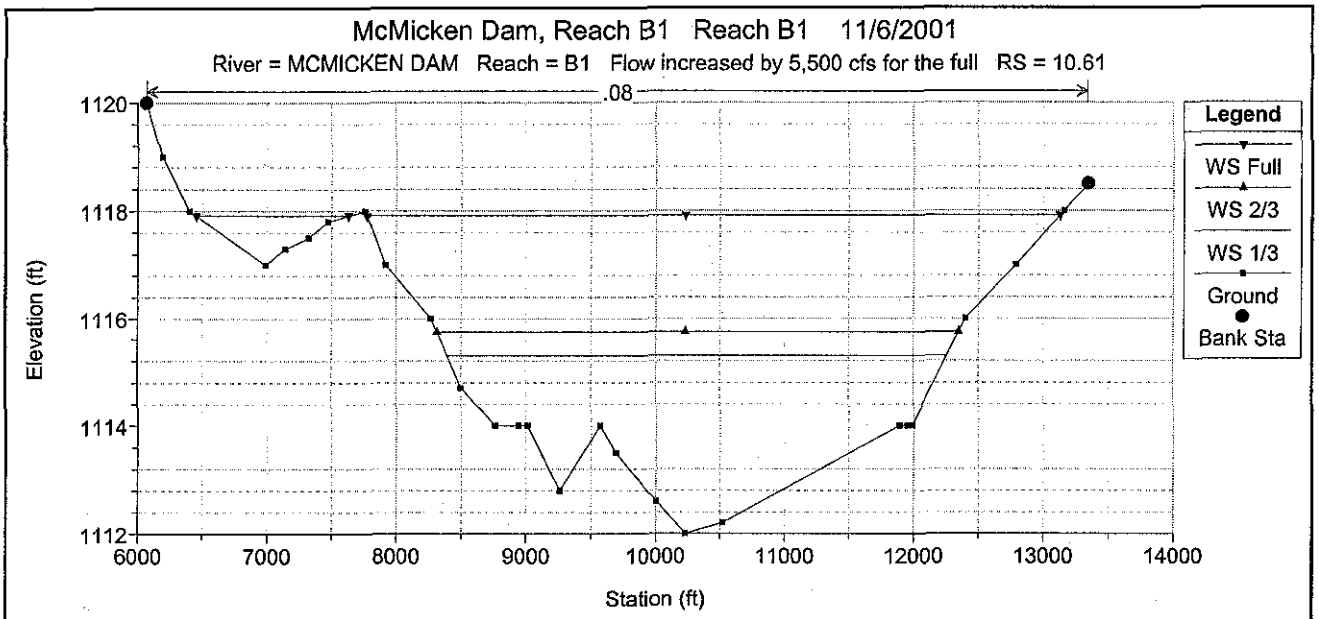

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,000 cfs RS = 14.07
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

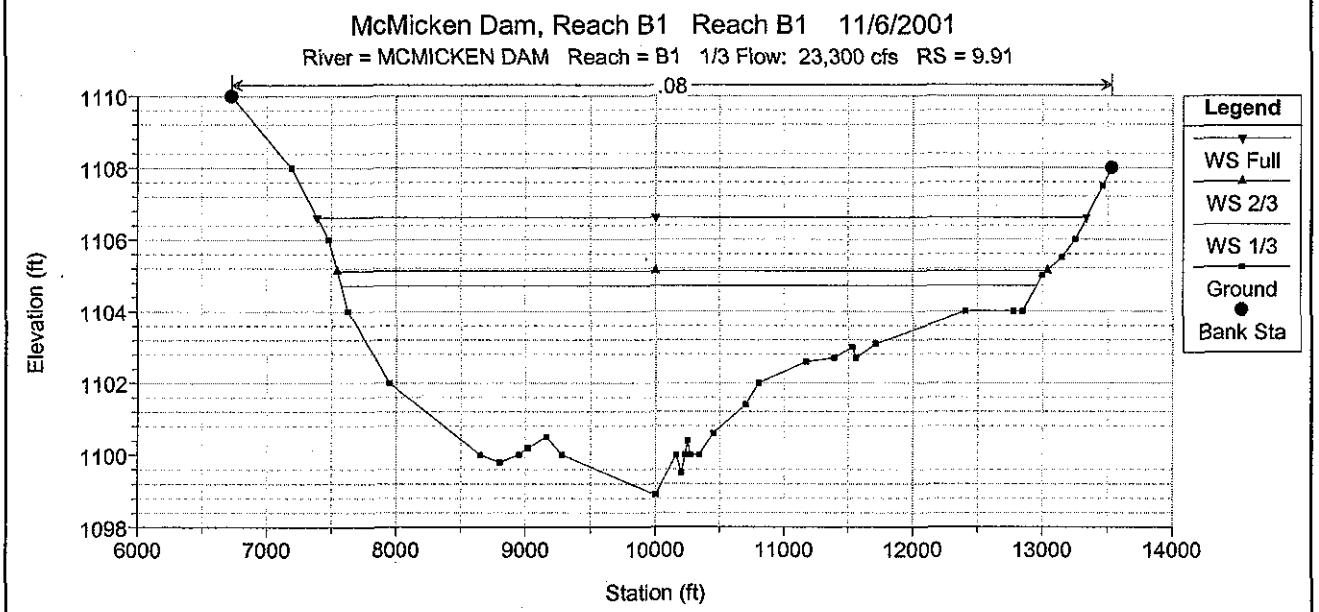

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 3,500 cfs for the full RS = 13.47
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

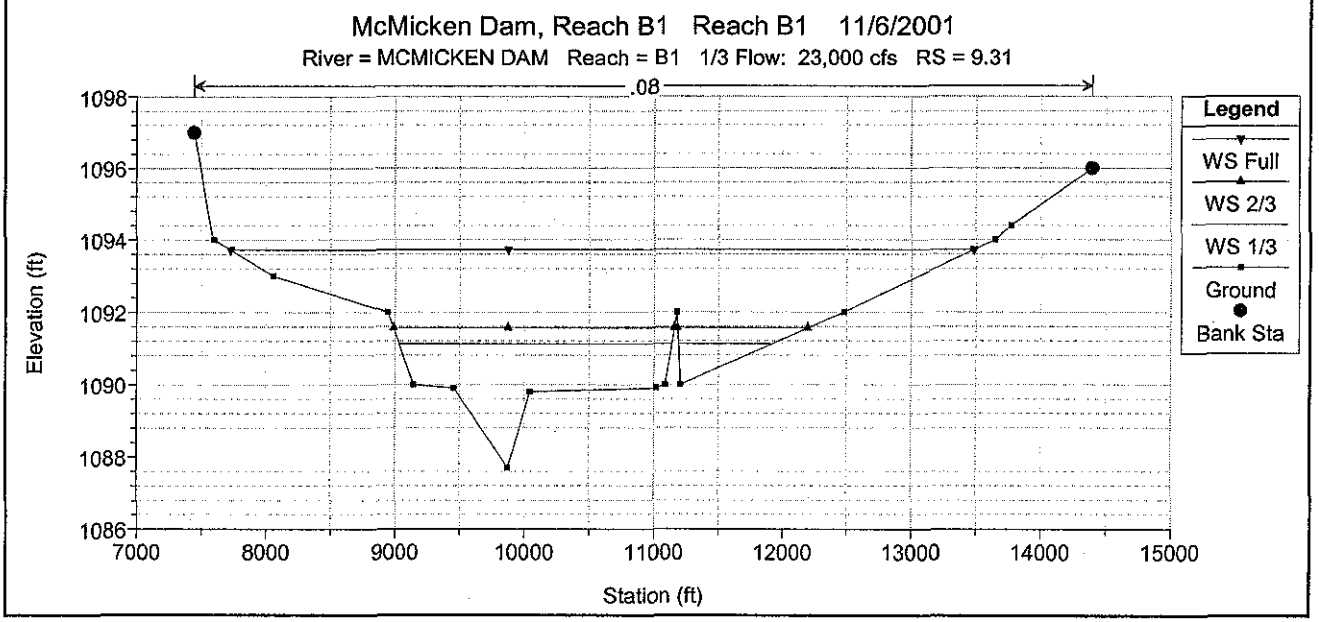

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 7,000 cfs and 500 cfs RS = 12.83
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

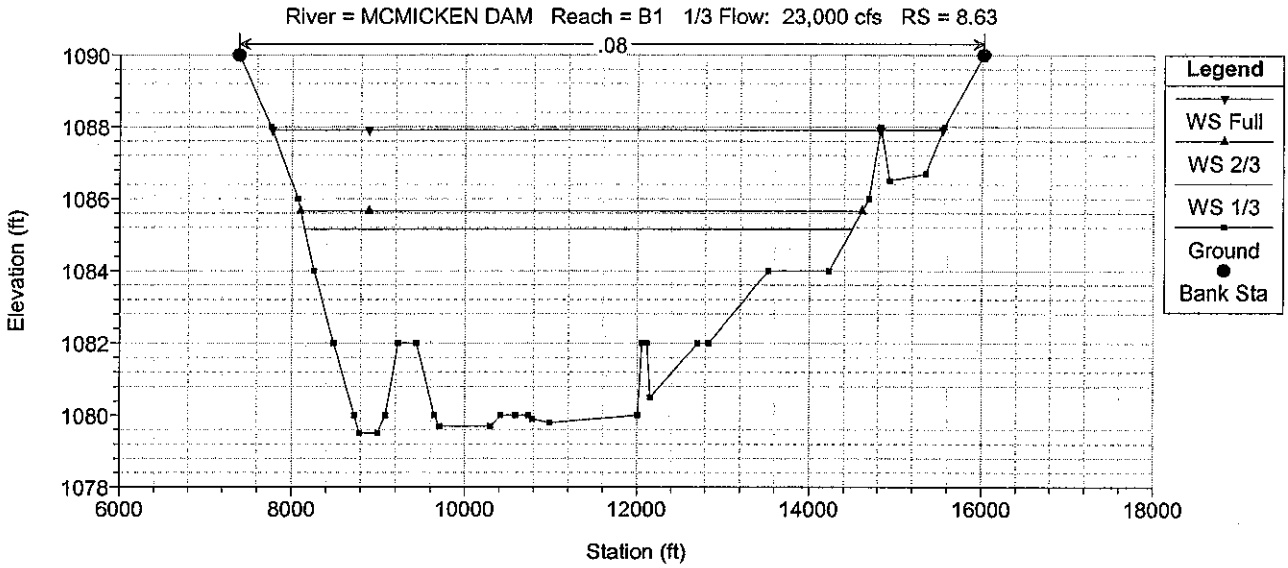

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 3,000 cfs for the full RS = 12.03
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

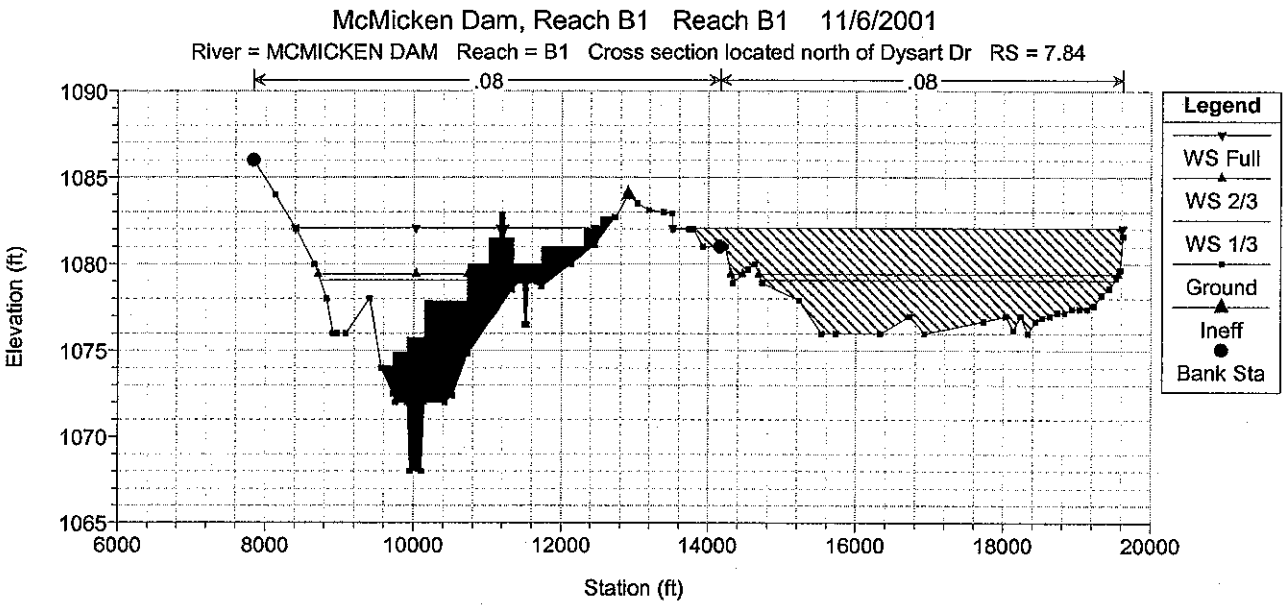

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 6,500 cfs for the full RS = 11.15
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

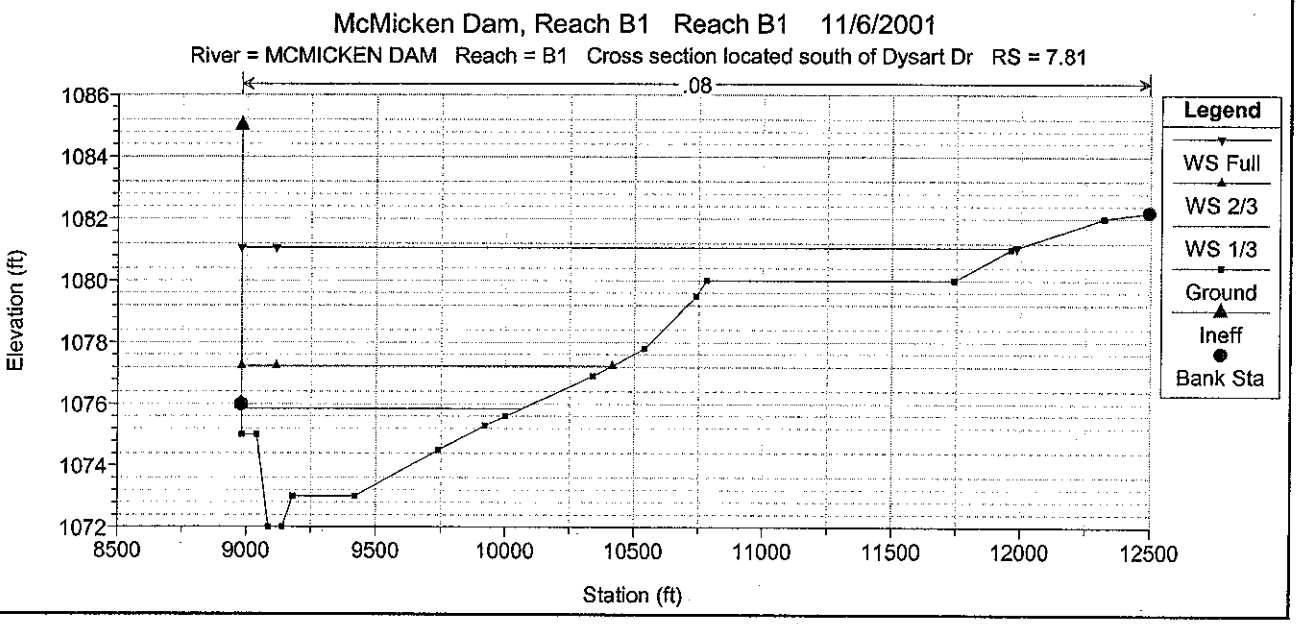

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Flow increased by 5,500 cfs for the full RS = 10.61
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

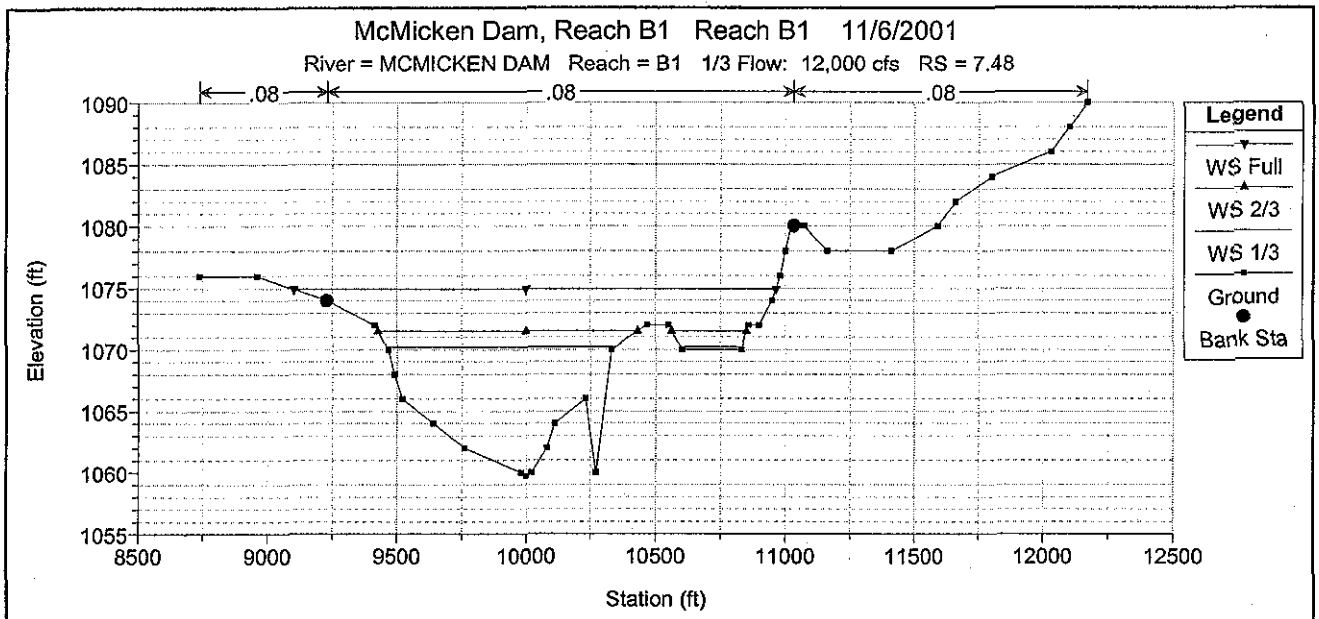

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,300 cfs RS = 9.91
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

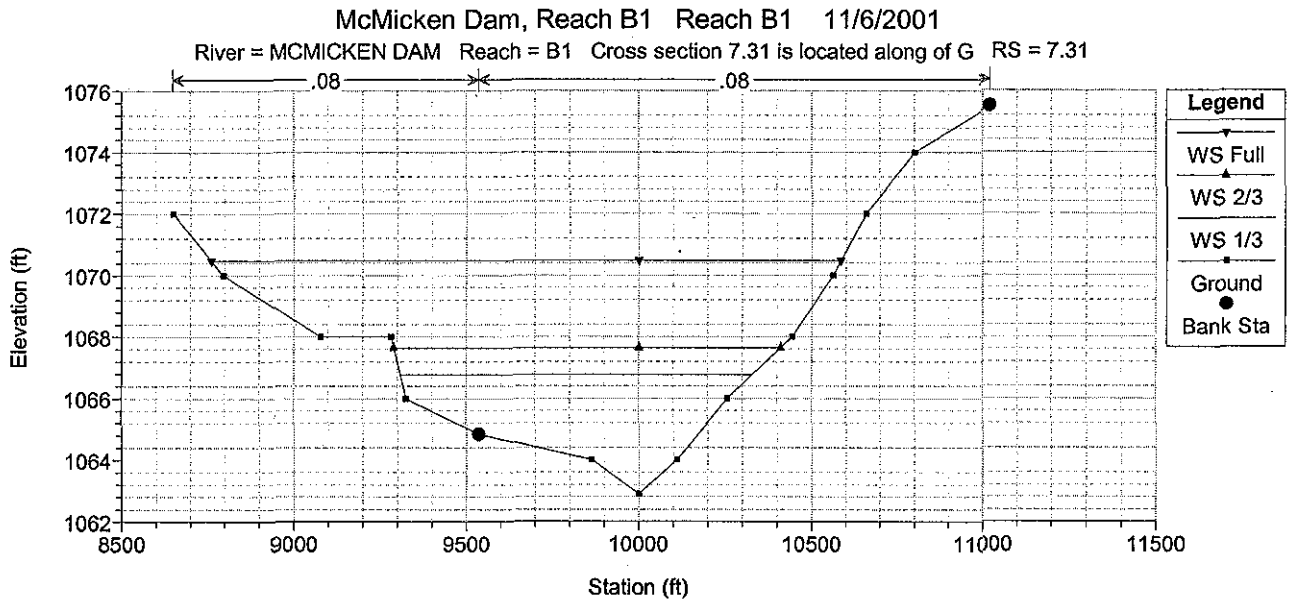

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,000 cfs RS = 9.31
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

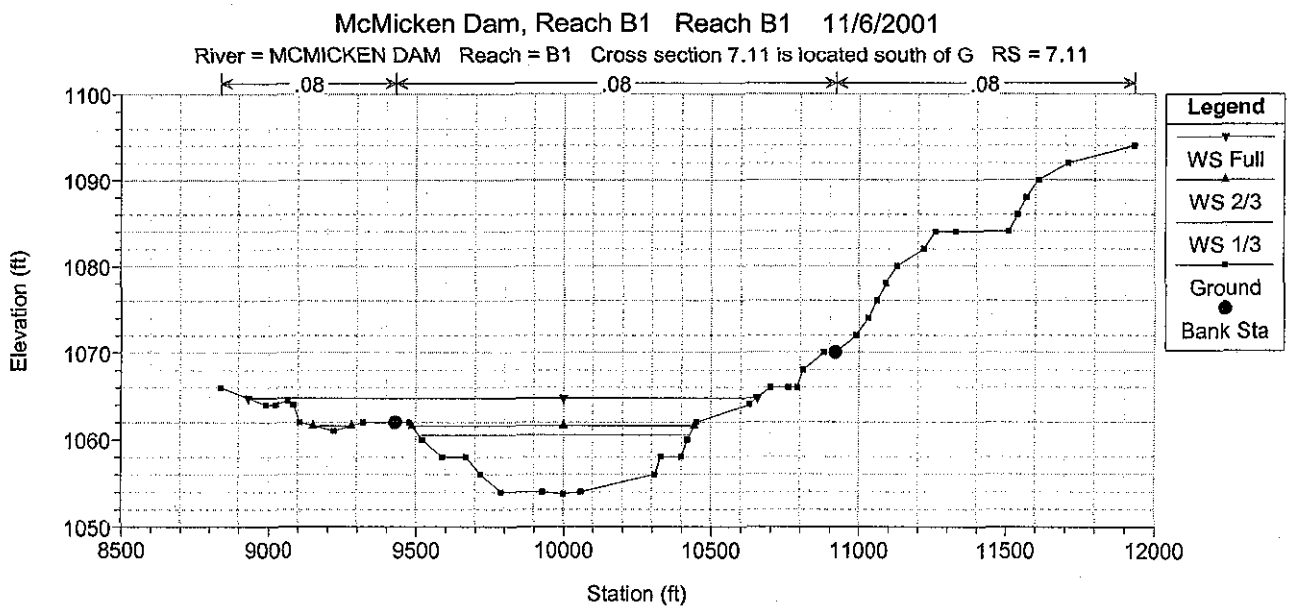

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 23,000 cfs RS = 8.63
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

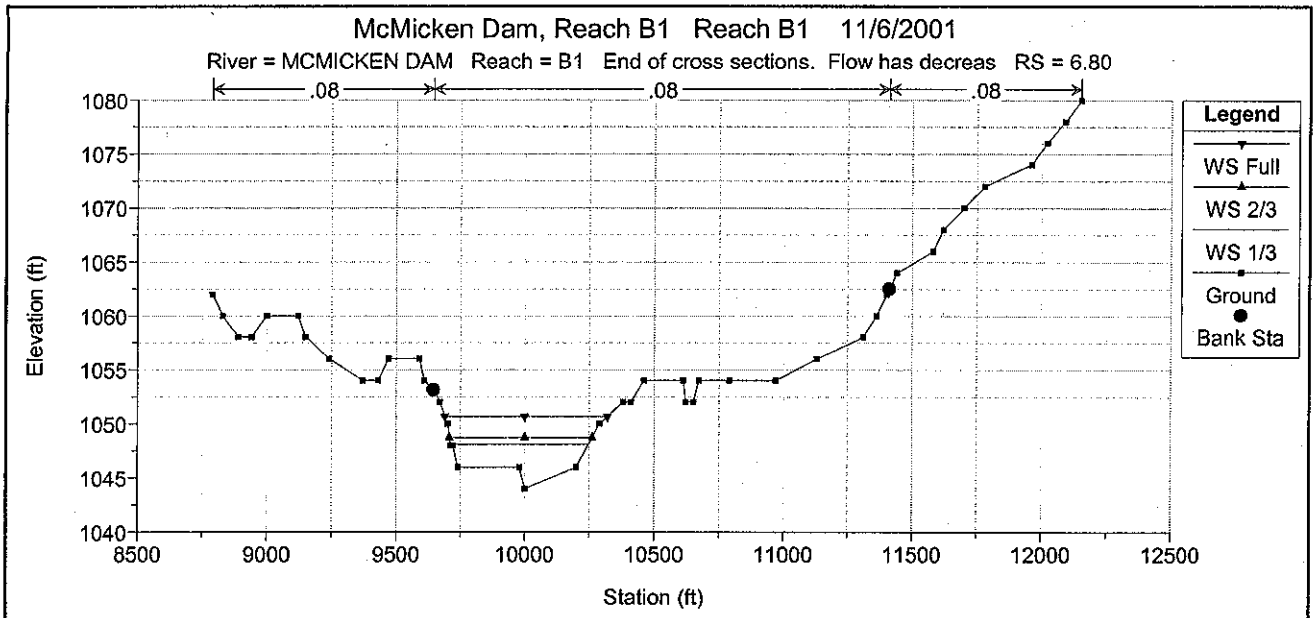

McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Cross section located north of Dysart Dr RS = 7.84
.08
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Cross section located south of Dysart Dr RS = 7.81
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 1/3 Flow: 12,000 cfs RS = 7.48
.08
.08
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Cross section 7.31 is located along of G RS = 7.31
.08
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 Cross section 7.11 is located south of G RS = 7.11
.08
.08
.08
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


McMicken Dam, Reach B1 Reach B1 11/6/2001
River = MCMICKEN DAM Reach = B1 End of cross sections. Flow has decreas RS = 6.80
.08
.08
.08
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
8500
9000
9500
10000
10500
11000
11500
12000
12500
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

2 Cross-Sections 7.84 and 7.81,

at the Dysart Drain

Summary Sheet for Cross-Sections 7.84 and 7.81, at the Dysart Drain

Description

Cross-sections taken along the Dysart Drain were determined using the deisgn plans entitled *FCDMC Plans of the Dysart Drain Improvement Project Reems Road to Agua Fria River Channel Improvements* (Ref. 1). These plans include the operations and maintenance road located along the north and/or south channel bank. Cross-section 7.84, in Model MDB1, is located along the north bank of the channel. Portions of cross-section 7.84 were blocked to simulate the highest ground elevation on either the north or south channel bank which the flow must weir over in order to cross the Dysart Drain. Cross-section 7.81 is located just south of the Dysart Drain.

Assumptions

- The Dysart Drain and its operations and maintenance road were constructed according to the design plans. No field survey was completed.
- The flow that does not travel east along the Dysart Drain will weir over the drain and will travel southward.

Method of Analysis

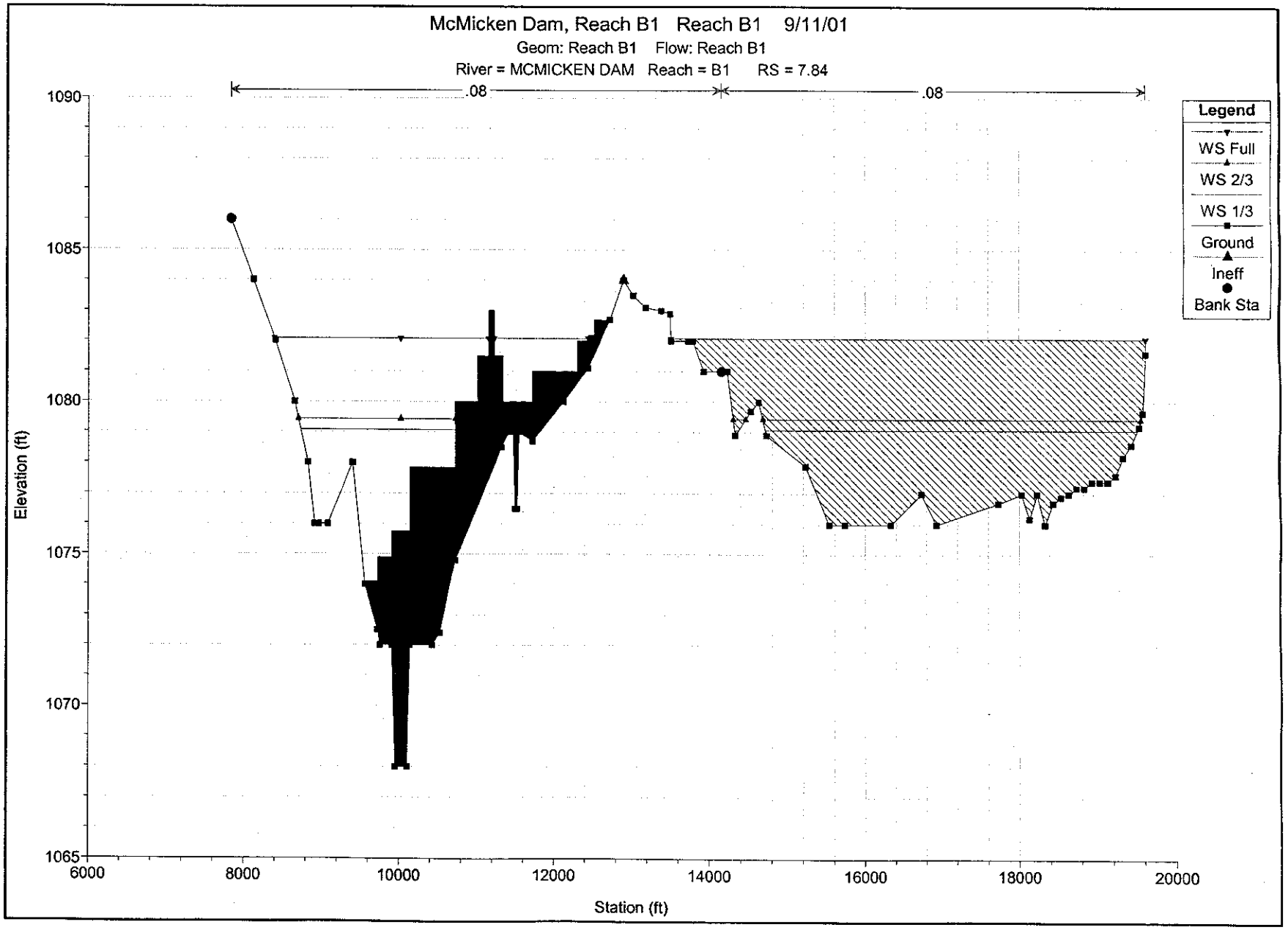
The cross-section elevations along the Dysart Drain are from the above mentioned plans. The maintenance road is located on both the north and south channel banks. There are sections of the maintenance road that are below adjacent grade. The higher of either the north or south bank was used to determine the blocking elevation used in Section 7.84. Since HEC-RAS does not allow differential blocking, an average elevation was used to block flow traveling towards the Dysart Drain.

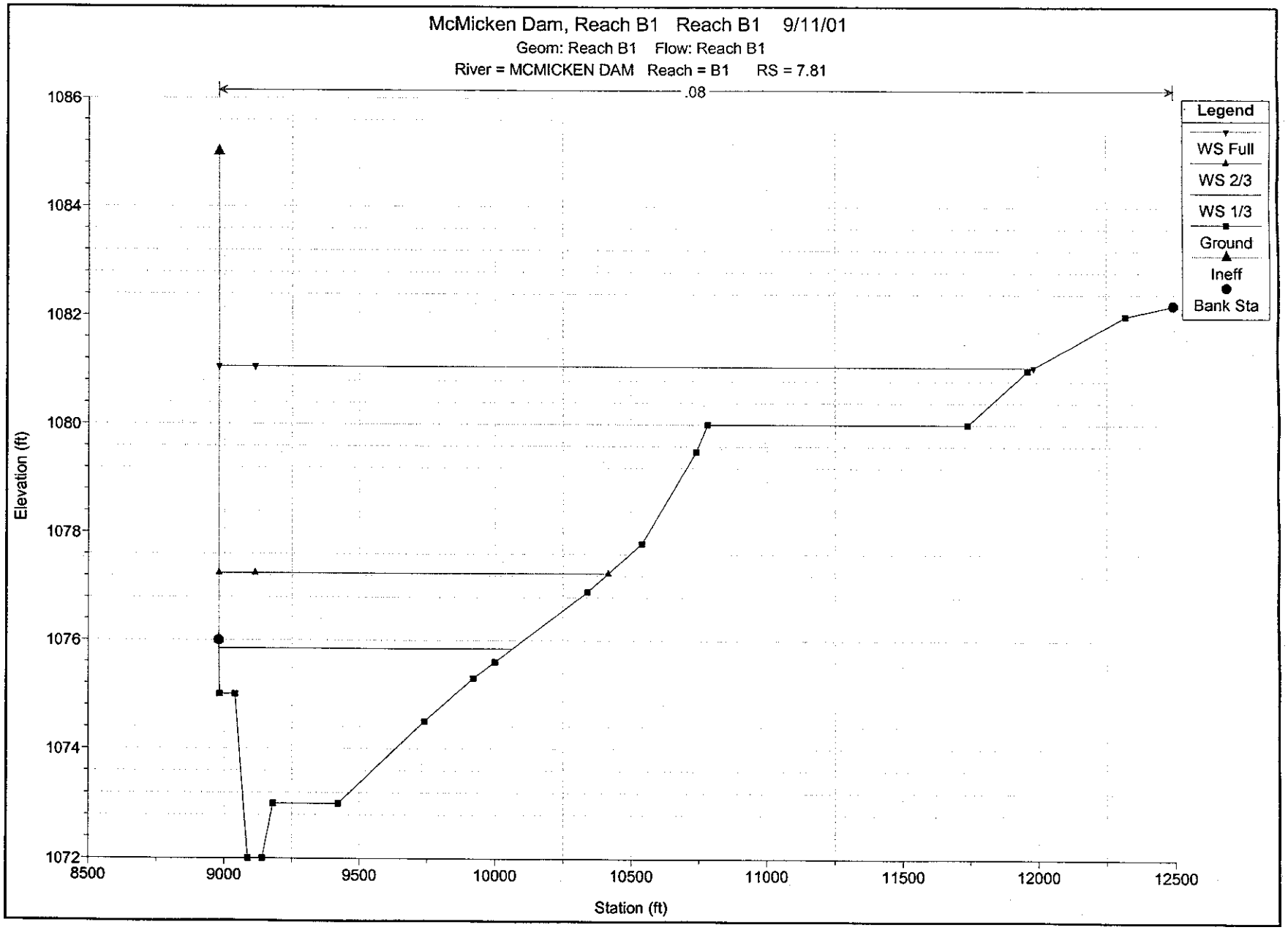
Results

The cross-section and its location are included after this summary.

References

1. NBS Lowry Engineers and Planners, *FCDMC Plans of the Dysart Drain Improvement Project, Reems Road to Agua Fria River, Channel Improvements*, May 1995.


McMicken Dam, Reach B1 Reach B1 9/11/01
Geom: Reach B1 Flow: Reach B1
River = MCMICKEN DAM Reach = B1 RS = 7.84
.08
.08
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1090
1085
1080
1075
1070
1065
6000
8000
10000
12000
14000
16000
18000
20000
Station (ft)


McMicken Dam, Reach B1 Reach B1 9/11/01
Geom: Reach B1 Flow: Reach B1
River = MCMICKEN DAM Reach = B1 RS = 7.81
.08
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1086
1084
1082
1080
1078
1076
1074
1072
8500
9000
9500
10000
10500
11000
11500
12000
12500
Station (ft)

3 Dysart Drain Analysis

Summary Sheet for Dysart Drain Analysis

Description

Cross-section 7.84 was modified according to the summary sheet entitled *Summary Sheet for Cross Section 7.84 and 7.81, at the Dysart Drain.* According to the cross-section geometry, approximately 75-85% of the flow will travel towards the west side of the cross-section. After further analysis of the topography, it was determined that this scenario was not accurate. It was estimated that the flow that is on the east side of Dysart Road at cross-section 8.63 will not cross to the west at cross-section 7.84. Flow on the west side of Dysart Road will pond against the north boundary wall of Luke Air Force Base and make its way east along the Dysart Drain. The Dysart Drain consists of a concrete lined channel, and an operations and maintenance road on one or both sides. The maintenance roads are located either between the concrete lined channel and a slope protected area, or between the slope protected area and natural grade. Channel capacity computations indicate that the 1/3, 2/3 and Full Flow will be conveyed to the east. The flow will combine with the flow on the east side of the Dysart Road and either continue east along the drain towards the Agua Fria River or weir south towards Glendale Avenue.

Assumptions

- The flow on the east side of Dysart Road at cross-section 8.63 will stay on the east side of Dysart Road at cross-section 7.84.
- The flow on the west side of Dysart Road at cross-section 8.63 will stay on the west side of Dysart Road at cross-section 7.84.
- The north boundary wall at Luke Air Force Base will not fail unless the ponding water surface elevation is greater than four (4) feet above the base of the wall.
- The Dysart Drain is empty and free of debris.

Method of Analysis

The percentage of flow on either side of Dysart Road was determined from the HEC-RAS output. The flow distribution at cross-section 8.63 determined the amount of flow on either side of the roadway in cross-section 7.84. The west side of Dysart Road was shown as ineffective flow in the model, and the flow reduced by the amount determined to be on the west side.

The amount of flow that could be conveyed within the Dysart Drain was determined using the cross-sections provided in the Dysart Drain Improvement Plans. The cross-section used to determine the drain capacity and water surface ponding elevation west of Dysart Road is located along the east boundary of the evaporation/salt ponds. This cross-section, which is identified as station 55+80 on the improvement plans, was used to estimate if the flow could travel east in the channel or if it would stay on the west side of Dysart Road and pond against the Luke Air Force Base boundary wall. A diagram indicating the location of the cross-sections that were analyzed along the Dysart Drain follows this summary. The analysis indicates that the Dysart Drain has sufficient capacity for the

Method of Analysis (cont'd.)

Full Flow which reaches it west of Dysart Road. The drain's capacity was computed based upon the full channel section plus freeboard to natural grade. A rating curve was developed to help evaluate the ponding water surface elevation against the Luke Air Force Base wall. The following sections were used to develop the rating curve: a channel section at Station 55+00, the ground topography south of the drain between Station 55+00 and El Mirage Road (identified as cross-section 7.81 in Model MDB1), and the center line grade of El Mirage Road.

The rating curve this developed was used to determine the ponding elevation at which the total flow could potentially flow east past El Mirage Road, travel south towards Glendale Avenue, and pond within the channel section. Any flow within the channel will flow east, and combine with flow which overtops.

A second rating curve was developed to determine the flow that will travel south towards Glendale Avenue. The following sections were used to develop the rating curve: a channel section at Station 20+40 (from the improvement plans located just west of El Mirage Road), the ground topography south of the drain from the salt ponds to El Mirage Road, and the center line of El Mirage Road. This rating curve was used to determine the elevation at which the total flow would either flow east and overtop El Mirage Road, travel south towards Glendale Avenue, or travel east within the channel section. The amount of flow which could travel east, either through the channel section or by overtopping El Mirage Road, was removed from the HEC-RAS model at cross-section 7.81. It was determined that this flow would reach the west boundary of the Agua Fria River Flood Plain without re-entering the model.

Results

Below is a table indicating the flow distribution east and west of Dysart Road. Attached are the cross-sections indicating the capacity of the Drain.

Flow Distribution Upstream of Dysart Drain

Cross Section	Flow West of Dysart Road			Flow East of Dysart Road		
	1/3 Flow	2/3 Flow	Full Flow	1/3 Flow	2/3 Flow	Full Flow
8.63	3,223	4,706	14,338	19,777	24,294	46,162
7.84	3,000	5,000	14,000	20,000	24,000	46,000

Results (cont'd.)

The table below indicates the ponding water surface elevation at cross-section 7.84 determined from the first rating curve described above.

Ponding Elevations at Dysart Drain

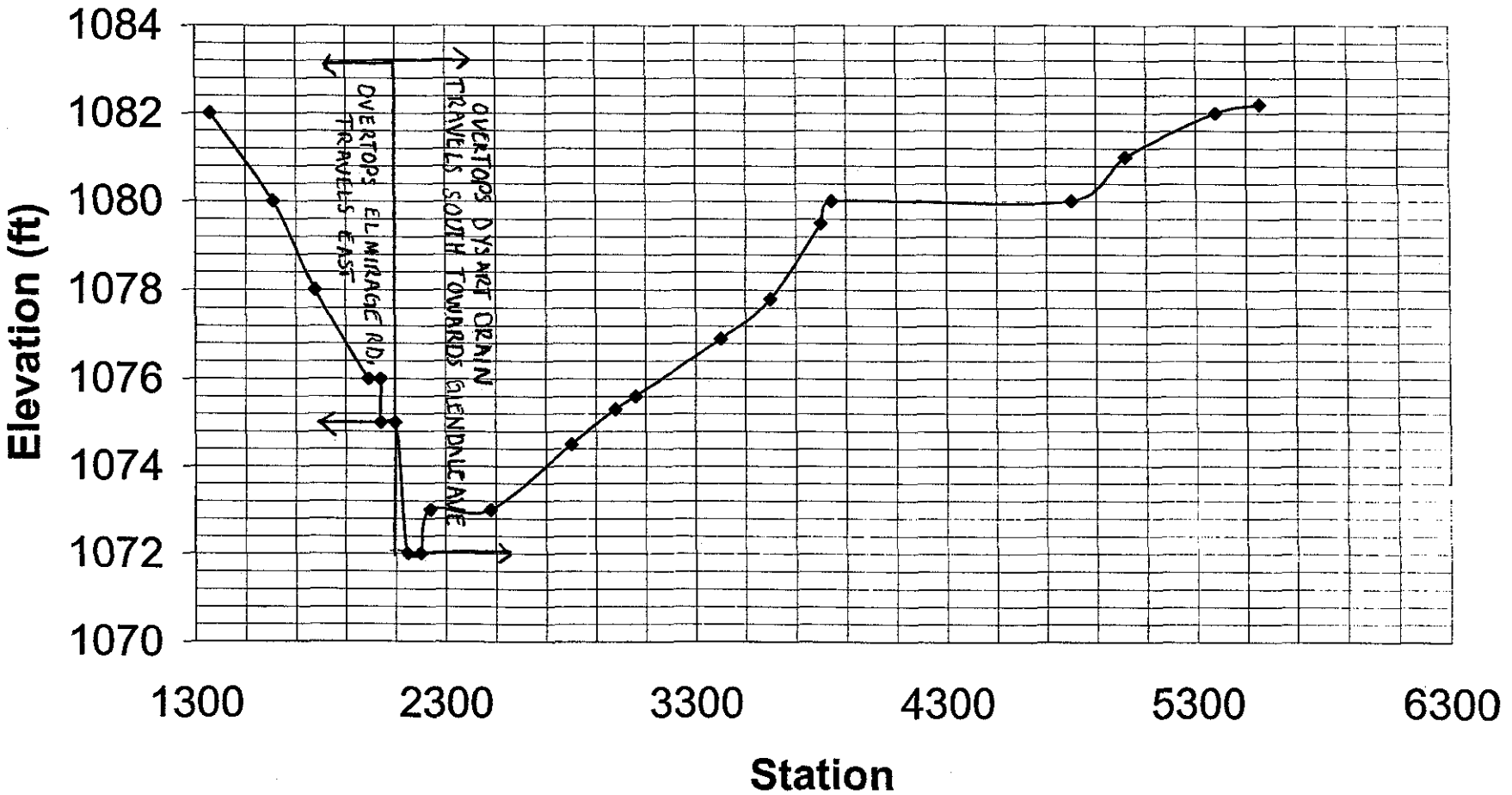
	1/3 Flow	2/3 Flow	Full Flow
Total Flow	23,000	29,000	60,000
WS Elevation	1076.64	1077.59	1080.35

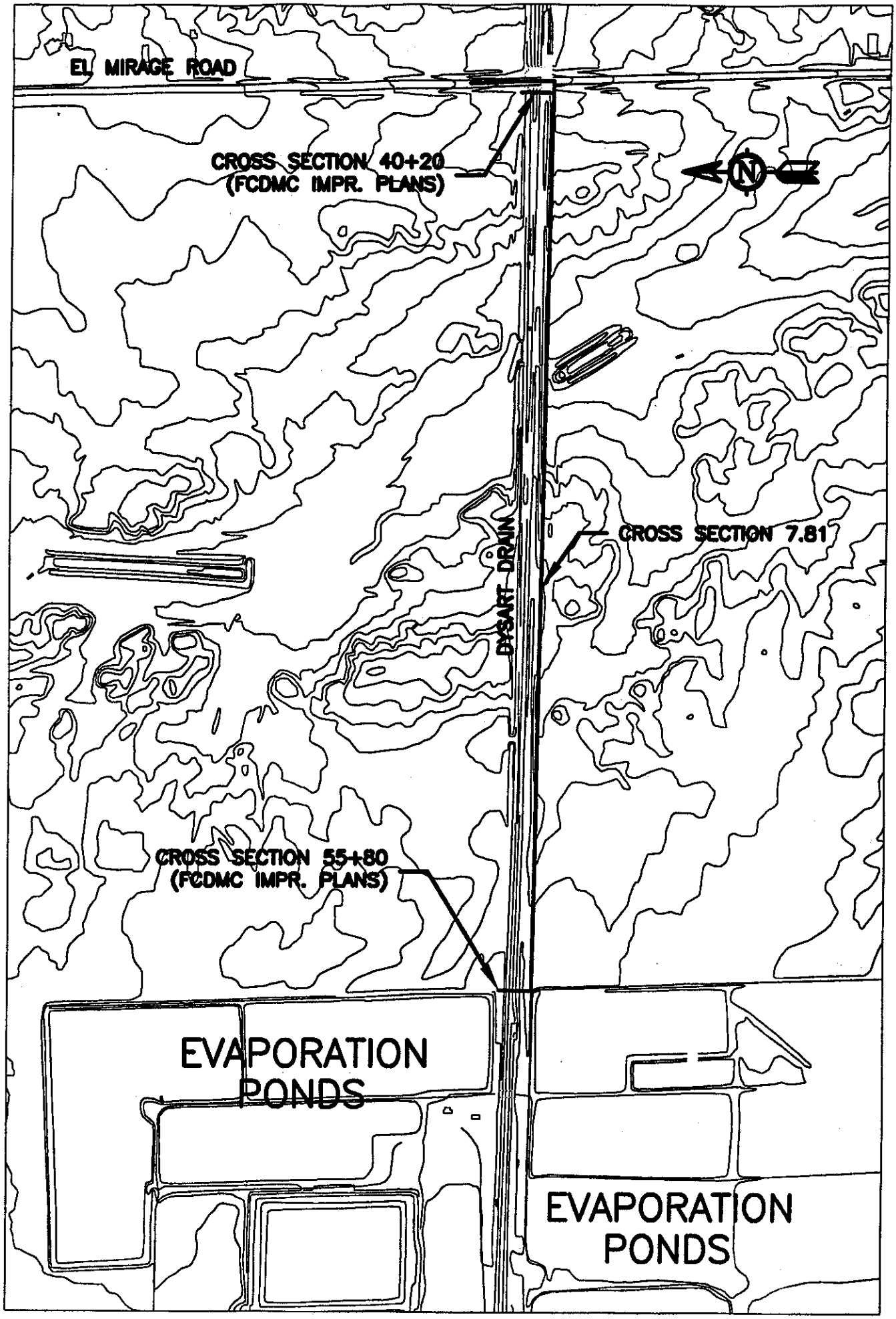
The table below indicates the amount of flow removed from the model at section 7.81. The flow removed is estimated to travel east of El Mirage Road either through the Dysart Drain channel section or by overtopping El Mirage Road.

Flow Distribution at Dysart Drain

	Flow Traveling South Towards Glendale Avenue	Flow Traveling East of El Mirage Road	Total Flow
1/3 Flow	12,000 cfs	11,000 cfs	23,000 cfs
2/3 Flow	17,500 cfs	11,500 cfs	29,000 cfs
Full Flow	43,500 cfs	16,500 cfs	60,000 cfs

Weir Section,South of Dysart Drain (El Mirage Road to Sta 5555)




EL MIRAGE ROAD
CROSS SECTION 40+20
(FCDMC IMPR. PLANS)
N
CROSS SECTION 7.81
DYSART DRAIN
CROSS SECTION 55+80
(FCDMC IMPR. PLANS)
EVAPORATION PONDS
EVAPORATION PONDS

Dysart Drain Rating Curve

PONDING WATER SURFACE ELEVATION WEST OF DYSART ROAD

$C_{El\ Mirage}$ 2.8

$C_{South\ of\ Dysart\ Drain}$ 2.3

Elevation	Flow weiring south from El Mirage Road to STA 5580*	Flow weiring to the east of El Mirage Road	Flow in complete channel section at STA 5580*	Total Flow
1072	0	0	5784	5784
1072.5	99	0	6208	6307
1073	439	0	6647	7087
1073.5	1099	0	7102	8201
1074	2141	0	7573	9714
1074.5	3620	0	8059	11678
1075	5583	0	8561	14144
1075.5	8075	0	9079	17154
1076	11136	0	9613	20750
1076.5	12113	24	10164	22301
1076.64	12564	44	10392	23000
1077	13997	134	10732	24863
1077.5	16575	370	11316	28261
1077.59	17108	428	11422	28958
1078	19791	760	11917	32468
1078.5	23625	1328	12535	37488
1079	28070	2095	13171	43336
1079.5	33127	3080	13823	50030
1080	38800	4300	14494	57594
1080.5	41142	4712	15181	61035
1081	45590	5551	15887	67028
1081.5	51581	6758	16611	74950
1082	58950	8331	17353	84634

* Stations from *FCDMC Dysart Drain Improvement Project Channel Improvement* plans.

RESULTS: FULL: WSE 1080.35
2/3: WSE 1077.64
1/3: WSE 1076.42

Worksheet
Worksheet for Irregular Channel

Project Description	
Project File	g:\projects\9081.3\calcs\9081dysa.fm2
Worksheet	Dysart Drain Sta 55+80, FCDMC Impr. Plan
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.000900	ft/ft
Water Surface Elevation	1,082.00	ft

Elevation range: 1,055.30 ft to 1,083.47 ft.

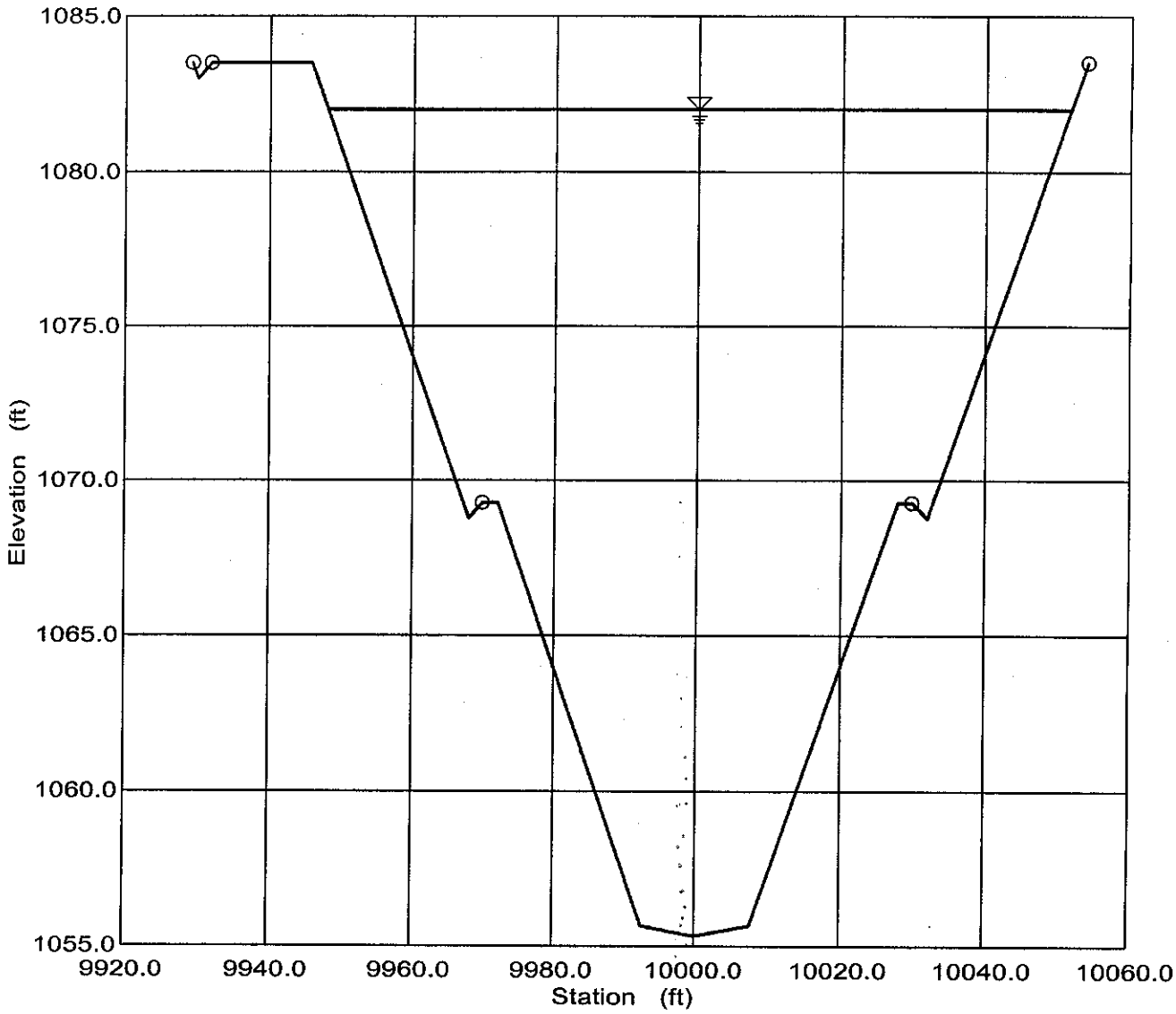
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
9,929.25	1,083.47	9,929.25	9,932.00	0.030
9,930.00	1,082.97	9,932.00	9,970.00	0.025
9,932.00	1,083.47	9,970.00	10,030.00	0.020
9,946.00	1,083.47	10,030.00	10,054.00	0.025
9,968.00	1,068.80			
9,970.00	1,069.30			
9,972.00	1,069.30			
9,992.50	1,055.63			
10,000.00	1,055.30			
10,007.50	1,055.63			
10,028.00	1,069.30			
10,030.00	1,069.30			
10,032.00	1,068.80			
10,054.00	1,083.47			

Results		
Wtd. Mannings Coefficient	0.022	
Discharge	17,353.22	cfs
Flow Area	1,562.86	ft²
Wetted Perimeter	120.00	ft
Top Width	103.59	ft
Height	26.70	ft
Critical Depth	1,075.09	ft
Critical Slope	0.003618	ft/ft
Velocity	11.10	ft/s
Velocity Head	1.92	ft
Specific Energy	1,083.92	ft
Froude Number	0.50	
Flow is subcritical.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	g:\projects\9081.3\calcs\9081dysa.fm2
Worksheet	Dysart Drain Sta 55+80, FCDMC Impr. Plan
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.022	
Channel Slope	0.000900	ft/ft
Water Surface Elevation	1,082.00	ft
Discharge	17,353.22	cfs



Dysart Drain Rating Curve

AMOUNT OF FLOW TRAVELING EAST OF EL MIRAGE ROAD AND SOUTH TO GLENDALE AVE

$C_{El\ Mirage}$ 2.8

$C_{South\ of\ Dysart\ Drain}$ 2.3

Elevation	Flow weiring south from El Mirage Road to STA 5580*	Flow weiring to the east of El Mirage Road	Flow in complete channel section at STA 2040*	Total Flow
1072	0	0	8140	8140
1072.5	99	0	8032	8131
1073	439	0	8482	8921
1073.5	1099	0	8795	9894
1074	2141	0	9414	11555
1074.5	3620	0	10055	13674
1075	5583	0	10716.4	16300
1075.5	8075	0	11110	19185
1076	11136	0	11110	22246
1076.42	11883	15	11110	23009
1076.5	12113	24	11110	23246
1077	13997	134	11110	25242
1077.5	16575	370	11110	28055
1077.64	17412	463	11110	28985
1078	19791	760	11110	31661
1078.5	23625	1328	11110	36063
1079	28070	2095	11110	41275
1079.5	33127	3080	11110	47317
1080	38800	4300	11110	54210
1080.5	41142	4712	11110	56963
1080.81	43704	5188	11110	60001
1081	45590	5551	11110	62251
1081.5	51581	6758	11110	69449
1082	58950	8331	11110	78391

* Stations from *FCDMC Dysart Drain Improvement Project Channel Improvement* plans.

RESULTS: FULL: 43500 cfs travels south, 16500 cfs travels east, WSE 1081.81
2/3: 17500 cfs travels south, 11500 cfs travels east, WSE 1077.64
1/3: 12000 cfs travels south, 11000 cfs travels east, WSE 1076.42

Worksheet
Worksheet for Irregular Channel

Project Description	
Project File	g:\projects\9081.3\calcs\9081dysa.fm2
Worksheet	Dysart Drain Sta 20+40, FCDMC Impr.Plan
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.000900	ft/ft
Water Surface Elevation	1,075.29	ft

Elevation range: 1,052.07 ft to 1,075.57 ft.

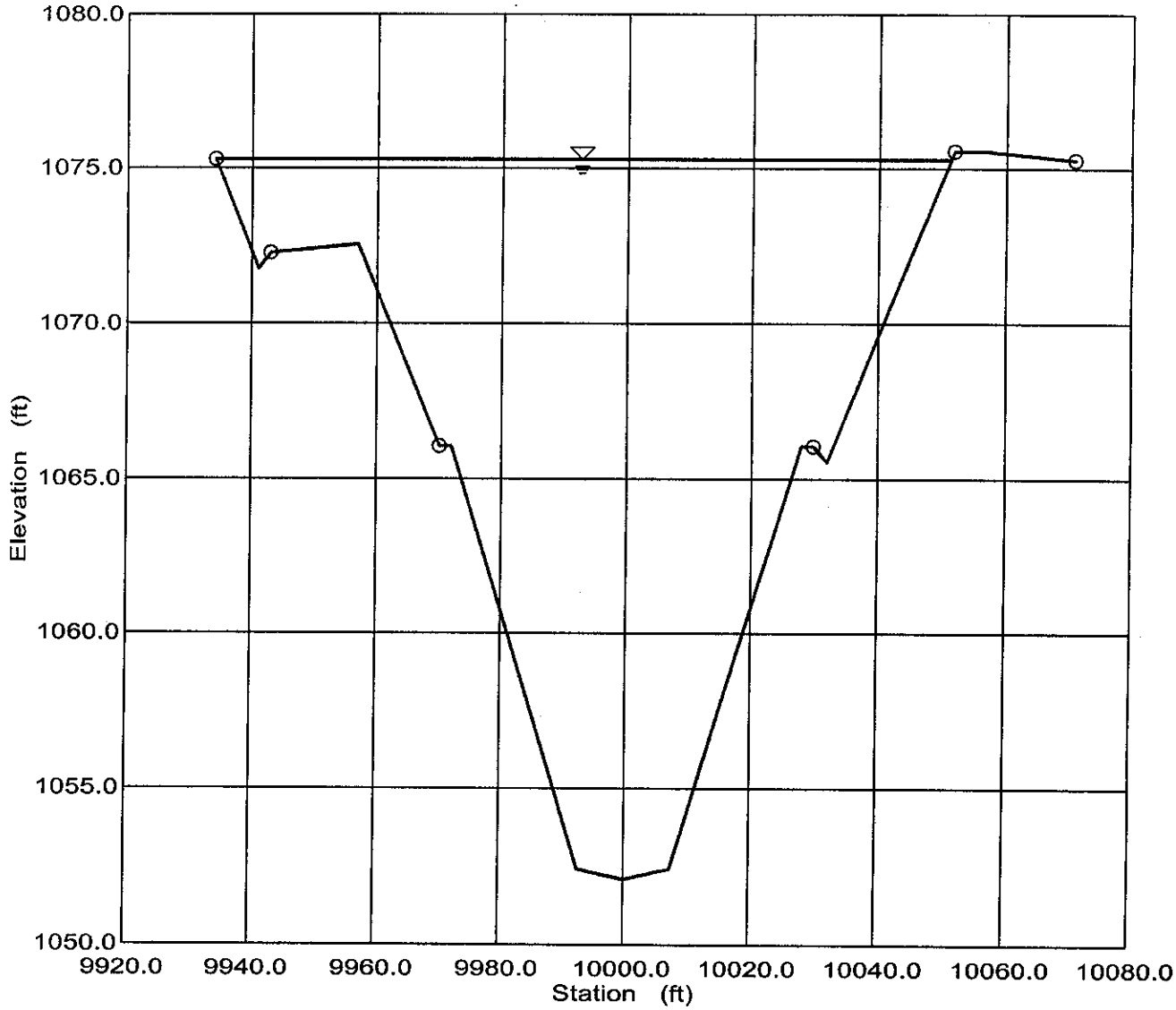
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
9,934.00	1,075.29	9,934.00	9,943.00	0.030
9,941.00	1,071.79	9,943.00	9,970.00	0.025
9,943.00	1,072.29	9,970.00	10,030.00	0.022
9,957.00	1,072.57	10,030.00	10,052.00	0.025
9,970.00	1,066.07	10,052.00	10,071.00	0.022
9,972.00	1,066.07			
9,992.50	1,052.40			
10,000.00	1,052.07			
10,007.50	1,052.40			
10,028.00	1,066.07			
10,030.00	1,066.07			
10,032.00	1,065.57			
10,052.00	1,075.57			
10,057.00	1,075.57			
10,071.00	1,075.29			

Results		
Wtd. Mannings Coefficient	0.024	
Discharge	11,110.01	cfs
Flow Area	1,290.78	ft²
Wetted Perimeter	130.52	ft
Top Width	117.44	ft
Height	23.22	ft
Critical Depth	1,068.50	ft
Critical Slope	0.004197	ft/ft
Velocity	8.61	ft/s
Velocity Head	1.15	ft
Specific Energy	1,076.44	ft
Froude Number	0.46	
Flow is subcritical.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	g:\projects\9081.3\calcs\9081dysa.fm2
Worksheet	Dysart Drain Sta 20+40, FCDMC Impr.Plan
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.024	
Channel Slope	0.000900	ft/ft
Water Surface Elevation	1,075.29	ft
Discharge	11,110.01	cfs



4 HEC-RAS Model MDB2

Summary Sheet for HEC-RAS Model MDB2

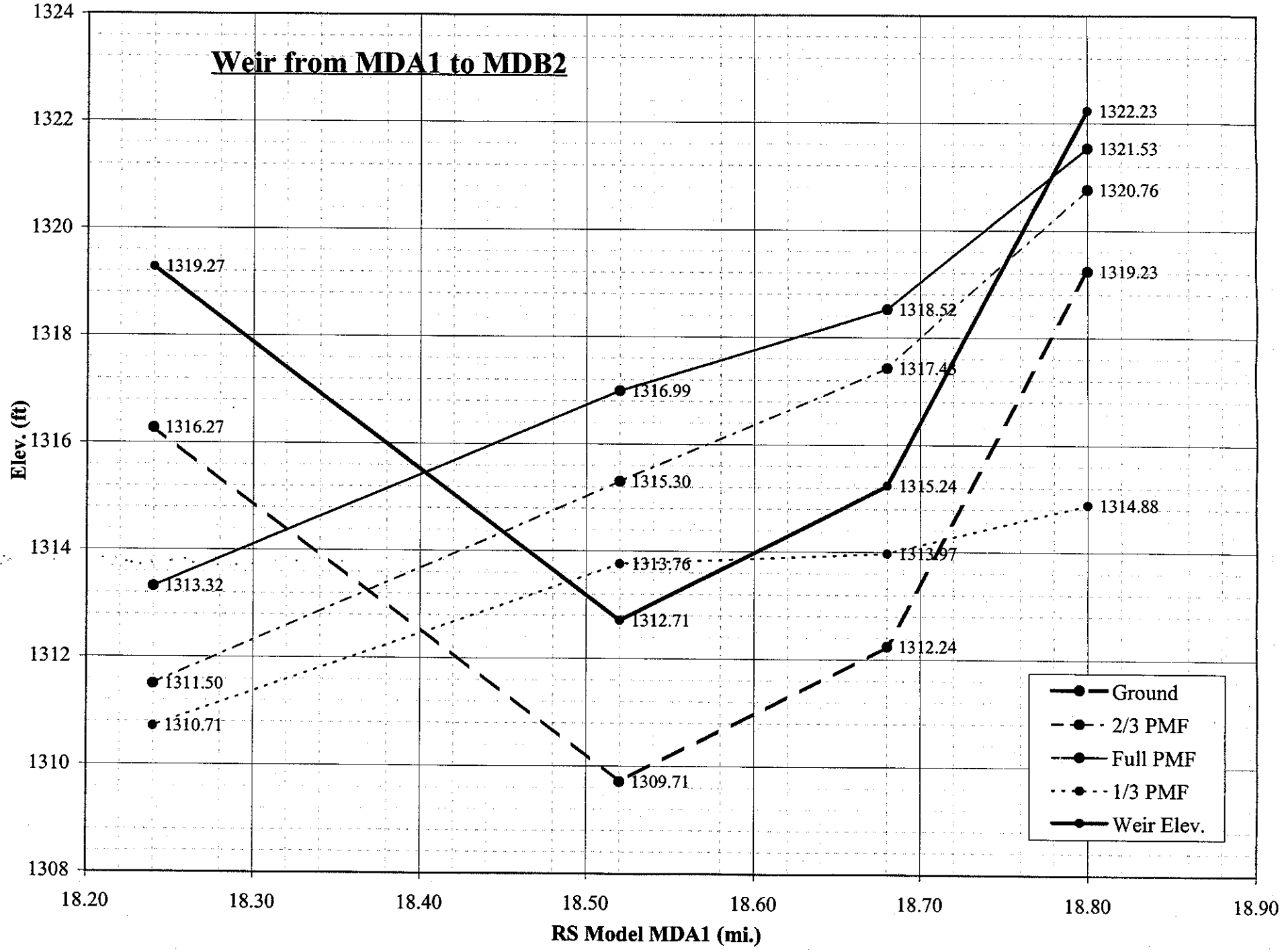
Description/Method of Analysis

HEC-RAS model MDB2 was created to model flow which weirs into Sun City Grand at approximately Mountain View Boulevard. The model begins at Section 18.46, which is representative of the ground elevations/wall height at the location where flow along the Loop 303 Freeway weirs in to Sun City Grand. The model continues south, parallel to Grand Avenue and ends at the Agua Fria floodplain. The downstream end of the model is Section 11.19, at approximately Cactus Road and the Agua Fria River. Models MDB1 and MDB2 have separate hydraulic baselines, but share some cross-section geometry. At cross-sections where the two models have common geometry, an ineffective flow boundary was set to block out the MDB1 half of the cross-section. Flow at the upstream end of the model was determined using weir flow analysis as described in Section 4 of Appendix D. The 1/3 PMF profile has zero flow due to the lack of weirflow into Sun City Grand, and was therefore not modeled through Reach B2.

Flow added from Model MDA2, along Grand Avenue, joins Model MDB2 between Sections 17.95 and 16.30. Model MDA2 and its flow splits are described in Appendix D. Flow removed from the model includes weir flow to the east between Sections 11.59 and 11.19, and weir flow to the west between Section 14.84 and 11.19. The amount of flow weiring to the east and west was determined using the method described in Section 3 of this appendix.

Results

The resulting floodplain limits for the 2/3 and Full flow events are shown on the delineation maps presented in Appendix F.


Weir from MDA1 to MDB2
Elev. (ft)
RS Model MDA1 (mi.)
1324
1322
1320
1318
1316
1314
1312
1310
1308
18.20
18.30
18.40
18.50
18.60
18.70
18.80
18.90
1319.27
1316.27
1313.32
1311.50
1310.71
1316.99
1315.30
1313.76
1312.71
1309.71
1318.52
1317.48
1315.24
1313.97
1312.24
1322.23
1321.53
1320.76
1319.23
1314.88
Ground
2/3 PMF
Full PMF
1/3 PMF
Weir Elev.

HEC-RAS Plan: MDB2 River: MCMICKEN DAM Reach: B2

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
B2	18.44	19500.00	1309.71	1315.27	1312.80	1315.37	0.006527	2.59	7523.79	2371.59	0.26
B2	18.44	37500.00	1309.71	1316.87	1313.79	1317.03	0.006736	3.21	11694.95	2742.56	0.27
B2	18.29	19500.00	1304.50	1308.58		1308.69	0.011035	2.63	7412.45	3387.77	0.31
B2	18.29	37500.00	1304.50	1309.74		1309.90	0.012299	3.18	11777.63	4385.26	0.34
B2	17.93	19500.00	1291.80	1297.36	1294.65	1297.41	0.003765	1.78	10977.44	4036.46	0.19
B2	17.93	37500.00	1291.80	1298.87	1295.81	1298.94	0.003391	2.16	17348.25	4393.51	0.19
B2	17.50	20000.00	1281.00	1286.51		1286.59	0.005944	2.27	8827.66	3174.23	0.24
B2	17.50	40500.00	1281.00	1288.05		1288.18	0.006613	2.79	14498.91	4125.22	0.26
B2	17.01	20000.00	1267.40	1270.68	1269.10	1270.73	0.006428	1.81	11038.02	5884.69	0.23
B2	17.01	41500.00	1267.40	1271.80	1269.72	1271.88	0.006111	2.27	18269.60	6680.69	0.24
B2	16.28	20500.00	1246.00	1249.17		1249.22	0.004946	1.77	11561.54	5231.15	0.21
B2	16.28	48500.00	1246.00	1250.70		1250.78	0.005038	2.27	21331.51	6739.16	0.23
B2	15.60	20500.00	1225.00	1228.45	1226.70	1228.52	0.006771	2.17	9441.45	3989.73	0.25
B2	15.60	48500.00	1225.00	1230.41	1227.56	1230.50	0.006330	2.38	20403.30	7900.66	0.25
B2	14.83	20500.00	1203.50	1208.01		1208.05	0.003863	1.60	12777.54	5580.75	0.19
B2	14.83	48500.00	1203.50	1209.52		1209.59	0.004222	2.17	22335.75	6622.93	0.21
B2	14.13	20500.00	1186.60	1190.43	1188.95	1190.48	0.006084	1.72	11926.64	6603.04	0.23
B2	14.13	45000.00	1186.60	1191.58	1189.69	1191.66	0.005804	2.31	19505.61	6703.02	0.24
B2	13.38	20000.00	1164.00	1170.05		1170.09	0.004330	1.56	12822.62	6364.72	0.19
B2	13.38	38000.00	1164.00	1170.98		1171.05	0.004518	1.99	19096.55	6789.69	0.21
B2	12.49	20000.00	1146.30	1149.92	1148.52	1149.95	0.004271	1.50	13341.91	7445.69	0.19
B2	12.49	35000.00	1146.30	1150.75	1148.85	1150.80	0.004110	1.80	19427.13	8612.88	0.20
B2	11.57	20000.00	1124.00	1130.33		1130.38	0.003842	1.80	11123.56	4078.17	0.19
B2	11.57	27500.00	1124.00	1130.84		1130.91	0.004116	2.08	13220.31	4100.00	0.20
B2	11.17	18000.00	1114.00	1122.18	1120.00	1122.24	0.003970	1.96	9171.76	3020.00	0.20
B2	11.17	20000.00	1114.00	1122.38	1120.14	1122.44	0.003953	2.04	9782.99	3020.00	0.20
B2	10.71	18000.00	1106.00	1111.19	1108.80	1111.27	0.005005	2.23	8057.65	4080.00	0.22
B2	10.71	20000.00	1106.00	1111.40	1108.92	1111.48	0.005006	2.33	8583.56	4080.00	0.23

```
HEC-RAS September 1998 Version 2.2
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: McMicken Dam, Reach B2
Project File : MDB2.prj
Run Date and Time: 10/16/2001 4:34:43 PM

Project in English units

Study Name: McMicken Dam Spillway Inundation Study
Contract No.: FCD 98-32
Purpose of Study: Delineation of the inundation limits of the 1/3, 2/3, and Full spillway discharges for the McMicken Dam spillway.

Model Name: MDB2
Model Description: Model for flow weiring into Sun City Grand at approximately Mountain View Boulevard. Upstream boundary is Section 18.44 at approximately the Loop 303 Freeway. Downstream boundary is Section 10.71 at approximately Cactus Road and the Agua Fria River.

Flow Profiles: Note: 1/3 PMF = 0 cfs, and therefore was not modeled.
Profile #1, 2/3 Flow
Sections 18.44 to 17.93, Q = 19,500 cfs
Section 17.50 to 17.01, Q = 20,000 cfs
Sections 16.28 to 14.13, Q = 20,500 cfs
Sections 13.38 to 11.57, Q = 20,000 cfs
Section 10.71, Q = 18,000 cfs
Profile #2, Full Flow
Sections 18.44 to 17.93, Q = 37,500 cfs
Section 17.50, Q = 40,500 cfs
Section 17.01, Q = 41,500 cfs
Sections 16.28 to 14.83, Q = 48,500 cfs
Section 14.13, Q = 45,000 cfs
Section 13.38, Q = 38,000 cfs
Section 12.49, Q = 35,000 cfs
Section 11.57, Q = 27,500 cfs
Section 10.71, Q = 20,000 cfs.

HEC-RAS Version: Version 2.2, September 1998, with RASPATCH

Consultants: Hoskin Engineering Consultants, Inc.
323 W. Roosevelt Street, Suite 200
Phoenix, AZ 85003
(602) 252-8384 Phone
(602) 252-8385 Fax
HEC 990006-03

DEI Professional Services, LLC
6225 N. 24th Street, Suite 200
Phoenix, AZ 85016
(602) 954-0038 Phone
(602) 944-8605 Fax

PLAN DATA

Plan Title: Reach B2
Plan File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach B\Model B2\MDB2.p01

Geometry Title: Reach B2
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach B\Model B2\MDB2.g01

Flow Title : Reach B2
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach B\Model B2\MDB2.f01

Plan Description:
Models flow from approximately the Loop 303 Freeway to Cactus Road at the Agua Fria River. Begins at Section 18.44, ends at Section 10.71. Flow profiles only for the 2/3 and Full PMF. Flow removed from the model includes weirflow to the east between Sections 11.57 and 11.17, and weirflow to the west between Sections 14.83 and 11.17.

Plan Summary Information:

Number of:	Cross Sections =	14	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	0		

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

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: Mixed Flow

FLOW DATA

Flow Title: Reach B2
Flow File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach B\Model B2\MDB2.f01

Flow Data (cfs)

River	Reach	RS	2/3	Full
MCMICKEN DAM	B2	18.44	19500	37500
MCMICKEN DAM	B2	17.50	20000	40500
MCMICKEN DAM	B2	17.01	20000	41500
MCMICKEN DAM	B2	16.28	20500	48500
MCMICKEN DAM	B2	14.83	20500	48500
MCMICKEN DAM	B2	14.13	20500	45000
MCMICKEN DAM	B2	13.38	20000	38000
MCMICKEN DAM	B2	12.49	20000	35000
MCMICKEN DAM	B2	11.57	20000	27500
MCMICKEN DAM	B2	11.17	18000	20000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MCMICKEN DAM	B2	2/3	Known WS = 1315.3	Normal S = .005
MCMICKEN DAM	B2	Full	Known WS = 1316.99	Normal S = .005

GEOMETRY DATA

Geometry Title: Reach B2
Geometry File : g:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\Hydro\Reach B\Model B2\MDB2.g01

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 18.44

INPUT
Description: Upstream end of Model MDB2;
2/3 PMF = 19,500 cfs
Full PMF =

37,500 cfs

Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8522	1316.27	10000	1309.71	10845	1312.24	11478	1319.23

Manning's n Values num= 1

Sta	n Val
8522	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8522	11478	925	801.4	675	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8522	8522	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1315.37	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.100	
W.S. Elev (ft)	1315.27	Reach Len. (ft)	925.00	801.40	675.00
Crit W.S. (ft)	1312.80	Flow Area (sq ft)		7523.79	
E.G. Slope (ft/ft)	0.006527	Area (sq ft)		7523.79	
Q Total (cfs)	19500.00	Flow (cfs)		19500.00	
Top Width (ft)	2371.59	Top Width (ft)		2371.59	
Vel Total (ft/s)	2.59	Avg. Vel. (ft/s)		2.59	
Max Chl Dpth (ft)	5.56	Hydr. Depth (ft)		3.17	
Conv. Total (cfs)	241375.4	Conv. (cfs)		241375.4	
Length Wtd. (ft)	801.40	Wetted Per. (ft)		2371.62	
Min Ch El (ft)	1309.71	Shear (lb/sq ft)		1.29	
Alpha	1.00	Stream Power (lb/ft s)		3.35	
Frctn Loss (ft)	6.69	Cum Volume (acre-ft)		10467.68	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		4758.30	100.37

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1317.03	Element			
Vel Head (ft)	0.16	Wt. n-Val.		0.100	
W.S. Elev (ft)	1316.87	Reach Len. (ft)	925.00	801.40	675.00
Crit W.S. (ft)	1313.79	Flow Area (sq ft)		11694.95	
E.G. Slope (ft/ft)	0.006736	Area (sq ft)		11694.95	
Q Total (cfs)	37500.00	Flow (cfs)		37500.00	
Top Width (ft)	2742.56	Top Width (ft)		2742.56	
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)		3.21	
Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)		4.26	
Conv. Total (cfs)	456898.9	Conv. (cfs)		456898.9	
Length Wtd. (ft)	801.40	Wetted Per. (ft)		2743.21	
Min Ch El (ft)	1309.71	Shear (lb/sq ft)		1.79	
Alpha	1.00	Stream Power (lb/ft s)		5.75	
Frctn Loss (ft)	7.13	Cum Volume (acre-ft)		16618.20	226.06
C & E Loss (ft)	0.00	Cum SA (acres)		5531.05	237.51

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8522.00	9113.20	275.59	296.53	365.54	1.41	0.81	0.93
9113.20	9704.40	3799.32	1734.85	591.21	19.48	2.93	2.19
9704.40	10295.60	9263.58	2961.44	591.20	47.51	5.01	3.13
10295.60	10886.80	5785.06	2232.66	591.21	29.67	3.78	2.59
10886.80	RB 11478.00	376.45	298.34	232.46	1.93	1.28	1.26

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8522.00	9113.20	1928.13	1132.17	591.81	5.14	1.92	1.70
9113.20	9704.40	8129.77	2683.49	591.21	21.68	4.54	3.03
9704.40	10295.60	15224.98	3910.09	591.20	40.60	6.61	3.89
10295.60	10886.80	10795.75	3181.30	591.21	28.79	5.38	3.39
10886.80	RB 11478.00	1421.37	787.92	377.78	3.79	2.09	1.80

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 18.29

INPUT
Description: 2/3 PMF = 19,500 cfs
Full PMF = 37,500 cfs
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7100	1310	7500	1309.8	8000	1309.5	8500	1307.5	9000	1307
9500	1305.5	9750	1305	10000	1304.5	10150	1304.5	10250	1304.8
10500	1305.2	11000	1307	11500	1308.2	12000	1309.8	12100	1310

Manning's n Values num= 1

Sta	n Val
7100	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7100	12100	2000	1874.84	1750	.1	.3

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.69	Element			
Vel Head (ft)	0.11	Wt. n-Val.		0.100	
W.S. Elev (ft)	1308.58	Reach Len. (ft)	2000.00	1874.84	1750.00
Crit W.S. (ft)		Flow Area (sq ft)		7412.45	
E.G. Slope (ft/ft)	0.011035	Area (sq ft)		7412.45	
Q Total (cfs)	19500.00	Flow (cfs)		19500.00	
Top Width (ft)	3387.77	Top Width (ft)		3387.77	
Vel Total (ft/s)	2.63	Avg. Vel. (ft/s)		2.63	
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)		2.19	
Conv. Total (cfs)	185632.6	Conv. (cfs)		185632.6	
Length Wtd. (ft)	1874.84	Wetted Per. (ft)		3387.78	
Min Ch El (ft)	1304.50	Shear (lb/sq ft)		1.51	
Alpha	1.00	Stream Power (lb/ft s)		3.97	
Frctn Loss (ft)	11.26	Cum Volume (acre-ft)		10330.28	83.61
C & E Loss (ft)	0.02	Cum SA (acres)		4705.32	100.37

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.90	Element			
Vel Head (ft)	0.16	Wt. n-Val.		0.100	
W.S. Elev (ft)	1309.74	Reach Len. (ft)	2000.00	1874.84	1750.00
Crit W.S. (ft)		Flow Area (sq ft)		11777.63	
E.G. Slope (ft/ft)	0.012299	Area (sq ft)		11777.63	
Q Total (cfs)	37500.00	Flow (cfs)		37500.00	
Top Width (ft)	4385.26	Top Width (ft)		4385.26	
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)		3.18	
Max Chl Dpth (ft)	5.24	Hydr. Depth (ft)		2.69	
Conv. Total (cfs)	338137.9	Conv. (cfs)		338137.9	
Length Wtd. (ft)	1874.84	Wetted Per. (ft)		4385.27	
Min Ch El (ft)	1304.50	Shear (lb/sq ft)		2.06	
Alpha	1.00	Stream Power (lb/ft s)		6.57	
Frctn Loss (ft)	10.93	Cum Volume (acre-ft)		16402.28	226.06
C & E Loss (ft)	0.03	Cum SA (acres)		5465.49	237.51

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8100.00	9100.00	1475.67	982.28	869.56	7.57	1.13	1.50
9100.00	10100.00	9565.80	3188.26	1000.00	49.06	3.19	3.00
10100.00	11100.00	8057.09	2876.26	1000.00	41.32	2.88	2.80
11100.00	RB 12100.00	401.43	365.67	518.21	2.06	0.71	1.10

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

section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7100.00	8100.00	42.25	93.03	503.38	0.11	0.18	0.45
8100.00	9100.00	4866.79	2112.07	1000.00	12.98	2.11	2.30
9100.00	10100.00	16238.86	4352.08	1000.00	43.30	4.35	3.73
10100.00	11100.00	14345.32	4040.08	1000.00	38.25	4.04	3.55
11100.00	RB 12100.00	2006.78	1180.40	881.88	5.35	1.34	1.70

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 17.93

INPUT
Description: 2/3 PMF = 19,500 cfs
Full PMF = 37,500 cfs
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6500	1300	7000	1297	7250	1295.5	7500	1296	8000	1295.5
8500	1295.2	9000	1295	9500	1293	9700	1292.5	9800	1292
10000	1292	10150	1291.8	10250	1292.2	10500	1294	10750	1296
11000	1297.5	11150	1300	11425	1300.08				

Manning's n Values num= 1

Sta	n Val
6500	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6500	11425	2000	2307.68	2500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6500	7500	1296

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1297.41	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1297.36	Reach Len. (ft)	2000.00	2307.68	2500.00
Crit W.S. (ft)	1294.65	Flow Area (sq ft)		10977.44	
E.G. Slope (ft/ft)	0.003765	Area (sq ft)		10977.44	
Q Total (cfs)	19500.00	Flow (cfs)		19500.00	
Top Width (ft)	4036.46	Top Width (ft)		4036.46	
Vel Total (ft/s)	1.78	Avg. Vel. (ft/s)		1.78	
Max Chl Dpth (ft)	5.56	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	317805.0	Conv. (cfs)		317805.0	
Length Wtd. (ft)	2307.68	Wetted Per. (ft)		4036.49	
Min Ch El (ft)	1291.80	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		1.14	
Frctn Loss (ft)	10.81	Cum Volume (acre-ft)		9934.53	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		4545.55	100.37

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1298.94	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.100	
W.S. Elev (ft)	1298.87	Reach Len. (ft)	2000.00	2307.68	2500.00
Crit W.S. (ft)	1295.81	Flow Area (sq ft)		17348.25	
E.G. Slope (ft/ft)	0.003391	Area (sq ft)		17348.25	
Q Total (cfs)	37500.00	Flow (cfs)		37500.00	
Top Width (ft)	4393.51	Top Width (ft)		4393.51	
Vel Total (ft/s)	2.16	Avg. Vel. (ft/s)		2.16	
Max Chl Dpth (ft)	7.07	Hydr. Depth (ft)		3.95	
Conv. Total (cfs)	643987.1	Conv. (cfs)		643987.1	
Length Wtd. (ft)	2307.68	Wetted Per. (ft)		4393.55	
Min Ch El (ft)	1291.80	Shear (lb/sq ft)		0.84	
Alpha	1.00	Stream Power (lb/ft s)		1.81	
Frctn Loss (ft)	10.76	Cum Volume (acre-ft)		15775.49	226.06
C & E Loss (ft)	0.00	Cum SA (acres)		5276.57	237.51

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the

cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6500.00	7485.00	616.78	669.84	544.90	3.16	1.23	0.92
7485.00	8470.00	2090.33	1765.50	985.00	10.72	1.79	1.18
8470.00	9455.00	4195.66	2681.77	985.00	21.52	2.72	1.56
9455.00	10440.00	11465.23	4901.97	985.01	58.80	4.98	2.34
10440.00	RB 11425.00	1132.01	958.36	536.58	5.81	1.79	1.18

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6500.00	7485.00	2214.61	1681.87	796.41	5.91	2.11	1.32
7485.00	8470.00	5768.28	3251.90	985.00	15.38	3.30	1.77
8470.00	9455.00	8724.17	4168.16	985.00	23.26	4.23	2.09
9455.00	10440.00	17774.55	6388.37	985.01	47.40	6.49	2.78
10440.00	RB 11425.00	3018.20	1857.95	642.13	8.05	2.89	1.62

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 *RS: 17.50*

INPUT
Description: Additional flow from Grand Avenue;
2/3 PMF = 20,000 cfs
Full PMF
= 40,500 cfs

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6950	1290	7000	1290	7500	1287.5	8000	1286	8500	1285.5
9000	1283	9500	1282	9750	1281.5	10000	1281	10250	1282
10500	1284	11000	1286.5	11500	1288	12000	1289.9	12100	1290

Manning's n Values num= 1

Sta	n Val
6950	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6950	12100	2564.24	2564.24	2564.24	.1	.3

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1286.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1286.51	Reach Len. (ft)	2564.24	2564.24	2564.24
Crit W.S. (ft)		Flow Area (sq ft)		8827.66	
E.G. Slope (ft/ft)	0.005944	Area (sq ft)		8827.66	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	3174.23	Top Width (ft)		3174.23	
Vel Total (ft/s)	2.27	Avg. Vel. (ft/s)		2.27	
Max Chl Dpth (ft)	5.51	Hydr. Depth (ft)		2.78	
Conv. Total (cfs)	259403.6	Conv. (cfs)		259403.6	
Length Wtd. (ft)	2564.24	Wetted Per. (ft)		3174.26	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		1.03	
Alpha	1.00	Stream Power (lb/ft s)		2.34	
Frctn Loss (ft)	15.85	Cum Volume (acre-ft)		9409.92	83.61
C & E Loss (ft)	0.01	Cum SA (acres)		4354.55	100.37

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1288.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.100	
W.S. Elev (ft)	1288.05	Reach Len. (ft)	2564.24	2564.24	2564.24
Crit W.S. (ft)		Flow Area (sq ft)		14498.91	

E.G. Slope (ft/ft)	0.006613	Area (sq ft)	14498.91	
Q Total (cfs)	40500.00	Flow (cfs)	40500.00	
Top Width (ft)	4125.22	Top Width (ft)	4125.22	
Vel Total (ft/s)	2.79	Avg. Vel. (ft/s)	2.79	
Max Chl Dpth (ft)	7.05	Hydr. Depth (ft)	3.51	
Conv. Total (cfs)	498028.2	Conv. (cfs)	498028.2	
Length Wtd. (ft)	2564.24	Wetted Per. (ft)	4125.25	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)	1.45	
Alpha	1.00	Stream Power (lb/ft s)	4.05	
Frctn Loss (ft)	16.28	Cum Volume (acre-ft)	14931.90	226.06
C & E Loss (ft)	0.01	Cum SA (acres)	5050.92	237.51

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6950.00	7980.00	12.70	33.95	150.45	0.06	0.23	0.37
7980.00	9010.00	2067.55	1556.19	1030.01	10.34	1.51	1.33
9010.00	10040.00	13016.56	4693.40	1030.00	65.08	4.56	2.77
10040.00	11070.00	4903.20	2544.12	963.80	24.52	2.64	1.93

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6950.00	7980.00	706.92	642.46	590.89	1.75	1.09	1.10
7980.00	9010.00	6890.35	3145.58	1030.01	17.01	3.05	2.19
9010.00	10040.00	21827.06	6282.78	1030.00	53.89	6.10	3.47
10040.00	11070.00	10833.84	4126.92	1030.02	26.75	4.01	2.63
11070.00	RB 12100.00	241.82	301.16	444.33	0.60	0.68	0.80

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 17.01

INPUT
Description: Additional flow from Grand Avenue;
2/3 PMF = 20,000 cfs
Full PMF
= 41,500 cfs
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6100	1272.8	6190	1272	6300	1271	6460	1271	6580	1270
6690	1268.4	6880	1269.2	7160	1270	7550	1271	7710	1270
7770	1268	8030	1267.6	8300	1268	8660	1268.8	8900	1269.2
8990	1268	9080	1267.8	9170	1268	9500	1269	9770	1269.5
10000	1268.7	10120	1268	10430	1267.4	10450	1267.4	10560	1268
10650	1267.7	10870	1268	11070	1267.4	11230	1267.4	11300	1268
11350	1268.9	11380	1268	11420	1267.9	11500	1268	11700	1270
11950	1270.5	12130	1271	12150	1270.91	12350	1270	12420	1269.8
12510	1270	12660	1270	12918.73	1272	12979.4	1272	13099.57	1272

Manning's n Values num= 1

Sta	n Val
6100	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
6100 12918.73 3839.07 3839.07 3839.07 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
6100	6100	1272.8

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1270.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1270.68	Reach Len. (ft)	3839.07	3839.07	3839.07
Crit W.S. (ft)	1269.10	Flow Area (sq ft)		11038.02	
E.G. Slope (ft/ft)	0.006428	Area (sq ft)		11038.02	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	5884.69	Top Width (ft)		5884.69	
Vel Total (ft/s)	1.81	Avg. Vel. (ft/s)		1.81	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		1.88	
Conv. Total (cfs)	249455.2	Conv. (cfs)		249455.2	

Length Wtd. (ft)	3839.07	Wetted Per. (ft)	5884.80	
Min Ch El (ft)	1267.40	Shear (lb/sq ft)	0.75	
Alpha	1.00	Stream Power (lb/ft s)	1.36	
Frctn Loss (ft)	21.51	Cum Volume (acre-ft)	8825.21	83.61
C & E Loss (ft)	0.00	Cum SA (acres)	4087.91	100.37

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1271.88	Element			
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1271.80	Reach Len. (ft)	3839.07	3839.07	3839.07
Crit W.S. (ft)	1269.72	Flow Area (sq ft)		18269.60	
E.G. Slope (ft/ft)	0.006111	Area (sq ft)		18269.60	
Q Total (cfs)	41500.00	Flow (cfs)		41500.00	
Top Width (ft)	6680.69	Top Width (ft)		6680.69	
Vel Total (ft/s)	2.27	Avg. Vel. (ft/s)		2.27	
Max Chl Dpth (ft)	4.40	Hydr. Depth (ft)		2.73	
Conv. Total (cfs)	530872.8	Conv. (cfs)		530872.8	
Length Wtd. (ft)	3839.07	Wetted Per. (ft)		6680.82	
Min Ch El (ft)	1267.40	Shear (lb/sq ft)		1.04	
Alpha	1.00	Stream Power (lb/ft s)		2.37	
Frctn Loss (ft)	21.10	Cum Volume (acre-ft)		13967.41	226.06
C & E Loss (ft)	0.00	Cum SA (acres)		4732.86	237.51

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6100.00	7463.75	1017.04	938.22	925.66	5.09	1.01	1.08
7463.75	8827.49	5135.51	2773.72	1225.97	25.68	2.26	1.85
8827.49	10191.24	4688.49	2740.54	1363.76	23.44	2.01	1.71
10191.24	11554.98	8670.57	3963.21	1363.78	43.35	2.91	2.19
11554.98	RB 12918.73	488.39	622.33	1005.63	2.44	0.62	0.78

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6100.00	7463.75	3540.33	2218.82	1251.69	8.53	1.77	1.60
7463.75	8827.49	9981.43	4276.71	1363.78	24.05	3.14	2.33
8827.49	10191.24	9955.84	4270.09	1363.76	23.99	3.13	2.33
10191.24	11554.98	15147.11	5492.76	1363.78	36.50	4.03	2.76
11554.98	RB 12918.73	2875.29	2011.23	1337.80	6.93	1.50	1.43

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 16.28

INPUT
Description: Additional flow from Grand Avenue:
2/3 PMF = 20,500 cfs
Full PMF
= 48,500 cfs
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6000	1250.786	6060	1250.3	6110	1250	6340	1248	6650	1247
7290	1246	7370	1246	7450	1246.3	7500	1246.4	7630	1246.5
7800	1247.2	7970	1247.7	8080	1246.9	8220	1248	8340	1246.6
8670	1247	8950	1248	9050	1248.4	9150	1248	9220	1246.6
9470	1246.9	9690	1247	9860	1247.3	10000	1247	10280	1246
11115	1246	11130	1248	11470	1249.3	11670	1249.4	12010	1249.2
12300	1249.4	12730	1250	12750	1250.2				

Manning's n Values num= 1

Sta	n Val
6000	.1

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

```
        6000   12750          3600.53 3600.53 3600.53            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   12750   12750
```

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1249.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1249.17	Reach Len. (ft)	3600.53	3600.53	3600.53
Crit W.S. (ft)		Flow Area (sq ft)		11561.54	
E.G. Slope (ft/ft)	0.004946	Area (sq ft)		11561.54	
Q Total (cfs)	20500.00	Flow (cfs)		20500.00	
Top Width (ft)	5231.15	Top Width (ft)		5231.15	
Vel Total (ft/s)	1.77	Avg. Vel. (ft/s)		1.77	
Max Chl Dpth (ft)	3.17	Hydr. Depth (ft)		2.21	
Conv. Total (cfs)	291483.1	Conv. (cfs)		291483.1	
Length Wtd. (ft)	3600.53	Wetted Per. (ft)		5231.33	
Min Ch El (ft)	1246.00	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)		1.21	
Frctn Loss (ft)	20.69	Cum Volume (acre-ft)		7829.32	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		3598.08	100.37

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1250.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1250.70	Reach Len. (ft)	3600.53	3600.53	3600.53
Crit W.S. (ft)		Flow Area (sq ft)		21331.51	
E.G. Slope (ft/ft)	0.005038	Area (sq ft)		21331.51	
Q Total (cfs)	48500.00	Flow (cfs)		48500.00	
Top Width (ft)	6739.16	Top Width (ft)		6739.16	
Vel Total (ft/s)	2.27	Avg. Vel. (ft/s)		2.27	
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		3.17	
Conv. Total (cfs)	683278.5	Conv. (cfs)		683278.5	
Length Wtd. (ft)	3600.53	Wetted Per. (ft)		6739.85	
Min Ch El (ft)	1246.00	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		2.26	
Frctn Loss (ft)	20.28	Cum Volume (acre-ft)		12222.33	226.06
C & E Loss (ft)	0.00	Cum SA (acres)		4141.50	237.51

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6000.00	7350.00	4340.68	2497.28	1144.74	21.17	2.18	1.74
7350.00	8700.00	5294.10	3005.11	1350.02	25.82	2.23	1.76
8700.00	10050.00	4062.75	2563.76	1350.02	19.82	1.90	1.58
10050.00	11400.00	6802.03	3492.87	1350.14	33.18	2.59	1.95
11400.00	RB 12750.00	0.44	2.54	36.42	0.00	0.07	0.17

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6000.00	7350.00	9648.19	4388.02	1339.18	19.89	3.28	2.20
7350.00	8700.00	12192.99	5066.03	1350.02	25.14	3.75	2.41
8700.00	10050.00	10474.51	4624.68	1350.02	21.60	3.43	2.26
10050.00	11400.00	14210.92	5553.80	1350.14	29.30	4.11	2.56
11400.00	RB 12750.00	1973.38	1698.99	1350.50	4.07	1.26	1.16

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 15.60

INPUT
Description: 2/3 PMF = 20,500 cfs
Full PMF = 48,500 cfs

Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6470	1231	6510	1230	6680	1229.5	6930	1229.5	7510	1229.4
7670	1230	7730	1229.5	7840	1228.5	7990	1228	8180	1227.9
8340	1228	8420	1227	8460	1226	8570	1225.6	8740	1225.3
8840	1226	8940	1225.5	9360	1225.3	9550	1225.6	9650	1225.7
9900	1225.7	10000	1225	11000	1226	11600	1226	11700	1228
11860	1228.5	12130	1229	12250	1229	12310	1229.2	12500	1228.8
12580	1230	12700	1230	12740	1229.8	12930	1229.3	13130	1229.3
13480	1229.9	13650	1230	13860	1229.7	14040	1230	14230	1230
14394.16	1229.59								

Manning's n Values num= 1

Sta	n Val
6470	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
6470 13650 4000 4080.25 4200 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
6470	7670	1230	13650	14394.16	

Blocked Obstructions num= 1

Sta L	Sta R	Elev
11000	11600	1226

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1228.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.100	
W.S. Elev (ft)	1228.45	Reach Len. (ft)	4000.00	4080.25	4200.00
Crit W.S. (ft)	1226.70	Flow Area (sq ft)		9441.45	
E.G. Slope (ft/ft)	0.006771	Area (sq ft)		9441.45	
Q Total (cfs)	20500.00	Flow (cfs)		20500.00	
Top Width (ft)	3989.73	Top Width (ft)		3989.73	
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)		2.17	
Max Chl Dpth (ft)	3.45	Hydr. Depth (ft)		2.37	
Conv. Total (cfs)	249130.7	Conv. (cfs)		249130.7	
Length Wtd. (ft)	4080.25	Wetted Per. (ft)		3989.77	
Min Ch El (ft)	1225.00	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		2.17	
Frctn Loss (ft)	20.47	Cum Volume (acre-ft)		6961.30	83.61
C & E Loss (ft)	0.01	Cum SA (acres)		3216.99	100.37

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1230.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.100	
W.S. Elev (ft)	1230.41	Reach Len. (ft)	4000.00	4080.25	4200.00
Crit W.S. (ft)	1227.56	Flow Area (sq ft)		20403.30	
E.G. Slope (ft/ft)	0.006330	Area (sq ft)		20403.30	399.20
Q Total (cfs)	48500.00	Flow (cfs)		48500.00	
Top Width (ft)	7900.66	Top Width (ft)		7156.50	744.16
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)		2.38	
Max Chl Dpth (ft)	5.41	Hydr. Depth (ft)		2.85	
Conv. Total (cfs)	609573.0	Conv. (cfs)		609573.0	
Length Wtd. (ft)	4080.25	Wetted Per. (ft)		7156.58	
Min Ch El (ft)	1225.00	Shear (lb/sq ft)		1.13	
Alpha	1.00	Stream Power (lb/ft s)		2.68	
Frctn Loss (ft)	20.90	Cum Volume (acre-ft)		10497.50	209.56
C & E Loss (ft)	0.00	Cum SA (acres)		3567.21	206.75

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6470.00	7906.00	1.02	4.39	51.35	0.00	0.09	0.23
7906.00	9342.00	5618.72	2932.59	1436.02	27.41	2.04	1.92
9342.00	10778.00	10581.06	4287.30	1436.00	51.61	2.99	2.47
10778.00	12214.00	4299.20	2217.20	1066.40	20.97	2.08	1.94

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6470.00	7906.00	1294.87	1345.14	1412.52	2.67	0.95	0.96
7906.00	9342.00	14416.08	5749.19	1436.02	29.72	4.00	2.51
9342.00	10778.00	20511.69	7103.90	1436.00	42.29	4.95	2.89
10778.00	12214.00	11069.87	4906.64	1436.02	22.82	3.42	2.26
12214.00	RB 13650.00	1207.49	1298.45	1436.01	2.49	0.90	0.93

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 14.83

INPUT
Description: Flow weirs to model MDB1 between sections 14.83 and 12.49;
2/3
PMF = 20,500 cfs
Full PMF = 48,500 cfs
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6920	1210.5	6950	1210	6960	1209	7040	1210	7070	1209
7240	1208.4	7380	1208.4	7700	1208	7970	1207	8240	1206
8290	1205.8	8360	1206	8500	1206	8580	1206.2	8740	1206.5
9050	1206	9150	1205	9210	1204.8	9350	1204	9420	1204
9530	1203.5	9640	1203.6	9700	1203.6	9910	1203.9	10000	1204
10110	1204.2	10310	1204	10420	1204	10600	1205	10820	1206
10960	1206.2	11090	1206	11500	1205.5	11750	1205.6	11940	1206
11990	1206	12100	1205.7	12320	1205.3	12510	1206	12630	1207
12740	1208	12780	1208.3	12850	1208	13030	1207.5	13170	1207.7
13260	1208	13340	1208.8	13450	1208	13530	1207.5	13570	1208
13650	1210	13690	1210.3						

Manning's n Values num= 1

Sta	n Val
6920	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6920	13690	3870	3668.12	3430	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
13690	13690	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1208.05	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.100	
W.S. Elev (ft)	1208.01	Reach Len. (ft)	3870.00	3668.12	3430.00
Crit W.S. (ft)		Flow Area (sq ft)		12777.54	
E.G. Slope (ft/ft)	0.003863	Area (sq ft)		12777.54	
Q Total (cfs)	20500.00	Flow (cfs)		20500.00	
Top Width (ft)	5580.75	Top Width (ft)		5580.75	
Vel Total (ft/s)	1.60	Avg. Vel. (ft/s)		1.60	
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)		2.29	
Conv. Total (cfs)	329819.8	Conv. (cfs)		329819.8	
Length Wtd. (ft)	3668.12	Wetted Per. (ft)		5580.79	
Min Ch El (ft)	1203.50	Shear (lb/sq ft)		0.55	
Alpha	1.00	Stream Power (lb/ft s)		0.89	
Frctn Loss (ft)	17.57	Cum Volume (acre-ft)		5920.68	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		2768.76	100.37

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1209.59	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.100	
W.S. Elev (ft)	1209.52	Reach Len. (ft)	3870.00	3668.12	3430.00
Crit W.S. (ft)		Flow Area (sq ft)		22335.75	
E.G. Slope (ft/ft)	0.004222	Area (sq ft)		22335.75	
Q Total (cfs)	48500.00	Flow (cfs)		48500.00	
Top Width (ft)	6622.93	Top Width (ft)		6622.93	
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)		2.17	
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	746376.6	Conv. (cfs)		746376.6	
Length Wtd. (ft)	3668.12	Wetted Per. (ft)		6623.03	
Min Ch El (ft)	1203.50	Shear (lb/sq ft)		0.89	
Alpha	1.00	Stream Power (lb/ft s)		1.93	
Frctn Loss (ft)	17.93	Cum Volume (acre-ft)		8495.82	190.32

C & E Loss (ft) 0.00 Cum SA (acres) 2921.85 170.88

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

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6920.00	8274.00	537.43	614.61	579.96	2.62	1.06	0.87
8274.00	9628.00	5690.09	3554.40	1354.01	27.76	2.63	1.60
9628.00	10982.00	9125.33	4718.93	1354.01	44.51	3.49	1.93
10982.00	12336.00	4528.56	3099.35	1354.00	22.09	2.29	1.46
12336.00	RB 13690.00	618.58	790.24	938.81	3.02	0.84	0.78

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 6920.00	8274.00	2883.32	2215.47	1266.24	5.94	1.75	1.30
8274.00	9628.00	12933.25	5600.11	1354.01	26.67	4.14	2.31
9628.00	10982.00	17719.65	6764.64	1354.01	36.54	5.00	2.62
10982.00	12336.00	11229.62	5145.06	1354.00	23.15	3.80	2.18
12336.00	RB 13690.00	3734.17	2610.46	1294.78	7.70	2.02	1.43

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

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 14.13

INPUT
Description: 2/3 PMF = 20,500 cfs
Full PMF = 45,000 cfs
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7176	1192	7320	1191	7350	1190	7370	1190.2	7420	1190
7450	1189	7550	1188.8	7770	1188.7	8030	1188	8560	1187.4
8710	1187	8920	1186.6	9080	1188	9150	1187.5	9340	1187.5
9600	1188	9790	1188	9930	1187.5	10000	1187.6	10070	1188
10160	1188	10350	1188	11200	1189.4	11590	1189.4	11720	1189
11830	1188.6	11930	1189.5	12290	1190	12350	1190.2	12390	1188
12440	1190	12460	1188.5	12540	1190	12740	1189.2	12950	1189.4
13150	1189	13940	1190						

Manning's n Values num= 1

Sta	n Val
7176	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7176	13940	4030	3991.28	3950	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
13940	13940	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1190.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1190.43	Reach Len. (ft)	4030.00	3991.28	3950.00
Crit W.S. (ft)	1188.95	Flow Area (sq ft)		11926.64	
E.G. Slope (ft/ft)	0.006084	Area (sq ft)		11926.64	
Q Total (cfs)	20500.00	Flow (cfs)		20500.00	
Top Width (ft)	6603.04	Top Width (ft)		6603.04	
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)		1.72	
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	262825.6	Conv. (cfs)		262825.6	
Length Wtd. (ft)	3991.28	Wetted Per. (ft)		6603.69	
Min Ch El (ft)	1186.60	Shear (lb/sq ft)		0.69	
Alpha	1.00	Stream Power (lb/ft s)		1.18	
Frctn Loss (ft)	20.39	Cum Volume (acre-ft)		4880.53	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		2255.77	100.37

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1191.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1191.58	Reach Len. (ft)	4030.00	3991.28	3950.00
Crit W.S. (ft)	1189.69	Flow Area (sq ft)		19505.61	
E.G. Slope (ft/ft)	0.005804	Area (sq ft)		19505.61	
Q Total (cfs)	45000.00	Flow (cfs)		45000.00	
Top Width (ft)	6703.02	Top Width (ft)		6703.02	
Vel Total (ft/s)	2.31	Avg. Vel. (ft/s)		2.31	
Max Chl Dpth (ft)	4.98	Hydr. Depth (ft)		2.91	
Conv. Total (cfs)	590657.7	Conv. (cfs)		590657.7	
Length Wtd. (ft)	3991.28	Wetted Per. (ft)		6704.83	
Min Ch El (ft)	1186.60	Shear (lb/sq ft)		1.05	
Alpha	1.00	Stream Power (lb/ft s)		2.43	
Frctn Loss (ft)	20.61	Cum Volume (acre-ft)		6734.12	190.32
C & E Loss (ft)	0.01	Cum SA (acres)		2360.77	170.88

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7176.00	8528.80	4274.68	2475.54	1191.86	20.85	2.08	1.73
8528.80	9881.60	8697.55	3988.14	1352.81	42.43	2.95	2.18
9881.60	11234.40	4584.44	2715.84	1352.80	22.36	2.01	1.69
11234.40	12587.20	1486.27	1381.70	1352.98	7.25	1.02	1.08
12587.20	RB 13940.00	1457.05	1365.44	1353.24	7.11	1.01	1.07

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7176.00	8528.80	8823.33	3875.09	1291.86	19.61	3.00	2.28
8528.80	9881.60	15491.08	5533.00	1352.81	34.42	4.09	2.80
9881.60	11234.40	10021.88	4260.69	1352.80	22.27	3.15	2.35
11234.40	12587.20	5358.45	2926.55	1352.98	11.91	2.16	1.83
12587.20	RB 13940.00	5305.26	2910.29	1354.38	11.79	2.15	1.82

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 13.38

INPUT
Description: 2/3 PMF = 20,000 cfs
Full PMF = 38,000 cfs
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7244	1172	7250	1171.5	7280	1170	7350	1169	7700	1169.3
7850	1169	8080	1168.5	8450	1169.1	8690	1168	8930	1167.5
9140	1167.6	9250	1167.7	9460	1167	9590	1168	9930	1164
10000	1164.4	10470	1166	11050	1168	11690	1170	11850	1170.4
12000	1170.2	12090	1168	12500	1168	12600	1170	12660	1168
12730	1168.5	12780	1168.8	13130	1169	13430	1168.5	13540	1168.4
13790	1170	13920	1170	14050	1170.3				

Manning's n Values num= 1

Sta	n Val
7244	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7244	14050	4750	4700.46	4650	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
14050	14050	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1170.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.100	

W.S. Elev (ft)	1170.05	Reach Len. (ft)	4750.00	4700.46	4650.00
Crit W.S. (ft)		Flow Area (sq ft)		12822.62	
E.G. Slope (ft/ft)	0.004330	Area (sq ft)		12822.62	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	6364.72	Top Width (ft)		6364.72	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	6.05	Hydr. Depth (ft)		2.01	
Conv. Total (cfs)	303923.3	Conv. (cfs)		303923.3	
Length Wtd. (ft)	4700.46	Wetted Per. (ft)		6364.85	
Min Ch El (ft)	1164.00	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		0.85	
Frctn Loss (ft)	20.13	Cum Volume (acre-ft)		3746.68	83.61
C & E Loss (ft)	0.00	Cum SA (acres)		1661.67	100.37

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1171.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.100	
W.S. Elev (ft)	1170.98	Reach Len. (ft)	4750.00	4700.46	4650.00
Crit W.S. (ft)		Flow Area (sq ft)		19096.55	
E.G. Slope (ft/ft)	0.004518	Area (sq ft)		19096.55	
Q Total (cfs)	38000.00	Flow (cfs)		38000.00	
Top Width (ft)	6789.69	Top Width (ft)		6789.69	
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)		1.99	
Max Chl Dpth (ft)	6.98	Hydr. Depth (ft)		2.81	
Conv. Total (cfs)	565349.6	Conv. (cfs)		565349.6	
Length Wtd. (ft)	4700.46	Wetted Per. (ft)		6790.54	
Min Ch El (ft)	1164.00	Shear (lb/sq ft)		0.79	
Alpha	1.00	Stream Power (lb/ft s)		1.58	
Frctn Loss (ft)	20.24	Cum Volume (acre-ft)		4965.62	190.32
C & E Loss (ft)	0.00	Cum SA (acres)		1742.63	170.88

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7244.00	8605.20	1315.60	1449.97	1326.17	6.58	1.09	0.91
8605.20	9966.40	6979.31	3987.55	1361.23	34.90	2.93	1.75
9966.40	11327.60	9138.40	4687.46	1361.21	45.69	3.44	1.95
11327.60	12688.80	1389.71	1372.20	1064.25	6.95	1.29	1.01
12688.80	RB 14050.00	1176.99	1325.41	1251.99	5.88	1.06	0.89

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

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7244.00	8605.20	3969.75	2700.89	1344.93	10.45	2.01	1.47
8605.20	9966.40	11969.78	5262.51	1361.23	31.50	3.87	2.27
9966.40	11327.60	14739.21	5962.42	1361.21	38.79	4.38	2.47
11327.60	12688.80	3658.22	2584.10	1361.28	9.63	1.90	1.42
12688.80	RB 14050.00	3663.04	2586.61	1361.89	9.64	1.90	1.42

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 12.49

INPUT
Description: Flow weirs to the east and to model MDB1 between sections12.49 and 11.17;
2/3 PMF = 20,000 cfs
Full PMF = 35,000 cfs
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7470	1152.2	7540	1152.2	7575	1152	7730	1151.5	7880	1151
8040	1150.5	8189	1150	8450	1150	8490	1149.5	9350	1148
9710	1148	9790	1147	10000	1146.3	10480	1147	10550	1148

11520	1148	12120	1148.5	12430	1148	12820	1148	12910	1149
12990	1148	13290	1147	14040	1148	14500	1148	14960	1148.3
15220	1149	15430	1150	15850	1150	15900	1150	16070	1149.5
16160	1150	16280	1150	16460	1149.31	6572.84	1148.79		

Manning's n Values num= 1

Sta	n Val
7470	.1

Bank Sta: Left 7540 Right 15430 Lengths: Left 4800 Channel 4844.96 Right 4750 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7470	7540		15430	16572.84	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1149.95	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.100	
W.S. Elev (ft)	1149.92	Reach Len. (ft)	4800.00	4844.96	4750.00
Crit W.S. (ft)	1148.52	Flow Area (sq ft)		13341.91	
E.G. Slope (ft/ft)	0.004271	Area (sq ft)		13341.91	193.20
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	7445.69	Top Width (ft)		6956.32	489.37
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)		1.50	
Max Chl Dpth (ft)	3.62	Hydr. Depth (ft)		1.92	
Conv. Total (cfs)	306034.8	Conv. (cfs)		306034.8	
Length Wtd. (ft)	4844.96	Wetted Per. (ft)		6956.35	
Min Ch El (ft)	1146.30	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		0.77	
Frctn Loss (ft)	19.57	Cum Volume (acre-ft)		2335.00	73.29
C & E Loss (ft)	0.00	Cum SA (acres)		942.95	74.25

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1150.80	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1150.75	Reach Len. (ft)	4800.00	4844.96	4750.00
Crit W.S. (ft)	1148.85	Flow Area (sq ft)		19427.13	
E.G. Slope (ft/ft)	0.004110	Area (sq ft)		19427.13	1093.02
Q Total (cfs)	35000.00	Flow (cfs)		35000.00	
Top Width (ft)	8612.88	Top Width (ft)		7470.04	1142.84
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	
Max Chl Dpth (ft)	4.45	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	545916.3	Conv. (cfs)		545916.3	
Length Wtd. (ft)	4844.96	Wetted Per. (ft)		7470.08	
Min Ch El (ft)	1146.30	Shear (lb/sq ft)		0.67	
Alpha	1.00	Stream Power (lb/ft s)		1.20	
Frctn Loss (ft)	19.89	Cum Volume (acre-ft)		2887.12	131.98
C & E Loss (ft)	0.00	Cum SA (acres)		973.26	109.88

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7540.00	9118.00	548.42	613.65	661.47	2.74	0.93	0.89
9118.00	10696.00	6948.00	3986.67	1578.02	34.74	2.53	1.74
10696.00	12274.00	3900.04	2819.26	1578.00	19.50	1.79	1.38
12274.00	13852.00	5391.59	3423.93	1578.01	26.96	2.17	1.57
13852.00	RB 15430.00	3211.96	2498.37	1560.85	16.06	1.60	1.29

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 7540.00	9118.00	1545.02	1449.33	1158.04	4.41	1.25	1.07
9118.00	10696.00	10908.25	5299.23	1578.02	31.17	3.36	2.06

10696.00	12274.00	7205.07	4131.82	1578.00	20.59	2.62	1.74
12274.00	13852.00	9046.79	4736.49	1578.01	25.85	3.00	1.91
13852.00	RB 15430.00	6294.88	3810.23	1578.00	17.99	2.41	1.65

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 11.57

INPUT
Description: 2/3 PMF = 20,000 cfs
Full PMF = 33,000 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8500	1130.4	8620	1130	8770	1130	9180	1128	9310	1128
9480	1126	9600	1126	9680	1126.4	9720	1126	9810	1125
10000	1125.2	10090	1125.5	10170	1126	10300	1128	10420	1128.4
10600	1128.4	10670	1128	10840	1126	10890	1124	11000	1124
11250	1126	11410	1128	11500	1128.3	11580	1128.3	11880	1128.3
12600	1130								

Manning's n Values num= 1

Sta	n Val
8500	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8500	12600	2087.21	2087.35	2087.21	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8500	8500		12600	12600	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1130.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.100	
W.S. Elev (ft)	1130.33	Reach Len. (ft)	2087.21	2087.35	2087.21
Crit W.S. (ft)		Flow Area (sq ft)		11123.56	
E.G. Slope (ft/ft)	0.003842	Area (sq ft)		11123.56	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	4078.17	Top Width (ft)		4078.17	
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	
Max Chl Dpth (ft)	6.33	Hydr. Depth (ft)		2.73	
Conv. Total (cfs)	322645.8	Conv. (cfs)		322645.8	
Length Wtd. (ft)	2087.35	Wetted Per. (ft)		4078.62	
Min Ch El (ft)	1124.00	Shear (lb/sq ft)		0.65	
Alpha	1.00	Stream Power (lb/ft s)		1.18	
Frctn Loss (ft)	8.14	Cum Volume (acre-ft)		974.41	62.76
C & E Loss (ft)	0.00	Cum SA (acres)		329.30	47.57

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1130.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.100	
W.S. Elev (ft)	1130.84	Reach Len. (ft)	2087.21	2087.35	2087.21
Crit W.S. (ft)		Flow Area (sq ft)		13220.31	
E.G. Slope (ft/ft)	0.004116	Area (sq ft)		13220.31	
Q Total (cfs)	27500.00	Flow (cfs)		27500.00	
Top Width (ft)	4100.00	Top Width (ft)		4100.00	
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)		2.08	
Max Chl Dpth (ft)	6.84	Hydr. Depth (ft)		3.22	
Conv. Total (cfs)	428657.2	Conv. (cfs)		428657.2	
Length Wtd. (ft)	2087.35	Wetted Per. (ft)		4101.40	
Min Ch El (ft)	1124.00	Shear (lb/sq ft)		0.83	
Alpha	1.00	Stream Power (lb/ft s)		1.72	
Frctn Loss (ft)	8.46	Cum Volume (acre-ft)		1071.51	72.38
C & E Loss (ft)	0.00	Cum SA (acres)		329.82	47.57

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8500.00	9320.00	850.60	935.74	798.18	4.25	1.17	0.91

9320.00	10140.00	8132.02	3665.47	820.02	40.66	4.47	2.22
10140.00	10960.00	4561.68	2591.17	820.07	22.81	3.16	1.76
10960.00	11780.00	5443.14	2880.85	820.02	27.22	3.51	1.89
11780.00	RB 12600.00	1012.57	1050.34	820.33	5.06	1.28	0.96

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 8500.00	9320.00	1652.23	1354.46	820.45	6.01	1.65	1.22
9320.00	10140.00	10405.42	4084.98	820.02	37.84	4.98	2.55
10140.00	10960.00	6257.01	3010.68	820.07	22.75	3.67	2.08
10960.00	11780.00	7292.53	3300.36	820.02	26.52	4.02	2.21
11780.00	RB 12600.00	1892.82	1469.85	820.84	6.88	1.79	1.29

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 11.17

INPUT
Description: 2/3 PMF = 18,000 cfs
Full PMF = 25,500 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9490	1121.3	9510	1121	9560	1120.8	9650	1120	9820	1119.5
10000	1118.8	10130	1118	10380	1114	10410	1116	10490	1118
10580	1120	10660	1120	10780	1118	10860	1118	10960	1118
11130	1119	11230	1119.6	11400	1119.6	11540	1120	11640	1120.2
11820	1120	11970	1120.1	12070	1120	12280	1119.7	12380	1120
12510	1121.3								

Manning's n Values num= 1

Sta	n Val
9490	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9490	12510	2300	2468.31	2800	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9490	9490	

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1122.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.100	
W.S. Elev (ft)	1122.18	Reach Len. (ft)	2300.00	2468.31	2800.00
Crit W.S. (ft)	1120.00	Flow Area (sq ft)		9171.76	
E.G. Slope (ft/ft)	0.003970	Area (sq ft)		9171.76	
Q Total (cfs)	18000.00	Flow (cfs)		18000.00	
Top Width (ft)	3020.00	Top Width (ft)		3020.00	
Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)		1.96	
Max Chl Dpth (ft)	8.18	Hydr. Depth (ft)		3.04	
Conv. Total (cfs)	285688.6	Conv. (cfs)		285688.6	
Length Wtd. (ft)	2468.31	Wetted Per. (ft)		3021.94	
Min Ch El (ft)	1114.00	Shear (lb/sq ft)		0.75	
Alpha	1.00	Stream Power (lb/ft s)		1.48	
Frctn Loss (ft)	10.96	Cum Volume (acre-ft)		488.15	62.76
C & E Loss (ft)	0.00	Cum SA (acres)		159.23	47.57

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1122.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.100	
W.S. Elev (ft)	1122.38	Reach Len. (ft)	2300.00	2468.31	2800.00
Crit W.S. (ft)	1120.14	Flow Area (sq ft)		9782.99	
E.G. Slope (ft/ft)	0.003953	Area (sq ft)		9782.99	
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	3020.00	Top Width (ft)		3020.00	
Vel Total (ft/s)	2.04	Avg. Vel. (ft/s)		2.04	
Max Chl Dpth (ft)	8.38	Hydr. Depth (ft)		3.24	
Conv. Total (cfs)	318091.4	Conv. (cfs)		318091.4	

Length Wtd. (ft)	2468.31	Wetted Per. (ft)	3022.34	
Min Ch El (ft)	1114.00	Shear (lb/sq ft)	0.80	
Alpha	1.00	Stream Power (lb/ft s)	1.63	
Frctn Loss (ft)	10.96	Cum Volume (acre-ft)	520.37	72.38
C & E Loss (ft)	0.00	Cum SA (acres)	159.23	47.57

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9490.00	10094.00	2554.04	1545.43	604.89	14.19	2.56	1.65
10094.00	10698.00	7188.55	2874.00	604.15	39.94	4.76	2.50
10698.00	11302.00	4383.32	2135.72	604.02	24.35	3.54	2.05
11302.00	11906.00	2042.52	1350.69	604.00	11.35	2.24	1.51
11906.00	RB 12510.00	1831.58	1265.92	604.88	10.18	2.10	1.45

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9490.00	10094.00	2912.19	1667.67	605.09	14.56	2.76	1.75
10094.00	10698.00	7740.67	2996.24	604.15	38.70	4.96	2.58
10698.00	11302.00	4831.45	2257.96	604.02	24.16	3.74	2.14
11302.00	11906.00	2370.63	1472.94	604.00	11.85	2.44	1.61
11906.00	RB 12510.00	2145.06	1388.17	605.09	10.73	2.30	1.55

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: MCMICKEN DAM
REACH: B2 RS: 10.71

INPUT
Description: Downstream end of model MDB2;
2/3 PMF = 18,000 cfs
Full PMF =
25,500 cfs
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530	1110.2	9560	1110	9610	1108	9700	1107.6	9730	1107.3
9750	1108	9770	1108.3	9790	1108	9840	1106	10000	1107
10230	1108	10260	1106	10560	1106	10670	1108	10800	1106
10890	1108.7	10920	1108.6	10980	1108	11100	1108.5	11160	1108.2
11200	1108	11370	1108.6	11550	1109.1	11800	1110	11980	1110.6
12130	1110.8	12170	1110.6	12260	1110.5	12480	1110.3	12590	1110
12640	1109.5	12720	1109.2	12770	1109.2	12910	1108.8	12950	1108.8
13010	1109	13040	1109.1	13090	1109.2	13150	1109.4	13240	1109.7
13310	1110	13480	1110.6	13610	1111				

Manning's n Values num= 1

Sta	n Val
9530	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9530	12130	0	0	0	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9530	9530		12130	13610	

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1111.27	Element			
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1111.19	Reach Len. (ft)			
Crit W.S. (ft)	1108.80	Flow Area (sq ft)		8057.65	
E.G. Slope (ft/ft)	0.005005	Area (sq ft)		8057.65	1952.76
Q Total (cfs)	18000.00	Flow (cfs)		18000.00	
Top Width (ft)	4080.00	Top Width (ft)		2600.00	1480.00
Vel Total (ft/s)	2.23	Avg. Vel. (ft/s)		2.23	
Max Chl Dpth (ft)	5.19	Hydr. Depth (ft)		3.10	
Conv. Total (cfs)	254422.1	Conv. (cfs)		254422.1	
Length Wtd. (ft)		Wetted Per. (ft)		2601.25	
Min Ch El (ft)	1106.00	Shear (lb/sq ft)		0.97	

Alpha	1.00	Stream Power (lb/ft s)	2.16
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1111.48	Element			
Vel Head (ft)	0.08	Wt. n-Val.		0.100	
W.S. Elev (ft)	1111.40	Reach Len. (ft)			
Crit W.S. (ft)	1108.92	Flow Area (sq ft)		8583.56	
E.G. Slope (ft/ft)	0.005006	Area (sq ft)		8583.56	2252.12
Q Total (cfs)	20000.00	Flow (cfs)		20000.00	
Top Width (ft)	4080.00	Top Width (ft)		2600.00	1480.00
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)		2.33	
Max Chl Dpth (ft)	5.40	Hydr. Depth (ft)		3.30	
Conv. Total (cfs)	282681.2	Conv. (cfs)		282681.2	
Length Wtd. (ft)		Wetted Per. (ft)		2601.45	
Min Ch El (ft)	1106.00	Shear (lb/sq ft)		1.03	
Alpha	1.00	Stream Power (lb/ft s)		2.40	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

FLOW DISTRIBUTION OUTPUT Profile #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9530.00	10050.00	4412.98	1917.99	521.10	24.52	3.69	2.30
10050.00	10570.00	6333.70	2380.45	520.07	35.19	4.58	2.66
10570.00	11090.00	4264.87	1877.63	520.08	23.69	3.61	2.27
11090.00	11610.00	2475.42	1354.66	520.00	13.75	2.61	1.83
11610.00	RB 12130.00	513.04	526.90	520.00	2.85	1.01	0.97

FLOW DISTRIBUTION OUTPUT Profile #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9530.00	10050.00	4871.45	2023.17	521.30	24.36	3.89	2.41
10050.00	10570.00	6876.20	2485.63	520.07	34.38	4.78	2.77
10570.00	11090.00	4717.95	1982.81	520.08	23.59	3.81	2.38
11090.00	11610.00	2832.49	1459.84	520.00	14.16	2.81	1.94
11610.00	RB 12130.00	701.91	632.08	520.00	3.51	1.22	1.11

SUMMARY OF MANNING'S N VALUES

River:MCMICKEN DAM

Reach	River Sta.	n1
B2	18.44	.1
B2	18.29	.1
B2	17.93	.1
B2	17.50	.1
B2	17.01	.1
B2	16.28	.1
B2	15.60	.1
B2	14.83	.1
B2	14.13	.1
B2	13.38	.1
B2	12.49	.1
B2	11.57	.1
B2	11.17	.1
B2	10.71	.1

SUMMARY OF REACH LENGTHS

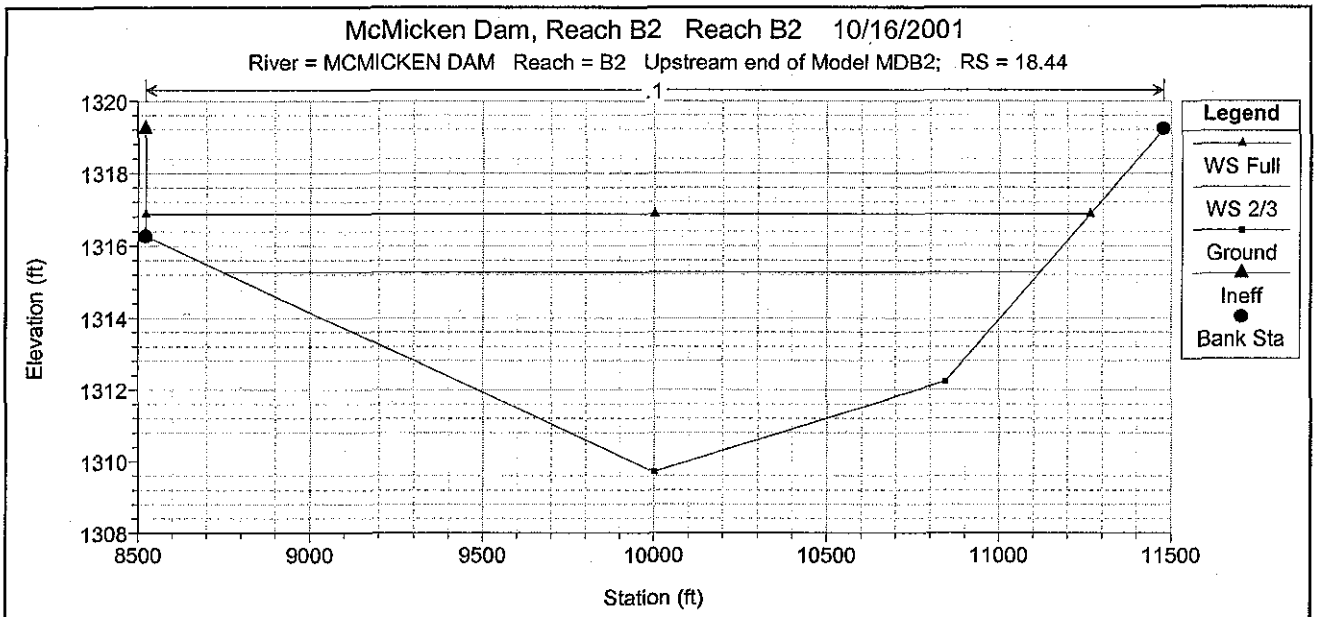
River: MCMICKEN DAM

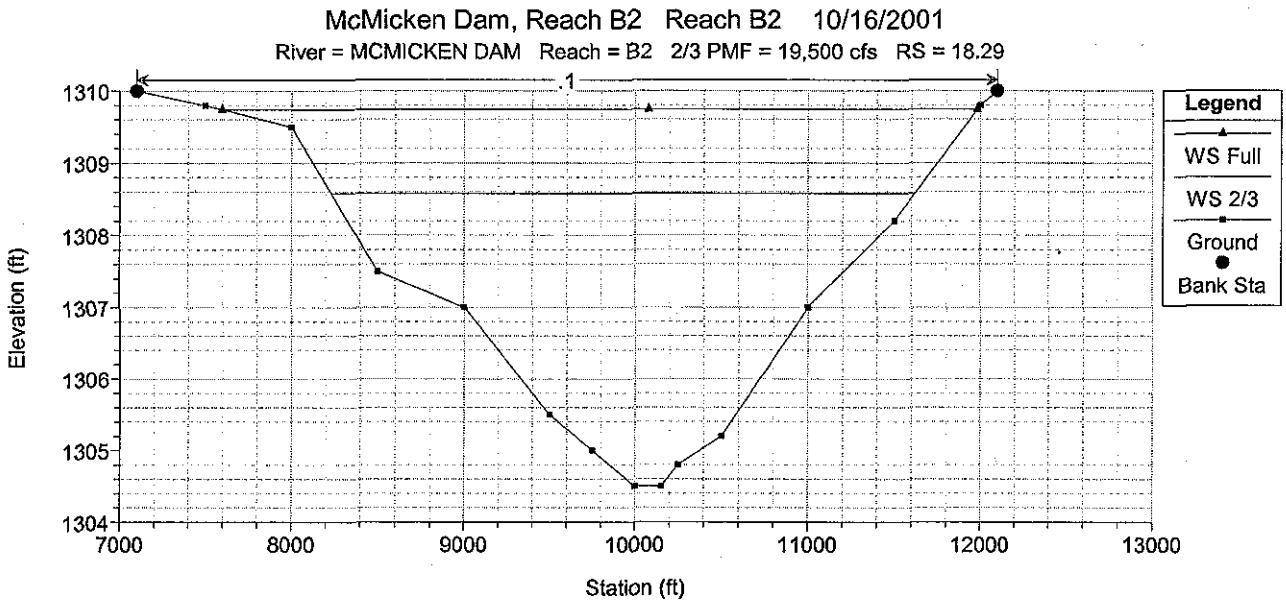
Reach	River Sta.	Left	Channel	Right
B2	18.44	925	801.4	675
B2	18.29	2000	1874.84	1750
B2	17.93	2000	2307.68	2500
B2	17.50	2564.24	2564.24	2564.24
B2	17.01	3839.07	3839.07	3839.07
B2	16.28	3600.53	3600.53	3600.53
B2	15.60	4000	4080.25	4200

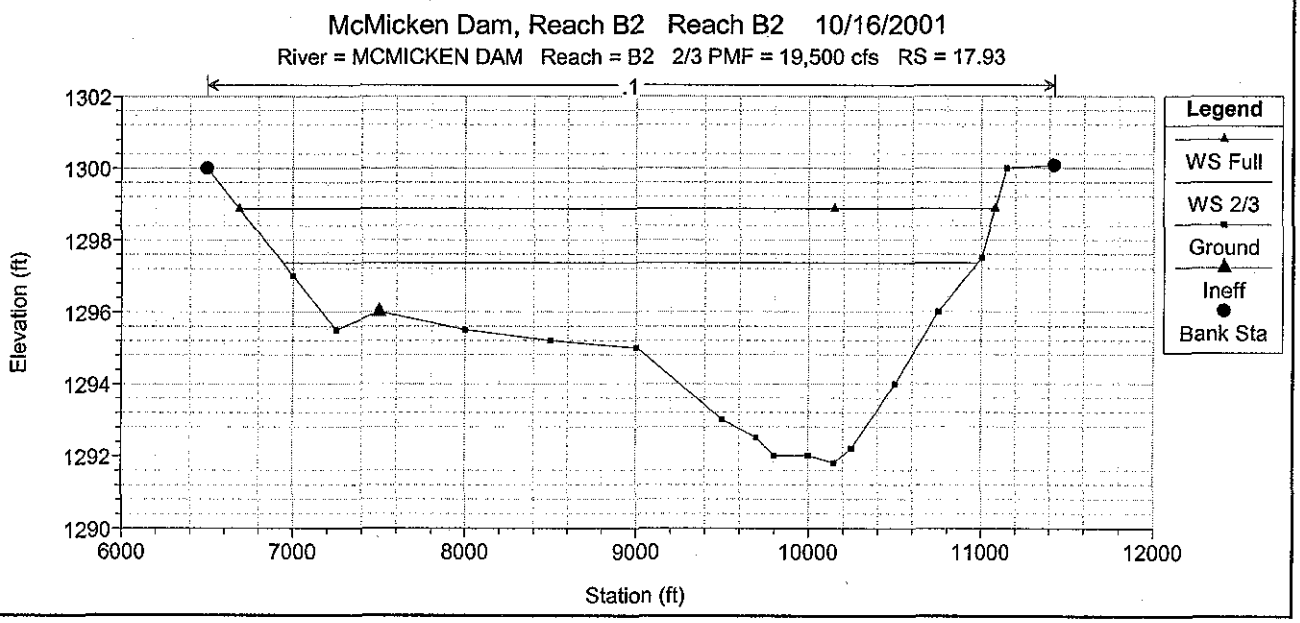
B2	14.83	3870	3668.12	3430
B2	14.13	4030	3991.28	3950
B2	13.38	4750	4700.46	4650
B2	12.49	4800	4844.96	4750
B2	11.57	2087.21	2087.35	2087.21
B2	11.17	2300	2468.31	2800
B2	10.71	0	0	0

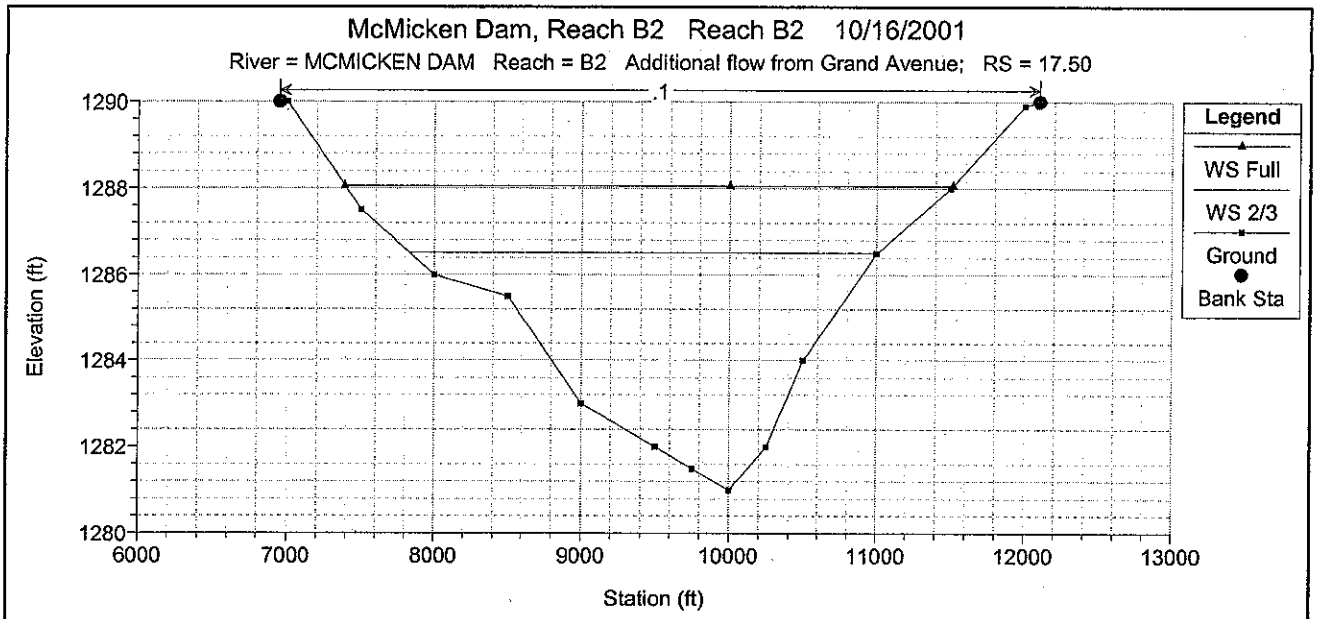
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: MCMICKEN DAM

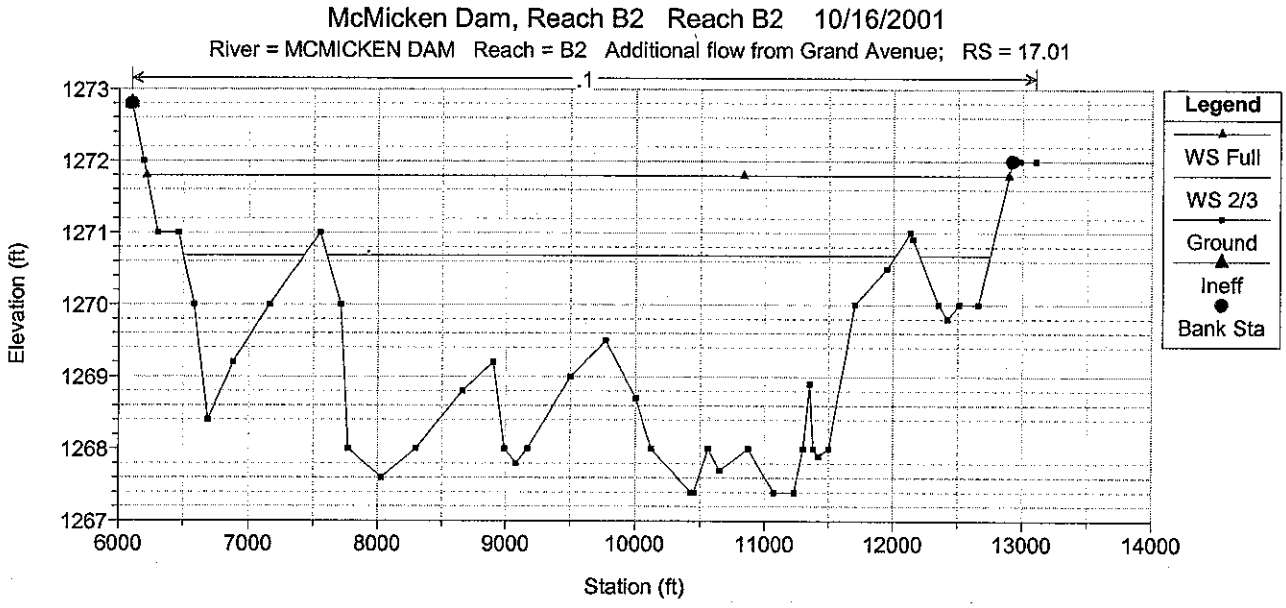
Reach	River Sta.	Contr.	Expan.
B2	18.44	.1	.3
B2	18.29	.1	.3
B2	17.93	.1	.3
B2	17.50	.1	.3
B2	17.01	.1	.3
B2	16.28	.1	.3
B2	15.60	.1	.3
B2	14.83	.1	.3
B2	14.13	.1	.3
B2	13.38	.1	.3
B2	12.49	.1	.3
B2	11.57	.1	.3
B2	11.17	.1	.3
B2	10.71	.1	.3

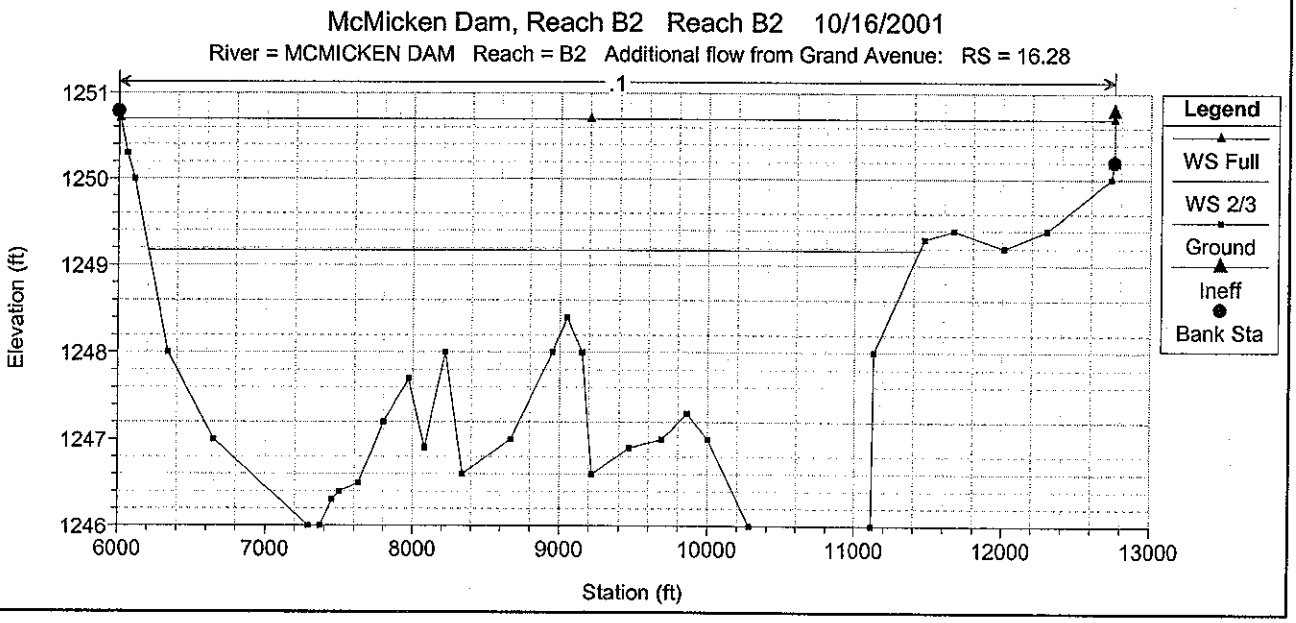

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Upstream end of Model MDB2; RS = 18.44
.1
Elevation (ft)
1320
1318
1316
1314
1312
1310
1308
8500
9000
9500
10000
10500
11000
11500
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

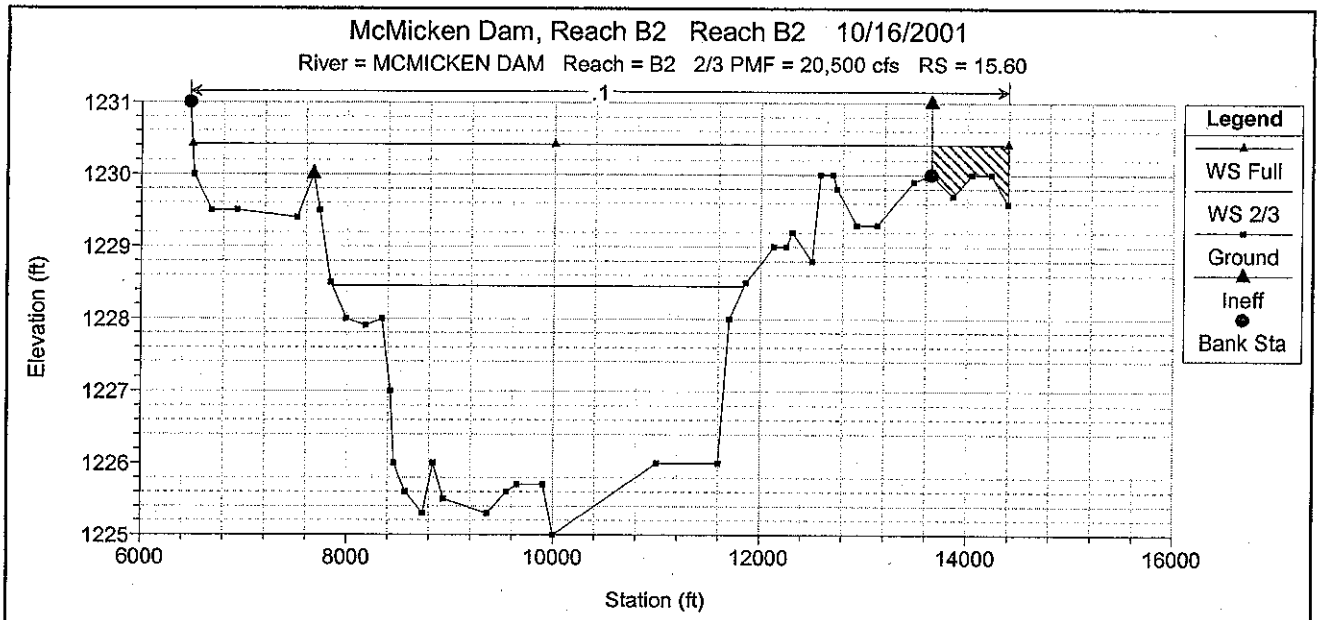

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 19,500 cfs RS = 18.29
.1
Elevation (ft)
1310
1309
1308
1307
1306
1305
1304
7000
8000
9000
10000
11000
12000
13000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Bank Sta

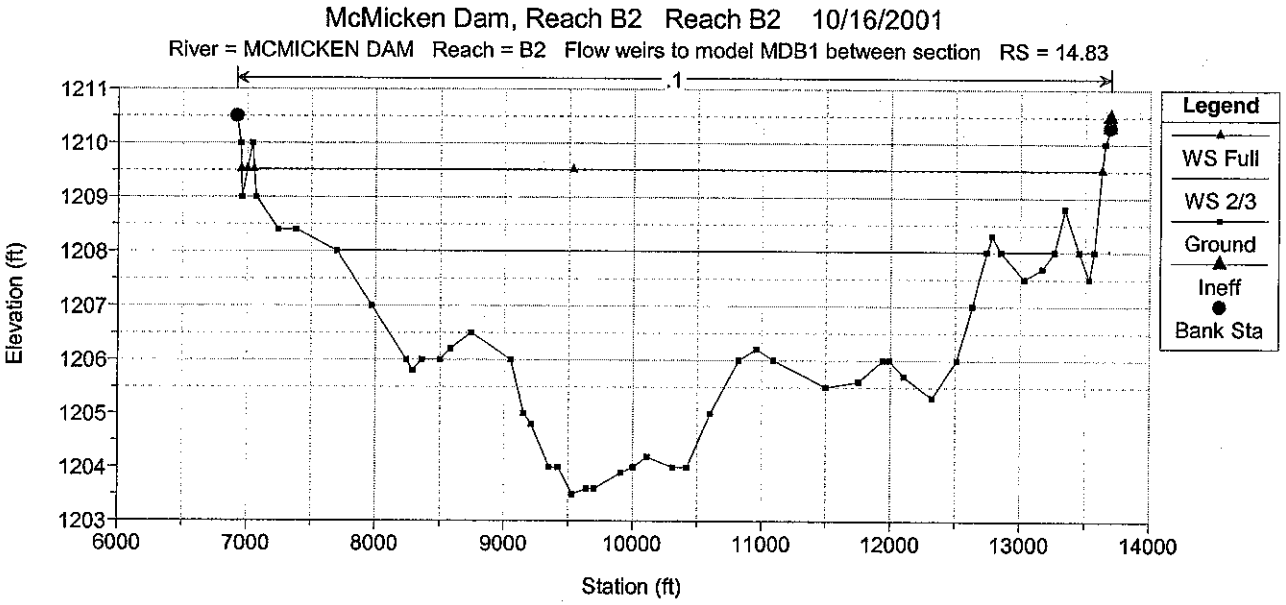

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 19,500 cfs RS = 17.93
.1
Elevation (ft)
1302
1300
1298
1296
1294
1292
1290
6000
7000
8000
9000
10000
11000
12000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

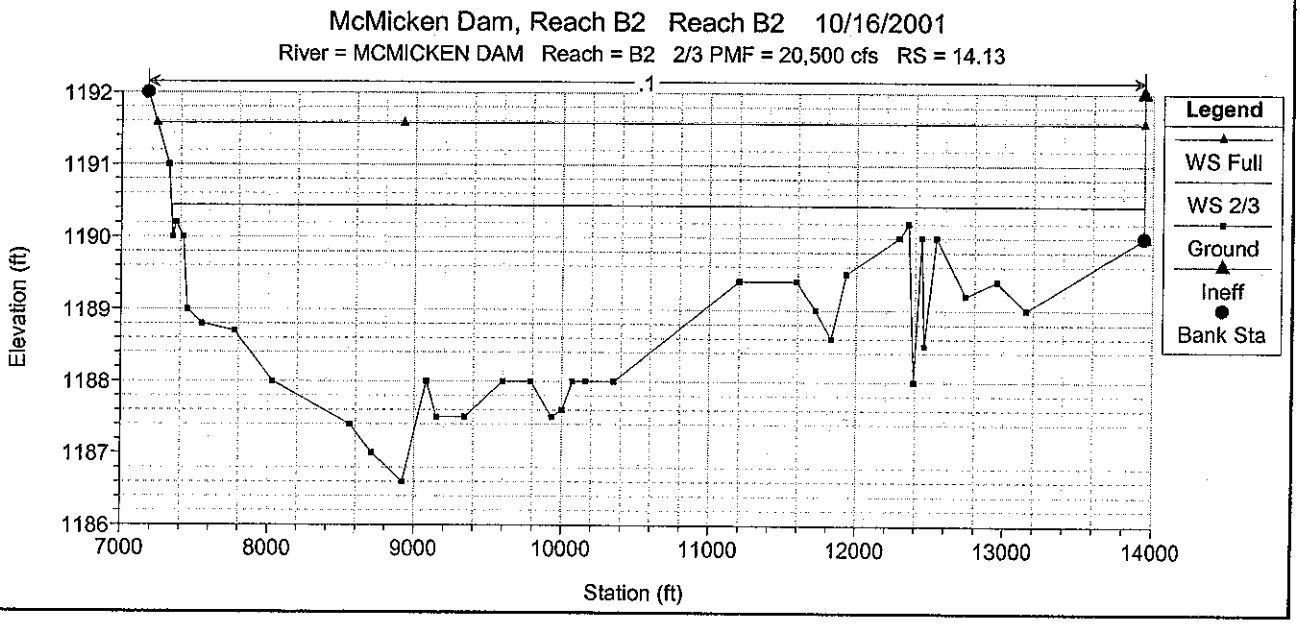

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Additional flow from Grand Avenue; RS = 17.50
.1
Elevation (ft)
1290
1288
1286
1284
1282
1280
6000
7000
8000
9000
10000
11000
12000
13000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Bank Sta

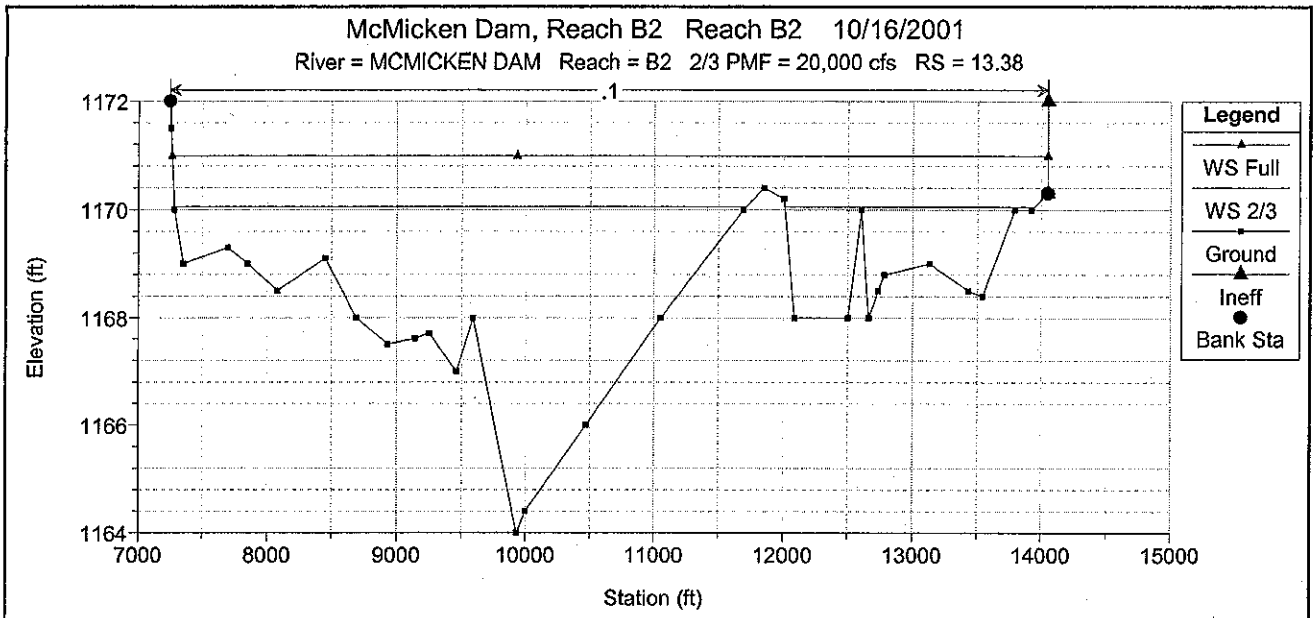

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Additional flow from Grand Avenue; RS = 17.01
.1
Elevation (ft)
1273
1272
1271
1270
1269
1268
1267
6000
7000
8000
9000
10000
11000
12000
13000
14000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

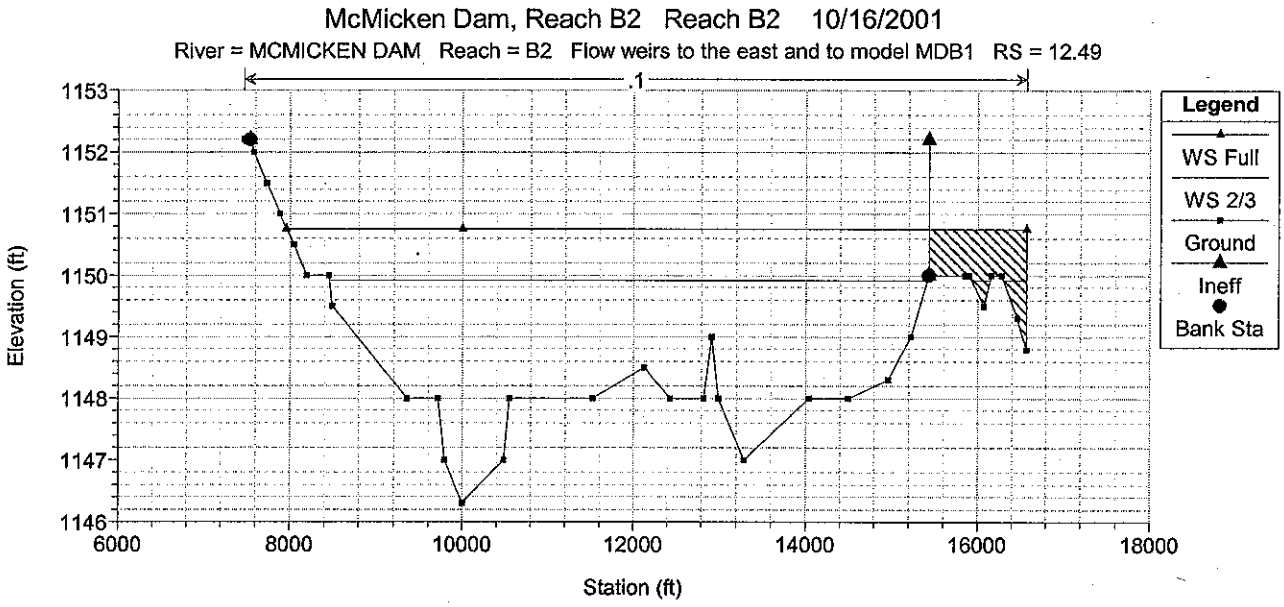

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Additional flow from Grand Avenue: RS = 16.28
.1
Elevation (ft)
1251
1250
1249
1248
1247
1246
6000
7000
8000
9000
10000
11000
12000
13000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

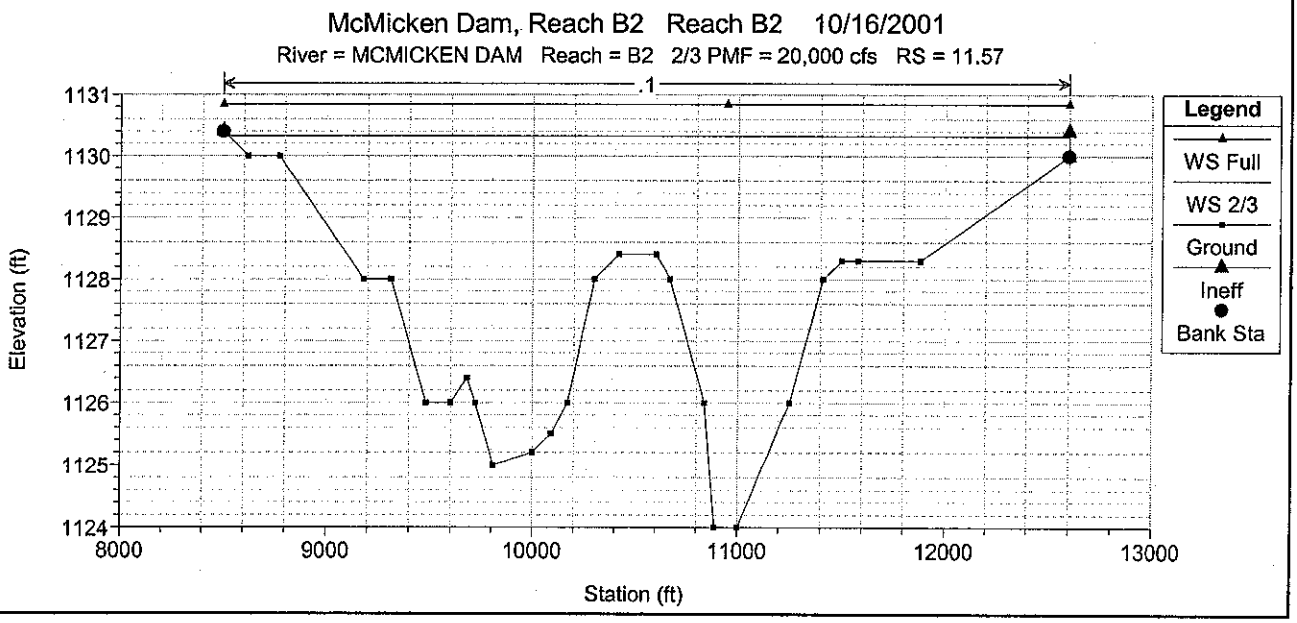

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 20,500 cfs RS = 15.60
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

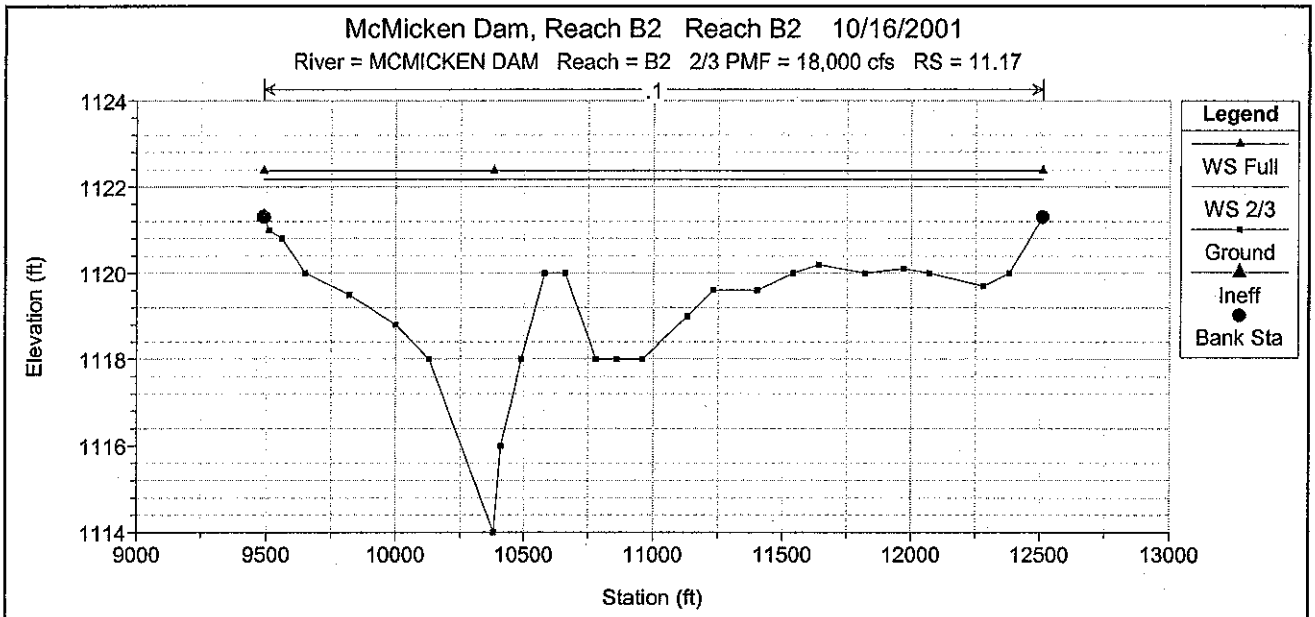

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Flow weirs to model MDB1 between section RS = 14.83
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

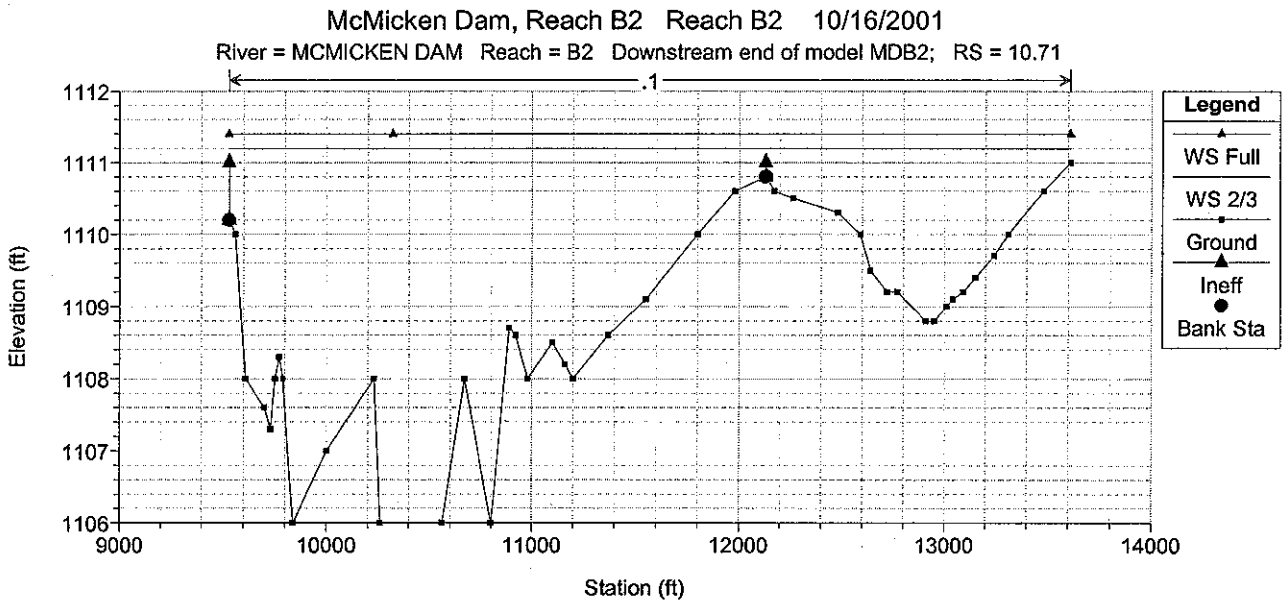

McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 20,500 cfs RS = 14.13
.1
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 20,000 cfs RS = 13.38
.1
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta
Elevation (ft)
1172
1170
1168
1166
1164
7000
8000
9000
10000
11000
12000
13000
14000
15000
Station (ft)


McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Flow weirs to the east and to model MDB1 RS = 12.49
.1
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta
Elevation (ft)
1153
1152
1151
1150
1149
1148
1147
1146
6000
8000
10000
12000
14000
16000
18000
Station (ft)


McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 20,000 cfs RS = 11.57
.1
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta
Elevation (ft)
1131
1130
1129
1128
1127
1126
1125
1124
8000
9000
10000
11000
12000
13000
Station (ft)


McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 2/3 PMF = 18,000 cfs RS = 11.17
.1
Elevation (ft)
1124
1122
1120
1118
1116
1114
9000
9500
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta


McMicken Dam, Reach B2 Reach B2 10/16/2001
River = MCMICKEN DAM Reach = B2 Downstream end of model MDB2; RS = 10.71
.1
Elevation (ft)
1112
1111
1110
1109
1108
1107
1106
9000
10000
11000
12000
13000
14000
Station (ft)
Legend
WS Full
WS 2/3
Ground
Ineff
Bank Sta

5 Model MDB2 Weir Flow

Summary Sheet for Model MDB2 Weir Flow

Description

A slight ridge separates flow between Models MDB1 and MDB2, and was used as the ineffective flow boundary between the models. Between Sections 14.83 and 11.17, flow in Model MDB2 has the potential to overtop the ridge and join Model MDB1. At the southern end of Model MDB2, flow is mostly contained within a depressed area, however a portion of the flow weirs to the east over a small ridge between Sections 12.49 and 11.17.

Weir flow at these two locations was analyzed using the lateral weir option of HEC-RAS Version 3.0. The lateral weirs were defined using topography between the cross-sections. Since removing flow from the downstream weir affects the amount of flow which can cross at the upstream weir, an iterative process was used to determine the amount of flow weiring at each location, as described below. First, the weir flow at the upstream weir (west weir from Section 14.83 to 12.49) was determined and the weir flow at the downstream weir (east weir from Section 12.49 to 11.17) was approximated. Second, it was determined how much flow weirs to the east versus to the west at the downstream weir (west and east weirs from Section 12.49 to 11.17).

Method of Analysis

Upstream Weir – Sections 14.83 to 12.49

1. A copy of HEC-RAS model MDB2 was modified with a lateral weir at the left overbank between Sections 12.49 and 11.17. This model was run for the Full PMF flow to determine the downstream (east) weir flow.
2. A copy of HEC-RAS model MDB2 was modified with a lateral weir at the right overbank between Sections 14.83 and 12.49. This model was run with the reduced flows at the downstream weir, and the full flow at the upstream (west) weir, to determine the weir flow at the upstream weir.
3. The downstream (east) weir model was then run with the flows from Step 2, to determine the revised weir flow at the downstream weir.
4. Steps 2 and 3 were then repeated until the resulting weir flows and water surface elevations did not show appreciable change. The process was then repeated for the 2/3 PMF discharge.

Downstream Weir – Sections 12.49 to 11.17

1. A copy of HEC-RAS model MDB2 was run for a range of flows, confining flow to the west lateral weir, east lateral weir, or main channel in each run. Water surface and flow data from the three runs was combined to create rating curves for Sections 11.17 and 11.57.
2. A starting flow value was chosen at Section 12.49, based upon the results of the upstream west weir analysis (Steps 1-4 above). The amount of flow weiring to the east, weiring to the west, and remaining in the main channel between Sections 12.49 and 11.57 was determined from the rating curve for Section 11.57. The remaining main channel flow was then used to determine the weir and main channel flows at Section 11.17.

Downstream Weir – Sections 12.49 to 11.17 (cont'd.)

3. The weir flows were removed from Model MDB2, and the resulting water surface elevations at Sections 11.17 and 11.57 were compared to those from the rating curves.
4. Steps 2 and 3 were repeated until the resulting water surface elevations in Model MDB2 did not show appreciable difference from those of the Section 11.17 and 11.57 rating curves.

Note: The downstream weir process was performed only for the Full PMF case, due to the confinement of the 2/3 PMF flow by the west portion of the downstream weir.

Results

Flow to the west was removed from Model MDB2 and added to Model MDB1. Flow to the east was removed from Model MDB2 and the approximate floodplain was modeled using the downstream portion of MDB2. The resulting weir flow from Model MDB2 is summarized below and on the following flow diagrams.

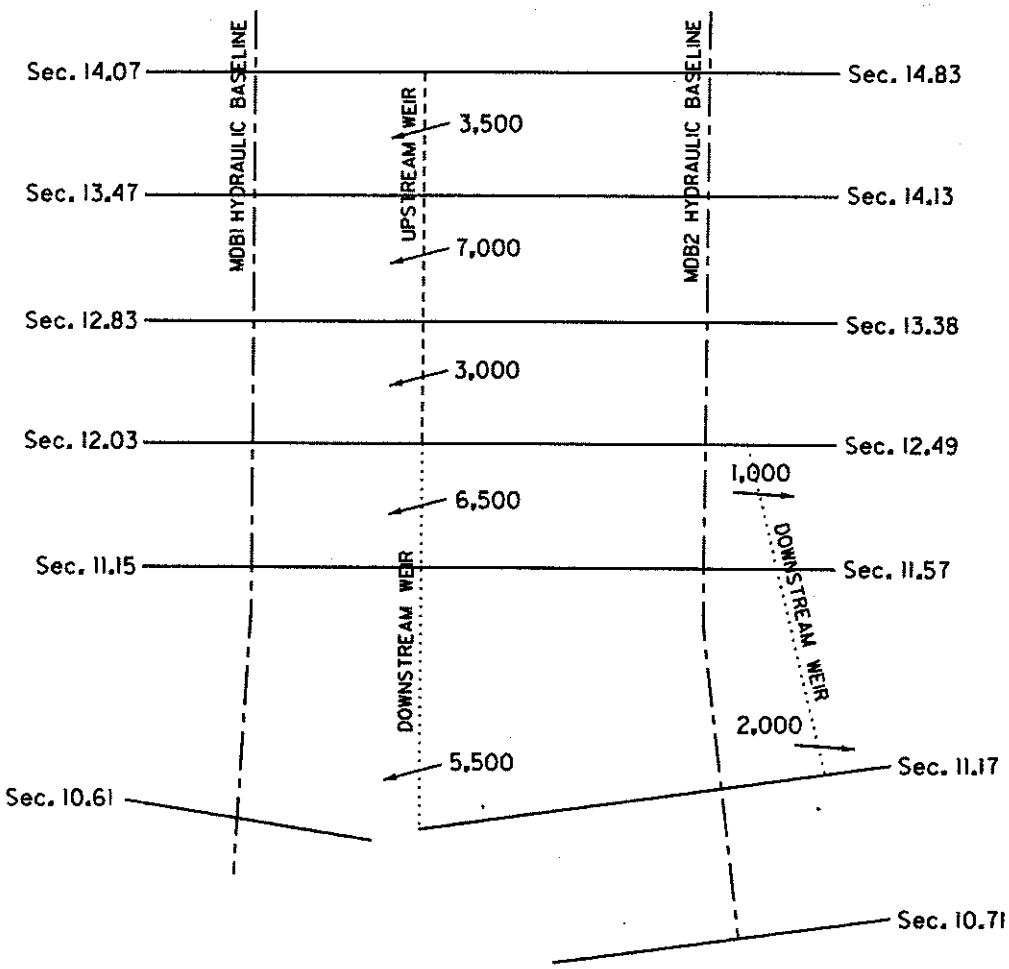
Approximate depths for flow weiring to the east were determined using Manning's Formula to determine the normal depth. The calculations are included in this section of the appendix.

Weir Flow to the West, cfs

Between	**2/3 PMF**	**Full PMF**
Sections 14.83 and 14.13	0	3,500
Sections 14.13 and 13.38	500	7,000
Sections 13.38 and 12.49	0	3,000
Sections 12.49 and 11.57	0	6,500
Sections 11.57 and 11.17	0	5,500
Total	**500**	**25,500**

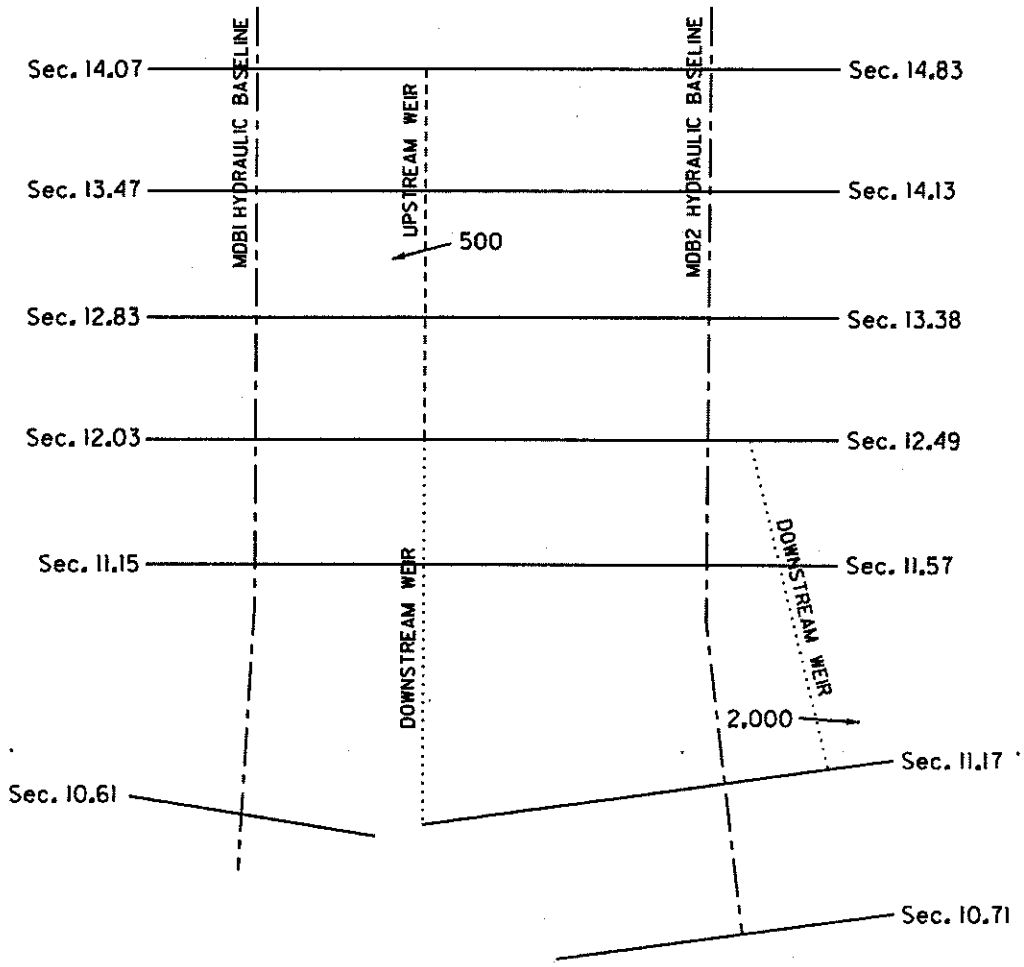
Weir Flow to the East, cfs

Between	**2/3 PMF**	**Full PMF**
Sections 12.49 and 11.57	0	1,000
Sections 11.57 and 11.17	2,000	2,000
Total	**2,000**	**3,000**



WEIR FLOW BETWEEN
MODELS MDB1 & MDB2 (CFS)

FULL PMF



WEIR FLOW BETWEEN
MODELS MDBI & MDB2 (CFS)

2/3 PMF

Model MDB2 Weir Flow Analysis
Full PMF Calcuations

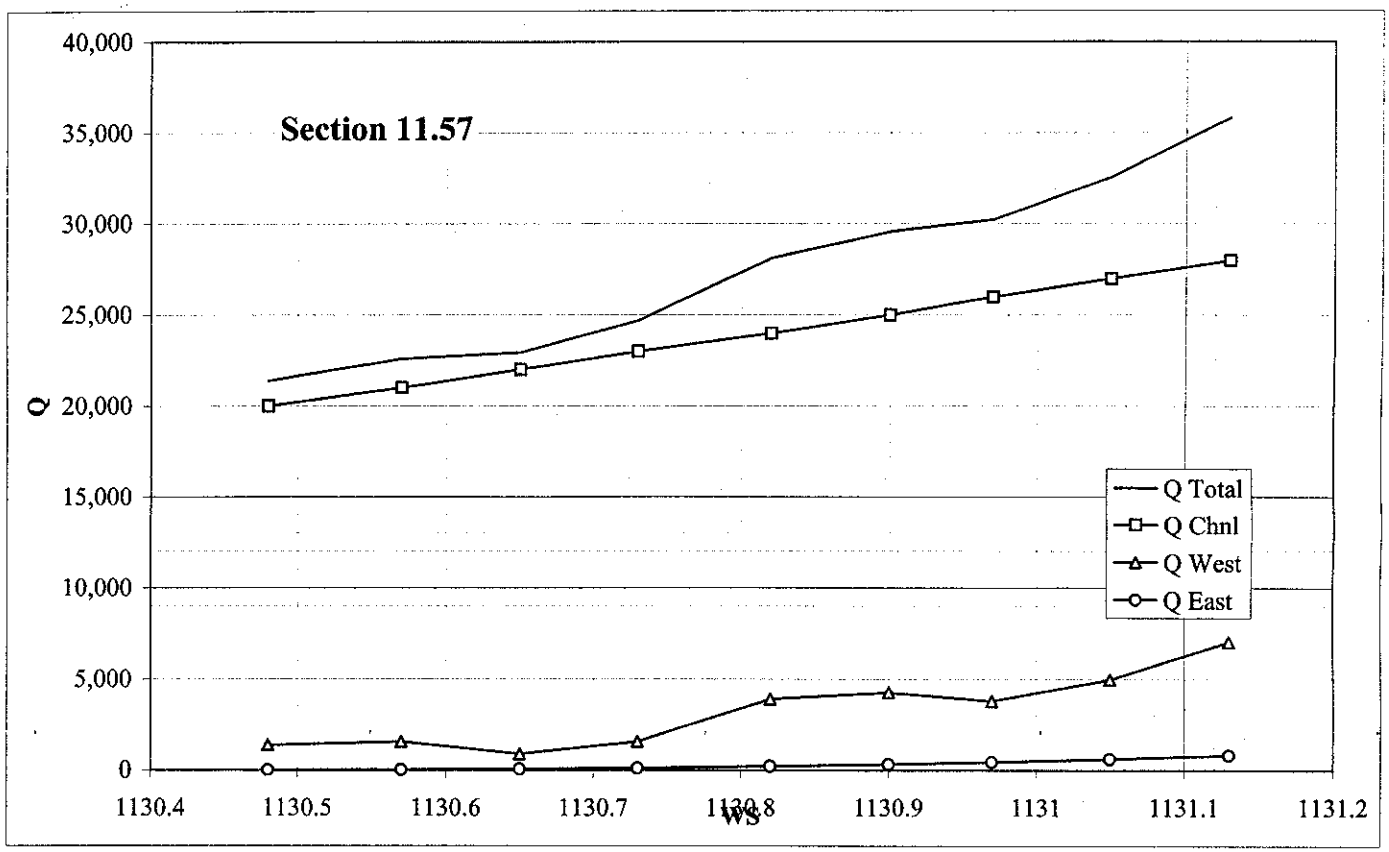
		Upstream Weir (west)			Downstream Weir (east)		
	RS	Q Input	Q Output	WS Elev	Q Input	Q Output	WS Elev
Iteration 1	14.83				48500		1209.56
	14.13				48500		1191.70
	13.38				48500		1171.45
	12.49				48500		1151.32
	11.57				48500	43181.83	1131.94
	11.17				48500	30804	1123.05
	14.83	48500	48500	1209.52			
	14.13	48500	45129.11	1191.58			
	13.38	48500	37870.21	1170.98			
	12.49	48500	34679.77	1150.74			
	11.57	43181.83		1130.98			
	11.17	30804.37		1121.87			
Iteration 2	14.83				48500		1209.55
	14.13				45129.11		1191.54
	13.38				37870.21		1171.02
	12.49				34679.77		1150.69
	11.57				34679.77	33108.62	1131.35
	11.17				34679.77	25590	1122.64
	14.83	48500	48500	1209.56			
	14.13	48500	45193.68	1191.54			
	13.38	48500	37876.08	1171.03			
	12.49	48500	34791.73	1150.68			
	11.57	33108.62		1130.26			
	11.17	25589.87		1121.34			
Iteration 3	14.83				48500		1209.55
	14.13				45193.68		1191.55
	13.38				37876.08		1171.02
	12.49				34791.73		1150.70
	11.57				34791.73	33197.6	1131.36
	11.17				34791.73	25638	1122.64
	14.83	48500	48500	1209.56			
	14.13	48500	45192.71	1191.54			
	13.38	48500	37875.71	1171.03			
	12.49	48500	34790.91	1150.68			
	11.57	33197.6		1130.27			
	11.17	25638.05		1121.35			

Model MDB2 Weir Flow Analysis
2/3 PMF Calcuations

		Upstream Weir (west)			Downstream Weir (east)		
	RS	Q Input	Q Output	WS Elev	Q Input	Q Output	WS Elev
Iteration 1	14.83				20500		1208.07
	14.13				20500		1190.37
	13.38				20500		1170.15
	12.49				20500		1149.88
	11.57				20500	20497.1	1130.47
	11.17				20500	18322.08	1122.00
	14.83	20500	20500	1208.07			
	14.13	20500	20417.26	1190.37			
	13.38	20500	20154.17	1170.13			
	12.49	20500	20154.17	1149.86			
	11.57	20497.1		1130.44			
	11.17	18322.08		1121.97			
Iteration 2	14.83				20500		1208.07
	14.13				20417.26		1190.37
	13.38				20154.17		1170.13
	12.49				20154.17		1149.86
	11.57				20154.17	20153	1130.45
	11.17				20154.17	18102.9	1121.98
	14.83	20500	20500	1208.07			
	14.13	20500	20417.8	1190.37			
	13.38	20500	20156.15	1170.13			
	12.49	20500	20156.15	1149.86			
	11.57	20153		1130.42			
	11.17	18102.9		1121.95			
Iteration 3	14.83				20500		1208.07
	14.13				20417.8		1190.37
	13.38				20156.15		1170.13
	12.49				20156.15		1149.86
	11.57				20156.15	20155	1130.45
	11.17				20156.15	18104.15	1121.98
	14.83	20500	20500	1208.07			
	14.13	20500	20417.86	1190.37			
	13.38	20500	20156.22	1170.13			
	12.49	20500	20156.22	1149.86			
	11.57	20155		1130.42			
	11.17	18104.15		1121.95			

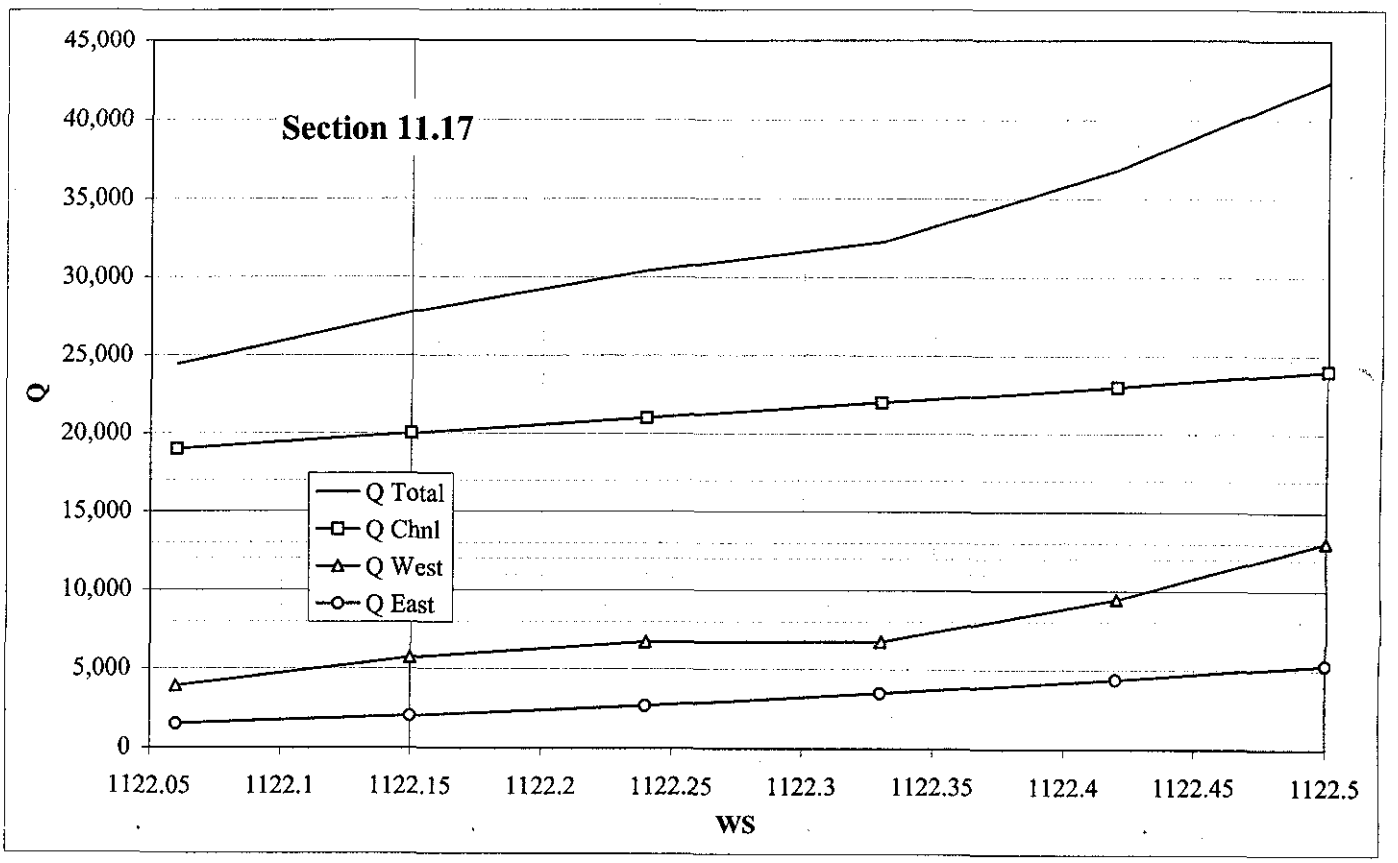
SECTION 11.57 RATING CURVE

WS	Q Total	Q Chnl	Q West	Q East
1130.48	21385	20000	1380	5
1130.57	22592	21000	1568	24
1130.65	22937	22000	879	58
1130.73	24696	23000	1585	111
1130.82	28118	24000	3900	218
1130.90	29580	25000	4257	323
1130.97	30230	26000	3789	441
1131.05	32574	27000	4967	607
1131.13	35833	28000	7028	805

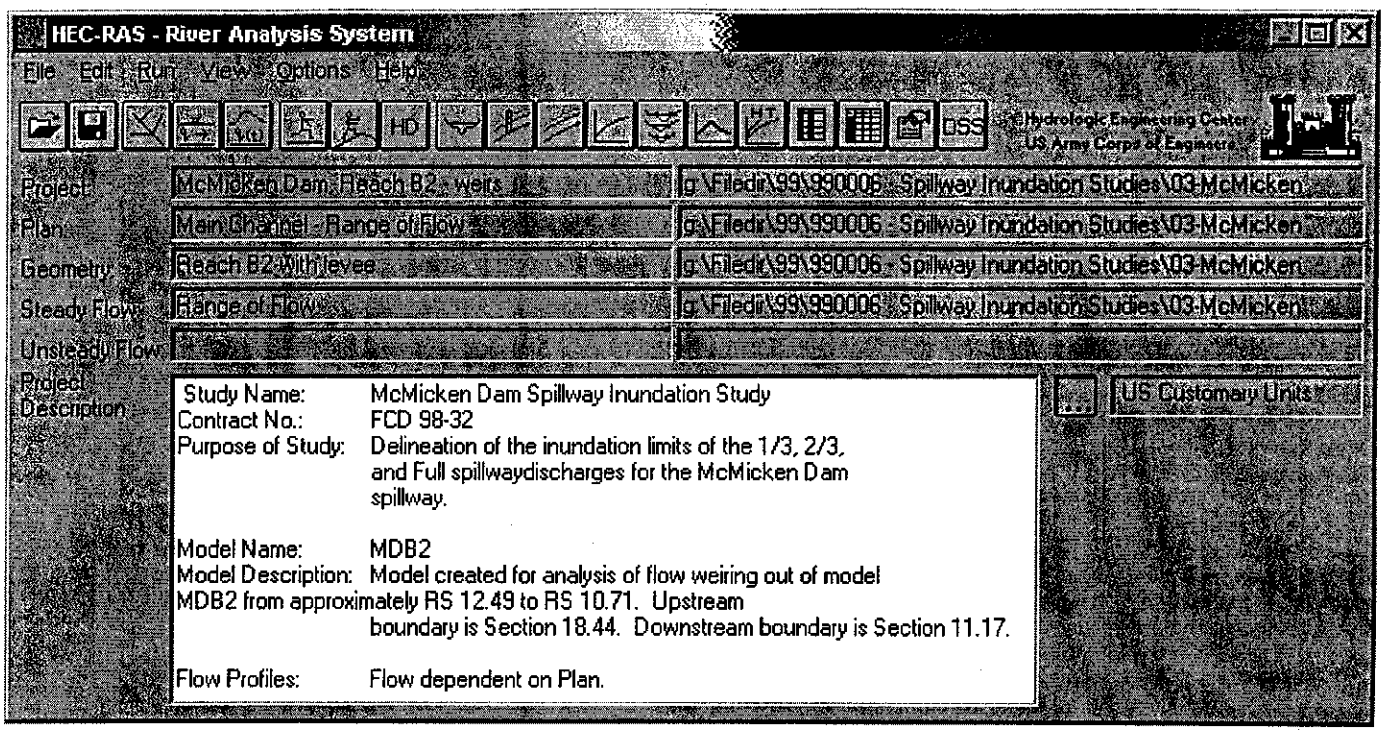


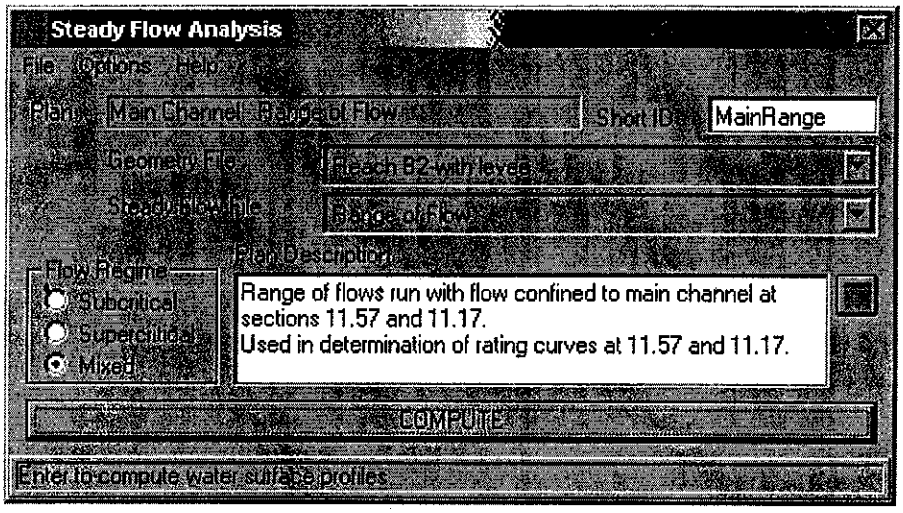
SECTION 11.17 RATING CURVE

WS	Q Total	Q Chnl	Q West	Q East
1122.06	24428	19000	3917	1511
1122.15	27757	20000	5710	2047
1122.24	30397	21000	6709	2688
1122.33	32244	22000	6742	3502
1122.42	36839	23000	9447	4392
1122.50	42356	24000	13063	5293



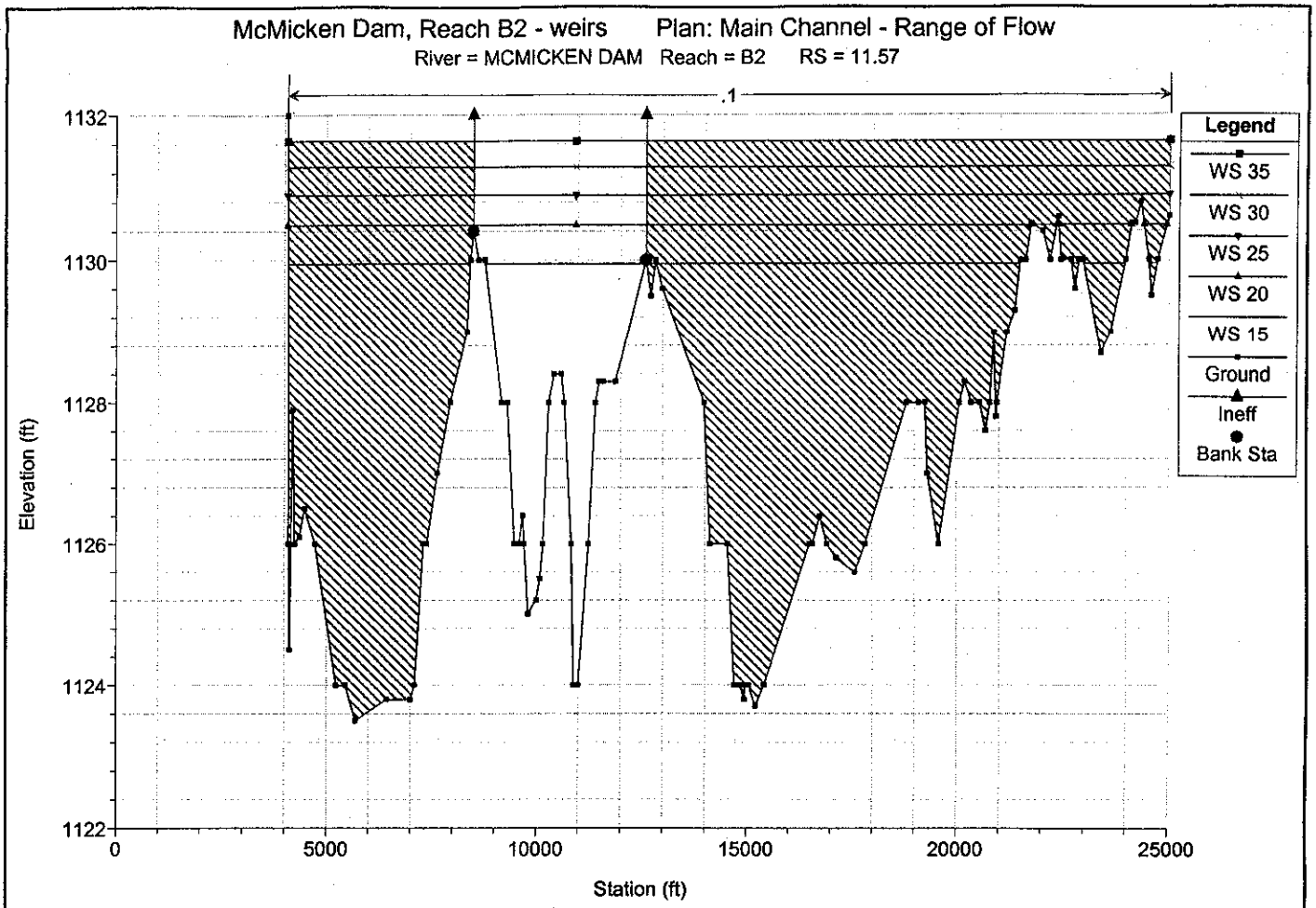
MDA2 WEIR FLOW ANALYSIS HEC-RAS, MAIN CHANNEL:

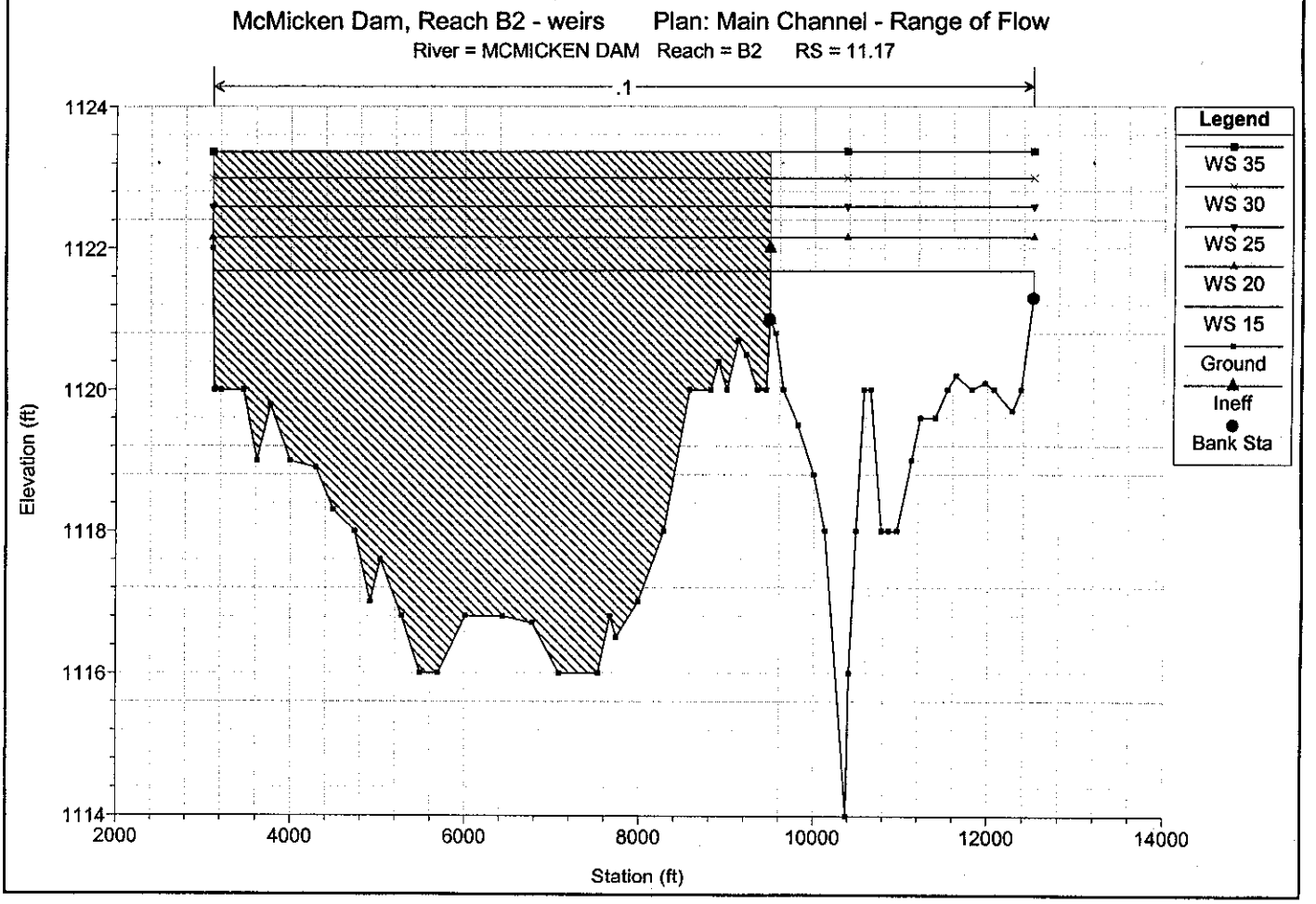




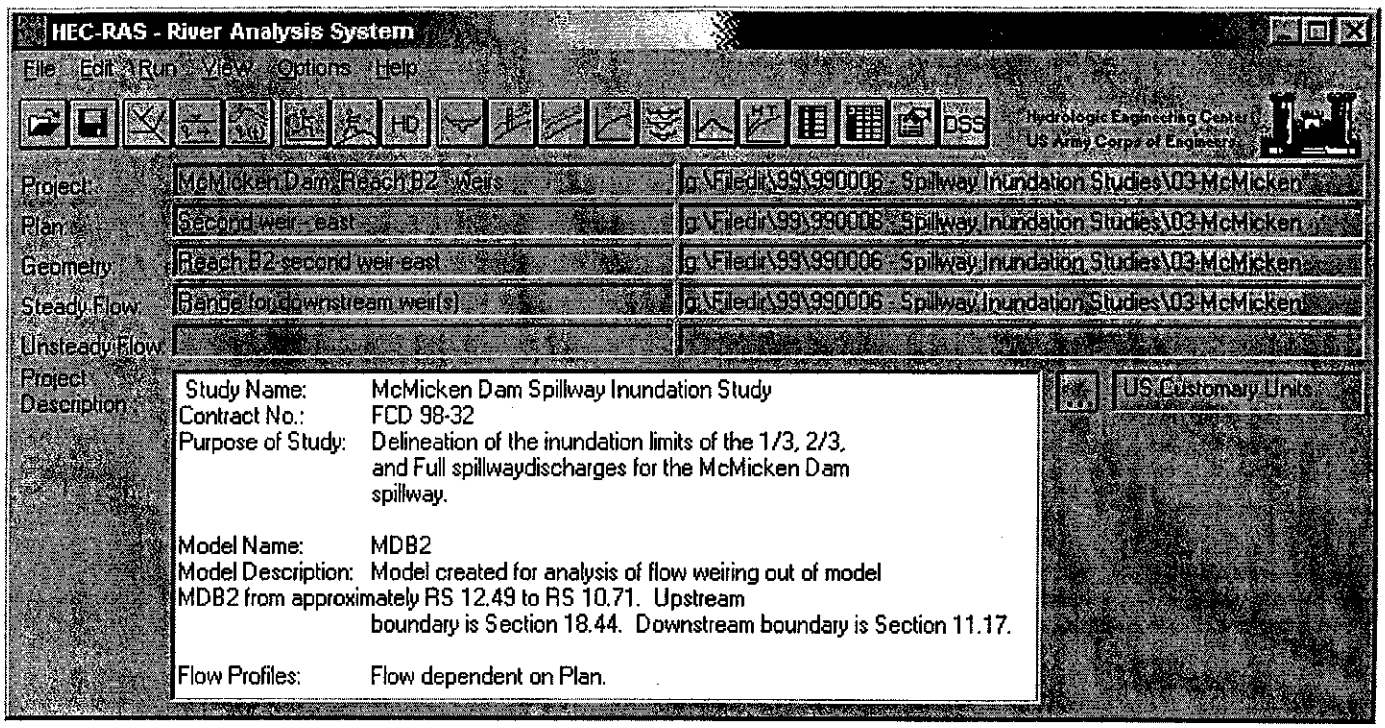
HEC-RAS Plan: MainRange River: MCMICKEN DAM Reach: B2

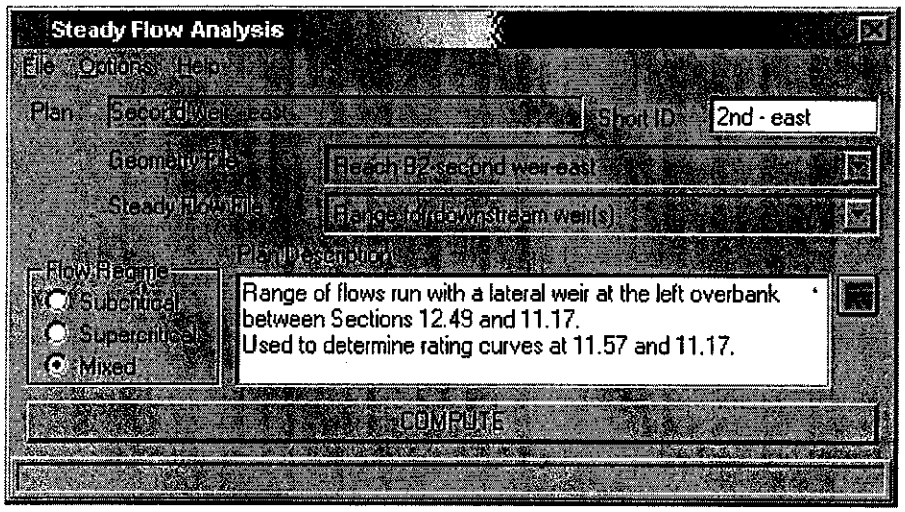
Reach	River Sta	Q Total	W.S. Elev
		(cfs)	(ft)
B2	11.57	15000.00	1129.95
B2	11.57	16000.00	1130.09
B2	11.57	17000.00	1130.20
B2	11.57	18000.00	1130.29
B2	11.57	19000.00	1130.39
B2	11.57	20000.00	1130.48
B2	11.57	21000.00	1130.57
B2	11.57	22000.00	1130.65
B2	11.57	23000.00	1130.73
B2	11.57	24000.00	1130.82
B2	11.57	25000.00	1130.90
B2	11.57	26000.00	1130.97
B2	11.57	27000.00	1131.05
B2	11.57	28000.00	1131.13
B2	11.57	29000.00	1131.20
B2	11.57	30000.00	1131.28
B2	11.57	31000.00	1131.35
B2	11.57	32000.00	1131.43
B2	11.57	33000.00	1131.50
B2	11.57	34000.00	1131.57
B2	11.57	35000.00	1131.64
B2	11.17	15000.00	1121.68
B2	11.17	16000.00	1121.78
B2	11.17	17000.00	1121.87
B2	11.17	18000.00	1121.97
B2	11.17	19000.00	1122.06
B2	11.17	20000.00	1122.15
B2	11.17	21000.00	1122.24
B2	11.17	22000.00	1122.33
B2	11.17	23000.00	1122.42
B2	11.17	24000.00	1122.50
B2	11.17	25000.00	1122.59
B2	11.17	26000.00	1122.67
B2	11.17	27000.00	1122.75
B2	11.17	28000.00	1122.83
B2	11.17	29000.00	1122.91
B2	11.17	30000.00	1122.99
B2	11.17	31000.00	1123.06
B2	11.17	32000.00	1123.14
B2	11.17	33000.00	1123.21
B2	11.17	34000.00	1123.29
B2	11.17	35000.00	1123.36


McMicken Dam, Reach B2 - weirs Plan: Main Channel - Range of Flow
River = MCMICKEN DAM Reach = B2 RS = 11.57
.1
Legend
WS 35
WS 30
WS 25
WS 20
WS 15
Ground
Ineff
Bank Sta
Elevation (ft)
1132
1130
1128
1126
1124
1122
0
5000
10000
15000
20000
25000
Station (ft)


McMicken Dam, Reach B2 - weirs Plan: Main Channel - Range of Flow
River = MCMICKEN DAM Reach = B2 RS = 11.17
.1
Legend
WS 35
WS 30
WS 25
WS 20
WS 15
Ground
Ineff
Bank Sta
Elevation (ft)
1124
1122
1120
1118
1116
1114
2000
4000
6000
8000
10000
12000
14000
Station (ft)

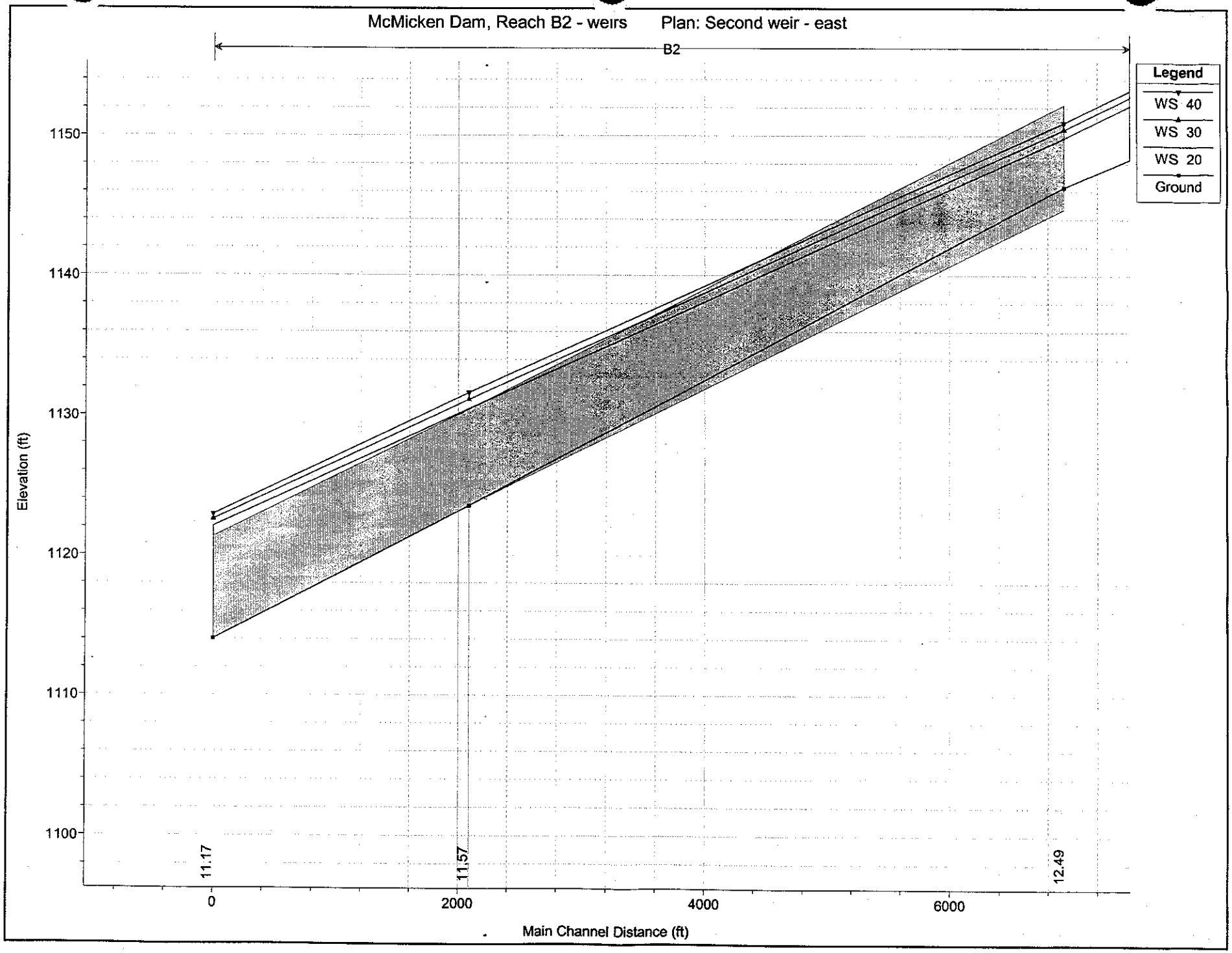
MDA2 WEIR FLOW ANALYSIS HEC-RAS, SECOND WEIR EAST:



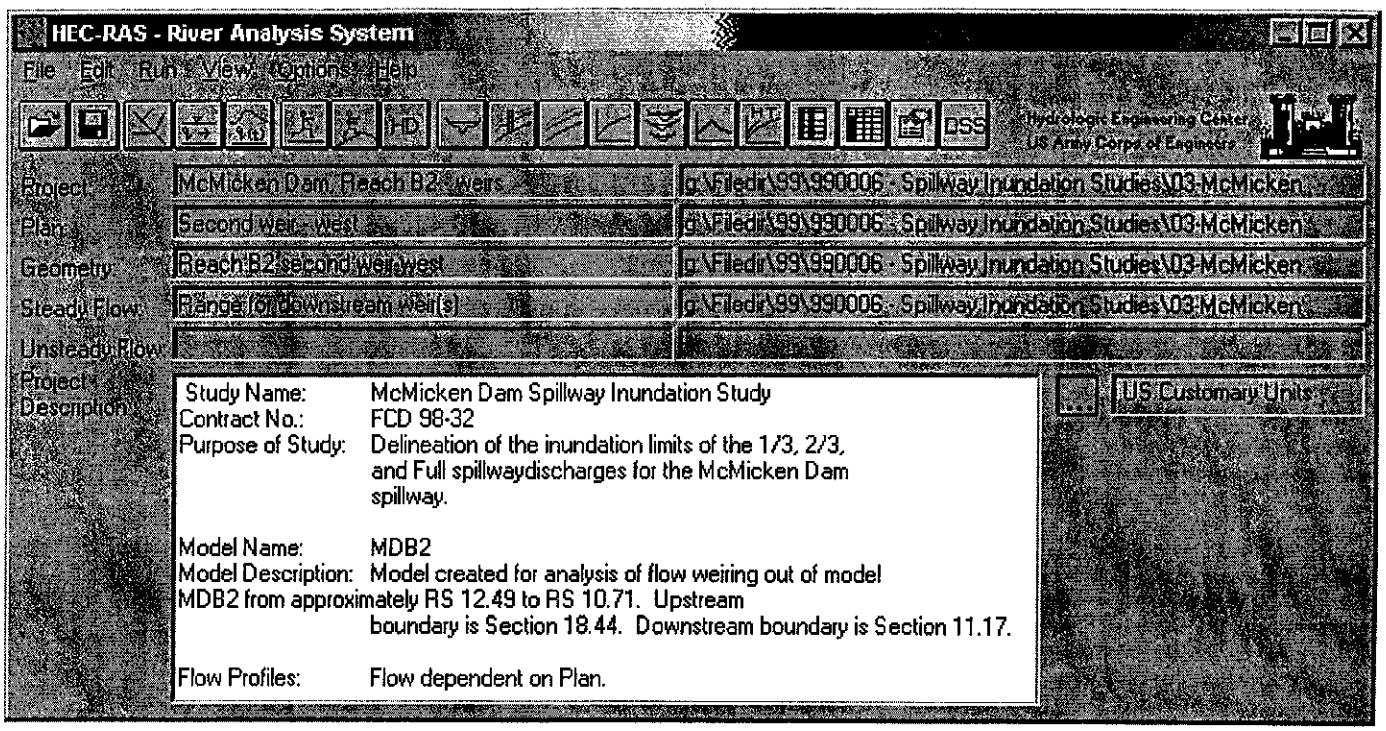


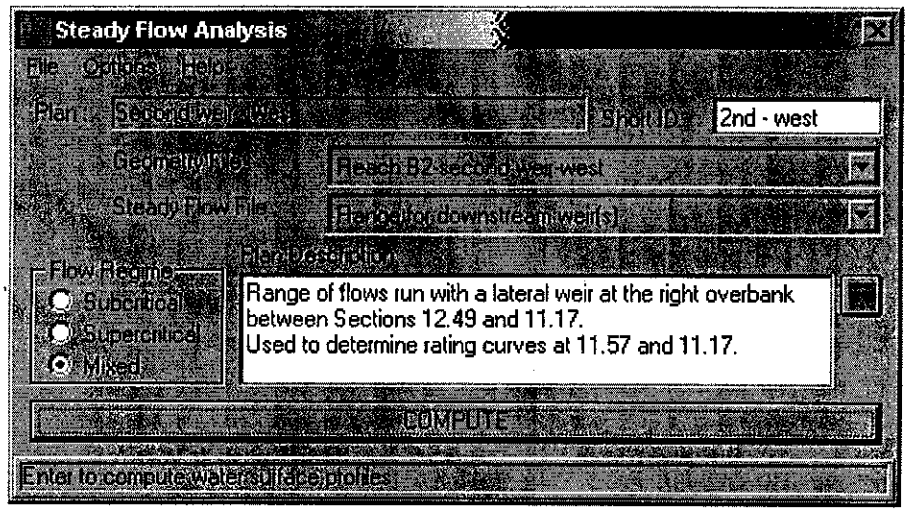
HEC-RAS Plan: 2nd - east River: MCMICKEN DAM Reach: B2

Reach	River Sta	Q Total	W.S. Elev
		(cfs)	(ft)
B2	12.4	Lat. Weir	
B2	11.57	19998.88	1130.45
B2	11.57	20989.24	1130.53
B2	11.57	21966.44	1130.60
B2	11.57	22927.87	1130.68
B2	11.57	23873.57	1130.75
B2	11.57	24793.88	1130.81
B2	11.57	25706.33	1130.88
B2	11.57	26616.95	1130.94
B2	11.57	27501.21	1131.00
B2	11.57	28370.75	1131.06
B2	11.57	29226.53	1131.12
B2	11.57	30068.07	1131.17
B2	11.57	30897.11	1131.23
B2	11.57	31713.15	1131.28
B2	11.57	32520.34	1131.33
B2	11.57	33311.86	1131.38
B2	11.57	34094.93	1131.43
B2	11.57	34873.47	1131.48
B2	11.57	35636.72	1131.52
B2	11.57	36389.99	1131.57
B2	11.57	37134.17	1131.61
B2	11.17	18655.83	1122.03
B2	11.17	19316.44	1122.09
B2	11.17	19948.58	1122.15
B2	11.17	20555.97	1122.21
B2	11.17	21141.21	1122.26
B2	11.17	21738.73	1122.31
B2	11.17	22245.22	1122.36
B2	11.17	22793.86	1122.40
B2	11.17	23316.29	1122.45
B2	11.17	23827.28	1122.49
B2	11.17	24328.11	1122.53
B2	11.17	24820.03	1122.57
B2	11.17	25303.52	1122.61
B2	11.17	25780.19	1122.65
B2	11.17	26249.11	1122.69
B2	11.17	26714.86	1122.73
B2	11.17	27174.70	1122.77
B2	11.17	27476.13	1122.79
B2	11.17	27891.82	1122.82
B2	11.17	28300.59	1122.86
B2	11.17	28700.34	1122.89


McMicken Dam, Reach B2 - weirs
Plan: Second weir - east
B2
Legend
WS 40
WS 30
WS 20
Ground
Elevation (ft)
1150
1140
1130
1120
1110
1100
11.17
11.57
12.49
0
2000
4000
6000
Main Channel Distance (ft)

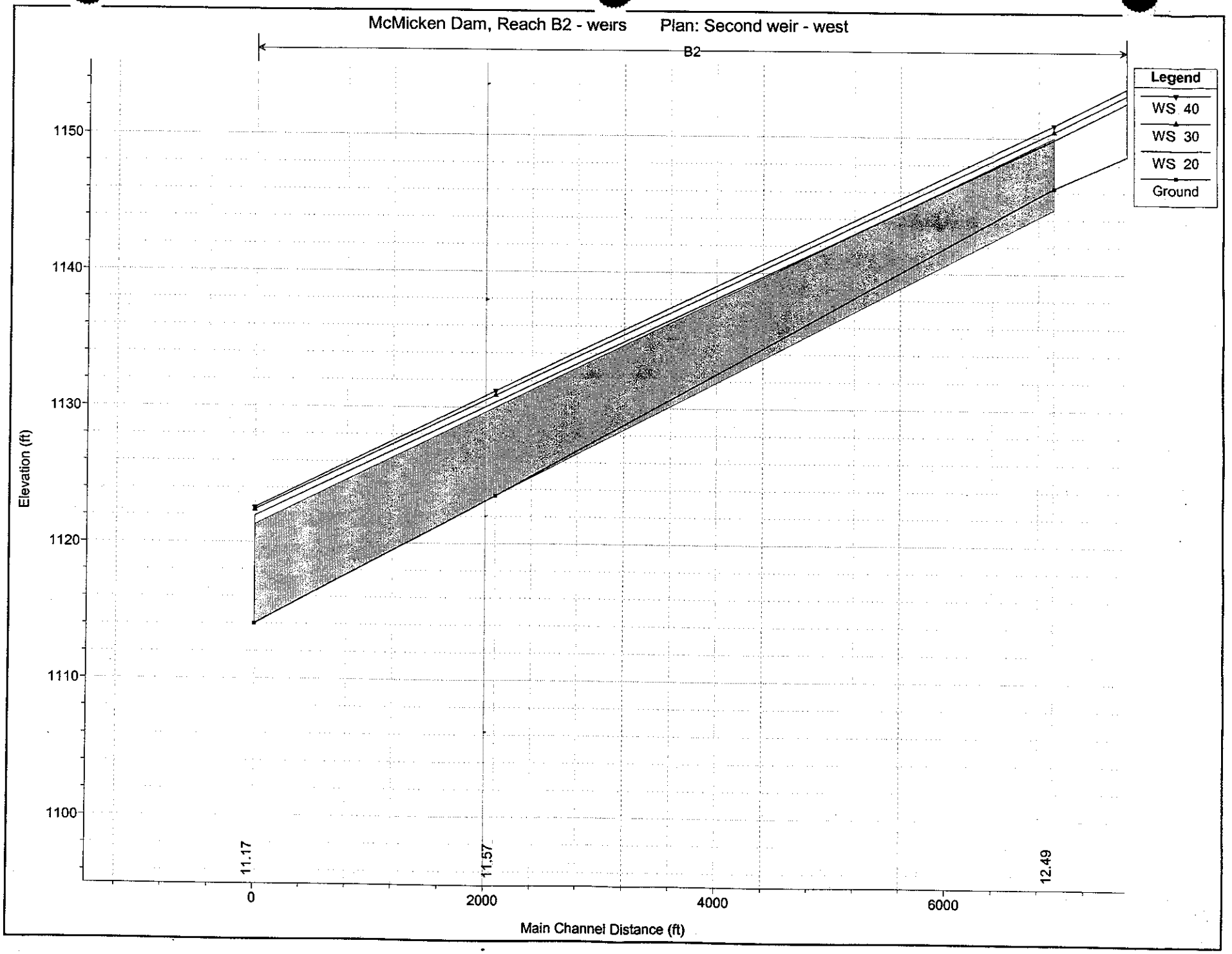
MDA2 WEIR FLOW ANALYSIS HEC-RAS, SECOND WEIR WEST:





HEC-RAS Plan: 2nd - west River: MCMICKEN DAM Reach: B2

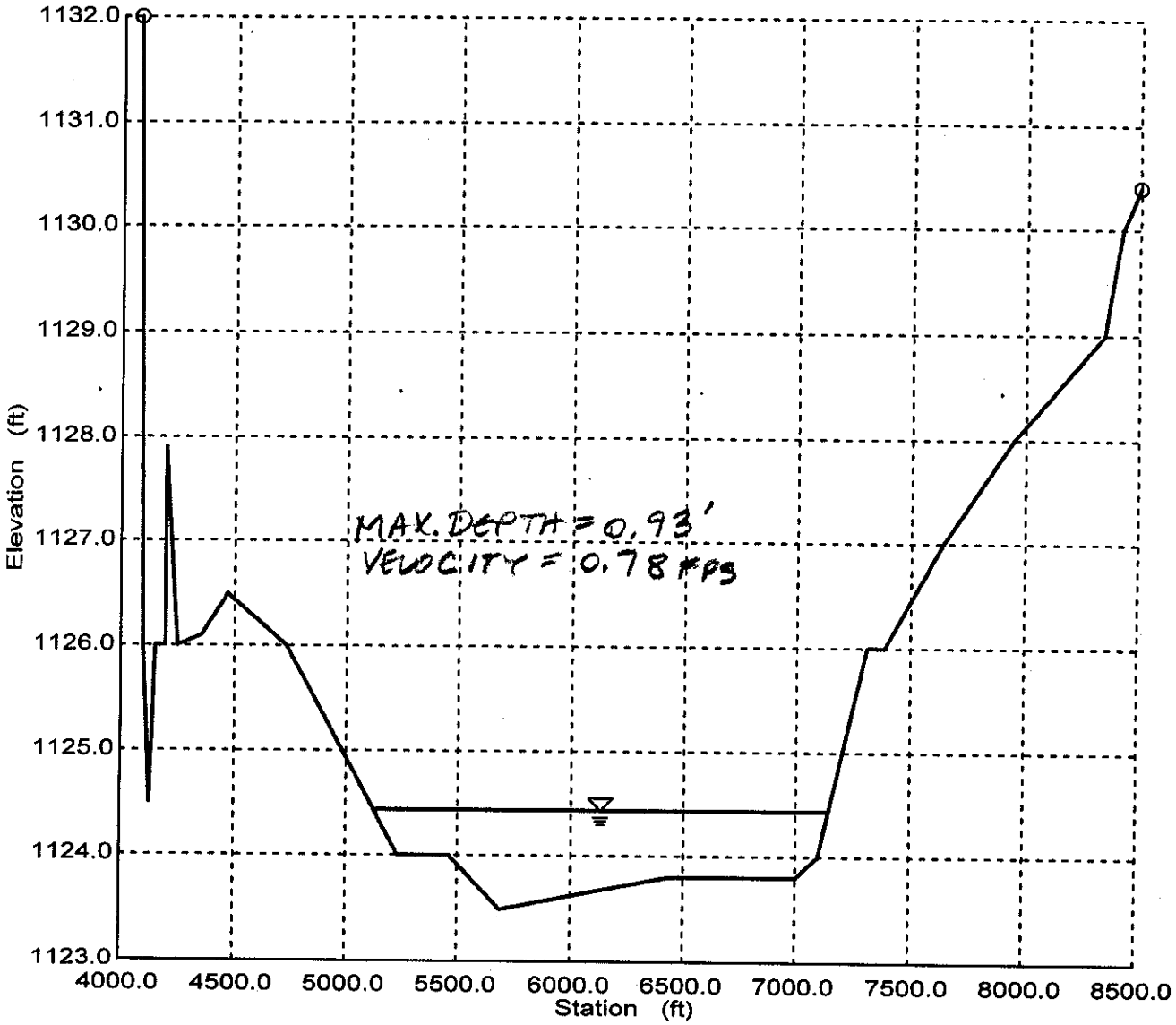
Reach	River Sta	Q Total	W.S. Elev
		(cfs)	(ft)
B2	12.4	Lat. Weir	
B2	11.57	19273.41	1130.38
B2	11.57	19954.33	1130.43
B2	11.57	20619.85	1130.48
B2	11.57	20958.16	1130.52
B2	11.57	23466.69	1130.69
B2	11.57	24007.54	1130.73
B2	11.57	24231.00	1130.74
B2	11.57	23311.32	1130.70
B2	11.57	24075.08	1130.76
B2	11.57	25107.42	1130.84
B2	11.57	25609.41	1130.88
B2	11.57	27279.79	1130.98
B2	11.57	27810.09	1131.01
B2	11.57	28232.11	1131.04
B2	11.57	28639.29	1131.07
B2	11.57	29035.92	1131.09
B2	11.57	29370.58	1131.11
B2	11.57	29776.57	1131.14
B2	11.57	30138.71	1131.16
B2	11.57	30493.64	1131.19
B2	11.57	30706.88	1131.20
B2	11.17	17542.41	1121.93
B2	11.17	17958.92	1121.97
B2	11.17	18350.47	1122.01
B2	11.17	18955.64	1122.06
B2	11.17	19429.51	1122.10
B2	11.17	19747.90	1122.13
B2	11.17	20060.51	1122.16
B2	11.17	20498.80	1122.20
B2	11.17	21182.77	1122.26
B2	11.17	22287.61	1122.36
B2	11.17	22545.36	1122.38
B2	11.17	22804.98	1122.40
B2	11.17	22939.36	1122.42
B2	11.17	23164.43	1122.44
B2	11.17	23380.44	1122.45
B2	11.17	23591.67	1122.47
B2	11.17	23750.07	1122.49
B2	11.17	23936.25	1122.50
B2	11.17	24117.79	1122.52
B2	11.17	24297.47	1122.53
B2	11.17	24367.68	1122.54


McMicken Dam, Reach B2 - weirs
Plan: Second weir - west
B2
Legend
WS 40
WS 30
WS 20
Ground
Elevation (ft)
1150
1140
1130
1120
1110
1100
11.17
11.57
12.49
0
2000
4000
6000
Main Channel Distance (ft)

Section 11.57 - East, Q=1000 cfs
Cross Section for Irregular Channel
FULL PMF

Project Description	
Project File	untitled.fm2
Worksheet	Section 11.57
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

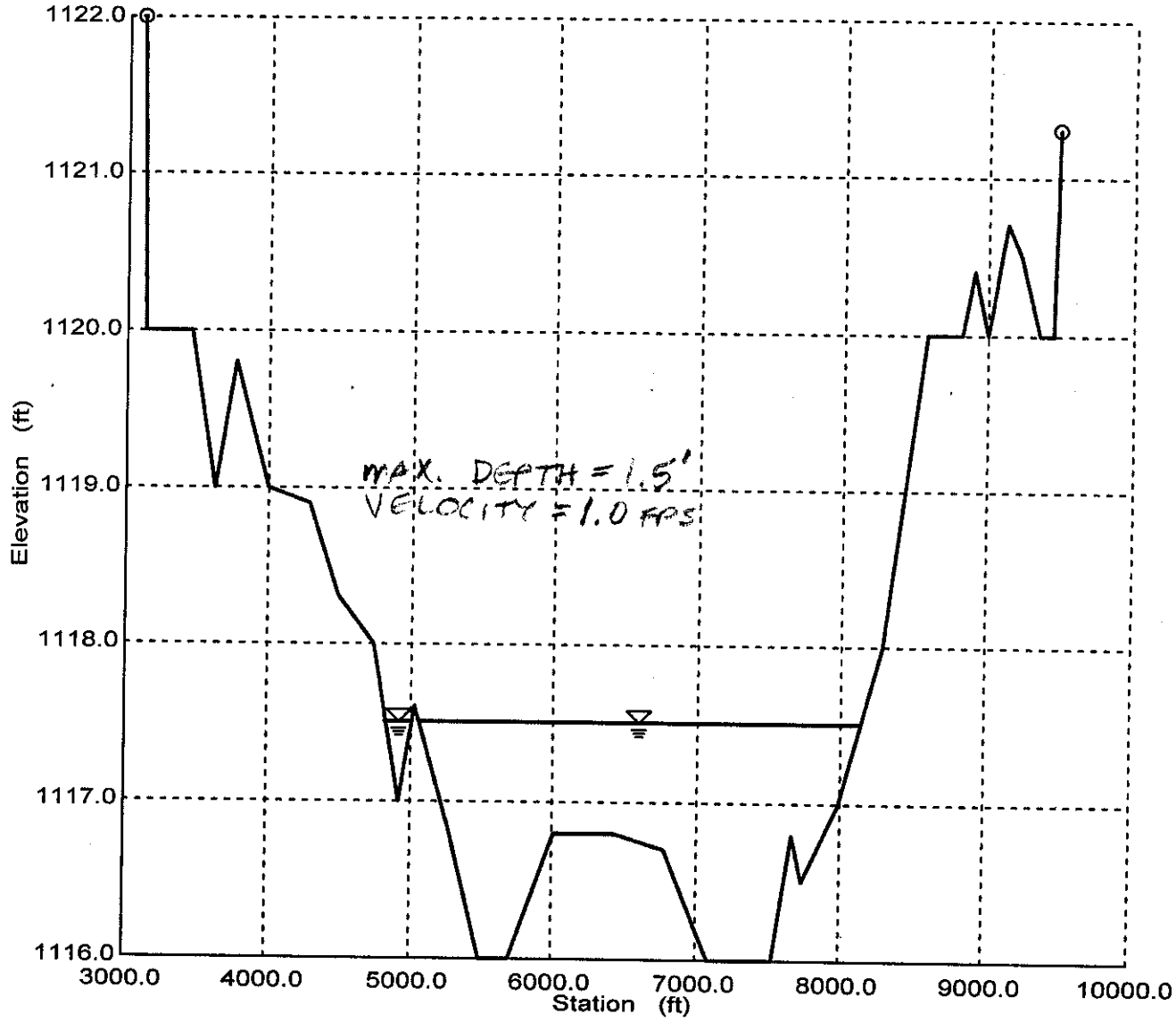
Section Data		
Wtd. Mannings Coefficient	0.100	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	1,124.43	ft
Discharge	1,000.00	cfs



Section 11.17 - East, Q=3000 cfs
Cross Section for Irregular Channel
FULL PMF

Project Description	
Project File	untitled.fm2
Worksheet	Section 11.17
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

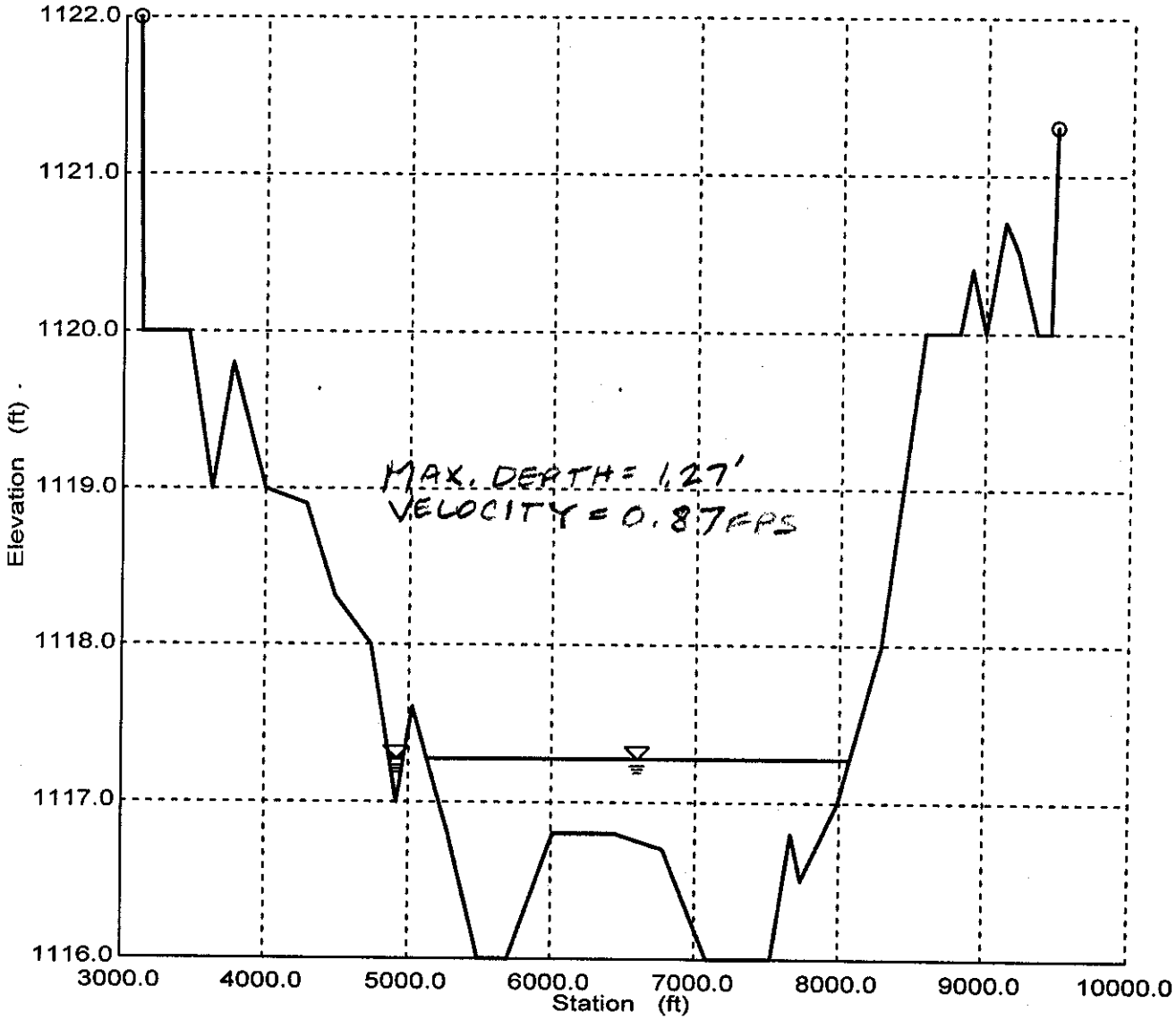
Section Data		
Wtd. Mannings Coefficient	0.100	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	1,117.50	ft
Discharge	3,000.00	cfs



Section 11.17 - East, Q=2000 cfs
Cross Section for Irregular Channel
2/3 PMF

Project Description	
Project File	untitled.fm2
Worksheet	Section 11.17
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.100	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	1,117.27	ft
Discharge	2,000.00	cfs



McMICKEN DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX F: COMPUTER FILES

McMicken Dam
Spillway Delineation Study

Appendix F: Computer Files

Table of Contents

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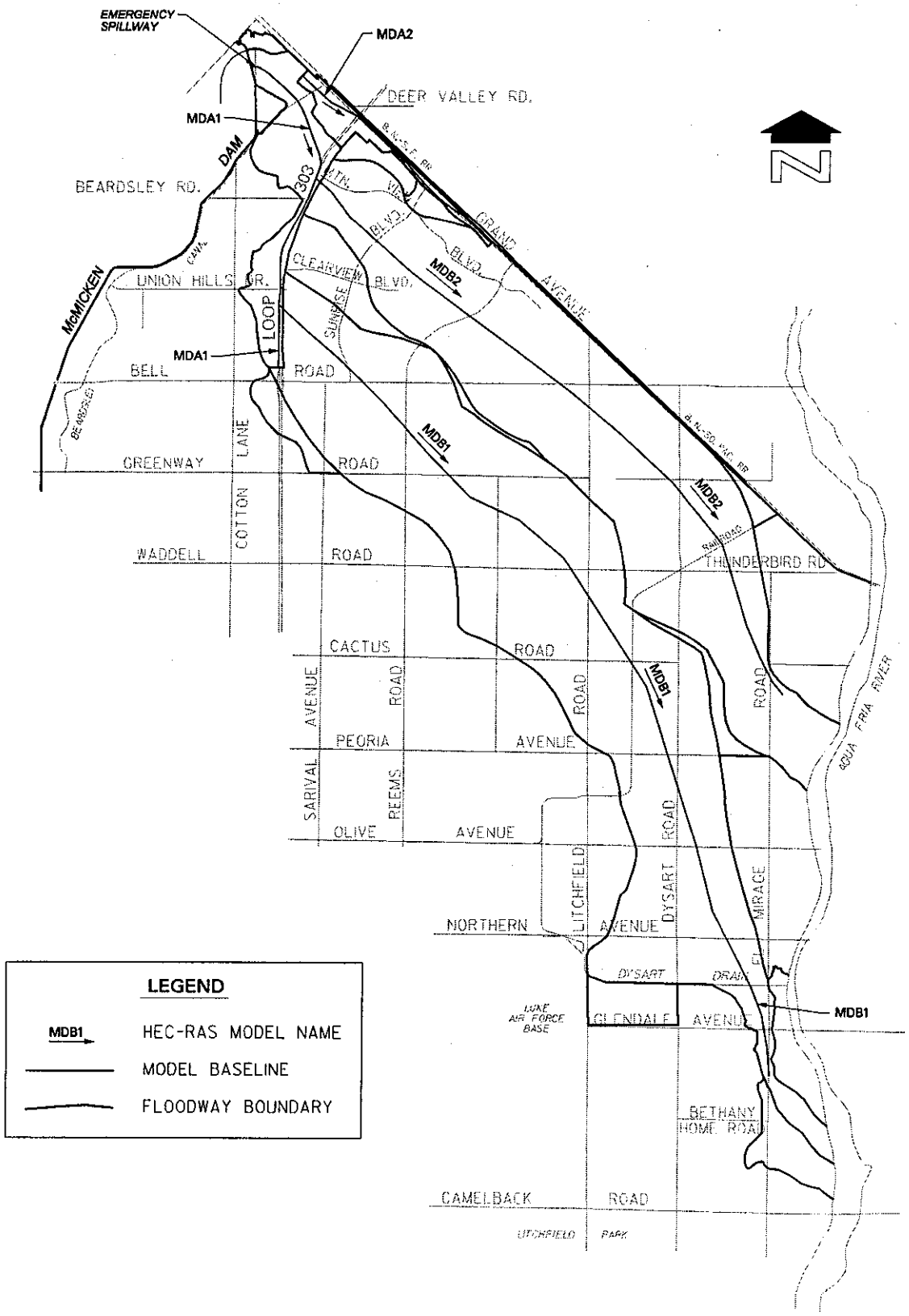
1 Figure F-1: HEC-RAS Index Map

2 CD Contents

3 CD with Models, Report, Photos, and GIS/Delineation

4 Spillway Delineation Maps (11" x 17")



creative engineering solutions
Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85003-1136
Tel: (602) 252-8384
Fax: (602) 252-8385
DEI Professional Services, LLC

McMICKEN DAM SPILLWAY
HEC-RAS INDEX MAP

FIGURE F-1

McMicken Dam Spillway Delineation Study
FCD 98-32

CD Contents

HEC-RAS:
MDA1.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach A1 Model
MDA2.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach A2 Model
MDB1.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach B1 Model
MDB2.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach B2 Model

Photos:
MD-01.jpg through MD-70.jpg = field photos of study area

Report Text:
AA-Main Report.doc
A-General Documentation.doc
B-Data Collection.doc
C-Field Reconnaissance.doc
D-Reach A Hydraulics.doc
E-Reach B Hydraulics.doc
F-Computer Files.doc

GIS:
carto.dxf
carto.xls
dq.xls
ndxprj.dxf
prj.dxf
prjdat.xls
spwbln1.dxf
spwbln1.xls
spwbln2.dxf
spwbln2.xls
spwbln3.dxf
spwbln3.xls
spwxsec1.dxf
spwxsec1.xls
spwxsec2.dxf
spwxsec2.xls
spwxsec3.dxf
spwxsec3.xls
spwzn1.dxf
spwzn2.dxf
spwzn3.dxf
tables for maps.xls
Survey files from Project Engineering Consultants:
    corners.xls
    ctrl.xls
    fpctlfcd.xls

McMicken Dam Spillway Delineation Study
FCD 98-32

CD Contents (Cont'd.)

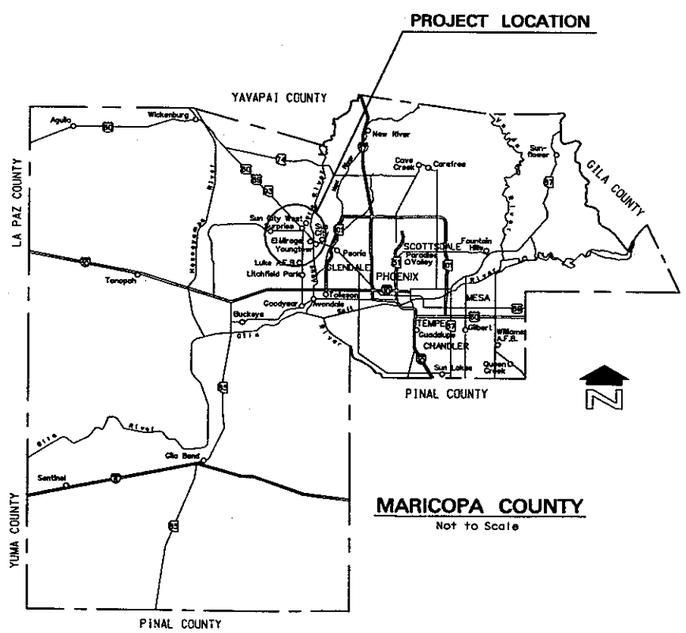
Planset DGN:
The following are all Microstation J .dgn files
border
border-fcd-s3d
cover-s01
delin&xsecs
flowdiags02
loop303
mcmicken
mcmickentopo2d
pln600s03 through pln600s32
shtclipkey
tmp
whitetank
whitetanktopo2d

tables for maps.xls

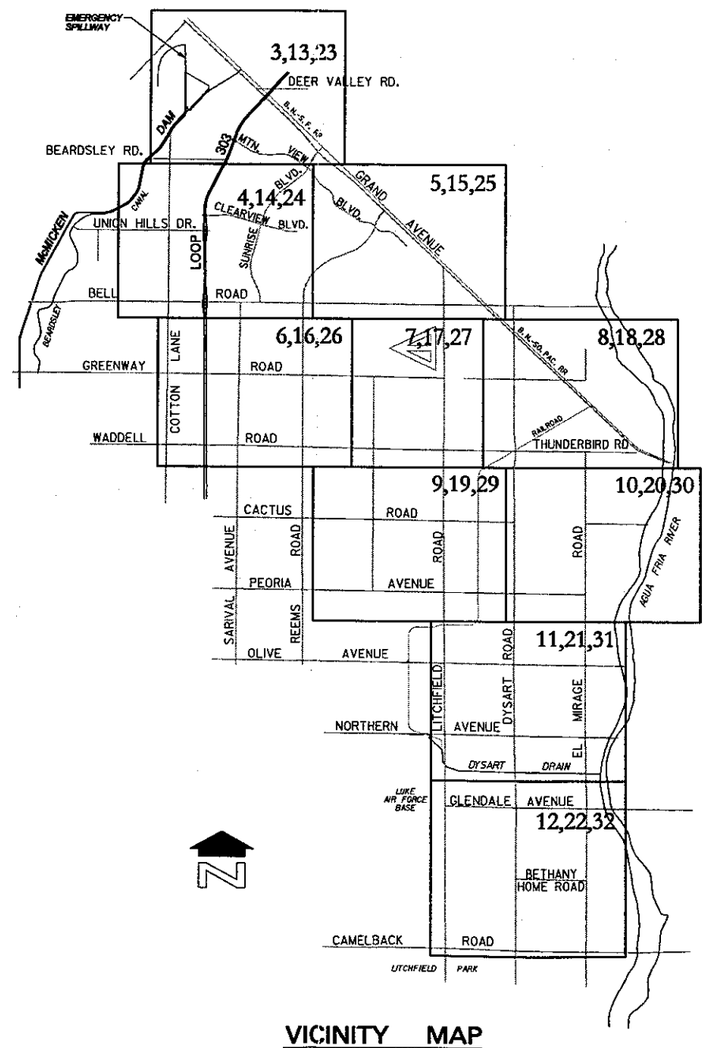
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM SPILLWAY DELINEATION STUDY

FCD CONTRACT NO. 98-32



MARICOPA COUNTY
Not to Scale



VICINITY MAP
Not to Scale

AERIAL MAPPING

KENNEY AERIAL MAPPING, INC., FLIGHT DATE: 6-9-00
HORIZONTAL: NORTH AMERICAN DATUM OF 1983.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

GROUND CONTROL BY PROJECT ENGINEERING CONSULTANTS, LTD.

THE FOLLOWING MAPPING PROVIDED BY FCDMC FROM THE WHITE TANKS/AGUA FRIA ADMS:

WESTERN AIR MAPS, INC., FLIGHT DATE: 12-22-89
HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

COOPER AERIAL OF PHOENIX, INC., FLIGHT DATE: 12-22-89
HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

HYDROLOGY/HYDRAULICS

HOSKIN ENGINEERING CONSULTANTS, INC.
323 W. ROOSEVELT STREET, STE. 200
PHOENIX, AZ 85003
(602) 252-8384

DEI PROFESSIONAL SERVICES, LLC.
6225 NORTH 24TH STREET, STE. 200
PHOENIX, AZ 85016
(602) 954-0038

SHEET INDEX

1	COVER SHEET
2	FLOW DIAGRAM
3-12	FULL FLOW MAPS
13-22	2/3 FLOW MAPS
23-32	1/3 FLOW MAPS

NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street, Suite 200, Phoenix, Arizona 85003-1336, Tel: (602) 252-8384, Fax: (602) 252-8385

DEI Professional Services, LLC
6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 954-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 16379 HAL E. MARRON ARIZONA U.S.A.

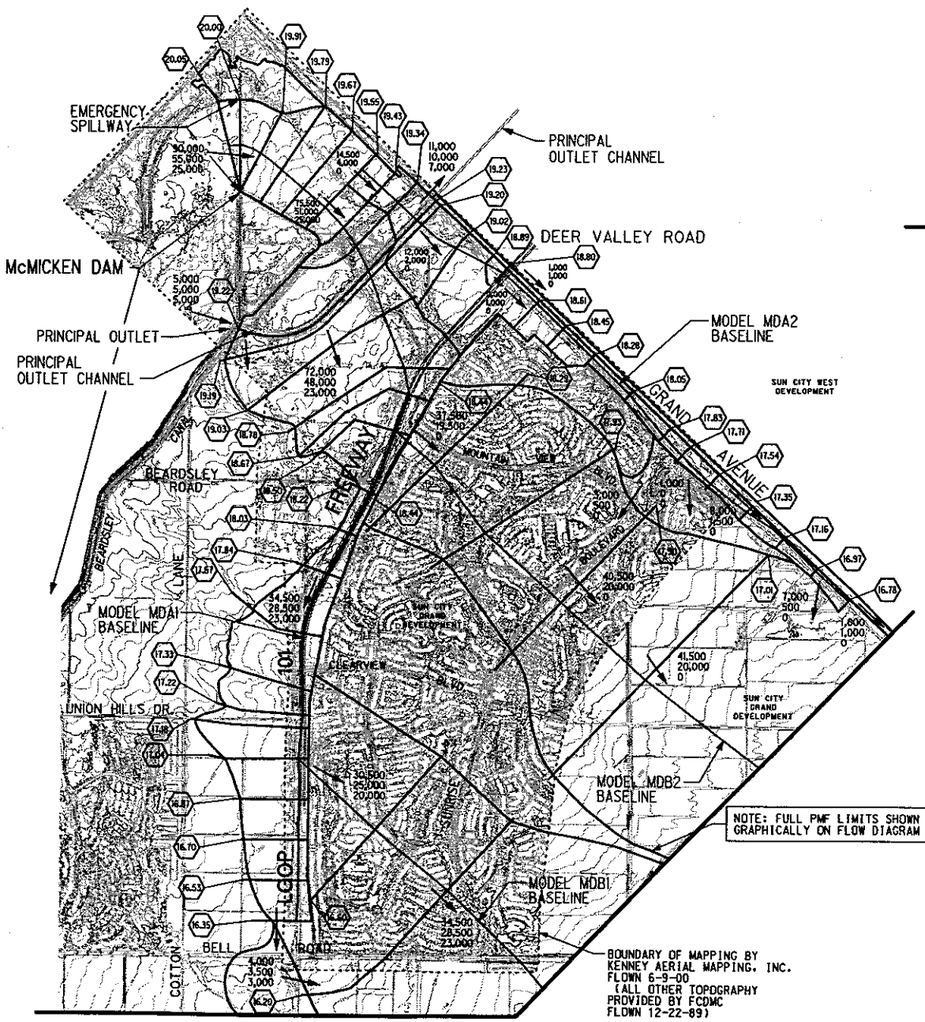
REGISTERED PROFESSIONAL ENGINEER (CIVIL) 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

COVER SHEET

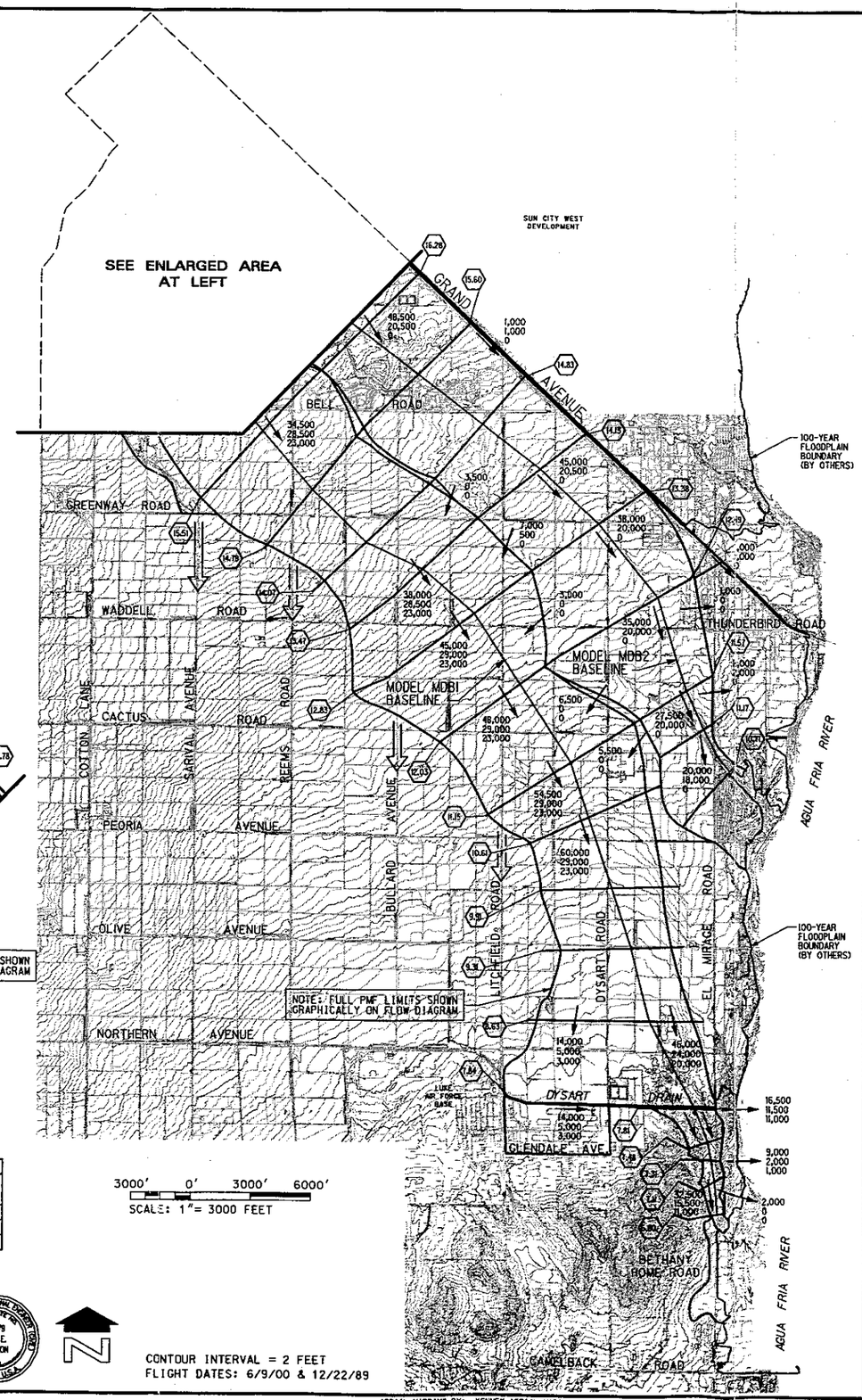
SHEET 1 OF 32

E:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\cover-s01.dgn
10/23/01



1500' 0' 1500' 3000'
SCALE: 1"= 1500 FEET

McMICKEN DAM FLOW VOLUMES			
FLOW	TOTAL (CFS)	PRINCIPAL OUTLET (CFS)	EMERGENCY SPILLWAY (CFS)
FULL PMF	95,000	5,000	90,000
2/3 PMF	60,000	5,000	55,000
1/3 PMF	30,000	5,000	25,000



3000' 0' 3000' 6000'
SCALE: 1"= 3000 FEET

CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 6/9/00 & 12/22/89

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

LEGEND

SPILLWAY FLOW, FULL PMF FLOODPLAIN BOUNDARY

FLOW VALUES — FULL FLOW Q= 34,500 CFS — 34,500; 2/3 FLOW Q= 28,500 CFS — 28,500; 1/3 FLOW Q= 23,000 CFS — 23,000

100-YEAR FLOODPLAIN BOUNDARY

FLOW DIRECTION ARROW

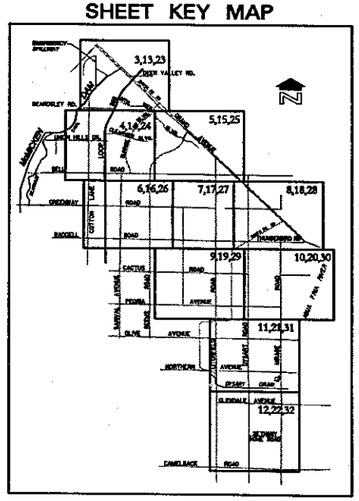
POTENTIAL FLOW LEAVING FLOODPLAIN

BOUNDARY OF MAPPING BY KENNEY AERIAL MAPPING, INC. FLOWN 6-9-00 (ALL OTHER TOPOGRAPHY PROVIDED BY FCDMC FLOWN 12-22-89)

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.

525 West Roosevelt Street, Suite 200, Phoenix, Arizona 85003-1556, Tel: (602) 252-4984, Fax: (602) 252-8585

6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 944-8665

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

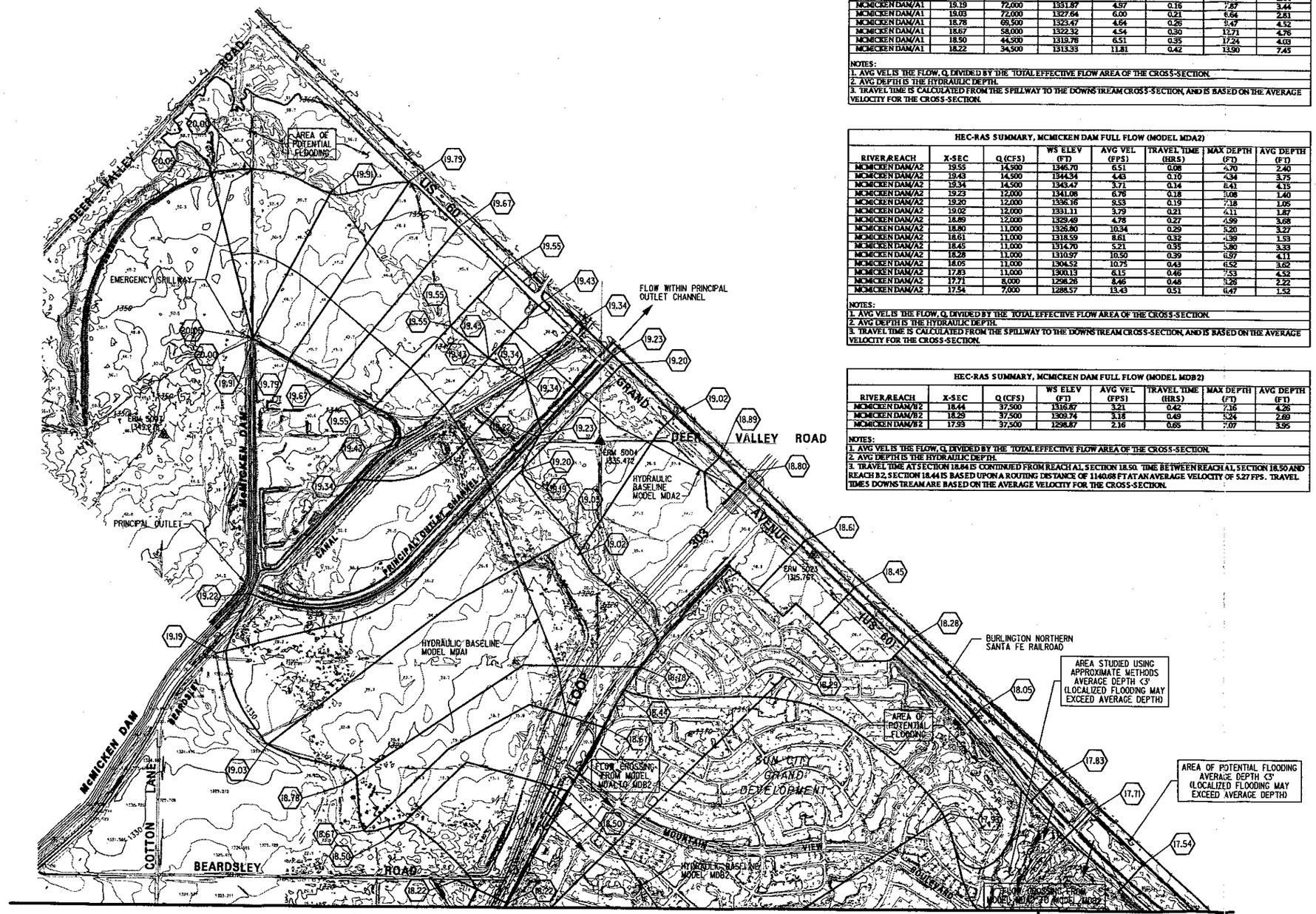
REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

FLOW DIAGRAM

SHEET 2 OF 32

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 15379 HAL E. MARION ARIZONA, U.S.A.

g:\fldir\99\990008 - spillway inundation studies\03-mcmicken dam\planset dgns\flowdiag02.dgn
10/23/01



MATCH LINE SEE SHEET 4

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A1	20.05	90,000	1360.37	4.54	0.00	11.37	9.50
MCMICKEN DAM/A1	20.00	90,000	1358.40	10.16	0.00	9.40	4.36
MCMICKEN DAM/A1	19.91	90,000	1355.08	8.39	0.01	6.08	5.37
MCMICKEN DAM/A1	19.79	90,000	1352.73	8.67	0.03	7.98	5.23
MCMICKEN DAM/A1	19.67	90,000	1349.01	9.80	0.06	7.53	6.06
MCMICKEN DAM/A1	19.55	75,500	1346.83	7.41	0.08	8.83	7.80
MCMICKEN DAM/A1	19.43	75,500	1342.18	11.93	0.10	9.01	4.36
MCMICKEN DAM/A1	19.34	75,500	1341.65	4.47	0.11	13.68	6.09
MCMICKEN DAM/A1	19.22	70,000	1339.30	8.14	0.15	11.30	2.04
MCMICKEN DAM/A1	19.19	72,000	1331.87	4.97	0.16	7.87	3.44
MCMICKEN DAM/A1	19.03	72,000	1327.64	6.00	0.21	6.64	2.81
MCMICKEN DAM/A1	18.78	69,500	1323.47	4.64	0.26	5.47	4.52
MCMICKEN DAM/A1	18.67	58,000	1322.32	4.54	0.30	12.71	4.76
MCMICKEN DAM/A1	18.50	44,500	1319.78	6.51	0.35	17.24	4.03
MCMICKEN DAM/A1	18.22	34,500	1313.33	11.81	0.42	13.90	7.45

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDA2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A2	19.55	14,500	1346.70	6.51	0.08	4.70	2.40
MCMICKEN DAM/A2	19.43	14,500	1344.34	4.43	0.10	4.34	3.75
MCMICKEN DAM/A2	19.34	14,500	1343.47	3.71	0.14	4.41	4.15
MCMICKEN DAM/A2	19.23	12,000	1341.08	6.76	0.18	3.08	1.40
MCMICKEN DAM/A2	19.20	12,000	1336.16	9.53	0.19	7.18	1.05
MCMICKEN DAM/A2	19.02	12,000	1331.11	3.79	0.21	4.11	1.87
MCMICKEN DAM/A2	18.89	12,000	1329.49	4.78	0.27	6.99	3.68
MCMICKEN DAM/A2	18.80	11,000	1326.80	10.34	0.29	8.20	3.27
MCMICKEN DAM/A2	18.61	11,000	1318.59	8.61	0.32	4.39	1.53
MCMICKEN DAM/A2	18.45	11,000	1314.70	5.21	0.35	5.80	3.33
MCMICKEN DAM/A2	18.28	11,000	1310.97	10.50	0.39	6.97	4.11
MCMICKEN DAM/A2	18.05	11,000	1304.52	10.75	0.43	6.52	3.62
MCMICKEN DAM/A2	17.83	11,000	1300.13	6.15	0.46	7.53	4.52
MCMICKEN DAM/A2	17.71	8,000	1296.26	8.46	0.48	3.28	2.22
MCMICKEN DAM/A2	17.54	7,000	1288.57	13.43	0.51	6.47	1.52

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	18.44	37,500	1316.87	3.21	0.42	7.16	4.26
MCMICKEN DAM/B2	18.29	37,500	1309.74	3.18	0.49	5.24	2.69
MCMICKEN DAM/B2	17.93	37,500	1298.87	2.16	0.65	7.07	3.95

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 18.84 IS CONTINUED FROM REACH A1, SECTION 18.50. TIME BETWEEN REACH A1, SECTION 18.50 AND REACH B2, SECTION 18.44 IS BASED UPON A ROUTING DISTANCE OF 1140.68 FT AT AN AVERAGE VELOCITY OF 5.27 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS (103 1293.85)
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

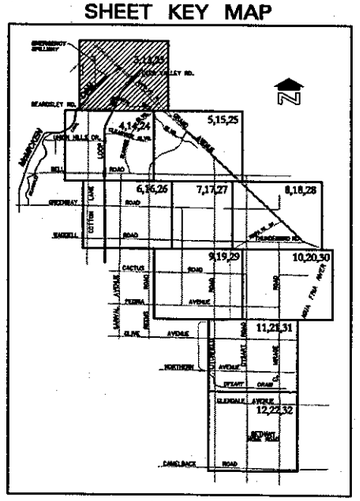
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
5004	1335.472	976121.969	550132.383
5007	1349.278	976165.781	544860.389
5023	1315.767	974773.215	552722.149

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
375 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-1936, Tel: (602) 252-8884, Fax (602) 252-8385
6223 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 954-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

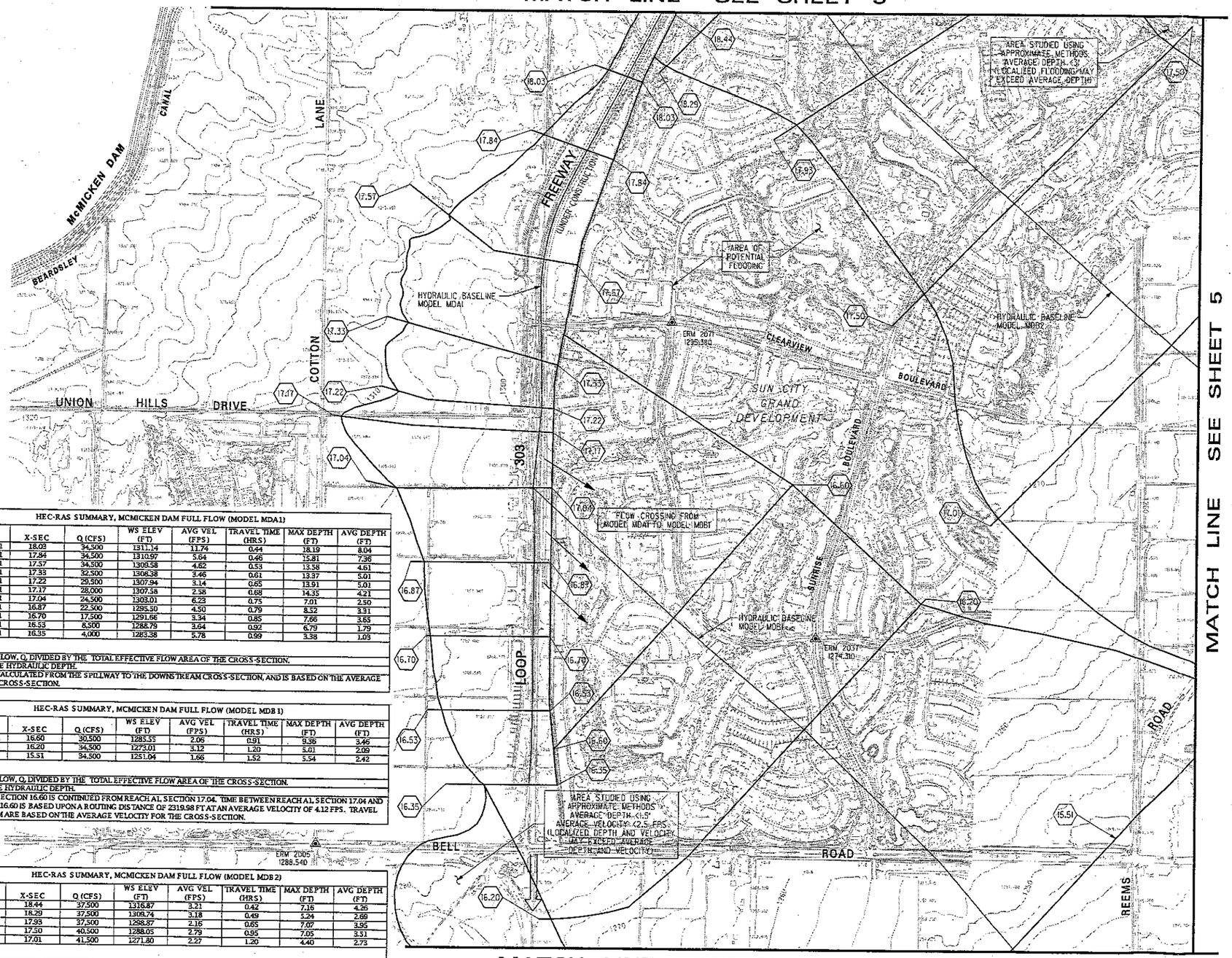
FULL FLOW
SHEET 3 OF 32

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

g:\filedir\98\980008 - spillway inundation studies\03-mcmicken dam\planset dgns\pln800s03.dgn
10/23/01

MATCH LINE SEE SHEET 3



MATCH LINE SEE SHEET 6

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAMA1	18.03	34,500	1311.14	11.74	0.44	18.19	8.04
MCMICKEN DAMA1	17.84	34,500	1310.97	5.64	0.46	15.81	7.36
MCMICKEN DAMA1	17.57	34,500	1308.58	4.62	0.53	13.58	4.61
MCMICKEN DAMA1	17.33	32,500	1306.38	3.46	0.61	13.37	5.01
MCMICKEN DAMA1	17.22	29,500	1307.94	3.14	0.65	13.91	5.01
MCMICKEN DAMA1	17.17	28,000	1307.58	2.58	0.68	14.35	4.21
MCMICKEN DAMA1	17.04	24,500	1303.01	6.23	0.75	7.01	2.50
MCMICKEN DAMA1	16.87	22,500	1295.50	4.50	0.79	8.52	3.31
MCMICKEN DAMA1	16.70	17,500	1291.66	3.34	0.85	7.66	3.65
MCMICKEN DAMA1	16.53	8,500	1288.79	3.64	0.92	6.79	1.79
MCMICKEN DAMA1	16.35	4,000	1283.38	5.78	0.99	3.38	1.03

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB 1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAMB 1	16.60	30,500	1285.55	2.06	0.91	9.38	3.46
MCMICKEN DAMB 1	16.20	34,500	1273.01	3.12	1.20	5.01	2.09
MCMICKEN DAMB 1	15.51	34,500	1251.04	1.66	1.52	5.54	2.42

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 16.60 IS CONTINUED FROM REACH A1, SECTION 17.04. TIME BETWEEN REACH A1, SECTION 17.04 AND REACH B1, SECTION 16.60 IS BASED UPON A ROUTING DISTANCE OF 2319.98 FT AT AN AVERAGE VELOCITY OF 4.12 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB 2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAMB2	18.44	37,500	1316.87	3.21	0.42	7.16	4.26
MCMICKEN DAMB2	18.29	37,500	1309.74	3.18	0.49	5.24	2.69
MCMICKEN DAMB2	17.93	37,500	1298.97	2.16	0.65	7.07	3.95
MCMICKEN DAMB2	17.50	40,500	1288.05	2.79	0.95	7.05	3.51
MCMICKEN DAMB2	17.01	41,500	1271.80	2.27	1.20	4.40	2.73

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 18.44 IS CONTINUED FROM REACH A1, SECTION 18.50. TIME BETWEEN REACH A1, SECTION 18.50 AND REACH B1, SECTION 18.44 IS BASED UPON A ROUTING DISTANCE OF 1140.68 FT AT AN AVERAGE VELOCITY OF 5.27 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS (103 / 1295.85)
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

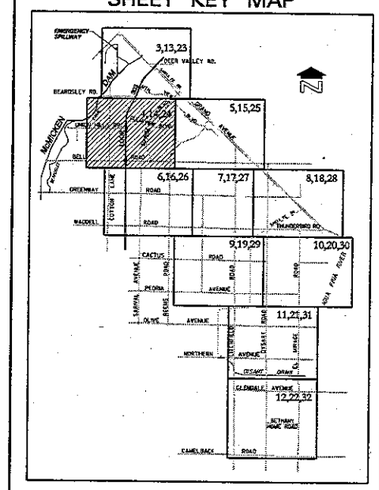
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
2005	1288.540	960361.450	544766.904
2037	1274.310	962907.044	550803.553
2071	1295.380	966749.391	549008.837

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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HEC creative engineering solutions
Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street Suite 200 Phoenix, Arizona 85005-1536 Tel: (602) 252-8884 Fax: (602) 252-8888

DEI Professional Services, LLC
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A. Date Signed

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A. Date Signed

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 4 OF 32

SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC.

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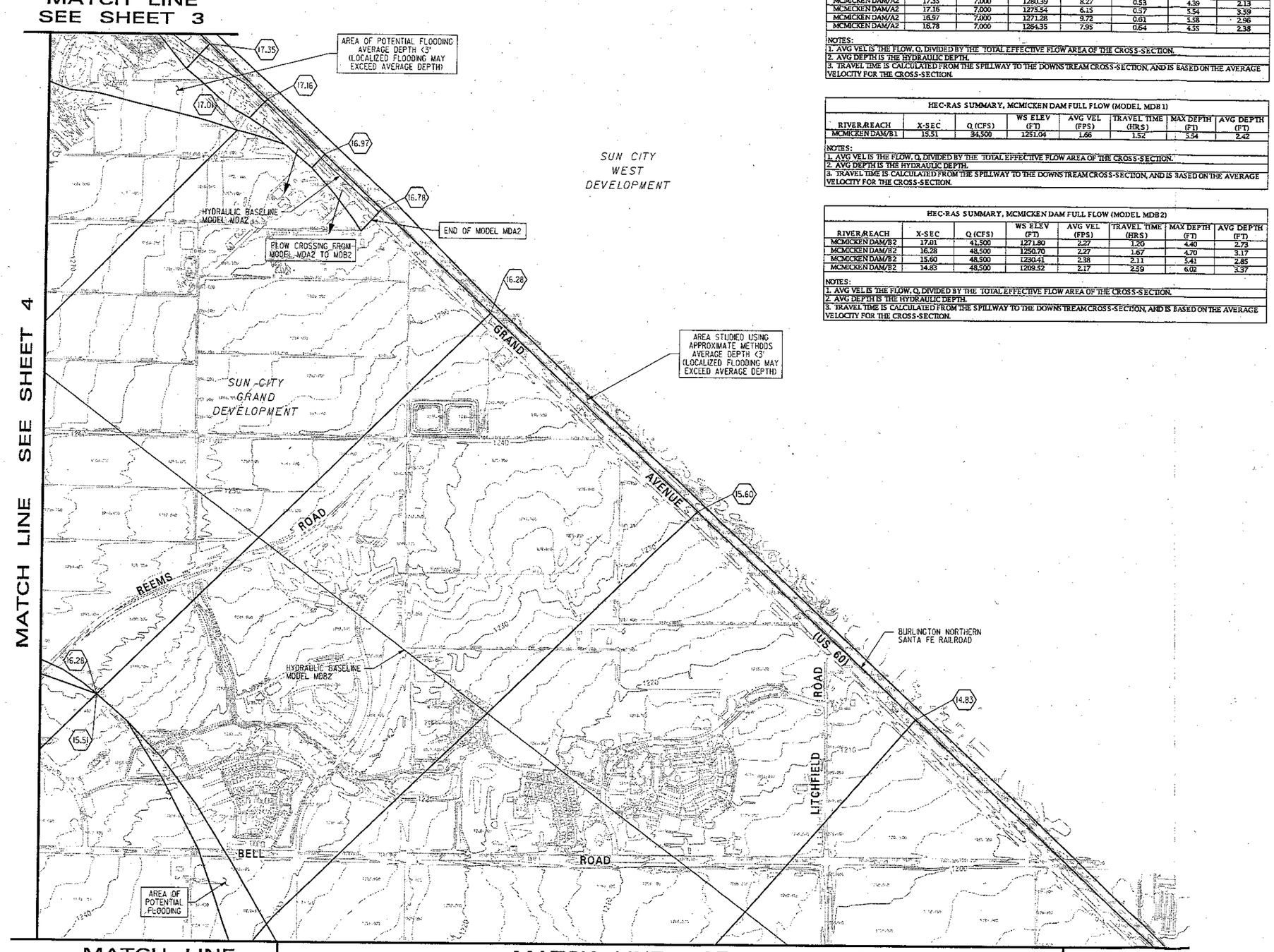
11/21/2001



HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDA2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A2	17.35	7,000	1280.39	8.27	0.53	4.39	2.13
MCMICKEN DAM/A2	17.16	7,000	1275.54	6.15	0.57	5.54	3.59
MCMICKEN DAM/A2	16.97	7,000	1271.28	9.72	0.61	5.58	2.98
MCMICKEN DAM/A2	16.78	7,000	1284.35	7.95	0.64	4.55	2.38

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	15.51	34,500	1251.04	1.66	1.52	5.54	2.42

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	17.01	41,500	1271.80	2.27	1.20	4.40	2.73
MCMICKEN DAM/B2	16.28	48,500	1250.70	2.27	1.67	4.70	3.17
MCMICKEN DAM/B2	15.60	48,500	1230.41	2.38	2.11	5.41	2.85
MCMICKEN DAM/B2	14.83	48,500	1209.52	2.17	2.59	6.02	3.37

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS (103 / 1293.85)

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

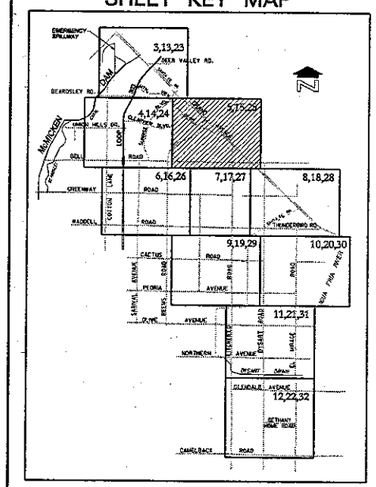
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

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Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16376 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 5 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC.

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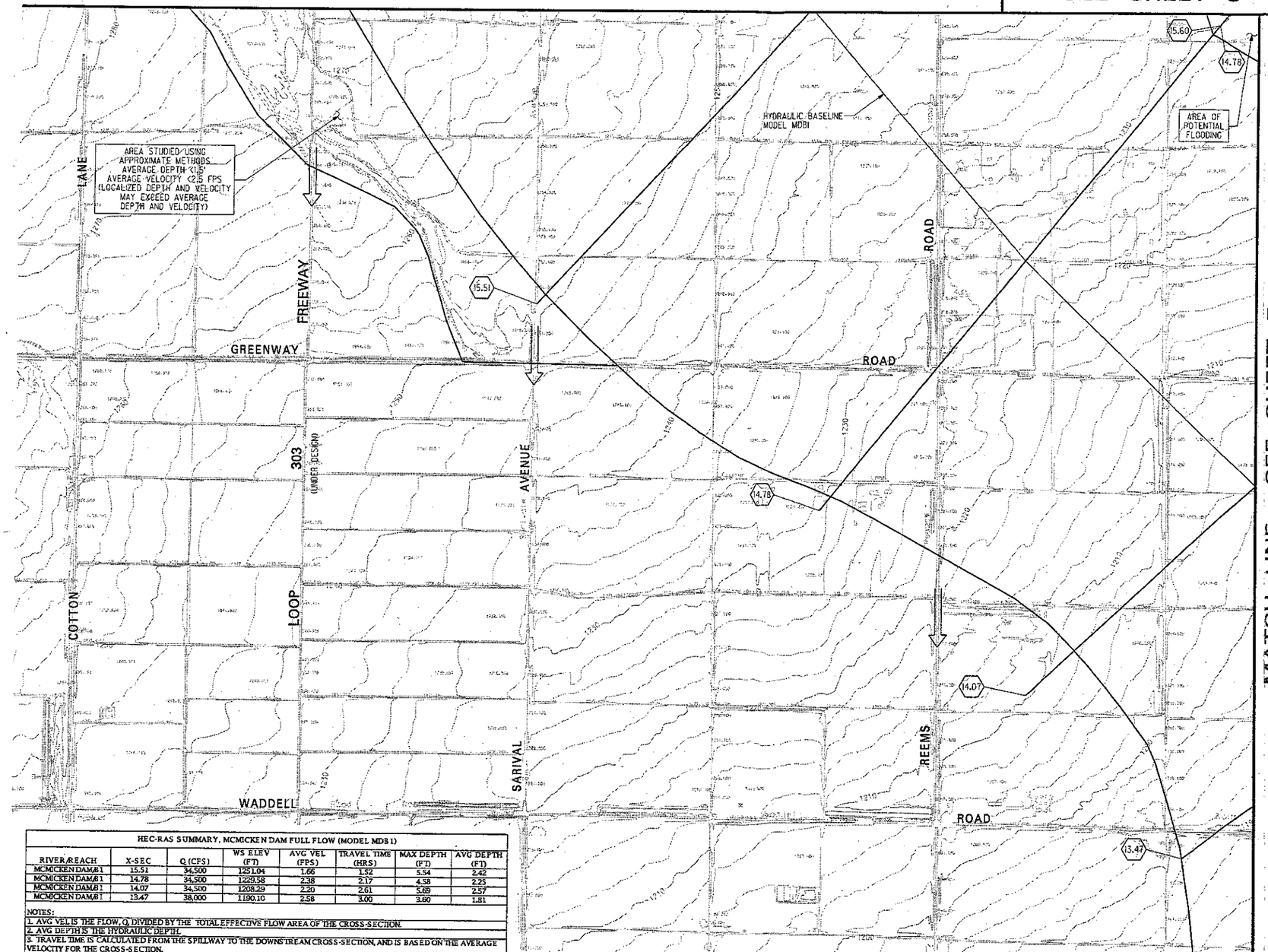
11/21/2001

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 5



MATCH LINE SEE SHEET 7

MATCH LINE SEE SHEET 9

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/81	15.51	34,500	1251.04	1.66	1.52	5.54	2.42
MCMICKEN DAM/81	14.78	34,500	1229.58	2.38	2.17	4.58	2.25
MCMICKEN DAM/81	14.07	34,500	1208.29	2.20	2.61	5.69	2.57
MCMICKEN DAM/81	13.47	38,000	1190.10	2.58	3.00	3.60	1.81

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/82	15.60	48,500	1230.41	2.38	2.11	5.41	2.85

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS 103 1293.85
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

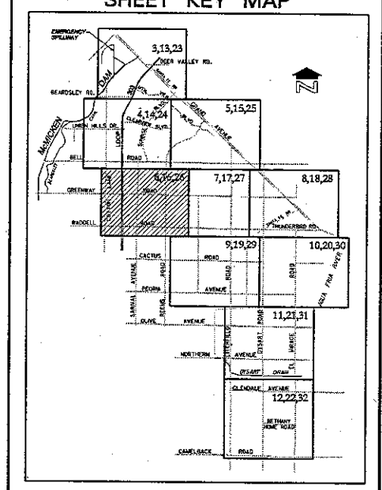
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15379 HAL E. MARRON Date Signed ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN Date Signed ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 6 OF 32

600' 0' 600' 1200'

SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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11/21/2001

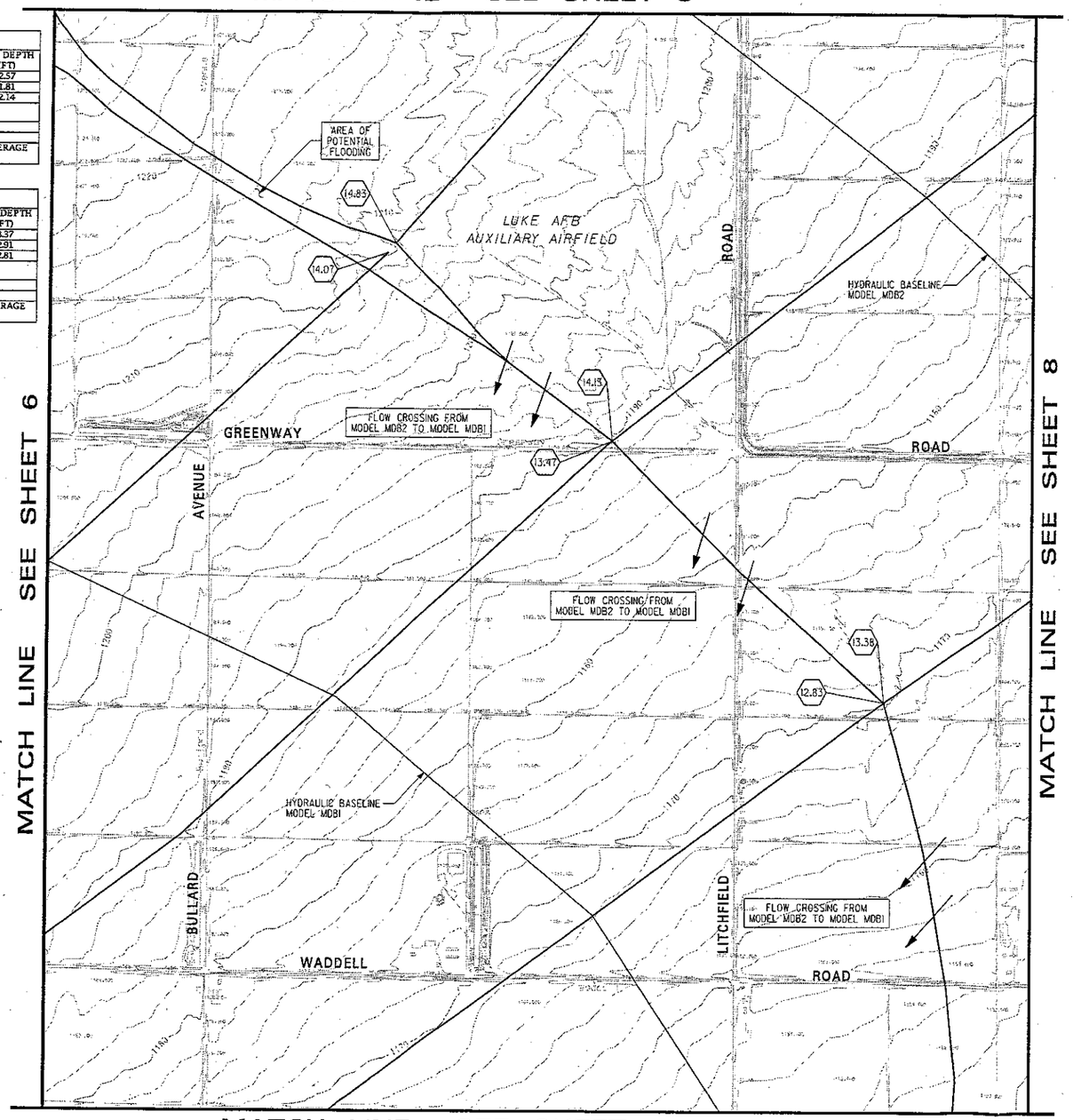
HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	14.07	34,500	1208.29	2.20	2.60	5.69	2.57
MCMICKEN DAM/B1	13.47	38,000	1190.10	2.58	3.00	3.60	1.81
MCMICKEN DAM/B1	12.83	45,000	1170.71	2.61	3.37	3.81	2.14

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	14.83	48,500	1209.52	2.17	2.59	6.02	3.37
MCMICKEN DAM/B2	14.13	43,000	1191.58	2.31	3.06	4.98	2.91
MCMICKEN DAM/B2	13.38	38,000	1170.98	1.99	3.54	6.98	2.81

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

MATCH LINE SEE SHEET 5



MATCH LINE SEE SHEET 6

MATCH LINE SEE SHEET 8

MATCH LINE SEE SHEET 9

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

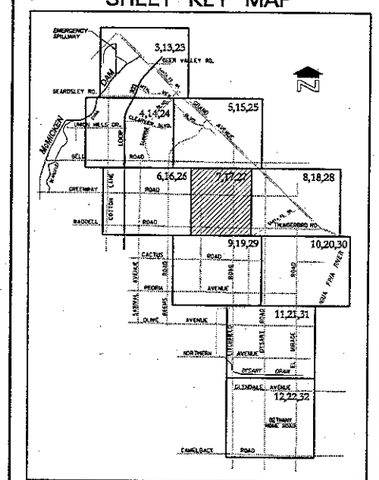
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
325 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-1136, Tel: (602) 253-8894, Fax: (602) 253-8895

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 7 OF 32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

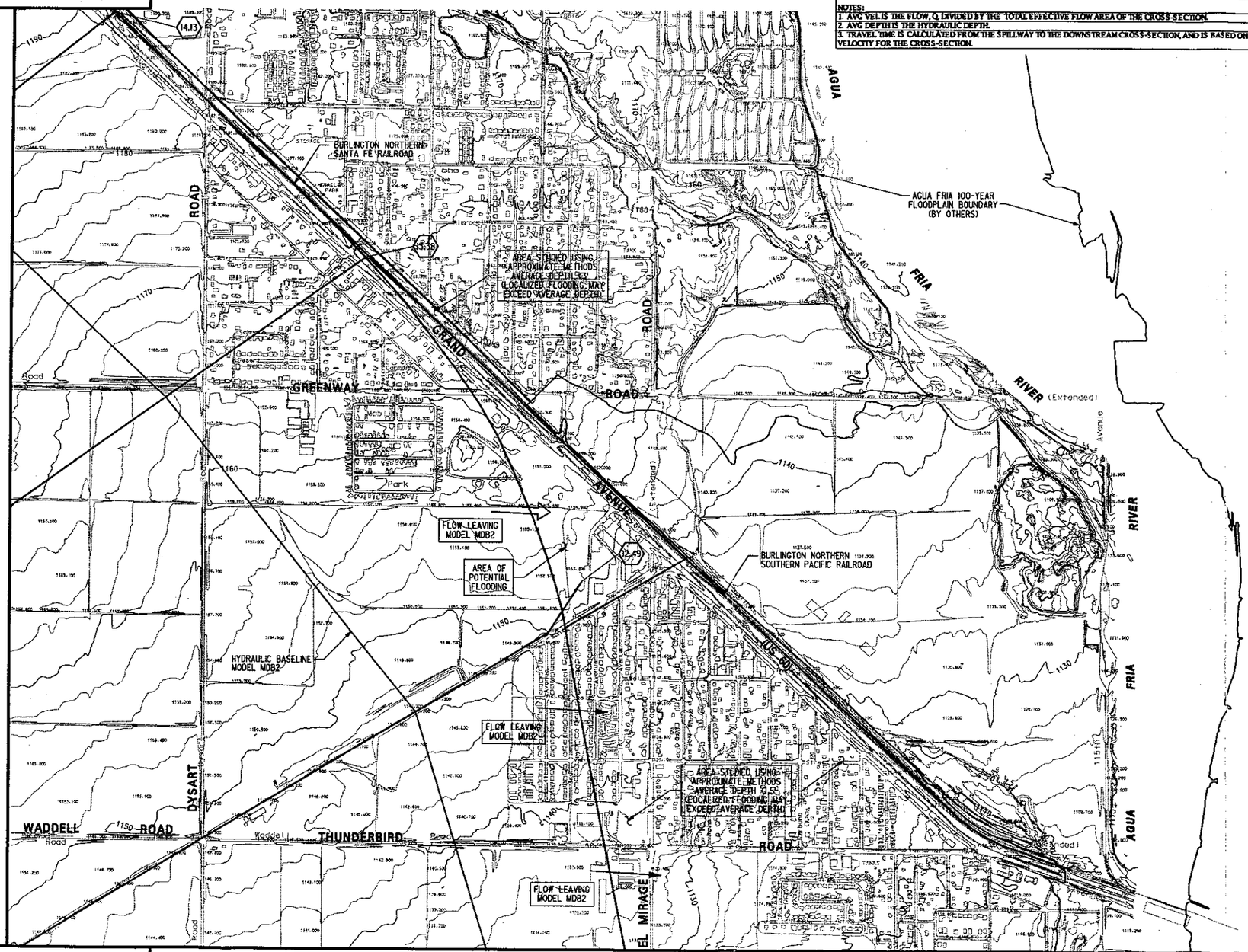
600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

G:\Filedir\99\990008 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln600s07.dgn
11/21/2001

MATCH LINE
SEE SHEET 5

MATCH LINE SEE SHEET 7



MATCH LINE
SEE SHEET 9

MATCH LINE SEE SHEET 10

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	14.13	45,000	1191.58	2.31	1.06	4.98	2.91
MCMICKEN DAM/B2	13.38	38,000	1170.98	1.99	3.54	6.98	2.81
MCMICKEN DAM/B2	12.49	35,000	1150.75	1.80	4.19	4.45	2.00

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS (103 / 1293.85)
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

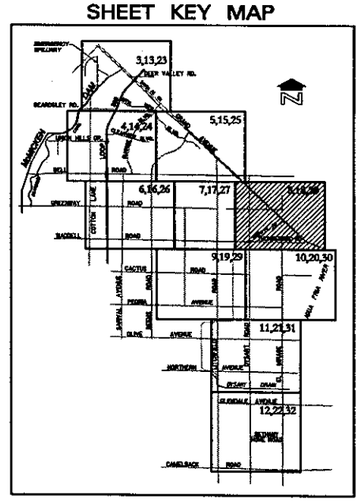
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1—THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

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DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15379 HAL E. MARION ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

FULL FLOW

SHEET 8 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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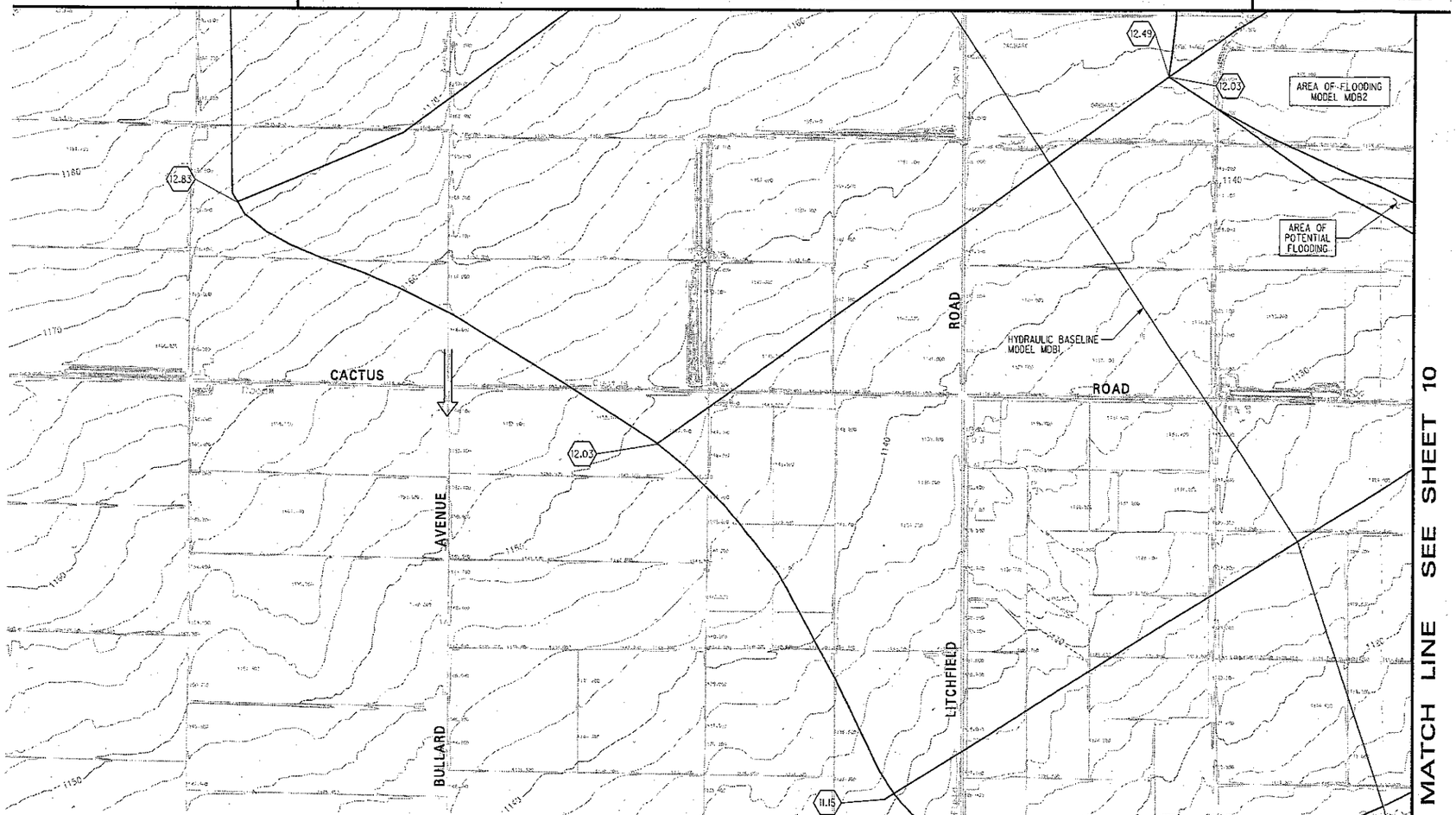
10/23/01

MATCH LINE SEE SHEET 6 | MATCH LINE SEE SHEET 7 | MATCH LINE SEE SHEET 8



MATCH LINE SEE SHEET 11

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	12.83	45,000	1170.71	2.01	3.36	3.81	2.14
MCMICKEN DAM/B1	12.03	48,000	1148.78	2.88	3.95	4.08	2.69
MCMICKEN DAM/B1	11.15	54,500	1129.76	2.10	4.39	6.06	3.00
MCMICKEN DAM/B1	10.61	60,000	1117.91	3.01	4.78	5.91	3.05

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	12.49	35,000	1150.75	1.80	4.20	4.45	2.60

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS (103 / 1293.85)
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

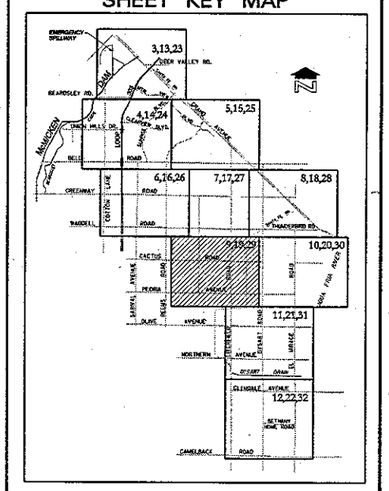
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85005-1156
Tel: (602) 252-8584
Fax: (602) 252-8885

DEI Professional Surveyors LLC
5225 North 24th Street
Suite 200
Phoenix, Arizona 85016
Tel: (602) 954-0038
Fax: (602) 944-3605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

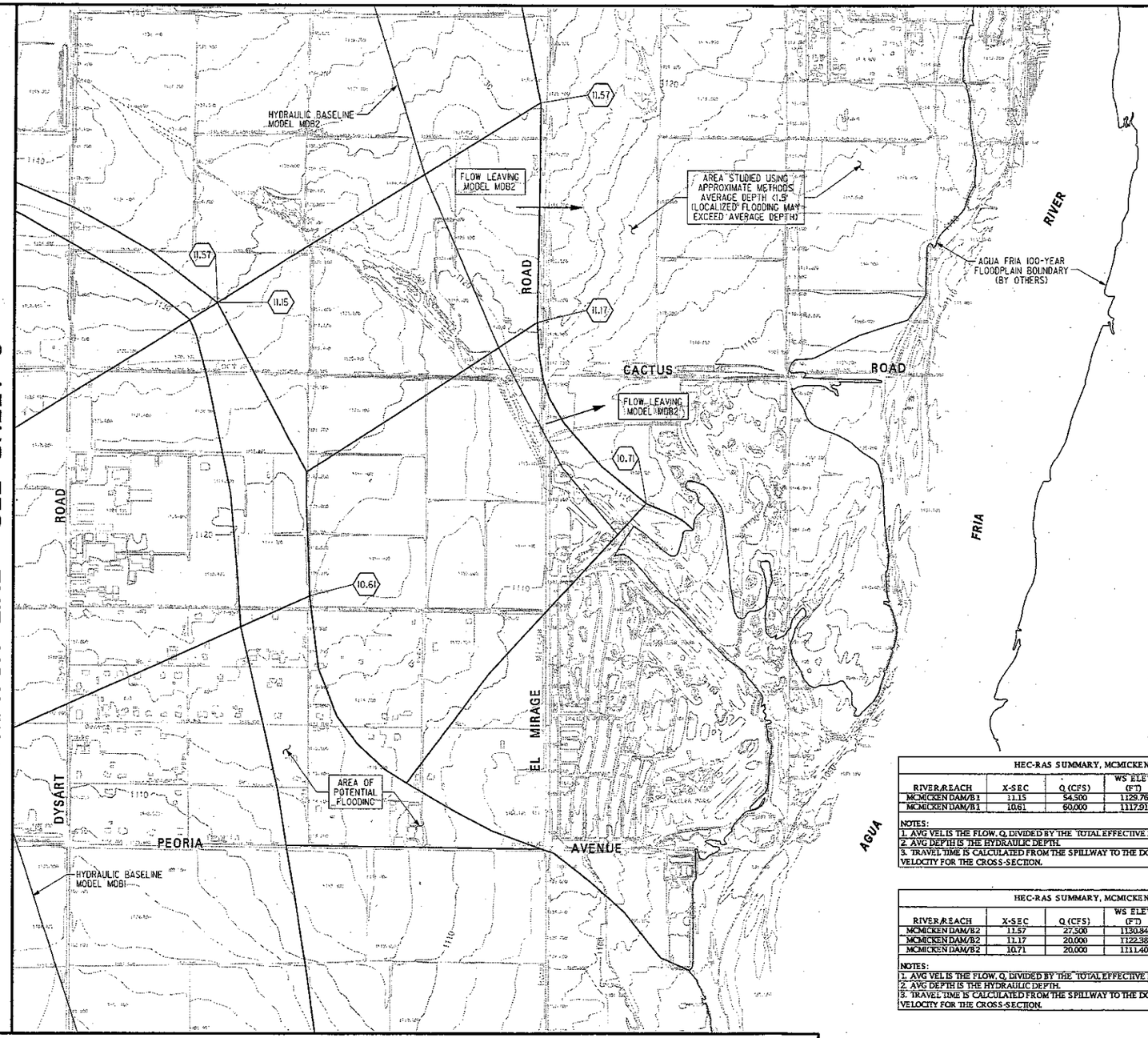
SHEET 9 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

C:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln600s09.dgn
11/21/2001

MATCH LINE SEE SHEET 8



MATCH LINE SEE SHEET 9

MATCH LINE SEE SHEET 11

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	11.15	54,500	1129.76	2.10	4.40	6.06	3.00
MCMICKEN DAM/B1	10.61	60,000	1117.91	3.01	4.78	5.91	3.05

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	11.57	27,500	1130.84	2.08	4.94	6.84	3.22
MCMICKEN DAM/B2	11.17	20,000	1122.38	2.04	5.22	8.38	3.24
MCMICKEN DAM/B2	10.71	20,000	1111.40	2.33	5.56	5.40	3.30

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16579 HAL E. MARRON ARIZONA U.S.A.

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS (103 / 1293.85)
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

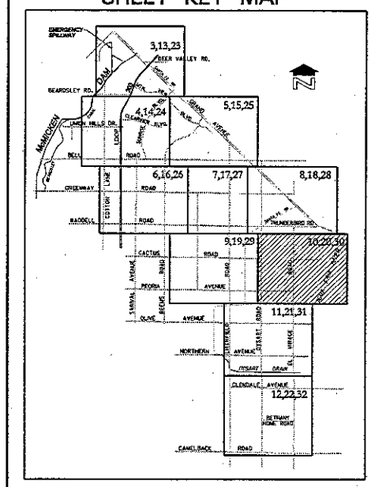
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

creative engineering solutions
Hoskin Engineering Consultants, Inc.
828 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-7556, Tel: (602) 252-8884, Fax: (602) 252-8386
DEI Professional Surveyors LLC
6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

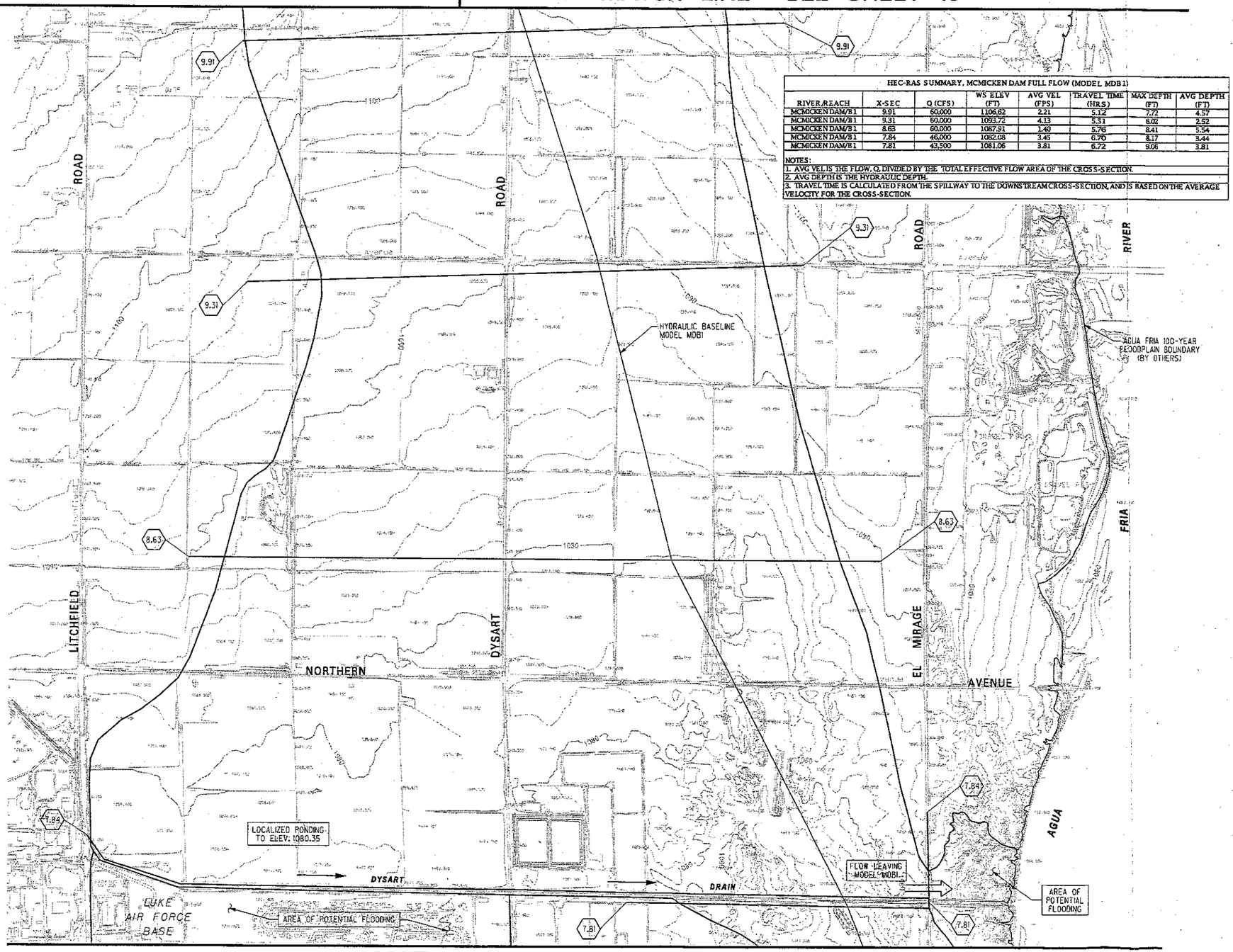
FULL FLOW

SHEET 10 OF 32

AERIAL MAPPING BY: PROVIDED BY FCDMC

G:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln600s10.dgn
11/21/2001

MATCH LINE SEE SHEET 9 | MATCH LINE SEE SHEET 10



MATCH LINE SEE SHEET 12

HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	9.91	60,000	1106.62	2.21	5.12	7.72	4.57
MCMICKEN DAM/B1	9.31	60,000	1093.72	4.13	5.51	6.02	2.52
MCMICKEN DAM/B1	8.63	60,000	1087.91	1.40	5.76	8.41	5.54
MCMICKEN DAM/B1	7.84	46,000	1082.08	3.45	6.70	8.17	3.44
MCMICKEN DAM/B1	7.81	43,500	1081.06	3.81	6.72	9.06	3.81

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

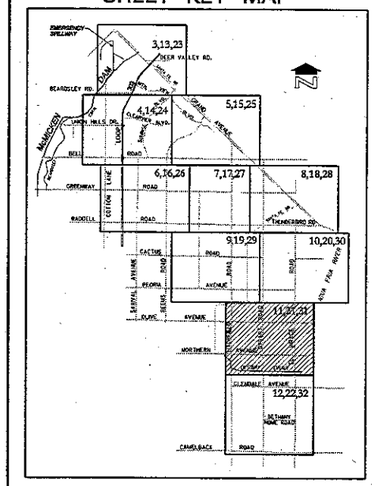
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
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Hoskin Engineering Consultants, Inc.
828 West Roosevelt Street Suite 200 Phoenix, Arizona 85005-1756 Tel: (602) 252-8384 Fax: (602) 252-8385

DEI Professional Services, LLC
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 11 OF 32

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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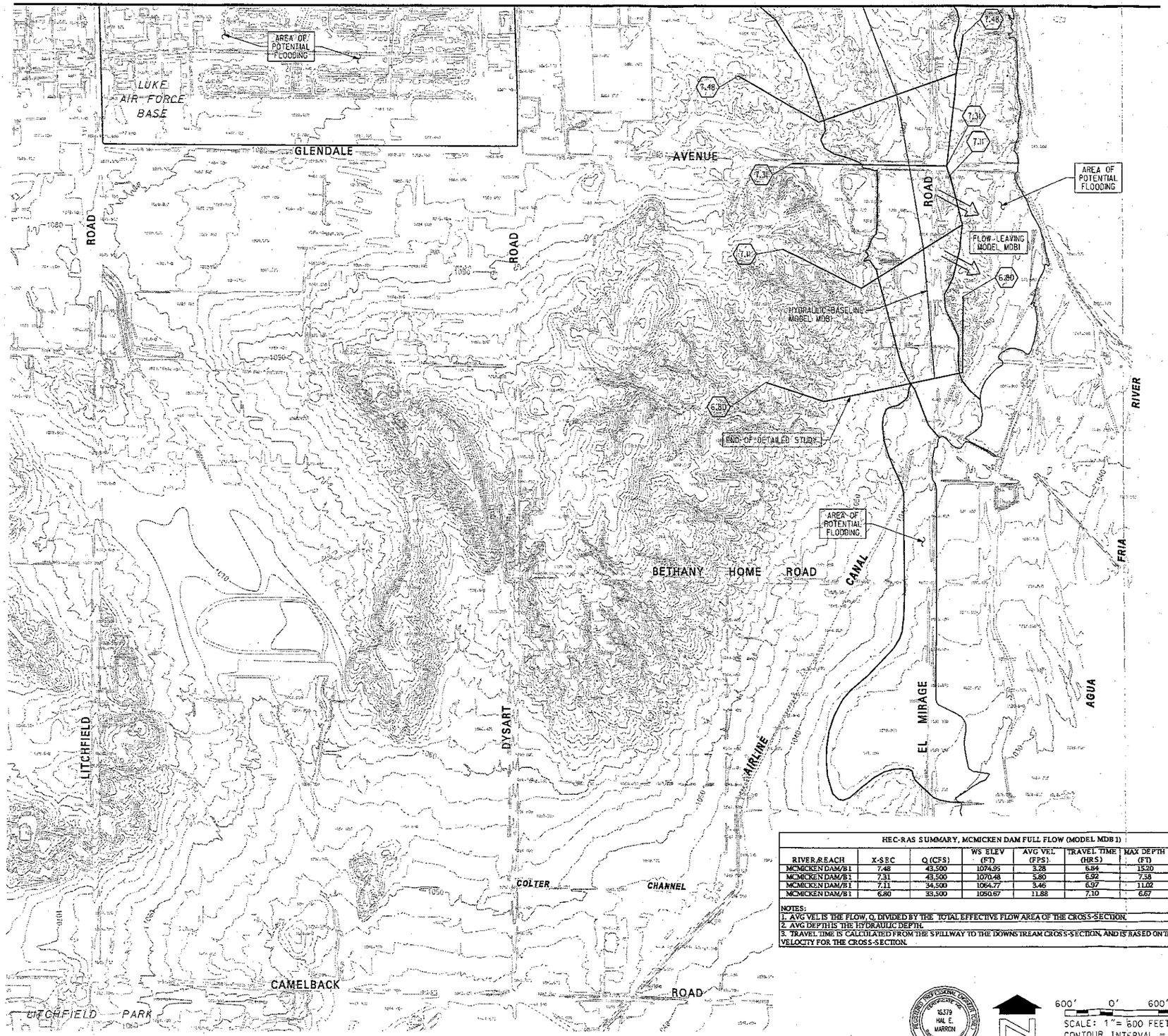
11/21/2001

MATCH LINE SEE SHEET 11



HEC-RAS SUMMARY, MCMICKEN DAM FULL FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	7.48	43,500	1074.95	3.28	6.84	15.20	7.11
MCMICKEN DAM/B1	7.31	43,500	1070.48	5.80	6.92	7.58	4.11
MCMICKEN DAM/B1	7.11	34,500	1064.77	3.46	6.97	11.02	5.79
MCMICKEN DAM/B1	6.80	33,500	1050.67	11.88	7.10	6.67	4.34

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION — 19.87 — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS — 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

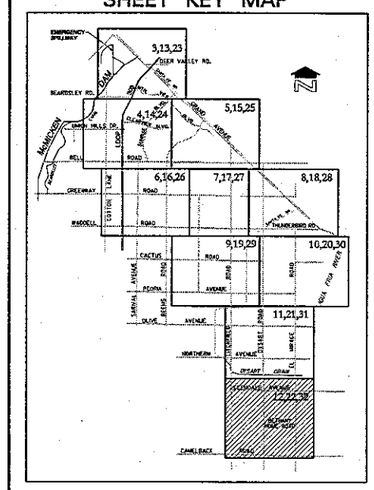
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
328 West Roosevelt Street Suite 200 Phoenix, Arizona 85005-1156 Tel: (602) 252-8884 Fax: (602) 252-8885

DEI Environmental Services LLC
6225 North 24th Street Suite 200 Phoenix, Arizona 85016 Tel: (602) 954-0038 Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19680 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

FULL FLOW

SHEET 12 OF 32

AERIAL MAPPING BY: PROVIDED BY FCDMC

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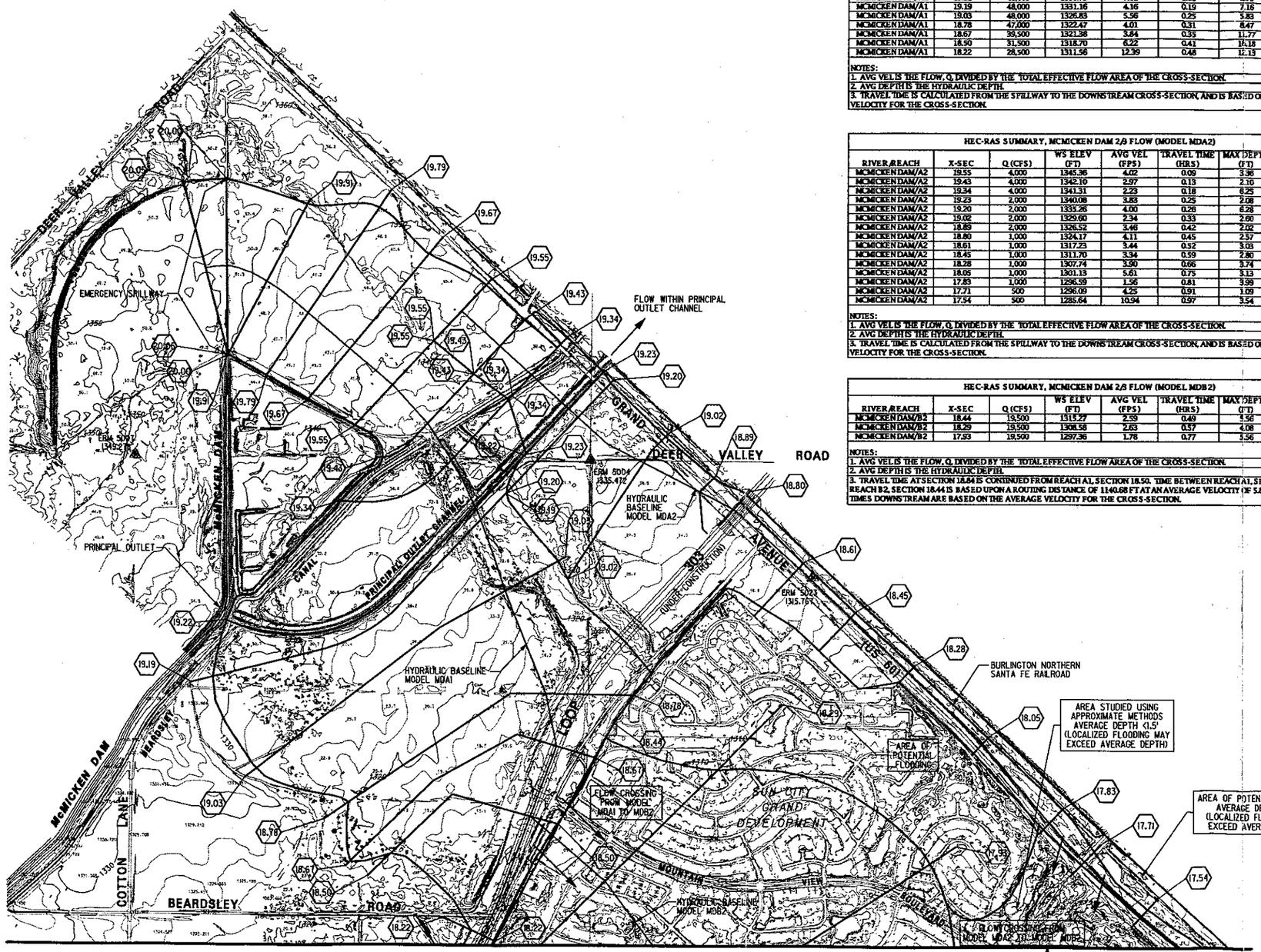
11/21/2001



MATCH LINE SEE SHEET 14

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDA1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A1	20.05	55,000	1350.69	3.37	0.00	8.69	7.95
MCMICKEN DAM/A1	20.00	55,000	1357.20	8.57	0.00	3.20	3.17
MCMICKEN DAM/A1	19.91	55,000	1353.09	6.92	0.02	5.29	4.04
MCMICKEN DAM/A1	19.79	55,000	1350.99	6.00	0.04	6.22	4.05
MCMICKEN DAM/A1	19.67	55,000	1347.50	7.80	0.07	6.02	4.58
MCMICKEN DAM/A1	19.55	51,000	1345.34	8.21	0.08	7.34	6.14
MCMICKEN DAM/A1	19.43	51,000	1340.92	11.04	0.12	7.75	5.92
MCMICKEN DAM/A1	19.34	51,000	1340.66	3.52	0.13	15.67	6.14
MCMICKEN DAM/A1	19.22	46,000	1338.79	7.11	0.18	2.79	1.56
MCMICKEN DAM/A1	19.19	48,000	1331.16	4.16	0.19	7.16	2.88
MCMICKEN DAM/A1	19.03	48,000	1326.83	5.56	0.25	5.83	2.13
MCMICKEN DAM/A1	18.78	47,000	1322.47	4.01	0.31	8.47	3.73
MCMICKEN DAM/A1	18.67	38,500	1321.38	3.84	0.35	11.77	3.95
MCMICKEN DAM/A1	18.50	31,500	1318.70	6.22	0.41	14.18	3.08
MCMICKEN DAM/A1	18.22	28,500	1311.56	12.39	0.48	12.13	7.97

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDA2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A2	19.55	4,000	1345.36	4.02	0.09	3.36	1.11
MCMICKEN DAM/A2	19.43	4,000	1342.10	2.97	0.13	2.10	1.58
MCMICKEN DAM/A2	19.34	4,000	1341.31	2.23	0.18	6.25	2.66
MCMICKEN DAM/A2	19.23	2,000	1340.08	3.83	0.25	2.08	0.42
MCMICKEN DAM/A2	19.20	2,000	1335.26	4.00	0.26	6.28	0.88
MCMICKEN DAM/A2	19.02	2,000	1329.60	2.34	0.33	2.60	0.71
MCMICKEN DAM/A2	18.89	2,000	1326.52	3.48	0.42	2.02	1.02
MCMICKEN DAM/A2	18.80	1,000	1324.17	4.11	0.45	2.57	0.89
MCMICKEN DAM/A2	18.61	1,000	1317.23	3.44	0.52	3.03	0.50
MCMICKEN DAM/A2	18.45	1,000	1311.70	3.34	0.59	2.80	0.67
MCMICKEN DAM/A2	18.28	1,000	1307.74	3.90	0.66	3.74	1.19
MCMICKEN DAM/A2	18.05	1,000	1301.13	5.61	0.75	3.13	0.97
MCMICKEN DAM/A2	17.83	1,000	1298.59	1.56	0.81	3.98	2.51
MCMICKEN DAM/A2	17.71	500	1296.09	4.25	0.91	1.09	0.56
MCMICKEN DAM/A2	17.54	500	1285.64	10.94	0.97	3.54	1.59

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	18.44	19,500	1315.27	2.59	0.49	5.56	3.17
MCMICKEN DAM/B2	18.29	19,500	1308.58	2.63	0.57	4.08	2.18
MCMICKEN DAM/B2	17.93	19,500	1297.36	1.78	0.77	5.56	2.72

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 18.84 IS CONTINUED FROM REACH A1, SECTION 18.50. TIME BETWEEN REACH A1, SECTION 18.50 AND REACH B2, SECTION 18.44 IS BASED UPON A ROUTING DISTANCE OF 1140.68 FT AT AN AVERAGE VELOCITY OF 5.84 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS (103 / 1293.85)
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

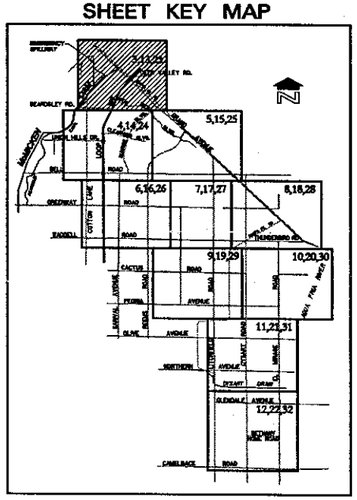
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
5004	1335.472	976121.969	550132.383
5007	1349.278	976165.781	544860.389
5023	1315.767	974773.215	552722.149

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

Hoskin Engineering Consultants, Inc.
325 West Roosevelt Street Suite 200 Phoenix, Arizona 85003-1356 Tel: (602) 252-4884 Fax: (602) 252-4885

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6223 North 24th Street Suite 208 Phoenix, Arizona 85016 Tel: (602) 954-0038 Fax: (602) 954-8602

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 13 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

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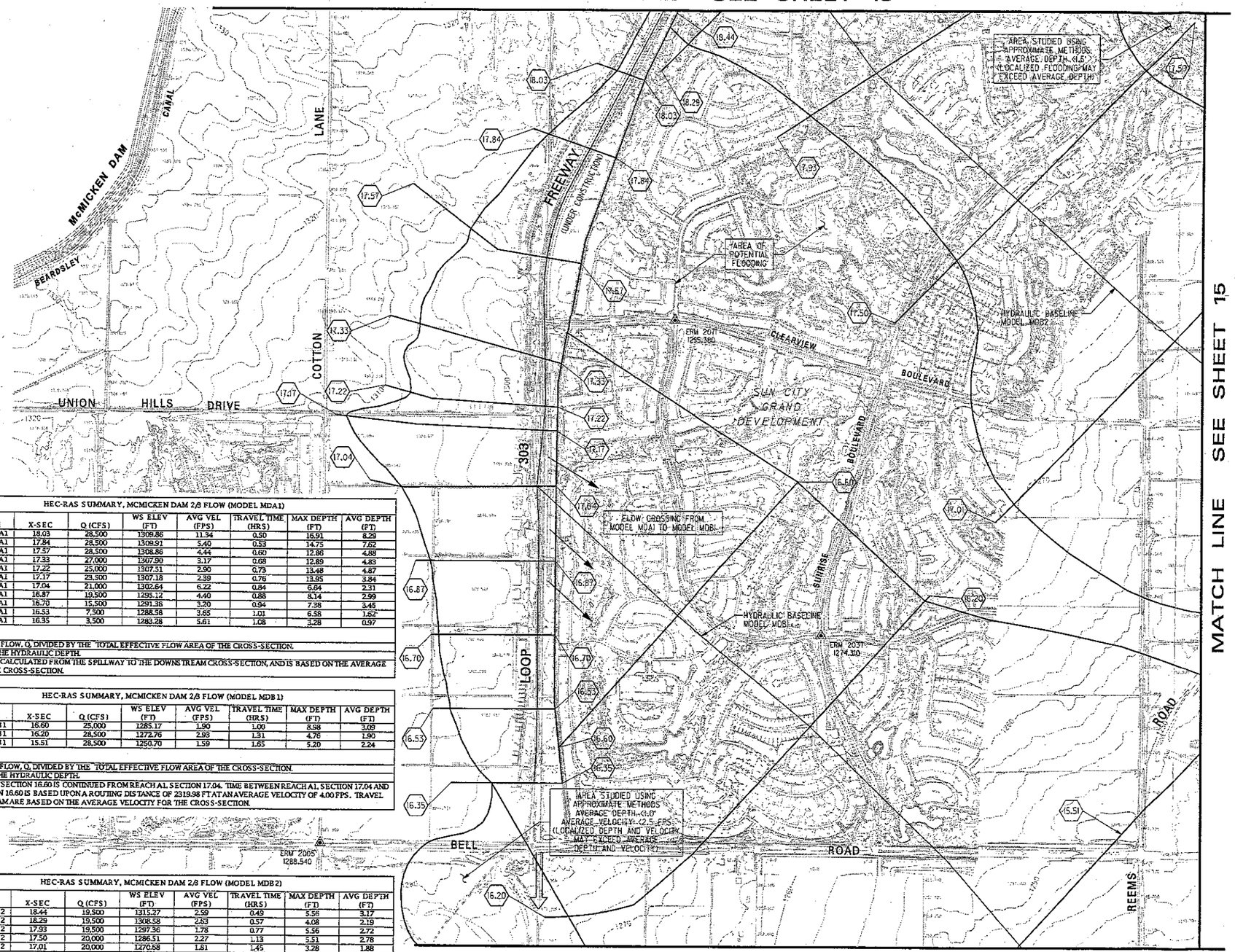
10/29/01

MATCH LINE SEE SHEET 13



MATCH LINE SEE SHEET 16

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A1	18.03	28,500	1309.86	11.34	0.50	16.91	8.29
MCMICKEN DAM/A1	17.84	28,500	1309.91	5.40	0.53	14.75	7.62
MCMICKEN DAM/A1	17.57	28,500	1308.86	4.44	0.60	12.86	4.88
MCMICKEN DAM/A1	17.33	27,000	1307.90	3.17	0.68	12.89	4.83
MCMICKEN DAM/A1	17.22	25,000	1307.51	2.90	0.73	13.48	4.87
MCMICKEN DAM/A1	17.17	23,500	1307.18	2.39	0.76	13.95	3.84
MCMICKEN DAM/A1	17.04	21,000	1302.64	6.22	0.84	6.64	2.31
MCMICKEN DAM/A1	16.87	19,500	1295.12	4.40	0.88	8.14	2.99
MCMICKEN DAM/A1	16.70	15,500	1291.38	3.20	0.94	7.38	3.45
MCMICKEN DAM/A1	16.53	7,500	1288.58	3.65	1.01	6.58	1.52
MCMICKEN DAM/A1	16.35	3,500	1283.28	5.61	1.08	3.28	0.97

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	16.60	25,000	1285.17	1.90	1.00	8.98	3.09
MCMICKEN DAM/B1	16.20	28,500	1272.76	2.93	1.31	4.76	1.90
MCMICKEN DAM/B1	15.51	28,500	1250.70	1.59	1.65	5.20	2.24

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 16.60 IS CONTINUED FROM REACH A1, SECTION 17.04. TIME BETWEEN REACH A1, SECTION 17.04 AND REACH B1, SECTION 16.60 IS BASED UPON A ROUTING DISTANCE OF 2319.98 FT AT AN AVERAGE VELOCITY OF 4.00 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	18.44	19,500	1315.27	2.59	0.49	5.56	3.17
MCMICKEN DAM/B2	18.29	19,500	1308.58	2.53	0.57	4.08	2.19
MCMICKEN DAM/B2	17.93	19,500	1297.36	1.78	0.77	5.56	2.72
MCMICKEN DAM/B2	17.50	20,000	1286.51	2.27	1.13	5.51	2.78
MCMICKEN DAM/B2	17.01	20,000	1270.68	1.81	1.45	3.28	1.88

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 18.44 IS CONTINUED FROM REACH A1, SECTION 18.50. TIME BETWEEN REACH A1, SECTION 18.50 AND REACH B1, SECTION 18.44 IS BASED UPON A ROUTING DISTANCE OF 1140.68 FT AT AN AVERAGE VELOCITY OF 5.84 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS (103 / 1293.85)
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

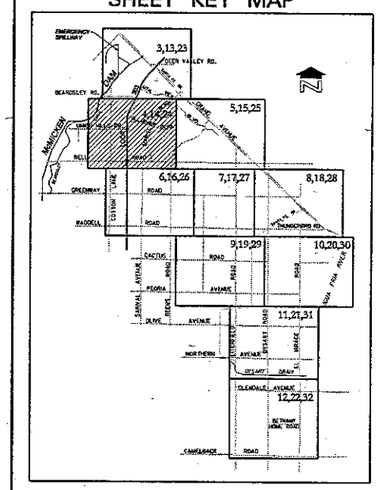
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
2005	1288.540	960361.450	544766.904
2037	1274.310	962907.044	550803.553
2071	1295.380	966749.391	549008.837

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE.

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street Suite 200 Phoenix, Arizona 85003-9166 Tel: (602) 252-8384 Fax: (602) 252-8385

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON Date Signed Arizona U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN Date Signed Arizona U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 14 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

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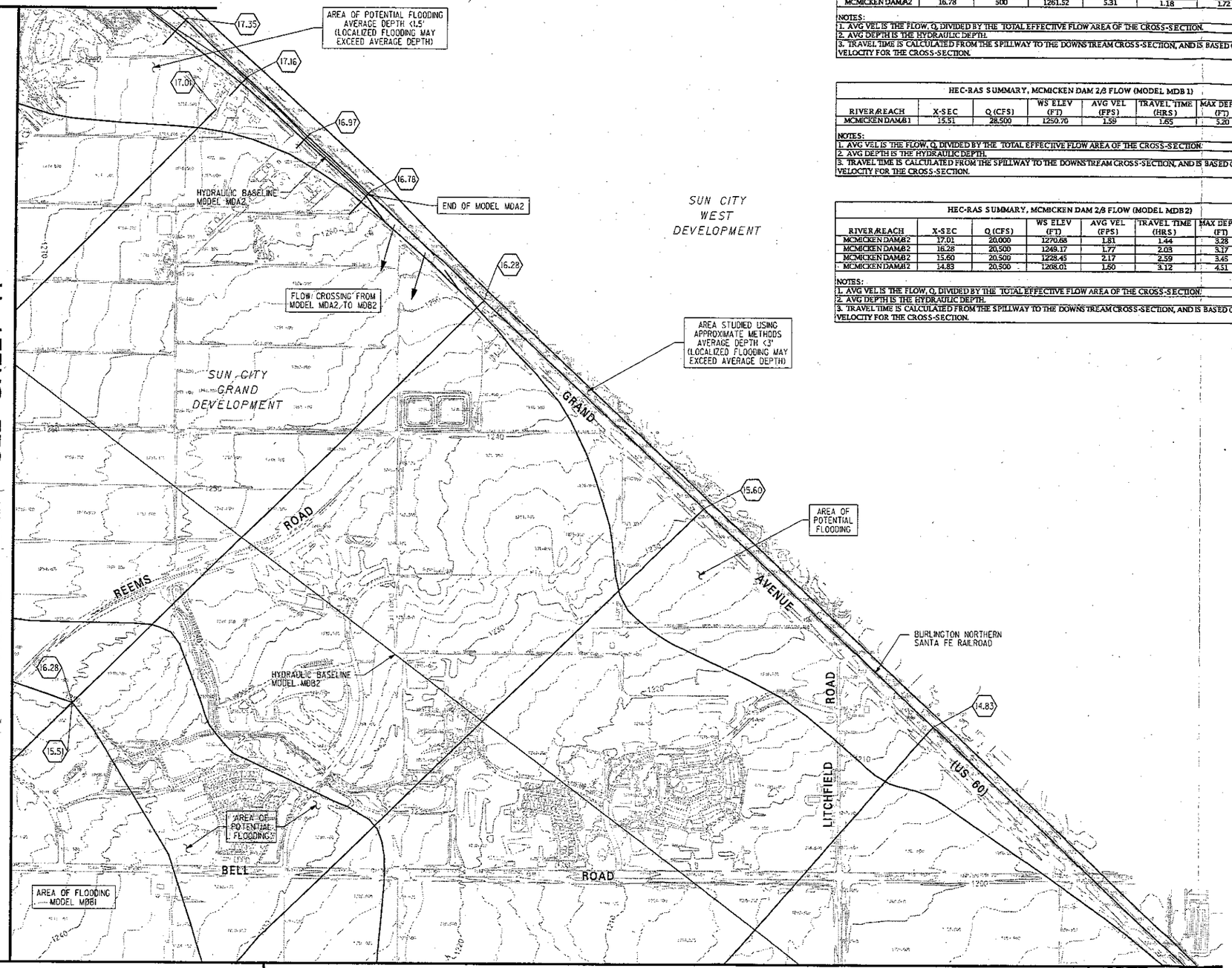
11/21/2001

MATCH LINE
SEE SHEET 13

MATCH LINE SEE SHEET 14



MATCH LINE
SEE SHEET 16

MATCH LINE SEE SHEET 17

MATCH SHEET 18

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDA2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A2	17.35	500	1278.46	4.53	1.00	2.46	0.59
MCMICKEN DAM/A2	17.16	500	1272.52	3.89	1.06	2.52	1.23
MCMICKEN DAM/A2	16.97	500	1267.70	5.41	1.13	2.00	1.17
MCMICKEN DAM/A2	16.78	500	1261.52	5.31	1.18	1.72	1.29

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	15.51	28,500	1250.70	1.59	1.65	5.20	2.24

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	17.01	20,000	1270.68	1.81	1.44	3.28	1.88
MCMICKEN DAM/B2	16.28	20,500	1249.17	1.77	2.03	3.17	2.21
MCMICKEN DAM/B2	15.60	20,500	1228.45	2.17	2.59	3.45	2.37
MCMICKEN DAM/B2	14.83	20,500	1208.01	1.50	3.12	4.51	2.29

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION — 19.87 — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS — 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

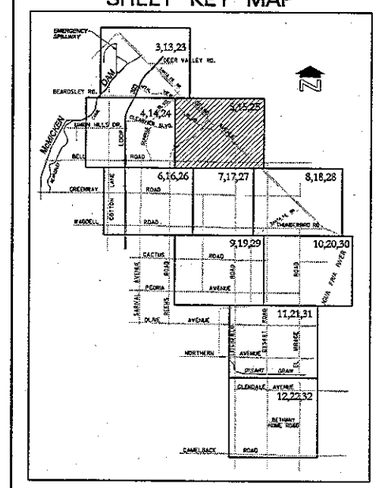
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 15 OF 32

CERTIFIED PROFESSIONAL ENGINEER CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

CERTIFIED PROFESSIONAL ENGINEER CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

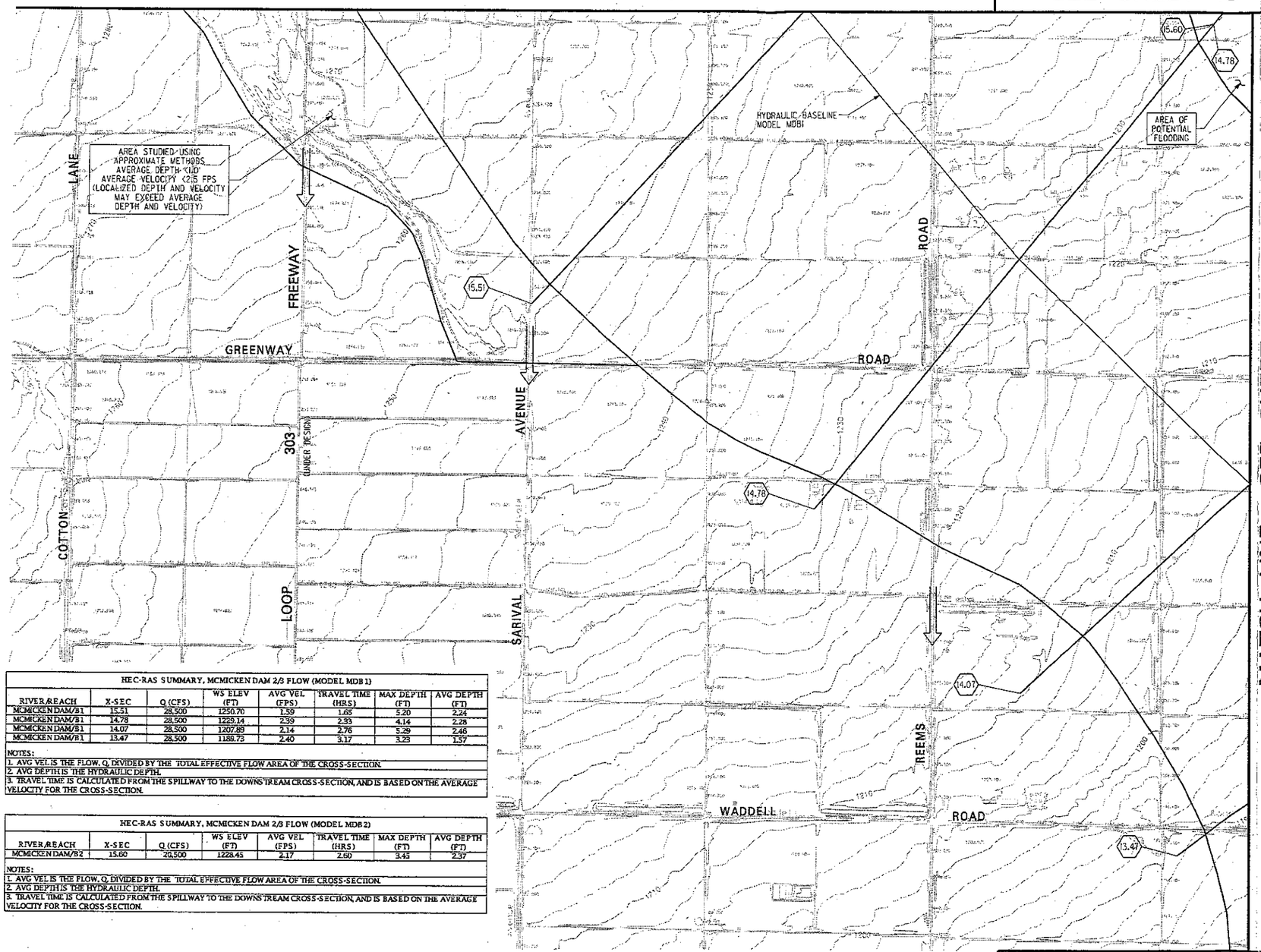
600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FFMC

G:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln600s15.dgn
11/21/2001

MATCH LINE SEE SHEET 14

MATCH LINE SEE SHEET 15



MATCH LINE SEE SHEET 19

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	15.51	28,500	1250.70	1.59	1.65	5.20	2.24
MCMICKEN DAM/B1	14.78	28,500	1229.14	2.39	2.33	4.14	2.28
MCMICKEN DAM/B1	14.07	28,500	1207.89	2.14	2.76	5.29	2.46
MCMICKEN DAM/B1	13.47	28,500	1189.73	2.40	3.17	3.23	1.57

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	15.60	20,500	1228.45	2.17	2.60	3.45	2.37

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

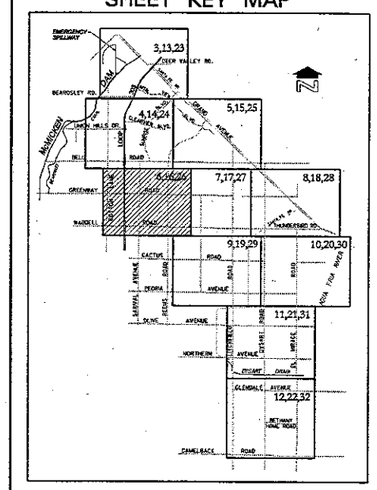
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street Suite 200 Phoenix, Arizona 85005-1156 Tel: (602) 252-8384 Fax: (602) 252-8385

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON Date Signed ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN Date Signed ARIZONA, U.S.A.

2/3 FLOW

SHEET 16 OF 32

SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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11/21/2001

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	14.07	28,500	1207.89	2.14	2.76	5.29	2.46
MCMICKEN DAM/B1	13.47	28,500	1189.73	2.40	3.17	3.23	1.57
MCMICKEN DAM/B1	12.83	29,000	1170.21	1.68	3.56	3.31	1.71

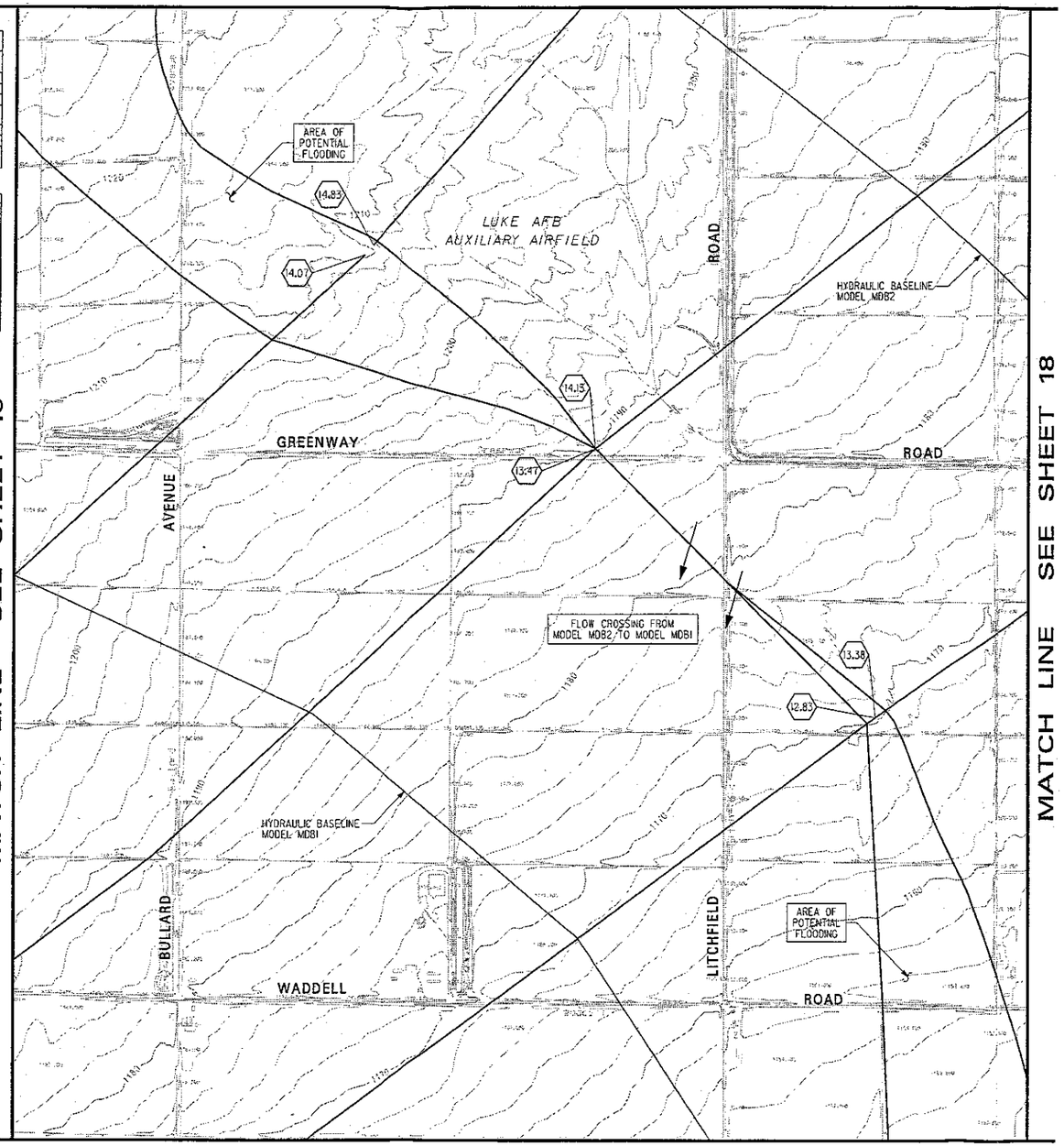
NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	14.83	20,500	1208.01	1.60	3.12	4.51	2.29
MCMICKEN DAM/B2	14.13	20,500	1190.43	1.72	3.76	3.83	1.81
MCMICKEN DAM/B2	13.38	20,000	1170.05	1.56	4.40	6.05	2.01

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

MATCH LINE SEE SHEET 15

MATCH LINE SEE SHEET 16



MATCH LINE SEE SHEET 18

MATCH LINE SEE SHEET 19

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS (103 / 1293.85)

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

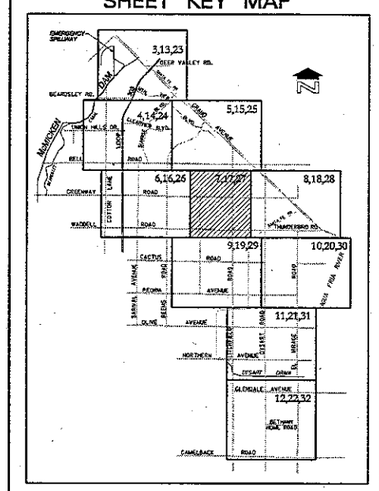
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON Date Signed ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN Date Signed ARIZONA, U.S.A.

2/3 FLOW

SHEET 17 OF 32

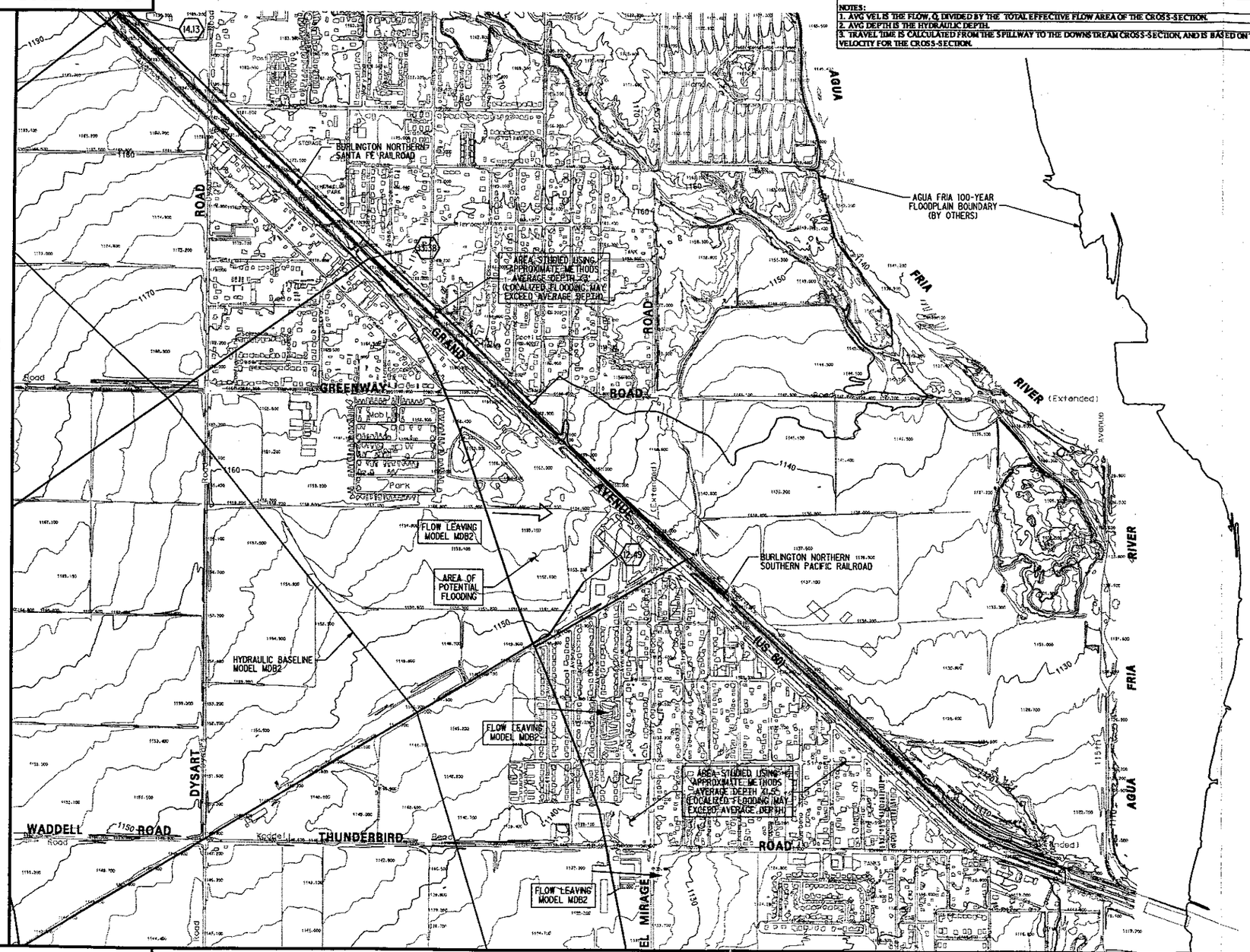
600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

G:\Filedir\99\900008 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln803s17.dgn
11/21/2001

MATCH LINE
SEE SHEET 15

MATCH LINE SEE SHEET 17



MATCH LINE
SEE SHEET 19

MATCH LINE SEE SHEET 20

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	14.13	20,500	1190.43	1.72	3.75	3.83	1.81
MCMICKEN DAM/B2	13.38	20,000	1170.05	1.56	4.40	4.05	2.01
MCMICKEN DAM/B2	12.49	20,000	1149.92	1.50	5.23	3.62	1.92

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION — 19.87 — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS — 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

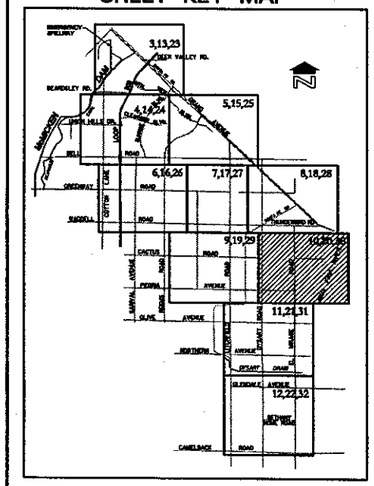
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
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Hoskin Engineering Consultants, Inc.
525 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-4156, Tel: (602) 252-4984, Fax: (602) 252-8905

DFI Engineering & Architecture, L.L.C.
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15379 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 18 OF 32

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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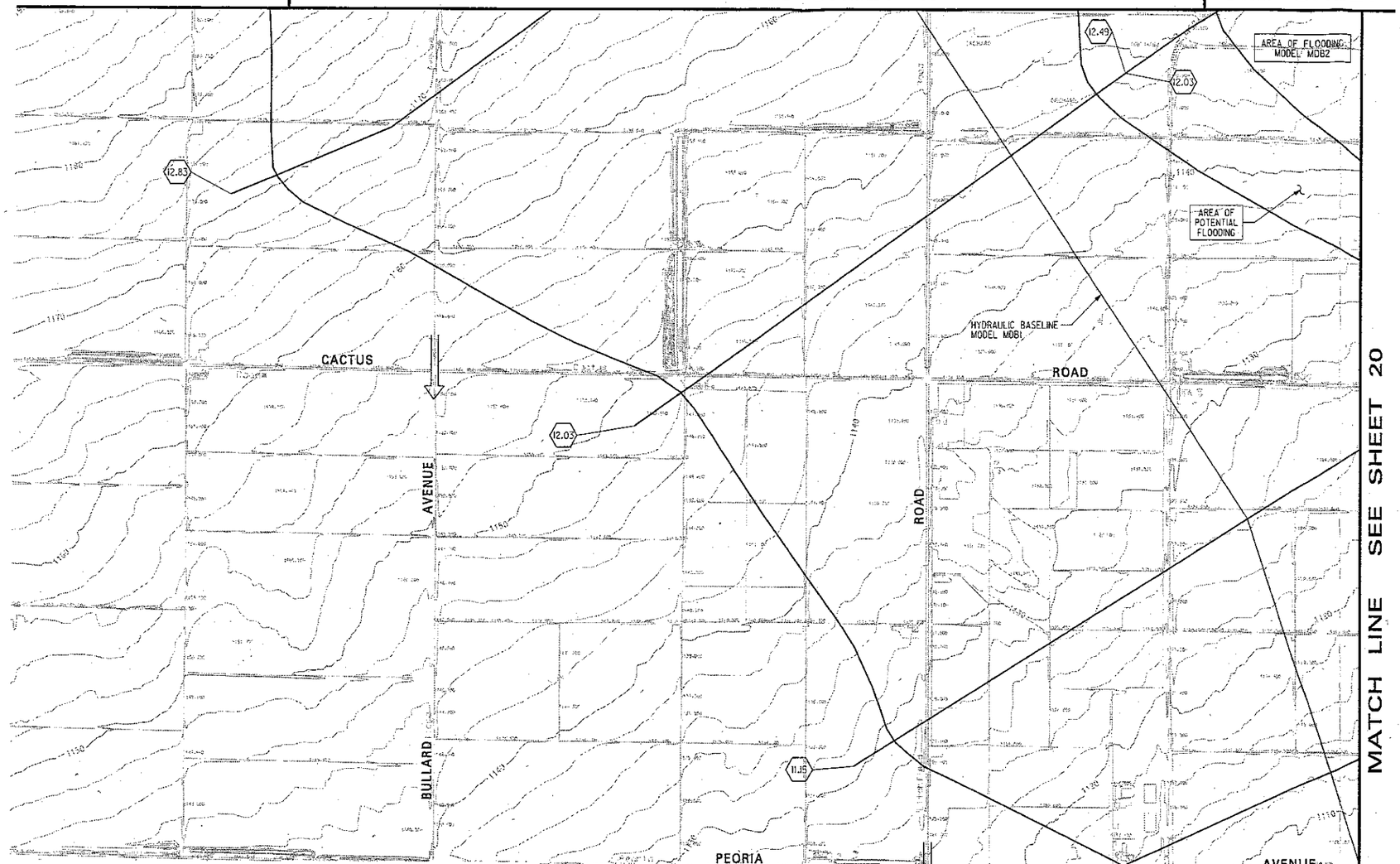
10/23/01

MATCH LINE SEE SHEET 16

MATCH LINE SEE SHEET 17

MATCH LINE SEE SHEET 18



MATCH LINE SEE SHEET 20

MATCH LINE SEE SHEET 21

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB 1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	12.83	29,000	1170.21	1.68	3.56	3.31	1.71
MCMICKEN DAM/B1	12.03	29,000	1147.81	2.62	4.26	3.11	2.10
MCMICKEN DAM/B1	11.15	29,000	1128.71	1.66	4.75	5.01	2.32
MCMICKEN DAM/B1	10.61	29,000	1115.74	3.15	5.23	3.74	2.29

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB 2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	12.49	20,000	1149.92	1.50	5.24	3.62	1.92

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

N

600' 0' 600' 1200'

SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87 — CROSS-SECTION DESIGNATION)

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS (103 / 1293.85)

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

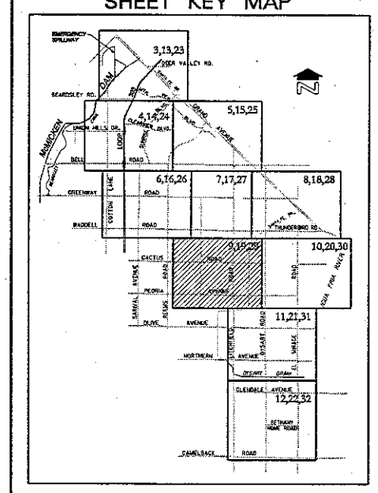
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 19 OF 32

AERIAL MAPPING BY: PROVIDED BY FCDMC

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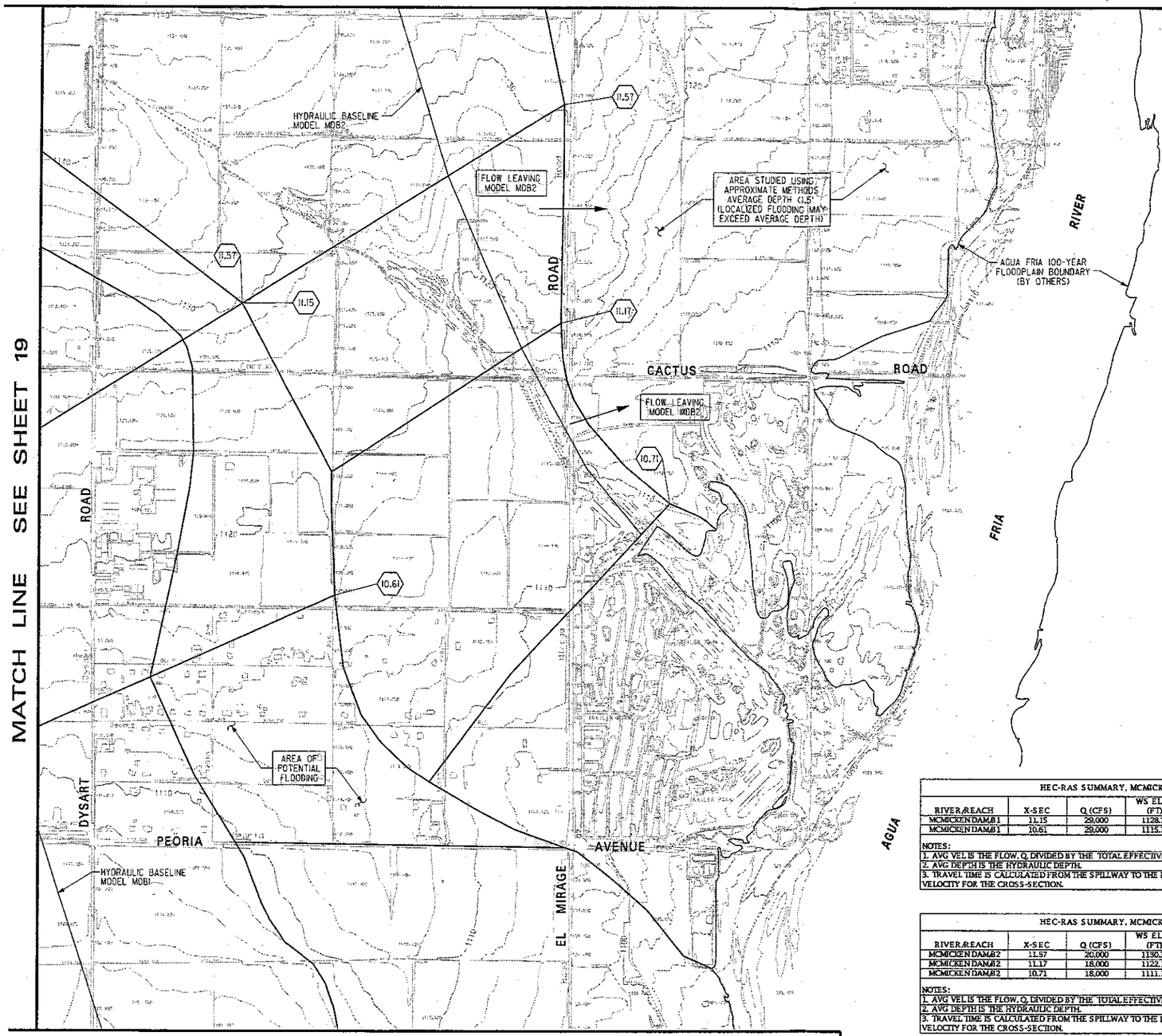
(11/21/2001)

MATCH LINE SEE SHEET 18



MATCH LINE SEE SHEET 19

MATCH LINE SEE SHEET 21

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	11.15	29,000	1128.71	1.66	4.74	5.01	2.32
MCMICKEN DAM/B1	10.61	29,000	1115.74	3.15	5.23	3.74	2.29

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB2)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B2	11.57	20,000	1130.33	1.80	6.13	6.33	2.73
MCMICKEN DAM/B2	11.17	18,000	1122.18	1.96	6.45	8.18	3.04
MCMICKEN DAM/B2	10.71	18,000	1111.19	2.23	6.80	5.19	3.10

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

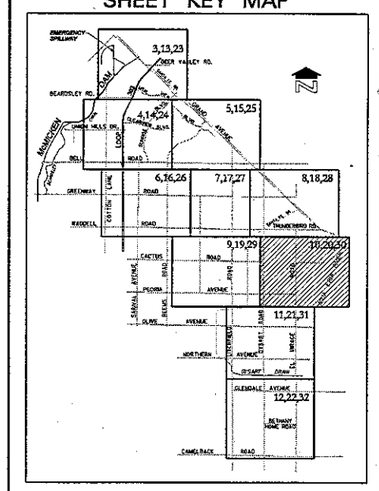
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10+000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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323 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-1156, Tel: (602) 252-8984, Fax: (602) 252-8585

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 20 OF 32

AERIAL MAPPING BY: PROVIDED BY FCDMC

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11/21/2001

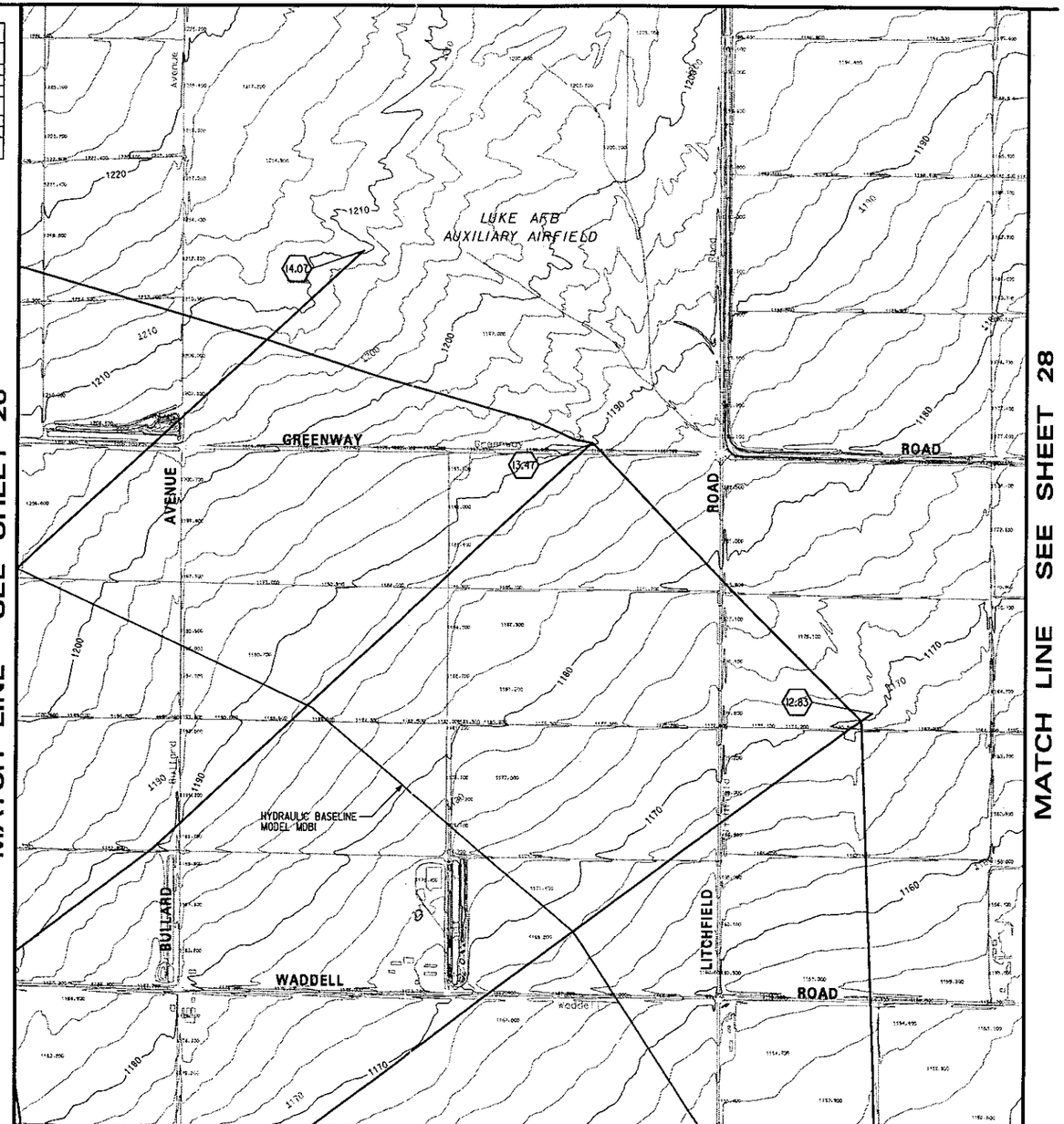
HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM,B1	14.07	23,000	1207.57	1.98	3.04	4.97	2.28
MCMICKEN DAM,B1	13.47	23,000	1189.47	2.31	3.48	2.97	1.40
MCMICKEN DAM,B1	12.83	23,000	1169.97	1.54	3.89	3.07	1.58

NOTES:

1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

MATCH LINE SEE SHEET 25

MATCH LINE SEE SHEET 26



MATCH LINE SEE SHEET 28

MATCH LINE SEE SHEET 29

600' 0' 600' 1200'

SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS (103 / 1293.85)

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

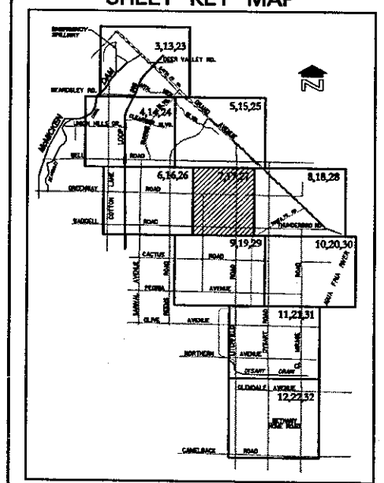
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

1/3 FLOW

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

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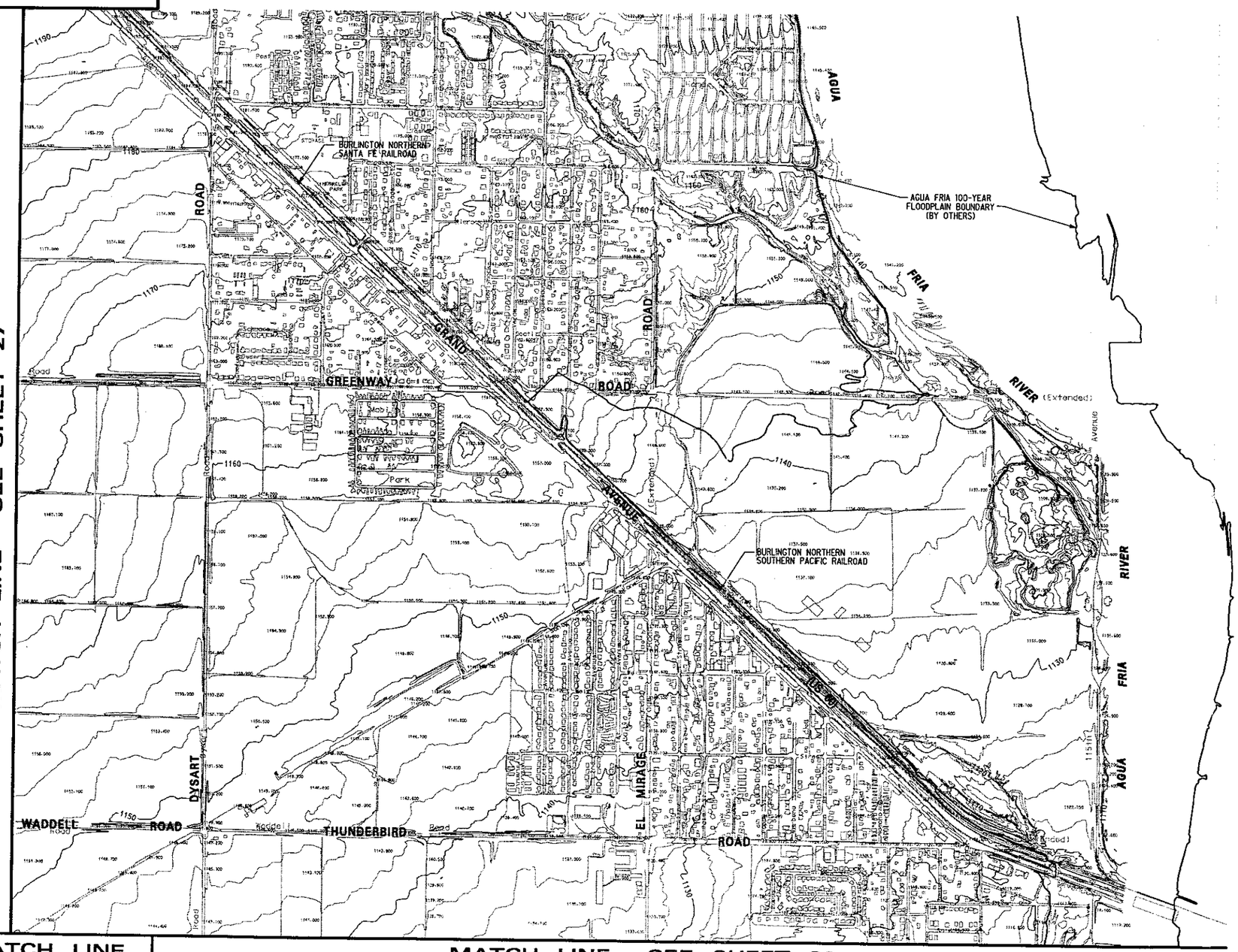
10/23/01

MATCH LINE
SEE SHEET 25

MATCH LINE
SEE SHEET 27



MATCH LINE
SEE SHEET 29

MATCH LINE SEE SHEET 30

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

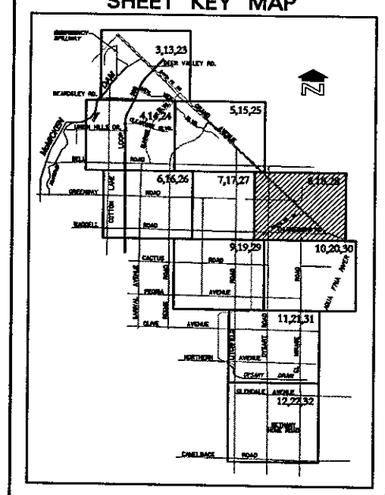
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Fax: (602) 954-8609

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 28 OF 32

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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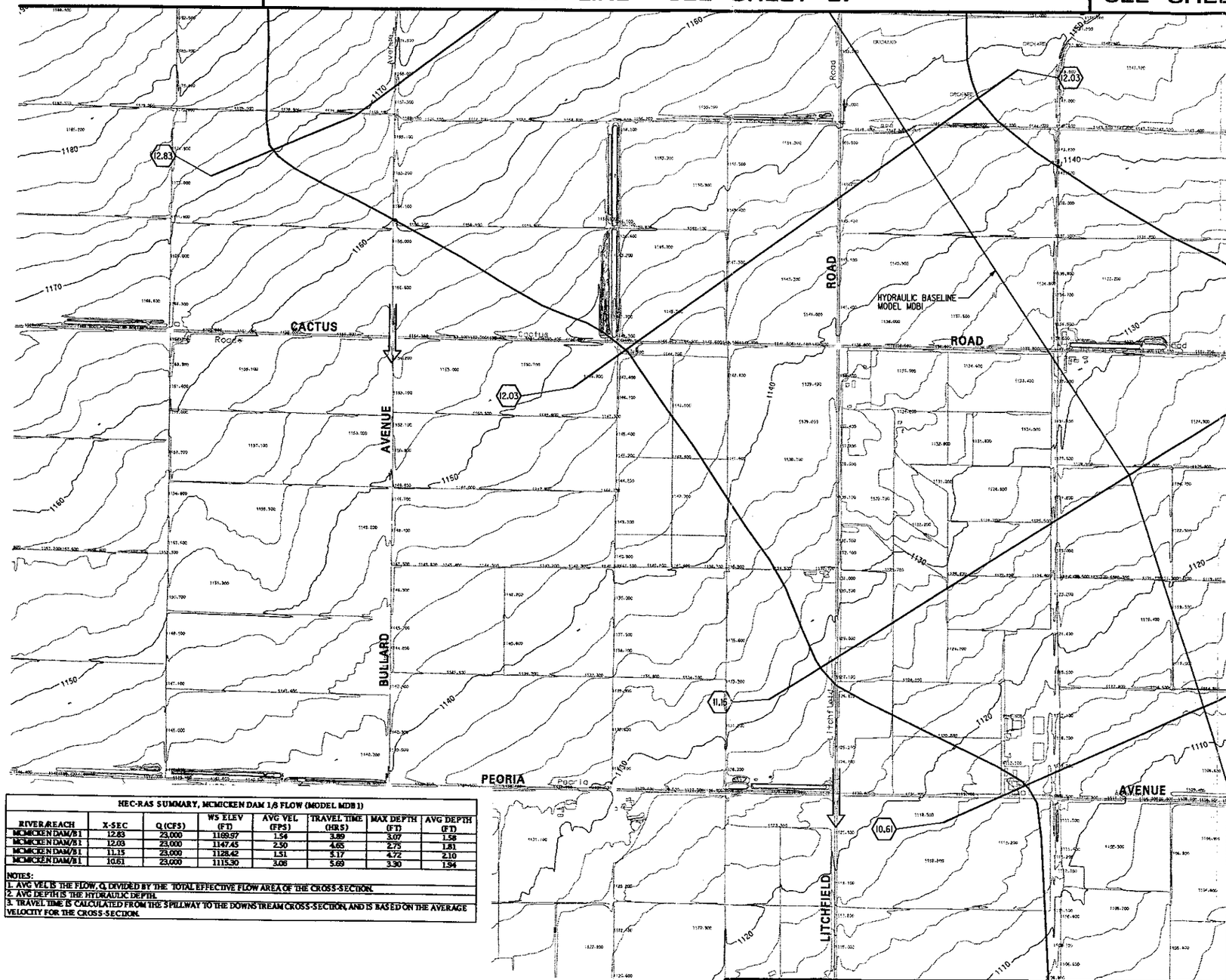
10/23/01

MATCH LINE SEE SHEET 26

MATCH LINE SEE SHEET 27

MATCH LINE SEE SHEET 28



MATCH LINE SEE SHEET 30

MATCH LINE SEE SHEET 31

HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	12.83	23,000	1169.97	1.54	3.89	3.07	1.58
MCMICKEN DAM/B1	12.03	23,000	1147.45	2.50	4.65	2.75	1.81
MCMICKEN DAM/B1	11.15	23,000	1128.42	1.51	5.17	4.72	2.10
MCMICKEN DAM/B1	10.61	23,000	1115.30	3.06	5.69	3.30	1.94

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARKON ARIZONA, U.S.A.

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS 103 1293.85
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

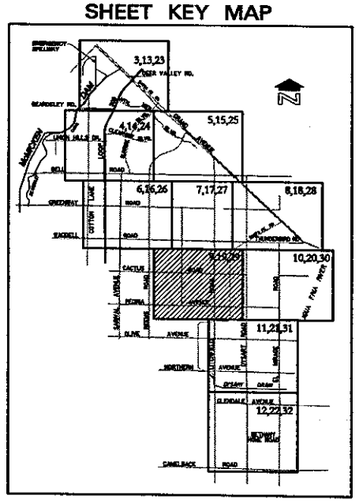
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10+000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 29 OF 32

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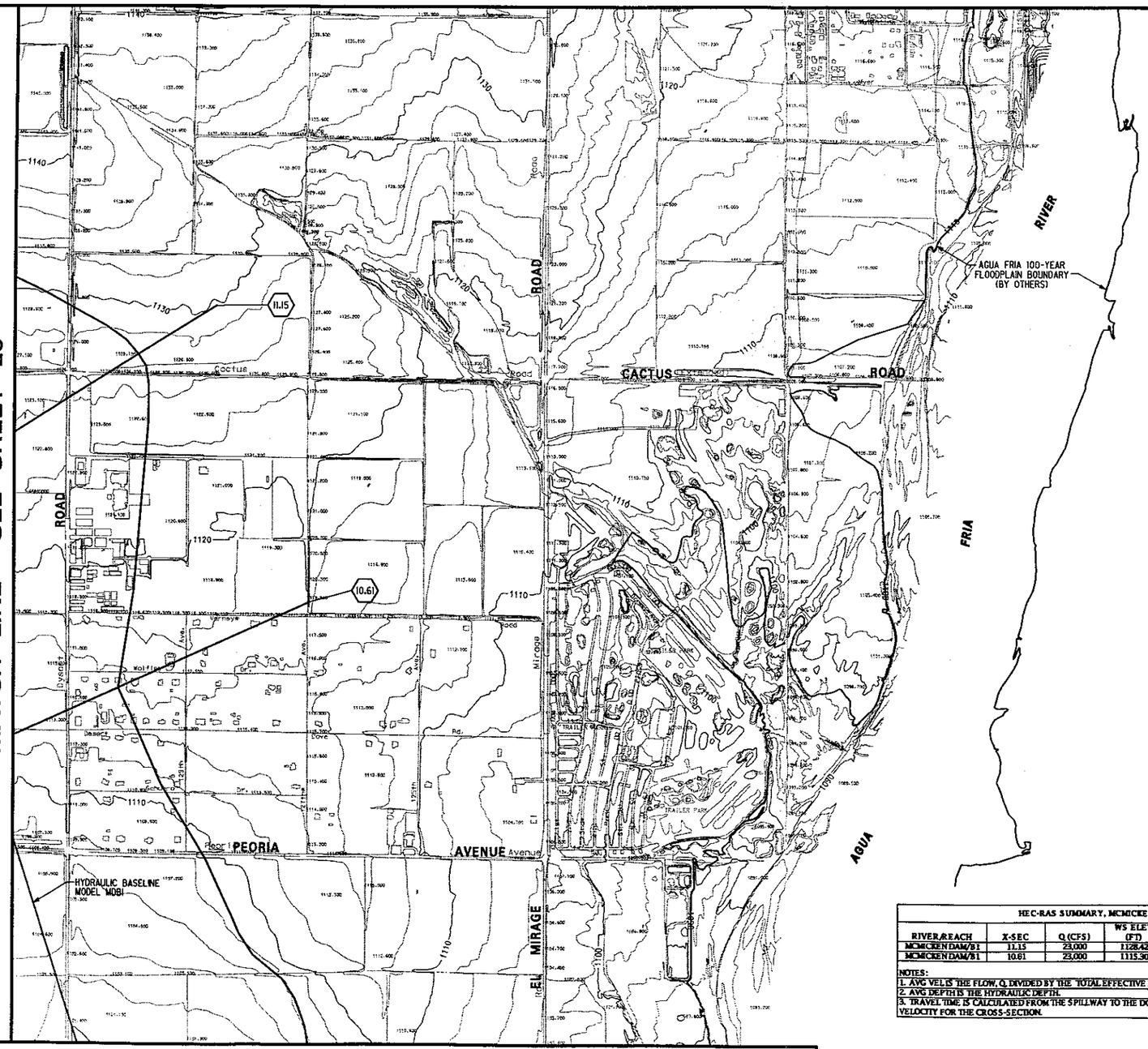
10/23/01

MATCH LINE SEE SHEET 28

MATCH LINE SEE SHEET 29



MATCH LINE SEE SHEET 31

HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	11.15	23,000	1128.42	1.51	5.17	4.72	2.10
MCMICKEN DAM/B1	10.61	23,000	1115.30	3.08	5.69	3.30	1.94

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

N

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

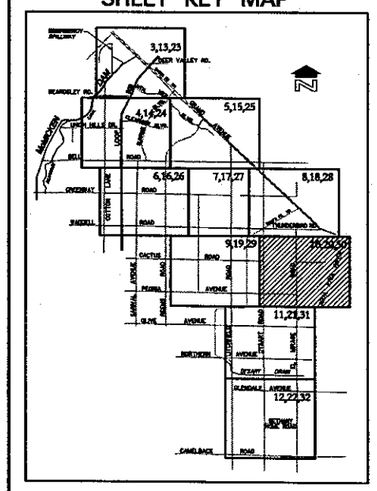
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10+000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

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	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 30 OF 32

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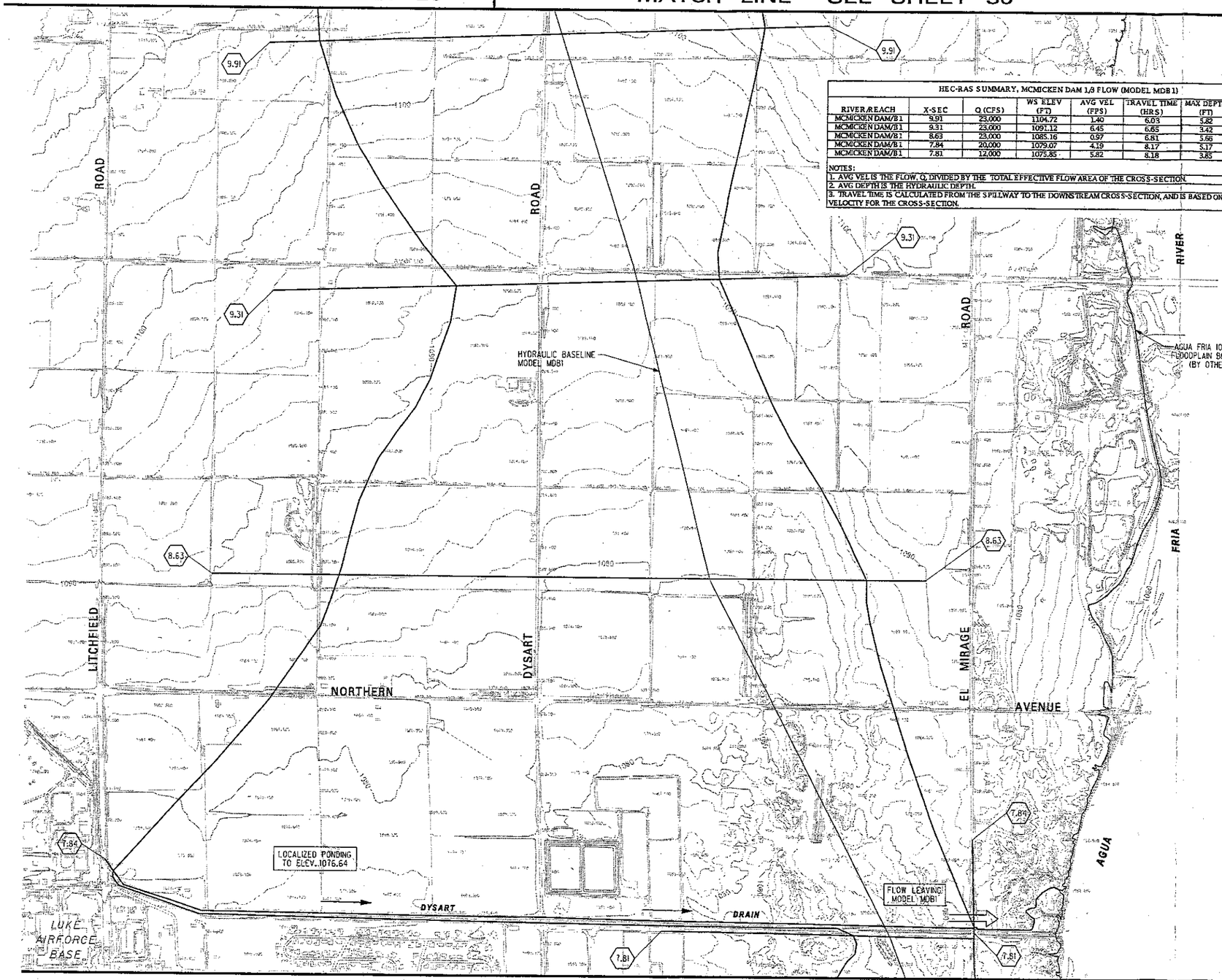
10/23/01

MATCH LINE SEE SHEET 29 | MATCH LINE SEE SHEET 30



MATCH LINE SEE SHEET 32

HEC-RAS SUMMARY, MCMICKEN DAM 1/8 FLOW (MODEL MDB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	9.91	23,000	1104.72	1.40	6.03	5.82	3.05
MCMICKEN DAM/B1	9.31	23,000	1091.12	6.45	6.65	3.42	1.26
MCMICKEN DAM/B1	8.63	23,000	1085.16	0.97	6.81	5.66	3.74
MCMICKEN DAM/B1	7.84	20,000	1079.07	4.19	8.17	5.17	2.51
MCMICKEN DAM/B1	7.81	12,000	1079.85	5.82	8.18	3.85	1.90

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

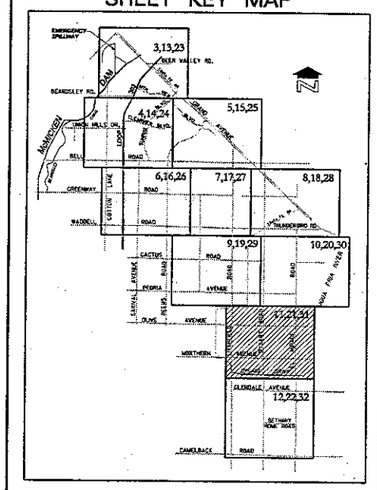
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1 - THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
328 West Roosevelt Street Suite 200 Phoenix, Arizona 85003-1726 Tel: (602) 252-8584 Fax: (602) 252-8585

DEI Professional Services, LLC
6225 North 24th Street Suite 200 Phoenix, Arizona 85016 Tel: (602) 954-6018 Fax: (602) 954-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 31 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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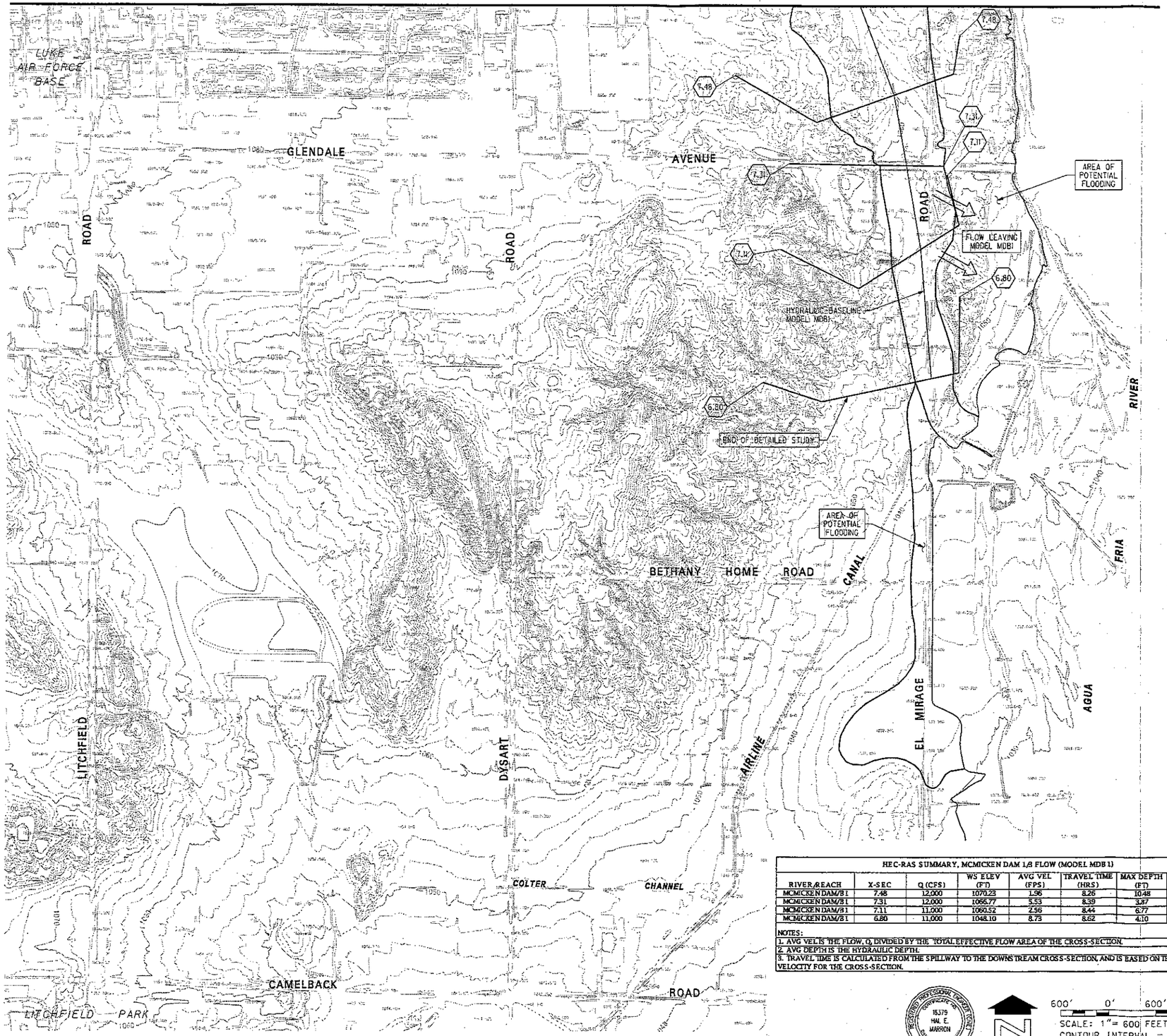
11/21/2001

MATCH LINE SEE SHEET 31



HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB 1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	7.48	12,000	1070.23	1.96	8.26	10.48	5.44
MCMICKEN DAM/B1	7.31	12,000	1066.77	5.53	8.39	3.87	2.13
MCMICKEN DAM/B1	7.11	11,000	1060.52	2.56	8.44	6.77	4.69
MCMICKEN DAM/B1	6.80	11,000	1048.10	8.73	8.62	4.10	2.54

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15379 HAL E. MARRON ARIZONA, U.S.A.

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

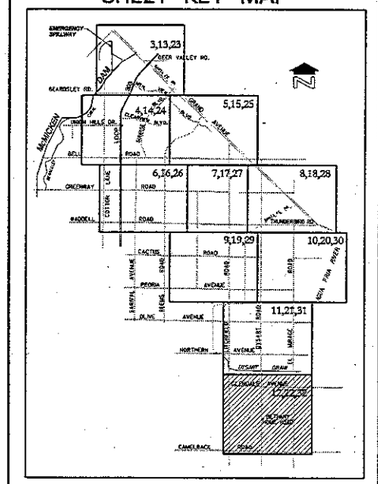
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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1			

Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street Suite 200 Phoenix, Arizona 85003-1555 Tel: (602) 252-8384 Fax: (602) 252-8385

DEI Professional Services LLC
6223 North 24th Street Suite 200 Phoenix, Arizona 85016 Tel: (602) 954-0038 Fax: (602) 944-8665

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

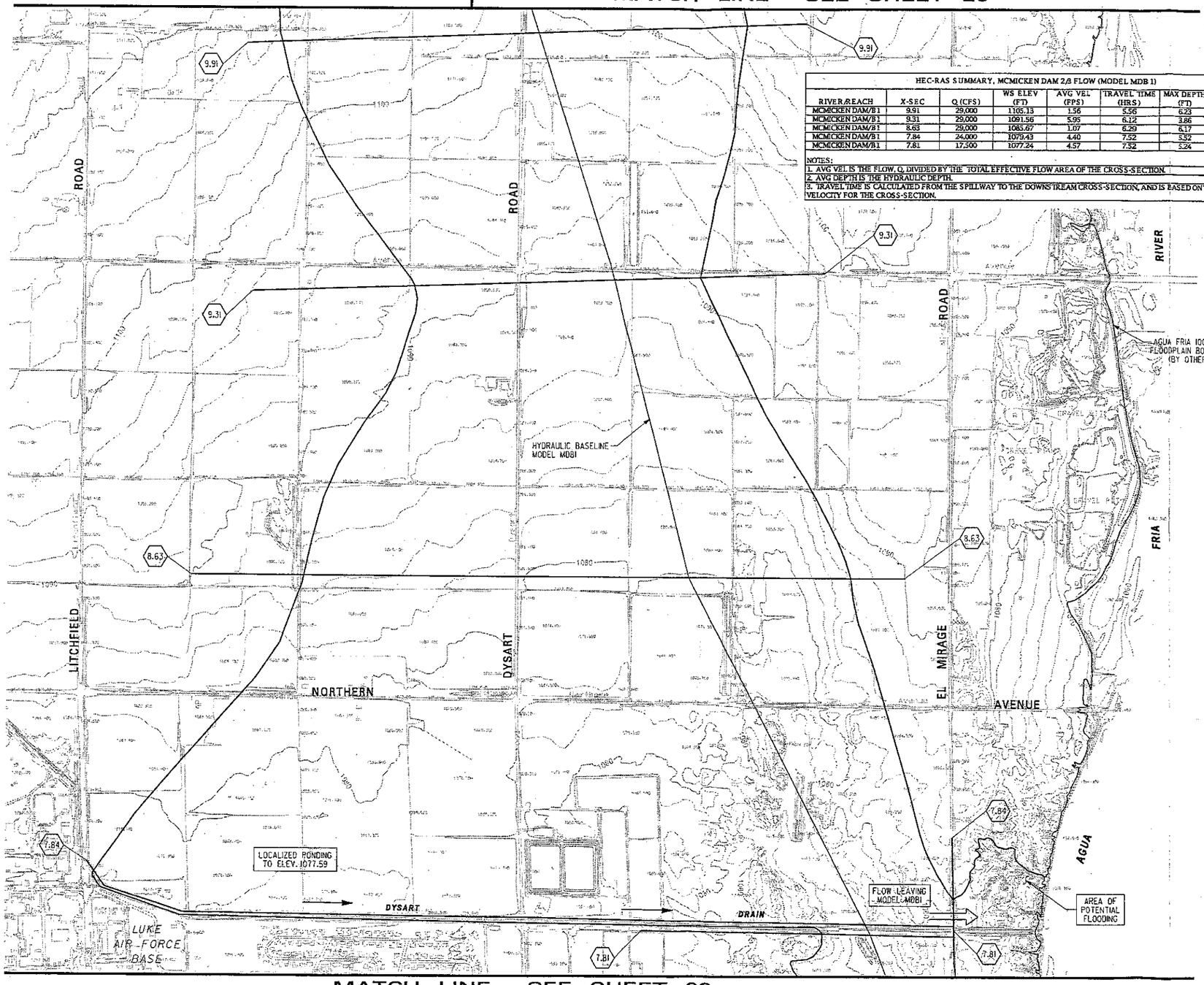
	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 32 OF 32

G:\Filedir\99\990006 - Spillway Inundation Studies\03-McMicken Dam\planset dgns\pln600s32.dgn
11/21/2001

MATCH LINE SEE SHEET 19 | MATCH LINE SEE SHEET 20



MATCH LINE SEE SHEET 22

HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB 1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	9.91	29,000	1105.13	1.56	5.56	6.23	3.39
MCMICKEN DAM/B1	9.31	29,000	1091.56	5.95	6.12	3.86	1.53
MCMICKEN DAM/B1	8.63	29,000	1085.67	1.07	6.29	6.17	4.15
MCMICKEN DAM/B1	7.84	24,000	1079.43	4.40	7.52	5.52	2.78
MCMICKEN DAM/B1	7.81	17,500	1077.24	4.57	7.52	5.24	2.66

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

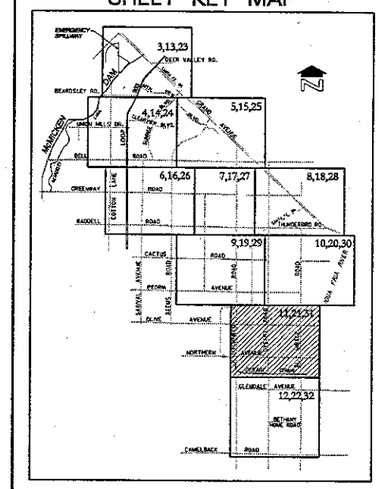
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10+000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
325 West Roosevelt Street Suite 200 Phoenix, Arizona 85003-1536 Tel: (602) 252-6584 Fax: (602) 252-8585

DEI Professional Services, LLC
6325 North 24th Street Suite 200 Phoenix, Arizona 85016 Tel: (602) 954-0038 Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON State Expiration ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN State Expiration ARIZONA, U.S.A.

2/3 FLOW

SHEET 21 OF 32

600' 0' 600' 1200'
SCALE: 1"= 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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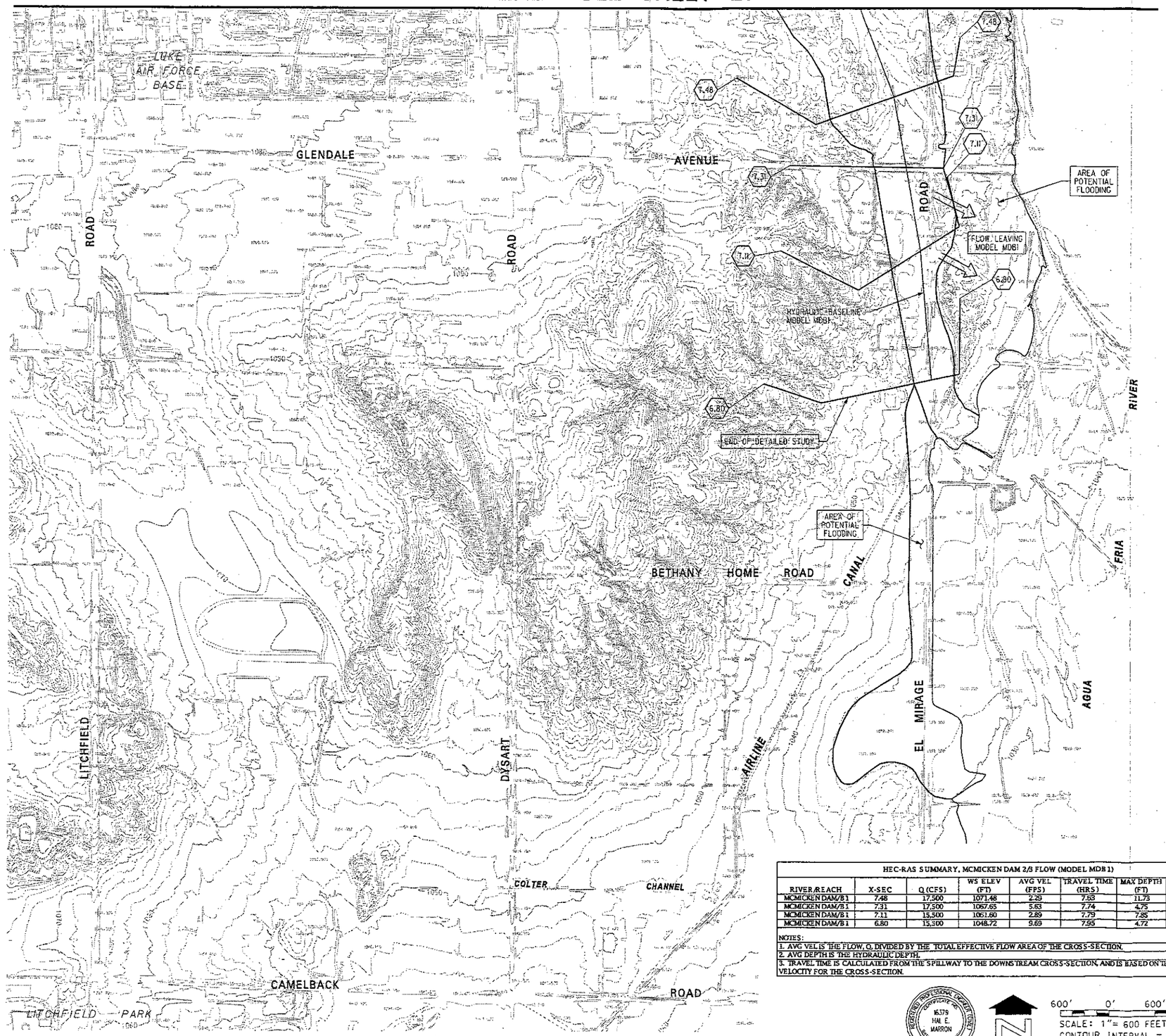
11/21/2001

MATCH LINE SEE SHEET 21



HEC-RAS SUMMARY, MCMICKEN DAM 2/3 FLOW (MODEL MDB 1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	7.48	17,500	1071.48	2.29	7.63	11.73	5.90
MCMICKEN DAM/B1	7.31	17,500	1067.65	5.63	7.74	4.75	2.77
MCMICKEN DAM/B1	7.11	15,500	1061.60	2.89	7.79	7.85	4.93
MCMICKEN DAM/B1	6.80	15,500	1048.72	9.69	7.95	4.72	2.88

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULAIED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRION ARIZONA, U.S.A.

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASELINE
CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
100-YEAR FLOODPLAIN BOUNDARY
ELEVATION REFERENCE MARKS 103 1293.85
FLOW DIRECTION ARROW
POTENTIAL FLOW LEAVING FLOODPLAIN

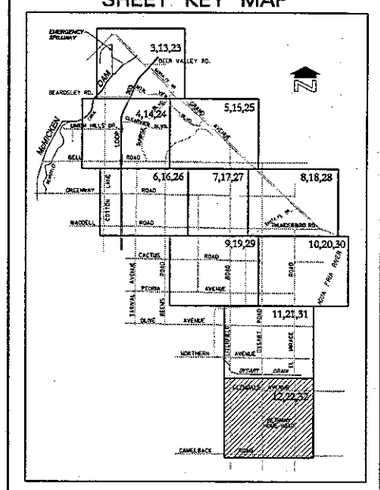
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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HEC creative engineering solutions
Hoskin Engineering Consultants, Inc.
528 West Roosevelt Street, Suite 200, Phoenix, Arizona 85003-1196, Tel: (602) 252-8384, Fax: (602) 252-8585

DEI Professional Services LLC
6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16990 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

2/3 FLOW

SHEET 22 OF 32

AERIAL MAPPING BY: PROVIDED BY FCDMC

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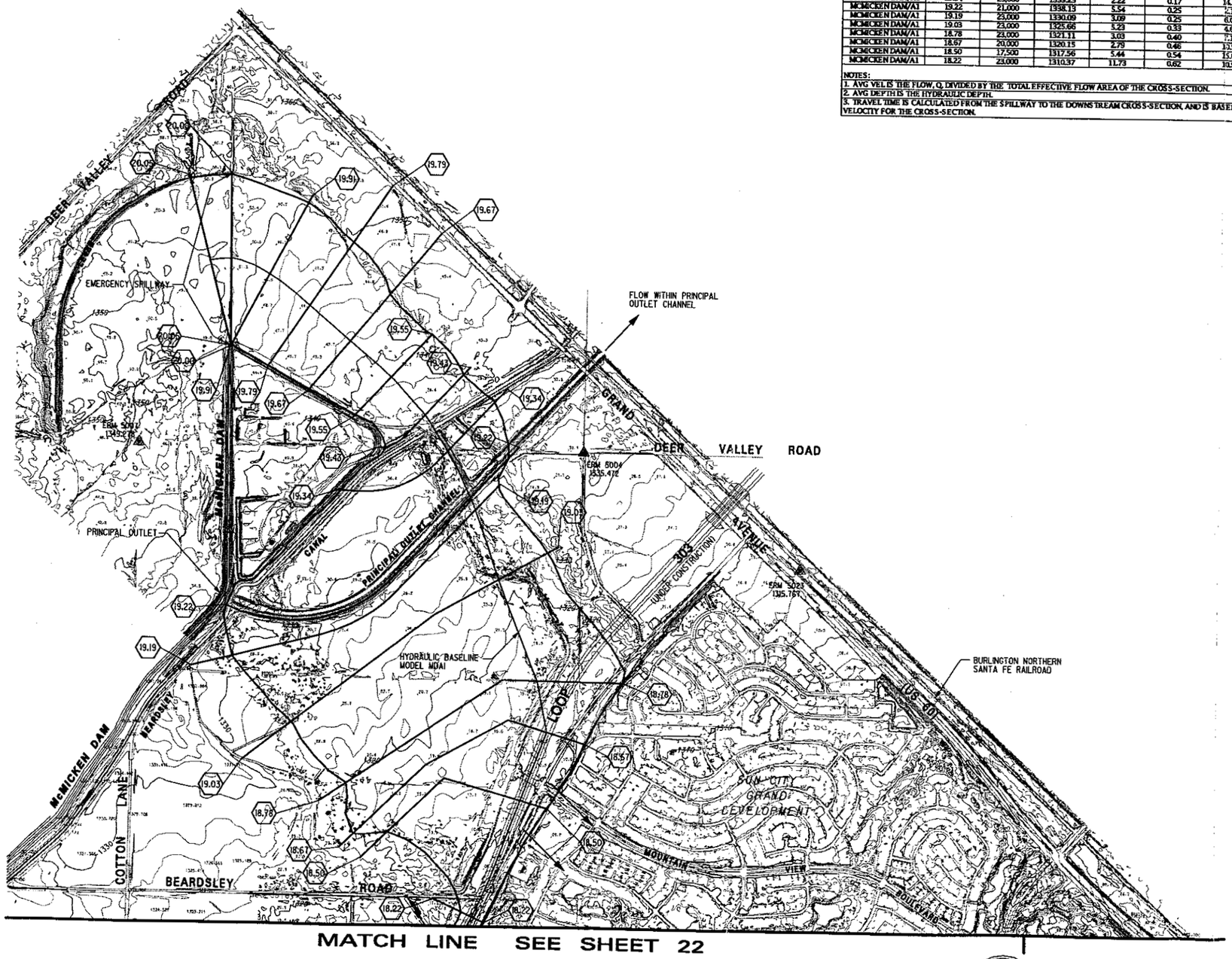
11/21/2001



MATCH LINE SEE SHEET 22

HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDA1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A1	20.05	25,000	1356.85	1.99	0.00	0.85	0.18
MCMICKEN DAM/A1	20.00	25,000	1356.03	6.15	0.00	2.05	2.02
MCMICKEN DAM/A1	19.91	25,000	1351.95	5.45	0.02	3.55	2.40
MCMICKEN DAM/A1	19.79	25,000	1349.05	4.73	0.05	4.26	2.98
MCMICKEN DAM/A1	19.67	25,000	1345.58	6.12	0.09	4.08	2.76
MCMICKEN DAM/A1	19.55	25,000	1343.21	4.68	0.12	5.21	4.02
MCMICKEN DAM/A1	19.43	25,000	1338.87	9.80	0.16	5.70	3.01
MCMICKEN DAM/A1	19.34	25,000	1339.23	2.22	0.17	14.24	5.21
MCMICKEN DAM/A1	19.22	21,000	1338.13	5.54	0.25	4.13	0.94
MCMICKEN DAM/A1	19.19	23,000	1330.09	3.09	0.25	6.09	2.02
MCMICKEN DAM/A1	19.03	23,000	1325.66	5.23	0.33	4.66	1.62
MCMICKEN DAM/A1	18.78	23,000	1321.11	3.03	0.40	7.11	2.52
MCMICKEN DAM/A1	18.67	20,000	1320.15	2.79	0.46	13.54	2.92
MCMICKEN DAM/A1	18.50	17,500	1317.56	5.44	0.54	15.04	2.04
MCMICKEN DAM/A1	18.22	23,000	1310.37	11.73	0.62	10.94	7.00

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

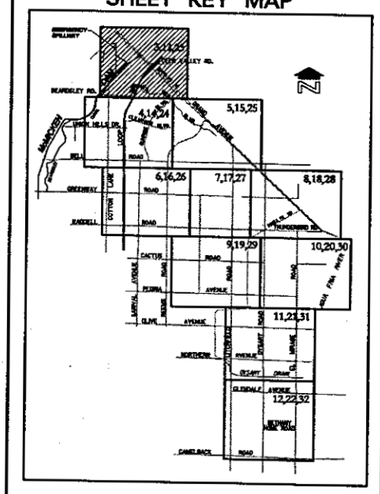
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
5004	1335.472	976121.969	550132.383
5007	1349.278	976165.781	544860.389
5023	1315.767	974773.215	552722.149

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
325 West Roosevelt Street, Suite 200, Phoenix, Arizona 85003-1186, Tel: (602) 252-8984, Fax: (602) 252-8385

DFI Services LLC
6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0038, Fax: (602) 944-3693

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15379 HAL E. MARRON ARIZONA U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 23 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

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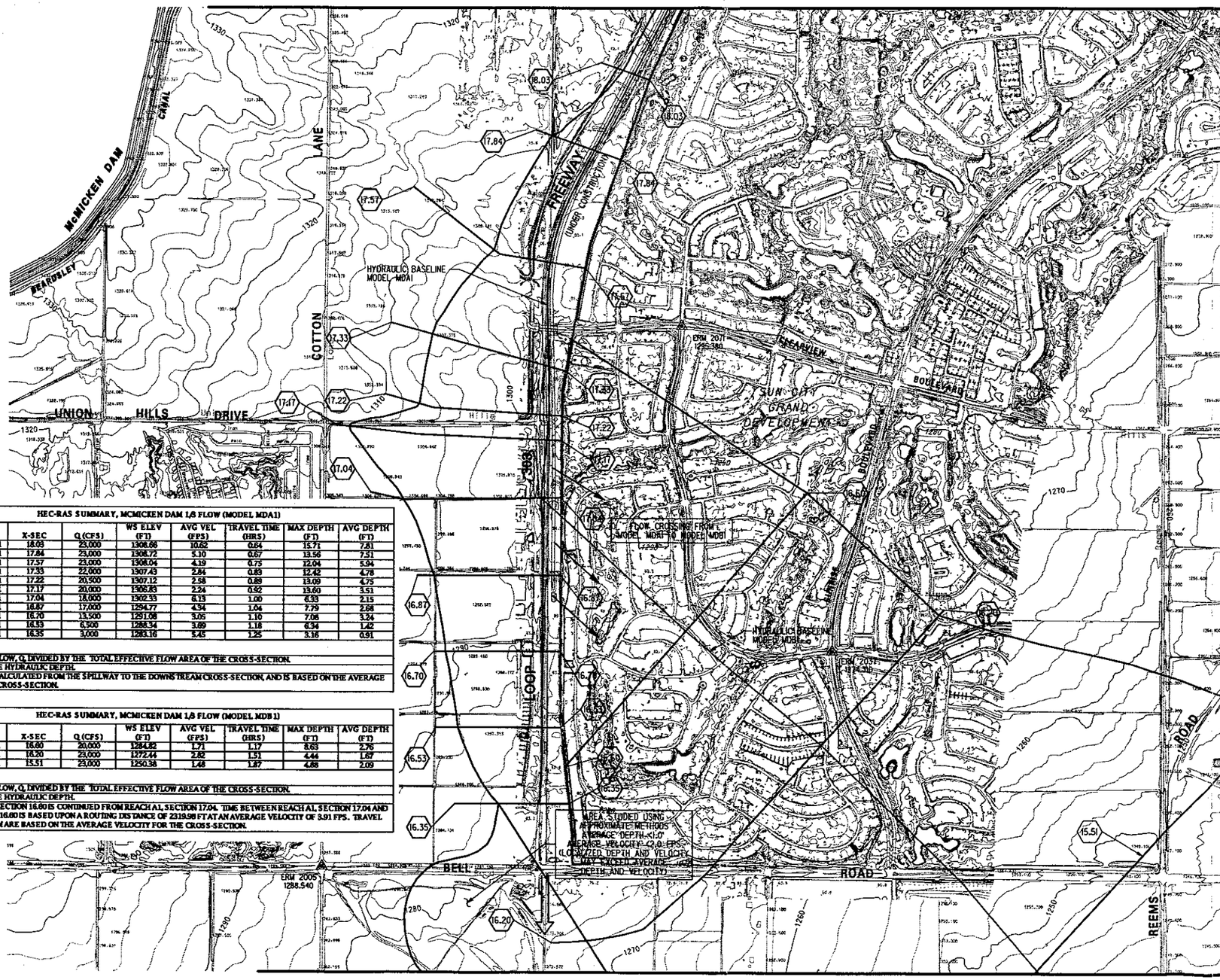
10/23/01

MATCH LINE SEE SHEET 23



MATCH LINE SEE SHEET 25

MATCH LINE SEE SHEET 26

HEC-RAS SUMMARY, MCMICKEN DAM 1/8 FLOW (MODEL MDA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/A1	18.03	23,000	1308.68	10.82	0.64	15.71	7.81
MCMICKEN DAM/A1	17.84	23,000	1308.72	5.10	0.67	13.56	7.51
MCMICKEN DAM/A1	17.57	23,000	1308.04	4.19	0.75	12.04	5.94
MCMICKEN DAM/A1	17.33	22,000	1307.43	2.84	0.88	12.42	4.78
MCMICKEN DAM/A1	17.22	20,500	1307.12	2.58	0.89	13.09	4.75
MCMICKEN DAM/A1	17.17	20,000	1306.83	2.24	0.92	13.60	3.51
MCMICKEN DAM/A1	17.04	18,000	1302.33	6.13	1.00	6.33	2.15
MCMICKEN DAM/A1	16.87	17,000	1294.77	4.34	1.04	7.79	2.68
MCMICKEN DAM/A1	16.70	13,500	1291.08	3.05	1.16	7.08	3.24
MCMICKEN DAM/A1	16.53	6,500	1288.34	3.89	1.18	6.34	1.42
MCMICKEN DAM/A1	16.35	3,000	1283.16	5.45	1.25	3.16	0.91

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, MCMICKEN DAM 1/8 FLOW (MODEL MDB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	16.60	20,000	1284.82	1.71	1.17	8.63	2.76
MCMICKEN DAM/B1	16.20	23,000	1272.44	2.82	1.51	4.44	1.67
MCMICKEN DAM/B1	15.51	23,000	1250.38	1.48	1.87	4.88	2.09

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 16.60 IS CONTINUED FROM REACH A1, SECTION 17.04. TIME BETWEEN REACH A1, SECTION 17.04 AND REACH B1, SECTION 16.60 IS BASED UPON A ROUTING DISTANCE OF 2319.98 FT AT AN AVERAGE VELOCITY OF 3.91 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

- SPILLWAY FLOW FLOODPLAIN BOUNDARY
- HYDRAULIC BASELINE
- CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION
- 100-YEAR FLOODPLAIN BOUNDARY
- ELEVATION REFERENCE MARKS 103 1293.85
- FLOW DIRECTION ARROW
- POTENTIAL FLOW LEAVING FLOODPLAIN

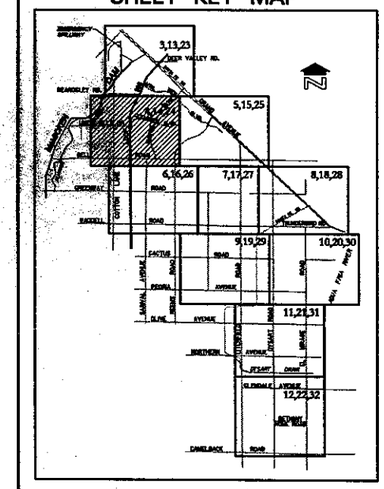
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
2005	1288.540	960361.450	544766.904
2037	1274.310	962907.044	550803.553
2071	1295.380	966749.391	549008.837

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
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Hoskin Engineering Consultants, Inc.
325 West Roosevelt Street, Suite 200, Phoenix, Arizona 85005-1156, Tel: (602) 252-4594, Fax: (602) 252-8385

DEI Development Earthwork LLC
6225 North 24th Street, Suite 200, Phoenix, Arizona 85016, Tel: (602) 954-0058, Fax: (602) 944-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

1/3 FLOW

SHEET 24 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

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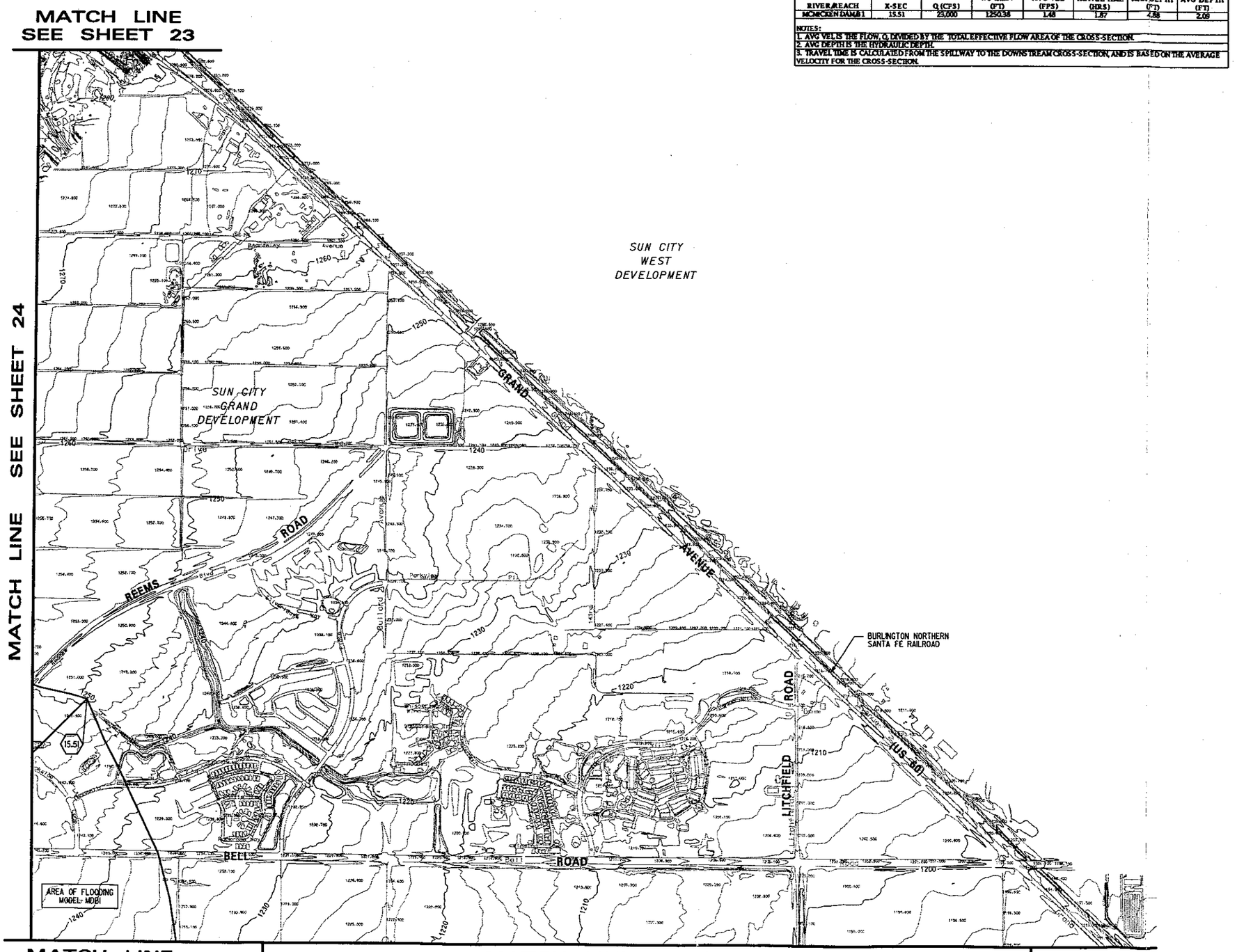
10/23/01

HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	15.51	23,000	1250.38	1.48	1.87	4.88	2.09

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

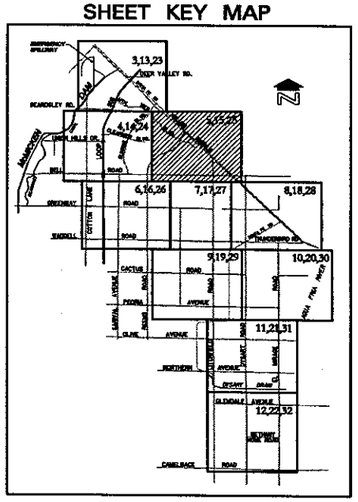
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
525 West Roosevelt Street
Suite 200
Phoenix, Arizona 85005-7136
Tel: (602) 252-8884
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DEI Services, LLC
6225 North 24th Street
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Fax: (602) 954-8605

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM
SPILLWAY DELINEATION STUDY
F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARRON ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA, U.S.A.

	BY	DATE
DESIGN	K. VAN METER	9-10-1
DESIGN CHK.	P. W. R. HOSKIN	9-10-1
PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 25 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: KENNEY AERIAL MAPPING, INC. AND PROVIDED BY FCDMC

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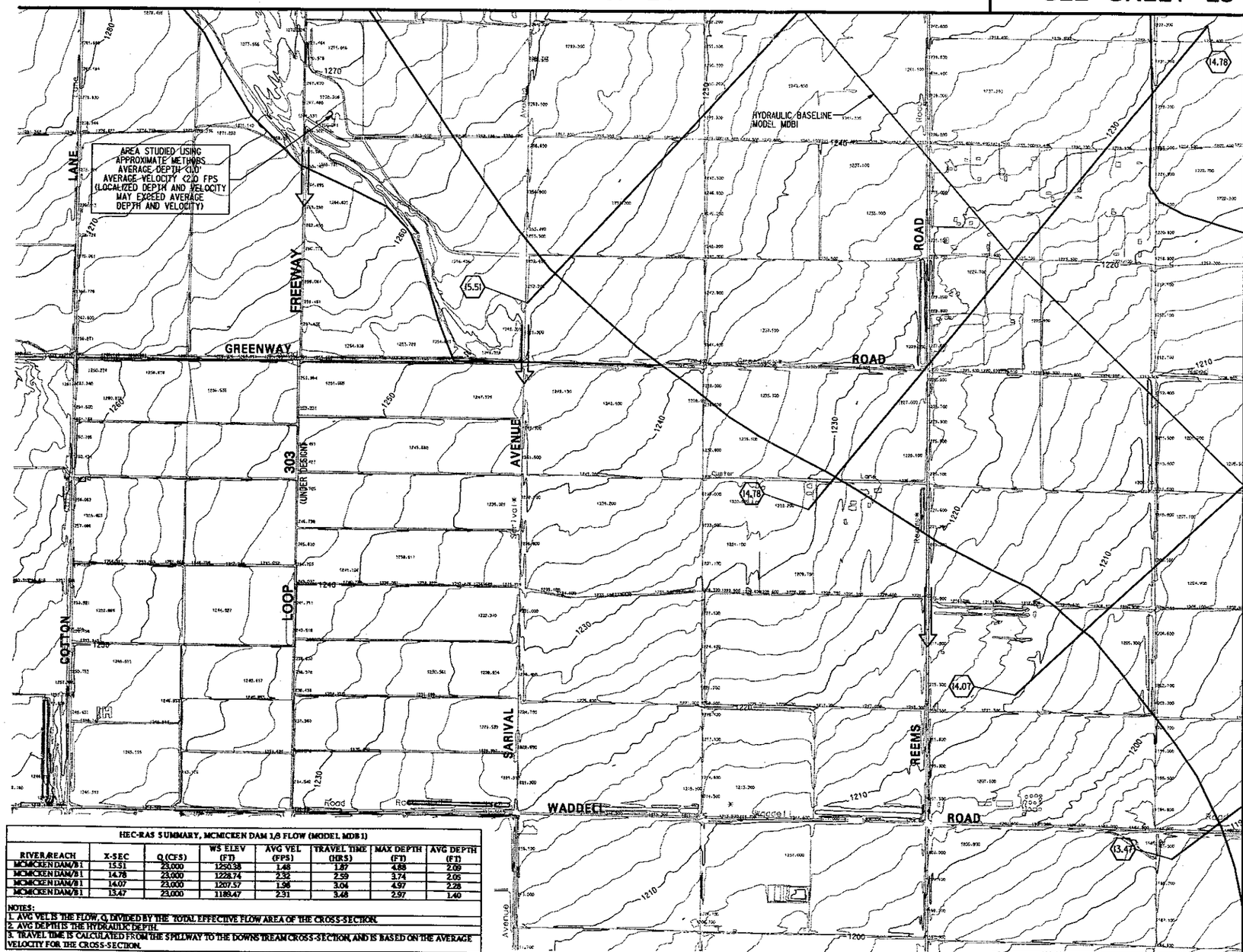
10/23/01

MATCH LINE SEE SHEET 24

MATCH LINE SEE SHEET 25



MATCH LINE SEE SHEET 27

MATCH LINE SEE SHEET 29

HEC-RAS SUMMARY, MCMICKEN DAM 1/3 FLOW (MODEL MDB1)							
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
MCMICKEN DAM/B1	15.51	23,000	1250.38	1.48	1.87	4.88	2.09
MCMICKEN DAM/B1	14.78	23,000	1228.74	2.32	2.59	3.74	2.05
MCMICKEN DAM/B1	14.07	23,000	1207.57	1.98	3.04	4.97	2.28
MCMICKEN DAM/B1	13.47	23,000	1189.47	2.31	3.48	2.97	1.40

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASELINE

CROSS-SECTION (19.87) — CROSS-SECTION DESIGNATION

100-YEAR FLOODPLAIN BOUNDARY

ELEVATION REFERENCE MARKS 103 1293.85

FLOW DIRECTION ARROW

POTENTIAL FLOW LEAVING FLOODPLAIN

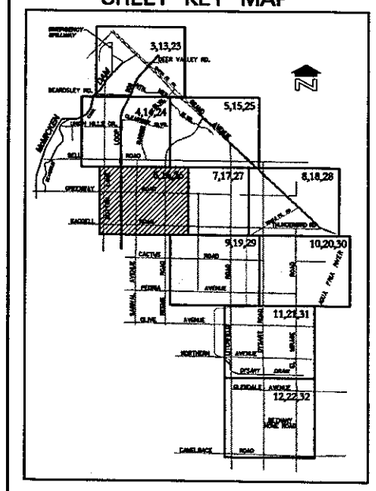
ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS-SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

McMICKEN DAM

SPILLWAY DELINEATION STUDY

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PLANS	J. C. CLEVER	9-10-1
PLANS CHK.	P. W. R. HOSKIN	9-10-1

1/3 FLOW

SHEET 26 OF 32

600' 0' 600' 1200'
SCALE: 1" = 600 FEET
CONTOUR INTERVAL = 2 FEET

AERIAL MAPPING BY: PROVIDED BY FCDMC

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10/23/01