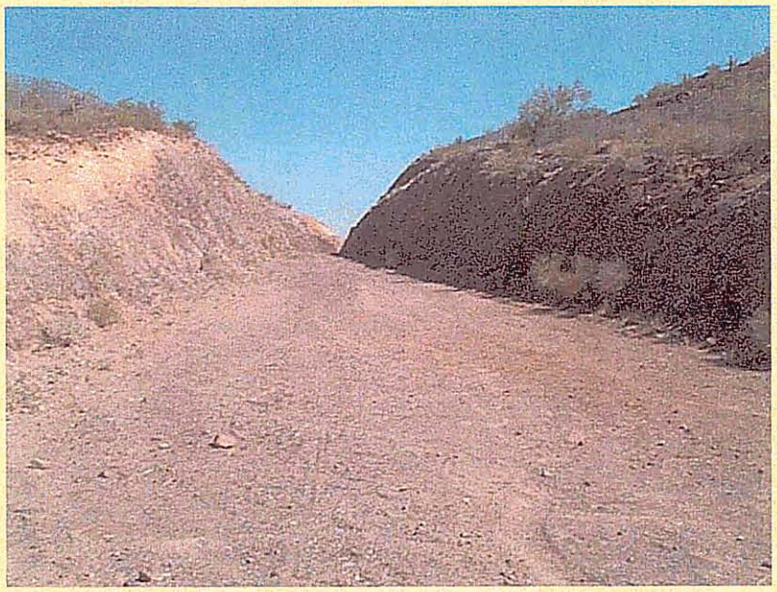
ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)



FINAL REPORT AND
TECHNICAL DATA NOTEBOOK

Submitted: June 2001

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

Prepared by:
Hoskin Engineering Consultants, Inc.
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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 Adobe Dam emergency spillway.

During the course of this study, Data Collection and Field Reconnaissance Appendices were prepared. These reports 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 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, E, and F.

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, have been contracted by the Flood Control District of Maricopa County (District) to delineate the inundation limits from several Adobe Dam spillway flows. 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 spillway discharges for Adobe Dam. The detailed study area covers a portion of north central Maricopa County, including portions of the cities of Glendale and Phoenix. The study limits are depicted in Figure 1.

1.2 Background

Adobe Dam, along with its spillway and outlet structure, was designed by the Corps of Engineers (COE) in 1980 to provide flood protection for the primarily residential area downstream of the dam. The dam was designed to detain floodwaters from an 89.6 square-mile portion of the Skunk Creek watershed north of the dam (Ref. 13).

2 Area Studied

Adobe Dam is located in an almost fully developed area of Phoenix. Due to many flow splits through the area; the detailed portion of the study encompasses approximately 3 river miles downstream of the spillway.

2.1 Scope of Study

The scope of this study includes the delineation of three spillway discharges from Adobe Dam's emergency spillway. The upstream limits of this study occur at the crest of the spillway, and at the dam's principal outlet. The downstream limits of the study occur where the spillway flows join the 100-year floodplains of either the Skunk Creek or the New 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 COE study (Ref. 13). A portion of the topography used in this study was originally produced for the Arizona Canal Diversion Channel Area Drainage Master Study (ACDC ADMS) (Ref. 6). Supplemental topographic mapping was produced for this study for areas along the Loop 101 freeway, and for another area, which was identified as having urbanized since the earlier mapping was produced. Hydraulic models were prepared using HEC-RAS (Ref. 12). Final deliverables include this report, a set of floodplain delineation maps, and the HEC-RAS data and mapping files on Compact Disc (CD). A complete scope of work is included in Appendix A.

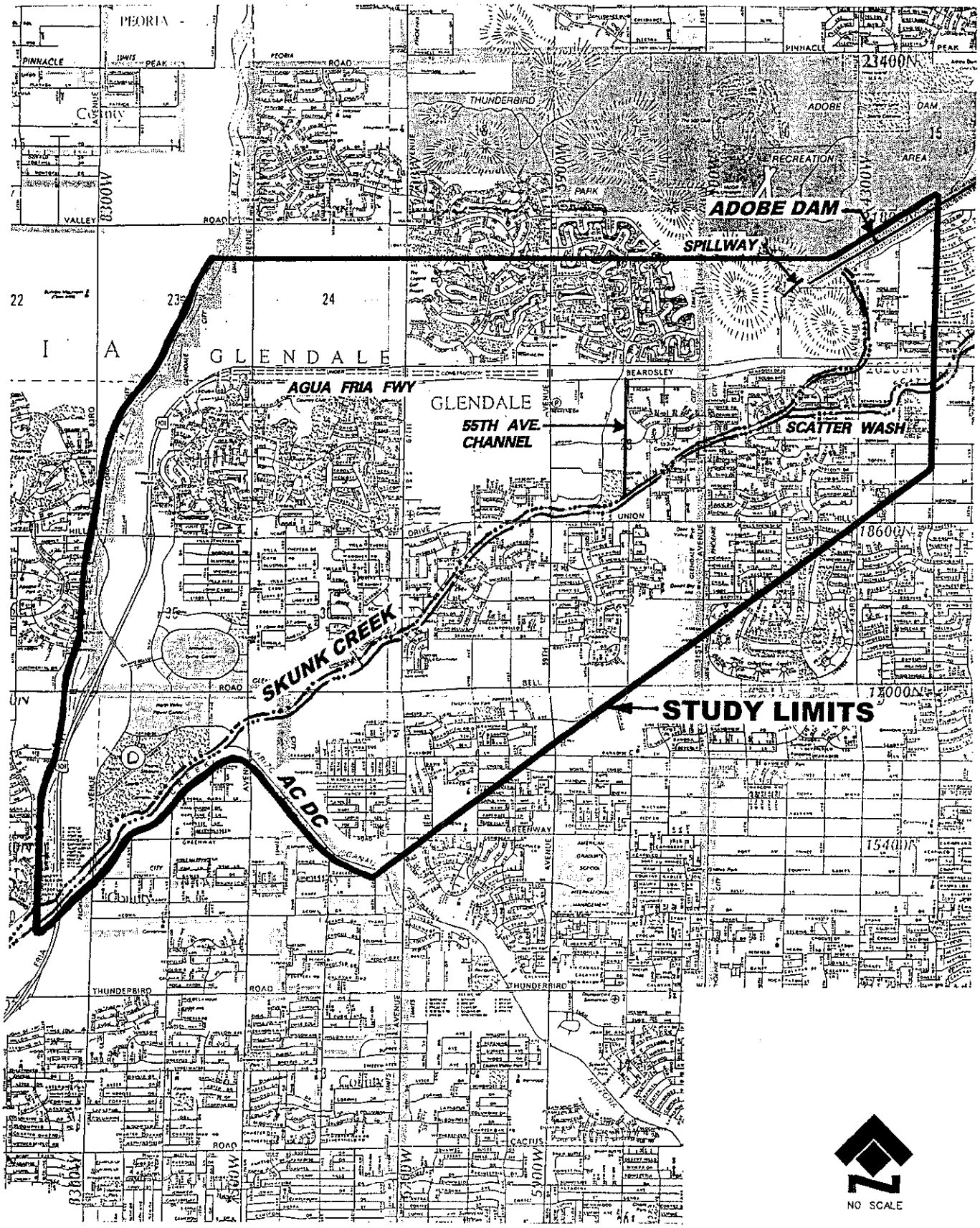
2.2 Description of the Study Area

The study area is approximately bounded by 39th Avenue to the east, New River to the west, Adobe Dam to the north, and Skunk Creek and the ACDC to the south (See Figure 1).

Adobe Dam is located north of the Agua Fria Freeway (Loop 101) and west of Interstate 17. The dam receives runoff from the Skunk Creek watershed, with an area of approximately 89.6 square miles, extending north of the dam. The principal outlet of the dam is located at the western end of the dam, just east of the Hedgepeth Hills. The emergency spillway is a rock-cut channel passing through the Hedgepeth Hills, west of the principal outlet. South and west of the spillway, the land is currently undeveloped. West of 51st Avenue, and south of the Loop 101 freeway, the area is almost fully urbanized with a combination of residential, industrial and commercial developments.

Significant features within the study area include: the Skunk Creek channelization between approximately 51st and 74th Avenues, a detention basin located at the northeast corner of 51st Avenue and Beardsley Road, the Arrowhead Lakes detention system and outlet structure, outflow culverts across the Agua Fria Freeway, and the 55th Avenue drainage channel. Detailed information regarding each of these facilities is included in Appendix B.

Potential construction within the study area, which is of significance to this study, includes development of the currently natural desert areas immediately downstream of the spillway, and construction of a soundwall along the north side of



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ADOBE DAM SPILLWAY
LOCATION AND VICINITY MAP

FIGURE 1

the Loop 101 Freeway, east of 51st Avenue. Development within the desert area northeast of the intersection of 51st Avenue and Beardsley Road would impact the results of this study because the flow path assumptions would be altered. Construction of a soundwall would prevent flow from crossing the freeway, and would also alter the flow split assumptions. The current assumption of no soundwall is more conservative because the subdivisions immediately south of freeway are included within the potential flood hazard area. A soundwall was not modeled in the HEC-RAS prepared for this study.

3 Technical Analysis

3.1 Hydrology

The principal outlet and emergency spillway were designed by the COE to handle the Probable Maximum Flood (PMF). Skunk Creek is intercepted by the dam, and continues south of the dam through the principal outlet and outlet channel. The portion of the Skunk Creek watershed intercepted by the dam includes approximately 89.6 square miles (Ref. 13). The discharge rates at the principal outlet and the emergency spillway were determined using outflow hydrographs from the COE design report entitled *Adobe Dam Design Memorandum No. 3* (Ref. 13). See Appendix B for a summary of hydraulic and design data obtained from the COE report (Ref. 13). Spillway discharges proposed for use in this study are summarized in Table 1.

Table1: Summary of Flood Discharge Rates

	100-yr	1/3 Discharge	2/3 Discharge	Full Discharge
Principal Outlet	1890	2100	2200	2360
Emergency Spillway	0	3200	6400	9620
Total	1890	5300	8600	11980

Downstream of the spillways the flow diverges, and flow splits occur at intersecting streets and at the Loop 101 freeway crossing. All discharges downstream of the spillways are rounded to the nearest 100 cfs.

Hydrology for the areas downstream of the spillways is addressed in a report entitled *ACDC ADMS Phase I: Skunk Creek Watershed* prepared by Kaminski-Hubbard (Ref. 6). The analysis includes a HEC-1 hydrologic analysis of the watershed areas contributing to Skunk Creek between Scatter Wash and the ACDC. This constitutes a majority of the Adobe Dam study area. While a useful reference, the results from the ACDC ADMS were not used in this study.

A new HEC-1 model was developed to track flow magnitudes and splits throughout the Adobe Dam study area. The hydrograph for the full PMF flow and principal outlet flow was used as an inflow hydrograph to this model. The full flow hydrograph was prorated for the 2/3 and 1/3 spillway discharges.

The Arrowhead Lakes development, located west of 51st Avenue, was included in the HEC-1 model. There are five lakes within the development area east of 59th Avenue. Lake 5 is the lowest lake, and the outfall for drainage inflows from all of the other lakes. The report *Arrowhead Ranch Development, Glendale, Arizona,*

Specific Area Plan, Storm Drainage Plan (Ref. 2) includes the input parameters and results from a TR-20 flood routing model. The stage-storage-discharge relationships for each of the five lakes were used to establish a storage relationship for all five lakes combined. The lakes were represented in the HEC-1 model as one retention basin, replacing the five individual lakes in the original model. Flows from the most upstream lake overflows into the next downstream lake, resulting in different normal and high water elevations in each of the lakes. Storage volume calculations for the entire Arrowhead Lakes subdivision are included in Appendix G.

As the flow from the emergency spillway flows in a southwesterly direction, it encounters many streets, developments, and other impediments to its flow path. Several flow splits occur within the study area, each of which is addressed in Appendices D, E, and F, according to location within the study area. The following tables summarize the results of the flow split analysis:

Table 2: Flow Split Summary, 51st Avenue and Beardsley Road

Discharge (cfs)	1/3	2/3	Full
Arrowhead Lakes	1300	2600	3700
Beardsley Road	1300	2300	3300
51st Avenue South	600	1400	2200
Across Loop 101 Freeway	0	100	400
Total	**3200**	**6400**	**9600**

Table 3: Flow Split Summary, 55th Avenue and Beardsley Road

Discharge (cfs)	1/3	2/3	Full
West of Arrowhead Lakes	0	800	1400
Beardsley Rd West of 55th Ave	500	800	2100
55th Ave Channel at Freeway	2100	3300	3500
Total	**2600**	**4900**	**7000**

Table 4: Flow Split Summary, 51st Avenue South of Loop 101 Freeway

Discharge (cfs)	1/3	2/3	Full
West along south frontage road	200	800	1500
South along 51st Avenue	400	700	1100
Total	**600**	**1500**	**2600**

Table 5: Flow Split Summary, 59th Avenue and Beardsley Road

Discharge (cfs)	1/3	2/3	Full
Enter Freeway East of 59th Ave	400	700	2000
Beardsley Road street capacity	100	100	100
West of Arrowhead Lakes	0	800	1400
Flow entering 101 Freeway west of 59th Avenue	100	900	1500

Table 6: Flow Split Summary, 55th Avenue South of Loop 101 Freeway

Discharge (cfs)	1/3	2/3	Full
55th Avenue channel immediately South of Freeway	2300	4100	5000
55th Avenue channel culvert at Utopia Road	1800	1800	1800
Utopia Road overflow	500	2300	3200
55th Avenue channel South of Utopia Road	2200	2500	2900
South to Skunk Creek	500	2100	2700
West to Kimberly Way	0	200	500

3.2 Topography

Topography for the area at a scale of 1 inch = 400 feet, with a 2-foot contour interval (Flight date: April, May, and July, 1991), as produced for the ACDC ADMS (Ref. 6), was used in this study. Since the area was mapped in 1991, there have been extensive development changes, including the construction of the Loop 101 freeway. Kenney Aerial Mapping Company produced new topographic mapping for the areas where most of the changes have occurred (Flight date: August 11, 1999). Mapping from both sources was used to produce the floodplain maps presented in this report.

During the course of the study, it was determined that additional detailed field surveys were necessary at several locations within the Arrowhead Lakes area, and along Beardsley Road. This supplemental fieldwork was performed by Project Engineering Consultants, Inc., and was used for the evaluation of some of the flow splits. See Appendix B for information on data collection.

3.3 Hydraulic Analysis

HEC-RAS (Ref. 12) was used to model the 1/3, 2/3, and full flows downstream from the spillway. Due to the fragmented nature of the flow path, the entire HEC-RAS analysis was broken into three reaches. They are as follows:

Reach A -	Adobe Dam Spillway to flow west on Beardsley Road
Reach B -	Flow southwest along south side of Loop 101 Freeway
Reach C -	55th Avenue Drainage Channel

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. See Appendix F for Reach C hydraulics.

Modeling proceeded from upstream to downstream. Flow paths were determined using mapping the mapping described earlier. A hydraulic baseline station of 10,000 was used for each cross-section. Stationing increases from south to north for Reaches A and B, and from east to west for Reach C. The spillway crest was assigned a river mile of 20.00, and the cross-sections numbers decrease in the downstream direction. Each reach was evaluated and mapped independently in HEC-RAS. The cross-section locations and floodplain delineations are shown on the

reduced-scale Spillway Delineation Maps included in Appendix H, and on the full-size Spillway Delineation Maps rolled separately.

Several split flow/weir flow calculations were performed to track flow that occurs along roads and through developed areas. Calculations corresponding to each reach are included in Appendices D, E, and F, and are accompanied by summary sheets detailing the methodology and results of the analysis. Flow splits were calculated using the weir flow equation ($Q = CLH^{3/2}$), and topographic cross-sections. Water surface balancing at each of the flow splits was accomplished using an iterative process.

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

3.3.1 Reach A - Adobe Dam Spillway to Flow West on Beardsley Road

Reach A encompasses the area starting at the spillway, through the desert area southwest of the spillway to the eastern border of the Arrowhead Lakes subdivision (51st Avenue), and west along Beardsley Road to 59th Avenue.

The HEC-RAS model ADA1 was created for this reach, and includes the area from the Adobe Dam spillway to the freeway ramp west of 59th Avenue. It begins with cross-section 20.00 at the crest of the spillway. Flow from the emergency spillway travels southwest towards the Loop 101

Freeway, through the currently undeveloped area north of the freeway and east of 51st Avenue. A concrete-lined drainage channel and detention basin along the north side of the freeway intercept an insignificant portion of the spillway flow, and were assumed to be ponded to capacity. The basin and any part of the channel below the top elevation of the basin were blocked in the HEC-RAS model.

The majority of the flow continues west towards 51st Avenue. For the 2/3 and full discharges, a portion of the flow crosses the freeway and flows south and west. Flow crossing the freeway enters Reach B and is discussed in Section 3.3.2 of this report.

Flow reaching 51st Avenue splits three (3) ways, continuing either west through the Arrowhead Lakes development, south along 51st Avenue, or west along Beardsley Road north of the freeway. A flow-split analysis was performed at 51st Avenue to determine the amount of flow continuing in each direction, and is described further in Section 1 of Appendix D.

Flow through the Arrowhead Lakes development contributes, in part, to the flow within the 55th Avenue channel modeled as Reach C. Flow continuing south along 51st Avenue joins HEC-RAS Model ADB1, as described in Section 3.3.2.

Flow continuing west on Beardsley Road is contained between the subdivision wall and the freeway sound wall. At approximately 55th Avenue, additional flow enters Bearsdley Road from the Arrowhead Lakes outlet, then

the combined flow splits either south towards the 55th Avenue channel, or west within Bearsdley Road towards 59th Avenue. Flow split calculations at the Arrowhead Lakes outlet are included in Section 2 of Appendix D. Flow south to the 55th Avenue channel becomes part of the Reach C analysis.

The freeway sound wall terminates at section 18.57. Weir flow calculations along Beardsley Road east of 59th Avenue were used to determine that all but 100 cfs, the capacity of Beardsley Road, weirs into the depressed freeway section east of 59th Avenue. The weir flow calculations are included in Section 3 of Appendix D. The remaining 100 cfs in Beardsley Road combines with flow that has traveled west from the Arrowhead Lakes subdivision, as described in Section 6 of Appendix D. The combined flow then flows into the freeway through the westbound on-ramp at 59th Avenue.

3.3.2 Reach B: Flow Southwest Along South Side of Loop 101 Freeway

Reach B encompasses the area from the point where spillway flow overtops the Agua Fria Freeway, west along the south side of the freeway, to the 55th Avenue channel. Flow within this reach travels west through the undeveloped desert area immediately south of the freeway.

HEC-RAS Model ADB1 was created for Reach B analysis. The amount of flow crossing the freeway east of 51st Avenue was determined using a combination of weir flow calculations and HEC-RAS modeling of the freeway median. Further detail and the corresponding calculations are

included in Section 1 of Appendix E. Flow crossing the freeway continues west along the freeway ramp and frontage road to 51st Avenue. At 51st Avenue it combines with flow from Model ADA1, and then the combined flow continues either west along the frontage road south of the freeway, or south along 51st Avenue. Weir flow calculations were used to determine the magnitude of these two flows, and are included in Section 2 of Appendix E.

Model ADB1 continues west along the south side of the freeway towards the 55th Avenue channel. It was assumed that the houses along the south side of the freeway have 6-ft walls, therefore constraining the flow between the freeway and the empty lots. Model ADB1 ends at the 55th Avenue channel.

3.3.3 Reach C: 55th Avenue Drainage Channel

The 55th Avenue drainage channel runs along the 55th Avenue alignment, from approximately the Agua Fria Freeway to Skunk Creek. It is a wide, shallow channel with very little slope, and has a bridged crossing at Utopia Road. Sources of flow contributing to the channel include: the Arrowhead Lakes outlet (See Appendix D), flow from the east along the south side of the Loop 101 Freeway (See Appendix E), and flow from the east through the Carmel Park subdivision (See Appendix F). As the capacity of the 5-10' x 4' concrete box culverts at Utopia Road is exceeded, flow breaks out of the channel and continues south and west towards Skunk Creek and 59th Avenue.

The combination of HEC-RAS Models ADC1 and ADC2 was created to model the spillway flow which reaches the 55th Avenue drainage channel. Each model has a separate hydraulic baseline (10,000 sta). A detailed description of the HEC-RAS analysis and the model output are included in Appendix F.

Hydraulic calculations for the 5-10' x 4' concrete box culverts at Utopia Road were performed using Dodson's *Hydrocalc* software (Ref. 3), and indicate that the box culvert has an approximate capacity of 1800 cfs. Model ADC1 was created to model the flow which does not pass through the box culvert, and is forced to overtop the west bank of the channel due to the elevations along Utopia Road. Once the flow overtops the channel bank, it heads in a southwest direction. An iterative process was used to determine the flow distribution at cross-section 17.80, where flow west of the building continues west toward 59th Avenue, and flow east of the building continues south toward Skunk Creek.

HEC-RAS model ADC2 was created to model the downstream portion of the channel, including the culvert capacity flow and flow from the east through the Carmel Park subdivision.

The resulting delineations for the 1/3, 2/3, and full flows are shown on the Spillway Delineation Maps. HEC-RAS model output is included in Appendix F. Flow splits occurring in Reach C are summarized in Table 6.

3.3.4 Arrowhead Lakes Subdivision

Flow through the Arrowhead Lakes subdivision and system of lakes was incorporated into the HEC-1 model for the Skunk Creek watershed (Ref. 6), as described in Section 3.1 of this report. The primary inflow to this area includes overtopping of the wall along 51st Avenue and flow through the subdivision entrance at Tonopah Drive. The primary outflow from the subdivision occurs at the outlet structure.

The Arrowhead Lakes outlet structure consists of a weir and six 10' x 4' box culverts under Beardsley Road. A subdivision wall runs across the top of the box culverts. The culverts under Beardsley Road outlet to a series of concrete-lined rectangular channels and box culverts that convey flow under the Agua Fria Freeway and outlet to the 55th Avenue Drainage Channel.

A combination of culvert calculations using Dodson's *Hydrocalc* software (Ref. 3) and weir flow calculations were used to determine a rating curve for the outlet system. Flow that is contained within the box culverts under Beardsley Road will continue south and outlet to the 55th Avenue drainage channel. Flow that overtops the subdivision wall will combine with flow in Beardsley Road and continue west. The calculations are included in Appendix D, and are summarized in Table 7.

Table 7: Arrowhead Lakes Outlet Summary

Discharge (cfs)	1/3	2/3	Full
Inflow:			
Entering Arrowhead Lakes subdivision from 51st Avenue	1300	2600	3700
Flow in Beardsley Road from 51st Avenue	1300	2300	3300
Outflow:			
West from Arrowhead Lakes	0	800	1400
West in Beardsley Road	500	800	2100
South to 55th Avenue Channel	2100	3300	3500

4 Conclusions

Hydraulic analysis for Reaches A, B, and C are included in Appendices D, E, and F, respectively. Tables summarizing the flow depths, velocities, and travel times are included in the appropriate appendix, and are shown on the spillway delineation maps rolled separately from this report. Limits of flooding are also depicted on the spillway delineation maps.

5 Study Limitations

Mapping Changes

This study was prepared using a aerial topographic mapping from two sources. The original mapping was flown in July, 1991, for the A.C.D.C. Area Drainage Master Plan Study. More recent mapping was obtained specifically for this project with a flight date of August, 1999. Only areas that were felt to be within the emergency spillway limits, and had seen development since the 1991 mapping was produced, were re-mapped. Because of the dynamic nature of the development in the area, changes to mapping have occurred in other areas of the study that were not re-mapped. In some area, approximate methods were

employed due to the lack of more detailed mapping. Continued development after the completion of this study may result in changes to the analysis presented herein.

Loop 101 Freeway Sound Wall

Currently, there are sound walls along the Loop 101 freeway adjacent to existing residential developments. For the stretch from 43rd Avenue to 51st Avenue, on the north side of the freeway, there is no sound wall since there is no development in this area. Future plans by ADOT may include the construction of a sound wall. If this occurs, any flow that is shown to cross the freeway between 43rd Avenue and 51st Avenue will be diverted west toward 51st Avenue. The flow that is currently shown to cross the freeway is as follows:

Table 8: Flow Crossing Freeway

Discharge Event	Flow west to 51st Ave. (cfs)	Flow Crossing Loop 101 Between. 43rd Ave. and 51st Ave. (cfs)
1/3	3200	0
2/3	6300	100
Full	9200	400

An increase in the discharge reaching the intersection of 51st Avenue on the north side of the freeway will have a minimal impact on the flooding to the west and south.

Future Development North of Loop 101

Currently, the emergency spillway discharges to an undeveloped area located between 43rd Avenue and 51st Avenue, on the north side of the Loop 101 freeway. The Arizona Department of Transportation (ADOT) owns a portion of the land in this area which is used for a detention basin. Other surrounding land is privately owned, and may be subjected to future development pressures. If the area downstream of the emergency spillway were developed, this would be an extremely high flood hazard area, with high flood

depths and flow velocity, and short travel time from the first point of flow release. Development within this area could also change the flow split analysis which was performed for this study, which in turn could change the results of this entire study.

Skunk Creek Flow Assumptions

It was assumed that the emergency spillway discharges will occur independently of any other storm event over the Skunk Creek and its tributaries. Therefore, it was assumed that there would be no flow within Scatter Wash (a tributary to Skunk Creek) at the time of the spillway discharge. The only flow considered within Skunk Creek is the flow from the principal outlet and the emergency spillway. Since the full discharge of 11,980 cfs is less than the 100-year flow in Skunk Creek, it was assumed that all spillway flows would be contained within Skunk Creek once they reach the FEMA designated 100-year floodplain.

Culvert and Bridge Assumptions

For the flow which exits the Arrowhead Lakes drainage system, it was assumed that the culverts would operate without plugging due to debris. If plugging of the culverts, which empty to the 55th Avenue channel, were to occur additional flow would occur along the Loop 101 frontage road. The additional flow would enter the freeway west of 59th Avenue.

Arrowhead Lakes System

The Arrowhead Lakes drainage system was assumed to be at its normal operating level at the time of the spillway discharge. Volume computations indicate that the storage volume within the lake system would have a negligible effect on attenuating the flood flows.

Flow Entering Arrowhead Lakes

Flow which reaches 51st Avenue will first tend to enter the Arrowhead Lakes development along Tonopah Drive. Because the elevation of the intersection of 51st Avenue and the frontage road is several feet higher than Tonopah Drive, the flow will first enter Arrowhead Lakes. Because of the limited capacity of the street entrance, the flow depth will build along the perimeter walls of the development until they are either overtopped or fail due to the hydrostatic loading. It was assumed that the walls would fail and that the resulting rubble will stand to an elevation of approximately 2 feet above the wall base.

71st Avenue Channel

It was assumed that the 71st Avenue channel would intercept street and sheet flooding which would occur to the east, and that the channel forms the boundary of the spillway flows.

6 References

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8. Simons, Li & Associates, Inc., *Final Design Report Skunk Creek Channel Improvements*, and *Appendices*, June 30, 1998.
9. Sutko, Timothy E. for Flood Control District of Maricopa County, *Dam-Break Analysis of Adobe Dam on Skunk Creek, Phoenix, Arizona*, June 22, 1987.
10. Sverdrup Civil, Inc., *Skunk Creek Master Plan Final Report, Volume 1: Skunk Creek, ACDC to Adobe Dam Outlet Structure, Maricopa County, Arizona*, August 23, 1995.
11. United State Army Corps of Engineers, *HEC-1 Flood Hydrograph Package*, Version 4.1, June 1998
12. United States Army Corps of Engineers, *HEC-RAS River Analysis System,* Version 2.2 with RASPATCH, September 1998.
13. United States Army Engineer District, Los Angeles Corps of Engineers, *Adobe Dam Design Memorandum No. 3, General Design Memorandum Phase III, Project Design Part 2*, April 1979.

ADOBE DAM
SPILLWAY DELINEATION STUDY

(FCD 98-32)

APPENDIX A: GENERAL DOCUMENTATION

Adobe 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 A - ADOBE DAM

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

The Adobe Dam study limits are illustrated in Exhibit 'A-1.' The study covers approximately 10 river miles due to numerous flow splits along major streets and the Loop 101 freeway.

TASK A1 - 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 Phoenix, Glendale, Peoria, 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.

TASK A2 - DATA COLLECTION

The District will supply some of the topographic mapping for this study in either a GIS or CADD format. The source of the topographic mapping data is the 1991 Arizona Canal Diversion Channel (ACDC) Area Drainage Master Study (ADMS). This mapping was originally developed using aerial photogrammetry methods. The horizontal scale is 1" = 400' and the contour interval is two-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 A3 – TOPOGRAPHIC MAPPING

The ACDC ADMS mapping will need to be augmented by new data because of the construction of State Route 101 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 ACDC 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 'A-2' as Area 1 and Area 2.

TASK A4 - 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 A5 - 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 City of Phoenix, 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)
6. 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 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.

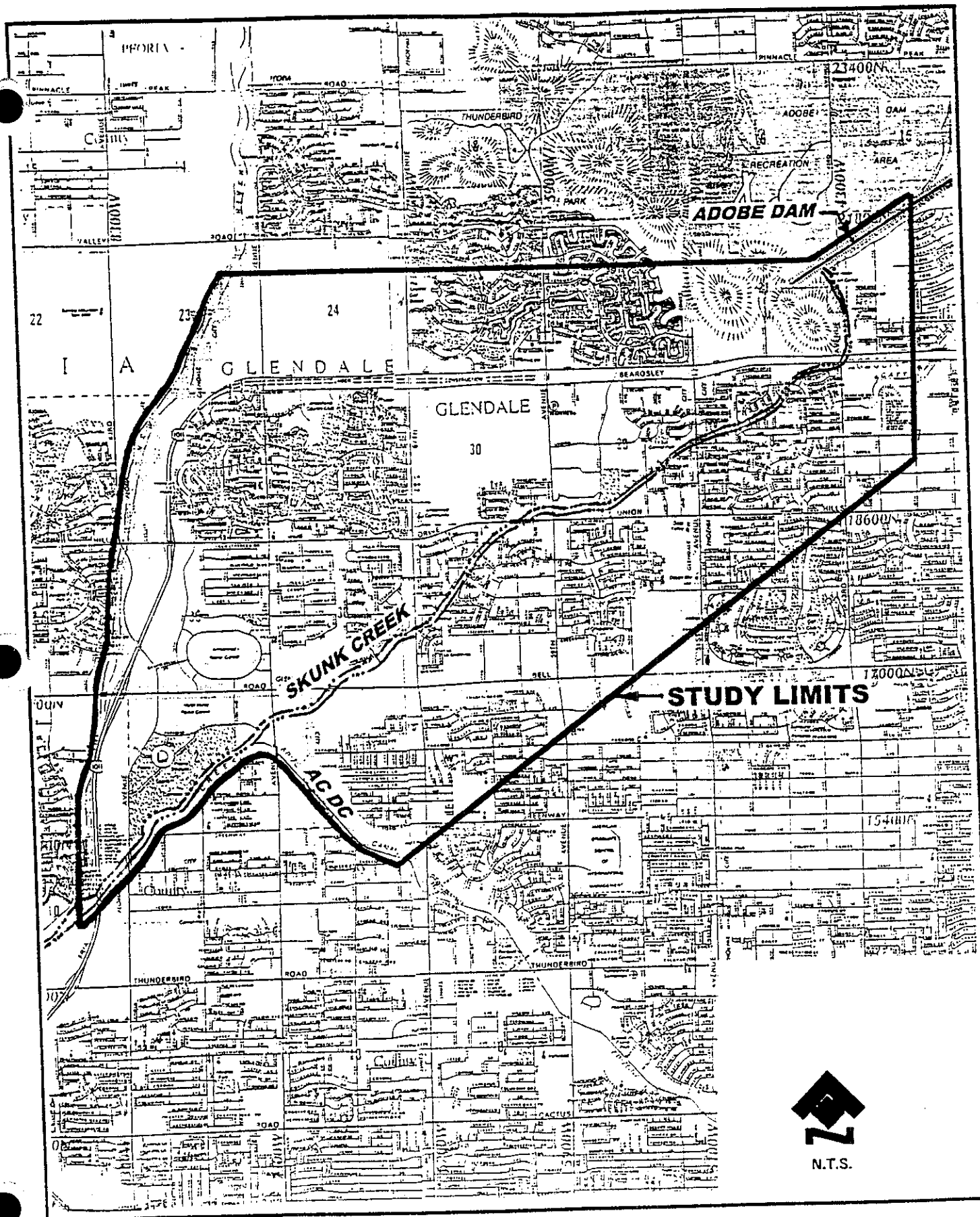
Introduction
The final outcome of the spillway inundation mapping is unknown at this stage. As a result, the study will be implemented in three phases. Study data will be reviewed with District staff, and authorization received, prior to proceeding onto the next phase. The phases of study are illustrated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



Hoskin Engineering Consultants

520 E. Portland St.
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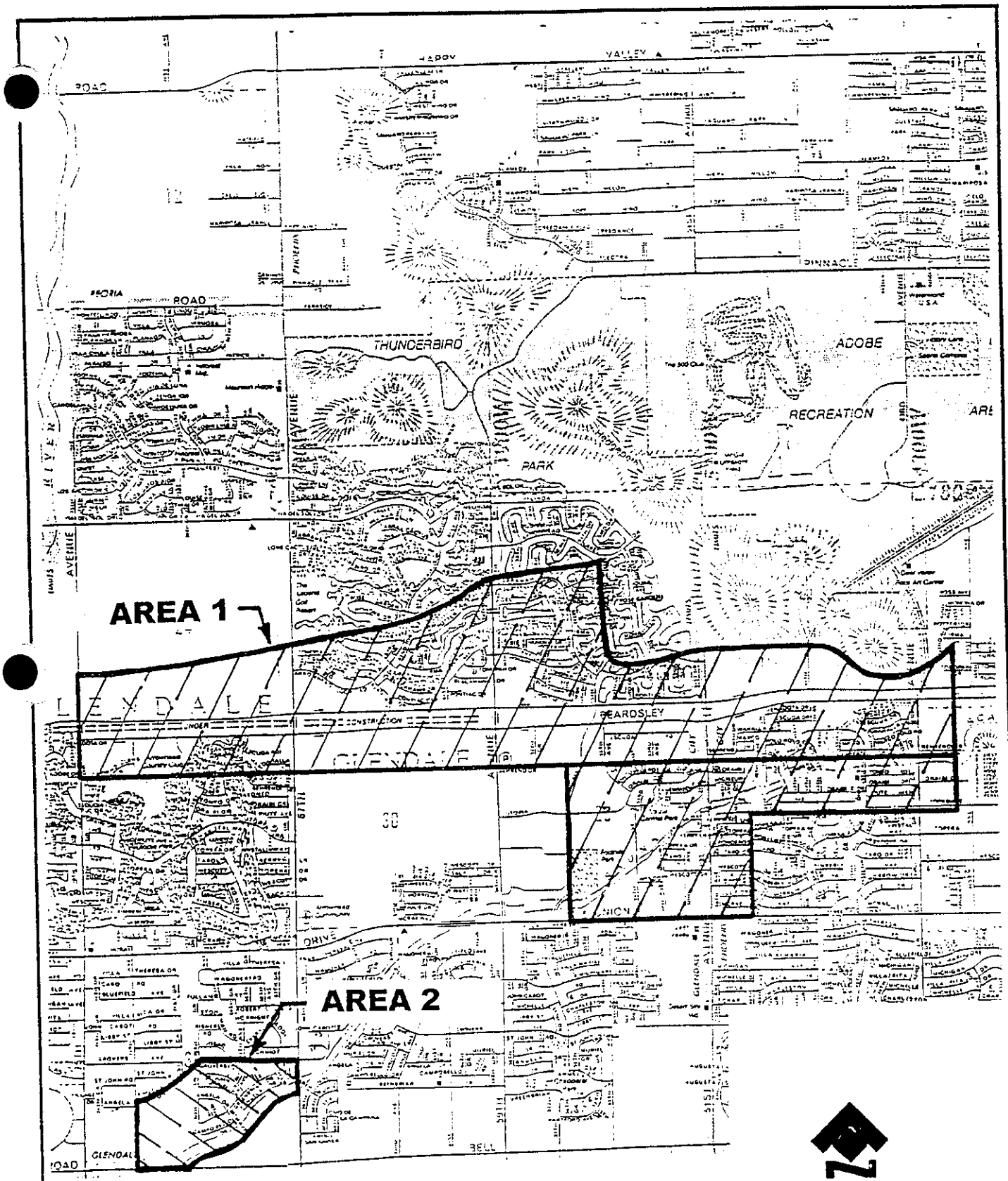
ADOBE DAM
Study Limits
EXHIBIT 'A-1'



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ADOBE DAM
Mapping Limits
EXHIBIT 'A-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: May 4, 2000

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

Date: April 14, 2000, 10:00 a.m.

Location: Adobe Dam Study Area

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

Purpose: Field Reconnaissance Meeting to tour the Adobe Dam study area, to obtain photographs, and identify limits of study.

Discussion:

- The team commenced the site review at the principal outlet for Adobe Dam. The Rock Museum is located over the outlet chute.
- A few years ago, Russ prepared a spillway rating for the principal outlet and the emergency spillway. The combined discharge (PMF) is rated as 11,980 cfs. Approximately 960 cfs will overtop the emergency spillway, which leaves approximately 2,380 cfs through the principal outlet.
- Russ noted that the outlet channel has a negative slope.
- From the principal outlet, we proceeded to the emergency spillway, then west through the Arrowhead Ranch development .
- If the emergency flows from the Arrowhead Ranch development to overtop onto the frontage road they would eventually spill into the freeway. We will do some rough estimates of the storage volumes within the freeway, however, it is unlikely that any flow would escape from the freeway.
- We then proceeded back to the 51st Avenue underpass. From there we headed west to 55th Avenue where the Arrowhead Channel outfalls. We continued west to

57th Avenue and Skunk Creek, and then to the confluence of Skunk Creek and the Arrowhead outlet channel

- The Skunk Creek has been recently re-channelized per design plans prepared by Simons, Li & Associates. It should be noted that the vegetation will increase over time, resulting in changes to the Manning's "n" valve.
- We then proceeded east and viewed the principal outlet channel downstream of the freeway, and then the confluence of this channel with Scatter Wash.

c. Attendees

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: May 17, 2000

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

Date: May 4, 2000, 10:00 a.m.

Location: Adobe Dam Study Area

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

Purpose: Meeting to address District review comments for the recent White Tanks FRS #4 submittal and to address the Adobe Dam project.

Discussion:

Adobe Dam

- ADOT is proposing a sound barrier wall along the Loop 101 freeway. This could have a significant impact on future spillway flow patterns. We will evaluate the existing conditions, and also review the potential impact of the wall in place.
- Work is continuing on the data collection phase of the project. DEI has provided us with the ADOT Loop 101 plans, The District has provided us with a list of reverences within the District's library. This list has been reviewed and Kristyn will visit the District to review the data and determine the relevance of some of the material.
- Need to provide Tim with an estimate of the amount (rounded to nearest $5,000) that will be invoiced on the project through the end of June.
- Kenney Aerial Mapping has been very slow providing us with a final product. Tim suggested that we consider alternative mapping consultants. We will solicit alternative bids.
- The District will not authorize the mapping of the McMicken dam area until the Adobe Dam mapping has been successfully completed.
- Check on the insurance coverage for the study.

White Tanks FRS #4

The following are a verbal explanation of review comments which are written either in the report or on the delineation maps:

Plan Review Comments:

- Add a reference on all sheets as to the source of the mapping.
- Need to check on how the islands are displayed. Either eliminate or show them as a different symbol and add a note that this is not high ground. This could possibly be put on the CARTO layer.
- Add the ERMs from the White Tanks mapping.
- Show the hydraulic baseline. Change the line style. Check on the flow split lines and whether to show on the maps. Change line style for the Gila River floodplain.
- Paul will get with Hal later in the week to review the maps and decide on presentation.

Report Review Comments:

- Add a discussion on the islands.
- Explain the effect that the roads have on the travel times and that the travel times will be quicker along the roads.
- Explain the capacity of the FRS and that the inflow capacity will be limited by the channels on the east and west sides. Refer to Meeting Minutes.
- Possibly add a "Problem Section" to discuss the limitations of the study.
- Explain that the White Tanks 1,2 and 3 were built at an earlier stage and that they have since been replaced.
- Put the model index map with the CD in the back of the report.
- The Cross-Section output in the HEC-RAS model should be turned on.
- Make tab dividers for the final report submission.
- Include the input/output from HEC-RAS in ASCII format along with the report text.
- Re-submit the report in two weeks on May 18, 2000.
- Obtain a copy of the survey report for inclusion in this report.

c. Attendees

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: 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: Adobe Dam Study Area

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:

- Currnetly 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
Tel. (602) 252-8384
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 1988 vertical 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 Whitman 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 apart 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

Hoskin Engineering Consultants, Inc.
323 W. Roosevelt, St., Ste. 200
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Meeting Minutes

Date Prepared: July 11, 2000

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

Date: June 27, 2000, 10:00 a.m.

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

Purpose: Meeting to discuss mapping for the Adobe Dam project and thefinal deliverables for the White Tanks project.

Discussion:

Adobe Dam

- The meeting minutes from the last meeting were reviewed.
- Paul had sent hydraulic cross-section locations to Tim and Hal for their review. These appeared to be acceptable to everyone. DEI expressed some concern over being able to read the contours from the hard copy. They do not have Microstation available to them and wondered if they might be able to get the topography in AutoCAD format.
- There was a discussion about the appropriate Manning's 'n' values for the area downstream of the spillway. The question was raised by Hal about using a lower 'n' value for the area through the ADOT detention basin, since it will be assumed full of water and modeled with a flow block out. The following 'n' values were discussed as being appropriate for the first study reach:

Description	Manning's 'n' value
Detention basin	0.010
Crossing Freeway	0.025
Natural Desert Area	0.045
Spillway	0.025
Concrete Channel	0.015 - 0.020

It will be necessary to check these values using the District's procedures.

- We will start to assemble the HEC-2 models that are currently available for the Skunk Creek. Sverdrup completed a HEC-2 model as a part of the Skunk Creek Master Plan which goes from the outlet to the ACDC, upstream to the principal outlet. We will substitute the Simons and Li (SLA) model for the improved channel section. The SLA model stops at Paradise lane (downstream limits).
- The 100-year flow rate in the channel downstream is 11,000 cfs. Since the full spillway discharge is 11,980 cfs, these values are very close. Accounting for floew losses within the study area, the full spillway discharge can probably be accommodated within the channel.
- Dibble and Associates have a TR-20 model in the Arrowhead Lakes Master Drainage Report. This might be used in the development of the HEC-1 routing model through the lakes system. Since the Kaminski-Hubbard study is more recent, this will also be reviewed, and possibly used. We will go to the City of Glendale to research available "as-built" plans for the lake system and 51st Avenue.

White Tanks #4

- Matt from DEI has met with mark Brewer at the District to review the GIS submittal.
- Tim had some minor review comments on the plans and none on the report.
- We should put a disclaimer note on the plans about the ERMS since they were provided from a previous mapping contract.
- We will make 4 copies of the final report for submission to Tim, along with mylars of the final maps.
- Check the run dat6e on the HEC-RAS model and revise. HEC-RAS model names have changed as a result of conversations with mark Brewer, The CD should also be revised with the new run date.
- Need to provide electronic files for Skyline Wash to Tim
- The next meeting is scheduled for July 13 at 10:00 a.m. at the offices of HEC.

C. Attendees.

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: July 24, 2000

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

Date: July 13, 2000, 10:00 a.m.

Location: Offices of HEC
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 and make the final delivery for the White Tanks project.

Discussion:

White Tanks #4

- The final delivery was made for the White Tanks #4. Two CDs were included in the back of the report. The first CD has the report text, HEC-RAS files, and field photographs. The second CD has the scanned images of the final drawings and the GIS submittal. The second CD, therefore will probably be changed out following completion of the District's review.

Adobe Dam

- Data collection has been ongoing. So far, we have been unable to locate the 51st Avenue paving plans. We have checked with the City of Phoenix and Glendale. The Skunk Creek bridge was constructed by Maricopa County Highway Dept.
- Work has commenced on assembling the HEC-RAS model for Skunk Creek. This model will be composed of the Simons & Li model and the HEC-2 model from the master plan.
- An evaluation has been made of the weir starting conditions for the HEC-RAS model at 51st Avenue. Assuming that the subdivision development wall at

Arrowhead Lakes does not fail, the water would reach a depth of 8.4 feet. Assuming that this holds true, the following flow splits would result:

Total Flow (cfs)	West through lakes	West along frontage road	South along 51st Avenue
9600	3300	2400	4000

If the wall overtops, however, it will fail and the flow splits will change. It was decided that it will be assumed that the wall will fail and leave a pile of rubble which will impede the flow to some extent. It will be assumed that the rubble will provide an obstruction to a depth of two feet and that the space between the houses will be assumed to be 10 feet.

- The Adobe mapping has been reviewed by the District and they have transmitted comments back to Gary Finney at Kenney Aerial.
- We should contact Kenney and see if we can obtain an electronic file in AutoCAD format.
- HEC and DEI will meet next week to further discuss the project. That meeting will be held at DEI on July 18 at 2:00 p.m.
- The next meeting will be held at the District on July 25, 2000.

c. Attendees.

Hoskin Engineering Consultants, Inc.
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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: Sept. 7, 2000

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

Date: August 8, 2000, 10:00 a.m.

Location: Offices of HEC
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:

Adobe Dam

- Need to contact Kenney Aerial to make sure that they have addressed the District's (Kevin) latest comments.
- Field survey of the box culvert structures, lake elevations, street cross-sections , and weir structures is underway on 8/15/00 and 8/16/00. Kristyn and Paul made a field visit to instruct the survey crew on specific requirements. The hydraulic analysis (HEC-RAS) for the area upstream of 51st Avenue has been revised using the latest flow split analysis at 51st Avenue. The results indicate that approximately 820 cfs crosses the freeway during the full spillway discharge event. This flow would cross through a vacant land parcel, however, a gas station has been constructed since the mapping was flown. The lie of the land suggests that a portion of the flow might cross 51st Avenue and continue west.
- Work has commenced on establishing cross-sections along the 55th Avenue channel.
- We will analyze the effect of the outlet from Arrowhead Lakes (lake 5) assuming that the perimeter wall were to remain in place. This represents the worst case scenario for any potential backwater effect to the upstream houses.

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Meeting Minutes

Date Prepared: Sept.20, 2000

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

Date: September 7, 2000, 10:00 a.m.

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

Purpose: Meeting to discuss the Adobe Dam project.

Discussion:

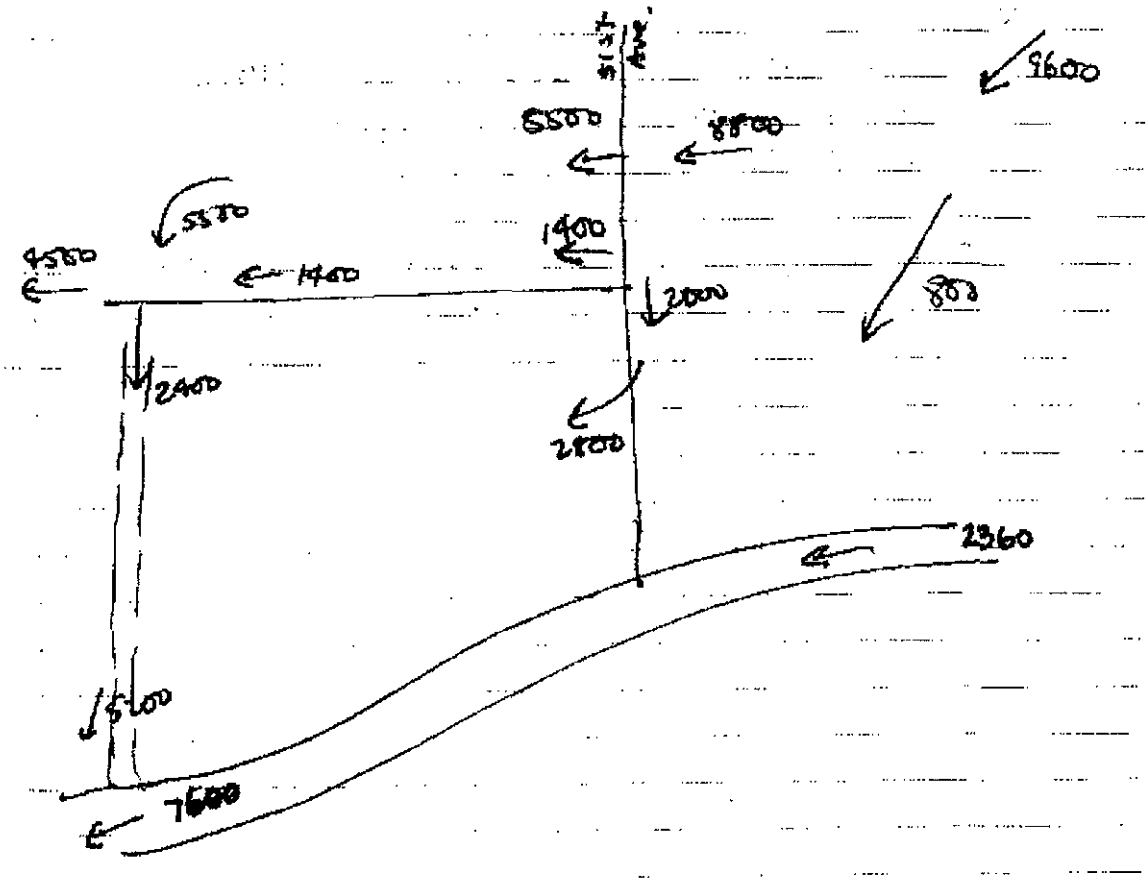
Adobe Dam

- The survey data has been obtained from PEC, however, at least in one location there appears to be an elevation difference of approximately 5 feet.
- The flow splits at 51st Avenue for the full spillway flow have been approximated as follows:

51st Ave. south	Cross Loop 101	Arrowhead Lakes	Beardsley Road	Total
2000	800	5500	1400	9600

- South of the Loop 101, approximately 2800 cfs will split and some of it will proceed west and some of it south and then west through the Carmel Park subdivision.
- After further review, it appears that some of the flow which enters the Arrowhead lakes subdivision will exit through subdivision streets to the west, rather than over the wall adjacent to the box culverts.

- The current assumption is that the box culverts under Beardsley Road remain unplugged. We should check to see the effect if these culverts become fully plugged.
- In evaluating the channel along 55th Avenue, we should assume a Manning's 'n' value which is higher than bare ground. The starting water surface elevation will be taken from the downstream confluence with Skunk Creek.
- In the subdivision areas south of the loop 101, and west of 51st Avenue, we will compute the normal depth which could occur within each of the streets. On the final maps we will show a flow depth rather than water surface elevations. Suggested manning's 'n' values are 0.1 for outside the right-of-way and 0.02 for the street.
- The flow splits for the system so far are as follows:



- The final flow splits can be rounded to the nearest 100 cfs.
- Hal has a publication entitled "Downstream Hazard Classification Guidelines", published by the US Dept. of Interior, ACER Tech Memo No. 11, 1988.
- A submittal will be made to the District at the next meeting.
- The next meeting will be September 21 at 10:00 a.m. at the District.

c. Attendees.

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Meeting Minutes

Date Prepared: Oct 4, 2000

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

Date: September 21, 2000, 10:00 a.m.

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

Purpose: Meeting to discuss the Adobe Dam project.

Discussion:

- A submittal was made to the District of the Data Collection, Field Reconnaissance, Final Notebook, and hydraulic analysis for a portion of the project. The purpose of this submittal is to finalize the flow split analysis and HEC-RAS model up to 51st Avenue.
- The submittal included floodplain maps of the area upstream of 51st Avenue. A review of this area indicates some minor inconsistencies with the plotted floodplain width. The hydraulic baseline was altered to occur along the freeway drainage channel.
- The flow split analysis at 51st Avenue south of the freeway indicates that 2100 cfs crosses the freeway through the underpass and an additional 800 cfs (full discharge) joins from a crossing point east of 51st Avenue. A flow split analysis still needs to be completed for the area south of the freeway.
- A flow split of 17cfs crossing the freeway east of 51st Avenue (1/3 flow) will be considered as 0 cfs but it will be noted that there is the potential for overflow.
- The 55th Avenue channel has a capacity of approximately 1000 cfs. The remainder will overtop the channel and flow in a southwesterly direction. The hydraulic cross-

sections may need to be modified to model this. Proposed cross-section locations will be provided to Tim.

- Freeway storage volumes will be computed for the next meeting and the location where flow could possibly exit identified.
- We need to review the flow that continues west through the Arrowhead Lakes area.
- All discharges will be rounded to the nearest 100 cfs.
- The District is still reviewing the Adobe mapping.
- The next meeting will be held with DEI on Wednesday September 27 at 10:00a.m. No follow up meeting was scheduled.

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: Nov. 28, 2000

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

Date: November 14, 2000, 10:00 a.m.

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

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

Adobe Dam

- The meeting minutes from the last meeting were reviewed.
- A list of tasks necessary for the completion of the project by December 20th was reviewed.
- The worksheets for the HEC-RAS model have been prepared at a scale of 1-inch = 300 feet. Tim asked if they could be produced at either a 200 or 400 scale. We will prepare an example of the maps, along with a sheet layout for Tim's review.
- A discussion started about the proposed river mile system. Conventionally, the river miles should start with river mile 20 at the emergency spillway. However, the Skunk Creek has it's own river mile system. It was decided that we will count down from River Mile 20.0 to the Skunk Creek, and maintain the Skunk Creek numbering system. Each of the tributary models will continue with the same numbering system.
- Kenney has been approved for their mapping submittal. We should re-submit the invoice from February.

White Tanks #4

- The digital files have been re-submitted

The next meeting will be November 29, 2000 at the offices of DEI.

c. Attendees.

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Meeting Minutes

Date Prepared: Dec. 13, 2000

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

Date: November 29, 2000, 10:00 a.m.

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

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

Adobe Dam

- A draft sheet layout and index map layout were reviewed and the scale of the final maps discussed. It was agreed that a scale of 1-inch = 400 feet would be acceptable.
- It was agreed that we might consider adding the drainage structure sizes to the maps. The Arrowhead Lakes title could be reduced in size.
- It was agreed to add a second sheet which shows the various flow splits throughout the study area.
- The HEC-1 schematic will be presented in the appendix of the report.
- We should check the plotting margins at the top and bottom of each sheet.
- Identify the areas of new and old mapping on an index sheet.
- There was discussion about the analysis of flow which enters the freeway both east and west of 59th Avenue. Tim said that the District is working on a side weir program. The methodology used appeared reasonable, and it should just be properly documented.
- The highest point of the spillway should be used as the 20.0 mile marker. This will mean revising the cross-section stations downstream.
- We should check the lengths measured along the hydraulic baseline and compare with the input in HEC-RAS.

The next meeting was scheduled for Thursday December 7, at the Offices of HEC (this meeting was subsequently canceled and re-scheduled for December 13 at 10:00 a.m.
c. Attendees.

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Meeting Minutes

Date Prepared: Dec. 13, 2000

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

Date: December 13, 2000, 10:00 a.m.

Location: Offices of HEC

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

Purpose: Meeting to discuss the Spillway Delineation projects.

Discussion:

Adobe Dam

- The split flow analysis will be updated to include the area south of 51st Avenue
- After reviewing the schematic (sheet 2) for the flow splits, Tim suggested that we *might want to eliminate the background topography.*
- The cross-section spacing for the Skunk Creek was discussed. There a re a lot of cross-sections right now. Tim is not sure if these are in the District's GIS. Possibly we should consider cross-sections at the roads and at representative reach points. Tim wants to make sure that we don't assume responsibility for the conversion into the GIS.
- Elisa will be taking the HEC-2 model and verifying the model with the newly created HEC-RAS model.

White Tanks #4

- There is still some work on the mapping that needs to be addressed.
-

c. Attendees.

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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.

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Meeting Minutes

Date Prepared: Feb. 27, 2001

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

Date: February 9 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:

Adobe Dam

- We filled out the Certificate of Performance incorrectly. A certificate should be provided. (At the end of the meeting, a new form was provided to Tim).
- Hal showed us a new aerial photograph available called "Digimap."
- Put a note on the plans to show that the spillway crest has been located as accurately as possible with the data available.
- DEI has a new piece of survey equipment called Cyrax Laser Scanner. They wil try this out on the emergency spillway.
- Some of the cross-section distances do not measure accurately. HEC will provide the distances between cross-sections to Elisa.
- Label some of the contours on the maps.
- Show the backwater effect within the ADOT channel.
- On Sheet 3 the discharges shown in the table appear to be incorrect.
- Elisa will come to HEC next week to resolve the flow split analysis at the Freeway upstream of 51st Avenue.
- The HEC-RAS models should be run for "mixed flow" conditions.
- Add a note to address the potential of flow exiting from the freeway upstream of 51st Avenue and affecting the residences to the south.
- Remove the "donut" holes within the map. i.e. islands of dry ground.
- Check the Sverdrup cross-sections upstream of 51st Avenue.

- Obtain the 100-year floodplains for the New River and the Skunk Creek from the GIS Department. The 100-year floodplain will represent the limits of the spillway study.
- Review the split flows through the Arrowhead Lakes lake system.
- Check the parameters used for the weir flow analysis through the lake system. A C=2.8 seems high at first because of the rubble, however, there are some other assumptions about the rubble depth which help to justify this. Two feet high of rubble was assumed.
- What happens if the assumptions of the wall collapsing do not hold true. How will the flow be distributed?

The next meeting will be on February 28 at 10:00 a.m. at the offices of DEI

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.

ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX B: DATA COLLECTION

Adobe Dam
Spillway Delineation Study

Appendix B: Data Collection

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Figure B-1: Existing Facilities Map

Field Survey Notes
Elevation Reference Marks
Excerpts from Previously Completed Studies
Survey Check Sections

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 Adobe 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 Adobe Dam, Agua Fria Freeway, Arrowhead Lakes, 51st Avenue Drainage Channel, Skunk Creek, 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 and the Arizona Department of Transportation (ADOT).

2.2 Field Reconnaissance

A field reconnaissance was conducted to investigate the outlet and emergency spillway of Adobe 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.

2.3 Field Survey

During the course of the study, it was determined that the existing topographic mapping does not provide sufficiently detailed information for the evaluation of overtopping of the Agua Fria Freeway (Loop 101) due to recent construction. Detailed field survey was obtained by Project Engineering Consultants, Inc., for the area around and including the freeway. Field survey notes are included in this appendix.

3 Previously Completed Studies

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

ACDC ADMS Phase I: Skunk Creek Watershed. This study provides hydrologic analysis of the watershed contributing to Skunk Creek between Scatter Wash and the ACDC, which constitutes a majority of the Adobe Dam study area. It includes HEC-1 models for both existing and future conditions, and includes information on previous hydrologic studies, model parameter estimation, split flows, and channelization. Detailed 1 inch = 400 feet, 2-foot contour interval mapping was produced.

Adobe Dam Design Memorandum No. 3. This report by the U.S. Army Corps of Engineers includes hydraulic and design data for Adobe Dam, the principal outlet, and the spillway. Hydraulic analysis and data included in the report hydraulic analysis and data for the dam, principal outlet, and spillway. The watershed area intercepted by

the dam was noted as 89.6 square miles. Pertinent hydraulic and design information from the Corps of Engineers' design report is presented in Section 4.1 of this study.

Final Design Report Skunk Creek Channel Improvements. The Final Design Report provides the final design parameters and calculations. A HEC-2 analysis is included for both the existing and proposed conditions. The design discharge is shown to be 11,000 cfs downstream of the confluence with the 55th Avenue drainage channel, and 8,400 cfs upstream of the 55th Avenue drainage channel to the confluence with Scatter Wash. Also included are estimated short-term aggradation/degradation trend calculations and grade control structure information.

Dam-Break Analysis of Adobe Dam on Skunk Creek. The dam-break analysis included in this report represents flooding downstream of Adobe Dam to the Agua Fria River, due to failure of the dam. Included is a map of the area inundated by dam-break flow. This study is used only as a reference regarding general direction of large flows in the area downstream of the dam.

Skunk Creek Master Plan Final Report. Volume 1 of this report addresses the master plan for Skunk Creek between the ACDC and the Adobe Dam outlet structure. Sections of Volume 1 address channel geometry and vegetation, flow capacity, drainage structures along the creek, and scour analysis sediment transport. The peak flows within Skunk Creek used for the Master Plan study are as follows:

Adobe Dam to Beardsley Road..... 1,730 cfs
Beardsley Road to confluence with Scatter Wash ..... 2,600 cfs
Confluence with Scatter Wash to Arrowhead Drain..... 8,400 cfs
Arrowhead Drain to ACDC ..... 11,000 cfs

4 Existing Facilities

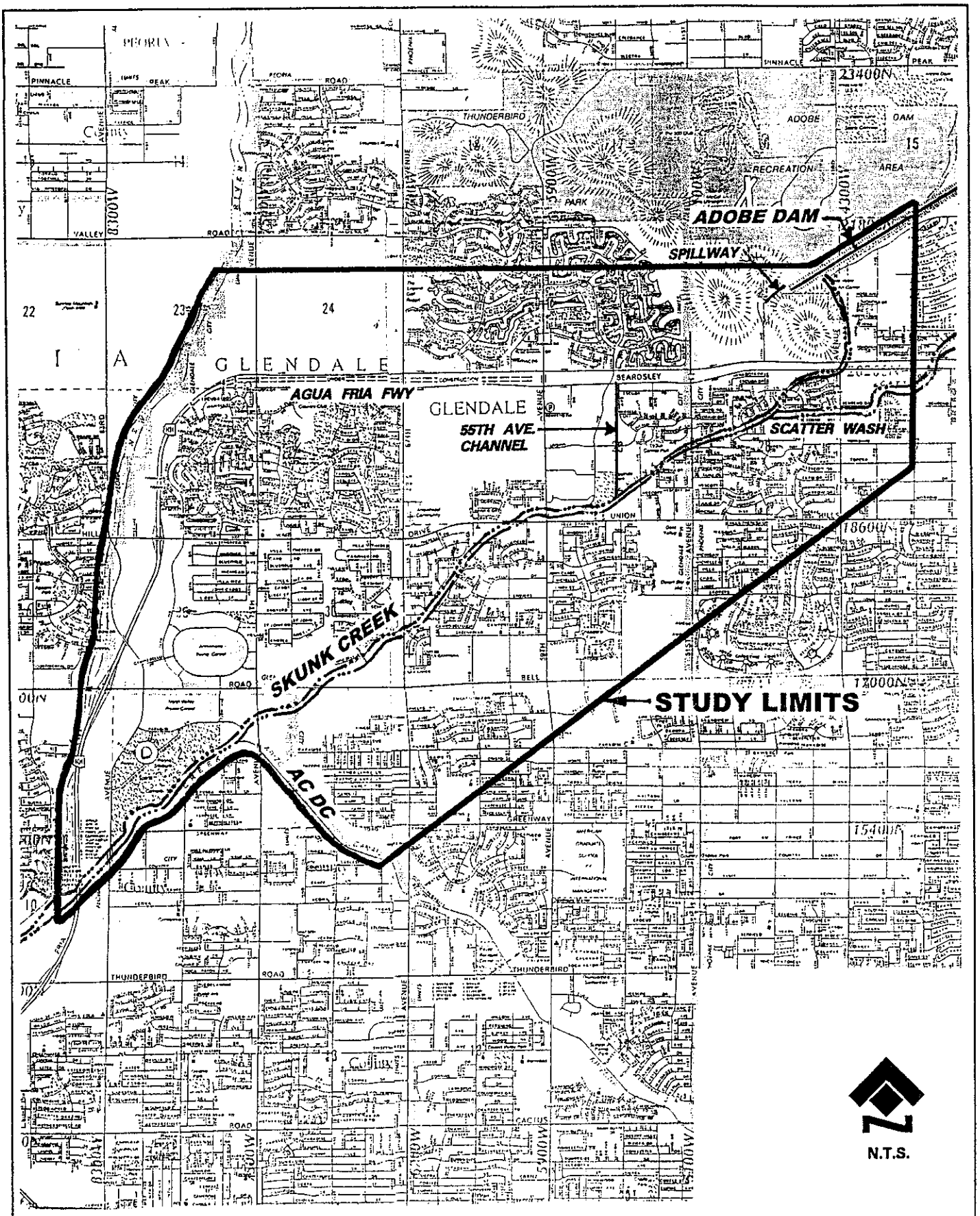
Major existing facilities within the study area include: Adobe Dam, Skunk Creek Channelization, 55th Avenue Drainage Channel, Arrowhead Lakes, and the Agua Fria Freeway (Loop 101). Sizes of culverts and channels were determined using as-built plans or field survey data. Locations of each of the listed existing facilities are illustrated on Figure B-1. Brief descriptions of the major existing drainage facilities follow:

4.1 Adobe Dam

Adobe Dam is located north of the Agua Fria Freeway (Loop 101), east of Interstate 17. Adobe Dam, along with its spillway and outlet structure, were designed by the Corps of Engineers in 1980 to provide flood protection for the primarily residential area downstream of the dam. The dam was designed to detain floodwaters from the 89.6 square-mile portion of the Skunk Creek watershed north of the dam (Ref. 10).

The principal outlet is located at the western end of the dam, just east of the Hedgepeth Hills. Flow from the outlet continues south within the principal outlet channel, and under the Agua Fria Freeway through concrete box culverts which outlet to Skunk Creek. The emergency spillway is a rock-cut trapezoidal channel passing through the Hedgepeth Hills to the west.

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 report prepared by the Corps of



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

ADOBE DAM
EXISTING FACILITIES MAP

FIGURE B-1

FILE NAME:

Engineers entitled *Adobe Dam Design Memorandum No.3* (Ref. 10) presents the following hydraulic and design data:

Dam
- Crest Elevation ..... 1,403.0 feet
- Crest Length ..... 11,245 feet
- Standard Project Flood Peak Outflow ..... 1,890 cfs
- Probable Maximum Flood Peak Inflow ..... 119,000 cfs
- Probable Maximum Flood Peak Outflow ..... 12,000 cfs

Spillway (trapezoidal)
- Crest Elevation ..... 1,377.8 feet
- Crest Length ..... 36 feet
- Sideslopes 1H:2V
- Elevation of Maximum Water Surface ..... 1,397.5 feet
- Peak Discharge ..... 9,620 cfs
- Peak Discharge Critical Depth ..... 12.29 feet
- Peak Discharge Velocity ..... 18.57 fps

4.2 Skunk Creek Channelization

Improvements to Skunk Creek between approximately 51st and 74th Avenues are described in the report entitled *Final Design Report Skunk Creek Channel Improvements*, by Simons, Li & Associates, Inc., (Ref. 7). The channel improvements include use of gabion mattresses along the majority of the improvement reach, as well as grade control structures and ramps.

4.3 55th Avenue Drainage Channel

The 55th Avenue Drainage Channel is located along approximately the 55th Avenue alignment, from the Agua Fria Freeway to Skunk Creek. It is a wide, trapezoidal, unlined channel with a very flat slope, which conveys runoff from a portion of the Arrowhead Ranch development south to Skunk Creek. Design of the channel is shown on *Arrowhead Ranch Infrastructure: 55th Avenue Drainage Channel* (Ref. Plan Set Bibliography).

4.4 Arrowhead Ranch Lakes System

Arrowhead Ranch is a master-planned community located north and south of the Agua Fria Freeway, west of 51st Avenue. The Lakes area of the development, located north of the Agua Fria Freeway and West of 51st Avenue, conveys storm runoff from portions of the development through a series of lakes, which outlet under the Agua Fria Freeway and into the 55th Avenue Drainage Channel. Detailed storm drainage analysis is provided in the *Specific Area Plan, Storm Drainage Plan* (Ref. 2) for Arrowhead Ranch.

4.5 Agua Fria Freeway (Loop 101)

Within the study area, the Agua Fria Freeway (Loop 101) runs parallel to Beardsley Road between Interstate 17 and approximately 75th Avenue. This portion of the freeway was designed by Stanley Consultants for the Arizona Department of Transportation Highway Division, as shown on as-built plans entitled *Phoenix Urbanized Area, Agua Fria Loop 101, Maricopa County, AZM-600-0-505, 101 L MA 17, Part B*, (Ref. Plan Set Bibliography).

Culverts and crossings of note in this area include: the Skunk Creek crossing through culverts at 43rd Avenue, the 51st Avenue underpass, and culverts at 55th Avenue which convey flow from Arrowhead Lakes to the 55th Avenue Drainage Channel.

5 Proposed Facilities

Potential facilities within the study area includes development of the currently natural desert areas, as well as the installation of a soundwall along the north side of the Agua Fria Freeway.

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3. Flood Control District of Maricopa County, *Consultant Guideline*, October 1, 1998.
4. Flood Control District of Maricopa County, *Delineation of Spillway Flow for Three West Side Structures, Contract FCD 98-32*, February 22, 1999.
5. Kaminski-Hubbard Engineering, Inc., *ACDC ADMS Phase I: Skunk Creek Watershed Hydrology Report*, February 28, 1995.
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7 Plan Set Bibliography

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Simons, Li & Associates, Inc., *Skunk Creek Channel Improvements, FCD 98-06, Phase I: Union Hills Drive to 51st Avenue*, March 27, 1998.

Simons, Li & Associates, Inc., *Skunk Creek Channel Improvements, FCD 98-19, Phase II: 74th Avenue to Union Hills Drive*, June 29, 1998.

United States Army Engineer District, Los Angeles Corps of Engineers, *Adobe Dam, Maricopa County, Arizona: As-Built*, August 1980.

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Field Survey Notes

Adobe Dam
Spillway Delineation Study
FCD 98-32

Hoskin Engineering Consultants, Inc.
DEI Professional Services
June 2001

Adobe Dam

Delineation of Spillway Flow

FCD 98-32

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
16863
LARRY M.
MALDONADO
Date Signed 5-3-01
ARIZONA, U.S.A.

Survey Report

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

May 3, 2001

Project Engineering Consultants, Ltd.

May 3, 2001

Adobe Dam
Delineation of Spillway Flow
FCD 98-32

Basis of Datum:
Accuracy and Order

The unit of measurement for this project is U.S. Survey Foot as defined by act of Congress in 1866.

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 NAD27 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 5-3-01
ARIZONA, U.S.A.

Engineers • Planners • Surveyors
2310 W. Mission Lane, Suite 4 Phoenix, Arizona 85021 (602) 906-1901 Fax (602) 906-3080
E-Mail: pec@pecaz.com

INDEX

P. 2, 3, 4 POINT DESC.
P. 5, 6 GPS SESSION A
P. 7, 8, 9, JOB SKETCH

	POINT DESC.
100	SET PK ORAIBI DR 1000'± E of 43 AVE
101	SET PK CHURCH PKS LOT TONAPAH DR 200'± WEST of 41 ST AVE
102	SET PK 47 AVE NEAR S/W COR DAM
103	BCF COG TONAPAH DR + 53 AVE
104	BCF COG 56TH LANE + ABRAHAM LN
105	BCF COG 59 AVE + ABRAHAM LN NORTH CAP of 2
106	BCF COG 59 AVE + DEC LAGO CIR
107	BCF COG POTTER DRIVE + IRMA LN
108	BCF COG N 70 DRIVE + IRMA LN
109	BCF COG N 79 AVE + BEAUBIEN DR S of ROSE GARDEN

POINTS 100 THRU 125 ARE PARKS

110 BCF C.C. WAHALLA LN 300'± WEST of N 77 AVE

111 BCF N 71 AVE + MARCO POLO LN

112 BCF C.C. ADOBE GRAN + WAHALLA LN

113 BCF 59 AVE + BEHREND DR.

114 SET PK 57 AVE 1/4± mi SOUTH of 101

115 BCF C.C. 53 AVE 150'± N of TONTO RD

116 BCF (C.O.P) N 48 AVE + W ORAIBI DR

117 SET PK UNION HILLS DR 600'± WEST of 47 AVE

118 BCF C.O.G. UNION HILLS DR + 53 AVE

119 BCF C.O.G. UNION HILLS DR + 57 AVE

120 SET PK 67 AVE 200'± S of SKUNK CREEK BRIDGE

121 BCHH .33 BELOW RIM
COR. 67 AVE + GROVERS

122 BCF COR N 70 DRIVE
+ GROVERS AVE

123 BCF MARICOPA COR 73 AVE +
ANGELA DRIVE

124 BCF 73 AVE + BELL RD

125 SET PK 69 AVE 400'± W
of BELL RD W/SIDE HOME DEPOT

126 BCF P.C. 70TH DR

127 BCHH COR 75 AVE + ROSE GARDEN LN

128 BCHH COR 75 AVE + DEER VALLEY RD

129 BCF DEER VALLEY RD + 63 AVE

CON. P. 12

GPS SESSION A 9-11-99

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A103	8:11	8:12		↓	↓
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A105	8:29	8:30			
A106	8:33	8:34			
A107	8:44	8:45			
A108	8:55	8:56			
A109	9:11	9:12			
A110	9:24	9:25			
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A123	10:05	10:06			
A121	10:13	10:14			
A120	10:17	10:18			
A112	10:28	10:29			
A113	10:34	10:35			
A114	10:39	10:40			
A115	10:47	10:48			

R.K. D.M.E.M. ADOBE DAM

REC 3
REC 2

ROVER 1
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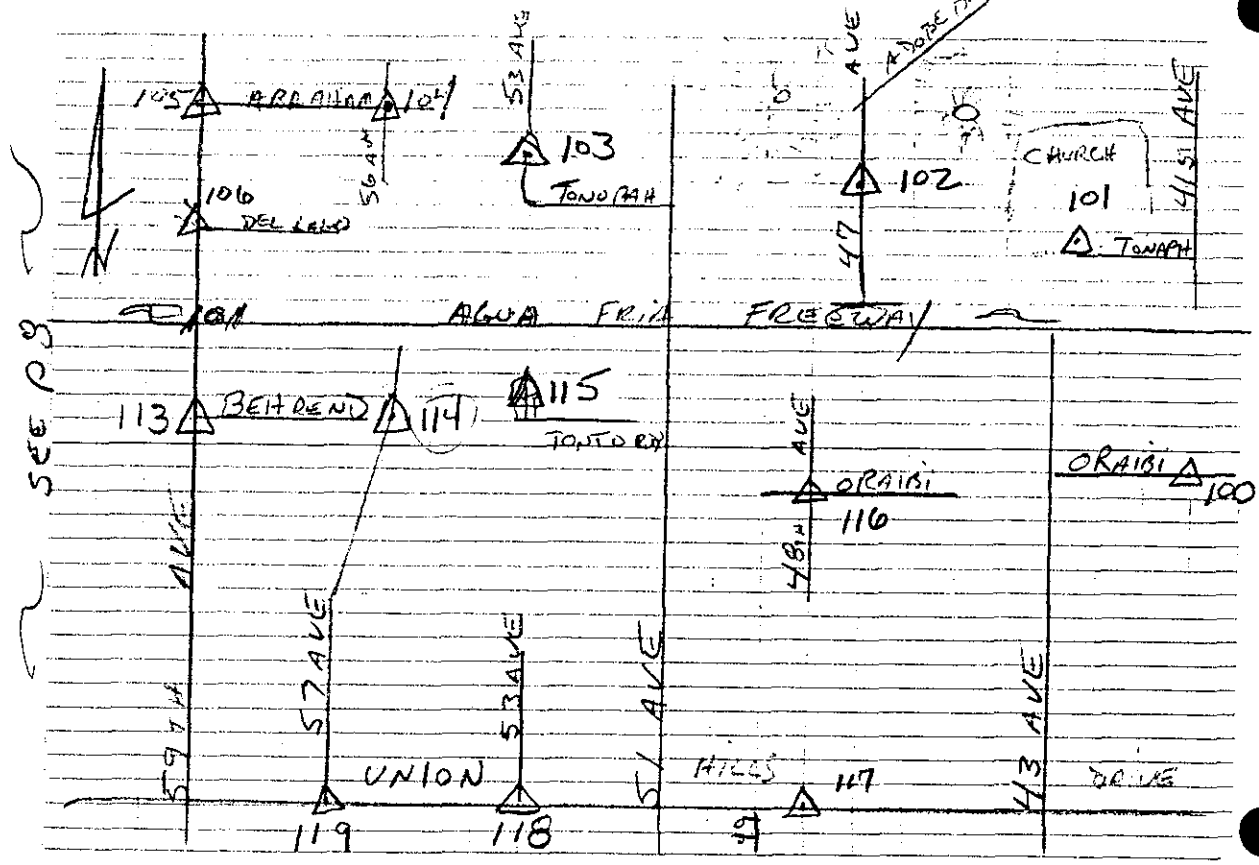
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TONOPAH
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DEL LAND
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ADOBE DR
AVE
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TONAPH
51 AVE
101
AGUA FRIA FREEWAY
SEE P 3
113
BEHREND
114
115
TONTO RD
AVE
ORAIBI
116
48 PL
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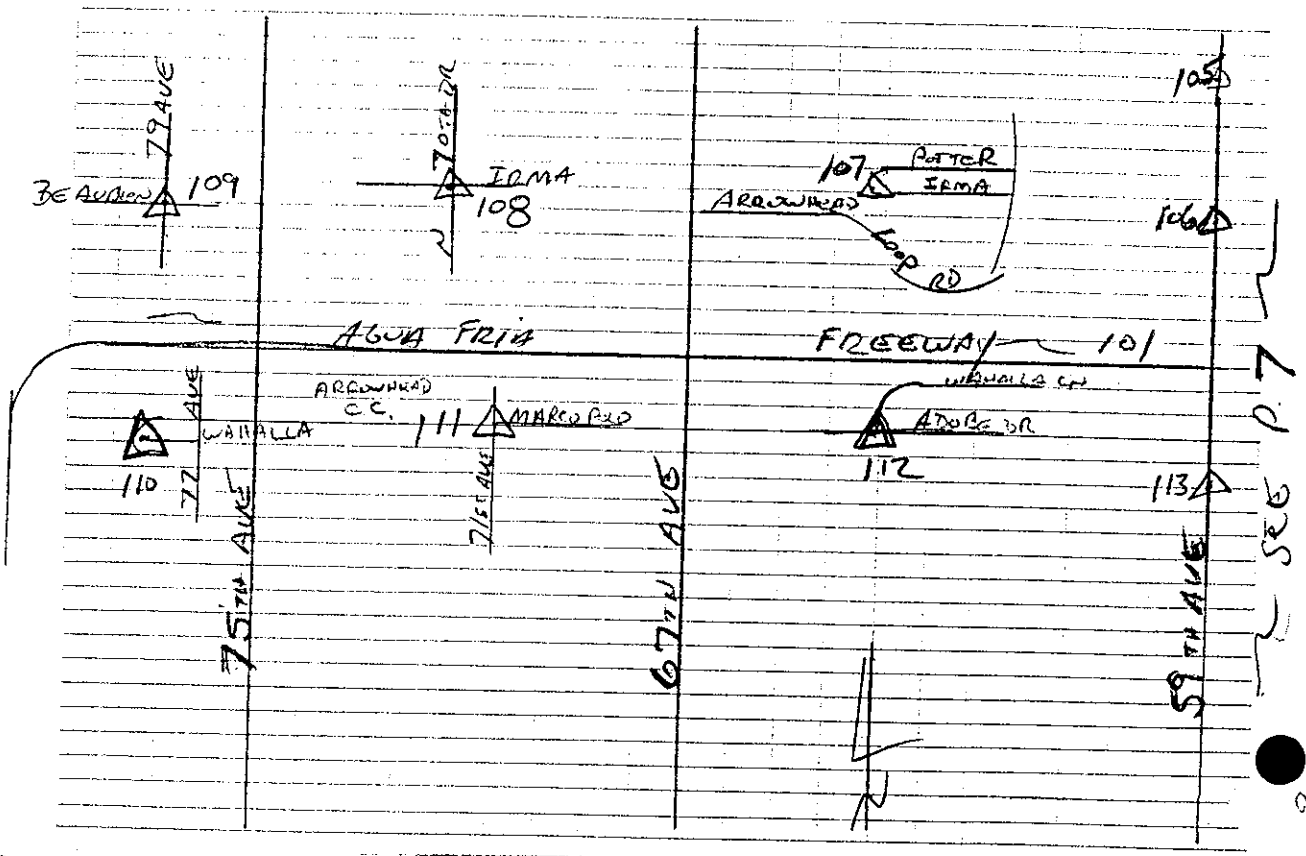
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FREEWAY
101
ARROWHEAD C.C.
111
MARCO PLO
WALHALLA
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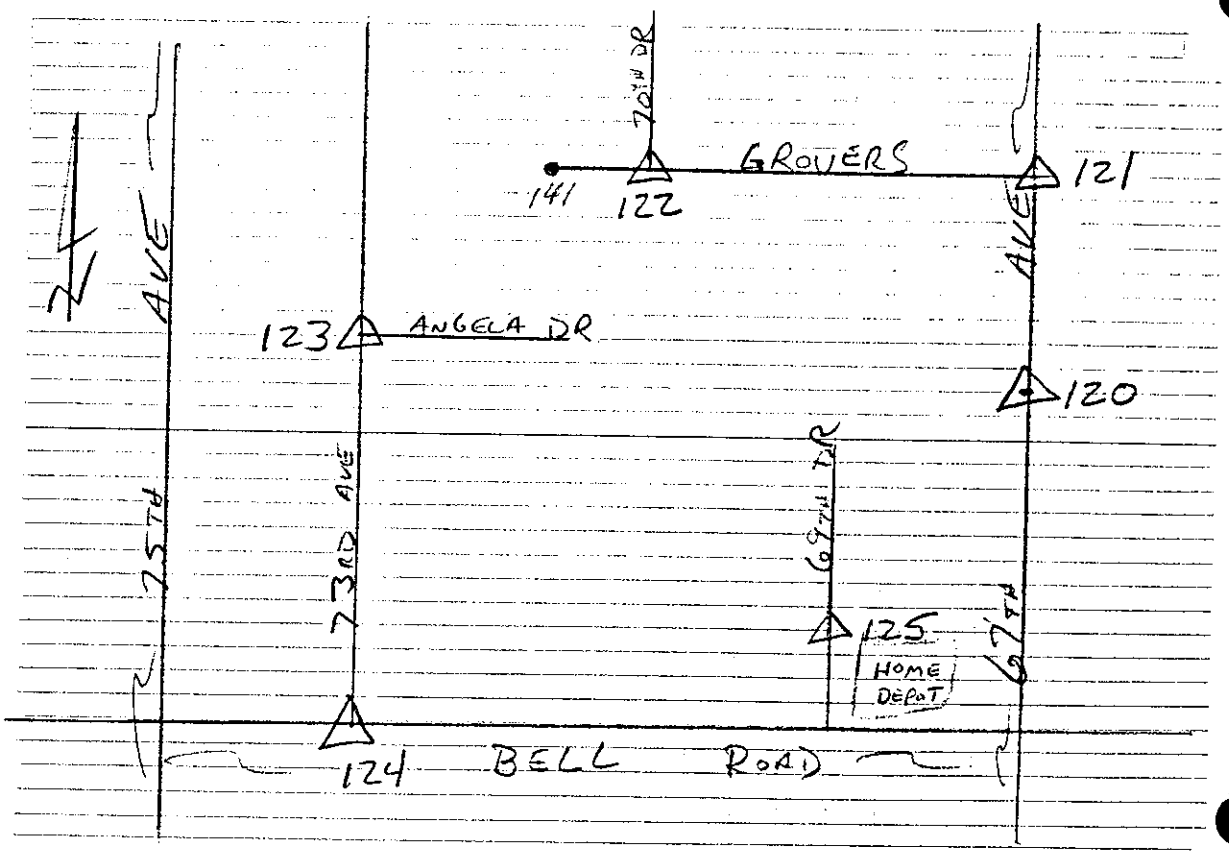
112
113
75TH AVE
71ST AVE
67TH AVE
59TH AVE
SEE P. 7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73RD AVE
70TH DR
GROVERS
141
122
121
AVE
123
ANGELA DR
120
69TH DR
125
HOME DEPOT
67TH
124
BELL ROAD

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A130	11:20	11:21			
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~ END SESSION ~

8-18-99 P.K. D.M. GA.

REC 2
REC 3

ROVER 1 ALCAMINO SUBDIV
75 AVE

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Session "C" 8-19-88

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P.K. DM. GA

REC 3 PANEL PT

REC 2 PANEL PT

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8/20-99 SESSION "D"

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A156	9:59	9:59			
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A162	10:32	10:33			
A163	10:37	10:38			
A164	10:48	10:49			
A166	10:54	10:55			
A165	11:01	11:02			
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REC 2

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SESSION E

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8/25/99 RKDM

REC 2

REC 3

ROVER 1

PHOTO ID POINT C good

TC 127 HI BS 128

BCHH 5.94 BCHH

75 AVE + ROSE GARDEN 75 + GLENDALE

H.R.

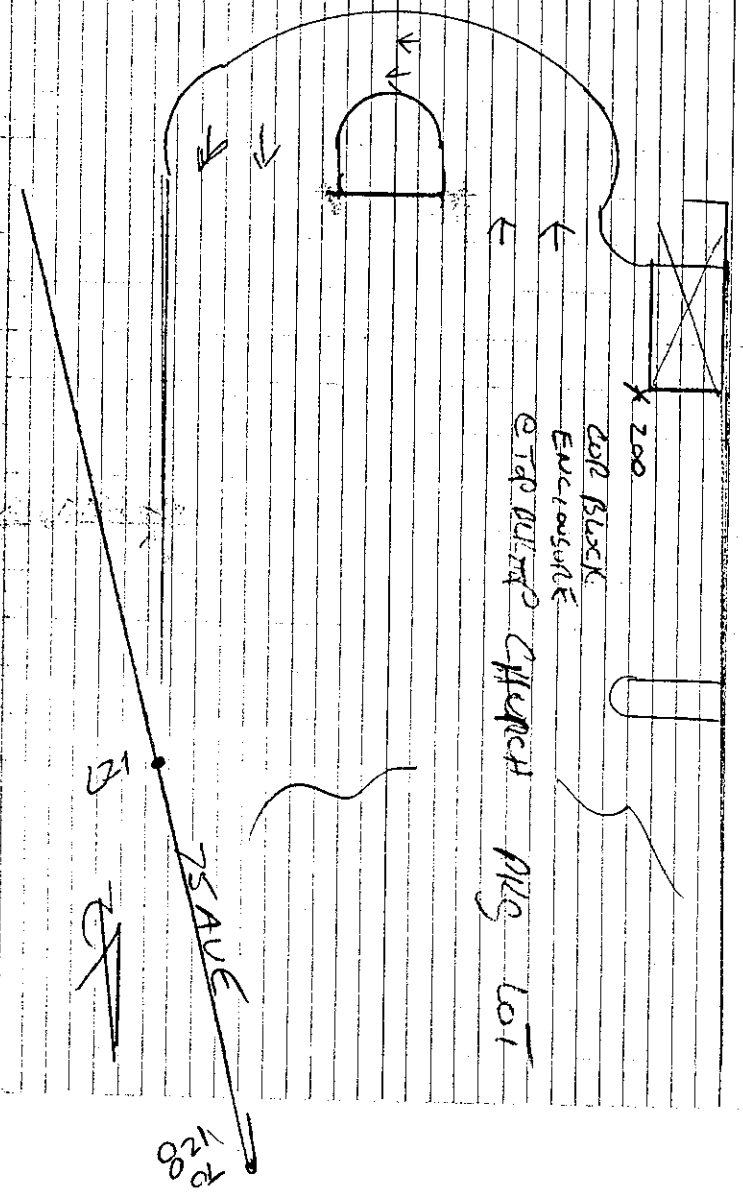
TO 200°/ 241° 40 40° 5.45

H/D 1,078.89

N/E COR BLOCK ENCLOSURE

@ TOP BLACKTOP PKG

COMMUNITY OF JOY PROPERTY



STA	HR		DESC
T@ 1,		BS 150	
HI 5 82		HT 5 45	
171	486	GOOD NAIL ±250' E OF 55TH AV.	
172	486	BCHH 55TH AV & WESTBOUND	
		101 FRONTAGE RD	
		END	
T@ 171	BS 150		
HI 5 26	HT 5 45		
173	10 96	TOP OF BANK W/ OF WIER	
74		W. END TOP OF WIER	
75		WATER LEVEL	
76		TOP OF WIER E. END	
77	10 96	TOP OF BANK @ WALL	
78	15 75	FE BOX CULVERT	
79			
80			
81			
82			
83	15 75	FE BOX CULVERT	
84	6 25	EXIT FE BOX CULVERT	
85			
186	6 25	EXIT FE BOX CULVERT	

LARGE 6'

15-AUG-200

E. PUCKETT

W.O. XXXXXX

D. WORKMAN

P/CLOUDY-HOT 100's

BS @ PT# 150 55TH AV &

WESTBOUND 101 FRONTAGE RD

ASSUMED BEARING ON FRONTAGE RD OF N 89-00-00W BETWEEN SEC COR & 1/4 COR

STA	HR	DESC
187	6.25	EXIT FL BOX CULVERT
88		
189	6.25	EXIT FL BOX CULVERT
90		INLET FL BOX CULVERT
91		
92		
93		
94		
95	6.25	INLET FL BOX CULVERT
96		TOP OF WALL @ BOX CULVERT
97		TOP OF WALL MID PT
98		TOP OF WALL @ BOX CULVERT
199		TOP OF WALL @ BOX CULVERT
200		TOP OF WALL MID PT
201		TOP OF WALL @ BOX CULVERT
02		END ADOT SOUND WALL W
03		END ADOT SOUND WALL E
04	4.86	SET PK SO. SIDE FRONTAGE ± 54'
05	0.30	TOP OF PERIMETER WALL
06		" " "
07		MID PT WALL & BOX CULVERT
08		
209		TOP OF PERIMETER WALL

	IT			
BC @ 171	5.			
T@ 204	5.0			
STA	HR			
210	4.86		Set RK	
211	8.00		NG	
212	4.86		B.C	
213			GUT	
214			LIP	
215			P/GB	
216			LIP	
217			GUT	
218			BC	
219	4.86		NG @ FENCE / TOE	
*220	4.86		SET RK IN N. Curb median (2' from T/C) @ 51st & BEARDSLEY	
221	0.25		NG @ N. WALL	
222	4.86		N.G. / TOE	
223			E.P	
224			P	
225			E.P	
226	4.86		NG / GB / Swale	
227	0.25		NG @ Sound wall	

15 Aug 2000

D. Workman

W. Oldato

D. Winter

Heritage Rd

RK [illegible] @ 54th Ave / [illegible]

east of West [illegible] wall

① * CROSS SECTION @ W. BCQ W. of ℄ INT. 51ST AVE & BEARDSLEY

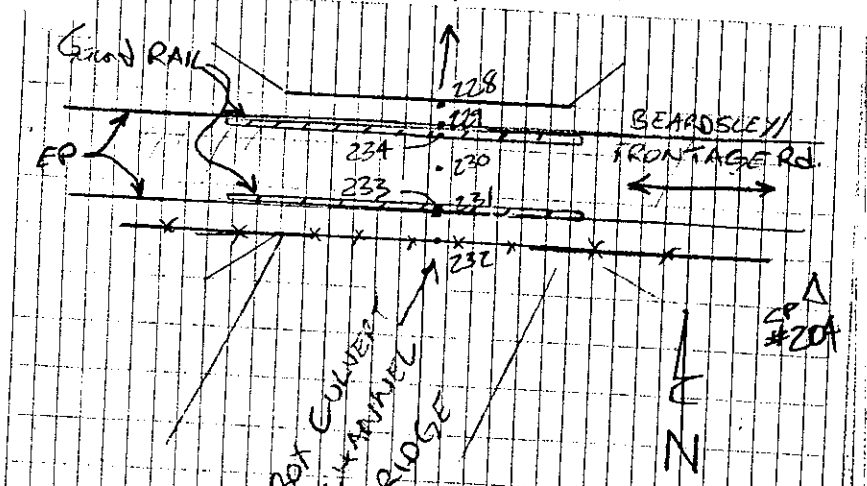
CONTROL PT.

① * CROSS SECTION @ APPROX. 53RD AVE

STA		DESCRIPTION
TP 204 HI	01	
BS 171	HT-5.15	
228	4.86	NG @ N. wall on weir
		structure on Box Culvert
229		E.P.
230		P
231		E.P
232		NG @ CLF on Top of
		Box Culvert
233		& 2' wide Guard Rail
234	4.86	" " " "
TP 210	HI 5.44	BS 204 HT-4.97
235	10.00	NG @ F/O. wall
236	8.00	& Top wier (2' wide)
237		" " "
238		" " "
239		NG @ F/O wall
240		NG @ F/O wall
241		& Top wier 1 (2' wide)
242		WATER LEVEL 1
243		Water Level
244		water Level
245		water Level 2
246	8.00	WATER Level

CROSS SECTION (1)

LAKE



(4) ARROW HEAD RANCH

← WATER DOES NOT spill over

← WATER spills over

← (@ WIER 1) LAKE LEVEL (AFTER SPILL over)

← (@ WIER)

LAKE LEVEL @ INLET/Pump

WATER LEVEL IN BETWEEN WIER 1 AND

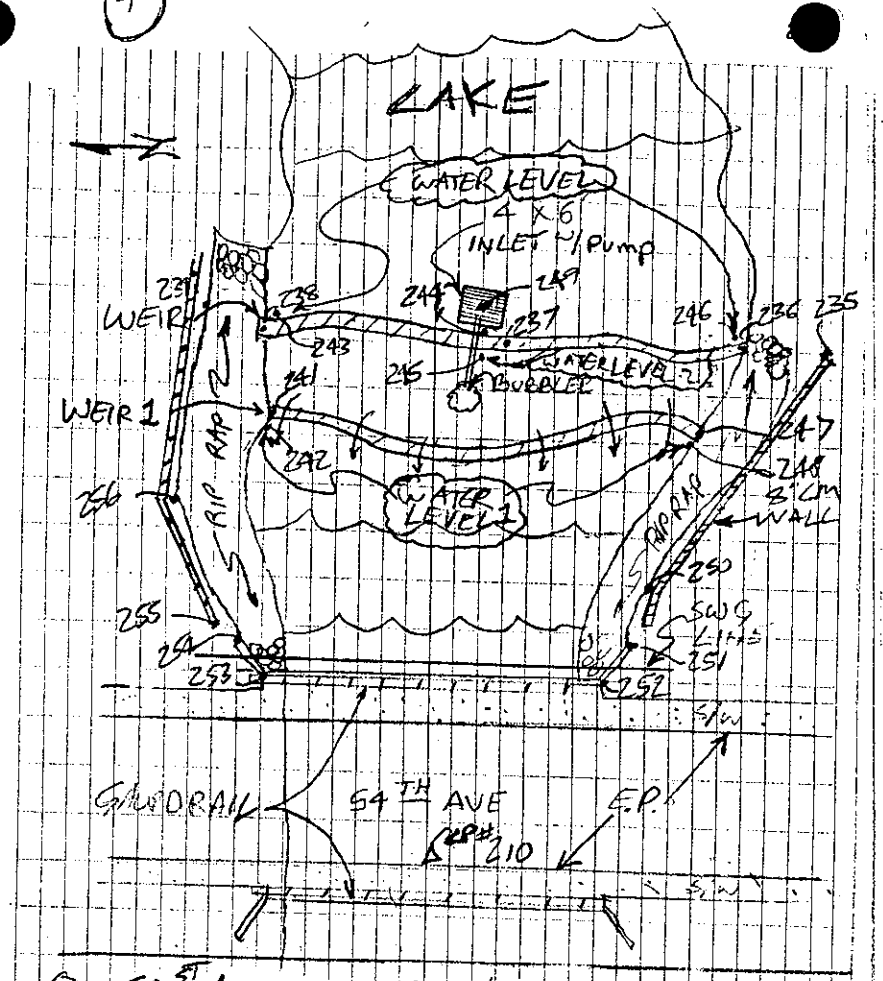
247	8.00	@WIER 1 / LAKE LEVEL
248	7.50	WATER LEVEL 1
249	8.00	℄ 4'X6' BOX INLET W/Pump
250		NG @ COR. WALL
251		WING WALL
252		HEAD WALL
253		HEAD WALL
254		WING WALL
255		NG @ BEG. WALL
256	8.00	NG @ F/O WALL Ang. PT.

TP@220 HI-5.45 BS 204 HT-4.97

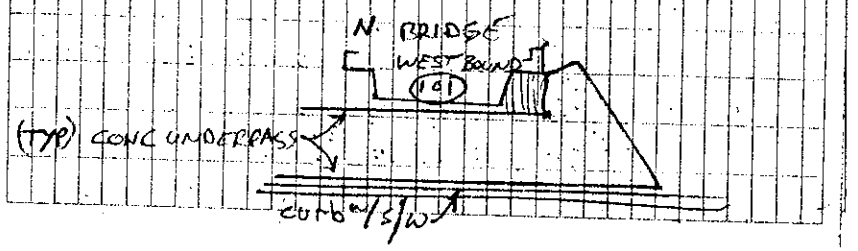
CP #256 4.86 SET NAIL 2' O/E.F.

EAST SIDE BRIDGE

257	0.25	N F/O ~~BRIDGE~~ BTM & TOP CONC. Underpass
258	0.25	N. F/O BRIDGE @ TOP (E.)
259	4.86	TOP ~~& PT~~ CONC. underPass @ F/O WALL
260	0.25	TOP CONC @ Bottom BRIDGE
261	4.86	TOE CONC @ B/W
262		CONC. P. N. Bound
263	4.86	CONC. P. S. Bound



② 51ST AVE UNDERPASS / N. Side - W. Side



TC[illegible]	HI 5.45	BS 204 HT 4.97
		WEST Side BRIDGE
264	9.86	N @ TOE CONC. underpass
265	0.25	TOP CONC. @ BTM. BRIDGE
266	4.86	TOP & PT. Conc. underpass @ F/O wall
267	"	N. F/O BRIDGE @ BTM & TOP CONC. underpass
268	0.25	N F/O BRIDGE @ TOP (W.)
(*269)	4.86	CP, SET NAIL @ E. SIDE of S1ST AVE & Tonopah Dr.
TC @ 269 HI - 5.26		BS 220 HT - 5.23
(*270)	4.88	CP / SET Nail 10' off
TC @ 270 HI - 4.95		BS 269 HT - 4.97
271	4.86	W. F/O walk / S. Side Bridge
272	"	W. B/W & TOP BRIDGE
273	4.86	W. Top of weir STRCTR. BTM. Bridge
274	15.68	W. weir STRCTR. (@ H_2O level)
275		E. F/O walk / N. Side Bridge
276		E. B/W & Top Bridge
277		E. Top of weir STRCTR BTM. Bridge
278		E. weir STRCTR. @ H_2O level
279	15.68	E. Top Lake @ BEG. Rip Rap

(2) S1ST AVE UNDERPASS
N Side / E. Side

(2' OFF E.P. N. OF 220)

B/C on S. Side Tonopah E. of Bridge #5

Arrow Head Ranch
BRIDGE #5
WEIR STRUCTURE

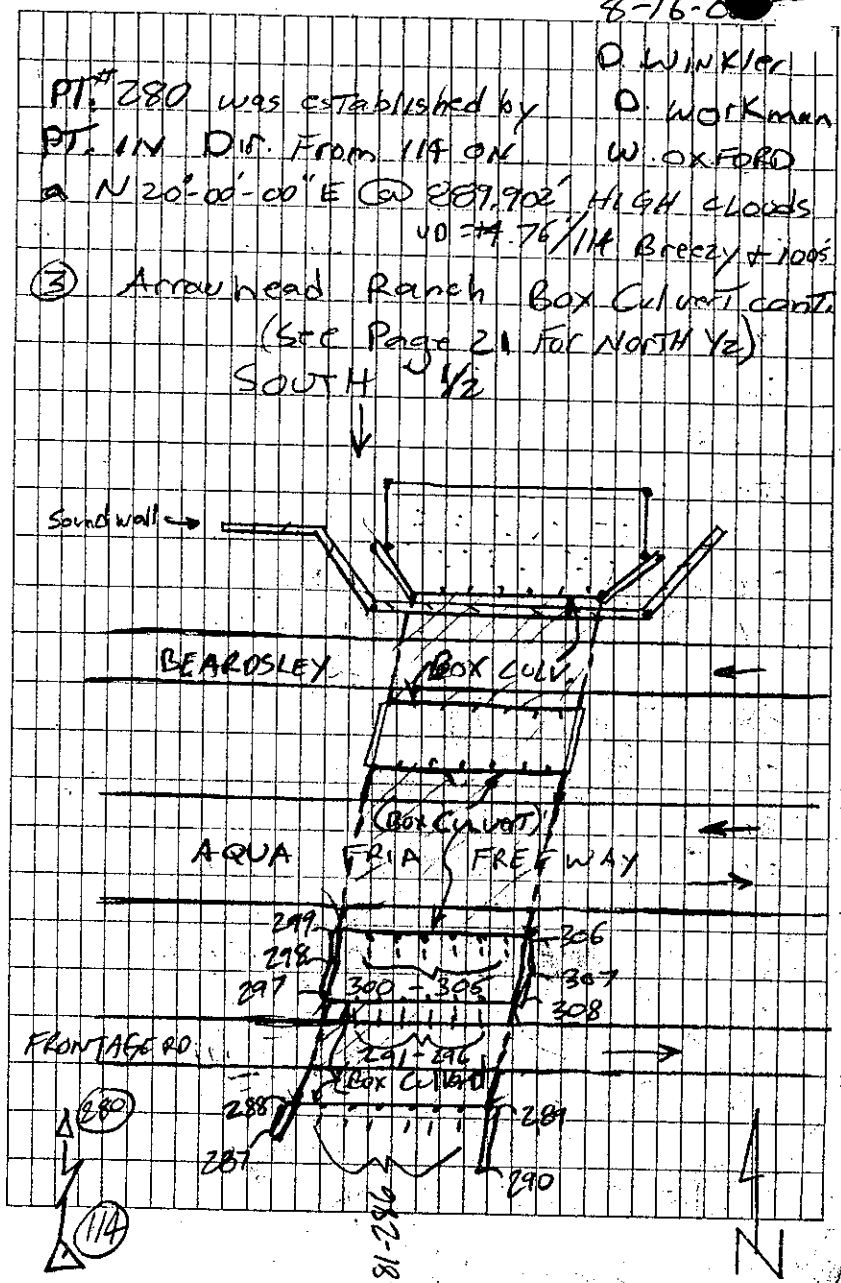
ST	200	Description
TK@ #280 HT=5.24' BS #114 HT=5.16'		
281	8.00	Box Culvert ℄ ⊥
282		
283		
284		
285		
286		Box Culvert ℄ ⊥
287		Top Wing wall
288		Top Head wall
289		Top Head wall
290	8.00	Top Wing wall
291	12.00	Box Culvert 1 ℄ ⊥
292		
293		
294		
295		
296		Box Culvert 1 ℄ ⊥
297		Top Head Wall 1
298		Top Wall
299		Top Wall
300	12.00	Box Culvert 2 ℄ ⊥

8-16-0[illegible]26

D. Winkler
D. Workman
W. Oxford

PT. #280 was established by
PT. 1N Dir. From 114 on
a N 20°-00'-00" E @ 289.902' High Clouds
VO = 74.76/114 Breezy + 100's

(3) Arrowhead Ranch Box Culvert cont.
(See Page 21 for North 1/2)

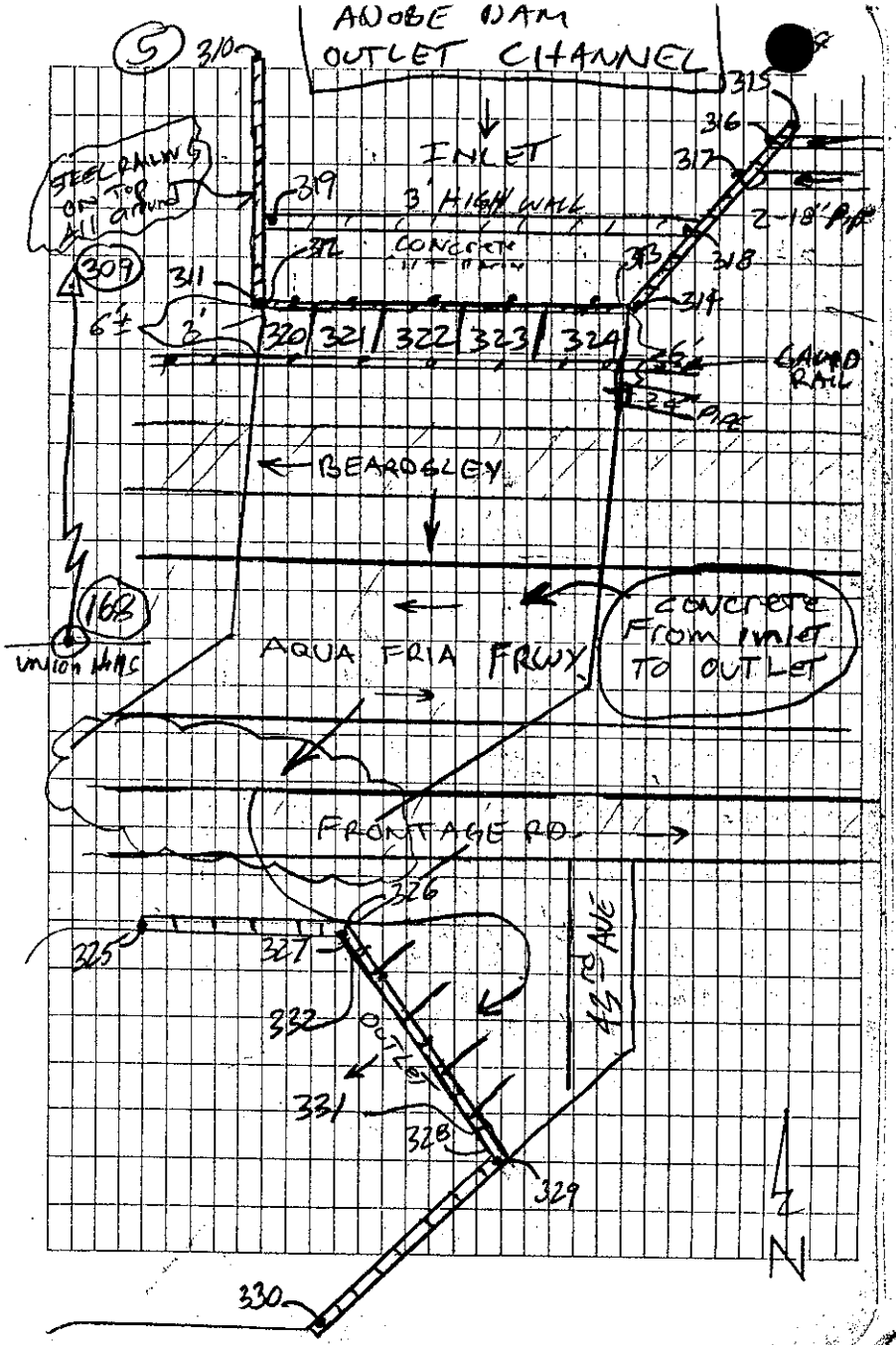


STA	OFFSET	DESCRIPTION
301	12.00	BOX Culvert Z & E
302		
303		
304		
305		BOX Culvert Z & F
306		Top Head wall Z
307		Top HEADWALL & PT
308	12.00	Top Headwall END
TP@ 309 HI-526		BS 168 HT-5.57
310	12.00	Top WING WALL
311		" " "
312		Top Headwall
313		" "
314		Top WINGWALL
315		" "
316		& 18" PIPE INVERT
317		" " "
318	12.00	Top 3' High Headwall
319	16.00	" " "
320		BOX Culvert & E
321		
322		
323	16.00	Box Culvert & E

PT #309:
SET NAIL ON N. side BEARDSLEY/W CULT
PT #309 was established BY PT. INDIR
FROM 168 ON a S00°-00'-00" W
@ DIST-5574.456' VD=+29.22/168
(E) 43rd AVE + AQUA FRIA FRWY.
BOX CULVERT @ ADOT DAM
OUTLET CHANNEL

SILT BASIN - BEG
" " - END

STA	ROD	DESCRIPTION
324	12.00	Box Culvert ℄ ⅊
325		Top WINGWALL
326		" "
327		Top Headwall
328		" "
329		Top WINGWALL
330		" "
331		⅊ @ INSIDE COR. Box Culvert
332	12.00	℄ @ INSIDE COR. Box Culvert



Point Location

Station	H.I.	Operator	Time On	Time Off	Epochs
#102 T-sta	2.119m	JDM	7:23am	12:41pm	
#382 T-sta	2.935m	JDM	7:50am	12:28pm	
#101	2.149	JDM	8:07am	8:17am	120
#132		J.D.M	8:31am	8:41am	120
#119		J.D.M	9:00am	9:10am	120
#117		J.D.M	9:21am	9:31am	120
#269		J.D.M	9:55am	9:57am	24
#103		J.D.M	10:02am	10:04am	24
#270	2.149m	J.D.M	10:10am	10:12am	24
#210			10:23am	10:25am	24
#220			10:54am	10:57am	24
#280			11:15am	11:17am	24
#204			11:34am	11:36am	24
#300			11:45am	11:47am	24
#172			11:55am	11:57am	24
#114	2.149m	J.D.M	12:07pm	12:07pm	24

END SETUP

8/18/00
J.D. Maurer
Partly Cloudy
Muggy 85°-88°

PK in Panel @ 47th Ave N. of Freeway
Nail Set 10' S. of Frontage RD / North Side

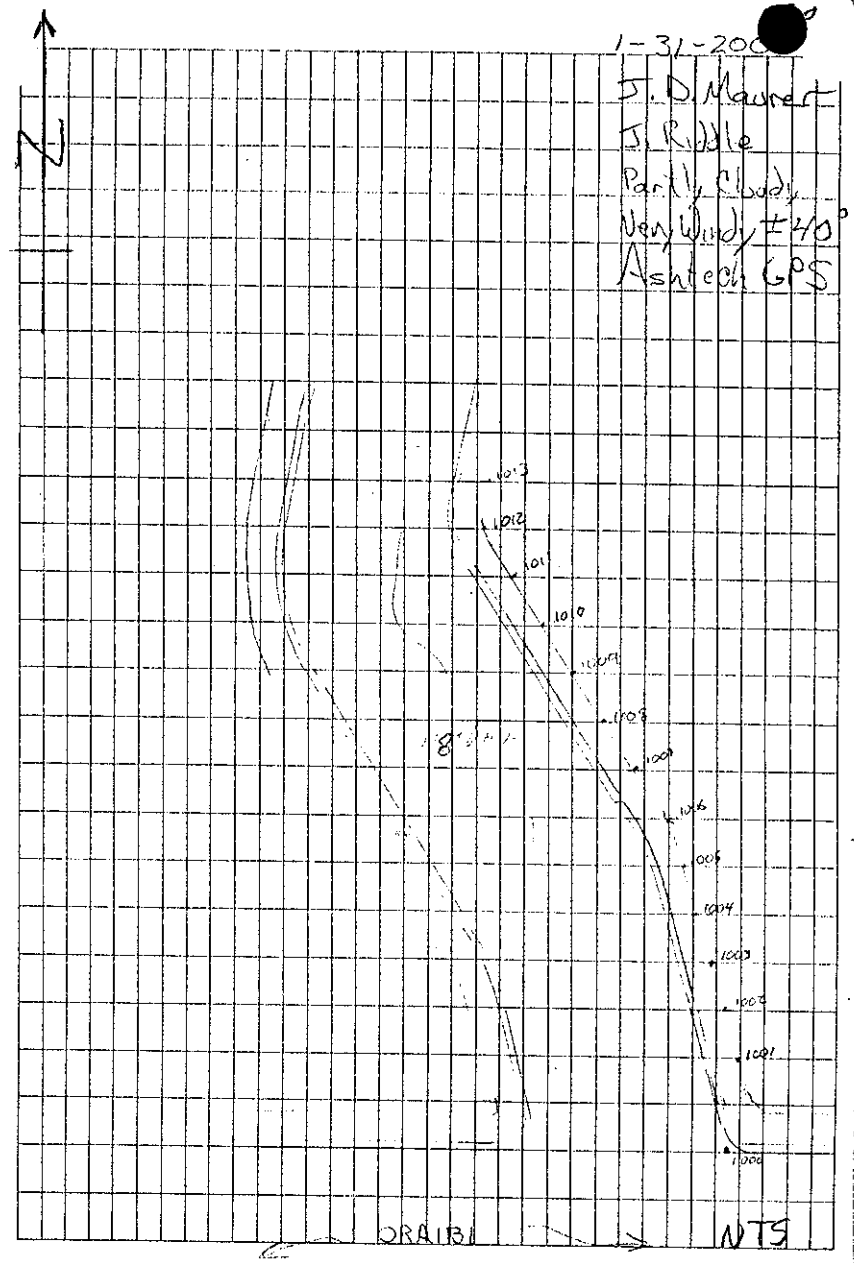
PK in Panel pt. South Side Church Parking Lot
BCHH N. side Frontage RD @ S.B. lane @ 63rd Ave.
BCF @ Union Hills to @ 57th Ave North
PK in Panel pt @ Union Hills approx 350'± E. of 49th Ave
Set Nail @ East Side 51st Ave 30'± N. of Tonopah
BCF in Panel @ @ Tonopah to 53rd Ave
Set Nail S. side Tonopah 10'± Under tree (Hands)
PK 180'± N. @ Pontiac on Bridge W. side 54th Ave
PK in Median 10'± N of WB. Frontage RD
@ Median 57th Ave 50'± S. South Frontage (Set nail)
PK S. side Westbound Frontage RD @ 54th Ave ±
W. side box culvert, N. side WB Frontage 120'± E. of 55th Ave
BCH @ WB Frontage to 55th Ave
PK in Panel @ 57th Ave 1,100'± S. of EB. Frontage RD

Sta	" Z	Oper	Unit	Start	Stop
108	2.188m	J.D.M.	"C"	7:28am	2:44pm
102	2.293m	"	"A"	7:53am	2:56pm
116	2.149m	"	"Rover"	8:43am	8:53am
112	2.149m	J.D.M.	"Rover"	2:21pm	2:31pm

Sta	H.R.	Length/Time	Description	
~~1000~~	~~2.145m~~	~~6 seconds~~	~~Rolled gutter~~	Delete Points
~~1~~	~~"~~	~~"~~	~~Curb Break~~	
~~2~~	~~"~~	~~"~~	~~116~~	
~~3~~	~~"~~	~~"~~	~~"~~	
4	"	"	"	
5	"	"	"	
6	"	"	"	
7	"	"	"	
8	"	"	"	
9	"	"	"	
1010	"	"	"	
11	"	"	"	
12	"	"	"	
13	2.145m	6 seconds	NG	

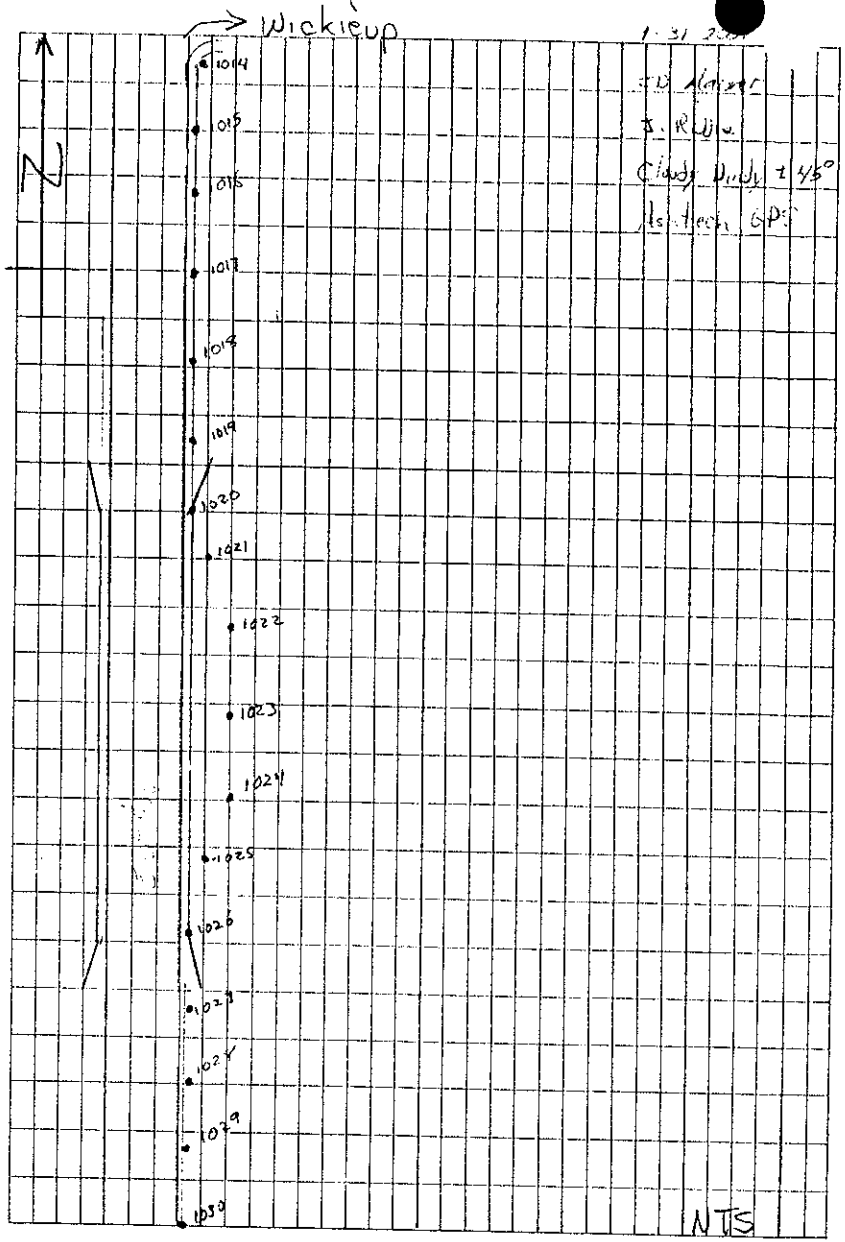
1-31-200

J.D. Maurer
J. Riddle
Partly Cloudy
Very Windy ≠40°
Ashtech GPS



Rolled gutter
Sidewalk

S	H.R.	Length/Time	Description
1014	2.145m	6 seconds	Natural Ground
15	"	"	" "
16	"	"	" "
17	"	"	" "
18	"	"	" "
19	"	"	" "
1020	"	"	Top
21	"	"	Mid Point
22	"	"	Toe
23	"	"	Flow line
24	"	"	Toe
25	"	"	Mid point
26	"	"	Top
27	"	"	Natural Ground
28	"	"	" "
29	"	"	" "
1030	2.145m	6 seconds	Natural ground



1.31 2000
J.D. Alanner
J. Rujo
Cloudy Windy 1 45°
Instech GPS

S	H.R.	Length/Time	Description			
1031	2.145 m	6 seconds	Natural Ground	edge	road	
32	"	"	"	"	"	"
33	"	"	"	"	"	"
34	"	"	"	"	"	"
35	"	"	"	"	"	"
36	"	"	"	"	"	"
37	"	"	"	"	"	"
38	"	"	approximate edge wash			
39	"	"	"	"	"	
1040	"	"	"	"	"	
41	"	"	"	"	"	
42	"	"	"	"	"	
43	"	"	approximate edge of wash			
44	"	"	Natural Ground	edge	road	
45	"	"	"	"	"	"
1046	2.145 m	6 seconds	"	"	"	"

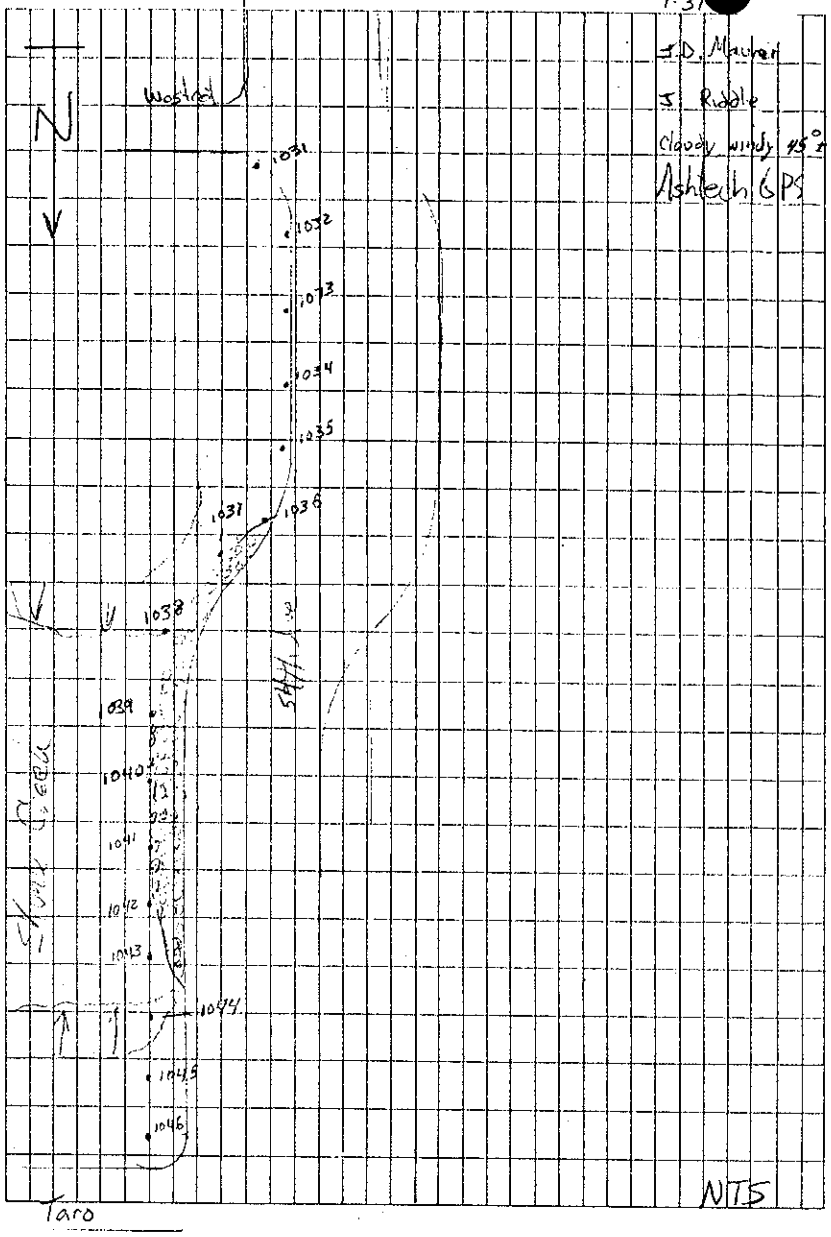
1.3

J.D. Maurer

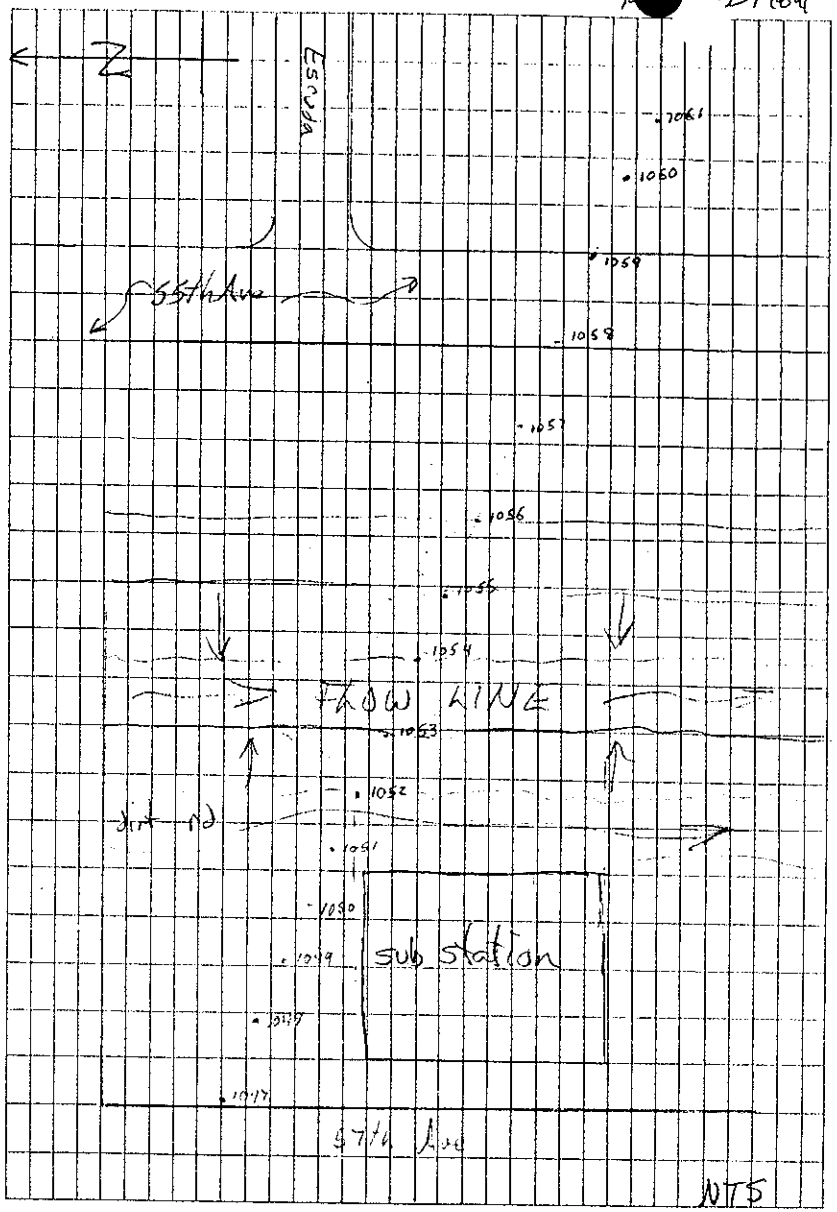
J. Riddle

Cloudy windy 45°F

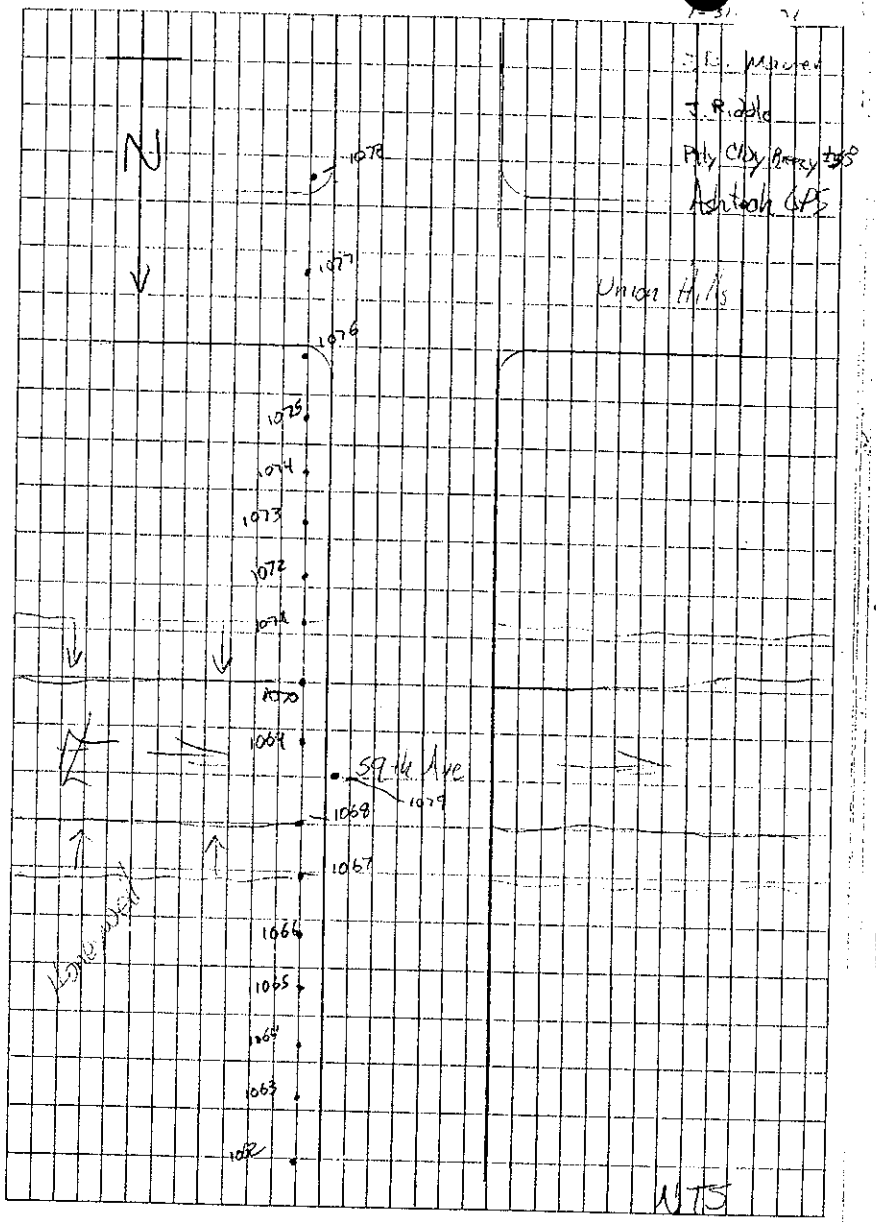
Ashtech GPS



Sta	H R	Length Time	Description	
1047	2.145m.	6 seconds	Normal Drain	
48	"	"	"	"
49	"	"	"	"
50	"	"	"	"
51	"	"		Toe
52	"	"		Top
53	"	"		Top
54	"	"		Toe
55	"	"	Flow line Dash	
56	"	"	Toe	
57	"	"	Top	
58	"	"	edge	
59	"	"	"	"
~~60~~	~~"~~	~~"~~	~~"~~	~~"~~
61	2.145m	6 seconds	"	"

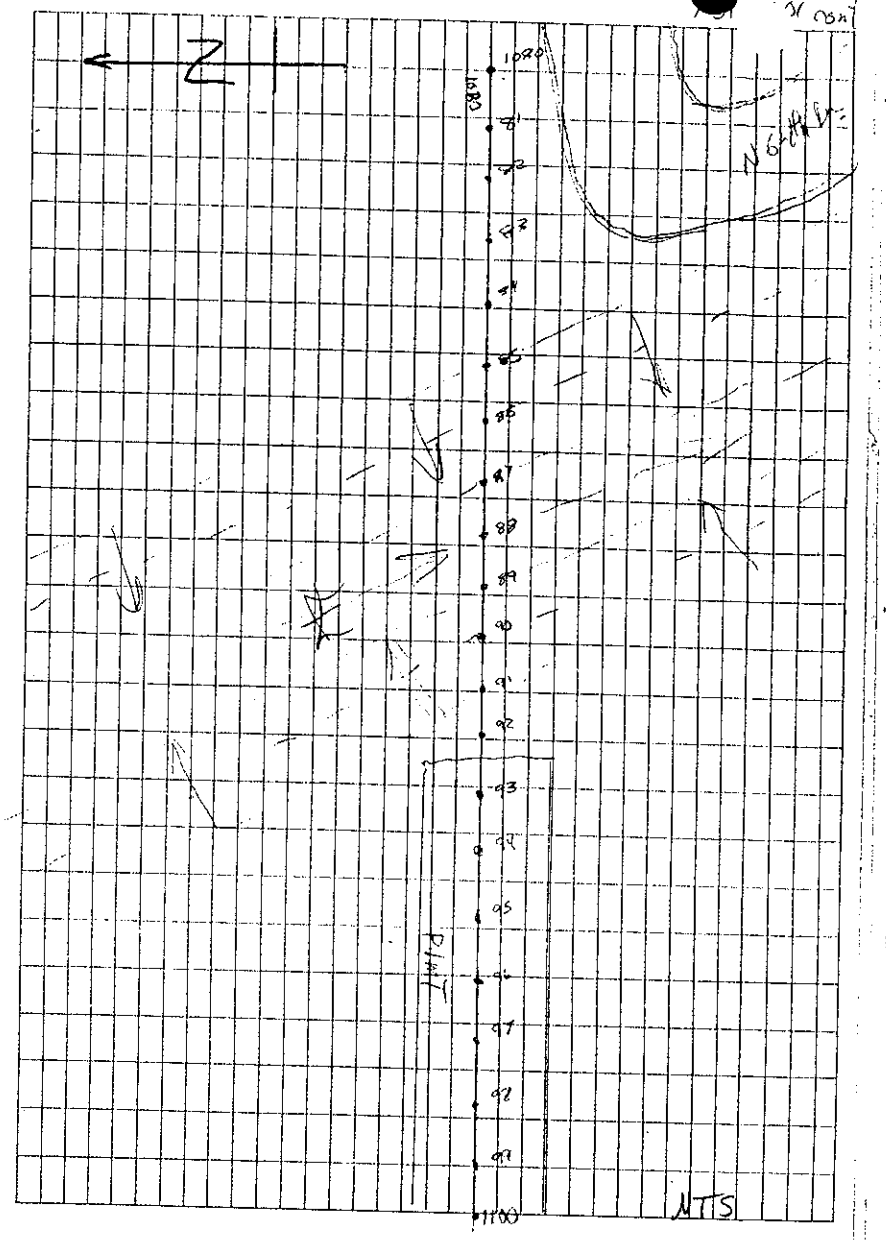


	H.R.	length/Time	Description
1062	2.145m	6 seconds	Natural Ground
63	"	"	" "
64	"	"	Driveway
65	"	"	NG
66	"	"	NG
67	"	"	Top
68	"	"	Toe
69	"	"	"
1070	"	"	Toe
71	"	"	Top
72	"	"	NG
73	"	"	"
74	"	"	"
75	"	"	
76	"	"	~~N.E. Cor/ground~~
77	"	"	℄ Union Hills point
~~78~~	~~2.145m~~	~~6 seconds~~	~~S.E. Cor/ground~~
1079	"	"	℄ of bridge



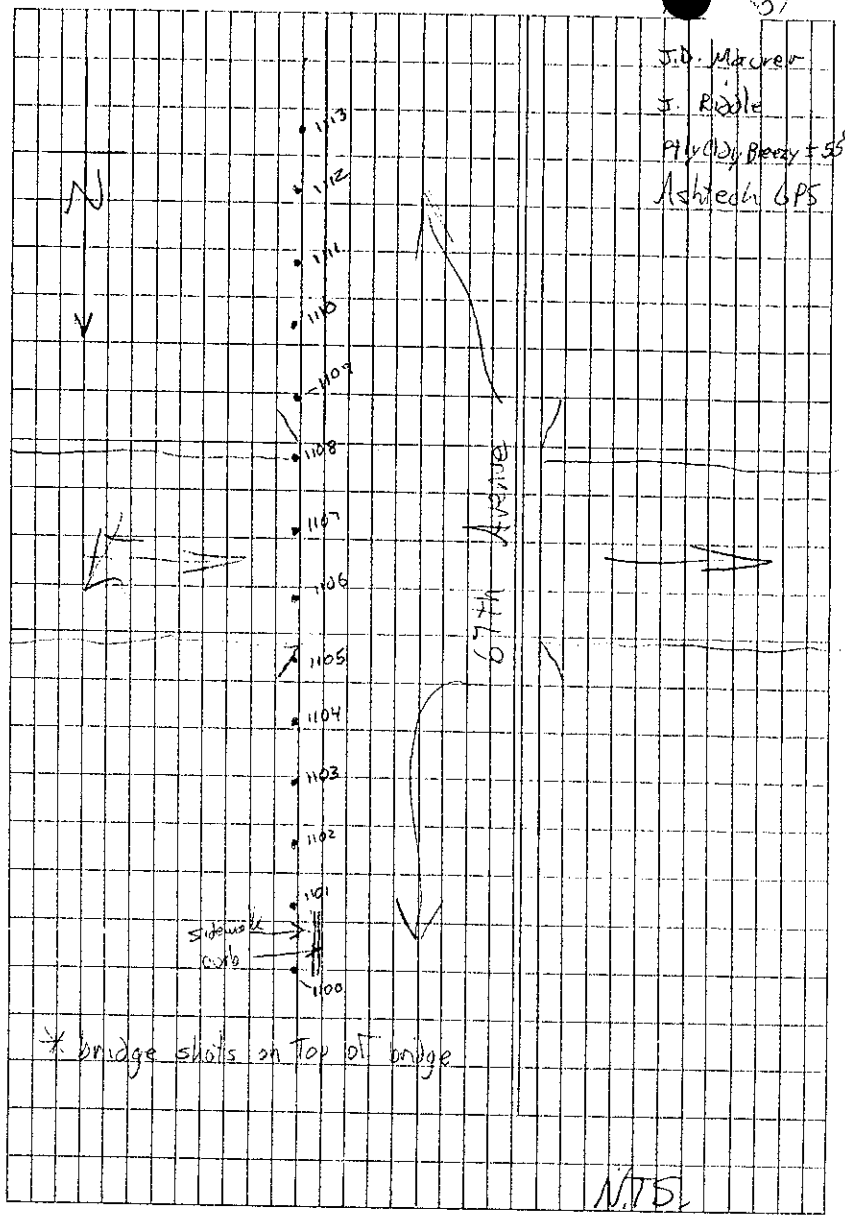
J.R. Marcus
J. Riddle
Poly Clay Rocky Top
Ashtech GPS

	H.R.	Length/time	Description	
80	2.145m	6 seconds	Natural ground	
81	"	"	"	"
82	"	"	"	"
83	"	"	"	"
84	"	"	"	"
85	"	"	Top	
86	"	"	Mid Point	
87	"	"	Toe	
88	"	"	Ø ft	
89	"	"	Toe	
1090	"	"	Mid Point	
91	"	"	Top	
92	"	"	Top	
93	"	"	Toe	
94	"	"	Punt	
95	"	"	"	
96	"	"	"	
97	"	"	"	
98	"	"	"	
99	2.145m	6seconds	Punt	



	H.R.	Longitude	Description.
1100	2.145m	6 seconds	Ground
101	"	"	"
102	"	"	"
103	"	"	"
104	"	"	Ground
105	"	"	Bridge
106	"	"	"
107	"	"	"
108	"	"	Bridge
109	"	"	Ground
1110	"	"	"
111	"	"	"
112	"	"	"
1113	2.145m	6 seconds	Ground

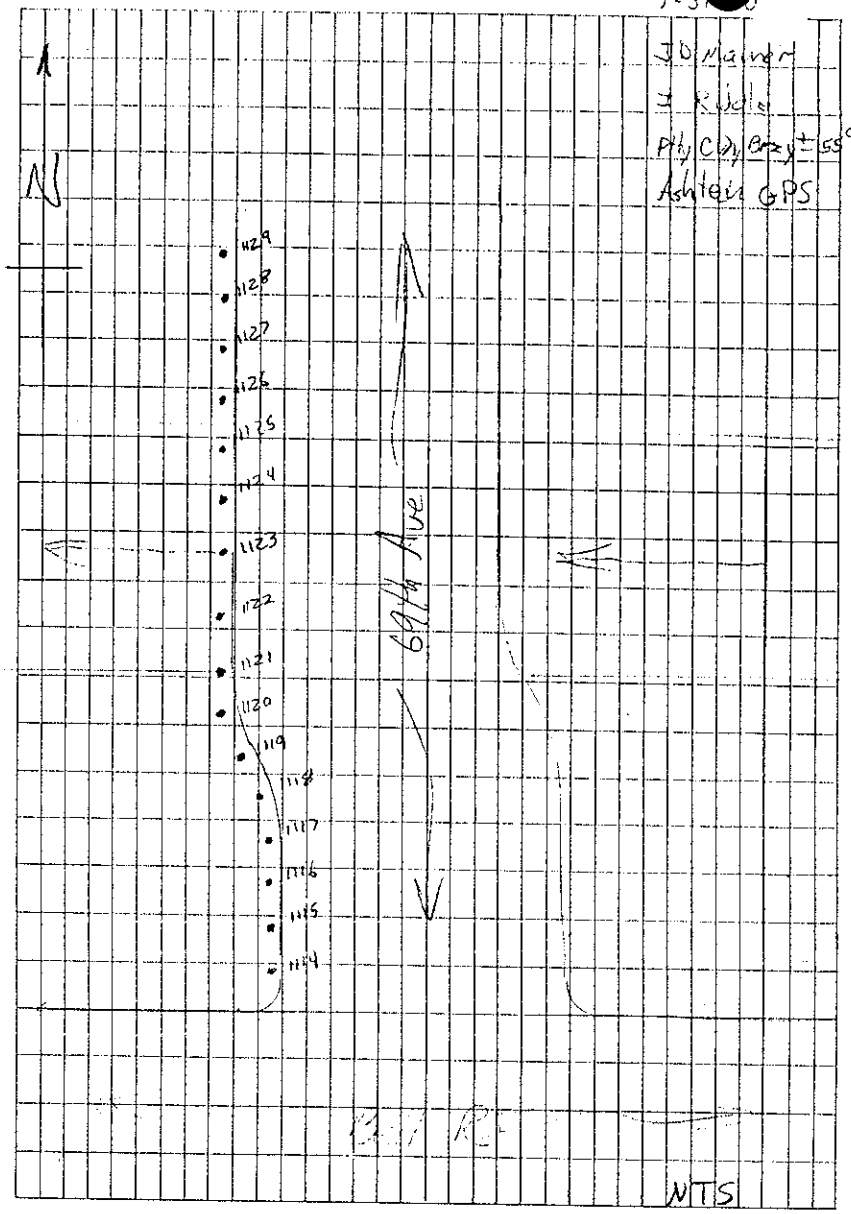
No Good



Pt.	H.R.	Length/Time	Descriptions		
1114	2.145m	0 seconds	Edge of Pavement		
115	"	"	"	"	
116	"	"	"	"	
117	"	"	"	"	
118	"	"	"	"	
119	"	"	"	"	
1120	"	"	"	"	
121	"	"	"	"	
122	"	"	"	"	
123	"	"	Flow Line		
124	"	"	Edge of Pavement		
125	"	"	"	"	
126	"	"	"	"	@ gutter
127	"	"	"	"	"
128	"	"			
1129	2.145m	6 seconds	Edge of Pavt @ gutter		

1-3

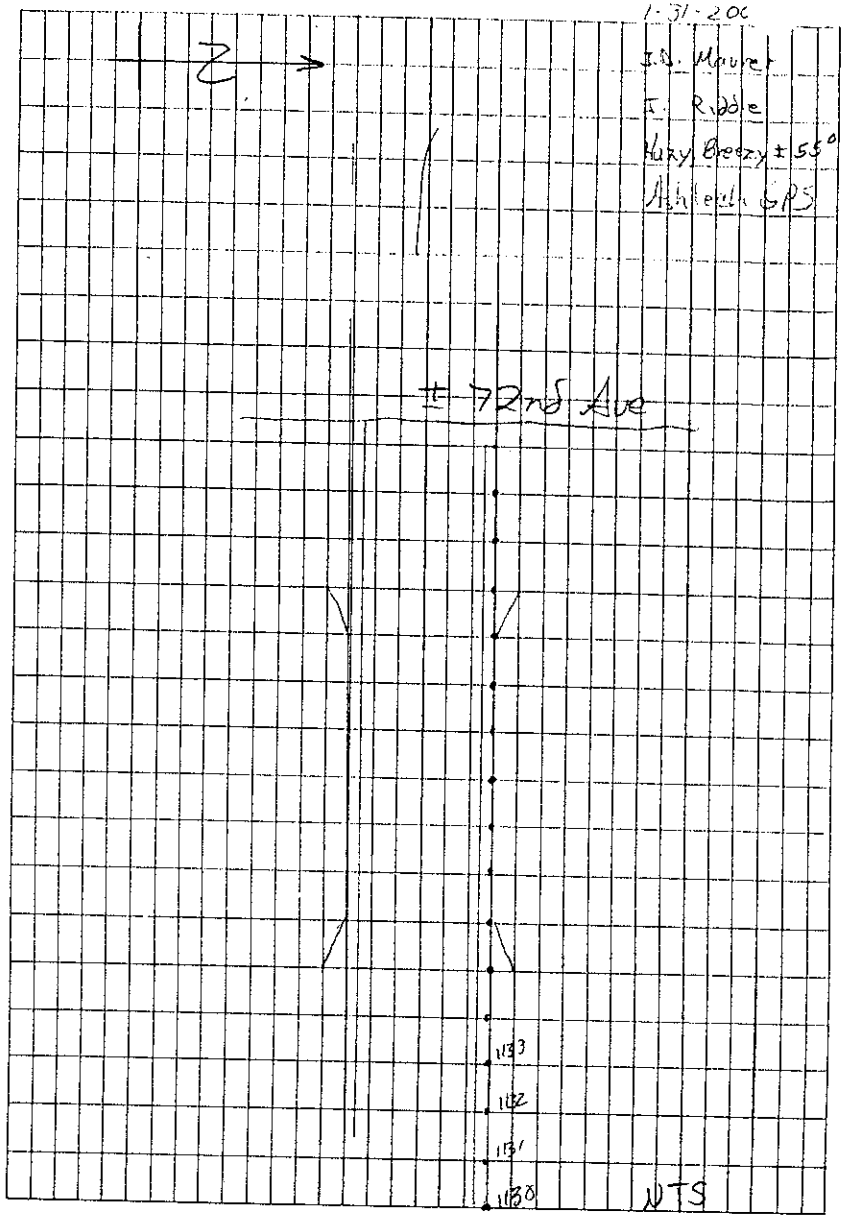
J.D. Mainor
J. Riddle
Pt, Cd, Bmx ± 55°
Ashtech GPS



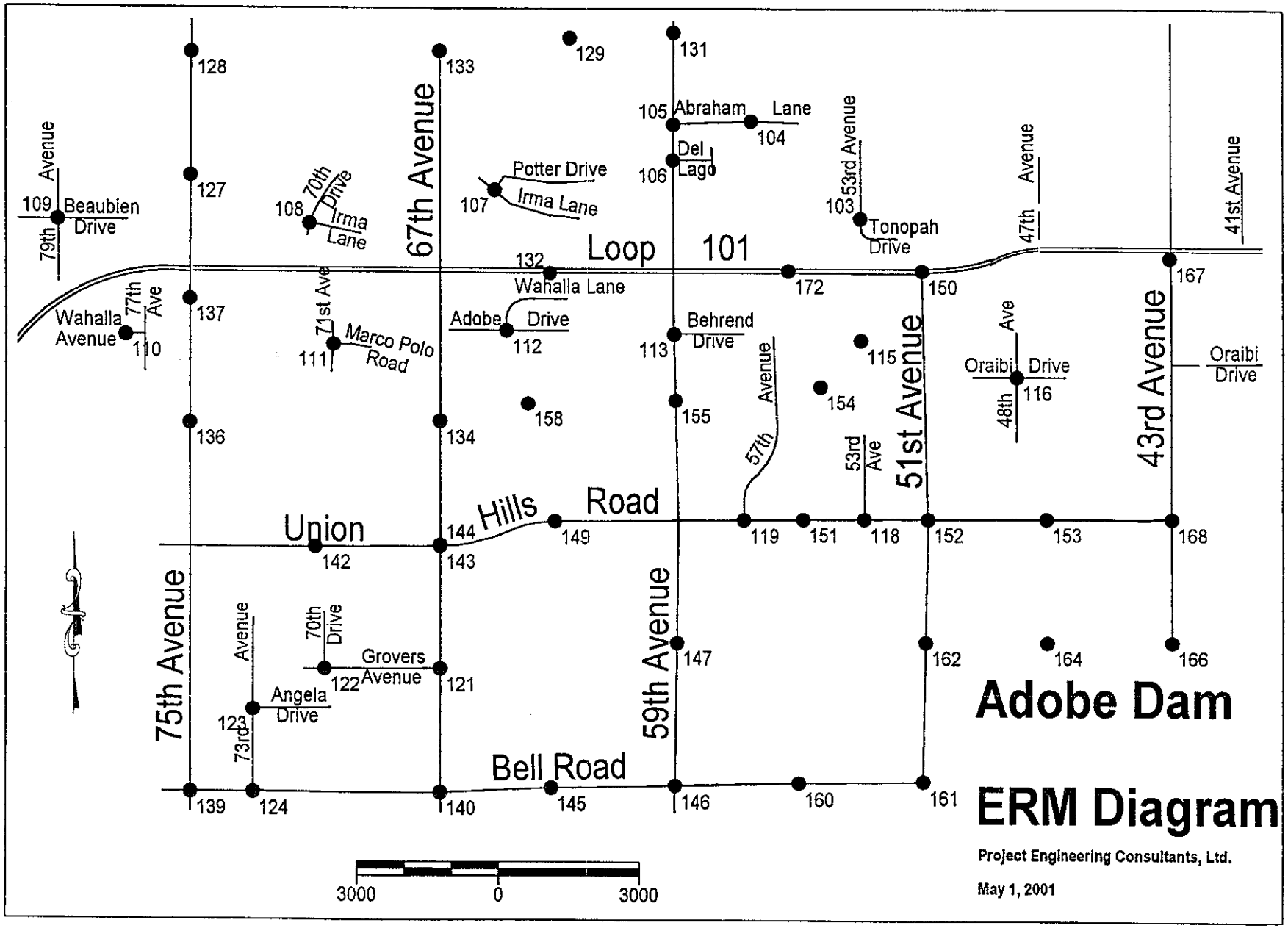
	H.R.	Length/Time	Description	
1130	2.145m	6 seconds	Gutter N. Side	
131	"	"	"	"
132	"	"	"	"
133	"	"	"	"
134	"	"	"	"
135	"	"	"	"
136	"	"	"	" on bridge
137	"	"	"	" " "
138	"	"	"	" " "
139	"	"	"	" " "
1140	"	"	"	" "
141	"	"	"	"
142	"	"	"	" on bridge (end)
143	"	"	"	"
144	"	"	"	"
1145	2.145m	6 seconds	Gutter N. Side	

End Setup

1-31-2006
J.N. Maurer
J. Ribble
Hazy Breezy ± 55°
Ashtech GPS



Elevation Reference Marks


Adobe Dam
ERM Diagram
Project Engineering Consultants, Ltd.
May 1, 2001
Loop 101
Union Hills Road
Bell Road
75th Avenue
67th Avenue
59th Avenue
51st Avenue
43rd Avenue
79th Avenue
77th Ave
71st Ave
70th Drive
73rd Avenue
57th Avenue
53rd Avenue
53rd Ave
48th Ave
47th Avenue
41st Avenue
Beaubien Drive
Wahalla Avenue
Wahalla Lane
Marco Polo Road
Irma Lane
Potter Drive
Adobe Drive
Abraham Lane
Del Lago
Behrend Drive
Tonopah Drive
Oraibi Drive
Grovers Avenue
Angela Drive
3000
0
3000

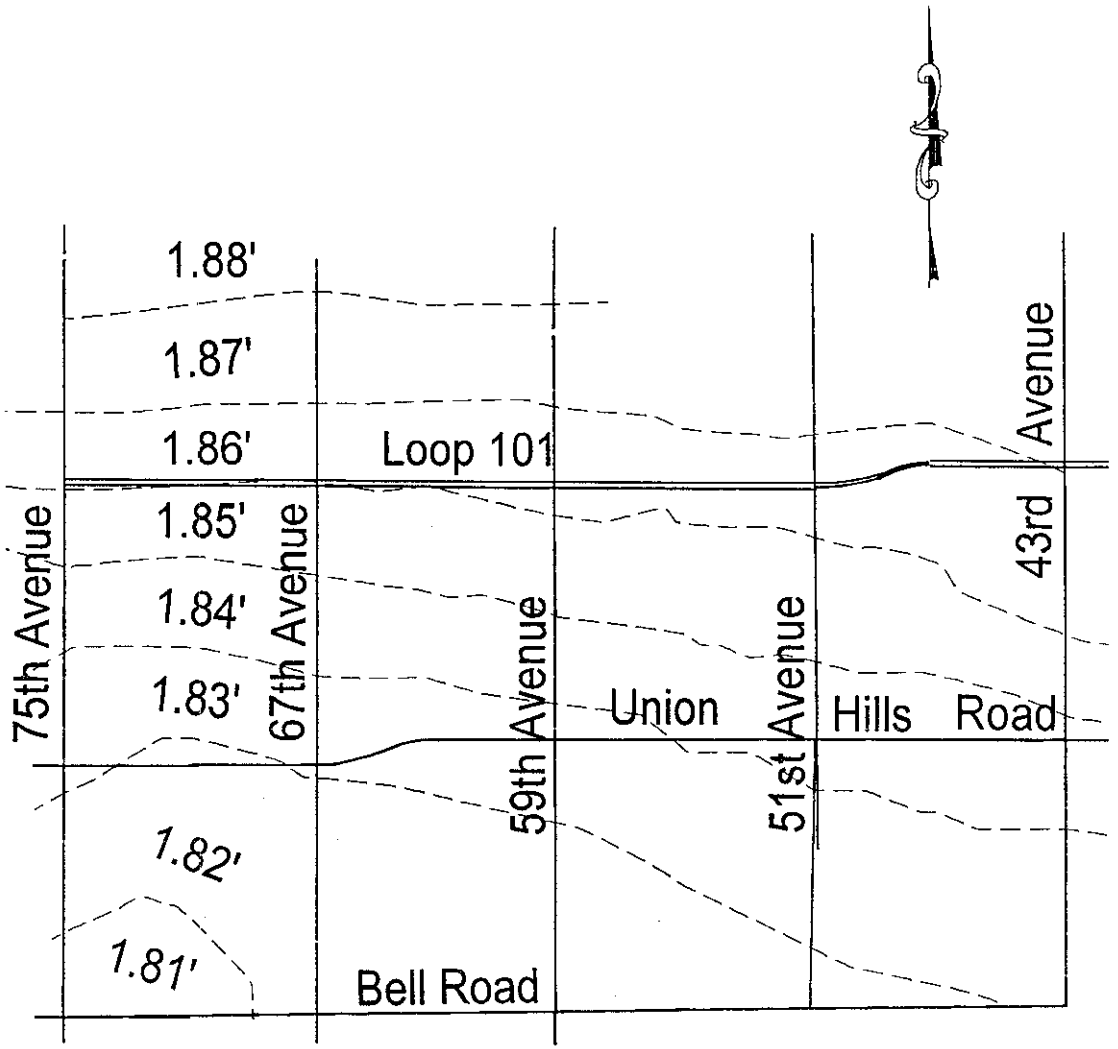
Adobe Dam

NGVD29 to NAVD88 Datum Conversion

Elevation differences between NGVD29 and NAVD88 for this area are listed:

NAVD88 = NGVD29 + (Elevation Difference)

Differences were computed for this area using the NGS Vertcon program. The Vertcon 2.0 model was computed on May 5, 1994 using 381,833 datum difference values. A key part of the computation procedure was the development of the predictable, physical components of the differences between the NAVD 88 and NGVD 29 datums. This included models of refraction effects on geodetic leveling, and gravity and elevation influences on the new NAVD 88 datum. Tests of the predictive capability of the physical model show a 2.0 cm RMS agreement at our 381,833 data points. For this reason, the Vertcon 2.0 model can be considered accurate at the 2 cm (one sigma) level. Since 381,833 data values were used to develop the corrections to the physical model, Vertcon 2.0 will display even better overall accuracy than that displayed by the uncorrected physical model.



NAD83 SPC System
NGVD29 Elevations - 3rd Order

Pt #	NAD27 Northing Easting	NGVD29 Elevation	NAD83 Northing Easting	NAVD88 Elevation	Description
103	972111.693 422046.014	1293.852	972153.174 621840.777	1295.722	City of Glendale Brass Cap flush w/pavement @ intersection of 53rd Avenue and Tonopah Drive
104	974195.287 419732.295	1294.495	974241.078 619522.015	1296.372	City of Glendale Brass Cap flush w/pavement @ intersection of 56th Lane and Abraham Lane
105	974130.255 418069.676	1286.372	974174.594 617865.513	1288.249	City of Glendale Brass Cap flush w/pavement @ intesection of 59th Avenue and Abraham Lane, north brass cap of 2
106	973358.852 418063.594	1278.537	973406.475 617855.064	1280.410	City of Glendale Brass Cap flush w/pavement @ intersection of 59th Avenue and Del Lago Circle
107	972720.688 414259.211	1268.265	972769.745 614050.432	1270.135	City of Glendale Brass Cap flush w/pavement @ intersection of Potter Drive and Irma Lane
108	972000.515 410330.517	1262.573	972042.847 610127.067	1264.440	City of Glendale Brass Cap flush w/pavement @ intersection of 70th Drive and Irma Lane
109	972044.978 405034.848	1259.121	972088.705 604828.252	1260.988	City of Glendale Brass Cap flush w/pavement @ intersection of 79th Avenue and Beaubein Drive
110	969589.038 406456.694	1251.730	969638.507 606249.247	1253.580	Brass Cap flush w/pavement in center of cul-de-sac on Wahalla Lane, west of 77th Avenue
111	969409.476 410830.358	1247.448	969453.986 610626.820	1249.298	Brass Cap flush w/pavement @ intersection of 71st Avenue and Marco Polo Lane
112	969716.979 414498.084	1253.639	969767.266 614287.367	1255.493	City of Glendale Brass Cap flush w/pavement @ intersection of Adobe Drive and Wahalla Lane
113	969642.616 418076.764	1274.076	969686.991 617870.748	1275.933	Brass Cap flush w/pavement @ intersection of 59th Avenue and Behrend Drive
115	969505.023 422060.511	1291.933	969555.605 621851.256	1293.790	City of Glendale Brass Cap flush w/pavement in center of cul-de-sac on 53rd Avenue, north of Tonto Road
116	968740.846 425354.853	1305.506	968789.590 625145.681	1307.363	City of Phoenix Brass Cap flush w/pavement @ intersection of 48th Avenue and Oraibi Drive
118	965706.154 422129.863	1284.308	965755.150 621917.934	1286.149	City of Glendale Brass Cap flush w/pavement @ intersection of 53rd Avenue and Union Hills Drive
119	965685.825 419573.275	1272.412	965731.241 619365.091	1274.249	City of Glendale Brass Cap flush w/pavement @ intersection of 57th Avenue and Union Hills Drive

Pt #	NAD27 Northing Easting	NGVD29 Elevation	NAD83 Northing Easting	NAVD88 Elevation	Description
121	962477.813 413094.990	1233.442	962524.252 612889.755	1235.263	City of Glendale Brass Cap in Handhole @ intersection of 67th Avenue and Grovers Avenue
122	962468.934 410639.886	1231.795	962510.919 610429.657	1233.616	City of Glendale Brass Cap flush w/pavement @ intersection of 70th Drive and Grovers Avenue
123	961593.331 409135.496	1219.404	961635.882 608930.810	1221.222	Maricopa County Highway Department Brass Cap flush w/pavement @ intersection of 73rd Avenue and Angela Drive
124	959832.360 409131.769	1214.699	959877.252 608925.745	1216.517	Brass Cap flush w/pavement @ intersection of 73rd Avenue and Bell Road
127	973005.857 407824.424	1268.298	973050.701 607619.986	1270.171	City of Glendale Brass Cap in Handhole @ intersection of 75th Avenue and Rose Garden Lane
128	975653.283 407840.634	1281.215	975698.744 607636.182	1283.101	City of Glendale Brass Cap in Handhole @ intersection of 75th Avenue and Deer Valley Road
129	975976.684 415864.280	1296.359	976019.930 615656.363	1298.245	Brass Cap flush w/pavement @ intersection of 63rd Avenue and Deer Valley Road
131	976079.853 418085.470	1300.329	976125.248 617879.035	1302.215	City of Glendale Brass Cap flush w/pavement @ intersection of 59th Avenue and Deer Valley Road
132	970940.819 415429.442	1259.994	970987.715 615220.347	1261.854	Brass Cap in Handhole @ intersection of 63rd Avenue and westbound S.R. 101 frontage road
133	975688.998 413097.630	1291.024	975734.330 612892.362	1292.907	Brass Cap flush w/pavement @ intersection of 67th Avenue and Deer Valley Road
134	967764.391 413095.864	1242.999	967810.304 612887.414	1244.843	City of Glendale Brass Cap in Handhole @ intersection of 67th Avenue and Utopia Road
136	967719.387 407804.281	1243.193	967764.705 607596.076	1245.034	Brass Cap in Handhole @ intersection of 75th Avenue and Utopia Road
137	970358.443 407809.105	1257.468	970402.660 607603.790	1259.325	Brass Cap in Handhole @ intersection of 75th Avenue and eastbound S.R. 101 frontage road
139	959831.277 407810.863	1207.635	959881.081 607606.850	1209.449	City of Glendale Brass Cap in Handhole @ intersection of 75th Avenue and Bell Road
140	959835.629 413095.080	1231.897	959876.177 612890.915	1233.718	City of Glendale Brass Cap in Handhole @ intersection of 67th Avenue and Bell Road
141	962468.187 410450.519	1232.071	962511.446 610243.674	1233.892	Brass Cap in Handhole

Pt #	NAD27 Northing Easting	NGVD29 Elevation	NAD83 Northing Easting	NAVD88 Elevation	Description
142	965100.658 410447.972	1227.980	965149.418 610242.710	1229.807	Brass Cap in Handhole @ intersection of 71st Avenue and Union Hills Drive
143	965124.676 413096.420	1244.417	965172.330 612888.597	1246.248	Brass Cap in Handhole @ intersection of 67th Avenue and Union Hills Drive (southern brass cap of 2)
144	965139.500 413096.390	1244.551	965182.438 612888.625	1246.382	Brass Cap in Handhole @ intersection of 67th Avenue and Union Hills Drive (northern brass cap of 2)
145	959936.623 415452.937	1241.858	959980.963 615241.550	1243.679	Brass Cap in Handhole @ intersection of 63rd Avenue and Bell Road
146	959979.394 418098.407	1250.047	960024.511 617887.916	1251.871	Brass Cap in Handhole @ intersection of 59th Avenue and Bell Road
147	963055.210 418137.979	1260.860	963096.972 617929.707	1262.687	Brass Cap in Handhole @ intersection of 59th Avenue and Grovers Avenue
149	965658.791 415531.158	1255.647	965701.386 615324.506	1257.481	Brass Cap in Handhole @ intersection of 63rd Avenue and Union Hills Road
150	970987.256 423345.167	1300.821	971028.089 623139.526	1302.685	Brass Cap in Handhole @ intersection of 51st Avenue and westbound S.R. 101 frontage road
151	965701.276 420825.648	1279.187	965748.287 620616.167	1281.028	City of Glendale Brass Cap flush w/pavement @ intersection of 55th Avenue and Union Hills Drive
152	965711.487 423477.025	1289.023	965761.944 623270.418	1290.867	Brass Cap in Handhole @ intersection of 51st Avenue and Union Hills Drive
153	965720.860 425987.573	1299.105	965766.054 625780.942	1300.949	Brass Cap in Handhole @ intersection of 47th Avenue and Union Hills Drive
154	968519.031 421205.216	1284.046	968567.232 620995.143	1285.900	Brass Cap flush w/pavement @ intersection of 55th Avenue and Utopia Road
155	968227.682 418110.333	1274.456	968271.910 617900.880	1276.306	Brass Cap flush w/pavement @ intersection of 59th Avenue and Utopia Road
158	968160.535 414961.436	1256.848	968209.491 614756.470	1258.695	Brass Cap flush w/pavement @ intersection of 63rd Avenue and Utopia Road (west brass cap of 2)
160	960041.614 420738.802	1257.251	960088.496 620534.323	1259.075	Brass Cap in Handhole @ intersection of 55th Avenue and Bell Road
161	960078.930 423376.099	1267.753	960122.403 623172.189	1269.580	Brass Cap in Handhole @ intersection of 51st Avenue and Bell Road

Pt #	NAD27 Northing Easting	NGVD29 Elevation	NAD83 Northing Easting	NAVD88 Elevation	Description
162	963066.645 423431.990	1277.921	963113.992 623221.723	1279.755	Brass Cap in Handhole @ intersection of 51st Avenue and Grovers Avenue
164	963074.915 426004.178	1288.255	963117.940 625800.086	1290.092	Brass Cap in Handhole @ intersection of 47th Avenue and Grovers Avenue
165	963092.233 433942.623	1324.466	963140.754 633729.614	1326.310	Brass Cap in Handhole @ intersection of 35th Avenue and Grovers Avenue
166	963081.656 428638.141	1297.927	963132.093 628429.191	1299.764	Brass Cap in Handhole @ intersection of 43rd Avenue and Grovers Avenue
167	960173.344 428649.464	1288.383	960221.221 628439.513	1290.214	Brass Cap in Handhole @ intersection of 43rd Avenue and Bell Road
168	965730.966 428628.098	1309.243	965780.185 628418.279	1311.090	Brass Cap in Handhole @ intersection of 43rd Avenue and Union Hills Drive
169	965736.538 433932.893	1330.778	965778.718 633726.689	1332.628	Brass Cap in Handhole @ intersection of 35th Avenue and Union Hills Drive
172	970990.629 420517.896	1289.535	971036.221 620302.559	1291.399	Brass Cap in Handhole @ 55th Avenue and Westbound Frontage Road of State Route 101

Excerpts from Previously Completed Studies

LIBRARY

GILA RIVER BASIN

Extra 44

LIBRARY

NEW RIVER & PHOENIX CITY STREAMS

ARIZONA

FLOOD CONTROL DISTRICT
of
MARICOPA COUNTY
3335 W. DURANGO
PHOENIX, ARIZONA 85009

ADOBE DAM

(Including Skunk Creek to the Arizona Canal)

HYDRO LIBRARY

DM-38

DESIGN MEMORANDUM NO. 3

GENERAL DESIGN MEMORANDUM – PHASE II

PROJECT DESIGN – PART 2

LIBRARY

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

APRIL 1979

Spillway

3.08 The spillway would be located in a saddle west of the main embankment (see pl. 11). It would be excavated in rock, be trapezoidal in cross-section with slopes of 1V on 0.5H, and would have a crest length of 36 feet. The approach channel would be about 625 feet in length. The first 100 feet of the approach channel upstream of the crest would have adverse slope of 0.040. The remainder of the approach channel would be excavated at an adverse slope of .0010 from elevation 1373.8. The spillway excavation downstream of the crest would be about 700 feet in length and would have an invert slope of 0.020. The spillway discharge curve (see fig. 3) was calculated by adding friction and velocity head losses to the critical head at the crest to determine the reservoir water surface elevation. The friction losses were determined by use of Manning's Formula using an "n" value of 0.035 (assuming the limit of excavation to be within plus or minus 9 inches of the excavation line). The peak spillway discharge at the maximum water surface (el. 1397.5) would be 9,620 cfs with a critical depth of 12.29 feet and a velocity of 18.57 fps.

Spillway Overflow Area

3.09 GENERAL - The construction and operation of Adobe Dam could create, or aggravate, a potential hazard in the spillway discharge area. The Office of the Chief of Engineers has published guidelines (EC 1110-2-183, dated 15 April 1977) on the acquisition of land downstream from the spillways in order to protect the public from hazards imposed by spillway discharges. Hazardous areas are defined as those areas where any one of the following criteria are exceeded:

a. Flood depths are a maximum of two feet in rural areas.

b. Velocities do not exceed 4 feet per second.

c. Erosion and debris potentials are minimal.

d. Flood durations are a maximum of 24 hours in agricultural areas.

e. Flood conditions have less than a 1% statistical chance of occurring in any one year.

3.10 To determine the hazardous area below the spillway the probable maximum flood (PMF) was routed down Skunk Creek without project and was routed through the detention basin with project. The areal extent of each of the overflow areas was delineated, and the depth of water, velocity of flows, and areas of aggradation and erosion were analyzed (see pl. 12). The area of required flowage easement to protect the public from hazards imposed by spillway discharges was derived from these studies.

3.11 HYDRAULIC ANALYSIS WITHOUT ADOBE DAM - Without the construction of Adobe Dam, Skunk Creek would have a peak PMF discharge below the proposed spillway of about 140,000 cfs (including 21,000 cfs from Scatter Wash). All flows less than 80,000 cfs would follow the Skunk Creek floodplain. However, a small percentage of flows in excess of 80,000 cfs would break northerly over Beardsley Road just west of the intersection of 47th Avenue, extended, and Beardsley Road. About 900 cfs would become trapped north of Beardsley Road and flow westward to an existing agricultural levee.

3.12 HYDRAULIC ANALYSIS WITH ADOBE DAM - With construction of Adobe Dam and appurtenant structures, flows in excess of the standard project flood would discharge over the spillway, down the hillside, and onto the alluvial fan just north of Beardsley Road. During a PMF, a peak discharge of 9,620 cfs would discharge over the spillway (see fig. 8). The time interval between initial flow over the spillway and when flow starts to increase a significant amount would be about 9 hours. The spillway flows could last up to approximately 128 hours.

3.13 Spillway flows of less than 900 cfs would follow the slight ground gradient to the west, staying north of Beardsley Road along a path similar to the PMF without project, rather than traverse the alluvial fan and cross Beardsley Road. Spillway flows greater than 900 cfs and up to the PMF (9,620 cfs) were analyzed. The analysis revealed that supercritical flow regime would govern until the alluvial fan at the base of the hill is reached. On the alluvial fan, the flow would spread out, velocities would decrease and the sediment load would drop out. About 5,700 cfs would flow southerly across Beardsley Road to Skunk Creek. Approximately 3,900 cfs would remain north of Beardsley Road and flow west one-half mile to the agricultural levee.

3.14 CONCLUSION - The results of the flow analysis are shown on plate 12. The areas of "hazardous" depths and velocities within the PMF overflow limits are delineated by diagonal lines. Average velocities would range from 20 fps at the downstream end of the spillway to 7 fps at the supercritical/subcritical transition. Because of the many complexities and unknowns of sediment and debris movement during a flood of the magnitude of the PMF, a rigorous analysis of the debris movement could not be performed. However, it can be generalized that any spillway discharge would be relatively free of sediment and debris. As the spillway discharge flows below the spillway channel, it would scour out the available material on the hillside; if its carrying capacity is not fulfilled, it would scour the upper portion of the alluvial fan. As the flow spreads out and the velocities decrease, the material would deposit on the fan.

3.15 HEC-2 computer runs were made with a range of scour criteria to determine probable areas of erosion and aggradation. The kinetic energy of the supercritiecal flow regime would not be sufficient to erode a channel directly south of the spillway channel across Beardsley Road to

Skunk Creek. Most probably, sufficient aggradation on the alluvial fan would cause receding spillway flows to be diverted more to the west.

Flood Routings

3.16 GENERAL - The flood routings were made by the modified PULS method. The 100 year sediment was assumed to have been deposited in the reservoir prior to the routings.

3.17 The routings of the reservoir design flood (standard project flood, local storm) was based on the net capacity curve (fig. 1) and the outlet discharge curve (fig. 2). The reservoir design flood peak inflow of 66,000 cfs would be reduced to a peak outflow of 1,890 cfs and the maximum water surface elevation would be 1377.8. At this elevation the reservoir area would be 1,320 acres and the net storage would be 15,650 acre-feet. The time inflow-outflow relationship for the reservoir design flood is shown on figure 4. The drawdown time from spillway crest to the bottom of the reservoir would be 5 days, 2 hours.

3.18 SPILLWAY FLOOD ROUTING - The routing of the spillway design flood (probable maximum flood of 3-day duration) was based on the net capacity curve (fig. 1), the outlet discharge curve (fig. 2), and the spillway discharge curve (fig. 3). The reservoir would be filled to the spillway crest at the beginning of the flood and the outlet would be operative. The spillway design flood peak inflow of 119,000 cfs would be reduced to a peak outflow of 11,980 cfs (2,360 cfs through the outlet works and 9,620 cfs over the spillway). With the maximum water surface at elevation 1397.5 the reservoir area would be 2,700 acres and the net storage would be 54,600 acre-feet. The time inflow-outflow relationship for the spillway design flood is shown on fig. 5. The drawdown time, from maximum water surface to spillway crest, would be 4 days 11 hours and from the maximum water surface to the bottom of the reservoir would be 9 days, 13 hours.

Elevation-Frequency Curve

3.19 The elevation-frequency curve (fig. 7) was plotted from the maximum water surface elevations obtained by routing various frequency floods. The routings were based on the net capacity curve (fig. 1) and the outlet discharge curve (fig. 2). The hydrographs were based on the hydrograph for the reservoir design flood.

Freeboard

Freeboard

3.20 The freeboard for Adobe Dam was determined by adding the maximum wave runup to the wind setup. The wave runup was calculated by means of the procedures outlined in ETL 1110-2-221. The effective fetch for the main embankment would be 1.87 miles. The significant wave would result from a wind velocity of 47.3 mph overland having a duration of 25.8 minutes. The wave height would be 3.40 feet and the maximum runup would

be 5.16 feet. The freeboard for the main embankment would be 5.50 feet. The effective fetch for the saddle dike would be 1.63 miles. The wind velocity over land would be 31.1 mph and the duration would be 28.2 minutes. The average depth would be 16 feet and the waves would be considered shallow water waves. The waves would break near the toe of the embankment slope. The maximum runup would be 2.06 feet and the wind setup would be 0.20 feet for a total of 2.26 feet. The freeboard would be a minimum of 3.0 feet. Adobe Dam would be located in earthquake zone 2 and the settlement allowance of 3 percent of the embankment height would be 2 feet. This allowance is less than the freeboard selected and is not additive to the wave runup.

Stone Revetment

3.21 The revetment thickness, stone size and filter blanket requirements are discussed in the section on Geology, Foundation and Materials.

SKUNK CREEK CHANNEL

3.22 The Skunk Creek channel would convey the standard project flood peak discharge of 54,000 cfs through the modified Black Canyon Highway bridges. The channel plan and profile are shown on plates 18 and 19. The channel would consist of two levees, a rectangular concrete chute, the modified Black Canyon Highway bridges, a grouted stone energy dissipator and a channel to provide back water to the energy dissipator. The two levees would collect the flow passing over the Central Arizona Project's Granite Reef aqueduct and convey it to the concrete chute. The left levee would be 5,550 feet in length and the height would vary from 25 feet to less than 1 foot. The alinement would have one horizontal curve with a central angle of 52°25'18" and a radius of 2,848.6 feet. The levee would be revetted for 2870 feet with a 12-inch layer of dumped stone having a depth of toe varying from 2 to 6 feet below the existing ground. The velocities along the left levee would vary from 3.7 to 8.6 fps. The right levee would be 6,590 feet in length and the height would vary from 25 feet to 1 foot. The alinement would have two horizontal curves with central angles of 67°24'16" and 26°48'18" with radii of 1,633.93 and 2,100 feet, respectively. The levee would be revetted for a distance of 5,060 feet upstream of the concrete chute. The revetment would be 12-inch layer of dumped stone with toe depths that vary from 4 to 6 feet except for a 250-foot reach which would be subject to attack by low flows. This reach would have 18 inches of revetment with toe depths varying from 4 to 8 feet. The velocities along the right levee would vary from 4.3 to 9.8 fps.

3.23 The concrete chute would have a length of 243 feet and an invert slope of 0.04400. The depth of flow would vary from 11.6 feet at the upstream end to 6.2 feet at the downstream end. The velocity would vary from 19.3 to 36.1 fps at the streamline nose of the piers. The Black Canyon Highway bridges would be modified by connecting the piers and

VI - REAL ESTATE REQUIREMENTS

General

6.01 As required by authorizing legislation, local interests would acquire all lands, easements and rights-of-way, including spoil disposal areas, necessary for the construction of the project. The Flood Control District of Maricopa County has assumed the responsibility of representing local interests for the New River and Phoenix City Streams flood control project, which includes Adobe Dam, and has demonstrated its ability to comply with Government requirements in supplying the necessary rights-of-way for other project features.

6.02 The Flood Control District would acquire interest in land required for the detention reservoir and appurtenant structures, the spillway discharge area, Skunk Creek channel and levees, and the cultural resources (archeological) site as follows:

a. Private land would be acquired in fee title;

b. State land would be acquired in fee title under permanent structures and for borrow areas; flowage easements, or feet title if the flowage easements are too costly, would be acquired for the remaining area.

6.03 Local interests would make no conveyance of either rights-of-way or flowage easement to the United States. However, when the local interests have acquired appropriate proprietary interest in the necessay rights-of-way or flowage easements, the Corps of Engineers would then be authorized to enter upon the rights-of-way for prosecution of the project construction. The project would be operated and maintained by the Flood Control District of Maricopa County, the local sponsor.

6.04 Local interests would be responsible for modifications to existing public and private facilities and for construction of new public and private facilities. This would include the relocation or removal of all public and private utilities within the project area.

6.05 Relocation assistance to any homeowners that must be relocated is required under the requirements of PL 91-646 (Uniform Relocation Assistance and Real Property Acquisition Policy Act). Approximately 9 homeowners will be aided in accordance with this act.

Adobe Dam

6.06 The top pool elevation (spillway crest elevation) for detaining water for flood control behind Adobe Dam would be 1377.8. Based on an earlier preliminary design, local interests have begun acquiring lands to elevation 1380.0, which provides a freeboard allowance of 2.2 feet. The 2.2 feet of freeboard allowance is judged to be adequate when the

estimated frequency of occurrence and the effects of saturation, wave action and bank erosion are considered.

6.07 About 1,435 acres of land within the reservoir taking line would be required upstream of the dam. Additionally, approximately 153 acres would be required for the construction of permanent structures such as the main embankment (112.6 acres), dike (7.7 acres), outlet channel (11.8 acres), and spillway (9.9 acres). Of the total acreage (1,577 acres), approximately 81 percent of the land is owned by the Flood Control District, 7 percent by private interests, 8 percent by the State of Arizona and 4 percent by the City of Glendale (see map on following page). There are no known mining claims in the project area and there has been no mining operation in the project area except for the removal of sand and gravel at selected locations along the streambed.

6.08 Since selection of the proposed damsite as the recommended site, the Flood Control District has begun to acquire privately owned lands within the proposed reservoir area. Applications have been filed by the Flood Control District to withdraw or acquire State lands.

Pertinent Data

PERTINENT DATA - Continued

ADOBE DAM

Reservoir		
Drainage area	sq mi	89.6
Dam (rolled earthfill)		
Crest elevation	ft msl	1,403.0*
Maximum height above streambed	ft	63
Crest length	ft	11,245
Freeboard	ft	5.5
Spillway		
Crest elevation	ft msl	1,377.8
Crest length	ft	36
Elevation of maximum water surface	ft msl	1,397.5
Outlet works		
Size of conduit	ft	5.9W x 8.85H
Length of conduit	ft	289.5
Intake elevation	ft msl	1,338.0
Dike		
Crest elevation	ft msl	1,400.5
Crest length	ft	1,635
Maximum height above existing ground	ft	6
Reservoir area at spillway crest	acre	1,320
Capacity (gross) at spillway crest	acre-ft	18,350
Storage allocation below spillway crest		
Flood control (net)	acre-ft	15,650
Sedimentation (100-year storage)	acre-ft	2,700
Standard project flood		
Total volume	acre-ft	17,000
Peak inflow	cfs	66,000
Peak outflow	cfs	1,890
Drawdown time	hr	229
Maximum probable flood		
Total volume	acre-ft	61,000
Peak inflow	cfs	119,000
Peak outflow	cfs	12,000
Drawdown time	hr	122
Skunk Creek Channel and Levees		
Standard project flood		
Peak inflow	cfs	54,000
Channel		
Base width	ft	241-271
Length	ft	2,670
Levees		
Maximum height above existing ground	ft	24.8; 25.5
Length	ft	5,550; 6,590
Top width	ft	16
Crest elevation	ft msl	Varies

*Does not include 1.83-foot settlement allowance.

b. Spillway
   (1) Approach channel
   (2) Control section
   (3) Outlet channel

c. Outlet Works
   (1) Approach channel
   (2) Trash rack structure
   (3) Conduit
   (4) Energy dissipator
   (5) Outlet channel
   (6) Gaging station bridge

10. INSTRUMENTATION.

a. Settlement Monuments. Twenty-six settlement monuments were installed at the upstream edge of the crest of the dam to determine the rate and magnitude of post-construction settlement and lateral displacements. In addition, 5 settlement monuments were installed on the upstream slope. The locations of the settlement monuments are shown on plate 31.

b. Subsidence Monuments. Twenty survey monuments were installed downstream of the embankment toe to monitor any subsidence. The locations of the subsidence monuments are shown on the embankment drawings, plates 6 through 14.

c. Sediment Range Monuments and Sediment Staff Gages. Eight sediment range monuments and eight sediment staff gages were installed in the reservoir to monitor accumulation of sediment. Locations are shown on plate 31.

d. Water Depth Recorders. Water depth recorders are on order for measuring depths at both ends of the outlet works. The recorders will be installed in the recorder house at the right abutment.

e. A rain gage will be installed in the recorder house.

f. Twelve staff gages were installed on the upstream slope of the dam facing the recorder house.

11. PERTINENT DATA.

Reservoir		
Drainage area	sq mi	89.6
Dam (rolled earthfill)		
Crest elevation	ft msl	1,403.0*
Maximum height above streambed	ft	63
Crest length	ft	11,245
Freeboard	ft	5.5
Spillway		
Crest elevation	ft msl	1,377.8
Crest length	ft	36
Elevation of maximum water surface	ft msl	1,397.5

Outlet works		
Size of conduit	ft	5.9W x 8.85H
Length of conduit	ft	289.5
Intake elevation	ft msl	1,338.0
Reservoir area at spillway crest	acre	1,320
Capacity (gross) at spillway crest	acre-ft	18,350
Storage allocation below spillway crest		
Flood control (net)	acre-ft	15,650
Sedimentation (100-year storage)	acre-ft	2,700
Standard project flood		
Total volume	acre-ft	17,000
Peak inflow	cfs	66,000
Peak outflow	cfs	1,890
Drawdown time	hr	229
Maximum probable flood		
Total volume	acre-ft	61,000
Peak inflow	cfs	119,000
Peak outflow	cfs	12,000
Drawdown time	hr	122

*Does not include 1.83-foot settlement allowance.

12. PLATES.

1. Project Location.
2. General Plan.
3. General Site Geology, Plan.
4. Embankment and Spillway, Geologic and Geophysical Exploration, Plan.
5. West Abutment and Outlet Works, Geology and Foundation Exploration, Plan and Profiles.
6. Embankment, Plan and Profile, Sta. 9+60 to Sta. 18+00 and Access Road, Plan.
7. Embankment, Plan and Profile, Sta. 18+00 to Sta. 31+00 and Access Road, Plan.
8. Embankment, Plan and Profile, Sta. 31+00 to Sta. 45+00 and Access Road, Plan.
9. Embankment, Plan and Profile, Sta. 45+00 to Sta. 59+00 and Access Road, Plan.
10. Embankment, Plan and Profile, Sta. 59+00 to Sta. 73+00.
11. Embankment, Plan and Profile, Sta. 73+00 to Sta. 86+00.
12. Embankment, Plan and Profile, Sta. 86+00 to Sta. 99+00.
13. Embankment, Plan and Profile, Sta. 99+00 to Sta. 112+00.
14. Embankment, Plan and Profile, Sta. 112+00 to Sta. 121+80±.
15. Embankment, Cross Sections No. 1.
16. Embankment, Cross Sections No. 2.
17. Embankment, Cross Sections No. 3.

Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Skunk Creek					
At Inflow of Adobe Dam	89.6	15,000	29,000	39,000	85,000
At Outflow of Adobe Dam	0.0	1,370	1,650	1,730	2,000
Above confluence with Scatter Wash	0.9	1,600	2,200	2,600	4,600
Below confluence with Scatter Wash (At 59th Avenue)	0.4	2,000	5,500	8,400	22,000
At confluence with Arizona Canal	19.9	2,200	6,700	11,000	33,000
Buchanan Wash					
800 feet downstream of Central Arizona Project Canal	9.17	1,065	1,253	1,308	1,407
At confluence with Skunk Creek	11.29	1,422	2,005	2,304	3,067
Scatter Wash					
At Mouth	8.5	580	3,500	6,100	17,000
Above Black Canyon Highway (State Highway 17)	6.3	540	3,200	5,700	16,000
Salt River					
At Granite Reef Dam	--[1]	--[1]	--[1]	245,000	--[1]
At Gilbert Road	12,593.0	100,000	170,000	230,000	345,000
At Country Club Drive	--[1]	--[1]	--[1]	225,000	--[1]
At Tempe Bridge	12,783.0	93,000	160,000	215,000	330,000
At Central Avenue	12,831.0	91,000	155,000	200,000	325,000
At 67th Avenue	12,931.0	90,000	150,000	190,000	315,000
Above confluence with Gila River	12,962.0	85,000	145,000	185,000	310,000
East Fork Cave Creek					
At confluence with Cave Creek	14.4	2,300	6,400	9,000	19,000
Below 7th Avenue Extended	13.8	2,300	6,300	8,900	18,000
Below 7th Street	12.4	2,200	5,900	8,400	17,000
Above 7th Street	10.0	1,900	5,300	7,500	15,200
At Bell Road	3.4	1,100	2,900	4,200	8,200
Below Cave Creek Road	3.0	1,000	2,800	3,900	7,900
At Utopia Road	1.8	800	2,100	3,000	5,800
At Beardsley Road	1.0	600	1,500	2,100	4,300

[1]Data Not Available

CITY OF GLENDALE

ARROWHEAD RANCH DEVELOPMENT
GLENDALE, ARIZONA

SPECIFIC AREA PLAN
STORM DRAINAGE PLAN

APRIL 20, 1992

DIBBLE AND ASSOCIATES
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INTRODUCTION

In July, 1982 a Storm Drainage Master Plan was prepared and submitted to the City of Glendale. This drainage plan provided for the utilization of recreational multi-purpose lakes and golf courses as a means of retarding and conveying runoff through the development. This revised analysis includes information developed for the City on the "As-Constructed" configuration of this system. In addition, land uses as presented in the Specific Plan have been utilized in the calculation of runoff coefficients. As specific projects are developed, more detailed analysis will be required to assure the adequacy of upstream and downstream conditions as well as stage-discharge relationships of new facilities.

OVERVIEW

The Arrowhead Ranch is served by several major drainage systems. The Lakes area (Section 20 - System I, see Exhibit 1) receives off-site flows through Thunderbird Park. The flows are first directed to a sedimentation basin located within the park, north of the developed lakes area. Storm water is then conveyed through a system of lakes to a drainage channel located east of 55th Avenue, crosses under the Agua Fria Freeway and enters the 55th Avenue drainage channel. Areas west of the channel and south of the Agua Fria Freeway (Section 29 - System XI) also drain into this channel. The channel then conveys the storm water runoff to Skunk Creek.

Sections 18 and 19 are served by two systems, Systems II and III. The proposed southerly system (System II) consists of a series of detention basins which will accept flows from the southern portion of Sections 18 and 19 (including the existing "Z" lake system) and then discharge into an existing ADOT storm drain located north of the Agua Fria Freeway. The other system (System III), is an existing system of lakes, streams and drainage structures that collect runoff water and diverts it into the lake recirculation system (streams) to be conveyed to an outlet structure located at 67th Avenue just south of Rose Garden Lane. This future structure will deliver water underneath 67th Avenue into System IV.

Sections 23 and 24 (System IV), located west of 67th Avenue and north of the Agua Fria Freeway will be served by a series of detention basins, lakes, drainage channels and storm drains. This integral system will also accept runoff from Sections 18 and 19 (System III) and deliver it into the existing Agua Fria Freeway drainage channel located just north of the Agua Fria Freeway, which will convey it to New River.

The area south of the Agua Fria Freeway, between 67th Avenue and the Agua Fria Freeway (Sections 25 and 26) is split into two major sub-systems (Systems V and VI). The easterly system (System V) collects water into the lakes and through a system of pipes and channels conveys the runoff to a drainage channel south of Union Hills Drive at 71st Avenue. The westerly system (System VI) collects runoff and conveys it in a southwesterly direction through a system of lakes, pipes and drainage swales to the Agua Fria Freeway drainage channel located just east of the Agua Fria Freeway and north of Union Hills Drive. The westerly section of Section 26 also contains two small independent systems (Systems VII and VIII) that each drain into ADOT storm drains that discharge to New River.

Section 30 will also be served by a system of detention basins, drainage channels and storm drains. The extreme westerly portion of this section (System IX), will drain south into 67th Avenue after having retarded the flow in local detention basins. The major system (System X) will be interconnected through open areas via wide open swales and channels, to deliver storm water runoff to Skunk Creek near Union Hills Drive.

All new developments will be required to comply with the City of Glendale Design Guidelines for Site Development and Infrastructure Construction. Compliance will be in the form of on-site detention and/or the participation in the regional system.

METHODOLOGY

Hydrology for this update utilizes the same methodology as was used in the previous updates to the Drainage Master Plan. The Soil Conservation Service (SCS) TR20 computer program is utilized using the rainfall tables for a 100-year, 24-hour storm as originally developed. For background information relating to the hydrologic analysis and the conditions assumed, refer to the "Arrowhead Ranch Preliminary Storm Drainage Master Plan", prepared by Dibble & Associates and dated July, 1982. For system model information, see the Appendix.

ANALYSIS

The analysis as contained herein, varies substantially from that which was prepared in 1982. The primary differences have resulted from the construction of the Arizona Department of Transportation Agua Fria Freeway, which bisected the Ranch and the proposed drainage system. As a result of that construction, ADOT has provided for a drainage system north of the Agua Fria Freeway to receive runoff from the Arrowhead Drainage System located in Sections 18/19/23 and 24. A summary of each system follows:

System I - Lakes rises range from 2.3 to 3.6 feet during the storm event (see Structure Summary). Discharge into the 55th Avenue drainage channel occurs under the ADOT Agua Fria Freeway. The discharge is estimated to be approximately 1,980 cfs. The channel has adequate capacity (4,495 cfs) to handle this flow (see Discharge Summary).

System II - This system discharges into the ADOT drainage system that is comprised of 42" culverts and open channel. The proposed System II requires modification of the existing 3' x 1.25' outlet structure (to 2' x 1.25') at Reservoir 5 at the west end of the "Z" lakes. System II also requires incorporation of two detention basins (No. 9 and No. 12) into the existing ADOT storm drain between 59th Avenue and 67th Avenue. The lakes and detention basins rise between 1.0 to 3.2 feet. Discharges into the ADOT system are consistent with the existing capacity.

STRUCTURE SUMMARY
ARROWHEAD RANCH DEVELOPMENT
REVISED DRAINAGE MASTER PLAN

SYSTEM	SECTION	STRUCTURE	FACILITY	NORMAL WATER SURFACE OR BOTTOM	HIGH WATER SURFACE	RISE (FT)	STRUCTURE
I	20	1	SED BASIN	1,294.0	1,297.6	3.6	170' WEIR
		2	LAKE	1,294.0	1,296.4	2.4	120' WEIR
		3	LAKE	1,292.0	1,294.3	2.3	60' WEIR
		4	LAKE	1,292.0	1,295.0	3.0	50' WEIR
		5	LAKE	1,290.0	1,293.1	3.1	140' WEIR
II	19/20	1	LAKE	1,277.0	1,279.1	2.1	18" S.P.
		2	LAKE	1,276.5	1,278.4	1.9	22' WEIR
		3	LAKE	1,275.0	1,276.9	1.9	22' WEIR
		4	LAKE	1,272.0	1,273.7	1.7	22' WEIR
		5	LAKE	1,268.0	1,270.1	2.1	2'x1.25' GRATE (1)
		6	DET BASIN	1,261.0	1,262.0	1.0	12" S.P.
		7	DET BASIN	1,278.0	1,280.7	2.7	2-12" S.P.'S
		8	DET BASIN	1,271.0	1,274.1	3.1	2-12" S.P.'S
		9	DET BASIN	1,267.0	1,269.6	2.6	18" S.P.
		10	DET BASIN	1,265.0	1,267.7	2.7	18" S.P.
		11	DET BASIN	1,261.0	1,263.6	2.6	18" S.P.
		12	DET BASIN	1,261.0	1,264.1	3.1	30" S.P.
		13	DET BASIN	1,258.0	1,261.2	3.2	24" S.P.
		14	DET BASIN	1,259.0	1,261.5	2.5	18" S.P.
III	18	1	LAKE	1,303.0	1,305.3	2.3	14' WEIR
		2	LAKE	1,289.0	1,291.2	2.2	14' WEIR
		3	LAKE	1,300.0	1,301.9	1.9	50' WEIR
		4	LAKE	1,287.0	1,289.2	2.2	20' WEIR
		5	LAKE	1,297.0	1,298.9	1.9	20' WEIR
		6	LAKE	1,294.0	1,296.1	2.1	20' WEIR
		7	LAKE	1,290.0	1,291.8	1.8	30' WEIR
		8	LAKE	1,277.5	1,280.4	2.9	25' WEIR (2)
		9	LAKE	1,273.0	1,274.6	1.6	50' WEIR
		10	LAKE	1,265.0	1,269.5	4.5	3-48" S.P.'S & 1-25" WEIR (3)
IV	23/24	1	DET BASIN	1,277.0	1,278.0	1.0	18" S.P.
		2	DET BASIN	1,267.0	1,268.3	1.3	18" S.P.
		3	DET BASIN	1,257.0	1,259.1	2.1	18" S.P.
		4	DET BASIN	1,256.0	1,258.2	2.2	18" S.P.
		5	DET BASIN	1,256.0	1,257.9	1.9	18" S.P.
		6	DET BASIN	1,277.0	1,279.6	2.6	18" S.P.
		7	DET BASIN	1,272.0	1,274.4	2.4	24" S.P.
		8	DET BASIN	1,257.0	1,259.8	2.8	24" S.P.
		9	DET BASIN	1,256.0	1,258.3	2.3	24" S.P.

NOTES: (1) MODIFY EXISTING 3' X 1.25' GRATE
(2) MODIFY EXISTING 45' WEIR
(3) MODIFY EXISTING 70' WEIR

DISCHARGE SUMMARY ARROWHEAD RANCH DEVELOPMENT REVISED DRAINAGE MASTER PLAN					
SYSTEM	SECTION	STRUCTURE X-SECTION	RECEIVING FACILITY	DISCHARGE (CFS)	CAPACITY (CFS)
I	20	5	55TH AVE CHANNEL	1,980	4,495
II	19/20	8	V-DITCH	14	43
		107	42" PIPE	42	61
		9	42" PIPE	14	61
		108	42" PIPE	27	61
		109	42" PIPE	40	61
		12	2-42" PIPES	41	54
		112	CONC. CHANNEL	63	644
		113	CONC. CHANNEL	76	644
III	18	10	FUTURE BOX CULVERT	319	???
IV	23/24	106	CONC. CHANNEL	88	644
		107	CONC. CHANNEL	446	644
		112	CONC. CHANNEL	470	689
		113	CONC. CHANNEL	492	726
V	25	114	73RD AVENUE CHANNEL	278	375+
VI	25/26	109	CONC. CHANNEL	36	114
VII	26	2	48" CULVERT	13	54
VIII	26	3	48" CULVERT	12	54
IX	30	3	67TH AVENUE	14	???
X	30	111	SKUNK CREEK @ UNION HILLS	96	???
X1	29	112	55TH AVENUE CHANNEL	38	
			(CUMULATIVE)	2,020	4,495

```
JOB TR-20          ECHO      FULLPRINT          SUMMARY    NOPLOTS
TITLE   1  ARROWHEAD RANCH - SECTION 20 - SYSTEM I
TITLE          RUN 1      (INPUT FILE SEC20_1.DAT)
RAINFL 2                0.020833333
          0.000     0.004     0.008     0.013     0.018
          0.022     0.026     0.031     0.035     0.040
          0.044     0.048     0.053     0.057     0.062
          0.066     0.071     0.075     0.080     0.093
          0.107     0.120     0.140     0.170     0.500
          0.830     0.860     0.880     0.893     0.907
          0.920     0.924     0.928     0.933     0.937
          0.942     0.947     0.951     0.956     0.960
          0.964     0.969     0.973     0.978     0.982
          0.987     0.991     0.995     1.000     1.000
ENDTBL
STRUCT      01
                    1294.0    0.        0.0
                    1294.5    156.      5.8
                    1295.0    442.      11.6
                    1295.5    812.      17.5
                    1296.0    1250.     23.4
                    1296.5    1747.     29.3
                    1297.0    2297.     35.3
                    1297.5    2894.     41.3
                    1298.0    3536.     47.3
ENDTBL
STRUCT      02
                    1294.0    0.        0.0
                    1294.5    276.      16.4
                    1295.0    780.      33.1
                    1295.5    1433.     49.8
                    1296.0    2206.     66.8
                    1296.5    3083.     83.9
                    1297.0    4053.     101.1
                    1297.5    5107.     118.6
                    1298.0    6240.     136.2
ENDTBL
XSECTN      104     1.0
                    1294.0    0.        0.
                    1294.5    74.       16.4
                    1295.0    208.      33.1
                    1295.5    382.      49.8
                    1296.0    588.      66.8
                    1296.5    822.      83.9
                    1297.0    1081.     101.1
                    1297.5    1362.     118.6
                    1298.0    1664.     136.2
ENDTBL
XSECTN      107     1.0
                    1294.0    0.        0.
                    1294.5    202.      16.4
                    1295.0    572.      33.1
                    1295.5    1051.     49.8
                    1296.0    1618.     66.8
                    1296.5    2261.     83.9
                    1297.0    2972.     101.1
                    1297.5    3745.     118.6
                    1298.0    4576.     136.2
ENDTBL
XSECTN      108     1.0
                    1294.0    0.        0.
                    1294.5    110.      16.4
                    1295.0    312.      33.1
                    1295.5    573.      49.8
```

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                          1297.0      1621.       101.1
                          1297.5      2043.       118.6
                          1298.0      2496.       136.2
ENDTBL
SECTN     109             1.0
                          1294.0      0.          0.
                          1294.5      92.         16.4
                          1295.0      260.        33.1
                          1295.5      478.        49.8
                          1296.0      735.        66.8
                          1296.5      1028.       83.9
                          1297.0      1351.       101.1
                          1297.5      1702.       118.6
                          1298.0      2080.       136.2
ENDTBL
STRUCT        03
                          1292.0      0.          0.0
                          1292.5      55.         11.8
                          1293.0      156.        23.7
                          1293.5      287.        35.7
                          1294.0      441.        47.9
                          1294.5      617.        60.2
                          1295.0      811.        72.6
                          1295.5      1021.       85.1
                          1296.0      1248.       97.7
ENDTBL
STRUCT        04
                          1292.0      0.          0.0
                          1292.5      46.         18.7
                          1293.0      130.        37.5
                          1293.5      239.        56.4
                          1294.0      368.        75.5
                          1294.5      514.        94.6
                          1295.0      675.        113.8
                          1295.5      851.        133.1
                          1296.0      1040.       152.5
ENDTBL
STRUCT        05
                          1290.0      0.          0.0
                          1290.5      129.        18.4
                          1291.0      364.        37.0
                          1291.5      669.        55.6
                          1292.0      1030.       74.4
                          1292.5      1439.       93.2
                          1293.0      1891.       112.2
                          1293.5      2383.       131.2
                          1294.0      2912.       150.3
ENDTBL
RUNOFF 1      11      1 3.560       89.         1.630       1 0 0 1 0 1
RUNOFF 1      12      3 0.225       92.         0.167       1 0 0 1 0 1
ADDHYD 4 101    1 3 4                                       1 0 0 1 0 1
RESVOR 2      01 4    1 1294.                               1 0 0 1 0 1
RUNOFF 1      14      2 0.166       88.         0.167       1 0 0 1 0 1
ADDHYD 4 102    1 2 3                                       1 0 0 1 0 1
RUNOFF 1      13      1 0.050       92.         0.167       1 0 0 1 0 1
ADDHYD 4 103    3 1 2                                       1 0 0 1 0 1
RESVOR 2      02 2    1 1294.                               1 0 0 1 0 1
DIVERT 6 104    1 2 3               0.667       107.        1 0 0 1 0 1
RUNOFF 1      15      4 0.095       90.         0.167       1 0 0 1 0 1
ADDHYD 4 105    2 4 1                                       1 0 0 1 0 1
RESVOR 2      03 1    2 1294.                               1 0 0 1 0 1
RUNOFF 1      16      1 0.175       89.         0.167       1 0 0 1 0 1
ADDHYD 4 106    1 2 4                                       1 0 0 1 0 1
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ADDHYD 4 111    2 1 4                                   1 0 0 1 0 1
RUNOFF 1     18      1 0.220        89.          0.167  1 0 0 1 0 1
ADDHYD 4 112    1 4 2                                   1 0 0 1 0 1
RUNOFF 1     19      1 0.227        89.          0.167  1 0 0 1 0 1
ADDHYD 4 113    1 2 4                                   1 0 0 1 0 1
RESVOR 2     04 4    1 1292.                            1 0 0 1 0 1
ADDHYD 4 114    1 3 2                                   1 0 0 1 0 1
RESVOR 2     05 2    1 1290.                            1 0 0 1 0 1
ENDATA
LIST
INCREM 6                0.10
COMPUT 7     11     05 0.0          4.04         24.    2 2  24  1
ENDCMP 1
ENDJOB 2
```

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 24 STORM 10													
TRUCTURE 11	RUNOFF	3.56	2	2	.10	.0	4.04	24.00	2.86	---	13.16	3065.94	861.2
TRUCTURE 12	RUNOFF	.22	2	2	.10	.0	4.04	24.00	3.15	---	12.45	378.38	1681.7
SECTION 101	ADDHYD	3.78	2	2	.10	.0	4.04	24.00	2.88	---	13.16	3091.79	816.9
TRUCTURE 1	RESVOR	3.78	2	2	.10	.0	4.04	24.00	2.88	1297.61	13.28	3040.54	803.3
TRUCTURE 14	RUNOFF	.17	2	2	.10	.0	4.04	24.00	2.76	---	12.45	261.71	1576.6
SECTION 102	ADDHYD	3.95	2	2	.10	.0	4.04	24.00	2.87	---	13.28	3056.74	773.7
TRUCTURE 13	RUNOFF	.05	2	2	.10	.0	4.04	24.00	3.15	---	12.45	84.08	1681.7
SECTION 103	ADDHYD	4.00	2	2	.10	.0	4.04	24.00	2.88	---	13.28	3061.87	765.3
TRUCTURE 2	RESVOR	4.00	2	2	.10	.0	4.04	24.00	2.88	1296.39	13.50	2896.60	724.0
SECTION 104	DIVERT	2.67	2	2	.10	.0	4.04	24.00	1.15	1296.39	13.50	772.27	289.4
ION 107	DIVERT	1.33	2	2	.10	.0	4.04	24.00	6.33	1296.39	13.50	2124.34	1594.4
TURE 15	RUNOFF	.09	2	2	.10	.0	4.04	24.00	2.95	---	12.45	155.04	1632.0
SECTION 105	ADDHYD	2.76	2	2	.10	.0	4.04	24.00	1.21	---	13.50	781.54	282.8
STRUCTURE 3	RESVOR	2.76	2	2	.10	.0	4.04	24.00	1.53	1294.34	14.16	559.96	202.6
TRUCTURE 16	RUNOFF	.17	2	2	.10	.0	4.04	24.00	2.86	---	12.45	280.85	1604.9
SECTION 106	ADDHYD	2.94	2	2	.10	.0	4.04	24.00	1.61	---	14.17	571.55	194.5
SECTION 108	DIVERT	.67	2	2	.10	.0	4.04	24.00	6.90	1296.39	13.50	1158.51	1739.1
SECTION 109	DIVERT	.67	2	2	.10	.0	4.04	24.00	5.76	1296.39	13.50	965.82	1449.8
SECTION 110	ADDHYD	3.60	2	2	.10	.0	4.04	24.00	2.59	---	13.65	1624.49	450.6
STRUCTURE 17	RUNOFF	.07	2	2	.10	.0	4.04	24.00	3.15	---	12.45	117.72	1681.7
SECTION 111	ADDHYD	.74	2	2	.10	.0	4.04	24.00	5.51	---	13.50	972.80	1321.4
STRUCTURE 18	RUNOFF	.22	2	2	.10	.0	4.04	24.00	2.86	---	12.45	353.07	1604.9
SECTION 112	ADDHYD	.96	2	2	.10	.0	4.04	24.00	4.90	---	13.49	994.06	1039.6
TRUCTURE 19	RUNOFF	.23	2	2	.10	.0	4.04	24.00	2.86	---	12.45	364.31	1604.9
SECTION 113	ADDHYD	1.18	2	2	.10	.0	4.04	24.00	4.51	---	12.48	1165.34	984.9
TRUCTURE 4	RESVOR	1.18	2	2	.10	.0	4.04	24.00	4.37	1294.97	14.27	666.22	563.1
SECTION 114	ADDHYD	4.79	2	2	.10	.0	4.04	24.00	3.03	---	13.76	2220.60	463.8
STRUCTURE 5	RESVOR	4.79	2	2	.10	.0	4.04	24.00	3.00	1293.09	14.29	1980.44	413.6

WHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS

RUNOFF COEFFICIENT

SECTION 20
==========

LAND USE	AREA	RUNOFF COEFF (CN)	WEIGHTED AVERAGE	WEIGHTED CN
SUB-BASIN 14				
SF	73.7	83	6,117	
LAKE	32.7	100	3,270	
	106.4 AC		9,387	88
SUB-BASIN 15				
SF	37.1	83	3,079	
LAKE	23.5	100	2,350	
	60.6 AC		5,429	90
BASIN 16				
SF	70.2	83	5,827	
MF	4.7	85	400	
LAKE	36.8	100	3,680	
	111.7 AC		9,906	89
SUB-BASIN 18				
SF	24.4	83	2,025	
MF	79.1	85	6,723	
LAKE	37.3	100	3,730	
	140.8 AC		12,479	89

ARROWHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS
STORAGE DISCHARGE

SECTION 20
==========

RESERVOIR/STRUCTURE NO. 1

WEIR L = 170 FT
WIDTH (AV)= 350 FT
EQ LENGTH = 1,440 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	11.57		
			5.8	
1,294.5	0.5	11.64		156
			11.6	
1,295.0	1.0	11.70		442
			17.5	
1,295.5	1.5	11.77		812
			23.4	
1,296.0	2.0	11.83		1,250
			29.3	
1,296.5	2.5	11.90		1,747
			35.3	
1,297.0	3.0	11.97		2,297
			41.3	
1,297.5	3.5	12.03		2,894
			47.3	
1,298.0	4.0	12.10		3,536

RESERVOIR/STRUCTURE NO. 2A

WEIR L = 80 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 7,129 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	32.73		
			16.4	
1,294.5	0.5	33.06		74
			33.1	
1,295.0	1.0	33.38		208
			49.8	
1,295.5	1.5	33.71		382
			66.8	
1,296.0	2.0	34.04		588
			83.9	
1,296.5	2.5	34.37		822
			101.1	
1,297.0	3.0	34.69		1,081
			118.6	
1,297.5	3.5	35.02		1,362
			136.2	
1,298.0	4.0	35.35		1,664

ARROWHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS
STORAGE DISCHARGE

SECTION 20
==========

RESERVOIR/STRUCTURE NO. 2B

WEIR L = 100 FT AND 120 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 7,129 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	32.73		
			16.4	
1,294.5	0.5	33.06		202
			33.1	
1,295.0	1.0	33.38		572
			49.8	
1,295.5	1.5	33.71		1,051
			66.8	
1,296.0	2.0	34.04		1,618
			83.9	
1,296.5	2.5	34.37		2,261
			101.1	
1,297.0	3.0	34.69		2,972
			118.6	
1,297.5	3.5	35.02		3,745
			136.2	
1,298.0	4.0	35.35		4,576

RESERVOIR/STRUCTURE NO. 2C

WEIR L = 120 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 7,129 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	32.73		
			16.4	
1,294.5	0.5	33.06		110
			33.1	
1,295.0	1.0	33.38		312
			49.8	
1,295.5	1.5	33.71		573
			66.8	
1,296.0	2.0	34.04		882
			83.9	
1,296.5	2.5	34.37		1,233
			101.1	
1,297.0	3.0	34.69		1,621
			118.6	
1,297.5	3.5	35.02		2,043
			136.2	
1,298.0	4.0	35.35		2,496

ARROWHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS
STORAGE DISCHARGE

SECTION 20
==========

RESERVOIR/STRUCTURE NO. 2D

WEIR L = 100 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 7,129 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	32.73		
			16.4	
1,294.5	0.5	33.06		92
			33.1	
1,295.0	1.0	33.38		260
			49.8	
1,295.5	1.5	33.71		478
			66.8	
1,296.0	2.0	34.04		735
			83.9	
1,296.5	2.5	34.37		1,028
			101.1	
1,297.0	3.0	34.69		1,351
			118.6	
1,297.5	3.5	35.02		1,702
			136.2	
1,298.0	4.0	35.35		2,080

RESERVOIR/STRUCTURE NO. 2

WEIR L = 80 FT, 120 FT AND 100 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 7,129 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,294.0	0.0	32.73		
			16.4	
1,294.5	0.5	33.06		276
			33.1	
1,295.0	1.0	33.38		780
			49.8	
1,295.5	1.5	33.71		1,433
			66.8	
1,296.0	2.0	34.04		2,206
			83.9	
1,296.5	2.5	34.37		3,083
			101.1	
1,297.0	3.0	34.69		4,053
			118.6	
1,297.5	3.5	35.02		5,107
			136.2	
1,298.0	4.0	35.35		6,240

ARROWHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS
STORAGE DISCHARGE

SECTION 20
==========

RESERVOIR/STRUCTURE NO. 3

WEIR L = 60 FT
WIDTH (AV)= 200 FT
EQ LENGTH = 5,114 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,292.0	0.0	23.48		
			11.8	
1,292.5	0.5	23.71		55
			23.7	
1,293.0	1.0	23.95		156
			35.7	
1,293.5	1.5	24.18		287
			47.9	
1,294.0	2.0	24.42		441
			60.2	
1,294.5	2.5	24.65		617
			72.6	
1,295.0	3.0	24.89		811
			85.1	
1,295.5	3.5	25.12		1,021
			97.7	
1,296.0	4.0	25.36		1,248

RESERVOIR/STRUCTURE NO. 4

WEIR L = 50 FT
WIDTH (AV)= 375 FT
EQ LENGTH = 4,336 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,292.0	0.0	37.33		
			18.7	
1,292.5	0.5	37.53		46
			37.5	
1,293.0	1.0	37.73		130
			56.4	
1,293.5	1.5	37.93		239
			75.5	
1,294.0	2.0	38.13		368
			94.6	
1,294.5	2.5	38.33		514
			113.8	
1,295.0	3.0	38.52		675
			133.1	
1,295.5	3.5	38.72		851
			152.5	
1,296.0	4.0	38.92		1,040

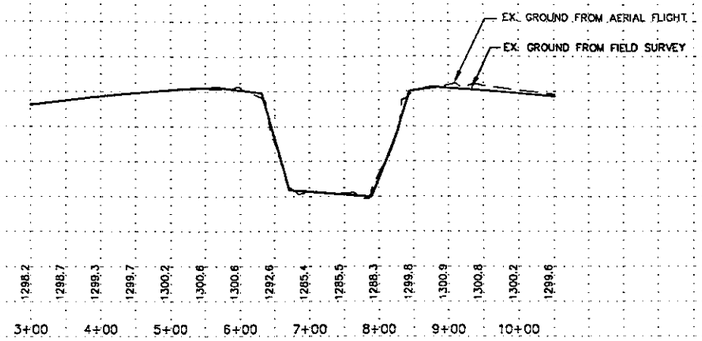
ARROWHEAD DRAINAGE MASTER PLAN
DRAINAGE CALCULATIONS
AGE DISCHARGE

SECTION 20
==========
RESERVOIR/STRUCTURE NO. 5

WEIR L =	140 FT
WIDTH (AV)=	375 FT
EQ LENGTH =	4,275 FT

ELEVATION	DEPTH (FT)	AREA (ACRES)	STORAGE (AF)	DISCHARGE (CFS)
1,290.0	0.0	36.80		
			18.4	
1,290.5	0.5	37.00		129
			37.0	
1,291.0	1.0	37.19		364
			55.6	
1,291.5	1.5	37.39		669
			74.4	
1,292.0	2.0	37.59		1,030
			93.2	
1,292.5	2.5	37.78		1,439
			112.2	
1,293.0	3.0	37.98		1,891
			131.2	
1,293.5	3.5	38.17		2,383
			150.3	
1,294.0	4.0	38.37		2,912

Survey Check Sections



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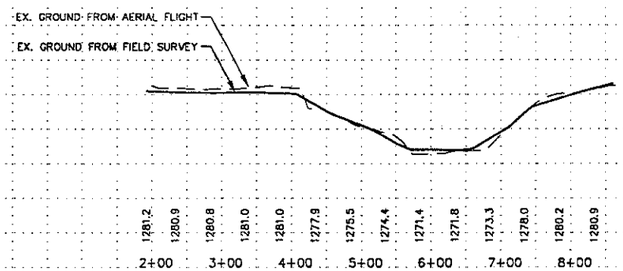

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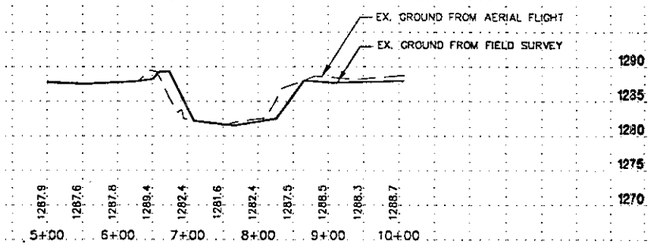

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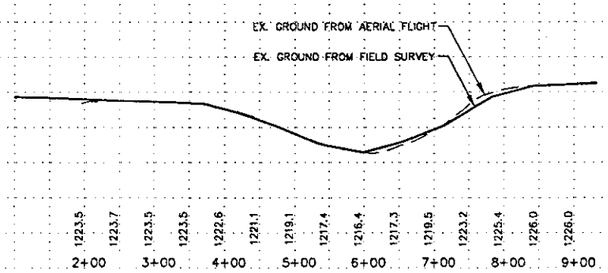

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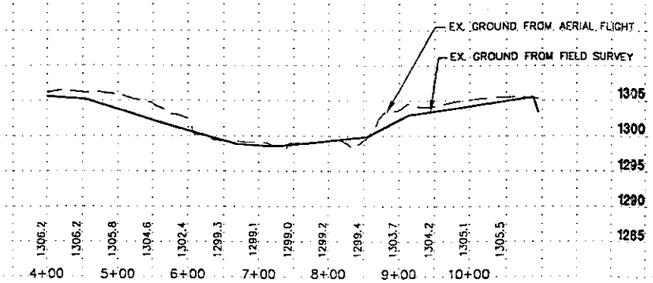


SECTION 'D'

REVISIONS

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISIONS

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISIONS

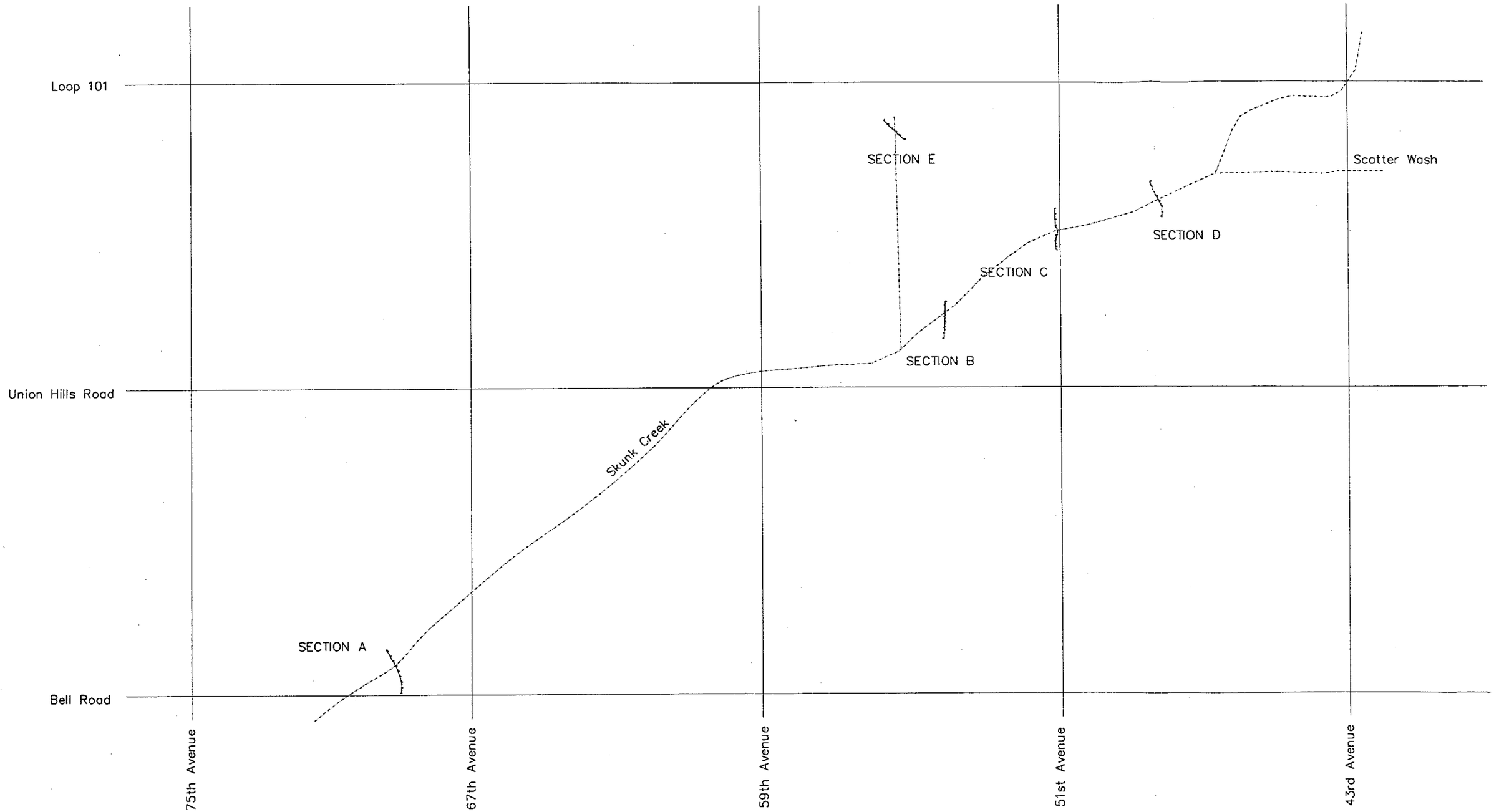
NO.	DESCRIPTION	REV BY	CKD BY	DATE

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

ADOBE CROSS SECTIONS

DR. JG	DES	CK	CC	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 4/30	DATE:	DATE: 4/30				

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


Loop 101
Union Hills Road
Bell Road
75th Avenue
67th Avenue
59th Avenue
51st Avenue
43rd Avenue
Skunk Creek
Scatter Wash
SECTION A
SECTION B
SECTION C
SECTION D
SECTION E

ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX C: FIELD RECONNAISSANCE

Adobe Dam
Spillway Delineation Study

Appendix C: Field Reconnaissance

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2 Manning's 'n' Estimation Methodology C-2
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Figure C-1 to C-4: Photo Location Maps

1 Introduction

The purpose of the field reconnaissance phase is to present information gained from a field visit of the study area, as well as evaluate and justify the estimation of Manning's 'n' values selected for use in hydraulic modeling. A field reconnaissance trip was made on April 4, 2000. The study area downstream of Adobe Dam is fully developed, and includes several densely developed subdivisions and a portion of the Agua Fria Freeway (Loop 101). Flow exiting through the emergency spillway enters an undeveloped area immediately south of the emergency spillway, then continues south toward the Agua Fria Freeway and west toward the Arrowhead Ranch development and south across the Agua Fria Freeway (Loop 101).

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' vales and adjustment factors. The photographs which follow were used to prepare a summary of 'n' values for use in this study, based upon the physical conditions which were observed and documented. The composite Manning's 'n' value can be computed as follows:

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

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

Photographs were taken throughout the study area and are presented in this appendix. It was estimated that flow immediately south from the spillway would be mainly contained between the Hedgepeth Hills to the north and the Agua Fria Freeway to the south, with some breakout flow crossing the freeway. The flowpath was modeled with wide cross-sections that cut across distinctive land types, which include undeveloped desert, houses/development, and roadway. Therefore, 'n' value will vary considerably across each cross-section, in accordance with the location of the various land types.

Between the spillway and the Arrowhead Ranch development, it was estimated that the flow would be about 2-3 feet deep. After a preliminary review of the topography, it was determined that the main portion of the flow would be primarily contained within a wide channel, flowing westward toward the Arrowhead Lakes development.

Since the land use types are either undeveloped desert or developed/residential, and easily distinguishable, Manning's 'n' values were assigned at each cross-section of the HEC-RAS model. The portion of the model from the spillway to the Arrowhead Ranch development is primarily undeveloped desert, with roadway (Agua Fria Freeway). Downstream of approximately 51st Avenue, the flowpath runs through a completely developed urban residential area.

2.1 Base Component (n_b)

Table 1 (Ref.1) gives a wide range of base 'n_b' values as reported by Benson & Darymple, and by Chow. The values given by Chow represent the smoothest channel attainable in a given material. A base 'n_b' value of 0.030 was assigned for the undeveloped desert areas which consist of a coarse gravel base material. A base value of 0.020 was chosen for the channel and freeway areas, which both have concrete as the base material. For the developed areas of the study, a base 'n_b' value of 0.030 was assigned. For the roadways, a base value of 0.016 was selected.

Undeveloped Desert	$n_b = 0.030$
Channel / Freeway	$n_b = 0.020$
Developed/Residential	$n_b = 0.030$
Pavement	$n_b = 0.016$

2.2 Irregularity Component (n_1)

The adjustment for irregularity is based upon the condition of the overbank or channel banks. Adjustment factors range from 0.0 to 0.020 (Ref. 1), depending upon the severity of bank erosion. A low value for n_1 was chosen for the developed/residential and undeveloped desert areas.

Undeveloped Desert	$n_1 = 0.005$
Channel / Freeway	$n_1 = 0.000$
Developed/Residential	$n_1 = 0.005$
Pavement	$n_1 = 0.000$

2.3 Obstruction Component (n_2)

The obstruction component was considered to be a factor only for the developed/residential areas of this study. The magnitude of the obstruction component applied in each case was determined by the percentage of cross-section

area occupied by obstructions. For areas of housing/development, the amount of obstructions is appreciable, approximately one-third of the total cross-section area. For undeveloped desert areas, the amount of obstructions is negligible. The following obstruction components were chosen for this study:

Undeveloped Desert	$n_2 = 0.000$
Channel / Freeway	$n_2 = 0.000$
Developed/Residential	$n_2 = 0.030$
Pavement	$n_2 = 0.000$

2.4 Vegetation Component (n_3)

The vegetation component of the Manning's 'n' value varied according to the density of growth and the ratio of flow depth to vegetation height. Just downstream of the spillway, the vegetation is moderate in height and not very dense, and the approximated flow depth is 2 to 3 feet. Within the developed/residential areas, the vegetation varies in density and height, therefore a medium-range vegetation component was selected. The following vegetation components were chosen for this study:

Undeveloped Desert	$n_3 = 0.010$
Channel / Freeway	$n_3 = 0.000$
Developed/Residential	$n_3 = 0.015$
Pavement	$n_3 = 0.000$

2.5 Meandering Factor (m)

The meandering factor applies only to flow confined within the channel. For this study, there is no meandering within the channel, and therefore a meandering factor of 1.00 was chosen.

2.6 Composite Manning's 'n' Value

Using the components described in Sections 2.1 through 2.5, the following range of Manning's 'n' values was established for this study.

Table 1: Manning's 'n' Value Summary

Land Type	Base 'n_b'	Irregularity n_1	Obstruction n_2	Vegetation n_3	Meandering m	Composite 'n'
Undeveloped	0.030	0.005	0.000	0.010	1.00	0.045
Channel / Freeway	0.020	0.000	0.000	0.000	1.00	0.020
Developed / Residential	0.030	0.005	0.030	0.015	1.00	0.080
Pavement	0.016	0.000	0.000	0.000	1.00	0.016

3 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

4 Photos

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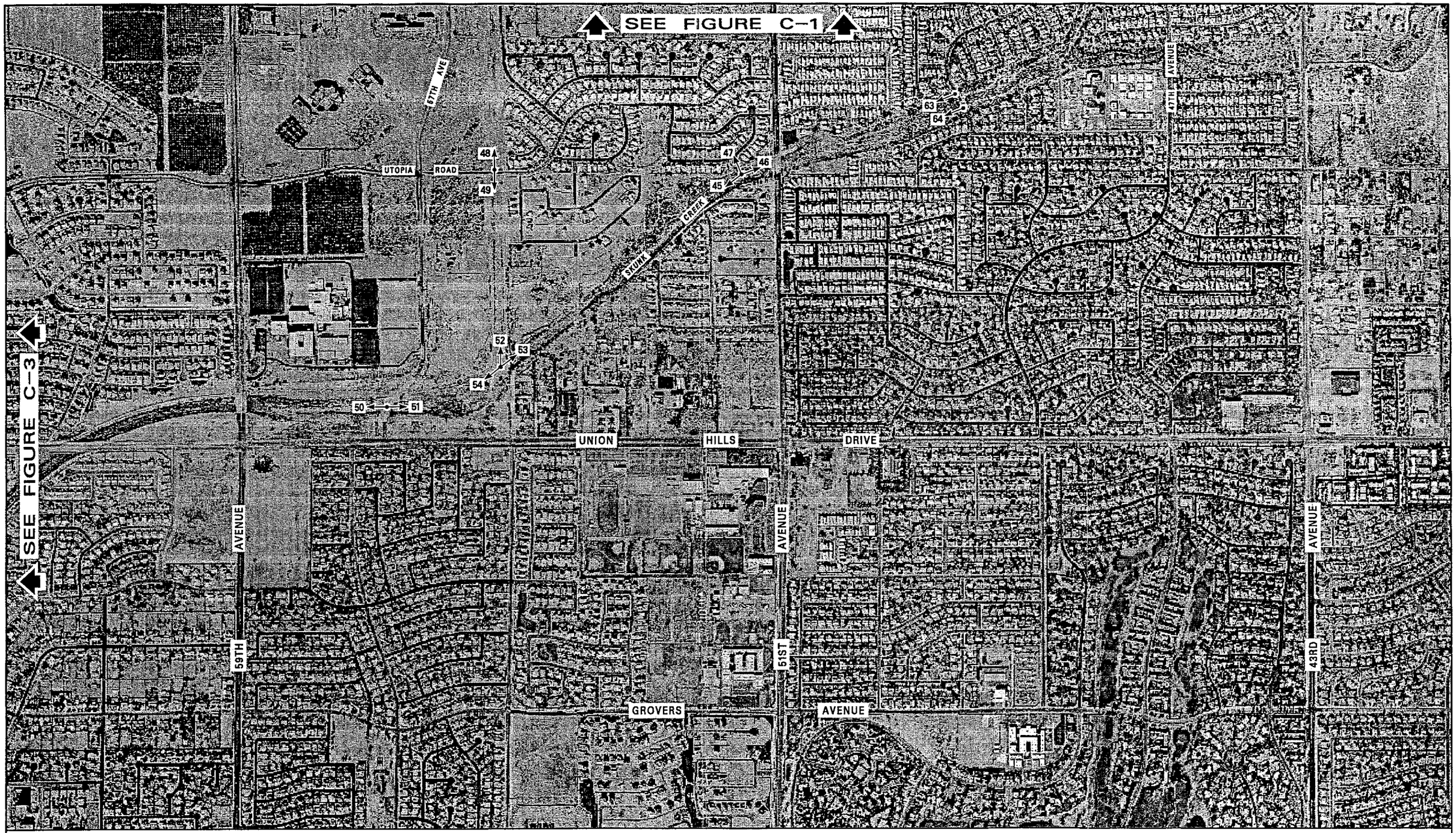
NOT TO SCALE

ADOBE DAM SPILLWAY
PHOTO LOCATION MAP

FIGURE C-1



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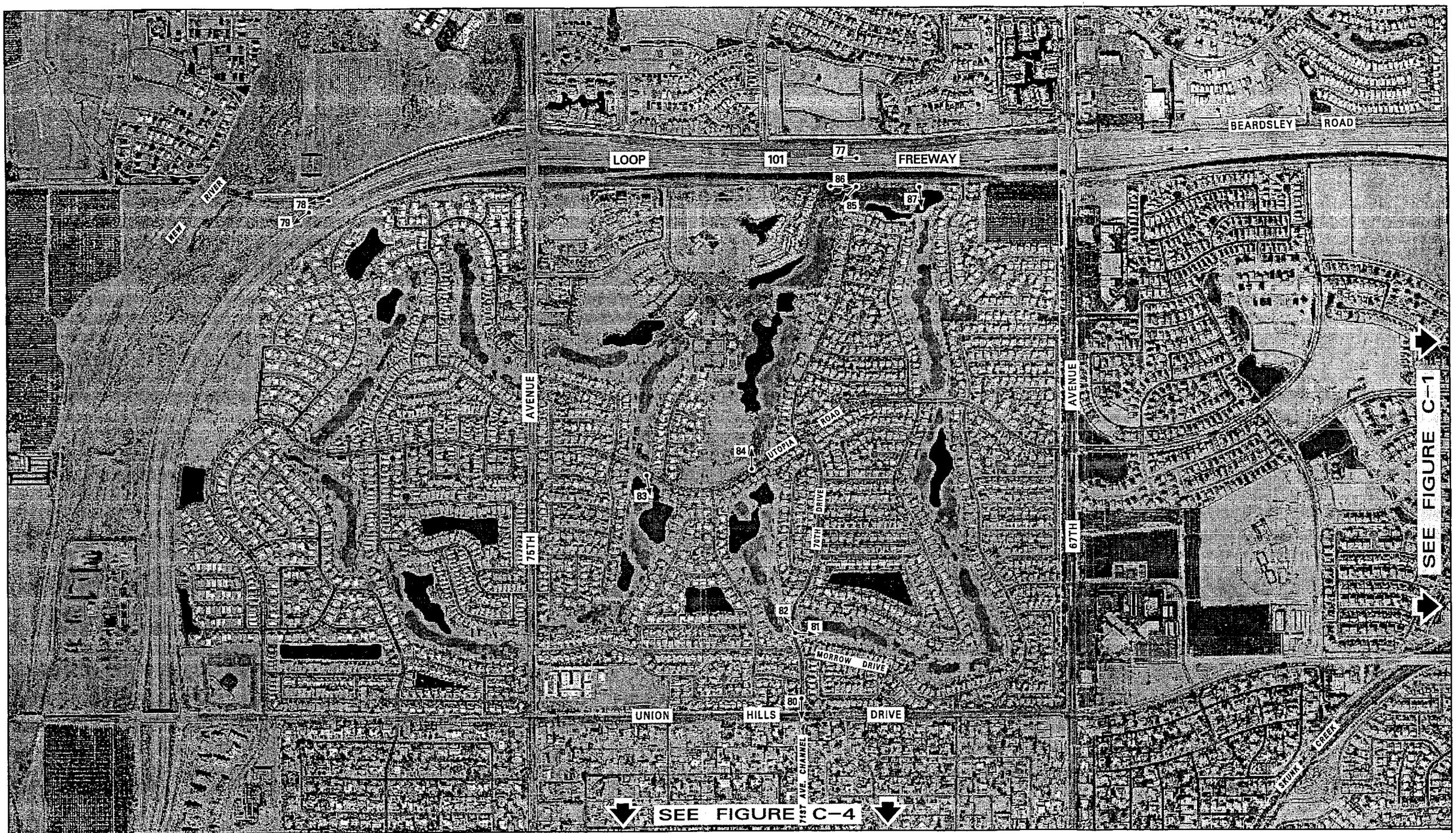
NOT TO SCALE

ADOBE DAM SPILLWAY
PHOTO LOCATION MAP

FIGURE C-2



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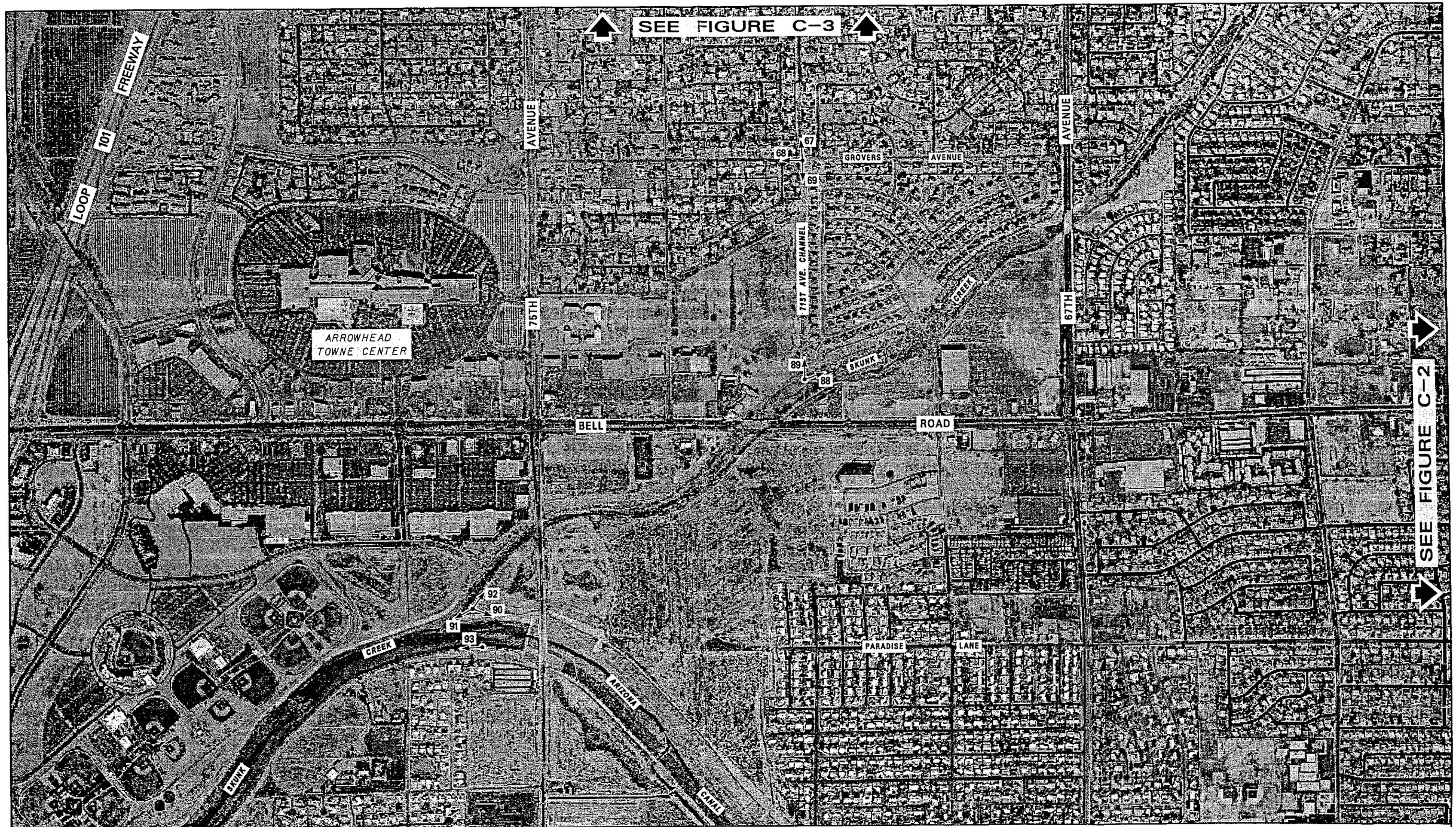
NOT TO SCALE

ADOBE DAM SPILLWAY
PHOTO LOCATION MAP

FIGURE C-3



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NOT TO SCALE

ADOBE DAM SPILLWAY
PHOTO LOCATION MAP

FIGURE C-4

Adobe Dam
Spillway Delineation Study

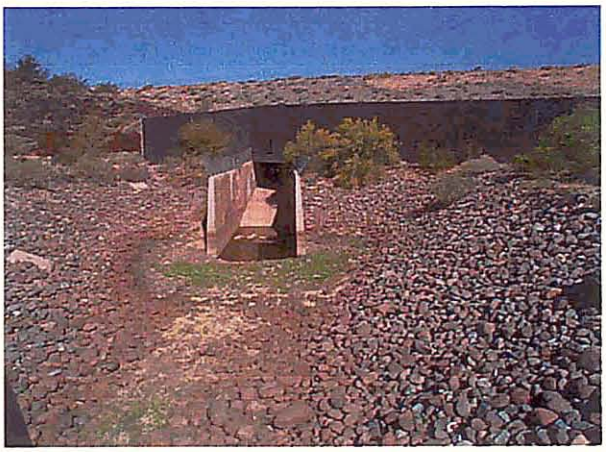
Appendix C: Field Reconnaissance

Photographs

Adobe-01	Principal outlet
Adobe-02	Principal outlet channel, looking downstream from outlet
Adobe-03	Principal outlet channel, looking northeast from Beardsley Road
Adobe-04	Principal outlet channel, looking north from Beardsley Road
Adobe-05	Principal outlet channel, looking west along Beardsley Road
Adobe-07	Principal outlet channel, looking east along Beardsley Road
Adobe-08	Principal outlet channel culverts under Beardsley Road and Loop 101, looking south
Adobe-09	Weir section, principal outlet channel north of Beardsley Road
Adobe-10	North side of Adobe Dam, view from spillway access road
Adobe-11-12-13	View south from the spillway
Adobe-14	Adobe Dam spillway, downstream end, looking east
Adobe-15	Adobe Dam spillway, downstream end, looking east
Adobe-16	Culverts under road immediately downstream of spillway, looking south
Adobe-17	Wash downstream of spillway, looking south, caliche outcrops visible
Adobe-18	Channel along north side of Beardsley Road, looking west
Adobe-19	Channel outlet to ADOT detention basin northeast of Beardsley Road and 51st Avenue, looking northeast
Adobe-20-21	ADOT detention basin northeast of Beardsley Road and 51st Avenue, looking west
Adobe-22	View east along Beardsley Road, east of 51st Avenue
Adobe-23	View southeast across 51st Avenue at Tonopah Drive
Adobe-24	View west across 51st Avenue at Tonopah Drive
Adobe-25	View north along 51st Avenue at Tonopah Drive
Adobe-26	View west at 51st Avenue and Tonopah Drive
Adobe-27	Low point in 51st Avenue, at Tonopah Drive entrance to Arrowhead Lakes
Adobe-28	Arrowhead Lakes, view north from Tonopah Drive near 51st Avenue
Adobe-29-30	Arrowhead Lakes, Bridge No. 9 and lake north of bridge
Adobe-31	Arrowhead Lakes, Bridge No. 9, lake south of bridge
Adobe-32	Arrowhead Lakes, Bridge No. 8, weir structure and lake east of bridge
Adobe-33	Arrowhead Lakes, Bridge No. 8, east side of bridge
Adobe-34-35	Arrowhead Lakes, Bridge No. 8, lake west of bridge
Adobe-36	Arrowhead Lakes, Bridge No. 4, view south from Tonopah Drive
Adobe-37	Arrowhead Lakes outlet structure north of Beardsley Road, looking east
Adobe-38	Arrowhead Lakes outlet, looking east along Beardsley Road
Adobe-39	Arrowhead Lakes outlet, culverts under Loop 101, looking south from Beardsley Road
Adobe-40	Arrowhead Lakes outlet to 55th Avenue drainage channel, looking north
Adobe-41	55th Avenue drainage channel, looking south from Loop 101
Adobe-42	51st Avenue underpass, looking north
Adobe-43	View south along 51st Avenue from underpass
Adobe-44	View east across 51st Avenue, south of Loop 101
Adobe-45	Carmel Park, Skunk Creek at Piute Avenue, looking downstream
Adobe-46	Carmel Park, Skunk Creek at Piute Avenue, looking upstream
Adobe-47	Carmel Park, undeveloped lots along Skunk Creek at Piute Avenue
Adobe-48	55th Avenue drainage channel, looking north from Utopia Road
Adobe-49	55th Avenue drainage channel, looking south from Utopia Road

Photographs (Cont'd.)

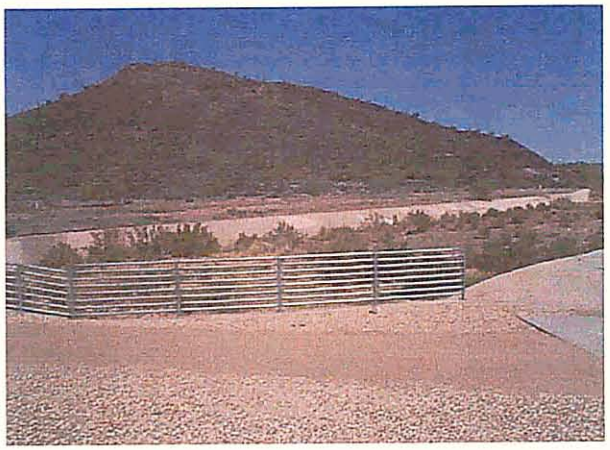
Adobe-50	Skunk Creek channelization at 57th Avenue, looking west
Adobe-51	Skunk Creek channelization at 57th Avenue, looking east
Adobe-52	Skunk Creek at 55th Avenue drainage channel confluence, looking north
Adobe-53	Skunk Creek at 55th Avenue drainage channel confluence, looking east
Adobe-54	Skunk Creek at 55th Avenue drainage channel confluence, looking west
Adobe-55	Skunk Creek at 43rd Avenue and Loop 101, looking west
Adobe-56	Skunk Creek at 43rd Avenue and Loop 101, looking east
Adobe-57	Skunk Creek at 43rd Avenue and Loop 101, looking northeast, culvert under Loop 101
Adobe-58	Skunk Creek upstream of confluence with Scatter Wash, looking northeast
Adobe-59	Skunk Creek upstream of confluence with Scatter Wash, looking southwest
Adobe-60	Skunk Creek, drop structure at Wahalla Lane
Adobe-61	Skunk Creek upstream of confluence with Scatter Wash, looking south from Wahalla Land
Adobe-62	Skunk Creek upstream of confluence with Scatter Wash, looking south from Wahalla Lane
Adobe-63	Skunk Creek downstream of confluence with Scatter Wash, looking west from Havasupai Drive
Adobe-64	Skunk Creek downstream of confluence with Scatter Wash, looking west from Havasupai Drive
Adobe-65	51st Avenue and Loop 101, view west along south side of Loop 101 frontage road
Adobe-66	51st Avenue and Loop 101, view south along 51st Avenue
Adobe-67	71st Avenue and Grovers Street, view north along drainage channel
Adobe-68	71st Avenue and Grovers Street, view west across drainage channel
Adobe-69	71st Avenue and Grovers Street, view south along drainage channel
Adobe-70	Arrowhead Lakes Park, view southwest from 55th Avenue
Adobe-71	Arrowhead Lakes Park, view west from 55th Avenue
Adobe-72	Arrowhead Lakes Park, view southwest from Irma Lane
Adobe-73	Channel along north side of Beardsley Road, east of 59th Avenue, view west
Adobe-74	View south at Beardsley Road and freeway, east of 59th Avenue
Adobe-75	Freeway on-ramp at Beardsley Road west of 59th Avenue, view west
Adobe-76	Freeway, view west at 67th Avenue bridge
Adobe-77	Freeway, view west at 75th Avenue bridge
Adobe-78	Freeway, curve at New River, view west
Adobe-79	Freeway, curve at New River, view southwest
Adobe-80	71st Avenue drainage channel at Union Hills, view south
Adobe-81	70th Drive at Morrow Drive, view east
Adobe-82	70th Drive at Morrow Drive, view northwest
Adobe-83	Golf course, Utopia Road at approx. 71st Avenue, view south
Adobe-84	Golf course, Utopia Road at approx. 71st Avenue, view north
Adobe-85	Beardsley Road south of freeway, at approx. 71st Avenue, view south
Adobe-86	Beardsley Road south of freeway, at approx. 71st Avenue, view east
Adobe-87	Beardsley Road south of freeway, at approx. 68th Avenue, view south
Adobe-88	71st Avenue drainage channel at Skunk Creek confluence, view east
Adobe-89	71st Avenue drainage channel at Skunk Creek confluence, view north
Adobe-90	View east at 75th Avenue bridge over Skunk Creek
Adobe-91	Skunk Creek at ACDC confluence, view southwest
Adobe-92	Skunk Creek at ACDC confluence, view northeast
Adobe-93	Skunk Creek near ACDC confluence, view southwest



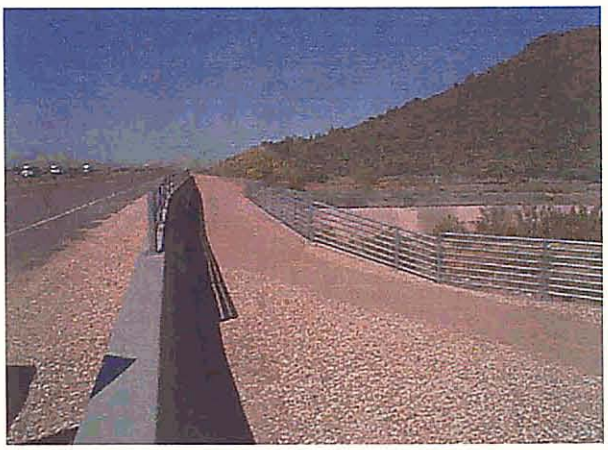
Adobe-01 Principal outlet

Adobe-02 Principal outlet channel, looking downstream from outlet

Adobe-03 Principal outlet channel, looking northeast from Beardsley Road



Adobe-04 Principal outlet channel, looking north from Beardsley Road



Adobe-05 Principal outlet channel, looking west along Beardsley Road

Adobe-07 Principal outlet channel, looking east along Beardsley Road

Adobe-08 Principal outlet channel culverts under Beardsley Road and Loop 101, looking south

Adobe-09 Weir section, principal outlet channel north of Beardsley Road

Adobe-10 North side of Adobe Dam, view from spillway access road

Adobe-11-12-13 View south from the spillway

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Adobe-15 Adobe Dam spillway, downstream end, looking east

Adobe-16 Culverts under road immediately downstream of spillway, looking south

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Adobe-18 Channel along north side of Beardsley Road, looking west

Adobe-19 Channel outlet to ADOT detention basin northeast of Beardsley Road and 51st Avenue, looking northeast

Adobe-20-21 ADOT detention basin northeast of Beardsley Road and 51st Avenue, looking west

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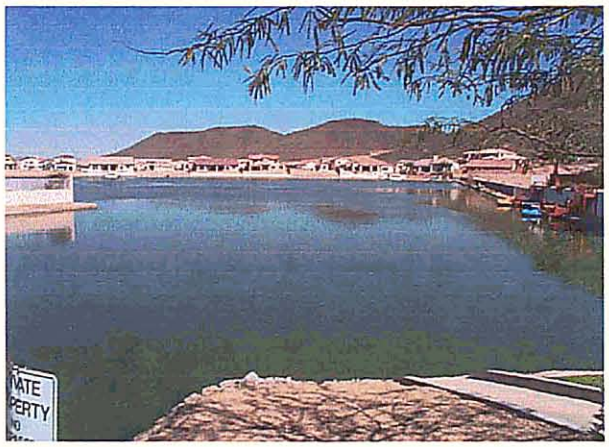
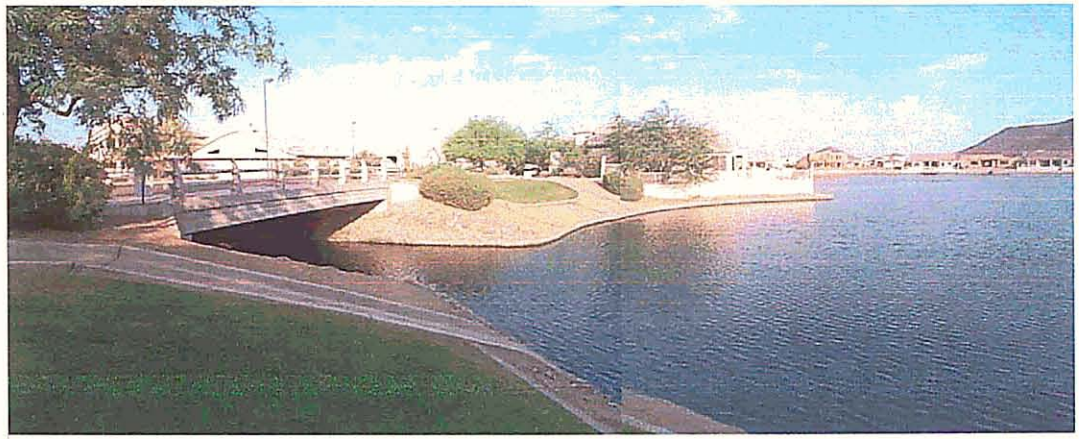
Adobe-25 View north along 51st Avenue at Tonopah Drive

Adobe-26 View west at 51st Avenue and Tonopah Drive

Adobe-27 Low point in 51st Avenue, at Tonopah Drive entrance to Arrowhead Lakes



Adobe-28 Arrowhead Lakes, view north from Tonopah Drive near 51st Avenue

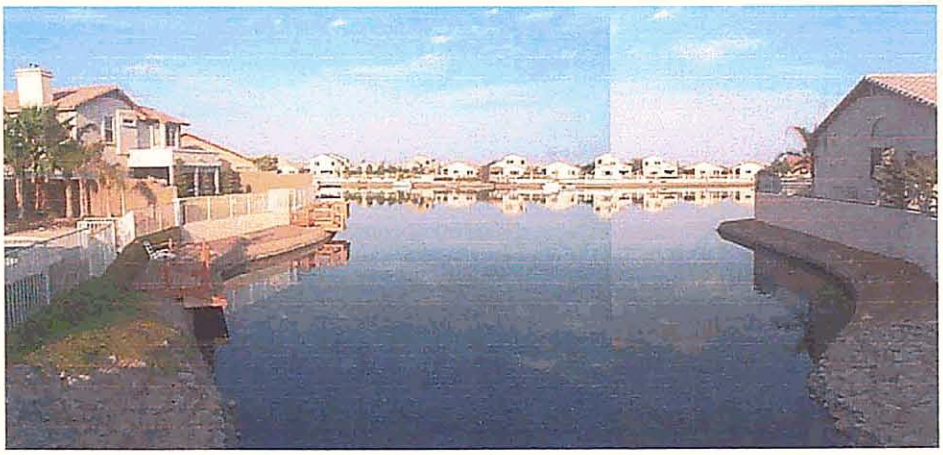


Adobe-29-30 Arrowhead Lakes, Bridge No. 9 and lake north of bridge

Adobe-31 Arrowhead Lakes, Bridge No. 9, lake south of bridge

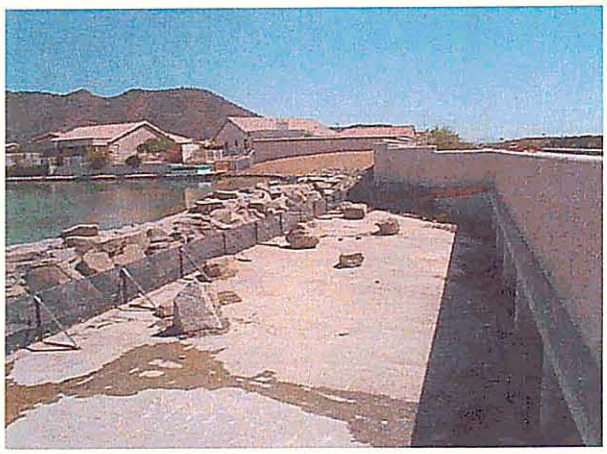
Adobe-32 Arrowhead Lakes, Bridge No. 8, weir structure and lake east of bridge

Adobe-33 Arrowhead Lakes, Bridge No. 8, east side of bridge

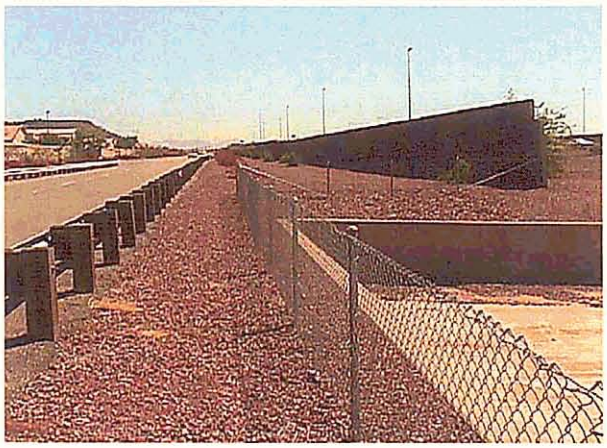


Adobe-34-35 Arrowhead Lakes, Bridge No. 8, lake west of bridge

Adobe-36 Arrowhead Lakes, Bridge No. 4, view south from Tonopah Drive

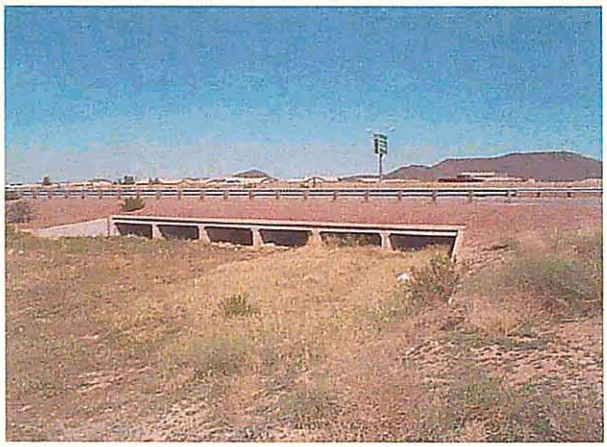


Adobe-37 Arrowhead Lakes outlet structure north of Beardsley Road, looking east



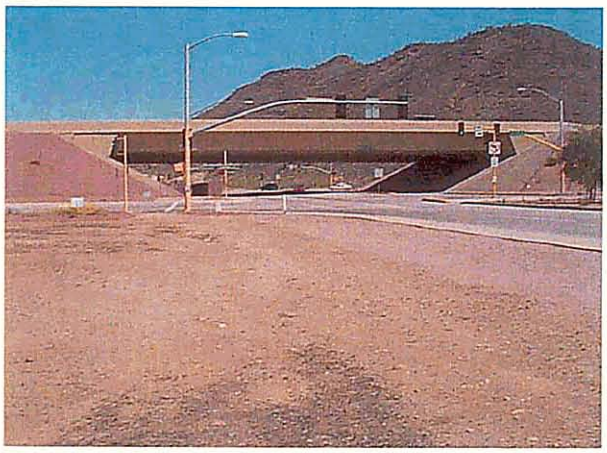
Adobe-38 Arrowhead Lakes outlet, looking east along Beardsley Road

Adobe-39 Arrowhead Lakes outlet, culverts under Loop 101, looking south from Beardsley Road



Adobe-40 Adobe Lakes outlet to 55th Avenue drainage channel, looking north

Adobe-41 55th Avenue drainage channel, looking south from Loop 101



Adobe-42 51st Avenue underpass, looking north

Adobe-43 View south along 51st Avenue from underpass

Adobe-44 View east across 51st Avenue, south of Loop 101

Adobe-45 Carmel Park, Skunk Creek at Piute Avenue, looking downstream

Adobe-46 Carmel Park, Skunk Creek at Piute Avenue, looking upstream

Adobe-47 Carmel Park, undeveloped lots along Skunk Creek at Piute Avenue

Adobe-48 55th Avuenue drainage channel, looking north from Utopia Road

Adobe-49 55th Avenue drainage channel, looking south from Utopia Road

Adobe-50 Skunk Creek channelization at 57th Avenue, looking west

Adobe-51 Skunk Creek channelization at 57th Avenue, looking east

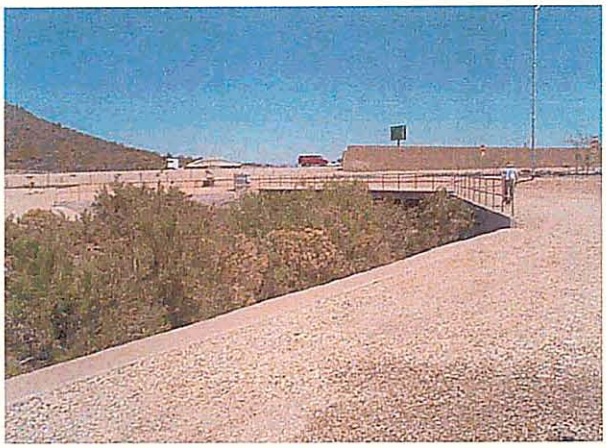
Adobe-52 Skunk Creek at 55th Avenue drainage channel confluence, looking north

Adobe-53 Skunk Creek at 55th Avenue drainage channel confluence, looking east

Adobe-54 Skunk Creek at 55th Avenue drainage channel confluence, looking west

Adobe-55 Skunk Creek at 43rd Avenue and Loop 101, looking west

Adobe-56 Skunk Creek at 43rd Avenue and Loop 101, looking east



Adobe-57 Skunk Creek at 43rd Avenue and Loop 101, looking northeast, culvert under Loop 101

Adobe-58 Skunk Creek upstream of confluence with Scatter Wash, looking northeast

Adobe-59 Skunk Creek upstream of confluence with Scatter Wash, looking southwest

Adobe-60 Skunk Creek, drop structure at Wahalla Lane

Adobe-61 Skunk Creek upstream of confluence with Scatter Wash, looking south from Wahalla Lane

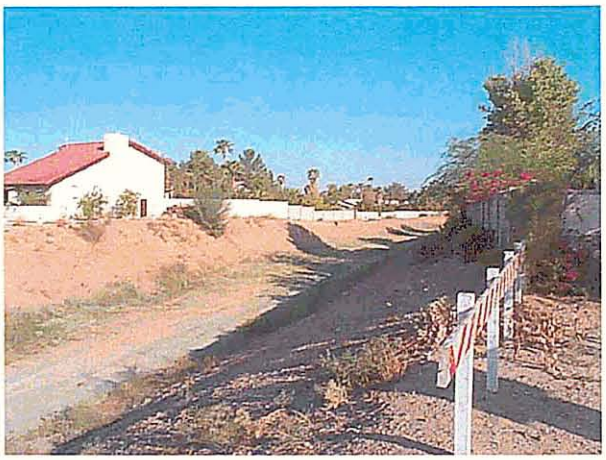
Adobe-62 Skunk Creek upstream of confluence with Scatter Wash, looking south from Wahalla Lane

Adobe-63 Skunk Creek downstream of confluence with Scatter Wash, looking west from Havasupai Drive

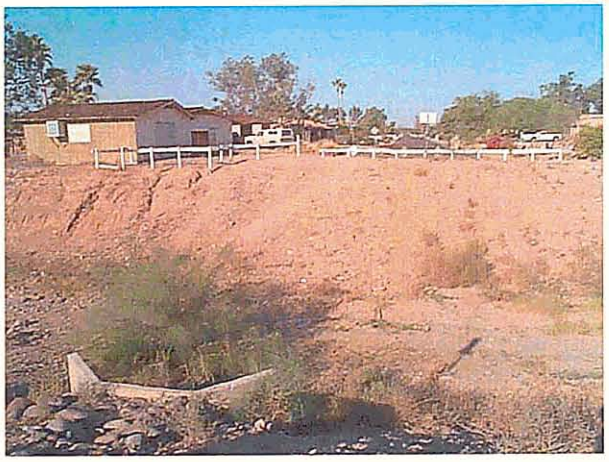
Adobe-64 Skunk Creek downstream of confluence with Scatter Wash, looking west from Havasupai Drive

Adobe-65 51st Avenue and Loop 101, view west along south side of Loop 101 frontage road

Adobe-66 51st Avenue and Loop 101, view south along 51st Avenue



Adobe-67 71st Avenue and Grovers Street, view north along drainage channel



Adobe-68 71st Avenue and Grovers Street, view west across drainage channel

Adobe-69 71st Avenue and Grovers Street, view south along drainage channel

Adobe-70 Arrowhead Lakes Park, view southwest from 55th Avenue

Adobe-71 Arrowhead Lakes Park, view west from 55th Avenue

Adobe-72 Arrowhead Lakes Park, view southwest from Irma Lane

Adobe-73 Channel along north side of Beardsley Road, east of 59th Avenue, view west

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Adobe-79 Freeway, curve at New River, view southwest

Adobe-80 71st Avenue drainage channel at Union Hills, view south

Adobe-81 70th Drive at Morrow Drive, view east

Adobe-82 70th Drive at Morrow Drive, view northwest

Adobe-83 Golf course, Utopia Road at approx. 71st Avenue, view south

Adobe-84 Golf course, Utopia Road at approx. 71st Avenue, view north

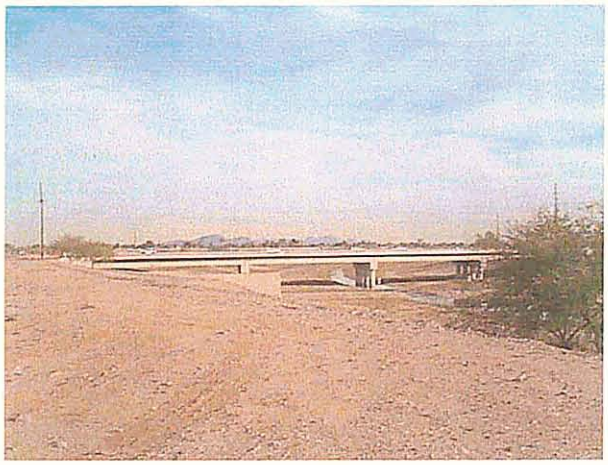
Adobe-85 Beardsley Road south of freeway, at approx. 71st Avenue, view south

Adobe-86 Beardsley Road south of freeway, at approx. 71st Avenue, view east

Adobe-87 Beardsley Road south of freeway, at approx. 68th Avenue, view south

Adobe-88 71st Avenue drainage channel at Skunk Creek confluence, view east

Adobe-89 71st Avenue drainage channel at Skunk Creek confluence, view north



Adobe-90 View east at 75th Avenue Bridge over Skunk Creek

Adobe-91 Skunk Creek at ACDC confluence, view southwest

Adobe-92 Skunk Creek at ACDC confluence, view northeast

Adobe-93 Skunk Creek at ACDC confluence, view southwest

5 Manning's 'n' Calculations

MANNING'S 'n' CALCULATIONS

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

where:
- n = composite value
- n_b = base value for a straight, uniform channel
- n_1 = surface irregularities component
- n_2 = obstruction component
- n_3 = vegetation component
- m = degree of meandering, within channel

Land Type	Manning's 'n' Components				Meandering	Composite
	Base, n_b	Irregularity, n_1	Obstruction, n_2	Vegetation, n_3	m	n
Undeveloped Desert	0.030	0.005	0.000	0.010	1.00	0.045
Channel / Freeway	0.020	0.000	0.000	0.000	1.00	0.020
Developed / Residential	0.030	0.005	0.030	0.015	1.00	0.080
Pavement	0.016	0.000	0.000	0.000	1.00	0.016

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.

ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX D: REACH A HYDRAULICS
HEC-RAS MODEL ADA1

Adobe Dam
Spillway Delineation Study

Appendix D: Reach A Hydraulics
HEC-RAS Model ADA1

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6 Flow West of Arrowhead Lakes Subdivision
- 6.1 Summary Sheet
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1 Flow Split at 51st Avenue, North of the Loop 101 Freeway

Summary Sheet for Flow Split at 51st Avenue, North of the 101 Freeway

Description

When the flow reaches 51st Avenue, it can travel south along 51st Avenue, continue west along Beardsley Road, or travel west through the subdivision. A flow split analysis, using the equation $Q = C L H^{3/2}$, was performed on this particular area. Typical cross sections were taken to determine the elevation at which all the flow would pass when adding the flow at each section. The sections are described as follows:

- South on 51st Avenue: Just north of the 51st Avenue Underpass.
- West on frontage road: Between the freeway side slope and the subdivision wall
- West through Arrowhead subdivision: Tonopah Street with six (6) ft side walls representing the homes adjacent to the street, and fifteen ten-ft openings representing the space between the homes after the wall on the east side of the subdivision have been destroyed by the water.

A diagram of the location of the cross sections is located at the end of this summary page, as well as a calculation page indicating the cross section calculations.

Assumptions

- There are fifteen (15) ten (10)-ft openings with two ft of rubble. The flow will travel into the subdivision through these openings, as well through Tonopah Street.
- The cross sections taken are the most constricting.

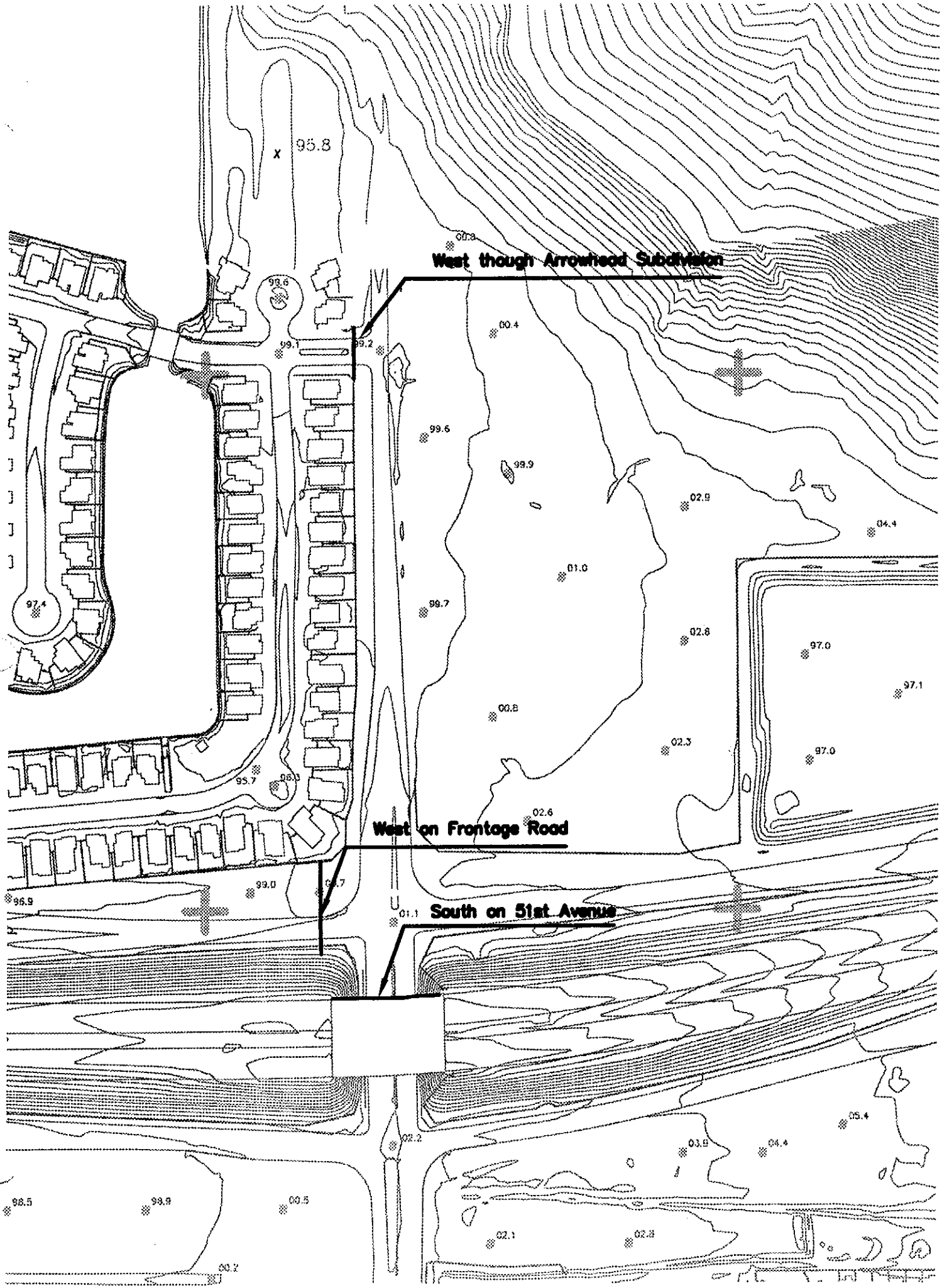
Method of Analysis

The equation $Q = C L H^{3/2}$ was used to determine the amount of flow traveling though each cross section at set elevations. C was assumed to be 2.8 for the cross sections along roadways and 2.2 for the cross sections between the houses. The amount of flow was calculated for each of the sections. An elevation was determined to indicate when the total flow would pass through the cross sections. This elevation determined the set water surface elevation in Cross Section 19.18 of the HEC-RAS Model ADA1.

Results

The flow-split analysis determined the amount of flow leaving the current model. Below is a table indicating the results of the analysis:

	1/3 Flow	**2/3 Flow**	**Full Flow**
Tonopah Drive and in-between houses	1300	2600	3700
West on Beardsley Road	1300	2300	3300
South on 51st Avenue	600	1400	2200
East Bound 101 Freeway	0	100	400
Total	**3200**	**6400**	**9600**


95.8
West though Arrowhead Subdivision
West on Frontage Road
South on 51st Avenue

ADOBE DAM

TONOPAH DRIVE			
ELEVATION (FT)	HEAD (FT)	LENGTH (FT)	FLOW (CFS)
1299.20	0.00	48.58	0.00
1299.40	0.00	48.58	0.00
1299.47	0.00	48.58	0.00
1299.60	0.00	48.58	0.00
1299.80	0.00	48.58	0.00
1300.00	0.00	48.58	0.00
1300.20	0.20	48.58	12.17
1300.34	0.34	48.58	26.97
1300.40	0.40	48.58	34.41
1300.50	0.50	48.58	48.09
1300.60	0.60	48.58	63.22
1300.73	0.73	48.58	84.84
1300.80	0.80	48.58	97.33
1301.00	1.00	48.58	136.02
1301.04	1.04	48.58	144.27
1301.15	1.15	48.58	167.75
1301.20	1.20	48.58	178.81
1301.40	1.40	48.58	225.32
1301.60	1.60	48.58	275.29
1301.80	1.80	48.58	328.49
1302.00	2.00	48.58	384.73
1302.20	2.20	48.58	443.86
1302.40	2.40	48.58	505.75
1302.60	2.60	48.58	570.26
1302.80	2.80	48.58	637.31
1303.00	3.00	48.58	706.80
1304.79	**4.79**	**48.58**	**1426.00**
1303.93	**3.93**	**48.58**	**1060.16**
1302.83	**2.83**	**48.58**	**647.24**

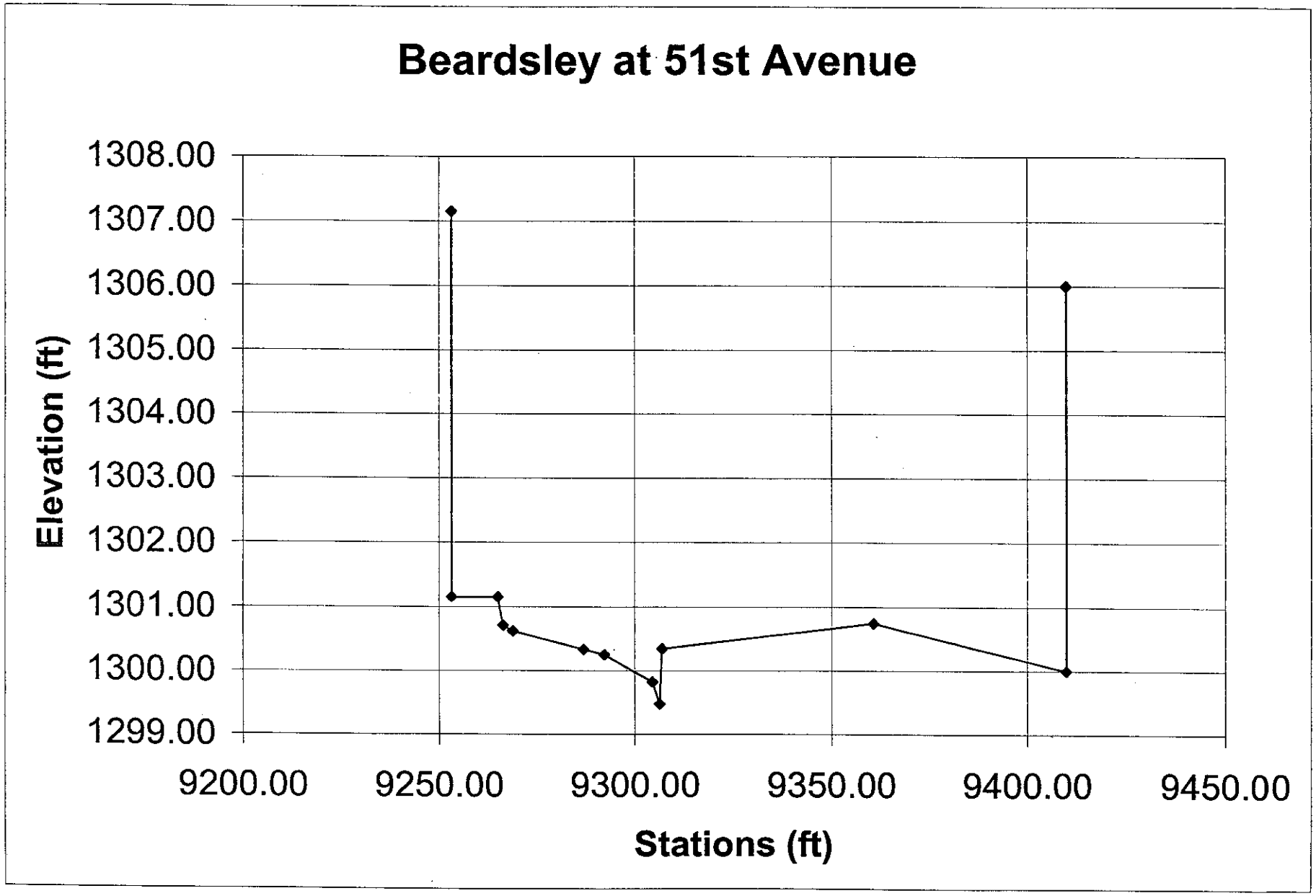
WEST ON FRONTAGE ROAD			
ELEVATION (FT)	HEAD (FT)	LENGTH (FT)	FLOW (CFS)
1299.20	0.00	0.00	0.00
1299.40	0.00	0.00	0.00
1299.47	0.00	0.00	0.00
1299.60	0.13	2.99	1.00
1299.80	0.33	7.60	4.03
1300.00	0.53	12.20	13.18
1300.20	0.73	30.13	52.63
1300.34	0.87	42.69	97.00
1300.40	0.06	57.96	99.38
1300.50	0.16	83.40	111.94
1300.60	0.26	108.84	137.40
1300.73	0.39	141.92	193.78
1300.80	0.07	143.63	201.23
1301.00	0.27	144.24	250.45
1301.04	0.31	144.37	263.55
1301.15	0.42	144.71	304.07
1301.20	0.05	156.64	308.97
1301.40	0.25	156.64	358.89
1301.60	0.45	156.64	436.47
1301.80	0.65	156.64	533.91
1302.00	0.85	156.64	647.78
1302.20	1.05	156.64	775.96
1302.40	1.25	156.64	917.02
1302.60	1.45	156.64	1069.86
1302.80	1.65	156.64	1233.65
1303.00	1.85	156.64	1407.69
1304.79	**3.64**	**156.64**	**3349.95**
1303.93	**2.78**	**156.64**	**2338.12**
1302.83	**1.68**	**156.64**	**1258.26**

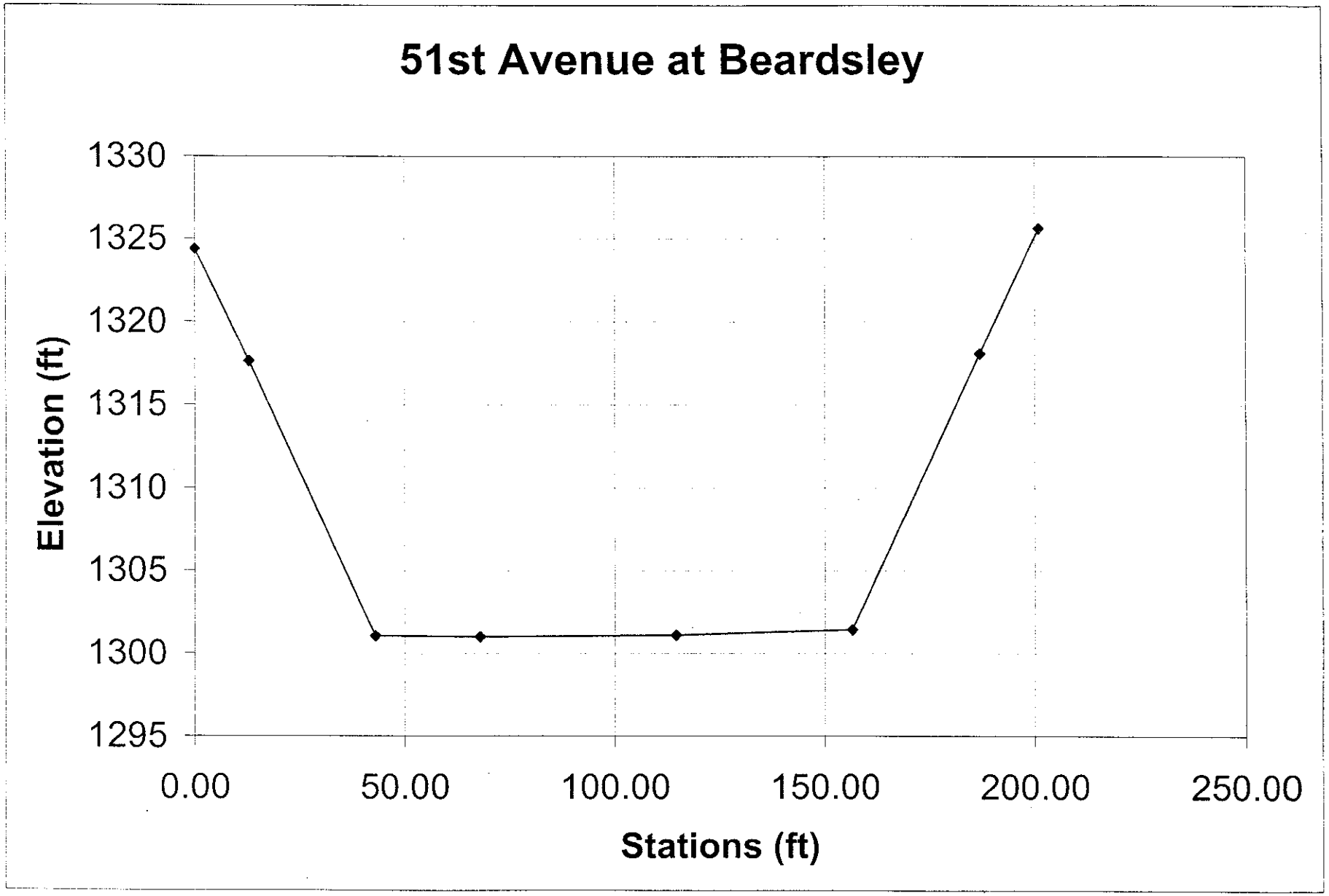
SOUTH ON 51ST AVENUE			
ELEVATION (FT)	HEAD (FT)	LENGTH (FT)	FLOW (CFS)
1299.20	0.00	0.00	0.00
1299.40	0.00	0.00	0.00
1299.47	0.00	0.00	0.00
1299.60	0.00	0.00	0.00
1299.80	0.00	0.00	0.00
1300.00	0.00	0.00	0.00
1300.20	0.00	0.00	0.00
1300.34	0.00	0.00	0.00
1300.40	0.00	0.00	0.00
1300.50	0.00	0.00	0.00
1300.60	0.00	0.00	0.00
1300.73	0.00	0.00	0.00
1300.80	0.00	0.00	0.00
1301.00	0.00	0.00	0.00
1301.04	0.00	0.00	0.00
1301.15	0.11	33.64	3.44
1301.20	0.16	48.93	8.77
1301.40	0.36	110.09	66.58
1301.60	0.20	110.82	94.33
1301.80	0.40	111.56	145.60
1302.00	0.60	112.29	212.71
1302.20	0.80	113.03	293.04
1302.40	1.00	113.76	385.12
1302.60	1.20	114.50	488.02
1302.80	1.40	115.24	601.07
1303.00	1.60	115.97	723.77
1304.79	**3.39**	**122.56**	**2208.45**
1303.93	**2.53**	**119.40**	**1412.71**
1302.83	**1.43**	**115.34**	**618.27**

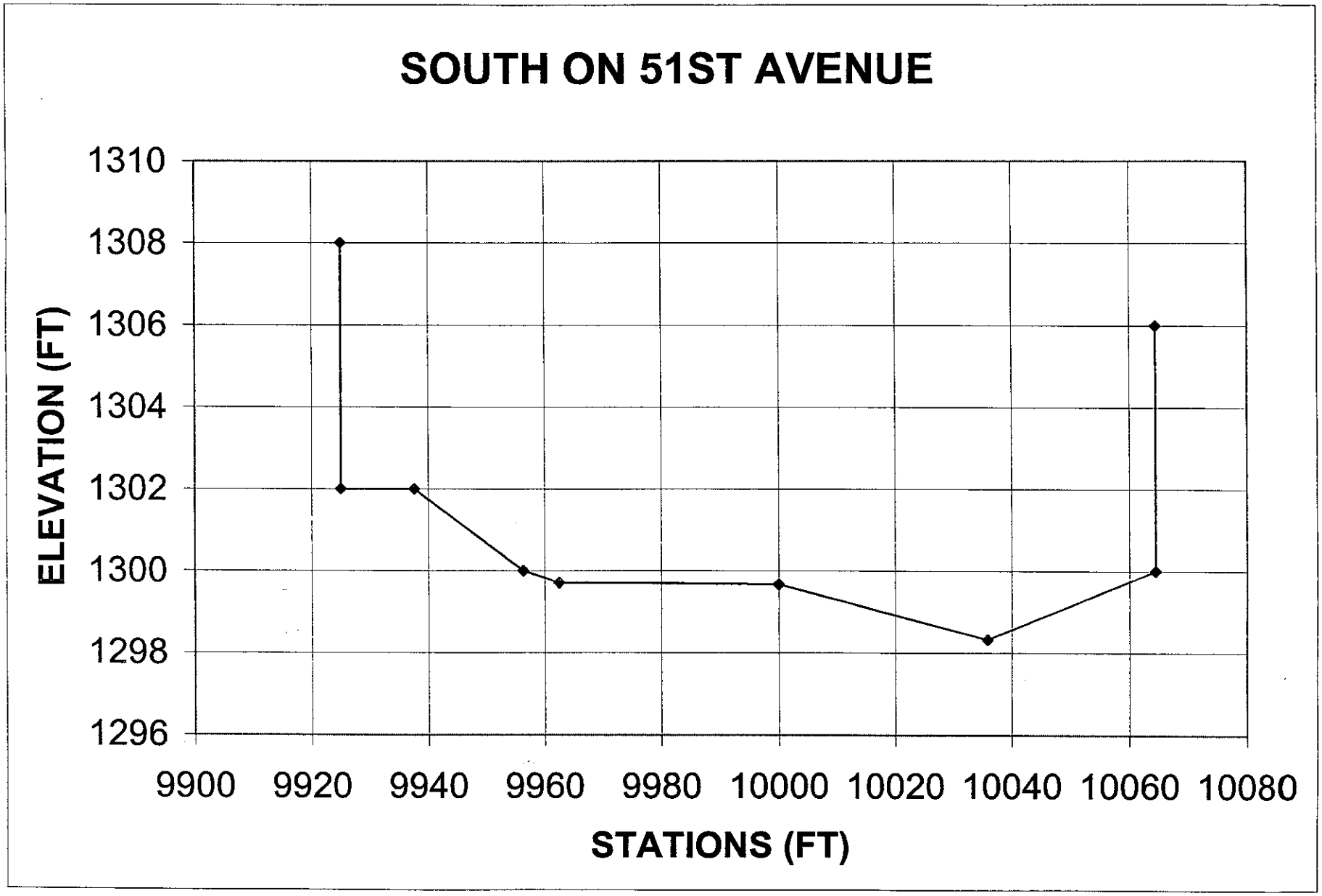
15HOUSES ON THE EASTSIDE OF ARROWHEAD LAKES			
ELEVATION (FT)	HEAD (FT)	LENGTH (FT)	FLOW (CFS)
1299.20	0.00	150.00	0.00
1299.40	0.00	150.00	0.00
1299.47	0.00	150.00	0.00
1299.60	0.00	150.00	0.00
1299.80	0.00	150.00	0.00
1300.00	0.00	150.00	0.00
1300.20	0.00	150.00	0.00
1300.34	0.00	150.00	0.00
1300.40	0.00	150.00	0.00
1300.50	0.00	150.00	0.00
1300.60	0.00	150.00	0.00
1300.73	0.00	150.00	0.00
1300.80	0.00	150.00	0.00
1301.00	0.00	150.00	0.00
1301.04	0.00	150.00	0.00
1301.15	0.00	150.00	0.00
1301.20	0.00	150.00	0.00
1301.40	0.20	150.00	29.52
1301.60	0.40	150.00	83.48
1301.80	0.60	150.00	153.37
1302.00	0.80	150.00	236.13
1302.20	1.00	150.00	330.00
1302.40	1.20	150.00	433.80
1302.60	1.40	150.00	546.65
1302.80	1.60	150.00	667.87
1303.00	1.80	150.00	796.93
1304.79	**3.59**	**150.00**	**2244.69**
1303.931	**2.73**	**150.00**	**1489.35**
1302.829	**1.63**	**150.00**	**686.11**

TOTAL FLOW (CFS)
0.00
0.00
0.00
1.00
4.03
13.18
64.79
123.97
133.80
160.04
200.62
278.62
298.56
386.47
407.82
475.26
496.55
680.31
889.58
1161.38
1481.35
1842.86
2241.68
2674.79
3139.90
3635.19
9229.08
6300.34
3209.89

	1/3	2/3	Full
Arrowhead: Tonopah Drive and 15 Houses	1,300	2,600	3,700
West on Beardsley	1,300	2,300	3,300
South on 51st Avenue	600	1,400	2,200
Eastbound 101 Freeway	0	100	400
TOTAL	3,200	6,400	9,600


Beardsley at 51st Avenue
Elevation (ft)
1308.00
1307.00
1306.00
1305.00
1304.00
1303.00
1302.00
1301.00
1300.00
1299.00
9200.00
9250.00
9300.00
9350.00
9400.00
9450.00
Stations (ft)


51st Avenue at Beardsley
Elevation (ft)
1330
1325
1320
1315
1310
1305
1300
1295
0.00
50.00
100.00
150.00
200.00
250.00
Stations (ft)


SOUTH ON 51ST AVENUE
ELEVATION (FT)
1310
1308
1306
1304
1302
1300
1298
1296
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
STATIONS (FT)

2 Arrowhead Lakes Outlet Analysis

2.1 1/3 Flow

Procedure to Determine the Runoff Distribution at the Arrowhead Lakes Outlet For the 1/3 Discharge

The objective was to determine how flow would exit the Arrowhead Lakes subdivision, cross Beardsley Road, and after combining with flows in Beardsley Road, either continue west along Beardsley or cross the Loop 101 Freeway. The following procedure was used to determine the flow split at this location:

Step 1: A rating curve was developed for the 55st Avenue channel just downstream of the Loop 101, south frontage road (Cross section B-B). The discharge range used was from 1000 to 4000 cfs.

Step 2: The resulting water surface elevation determined in Step 1 was used as the tailwater condition for the culverts across the Loop 101 freeway. A rating curve was then established for the culverts across Loop 101 and the frontage road. In order to simplify the calculation process, the two culverts were considered as one. The dQ and dWS data from Step 1 were used as the initial condition data in the box culvert hydraulic calculations.

Step 3: An iterative procedure was used to balance the culvert flow across Loop 101 with the discharge from Lake 5, the lake immediately north of the Arrowhead Lakes outlet structure. The discharge at the Beardsley Road culvert was assumed to be 1332 cfs (Q_{boxb}=1332), which is the flow which enters the Arrowhead Lakes subdivision from 51st Avenue.

Step 4: From the HEC-RAS model for flow north of the freeway (Model ADA1), the flow depth above the top of curb along Beardsley Road was determined to be 2.1 feet. Weir flow at the Beardsley Road culverts was determined using the weir equation and the 2.1 feet water depth ($Q_{wb}=CLH^{1.5}=3\times80\times2.1^{1.5}=730$ cfs).

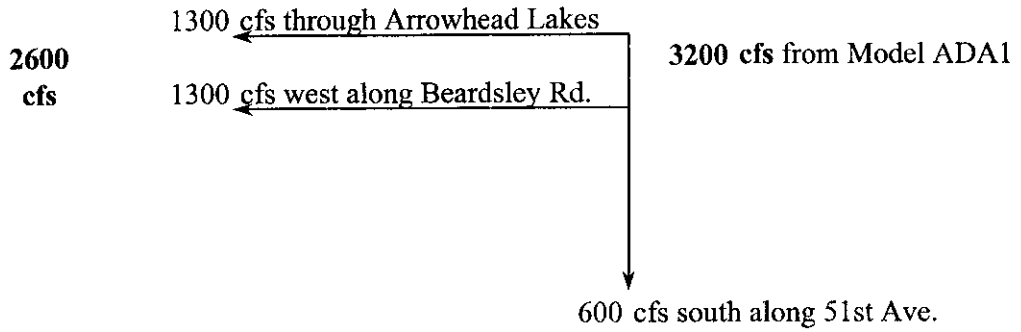
Step 5: The headwater (HW) and tailwater (TW) at the freeway culvert inlet and outlet, respectively, were determined using curves from Step 2 and Q_{boxf} ($Q_{boxf}=Q_{boxb}+Q_{wb}=1332+730=2062$ cfs).

Step 6: The channel water surface elevation (WSEL) was determined using the given discharge Q_{boxf}, and the rating curve developed for Step 1. If the WSEL did not match the TW from Step 5, Step 3 was repeated with another discharge.

Step 7: The HW elevation at the Beardsley Road culvert inlet was determined.

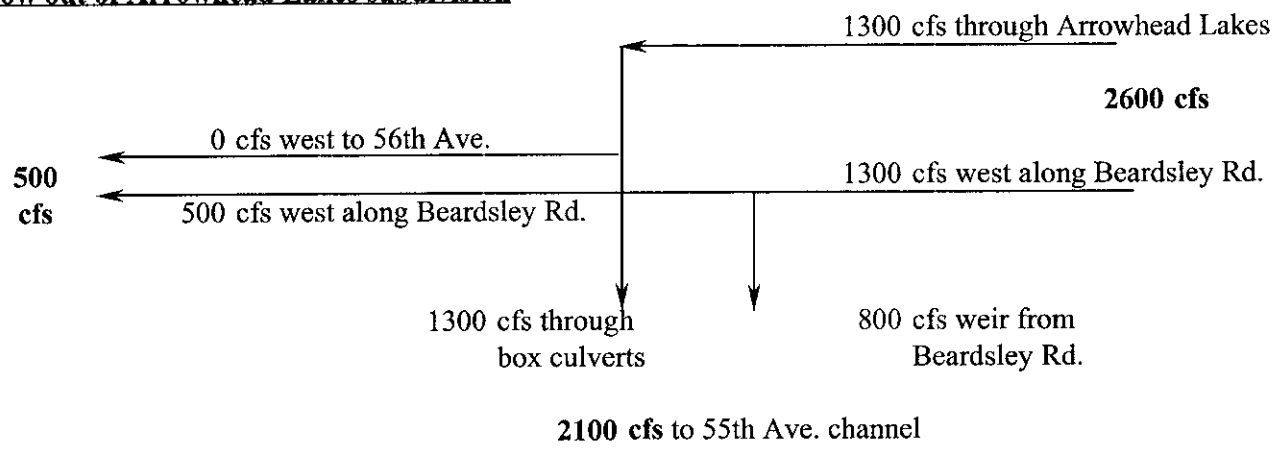
Adobe Dam Spillway Delineation Study
Flow Split Analysis at Arrowhead Lakes Outlet
1/3 Flow

Flow into Arrowhead Lakes subdivision at 51st Avenue



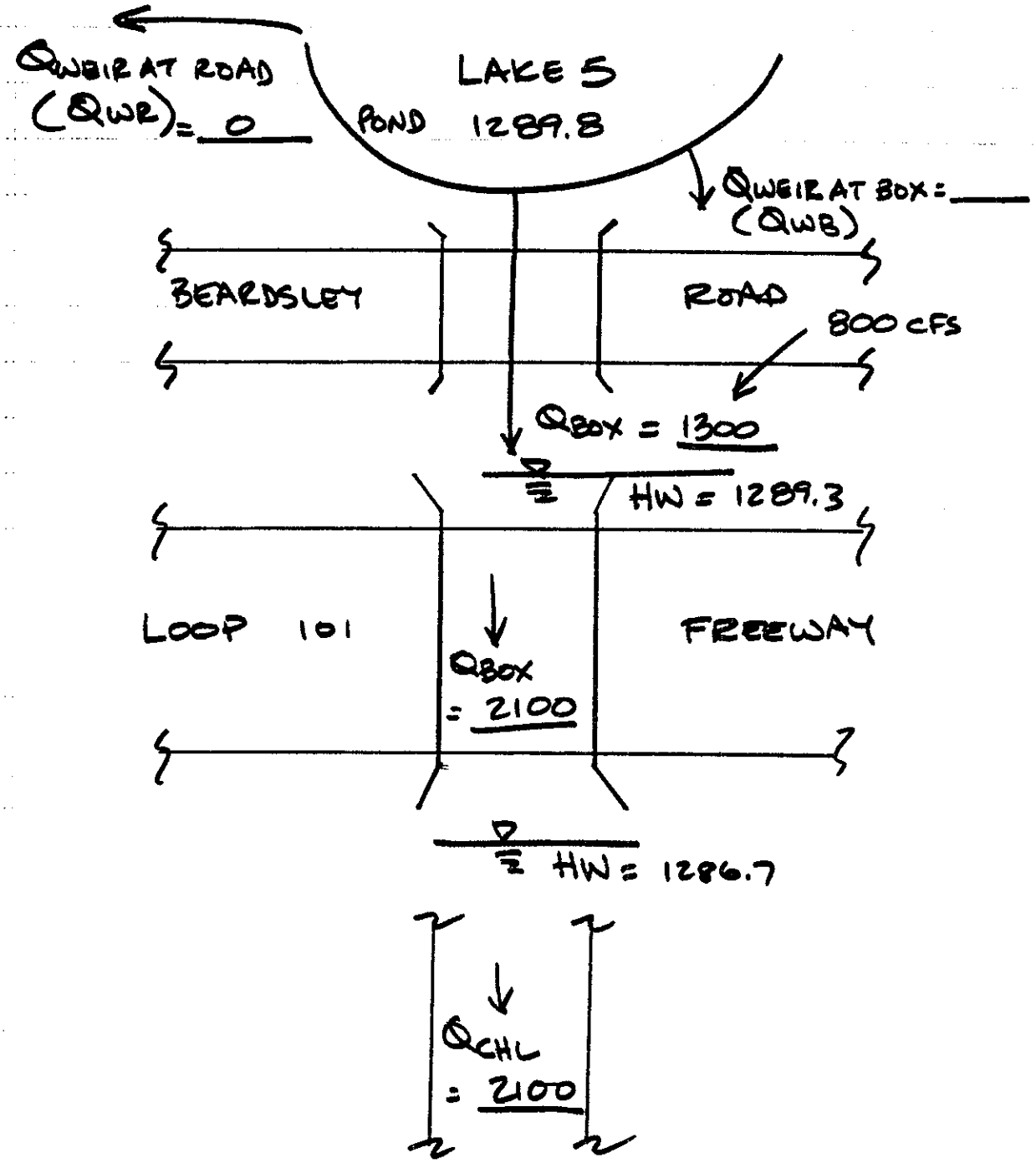
1. Qlake = flow intoArrowhead Lakes from 51st Ave. =		1300 cfs
2. Qbox = flow through concrete box culverts across Beardsley Rd. =		1300 cfs
	HW =	1289.8 ft
	TW =	1289.24 ft
3. QwB = weir flow over concrete box culvert headwall into Beardsley Rd.		0 cfs
4. QwR = weir flow into 56th Ave. from lake =		0 cfs

Flow out of Arrowhead Lakes subdivision



ADOBE DAM SPILLWAY DELINEATION STUDY

LAKE 5 OUTLET 1/3 FLOW



Rating Curve Table
Rating Table for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006~2\boxl5.fm2
Worksheet	Channel freeway culvert downstream B-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.002000 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	1,000.00	4,000.00	100.00 cfs

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
1,000.00	0.030	1,285.22	3.91
1,100.00	0.030	1,285.37	4.04
1,200.00	0.030	1,285.52	4.17
1,300.00	0.030	1,285.65	4.28
1,400.00	0.030	1,285.79	4.40
1,500.00	0.030	1,285.92	4.50
1,600.00	0.030	1,286.04	4.60
1,700.00	0.030	1,286.17	4.69
1,800.00	0.030	1,286.29	4.78
1,900.00	0.030	1,286.41	4.86
2,000.00	0.030	1,286.52	4.94
2,100.00	0.030	1,286.64	5.02
2,200.00	0.030	1,286.75	5.10
2,300.00	0.030	1,286.86	5.17
2,400.00	0.030	1,286.96	5.24
2,500.00	0.030	1,287.06	5.31
2,600.00	0.030	1,287.17	5.37
2,700.00	0.030	1,287.27	5.44
2,800.00	0.030	1,287.36	5.50
2,900.00	0.030	1,287.46	5.56
3,000.00	0.030	1,287.55	5.62
3,100.00	0.030	1,287.65	5.67
3,200.00	0.030	1,287.74	5.73
3,300.00	0.030	1,287.83	5.78
3,400.00	0.030	1,287.92	5.84
3,500.00	0.030	1,288.00	5.89
3,600.00	0.030	1,288.09	5.94

Rating Curve Table
Rating Table for Irregular Channel

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
3,700.00	0.030	1,288.17	6.00
3,800.00	0.030	1,288.25	6.05
3,900.00	0.030	1,288.33	6.11
4,000.00	0.030	1,288.41	6.16

Adobe Dam Spillway Delineation Study
Box Culverts across the Loop 101 Freeway
1/3 Flow

Flow Rate per cell (cfs)	Full Flow Rate (cfs)	Headwater (ft)	Tailwater (ft)	Tailwater Elev. (ft)	Headwater Elev. (ft)
210	1262	3.86	3.13	1285.60	1287.02
221	1329	4.00	3.21	1285.68	1287.16
233	1396	4.14	3.29	1285.76	1287.30
244	1463	4.28	3.37	1285.84	1287.44
255	1530	4.41	3.45	1285.92	1287.57
266	1597	4.55	3.53	1286.00	1287.71
277	1664	4.68	3.61	1286.08	1287.84
289	1731	4.99	3.69	1286.16	1288.15
300	1798	5.30	3.77	1286.24	1288.46
311	1866	5.55	3.85	1286.32	1288.71
322	1933	5.73	3.93	1286.40	1288.89
333	2000	5.91	4.01	1286.48	1289.07
344	2067	6.09	4.09	1286.56	1289.25
356	2134	6.28	4.17	1286.64	1289.44
367	2201	6.47	4.25	1286.72	1289.63
378	2268	6.67	4.33	1286.80	1289.83
389	2335	6.88	4.41	1286.88	1290.04
400	2402	7.12	4.49	1286.96	1290.28
412	2469	7.39	4.57	1287.04	1290.55
423	2536	7.66	4.65	1287.12	1290.82
434	2603	7.94	4.73	1287.20	1291.10
445	2670	8.22	4.81	1287.28	1291.38
456	2738	8.51	4.89	1287.36	1291.67
467	2805	8.81	4.97	1287.44	1291.97
479	2872	9.11	5.05	1287.52	1292.27
490	2939	9.41	5.13	1287.60	1292.57

67.1 cfs / 6 = 11.18 cfs/culv

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

September 20, 2000

LOOP 101 FREEWAY CULVERTS

PROGRAM INPUT DATA

6 - 10' x 4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	289.0
Invert Elevation at Downstream end of Culvert (ft)	1,282.47
Invert Elevation at Upstream end of Culvert (ft)	1,283.16
Culvert Slope (ft/ft)	0.0024
Starting Flow Rate (cfs)	210.3 x 6 = 1262 cfs
Incremental Flow Rate (cfs)	11.18
Ending Flow Rate (cfs)	489.8
Starting Tailwater Depth (ft)	3.13 + 1282.47 = 1285.6
Incremental Tailwater Depth (ft)	0.08
Ending Tailwater Depth (ft)	5.13

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater Inlet Control	(ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
210.3	3.13	3.86	0.0	2.34	2.4	2.34	9.0
221.48	3.21	4.0	0.0	2.42	2.48	2.42	9.15
232.66	3.29	4.14	0.0	2.51	2.56	2.51	9.29
243.84	3.37	4.28	0.0	2.59	2.64	2.59	9.42
255.02	3.45	4.41	0.0	2.67	2.72	2.67	9.55
266.2	3.53	4.55	0.0	2.75	2.8	2.75	9.67
277.38	3.61	4.68	0.0	2.83	2.88	2.83	9.79
288.56	3.69	4.99	0.0	2.91	2.96	2.91	9.91
299.74	3.77	5.3	0.0	2.99	3.03	2.99	10.02
310.92	3.85	5.55	0.0	3.07	3.11	3.07	10.13
322.1	3.93	5.73	0.0	3.15	3.18	3.15	10.24
333.28	4.01	5.91	5.62	3.22	3.26	3.22	10.34
344.46	4.09	6.09	5.86	3.3	3.33	3.3	10.43
355.64	4.17	6.28	6.1	3.38	3.4	3.38	10.53
366.82	4.25	6.47	6.35	3.45	3.47	3.45	10.62
378.0	4.33	6.67	6.6	3.53	3.54	3.53	10.71
389.18	4.41	6.88	6.86	3.6	3.61	3.6	10.8
400.36	4.49	7.09	7.12	3.68	3.68	4.0	10.01
411.54	4.57	7.31	7.39	3.75	3.75	4.0	10.29
422.72	4.65	7.54	7.66	3.82	3.82	4.0	10.57
433.9	4.73	7.77	7.94	3.9	3.88	4.0	10.85
445.08	4.81	8.0	8.22	3.97	3.95	4.0	11.13
456.26	4.89	8.24	8.51	4.0	4.0	4.0	11.41
467.44	4.97	8.49	8.81	4.0	4.0	4.0	11.69
478.62	5.05	8.75	9.11	4.0	4.0	4.0	11.97
489.8	5.13	9.01	9.41	4.0	4.0	4.0	12.24

1/3

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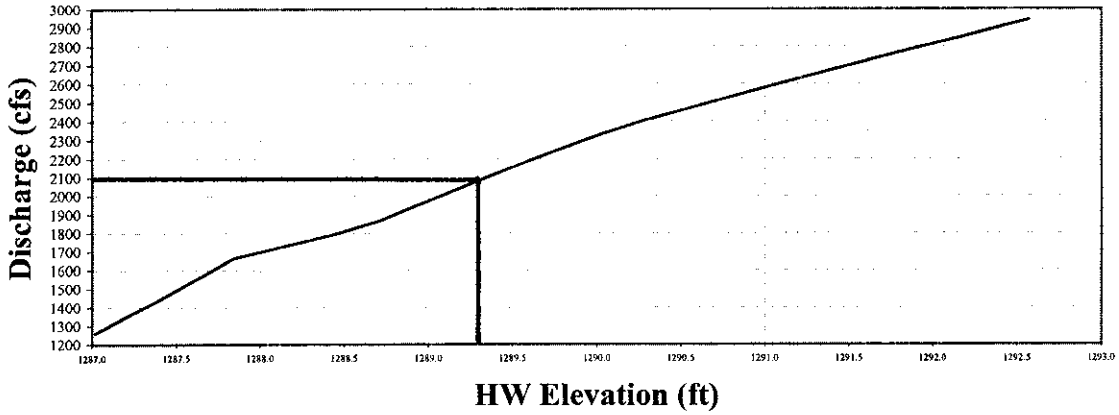
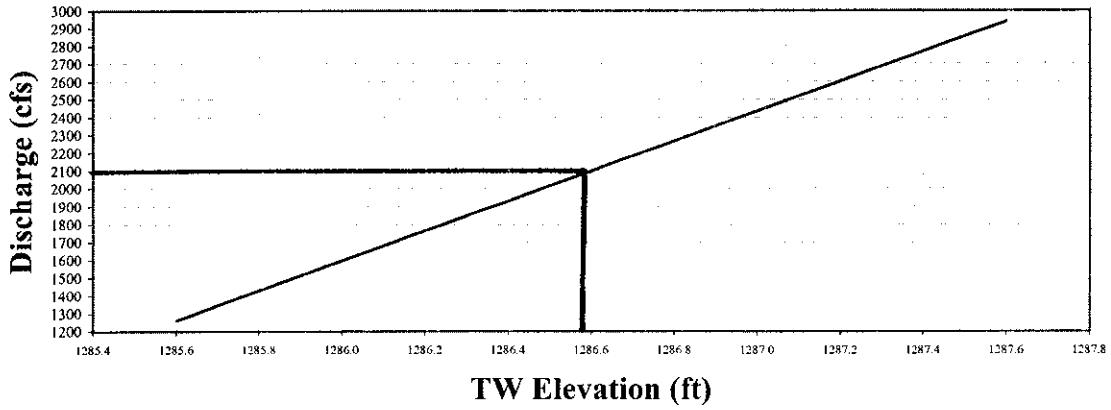
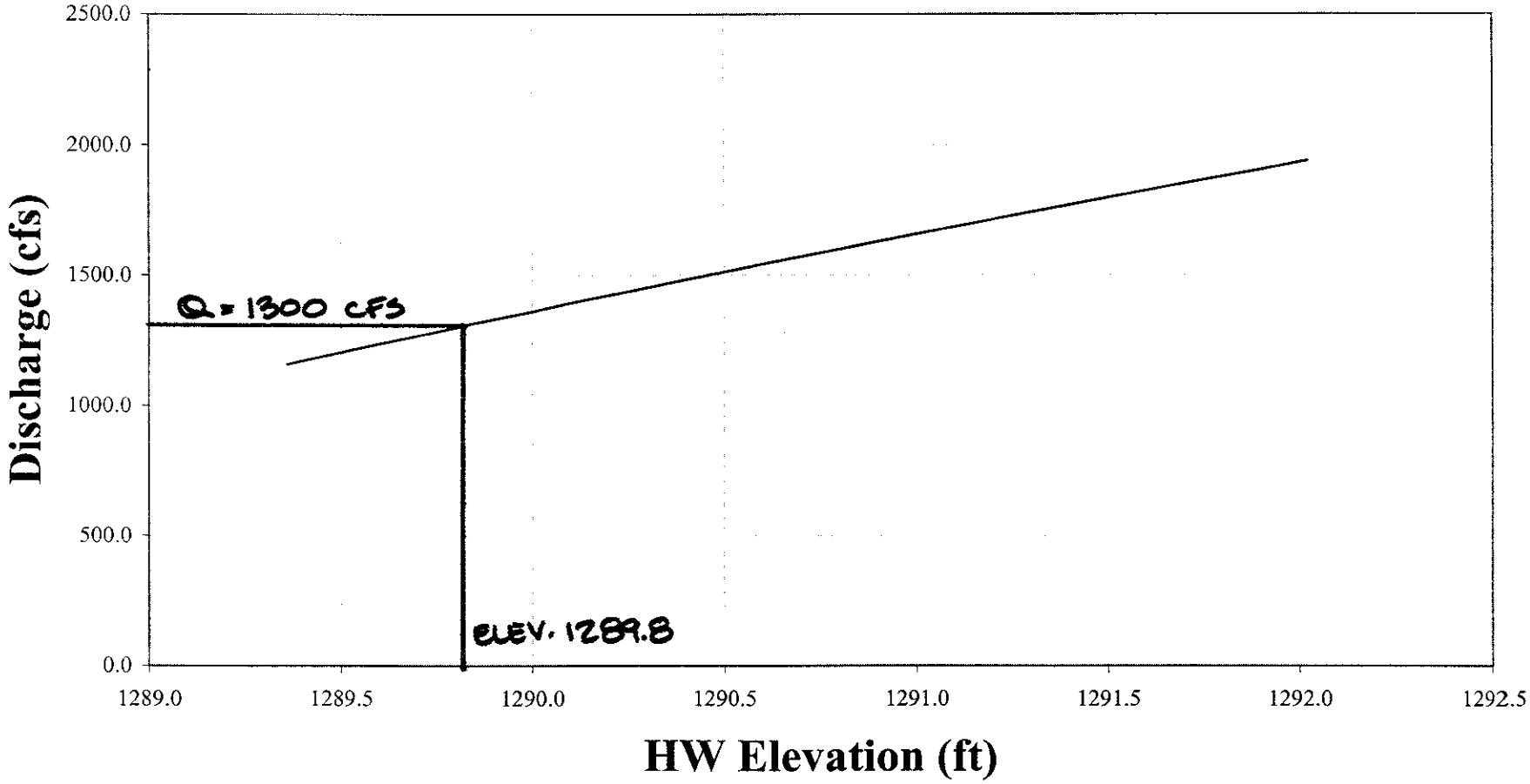
Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Headwater (1/3 Flow)



Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Tailwater (1/3 Flow)



Adobe Dam Spillway Delineation Study
Arrowhead Lake 5
Discharge vs. Elevation (1/3 Flow)



Water Surface Elevation at Beardsley Road and 55th Avenue from HEC-RAS model

***Full Flow*:**

Road Elevation: 1291.4 ft, WSEL = 1295.74 ft

Water Depth = **4.34** ft

2/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1295.0 ft

Water Depth = **3.6** ft

1/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1294 ft

Water Depth = **2.6** ft

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

December 22, 2000

LAKE 5 OUTLET CULVERTS

PROGRAM INPUT DATA

6 - 10' x 4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	60.0
Invert Elevation at Downstream end of Culvert (ft)	1,283.63
Invert Elevation at Upstream end of Culvert (ft)	1,283.72
Culvert Slope (ft/ft)	0.0015
Starting Flow Rate (cfs)	216.7
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	216.7
Starting Tailwater Depth (ft)	5.62
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	5.62

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
216.7	5.62	3.94	6.27	2.8	2.44	4.0	5.42

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216.7 x 6 = 1300 CFS

2.2 2/3 Flow

Procedure to Determine the Runoff Distribution at the Arrowhead Lakes Outlet For the 2/3 Discharge

The objective was to determine how flow would exit the Arrowhead Lakes subdivision, cross Beardsley Road, and after combining with flows in Beardsley Road, either continue west along Beardsley or cross the Loop 101 Freeway. The following procedure was used to determine the flow split at this location:

Step 1: A rating curve was developed for the 55th Avenue channel just downstream of the Loop 101 south frontage road (Cross section B-B). The discharge range used was from 1000 to 4000 cfs.

Step 2: The resulting water surface elevation determined in Step 1 was used as the tailwater condition for the culverts across the Loop 101 freeway. A rating curve was then established for the culverts across Loop 101 and the frontage road. In order to simplify the calculation process, the two culverts were considered as one. The dQ and dWS data from Step 1 were used as the initial condition data in the box culvert hydraulic calculations.

Step 3: A rating curve was developed for the culverts that cross Beardsley Road. For the 2/3 flow condition, the tailwater was assumed to be the full depth of flow within Beardsley Road. This condition exists because the culverts across the freeway reach capacity with flow entering from Beardsley Road, and from Lake 5, the lake immediately north of the Arrowhead Lakes outlet structure. The flow depth in Beardsley Road was obtained from the HEC-RAS model for Reach A (Model ADA1).

Step 4: A rating curve was developed for the wall above the Beardsley Road box culvert inlet.

Step 5: A rating curve was developed for weirflow which can overtop the roadway along the northwest edge of Lake 5 (approx. 55th Avenue and Tonopah Drive).

Step 6: The rating curves from Steps 3, 4, and 5 were combined to obtain the Lake 5 outlet rating curve.

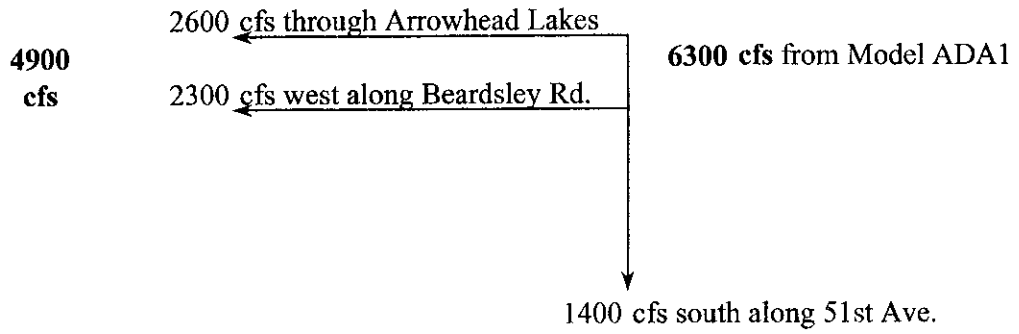
Step 7: The headwater elevation at for the Beardsley Road culvert was determined based on the total discharge from Lake 5.

Step 8: The culvert and weir flows were determined using the rating curve from Step 6.

Step 9: An iterative procedure based on the given headwater at the freeway box culvert inlet was used to determine the flows across the Loop 101 freeway, through the Lake 5 culvert, along the Beardsley Road frontage road, and within the downstream channel.

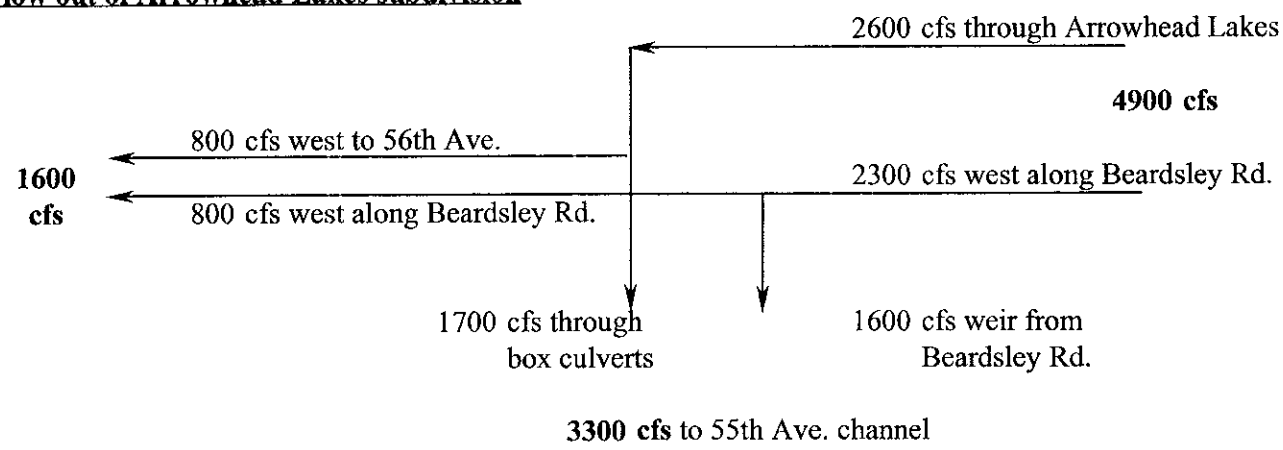
Adobe Dam Spillway Delineation Study
Flow Split Analysis at Arrowhead Lakes Outlet
2/3 Flow

Flow into Arrowhead Lakes subdivision at 51st Avenue



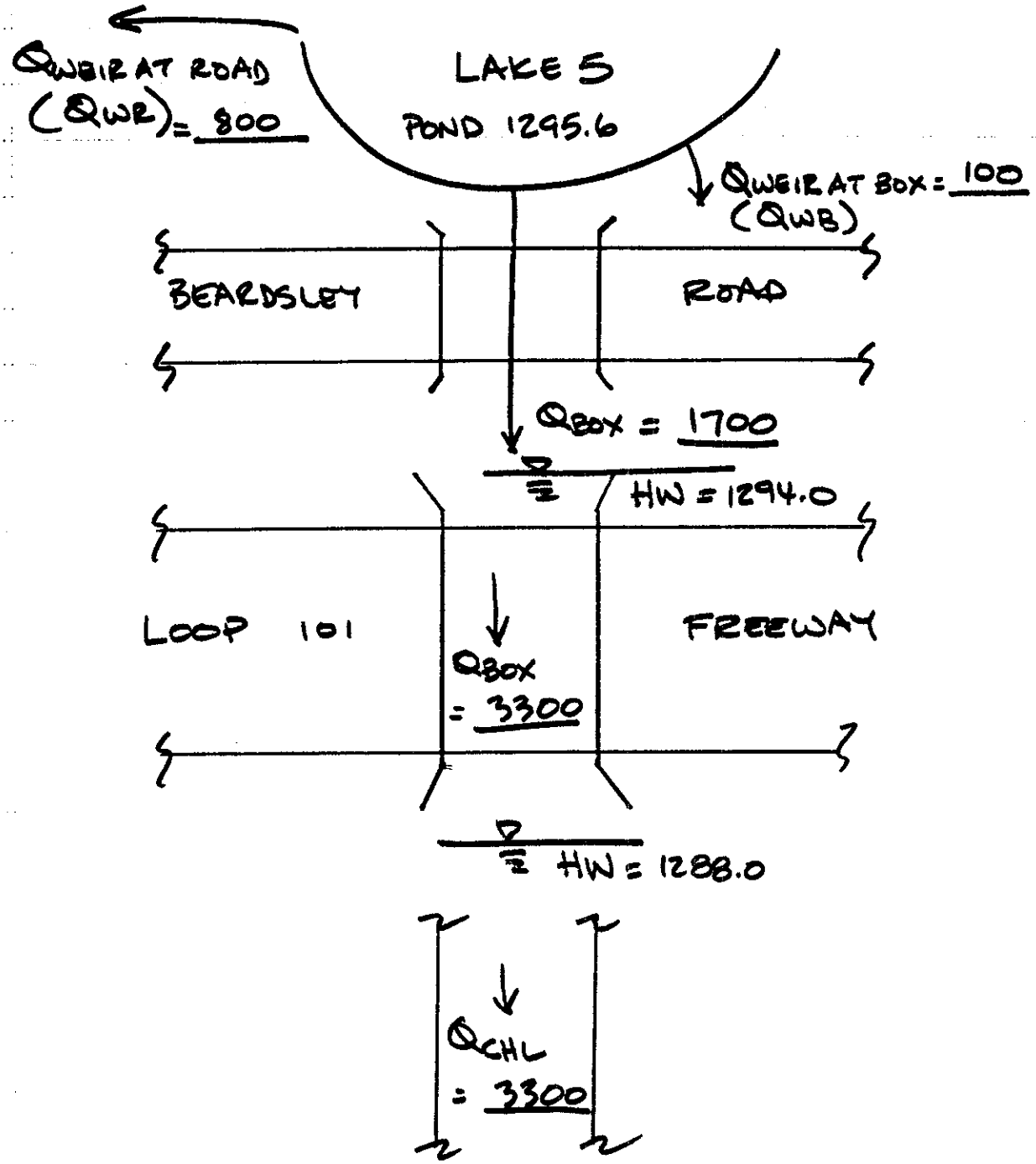
1. Qlake = flow intoArrowhead Lakes from 51st Ave. =		2600 cfs
2. Qbox = flow through concrete box culverts across Beardsley Rd. =		1700 cfs
	HW =	1295.6 ft
	TW =	1294.3 ft
3. QwB = weir flow over concrete box culvert headwall into Beardsley Rd.		100 cfs
4. QwR = weir flow into 56th Ave. from lake =		800 cfs

Flow out of Arrowhead Lakes subdivision



ADOBE DAM SPILLWAY DELINEATION STUDY

LAKE 5 OUTLET 2/3



Rating Curve Table
Rating Table for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006~2\boxl5.fm2
Worksheet	Channel freeway culvert downstream B-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.002000 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	1,000.00	4,000.00	100.00 cfs

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
1,000.00	0.030	1,285.22	3.91
1,100.00	0.030	1,285.37	4.04
1,200.00	0.030	1,285.52	4.17
1,300.00	0.030	1,285.65	4.28
1,400.00	0.030	1,285.79	4.40
1,500.00	0.030	1,285.92	4.50
1,600.00	0.030	1,286.04	4.60
1,700.00	0.030	1,286.17	4.69
1,800.00	0.030	1,286.29	4.78
1,900.00	0.030	1,286.41	4.86
2,000.00	0.030	1,286.52	4.94
2,100.00	0.030	1,286.64	5.02
2,200.00	0.030	1,286.75	5.10
2,300.00	0.030	1,286.86	5.17
2,400.00	0.030	1,286.96	5.24
2,500.00	0.030	1,287.06	5.31
2,600.00	0.030	1,287.17	5.37
2,700.00	0.030	1,287.27	5.44
2,800.00	0.030	1,287.36	5.50
2,900.00	0.030	1,287.46	5.56
3,000.00	0.030	1,287.55	5.62
3,100.00	0.030	1,287.65	5.67
3,200.00	0.030	1,287.74	5.73
3,300.00	0.030	1,287.83	5.78
3,400.00	0.030	1,287.92	5.84
3,500.00	0.030	1,288.00	5.89
3,600.00	0.030	1,288.09	5.94

Rating Curve Table
Rating Table for Irregular Channel

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
3,700.00	0.030	1,288.17	6.00
3,800.00	0.030	1,288.25	6.05
3,900.00	0.030	1,288.33	6.11
4,000.00	0.030	1,288.41	6.16

Adobe Dam Spillway Delineation Study
Box Culverts across the Loop 101 Freeway
2/3 and Full Flow

Flow Rate per cell (cfs)	Full Flow Rate (cfs)	Headwater (ft)	Tailwater (ft)	Tailwater Elev. (ft)	Headwater Elev. (ft)	
417	2500	7.50	4.59	1287.06	1290.66	
431	2589	7.84	4.67	1287.14	1291.00	
446	2677	8.19	4.75	1287.22	1291.35	
461	2766	8.54	4.83	1287.30	1291.70	
476	2855	8.91	4.91	1287.38	1292.07	
491	2943	9.29	4.99	1287.46	1292.45	
505	3032	9.67	5.07	1287.54	1292.83	
520	3120	10.06	5.15	1287.62	1293.22	
535	3209	10.47	5.23	1287.70	1293.63	
550	3298	10.88	5.31	1287.78	1294.04	2/3 FLOW
564	3386	11.30	5.39	1287.86	1294.46	
579	3475	11.73	5.47	1287.94	1294.89	FULL FLOW
594	3563	12.17	5.55	1288.02	1295.33	
609	3652	12.62	5.63	1288.10	1295.78	
623	3741	13.07	5.71	1288.18	1296.23	
638	3829	13.54	5.79	1288.26	1296.70	
653	3918	14.02	5.87	1288.34	1297.18	
668	4007	14.50	5.95	1288.42	1297.66	
683	4095	14.99	6.03	1288.50	1298.15	
697	4184	15.50	6.11	1288.58	1298.66	
712	4272	16.01	6.19	1288.66	1299.17	
727	4361	16.53	6.27	1288.74	1299.69	
742	4450	17.06	6.35	1288.82	1300.22	
756	4538	17.59	6.43	1288.90	1300.75	
771	4627	18.14	6.51	1288.98	1301.30	
786	4716	18.70	6.59	1289.06	1301.86	

Note: Hydraullic computations are based upon Box Culvert Analysis

88.65 cfs / 6

= 14.77 cfs

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

September 18, 2000

LOOP 101 FREEWAY CULVERTS

PROGRAM INPUT DATA

6 - 10' x 4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	289.0
Invert Elevation at Downstream end of Culvert (ft)	1,282.47
Invert Elevation at Upstream end of Culvert (ft)	1,283.16
Culvert Slope (ft/ft)	0.0024
Starting Flow Rate (cfs)	416.67 x 6 = 2500 cfs
Incremental Flow Rate (cfs)	14.77
Ending Flow Rate (cfs)	785.92
Starting Tailwater Depth (ft)	4.59 + 1282.47 = 1287.06 ft
Incremental Tailwater Depth (ft)	0.08
Ending Tailwater Depth (ft)	6.59

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)	
416.67	4.59	7.41	7.5	3.78	3.78	4.0	10.42	
431.44	4.67	7.71	7.84	3.88	3.87	4.0	10.79	
446.21	4.75	8.03	8.19	3.98	3.96	4.0	11.16	
460.98	4.83	8.35	8.54	4.0	4.0	4.0	11.52	
475.75	4.91	8.68	8.91	4.0	4.0	4.0	11.89	
490.52	4.99	9.02	9.29	4.0	4.0	4.0	12.26	
505.29	5.07	9.38	9.67	4.0	4.0	4.0	12.63	
520.06	5.15	9.74	10.06	4.0	4.0	4.0	13.0	
534.83	5.23	10.12	10.47	4.0	4.0	4.0	13.37	
549.6	5.31	10.5	10.88	4.0	4.0	4.0	13.74	2/3
564.37	5.39	10.9	11.3	4.0	4.0	4.0	14.11	
579.14	5.47	11.31	11.73	4.0	4.0	4.0	14.48	FULL
593.91	5.55	11.72	12.17	4.0	4.0	4.0	14.85	
608.68	5.63	12.15	12.62	4.0	4.0	4.0	15.22	
623.45	5.71	12.59	13.07	4.0	4.0	4.0	15.59	
638.22	5.79	13.04	13.54	4.0	4.0	4.0	15.96	
652.99	5.87	13.5	14.02	4.0	4.0	4.0	16.32	
667.76	5.95	13.96	14.5	4.0	4.0	4.0	16.69	
682.53	6.03	14.44	14.99	4.0	4.0	4.0	17.06	
697.3	6.11	14.94	15.5	4.0	4.0	4.0	17.43	
712.07	6.19	15.44	16.01	4.0	4.0	4.0	17.8	
726.84	6.27	15.95	16.53	4.0	4.0	4.0	18.17	
741.61	6.35	16.47	17.06	4.0	4.0	4.0	18.54	
756.38	6.43	17.0	17.59	4.0	4.0	4.0	18.91	
771.15	6.51	17.54	18.14	4.0	4.0	4.0	19.28	
785.92	6.59	18.1	18.7	4.0	4.0	4.0	19.65	

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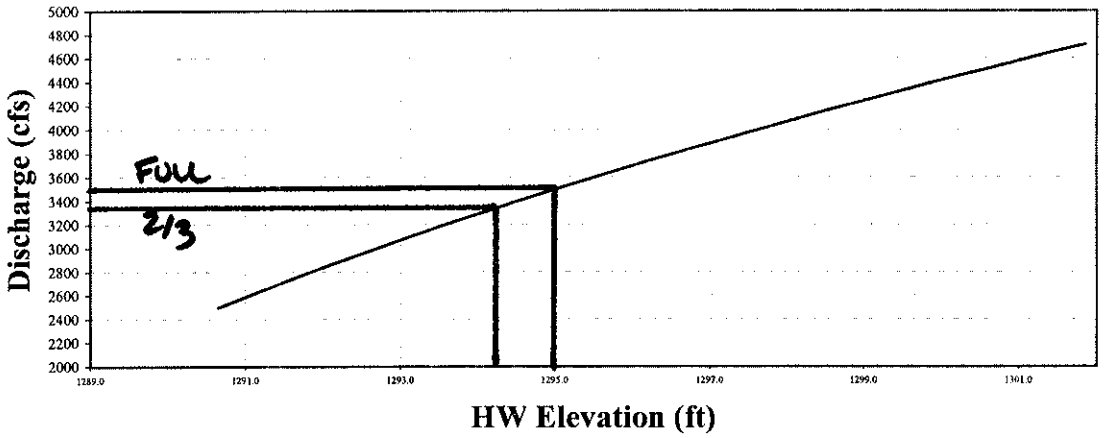
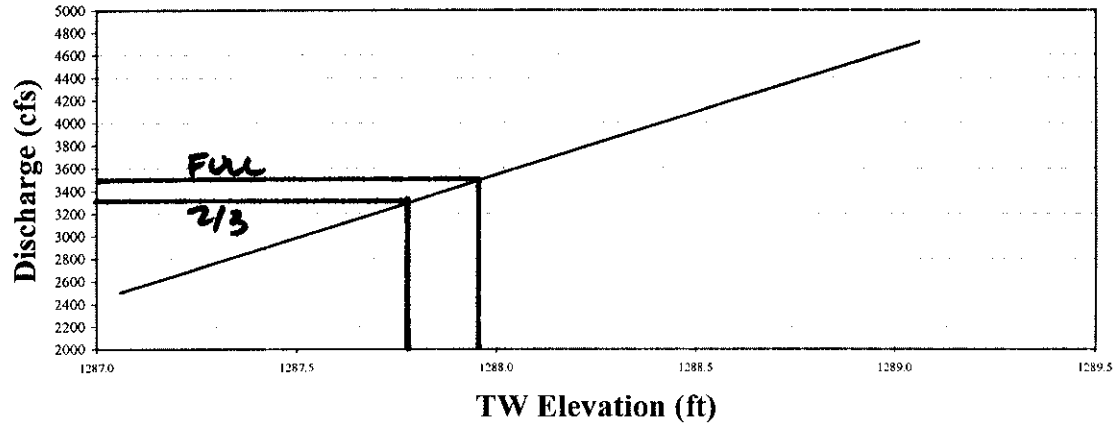
Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Headwater (Full & 2/3 Flow)



Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Tailwater (Full & 2/3 Flow)



Adobe Dam Spillway Delineation Study
Box Culverts across the Loop 101 Freeway
1/3 Flow

Adobe Dam Spillway Delineation Study
Weir Calculation for flow above Box Culvert on Beardsley Road
Outflow from Lake 5 of Arrowhead Lakes

Weir Coeff. (C) =	3	
Weir Length (L) =	80	ft
Initial Weir elevation	1290.7	ft

Weir Equation

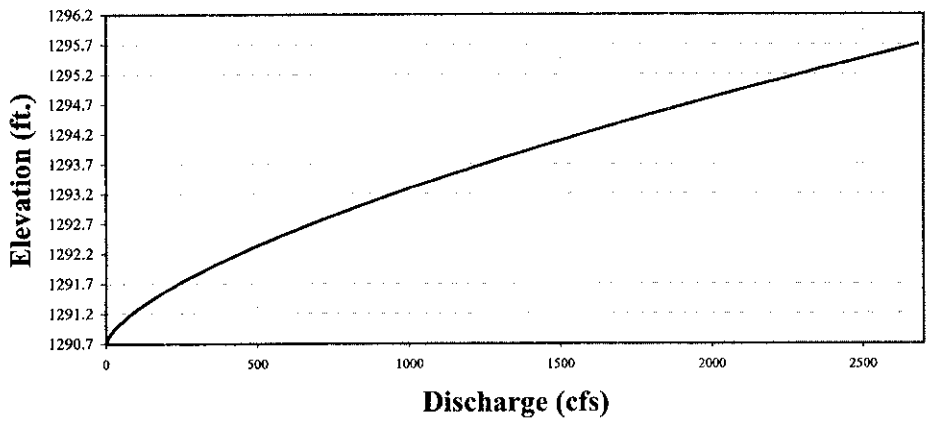
Q = CLH^1.5

where:

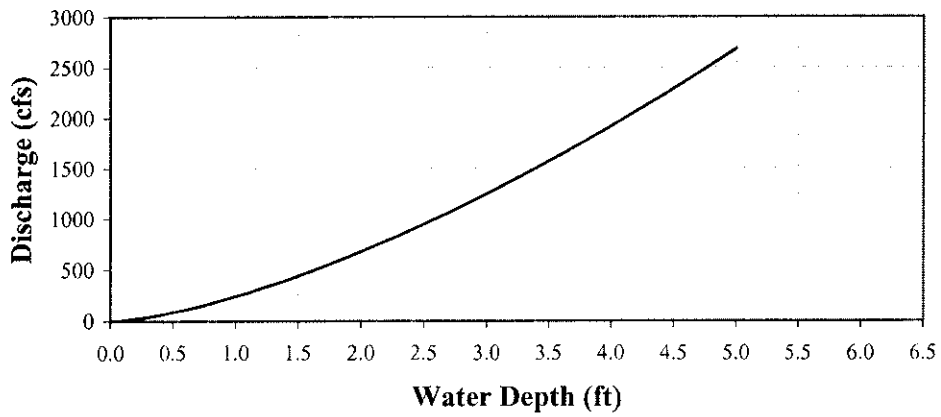
L = Length of curb opening

H = Depth of flow

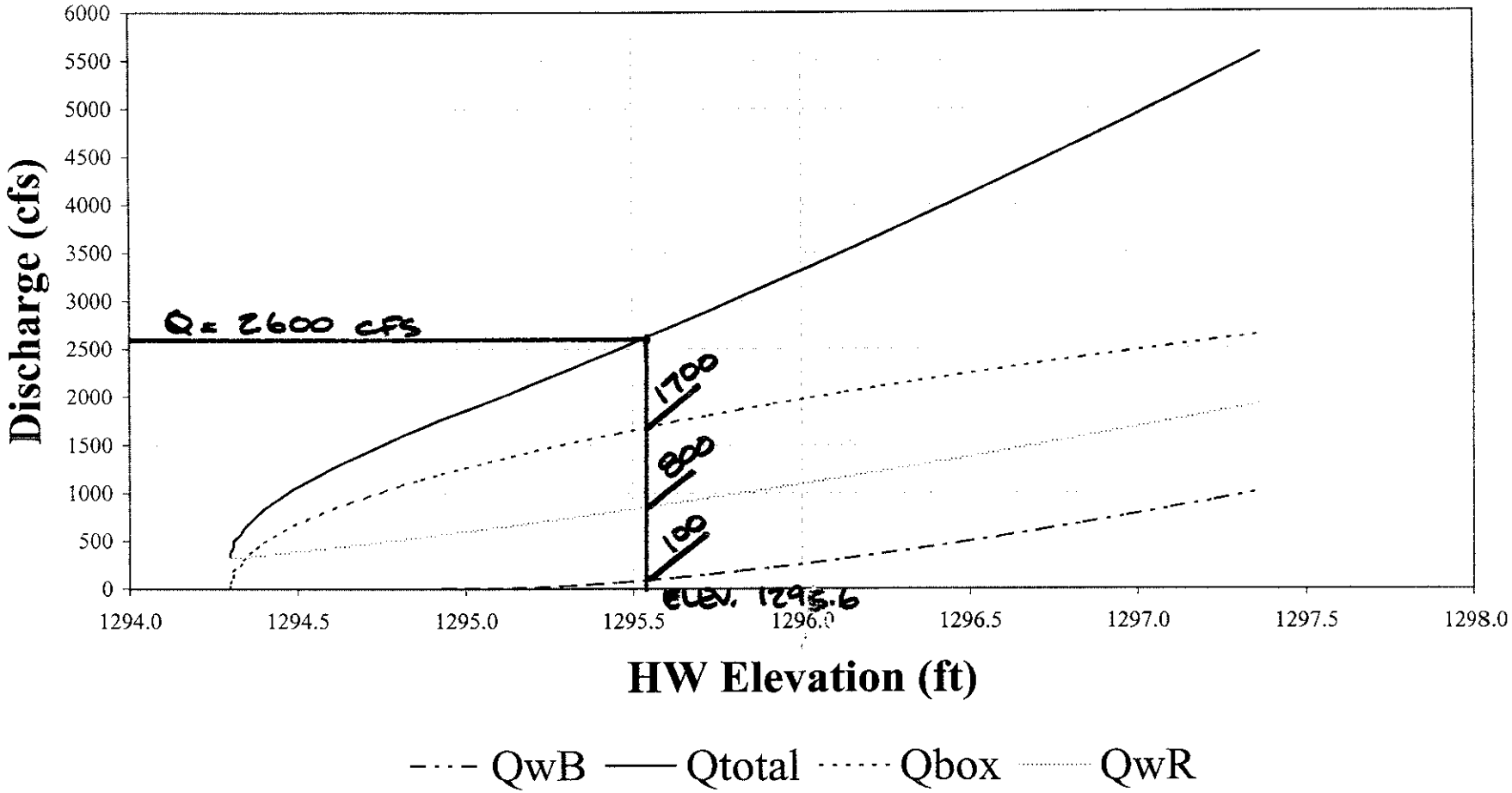
Adobe Dam Spillway Delineation Study
Weir Overflow from Lake5 to Beardsley Road
Discharge vs. Elevation



Adobe Dam Spillway Delineation Study
Weir Overflow from Lake 5 to Beardsley Road
Discharge vs. Depth



Adobe Dam Spillway Delineation Study
Arrowhead Lake 5
Discharge vs. Elevation (2/3 Flow)



Water Surface Elevation at Beardsley Road and 55th Avenue from HEC-RAS model

Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1295.74 ft

Water Depth = **4.34** ft

2/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1295.0 ft

Water Depth = **3.6** ft

1/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1294 ft

Water Depth = **2.6** ft

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

December 22, 2000
LAKE 5 OUTLET CULVERT (2/3 FLOW)

PROGRAM INPUT DATA

6-10'x4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	60.0
Invert Elevation at Downstream end of Culvert (ft)	1,283.63
Invert Elevation at Upstream end of Culvert (ft)	1,283.72
Culvert Slope (ft/ft)	0.0015
Starting Flow Rate (cfs)	283.3
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	283.3
Starting Tailwater Depth (ft)	10.37 + 1283.63 = 1294.00
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	10.37

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
283.3	10.37	4.82	11.55	3.39	2.92	4.0	7.08

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283.3 x 6 = 1700 CFS

2.3 Full Flow

Procedure to Determine the Runoff Distribution at the Arrowhead Lakes Outlet For the Full Discharge

The objective was to determine how flow would exit the Arrowhead Lakes subdivision, cross Beardsley Road, and after combining with flows in Beardsley Road, either continue west along Beardsley or cross the Loop 101 Freeway. The following procedure was used to determine the flow split at this location:

Step 1: A rating curve was developed for the 55th Avenue channel just downstream of the Loop 101 south frontage road (Cross section B-B). The discharge range used was from 1000 to 4000 cfs.

Step 2: The resulting water surface elevation determined in Step 1 was used as the tailwater condition for the culverts across the Loop 101 freeway. A rating curve was then established for the culverts across Loop 101 and the frontage road. In order to simplify the calculation process, the two culverts were considered as one. The dQ and dWS data from Step 1 were used as the initial condition data in the box culvert hydraulic calculations.

Step 3: A rating curve was developed for the culverts that cross Beardsley Road. For the full flow condition, the tailwater was assumed to be the full depth of flow within Beardsley Road. This condition exists because the culverts across the freeway reach capacity with flow entering from Beardsley Road, and from Lake 5, the lake immediately north of the Arrowhead Lakes outlet structure. The flow depth in Beardsley Road was obtained from the HEC-RAS model for Reach A (Model ADA1).

Step 4: A rating curve was developed for the wall above the Beardsley Road box culvert inlet.

Step 5: A rating curve was developed for weirflow which can overtop the roadway along the northwest edge of Lake 5 (approx. 55th Avenue and Tonopah Drive).

Step 6: The rating curves from Steps 3, 4, and 5 were combined to obtain the Lake 5 outlet rating curve.

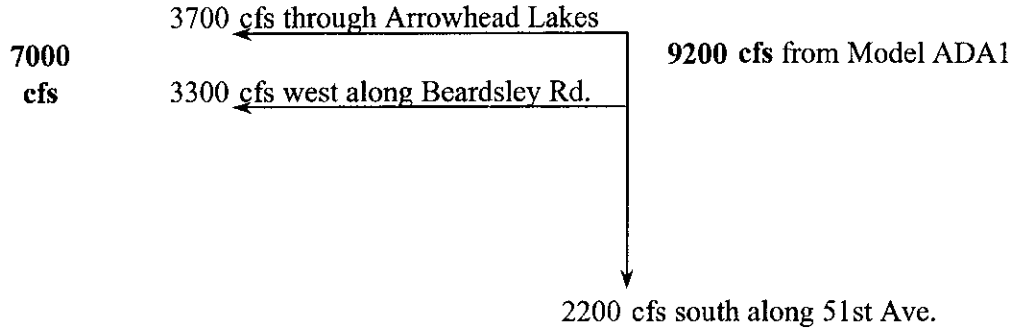
Step 7: The headwater elevation at for the Beardsley Road culvert was determined based on the total discharge from Lake 5.

Step 8: The culvert and weir flows were determined using the rating curve from Step 6.

Step 9: An iterative procedure based on the given headwater at the freeway box culvert inlet was used to determine the flows across the Loop 101 freeway, through the Lake 5 culvert, along the Beardsley Road frontage road, and within the downstream channel.

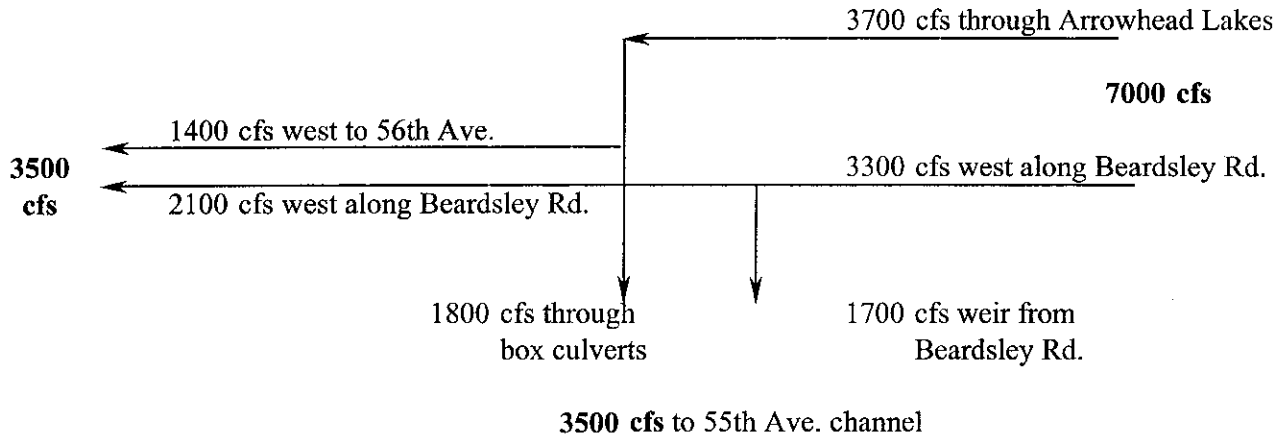
Adobe Dam Spillway Delineation Study
Flow Split Analysis at Arrowhead Lakes Outlet
Full Flow

Flow into Arrowhead Lakes subdivision at 51st Avenue



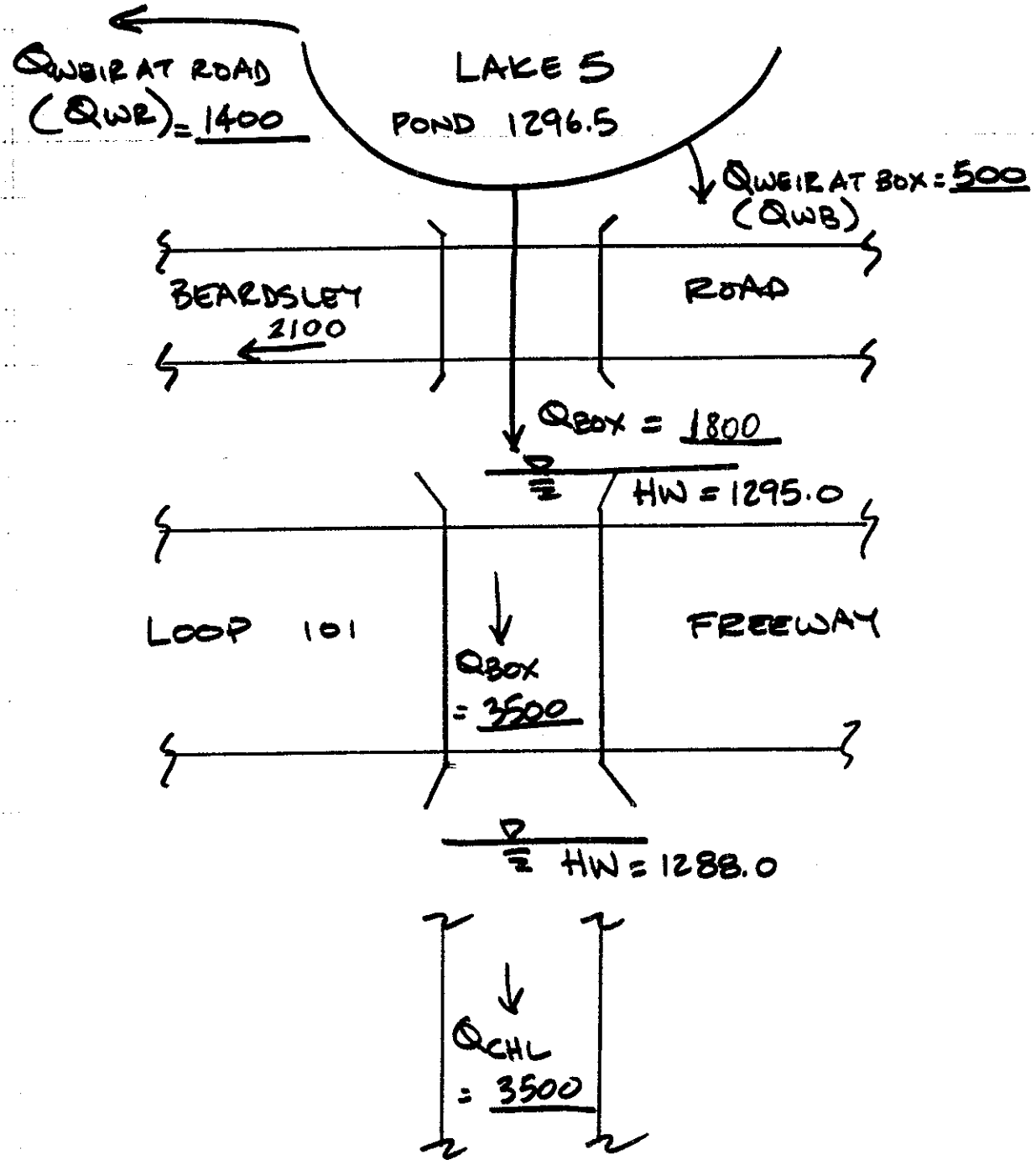
1. Qlake = flow intoArrowhead Lakes from 51st Ave. =		3700 cfs
2. Qbox = flow through concrete box culverts across Beardsley Rd. =		1800 cfs
	HW =	1296.5 ft
	TW =	1295 ft
3. QwB = weir flow over concrete box culvert headwall into Beardsley Rd.		500 cfs
4. QwR = weir flow into 56th Ave. from lake =		1400 cfs

Flow out of Arrowhead Lakes subdivision



ADOBE DAM SPILLWAY DELINEATION STUDY

LAKE 5 OUTLET - FULL FLOW



Rating Curve Table
Rating Table for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006~2\boxl5.fm2
Worksheet	Channel freeway culvert downstream B-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.002000 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	1,000.00	4,000.00	100.00 cfs

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
1,000.00	0.030	1,285.22	3.91
1,100.00	0.030	1,285.37	4.04
1,200.00	0.030	1,285.52	4.17
1,300.00	0.030	1,285.65	4.28
1,400.00	0.030	1,285.79	4.40
1,500.00	0.030	1,285.92	4.50
1,600.00	0.030	1,286.04	4.60
1,700.00	0.030	1,286.17	4.69
1,800.00	0.030	1,286.29	4.78
1,900.00	0.030	1,286.41	4.86
2,000.00	0.030	1,286.52	4.94
2,100.00	0.030	1,286.64	5.02
2,200.00	0.030	1,286.75	5.10
2,300.00	0.030	1,286.86	5.17
2,400.00	0.030	1,286.96	5.24
2,500.00	0.030	1,287.06	5.31
2,600.00	0.030	1,287.17	5.37
2,700.00	0.030	1,287.27	5.44
2,800.00	0.030	1,287.36	5.50
2,900.00	0.030	1,287.46	5.56
3,000.00	0.030	1,287.55	5.62
3,100.00	0.030	1,287.65	5.67
3,200.00	0.030	1,287.74	5.73
3,300.00	0.030	1,287.83	5.78
3,400.00	0.030	1,287.92	5.84
3,500.00	0.030	1,288.00	5.89
3,600.00	0.030	1,288.09	5.94

Rating Curve Table
Rating Table for Irregular Channel

Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
3,700.00	0.030	1,288.17	6.00
3,800.00	0.030	1,288.25	6.05
3,900.00	0.030	1,288.33	6.11
4,000.00	0.030	1,288.41	6.16

Adobe Dam Spillway Delineation Study
Box Culverts across the Loop 101 Freeway
2/3 and Full Flow

Flow Rate per cell (cfs)	Full Flow Rate (cfs)	Headwater (ft)	Tailwater (ft)	Tailwater Elev. (ft)	Headwater Elev. (ft)	
417	2500	7.50	4.59	1287.06	1290.66	
431	2589	7.84	4.67	1287.14	1291.00	
446	2677	8.19	4.75	1287.22	1291.35	
461	2766	8.54	4.83	1287.30	1291.70	
476	2855	8.91	4.91	1287.38	1292.07	
491	2943	9.29	4.99	1287.46	1292.45	
505	3032	9.67	5.07	1287.54	1292.83	
520	3120	10.06	5.15	1287.62	1293.22	
535	3209	10.47	5.23	1287.70	1293.63	
550	3298	10.88	5.31	1287.78	1294.04	2/3 FLOW
564	3386	11.30	5.39	1287.86	1294.46	
579	3475	11.73	5.47	1287.94	1294.89	FULL FLOW
594	3563	12.17	5.55	1288.02	1295.33	
609	3652	12.62	5.63	1288.10	1295.78	
623	3741	13.07	5.71	1288.18	1296.23	
638	3829	13.54	5.79	1288.26	1296.70	
653	3918	14.02	5.87	1288.34	1297.18	
668	4007	14.50	5.95	1288.42	1297.66	
683	4095	14.99	6.03	1288.50	1298.15	
697	4184	15.50	6.11	1288.58	1298.66	
712	4272	16.01	6.19	1288.66	1299.17	
727	4361	16.53	6.27	1288.74	1299.69	
742	4450	17.06	6.35	1288.82	1300.22	
756	4538	17.59	6.43	1288.90	1300.75	
771	4627	18.14	6.51	1288.98	1301.30	
786	4716	18.70	6.59	1289.06	1301.86	

Note: Hydraullic computations are based upon Box Culvert Analysis

88.65 cfs / 6

= 14.77 cfs/ea

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

September 18, 2000

LOOP 101 FREEWAY CULVERTS

PROGRAM INPUT DATA

6 - 10' x 4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	289.0
Invert Elevation at Downstream end of Culvert (ft)	1,282.47
Invert Elevation at Upstream end of Culvert (ft)	1,283.16
Culvert Slope (ft/ft)	0.0024
Starting Flow Rate (cfs)	416.67 x 6 = 2500 cfs
Incremental Flow Rate (cfs)	14.77
Ending Flow Rate (cfs)	785.92
Starting Tailwater Depth (ft)	4.59 + 1287.47 = 1287.06 ft
Incremental Tailwater Depth (ft)	0.08
Ending Tailwater Depth (ft)	6.59

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)	
416.67	4.59	7.41	7.5	3.78	3.78	4.0	10.42	
431.44	4.67	7.71	7.84	3.88	3.87	4.0	10.79	
446.21	4.75	8.03	8.19	3.98	3.96	4.0	11.16	
460.98	4.83	8.35	8.54	4.0	4.0	4.0	11.52	
475.75	4.91	8.68	8.91	4.0	4.0	4.0	11.89	
490.52	4.99	9.02	9.29	4.0	4.0	4.0	12.26	
505.29	5.07	9.38	9.67	4.0	4.0	4.0	12.63	
520.06	5.15	9.74	10.06	4.0	4.0	4.0	13.0	
534.83	5.23	10.12	10.47	4.0	4.0	4.0	13.37	
549.6	5.31	10.5	10.88	4.0	4.0	4.0	13.74	2/3
564.37	5.39	10.9	11.3	4.0	4.0	4.0	14.11	
579.14	5.47	11.31	11.73	4.0	4.0	4.0	14.48	FULL
593.91	5.55	11.72	12.17	4.0	4.0	4.0	14.85	
608.68	5.63	12.15	12.62	4.0	4.0	4.0	15.22	
623.45	5.71	12.59	13.07	4.0	4.0	4.0	15.59	
638.22	5.79	13.04	13.54	4.0	4.0	4.0	15.96	
652.99	5.87	13.5	14.02	4.0	4.0	4.0	16.32	
667.76	5.95	13.96	14.5	4.0	4.0	4.0	16.69	
682.53	6.03	14.44	14.99	4.0	4.0	4.0	17.06	
697.3	6.11	14.94	15.5	4.0	4.0	4.0	17.43	
712.07	6.19	15.44	16.01	4.0	4.0	4.0	17.8	
726.84	6.27	15.95	16.53	4.0	4.0	4.0	18.17	
741.61	6.35	16.47	17.06	4.0	4.0	4.0	18.54	
756.38	6.43	17.0	17.59	4.0	4.0	4.0	18.91	
771.15	6.51	17.54	18.14	4.0	4.0	4.0	19.28	
785.92	6.59	18.1	18.7	4.0	4.0	4.0	19.65	

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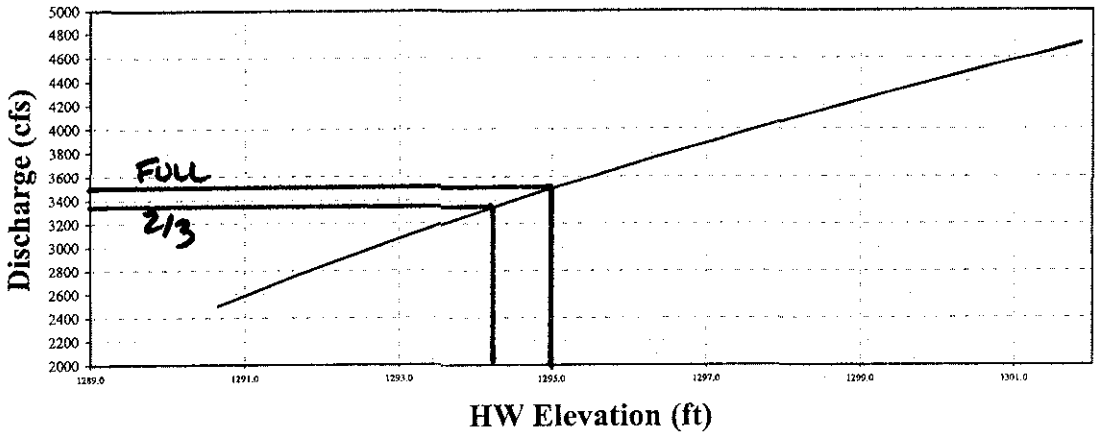
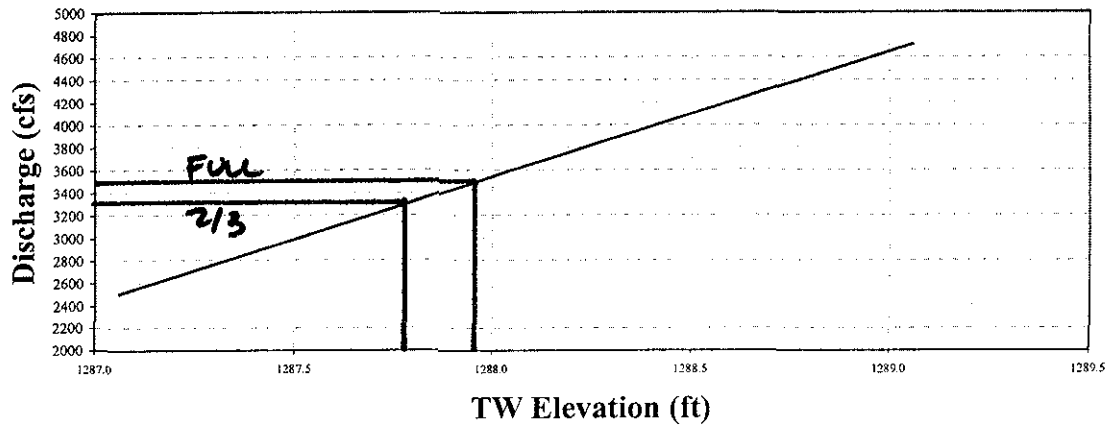
Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Headwater (Full & 2/3 Flow)

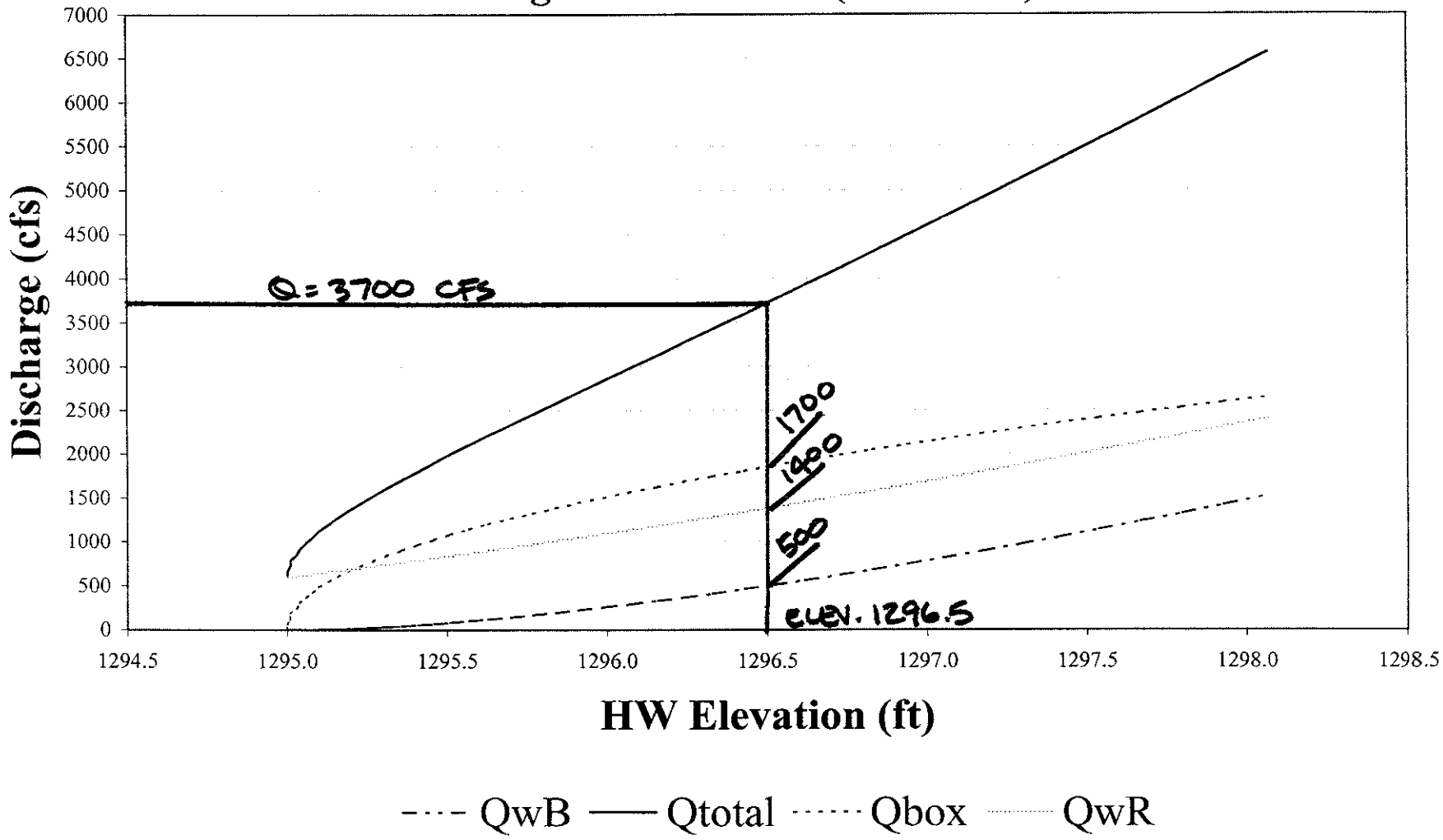


Adobe Dam Spillway Delineation Study
Box Culverts across Loop 101 Freeway
Discharge vs. Tailwater (Full & 2/3 Flow)



Adobe Dam Spillway Delineation Study
Box Culverts across the Loop 101 Freeway
1/3 Flow

Adobe Dam Spillway Delineation Study
Arrowhead Lake 5
Discharge vs. Elevation (Full Flow)



Water Surface Elevation at Beardsley Road and 55th Avenue from HEC-RAS model

Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1295.74 ft

Water Depth = **4.34** ft

2/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1295.0 ft

Water Depth = **3.6** ft

1/3 Full Flow:

Road Elevation: 1291.4 ft, WSEL = 1294 ft

Water Depth = **2.6** ft

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

December 22, 2000

LAKE 5 OUTLET CULVERT (FULL FLOW)

PROGRAM INPUT DATA

6-10'x4' CBC

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	60.0
Invert Elevation at Downstream end of Culvert (ft)	1,283.63
Invert Elevation at Upstream end of Culvert (ft)	1,283.72
Culvert Slope (ft/ft)	0.0015
Starting Flow Rate (cfs)	283.3
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	283.3
Starting Tailwater Depth (ft)	11.37 (ELEV. 1295.00
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	11.37

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
283.3	11.37	4.82	12.55	3.39	2.92	4.0	7.08

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283.3 x 6 = 1700 CFS

3 Weir Flow Into the Loop 101 Freeway

Summary Sheet for Weir Flow into the Loop 101 Freeway

Description

The wall along the north side of the 101 freeway terminates at cross section 18.58. The flow will begin to weir over into the depressed freeway once it travels beyond this point. Similarly, the flow will weir into the freeway after additional flow is added at 59th Avenue. Weir flow calculations were used to determine the amount of flow that would weir into the freeway between the cross sections.

Assumptions

- For the area from cross section 18.58 to cross section 18.34 a triangular approximation was used due to the wall at 18.58 and a known flow depth at the wall.
- For the area between cross sections 18.17 and 18.08 a rectangular weir approximation was used and an assumed even flow distribution over the weir was used.
- All the runoff would weir into the freeway with the exception of the 100-cfs contained within the roadway section.

Method of Analysis

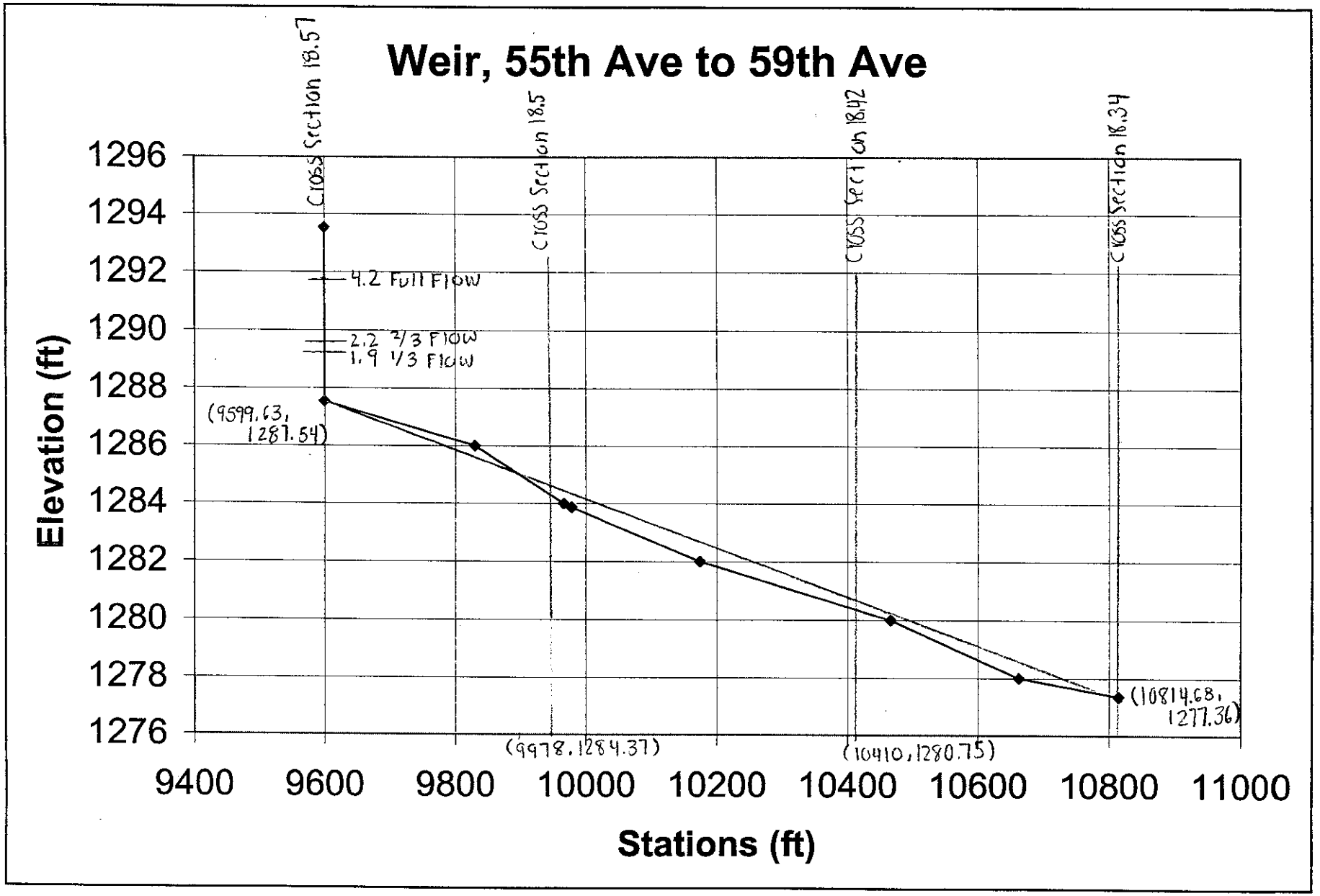
A triangular approximation was used to determine the amount of flow weiring from cross section 18.58 to 18.34. A known depth was determined from the HEC-RAS model at cross section 18.58. This was used to model one side of the triangle. The slope of the roadway at the weir was used to model another side of the triangle. Calculations can be found after this summary page.

A rectangular approximation was used to determine the amount of flow weiring into the freeway from cross section 18.17 to 18.08. 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.

Results

The following is a percentage of the flow weiring between cross sections:

Cross Sections	Weir	Percentage
18.58 to 18.50	Between 18.58 and 18.34	53%
18.50 to 18.42	Between 18.58 and 18.34	36%
18.42 to 18.34	Between 18.58 and 18.34	11%
18.17 to 18.13	Between 18.17 and 18.08	39%
18.13 to 18.08	Between 18.17 and 18.08	61%


Weir, 55th Ave to 59th Ave
Cross Section 18.57
Cross Section 18.5
Cross Section 18.42
Cross Section 18.34
4.2 Full Flow
2.2 2/3 Flow
1.9 1/3 Flow
(9599.63, 1287.54)
(9978, 1284.37)
(10410, 1280.75)
(10814.68, 1277.36)
Elevation (ft)
1296
1294
1292
1290
1288
1286
1284
1282
1280
1278
1276
9400
9600
9800
10000
10200
10400
10600
10800
11000
Stations (ft)

DEI PROFESSIONAL SERVICES

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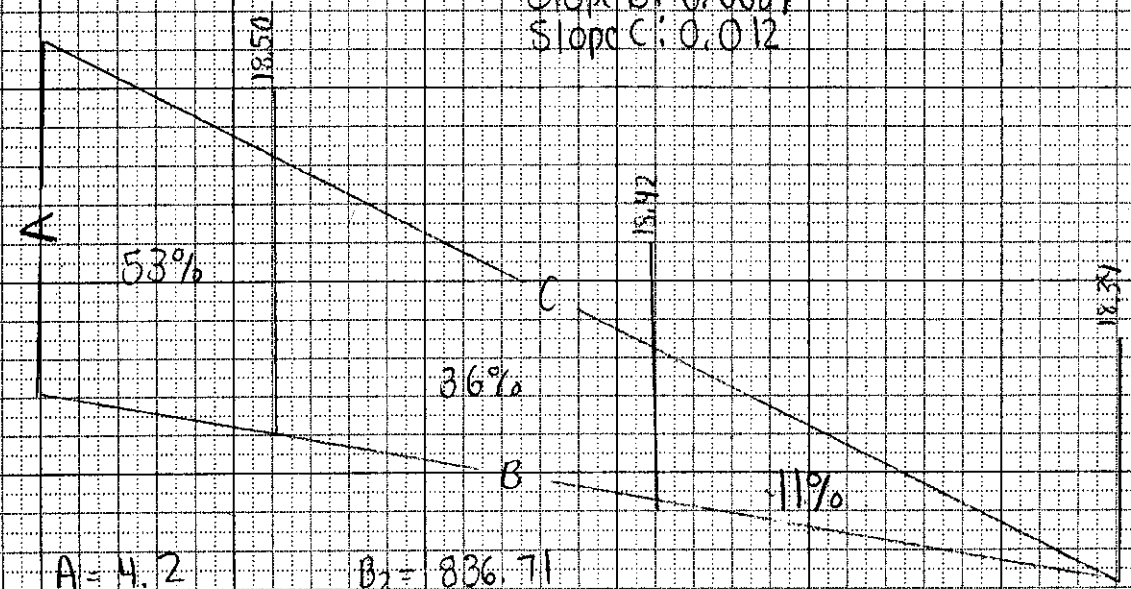
PROJECT Adobe Dam SHEET NO. ____

MADE BY EC DATE ____ JOB NO. ____

CHECKED BY TK DATE ____ SEC. SHT. NO. ____

CALCULATIONS FOR Weiring Into 101 Freeway

Slope B: 0.0084
Slope C: 0.012



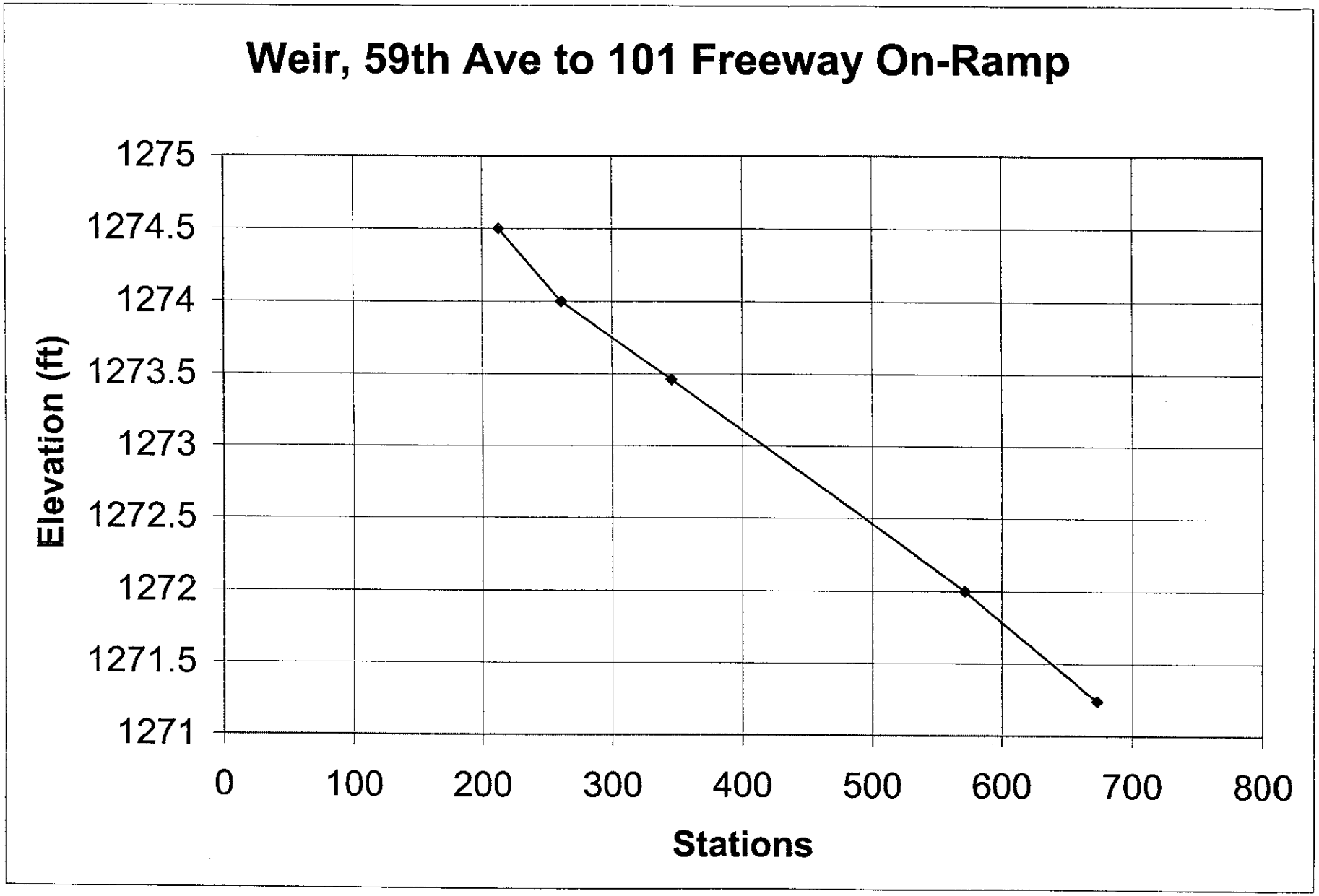
A = 4.2	B_2 = 836.71
B = 1215.09	B_3 = 404.69
C 1215.14	C_2 = 836.74
∠ AC = 89.48	C_3 = 404.71
∠ BC = 0.2	A_2 = 2.89
∠ AB = 90.52	A_3 = 1.40

Whole Triangle: $\frac{1}{2}(4.2)(1215.14) = 2551.79$

Triangle A_2: $\frac{1}{2}(2.89)(836.74) = 1209.04$

Triangle A_3: $\frac{1}{2}(1.40)(404.71) = 283.30$

$\frac{1209.04}{2551.79} = 0.47$ $\frac{283.30}{2551.79} = 0.11$


Weir, 59th Ave to 101 Freeway On-Ramp
Elevation (ft)
1275
1274.5
1274
1273.5
1273
1272.5
1272
1271.5
1271
0
100
200
300
400
500
600
700
800
Stations

4 Loop 101 Freeway Ponding Analysis

Summary Sheet for Loop 101 Freeway Ponding Analysis

Description

A majority of the flow within Beardsley Road will weir into the Loop 101 freeway at the 59th Avenue west-bound off-ramp, as described in Section 4 of this appendix. The remaining flow within the street section combines with flow in 59th Avenue, which then can flow into the freeway at the west-bound on-ramp at 59th Avenue. The freeway is depressed from approximately 59th Avenue to the curve at New River. Flow can pond in the freeway within this section, ultimately weiring into New River. The amount of flow that can pond within this portion of the freeway was analyzed using a combination of culvert calculations, retention volume calculations, and uneven weir calculations.

Assumptions

- Flow under overpasses at 67th and 75th Avenues was modeled as culvert flow, with the overpass as the top of the culvert. The height of the overpasses is 17 feet.
- Calculations were performed for only the Full flow event.

Method of Analysis

A downstream water surface elevation was established for each of the three flows, using uneven weir calculations along the edge of the freeway where flow overtops into New River. The water surface elevations were then used as the starting tailwater condition for a series of culvert calculations. Culvert flow analysis was used to computed the water surfaces upstream of the 75th Avenue and 67th Avenue overpasses. Freeway topography was used to determine the volume of water that can pond within the freeway.

Results

The weir elevation at New River is 1248.0 feet. The computed water surface elevations upstream of at 75th and 67th Avenues are 1252.03 and 1252.06, respectively. At these elevations, there is the potential for water to overtop the frontage road south of the freeway at the locations shown on the spillway delineation mapping.

WEIR CALCULATIONS AT NEW RIVER

p. 1 of 2

```
*********************************************
    UNEVEN WEIR FLOW PROGRAM
    FORTRAN VERSION 1.0
*********************************************
    PROJECT:  NEW RIVER
    ENGINEER:  KVM
    DATE:   3/ 6/2001
    TIME:  14:31. 9

---------------------------------------------
    INPUT PARAMETERS
---------------------------------------------
    STARTING WSEL:       1248.00
    MAXIMUM WSEL:        1256.00
    STEP SIZE:              0.10
    BREADTH OF WEIR:      530.00


*********************************************
    INPUT ELEVATION/STATION TABLE.
    PROJECT:  NEW RIVER
    DATE:   3/ 6/2001
    TIME:  14:31. 9
*********************************************
    POINT    ELEVATION    STATION
    -----    ---------    -------
        1      1252.00       0.00
        2      1250.00      75.00
        3      1248.00     126.00
        4      1248.00     185.00
        5      1250.00     250.00
        6      1251.30     385.00
        7      1252.00     440.00
        8      1254.00     460.00
        9      1256.00     530.00


*********************************************
    WEIR COEFFICIENT TABLE
    PROJECT:  NEW RIVER
    DATE:   3/ 6/2001
    TIME:  14:31. 9
*********************************************
    INPUT COEFFICENT VALUES.

POINT     HEAD     COEFFICIENT
-----     ----     -----------
    1     0.00          2.6000
    2     5.00          2.6000
    3    15.00          2.6000
```

****
UNEVEN WEIR FLOW PROGRAM
FORTRAN VERSION 1.0
PROJECT: NEW RIVER
DATE: 3/ 6/2001
TIME: 14:31. 9
****

WEIR CALCULATIONS AT NEW RIVER

ELEVATION	DISCHARGE (CFS)	ELEVATION	DISCHARGE (CFS)
1248.00	0.00	1249.50	447.83
1248.10	5.04	1249.60	505.55
1248.20	14.79	1249.70	567.04
1248.30	28.17	1249.80	632.36
1248.40	44.89	1249.90	701.57
1248.50	64.87	1250.00	774.73
1248.60	88.08	1250.10	852.18
1248.70	114.52	1250.20	934.69
1248.80	144.23	1250.30	1022.77
1248.90	177.25	1250.40	1116.81
1249.00	213.63	1250.50	1217.15
1249.10	253.41	1250.60	1324.08
1249.20	296.67	1250.70	1437.88
1249.30	343.45	1250.80	1558.82
1249.40	393.82	1250.90	1687.12

$\frac{1}{3}$ FLOW, Q = 500 CFS

$\frac{2}{3}$ FLOW, Q = 1600 CFS

ELEVATION	DISCHARGE (CFS)	ELEVATION	DISCHARGE (CFS)
1251.00	1823.04	1252.50	4848.24
1251.10	1966.78	1252.60	5111.34
1251.20	2118.55	1252.70	5380.75
1251.30	2278.58	1252.80	5656.30
1251.40	2446.96	1252.90	5937.87
1251.50	2623.68	1253.00	6225.33
1251.60	2808.77	1253.10	6518.57
1251.70	3002.34	1253.20	6817.48
1251.80	3204.47	1253.30	7121.99
1251.90	3415.25	1253.40	7431.99
1252.00	3634.79	1253.50	7747.41
1252.10	3862.87	1253.60	8068.18
1252.20	4098.64	1253.70	8394.23
1252.30	4341.66	1253.80	8725.49
1252.40	4591.61	1253.90	9061.91

FULL FLOW, Q = 3600 CFS

ELEVATION	DISCHARGE (CFS)	ELEVATION	DISCHARGE (CFS)
1254.00	9403.41	1255.50	15177.57
1254.10	9750.04	1255.60	15607.26
1254.20	10101.95	1255.70	16042.64
1254.30	10459.24	1255.80	16483.71
1254.40	10821.95	1255.90	16930.48
1254.50	11190.12		
1254.60	11563.79		
1254.70	11942.98		
1254.80	12327.71		
1254.90	12718.01		
1255.00	13113.89		
1255.10	13515.37		
1255.20	13922.46		
1255.30	14335.19		
1255.40	14753.55		

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

December 21, 2000

LOOP 101 FREEWAY AT 75TH AVE.

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	167.0
Culvert Rise (ft)	17.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	110.0
Invert Elevation at Downstream end of Culvert (ft)	1,234.0
Invert Elevation at Upstream end of Culvert (ft)	1,234.01
Culvert Slope (ft/ft)	0.0001
Starting Flow Rate (cfs)	3,600.0
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	3,600.0
Starting Tailwater Depth (ft)	18.0
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	18.0

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
3,600.0	18.0	3.79	18.03	5.87	2.44	17.0	1.27

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FOR QFULL, OVERFLOW WEIR TO NEW RIVER OCCURS AT ELEVATION 1252.0.

⇒ TAILWATER = 18.0

UPSTREAM HW = 1252.03

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

December 21, 2000

LOOP 101 FREEWAY AT 67TH AVE.

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	167.0
Culvert Rise (ft)	17.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	110.0
Invert Elevation at Downstream end of Culvert (ft)	1,232.0
Invert Elevation at Upstream end of Culvert (ft)	1,232.01
Culvert Slope (ft/ft)	0.0001
Starting Flow Rate (cfs)	3,600.0
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	3,600.0
Starting Tailwater Depth (ft)	20.03
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	20.03

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
3,600.0	20.03	3.79	20.06	5.87	2.44	17.0	1.27

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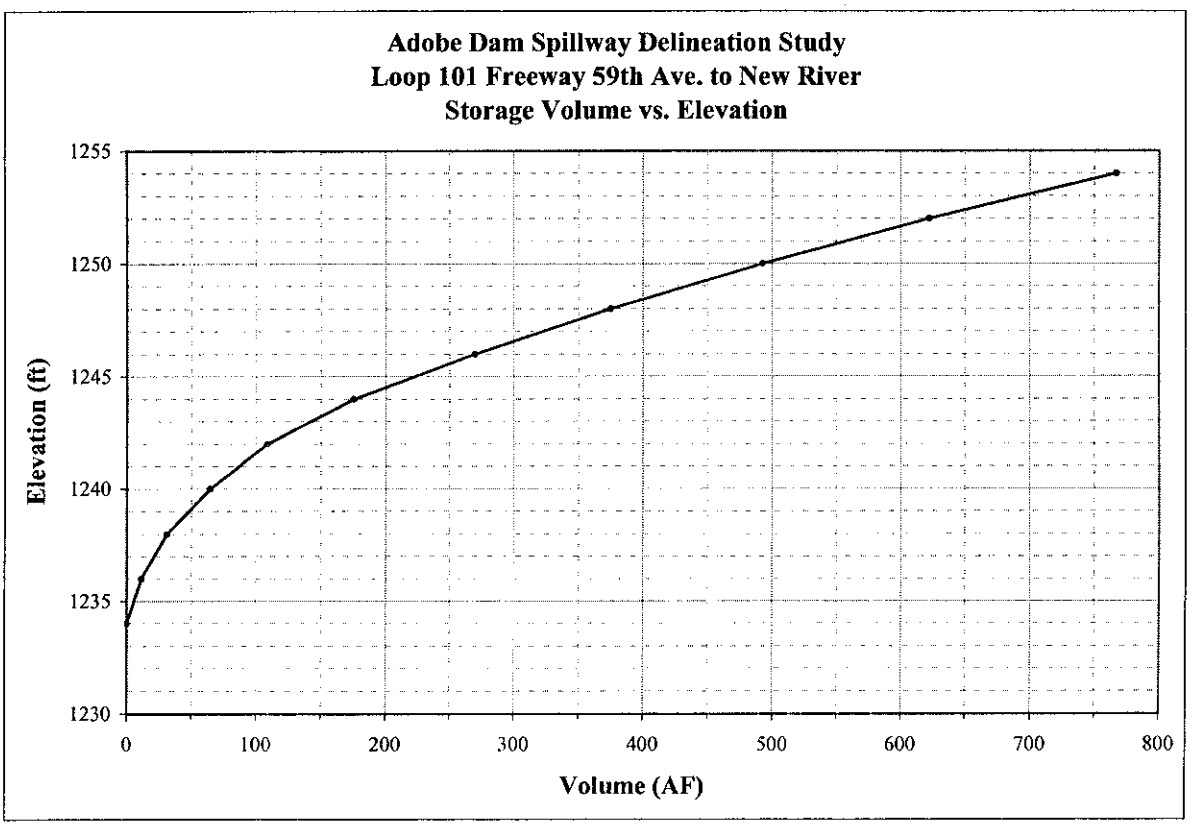
TAILWATER (75TH AVE. BRIDGE) = 1252.03
=> TW = 20.03
UPSTREAM HW = 1252.06

Adobe Dam Spillway Delineation Study
Loop 101 Freeway Volume from 59th Avenue to 75th Avenue

Elevation	Area (sq ft)	Area (Ac)	Avg. Area (Ac)	Incremental Volume (AF)	Cumulative Volume (AF)
1234	185718	4.26			0
1236	309458	7.10	5.68	11.25	11.25
1238	574252	13.18	10.14	19.98	31.22
1240	898493	20.63	16.90	33.53	64.76
1242	1024960	23.53	22.08	44.12	108.88
1244	1928651	44.28	33.90	66.72	175.60
1246	2173639	49.90	47.09	94.12	269.72
1248	2423397	55.63	52.77	105.48	375.20
1250	2692993	61.82	58.73	117.40	492.61
1252	2958970	67.93	64.88	129.70	622.31
1254	3345637	76.81	72.37	144.64	766.95

Note: Volume based upon Conic Method, where
Volume = (h/3)(A1+A2+(A1*A2)^0.5))



5 HEC-RAS Model ADA1

Summary Sheet for HEC-RAS Model ADA1

Description

The HEC-RAS model ADA1 includes the area from the Adobe Dam spillway to the freeway ramp west of 59th Avenue. It begins with section 20 at the crest of the spillway. Flow travels to the southwest until it intersects the 101 Freeway at section 19.64. A majority of the flow will continue to travel west until reaching 51st Avenue. A small portion of the flow travels south, across the freeway. At 51st Avenue, the flow will split three (3) ways. It either will break into the Arrowhead Lakes subdivision located west of 51st Avenue, continue flowing west along Beardsley Road, or travel south along 51st Avenue. A flow-split analysis was performed using typical cross sections at each area, and is included in this appendix.

Flow traveling west on the frontage road will be contained between the subdivision sound wall and the freeway wall. At approximately 55th Avenue, the flow in Bearsdley Road combines with flow from the Arrowhead Lakes outlet, then splits either south towards the 55th Avenue channel or west within Bearsdley Road towards 59th Avenue. Flow split calculations at the Arrowhead Lakes outlet are included in Section 3 of this appendix.

The freeway wall terminates at section 18.57. All but 100 cfs, the capacity of Beardsley Road, weirs into the freeway east of 59th Avenue. Calculations are included in Section 4 of this appendix. The remaining 100 cfs in Beardsley Road then combines with flow that has traveled west from the Arrowhead Lakes subdivision. The combined flow then weirs into the freeway through the west-bound on-ramp west of 59th Avenue.

Assumptions

- Flow on the south side of the median at section 19.46 will exit the freeway on the south side.
- The ADOT detention basin and drainage channel are assumed full to elevation 1304.
- The subdivision wall along the west side of 51st Avenue is torn down by the force of the water, producing two feet of rubble.
- There are fifteen (15) ten (10)-ft openings with two feet of rubble, to simulate flow between the existing houses. The flow will travel into the subdivision through these openings, as well as the street opening. It is assumed that the houses stay in place.
- Flow along Bearsdley Road is contained between the freeway slopes and the subdivision wall.

Method of Analysis

HEC-RAS model ADA1 was developed for the area described above.

Results

The resulting 100-year floodplain limits for the 1/3, 2/3, and Full flow events are shown on the delineation mapping. The HEC-RAS model output is included in this section.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW (MODEL ADA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	3200	1383.14	13.51	0.00	7.14	5.66
ADOBE DAM/A1	19.97	3200	1380.74	16.02	0.00	6.24	4.91
ADOBE DAM/A1	19.91	3200	1374.09	19.70	0.01	5.81	4.33
ADOBE DAM/A1	19.84	3200	1351.90	25.32	0.01	3.05	0.97
ADOBE DAM/A1	19.80	3200	1334.39	7.99	0.02	2.56	1.21
ADOBE DAM/A1	19.76	3200	1321.68	9.71	0.02	2.08	1.02
ADOBE DAM/A1	19.71	3200	1317.23	3.93	0.03	1.70	1.03
ADOBE DAM/A1	19.64	3200	1313.27	10.07	0.06	7.27	3.14
ADOBE DAM/A1	19.54	3200	1309.67	12.77	0.07	5.67	3.52
ADOBE DAM/A1	19.46	3200	1307.48	7.01	0.08	3.48	1.13
ADOBE DAM/A1	19.38	3200	1304.69	9.85	0.10	0.69	0.69
ADOBE DAM/A1	19.31	3200	1304.60	4.70	0.11	1.73	0.81
ADOBE DAM/A1	19.24	3200	1302.81	1.86	0.13	1.99	1.36
ADOBE DAM/A1	19.18	3200	1302.83	0.70	0.17	3.63	2.39
ADOBE DAM/A1	19.16	1300	1302.17	4.81	0.22	2.70	1.64
ADOBE DAM/A1	19.08	1300	1301.34	3.26	0.25	3.90	2.70
ADOBE DAM/A1	19.01	1300	1300.31	4.82	0.28	3.56	2.89
ADOBE DAM/A1	18.93	1300	1299.02	5.78	0.30	4.05	3.24
ADOBE DAM/A1	18.84	1300	1296.82	6.72	0.33	3.85	2.55
ADOBE DAM/A1	18.77	1300	1296.03	5.63	0.34	4.25	3.10
ADOBE DAM/A1	18.71	1300	1293.86	8.42	0.36	3.40	2.08
ADOBE DAM/A1	18.67	600	1291.43	9.36	0.36	1.43	0.89
ADOBE DAM/A1	18.58	600	1289.12	6.14	0.38	2.01	1.37
ADOBE DAM/A1	18.50	200	1284.39	3.60	0.40	1.64	0.56
ADOBE DAM/A1	18.42	100	1281.14	1.99	0.43	3.93	0.65
ADOBE DAM/A1	18.34	100	1277.99	3.89	0.49	7.99	0.37
ADOBE DAM/A1	18.24	100	1275.74	1.54	0.52	20.19	0.52
ADOBE DAM/A1	18.16	100	1274.32	2.13	0.60	20.31	0.29
ADOBE DAM/A1	18.13	100	1272.40	2.32	0.62	19.75	0.48
ADOBE DAM/A1	18.08	100	1270.43	4.36	0.65	15.54	0.58

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.

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW (MODEL ADA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	6400	1386.60	16.40	0.00	10.60	8.34
ADOBE DAM/A1	19.97	6400	1383.80	19.30	0.00	9.30	7.31
ADOBE DAM/A1	19.91	6400	1376.86	23.37	0.01	8.58	6.37
ADOBE DAM/A1	19.84	6400	1352.37	31.61	0.01	3.52	1.08
ADOBE DAM/A1	19.80	6400	1335.01	10.44	0.01	3.18	1.70
ADOBE DAM/A1	19.76	6400	1322.33	11.08	0.02	2.73	1.30
ADOBE DAM/A1	19.71	6400	1317.48	6.31	0.03	1.95	1.21
ADOBE DAM/A1	19.64	6400	1314.33	6.11	0.04	8.32	1.24
ADOBE DAM/A1	19.54	6400	1310.85	9.20	0.07	6.85	1.17
ADOBE DAM/A1	19.46	6400	1308.65	5.74	0.08	4.64	1.58
ADOBE DAM/A1	19.38	6300	1305.17	11.38	0.10	1.17	1.12
ADOBE DAM/A1	19.31	6300	1304.98	6.25	0.11	2.11	1.17
ADOBE DAM/A1	19.24	6300	1303.91	2.02	0.12	3.09	2.42
ADOBE DAM/A1	19.18	6300	1303.93	0.93	0.17	4.73	3.37
ADOBE DAM/A1	19.16	2300	1302.92	5.82	0.20	3.45	2.34
ADOBE DAM/A1	19.08	2300	1302.93	3.60	0.22	5.50	4.16
ADOBE DAM/A1	19.01	2300	1301.97	5.35	0.25	5.22	4.30
ADOBE DAM/A1	18.93	2300	1300.05	7.74	0.27	5.09	4.28
ADOBE DAM/A1	18.84	2300	1298.04	8.04	0.29	5.08	3.77
ADOBE DAM/A1	18.77	2300	1295.41	12.43	0.30	3.63	2.48
ADOBE DAM/A1	18.71	2300	1295.66	6.71	0.31	5.20	3.21
ADOBE DAM/A1	18.67	800	1291.30	14.57	0.32	1.30	0.76
ADOBE DAM/A1	18.58	800	1289.31	7.16	0.33	2.20	1.57
ADOBE DAM/A1	18.50	300	1284.60	3.91	0.34	1.85	0.73
ADOBE DAM/A1	18.42	100	1281.14	1.99	0.37	3.93	0.65
ADOBE DAM/A1	18.34	100	1277.99	3.89	0.43	7.99	0.37
ADOBE DAM/A1	18.24	100	1276.60	0.55	0.47	21.05	1.30
ADOBE DAM/A1	18.16	900	1275.13	4.66	0.67	21.13	1.03
ADOBE DAM/A1	18.13	500	1273.08	4.36	0.69	20.43	0.87
ADOBE DAM/A1	18.08	100	1270.43	4.36	0.70	15.54	0.58

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.

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW (MODEL ADA1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	9600	1389.36	18.29	0.00	13.36	10.34
ADOBE DAM/A1	19.97	9600	1386.31	21.31	0.00	11.81	9.16
ADOBE DAM/A1	19.91	9600	1379.08	25.66	0.01	10.80	7.90
ADOBE DAM/A1	19.84	9600	1352.71	35.86	0.01	3.86	1.33
ADOBE DAM/A1	19.80	9600	1335.30	13.33	0.01	3.47	1.93
ADOBE DAM/A1	19.76	9600	1322.96	10.34	0.02	3.36	1.41
ADOBE DAM/A1	19.71	9600	1317.89	7.00	0.02	2.36	1.50
ADOBE DAM/A1	19.64	9600	1315.01	5.88	0.04	9.01	1.90
ADOBE DAM/A1	19.54	9500	1311.41	9.05	0.06	7.41	1.59
ADOBE DAM/A1	19.46	9500	1309.10	6.55	0.08	5.10	1.88
ADOBE DAM/A1	19.38	9200	1305.55	12.27	0.09	1.55	1.38
ADOBE DAM/A1	19.31	9200	1305.34	6.94	0.10	2.47	1.49
ADOBE DAM/A1	19.24	9200	1304.77	2.17	0.12	3.95	3.23
ADOBE DAM/A1	19.18	9200	1304.79	1.09	0.16	5.59	4.19
ADOBE DAM/A1	19.16	3300	1304.49	4.94	0.19	5.02	3.78
ADOBE DAM/A1	19.08	3300	1304.51	3.72	0.21	7.08	5.59
ADOBE DAM/A1	19.01	3300	1303.55	5.50	0.24	6.80	5.21
ADOBE DAM/A1	18.93	3300	1300.85	9.36	0.26	5.89	5.07
ADOBE DAM/A1	18.84	3300	1299.08	9.05	0.27	6.12	4.81
ADOBE DAM/A1	18.77	3300	1295.96	14.61	0.29	4.18	3.03
ADOBE DAM/A1	18.71	3300	1296.53	7.58	0.29	6.07	4.08
ADOBE DAM/A1	18.67	2200	1293.00	12.46	0.30	2.99	2.46
ADOBE DAM/A1	18.58	2200	1291.26	8.79	0.31	4.15	3.52
ADOBE DAM/A1	18.50	1000	1284.46	16.17	0.32	1.71	0.61
ADOBE DAM/A1	18.42	200	1281.32	3.11	0.33	4.11	0.84
ADOBE DAM/A1	18.34	100	1277.99	3.88	0.37	7.99	0.37
ADOBE DAM/A1	18.24	100	1277.13	0.39	0.40	21.58	1.83
ADOBE DAM/A1	18.17	1500	1275.61	5.29	0.69	21.61	1.51
ADOBE DAM/A1	18.13	900	1273.05	8.13	0.70	20.40	0.87
ADOBE DAM/A1	18.08	100	1270.43	4.36	0.71	15.54	0.58

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.

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: Adobe Dam, Reach A1
Project File : ADA1.prj
Run Date and Time: 06/14/2001 9:32:06 AM

Project in English units

Project Description:
Study Name: Adobe Dam Spillway Delineation 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 Adobe Dam spillway.

Model Name: ADA1
Model Description: Adobe Dam Model begins with CS 20.00 at the crest of the spillway. A total of 400 and 100 for the full and 2/3 Flow respectively weir over the 101 Freeway and exit through the south on-ramp on 51st Avenue. Model ADA1 continues west and splits at 51st Avenue. The flow splits between flow traveling into the Arrowhead subdivision, South on 51st Avenue and continuing west along Beardsley Road. Model ADA1 follows the flow continuing on Beardsley. The flow splits again at the 55th Avenue Channel. A portion continues west and weirs into the freeway once the wall on the north side of the freeway ends. It combines with flow that spills from the Arrowhead subdivision along 59th Avenue then continues to weir into freeway.

Flow Profiles: Profile #1, 1/3 Flow
Sections 20.00 to 19.18, Q=3200 cfs
Sections 19.16 to 18.71, Q=1300 cfs
Sections 18.67 to 18.58, Q=600 cfs
Section 18.50, Q=200 cfs
Sections 18.42 to 18.08, Q=100 cfs

Profile #2, 2/3 Flow
Sections 20.00 to 19.46, Q=6400 cfs
Sections 19.38 to 19.18, Q=6300 cfs
Sections 19.16 to 18.71, Q=2300 cfs
Sections 18.67 to 18.58, Q=800 cfs
Section 18.50 Q=300 cfs
Sections 18.42 to 18.24, Q=100 cfs
Section 18.17 Q=900 cfs
Section 18.13 Q=500 cfs
Section 18.08 Q=100 cfs

Profile #3, Full Flow
Sections 20.00 to 19.64, Q=9600 cfs
Sections 19.54 to 19.46, Q=9500 cfs
Sections 19.38 to 19.18, Q=9200 cfs
Sections 19.16 to 18.71, Q=3300 cfs
Sections 18.67 to 18.58, Q=2200 cfs
Section 18.50, Q=1000 cfs
Section 18.42, Q=200 cfs
Sections 18.34 to 18.24, Q=100 cfs
Section 18.17, Q=1500 cfs
Section 18.13, Q=900 cfs
Section 18.08, Q=100 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 990006-02

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 A1, North of Loop 101
Plan File : g:\Filedir\99\990006-02Hydro\Reach A\ADA1.p01

Geometry Title: Reach A1, North of Loop 101
Geometry File : g:\Filedir\99\990006-02Hydro\Reach A\ADA1.g01

Flow Title : Reach A1, North of Loop 101
Flow File : g:\Filedir\99\990006-02Hydro\Reach A\ADA1.f01

Plan Summary Information:
Number of: Cross Sections = 30 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 A1, North of Loop 101
Flow File : g:\Filedir\99\990006-02Hydro\Reach A\ADA1.f01

Flow Data (cfs)

River	Reach	RS	1/3	2/3	Full
ADOBE DAM	A1	20	3200	6400	9600
ADOBE DAM	A1	19.64	3200	6400	9600
ADOBE DAM	A1	19.54	3200	6400	9500
ADOBE DAM	A1	19.46	3200	6400	9500
ADOBE DAM	A1	19.38	3200	6300	9200
ADOBE DAM	A1	19.18	3200	6300	9200
ADOBE DAM	A1	19.16	1300	2300	3300
ADOBE DAM	A1	18.67	600	800	2200
ADOBE DAM	A1	18.5	200	300	1000
ADOBE DAM	A1	18.42	100	100	200
ADOBE DAM	A1	18.34	100	100	100
ADOBE DAM	A1	18.17	100	900	1500
ADOBE DAM	A1	18.13	100	500	900
ADOBE DAM	A1	18.08	100	100	100

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
ADOBE DAM	A1	1/3	Critical	Critical

Changes in WS and EG

River	Reach	RS	Profile	Type	Value
ADOBE DAM	A1	19.18	Full Known WS	1304.79	
ADOBE DAM	A1	19.18	2/3 Known WS	1303.93	
ADOBE DAM	A1	19.18	1/3 Known WS	1302.83	

GEOMETRY DATA

Geometry Title: Reach A1, North of Loop 101
Geometry File : g:\Filedir\99\990006-02Hydro\Reach A\ADA1.g01

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 20

INPUT
Description: Northern Boundary of HEC-RAS Model ADA1
1/3 Q=3200 cfs
2/3
Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9512.31	1560	9536.23	1550	9558.32	1540	9580.37	1530	9607.08	1520
9640.65	1510	9673.04	1500	9710.24	1490	9742.24	1480	9777.78	1470
9819.06	1460	9891.44	1450	9926.24	1440	9937.97	1430	9948.8	1420
9957.52	1410	9966.16	1400	9974.09	1390	9981.53	1380	9984.74	1376
9992.91	1376	10000	1376.62	10016.9	1378	10018.88	1380	10025.75	1390
10032.29	1400	10040.3	1410	10049.5	1420	10058.34	1430	10068.95	1440
10081.5	1450	10149.66	1460	10248.73	1470	10314.89	1480	10366.74	1490
10366.74	1500								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9512.31	.045	9891.44	.025	10081.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9891.44	10081.5	144.75	144.75	144.75	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1385.97	Element			
Vel Head (ft)	2.83	Wt. n-Val.		0.025	
W.S. Elev (ft)	1383.14	Reach Len. (ft)	144.75	144.75	144.75
Crit W.S. (ft)	1383.14	Flow Area (sq ft)		236.92	
E.G. Slope (ft/ft)	0.006128	Area (sq ft)		236.92	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	41.84	Top Width (ft)		41.84	
Vel Total (ft/s)	13.51	Avg. Vel. (ft/s)		13.51	
Max Chl Dpth (ft)	7.14	Hydr. Depth (ft)		5.66	
Conv. Total (cfs)	40877.3	Conv. (cfs)		40877.3	
Length Wtd. (ft)	144.75	Wetted Per. (ft)		47.90	
Min Ch El (ft)	1376.00	Shear (lb/sq ft)		1.89	
Alpha	1.00	Stream Power (lb/ft s)		25.56	
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	34.70	70.59	12.52
C & E Loss (ft)	0.00	Cum SA (acres)	9.65	46.69	10.21

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 energy loss was 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)	1390.77	Element			
Vel Head (ft)	4.18	Wt. n-Val.		0.025	
W.S. Elev (ft)	1386.60	Reach Len. (ft)	144.75	144.75	144.75
Crit W.S. (ft)	1386.60	Flow Area (sq ft)		390.30	
E.G. Slope (ft/ft)	0.005774	Area (sq ft)		390.30	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	46.79	Top Width (ft)		46.79	
Vel Total (ft/s)	16.40	Avg. Vel. (ft/s)		16.40	
Max Chl Dpth (ft)	10.60	Hydr. Depth (ft)		8.34	
Conv. Total (cfs)	84228.4	Conv. (cfs)		84228.4	

Length Wtd. (ft)	144.75	Wetted Per. (ft)		56.42	
Min Ch El (ft)	1376.00	Shear (lb/sq ft)		2.49	
Alpha	1.00	Stream Power (lb/ft s)		40.89	
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)	47.60	111.23	27.55
C & E Loss (ft)	0.01	Cum SA (acres)	15.81	52.69	23.09

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

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1394.55				
Vel Head (ft)	5.19	Wt. n-Val.		0.025	
W.S. Elev (ft)	1389.36	Reach Len. (ft)	144.75	144.75	144.75
Crit W.S. (ft)	1389.36	Flow Area (sq ft)		524.91	
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		524.91	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	50.74	Top Width (ft)		50.74	
Vel Total (ft/s)	18.29	Avg. Vel. (ft/s)		18.29	
Max Chl Dpth (ft)	13.36	Hydr. Depth (ft)		10.34	
Conv. Total (cfs)	127945.3	Conv. (cfs)		127945.3	
Length Wtd. (ft)	144.75	Wetted Per. (ft)		63.21	
Min Ch El (ft)	1376.00	Shear (lb/sq ft)		2.92	
Alpha	1.00	Stream Power (lb/ft s)		53.38	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)	55.49	145.85	43.14
C & E Loss (ft)	0.02	Cum SA (acres)	17.14	55.42	24.36

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9954.79	10018.15	3169.43	230.97	43.05	99.04	5.93	13.72
10018.15	RB 10081.50	30.57	5.95	4.85	0.96	2.06	5.13

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9954.79	10018.15	6253.64	370.24	47.37	97.71	8.92	16.89
10018.15	RB 10081.50	146.36	20.07	9.05	2.29	3.81	7.29

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)
9954.79	10018.15	9273.87	487.69	50.81	96.60	11.19	19.02
10018.15	RB 10081.50	326.13	37.22	12.40	3.40	5.20	8.76

```
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          RIVER: ADOBE DAM
REACH: A1                 RS: 19.97

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9493.23    1520 9504.71 1515.39 9517.22    1510 9525.03  1506.5 9539.48    1500
  9551.7 1495.42  9566.5    1490  9578.4 1486.98 9594.13    1480 9603.01 1473.98
 9619.34    1470  9633.6 1465.64 9650.57    1460  9662.1 1456.68 9686.05    1450
  9706.2 1445.65  9740.1    1440 9802.39 1434.12  9931.2    1430 9941.98    1420
  9951.3    1410 9959.88    1400 9968.19    1390 9976.97    1380 9979.28    1376
   10000  1374.510012.39    137610016.57    138010022.98    139010030.31    1400
10038.12    1410 10046.5    142010055.88    143010087.44    144010118.84 1444.22
10157.52    145010207.84 1453.7510256.15    146010284.29 1465.0610311.02    1470
10340.05 1475.6610361.25    1480

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9493.23    .045  9931.2    .02510055.88    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9931.210055.88            337.52  337.52  337.52             .1       .3

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1384.72   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                3.98   Wt. n-Val.                            0.025
  W.S. Elev (ft)            1380.74   Reach Len. (ft)             337.52    337.52     337.52
  Crit W.S. (ft)            1381.62   Flow Area (sq ft)                     199.77
  E.G. Slope (ft/ft)       0.010106   Area (sq ft)                          199.77
  Q Total (cfs)             3200.00   Flow (cfs)                           3200.00
  Top Width (ft)              40.72   Top Width (ft)                         40.72
  Vel Total (ft/s)            16.02   Avg. Vel. (ft/s)                       16.02
  Max Chl Dpth (ft)            6.24   Hydr. Depth (ft)                        4.91
  Conv. Total (cfs)         31832.3   Conv. (cfs)                         31832.3
  Length Wtd. (ft)           337.52   Wetted Per. (ft)                       45.51
  Min Ch El (ft)            1374.50   Shear (lb/sq ft)                        2.77
  Alpha                        1.00   Stream Power (lb/ft s)                 44.36
  Frctn Loss (ft)              1.12   Cum Volume (acre-ft)         34.70     69.86      12.52
  C & E Loss (ft)              0.12   Cum SA (acres)                9.65     46.55      10.21

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 OUTPUT    Profile #2/3

  E.G. Elev (ft)            1389.58   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                5.78   Wt. n-Val.                            0.025
  W.S. Elev (ft)            1383.80   Reach Len. (ft)             337.52    337.52     337.52
  Crit W.S. (ft)            1385.10   Flow Area (sq ft)                     331.62
  E.G. Slope (ft/ft)       0.009196   Area (sq ft)                          331.62
  Q Total (cfs)             6400.00   Flow (cfs)                           6400.00
  Top Width (ft)              45.37   Top Width (ft)                         45.37
  Vel Total (ft/s)            19.30   Avg. Vel. (ft/s)                       19.30
  Max Chl Dpth (ft)            9.30   Hydr. Depth (ft)                        7.31
  Conv. Total (cfs)         66739.0   Conv. (cfs)                         66739.0
  Length Wtd. (ft)           337.52   Wetted Per. (ft)                       53.23
  Min Ch El (ft)            1374.50   Shear (lb/sq ft)                        3.58
  Alpha                        1.00   Stream Power (lb/ft s)                 69.03
  Frctn Loss (ft)              1.04   Cum Volume (acre-ft)         47.60    110.03      27.55
  C & E Loss (ft)              0.16   Cum SA (acres)               15.81     52.54      23.09

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 OUTPUT Profile #Full

E.G. Elev (ft)	1393.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.05	Wt. n-Val.		0.025	
W.S. Elev (ft)	1386.31	Reach Len. (ft)	337.52	337.52	337.52
Crit W.S. (ft)	1387.84	Flow Area (sq ft)		450.48	
E.G. Slope (ft/ft)	0.008658	Area (sq ft)		450.48	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	49.19	Top Width (ft)		49.19	
Vel Total (ft/s)	21.31	Avg. Vel. (ft/s)		21.31	
Max Chl Dpth (ft)	11.81	Hydr. Depth (ft)		9.16	
Conv. Total (cfs)	103173.1	Conv. (cfs)		103173.1	
Length Wtd. (ft)	337.52	Wetted Per. (ft)		59.56	
Min Ch El (ft)	1374.50	Shear (lb/sq ft)		4.09	
Alpha	1.00	Stream Power (lb/ft s)		87.13	
Frctn Loss (ft)	1.00	Cum Volume (acre-ft)	55.49	144.23	43.14
C & E Loss (ft)	0.19	Cum SA (acres)	17.14	55.26	24.36

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)
9972.76	10014.32	3174.38	195.52	41.52	99.20	5.15	16.24
10014.32	RB 10055.88	25.62	4.25	3.99	0.80	1.56	6.03

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.

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)
9972.76	10014.32	6263.06	316.03	45.60	97.86	7.77	19.82
10014.32	RB 10055.88	136.94	15.59	7.63	2.14	3.33	8.78

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9931.20	9972.76	3.27	1.01	2.02	0.03	0.76	3.24
9972.76	10014.32	9299.03	420.08	46.93	96.86	10.11	22.14
10014.32	RB 10055.88	297.71	29.39	10.61	3.10	4.67	10.13

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: ADOBE DAM
REACH: A1 RS: 19.91

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9615.79	1400	9753.94	1402	9817.19	1402	9852.33	1400	9869.27	1398
9882.24	1396	9898.93	1394	9911.07	1392	9921.74	1390	9934.41	1388
9948.63	1386	9970.07	1384	9975.52	1380	9985.77	1370	10000	1368.28

```
10015.25    137010024.67    138010061.71    139010107.63 1395.4610151.97    1400
10193.99 1405.1510238.26    141010261.12 1414.0110282.13    142010305.91 1425.05
10330.69    143010352.28  1434.710374.17    144010389.95 1444.9310405.88    1450
10422.05 1455.6410433.94    1460

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9615.79    .045 9975.52    .02510024.67    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9975.5210024.67               335  346.57  403.08              .1       .3
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1380.12	Element			
Vel Head (ft)	6.02	Wt. n-Val.		0.025	
W.S. Elev (ft)	1374.09	Reach Len. (ft)	335.00	346.57	403.08
Crit W.S. (ft)	1375.94	Flow Area (sq ft)		162.47	
E.G. Slope (ft/ft)	0.017605	Area (sq ft)		162.47	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	37.53	Top Width (ft)		37.53	
Vel Total (ft/s)	19.70	Avg. Vel. (ft/s)		19.70	
Max Chl Dpth (ft)	5.81	Hydr. Depth (ft)		4.33	
Conv. Total (cfs)	24117.8	Conv. (cfs)		24117.8	
Length Wtd. (ft)	346.57	Wetted Per. (ft)		41.16	
Min Ch El (ft)	1368.28	Shear (lb/sq ft)		4.34	
Alpha	1.00	Stream Power (lb/ft s)		85.44	
Frctn Loss (ft)	4.41	Cum Volume (acre-ft)	34.70	68.46	12.52
C & E Loss (ft)	0.20	Cum SA (acres)	9.65	46.25	10.21

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 OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1385.34	Element			
Vel Head (ft)	8.48	Wt. n-Val.		0.025	
W.S. Elev (ft)	1376.86	Reach Len. (ft)	335.00	346.57	403.08
Crit W.S. (ft)	1379.50	Flow Area (sq ft)		273.84	
E.G. Slope (ft/ft)	0.015559	Area (sq ft)		273.84	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	42.97	Top Width (ft)		42.97	
Vel Total (ft/s)	23.37	Avg. Vel. (ft/s)		23.37	
Max Chl Dpth (ft)	8.58	Hydr. Depth (ft)		6.37	
Conv. Total (cfs)	51309.1	Conv. (cfs)		51309.1	
Length Wtd. (ft)	346.57	Wetted Per. (ft)		48.93	
Min Ch El (ft)	1368.28	Shear (lb/sq ft)		5.44	
Alpha	1.00	Stream Power (lb/ft s)		127.06	
Frctn Loss (ft)	3.97	Cum Volume (acre-ft)	47.60	107.68	27.55
C & E Loss (ft)	0.27	Cum SA (acres)	15.81	52.20	23.09

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 OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1389.30	Element			
Vel Head (ft)	10.22	Wt. n-Val.		0.025	
W.S. Elev (ft)	1379.08	Reach Len. (ft)	335.00	346.57	403.08
Crit W.S. (ft)	1382.19	Flow Area (sq ft)		374.14	
E.G. Slope (ft/ft)	0.014514	Area (sq ft)		374.14	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	47.34	Top Width (ft)		47.34	
Vel Total (ft/s)	25.66	Avg. Vel. (ft/s)		25.66	
Max Chl Dpth (ft)	10.80	Hydr. Depth (ft)		7.90	
Conv. Total (cfs)	79684.6	Conv. (cfs)		79684.6	
Length Wtd. (ft)	346.57	Wetted Per. (ft)		55.16	
Min Ch El (ft)	1368.28	Shear (lb/sq ft)		6.15	
Alpha	1.00	Stream Power (lb/ft s)		157.70	
Frctn Loss (ft)	3.72	Cum Volume (acre-ft)	55.49	141.04	43.14
C & E Loss (ft)	0.32	Cum SA (acres)	17.14	54.88	24.36

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 9975.52	9991.90	563.82	35.96	12.04	17.62	3.48	15.68
9991.90	10008.29	2007.77	87.39	16.49	62.74	5.33	22.97
10008.29	RB 10024.67	628.42	39.12	12.63	19.64	3.62	16.06

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9975.52	9991.90	1270.19	68.46	16.00	19.85	5.20	18.55
9991.90	10008.29	3751.64	132.72	16.49	58.62	8.10	28.27
10008.29	RB 10024.67	1378.17	72.66	16.43	21.53	5.41	18.97

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9975.52	9991.90	2038.03	100.23	19.18	21.23	6.49	20.33
9991.90	10008.29	5389.19	169.11	16.49	56.14	10.32	31.87
10008.29	RB 10024.67	2172.77	104.81	19.48	22.63	6.75	20.73

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: ADOBE DAM
REACH: A1 RS: 19.84

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9410.68	1360	9475.72	1362	9515.13	1364	9531.09	1366	9549.8	1368
9571.6	1370	9619.17	1371.3	9670.04	1370	9692.74	1368	9719.23	1366
9745.75	1364	9774.45	1362	9805.86	1360	9834.2	1358	9859.97	1356
9904.15	1354	9968.04	1352	9991.32	1350	10000	1348.85	10013.52	1350
10024.05	1352	10039.12	1352.2	10055.3	1352	10099.06	1350.83	10138.08	1352
10164.06	1354	10188.58	1356	10206.74	1358	10219.8	1360	10232.71	1362
10246.14	1364	10258.31	1366	10271.59	1368	10284.65	1370	10296.77	1372
10307.86	1374	10317.49	1376	10326.76	1378	10336.03	1380	10346.37	1382
10356.57	1384	10368.45	1386						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9410.68	.045	9619.17	.045	10368.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9619.17	10368.45	338.94	214.48	180.39	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1361.86	Element			
Vel Head (ft)	9.95	Wt. n-Val.		0.045	
W.S. Elev (ft)	1351.90	Reach Len. (ft)	338.94	214.48	180.39
Crit W.S. (ft)	1353.40	Flow Area (sq ft)		126.39	
E.G. Slope (ft/ft)	0.614925	Area (sq ft)		126.39	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	

Top Width (ft)	130.32	Top Width (ft)		130.32	
Vel Total (ft/s)	25.32	Avg. Vel. (ft/s)		25.32	
Max Chl Dpth (ft)	3.05	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	4080.7	Conv. (cfs)		4080.7	
Length Wtd. (ft)	214.48	Wetted Per. (ft)		130.73	
Min Ch El (ft)	1348.85	Shear (lb/sq ft)		37.12	
Alpha	1.00	Stream Power (lb/ft s)		939.69	
Frctn Loss (ft)	17.86	Cum Volume (acre-ft)	34.70	67.31	12.52
C & E Loss (ft)	0.39	Cum SA (acres)	9.65	45.58	10.21

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 #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1367.89	Element			
Vel Head (ft)	15.51	Wt. n-Val.		0.045	
W.S. Elev (ft)	1352.37	Reach Len. (ft)	338.94	214.48	180.39
Crit W.S. (ft)	1354.51	Flow Area (sq ft)		202.47	
E.G. Slope (ft/ft)	0.825189	Area (sq ft)		202.47	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	186.71	Top Width (ft)		186.71	
Vel Total (ft/s)	31.61	Avg. Vel. (ft/s)		31.61	
Max Chl Dpth (ft)	3.52	Hydr. Depth (ft)		1.08	
Conv. Total (cfs)	7045.4	Conv. (cfs)		7045.4	
Length Wtd. (ft)	214.48	Wetted Per. (ft)		187.17	
Min Ch El (ft)	1348.85	Shear (lb/sq ft)		55.73	
Alpha	1.00	Stream Power (lb/ft s)		1761.54	
Frctn Loss (ft)	16.69	Cum Volume (acre-ft)	47.60	105.79	27.55
C & E Loss (ft)	0.71	Cum SA (acres)	15.81	51.28	23.09

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

			Left OB	Channel	Right OB
E.G. Elev (ft)	1372.67	Element			
Vel Head (ft)	19.97	Wt. n-Val.		0.045	
W.S. Elev (ft)	1352.71	Reach Len. (ft)	338.94	214.48	180.39
Crit W.S. (ft)	1355.36	Flow Area (sq ft)		267.71	
E.G. Slope (ft/ft)	0.811650	Area (sq ft)		267.71	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	201.80	Top Width (ft)		201.80	
Vel Total (ft/s)	35.86	Avg. Vel. (ft/s)		35.86	
Max Chl Dpth (ft)	3.86	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	10655.8	Conv. (cfs)		10655.8	
Length Wtd. (ft)	214.48	Wetted Per. (ft)		202.28	
Min Ch El (ft)	1348.85	Shear (lb/sq ft)		67.06	
Alpha	1.00	Stream Power (lb/ft s)		2404.84	
Frctn Loss (ft)	15.65	Cum Volume (acre-ft)	55.49	138.49	43.14
C & E Loss (ft)	0.97	Cum SA (acres)	17.14	53.89	24.36

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)
9868.93	10118.69	3162.40	122.48	114.56	98.82	1.07	25.82
10118.69	RB 10368.45	37.60	3.92	16.17	1.18	0.24	9.60

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9868.93	10118.69	6123.59	188.75	162.94	95.68	1.16	32.44
10118.69	RB 10368.45	276.41	13.73	24.23	4.32	0.57	20.14

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)
9868.93	10118.69	9034.71	245.12	173.67	94.11	1.41	36.86
10118.69	RB 10368.45	565.29	22.59	28.61	5.89	0.79	25.02

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: ADOBE DAM
REACH: A1 RS: 19.80

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9411.15	1340	9418.07	1339.88	9427.98	1340	9441.85	1340.13	9465.29	1340
9580.97	1339.25	9687.57	1338	9769.79	1336.68	9824.88	1336	9834.4	1335.35
9851.18	1334.33	9858.16	1334.47	9867.37	1334.69	9888.75	1335.44	9904.46	1334
9915.51	1333.85	9938.61	1332	9952.79	1331.83	9965.76	1332	10000	1332.91
10025.08	1333.7	10037.65	1332	10050.64	1333.5	10085.98	1332	10126.23	1334
10170.87	1334.1	10196.92	1334	10204.51	1333	10218.7	1334	10287.88	1336
10320.27	1338	10343.62	1340	10368.5	1342	10384.39	1343.25		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9411.15	.045	9888.75	.045	10384.39	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9888.75	10384.39	371.13	201.4	175	.1	.3

Left Levee Station= 9888.75 Elevation= 1335.44

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1335.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.		0.045	
W.S. Elev (ft)	1334.39	Reach Len. (ft)	371.13	201.40	175.00
Crit W.S. (ft)	1334.62	Flow Area (sq ft)		400.27	
E.G. Slope (ft/ft)	0.045801	Area (sq ft)		400.27	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	332.14	Top Width (ft)		332.14	
Vel Total (ft/s)	7.99	Avg. Vel. (ft/s)		7.99	
Max Chl Dpth (ft)	2.56	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	14952.5	Conv. (cfs)		14952.5	
Length Wtd. (ft)	201.40	Wetted Per. (ft)		332.65	
Min Ch El (ft)	1331.83	Shear (lb/sq ft)		3.44	
Alpha	1.00	Stream Power (lb/ft s)		27.51	
Frctn Loss (ft)	23.79	Cum Volume (acre-ft)	34.70	66.01	12.52
C & E Loss (ft)	2.69	Cum SA (acres)	9.65	44.44	10.21

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.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1336.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.045	
W.S. Elev (ft)	1335.01	Reach Len. (ft)	371.13	201.40	175.00
Crit W.S. (ft)	1335.50	Flow Area (sq ft)		613.05	
E.G. Slope (ft/ft)	0.049273	Area (sq ft)		613.05	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	360.11	Top Width (ft)		360.11	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.18	Hydr. Depth (ft)		1.70	
Conv. Total (cfs)	28832.1	Conv. (cfs)		28832.1	
Length Wtd. (ft)	201.40	Wetted Per. (ft)		360.66	
Min Ch El (ft)	1331.83	Shear (lb/sq ft)		5.23	
Alpha	1.00	Stream Power (lb/ft s)		54.59	
Frctn Loss (ft)	27.05	Cum Volume (acre-ft)	47.60	103.78	27.55
C & E Loss (ft)	4.15	Cum SA (acres)	15.81	49.94	23.09

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 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 OUTPUT Profile #Full

E.G. Elev (ft)	1338.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.76	Wt. n-Val.		0.045	
W.S. Elev (ft)	1335.30	Reach Len. (ft)	371.13	201.40	175.00
Crit W.S. (ft)	1336.09	Flow Area (sq ft)		720.36	
E.G. Slope (ft/ft)	0.067965	Area (sq ft)		720.36	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	373.42	Top Width (ft)		373.42	
Vel Total (ft/s)	13.33	Avg. Vel. (ft/s)		13.33	
Max Chl Dpth (ft)	3.47	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	36823.9	Conv. (cfs)		36823.9	
Length Wtd. (ft)	201.40	Wetted Per. (ft)		373.99	
Min Ch El (ft)	1331.83	Shear (lb/sq ft)		8.17	
Alpha	1.00	Stream Power (lb/ft s)		108.91	
Frctn Loss (ft)	30.35	Cum Volume (acre-ft)	55.49	136.05	43.14
C & E Loss (ft)	5.26	Cum SA (acres)	17.14	52.47	24.36

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.

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 9888.75	10053.96	2219.54	244.35	154.12	69.36	1.59	9.08
10053.96	10219.18	974.96	153.43	165.40	30.47	0.93	6.35
10219.18	RB 10384.39	5.49	2.49	13.13	0.17	0.19	2.21

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.

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 9888.75	10053.96	3941.03	340.96	160.86	61.58	2.12	11.56
10053.96	10219.18	2383.83	254.99	165.40	37.25	1.54	9.35
10219.18	RB 10384.39	75.14	17.10	34.41	1.17	0.50	4.39

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 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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9888.75	10053.96	5681.33	388.39	164.06	59.18	2.37	14.63
10053.96	10219.18	3742.92	303.34	165.40	38.99	1.84	12.34
10219.18	RB 10384.39	175.75	28.64	44.53	1.83	0.64	6.14

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 19.76

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9214.21	1336.93	9214.47	1336	9228.64	1335.01	9247.29	1334	9269.62	1332.97
9293.03	1332	9319.64	1330.87	9356.38	1330	9411.34	1328.18	9472.71	1328.62
9532.67	1328	9567.23	1326.94	9592.38	1326	9625.58	1325.17	9664.43	1324
9711.85	1323.21	9756.82	1322	9810.66	1321.13	9868.26	1320	9891.31	1319.6
9912.96	1320	9928.01	1320.42	9935.36	1320.81	9943.96	1321.11	9964.07	1321.58
9990.1	1320	10000	1319.87	10013.2	1320	10053.51	1320.95	10113.06	1321.89
10150.4	1322	10213.22	1322.95	10331.15	1322.27	10372.83	1322.77	10427.48	1324
10452.4	1325.05	10472.36	1326	10507.41	1328	10544.71	1330		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9214.21	.045	9214.21	.045	10544.71	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9214.21	10544.71	995.08	293.58	98.64	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1323.15	Element			
Vel Head (ft)	1.46	Wt. n-Val.		0.045	
W.S. Elev (ft)	1321.68	Reach Len. (ft)	995.08	293.58	98.64
Crit W.S. (ft)	1322.16	Flow Area (sq ft)		329.45	
E.G. Slope (ft/ft)	0.084365	Area (sq ft)		329.45	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	323.14	Top Width (ft)		323.14	
Vel Total (ft/s)	9.71	Avg. Vel. (ft/s)		9.71	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.02	
Conv. Total (cfs)	11017.1	Conv. (cfs)		11017.1	
Length Wtd. (ft)	293.58	Wetted Per. (ft)		323.25	

Min Ch El (ft)	1319.60	Shear (lb/sq ft)		5.37	
Alpha	1.00	Stream Power (lb/ft s)		52.14	
Frctn Loss (ft)	12.20	Cum Volume (acre-ft)	34.70	64.33	12.52
C & E Loss (ft)	0.05	Cum SA (acres)	9.65	42.93	10.21

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1324.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.91	Wt. n-Val.		0.045	
W.S. Elev (ft)	1322.33	Reach Len. (ft)	995.08	293.58	98.64
Crit W.S. (ft)	1322.98	Flow Area (sq ft)		577.62	
E.G. Slope (ft/ft)	0.079231	Area (sq ft)		577.62	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	443.67	Top Width (ft)		443.67	
Vel Total (ft/s)	11.08	Avg. Vel. (ft/s)		11.08	
Max Chl Dpth (ft)	2.73	Hydr. Depth (ft)		1.30	
Conv. Total (cfs)	22737.0	Conv. (cfs)		22737.0	
Length Wtd. (ft)	293.58	Wetted Per. (ft)		443.80	
Min Ch El (ft)	1319.60	Shear (lb/sq ft)		6.44	
Alpha	1.00	Stream Power (lb/ft s)		71.33	
Frctn Loss (ft)	12.43	Cum Volume (acre-ft)	47.60	101.03	27.55
C & E Loss (ft)	0.02	Cum SA (acres)	15.81	48.08	23.09

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)	1324.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.66	Wt. n-Val.		0.045	
W.S. Elev (ft)	1322.96	Reach Len. (ft)	995.08	293.58	98.64
Crit W.S. (ft)	1323.45	Flow Area (sq ft)		928.68	
E.G. Slope (ft/ft)	0.062222	Area (sq ft)		928.68	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	660.37	Top Width (ft)		660.37	
Vel Total (ft/s)	10.34	Avg. Vel. (ft/s)		10.34	
Max Chl Dpth (ft)	3.36	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	38485.8	Conv. (cfs)		38485.8	
Length Wtd. (ft)	293.58	Wetted Per. (ft)		660.51	
Min Ch El (ft)	1319.60	Shear (lb/sq ft)		5.46	
Alpha	1.00	Stream Power (lb/ft s)		56.46	
Frctn Loss (ft)	13.11	Cum Volume (acre-ft)	55.49	132.24	43.14
C & E Loss (ft)	0.33	Cum SA (acres)	17.14	50.08	24.36

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)
9657.71	10101.21	3200.00	329.45	323.25	100.00	1.02	9.71

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.

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)
9657.71	10101.21	6297.71	552.72	356.84	98.40	1.55	11.39
10101.21	RB 10544.71	102.29	24.90	86.96	1.60	0.29	4.11

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)
9657.71	10101.21	8954.91	785.29	380.31	93.28	2.07	11.40
10101.21	RB 10544.71	645.09	143.38	280.21	6.72	0.51	4.50

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: ADOBE DAM
REACH: A1 RS: 19.71

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8905.17	1322	8994.68	1320	9256.13	1318.4	9536.67	1318	9570.36	1317.92
9606.75	1318	9732.22	1316.95	9920.75	1316	10000	1315.5	310077.45	1316
10153.45	1316.42	10216.17	1316	10236.91	1315.78	10256.29	1316	10289.54	1316.29
10336.51	1316	10381.93	1315.78	10401.21	1315.85	10413.73	1316	10540.29	1318
10577.43	1320	10610.69	1322	10642.93	1324				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8905.17	.045	8905.17	.045	10642.93	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8905.17	10642.93	473.42	365.99	700.05	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1317.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.045	
W.S. Elev (ft)	1317.23	Reach Len. (ft)	473.42	365.99	700.05
Crit W.S. (ft)	1316.97	Flow Area (sq ft)		813.93	
E.G. Slope (ft/ft)	0.013703	Area (sq ft)		813.93	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	793.43	Top Width (ft)		793.43	
Vel Total (ft/s)	3.93	Avg. Vel. (ft/s)		3.93	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		1.03	
Conv. Total (cfs)	27336.7	Conv. (cfs)		27336.7	
Length Wtd. (ft)	365.99	Wetted Per. (ft)		793.45	
Min Ch El (ft)	1315.53	Shear (lb/sq ft)		0.88	
Alpha	1.00	Stream Power (lb/ft s)		3.45	
Frctn Loss (ft)	2.49	Cum Volume (acre-ft)	34.70	60.47	12.52
C & E Loss (ft)	0.13	Cum SA (acres)	9.65	39.17	10.21

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 OUTPUT Profile #2/3

E.G. Elev (ft)	1318.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.045	
W.S. Elev (ft)	1317.48	Reach Len. (ft)	473.42	365.99	700.05
Crit W.S. (ft)	1317.48	Flow Area (sq ft)		1013.90	
E.G. Slope (ft/ft)	0.028356	Area (sq ft)		1013.90	
Q Total (cfs)	6400.00	Flow (cfs)		6400.00	
Top Width (ft)	838.23	Top Width (ft)		838.23	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	
Max Chl Dpth (ft)	1.95	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	38006.5	Conv. (cfs)		38006.5	
Length Wtd. (ft)	379.83	Wetted Per. (ft)		838.26	
Min Ch El (ft)	1315.53	Shear (lb/sq ft)		2.14	
Alpha	1.00	Stream Power (lb/ft s)		13.52	
Frctn Loss (ft)	2.44	Cum Volume (acre-ft)	47.60	95.66	27.55
C & E Loss (ft)	0.02	Cum SA (acres)	15.81	43.76	23.09

Warning: The energy equation could not be balanced within the specified number of iterations. The

program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1318.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.045	
W.S. Elev (ft)	1317.89	Reach Len. (ft)	473.42	365.99	700.05
Crit W.S. (ft)	1317.89	Flow Area (sq ft)		1370.74	
E.G. Slope (ft/ft)	0.026158	Area (sq ft)		1370.74	
Q Total (cfs)	9600.00	Flow (cfs)		9600.00	
Top Width (ft)	912.72	Top Width (ft)		912.72	
Vel Total (ft/s)	7.00	Avg. Vel. (ft/s)		7.00	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	59356.9	Conv. (cfs)		59356.9	
Length Wtd. (ft)	393.27	Wetted Per. (ft)		912.76	
Min Ch El (ft)	1315.53	Shear (lb/sq ft)		2.45	
Alpha	1.00	Stream Power (lb/ft s)		17.18	
Frctn Loss (ft)		Cum Volume (acre-ft)	55.49	124.49	43.14
C & E Loss (ft)		Cum SA (acres)	17.14	44.78	24.36

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.

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)
9484.42	10063.68	1379.01	360.32	365.33	43.09	0.99	3.83
10063.68	RB 10642.93	1820.99	453.61	428.12	56.91	1.06	4.01

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)
9484.42	10063.68	2762.73	453.46	394.62	43.17	1.15	6.09
10063.68	RB 10642.93	3637.27	560.45	443.63	56.83	1.26	6.49

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

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)
9484.42	10063.68	4179.40	624.22	443.33	43.54	1.41	6.70
10063.68	RB 10642.93	5420.60	746.52	469.43	56.46	1.59	7.26

Warning: The energy equation could not be balanced within the specified number of iterations. The

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        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.

CROSS SECTION          RIVER: ADOBE DAM
REACH: A1                 RS: 19.64

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9600 cfs
Station Elevation Data    num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9609.32 1314.77 9639.63    1314 9648.36    1312 9657.18    1310 9662.18    1310
 9670.61 1311.31 9686.41    1312 9717.93  1313.5 9762.56    1312 9775.69 1310.83
 9791.76    1312 9817.24 1313.11  9838.3    1314 9844.15    1314 9859.76  1312.7
 9868.44    1312 9875.57 1310.97  9882.3    1310 9884.93    1310 9890.19 1310.89
 9896.76    1312 9924.14 1313.86 9958.56    1312 9967.35 1310.85 9973.88    1310
  9985.3    1308 9989.49    1306   10000    130610009.09    130810016.95    1310
10025.72    131210034.52 1313.1710047.24 1313.8710173.96 1313.3610234.11    1314
10285.23 1314.1910328.33    131410361.46 1313.99 10406.5 1313.9710425.55    1314
10480.09 1314.28 10507.8    131410520.75 1313.8510525.34 1313.7610555.49    1314
10577.11 1315.1210593.14    131610605.67  1316.4 10649.2    131810673.43    1320
10697.16    132210718.99    132410740.87    1326

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9609.32     .03  9838.3     .0210047.24     .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9838.310047.24           510.09  531.95  545.25             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 9609.32 9717.93    1317
Left Levee      Station= 9924.14      Elevation= 1313.86
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9609.3210047.25    1304

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1314.84   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                1.58   Wt. n-Val.                            0.020
  W.S. Elev (ft)            1313.27   Reach Len. (ft)            510.09     531.95    545.25
  Crit W.S. (ft)            1313.27   Flow Area (sq ft)                     317.65
  E.G. Slope (ft/ft)       0.004085   Area (sq ft)                          317.65
  Q Total (cfs)             3200.00   Flow (cfs)                           3200.00
  Top Width (ft)             101.24   Top Width (ft)                        101.24
  Vel Total (ft/s)            10.07   Avg. Vel. (ft/s)                       10.07
  Max Chl Dpth (ft)            7.27   Hydr. Depth (ft)                        3.14
  Conv. Total (cfs)         50064.3   Conv. (cfs)                         50064.3
  Length Wtd. (ft)           531.95   Wetted Per. (ft)                      102.81
  Min Ch El (ft)            1306.00   Shear (lb/sq ft)                        0.79
  Alpha                        1.00   Stream Power (lb/ft s)                  7.94
  Frctn Loss (ft)              1.78   Cum Volume (acre-ft)        34.70      55.72     12.52
  C & E Loss (ft)              0.27   Cum SA (acres)               9.65      35.41     10.21

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

CROSS SECTION OUTPUT    Profile #2/3

  E.G. Elev (ft)            1315.31   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.99   Wt. n-Val.                  0.030      0.020     0.045
  W.S. Elev (ft)            1314.32   Reach Len. (ft)            510.09     531.95    545.25
  Crit W.S. (ft)            1314.44   Flow Area (sq ft)          216.55     610.32    220.46
  E.G. Slope (ft/ft)       0.003263   Area (sq ft)               403.88     610.32    220.46
  Q Total (cfs)             6400.00   Flow (cfs)                 905.42    5258.25    236.33
```

Top Width (ft)	934.91	Top Width (ft)	211.45	208.94	514.52
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	4.18	8.62	1.07
Max Chl Dpth (ft)	8.32	Hydr. Depth (ft)	1.80	2.92	0.43
Conv. Total (cfs)	112043.5	Conv. (cfs)	15851.0	92055.2	4137.4
Length Wtd. (ft)	529.89	Wetted Per. (ft)	120.53	210.99	514.54
Min Ch El (ft)	1306.00	Shear (lb/sq ft)	0.37	0.59	0.09
Alpha	1.70	Stream Power (lb/ft s)	1.53	5.08	0.09
Frctn Loss (ft)	2.75	Cum Volume (acre-ft)	45.40	88.84	25.78
C & E Loss (ft)	0.04	Cum SA (acres)	14.66	39.36	18.96

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

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1316.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.030	0.020	0.045
W.S. Elev (ft)	1315.01	Reach Len. (ft)	510.09	531.95	545.25
Crit W.S. (ft)	1315.04	Flow Area (sq ft)	299.35	754.04	578.95
E.G. Slope (ft/ft)	0.002893	Area (sq ft)	557.49	754.04	578.95
Q Total (cfs)	9600.00	Flow (cfs)	1462.57	7043.78	1093.65
Top Width (ft)	965.72	Top Width (ft)	228.98	208.94	527.80
Vel Total (ft/s)	5.88	Avg. Vel. (ft/s)	4.89	9.34	1.89
Max Chl Dpth (ft)	9.01	Hydr. Depth (ft)	2.49	3.61	1.10
Conv. Total (cfs)	178475.1	Conv. (cfs)	27190.9	130952.1	20332.1
Length Wtd. (ft)	530.56	Wetted Per. (ft)	120.53	210.99	527.83
Min Ch El (ft)	1306.00	Shear (lb/sq ft)	0.45	0.65	0.20
Alpha	1.97	Stream Power (lb/ft s)	2.19	6.03	0.37
Frctn Loss (ft)	2.55	Cum Volume (acre-ft)	52.47	115.57	38.49
C & E Loss (ft)	0.03	Cum SA (acres)	15.90	40.07	20.12

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

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)
9907.95	9977.59	349.12	63.03	42.74	10.91	1.48	5.54
9977.59	RB 10047.24	2850.88	254.62	60.07	89.09	4.34	11.20

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 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.
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)
9685.65	9761.97	261.33	68.92	44.07	4.08	1.56	3.79
9761.97	9838.30	644.10	147.62	76.46	10.06	1.93	4.36
LB 9838.30	9907.95	996.75	152.80	70.07	15.57	2.19	6.52
9907.95	9977.59	788.67	132.66	69.92	12.32	1.90	5.94
9977.59	RB 10047.24	3472.82	324.86	71.01	54.26	4.66	10.69
10047.24	10278.45	173.62	139.46	231.21	2.71	0.60	1.24
10278.45	10509.66	42.14	59.64	231.21	0.66	0.26	0.71
10509.66	10740.87	20.56	21.36	52.11	0.32	0.41	0.96

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

```
        than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was 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.
```

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)
9685.65	9761.97	452.82	99.22	44.07	4.72	2.25	4.56
9761.97	9838.30	1009.76	200.13	76.46	10.52	2.62	5.05
LB 9838.30	9907.95	1524.30	200.71	70.07	15.88	2.88	7.59
9907.95	9977.59	1279.80	180.57	69.92	13.33	2.59	7.09
9977.59	RB 10047.24	4239.68	372.77	71.01	44.16	5.35	11.37
10047.24	10278.45	620.21	298.50	231.21	6.46	1.29	2.08
10278.45	10509.66	369.24	218.68	231.21	3.85	0.95	1.69
10509.66	10740.87	104.19	61.77	65.41	1.09	0.94	1.69

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

CROSS SECTION          RIVER: ADOBE DAM
REACH: A1                 RS: 19.54

INPUT
Description: Flow decreased by 100 cfs on Full Q.  Flow has weired over to the
             eastbound 101 Freeway lanes
1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full
             Q=9500 cfs
Station Elevation Data    num=      58
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9561.38 1312.56 9587.14    1312 9592.68 1311.53 9597.05    1312 9608.61 1312.14
  9624.7    1312 9630.91 1311.01 9636.68    1310 9646.22    1308 9660.87    1308
 9678.63 1309.07    9694    1310 9730.82 1311.39 9770.54    1308 9773.17    1308
 9775.79    1308 9785.36 1309.12 9792.72    1310 9836.65 1311.85 9860.65    1310
 9882.41    1308 9901.65    1308 9911.14 1309.14 9918.09    1310 9947.33 1310.49
  9966.3    1310 9976.46    1308 9982.15 1306.88 9986.56    1306 9993.45    1304
   10000    130210007.14    130210013.74    130410021.78    130610025.67 1306.81
10031.43    130810035.38 1308.9410040.89    131010113.22 1310.3210189.73 1310.73
10337.93 1310.7210380.56  1310.910434.75    131210458.24  1313.110477.41    1314
10493.52 1315.0910506.99    131610517.17 1316.9810528.04    131810529.66 1318.98
10540.87    132010552.37 1320.9910564.06    132210575.17  1322.910586.66    1324
10594.49 1324.9210603.52    132610608.86 1326.62

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9561.38     .03 9836.65     .0210040.89    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9836.6510040.89            425.35  435.34   450.8              .1       .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev
 9561.38 9730.82    1317
Left Levee      Station= 9947.33      Elevation= 1310.49
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9561.3810040.89    1304
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1312.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.53	Wt. n-Val.		0.020	
W.S. Elev (ft)	1309.67	Reach Len. (ft)	425.35	435.34	450.80
Crit W.S. (ft)	1310.50	Flow Area (sq ft)		250.68	
E.G. Slope (ft/ft)	0.005644	Area (sq ft)		250.68	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	71.20	Top Width (ft)		71.20	
Vel Total (ft/s)	12.77	Avg. Vel. (ft/s)		12.77	
Max Chl Dpth (ft)	5.67	Hydr. Depth (ft)		3.52	
Conv. Total (cfs)	42595.8	Conv. (cfs)		42595.8	
Length Wtd. (ft)	436.52	Wetted Per. (ft)		72.47	

Min Ch El (ft)	1304.00	Shear (lb/sq ft)		1.22	
Alpha	1.00	Stream Power (lb/ft s)		15.56	
Frctn Loss (ft)	2.55	Cum Volume (acre-ft)	34.70	52.25	12.52
C & E Loss (ft)	0.09	Cum SA (acres)	9.65	34.36	10.21

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: 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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1312.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.91	Wt. n-Val.	0.030	0.020	0.045
W.S. Elev (ft)	1310.85	Reach Len. (ft)	425.35	435.34	450.80
Crit W.S. (ft)	1311.49	Flow Area (sq ft)	102.56	497.65	95.42
E.G. Slope (ft/ft)	0.006883	Area (sq ft)	234.95	497.65	95.42
Q Total (cfs)	6400.00	Flow (cfs)	514.54	5770.67	114.79
Top Width (ft)	679.65	Top Width (ft)	160.47	191.27	327.91
Vel Total (ft/s)	9.20	Avg. Vel. (ft/s)	5.02	11.60	1.20
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)	1.35	2.60	0.29
Conv. Total (cfs)	77143.2	Conv. (cfs)	6202.0	69557.5	1383.6
Length Wtd. (ft)	437.88	Wetted Per. (ft)	76.03	192.86	327.91
Min Ch El (ft)	1304.00	Shear (lb/sq ft)	0.58	1.11	0.13
Alpha	1.46	Stream Power (lb/ft s)	2.91	12.86	0.15
Frctn Loss (ft)	2.44	Cum Volume (acre-ft)	41.66	82.08	23.80
C & E Loss (ft)	0.09	Cum SA (acres)	12.48	36.92	13.69

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1313.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.28	Wt. n-Val.	0.030	0.020	0.045
W.S. Elev (ft)	1311.41	Reach Len. (ft)	425.35	435.34	450.80
Crit W.S. (ft)	1312.14	Flow Area (sq ft)	150.66	607.03	292.18
E.G. Slope (ft/ft)	0.007079	Area (sq ft)	335.69	607.03	292.18
Q Total (cfs)	9500.00	Flow (cfs)	849.63	7950.36	700.01
Top Width (ft)	761.27	Top Width (ft)	197.85	198.55	364.87
Vel Total (ft/s)	9.05	Avg. Vel. (ft/s)	5.64	13.10	2.40
Max Chl Dpth (ft)	7.41	Hydr. Depth (ft)	1.58	3.06	0.80
Conv. Total (cfs)	112908.3	Conv. (cfs)	10098.0	94490.7	8319.7
Length Wtd. (ft)	438.32	Wetted Per. (ft)	95.71	200.17	364.88
Min Ch El (ft)	1304.00	Shear (lb/sq ft)	0.70	1.34	0.35
Alpha	1.79	Stream Power (lb/ft s)	3.92	17.55	0.85
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	47.24	107.26	33.04
C & E Loss (ft)	0.12	Cum SA (acres)	13.40	37.58	14.53

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.

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)
9904.73	9972.81	7.47	2.30	4.93	0.23	0.48	3.25
9972.81	RB 10040.89	3192.53	248.38	67.55	99.77	3.74	12.85

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: 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.
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)
9653.14	9744.89	4.83	2.56	7.78	0.08	0.33	1.89
9744.89	9836.65	509.71	100.00	68.25	7.96	1.47	5.10
LB 9836.65	9904.73	845.41	108.00	55.26	13.21	1.96	7.83
9904.73	9972.81	284.92	61.22	68.31	4.45	0.90	4.65
9972.81	RB 10040.89	4640.35	328.43	69.29	72.51	4.82	14.13
10040.89	10230.21	106.11	79.76	189.33	1.66	0.42	1.33
10230.21	10419.54	8.67	15.66	138.58	0.14	0.11	0.55

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.

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)
9653.14	9744.89	25.55	8.75	14.12	0.27	0.62	2.92
9744.89	9836.65	824.09	141.91	81.59	8.67	1.74	5.81
LB 9836.65	9904.73	1298.77	140.97	62.56	13.67	2.26	9.21
9904.73	9972.81	684.38	99.42	68.31	7.20	1.46	6.88
9972.81	RB 10040.89	5967.21	366.64	69.29	62.81	5.39	16.28
10040.89	10230.21	495.34	186.00	189.33	5.21	0.98	2.66
10230.21	10419.54	204.65	106.18	175.55	2.15	0.60	1.93

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 19.46

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6400 cfs
Full Q=9500 cfs
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9561.81	1310	9581.46	1309.72	9609.95	1308	9653.32	1308	9696.47	1309
9730.59	1308	9753.87	1308	9777.15	1308	9837.67	1309	9885.5	1308
9915.86	1308	9922.79	1308.32	9929.75	1308	9966.35	1306	9984.54	1304
9995.73	1302	10000	130010013.72		1300	10020.7	130210028.68		1304
10036.47	130610269.52		1307.1810425.35		1307.810429.45		130810461.67		1308.95
10497.24	131010522.27		1311.110543.35		131210553.76		1312.9610564.37		1314
10576.38	1315.1810585.33		131610598.26		1317.0410610.33		131810629.25		1320

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9561.81	.03	9837.67	.0210036.47		.045

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

```
      9837.6710036.47            366.9   395.1  549.16            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 9561.81 9696.47    1317
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9930.5310629.25    1304
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.20	Element			
Vel Head (ft)	1.72	Wt. n-Val.		0.020	0.045
W.S. Elev (ft)	1307.48	Reach Len. (ft)	366.90	395.10	549.16
Crit W.S. (ft)	1308.14	Flow Area (sq ft)		238.08	218.71
E.G. Slope (ft/ft)	0.007169	Area (sq ft)		238.08	218.71
Q Total (cfs)	3200.00	Flow (cfs)		2713.77	486.23
Top Width (ft)	405.64	Top Width (ft)		97.20	308.43
Vel Total (ft/s)	7.01	Avg. Vel. (ft/s)		11.40	2.22
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		2.45	0.71
Conv. Total (cfs)	37793.9	Conv. (cfs)		32051.2	5742.7
Length Wtd. (ft)	406.80	Wetted Per. (ft)		97.61	308.44
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		1.09	0.32
Alpha	2.26	Stream Power (lb/ft s)		12.44	0.71
Frctn Loss (ft)	2.76	Cum Volume (acre-ft)	34.70	49.81	11.39
C & E Loss (ft)	0.24	Cum SA (acres)	9.65	33.51	8.61

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 OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.63	Element			
Vel Head (ft)	0.99	Wt. n-Val.	0.030	0.020	0.045
W.S. Elev (ft)	1308.64	Reach Len. (ft)	366.90	395.10	549.16
Crit W.S. (ft)	1308.83	Flow Area (sq ft)	49.68	396.14	668.85
E.G. Slope (ft/ft)	0.006209	Area (sq ft)	90.05	396.14	668.85
Q Total (cfs)	6400.00	Flow (cfs)	115.84	3891.43	2392.73
Top Width (ft)	786.08	Top Width (ft)	189.44	181.80	414.85
Vel Total (ft/s)	5.74	Avg. Vel. (ft/s)	2.33	9.82	3.58
Max Chl Dpth (ft)	4.64	Hydr. Depth (ft)	0.46	2.18	1.61
Conv. Total (cfs)	81223.8	Conv. (cfs)	1470.1	49387.0	30366.6
Length Wtd. (ft)	423.87	Wetted Per. (ft)	107.59	182.24	414.86
Min Ch El (ft)	1304.00	Shear (lb/sq ft)	0.18	0.84	0.62
Alpha	1.93	Stream Power (lb/ft s)	0.42	8.28	2.24
Frctn Loss (ft)	2.86	Cum Volume (acre-ft)	40.08	77.61	19.85
C & E Loss (ft)	0.28	Cum SA (acres)	10.77	35.05	9.84

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 OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1310.31	Element			
Vel Head (ft)	1.22	Wt. n-Val.	0.030	0.020	0.045
W.S. Elev (ft)	1309.10	Reach Len. (ft)	366.90	395.10	549.16
Crit W.S. (ft)	1309.27	Flow Area (sq ft)	107.60	483.08	860.05
E.G. Slope (ft/ft)	0.006909	Area (sq ft)	190.92	483.08	860.05
Q Total (cfs)	9500.00	Flow (cfs)	369.56	5384.29	3746.15
Top Width (ft)	874.88	Top Width (ft)	245.89	198.80	430.19
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	3.43	11.15	4.36
Max Chl Dpth (ft)	5.10	Hydr. Depth (ft)	0.76	2.43	2.00
Conv. Total (cfs)	114288.9	Conv. (cfs)	4445.9	64775.2	45067.7
Length Wtd. (ft)	425.50	Wetted Per. (ft)	141.22	199.24	430.21
Min Ch El (ft)	1304.00	Shear (lb/sq ft)	0.33	1.05	0.86
Alpha	1.83	Stream Power (lb/ft s)	1.13	11.66	3.76
Frctn Loss (ft)	3.06	Cum Volume (acre-ft)	44.66	101.81	27.07
C & E Loss (ft)	0.32	Cum SA (acres)	11.23	35.60	10.42

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)
9903.94	9970.20	135.20	26.56	31.00	4.22	0.86	5.09
9970.20	RB 10036.47	2578.56	211.52	66.61	80.58	3.19	12.19
10036.47	10234.06	463.57	193.59	197.60	14.49	0.98	2.39
10234.06	10431.66	22.67	25.12	110.84	0.71	0.23	0.90

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9653.76	9745.72	38.80	16.84	37.13	0.61	0.45	2.30
9745.72	9837.67	77.04	32.84	70.45	1.20	0.47	2.35
LB 9837.67	9903.94	55.97	21.82	49.28	0.87	0.44	2.56
9903.94	9970.20	447.90	85.62	66.36	7.00	1.29	5.23
9970.20	RB 10036.47	3387.55	288.70	66.61	52.93	4.36	11.73
10036.47	10234.06	1721.68	423.72	197.60	26.90	2.14	4.06
10234.06	10431.66	664.97	239.44	197.60	10.39	1.21	2.78
10431.66	10629.25	6.09	5.70	19.67	0.10	0.29	1.07

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.

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)
9653.76	9745.72	125.70	36.97	49.26	1.32	0.75	3.40
9745.72	9837.67	243.85	70.63	91.96	2.57	0.77	3.45
LB 9837.67	9903.94	192.60	48.79	66.28	2.03	0.74	3.95
9903.94	9970.20	810.43	115.61	66.36	8.53	1.74	7.01
9970.20	RB 10036.47	4381.25	318.68	66.61	46.12	4.81	13.75
10036.47	10234.06	2516.99	513.14	197.60	26.49	2.60	4.91
10234.06	10431.66	1199.01	328.85	197.60	12.62	1.66	3.65
10431.66	10629.25	30.17	18.06	35.02	0.32	0.52	1.67

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: ADOBE DAM
REACH: A1 RS: 19.38

INPUT
Description: Flow decreased by 100 cfs and 300 cfs for the 2/3 and Full Q respectively. Amount of flow in median has split between Model ADA1 and ADB1
1/3 Q=3200 cfs
2/3 Q=6300 cfs
Full Q=9200 cfs
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9826.43	1311.89	9849.29	1310.65	9862.88	1308	9887.18	1306.11	9920.1	1306.95
9981.37	1306	10000	130410009.92		1302	10018.9	130010027.73		1298
10213.82	1297.310438.42		129810446.84		130010454.84		130210463.18		1304
10470.74	130610474.84		130610528.84		1305.0610586.17		130610640.44		1308
10678.95	131010703.42		131210741.36		131410784.13		131610811.42		1318
10838.85	1320	10866.1	132210881.59		132410895.91		132610909.96		1328
10926.41	133010935.34		1332	10946.7	133410957.48		133610965.71		1338
10973.78	1340	10982	134210989.95		134410996.52		134611002.73		1348
11009.13	135011015.29		135211021.42		135411028.46		135611035.29		1358
11043.95	136011050.19		136211056.45		136411062.52		136611068.62		1368
11074.98	137011081.55		1374	11089.5	137411095.85		137611102.18		1378
11108.72	138011114.98		138211128.62		1387.68				

```
Manning's n Values          num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
 9826.43     .045 9981.37      .0110470.74     .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9981.3710470.74             366.9  370.12  375.35          .1          .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev
 9826.4310470.74    1304
Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
 9826.4310470.74    1304
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1306.20	Element			
Vel Head (ft)	1.51	Wt. n-Val.		0.010	
W.S. Elev (ft)	1304.69	Reach Len. (ft)	366.90	370.12	375.35
Crit W.S. (ft)	1305.13	Flow Area (sq ft)		324.82	
E.G. Slope (ft/ft)	0.007243	Area (sq ft)		324.82	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	472.27	Top Width (ft)		472.27	
Vel Total (ft/s)	9.85	Avg. Vel. (ft/s)		9.85	
Max Chl Dpth (ft)	0.69	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	37599.8	Conv. (cfs)		37599.8	
Length Wtd. (ft)	370.12	Wetted Per. (ft)		472.40	
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		3.06	
Frctn Loss (ft)	2.93	Cum Volume (acre-ft)	34.70	47.25	10.01
C & E Loss (ft)	0.06	Cum SA (acres)	9.65	30.93	6.67

Warning: The energy loss was 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)	1307.19	Element			
Vel Head (ft)	2.02	Wt. n-Val.		0.010	0.045
W.S. Elev (ft)	1305.17	Reach Len. (ft)	366.90	370.12	375.35
Crit W.S. (ft)	1305.78	Flow Area (sq ft)		552.72	0.77
E.G. Slope (ft/ft)	0.004858	Area (sq ft)		552.72	0.77
Q Total (cfs)	6300.00	Flow (cfs)		6299.74	0.26
Top Width (ft)	492.03	Top Width (ft)		478.55	13.48
Vel Total (ft/s)	11.38	Avg. Vel. (ft/s)		11.40	0.34
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)		1.15	0.06
Conv. Total (cfs)	90385.7	Conv. (cfs)		90381.9	3.7
Length Wtd. (ft)	370.13	Wetted Per. (ft)		478.77	13.48
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		0.35	0.02
Alpha	1.00	Stream Power (lb/ft s)		3.99	0.01
Frctn Loss (ft)	2.33	Cum Volume (acre-ft)	39.70	73.31	15.63
C & E Loss (ft)	0.10	Cum SA (acres)	9.98	32.06	7.14

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 OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1307.97	Element			
Vel Head (ft)	2.42	Wt. n-Val.		0.010	0.045
W.S. Elev (ft)	1305.55	Reach Len. (ft)	366.90	370.12	375.35
Crit W.S. (ft)	1306.28	Flow Area (sq ft)		735.63	14.45
E.G. Slope (ft/ft)	0.004041	Area (sq ft)		735.63	14.45
Q Total (cfs)	9200.00	Flow (cfs)		9188.06	11.94
Top Width (ft)	542.04	Top Width (ft)		483.53	58.51
Vel Total (ft/s)	12.27	Avg. Vel. (ft/s)		12.49	0.83
Max Chl Dpth (ft)	1.55	Hydr. Depth (ft)		1.52	0.25
Conv. Total (cfs)	144723.4	Conv. (cfs)		144535.5	187.9
Length Wtd. (ft)		Wetted Per. (ft)		483.82	58.52
Min Ch El (ft)	1304.00	Shear (lb/sq ft)		0.38	0.06
Alpha	1.04	Stream Power (lb/ft s)		4.79	0.05
Frctn Loss (ft)	2.22	Cum Volume (acre-ft)	43.86	96.28	21.56
C & E Loss (ft)	0.12	Cum SA (acres)	10.19	32.50	7.34

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)
LB 9981.37	10144.49	1002.62	102.59	151.00	31.33	0.68	9.77
10144.49	10307.62	1123.40	113.28	163.12	35.11	0.69	9.92
10307.62	RB 10470.74	1073.98	108.94	158.28	33.56	0.69	9.86

Warning: The energy loss was 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 9981.37	10144.49	1980.08	176.03	155.49	31.43	1.13	11.25
10144.49	10307.62	2206.52	191.48	163.12	35.02	1.17	11.52
10307.62	RB 10470.74	2113.13	185.21	160.15	33.54	1.16	11.41
10470.74	10690.03	0.26	0.77	13.48	0.00	0.06	0.34

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9981.37	10144.49	2895.39	235.80	159.05	31.47	1.48	12.28
10144.49	10307.62	3212.13	253.51	163.12	34.91	1.55	12.67
10307.62	RB 10470.74	3080.53	246.32	161.64	33.48	1.53	12.51
10470.74	10690.03	11.94	14.45	58.52	0.13	0.25	0.83

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: ADOBE DAM
REACH: A1 RS: 19.31

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6300 cfs
Full Q=9200 cfs
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9868.19	1314	9878.78	1312	9887.01	1310.65	9894.45	1308	9901.98	1306
9930.56	1304	9938.72	1303.2	9998.53	1304	10000	1304.15	10049.68	1304
10427.35	1304	10618.71	1302.87	10728.47	1304	10832.27	1306	10896.39	1308
10952.82	1310	10983.35	1312	11005.37	1314	11027.85	1316	11046.53	1318

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9868.19	.045	9868.19	.045	11046.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9868.19	11046.53	380.43	385.3	461.83	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1304.94	Element			
Vel Head (ft)	0.34	Wt. n-Val.		0.045	
W.S. Elev (ft)	1304.60	Reach Len. (ft)	380.43	385.30	461.83
Crit W.S. (ft)	1304.54	Flow Area (sq ft)		680.96	
E.G. Slope (ft/ft)	0.026686	Area (sq ft)		680.96	
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	837.37	Top Width (ft)		837.37	
Vel Total (ft/s)	4.70	Avg. Vel. (ft/s)		4.70	

Max Chl Dpth (ft)	1.73	Hydr. Depth (ft)		0.81	
Conv. Total (cfs)	19588.7	Conv. (cfs)		19588.7	
Length Wtd. (ft)	385.30	Wetted Per. (ft)		837.46	
Min Ch El (ft)	1302.87	Shear (lb/sq ft)		1.35	
Alpha	1.00	Stream Power (lb/ft s)		6.37	
Frctn Loss (ft)	1.98	Cum Volume (acre-ft)	34.70	42.98	10.01
C & E Loss (ft)	0.09	Cum SA (acres)	9.65	25.37	6.67

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1305.59	Element			
Vel Head (ft)	0.61	Wt. n-Val.		0.045	
W.S. Elev (ft)	1304.98	Reach Len. (ft)	380.43	385.30	461.83
Crit W.S. (ft)	1304.98	Flow Area (sq ft)		1008.58	
E.G. Slope (ft/ft)	0.029069	Area (sq ft)		1008.58	
Q Total (cfs)	6300.00	Flow (cfs)		6300.00	
Top Width (ft)	862.88	Top Width (ft)		862.88	
Vel Total (ft/s)	6.25	Avg. Vel. (ft/s)		6.25	
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	36951.1	Conv. (cfs)		36951.1	
Length Wtd. (ft)	385.29	Wetted Per. (ft)		862.99	
Min Ch El (ft)	1302.87	Shear (lb/sq ft)		2.12	
Alpha	1.00	Stream Power (lb/ft s)		13.25	
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	39.70	66.67	15.62
C & E Loss (ft)	0.16	Cum SA (acres)	9.98	26.36	7.08

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 #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1306.09	Element			
Vel Head (ft)	0.75	Wt. n-Val.		0.045	
W.S. Elev (ft)	1305.34	Reach Len. (ft)	380.43	385.30	461.83
Crit W.S. (ft)	1305.34	Flow Area (sq ft)		1325.22	
E.G. Slope (ft/ft)	0.025877	Area (sq ft)		1325.22	
Q Total (cfs)	9200.00	Flow (cfs)		9200.00	
Top Width (ft)	886.84	Top Width (ft)		886.84	
Vel Total (ft/s)	6.94	Avg. Vel. (ft/s)		6.94	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)		1.49	
Conv. Total (cfs)	57191.0	Conv. (cfs)		57191.0	
Length Wtd. (ft)	385.29	Wetted Per. (ft)		886.96	
Min Ch El (ft)	1302.87	Shear (lb/sq ft)		2.41	
Alpha	1.00	Stream Power (lb/ft s)		16.76	
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)	43.86	87.53	21.50
C & E Loss (ft)	0.20	Cum SA (acres)	10.19	26.68	7.08

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9868.19	10260.97	894.31	222.88	339.00	27.95	0.66	4.01
10260.97	10653.75	1934.39	375.57	392.78	60.45	0.96	5.15
10653.75	RB 11046.53	371.30	82.51	105.67	11.60	0.78	4.50

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9868.19	10260.97	2014.24	354.56	344.52	31.97	1.03	5.68
10260.97	10653.75	3572.20	526.93	392.78	56.70	1.34	6.78
10653.75	RB 11046.53	713.56	127.09	125.68	11.33	1.01	5.61

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9868.19	10260.97	3121.50	480.16	349.71	33.93	1.37	6.50
10260.97	10653.75	5022.32	669.10	392.78	54.59	1.70	7.51
10653.75	RB 11046.53	1056.18	175.97	144.46	11.48	1.22	6.00

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 RIVER: ADOBE DAM
REACH: A1 RS: 19.24

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6300 cfs
Full Q=9200 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9918.57	1306	9927.24	1304	9941.94	1302	10000	1301.81	10034.53	1302
10180.31	1302.56	10237.86	1302	10498.61	1300.86	10684.23	1300.82	10829.81	1300.84
11188.7	1302	11219.32	1304	11263.18	1306	11290.79	1308	11327.97	1310
11358.54	1312								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9918.57	.045	9941.94	.045	11358.54	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9941.94	11358.54	239.59	293.59	277.42	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1302.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.045	0.045	
W.S. Elev (ft)	1302.81	Reach Len. (ft)	239.59	293.59	277.42
Crit W.S. (ft)		Flow Area (sq ft)	2.43	1713.89	
E.G. Slope (ft/ft)	0.002117	Area (sq ft)	2.43	1713.89	
Q Total (cfs)	3200.00	Flow (cfs)	2.02	3197.98	
Top Width (ft)	1265.20	Top Width (ft)	5.98	1259.22	
Vel Total (ft/s)	1.86	Avg. Vel. (ft/s)	0.83	1.87	
Max Chl Dpth (ft)	1.99	Hydr. Depth (ft)	0.41	1.36	
Conv. Total (cfs)	69548.2	Conv. (cfs)	43.9	69504.4	
Length Wtd. (ft)	291.96	Wetted Per. (ft)	6.04	1259.25	
Min Ch El (ft)	1300.82	Shear (lb/sq ft)	0.05	0.18	
Alpha	1.00	Stream Power (lb/ft s)	0.04	0.34	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	34.69	32.39	10.01
C & E Loss (ft)	0.01	Cum SA (acres)	9.62	16.09	6.67

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.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1303.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.045	0.045	
W.S. Elev (ft)	1303.91	Reach Len. (ft)	239.59	293.59	277.42
Crit W.S. (ft)	1302.34	Flow Area (sq ft)	13.46	3107.95	
E.G. Slope (ft/ft)	0.001145	Area (sq ft)	13.46	3107.95	
Q Total (cfs)	6300.00	Flow (cfs)	14.51	6285.49	
Top Width (ft)	1290.12	Top Width (ft)	14.06	1276.05	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)	1.08	2.02	
Max Chl Dpth (ft)	3.09	Hydr. Depth (ft)	0.96	2.44	
Conv. Total (cfs)	186199.3	Conv. (cfs)	428.8	185770.5	
Length Wtd. (ft)	290.85	Wetted Per. (ft)	14.19	1276.13	
Min Ch El (ft)	1300.82	Shear (lb/sq ft)	0.07	0.17	
Alpha	1.00	Stream Power (lb/ft s)	0.07	0.35	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	39.64	48.47	15.62
C & E Loss (ft)	0.01	Cum SA (acres)	9.91	16.90	7.08

Warning: The conveyance ratio (upstream 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: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1304.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.045	0.045	
W.S. Elev (ft)	1304.77	Reach Len. (ft)	239.59	293.59	277.42
Crit W.S. (ft)	1302.62	Flow Area (sq ft)	27.29	4207.77	
E.G. Slope (ft/ft)	0.000903	Area (sq ft)	27.29	4207.77	
Q Total (cfs)	9200.00	Flow (cfs)	35.42	9164.58	
Top Width (ft)	1312.29	Top Width (ft)	18.04	1294.25	
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)	1.30	2.18	
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)	1.51	3.25	
Conv. Total (cfs)	306086.1	Conv. (cfs)	1178.3	304907.8	
Length Wtd. (ft)	290.33	Wetted Per. (ft)	18.26	1294.34	
Min Ch El (ft)	1300.82	Shear (lb/sq ft)	0.08	0.18	
Alpha	1.00	Stream Power (lb/ft s)	0.11	0.40	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	43.74	63.06	21.50
C & E Loss (ft)	0.02	Cum SA (acres)	10.12	17.04	7.08

Warning: The conveyance ratio (upstream 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: Hydraulic jump has occurred between this cross section and the previous upstream 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)
9934.15	9941.94	2.02	2.43	6.04	0.06	0.41	0.83
LB 9941.94	10414.14	519.18	404.03	472.21	16.22	0.86	1.29
10414.14	10886.34	2013.00	911.01	472.20	62.91	1.93	2.21
10886.34	RB 11358.54	665.80	398.85	314.85	20.81	1.27	1.67

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.

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)
9926.36	9934.15	1.48	2.68	6.33	0.02	0.43	0.55
9934.15	9941.94	13.03	10.78	7.86	0.21	1.38	1.21
LB 9941.94	10414.14	1580.30	923.32	472.21	25.08	1.96	1.71
10414.14	10886.34	3277.43	1430.30	472.20	52.02	3.03	2.29
10886.34	RB 11358.54	1427.76	754.33	331.72	22.66	2.27	1.89

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
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)
9918.57	9926.36	0.26	0.70	2.52	0.00	0.28	0.37
9926.36	9934.15	8.94	9.15	7.88	0.10	1.17	0.98
9934.15	9941.94	26.22	17.45	7.86	0.28	2.24	1.50
LB 9941.94	10414.14	2592.51	1327.50	472.21	28.18	2.81	1.95
10414.14	10886.34	4444.82	1834.49	472.20	48.31	3.88	2.42
10886.34	RB 11358.54	2127.26	1045.78	349.94	23.12	2.99	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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 19.18

INPUT
Description: 1/3 Q=3200 cfs
2/3 Q=6300 cfs
Full Q=9200 cfs
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9612.97	1302.2	10000	1301.1	10428.39	1300	10713.05	1299.6	511065.61	1299.2
11211.93	1300	11284.3	1299.6	911481.56	1302	11558.87	1303.3	211618.86	1304
11662.55	1306	11696.56	1308						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9612.97	.016	10000	.016	11696.56	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10000	11696.56	122	122	122	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.84	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.016	0.016	
W.S. Elev (ft)	1302.83	Reach Len. (ft)	122.00	122.00	122.00
Crit W.S. (ft)		Flow Area (sq ft)	456.69	4132.92	
E.G. Slope (ft/ft)	0.000016	Area (sq ft)	456.69	4132.92	
Q Total (cfs)	3200.00	Flow (cfs)	191.22	3008.78	
Top Width (ft)	1917.20	Top Width (ft)	387.03	1530.17	
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.42	0.73	
Max Chl Dpth (ft)	3.63	Hydr. Depth (ft)	1.18	2.70	
Conv. Total (cfs)	791708.5	Conv. (cfs)	47309.3	744399.2	
Length Wtd. (ft)		Wetted Per. (ft)	387.66	1530.20	
Min Ch El (ft)	1299.20	Shear (lb/sq ft)	0.00	0.00	
Alpha	1.05	Stream Power (lb/ft s)	0.00	0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)	33.43	12.69	10.01
C & E Loss (ft)		Cum SA (acres)	8.54	6.69	6.67

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1303.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.016	0.016	
W.S. Elev (ft)	1303.93	Reach Len. (ft)	122.00	122.00	122.00
Crit W.S. (ft)		Flow Area (sq ft)	882.46	5857.22	
E.G. Slope (ft/ft)	0.000019	Area (sq ft)	882.46	5857.22	
Q Total (cfs)	6300.00	Flow (cfs)	625.02	5674.98	
Top Width (ft)	1999.72	Top Width (ft)	387.03	1612.69	
Vel Total (ft/s)	0.93	Avg. Vel. (ft/s)	0.71	0.97	
Max Chl Dpth (ft)	4.73	Hydr. Depth (ft)	2.28	3.63	
Conv. Total (cfs)	1426801.6	Conv. (cfs)	141551.5	1285250.1	
Length Wtd. (ft)		Wetted Per. (ft)	388.76	1612.72	
Min Ch El (ft)	1299.20	Shear (lb/sq ft)	0.00	0.00	
Alpha	1.02	Stream Power (lb/ft s)	0.00	0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)	37.17	18.26	15.62
C & E Loss (ft)		Cum SA (acres)	8.81	7.16	7.08

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1304.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.016	0.016	
W.S. Elev (ft)	1304.79	Reach Len. (ft)	122.00	122.00	122.00
Crit W.S. (ft)		Flow Area (sq ft)	1215.30	7256.02	
E.G. Slope (ft/ft)	0.000020	Area (sq ft)	1215.30	7256.02	
Q Total (cfs)	9200.00	Flow (cfs)	1076.13	8123.87	
Top Width (ft)	2023.15	Top Width (ft)	387.03	1636.12	
Vel Total (ft/s)	1.09	Avg. Vel. (ft/s)	0.89	1.12	
Max Chl Dpth (ft)	5.59	Hydr. Depth (ft)	3.14	4.43	
Conv. Total (cfs)	2059893.9	Conv. (cfs)	240946.9	1818947.0	
Length Wtd. (ft)		Wetted Per. (ft)	389.62	1636.17	
Min Ch El (ft)	1299.20	Shear (lb/sq ft)	0.00	0.01	
Alpha	1.02	Stream Power (lb/ft s)	0.00	0.01	
Frctn Loss (ft)		Cum Volume (acre-ft)	40.32	24.42	21.50
C & E Loss (ft)		Cum SA (acres)	9.00	7.16	7.08

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation at 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)
9612.97	9741.98	33.01	104.93	129.64	1.03	0.81	0.31
9741.98	9870.99	61.57	152.23	129.01	1.92	1.18	0.40
9870.99	10000.00	96.65	199.53	129.01	3.02	1.55	0.48
LB 10000.00	10565.52	918.15	1376.34	565.52	28.69	2.43	0.67
10565.52	11131.04	1546.70	1882.02	565.52	48.33	3.33	0.82
11131.04	RB 11696.56	543.94	874.56	399.15	17.00	2.19	0.62

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation 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)

9612.97	9741.98	153.05	246.85	130.74	2.43	1.91	0.62
9741.98	9870.99	206.81	294.16	129.01	3.28	2.28	0.70
9870.99	10000.00	265.16	341.45	129.01	4.21	2.65	0.78
LB 10000.00	10565.52	1867.73	1998.47	565.52	29.65	3.53	0.93
10565.52	11131.04	2720.09	2504.15	565.52	43.18	4.43	1.09
11131.04	RB 11696.56	1087.16	1354.60	481.68	17.26	2.81	0.80

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation 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)
9612.97	9741.98	287.39	357.80	131.60	3.12	2.77	0.80
9741.98	9870.99	358.18	405.10	129.01	3.89	3.14	0.88
9870.99	10000.00	430.56	452.40	129.01	4.68	3.51	0.95
LB 10000.00	10565.52	2725.70	2484.81	565.52	29.63	4.39	1.10
10565.52	11131.04	3711.57	2990.49	565.52	40.34	5.29	1.24
11131.04	RB 11696.56	1686.60	1780.72	505.13	18.33	3.53	0.95

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: During the standard step calculations, the final energy answer that was computed is less than the downstream energy. This is not physically possible. Please check your data.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 19.16

INPUT
Description: Flow decreased by 1900, 4000, and 5900 cfs for the 1/3, 2/3 and Full Q respectively. The flow is split between the flow entering the Arrowhead Subdivison, flow traveling south on 51st Avenue and the flow continuing west along Beardsley Road.

1/3 Q=1300
cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9928.21	1310	9933.87	1308	9940.57	1306	9948.1	1304	9958.86	1302
9966.22	1301.15	9978.09	1301.15	9979.45	1300.71	9981.93	1300.62	10000	1300.33
10005.33	1300.25	10017.49	1299.82	10019.32	1299.47	10020.01	1300.34	10073.75	1300.74
10122.86	1300	10122.86	1306						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9928.21	.033	9979.45	.016	10017.49	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9979.45	10017.49	400.63	400.63	400.63	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1302.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1302.17	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)	1302.17	Flow Area (sq ft)	18.18	70.22	181.82
E.G. Slope (ft/ft)	0.004664	Area (sq ft)	18.18	70.22	181.82
Q Total (cfs)	1300.00	Flow (cfs)	49.79	669.95	580.26
Top Width (ft)	164.90	Top Width (ft)	21.49	38.04	105.37
Vel Total (ft/s)	4.81	Avg. Vel. (ft/s)	2.74	9.54	3.19
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)	0.85	1.85	1.73
Conv. Total (cfs)	19036.3	Conv. (cfs)	729.2	9810.3	8496.8
Length Wtd. (ft)	400.63	Wetted Per. (ft)	21.62	38.05	108.00
Min Ch El (ft)	1299.82	Shear (lb/sq ft)	0.24	0.54	0.49
Alpha	2.24	Stream Power (lb/ft s)	0.67	5.13	1.56

Frctn Loss (ft)	0.75	Cum Volume (acre-ft)	32.76	6.80	9.76
C & E Loss (ft)	0.17	Cum SA (acres)	7.97	4.50	6.52

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.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1304.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.16	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1302.92	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)	1302.92	Flow Area (sq ft)	35.77	98.69	260.68
E.G. Slope (ft/ft)	0.004387	Area (sq ft)	35.77	98.69	260.68
Q Total (cfs)	2300.00	Flow (cfs)	132.91	1145.87	1021.22
Top Width (ft)	168.92	Top Width (ft)	25.51	38.04	105.37
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)	3.72	11.61	3.92
Max Chl Dpth (ft)	3.45	Hydr. Depth (ft)	1.40	2.59	2.47
Conv. Total (cfs)	34724.7	Conv. (cfs)	2006.6	17299.9	15418.1
Length Wtd. (ft)		Wetted Per. (ft)	25.72	38.05	108.75
Min Ch El (ft)	1299.82	Shear (lb/sq ft)	0.38	0.71	0.66
Alpha	2.21	Stream Power (lb/ft s)	1.42	8.25	2.57
Frctn Loss (ft)		Cum Volume (acre-ft)	35.89	9.92	15.26
C & E Loss (ft)		Cum SA (acres)	8.23	4.85	6.94

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.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1305.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1304.49	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)		Flow Area (sq ft)	82.45	158.62	426.71
E.G. Slope (ft/ft)	0.001717	Area (sq ft)	82.45	158.62	426.71
Q Total (cfs)	3300.00	Flow (cfs)	280.09	1581.18	1438.73
Top Width (ft)	176.61	Top Width (ft)	33.20	38.04	105.37
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)	3.40	9.97	3.37
Max Chl Dpth (ft)	5.02	Hydr. Depth (ft)	2.48	4.17	4.05
Conv. Total (cfs)	79635.1	Conv. (cfs)	6759.0	38156.9	34719.3
Length Wtd. (ft)	400.63	Wetted Per. (ft)	33.56	38.05	110.32
Min Ch El (ft)	1299.82	Shear (lb/sq ft)	0.26	0.45	0.41
Alpha	2.19	Stream Power (lb/ft s)	0.89	4.45	1.40
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	38.51	14.04	20.90
C & E Loss (ft)	0.14	Cum SA (acres)	8.41	4.82	6.94

Warning: The conveyance ratio (upstream 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)
9945.29	9962.37	1.81	1.37	4.44	0.14	0.31	1.32
9962.37	9979.45	47.98	16.81	17.18	3.69	0.98	2.85
LB 9979.45	9992.13	175.37	20.33	12.68	13.49	1.60	8.62
9992.13	10004.81	214.82	22.97	12.68	16.52	1.81	9.35
10004.81	RB 10017.49	279.76	26.91	12.69	21.52	2.12	10.39
10017.49	10052.61	200.67	61.77	35.58	15.44	1.76	3.25
10052.61	10087.74	158.00	53.25	35.13	12.15	1.52	2.97
10087.74	10122.86	221.58	66.81	37.29	17.04	1.90	3.32

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 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)
9945.29	9962.37	13.92	6.18	8.54	0.61	0.73	2.25
9962.37	9979.45	118.99	29.59	17.18	5.17	1.73	4.02
LB 9979.45	9992.13	323.20	29.82	12.68	14.05	2.35	10.84
9992.13	10004.81	372.16	32.46	12.68	16.18	2.56	11.47
10004.81	RB 10017.49	450.50	36.40	12.69	19.59	2.87	12.37
10017.49	10052.61	352.12	88.06	35.58	15.31	2.51	4.00
10052.61	10087.74	299.69	79.53	35.13	13.03	2.26	3.77
10087.74	10122.86	369.42	93.09	38.04	16.06	2.65	3.97

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.

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)
9945.29	9962.37	61.61	25.95	16.39	1.87	1.61	2.37
9962.37	9979.45	218.47	56.50	17.18	6.62	3.31	3.87
LB 9979.45	9992.13	476.37	49.80	12.68	14.44	3.93	9.57
9992.13	10004.81	519.12	52.44	12.68	15.73	4.14	9.90
10004.81	RB 10017.49	585.69	56.38	12.69	17.75	4.45	10.39
10017.49	10052.61	496.72	143.40	35.58	15.05	4.08	3.46
10052.61	10087.74	452.32	134.88	35.13	13.71	3.84	3.35
10087.74	10122.86	489.70	148.43	39.62	14.84	4.23	3.30

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 19.08

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9913.63	1310	9918.39	1308	9923.78	1306	9929.45	1304	9936.12	1302
9944.13	1300	9986.69	1298.91	10000	1298.94	10015.44	1298.54	10041.74	1298
10065.19	1297.43	10086.53	1298	10086.53	1304.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9913.63	.033	9944.13	.016	10015.44	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9944.13	10015.44	400.63	400.63	400.63	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1301.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1301.33	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)	1299.92	Flow Area (sq ft)	3.57	152.14	242.73
E.G. Slope (ft/ft)	0.000998	Area (sq ft)	3.57	152.14	242.73
Q Total (cfs)	1300.00	Flow (cfs)	3.80	739.51	556.69
Top Width (ft)	147.75	Top Width (ft)	5.35	71.31	71.09
Vel Total (ft/s)	3.26	Avg. Vel. (ft/s)	1.06	4.86	2.29
Max Chl Dpth (ft)	3.90	Hydr. Depth (ft)	0.67	2.13	3.41
Conv. Total (cfs)	41154.7	Conv. (cfs)	120.2	23411.0	17623.4

Length Wtd. (ft)	400.63	Wetted Per. (ft)	5.51	71.33	74.44
Min Ch El (ft)	1298.54	Shear (lb/sq ft)	0.04	0.13	0.20
Alpha	1.47	Stream Power (lb/ft s)	0.04	0.65	0.47
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	32.66	5.78	7.80
C & E Loss (ft)	0.04	Cum SA (acres)	7.84	4.00	5.71

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1303.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1302.93	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)	1300.61	Flow Area (sq ft)	16.87	265.70	355.94
E.G. Slope (ft/ft)	0.000609	Area (sq ft)	16.87	265.70	355.94
Q Total (cfs)	2300.00	Flow (cfs)	24.23	1463.82	811.95
Top Width (ft)	153.50	Top Width (ft)	11.10	71.31	71.09
Vel Total (ft/s)	3.60	Avg. Vel. (ft/s)	1.44	5.51	2.28
Max Chl Dpth (ft)	5.50	Hydr. Depth (ft)	1.52	3.73	5.01
Conv. Total (cfs)	93166.3	Conv. (cfs)	981.7	59294.9	32889.6
Length Wtd. (ft)	400.63	Wetted Per. (ft)	11.48	71.33	76.04
Min Ch El (ft)	1298.54	Shear (lb/sq ft)	0.06	0.14	0.18
Alpha	1.63	Stream Power (lb/ft s)	0.08	0.78	0.41
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	35.65	8.24	12.42
C & E Loss (ft)	0.05	Cum SA (acres)	8.07	4.35	6.13

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

E.G. Elev (ft)	1304.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1304.51	Reach Len. (ft)	400.63	400.63	400.63
Crit W.S. (ft)		Flow Area (sq ft)	38.60	378.77	468.66
E.G. Slope (ft/ft)	0.000418	Area (sq ft)	38.60	378.77	468.66
Q Total (cfs)	3300.00	Flow (cfs)	61.97	2188.97	1049.06
Top Width (ft)	158.53	Top Width (ft)	16.13	71.31	71.09
Vel Total (ft/s)	3.72	Avg. Vel. (ft/s)	1.61	5.78	2.24
Max Chl Dpth (ft)	7.08	Hydr. Depth (ft)	2.39	5.31	6.59
Conv. Total (cfs)	161409.0	Conv. (cfs)	3031.1	107066.3	51311.7
Length Wtd. (ft)	400.63	Wetted Per. (ft)	16.76	71.33	77.62
Min Ch El (ft)	1298.54	Shear (lb/sq ft)	0.06	0.14	0.16
Alpha	1.72	Stream Power (lb/ft s)	0.10	0.80	0.35
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	37.95	11.57	16.78
C & E Loss (ft)	0.06	Cum SA (acres)	8.19	4.31	6.12

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.

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)
9933.96	9944.13	3.80	3.57	5.51	0.29	0.67	1.06
LB 9944.13	9967.90	156.23	38.96	23.78	12.02	1.64	4.01
9967.90	9991.67	261.62	53.08	23.78	20.12	2.23	4.93
9991.67	RB 10015.44	321.66	60.09	23.78	24.74	2.53	5.35
10015.44	10039.14	157.11	71.99	23.70	12.09	3.04	2.18
10039.14	10062.83	204.63	84.36	23.70	15.74	3.56	2.43
10062.83	10086.53	194.96	86.38	27.04	15.00	3.65	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.

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)
9923.80	9933.96	0.04	0.13	0.98	0.00	0.14	0.28

9933.96	9944.13	24.20	16.74	10.51	1.05	1.65	1.45
LB 9944.13	9967.90	382.77	76.82	23.78	16.64	3.23	4.98
9967.90	9991.67	507.13	90.94	23.78	22.05	3.83	5.58
9991.67	RB 10015.44	573.91	97.95	23.78	24.95	4.12	5.86
10015.44	10039.14	247.74	109.73	23.70	10.77	4.63	2.26
10039.14	10062.83	296.01	122.10	23.70	12.87	5.15	2.42
10062.83	10086.53	268.20	124.11	28.63	11.66	5.24	2.16

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)
9923.80	9933.96	4.44	5.74	6.25	0.13	0.96	0.77
9933.96	9944.13	57.53	32.86	10.51	1.74	3.23	1.75
LB 9944.13	9967.90	618.33	114.51	23.78	18.74	4.82	5.40
9967.90	9991.67	750.62	128.63	23.78	22.75	5.41	5.84
9991.67	RB 10015.44	820.01	135.64	23.78	24.85	5.71	6.05
10015.44	10039.14	334.39	147.30	23.70	10.13	6.22	2.27
10039.14	10062.83	382.48	159.67	23.70	11.59	6.74	2.40
10062.83	10086.53	332.19	161.69	30.22	10.07	6.82	2.05

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: ADOBE DAM
REACH: A1 RS: 19.01

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9862.88	1316	9869.33	1314	9876.22	1312	9884.04	1310	9890.6	1308
9898.52	1306	9933.55	1304	9952.95	1302	9961.06	1300	9972.32	1298
9982.26	1297.09	9989.75	1297.28	10000	1297.51	10017.19	1297.13	10032.79	1296.75
10053.19	1297	10053.19	1303.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9862.88	.033	9989.75	.016	10017.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9989.75	10017.19	399.57	399.57	399.57	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1300.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1300.31	Reach Len. (ft)	399.57	399.57	399.57
Crit W.S. (ft)		Flow Area (sq ft)	65.84	81.28	122.65
E.G. Slope (ft/ft)	0.001982	Area (sq ft)	65.84	81.28	122.65
Q Total (cfs)	1300.00	Flow (cfs)	221.91	693.10	384.99
Top Width (ft)	93.39	Top Width (ft)	29.95	27.44	36.00
Vel Total (ft/s)	4.82	Avg. Vel. (ft/s)	3.37	8.53	3.14
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)	2.20	2.96	3.41
Conv. Total (cfs)	29198.1	Conv. (cfs)	4984.1	15567.1	8646.9
Length Wtd. (ft)	399.57	Wetted Per. (ft)	30.21	27.45	39.32
Min Ch El (ft)	1297.13	Shear (lb/sq ft)	0.27	0.37	0.39
Alpha	1.88	Stream Power (lb/ft s)	0.91	3.13	1.21
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)	32.34	4.70	6.12
C & E Loss (ft)	0.03	Cum SA (acres)	7.68	3.54	5.22

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1302.84	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.88	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1301.97	Reach Len. (ft)	399.57	399.57	399.57
Crit W.S. (ft)		Flow Area (sq ft)	121.03	126.75	182.30
E.G. Slope (ft/ft)	0.001426	Area (sq ft)	121.03	126.75	182.30
Q Total (cfs)	2300.00	Flow (cfs)	452.44	1232.64	614.92
Top Width (ft)	100.11	Top Width (ft)	36.67	27.44	36.00
Vel Total (ft/s)	5.35	Avg. Vel. (ft/s)	3.74	9.73	3.37
Max Chl Dpth (ft)	5.22	Hydr. Depth (ft)	3.30	4.62	5.06
Conv. Total (cfs)	60907.2	Conv. (cfs)	11981.3	32642.0	16283.9
Length Wtd. (ft)	399.57	Wetted Per. (ft)	37.13	27.45	40.97
Min Ch El (ft)	1297.13	Shear (lb/sq ft)	0.29	0.41	0.40
Alpha	1.97	Stream Power (lb/ft s)	1.08	4.00	1.34
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	35.01	6.43	9.95
C & E Loss (ft)	0.09	Cum SA (acres)	7.85	3.90	5.63

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1304.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1303.55	Reach Len. (ft)	399.57	399.57	399.57
Crit W.S. (ft)		Flow Area (sq ft)	190.89	170.17	239.26
E.G. Slope (ft/ft)	0.001119	Area (sq ft)	190.89	170.17	239.26
Q Total (cfs)	3300.00	Flow (cfs)	680.87	1783.69	835.45
Top Width (ft)	115.27	Top Width (ft)	51.83	27.44	36.00
Vel Total (ft/s)	5.50	Avg. Vel. (ft/s)	3.57	10.48	3.49
Max Chl Dpth (ft)	6.80	Hydr. Depth (ft)	3.68	6.20	6.65
Conv. Total (cfs)	98671.9	Conv. (cfs)	20358.3	53333.2	24980.4
Length Wtd. (ft)	399.57	Wetted Per. (ft)	52.37	27.45	42.56
Min Ch El (ft)	1297.13	Shear (lb/sq ft)	0.25	0.43	0.39
Alpha	2.15	Stream Power (lb/ft s)	0.91	4.54	1.37
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)	36.89	9.04	13.53
C & E Loss (ft)	0.17	Cum SA (acres)	7.87	3.86	5.63

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)
9947.46	9989.75	221.91	65.84	30.21	17.07	2.20	3.37
LB 9989.75	9998.90	226.44	26.78	9.15	17.42	2.93	8.46
9998.90	10008.04	220.35	26.34	9.15	16.95	2.88	8.36
10008.04	RB 10017.19	246.31	28.16	9.15	18.95	3.08	8.75
10017.19	10029.19	129.66	39.92	12.00	9.97	3.33	3.25
10029.19	10041.19	141.90	42.13	12.00	10.92	3.51	3.37
10041.19	10053.19	113.43	40.60	15.31	8.73	3.38	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.

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)
9947.46	9989.75	452.44	121.03	37.13	19.67	3.30	3.74
LB 9989.75	9998.90	405.67	41.93	9.15	17.64	4.58	9.67
9998.90	10008.04	398.70	41.50	9.15	17.33	4.54	9.61
10008.04	RB 10017.19	428.27	43.32	9.15	18.62	4.74	9.89
10017.19	10029.19	214.12	59.80	12.00	9.31	4.98	3.58
10029.19	10041.19	227.53	62.01	12.00	9.89	5.17	3.67
10041.19	10053.19	173.27	60.49	16.97	7.53	5.04	2.86

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)
9905.17	9947.46	3.97	4.69	9.59	0.12	0.49	0.85
9947.46	9989.75	676.89	186.20	42.78	20.51	4.40	3.64
LB 9989.75	9998.90	588.96	56.40	9.15	17.85	6.17	10.44
9998.90	10008.04	581.45	55.97	9.15	17.62	6.12	10.39
10008.04	RB 10017.19	613.28	57.79	9.15	18.58	6.32	10.61
10017.19	10029.19	297.69	78.79	12.00	9.02	6.57	3.78
10029.19	10041.19	311.80	81.00	12.00	9.45	6.75	3.85
10041.19	10053.19	225.96	79.47	18.55	6.85	6.62	2.84

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: ADOBE DAM
REACH: A1 RS: 18.93

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9981.22	1301.64	9981.22	1295.64	9986.45	1295.87	9989.9	1296	10000	1296.33
10010.37	1296	10014.78	1295.73	10027.16	1294.96	10043.62	1296	10050.76	1296
10050.76	1302								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9981.22	.033	9989.9	.016	10010.37	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9989.91	10010.37	484.72	484.72	484.72	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1299.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1299.01	Reach Len. (ft)	484.72	484.72	484.72
Crit W.S. (ft)	1298.32	Flow Area (sq ft)	27.67	58.33	139.02
E.G. Slope (ft/ft)	0.003190	Area (sq ft)	27.67	58.33	139.02
Q Total (cfs)	1300.00	Flow (cfs)	122.43	614.76	562.81
Top Width (ft)	69.54	Top Width (ft)	8.68	20.47	40.39
Vel Total (ft/s)	5.78	Avg. Vel. (ft/s)	4.42	10.54	4.05
Max Chl Dpth (ft)	4.05	Hydr. Depth (ft)	3.19	2.85	3.44
Conv. Total (cfs)	23016.3	Conv. (cfs)	2167.5	10884.2	9964.5
Length Wtd. (ft)	484.72	Wetted Per. (ft)	12.06	20.48	43.47
Min Ch El (ft)	1296.00	Shear (lb/sq ft)	0.46	0.57	0.64
Alpha	1.84	Stream Power (lb/ft s)	2.02	5.98	2.58
Frctn Loss (ft)	1.77	Cum Volume (acre-ft)	31.92	4.06	4.92
C & E Loss (ft)	0.04	Cum SA (acres)	7.50	3.32	4.87

Warning: The energy loss was 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)	1301.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.81	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1300.05	Reach Len. (ft)	484.72	484.72	484.72
Crit W.S. (ft)	1299.66	Flow Area (sq ft)	36.70	79.61	181.00
E.G. Slope (ft/ft)	0.003909	Area (sq ft)	36.70	79.61	181.00
Q Total (cfs)	2300.00	Flow (cfs)	205.27	1142.69	952.04
Top Width (ft)	69.54	Top Width (ft)	8.68	20.47	40.39
Vel Total (ft/s)	7.74	Avg. Vel. (ft/s)	5.59	14.35	5.26
Max Chl Dpth (ft)	5.09	Hydr. Depth (ft)	4.23	3.89	4.48
Conv. Total (cfs)	36787.2	Conv. (cfs)	3283.2	18276.6	15227.4
Length Wtd. (ft)	484.72	Wetted Per. (ft)	13.10	20.48	44.51
Min Ch El (ft)	1296.00	Shear (lb/sq ft)	0.68	0.95	0.99
Alpha	1.95	Stream Power (lb/ft s)	3.82	13.62	5.22
Frctn Loss (ft)	1.84	Cum Volume (acre-ft)	34.29	5.49	8.28
C & E Loss (ft)	0.02	Cum SA (acres)	7.64	3.68	5.28

Warning: The energy loss was 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)	1303.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.74	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1300.85	Reach Len. (ft)	484.72	484.72	484.72
Crit W.S. (ft)	1300.80	Flow Area (sq ft)	43.61	95.91	213.17
E.G. Slope (ft/ft)	0.004553	Area (sq ft)	43.61	95.91	213.17
Q Total (cfs)	3300.00	Flow (cfs)	283.99	1682.32	1333.68
Top Width (ft)	69.54	Top Width (ft)	8.68	20.47	40.39
Vel Total (ft/s)	9.36	Avg. Vel. (ft/s)	6.51	17.54	6.26
Max Chl Dpth (ft)	5.89	Hydr. Depth (ft)	5.02	4.69	5.28
Conv. Total (cfs)	48906.3	Conv. (cfs)	4208.8	24932.2	19765.3
Length Wtd. (ft)	484.72	Wetted Per. (ft)	13.90	20.48	45.31
Min Ch El (ft)	1296.00	Shear (lb/sq ft)	0.89	1.33	1.34
Alpha	2.01	Stream Power (lb/ft s)	5.81	23.35	8.37
Frctn Loss (ft)	1.91	Cum Volume (acre-ft)	35.82	7.82	11.45
C & E Loss (ft)	0.06	Cum SA (acres)	7.60	3.64	5.28

Warning: The energy loss was 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)
9981.22	9984.11	30.28	9.58	6.27	2.33	3.31	3.16
9984.11	9987.01	47.48	9.21	2.90	3.65	3.18	5.15
9987.01	9989.90	44.66	8.88	2.90	3.44	3.07	5.03
LB 9989.90	9996.72	211.28	19.81	6.83	16.25	2.90	10.67
9996.72	10003.55	191.83	18.69	6.83	14.76	2.74	10.26
10003.55	RB 10010.37	211.64	19.83	6.83	16.28	2.91	10.67
10010.37	10023.83	192.58	46.17	13.49	14.81	3.43	4.17
10023.83	10037.30	227.26	51.00	13.49	17.48	3.79	4.46
10037.30	10050.76	142.97	41.85	16.49	11.00	3.11	3.42

Warning: The energy loss was 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)
9981.22	9984.11	46.13	12.59	7.31	2.01	4.35	3.66
9984.11	9987.01	81.40	12.22	2.90	3.54	4.22	6.66
9987.01	9989.90	77.75	11.89	2.90	3.38	4.11	6.54
LB 9989.90	9996.72	389.58	26.90	6.83	16.94	3.94	14.48
9996.72	10003.55	363.04	25.79	6.83	15.78	3.78	14.08
10003.55	RB 10010.37	390.07	26.92	6.83	16.96	3.95	14.49
10010.37	10023.83	330.72	60.17	13.49	14.38	4.47	5.50
10023.83	10037.30	376.08	64.99	13.49	16.35	4.83	5.79
10037.30	10050.76	245.24	55.84	17.53	10.66	4.15	4.39

Warning: The energy loss was 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)
9981.22	9984.11	59.93	14.89	8.11	1.82	5.15	4.02
9984.11	9987.01	114.19	14.53	2.90	3.46	5.02	7.86
9987.01	9989.90	109.87	14.19	2.90	3.33	4.90	7.74
LB 9989.90	9996.72	571.40	32.34	6.83	17.32	4.74	17.67
9996.72	10003.55	538.93	31.22	6.83	16.33	4.58	17.26
10003.55	RB 10010.37	572.00	32.36	6.83	17.33	4.74	17.68
10010.37	10023.83	467.96	70.89	13.49	14.18	5.27	6.60
10023.83	10037.30	522.23	75.72	13.49	15.83	5.62	6.90
10037.30	10050.76	343.48	66.56	18.33	10.41	4.94	5.16

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.

```
CROSS SECTION          RIVER: ADOBE DAM
REACH: A1                 RS: 18.84

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9978.95 1300.58 9978.95 1293.58 9985.16 1294.05   10000 1294.4810013.29 1293.99
10022.71    129410032.17 1292.96 10035.9    129410054.72 1296.2210054.72 1302.22

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9978.95    .033 9985.16    .01610013.29    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9985.1610013.29            379.78  379.78  379.78              .1       .3
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1298.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.34	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1296.81	Reach Len. (ft)	379.78	379.78	379.78
Crit W.S. (ft)	1296.81	Flow Area (sq ft)	18.63	72.12	102.62
E.G. Slope (ft/ft)	0.004237	Area (sq ft)	18.63	72.12	102.62
Q Total (cfs)	1300.00	Flow (cfs)	85.75	816.33	397.92
Top Width (ft)	75.77	Top Width (ft)	6.21	28.13	41.43
Vel Total (ft/s)	6.72	Avg. Vel. (ft/s)	4.60	11.32	3.88
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)	3.00	2.56	2.48
Conv. Total (cfs)	19972.0	Conv. (cfs)	1317.4	12541.4	6113.2
Length Wtd. (ft)	379.78	Wetted Per. (ft)	9.46	28.15	42.35
Min Ch El (ft)	1293.99	Shear (lb/sq ft)	0.52	0.68	0.64
Alpha	1.91	Stream Power (lb/ft s)	2.40	7.67	2.49
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	31.66	3.34	3.58
C & E Loss (ft)	0.24	Cum SA (acres)	7.42	3.05	4.41

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.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1300.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.97	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1298.04	Reach Len. (ft)	379.78	379.78	379.78
Crit W.S. (ft)	1298.04	Flow Area (sq ft)	26.22	106.51	153.28
E.G. Slope (ft/ft)	0.003688	Area (sq ft)	26.22	106.51	153.28
Q Total (cfs)	2300.00	Flow (cfs)	130.43	1458.71	710.86
Top Width (ft)	75.77	Top Width (ft)	6.21	28.13	41.43
Vel Total (ft/s)	8.04	Avg. Vel. (ft/s)	4.97	13.70	4.64
Max Chl Dpth (ft)	5.08	Hydr. Depth (ft)	4.22	3.79	3.70
Conv. Total (cfs)	37875.4	Conv. (cfs)	2147.9	24021.4	11706.2
Length Wtd. (ft)	379.78	Wetted Per. (ft)	10.69	28.15	43.58
Min Ch El (ft)	1293.99	Shear (lb/sq ft)	0.56	0.87	0.81
Alpha	1.96	Stream Power (lb/ft s)	2.81	11.93	3.76
Frctn Loss (ft)	0.91	Cum Volume (acre-ft)	33.94	4.45	6.42
C & E Loss (ft)	0.25	Cum SA (acres)	7.56	3.41	4.83

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1301.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.55	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1299.08	Reach Len. (ft)	379.78	379.78	379.78
Crit W.S. (ft)	1299.08	Flow Area (sq ft)	32.66	135.71	196.28
E.G. Slope (ft/ft)	0.003438	Area (sq ft)	32.66	135.71	196.28
Q Total (cfs)	3300.00	Flow (cfs)	170.76	2108.97	1020.26
Top Width (ft)	75.77	Top Width (ft)	6.21	28.13	41.43
Vel Total (ft/s)	9.05	Avg. Vel. (ft/s)	5.23	15.54	5.20
Max Chl Dpth (ft)	6.12	Hydr. Depth (ft)	5.26	4.82	4.74
Conv. Total (cfs)	56283.1	Conv. (cfs)	2912.5	35969.6	17401.1
Length Wtd. (ft)	379.78	Wetted Per. (ft)	11.72	28.15	44.61
Min Ch El (ft)	1293.99	Shear (lb/sq ft)	0.60	1.03	0.94
Alpha	2.00	Stream Power (lb/ft s)	3.13	16.08	4.91
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	35.39	6.54	9.18
C & E Loss (ft)	0.31	Cum SA (acres)	7.51	3.37	4.83

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.

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)
9978.95	9981.02	20.00	6.53	5.31	1.54	3.16	3.06
9981.02	9983.09	34.34	6.21	2.08	2.64	3.00	5.53
9983.09	9985.16	31.42	5.89	2.08	2.42	2.84	5.34
LB 9985.16	9994.54	283.45	24.65	9.38	21.80	2.63	11.50
9994.54	10003.91	245.34	22.60	9.38	18.87	2.41	10.85
10003.91	RB 10013.29	287.55	24.87	9.38	22.12	2.65	11.56
10013.29	10027.10	164.44	39.97	13.84	12.65	2.89	4.11
10027.10	10040.91	185.46	43.19	14.02	14.27	3.13	4.29
10040.91	10054.72	48.01	19.46	14.50	3.69	1.41	2.47

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.

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)
9978.95	9981.02	26.52	9.07	6.53	1.15	4.38	2.93
9981.02	9983.09	53.58	8.74	2.08	2.33	4.22	6.13
9983.09	9985.16	50.33	8.42	2.08	2.19	4.07	5.98
LB 9985.16	9994.54	500.05	36.11	9.38	21.74	3.85	13.85
9994.54	10003.91	453.71	34.07	9.38	19.73	3.63	13.32
10003.91	RB 10013.29	504.95	36.33	9.38	21.95	3.87	13.90
10013.29	10027.10	281.85	56.86	13.84	12.25	4.12	4.96
10027.10	10040.91	306.25	60.08	14.02	13.32	4.35	5.10
10040.91	10054.72	122.76	36.34	15.72	5.34	2.63	3.38

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.

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)
9978.95	9981.02	31.62	11.21	7.57	0.96	5.42	2.82
9981.02	9983.09	71.31	10.88	2.08	2.16	5.26	6.55
9983.09	9985.16	67.83	10.57	2.08	2.06	5.10	6.42
LB 9985.16	9994.54	718.72	45.85	9.38	21.78	4.89	15.68
9994.54	10003.91	666.02	43.80	9.38	20.18	4.67	15.21
10003.91	RB 10013.29	724.24	46.06	9.38	21.95	4.91	15.72
10013.29	10027.10	397.52	71.19	13.84	12.05	5.16	5.58
10027.10	10040.91	424.21	74.41	14.02	12.85	5.39	5.70
10040.91	10054.72	198.52	50.68	16.76	6.02	3.67	3.92

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.77

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9977.42	1297.78	9977.42	1291.78	9985.85	1292	10000	1293.17	10052	1293.22
10052	1299.22								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9977.42	.033	9985.85	.016	10052	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.85	10052	278.68	278.68	278.68	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1296.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.033	0.016	
W.S. Elev (ft)	1296.03	Reach Len. (ft)	278.68	278.68	278.68
Crit W.S. (ft)	1295.09	Flow Area (sq ft)	34.88	196.01	
E.G. Slope (ft/ft)	0.001078	Area (sq ft)	34.88	196.01	
Q Total (cfs)	1300.00	Flow (cfs)	101.23	1198.77	
Top Width (ft)	74.58	Top Width (ft)	8.43	66.15	
Vel Total (ft/s)	5.63	Avg. Vel. (ft/s)	2.90	6.12	
Max Chl Dpth (ft)	4.25	Hydr. Depth (ft)	4.14	2.96	
Conv. Total (cfs)	39592.6	Conv. (cfs)	3083.1	36509.4	
Length Wtd. (ft)	278.68	Wetted Per. (ft)	12.68	69.01	
Min Ch El (ft)	1292.00	Shear (lb/sq ft)	0.19	0.19	
Alpha	1.11	Stream Power (lb/ft s)	0.54	1.17	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	31.43	2.17	3.13
C & E Loss (ft)	0.14	Cum SA (acres)	7.36	2.64	4.23

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

E.G. Elev (ft)	1298.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.64	Wt. n-Val.	0.033	0.016	

W.S. Elev (ft)	1295.41	Reach Len. (ft)	278.68	278.68	278.68
Crit W.S. (ft)	1296.11	Flow Area (sq ft)	29.69	155.30	
E.G. Slope (ft/ft)	0.007070	Area (sq ft)	29.69	155.30	
Q Total (cfs)	2300.00	Flow (cfs)	204.90	2095.10	
Top Width (ft)	74.58	Top Width (ft)	8.43	66.15	
Vel Total (ft/s)	12.43	Avg. Vel. (ft/s)	6.90	13.49	
Max Chl Dpth (ft)	3.63	Hydr. Depth (ft)	3.52	2.35	
Conv. Total (cfs)	27354.4	Conv. (cfs)	2437.0	24917.4	
Length Wtd. (ft)	278.68	Wetted Per. (ft)	12.06	68.39	
Min Ch El (ft)	1292.00	Shear (lb/sq ft)	1.09	1.00	
Alpha	1.10	Stream Power (lb/ft s)	7.50	13.52	
Frctn Loss (ft)	1.89	Cum Volume (acre-ft)	33.69	3.31	5.75
C & E Loss (ft)	0.07	Cum SA (acres)	7.49	2.99	4.65

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1299.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.67	Wt. n-Val.	0.033	0.016	
W.S. Elev (ft)	1295.96	Reach Len. (ft)	278.68	278.68	278.68
Crit W.S. (ft)	1296.99	Flow Area (sq ft)	34.31	191.56	
E.G. Slope (ft/ft)	0.007474	Area (sq ft)	34.31	191.56	
Q Total (cfs)	3300.00	Flow (cfs)	260.28	3039.72	
Top Width (ft)	74.58	Top Width (ft)	8.43	66.15	
Vel Total (ft/s)	14.61	Avg. Vel. (ft/s)	7.59	15.87	
Max Chl Dpth (ft)	4.18	Hydr. Depth (ft)	4.07	2.90	
Conv. Total (cfs)	38172.2	Conv. (cfs)	3010.7	35161.5	
Length Wtd. (ft)	278.68	Wetted Per. (ft)	12.61	68.94	
Min Ch El (ft)	1292.00	Shear (lb/sq ft)	1.27	1.30	
Alpha	1.11	Stream Power (lb/ft s)	9.63	20.57	
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	35.10	5.11	8.32
C & E Loss (ft)	0.11	Cum SA (acres)	7.45	2.96	4.65

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9977.42	9980.23	22.32	11.83	7.06	1.72	4.21	1.89
9980.23	9983.04	40.05	11.63	2.81	3.08	4.14	3.44
9983.04	9985.85	38.86	11.42	2.81	2.99	4.06	3.40
LB 9985.85	10007.90	471.37	71.26	22.10	36.26	3.23	6.62
10007.90	10029.95	380.49	62.61	22.05	29.27	2.84	6.08
10029.95	RB 10052.00	346.90	62.14	24.86	26.68	2.82	5.58

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)
9977.42	9980.23	47.62	10.10	6.44	2.07	3.60	4.71
9980.23	9983.04	80.03	9.90	2.81	3.48	3.52	8.08
9983.04	9985.85	77.25	9.69	2.81	3.36	3.45	7.97
LB 9985.85	10007.90	848.30	57.69	22.10	36.88	2.62	14.70
10007.90	10029.95	648.07	49.04	22.05	28.18	2.22	13.21
10029.95	RB 10052.00	598.73	48.57	24.24	26.03	2.20	12.33

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: 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)
9977.42	9980.23	57.69	11.64	6.99	1.75	4.14	4.96
9980.23	9983.04	102.84	11.44	2.81	3.12	4.07	8.99
9983.04	9985.85	99.74	11.23	2.81	3.02	4.00	8.88
LB 9985.85	10007.90	1198.29	69.77	22.10	36.31	3.16	17.17
10007.90	10029.95	962.54	61.13	22.05	29.17	2.77	15.75
10029.95	RB 10052.00	878.88	60.66	24.79	26.63	2.75	14.49

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: ADOBE DAM
REACH: A1 RS: 18.71

INPUT
Description: 1/3 Q=1300 cfs
2/3 Q=2300 cfs
Full Q=3300 cfs
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9977.23	1297	9977.23	1290.46	9981.26	1290.67	10000	1291.98	10015.54	1291.7
10026.23	1290.79	10033.47	1292	10052.76	1294	10084.04	1294	10084.04	1300

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9977.23	.033	9981.26	.016	10015.54	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9981.26	10015.54	256.7	256.7	256.7	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1295.83	Element			
Vel Head (ft)	1.98	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1293.86	Reach Len. (ft)	256.70	256.70	256.70
Crit W.S. (ft)	1293.86	Flow Area (sq ft)	13.26	78.78	62.36
E.G. Slope (ft/ft)	0.006152	Area (sq ft)	13.26	78.78	62.36
Q Total (cfs)	1300.00	Flow (cfs)	68.92	998.43	232.66
Top Width (ft)	74.15	Top Width (ft)	4.03	34.28	35.84
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)	5.20	12.67	3.73
Max Chl Dpth (ft)	3.40	Hydr. Depth (ft)	3.29	2.30	1.74
Conv. Total (cfs)	16573.9	Conv. (cfs)	878.7	12729.1	2966.2
Length Wtd. (ft)	256.70	Wetted Per. (ft)	7.43	34.33	36.07
Min Ch El (ft)	1290.67	Shear (lb/sq ft)	0.69	0.88	0.66
Alpha	1.80	Stream Power (lb/ft s)	3.56	11.17	2.48
Frctn Loss (ft)	1.32	Cum Volume (acre-ft)	31.27	1.29	2.93
C & E Loss (ft)	0.42	Cum SA (acres)	7.32	2.32	4.12

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.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1297.27	Element			
Vel Head (ft)	1.61	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1295.66	Reach Len. (ft)	256.70	256.70	256.70
Crit W.S. (ft)	1295.66	Flow Area (sq ft)	20.53	140.64	181.38
E.G. Slope (ft/ft)	0.002471	Area (sq ft)	20.53	140.64	181.38

Q Total (cfs)	2300.00	Flow (cfs)	78.29	1662.23	559.48
Top Width (ft)	106.81	Top Width (ft)	4.03	34.28	68.50
Vel Total (ft/s)	6.71	Avg. Vel. (ft/s)	3.81	11.82	3.08
Max Chl Dpth (ft)	5.20	Hydr. Depth (ft)	5.10	4.10	2.65
Conv. Total (cfs)	46270.8	Conv. (cfs)	1574.9	33440.3	11255.6
Length Wtd. (ft)	256.70	Wetted Per. (ft)	9.24	34.33	70.40
Min Ch El (ft)	1290.67	Shear (lb/sq ft)	0.34	0.63	0.40
Alpha	2.30	Stream Power (lb/ft s)	1.31	7.47	1.23
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	33.53	2.36	5.17
C & E Loss (ft)	0.26	Cum SA (acres)	7.45	2.67	4.43

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1298.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.05	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1296.53	Reach Len. (ft)	256.70	256.70	256.70
Crit W.S. (ft)	1296.53	Flow Area (sq ft)	24.03	170.41	240.87
E.G. Slope (ft/ft)	0.002508	Area (sq ft)	24.03	170.41	240.87
Q Total (cfs)	3300.00	Flow (cfs)	96.56	2306.38	897.06
Top Width (ft)	106.81	Top Width (ft)	4.03	34.28	68.50
Vel Total (ft/s)	7.58	Avg. Vel. (ft/s)	4.02	13.53	3.72
Max Chl Dpth (ft)	6.07	Hydr. Depth (ft)	5.96	4.97	3.52
Conv. Total (cfs)	65894.3	Conv. (cfs)	1928.2	46053.7	17912.4
Length Wtd. (ft)	256.70	Wetted Per. (ft)	10.10	34.33	71.27
Min Ch El (ft)	1290.67	Shear (lb/sq ft)	0.37	0.78	0.53
Alpha	2.30	Stream Power (lb/ft s)	1.50	10.52	1.97
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	34.92	3.95	7.55
C & E Loss (ft)	0.02	Cum SA (acres)	7.41	2.64	4.43

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.

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)
9977.23	9978.57	12.77	4.51	4.74	0.98	3.36	2.83
9978.57	9979.92	28.59	4.42	1.35	2.20	3.29	6.46
9979.92	9981.26	27.56	4.33	1.34	2.12	3.22	6.37
LB 9981.26	9992.69	453.14	31.85	11.45	34.86	2.79	14.23
9992.69	10004.11	272.50	23.47	11.45	20.96	2.05	11.61
10004.11	RB 10015.54	272.79	23.47	11.43	20.98	2.05	11.62
10015.54	10038.37	217.18	53.60	23.00	16.71	2.35	4.05
10038.37	10061.21	15.48	8.76	13.07	1.19	0.67	1.77

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.

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)
9977.23	9978.57	11.95	6.94	6.55	0.52	5.17	1.72
9978.57	9979.92	33.56	6.85	1.35	1.46	5.10	4.90
9979.92	9981.26	32.78	6.75	1.34	1.43	5.03	4.86
LB 9981.26	9992.69	665.46	52.47	11.45	28.93	4.59	12.68
9992.69	10004.11	498.13	44.08	11.45	21.66	3.86	11.30
10004.11	RB 10015.54	498.64	44.09	11.43	21.68	3.86	11.31
10015.54	10038.37	363.73	94.80	23.00	15.81	4.15	3.84
10038.37	10061.21	119.99	48.66	22.91	5.22	2.13	2.47
10061.21	10084.04	75.76	37.93	24.49	3.29	1.66	2.00

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.

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)
9977.23	9978.57	13.67	8.10	7.41	0.41	6.03	1.69
9978.57	9979.92	41.87	8.01	1.35	1.27	5.96	5.22
9979.92	9981.26	41.03	7.92	1.34	1.24	5.89	5.18
LB 9981.26	9992.69	895.98	62.39	11.45	27.15	5.46	14.36
9992.69	10004.11	704.84	54.01	11.45	21.36	4.73	13.05
10004.11	RB 10015.54	705.56	54.01	11.43	21.38	4.73	13.06
10015.54	10038.37	520.38	114.63	23.00	15.77	5.02	4.54
10038.37	10061.21	221.13	68.49	22.91	6.70	3.00	3.23
10061.21	10084.04	155.54	57.76	25.36	4.71	2.53	2.69

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.67

INPUT
Description: Flow decreased by 700, 1500, and 1100 for the 1/3, 2/3 and Full Q respectively. Flow has combined with the flow exiting the Arrowhead Lakes System and has continued south in the 55th Avenue Channel

1/3 Q=600 cfs
2/3 Q=800 cfs
Full Q=2200 cfs

Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9979.73	1296.22	9979.73	1290.22	9985.64	1290.44	10000	1290.99	10015.12	1290.58
10032.03	1290	10051.66	1291	10051.66	1297				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9979.73	.033	9985.64	.016	10015.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.64	10015.12	500.03	500.03	500.03	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1293.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.99	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1291.43	Reach Len. (ft)	500.03	500.03	500.03

Crit W.S. (ft)	1292.01	Flow Area (sq ft)	6.50	20.03	37.54
E.G. Slope (ft/ft)	0.040988	Area (sq ft)	6.50	20.03	37.54
Q Total (cfs)	600.00	Flow (cfs)	55.76	290.86	253.37
Top Width (ft)	71.93	Top Width (ft)	5.91	29.48	36.54
Vel Total (ft/s)	9.37	Avg. Vel. (ft/s)	8.58	14.52	6.75
Max Chl Dpth (ft)	1.43	Hydr. Depth (ft)	1.10	0.68	1.03
Conv. Total (cfs)	2963.6	Conv. (cfs)	275.4	1436.7	1251.5
Length Wtd. (ft)	500.03	Wetted Per. (ft)	7.12	29.50	37.01
Min Ch El (ft)	1290.44	Shear (lb/sq ft)	2.34	1.74	2.60
Alpha	1.46	Stream Power (lb/ft s)	20.03	25.23	17.52
Frctn Loss (ft)	2.42	Cum Volume (acre-ft)	31.21	1.00	2.64
C & E Loss (ft)	0.00	Cum SA (acres)	7.29	2.13	3.90

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 OUTPUT Profile #2/3

E.G. Elev (ft)	1295.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.59	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1291.30	Reach Len. (ft)	500.03	500.03	500.03
Crit W.S. (ft)	1292.36	Flow Area (sq ft)	5.75	16.28	32.89
E.G. Slope (ft/ft)	0.126368	Area (sq ft)	5.75	16.28	32.89
Q Total (cfs)	800.00	Flow (cfs)	80.75	361.50	357.75
Top Width (ft)	71.93	Top Width (ft)	5.91	29.48	36.54
Vel Total (ft/s)	14.57	Avg. Vel. (ft/s)	14.04	22.21	10.88
Max Chl Dpth (ft)	1.30	Hydr. Depth (ft)	0.97	0.55	0.90
Conv. Total (cfs)	2250.5	Conv. (cfs)	227.2	1016.9	1006.4
Length Wtd. (ft)	500.03	Wetted Per. (ft)	7.00	29.50	36.88
Min Ch El (ft)	1290.44	Shear (lb/sq ft)	6.48	4.35	7.04
Alpha	1.39	Stream Power (lb/ft s)	91.06	96.69	76.53
Frctn Loss (ft)	1.05	Cum Volume (acre-ft)	33.46	1.90	4.54
C & E Loss (ft)	0.30	Cum SA (acres)	7.42	2.49	4.12

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)	1297.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.26	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1292.99	Reach Len. (ft)	500.03	500.03	500.03
Crit W.S. (ft)	1294.23	Flow Area (sq ft)	15.75	66.16	94.72
E.G. Slope (ft/ft)	0.016219	Area (sq ft)	15.75	66.16	94.72
Q Total (cfs)	2200.00	Flow (cfs)	134.25	1340.73	725.02
Top Width (ft)	71.93	Top Width (ft)	5.91	29.48	36.54
Vel Total (ft/s)	12.46	Avg. Vel. (ft/s)	8.52	20.27	7.65
Max Chl Dpth (ft)	2.99	Hydr. Depth (ft)	2.67	2.24	2.59
Conv. Total (cfs)	17274.7	Conv. (cfs)	1054.2	10527.6	5693.0
Length Wtd. (ft)		Wetted Per. (ft)	8.69	29.50	38.57
Min Ch El (ft)	1290.44	Shear (lb/sq ft)	1.84	2.27	2.49
Alpha	1.77	Stream Power (lb/ft s)	15.65	46.02	19.03
Frctn Loss (ft)	1.12	Cum Volume (acre-ft)	34.80	3.25	6.56
C & E Loss (ft)	0.22	Cum SA (acres)	7.38	2.45	4.12

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)
9979.73	9981.70	16.71	2.31	3.18	2.78	1.17	7.23
9981.70	9983.67	20.65	2.17	1.97	3.44	1.10	9.53
9983.67	9985.64	18.41	2.02	1.97	3.07	1.03	9.10
LB 9985.64	9995.47	125.70	7.88	9.83	20.95	0.80	15.95

9995.47	10005.29	60.84	5.10	9.83	10.14	0.52	11.93
10005.29	RB 10015.12	104.31	7.05	9.83	17.39	0.72	14.80
10015.12	10027.30	86.97	12.90	12.19	14.49	1.06	6.74
10027.30	10039.48	119.64	15.62	12.19	19.94	1.28	7.66
10039.48	10051.66	46.78	9.02	12.63	7.80	0.74	5.19

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.
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)
9979.73	9981.70	25.02	2.06	3.05	3.13	1.05	12.14
9981.70	9983.67	29.68	1.92	1.97	3.71	0.97	15.49
9983.67	9985.64	26.05	1.77	1.97	3.26	0.90	14.70
LB 9985.64	9995.47	164.09	6.63	9.83	20.51	0.67	24.74
9995.47	10005.29	66.28	3.85	9.83	8.28	0.39	17.22
10005.29	RB 10015.12	131.13	5.80	9.83	16.39	0.59	22.62
10015.12	10027.30	122.51	11.35	12.19	15.31	0.93	10.79
10027.30	10039.48	175.27	14.07	12.19	21.91	1.16	12.45
10039.48	10051.66	59.97	7.47	12.50	7.50	0.61	8.03

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.

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)
9979.73	9981.70	30.82	5.39	4.75	1.40	2.74	5.71
9981.70	9983.67	52.92	5.25	1.97	2.41	2.67	10.08
9983.67	9985.64	50.51	5.11	1.97	2.30	2.59	9.90
LB 9985.64	9995.47	487.57	23.26	9.83	22.16	2.37	20.96
9995.47	10005.29	394.31	20.47	9.83	17.92	2.08	19.26
10005.29	RB 10015.12	458.84	22.42	9.83	20.86	2.28	20.46
10015.12	10027.30	252.28	31.96	12.19	11.47	2.62	7.89
10027.30	10039.48	289.05	34.68	12.19	13.14	2.85	8.33
10039.48	10051.66	183.69	28.08	14.19	8.35	2.31	6.54

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: ADOBE DAM
REACH: A1 RS: 18.58

INPUT
Description: 1/3 Q=600 cfs
2/3 Q=800 cfs
Full Q=2200 cfs
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9979.84	1293.54	9979.84	1287.54	9985.27	1287.64	10000	1289.09	10013.54	1287.65
10032.36	1287.11	10050.99	1287.31	10050.99	1293.31				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9979.84	.033	9985.27	.016	10013.54	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.27	10013.54	378.61	378.61	378.61	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1289.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.033	0.016	0.045

W.S. Elev (ft)	1289.12	Reach Len. (ft)	378.61	378.61	378.61
Crit W.S. (ft)	1289.04	Flow Area (sq ft)	8.29	21.20	68.22
E.G. Slope (ft/ft)	0.012851	Area (sq ft)	8.29	21.20	68.22
Q Total (cfs)	600.00	Flow (cfs)	47.35	183.55	369.10
Top Width (ft)	71.15	Top Width (ft)	5.43	28.27	37.45
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)	5.71	8.66	5.41
Max Chl Dpth (ft)	2.01	Hydr. Depth (ft)	1.53	0.75	1.82
Conv. Total (cfs)	5292.7	Conv. (cfs)	417.7	1619.1	3255.9
Length Wtd. (ft)	378.61	Wetted Per. (ft)	7.01	28.42	39.27
Min Ch El (ft)	1287.64	Shear (lb/sq ft)	0.95	0.60	1.39
Alpha	1.15	Stream Power (lb/ft s)	5.42	5.18	7.54
Frctn Loss (ft)	5.04	Cum Volume (acre-ft)	31.13	0.76	2.03
C & E Loss (ft)	0.14	Cum SA (acres)	7.22	1.80	3.48

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 #2/3

E.G. Elev (ft)	1290.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1289.31	Reach Len. (ft)	378.61	378.61	378.61
Crit W.S. (ft)	1289.25	Flow Area (sq ft)	9.36	26.75	75.58
E.G. Slope (ft/ft)	0.014102	Area (sq ft)	9.36	26.75	75.58
Q Total (cfs)	800.00	Flow (cfs)	59.58	283.35	457.07
Top Width (ft)	71.15	Top Width (ft)	5.43	28.27	37.45
Vel Total (ft/s)	7.16	Avg. Vel. (ft/s)	6.37	10.59	6.05
Max Chl Dpth (ft)	2.20	Hydr. Depth (ft)	1.72	0.95	2.02
Conv. Total (cfs)	6736.7	Conv. (cfs)	501.7	2386.1	3848.9
Length Wtd. (ft)	378.61	Wetted Per. (ft)	7.20	28.42	39.46
Min Ch El (ft)	1287.64	Shear (lb/sq ft)	1.14	0.83	1.69
Alpha	1.24	Stream Power (lb/ft s)	7.28	8.78	10.20
Frctn Loss (ft)	5.23	Cum Volume (acre-ft)	33.37	1.66	3.92
C & E Loss (ft)	0.22	Cum SA (acres)	7.36	2.15	3.69

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 OUTPUT Profile #Full

E.G. Elev (ft)	1293.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.04	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1291.26	Reach Len. (ft)	378.61	378.61	378.61
Crit W.S. (ft)	1291.26	Flow Area (sq ft)	19.94	81.82	148.54
E.G. Slope (ft/ft)	0.006009	Area (sq ft)	19.94	81.82	148.54
Q Total (cfs)	2200.00	Flow (cfs)	116.93	1192.18	890.90
Top Width (ft)	71.15	Top Width (ft)	5.43	28.27	37.45
Vel Total (ft/s)	8.79	Avg. Vel. (ft/s)	5.87	14.57	6.00
Max Chl Dpth (ft)	4.15	Hydr. Depth (ft)	3.67	2.89	3.97
Conv. Total (cfs)	28381.2	Conv. (cfs)	1508.4	15379.7	11493.1
Length Wtd. (ft)	378.61	Wetted Per. (ft)	9.15	28.42	41.41
Min Ch El (ft)	1287.64	Shear (lb/sq ft)	0.82	1.08	1.35
Alpha	1.70	Stream Power (lb/ft s)	4.79	15.74	8.07
Frctn Loss (ft)	2.76	Cum Volume (acre-ft)	34.59	2.40	5.16
C & E Loss (ft)	0.41	Cum SA (acres)	7.32	2.12	3.69

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.

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)
9979.84	9981.65	12.21	2.82	3.39	2.04	1.56	4.32
9981.65	9983.46	17.90	2.76	1.81	2.98	1.53	6.47
9983.46	9985.27	17.24	2.70	1.81	2.87	1.49	6.38
LB 9985.27	9994.69	90.28	9.55	9.47	15.05	1.01	9.45
9994.69	10004.12	9.95	2.54	9.47	1.66	0.27	3.91
10004.12	RB 10013.54	83.32	9.10	9.48	13.89	0.97	9.15
10013.54	10026.02	106.84	20.55	12.49	17.81	1.65	5.20
10026.02	10038.51	141.06	24.28	12.49	23.51	1.94	5.81
10038.51	10050.99	121.21	23.40	14.29	20.20	1.87	5.18

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.
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)
9979.84	9981.65	14.87	3.18	3.58	1.86	1.76	4.68
9981.65	9983.46	22.72	3.12	1.81	2.84	1.72	7.28
9983.46	9985.27	21.98	3.06	1.81	2.75	1.69	7.19
LB 9985.27	9994.69	132.45	11.40	9.47	16.56	1.21	11.62
9994.69	10004.12	27.03	4.39	9.47	3.38	0.47	6.15
10004.12	RB 10013.54	123.87	10.95	9.48	15.48	1.16	11.31
10013.54	10026.02	135.04	23.00	12.49	16.88	1.84	5.87
10026.02	10038.51	173.47	26.73	12.49	21.68	2.14	6.49
10038.51	10050.99	148.56	25.85	14.49	18.57	2.07	5.75

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9979.84	9981.65	22.84	6.70	5.53	1.04	3.71	3.41
9981.65	9983.46	47.41	6.65	1.81	2.16	3.67	7.13
9983.46	9985.27	46.67	6.58	1.81	2.12	3.64	7.09
LB 9985.27	9994.69	456.12	29.76	9.47	20.73	3.16	15.33
9994.69	10004.12	291.50	22.75	9.47	13.25	2.41	12.81
10004.12	RB 10013.54	444.56	29.31	9.48	20.21	3.11	15.17
10013.54	10026.02	291.85	47.32	12.49	13.27	3.79	6.17
10026.02	10038.51	331.19	51.05	12.49	15.05	4.09	6.49
10038.51	10050.99	267.85	50.17	16.44	12.18	4.02	5.34

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.50

INPUT
Description: Flow decreased by 400, 500, and 1200 for the 1/3, 2/3 and Full Q respectively. Flow has begun to weir into the 101 Freeway due to the termination of the wall on north side of freeway.

1/3 Q=200
cfs

2/3 Q=300 cfs
Full Q=1000 cfs
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9796.18	1286	9811.38	1286.81	9820.26	1286	9840.91	1284.75	9852.73	1284
9875.54	1283.56	9899.5	1284	9934.5	1284.36	9968.09	1284	9978.34	1283.87
9986.49	1284	10000	1285.02	10014.97	1284	10051.98	1282.75	10051.98	1289.75

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9796.18	.033	9986.49	.016	10014.97	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9986.49	10014.97	431.72	431.72	431.72	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9796.18	9934.5	1286

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1284.62	Element			
Vel Head (ft)	0.22	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1284.39	Reach Len. (ft)	431.72	431.72	431.72
Crit W.S. (ft)	1284.36	Flow Area (sq ft)	15.63	2.17	37.71
E.G. Slope (ft/ft)	0.015465	Area (sq ft)	53.05	2.17	37.71
Q Total (cfs)	200.00	Flow (cfs)	39.28	8.46	152.27
Top Width (ft)	187.98	Top Width (ft)	139.97	11.00	37.01
Vel Total (ft/s)	3.60	Avg. Vel. (ft/s)	2.51	3.90	4.04
Max Chl Dpth (ft)	1.64	Hydr. Depth (ft)	0.30	0.20	1.02
Conv. Total (cfs)	1608.3	Conv. (cfs)	315.8	68.0	1224.4
Length Wtd. (ft)	431.72	Wetted Per. (ft)	51.99	11.03	38.68
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	0.29	0.19	0.94
Alpha	1.10	Stream Power (lb/ft s)	0.73	0.74	3.80
Frctn Loss (ft)	3.36	Cum Volume (acre-ft)	30.86	0.66	1.57
C & E Loss (ft)	0.04	Cum SA (acres)	6.59	1.63	3.16

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)	1284.85	Element			
Vel Head (ft)	0.25	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1284.60	Reach Len. (ft)	431.72	431.72	431.72
Crit W.S. (ft)	1284.52	Flow Area (sq ft)	26.35	5.03	45.34
E.G. Slope (ft/ft)	0.013093	Area (sq ft)	82.25	5.03	45.34
Q Total (cfs)	300.00	Flow (cfs)	86.29	23.90	189.80
Top Width (ft)	196.98	Top Width (ft)	143.22	16.75	37.01
Vel Total (ft/s)	3.91	Avg. Vel. (ft/s)	3.28	4.75	4.19
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)	0.51	0.30	1.23
Conv. Total (cfs)	2621.8	Conv. (cfs)	754.2	208.9	1658.8
Length Wtd. (ft)	431.72	Wetted Per. (ft)	51.99	16.80	38.88
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	0.41	0.24	0.95
Alpha	1.04	Stream Power (lb/ft s)	1.36	1.16	3.99
Frctn Loss (ft)	3.58	Cum Volume (acre-ft)	32.97	1.52	3.39
C & E Loss (ft)	0.05	Cum SA (acres)	6.71	1.96	3.37

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)	1288.83	Element			
Vel Head (ft)	4.38	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1284.46	Reach Len. (ft)	431.72	431.72	431.72
Crit W.S. (ft)	1285.24	Flow Area (sq ft)	18.89	2.91	40.03
E.G. Slope (ft/ft)	0.281372	Area (sq ft)	61.87	2.91	40.03
Q Total (cfs)	1000.00	Flow (cfs)	229.77	53.49	716.74
Top Width (ft)	190.72	Top Width (ft)	140.96	12.75	37.01
Vel Total (ft/s)	16.17	Avg. Vel. (ft/s)	12.16	18.37	17.90
Max Chl Dpth (ft)	1.71	Hydr. Depth (ft)	0.36	0.23	1.08
Conv. Total (cfs)	1885.2	Conv. (cfs)	433.2	100.8	1351.2
Length Wtd. (ft)	431.72	Wetted Per. (ft)	51.99	12.78	38.74
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	6.38	4.00	18.15

Alpha	1.08	Stream Power (lb/ft s)	77.63	73.50	325.01
Frctn Loss (ft)	4.23	Cum Volume (acre-ft)	34.24	2.04	4.34
C & E Loss (ft)	0.23	Cum SA (acres)	6.68	1.94	3.37

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.

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)
9923.05	9986.49	39.28	15.63	51.99	19.64	0.30	2.51
LB 9986.49	9995.98	4.01	1.03	5.23	2.01	0.20	3.90
9995.98	10005.48						
10005.48	RB 10014.97	4.44	1.14	5.79	2.22	0.20	3.90
10014.97	10027.31	20.81	7.43	12.34	10.41	0.60	2.80
10027.31	10039.64	50.00	12.57	12.34	25.00	1.02	3.98
10039.64	10051.98	81.46	17.71	13.99	40.73	1.44	4.60

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)
9923.05	9986.49	86.29	26.35	51.99	28.76	0.51	3.28
LB 9986.49	9995.98	11.34	2.38	7.97	3.78	0.30	4.75
9995.98	10005.48						
10005.48	RB 10014.97	12.57	2.64	8.83	4.19	0.30	4.76
10014.97	10027.31	31.81	9.97	12.34	10.60	0.81	3.19
10027.31	10039.64	63.60	15.11	12.34	21.20	1.23	4.21
10039.64	10051.98	94.39	20.25	14.19	31.46	1.64	4.66

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)
9923.05	9986.49	229.77	18.89	51.99	22.98	0.36	12.16
LB 9986.49	9995.98	25.37	1.38	6.07	2.54	0.23	18.37
9995.98	10005.48						
10005.48	RB 10014.97	28.12	1.53	6.72	2.81	0.23	18.37
10014.97	10027.31	105.37	8.20	12.34	10.54	0.66	12.84
10027.31	10039.64	237.06	13.34	12.34	23.71	1.08	17.76
10039.64	10051.98	374.31	18.49	14.05	37.43	1.50	20.25

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.42

INPUT
Description: Flow decreased by 100, 200, and 800 for the 1/3, 2/3 and Full Q respectively. Flow has continued to weir into the 101 Freeway due

to the termination of the wall on north side of freeway.

```
1/3
            Q=100 cfs
2/3 Q=100 cfs
Full Q=200 cfs
Station Elevation Data     num=       16
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 9785.39     1278 9820.81 1277.56 9838.31     1278 9864.73 1278.72 9884.97     1278
  9895.1 1277.21 9954.64     1278 9974.61     1280 9984.34 1280.52   10000 1280.72
10013.39 1281.06   10036     128010040.55 1279.9610044.34     128010051.33  1280.3
10051.33  1286.3

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
 9785.39    .033 9984.34    .01610013.39    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9984.3410013.39           407.21  407.21  407.21              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 9785.39 9974.61    1287
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1281.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1281.14	Reach Len. (ft)	407.21	407.21	407.21
Crit W.S. (ft)	1280.80	Flow Area (sq ft)	8.53	11.40	30.27
E.G. Slope (ft/ft)	0.003206	Area (sq ft)	604.50	11.40	30.27
Q Total (cfs)	100.00	Flow (cfs)	19.91	32.14	47.95
Top Width (ft)	265.94	Top Width (ft)	198.95	29.05	37.94
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)	2.33	2.82	1.58
Max Chl Dpth (ft)	3.93	Hydr. Depth (ft)	0.88	0.39	0.80
Conv. Total (cfs)	1766.2	Conv. (cfs)	351.7	567.6	847.0
Length Wtd. (ft)	407.21	Wetted Per. (ft)	9.74	29.06	38.81
Min Ch El (ft)	1280.52	Shear (lb/sq ft)	0.18	0.08	0.16
Alpha	1.22	Stream Power (lb/ft s)	0.41	0.22	0.25
Frctn Loss (ft)	2.93	Cum Volume (acre-ft)	27.60	0.59	1.23
C & E Loss (ft)	0.02	Cum SA (acres)	4.91	1.43	2.78

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)	1281.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1281.14	Reach Len. (ft)	407.21	407.21	407.21
Crit W.S. (ft)	1280.80	Flow Area (sq ft)	8.53	11.40	30.27
E.G. Slope (ft/ft)	0.003206	Area (sq ft)	604.50	11.40	30.27
Q Total (cfs)	100.00	Flow (cfs)	19.91	32.14	47.95
Top Width (ft)	265.94	Top Width (ft)	198.95	29.05	37.94
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)	2.33	2.82	1.58
Max Chl Dpth (ft)	3.93	Hydr. Depth (ft)	0.88	0.39	0.80
Conv. Total (cfs)	1766.2	Conv. (cfs)	351.7	567.6	847.0
Length Wtd. (ft)	407.21	Wetted Per. (ft)	9.74	29.06	38.81
Min Ch El (ft)	1280.52	Shear (lb/sq ft)	0.18	0.08	0.16
Alpha	1.22	Stream Power (lb/ft s)	0.41	0.22	0.25
Frctn Loss (ft)	2.93	Cum Volume (acre-ft)	29.57	1.44	3.02
C & E Loss (ft)	0.02	Cum SA (acres)	5.02	1.73	3.00

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)	1281.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1281.32	Reach Len. (ft)	407.21	407.21	407.21
Crit W.S. (ft)	1281.07	Flow Area (sq ft)	10.33	16.76	37.27
E.G. Slope (ft/ft)	0.005266	Area (sq ft)	641.20	16.76	37.27

Q Total (cfs)	200.00	Flow (cfs)	35.08	78.27	86.65
Top Width (ft)	265.94	Top Width (ft)	198.95	29.05	37.94
Vel Total (ft/s)	3.11	Avg. Vel. (ft/s)	3.40	4.67	2.33
Max Chl Dpth (ft)	4.11	Hydr. Depth (ft)	1.06	0.58	0.98
Conv. Total (cfs)	2756.1	Conv. (cfs)	483.4	1078.6	1194.1
Length Wtd. (ft)	407.21	Wetted Per. (ft)	9.74	29.06	38.99
Min Ch El (ft)	1280.52	Shear (lb/sq ft)	0.35	0.19	0.31
Alpha	1.34	Stream Power (lb/ft s)	1.18	0.89	0.73
Frctn Loss (ft)	3.26	Cum Volume (acre-ft)	30.75	1.94	3.96
C & E Loss (ft)	0.01	Cum SA (acres)	4.99	1.73	3.00

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9918.02	9984.34	19.91	8.53	9.74	19.91	0.88	2.33
LB 9984.34	9994.02	17.69	5.38	9.68	17.69	0.56	3.29
9994.02	10003.71	11.22	4.09	9.68	11.22	0.42	2.74
10003.71	RB 10013.39	3.22	1.94	9.69	3.22	0.20	1.67
10013.39	10026.04	4.25	4.72	12.66	4.25	0.37	0.90
10026.04	10038.68	20.35	12.08	12.66	20.35	0.96	1.68
10038.68	10051.33	23.36	13.47	13.49	23.36	1.06	1.73

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)
9918.02	9984.34	19.91	8.53	9.74	19.91	0.88	2.33
LB 9984.34	9994.02	17.69	5.38	9.68	17.69	0.56	3.29
9994.02	10003.71	11.22	4.09	9.68	11.22	0.42	2.74
10003.71	RB 10013.39	3.22	1.94	9.69	3.22	0.20	1.67
10013.39	10026.04	4.25	4.72	12.66	4.25	0.37	0.90
10026.04	10038.68	20.35	12.08	12.66	20.35	0.96	1.68
10038.68	10051.33	23.36	13.47	13.49	23.36	1.06	1.73

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)
9918.02	9984.34	35.08	10.33	9.74	17.54	1.06	3.40
LB 9984.34	9994.02	38.09	7.16	9.68	19.04	0.74	5.32
9994.02	10003.71	27.40	5.88	9.68	13.70	0.61	4.66
10003.71	RB 10013.39	12.79	3.72	9.69	6.40	0.38	3.44
10013.39	10026.04	10.92	7.05	12.66	5.46	0.56	1.55
10026.04	10038.68	35.95	14.42	12.66	17.98	1.14	2.49
10038.68	10051.33	39.77	15.80	13.67	19.89	1.25	2.52

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.34

INPUT
Description: Flow decreased by 100 for the Full Q. Flow has continued to weir into the 101 Freeway due to the termination of the wall on north side of freeway.

1/3 Q=100 cfs
2/3 Q=100 cfs
Full Q=200 cfs
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9851.97	1270	9863.54	1272	9874.6	1274	9885.48	1276	9908.75	1276.79
9938.39	1276	9970.37	1276	9977.43	1277.36	9985.18	1278.13	9985.18	1277.63
10000	1277.81	10014.78	1277.85	10014.78	1278.35	10069.04	1277	10069.04	1283

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9851.97	.033	9985.18	.016	10014.78	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.18	10014.78	530.92	530.92	530.92	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9851.97	9985.18	1280

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1278.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1277.99	Reach Len. (ft)	530.92	530.92	530.92
Crit W.S. (ft)	1277.99	Flow Area (sq ft)		6.23	19.51
E.G. Slope (ft/ft)	0.027995	Area (sq ft)	327.26	6.23	19.51
Q Total (cfs)	100.00	Flow (cfs)		33.86	66.14
Top Width (ft)	200.96	Top Width (ft)	131.75	29.60	39.60
Vel Total (ft/s)	3.88	Avg. Vel. (ft/s)		5.44	3.39
Max Chl Dpth (ft)	7.99	Hydr. Depth (ft)		0.21	0.49
Conv. Total (cfs)	597.7	Conv. (cfs)		202.4	395.3
Length Wtd. (ft)	530.92	Wetted Per. (ft)		30.09	40.60
Min Ch El (ft)	1277.63	Shear (lb/sq ft)		0.36	0.84
Alpha	1.17	Stream Power (lb/ft s)		1.97	2.85
Frctn Loss (ft)	2.18	Cum Volume (acre-ft)	23.25	0.51	1.00
C & E Loss (ft)	0.06	Cum SA (acres)	3.37	1.16	2.42

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 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 #2/3

E.G. Elev (ft)	1278.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1277.99	Reach Len. (ft)	530.92	530.92	530.92
Crit W.S. (ft)	1277.99	Flow Area (sq ft)		6.23	19.51
E.G. Slope (ft/ft)	0.027995	Area (sq ft)	327.26	6.23	19.51
Q Total (cfs)	100.00	Flow (cfs)		33.86	66.14
Top Width (ft)	200.96	Top Width (ft)	131.75	29.60	39.60
Vel Total (ft/s)	3.88	Avg. Vel. (ft/s)		5.44	3.39
Max Chl Dpth (ft)	7.99	Hydr. Depth (ft)		0.21	0.49
Conv. Total (cfs)	597.7	Conv. (cfs)		202.4	395.3
Length Wtd. (ft)	530.92	Wetted Per. (ft)		30.09	40.60
Min Ch El (ft)	1277.63	Shear (lb/sq ft)		0.36	0.84
Alpha	1.17	Stream Power (lb/ft s)		1.97	2.85
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	25.21	1.35	2.78
C & E Loss (ft)	0.08	Cum SA (acres)	3.47	1.46	2.64

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)	1278.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1277.99	Reach Len. (ft)	530.92	530.92	530.92
Crit W.S. (ft)	1277.99	Flow Area (sq ft)		6.23	19.51
E.G. Slope (ft/ft)	0.027995	Area (sq ft)	327.26	6.23	19.51
Q Total (cfs)	100.00	Flow (cfs)		33.86	66.14
Top Width (ft)	200.96	Top Width (ft)	131.75	29.60	39.60
Vel Total (ft/s)	3.88	Avg. Vel. (ft/s)		5.44	3.39
Max Chl Dpth (ft)	7.99	Hydr. Depth (ft)		0.21	0.49
Conv. Total (cfs)	597.7	Conv. (cfs)		202.4	395.3
Length Wtd. (ft)	530.92	Wetted Per. (ft)		30.09	40.60
Min Ch El (ft)	1277.63	Shear (lb/sq ft)		0.36	0.84
Alpha	1.17	Stream Power (lb/ft s)		1.97	2.85
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	26.23	1.83	3.70
C & E Loss (ft)	0.08	Cum SA (acres)	3.45	1.46	2.64

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9985.18	9995.05	18.80	2.91	10.22	18.80	0.30	6.45
9995.05	10004.91	8.99	1.85	9.87	8.99	0.19	4.87
10004.91	RB 10014.78	6.07	1.47	10.00	6.07	0.15	4.14
10014.78	10032.87	0.09	0.15	3.43	0.09	0.04	0.59
10032.87	10050.95	12.47	5.61	18.09	12.47	0.31	2.22
10050.95	10069.04	53.59	13.75	19.08	53.59	0.76	3.90

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: 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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9985.18	9995.05	18.80	2.91	10.22	18.80	0.30	6.45
9995.05	10004.91	8.99	1.85	9.87	8.99	0.19	4.87
10004.91	RB 10014.78	6.07	1.47	10.00	6.07	0.15	4.14
10014.78	10032.87	0.09	0.15	3.43	0.09	0.04	0.59
10032.87	10050.95	12.47	5.61	18.09	12.47	0.31	2.22

10050.95	10069.04	53.59	13.75	19.08	53.59	0.76	3.90

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 9985.18	9995.05	18.80	2.91	10.22	18.80	0.30	6.45
9995.05	10004.91	8.99	1.85	9.87	8.99	0.19	4.87
10004.91	RB 10014.78	6.07	1.47	10.00	6.07	0.15	4.14
10014.78	10032.87	0.09	0.15	3.43	0.09	0.04	0.59
10032.87	10050.95	12.47	5.61	18.09	12.47	0.31	2.22
10050.95	10069.04	53.59	13.75	19.08	53.59	0.76	3.90

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 RIVER: ADOBE DAM
REACH: A1 RS: 18.24

INPUT
Description: 1/3 Q=100 cfs
2/3 Q=100 cfs
Full Q=100 cfs
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9861.6	1255.55	9866.48	1256	9877.24	1258	9886.02	1260	9894.68	1262
9903.38	1264	9911.91	1266	9920.59	1268	9928.95	1270	9937.95	1272
9946.31	1274	9969.5	1275.13	9983.08	1275.59	9983.08	1275.09	10000	1275.38
10034.84	1274.95	10034.84	1275.45	10079.57	1275	10097.74	1276	10107.11	1276
10114.73	1275	10123.49	1275	10123.49	1280				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9861.6	.033	9983.08	.016	10034.84	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9983.08	10034.84	403.54	403.54	403.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9861.6	9983.08	1278

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1275.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1275.74	Reach Len. (ft)	403.54	403.54	403.54
Crit W.S. (ft)	1275.53	Flow Area (sq ft)		28.57	36.57
E.G. Slope (ft/ft)	0.001570	Area (sq ft)	1006.32	28.57	36.57
Q Total (cfs)	100.00	Flow (cfs)		69.85	30.15
Top Width (ft)	245.81	Top Width (ft)	121.48	51.76	72.57
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		2.44	0.82
Max Chl Dpth (ft)	20.19	Hydr. Depth (ft)		0.55	0.50
Conv. Total (cfs)	2523.8	Conv. (cfs)		1762.8	761.0

Length Wtd. (ft)	403.54	Wetted Per. (ft)		52.76	73.38
Min Ch El (ft)	1274.95	Shear (lb/sq ft)		0.05	0.05
Alpha	1.86	Stream Power (lb/ft s)		0.13	0.04
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	15.12	0.30	0.66
C & E Loss (ft)	0.01	Cum SA (acres)	1.82	0.66	1.74

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1276.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1276.60	Reach Len. (ft)	403.54	403.54	403.54
Crit W.S. (ft)	1275.53	Flow Area (sq ft)		73.13	109.59
E.G. Slope (ft/ft)	0.000063	Area (sq ft)	1110.91	73.13	109.59
Q Total (cfs)	100.00	Flow (cfs)		67.23	32.77
Top Width (ft)	261.89	Top Width (ft)	121.48	51.76	88.65
Vel Total (ft/s)	0.55	Avg. Vel. (ft/s)		0.92	0.30
Max Chl Dpth (ft)	21.05	Hydr. Depth (ft)		1.41	1.24
Conv. Total (cfs)	12559.0	Conv. (cfs)		8443.4	4115.6
Length Wtd. (ft)	403.54	Wetted Per. (ft)		52.76	90.35
Min Ch El (ft)	1274.95	Shear (lb/sq ft)		0.01	0.00
Alpha	1.99	Stream Power (lb/ft s)		0.01	0.00
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	16.45	0.87	2.00
C & E Loss (ft)	0.06	Cum SA (acres)	1.93	0.96	1.85

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1277.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1277.13	Reach Len. (ft)	403.54	403.54	403.54
Crit W.S. (ft)	1275.53	Flow Area (sq ft)		100.59	156.61
E.G. Slope (ft/ft)	0.000021	Area (sq ft)	1175.35	100.59	156.61
Q Total (cfs)	100.00	Flow (cfs)		65.90	34.10
Top Width (ft)	261.89	Top Width (ft)	121.48	51.76	88.65
Vel Total (ft/s)	0.39	Avg. Vel. (ft/s)		0.66	0.22
Max Chl Dpth (ft)	21.58	Hydr. Depth (ft)		1.94	1.77
Conv. Total (cfs)	21795.2	Conv. (cfs)		14362.2	7432.9
Length Wtd. (ft)	403.54	Wetted Per. (ft)		52.76	90.88
Min Ch El (ft)	1274.95	Shear (lb/sq ft)		0.00	0.00
Alpha	1.98	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	17.07	1.18	2.62
C & E Loss (ft)	0.08	Cum SA (acres)	1.91	0.96	1.85

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.

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 9983.08	10000.33	19.48	8.66	17.76	19.48	0.50	2.25
10000.33	10017.59	17.81	8.12	17.26	17.81	0.47	2.19
10017.59	RB 10034.84	32.56	11.79	17.75	32.56	0.68	2.76
10034.84	10064.39	9.75	12.96	29.55	9.75	0.44	0.75
10064.39	10093.94	12.77	15.05	28.65	12.77	0.53	0.85
10093.94	10123.49	7.63	8.57	15.19	7.63	0.60	0.89

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 9983.08	10000.33	20.93	23.52	17.76	20.93	1.36	0.89
10000.33	10017.59	20.52	22.97	17.26	20.52	1.33	0.89
10017.59	RB 10034.84	25.78	26.64	17.75	25.78	1.54	0.97
10034.84	10064.39	11.89	38.40	29.55	11.89	1.30	0.31
10064.39	10093.94	12.97	40.46	29.57	12.97	1.37	0.32
10093.94	10123.49	7.91	30.72	31.22	7.91	1.04	0.26

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.

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 9983.08	10000.33	20.88	32.67	17.76	20.88	1.89	0.64
10000.33	10017.59	20.70	32.12	17.26	20.70	1.86	0.64
10017.59	RB 10034.84	24.32	35.80	17.75	24.32	2.07	0.68
10034.84	10064.39	12.17	54.07	29.55	12.17	1.83	0.23
10064.39	10093.94	12.95	56.14	29.57	12.95	1.90	0.23
10093.94	10123.49	8.99	46.39	31.75	8.99	1.57	0.19

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.17

INPUT
Description: Flow increased by 800, and 1400 for the 2/3 and Full Q respectively. Flow has been added from the flow exiting the Arrowhead Subdivion on the northwest side and traveling south on 59th Avenue.

1/3 Q=100 cfs
2/3 Q=900 cfs
Full Q=1500 cfs
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9872.46	1254	9879.61	1256	9886.45	1258	9893.31	1260	9900.18	1262
9907.14	1264	9913.57	1266	9921	1268	9927.44	1270	9934.54	1272
9941.84	1274	9963.9	1274	9976.22	1274.47	9976.22	1273.97	9981.04	1274
10000	1274.84	10017.85	1274	10034.45	1273.83	10034.45	1274.33	10129.13	1274
10163.64	1273.33	10163.64	1279.33						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9872.46	.033	9976.22	.016	10034.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9976.22	10034.45	185.24	185.24	185.24	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9872.46	9976.22	1279

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1274.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1274.31	Reach Len. (ft)	185.24	185.24	185.24
Crit W.S. (ft)	1274.30	Flow Area (sq ft)		10.39	36.63
E.G. Slope (ft/ft)	0.011019	Area (sq ft)	721.66	10.39	36.63
Q Total (cfs)	100.00	Flow (cfs)		44.22	55.78
Top Width (ft)	259.71	Top Width (ft)	99.69	35.21	124.81
Vel Total (ft/s)	2.13	Avg. Vel. (ft/s)		4.25	1.52
Max Chl Dpth (ft)	20.31	Hydr. Depth (ft)		0.30	0.29
Conv. Total (cfs)	952.7	Conv. (cfs)		421.3	531.4
Length Wtd. (ft)	185.24	Wetted Per. (ft)		36.06	125.80
Min Ch El (ft)	1273.83	Shear (lb/sq ft)		0.20	0.20
Alpha	2.06	Stream Power (lb/ft s)		0.84	0.30
Frctn Loss (ft)	1.92	Cum Volume (acre-ft)	7.12	0.12	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.80	0.26	0.82

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 energy loss was 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)	1275.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1275.13	Reach Len. (ft)	185.24	185.24	185.24
Crit W.S. (ft)	1275.13	Flow Area (sq ft)		51.68	141.60
E.G. Slope (ft/ft)	0.009356	Area (sq ft)	805.67	51.68	141.60
Q Total (cfs)	900.00	Flow (cfs)		423.66	476.34
Top Width (ft)	291.18	Top Width (ft)	103.76	58.23	129.19
Vel Total (ft/s)	4.66	Avg. Vel. (ft/s)		8.20	3.36
Max Chl Dpth (ft)	21.13	Hydr. Depth (ft)		0.89	1.10
Conv. Total (cfs)	9304.4	Conv. (cfs)		4379.9	4924.5
Length Wtd. (ft)	185.24	Wetted Per. (ft)		59.27	130.99
Min Ch El (ft)	1273.83	Shear (lb/sq ft)		0.51	0.63
Alpha	1.74	Stream Power (lb/ft s)		4.18	2.12
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	7.57	0.29	0.83
C & E Loss (ft)	0.07	Cum SA (acres)	0.88	0.45	0.85

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 OUTPUT Profile #Full

E.G. Elev (ft)	1276.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1275.61	Reach Len. (ft)	185.24	185.24	185.24
Crit W.S. (ft)	1275.61	Flow Area (sq ft)		79.73	203.84
E.G. Slope (ft/ft)	0.006914	Area (sq ft)	855.66	79.73	203.84
Q Total (cfs)	1500.00	Flow (cfs)		750.29	749.71
Top Width (ft)	291.18	Top Width (ft)	103.76	58.23	129.19
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		9.41	3.68
Max Chl Dpth (ft)	21.61	Hydr. Depth (ft)		1.37	1.58
Conv. Total (cfs)	18039.9	Conv. (cfs)		9023.5	9016.4
Length Wtd. (ft)	185.24	Wetted Per. (ft)		59.27	131.48
Min Ch El (ft)	1273.83	Shear (lb/sq ft)		0.58	0.67
Alpha	1.82	Stream Power (lb/ft s)		5.46	2.46
Frctn Loss (ft)	1.61	Cum Volume (acre-ft)	7.66	0.35	0.95
C & E Loss (ft)	0.02	Cum SA (acres)	0.86	0.45	0.84

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9976.22	9995.63	9.05	2.71	12.28	9.05	0.23	3.34
9995.63	10015.04	0.66	0.35	3.88	0.66	0.09	1.85
10015.04	RB 10034.45	34.52	7.33	19.90	34.52	0.38	4.71
10034.45	10077.51	1.16	2.61	38.68	1.16	0.07	0.45
10077.51	10120.58	8.58	9.04	43.06	8.58	0.21	0.95
10120.58	10163.64	46.03	24.99	44.05	46.03	0.58	1.84

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9976.22	9995.63	135.15	17.24	19.92	15.02	0.89	7.84
9995.63	10015.04	68.22	11.33	19.43	7.58	0.58	6.02
10015.04	RB 10034.45	220.30	23.11	19.91	24.48	1.19	9.53
10034.45	10077.51	107.65	37.57	43.06	11.96	0.87	2.87
10077.51	10120.58	140.25	44.03	43.06	15.58	1.02	3.18
10120.58	10163.64	228.43	59.99	44.87	25.38	1.39	3.81

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9976.22	9995.63	244.93	26.59	19.92	16.33	1.37	9.21
9995.63	10015.04	163.75	20.68	19.43	10.92	1.07	7.92
10015.04	RB 10034.45	341.61	32.46	19.91	22.77	1.67	10.52
10034.45	10077.51	194.60	58.32	43.06	12.97	1.35	3.34
10077.51	10120.58	231.85	64.78	43.06	15.46	1.50	3.58
10120.58	10163.64	323.26	80.73	45.35	21.55	1.87	4.00

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: ADOBE DAM
REACH: A1 RS: 18.13

INPUT
Description: Flow has decreased by 400, and 600 for the 2/3 and Full Q respectively. Flow has been begun to travel down the on-ramp of 101 Freeway and begun to weir into freeway.

1/3 Q=100 cfs
2/3
Q=500 cfs
Full Q=900 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9869.07	1252.65	9877.1	1254	9885.35	1256	9892.36	1258	9899.46	1260
9906.29	1262	9913.01	1264	9920.04	1266	9927.41	1268	9934.49	1270
9941.77	1272	9949.65	1273.98	9962.42	1273.12	9978.65	1272.99	9978.65	1272.49
10000	1273.05	10009.88	1272	10016.91	1271.77	10016.91	1272.27	10026.53	1272
10046.29	1272.35	10070.64	1272	10087.89	1270.68	10094.89	1272	10101.68	1274
10111.35	1274								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9869.07	.033	9978.65	.016	10016.91	.045

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9978.6510016.91           276.17  276.17  276.17            .1        .3
Ineffective Flow     num=        1
  .Sta L   Sta R    Elev
 9869.07 9949.65    1275
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1272.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.016	0.045
W.S. Elev (ft)	1272.40	Reach Len. (ft)	276.17	276.17	276.17
Crit W.S. (ft)	1272.16	Flow Area (sq ft)		4.40	38.65
E.G. Slope (ft/ft)	0.009887	Area (sq ft)	767.42	4.40	38.65
Q Total (cfs)	100.00	Flow (cfs)		21.61	78.39
Top Width (ft)	164.46	Top Width (ft)	74.30	10.82	79.35
Vel Total (ft/s)	2.32	Avg. Vel. (ft/s)		4.91	2.03
Max Chl Dpth (ft)	19.75	Hydr. Depth (ft)		0.41	0.49
Conv. Total (cfs)	1005.7	Conv. (cfs)		217.3	788.4
Length Wtd. (ft)	276.17	Wetted Per. (ft)		11.34	79.59
Min Ch El (ft)	1271.77	Shear (lb/sq ft)		0.24	0.30
Alpha	1.56	Stream Power (lb/ft s)		1.18	0.61
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	3.95	0.09	0.16
C & E Loss (ft)	0.02	Cum SA (acres)	0.43	0.16	0.39

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)	1273.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1273.08	Reach Len. (ft)	276.17	276.17	276.17
Crit W.S. (ft)	1272.98	Flow Area (sq ft)	0.55	20.64	93.47
E.G. Slope (ft/ft)	0.011723	Area (sq ft)	819.49	20.64	93.47
Q Total (cfs)	500.00	Flow (cfs)	0.35	134.99	364.66
Top Width (ft)	208.60	Top Width (ft)	88.69	38.26	81.66
Vel Total (ft/s)	4.36	Avg. Vel. (ft/s)	0.63	6.54	3.90
Max Chl Dpth (ft)	20.43	Hydr. Depth (ft)	0.05	0.54	1.14
Conv. Total (cfs)	4618.0	Conv. (cfs)	3.2	1246.8	3368.0
Length Wtd. (ft)	276.17	Wetted Per. (ft)	11.67	39.33	82.00
Min Ch El (ft)	1271.77	Shear (lb/sq ft)	0.03	0.38	0.83
Alpha	1.19	Stream Power (lb/ft s)	0.02	2.51	3.25
Frctn Loss (ft)	2.69	Cum Volume (acre-ft)	4.12	0.14	0.33
C & E Loss (ft)	0.02	Cum SA (acres)	0.47	0.25	0.40

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

E.G. Elev (ft)	1274.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.20	Wt. n-Val.	0.033	0.016	0.045
W.S. Elev (ft)	1273.05	Reach Len. (ft)	276.17	276.17	276.17
Crit W.S. (ft)	1273.39	Flow Area (sq ft)	0.25	19.47	90.99
E.G. Slope (ft/ft)	0.042685	Area (sq ft)	816.86	19.47	90.99
Q Total (cfs)	900.00	Flow (cfs)	0.23	233.85	665.92
Top Width (ft)	204.58	Top Width (ft)	84.77	38.26	81.55
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)	0.93	12.01	7.32
Max Chl Dpth (ft)	20.40	Hydr. Depth (ft)	0.03	0.51	1.12
Conv. Total (cfs)	4356.2	Conv. (cfs)	1.1	1131.9	3223.2
Length Wtd. (ft)	276.17	Wetted Per. (ft)	7.88	39.33	81.89
Min Ch El (ft)	1271.77	Shear (lb/sq ft)	0.08	1.32	2.96
Alpha	1.17	Stream Power (lb/ft s)	0.08	15.85	21.67
Frctn Loss (ft)	2.12	Cum Volume (acre-ft)	4.11	0.13	0.33
C & E Loss (ft)	0.04	Cum SA (acres)	0.46	0.25	0.40

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: Program found supercritical flow starting at 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)
10004.16	RB 10016.91	21.61	4.40	11.34	21.61	0.41	4.91
10016.91	10048.39	6.99	7.21	31.49	6.99	0.23	0.97
10048.39	10079.87	17.19	12.37	31.51	17.19	0.39	1.39
10079.87	10111.35	54.20	19.06	16.59	54.20	1.16	2.84

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)
9942.12	9978.65	0.35	0.55	11.67	0.07	0.05	0.63
LB 9978.65	9991.40	24.74	5.44	13.26	4.95	0.43	4.55
9991.40	10004.16	6.11	2.31	12.78	1.22	0.18	2.64
10004.16	RB 10016.91	104.14	12.89	13.29	20.83	1.01	8.08
10016.91	10048.39	93.13	28.65	31.49	18.63	0.91	3.25
10048.39	10079.87	122.69	33.81	31.51	24.54	1.07	3.63
10079.87	10111.35	148.83	31.01	19.00	29.77	1.66	4.80

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)
9942.12	9978.65	0.23	0.25	7.88	0.03	0.03	0.93
LB 9978.65	9991.40	40.81	5.05	13.26	4.53	0.40	8.08
9991.40	10004.16	8.40	1.93	12.78	0.93	0.15	4.36
10004.16	RB 10016.91	184.64	12.50	13.29	20.52	0.98	14.77
10016.91	10048.39	167.52	27.69	31.49	18.61	0.88	6.05
10048.39	10079.87	222.63	32.85	31.51	24.74	1.04	6.78
10079.87	10111.35	275.77	30.44	18.89	30.64	1.64	9.06

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: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: ADOBE DAM
REACH: A1 RS: 18.08

INPUT
Description: Southern Bounday of HEC-RAS Model ADA1
Flow has decreased by 400,
and 800 for the 2/3 and Full Q respectively. Flow has continued to travel down the on-ramp of 101 Freeway and continued to weir into freeway.

1/3 Q=100 cfs
2/3 Q=100 cfs
Full Q=100 cfs
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9894.4	1254.89	9898.32	1256	9907.81	1258	9915.48	1260	9923.04	1262

```
 9930.74    1264 9937.95    1266 9945.51    1268 9953.18    1270 9961.92  1271.8
 9970.62 1270.99 9981.63 1270.87 9981.63 1270.37   10000 1269.5310021.31    1270
10021.31  1270.510026.17 1269.9110031.13    1270 10057.9 1270.2610136.55    1272
10146.75    127210150.49    127210150.49    1278

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  9894.4    .033 9981.63    .01610021.31    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9981.6310021.31                 0       0       0              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
  9894.4 9961.92    127710021.3110150.49    1277

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1270.72   Element                   Left OB    Channel   Right OB
  Vel Head (ft)                0.30   Wt. n-Val.                           0.016
  W.S. Elev (ft)            1270.43   Reach Len. (ft)
  Crit W.S. (ft)            1270.43   Flow Area (sq ft)                     22.93
  E.G. Slope (ft/ft)       0.004662   Area (sq ft)              478.76      22.93      12.09
  Q Total (cfs)              100.00   Flow (cfs)                           100.00
  Top Width (ft)             144.16   Top Width (ft)             60.86      39.68      43.62
  Vel Total (ft/s)             4.36   Avg. Vel. (ft/s)                      4.36
  Max Chl Dpth (ft)           15.54   Hydr. Depth (ft)                      0.58
  Conv. Total (cfs)           1464.6   Conv. (cfs)                         1464.6
  Length Wtd. (ft)                    Wetted Per. (ft)                      40.19
  Min Ch El (ft)            1269.53   Shear (lb/sq ft)                      0.17
  Alpha                        1.00   Stream Power (lb/ft s)                0.72
  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)            1270.72   Element                   Left OB    Channel   Right OB
  Vel Head (ft)                0.30   Wt. n-Val.                           0.016
  W.S. Elev (ft)            1270.43   Reach Len. (ft)
  Crit W.S. (ft)            1270.43   Flow Area (sq ft)                     22.93
  E.G. Slope (ft/ft)       0.004662   Area (sq ft)              478.76      22.93      12.09
  Q Total (cfs)              100.00   Flow (cfs)                           100.00
  Top Width (ft)             144.16   Top Width (ft)             60.86      39.68      43.62
  Vel Total (ft/s)             4.36   Avg. Vel. (ft/s)                      4.36
  Max Chl Dpth (ft)           15.54   Hydr. Depth (ft)                      0.58
  Conv. Total (cfs)           1464.6   Conv. (cfs)                         1464.6
  Length Wtd. (ft)                    Wetted Per. (ft)                      40.19
  Min Ch El (ft)            1269.53   Shear (lb/sq ft)                      0.17
  Alpha                        1.00   Stream Power (lb/ft s)                0.72
  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)            1270.72   Element                   Left OB    Channel   Right OB
  Vel Head (ft)                0.30   Wt. n-Val.                           0.016
  W.S. Elev (ft)            1270.43   Reach Len. (ft)
  Crit W.S. (ft)            1270.43   Flow Area (sq ft)                     22.93
  E.G. Slope (ft/ft)       0.004662   Area (sq ft)              478.76      22.93      12.09
  Q Total (cfs)              100.00   Flow (cfs)                           100.00
  Top Width (ft)             144.16   Top Width (ft)             60.86      39.68      43.62
  Vel Total (ft/s)             4.36   Avg. Vel. (ft/s)                      4.36
  Max Chl Dpth (ft)           15.54   Hydr. Depth (ft)                      0.58
  Conv. Total (cfs)           1464.6   Conv. (cfs)                         1464.6
  Length Wtd. (ft)                    Wetted Per. (ft)                      40.19
  Min Ch El (ft)            1269.53   Shear (lb/sq ft)                      0.17
  Alpha                        1.00   Stream Power (lb/ft s)                0.72
  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
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Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9981.63	9994.86	14.49	4.77	13.30	14.49	0.36	3.04
9994.86	10008.08	54.61	10.56	13.23	54.61	0.80	5.17
10008.08	RB 10021.31	30.89	7.60	13.66	30.89	0.57	4.07

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 9981.63	9994.86	14.49	4.77	13.30	14.49	0.36	3.04
9994.86	10008.08	54.61	10.56	13.23	54.61	0.80	5.17
10008.08	RB 10021.31	30.89	7.60	13.66	30.89	0.57	4.07

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 9981.63	9994.86	14.49	4.77	13.30	14.49	0.36	3.04
9994.86	10008.08	54.61	10.56	13.23	54.61	0.80	5.17
10008.08	RB 10021.31	30.89	7.60	13.66	30.89	0.57	4.07

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:ADOBE DAM

Reach	River Sta.	n1	n2	n3
A1	20	.045	.025	.045
A1	19.97	.045	.025	.045
A1	19.91	.045	.025	.045
A1	19.84	.045	.045	.045
A1	19.80	.045	.045	.045
A1	19.76	.045	.045	.045
A1	19.71	.045	.045	.045
A1	19.64	.03	.02	.045
A1	19.54	.03	.02	.045
A1	19.46	.03	.02	.045
A1	19.38	.045	.01	.045
A1	19.31	.045	.045	.045
A1	19.24	.045	.045	.045
A1	19.18	.016	.016	.016
A1	19.16	.033	.016	.045
A1	19.08	.033	.016	.045
A1	19.01	.033	.016	.045
A1	18.93	.033	.016	.045
A1	18.84	.033	.016	.045
A1	18.77	.033	.016	.016
A1	18.71	.033	.016	.045
A1	18.67	.033	.016	.045
A1	18.58	.033	.016	.045
A1	18.50	.033	.016	.045
A1	18.42	.033	.016	.045
A1	18.34	.033	.016	.045
A1	18.24	.033	.016	.045
A1	18.17	.033	.016	.045
A1	18.13	.033	.016	.045
A1	18.08	.033	.016	.045

SUMMARY OF REACH LENGTHS

River: ADOBE DAM

Reach	River Sta.	Left	Channel	Right
A1	20	144.75	144.75	144.75

A1	19.97	337.52	337.52	337.52
A1	19.91	335	346.57	403.08
A1	19.84	338.94	214.48	180.39
A1	19.80	371.13	201.4	175
A1	19.76	995.08	293.58	98.64
A1	19.71	473.42	365.99	700.05
A1	19.64	510.09	531.95	545.25
A1	19.54	425.35	435.34	450.8
A1	19.46	366.9	395.1	549.16
A1	19.38	366.9	370.12	375.35
A1	19.31	380.43	385.3	461.83
A1	19.24	239.59	293.59	277.42
A1	19.18	122	122	122
A1	19.16	400.63	400.63	400.63
A1	19.08	400.63	400.63	400.63
A1	19.01	399.57	399.57	399.57
A1	18.93	484.72	484.72	484.72
A1	18.84	379.78	379.78	379.78
A1	18.77	278.68	278.68	278.68
A1	18.71	256.7	256.7	256.7
A1	18.67	500.03	500.03	500.03
A1	18.58	378.61	378.61	378.61
A1	18.50	431.72	431.72	431.72
A1	18.42	407.21	407.21	407.21
A1	18.34	530.92	530.92	530.92
A1	18.24	403.54	403.54	403.54
A1	18.17	185.24	185.24	185.24
A1	18.13	276.17	276.17	276.17
A1	18.08	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: ADOBE DAM

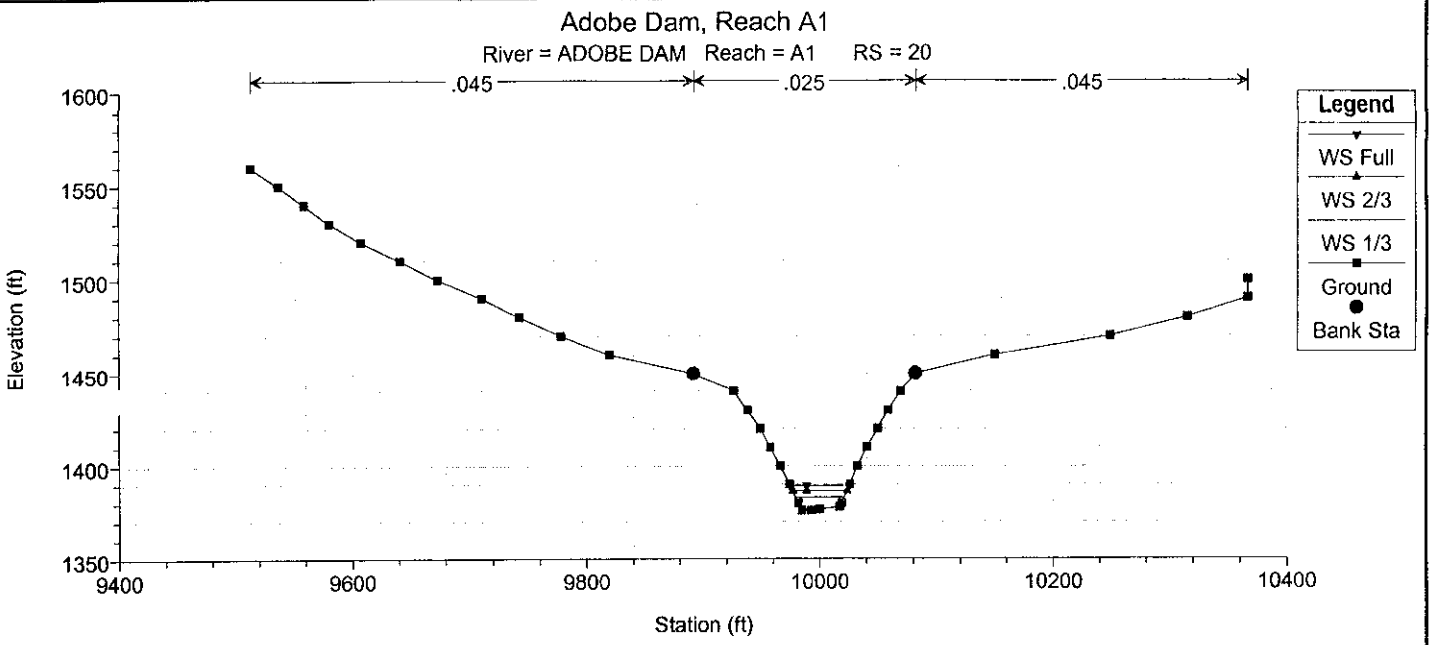
Reach	River Sta.	Contr.	Expan.
A1	20	.1	.3
A1	19.97	.1	.3
A1	19.91	.1	.3
A1	19.84	.1	.3
A1	19.80	.1	.3
A1	19.76	.1	.3
A1	19.71	.1	.3
A1	19.64	.1	.3
A1	19.54	.1	.3
A1	19.46	.1	.3
A1	19.38	.1	.3
A1	19.31	.1	.3
A1	19.24	.1	.3
A1	19.18	.1	.3
A1	19.16	.1	.3
A1	19.08	.1	.3
A1	19.01	.1	.3
A1	18.93	.1	.3
A1	18.84	.1	.3
A1	18.77	.1	.3
A1	18.71	.1	.3
A1	18.67	.1	.3
A1	18.58	.1	.3
A1	18.50	.1	.3
A1	18.42	.1	.3
A1	18.34	.1	.3
A1	18.24	.1	.3
A1	18.17	.1	.3
A1	18.13	.1	.3
A1	18.08	.1	.3

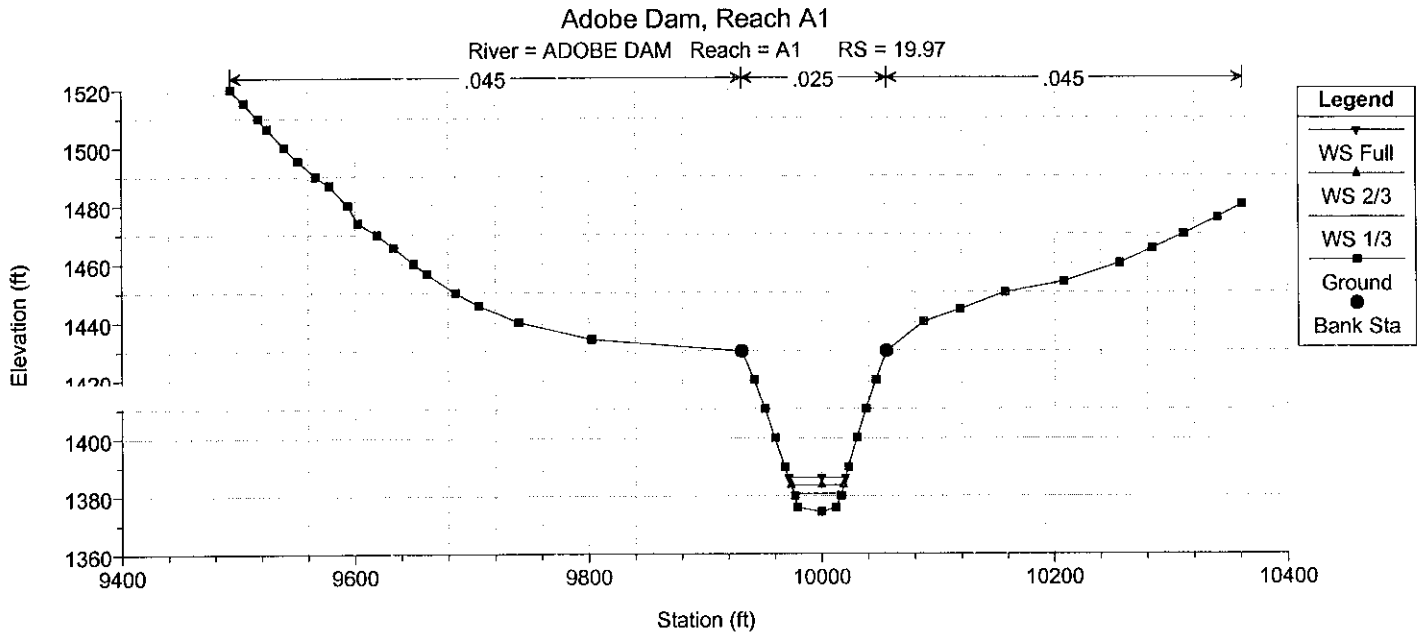
HEC-RAS Plan: ADA1 River: ADOBE DAM Reach: A1

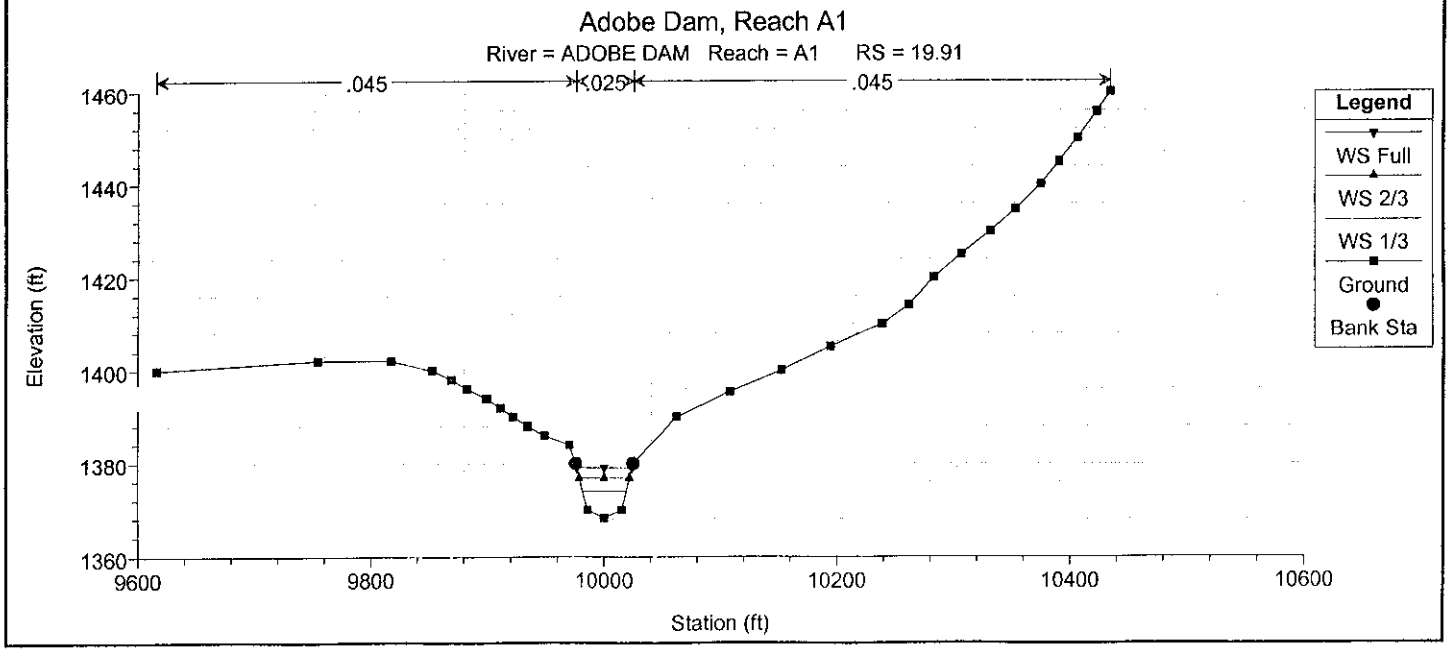
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A1	20	3200.00	1376.00	1383.14	1383.14	1385.97	0.006128	13.51	236.92	41.84	1.00
A1	20	6400.00	1376.00	1386.60	1386.60	1390.77	0.005774	16.40	390.30	46.79	1.00
A1	20	9600.00	1376.00	1389.36	1389.36	1394.55	0.005630	18.29	524.91	50.74	1.00
A1	19.97	3200.00	1374.50	1380.74	1381.62	1384.72	0.010106	16.02	199.77	40.72	1.27
A1	19.97	6400.00	1374.50	1383.80	1385.10	1389.58	0.009196	19.30	331.62	45.37	1.26
A1	19.97	9600.00	1374.50	1386.31	1387.84	1393.36	0.008658	21.31	450.48	49.19	1.24
A1	19.91	3200.00	1368.28	1374.09	1375.94	1380.12	0.017605	19.70	162.47	37.53	1.67
A1	19.91	6400.00	1368.28	1376.86	1379.50	1385.34	0.015559	23.37	273.84	42.97	1.63
A1	19.91	9600.00	1368.28	1379.08	1382.19	1389.30	0.014514	25.66	374.14	47.34	1.61
A1	19.84	3200.00	1348.85	1351.90	1353.40	1361.86	0.614925	25.32	126.39	130.32	4.53
A1	19.84	6400.00	1348.85	1352.37	1354.51	1367.89	0.825189	31.61	202.47	186.71	5.35
A1	19.84	9600.00	1348.85	1352.71	1355.36	1372.67	0.811650	35.86	267.71	201.80	5.49
A1	19.80	3200.00	1331.83	1334.39	1334.62	1335.39	0.045801	7.99	400.27	332.14	1.28
A1	19.80	6400.00	1331.83	1335.01	1335.50	1336.70	0.049273	10.44	613.05	360.11	1.41
A1	19.80	9600.00	1331.83	1335.30	1336.09	1338.06	0.067965	13.33	720.36	373.42	1.69
A1	19.76	3200.00	1319.60	1321.68	1322.16	1323.15	0.084365	9.71	329.45	323.14	1.70
A1	19.76	6400.00	1319.60	1322.33	1322.98	1324.24	0.079231	11.08	577.62	443.67	1.71
A1	19.76	9600.00	1319.60	1322.96	1323.45	1324.62	0.062222	10.34	928.68	660.37	1.54
A1	19.71	3200.00	1315.53	1317.23	1316.97	1317.47	0.013703	3.93	813.93	793.43	0.68
A1	19.71	6400.00	1315.53	1317.48	1317.48	1318.10	0.028356	6.31	1013.90	838.23	1.01
A1	19.71	9600.00	1315.53	1317.89	1317.89	1318.65	0.026158	7.00	1370.74	912.72	1.01
A1	19.64	3200.00	1306.00	1313.27	1313.27	1314.84	0.004085	10.07	317.65	101.24	1.00
A1	19.64	6400.00	1306.00	1314.32	1314.44	1315.31	0.003263	8.62	1047.33	934.91	0.89
A1	19.64	9600.00	1306.00	1315.01	1315.04	1316.07	0.002893	9.34	1632.34	965.72	0.87
A1	19.64	3200.00	1304.00	1309.67	1310.50	1312.20	0.005644	12.77	250.68	71.20	1.20
A1	19.64	6400.00	1304.00	1310.85	1311.49	1312.76	0.006883	11.60	695.64	679.65	1.27
A1	19.64	9500.00	1304.00	1311.41	1312.14	1313.69	0.007079	13.10	1049.87	761.27	1.32
A1	19.46	3200.00	1304.00	1307.48	1308.14	1309.20	0.007169	11.40	456.79	405.64	1.28
A1	19.46	6400.00	1304.00	1308.64	1308.83	1309.63	0.006209	9.82	1114.67	786.08	1.17
A1	19.46	9500.00	1304.00	1309.10	1309.27	1310.31	0.006909	11.15	1450.73	874.88	1.26
A1	19.38	3200.00	1304.00	1304.69	1305.13	1306.20	0.007243	9.85	324.82	472.27	2.09
A1	19.38	6300.00	1304.00	1305.17	1305.78	1307.19	0.004858	11.40	553.48	492.03	1.87
A1	19.38	9200.00	1304.00	1305.55	1306.28	1307.97	0.004041	12.49	750.08	542.04	1.78
A1	19.31	3200.00	1302.87	1304.60	1304.54	1304.94	0.026686	4.70	680.96	837.37	0.92
A1	19.31	6300.00	1302.87	1304.98	1304.98	1305.59	0.029069	6.25	1008.58	862.88	1.02
A1	19.31	9200.00	1302.87	1305.34	1305.34	1306.09	0.025877	6.94	1325.22	886.84	1.00
A1	19.24	3200.00	1300.82	1302.81		1302.87	0.002117	1.87	1716.32	1265.20	0.28
A1	19.24	6300.00	1300.82	1303.91	1302.34	1303.98	0.001145	2.02	3121.40	1290.12	0.23
A1	19.24	9200.00	1300.82	1304.77	1302.62	1304.84	0.000903	2.18	4235.06	1312.29	0.21
A1	19.18	3200.00	1299.20	1302.83		1302.84	0.000016	0.73	4589.62	1917.20	0.08
A1	19.18	6300.00	1299.20	1303.93		1303.94	0.000019	0.97	6739.68	1999.72	0.09
A1	19.18	9200.00	1299.20	1304.79		1304.81	0.000020	1.12	8471.32	2023.15	0.09
A1	19.16	1300.00	1299.82	1302.17	1302.17	1302.97	0.004664	9.54	270.22	164.90	1.24
A1	19.16	2300.00	1299.82	1302.92	1302.92	1304.08	0.004387	11.61	395.14	168.92	1.27
A1	19.16	3300.00	1299.82	1304.49		1305.32	0.001717	9.97	667.79	176.61	0.86
A1	19.08	1300.00	1298.54	1301.33	1299.92	1301.58	0.000998	4.86	398.43	147.75	0.59
A1	19.08	2300.00	1298.54	1302.93	1300.61	1303.26	0.000609	5.51	638.51	153.50	0.50
A1	19.08	3300.00	1298.54	1304.51		1304.88	0.000418	5.78	886.03	158.53	0.44
A1	19.01	1300.00	1297.13	1300.31		1300.99	0.001982	8.53	269.78	93.39	0.87
A1	19.01	2300.00	1297.13	1301.97		1302.84	0.001426	9.73	430.07	100.11	0.80

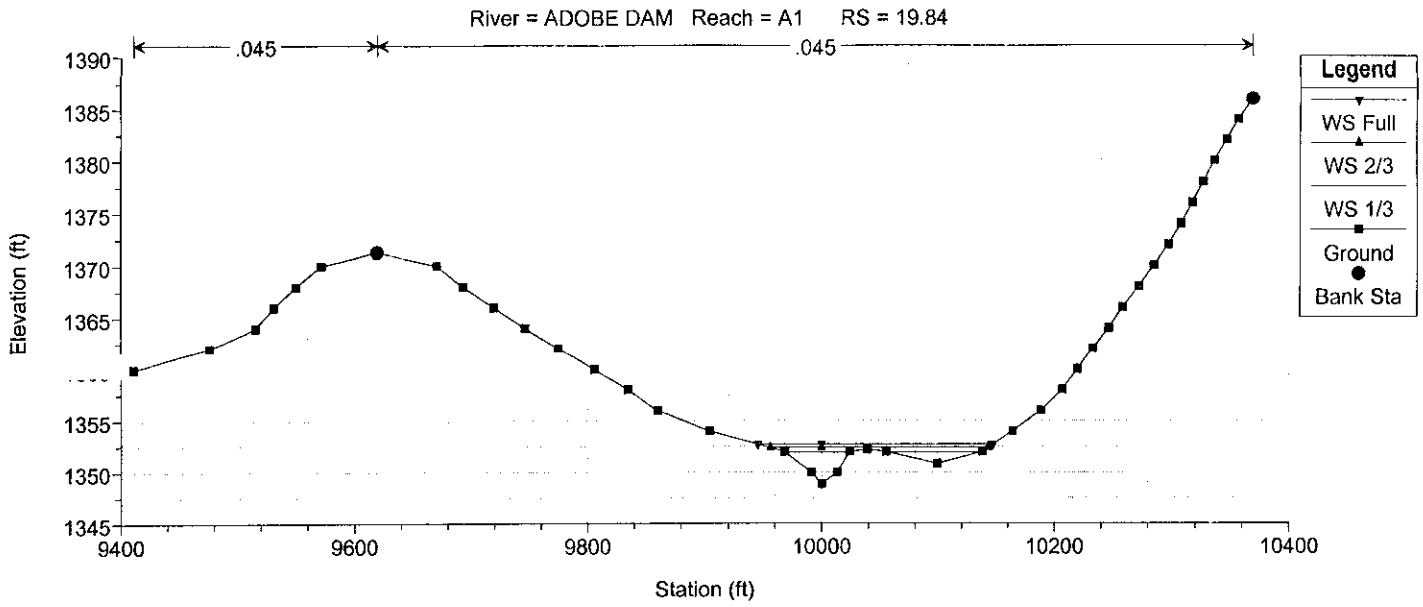
HEC-RAS Plan: ADA1 River: ADOBE DAM Reach: A1 (Continued)

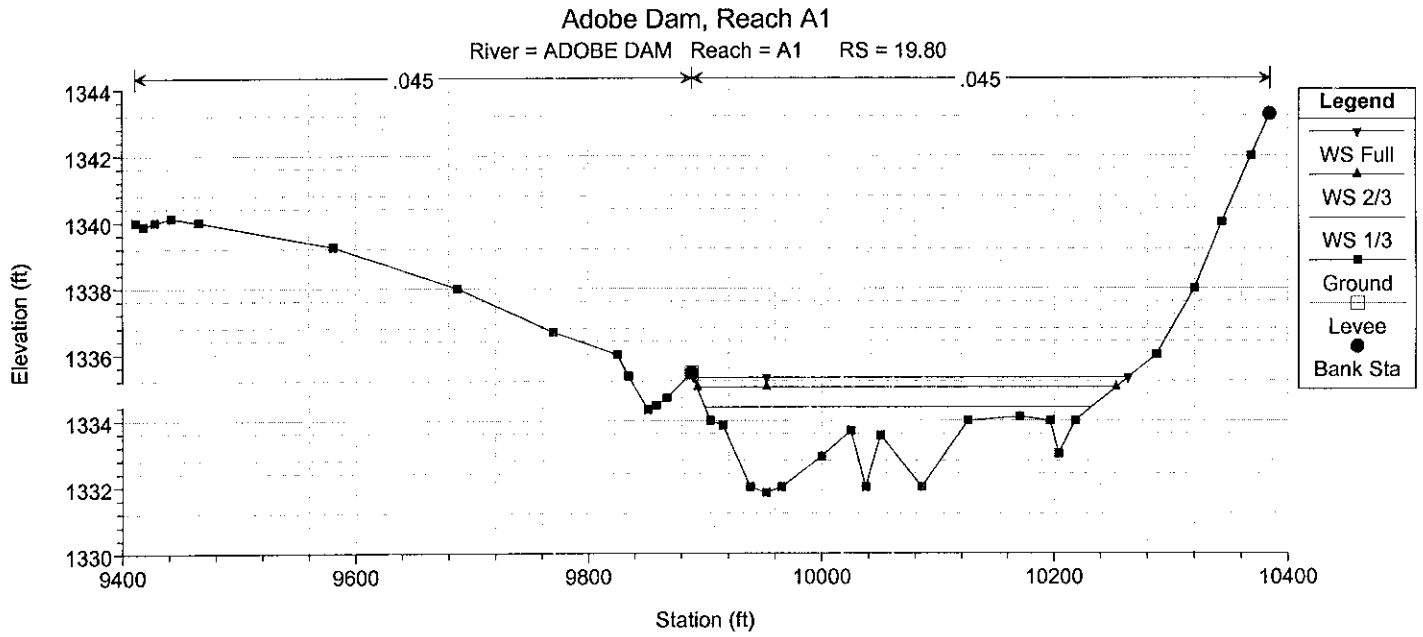
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A1	19.01	3300.00	1297.13	1303.55		1304.56	0.001119	10.48	600.32	115.27	0.74
A1	18.93	1300.00	1296.00	1299.01	1298.32	1299.97	0.003190	10.54	225.02	69.54	1.10
A1	18.93	2300.00	1296.00	1300.05	1299.66	1301.86	0.003909	14.35	297.30	69.54	1.28
A1	18.93	3300.00	1296.00	1300.85	1300.80	1303.59	0.004553	17.54	352.69	69.54	1.43
A1	18.84	1300.00	1293.99	1296.81	1296.81	1298.16	0.004237	11.32	193.37	75.77	1.25
A1	18.84	2300.00	1293.99	1298.04	1298.04	1300.01	0.003688	13.70	286.01	75.77	1.24
A1	18.84	3300.00	1293.99	1299.08	1299.08	1301.62	0.003438	15.54	364.65	75.77	1.25
A1	18.77	1300.00	1292.00	1296.03	1295.09	1296.57	0.001078	6.12	230.89	74.58	0.63
A1	18.77	2300.00	1292.00	1295.41	1296.11	1298.05	0.007070	13.49	184.99	74.58	1.55
A1	18.77	3300.00	1292.00	1295.96	1296.99	1299.63	0.007474	15.87	225.87	74.58	1.64
A1	18.71	1300.00	1290.67	1293.86	1293.86	1295.83	0.006152	12.67	154.40	74.15	1.47
A1	18.71	2300.00	1290.67	1295.66	1295.66	1297.27	0.002471	11.82	342.55	106.81	1.03
A1	18.71	3300.00	1290.67	1296.53	1296.53	1298.58	0.002508	13.53	435.32	106.81	1.07
A1	18.67	600.00	1290.44	1291.43	1292.01	1293.42	0.040988	14.52	64.07	71.93	3.11
A1	18.67	800.00	1290.44	1291.30	1292.36	1295.89	0.126368	22.21	54.92	71.93	5.27
A1	18.67	2200.00	1290.44	1292.99	1294.23	1297.25	0.016219	20.27	176.62	71.93	2.38
A1	18.58	600.00	1287.64	1289.12	1289.04	1289.79	0.012851	8.66	97.71	71.15	1.76
A1	18.58	800.00	1287.64	1289.31	1289.25	1290.30	0.014102	10.59	111.69	71.15	1.92
A1	18.58	2200.00	1287.64	1291.26	1291.26	1293.30	0.006009	14.57	250.30	71.15	1.51
A1	18.50	200.00	1284.00	1284.39	1284.36	1284.62	0.015465	3.90	55.51	187.98	1.55
A1	18.50	300.00	1284.00	1284.60	1284.52	1284.85	0.013093	4.75	76.72	196.98	1.53
A1	18.50	1000.00	1284.00	1284.46	1285.24	1288.83	0.281372	18.37	61.84	190.72	6.78
A1	18.42	100.00	1280.52	1281.14	1280.80	1281.21	0.003206	2.82	50.21	265.94	0.79
A1	18.42	100.00	1280.52	1281.14	1280.80	1281.21	0.003206	2.82	50.21	265.94	0.79
A1	18.42	200.00	1280.52	1281.32	1281.07	1281.52	0.005266	4.67	64.36	265.94	1.08
A1	18.34	100.00	1277.63	1277.99	1277.99	1278.26	0.027995	5.44	25.74	200.96	2.09
A1	18.34	100.00	1277.63	1277.99	1277.99	1278.26	0.027995	5.44	25.74	200.96	2.09
A1	18.34	100.00	1277.63	1277.99	1277.99	1278.26	0.027995	5.44	25.74	200.96	2.09
A1	18.24	100.00	1274.95	1275.74	1275.53	1275.81	0.001570	2.44	65.14	245.81	0.58
A1	18.24	100.00	1274.95	1276.60	1275.53	1276.61	0.000063	0.92	182.72	261.89	0.14
A1	18.24	100.00	1274.95	1277.13	1275.53	1277.14	0.000021	0.66	257.19	261.89	0.08
A1	18.17	100.00	1273.83	1274.31	1274.30	1274.46	0.011019	4.25	47.03	259.71	1.38
A1	18.17	900.00	1273.83	1275.13	1275.13	1275.71	0.009356	8.20	193.27	291.18	1.53
A1	18.17	1500.00	1273.83	1275.61	1275.61	1276.40	0.006914	9.41	283.57	291.18	1.42
A1	18.13	100.00	1271.77	1272.40	1272.16	1272.53	0.009887	4.91	43.05	164.46	1.36
A1	18.13	500.00	1271.77	1273.08	1272.98	1273.44	0.011723	6.54	114.65	208.60	1.57
A1	18.13	900.00	1271.77	1273.05	1273.39	1274.25	0.042685	12.01	110.71	204.58	2.97
A1	18.08	100.00	1269.53	1270.43	1270.43	1270.72	0.004662	4.36	22.93	144.16	1.01
A1	18.08	100.00	1269.53	1270.43	1270.43	1270.72	0.004662	4.36	22.93	144.16	1.01
A1	18.08	100.00	1269.53	1270.43	1270.43	1270.72	0.004662	4.36	22.93	144.16	1.01

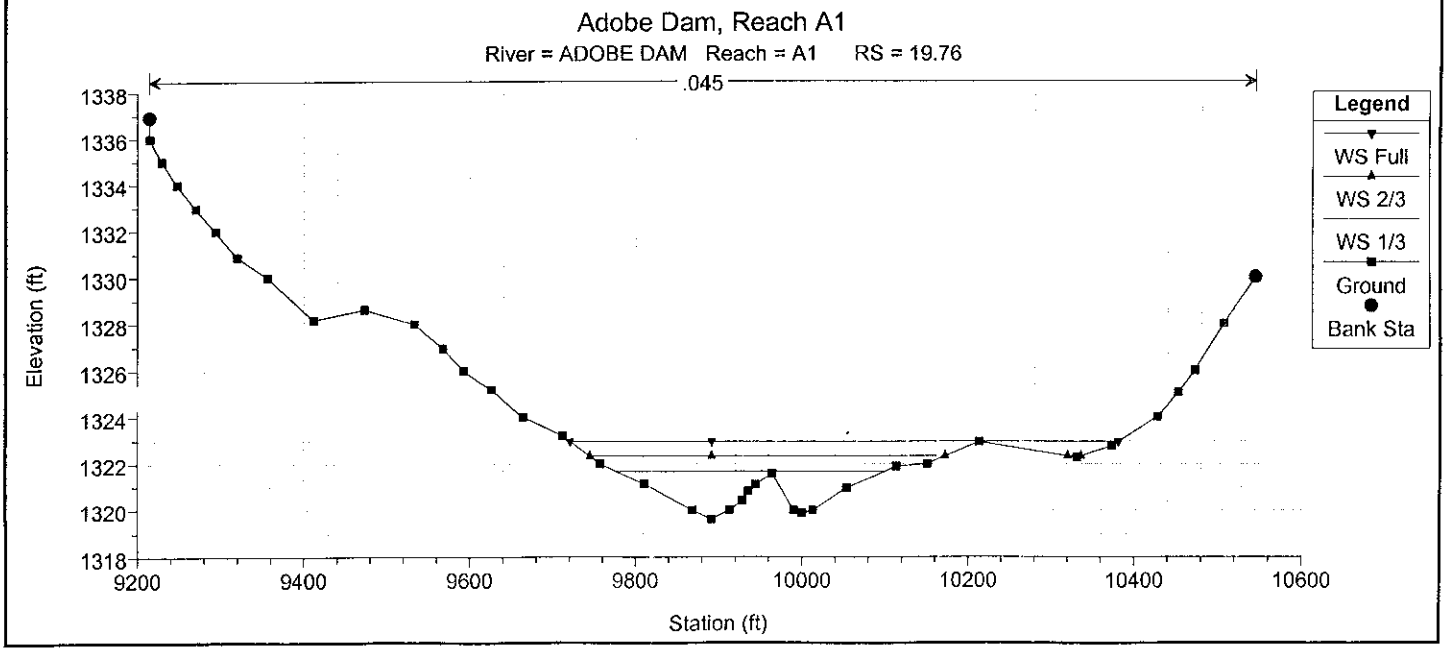

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 20
.045
.025
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1600
1550
1500
1450
1400
1350
9400
9600
9800
10000
10200
10400
Station (ft)

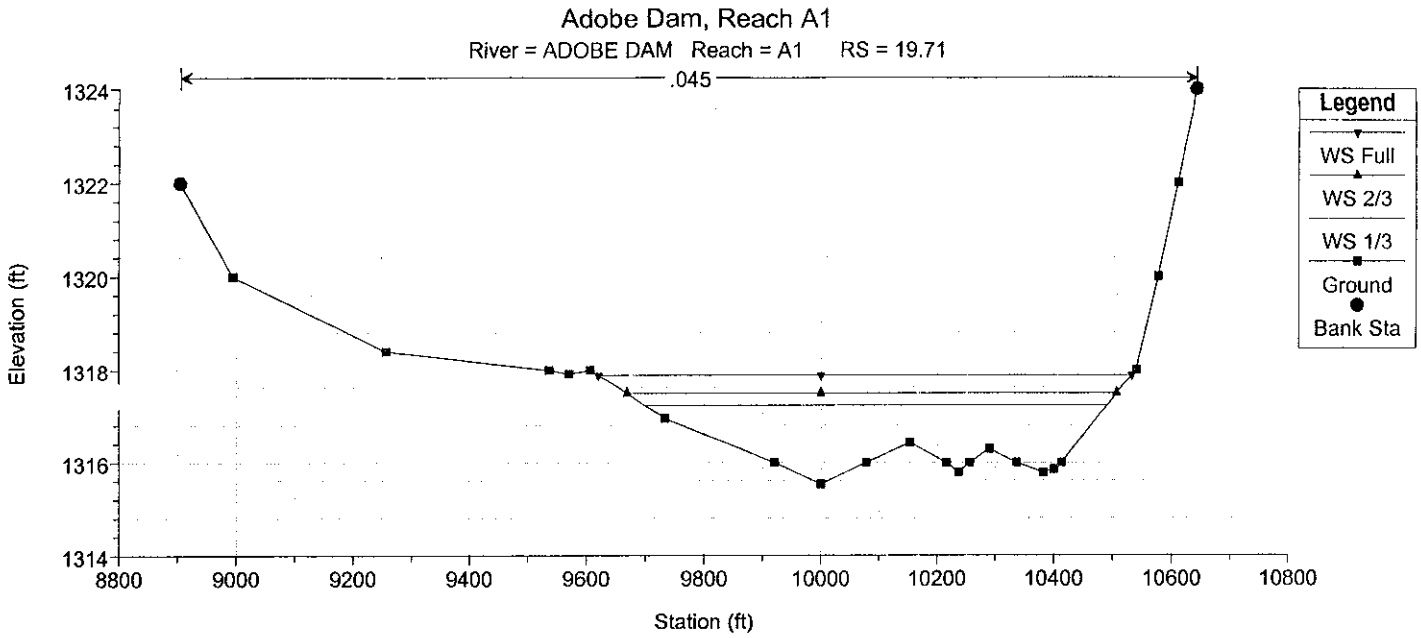

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.97
.045
.025
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1520
1500
1480
1460
1440
1400
1380
1360
9400
9600
9800
10000
10200
10400
Station (ft)

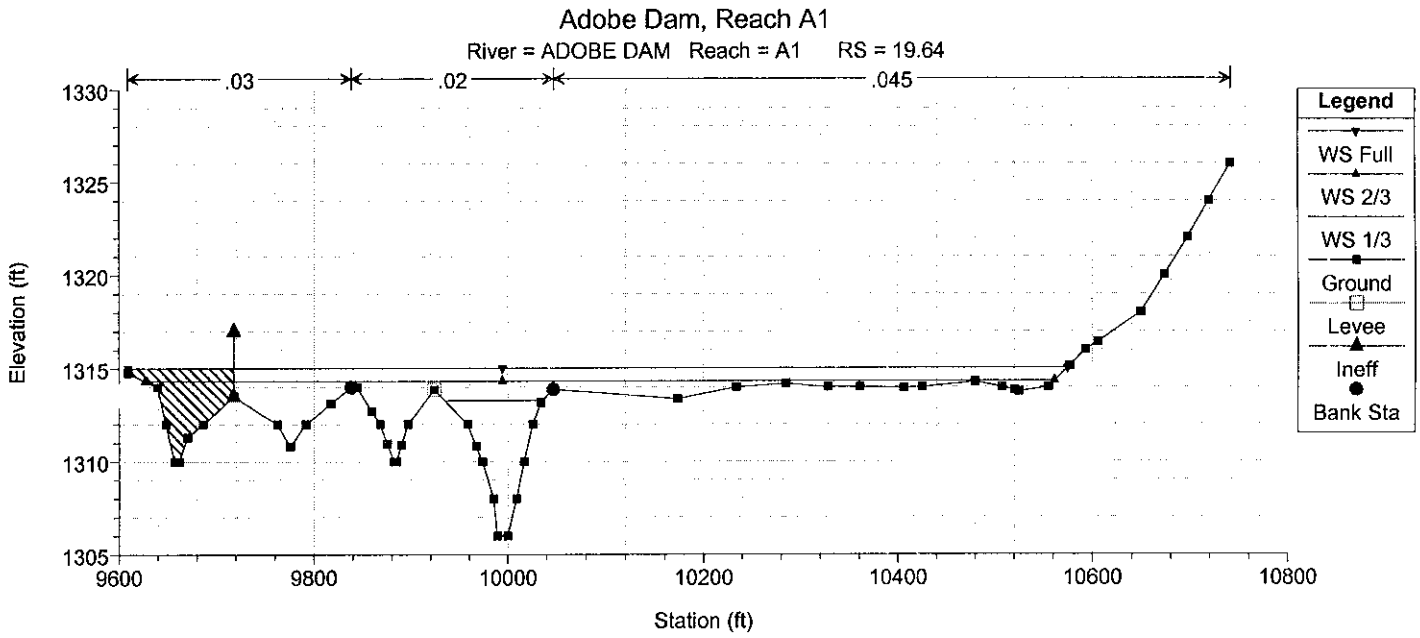

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.91
.045
.025
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1460
1440
1420
1400
1380
1360
9600
9800
10000
10200
10400
10600
Station (ft)

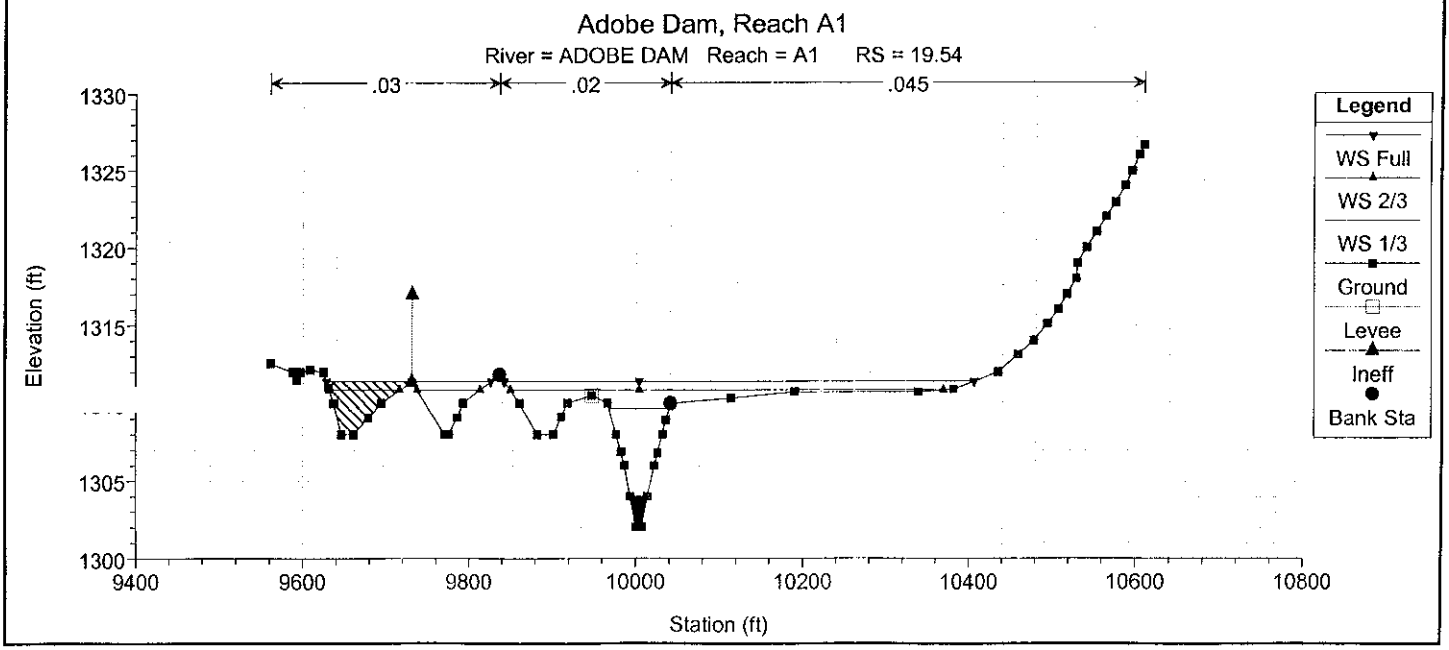

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.84
.045
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1390
1385
1380
1375
1370
1365
1355
1350
1345
9400
9600
9800
10000
10200
10400
Station (ft)

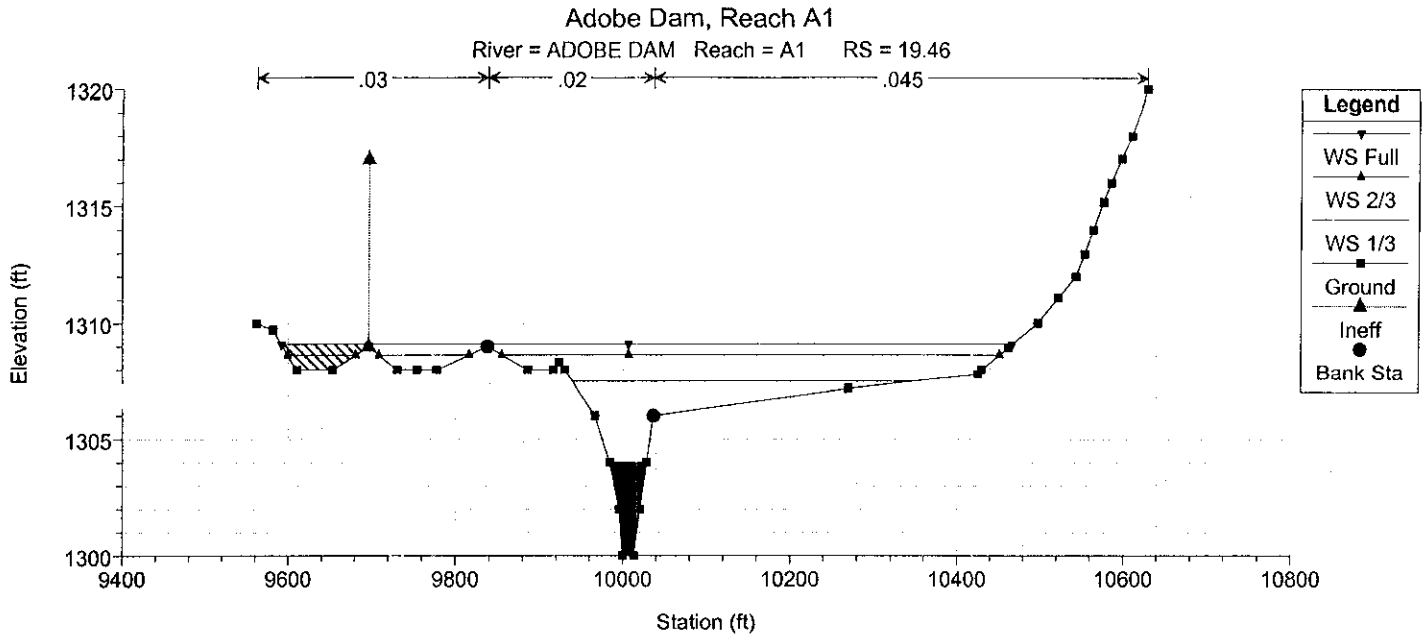

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.80
.045
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Levee
Bank Sta
Elevation (ft)
1344
1342
1340
1338
1336
1334
1332
1330
9400
9600
9800
10000
10200
10400
Station (ft)

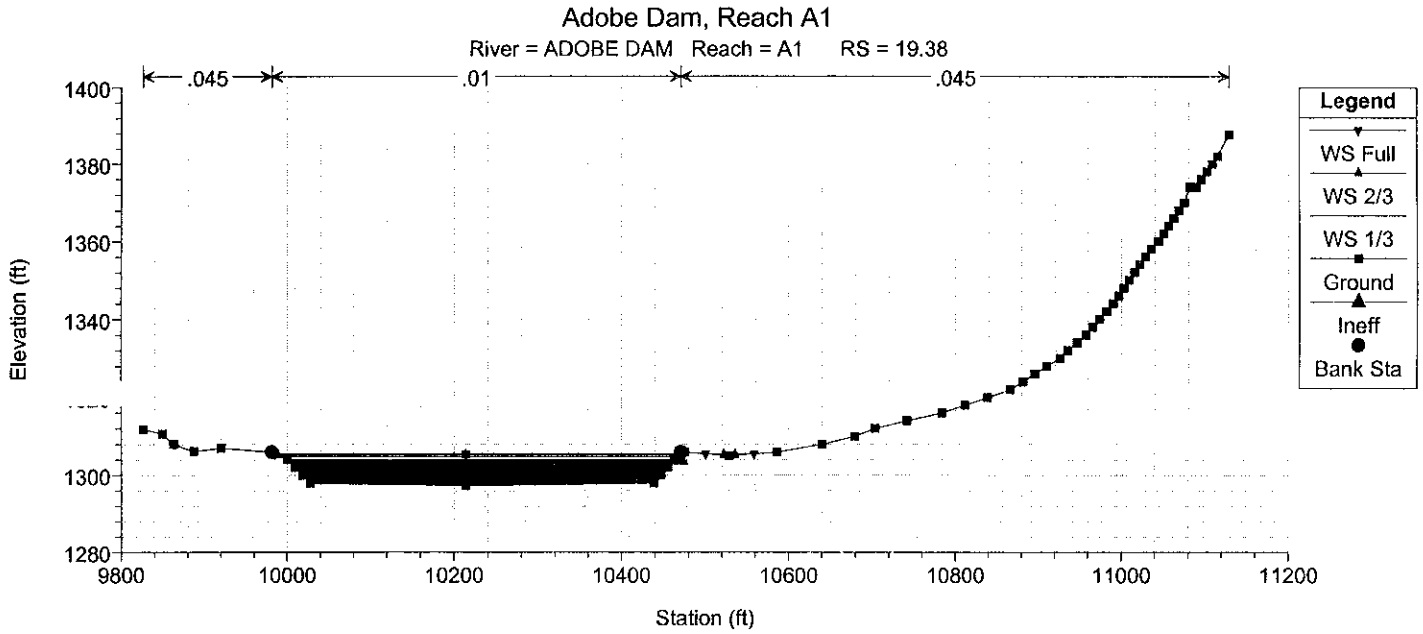

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.76
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1338
1336
1334
1332
1330
1328
1326
1324
1322
1320
1318
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

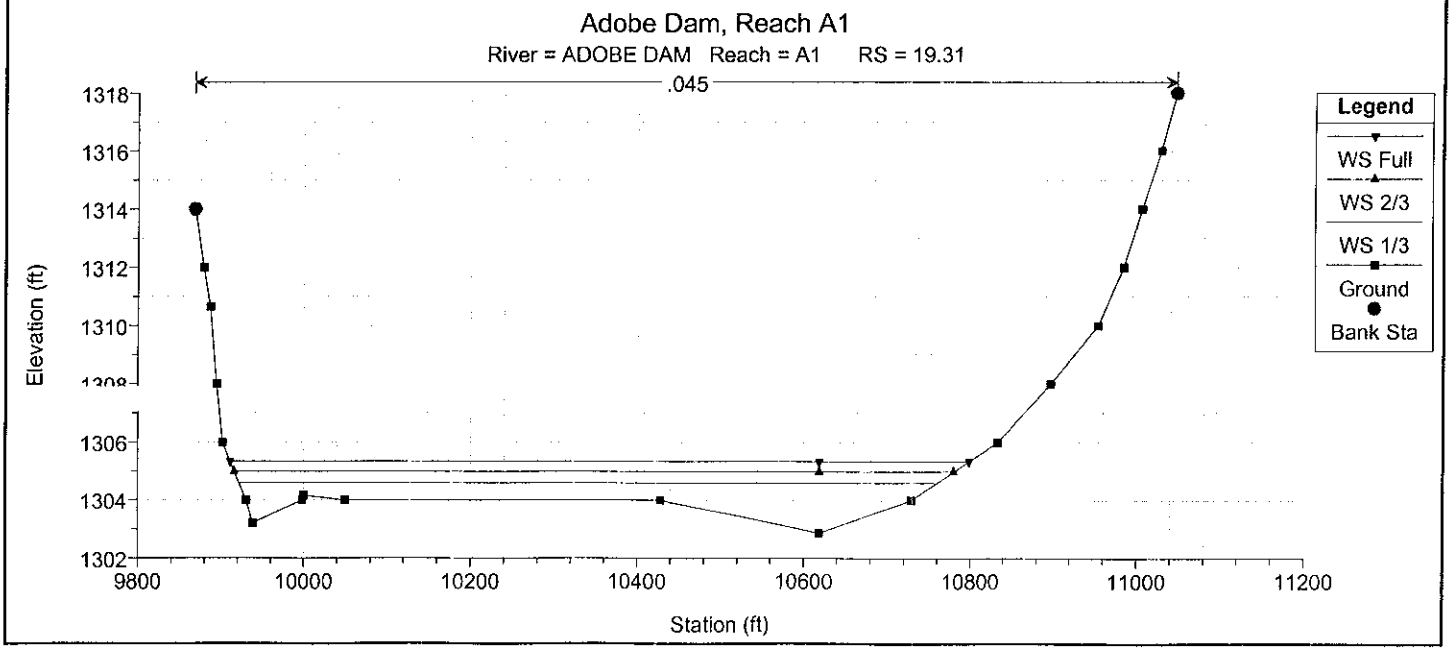

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.71
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

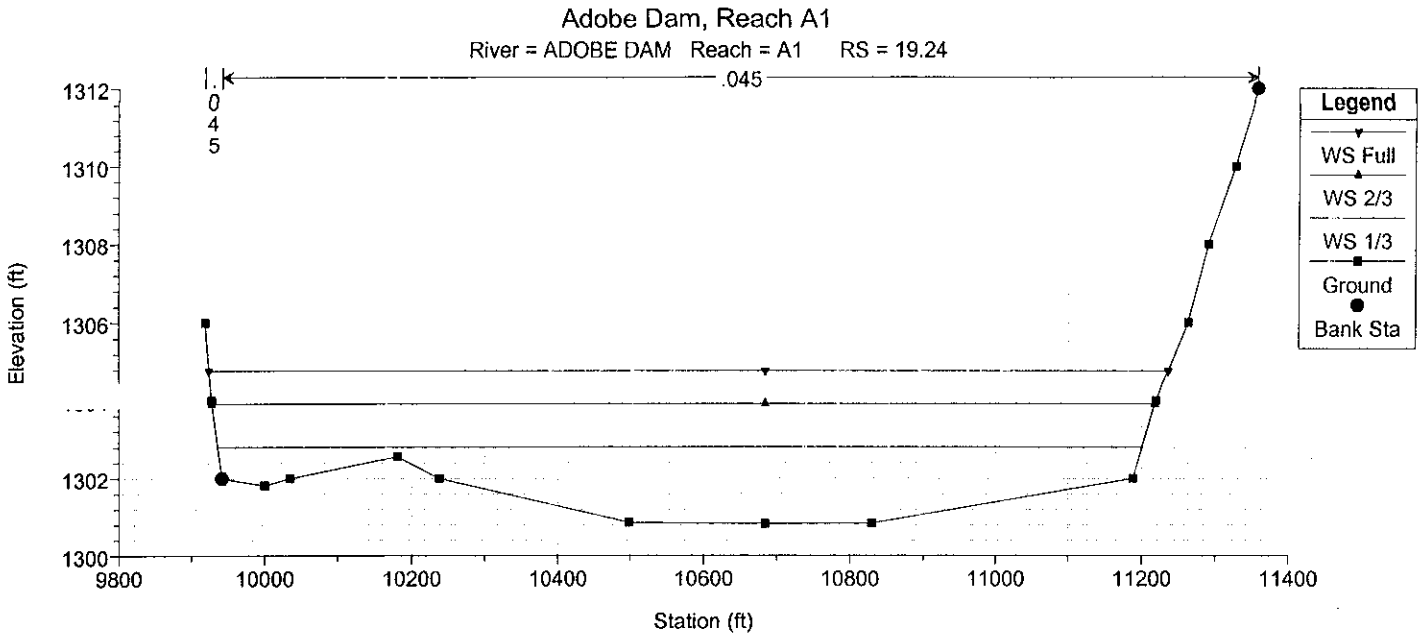

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.64
.03
.02
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Levee
Ineff
Bank Sta

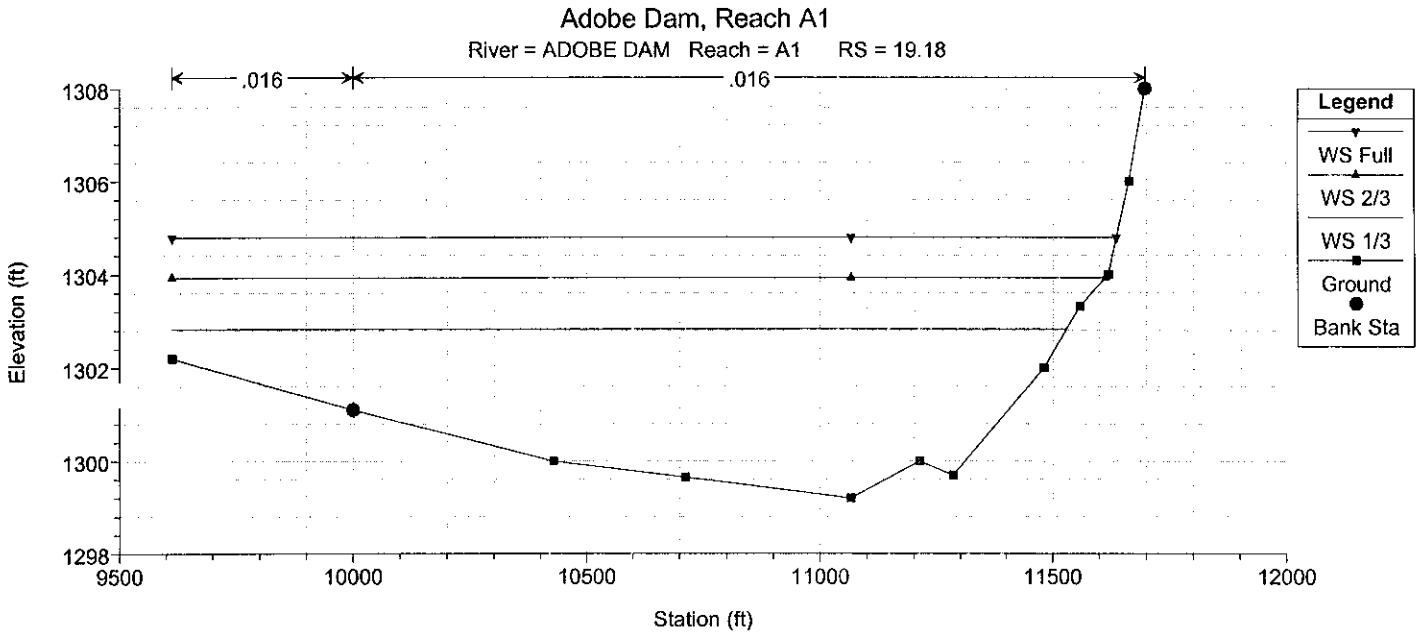

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.54
.03
.02
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Levee
Ineff
Bank Sta

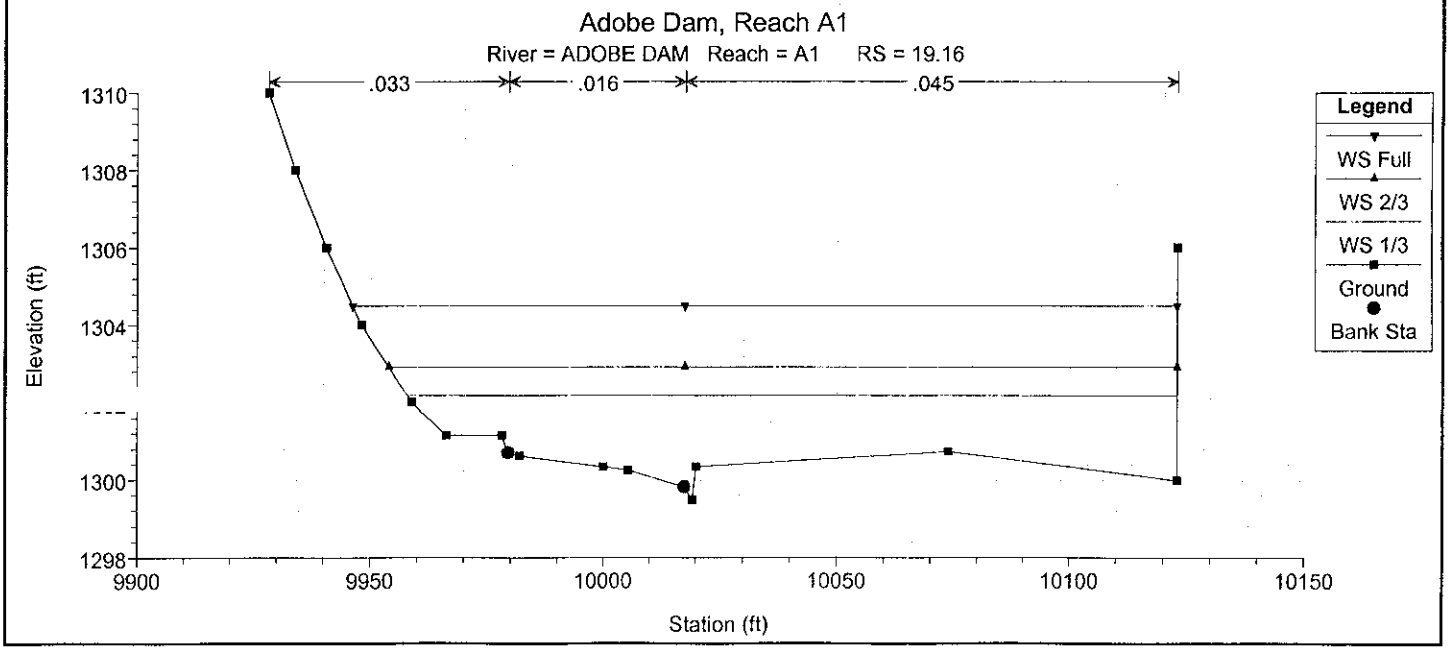

Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.46
.03
.02
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.38
.045
.01
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.31
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.24
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.18
.016
.016
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)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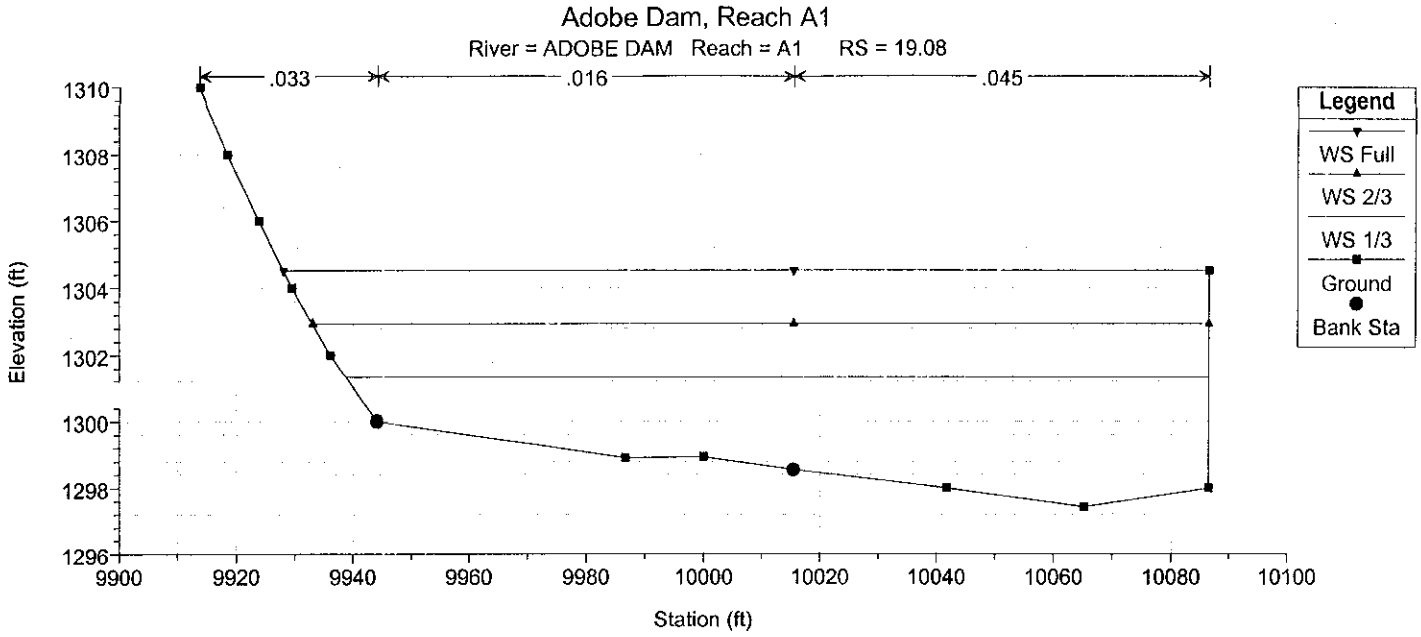
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 19.08
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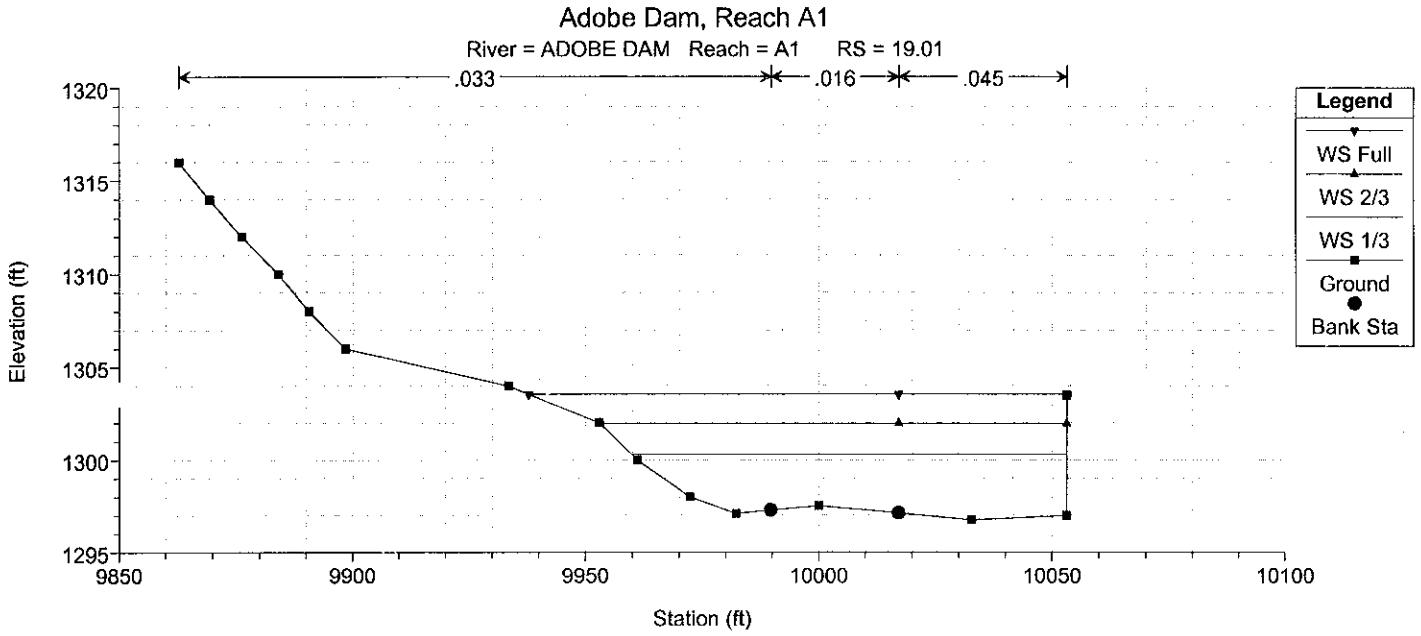
.016
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta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.016
.045
Elevation (ft)
Station (ft)
Legend
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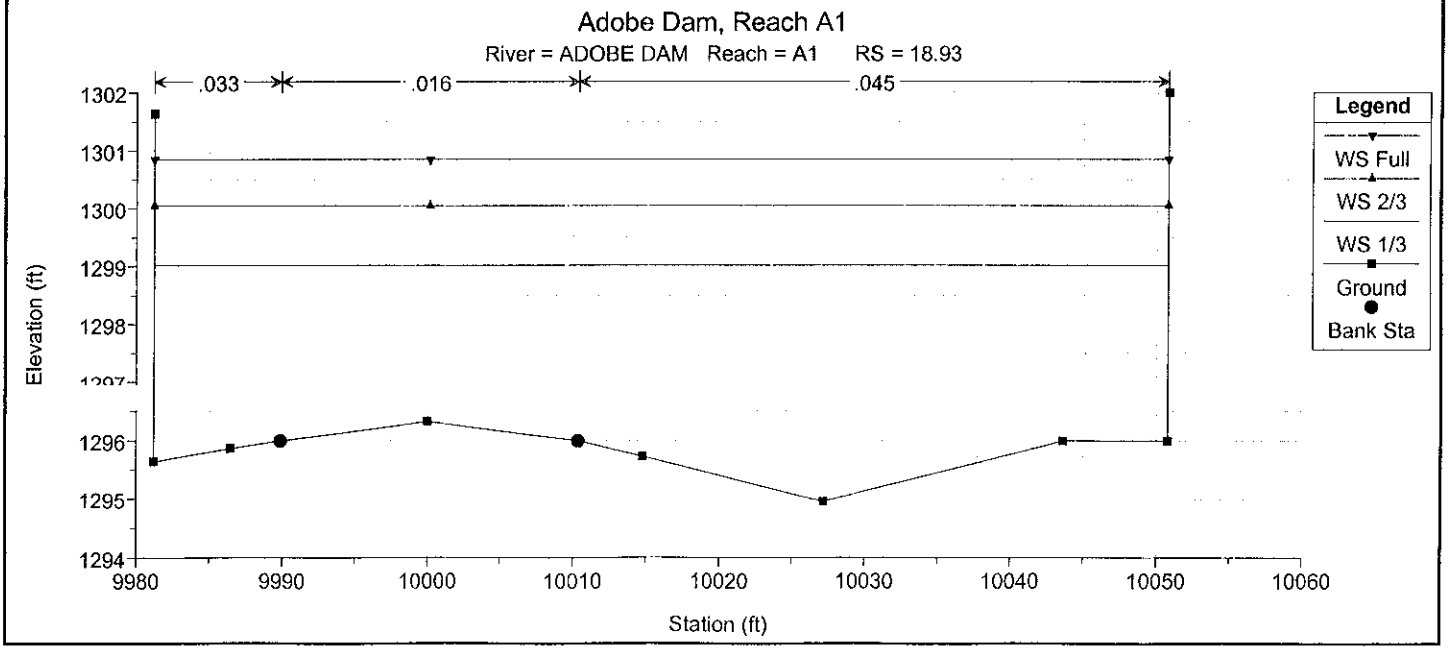
WS 2/3
WS 1/3
Ground
Bank Sta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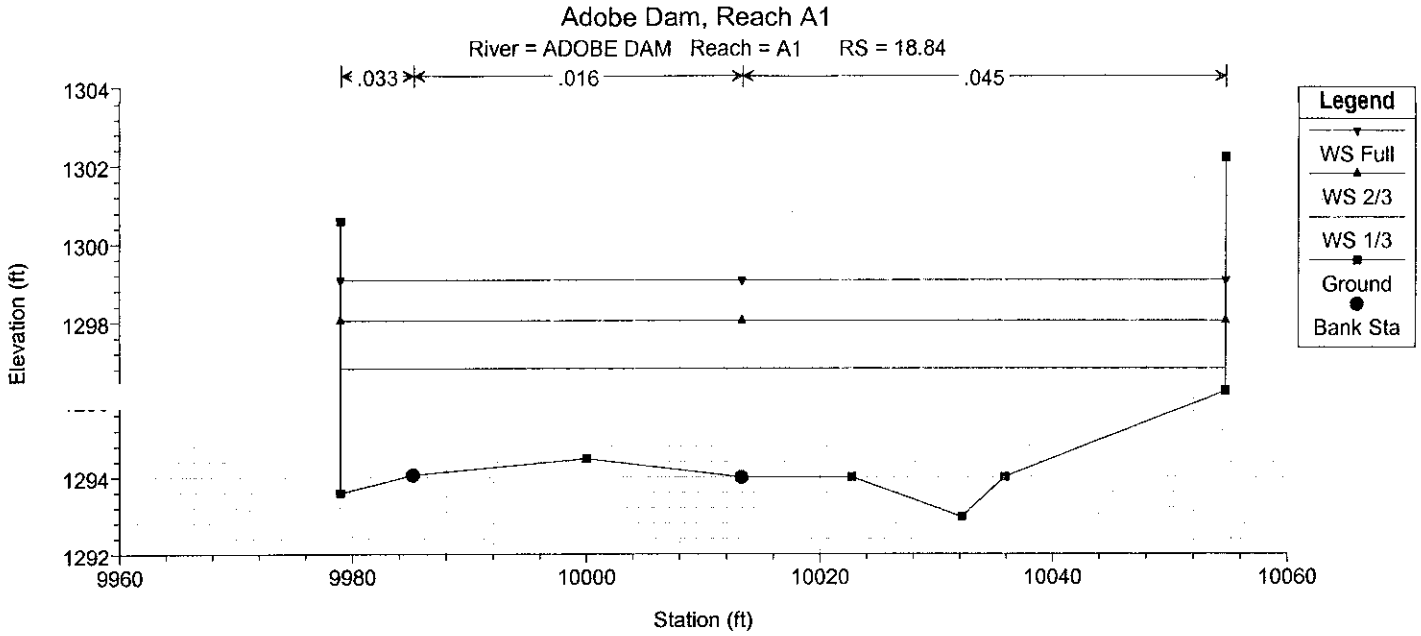
.016
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta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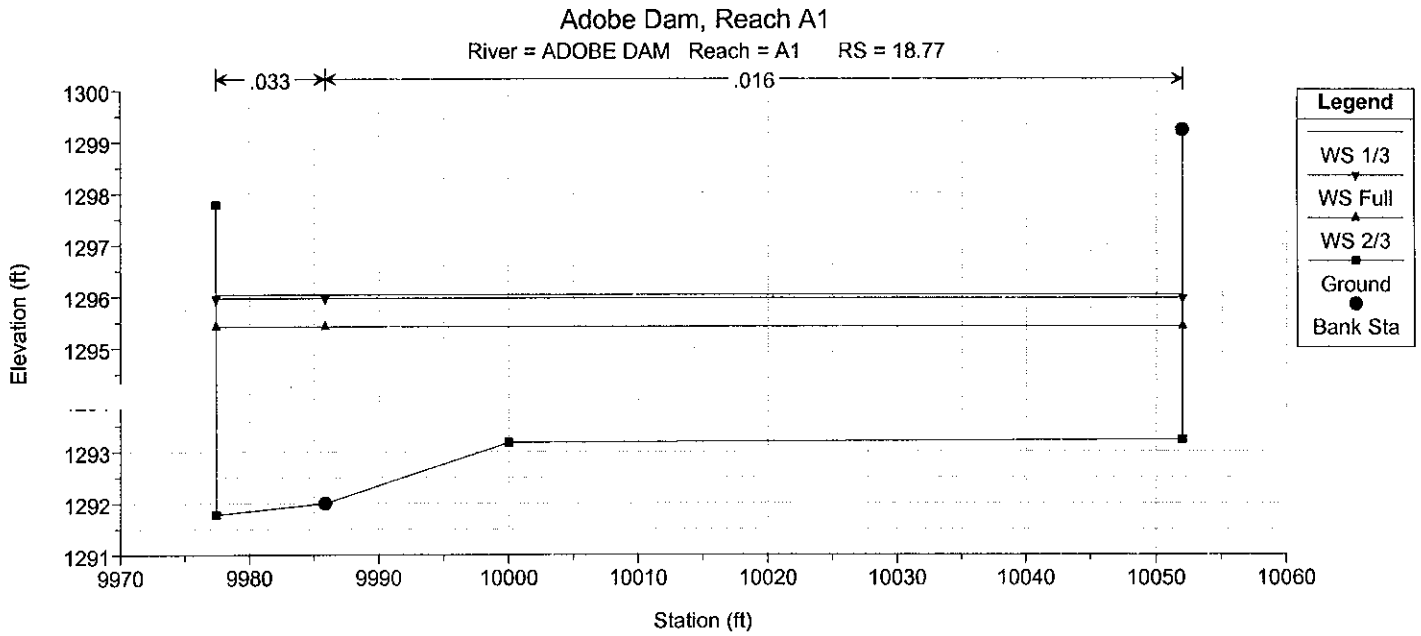
.016
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1304
1302
1300
1298
1294
1292
9960
9980
10000
10020
10040
10060
Station (ft)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River = ADOBE DAM Reach = A1 RS = 18.77
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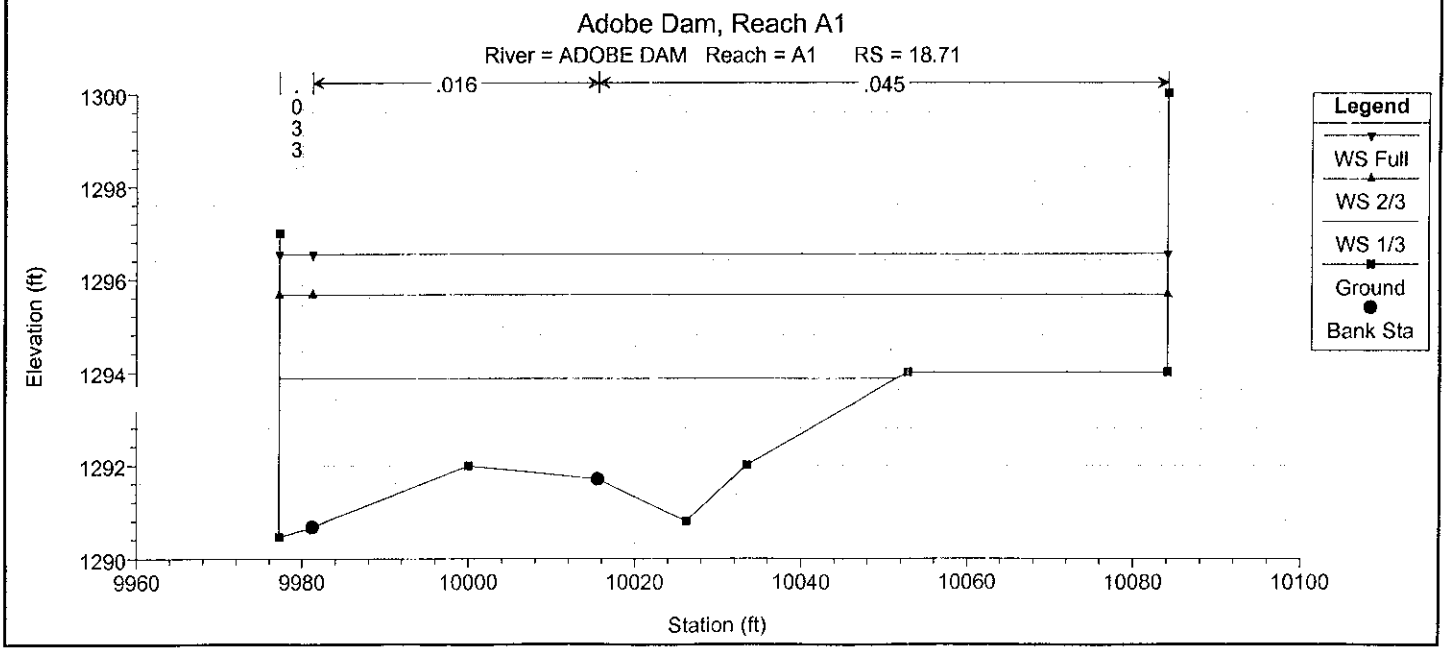
.016
Legend
WS 1/3
WS Full
WS 2/3
Ground
Bank Sta
Elevation (ft)
1300
1299
1298
1297
1296
1295
1293
1292
1291
9970
9980
9990
10000
10010
10020
10030
10040
10050
10060
Station (ft)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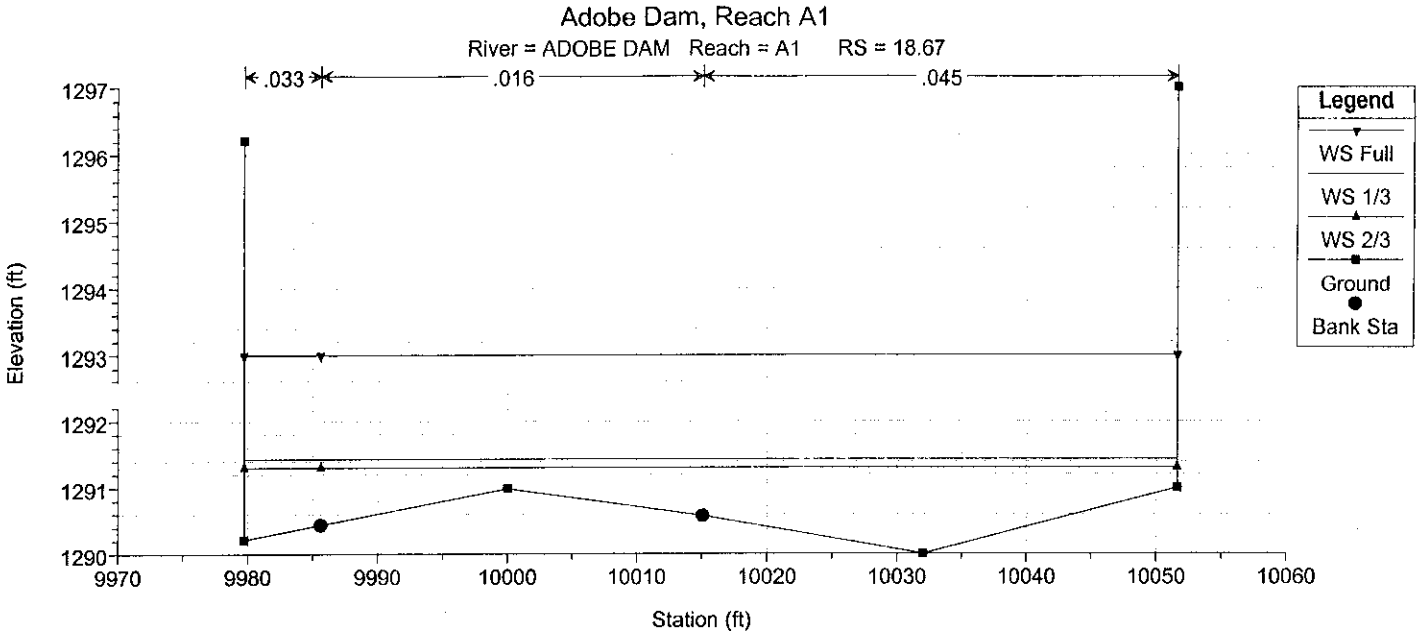
River = ADOBE DAM Reach = A1 RS = 18.71
.033
.016
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1300
1298
1296
1294
1292
1290
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)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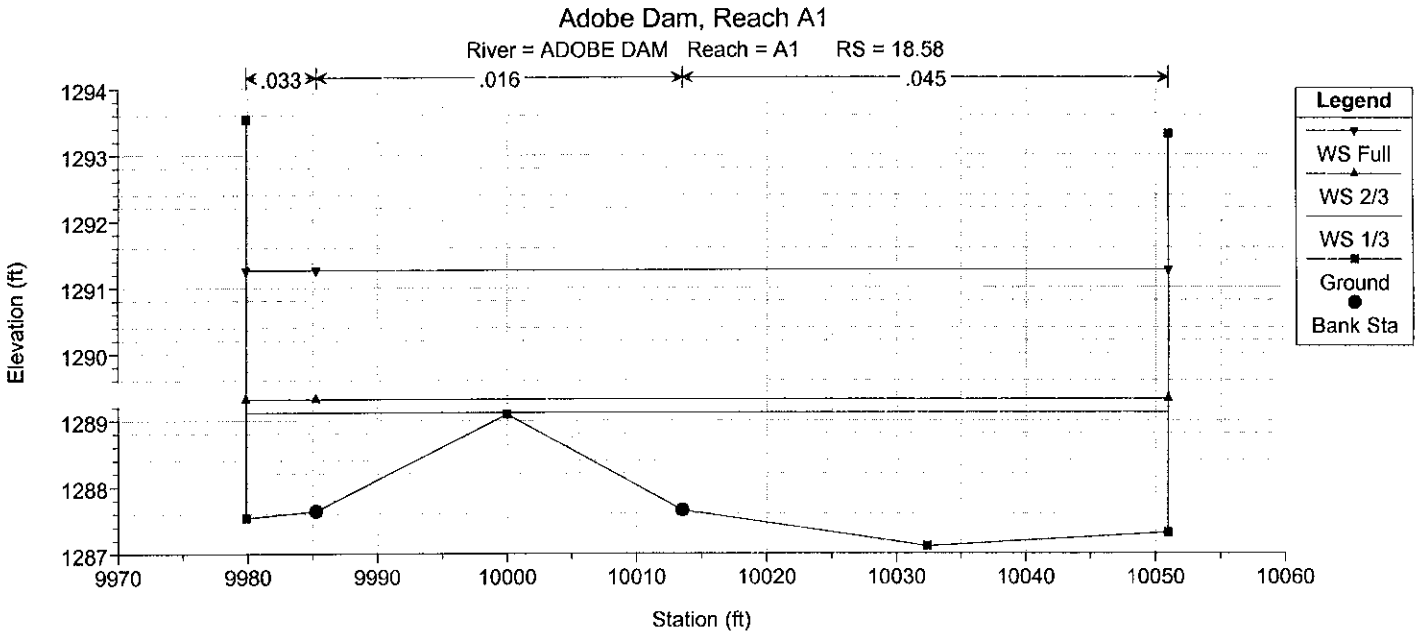
River = ADOBE DAM Reach = A1 RS = 18.67
.033
.016
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 1/3
WS 2/3
Ground
Bank Sta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.016
.045
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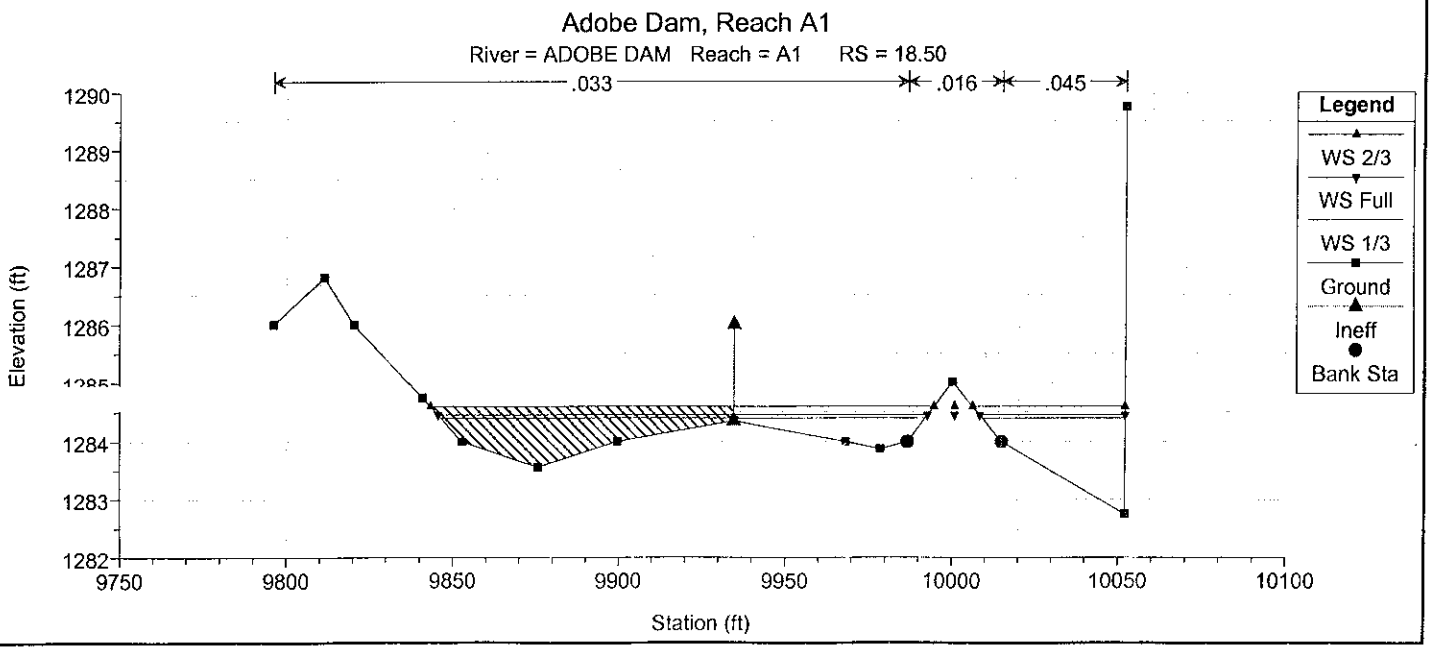
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta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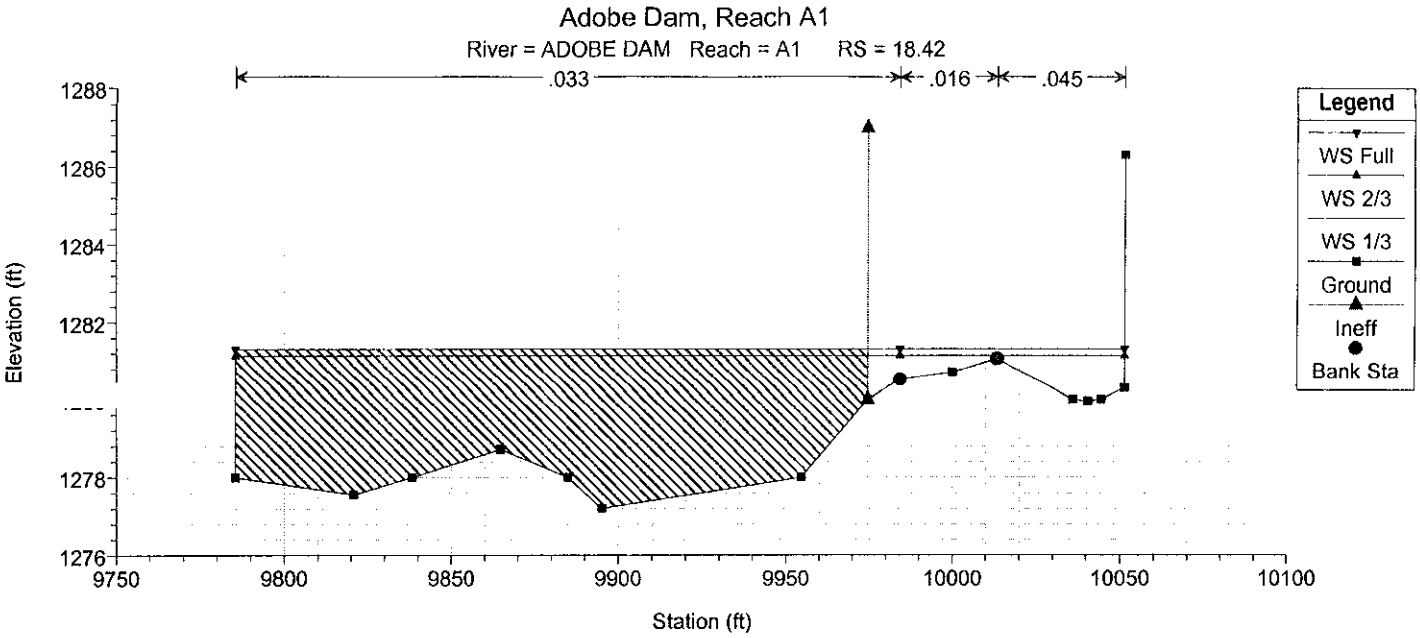
.016
.045
Elevation (ft)
Station (ft)
Legend
WS 2/3
WS Full
WS 1/3
Ground
Ineff
Bank Sta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River = ADOBE DAM Reach = A1 RS = 18.42
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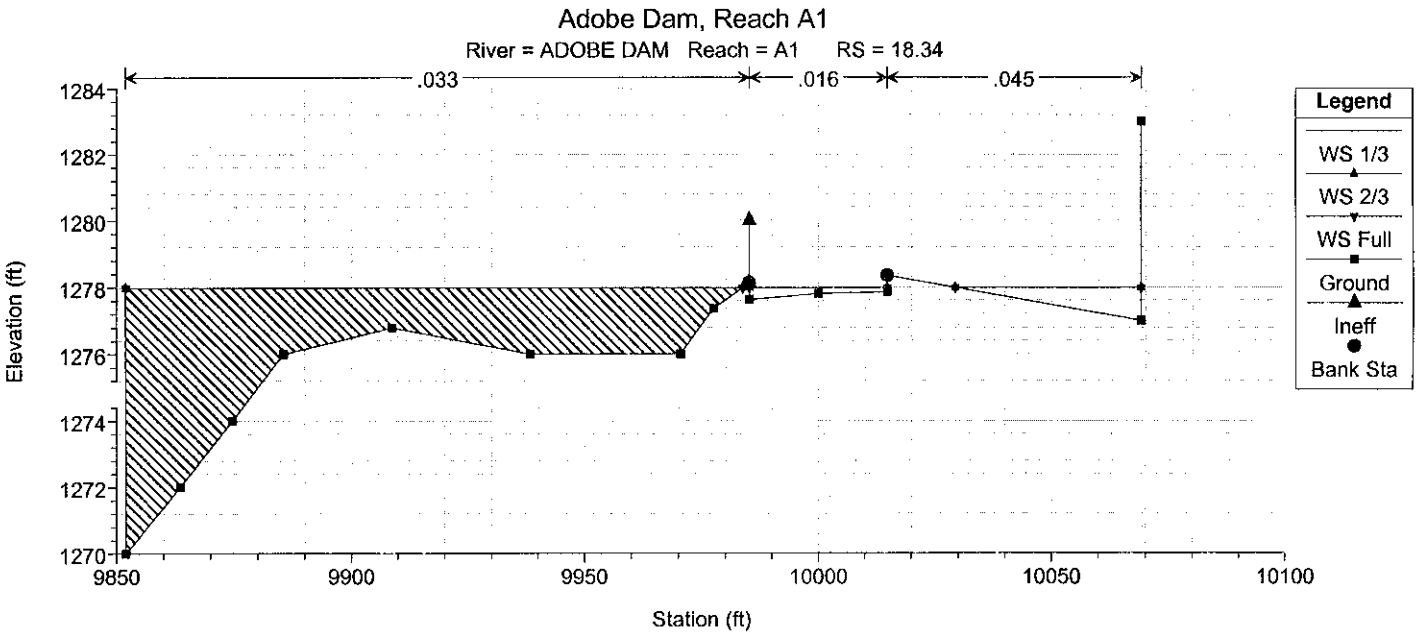
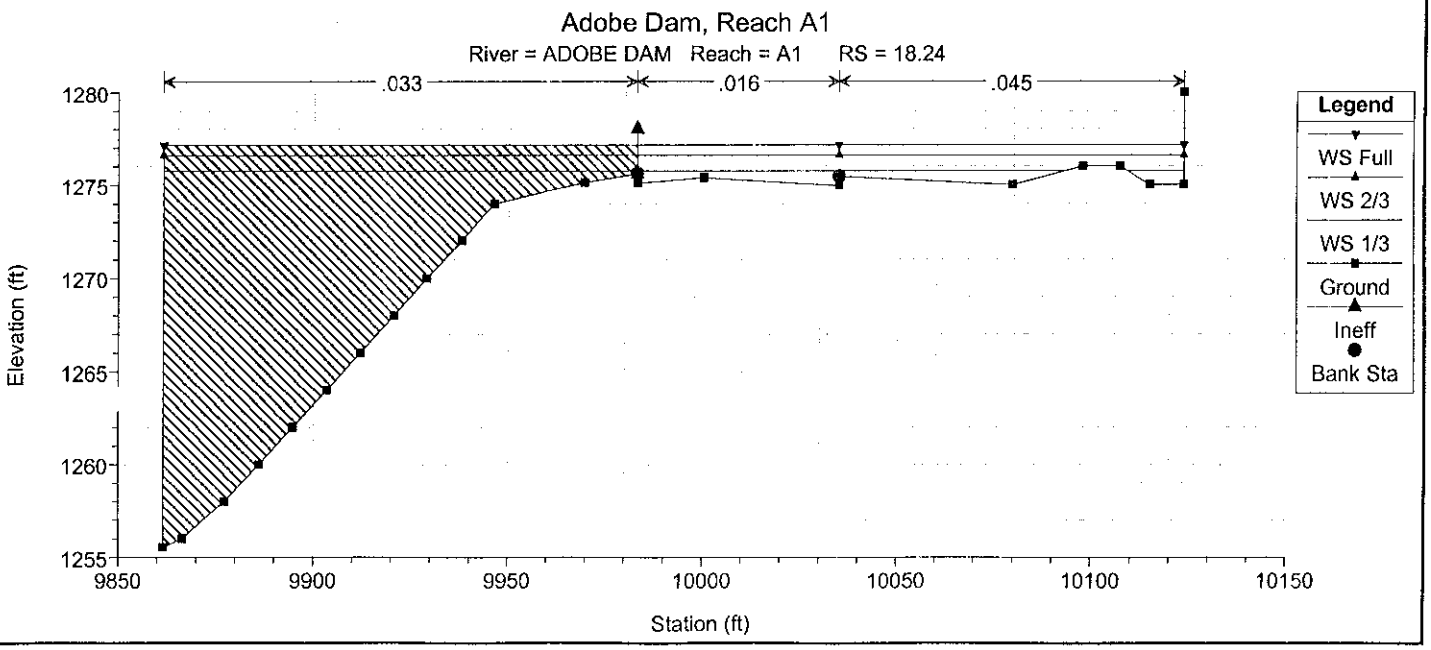
.016
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 18.34
.033
.016
.045
Elevation (ft)
Station (ft)
Legend
WS 1/3
WS 2/3
WS Full
Ground
Ineff
Bank Sta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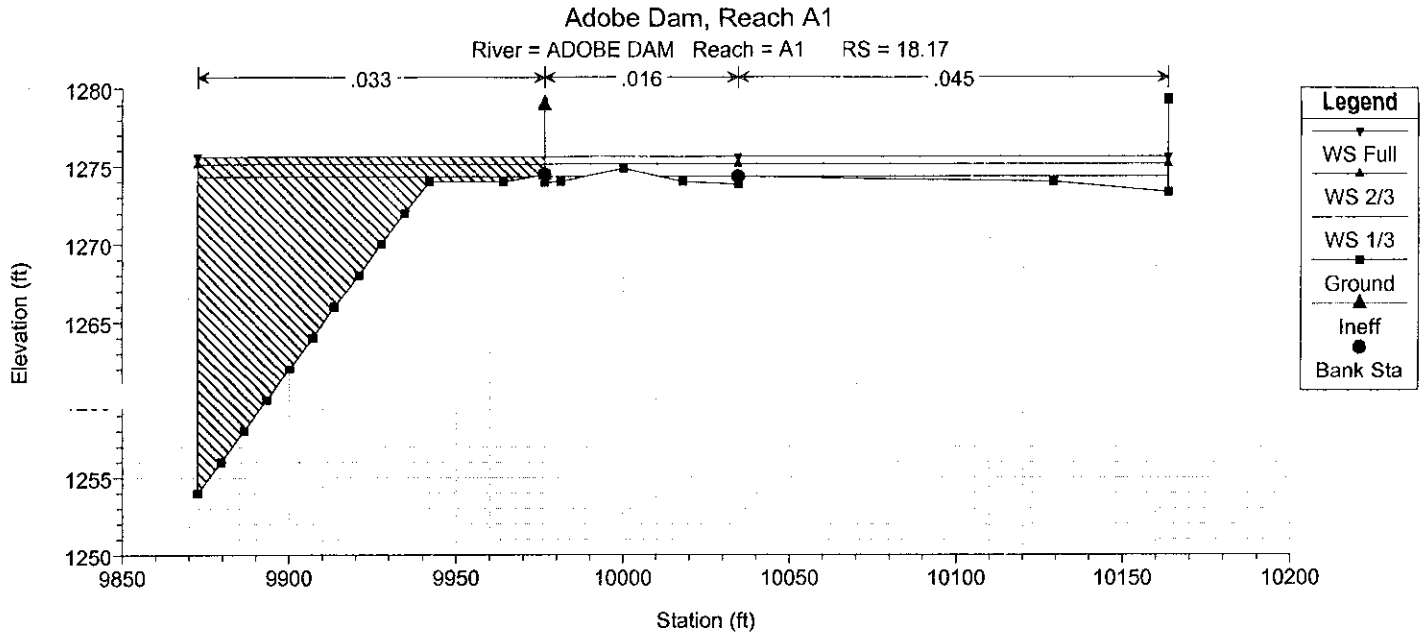
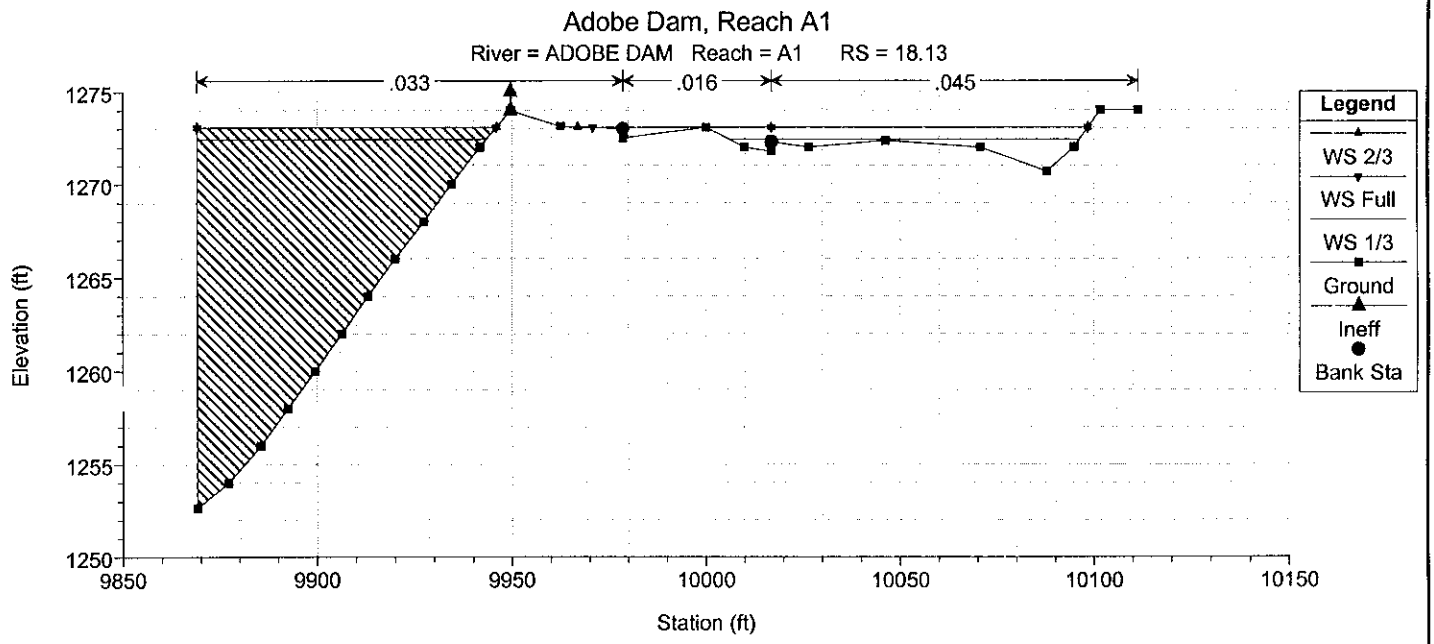
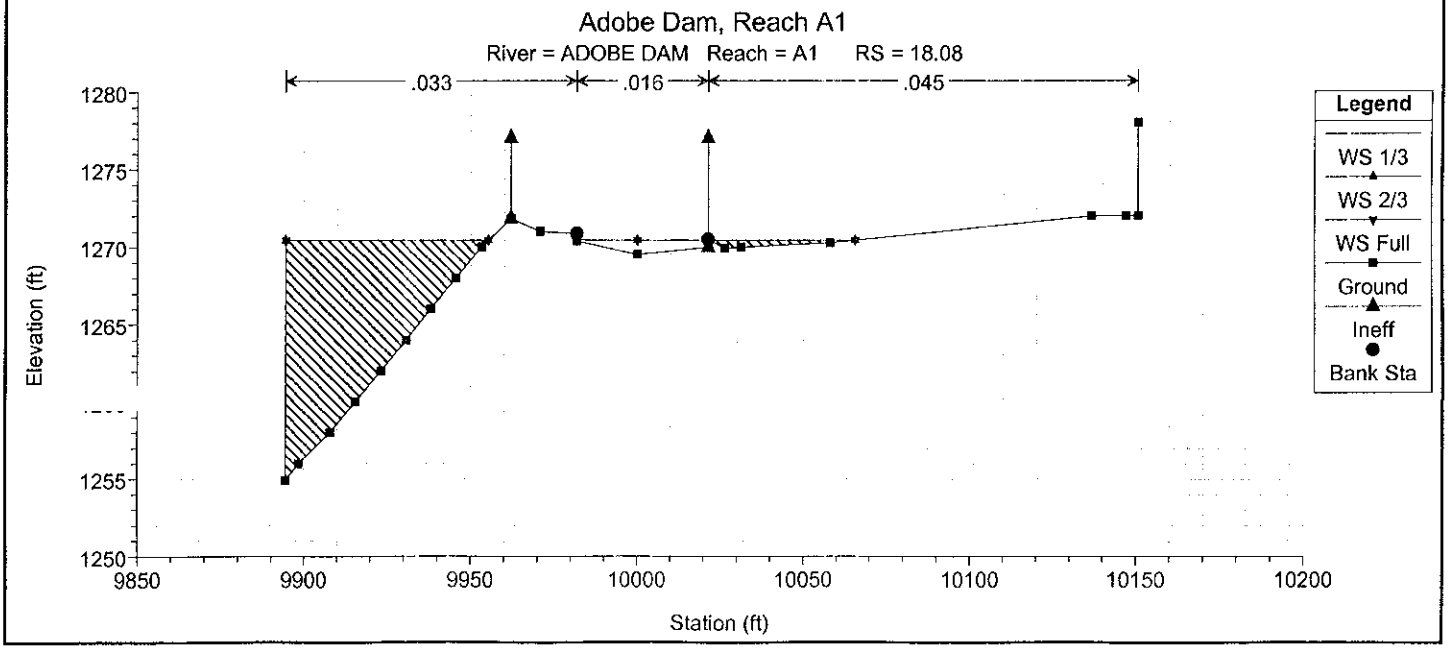
.033
.016
.045
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 18.17
.033
.016
.045
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1280
1275
1270
1265
1255
1250
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 18.13
.033
.016
.045
Legend
WS 2/3
WS Full
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
1275
1270
1265
1260
1255
1250
9850
9900
9950
10000
10050
10100
10150
Station (ft)


Adobe Dam, Reach A1
River = ADOBE DAM Reach = A1 RS = 18.08
.033
.016
.045
Legend
WS 1/3
WS 2/3
WS Full
Ground
Ineff
Bank Sta
Elevation (ft)
1280
1275
1270
1265
1255
1250
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)

6 Flow West of Arrowhead Lakes Subdivision

Summary Sheet for Flow West of Arrowhead Lakes Subdivision

Description

The capacity of the outlet structure of the Arrohead Lakes subdivision is such that ponding will occur within the lakes system, causing ponding which can break out of the lakes and to the west.

Method of Analysis

Normal depth calculations were used to determine approximate flow depths within the main flow breakout along the west side of Arrowhead Lakes. Two cross-sections through the approximate flowpath were analyzed for the 2/3 and Full flows only, as the 1/3 flow is contained within the lakes system.

Results

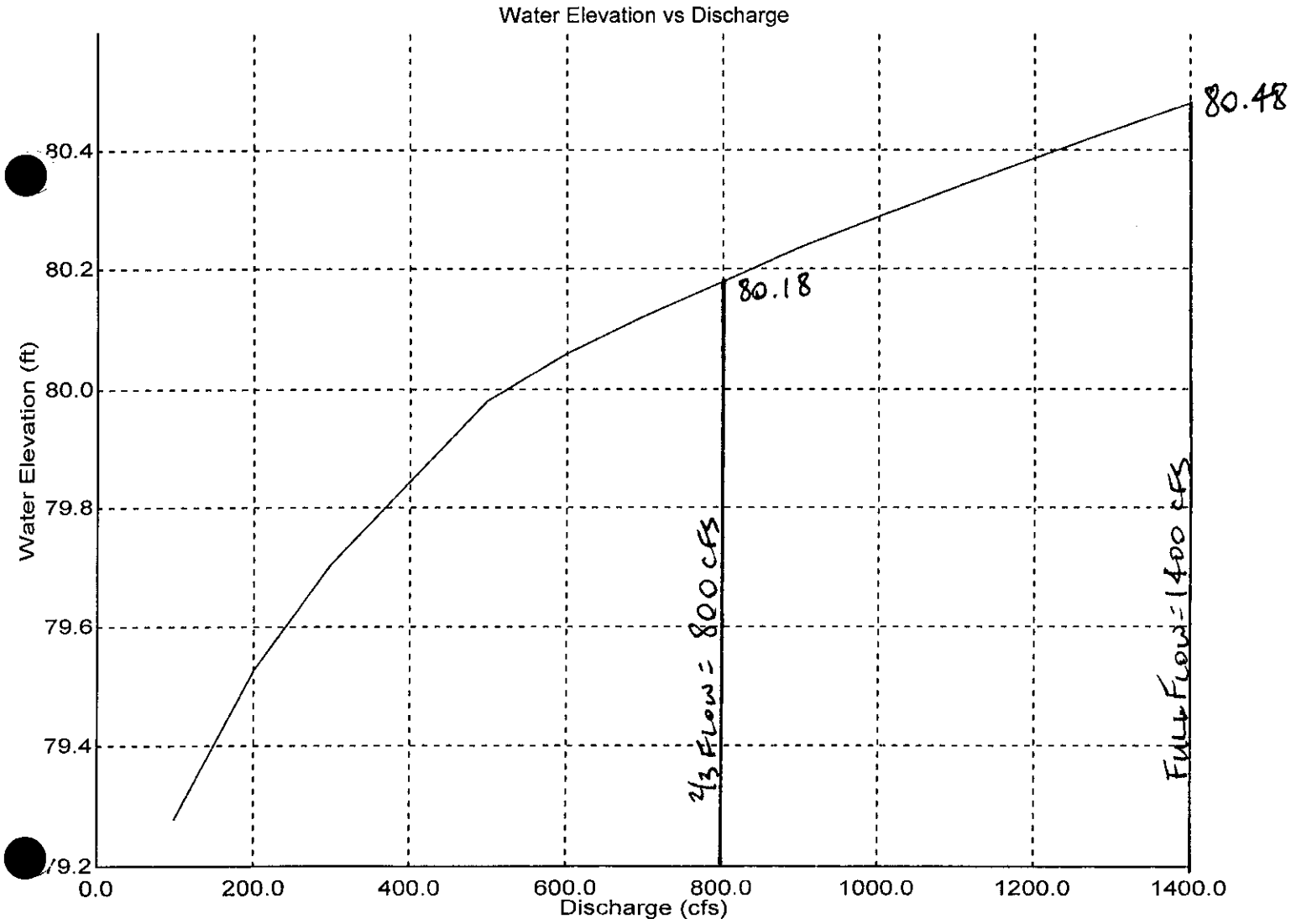
An approximate delineation for the 2/3 and Full flows is shown on the delineation maps.

Section A-A
Plotted Curves for Irregular Channel

Project Description	
Project File	c:\windows\desktop\wofarrow.fm2
Worksheet	West of Arrowhead Lakes, Section A-A
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.005900 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	1,400.00	100.00 cfs

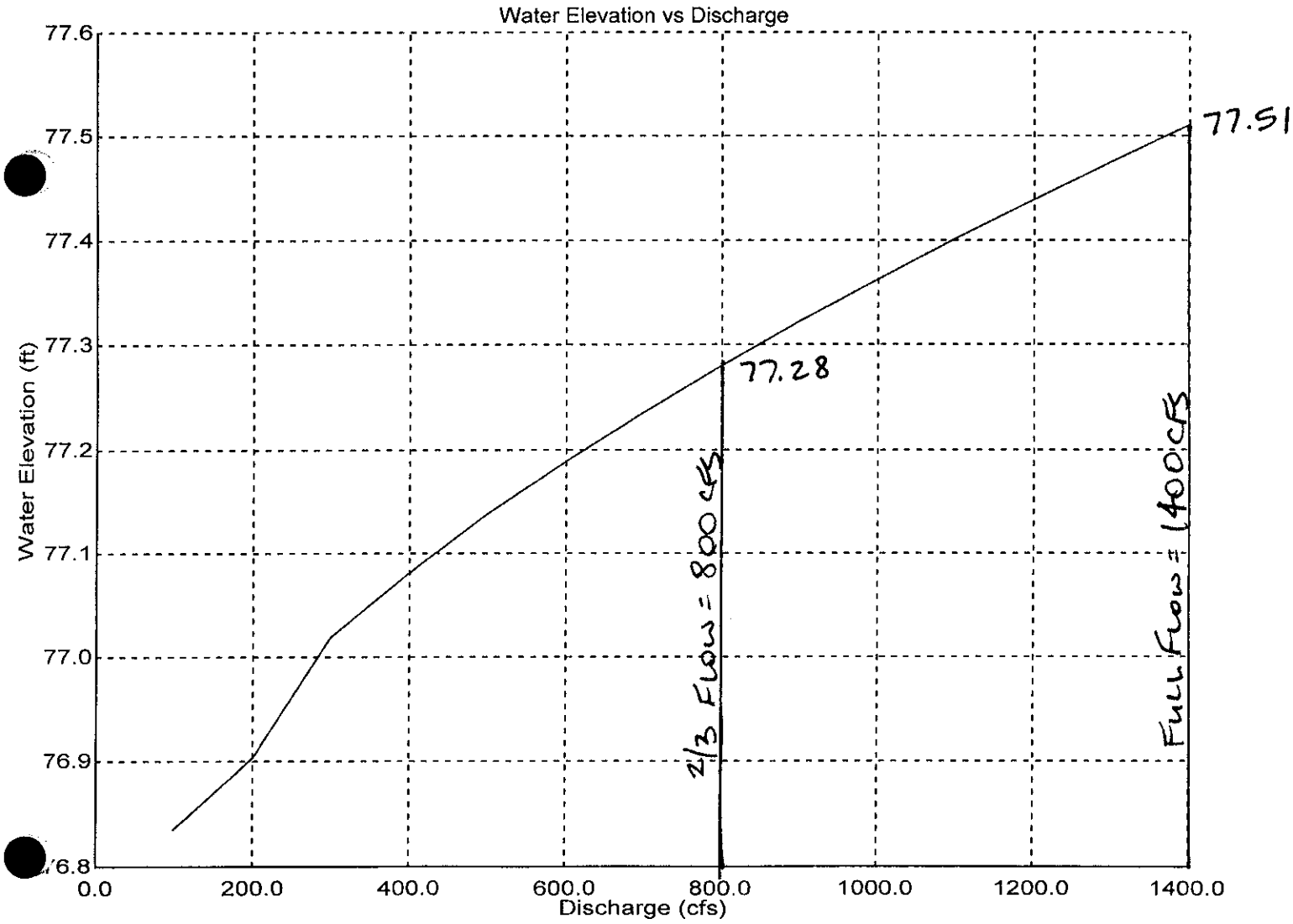


Section B-B
Plotted Curves for Irregular Channel

Project Description	
Project File	c:\windows\desktop\wofarrow.fm2
Worksheet	West of Arrowhead Lakes, Section B-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.002850 ft/ft

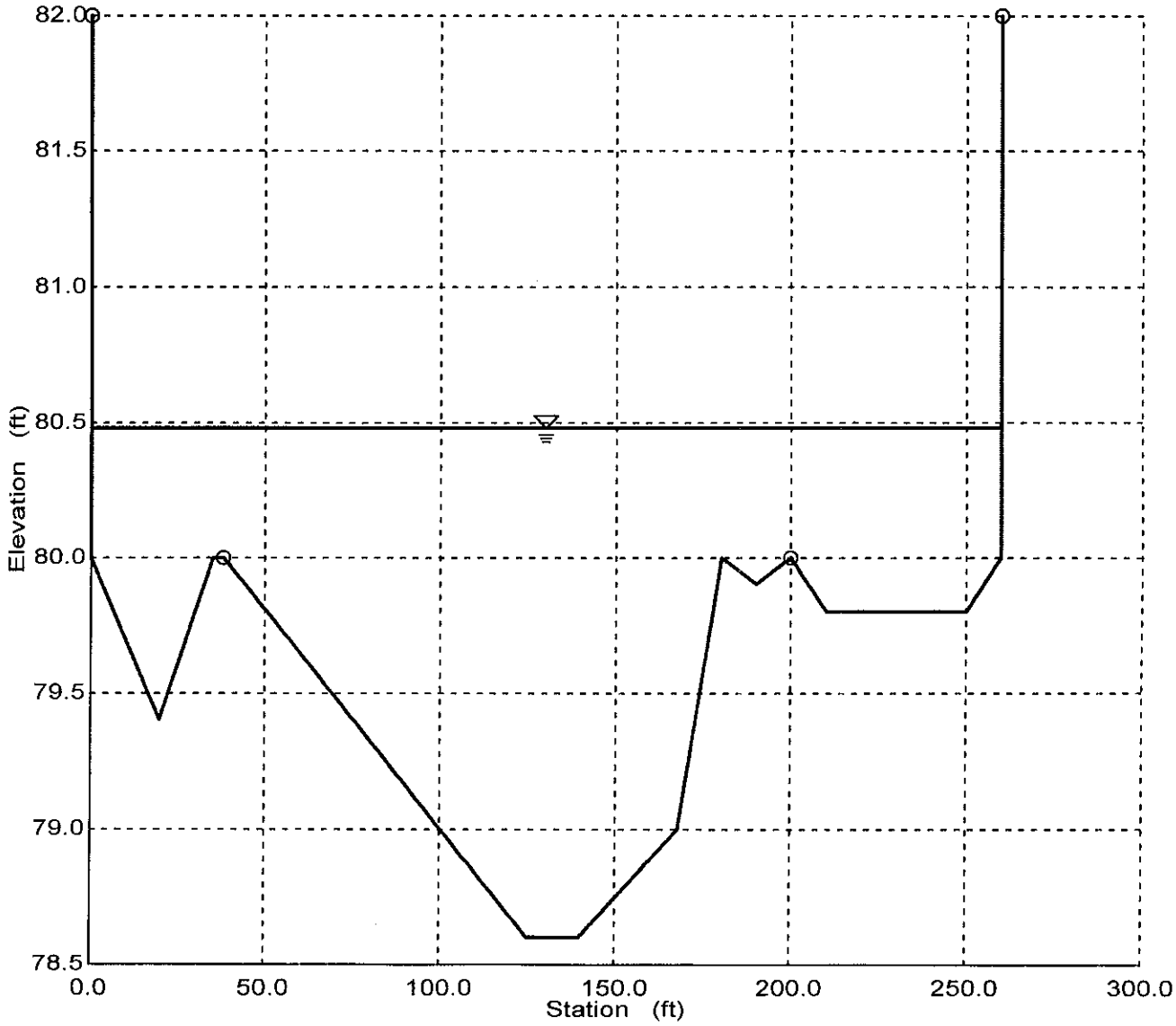
Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	1,400.00	100.00 cfs



Section A-A, 1400
Cross Section for Irregular Channel

Project Description	
Project File	c:\windows\desktop\wofarrow.fm2
Worksheet	West of Arrowhead Lakes, Section A-A
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

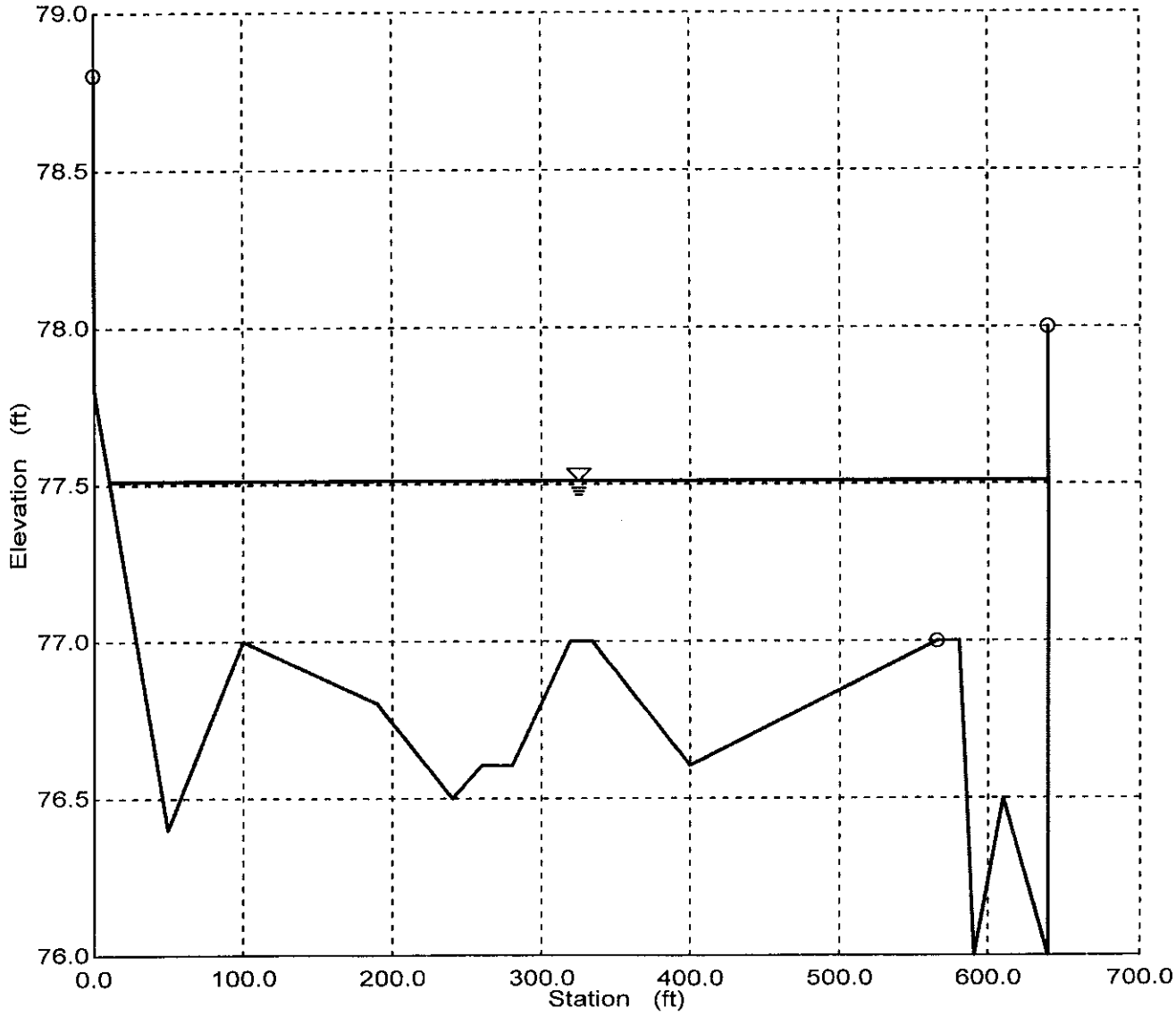
Section Data		
Wtd. Mannings Coefficient	0.022	
Channel Slope	0.005900	ft/ft
Water Surface Elevation	80.48	ft
Discharge	1,400.00	cfs



Section B-B, 1400
Cross Section for Irregular Channel

Project Description	
Project File	c:\windows\desktop\wofarrow.fm2
Worksheet	West of Arrowhead Lakes, Section B-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.023	
Channel Slope	0.002850	ft/ft
Water Surface Elevation	77.51	ft
Discharge	1,400.00	cfs



ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX E: REACH B HYDRAULICS
HEC-RAS MODEL ADB1

Adobe Dam
Spillway Delineation Study

Appendix E: Reach B Hydraulics
HEC-RAS Model ADB1

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1 Flow Crossing the Loop 101 Freeway
- 1.1 Summary Sheet
- 1.2 Calculations
- 1.3 HEC-RAS Model Printout

2 Flow Split at 51st Avenue, South of the Loop 101 Freeway
- 2.1 Summary Sheet
- 2.2 Cross-Section Diagram
- 2.3 Calculations

3 HEC-RAS Model ADB1
- 3.1 Summary Sheet
- 3.2 Summary Tables
- 3.3 HEC-RAS Model Printout

1 Flow Crossing the Loop 101 Freeway

Summary Sheet for Flow Crossing the Loop 101 Freeway

Description

Flow from the spillway approaches the Loop 101 Freeway from the north, as modeled in HEC-RAS model ADA1. Flow starts to weir into the freeway median between cross-sections 19.71 and 19.64. A HEC-RAS model for the freeway median, in combination with weir flow calculations, was run to determine the amount of flow that crosses the freeway. A diagram depicting the weir analysis is included in this section of the appendix.

Assumptions

- The quantity of flow within the median at cross-section 19.47 will be split, and added to either model ADA1 or ADB1.
- Flow south of the freeway median at section 19.47 will continue southwest and exit the freeway through the eastbound on-ramp at 51st Avenue.
- HEC-RAS Model MEDIAN.prj was created solely for computational purposes, and was not used in floodplain boundary determination.

Method of Analysis

A HEC-RAS model (MEDIAN.prj) was created to model the Loop 101 Freeway median between cross-sections 19.64 and 19.41. The model was run for a range of flows. The weir flow equation, Q = CLH^3/2, was used to determine the amount of flow that will cross the freeway between cross-sections. Distance measured along the median, between cross-sections, was used as the length of the weir. The average head between consecutive cross-sections was used as the height of the weir, starting with zero head at the east end and an assumed head at the west end of the first segment. The resulting computed weir flow and corresponding average head were compared to the range of flow and corresponding head generated in the HEC-RAS model.

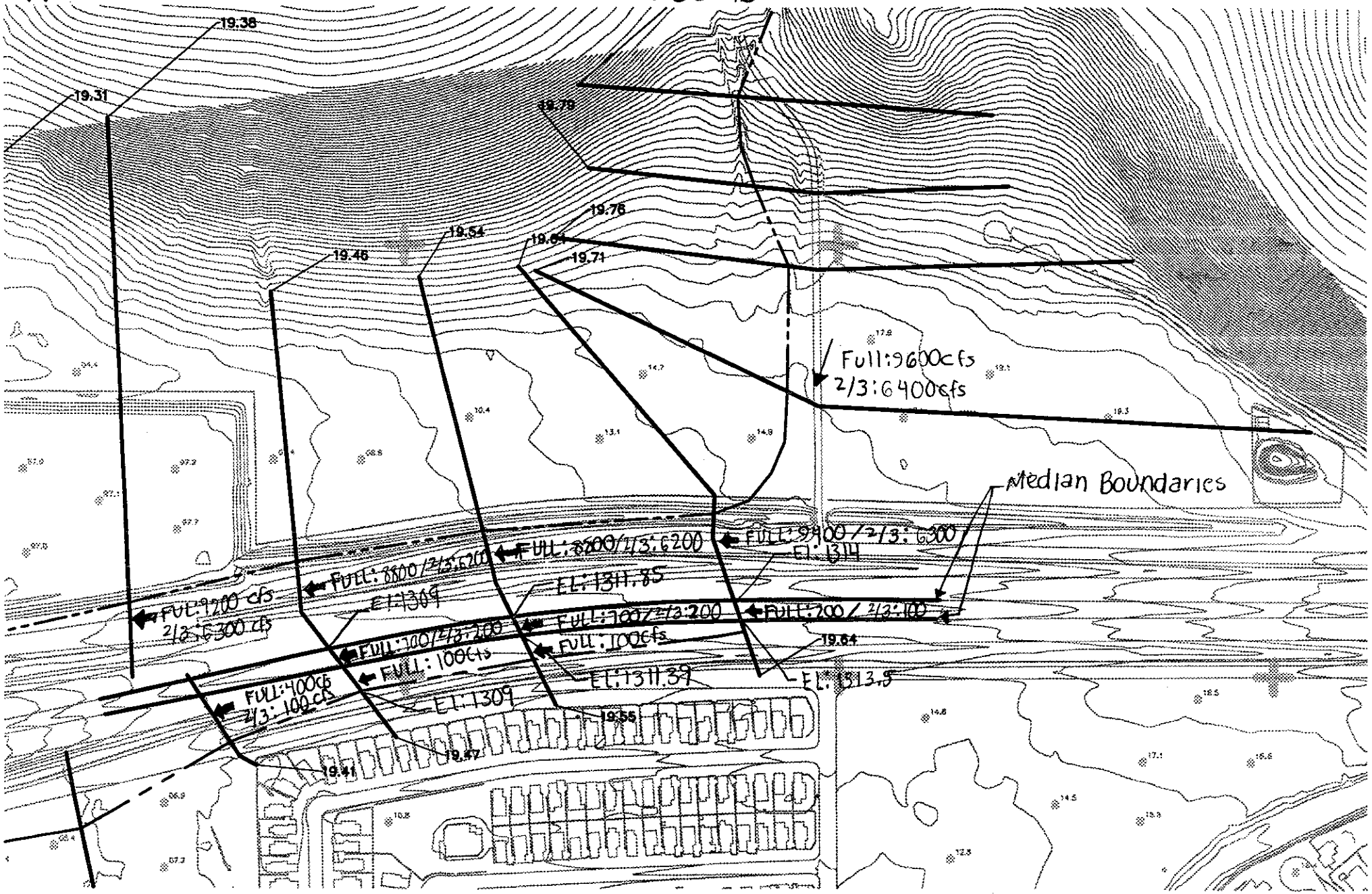
This process was repeated for each cross-section, from 19.64 to 19.41. Flow values in HEC-RAS models ADA1 and ADB1 were adjusted to reflect the weir flow over the freeway.

Results

Results from the analysis are summarized below:

	Total Flow Crossing Freeway (cfs)
1/3 Flow	0
2/3 Flow	100
Full Flow	400

WEIR ONTO EAST BOUND LANES: MODEL ADB1



MAXIMUM POTENTIAL CROSSING

FLOW TRAVELING INTO MEDIAN CS 19.71- CS 19.64

ITERATION 1:

2/3 FLOW 6400 CFS

L	WS ELE	CS HIGH POINT	H	Q
145	1314.7	1314	0.7	84.06749372

100 cfs crosses into CS 1964 ADA2

FULL FLO\ 9600 CFS

L	WS ELE	CS HIGH POINT	H	Q
145	1315.4	1314	1.4	237.7787795

200 cfs crosses into CS 1964 ADA2

FLOW TRAVELING INTO MEDIAN CS 19.64- CS 19.54

ITERATION 1:

2/3 FLOW 6300 CFS

L	CS 1964			CS 19.54			PORPORTIONED	Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	LENGTH	(cfs)
510	1314	1314.67	0.67	1311.85	1310.82	-1.03	201	109.1243

100 cfs crosses into CS 19.54 ADA2

FULL FLO\ 9400 CFS

L	CS 1964			CS 19.54			PORPORTIONED	Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	LENGTH	(cfs)
510	1314	1315.36	1.36	1311.85	1311.52	-0.33	410	644.3826

600 cfs crosses into CS 19.54 ADA2

WS WITH NEW FLOW

2/3 FLOW 6200 CFS

L	CS 1964			CS 19.54		
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD
510	1314	1314.67	0.67	1311.85	1310.79	-1.06

FULL FLOW 8800 CFS

L	CS 1964			CS 19.54		
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD
510	1314	1315.36	1.36	1311.85	1311.35	-0.5

FLOW TRAVELING INTO MEDIAN CS 19.54- CS 19.46

ITERATION 1:

2/3 FLOW 6200 CFS

L	CS 19.54			CS 19.46			PORPORTIONED LENGTH	Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD		(cfs)
345	1311.85	1310.82	-1.03	1309	1308.61	-0.39	NO FLOW CROSSING	

FULL FLOW 8800 CFS

L	CS 19.54			CS 19.46			PORPORTIONED LENGTH	Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD		(cfs)
345	1311.85	1311.52	-0.33	1309	1309	0	NO FLOW CROSSING	

FLOW IN MEDIAN OVERTOPPINT TO ROADWAY CS 19.71-19.64

ITERATION 1:

2/3 FLOW 100

L	WS ELE	HIGHT POINT ON	H	Q
(ft)	(ft)	LEFT BANK OF	(ft)	(cfs)
145	1312.16	1313.5	-1.34	STAYS WITHIN MEDIAN

FULL FLOW 200

L	WS ELE	HIGHT POINT ON	H	Q
(ft)	(ft)	LEFT BANK OF	(ft)	(cfs)
145	1313.18	1313.5	-0.32	STAYS WITHIN MEDIAN

FLOW IN MEDIAN OVERTOPPINT TO ROADWAY CS 19.64-19.54

ITERATION 1:

2/3 FLOW 200

L	WS ELE	HIGHT POINT ON	H	Q
(ft)	(ft)	LEFT BANK OF	(ft)	(cfs)
510	1310.57	1311.39	-0.82	STAYS WITHIN MEDIAN

FULL FLOW 800

L	CS 1964			CS 19.54			PORPOR	Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	TIONED	(cfs)
510	1313.5	1313.37	-0.13	1311.39	1311.9	0.51	406	147

100 CFS CROSSES THE MEDIAN INTO THE EAST BOUND LANES OF AGUA FRIA FREEWAY

WS WITH NEW FLOW

2/3 FLOW 200

L	WS ELE	HIGHT POINT ON	H	Q
(ft)	(ft)	LEFT BANK OF	(ft)	(cfs)
510	1310.57	1311.39	-0.82	STAYS WITHIN MEDIAN

FULL FLOW 653

L	CS 1964			CS 19.54		
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD
510	1313.5	1313.18	-0.32	1311.39	1311.68	0.29

FLOW IN MEDIAN OVERTOPPINT TO ROADWAY CS 19.54-19.46

ITERATION 1:

2/3 FLOW 200

L	WS ELE	HIGHT POINT ON LEFT BANK OF MEDIAN	H	Q	
(ft)	(ft)		(ft)	(cfs)	
345	1308.66	1309	-0.34		

FULL FLOW 653

L	CS 19.54			CS 19.46			Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)
510	1311.39	1311.68	0.29	1309	1309.21	0.21	179

200 Potential CFS crosses the median into the east bound lanes. Capacity of East bound lanes 100 cfs!

ITERATION 1:

2/3 FLOW 200

L	WS ELE	HIGHT POINT ON LEFT BANK OF MEDIAN	H	Q	
(ft)	(ft)		(ft)	(cfs)	
345	1308.66	1309	-0.34		

FULL FLOW 474

L	CS 19.54			CS 19.46			Q
(ft)	HIGH POINT	WS ELEV	HEAD	HIGH POINT	WS ELEV	HEAD	(cfs)
510	1311.39	1311.54	0.15	1309	1309.04	0.04	42

```
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
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Project File : MEDIAN.prj
Run Date and Time: 04/09/2001 1:40:54 PM

Project in English units

Study Name: Adobe Dam Spillway Delineation 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 Adobe Dam spillway.

Model Name: MEDIAN
Model Description: Created to model the Agua Fria Freeway (Loop 101) median, as an aid in the determination of flow crossing the freeway to the south. This model was not used in the actual floodplain boundary determination, and was created solely for computational purposes.

HEC-RAS Version: Version 2.2, September 1998 with RASPATCH

Consultants: Hoskin Engineering Consultants, Inc.
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PLAN DATA

Plan Title: Loop 101 Median
Plan File : g:\Filedir\99\990006-02Hydro\Reach B\MEDIAN.p01

Geometry Title: Loop 101 Median
Geometry File : g:\Filedir\99\990006-02Hydro\Reach B\MEDIAN.g01

Flow Title : Loop 101 Median
Flow File : g:\Filedir\99\990006-02Hydro\Reach B\MEDIAN.f01

Plan Summary Information:

Number of:	Cross Sections =	3	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: Loop 101 Median
Flow File : g:\Filedir\99\990006-02Hydro\Reach B\MEDIAN.f01

Flow Data (cfs)

River	Reach	RS	2/3 FLOW	FULL FLOW
ADOBE DAM	A2	19.64	100	200
ADOBE DAM	A2	19.54	200	700
ADOBE DAM	A2	19.46	200	700
Loop 101	Median	19.64	100	200
Loop 101	Median	19.54	200	700
Loop 101	Median	19.46	200	700

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Loop 101	Median	2/3 FLOW	Critical	Critical

Changes in WS and EG

River	Reach	RS	Profile	Type	Value
Loop 101	Median	19.18	PF 3	Known WS	1304.84
Loop 101	Median	19.18	FULL FLOW	Known WS	1303.93
Loop 101	Median	19.18	2/3 FLOW	Known WS	1302.83

GEOMETRY DATA

Geometry Title: Loop 101 Median
Geometry File : g:\Filedir\99\990006-02Hydro\Reach B\MEDIAN.g01

CROSS SECTION RIVER: Loop 101
REACH: Median RS: 19.64

INPUT
Description:
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9609.32	1314.77	9639.63	1314	9648.36	1312	9657.18	1310	9662.18	1310
9670.61	1311.31	9686.41	1312	9717.93	1313.5	9762.56	1312	9775.69	1310.83

```
 9791.76    1312 9817.24 1313.11  9838.3    1314 9844.15    1314 9859.76  1312.7
 9868.44    1312 9875.57 1310.97  9882.3    1310 9884.93    1310 9890.19 1310.89
 9896.76    1312 9924.14 1313.86 9958.56    1312 9967.35 1310.85 9973.88    1310
  9985.3    1308 9989.49    1306   10000    130610009.09    130810016.95    1310
10025.72    131210034.52 1313.1710047.24 1313.8710173.96 1313.3610234.11    1314
10285.23 1314.1910328.33    131410361.46 1313.99 10406.5 1313.9710425.55    1314
10480.09 1314.28 10507.8    131410520.75 1313.8510525.34 1313.7610555.49    1314
10577.11 1315.1210593.14    131610605.67  1316.4 10649.2    131810673.43    1320
10697.16    132210718.99    132410740.87    1326

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9609.32     .02 9717.93     .03  9838.3     .02

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9717.93  9838.3            510.09  531.95  545.25             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
  9838.310740.87    1317
Left Levee      Station= 9717.93      Elevation=  1313.5
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9609.3210047.25    1304

CROSS SECTION OUTPUT    Profile #2/3 FLOW

  E.G. Elev (ft)            1312.47   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.31   Wt. n-Val.                          0.030
  W.S. Elev (ft)            1312.16   Reach Len. (ft)           510.09    531.95    545.25
  Crit W.S. (ft)            1312.16   Flow Area (sq ft)                    22.56
  E.G. Slope (ft/ft)       0.016012   Area (sq ft)                         22.56    258.67
  Q Total (cfs)              100.00   Flow (cfs)                          100.00
  Top Width (ft)             141.97   Top Width (ft)                       37.81    104.16
  Vel Total (ft/s)             4.43   Avg. Vel. (ft/s)                      4.43
  Max Chl Dpth (ft)            6.16   Hydr. Depth (ft)                      0.60
  Conv. Total (cfs)           790.3   Conv. (cfs)                          790.3
  Length Wtd. (ft)           531.95   Wetted Per. (ft)                     37.91
  Min Ch El (ft)            1310.83   Shear (lb/sq ft)                      0.59
  Alpha                        1.00   Stream Power (lb/ft s)                2.64
  Frctn Loss (ft)                     Cum Volume (acre-ft)                  1.31     12.65
  C & E Loss (ft)                     Cum SA (acres)                        1.51      7.24

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT    Profile #FULL FLOW

  E.G. Elev (ft)            1313.31   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.07   Wt. n-Val.                          0.030
  W.S. Elev (ft)            1313.24   Reach Len. (ft)           510.09    531.95    545.25
  Crit W.S. (ft)            1312.55   Flow Area (sq ft)                    94.19
  E.G. Slope (ft/ft)       0.001859   Area (sq ft)                         94.19    402.22
  Q Total (cfs)              200.00   Flow (cfs)                          200.00
  Top Width (ft)             257.02   Top Width (ft)                       94.86    162.16
  Vel Total (ft/s)             2.12   Avg. Vel. (ft/s)                      2.12
  Max Chl Dpth (ft)            7.24   Hydr. Depth (ft)                      0.99
  Conv. Total (cfs)          4638.6   Conv. (cfs)                         4638.6
  Length Wtd. (ft)           531.95   Wetted Per. (ft)                     95.00
  Min Ch El (ft)            1310.83   Shear (lb/sq ft)                      0.12
  Alpha                        1.00   Stream Power (lb/ft s)                0.24
  Frctn Loss (ft)              1.32   Cum Volume (acre-ft)        2.86      3.27     22.51
  C & E Loss (ft)              0.02   Cum SA (acres)              1.70      2.44     10.98

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: Loop 101
REACH: Median             RS: 19.54

INPUT
Description: 9180.82
1312.56

1312
9212.12
1311.53
9216.49
1312
Station Elevation Data     num=      58
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 9561.38 1312.56 9587.14    1312 9592.68 1311.53 9597.05    1312 9608.61 1312.14
  9624.7    1312 9630.91 1311.01 9636.68    1310 9646.22    1308 9660.87    1308
 9678.63 1309.07    9694    1310 9730.82 1311.39 9770.54    1308 9773.17    1308
 9775.79    1308 9785.36 1309.12 9792.72    1310 9836.65 1311.85 9860.65    1310
 9882.41    1308 9901.65    1308 9911.14 1309.14 9918.09    1310 9947.33 1310.49
  9966.3    1310 9976.46    1308 9982.15 1306.88 9986.56    1306 9993.45    1304
   10000    130210007.14    130210013.74    130410021.78    130610025.67 1306.81
10031.43    130810035.38 1308.9410040.89    131010113.22 1310.3210189.73 1310.73
10337.93 1310.7210380.56  1310.910434.75    131210458.24  1313.110477.41    1314
10493.52 1315.0910506.99    131610517.17 1316.9810528.04    131810529.66 1318.98
10540.87    132010552.37 1320.9910564.06    132210575.17  1322.910586.66    1324
10594.49 1324.9210603.52    132610608.86 1326.62

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9561.38     .02 9730.82     .03 9836.65    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9730.82 9836.65           425.35  435.34   450.8             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 9561.38 9730.82    1315 9836.6510608.86    1315
Left Levee      Station= 9730.82      Elevation= 1311.39
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9561.3810040.89    1304

CROSS SECTION OUTPUT    Profile #2/3 FLOW

  E.G. Elev (ft)            1310.66   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                            0.030
  W.S. Elev (ft)            1310.57   Reach Len. (ft)             425.35    435.34    450.80
  Crit W.S. (ft)            1309.65   Flow Area (sq ft)                     82.49
  E.G. Slope (ft/ft)       0.001778   Area (sq ft)                          82.49    479.01
  Q Total (cfs)              200.00   Flow (cfs)                           200.00
  Top Width (ft)             371.66   Top Width (ft)                        65.71    305.96
  Vel Total (ft/s)             2.42   Avg. Vel. (ft/s)                       2.42
  Max Chl Dpth (ft)            6.57   Hydr. Depth (ft)                       1.26
  Conv. Total (cfs)          4743.5   Conv. (cfs)                          4743.5
  Length Wtd. (ft)           435.34   Wetted Per. (ft)                      65.95
  Min Ch El (ft)            1308.00   Shear (lb/sq ft)                       0.14
  Alpha                        1.00   Stream Power (lb/ft s)                 0.34
  Frctn Loss (ft)              1.75   Cum Volume (acre-ft)                   0.67      8.04
  C & E Loss (ft)              0.01   Cum SA (acres)                         0.87      4.68


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.
Note:    Hydraulic jump has occurred between this cross section and the previous upstream
section.
```

CROSS SECTION OUTPUT Profile #FULL FLOW

E.G. Elev (ft)	1311.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.030	
W.S. Elev (ft)	1311.76	Reach Len. (ft)	425.35	435.34	450.80
Crit W.S. (ft)	1310.88	Flow Area (sq ft)		185.10	
E.G. Slope (ft/ft)	0.002700	Area (sq ft)	221.40	185.10	1097.92
Q Total (cfs)	700.00	Flow (cfs)		700.00	
Top Width (ft)	797.99	Top Width (ft)	109.40	103.64	584.96
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	7.76	Hydr. Depth (ft)		1.79	
Conv. Total (cfs)	13470.7	Conv. (cfs)		13470.7	
Length Wtd. (ft)	435.34	Wetted Per. (ft)		103.93	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		1.14	
Frctn Loss (ft)	2.25	Cum Volume (acre-ft)	1.57	1.57	13.12
C & E Loss (ft)	0.02	Cum SA (acres)	1.06	1.22	6.31

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: Loop 101
REACH: Median RS: 19.46

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9561.81	1310	9581.46	1309.72	9609.95	1308	9653.32	1308	9696.47	1309
9730.59	1308	9753.87	1308	9777.15	1308	9837.67	1309	9885.5	1308
9915.86	1308	9922.79	1308.32	9929.75	1308	9966.35	1306	9984.54	1304
9995.73	1302	10000	130	10013.72	1300	10020.7	130	10028.68	1304
10036.47	130	10269.52	1307.18	10425.35	1307.81	10429.45	130	10461.67	1308.95
10497.24	131	10522.27	1311.11	10543.35	131	10553.76	1312.96	10564.37	1314
10576.38	1315.18	10585.33	131	10598.26	1317.04	10610.33	131	10629.25	1320

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9561.81	.02	9696.47	.03	9837.67	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9696.47	9837.67	0	0	0	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9561.81	9696.47	1310	9837.67	10629.25	1310

Left Levee Station= 9696.47 Elevation= 1309
Blocked Obstructions num= 1

Sta L	Sta R	Elev
9930.53	10629.25	1304

CROSS SECTION OUTPUT Profile #2/3 FLOW

E.G. Elev (ft)	1308.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	1308.66	Reach Len. (ft)			
Crit W.S. (ft)	1308.66	Flow Area (sq ft)		51.33	
E.G. Slope (ft/ft)	0.016893	Area (sq ft)		51.33	1074.11
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	706.91	Top Width (ft)		109.01	597.90
Vel Total (ft/s)	3.90	Avg. Vel. (ft/s)		3.90	
Max Chl Dpth (ft)	4.66	Hydr. Depth (ft)		0.47	
Conv. Total (cfs)	1538.8	Conv. (cfs)		1538.8	
Length Wtd. (ft)		Wetted Per. (ft)		109.03	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		1.93	

Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

Warning: Divided flow computed for this cross-section.
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 OUTPUT Profile #FULL FLOW

E.G. Elev (ft)	1309.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.46	Wt. n-Val.		0.030	
W.S. Elev (ft)	1309.25	Reach Len. (ft)			
Crit W.S. (ft)	1309.25	Flow Area (sq ft)		128.94	
E.G. Slope (ft/ft)	0.013564	Area (sq ft)	99.33	128.94	1438.57
Q Total (cfs)	700.00	Flow (cfs)		700.00	
Top Width (ft)	882.50	Top Width (ft)	107.20	141.20	634.11
Vel Total (ft/s)	5.43	Avg. Vel. (ft/s)		5.43	
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	6010.5	Conv. (cfs)		6010.5	
Length Wtd. (ft)		Wetted Per. (ft)		141.22	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.77	
Alpha	1.00	Stream Power (lb/ft s)		4.20	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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.

SUMMARY OF MANNING'S N VALUES

River:Loop 101

Reach	River Sta.	n1	n2	n3
Median	19.64	.02	.03	.02
Median	19.54	.02	.03	.045
Median	19.46	.02	.03	.02

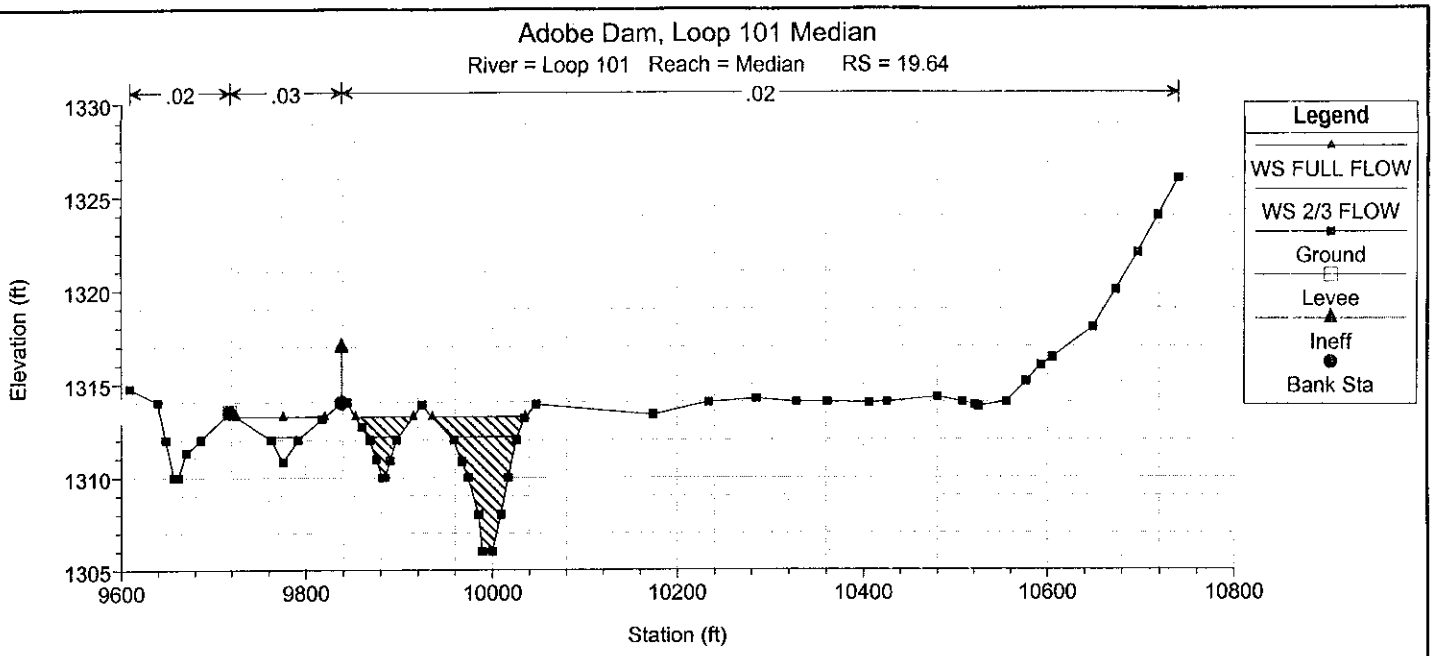
SUMMARY OF REACH LENGTHS

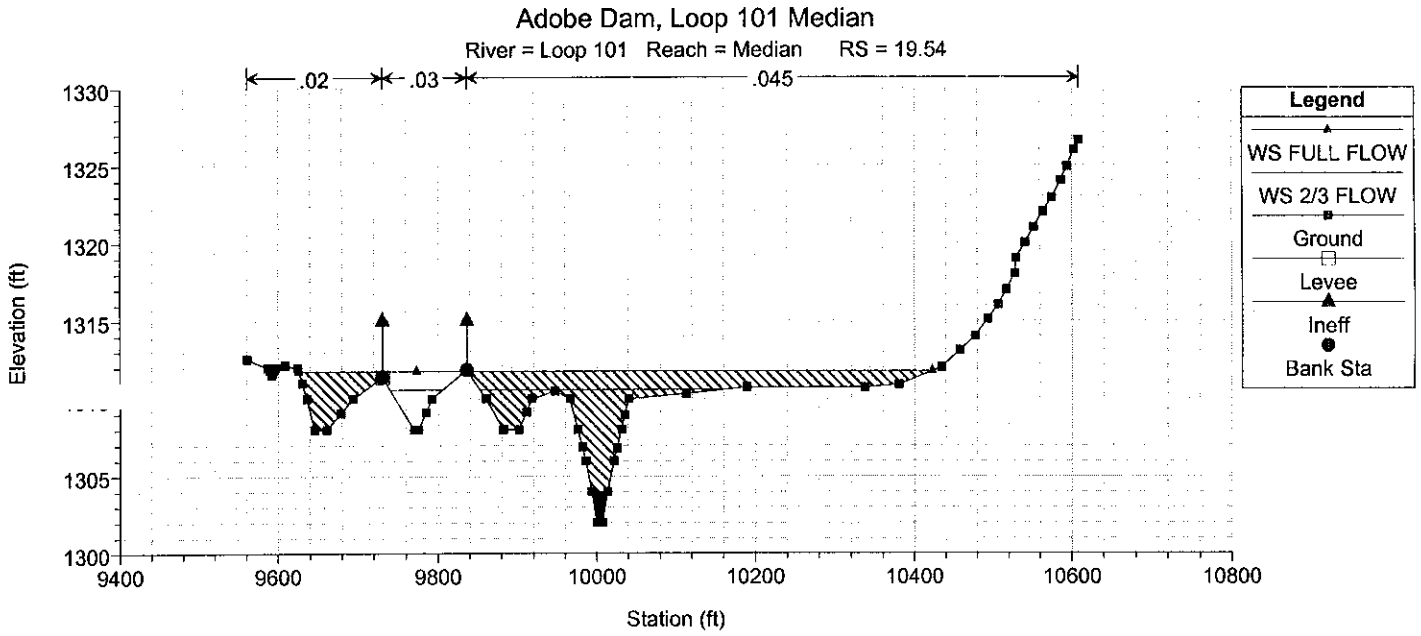
River: Loop 101

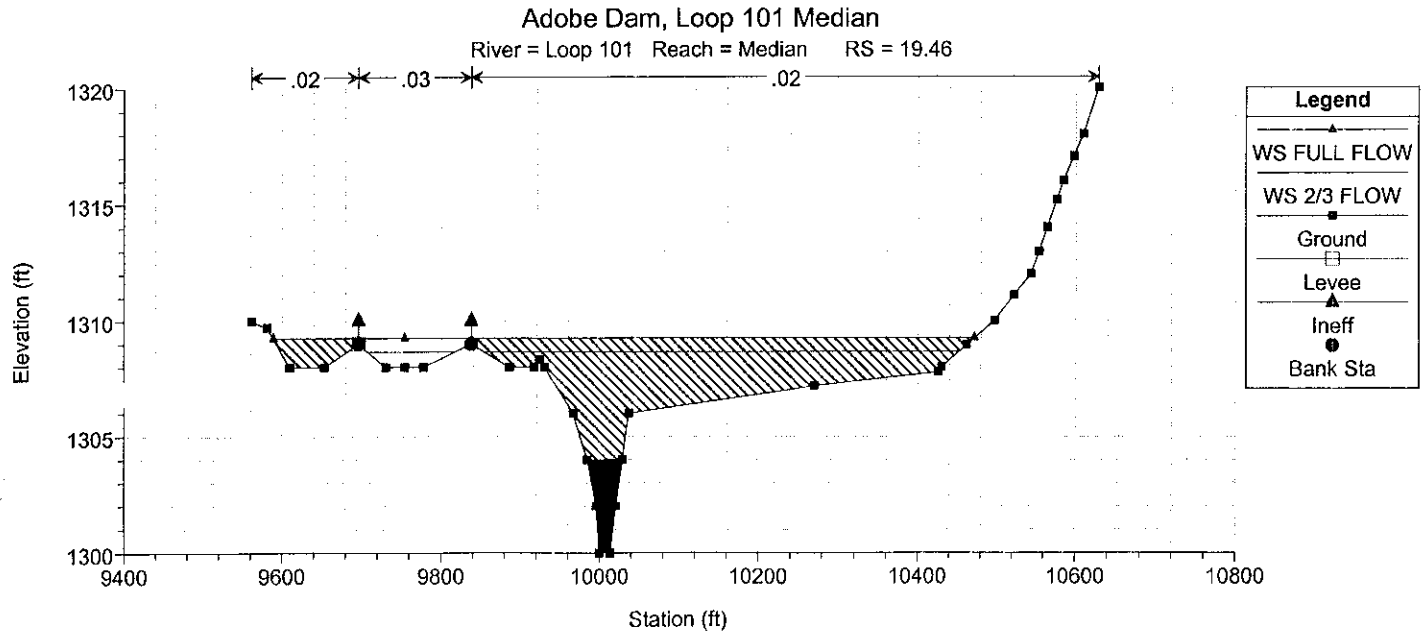
Reach	River Sta.	Left	Channel	Right
Median	19.64	510.09	531.95	545.25
Median	19.54	425.35	435.34	450.8
Median	19.46	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Loop 101

Reach	River Sta.	Contr.	Expan.
Median	19.64	.1	.3
Median	19.54	.1	.3
Median	19.46	.1	.3


Adobe Dam, Loop 101 Median
River = Loop 101 Reach = Median RS = 19.64
.02
.03
.02
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
WS 2/3 FLOW
Ground
Levee
Ineff
Bank Sta


Adobe Dam, Loop 101 Median
River = Loop 101 Reach = Median RS = 19.54
.02
.03
.045
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
WS 2/3 FLOW
Ground
Levee
Ineff
Bank Sta


Adobe Dam, Loop 101 Median
River = Loop 101 Reach = Median RS = 19.46
.02
.03
.02
Elevation (ft)
Station (ft)
Legend
WS FULL FLOW
WS 2/3 FLOW
Ground
Levee
Ineff
Bank Sta

2 Flow Split at 51st Avenue, South of the Loop 101 Freeway

Summary Sheet for Flow Split at 51st Avenue, South of 101 Freeway

Description

When the flow reaches 51st Avenue, it flows either south along 51st Avenue, or continues west along the south frontage road. A flow split analysis was performed, using the equation $Q = C\ L\ H^{3/2}$. Typical cross-sections were used to determine the elevation at which all the flow would pass when adding the flow at each section. The cross-sections are described as follows:

- South on 51st Avenue: Section south of 51st Avenue Overpass, where 51st Avenue has subdivisions on the east and west sides.
- West along the frontage road: Between the freeway sideslope and the homes south of the empty lots.

The calculations and a diagram showing the cross-section locations iare included in this section.

Assumptions

- The row of houses south of the empty lots, south of the freeway and west of 51st Avenue, have a consistent six (6) ft wall along the north side.
- The cross-sections taken are the most constricting.

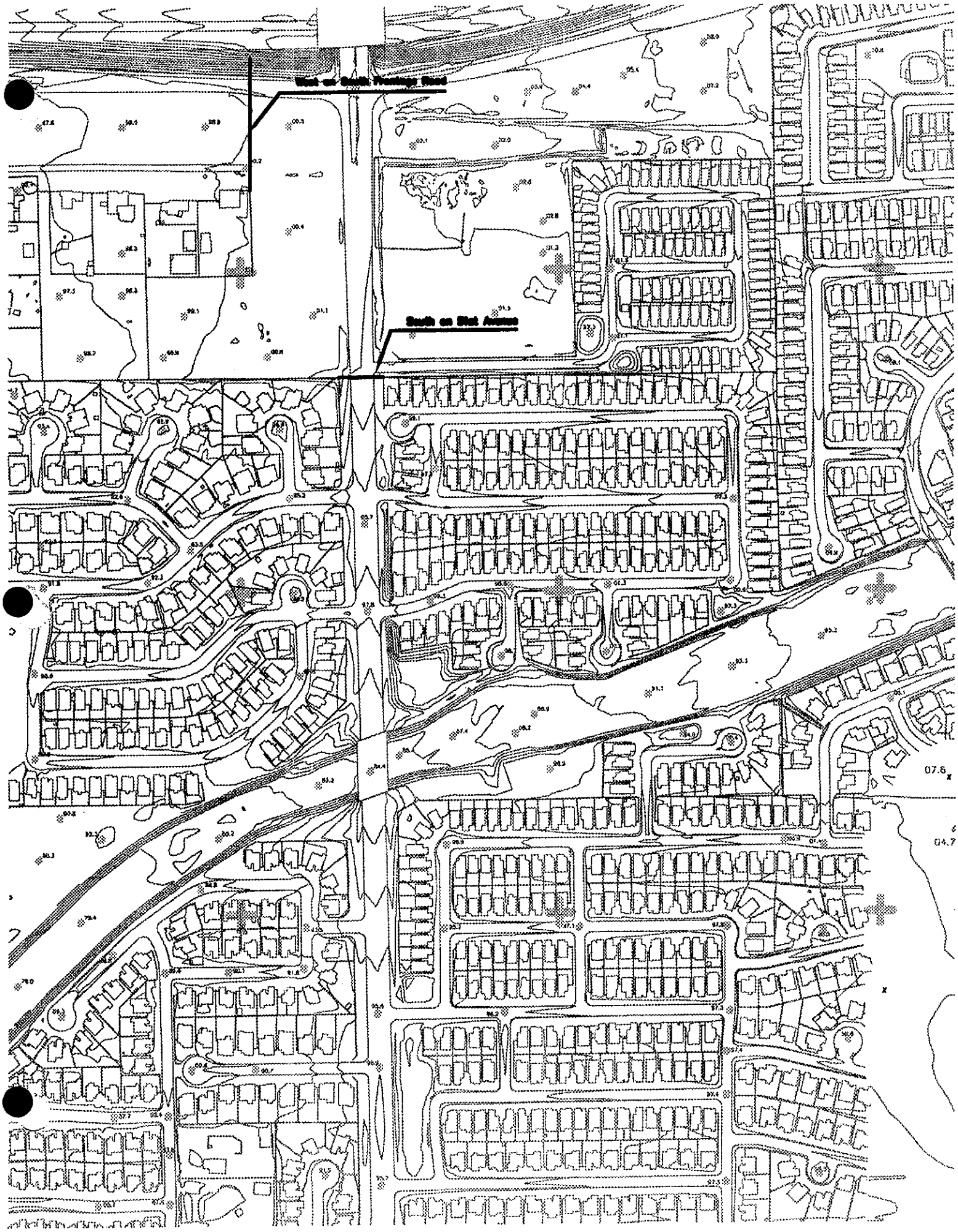
Method of Analysis

The equation $Q = C\ L\ H^{3/2}$ was used to determine the amount of flow traveling though each cross-section at set elevations. C was assumed to be 2.8. The amount of flow was calculated for each cross-section. The total flow was determined by the addition the three cross-section flows. The elevation at which the total flow passes was determined.

Results

Results of the flow split analysis are summarized in the table below. Flow south on 51st Avenue was removed from HEC-RAS model ADB1.

	1/3	2/3	Full
Total Flow @ 51st Avenue and 101	**600**	**1,500**	**2,600**
West along Frontage Road and South of 101	200	800	1,500
South on 51st Avenue	400	700	1,100

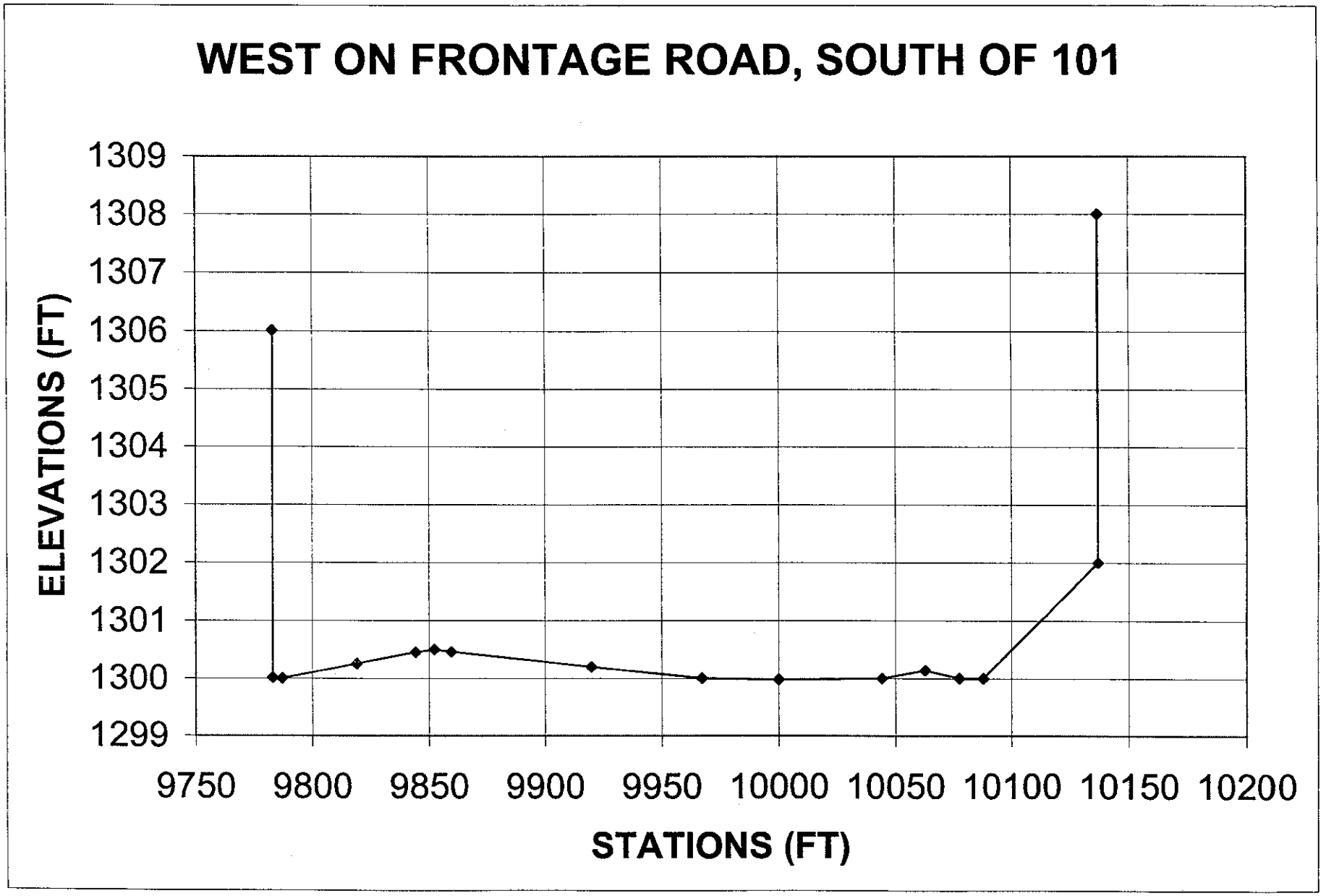

West on South Heritage Road
South on Slot Avenue

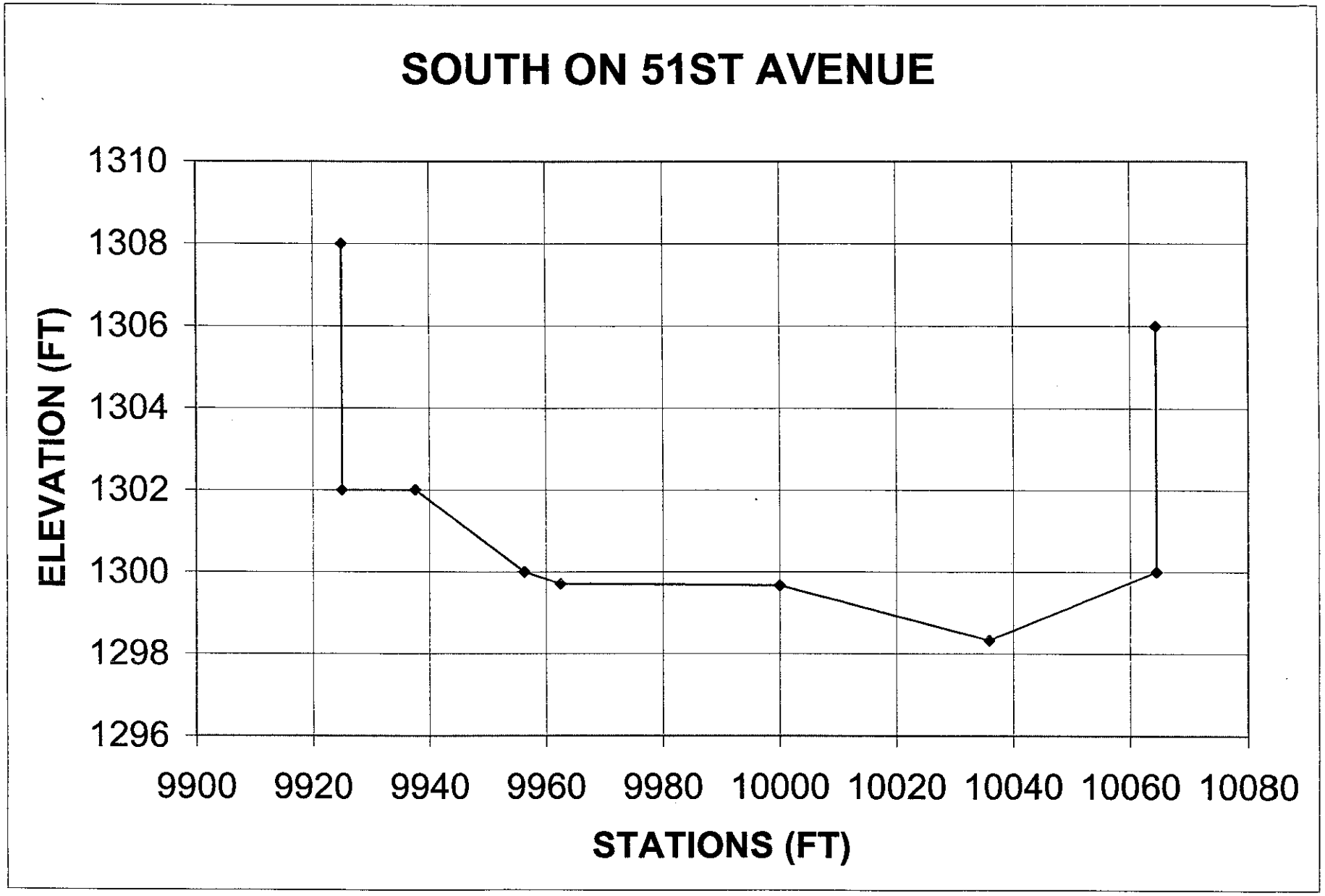
SOUTH ON 51ST AVENUE			
ELEVATION	HEAD	LENGTH	FLOW
(FT)	(FT)	(FT)	(CFS)
1298.33	0.00	0.00	0.00
1298.53	0.20	8.70	2.18
1298.73	0.40	17.39	12.32
1298.93	0.60	26.09	33.95
1299.13	0.80	34.78	69.69
1299.33	1.00	43.48	121.74
1299.53	1.20	52.18	192.04
1299.69	1.36	59.13	262.60
1299.73	0.04	98.14	264.79
1299.93	0.24	105.52	297.33
1300.00	0.31	108.10	314.84
1300.13	0.13	109.32	329.18
1300.14	0.14	109.41	330.89
1300.33	0.33	111.19	373.86
1300.47	**0.47**	**112.50**	**416.33**
1300.50	0.50	112.78	426.48
1300.53	0.53	113.06	436.98
1300.73	0.73	114.93	515.55
1300.93	0.93	116.80	608.15
1301.13	1.13	118.67	713.97
1301.19	**1.19**	**119.22**	**747.64**
1301.30	1.30	120.26	813.95
1301.33	1.33	120.54	832.53
1301.53	1.53	122.41	963.50
1301.68	**1.68**	**123.82**	**1069.75**
1301.73	1.73	124.28	1106.68
1301.83	1.83	125.22	1182.80
1301.93	1.93	126.15	1261.93
1302.00	2.00	126.81	1319.11
1302.13	0.13	126.81	1335.75
1302.33	0.33	126.81	1386.42
1302.53	0.53	126.81	1456.11
1302.73	0.73	126.81	1540.57
1302.93	0.93	126.81	1637.55
1303.13	1.13	126.81	1745.62

WEST SOUTH OF FRONTAGE ROAD			
ELEVATION	HEAD	LENGTH	FLOW
(FT)	(FT)	(FT)	(CFS)
1298.33	0.00	0.00	0.00
1298.53	0.00	0.00	0.00
1298.73	0.00	0.00	0.00
1298.93	0.00	0.00	0.00
1299.13	0.00	0.00	0.00
1299.33	0.00	0.00	0.00
1299.53	0.00	0.00	0.00
1299.69	0.00	0.00	0.00
1299.73	0.00	0.00	0.00
1299.93	0.00	0.00	0.00
1300.00	0.00	91.35	0.00
1300.13	0.13	172.74	22.67
1300.14	0.14	179.00	26.26
1300.33	0.19	251.30	84.53
1300.47	**0.33**	**305.55**	**188.44**
1300.50	0.36	317.17	218.08
1300.53	0.03	317.91	222.71
1300.73	0.23	322.82	317.79
1300.93	0.43	327.74	476.83
1301.13	0.63	332.65	683.84
1301.19	**0.69**	**334.10**	**753.09**
1301.30	0.80	336.83	892.92
1301.33	0.83	337.57	932.80
1301.53	1.03	342.48	1220.50
1301.68	**1.18**	**346.16**	**1460.49**
1301.73	1.23	347.39	1544.98
1301.83	1.33	349.85	1720.59
1301.93	1.43	352.31	1904.96
1302.00	1.50	354.03	2039.17
1302.13	0.13	354.03	2303.72
1302.33	0.33	354.03	2445.17
1302.53	0.53	354.03	2639.73
1302.73	0.73	354.03	2875.52
1302.93	0.93	354.03	3146.29
1303.13	1.13	354.03	3447.98

TOTAL FLOW
FLOW
(CFS)
0.00
2.18
12.32
33.95
69.69
121.74
192.04
262.60
264.79
297.33
314.84
351.86
357.14
458.38
604.77
644.56
659.69
833.33
1084.98
1397.81
1500.73
1706.87
1765.33
2184.00
2530.24
2651.66
2903.40
3166.89
3358.28
3639.47
3831.59
4095.84
4416.09
4783.84
5193.60

	1/3	2/3	Full
Total Flow @ 51st	**600**	**1,500**	**2,600**
West along Frontage	200	800	1,500
South on 51st Avenue	400	700	1,100


WEST ON FRONTAGE ROAD, SOUTH OF 101
ELEVATIONS (FT)
1309
1308
1307
1306
1305
1304
1303
1302
1301
1300
1299
9750
9800
9850
9900
9950
10000
10050
10100
10150
10200
STATIONS (FT)


SOUTH ON 51ST AVENUE
ELEVATION (FT)
1310
1308
1306
1304
1302
1300
1298
1296
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
STATIONS (FT)

3 HEC-RAS Model ADB1

Summary Sheet for Model ADB1

Description

HEC-RAS Model ADB1 encompasses the area along the south of the side of the 101 Freeway from the point where flow overtops the freeway from model ADA1, to the 55th Avenue Channel. Cross-sections 19.64, 19.55 and 19.47 are consistent with sections in Model ADA1, except the area north of the freeway median is modeled as ineffective flow. The amount of flow crossing the freeway between cross-sections was determined using a combination of HEC-RAS and weir flow calculations, and is described in Section 1 of Appendix E. The amount of flow in section 19.47 determined the amount of flow that would exit the freeway though the on-ramp on the south side. After the flow exits the freeway, it continues to travel west along the frontage road. At 51st Avenue, flow in the frontage road combines with flow in 51st Avenue, from north of the freeway. This combined flow splits, either traveling south on 51st Avenue or continuing west towards the 55th Avenue Channel.

Assumptions

- Flow south of the freeway median, at section 19.46, continues southwest and exits the freeway though the east-bound on-ramp at 51st Avenue.
- The homes south of the empty lots south of the freeway, west of 51st Avenue, have a consistant six (6) ft wall along the north side.

Method of Analysis

A HEC-RAS model was developed to model the area described above.

Results

The resulting 100-year floodplain limits for the 1/3, 2/3, and Full flow events are shown on the delineation mapping. The HEC-RAS model output is included in this section.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW (MODEL ADB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	0					
ADOBE DAM/B1	19.47	0					
ADOBE DAM/B1	19.41	0					
ADOBE DAM/B1	19.33	0					
ADOBE DAM/B1	19.23	0					
ADOBE DAM/B1	19.17	0					
ADOBE DAM/B1	19.10	200	1300.47	2.00	0.17	0.49	0.33
ADOBE DAM/B1	19.00	200	1298.85	1.52	0.24	0.81	0.46
ADOBE DAM/B1	18.94	200	1297.36	1.40	0.31	0.95	0.66
ADOBE DAM/B1	18.84	200	1294.25	2.43	0.41	0.64	0.39
ADOBE DAM/B1	18.75	200	1291.77	1.22	0.47	0.87	0.66
ADOBE DAM/B1	18.67	200	1288.95	3.57	0.56	0.66	0.39

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 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW (MODEL ADB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	0					
ADOBE DAM/B1	19.47	0					
ADOBE DAM/B1	19.41	100	1308.45	2.17	0.10	0.57	0.44
ADOBE DAM/B1	19.33	100	1306.04	2.00	0.15	0.44	0.17
ADOBE DAM/B1	19.23	100	1302.74	1.68	0.23	0.74	0.52
ADOBE DAM/B1	19.17	100	1302.46	0.76	0.27	0.61	0.51
ADOBE DAM/B1	19.10	800	1301.19	2.39	0.17	1.21	1.00
ADOBE DAM/B1	19.00	800	1299.58	2.22	0.22	1.54	1.09
ADOBE DAM/B1	18.94	800	1298.10	2.53	0.27	1.70	1.29
ADOBE DAM/B1	18.84	800	1294.88	3.18	0.32	1.27	0.85
ADOBE DAM/B1	18.75	800	1292.58	2.11	0.37	1.68	1.36
ADOBE DAM/B1	18.67	800	1289.51	5.01	0.42	1.21	0.76

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 19.41 IS FROM REACH A1, SECTION 19.38. TRAVEL TIME AT SECTION 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW (MODEL ADB1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	100	1309.53	2.11	0.06	2.51	1.00
ADOBE DAM/B1	19.47	100	1309.49	0.80	0.12	9.48	1.13
ADOBE DAM/B1	19.41	400	1308.87	4.27	0.23	0.99	0.79
ADOBE DAM/B1	19.33	400	1306.41	2.53	0.26	0.81	0.53
ADOBE DAM/B1	19.23	400	1303.33	2.59	0.32	1.33	0.84
ADOBE DAM/B1	19.17	400	1302.90	1.64	0.35	1.05	0.92
ADOBE DAM/B1	19.10	1500	1301.68	2.99	0.16	1.70	1.44
ADOBE DAM/B1	19.00	1500	1300.13	2.72	0.20	2.09	1.56
ADOBE DAM/B1	18.94	1500	1298.61	3.39	0.24	2.21	1.76
ADOBE DAM/B1	18.84	1500	1295.33	3.84	0.28	1.72	1.23
ADOBE DAM/B1	18.75	1500	1293.15	2.72	0.32	2.25	1.80
ADOBE DAM/B1	18.67	1500	1289.91	6.02	0.36	1.62	1.10

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 AT SECTION 19.55 IS FROM REACH A1, SECTION 19.54. TRAVEL TIME AT SECTION 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

```
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: Adobe Dam, Reach B1
Project File : ADB1.prj
Run Date and Time: 06/14/2001 9:37:50 AM

Project in English units

Project Description:
Study Name: Adobe Dam Spillway Delineation 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 Adobe Dam spillway.

Model
Name: ADB1
Model Description: The model begins at CS 19.64 and conveys the flow to the east bound on-ramp at 51st Avenue. At cross section 19.10 the flow is increased by the amount of flow traveling south on 51st Avenue. A portion of the flow traveling south does continue to travel south. The model continues west until it reaches the 55th Avenue Channel.

Flow Profiles: Profile #1, 1/3 Flow
Sections 19.64 to 19.17, Q=0.01 cfs
Sections 19.10 to 18.67, Q=200 cfs
Profile #2, 2/3 Flow
Sections 19.64 to 19.47, Q=0.01 cfs
Sections 19.41 to 19.17, Q=100 cfs
Sections 19.10 to 18.67, Q=800 cfs
Profile #3, Full Flow
Section 19.64, Q=0.01 cfs
Sections 19.55 to 19.47, Q=100 cfs
Sections 19.41 to 19.17, Q=400 cfs
Sections 19.10 to 18.67, Q= 1500 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 990006-02

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 B1, South of Loop 101
Plan File : g:\Filedir\99\990006-02Hydro\Reach B\ADB1.p01

Geometry Title: Reach B1, South of Loop 101
Geometry File : g:\Filedir\99\990006-02Hydro\Reach B\ADB1.g01

```
          Flow Title     : Reach B1, South of Loop 101
          Flow File      : g:\Filedir\99\990006-02Hydro\Reach B\ADB1.f01

Plan Summary Information:
Number of:  Cross Sections =   13    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 B1, South of Loop 101
Flow File : g:\Filedir\99\990006-02Hydro\Reach B\ADB1.f01

Flow Data (cfs)

River	Reach	RS	1/3	2/3	Full
ADOBE DAM	B1	19.64	.01	.01	.01
ADOBE DAM	B1	19.55	.01	.01	100
ADOBE DAM	B1	19.47	.01	.01	100
ADOBE DAM	B1	19.41	.01	100	400
ADOBE DAM	B1	19.10	200	800	1500

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
ADOBE DAM	B1	1/3	Critical	Critical

Changes in WS and EG

River	Reach	RS	Profile	Type	Value
ADOBE DAM	B1	19.10	Full Known WS	1301.68	
ADOBE DAM	B1	19.10	2/3 Known WS	1301.19	
ADOBE DAM	B1	19.10	1/3 Known WS	1300.47	

GEOMETRY DATA

Geometry Title: Reach B1, South of Loop 101
Geometry File : g:\Filedir\99\990006-02Hydro\Reach B\ADB1.g01

CROSS SECTION RIVER: ADOBE DAM
REACH: B1 RS: 19.64

INPUT
Description: Northern Boundary of HEC-RAS Model ADB1
1/3 Q=0 cfs
2/3 Q=0
cfs
Full Q=0 cfs
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9891.39	1314.77	9921.7	1314	9930.43	1312	9939.25	1310	9944.25	1310
9952.68	1311.31	9968.48	1312	10000	1313.5	10044.63	1312	10057.76	1310.83
10073.83	1312	10099.31	1313.1	110120.37	1314	10126.22	1314	10141.83	1312.7
10150.51	1312	10157.64	1310.97	10164.37	1310	10167	1310	10172.26	1310.89
10178.83	1312	10206.21	1313.86	10240.63	1312	10249.42	1310.85	10255.95	1310
10267.37	1308	10271.59	1306	10282.07	1306	10291.16	1308	10299.02	1310
10307.79	1312	10316.59	1313.17	10329.31	1313.87	10456.03	1313.36	10516.18	1314
10567.3	1314.19	10610.4	1314	10643.53	1313.99	10688.57	1313.97	10707.62	1314

```
10762.16 1314.2810789.87    131410802.82 1313.8510807.41 1313.7610837.56    1314
10859.18 1315.1210875.21    131610887.74  1316.410931.27    1318 10955.5    1320
10979.23    132211001.06    132411022.94    1326

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9891.39     .02 9891.39     .02   10000     .02

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9891.39   10000              498  489.74  510.09             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   1000011022.94    1317
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 9891.3910781.68 1307.02
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1310.02	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1310.02	Reach Len. (ft)	498.00	489.74	510.09
Crit W.S. (ft)	1310.01	Flow Area (sq ft)		0.08	
E.G. Slope (ft/ft)	0.000678	Area (sq ft)		0.08	87.72
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	51.28	Top Width (ft)		5.17	46.10
Vel Total (ft/s)	0.12	Avg. Vel. (ft/s)		0.12	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		0.02	
Conv. Total (cfs)	0.4	Conv. (cfs)		0.4	
Length Wtd. (ft)	489.74	Wetted Per. (ft)		5.18	
Min Ch El (ft)	1310.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		7.29	9.37
C & E Loss (ft)	0.00	Cum SA (acres)		16.72	7.85

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1310.02	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1310.02	Reach Len. (ft)	498.00	489.74	510.09
Crit W.S. (ft)	1310.01	Flow Area (sq ft)		0.08	
E.G. Slope (ft/ft)	0.000678	Area (sq ft)		0.08	87.72
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	51.28	Top Width (ft)		5.17	46.10
Vel Total (ft/s)	0.12	Avg. Vel. (ft/s)		0.12	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		0.02	
Conv. Total (cfs)	0.4	Conv. (cfs)		0.4	
Length Wtd. (ft)	489.74	Wetted Per. (ft)		5.18	
Min Ch El (ft)	1310.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		19.81	14.07
C & E Loss (ft)	0.00	Cum SA (acres)		22.27	10.40

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: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1310.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1310.01	Reach Len. (ft)	498.00	489.74	510.09
Crit W.S. (ft)	1310.01	Flow Area (sq ft)		0.07	
E.G. Slope (ft/ft)	0.000933	Area (sq ft)		0.07	87.65
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	51.22	Top Width (ft)		5.16	46.06
Vel Total (ft/s)	0.13	Avg. Vel. (ft/s)		0.13	
Max Chl Dpth (ft)	2.99	Hydr. Depth (ft)		0.01	
Conv. Total (cfs)	0.3	Conv. (cfs)		0.3	
Length Wtd. (ft)		Wetted Per. (ft)		5.16	
Min Ch El (ft)	1310.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)		31.35	22.09
C & E Loss (ft)		Cum SA (acres)		23.50	12.55

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.

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)
9927.59	9963.80	0.01	0.08	5.18	100.00	0.02	0.12

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

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)
9927.59	9963.80	0.01	0.08	5.18	100.00	0.02	0.12

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

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)
9927.59	9963.80	0.01	0.07	5.16	100.00	0.01	0.13

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.

CROSS SECTION RIVER: ADOBE DAM

REACH: B1 RS: 19.55

INPUT
Description: Flow increased by 100 cfs for the Full Q. Flow is weiring over the west bound freeway lanes into the east bound freeway lanes.

1/3 Q=0 cfs
2/3 Q=0 cfs
Full Q=100 cfs
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9900.51	1312.56	9926.27	1312	9931.81	1311.53	9936.18	1312	9947.74	1312.14
9963.83	1312	9970.04	1311.01	9975.81	1310	9985.35	1308	10000	1308
10017.76	1309.07	10033.13	1310	10069.95	1311.39	10093.96	1310	10109.67	1308
10112.3	1308	10114.92	1308	10124.49	1309.12	10131.85	1310	10175.78	1311.85
10199.78	1310	10221.54	1308	10240.78	1308	10250.27	1309.14	10257.22	1310
10286.46	1310.49	10305.43	1310	10315.59	1308	10321.28	1306.88	10325.69	1306
10332.58	1304	10339.13	1302	10346.27	1302	10352.87	1304	10360.91	1306
10364.8	1306.81	10370.56	1308	10374.51	1308.94	10380.02	1310	10452.35	1310.32
10528.86	1310.73	10677.06	1310.72	10719.69	1310.91	10773.88	1312	10797.37	1313.1
10816.54	1314	10832.65	1315.09	10846.12	1316	10856.3	1316.98	10867.17	1318
10868.79	1318.98	10880	1320	10891.5	1320.99	10903.19	1322	10914.3	1322.9
10925.79	1324	10933.62	1324.92	10942.65	1326	10947.99	1326.62		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9900.51	.02	9900.51	.02	10069.95	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9900.51	10069.95	397.5	405.24	425.35	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10069.95	10947.99	1315

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9900.51	10625.16	1307.02

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.15	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.15	Reach Len. (ft)	397.50	405.24	425.35
Crit W.S. (ft)	1308.01	Flow Area (sq ft)		2.38	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		2.38	61.26
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	103.84	Top Width (ft)		17.79	86.05
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	
Max Chl Dpth (ft)	1.13	Hydr. Depth (ft)		0.13	
Conv. Total (cfs)	46.3	Conv. (cfs)		46.3	
Length Wtd. (ft)	405.24	Wetted Per. (ft)		17.81	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		7.27	8.50
C & E Loss (ft)	0.00	Cum SA (acres)		16.59	7.08

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.71	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.71	Reach Len. (ft)	397.50	405.24	425.35
Crit W.S. (ft)	1308.01	Flow Area (sq ft)		15.71	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		15.71	116.56
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	140.99	Top Width (ft)		29.77	111.22
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	760.9	Conv. (cfs)		760.9	
Length Wtd. (ft)	405.24	Wetted Per. (ft)		29.86	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		19.72	12.88
C & E Loss (ft)	0.00	Cum SA (acres)		22.07	9.48

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1309.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.020	
W.S. Elev (ft)	1309.53	Reach Len. (ft)	397.50	405.24	425.35
Crit W.S. (ft)	1308.90	Flow Area (sq ft)		47.50	
E.G. Slope (ft/ft)	0.000804	Area (sq ft)		47.50	223.61
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	195.98	Top Width (ft)		47.35	148.63
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)		2.11	
Max Chl Dpth (ft)	2.51	Hydr. Depth (ft)		1.00	
Conv. Total (cfs)	3526.5	Conv. (cfs)		3526.5	
Length Wtd. (ft)	405.24	Wetted Per. (ft)		47.55	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		31.08	20.26
C & E Loss (ft)	0.02	Cum SA (acres)		23.20	11.41

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream 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)
9956.99	10013.47	0.01	2.38	17.81	100.00	0.13	0.00

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
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)
9956.99	10013.47	0.01	15.71	29.86	100.00	0.53	0.00

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
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)
9956.99	10013.47	95.76	43.20	35.61	95.76	1.22	2.22
10013.47	RB 10069.95	4.24	4.30	11.94	4.24	0.36	0.99

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: ADOBE DAM
REACH: B1 RS: 19.47

INPUT
Description: 1/3 Q=0 cfs
2/3 Q=0 cfs
Full Q=100 cfs
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9908.49	1310	9928.14	1309.72	9956.63	1308	10000	130810	043.15	1309
10077.27	130810	100.55	130810	123.83	130810	184.35	130910	232.18	1308
10262.54	130810	269.47	1308.32	10276.43	130810	313.03	130610	331.22	1304
10342.41	130210	346.68	1300	10360.4	130010	367.38	130210	375.36	1304

```
10383.15    1306 10616.2 1307.1810772.03  1307.810776.13    130810811.35 1308.95
10843.92    131010868.95  1311.110890.03    131210900.44 1312.9610911.05    1314
10923.06 1315.1810932.01    131610944.94 1317.0410957.01    131810975.93    1320

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
 9908.49     .02 9908.49     .0210043.15    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9908.4910043.15            325.8  322.01  345.05              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev
10043.1510975.93    1317
Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
10573.3610975.93 1307.02
```

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.15	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.15	Reach Len. (ft)	325.80	322.01	345.05
Crit W.S. (ft)	1308.02	Flow Area (sq ft)		7.01	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		7.01	894.13
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	661.50	Top Width (ft)		52.14	609.36
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	
Max Chl Dpth (ft)	8.15	Hydr. Depth (ft)		0.13	
Conv. Total (cfs)	136.8	Conv. (cfs)		136.8	
Length Wtd. (ft)	322.01	Wetted Per. (ft)		52.15	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		7.23	3.83
C & E Loss (ft)	0.00	Cum SA (acres)		16.27	3.69

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.71	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.71	Reach Len. (ft)	325.80	322.01	345.05
Crit W.S. (ft)	1308.02	Flow Area (sq ft)		45.63	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		45.63	1267.57
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	803.16	Top Width (ft)		85.62	717.54
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	
Max Chl Dpth (ft)	8.71	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	2228.0	Conv. (cfs)		2228.0	
Length Wtd. (ft)	322.01	Wetted Per. (ft)		85.65	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)		19.43	6.12
C & E Loss (ft)	0.01	Cum SA (acres)		21.53	5.43

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1309.49	Element			
Vel Head (ft)	0.01	Wt. n-Val.		0.020	
W.S. Elev (ft)	1309.48	Reach Len. (ft)	325.80	322.01	345.05
Crit W.S. (ft)	1308.49	Flow Area (sq ft)		125.17	
E.G. Slope (ft/ft)	0.000099	Area (sq ft)		125.17	1862.07
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	895.91	Top Width (ft)		111.12	784.79
Vel Total (ft/s)	0.80	Avg. Vel. (ft/s)		0.80	
Max Chl Dpth (ft)	9.48	Hydr. Depth (ft)		1.13	
Conv. Total (cfs)	10064.6	Conv. (cfs)		10064.6	
Length Wtd. (ft)	322.01	Wetted Per. (ft)		111.17	
Min Ch El (ft)	1308.00	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		30.27	10.08
C & E Loss (ft)	0.03	Cum SA (acres)		22.47	6.85

Warning: The conveyance ratio (upstream 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)
9953.38	9998.26	0.01	6.29	44.07	92.28	0.14	0.00
9998.26	RB 10043.15	0.00	0.72	8.07	7.72	0.09	0.00

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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 9908.49	9953.38	0.00	2.16	8.48	2.73	0.26	0.00
9953.38	9998.26	0.01	31.44	44.89	77.74	0.70	0.00
9998.26	RB 10043.15	0.00	12.03	32.27	19.53	0.37	0.00

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 9908.49	9953.38	7.24	13.75	21.38	7.24	0.64	0.53
9953.38	9998.26	60.82	66.34	44.89	60.82	1.48	0.92
9998.26	RB 10043.15	31.94	45.08	44.90	31.94	1.00	0.71

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: ADOBE DAM
REACH: B1 RS: 19.41

INPUT
Description: Flow increased by 100 cfs and 400 cfs for the 2/3 and Full Q respectively. Approximately half of the flow in the median section of the freeway is contributing to this Model.

1/3
Q=0 cfs
2/3 Q=100 cfs
Full Q=400 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9915.84	1315	9922.09	1310	9961.23	1308	9977.52	1307.88	10000	1308
10014.52	1308	10023.07	1308	10041.89	1308	10052.97	1308.02	10083.94	1310.65
10095.1	1310.64	10103.55	1310.65	10113.97	1310.73	10125.05	1310.65	10149.83	1308.24
10171.59	1310.49								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9915.84	.02	9922.09	.02	10083.94	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9922.09	10083.94	450	397.36	331.56	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10083.94	10171.59	1310.65

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1308.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.15	Reach Len. (ft)	450.00	397.36	331.56
Crit W.S. (ft)	1307.90	Flow Area (sq ft)		15.99	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		15.99	
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	96.11	Top Width (ft)		96.11	
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	
Max Chl Dpth (ft)	0.27	Hydr. Depth (ft)		0.17	
Conv. Total (cfs)	359.5	Conv. (cfs)		359.5	
Length Wtd. (ft)	397.36	Wetted Per. (ft)		96.12	

Min Ch El (ft)	1307.88	Shear (lb/sq ft)	0.00	
Alpha	1.00	Stream Power (lb/ft s)	0.00	
Frctn Loss (ft)	2.25	Cum Volume (acre-ft)	7.14	0.29
C & E Loss (ft)	0.00	Cum SA (acres)	15.72	1.27

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1308.52	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.45	Reach Len. (ft)	450.00	397.36	331.56
Crit W.S. (ft)	1308.30	Flow Area (sq ft)		46.19	
E.G. Slope (ft/ft)	0.002555	Area (sq ft)		46.19	0.43
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	109.62	Top Width (ft)		105.50	4.12
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)		2.17	
Max Chl Dpth (ft)	0.57	Hydr. Depth (ft)		0.44	
Conv. Total (cfs)	1978.3	Conv. (cfs)		1978.3	
Length Wtd. (ft)	392.72	Wetted Per. (ft)		105.53	
Min Ch El (ft)	1307.88	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)		19.09	1.10
C & E Loss (ft)	0.00	Cum SA (acres)		20.83	2.57

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)	1309.15	Element			
Vel Head (ft)	0.28	Wt. n-Val.		0.020	
W.S. Elev (ft)	1308.87	Reach Len. (ft)	450.00	397.36	331.56
Crit W.S. (ft)	1308.78	Flow Area (sq ft)		93.66	
E.G. Slope (ft/ft)	0.004538	Area (sq ft)		93.66	3.96
Q Total (cfs)	400.00	Flow (cfs)		400.00	
Top Width (ft)	131.33	Top Width (ft)		118.77	12.57
Vel Total (ft/s)	4.27	Avg. Vel. (ft/s)		4.27	
Max Chl Dpth (ft)	0.99	Hydr. Depth (ft)		0.79	
Conv. Total (cfs)	5937.6	Conv. (cfs)		5937.6	
Length Wtd. (ft)	390.48	Wetted Per. (ft)		118.83	
Min Ch El (ft)	1307.88	Shear (lb/sq ft)		0.22	
Alpha	1.00	Stream Power (lb/ft s)		0.95	
Frctn Loss (ft)	2.57	Cum Volume (acre-ft)		29.47	2.69
C & E Loss (ft)	0.05	Cum SA (acres)		21.62	3.69

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

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 9922.09	9976.04	0.00	3.19	17.69	20.96	0.18	0.00
9976.04	10029.99	0.01	9.44	53.95	60.68	0.17	0.00
10029.99	RB 10083.94	0.00	3.36	24.48	18.35	0.14	0.00

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
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 9922.09	9976.04	18.95	9.37	23.56	18.95	0.40	2.02
9976.04	10029.99	58.26	25.60	53.95	58.26	0.47	2.28
10029.99	RB 10083.94	22.79	11.22	28.02	22.79	0.40	2.03

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.

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 9922.09	9976.04	79.44	21.09	31.85	19.86	0.66	3.77
9976.04	10029.99	223.53	48.44	53.95	55.88	0.90	4.61
10029.99	RB 10083.94	97.04	24.13	33.02	24.26	0.73	4.02

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

CROSS SECTION RIVER: ADOBE DAM
REACH: B1 RS: 19.33

INPUT
Description: 1/3 Q=0 cfs
2/3 Q=100 cfs
Full Q=400 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9745.25	1306	9758.09	1306	9770.88	1306	9786.98	1308	9800.35	1308
9809.75	1306	9828.06	1305.6	9860.81	1306	9933.03	1305.82	10000	1305.8
10013.93	1306	10063.39	1305.8	10098.71	1306	10130.27	1307.58	10163.71	1308
10179.86	1312								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9745.25	.045	9800.35	.045	10063.39	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9800.35 10063.39 541.29 571.61 588.73 .1 .3
Left Levee Station= 9800.35 Elevation= 1308

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1305.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.045	
W.S. Elev (ft)	1305.62	Reach Len. (ft)	541.29	571.61	588.73
Crit W.S. (ft)	1305.62	Flow Area (sq ft)		0.02	
E.G. Slope (ft/ft)	0.176385	Area (sq ft)		0.02	
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	2.12	Top Width (ft)		2.12	
Vel Total (ft/s)	0.57	Avg. Vel. (ft/s)		0.57	
Max Chl Dpth (ft)	0.02	Hydr. Depth (ft)		0.01	
Conv. Total (cfs)	0.0	Conv. (cfs)		0.0	
Length Wtd. (ft)	577.84	Wetted Per. (ft)		2.12	
Min Ch El (ft)	1305.60	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		7.07	0.29
C & E Loss (ft)	0.00	Cum SA (acres)		15.27	1.27

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

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1306.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.045	0.020
W.S. Elev (ft)	1306.04	Reach Len. (ft)	541.29	571.61	588.73
Crit W.S. (ft)	1306.02	Flow Area (sq ft)		45.57	4.34
E.G. Slope (ft/ft)	0.032187	Area (sq ft)		45.57	4.34
Q Total (cfs)	100.00	Flow (cfs)		85.90	14.10
Top Width (ft)	290.01	Top Width (ft)		253.84	36.17
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		1.89	3.24
Max Chl Dpth (ft)	0.44	Hydr. Depth (ft)		0.18	0.12
Conv. Total (cfs)	557.4	Conv. (cfs)		478.8	78.6
Length Wtd. (ft)	578.77	Wetted Per. (ft)		253.85	36.17
Min Ch El (ft)	1305.60	Shear (lb/sq ft)		0.36	0.24
Alpha	1.13	Stream Power (lb/ft s)		0.68	0.78
Frctn Loss (ft)	3.30	Cum Volume (acre-ft)		18.68	1.08
C & E Loss (ft)	0.00	Cum SA (acres)		19.19	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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1306.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.045	0.020
W.S. Elev (ft)	1306.41	Reach Len. (ft)	541.29	571.61	588.73
Crit W.S. (ft)	1306.28	Flow Area (sq ft)		138.87	18.93
E.G. Slope (ft/ft)	0.010732	Area (sq ft)		138.87	18.93
Q Total (cfs)	400.00	Flow (cfs)		316.29	83.71
Top Width (ft)	299.05	Top Width (ft)		255.56	43.49
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)		2.28	4.42
Max Chl Dpth (ft)	0.81	Hydr. Depth (ft)		0.54	0.44
Conv. Total (cfs)	3861.2	Conv. (cfs)		3053.2	808.0
Length Wtd. (ft)	579.02	Wetted Per. (ft)		255.61	43.50
Min Ch El (ft)	1305.60	Shear (lb/sq ft)		0.36	0.29
Alpha	1.27	Stream Power (lb/ft s)		0.83	1.29
Frctn Loss (ft)	3.01	Cum Volume (acre-ft)		28.41	2.60
C & E Loss (ft)	0.01	Cum SA (acres)		19.91	3.48

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9800.35	9888.03	0.01	0.02	2.12	100.00	0.01	0.57

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: 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 9800.35	9888.03	27.62	14.47	78.49	27.62	0.18	1.91

9888.03	9975.71	34.43	17.26	87.68	34.43	0.20	2.00
9975.71	RB 10063.39	23.85	13.84	87.68	23.85	0.16	1.72
10063.39	10102.21	14.10	4.34	36.17	14.10	0.12	3.24

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9800.35	9888.03	98.99	43.53	80.25	24.75	0.54	2.27
9888.03	9975.71	115.13	49.38	87.68	28.78	0.56	2.33
9975.71	RB 10063.39	102.17	45.96	87.68	25.54	0.52	2.22
10063.39	10102.21	82.74	18.39	38.83	20.69	0.47	4.50
10102.21	10141.04	0.96	0.54	4.67	0.24	0.12	1.77

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: B1 RS: 19.23

INPUT
Description: 1/3 Q=0 cfs
2/3 Q=100 cfs
Full Q=400 cfs
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9548.67	1302	9614.61	1302.99	9748.19	1302	9761.32	1302	9768.11	1304
9778.5	1304	9848.44	1303.19	9900.38	1304	9906.19	1304	9913.99	1304
9927.3	1302	9937.73	1302	9947.58	1302	10000	1302.99	10041.17	1302.95
10068.5	1302	10094.51	1302	10104.51	1304	10112.05	1306	10117.26	1308
10128.76	1312	10134.51	1314	10140.35	1316	10146.27	1318		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9548.67	.045	9913.99	.045	10041.17	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9913.99	10041.17	250	277.61	300	.1	.3

Left Levee Station= 9913.99 Elevation= 1304

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.22	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.045	0.020
W.S. Elev (ft)	1302.22	Reach Len. (ft)	250.00	277.61	300.00
Crit W.S. (ft)	1302.02	Flow Area (sq ft)		5.87	6.51
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		5.87	6.51
Q Total (cfs)	0.01	Flow (cfs)		0.00	0.01
Top Width (ft)	66.74	Top Width (ft)		33.33	33.41
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	0.00
Max Chl Dpth (ft)	0.22	Hydr. Depth (ft)		0.18	0.19
Conv. Total (cfs)	223.2	Conv. (cfs)		60.9	162.3
Length Wtd. (ft)	290.57	Wetted Per. (ft)		33.35	33.43
Min Ch El (ft)	1302.00	Shear (lb/sq ft)		0.00	0.00
Alpha	1.48	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		7.03	0.25
C & E Loss (ft)	0.00	Cum SA (acres)		15.04	1.05

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.80	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.045	0.020
W.S. Elev (ft)	1302.74	Reach Len. (ft)	250.00	277.61	300.00
Crit W.S. (ft)	1302.50	Flow Area (sq ft)		31.07	28.29
E.G. Slope (ft/ft)	0.002375	Area (sq ft)		31.07	28.29
Q Total (cfs)	100.00	Flow (cfs)		30.81	69.19

Top Width (ft)	115.01	Top Width (ft)	64.15	50.86
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)	0.99	2.45
Max Chl Dpth (ft)	0.74	Hydr. Depth (ft)	0.48	0.56
Conv. Total (cfs)	2052.0	Conv. (cfs)	632.3	1419.7
Length Wtd. (ft)	290.95	Wetted Per. (ft)	64.21	50.95
Min Ch El (ft)	1302.00	Shear (lb/sq ft)	0.07	0.08
Alpha	1.56	Stream Power (lb/ft s)	0.07	0.20
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	18.17	0.86
C & E Loss (ft)	0.02	Cum SA (acres)	17.10	1.83

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1303.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.045	0.020
W.S. Elev (ft)	1303.33	Reach Len. (ft)	250.00	277.61	300.00
Crit W.S. (ft)	1302.93	Flow Area (sq ft)		91.73	62.52
E.G. Slope (ft/ft)	0.003036	Area (sq ft)		91.73	62.52
Q Total (cfs)	400.00	Flow (cfs)		137.37	262.63
Top Width (ft)	182.74	Top Width (ft)		122.74	60.00
Vel Total (ft/s)	2.59	Avg. Vel. (ft/s)		1.50	4.20
Max Chl Dpth (ft)	1.33	Hydr. Depth (ft)		0.75	1.04
Conv. Total (cfs)	7259.3	Conv. (cfs)		2493.1	4766.2
Length Wtd. (ft)	290.97	Wetted Per. (ft)		122.85	60.15
Min Ch El (ft)	1302.00	Shear (lb/sq ft)		0.14	0.20
Alpha	1.84	Stream Power (lb/ft s)		0.21	0.83
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)		26.89	2.05
C & E Loss (ft)	0.04	Cum SA (acres)		17.43	2.78

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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 9913.99	9956.38	0.00	5.80	30.56	27.18	0.19	0.00
9956.38	9998.78	0.00	0.07	2.79	0.09	0.03	0.00
9998.78	10041.17						
10041.17	10076.20	0.00	2.38	14.01	24.09	0.17	0.00
10076.20	10111.24	0.00	4.13	19.42	48.63	0.21	0.00

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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 9913.99	9956.38	25.29	22.48	34.04	25.29	0.66	1.13
9956.38	9998.78	5.52	8.59	30.17	5.52	0.28	0.64
9998.78	10041.17						
10041.17	10076.20	28.75	13.46	28.89	28.75	0.47	2.14
10076.20	10111.24	40.44	14.83	22.06	40.44	0.67	2.73

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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 9913.99	9956.38	79.71	43.92	38.05	19.93	1.16	1.81
9956.38	9998.78	44.80	32.46	42.40	11.20	0.77	1.38
9998.78	RB 10041.17	12.86	15.35	42.39	3.21	0.36	0.84
10041.17	10076.20	133.77	33.69	35.05	33.44	0.96	3.97
10076.20	10111.24	128.86	28.83	25.10	32.22	1.15	4.47

Warning: The conveyance ratio (upstream 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: ADOBE DAM
REACH: B1 RS: 19.17

INPUT
Description: 1/3 Q=0 cfs
2/3 Q=100 cfs
Full Q=400 cfs
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9882.61	1317.94	9882.61	1301.94	10000	1301.93	10054.19	1301.85	10101.88	1302.1
10133.49	130	210163.41	130	410170.87	130	610178.31	130	810186.39	1310
10192.52	131	210197.37	131	410202.65	1316				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9882.61	.02	9882.61	.045	10054.19	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9882.61	10054.19	420	394.51	400	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.22	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1302.22	Reach Len. (ft)	420.00	394.51	400.00
Crit W.S. (ft)	1301.87	Flow Area (sq ft)		51.17	17.34
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		51.17	17.34
Q Total (cfs)	0.01	Flow (cfs)		0.01	0.00
Top Width (ft)	254.16	Top Width (ft)		171.58	82.58
Vel Total (ft/s)	0.00	Avg. Vel. (ft/s)		0.00	0.00
Max Chl Dpth (ft)	0.37	Hydr. Depth (ft)		0.30	0.21
Conv. Total (cfs)	1322.1	Conv. (cfs)		753.3	568.8
Length Wtd. (ft)	395.58	Wetted Per. (ft)		171.86	82.58
Min Ch El (ft)	1301.85	Shear (lb/sq ft)		0.00	0.00
Alpha	1.57	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	1.62	Cum Volume (acre-ft)		6.85	0.16
C & E Loss (ft)	0.01	Cum SA (acres)		14.39	0.65

Warning: The energy loss was 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)	1302.48	Element			
Vel Head (ft)	0.02	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1302.46	Reach Len. (ft)	420.00	394.51	400.00
Crit W.S. (ft)		Flow Area (sq ft)		92.91	37.87
E.G. Slope (ft/ft)	0.000605	Area (sq ft)		92.91	37.87
Q Total (cfs)	100.00	Flow (cfs)		50.02	49.98
Top Width (ft)	257.80	Top Width (ft)		171.58	86.22
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)		0.54	1.32
Max Chl Dpth (ft)	0.61	Hydr. Depth (ft)		0.54	0.44
Conv. Total (cfs)	4066.1	Conv. (cfs)		2034.0	2032.0
Length Wtd. (ft)	395.72	Wetted Per. (ft)		172.10	86.23
Min Ch El (ft)	1301.85	Shear (lb/sq ft)		0.02	0.02
Alpha	1.74	Stream Power (lb/ft s)		0.01	0.02
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)		17.78	0.63
C & E Loss (ft)	0.01	Cum SA (acres)		16.35	1.36

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

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1302.97	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1302.90	Reach Len. (ft)	420.00	394.51	400.00
Crit W.S. (ft)		Flow Area (sq ft)		167.47	76.75
E.G. Slope (ft/ft)	0.001168	Area (sq ft)		167.47	76.75
Q Total (cfs)	400.00	Flow (cfs)		185.28	214.72
Top Width (ft)	264.30	Top Width (ft)		171.58	92.72
Vel Total (ft/s)	1.64	Avg. Vel. (ft/s)		1.11	2.80
Max Chl Dpth (ft)	1.05	Hydr. Depth (ft)		0.98	0.83
Conv. Total (cfs)	11703.8	Conv. (cfs)		5421.3	6282.6
Length Wtd. (ft)	396.01	Wetted Per. (ft)		172.54	92.75

Min Ch El (ft)	1301.85	Shear (lb/sq ft)	0.07	0.06
Alpha	1.78	Stream Power (lb/ft s)	0.08	0.17
Frctn Loss (ft)	1.09	Cum Volume (acre-ft)	26.07	1.57
C & E Loss (ft)	0.01	Cum SA (acres)	16.49	2.25

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9882.61	9939.80	0.00	16.10	57.47	17.16	0.28	0.00
9939.80	9997.00	0.00	16.37	57.19	17.71	0.29	0.00
9997.00	RB 10054.19	0.00	18.69	57.19	22.10	0.33	0.00
10054.19	10103.68	0.00	11.86	49.49	31.60	0.24	0.00
10103.68	10153.16	0.00	5.48	33.10	11.43	0.17	0.00

Warning: The energy loss was 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 9882.61	9939.80	15.75	30.01	57.72	15.75	0.52	0.52
9939.80	9997.00	16.08	30.29	57.19	16.08	0.53	0.53
9997.00	RB 10054.19	18.19	32.61	57.19	18.19	0.57	0.56
10054.19	10103.68	33.34	23.90	49.49	33.34	0.48	1.40
10103.68	10153.16	16.63	13.98	36.75	16.63	0.38	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.
Warning: The energy loss was 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 9882.61	9939.80	59.54	54.86	58.15	14.89	0.96	1.09
9939.80	9997.00	60.71	55.14	57.19	15.18	0.96	1.10
9997.00	RB 10054.19	65.03	57.46	57.19	16.26	1.00	1.13
10054.19	10103.68	135.04	45.40	49.49	33.76	0.92	2.97
10103.68	10153.16	79.68	31.35	43.26	19.92	0.73	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: ADOBE DAM
REACH: B1 RS: 19.10

INPUT
Description: 1/3 Q=200 cfs
2/3 Q=800 cfs
Full Q=1500 cfs
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9783.03	1306.01	9783.03	1300.01	9787.1	1300	9819.1	1300.25	9844.34	1300.45
9852.29	1300.5	9859.67	1300.46	9920.05	1300.2	9967.28	1300	10000	1299.98
10044.29	1300	10062.89	1300.14	10077.61	1300	10087.88	1300	10139.32	1302
10146.85	1304	10154.54	1306	10161.01	1308	10167.52	1310	10172.18	1312

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9783.03	.02	9783.03	.045	10077.61	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9783.03	10077.61	480	495.78	500	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1300.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1300.47	Reach Len. (ft)	480.00	495.78	500.00
Crit W.S. (ft)		Flow Area (sq ft)		92.22	7.67
E.G. Slope (ft/ft)	0.012556	Area (sq ft)		92.22	7.67
Q Total (cfs)	200.00	Flow (cfs)		160.92	39.08
Top Width (ft)	306.63	Top Width (ft)		284.27	22.36
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		1.74	5.10
Max Chl Dpth (ft)	0.49	Hydr. Depth (ft)		0.32	0.34
Conv. Total (cfs)	1784.9	Conv. (cfs)		1436.1	348.7
Length Wtd. (ft)		Wetted Per. (ft)		284.74	22.37
Min Ch El (ft)	1299.98	Shear (lb/sq ft)		0.25	0.27
Alpha	1.88	Stream Power (lb/ft s)		0.44	1.37
Frctn Loss (ft)		Cum Volume (acre-ft)		6.20	0.05
C & E Loss (ft)		Cum SA (acres)		12.32	0.17

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.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1301.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1301.19	Reach Len. (ft)	480.00	495.78	500.00
Crit W.S. (ft)		Flow Area (sq ft)		304.15	30.43
E.G. Slope (ft/ft)	0.004062	Area (sq ft)		304.15	30.43
Q Total (cfs)	800.00	Flow (cfs)		652.12	147.88
Top Width (ft)	335.46	Top Width (ft)		294.58	40.88
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.14	4.86
Max Chl Dpth (ft)	1.21	Hydr. Depth (ft)		1.03	0.74
Conv. Total (cfs)	12552.8	Conv. (cfs)		10232.4	2320.4
Length Wtd. (ft)		Wetted Per. (ft)		295.76	40.90
Min Ch El (ft)	1299.98	Shear (lb/sq ft)		0.26	0.19
Alpha	1.42	Stream Power (lb/ft s)		0.56	0.92
Frctn Loss (ft)		Cum Volume (acre-ft)		15.98	0.32
C & E Loss (ft)		Cum SA (acres)		14.24	0.78

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1301.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1301.68	Reach Len. (ft)	480.00	495.78	500.00
Crit W.S. (ft)		Flow Area (sq ft)		448.53	53.55
E.G. Slope (ft/ft)	0.003747	Area (sq ft)		448.53	53.55
Q Total (cfs)	1500.00	Flow (cfs)		1195.41	304.59
Top Width (ft)	348.06	Top Width (ft)		294.58	53.48
Vel Total (ft/s)	2.99	Avg. Vel. (ft/s)		2.67	5.69
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		1.52	1.00
Conv. Total (cfs)	24503.9	Conv. (cfs)		19528.2	4975.7
Length Wtd. (ft)		Wetted Per. (ft)		296.25	53.51
Min Ch El (ft)	1299.98	Shear (lb/sq ft)		0.35	0.23
Alpha	1.37	Stream Power (lb/ft s)		0.94	1.33
Frctn Loss (ft)		Cum Volume (acre-ft)		23.28	0.97
C & E Loss (ft)		Cum SA (acres)		14.38	1.58

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: The user has entered a known water surface elevation at this cross section.

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 9783.03	9881.22	20.23	17.22	88.35	10.11	0.20	1.17
9881.22	9979.42	48.79	30.46	98.19	24.39	0.31	1.60
9979.42	RB 10077.61	91.91	44.54	98.19	45.95	0.45	2.06
10077.61	10109.13	39.08	7.67	22.37	19.54	0.34	5.10

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: The user has entered a known water surface elevation at this cross section.

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 9783.03	9881.22	168.74	87.76	99.38	21.09	0.89	1.92
9881.22	9979.42	215.54	101.16	98.19	26.94	1.03	2.13
9979.42	RB 10077.61	267.83	115.24	98.19	33.48	1.17	2.32
10077.61	10109.13	144.96	28.73	31.54	18.12	0.91	5.05
10109.13	10140.66	2.93	1.70	9.36	0.37	0.18	1.72

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: The user has entered a known water surface elevation at this cross section.

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 9783.03	9881.22	336.01	135.88	99.87	22.40	1.38	2.47
9881.22	9979.42	397.48	149.28	98.19	26.50	1.52	2.66
9979.42	RB 10077.61	461.91	163.36	98.19	30.79	1.66	2.83
10077.61	10109.13	277.91	44.18	31.54	18.53	1.40	6.29
10109.13	10140.66	26.69	9.37	21.97	1.78	0.43	2.85

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: ADOBE DAM
REACH: B1 RS: 19.00

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9772.57	1304.5	9772.57	1298.5	9839.63	1298.55	9850.91	1298.6	9858.27	1298.52
10000	1298.04	10082.85	1299.13	10124.85	1300	10154.22	1302		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9772.57	.02	9772.57	.045	10082.85	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9772.57	10082.85	366	364.36	364	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1298.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.045	
W.S. Elev (ft)	1298.85	Reach Len. (ft)	366.00	364.36	364.00
Crit W.S. (ft)		Flow Area (sq ft)		131.75	
E.G. Slope (ft/ft)	0.006026	Area (sq ft)		131.75	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	288.73	Top Width (ft)		288.73	
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)		1.52	
Max Chl Dpth (ft)	0.81	Hydr. Depth (ft)		0.46	
Conv. Total (cfs)	2576.4	Conv. (cfs)		2576.4	
Length Wtd. (ft)	364.36	Wetted Per. (ft)		289.09	
Min Ch El (ft)	1298.04	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.26	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)		4.93	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		9.06	0.04

Warning: The energy loss was 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)	1299.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.045	0.016

W.S. Elev (ft)	1299.58	Reach Len. (ft)	366.00	364.36	364.00
Crit W.S. (ft)		Flow Area (sq ft)		355.42	4.83
E.G. Slope (ft/ft)	0.003796	Area (sq ft)		355.42	4.83
Q Total (cfs)	800.00	Flow (cfs)		789.82	10.18
Top Width (ft)	331.87	Top Width (ft)		310.28	21.59
Vel Total (ft/s)	2.22	Avg. Vel. (ft/s)		2.22	2.11
Max Chl Dpth (ft)	1.54	Hydr. Depth (ft)		1.15	0.22
Conv. Total (cfs)	12983.8	Conv. (cfs)		12818.6	165.2
Length Wtd. (ft)	364.36	Wetted Per. (ft)		311.37	21.60
Min Ch El (ft)	1298.04	Shear (lb/sq ft)		0.27	0.05
Alpha	1.00	Stream Power (lb/ft s)		0.60	0.11
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)		12.23	0.11
C & E Loss (ft)	0.00	Cum SA (acres)		10.80	0.42

Warning: The energy loss was 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)	1300.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1300.13	Reach Len. (ft)	366.00	364.36	364.00
Crit W.S. (ft)		Flow Area (sq ft)		528.21	24.04
E.G. Slope (ft/ft)	0.003260	Area (sq ft)		528.21	24.04
Q Total (cfs)	1500.00	Flow (cfs)		1414.81	85.19
Top Width (ft)	354.25	Top Width (ft)		310.28	43.97
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)		2.68	3.54
Max Chl Dpth (ft)	2.09	Hydr. Depth (ft)		1.70	0.55
Conv. Total (cfs)	26271.9	Conv. (cfs)		24779.8	1492.1
Length Wtd. (ft)	364.35	Wetted Per. (ft)		311.92	43.98
Min Ch El (ft)	1298.04	Shear (lb/sq ft)		0.34	0.11
Alpha	1.01	Stream Power (lb/ft s)		0.92	0.39
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)		17.72	0.53
C & E Loss (ft)	0.01	Cum SA (acres)		10.94	1.02

Warning: The energy loss was 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 9772.57	9876.00	38.35	33.05	103.77	19.18	0.32	1.16
9876.00	9979.42	98.38	58.09	103.43	49.19	0.56	1.69
9979.42	RB 10082.85	63.27	40.60	81.89	31.63	0.50	1.56

Warning: The energy loss was 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 9772.57	9876.00	225.66	108.63	104.50	28.21	1.05	2.08
9876.00	9979.42	321.07	133.67	103.43	40.13	1.29	2.40
9979.42	RB 10082.85	243.09	113.12	103.43	30.39	1.09	2.15
10082.85	10106.64	10.18	4.83	21.60	1.27	0.22	2.11

Warning: The energy loss was 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 9772.57	9876.00	424.47	166.23	105.06	28.30	1.61	2.55
9876.00	9979.42	541.94	191.27	103.43	36.13	1.85	2.83
9979.42	RB 10082.85	448.40	170.72	103.43	29.89	1.65	2.63
10082.85	10106.64	72.27	18.03	23.80	4.82	0.76	4.01
10106.64	10130.43	12.92	6.01	20.19	0.86	0.30	2.15

Warning: The energy loss was 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: ADOBE DAM

REACH: B1 RS: 18.94

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9814.93	1302.82	9814.93	1296.82	9829.78	1296.83	9838.21	1296.88	9847.1	1296.83
9962.61	1296.4	10000	1296.67	10058.61	1298	10074.12	1299.27	10083.1	1300
10106.12	1300	10110.03	1300	10110.03	1306				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9814.93	.02	9814.93	.045	10074.12	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9814.93	10074.12	500.25	499.78	499.01	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1297.39	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.045	
W.S. Elev (ft)	1297.35	Reach Len. (ft)	500.25	499.78	499.01
Crit W.S. (ft)		Flow Area (sq ft)		143.00	
E.G. Slope (ft/ft)	0.003105	Area (sq ft)		143.00	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	215.25	Top Width (ft)		215.25	
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)		1.40	
Max Chl Dpth (ft)	0.95	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	3589.1	Conv. (cfs)		3589.1	
Length Wtd. (ft)	499.78	Wetted Per. (ft)		215.80	
Min Ch El (ft)	1296.40	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	3.04	Cum Volume (acre-ft)		3.78	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		6.95	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1298.20	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.045	
W.S. Elev (ft)	1298.10	Reach Len. (ft)	500.25	499.78	499.01
Crit W.S. (ft)		Flow Area (sq ft)		315.83	
E.G. Slope (ft/ft)	0.004222	Area (sq ft)		315.83	
Q Total (cfs)	800.00	Flow (cfs)		800.00	
Top Width (ft)	244.92	Top Width (ft)		244.92	
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)		2.53	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	12311.4	Conv. (cfs)		12311.4	
Length Wtd. (ft)	499.77	Wetted Per. (ft)		246.22	
Min Ch El (ft)	1296.40	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		0.86	
Frctn Loss (ft)	3.15	Cum Volume (acre-ft)		9.42	0.09
C & E Loss (ft)	0.01	Cum SA (acres)		8.47	0.33

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1298.79	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.045	
W.S. Elev (ft)	1298.61	Reach Len. (ft)	500.25	499.78	499.01
Crit W.S. (ft)		Flow Area (sq ft)		442.85	
E.G. Slope (ft/ft)	0.004988	Area (sq ft)		442.85	
Q Total (cfs)	1500.00	Flow (cfs)		1500.00	
Top Width (ft)	251.17	Top Width (ft)		251.17	
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)		3.39	
Max Chl Dpth (ft)	2.21	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	21238.0	Conv. (cfs)		21238.0	
Length Wtd. (ft)	499.75	Wetted Per. (ft)		253.01	
Min Ch El (ft)	1296.40	Shear (lb/sq ft)		0.55	
Alpha	1.00	Stream Power (lb/ft s)		1.85	

Frctn Loss (ft)	3.22	Cum Volume (acre-ft)	13.66	0.43
C & E Loss (ft)	0.01	Cum SA (acres)	8.59	0.84

Warning: The energy loss was 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 9814.93	9901.33	62.66	50.47	86.93	31.33	0.58	1.24
9901.33	9987.72	117.01	73.24	86.40	58.51	0.85	1.60
9987.72	RB 10074.12	20.33	19.29	42.47	10.17	0.45	1.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9814.93	9901.33	287.39	114.97	87.68	35.92	1.33	2.50
9901.33	9987.72	392.19	137.74	86.40	49.02	1.59	2.85
9987.72	RB 10074.12	120.43	63.11	72.15	15.05	0.87	1.91

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9814.93	9901.33	539.84	159.22	88.19	35.99	1.84	3.39
9901.33	9987.72	683.83	181.98	86.40	45.59	2.11	3.76
9987.72	RB 10074.12	276.32	101.64	78.42	18.42	1.30	2.72

Warning: The energy loss was 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: ADOBE DAM
REACH: B1 RS: 18.84

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9789.6	1300.42	9789.6	1294.42	9826.28	1294.44	9834.43	1294.43	9842.54	1294.33
9877.46	1294	10000	1293.61	10053.44	1294	10066.29	1294.63	10082.17	1295.11
10092.87	1295.05	10106.5	1294	10106.5	1300				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9789.6	.02	9789.6	.045	10066.29	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9789.61	10066.29	501.25	500.2	498.67	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1294.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1294.25	Reach Len. (ft)	501.25	500.20	498.67
Crit W.S. (ft)		Flow Area (sq ft)		81.83	0.40
E.G. Slope (ft/ft)	0.018695	Area (sq ft)		81.83	0.40
Q Total (cfs)	200.00	Flow (cfs)		198.80	1.20
Top Width (ft)	210.49	Top Width (ft)		207.28	3.22
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)		2.43	3.00
Max Chl Dpth (ft)	0.64	Hydr. Depth (ft)		0.39	0.12
Conv. Total (cfs)	1462.7	Conv. (cfs)		1454.0	8.7
Length Wtd. (ft)	500.20	Wetted Per. (ft)		207.28	3.48
Min Ch El (ft)	1293.61	Shear (lb/sq ft)		0.46	0.13
Alpha	1.00	Stream Power (lb/ft s)		1.12	0.40

Frctn Loss (ft)	2.52	Cum Volume (acre-ft)	2.49	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	4.53	0.02

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

CROSS SECTION OUTPUT Profile #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1295.04	Element			
Vel Head (ft)	0.16	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1294.88	Reach Len. (ft)	501.25	500.20	498.67
Crit W.S. (ft)		Flow Area (sq ft)		245.77	6.07
E.G. Slope (ft/ft)	0.010597	Area (sq ft)		245.77	6.07
Q Total (cfs)	800.00	Flow (cfs)		771.06	28.94
Top Width (ft)	296.41	Top Width (ft)		276.69	19.72
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)		3.14	4.77
Max Chl Dpth (ft)	1.27	Hydr. Depth (ft)		0.89	0.31
Conv. Total (cfs)	7771.3	Conv. (cfs)		7490.2	281.1
Length Wtd. (ft)	500.17	Wetted Per. (ft)		277.17	20.64
Min Ch El (ft)	1293.61	Shear (lb/sq ft)		0.59	0.19
Alpha	1.02	Stream Power (lb/ft s)		1.84	0.93
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)		6.20	0.06
C & E Loss (ft)	0.03	Cum SA (acres)		5.48	0.22

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)	1295.57	Element			
Vel Head (ft)	0.24	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1295.33	Reach Len. (ft)	501.25	500.20	498.67
Crit W.S. (ft)		Flow Area (sq ft)		370.13	20.95
E.G. Slope (ft/ft)	0.008748	Area (sq ft)		370.13	20.95
Q Total (cfs)	1500.00	Flow (cfs)		1384.74	115.26
Top Width (ft)	316.90	Top Width (ft)		276.69	40.21
Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)		3.74	5.50
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)		1.34	0.52
Conv. Total (cfs)	16037.1	Conv. (cfs)		14804.9	1232.2
Length Wtd. (ft)	500.11	Wetted Per. (ft)		277.62	41.59
Min Ch El (ft)	1293.61	Shear (lb/sq ft)		0.73	0.28
Alpha	1.04	Stream Power (lb/ft s)		2.72	1.51
Frctn Loss (ft)	2.26	Cum Volume (acre-ft)		8.99	0.31
C & E Loss (ft)	0.04	Cum SA (acres)		5.56	0.61

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9789.60	9881.83	5.15	4.37	30.61	2.57	0.14	1.18
9881.83	9974.06	89.64	37.69	92.23	44.82	0.41	2.38
9974.06	RB 10066.29	104.01	39.78	84.45	52.01	0.47	2.61
10066.29	10093.10						
10093.10	10106.50	1.20	0.40	3.48	0.60	0.12	3.00

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

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 9789.60	9881.83	120.15	53.09	92.69	15.02	0.58	2.26
9881.83	9974.06	323.79	96.04	92.23	40.47	1.04	3.37
9974.06	RB 10066.29	327.12	96.64	92.25	40.89	1.05	3.38
10066.29	10079.69	2.49	1.04	8.29	0.31	0.13	2.39
10079.69	10093.10						
10093.10	10106.50	26.46	5.03	12.35	3.31	0.44	5.26

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9789.60	9881.83	290.21	94.54	93.14	19.35	1.03	3.07
9881.83	9974.06	545.32	137.49	92.23	36.35	1.49	3.97
9974.06	RB 10066.29	549.22	138.09	92.25	36.61	1.50	3.98
10066.29	10079.69	33.40	6.67	13.41	2.23	0.50	5.01
10079.69	10093.10	10.76	3.38	13.41	0.72	0.25	3.18
10093.10	10106.50	71.10	10.91	14.77	4.74	0.81	6.52

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: B1 RS: 18.75

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9804.67	1297.01	9804.67	1291.01	9833.04	1291.1	9842.49	1291.31	9853.26	1291.14
10000	1290.91	10066.97	1292	10075.09	1292.52	10089.89	1292.91	10101.79	1292.71
10110.89	1292	10110.89	1298						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9804.67	.02	9804.67	.045	10075.09	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9804.67	10075.09	422.12	424.08	426	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1291.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.045	
W.S. Elev (ft)	1291.77	Reach Len. (ft)	422.12	424.08	426.00
Crit W.S. (ft)		Flow Area (sq ft)		164.41	
E.G. Slope (ft/ft)	0.002361	Area (sq ft)		164.41	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	248.25	Top Width (ft)		248.25	
Vel Total (ft/s)	1.22	Avg. Vel. (ft/s)		1.22	
Max Chl Dpth (ft)	0.87	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	4116.2	Conv. (cfs)		4116.2	
Length Wtd. (ft)	424.08	Wetted Per. (ft)		249.02	
Min Ch El (ft)	1290.90	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	2.63	Cum Volume (acre-ft)		1.07	
C & E Loss (ft)	0.02	Cum SA (acres)		1.91	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1292.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1292.58	Reach Len. (ft)	422.12	424.08	426.00
Crit W.S. (ft)		Flow Area (sq ft)		377.79	2.22
E.G. Slope (ft/ft)	0.002626	Area (sq ft)		377.79	2.22

Q Total (cfs)	800.00	Flow (cfs)	795.72	4.28
Top Width (ft)	280.08	Top Width (ft)	270.42	9.67
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)	2.11	1.93
Max Chl Dpth (ft)	1.68	Hydr. Depth (ft)	1.40	0.23
Conv. Total (cfs)	15612.4	Conv. (cfs)	15528.9	83.5
Length Wtd. (ft)	424.09	Wetted Per. (ft)	272.02	10.27
Min Ch El (ft)	1290.90	Shear (lb/sq ft)	0.23	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.48	0.07
Frctn Loss (ft)	2.72	Cum Volume (acre-ft)	2.62	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	2.34	0.05

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)	1293.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.045	0.016
W.S. Elev (ft)	1293.15	Reach Len. (ft)	422.12	424.08	426.00
Crit W.S. (ft)		Flow Area (sq ft)		533.04	17.83
E.G. Slope (ft/ft)	0.002762	Area (sq ft)		533.04	17.83
Q Total (cfs)	1500.00	Flow (cfs)		1446.49	53.51
Top Width (ft)	306.22	Top Width (ft)		270.42	35.80
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)		2.71	3.00
Max Chl Dpth (ft)	2.25	Hydr. Depth (ft)		1.97	0.50
Conv. Total (cfs)	28541.9	Conv. (cfs)		27523.7	1018.3
Length Wtd. (ft)	424.11	Wetted Per. (ft)		272.59	36.99
Min Ch El (ft)	1290.90	Shear (lb/sq ft)		0.34	0.08
Alpha	1.00	Stream Power (lb/ft s)		0.91	0.25
Frctn Loss (ft)	2.75	Cum Volume (acre-ft)		3.81	0.09
C & E Loss (ft)	0.04	Cum SA (acres)		2.42	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.
Warning: The energy loss was 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 9804.67	9894.81	70.16	59.02	90.90	35.08	0.65	1.19
9894.81	9984.95	92.65	69.49	90.14	46.32	0.77	1.33
9984.95	RB 10075.09	37.19	35.90	67.98	18.59	0.53	1.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9804.67	9894.81	282.09	132.01	91.71	35.26	1.46	2.14
9894.81	9984.95	324.09	142.49	90.14	40.51	1.58	2.27
9984.95	RB 10075.09	189.54	103.29	90.17	23.69	1.15	1.84
10075.09	10087.02	0.03	0.07	2.24	0.00	0.03	0.45
10087.02	10098.96						
10098.96	10110.89	4.25	2.15	8.02	0.53	0.29	1.98

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 9804.67	9894.81	502.38	183.76	92.29	33.49	2.04	2.73
9894.81	9984.95	559.73	194.24	90.14	37.32	2.15	2.88

9984.95	RB 10075.09	384.36	155.04	90.17	25.62	1.72	2.48
10075.09	10087.02	16.16	5.68	11.94	1.08	0.48	2.85
10087.02	10098.96	7.92	3.70	11.93	0.53	0.31	2.14
10098.96	10110.89	29.44	8.45	13.11	1.96	0.71	3.48

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: B1 RS: 18.67

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9797.68	1294.29	9797.68	1288.29	9831.51	1288.32	9840.5	1289.07	9849.87	1288.33
10000	1289.31	10062.45	1290.87	10080.52	1291.14	10092.17	1291.22	10109.22	1290.92
10117.14	1290.41	10117.14	1296.41						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9797.68	.02	9797.68	.045	10080.52	.016

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9797.68	10080.52	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #1/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1289.15	Element			
Vel Head (ft)	0.20	Wt. n-Val.		0.045	
W.S. Elev (ft)	1288.95	Reach Len. (ft)			
Crit W.S. (ft)	1288.95	Flow Area (sq ft)		56.06	
E.G. Slope (ft/ft)	0.041642	Area (sq ft)		56.06	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	144.79	Top Width (ft)		144.79	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57	
Max Chl Dpth (ft)	0.66	Hydr. Depth (ft)		0.39	
Conv. Total (cfs)	980.1	Conv. (cfs)		980.1	
Length Wtd. (ft)		Wetted Per. (ft)		145.50	
Min Ch El (ft)	1288.29	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		3.57	
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 #2/3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1289.89	Element			
Vel Head (ft)	0.39	Wt. n-Val.		0.045	
W.S. Elev (ft)	1289.50	Reach Len. (ft)			
Crit W.S. (ft)	1289.50	Flow Area (sq ft)		159.82	
E.G. Slope (ft/ft)	0.033439	Area (sq ft)		159.82	
Q Total (cfs)	800.00	Flow (cfs)		800.00	
Top Width (ft)	210.47	Top Width (ft)		210.47	
Vel Total (ft/s)	5.01	Avg. Vel. (ft/s)		5.01	
Max Chl Dpth (ft)	1.21	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	4374.9	Conv. (cfs)		4374.9	
Length Wtd. (ft)		Wetted Per. (ft)		211.75	
Min Ch El (ft)	1288.29	Shear (lb/sq ft)		1.58	
Alpha	1.00	Stream Power (lb/ft s)		7.89	
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)	1290.48	Element			
Vel Head (ft)	0.56	Wt. n-Val.		0.045	
W.S. Elev (ft)	1289.91	Reach Len. (ft)			
Crit W.S. (ft)	1289.91	Flow Area (sq ft)		249.19	
E.G. Slope (ft/ft)	0.029593	Area (sq ft)		249.19	
Q Total (cfs)	1500.00	Flow (cfs)		1500.00	
Top Width (ft)	226.73	Top Width (ft)		226.73	
Vel Total (ft/s)	6.02	Avg. Vel. (ft/s)		6.02	
Max Chl Dpth (ft)	1.62	Hydr. Depth (ft)		1.10	

Conv. Total (cfs)	8719.7	Conv. (cfs)	8719.7
Length Wtd. (ft)		Wetted Per. (ft)	228.43
Min Ch El (ft)	1288.29	Shear (lb/sq ft)	2.02
Alpha	1.00	Stream Power (lb/ft s)	12.13
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 9797.68	9891.96	182.43	46.80	91.98	91.22	0.51	3.90
9891.96	9986.24	17.57	9.25	53.52	8.78	0.17	1.90

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 9797.68	9891.96	568.07	99.15	95.56	71.01	1.05	5.73
9891.96	9986.24	223.92	56.41	94.28	27.99	0.60	3.97
9986.24	RB 10080.52	8.01	4.26	21.91	1.00	0.19	1.88

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 9797.68	9891.96	938.22	137.69	95.97	62.55	1.46	6.81
9891.96	9986.24	511.03	94.95	94.28	34.07	1.01	5.38
9986.24	RB 10080.52	50.75	16.55	38.18	3.38	0.43	3.07

SUMMARY OF MANNING'S N VALUES

River:ADOBE DAM

Reach	River Sta.	n1	n2	n3
B1	19.64	.02	.02	.02
B1	19.55	.02	.02	.045
B1	19.47	.02	.02	.045
B1	19.41	.02	.02	.02
B1	19.33	.045	.045	.02
B1	19.23	.045	.045	.02
B1	19.17	.02	.045	.016
B1	19.10	.02	.045	.016
B1	19.00	.02	.045	.016
B1	18.94	.02	.045	.016
B1	18.84	.02	.045	.016
B1	18.75	.02	.045	.016
B1	18.67	.02	.045	.016

SUMMARY OF REACH LENGTHS

River: ADOBE DAM

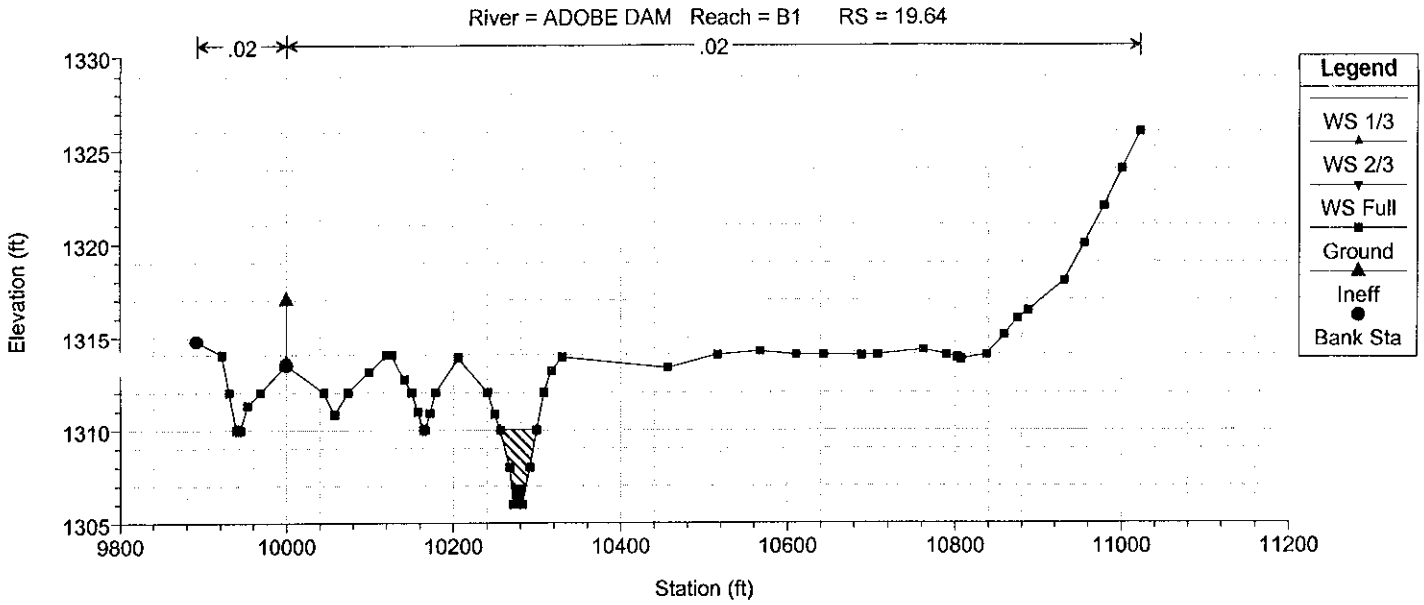
Reach	River Sta.	Left	Channel	Right
B1	19.64	498	489.74	510.09
B1	19.55	397.5	405.24	425.35
B1	19.47	325.8	322.01	345.05
B1	19.41	450	397.36	331.56
B1	19.33	541.29	571.61	588.73
B1	19.23	250	277.61	300
B1	19.17	420	394.51	400
B1	19.10	480	495.78	500
B1	19.00	366	364.36	364
B1	18.94	500.25	499.78	499.01
B1	18.84	501.25	500.2	498.67
B1	18.75	422.12	424.08	426
B1	18.67	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: ADOBE DAM

Reach	River Sta.	Contr.	Expan.
B1	19.64	.1	.3
B1	19.55	.1	.3
B1	19.47	.1	.3
B1	19.41	.1	.3
B1	19.33	.1	.3
B1	19.23	.1	.3
B1	19.17	.1	.3
B1	19.10	.1	.3
B1	19.00	.1	.3
B1	18.94	.1	.3
B1	18.84	.1	.3
B1	18.75	.1	.3
B1	18.67	.1	.3

HEC-RAS Plan: ADB1 River: ADOBE 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	19.64	0.01	1310.00	1310.02	1310.01	1310.02	0.000678	0.12	0.08	51.28	0.17
B1	19.64	0.01	1310.00	1310.02	1310.01	1310.02	0.000678	0.12	0.08	51.28	0.17
B1	19.64	0.01	1310.00	1310.01	1310.01	1310.01	0.000933	0.13	0.07	51.22	0.20
B1	19.55	0.01	1308.00	1308.15	1308.01	1308.15	0.000000	0.00	2.38	103.84	0.00
B1	19.55	0.01	1308.00	1308.71	1308.01	1308.71	0.000000	0.00	15.71	140.99	0.00
B1	19.55	100.00	1308.00	1309.53	1308.90	1309.60	0.000804	2.11	47.50	195.98	0.37
B1	19.47	0.01	1308.00	1308.15	1308.02	1308.15	0.000000	0.00	7.01	661.50	0.00
B1	19.47	0.01	1308.00	1308.71	1308.02	1308.71	0.000000	0.00	45.63	803.16	0.00
B1	19.47	100.00	1308.00	1309.48	1308.49	1309.49	0.000099	0.80	125.17	895.91	0.13
B1	19.41	0.01	1307.88	1308.15	1307.90	1308.15	0.000000	0.00	15.99	96.11	0.00
B1	19.41	100.00	1307.88	1308.45	1308.30	1308.52	0.002555	2.17	46.19	109.62	0.58
B1	19.41	400.00	1307.88	1308.87	1308.78	1309.15	0.004538	4.27	93.66	131.33	0.85
B1	19.33	0.01	1305.60	1305.62	1305.62	1305.62	0.176385	0.57	0.02	2.12	1.10
B1	19.33	100.00	1305.60	1306.04	1306.02	1306.11	0.032187	1.89	49.91	290.01	0.78
B1	19.33	400.00	1305.60	1306.41	1306.28	1306.54	0.010732	2.28	157.81	299.05	0.54
B1	19.23	0.01	1302.00	1302.22	1302.02	1302.22	0.000000	0.00	12.38	66.74	0.00
B1	19.23	100.00	1302.00	1302.74	1302.50	1302.80	0.002375	0.99	59.36	115.01	0.25
B1	19.23	400.00	1302.00	1303.33	1302.93	1303.52	0.003036	1.50	154.25	182.74	0.31
B1	19.17	0.01	1301.85	1302.22	1301.87	1302.22	0.000000	0.00	68.50	254.16	0.00
B1	19.17	100.00	1301.85	1302.46		1302.48	0.000605	0.54	130.78	257.80	0.13
B1	19.17	400.00	1301.85	1302.90		1302.97	0.001168	1.11	244.22	264.30	0.20
B1	19.10	200.00	1299.98	1300.47		1300.59	0.012556	1.74	99.89	306.63	0.54
B1	19.10	800.00	1299.98	1301.19		1301.32	0.004062	2.14	334.58	335.46	0.37
B1	19.10	1500.00	1299.98	1301.68		1301.87	0.003747	2.67	502.08	348.06	0.38
B1	19.00	200.00	1298.04	1298.85		1298.88	0.006026	1.52	131.75	288.73	0.40
B1	19.00	800.00	1298.04	1299.58		1299.65	0.003796	2.22	360.25	331.87	0.37
B1	19.00	1500.00	1298.04	1300.13		1300.25	0.003260	2.68	552.25	354.25	0.36
B1	18.94	200.00	1296.40	1297.35		1297.39	0.003105	1.40	143.00	215.25	0.30
B1	18.94	800.00	1296.40	1298.10		1298.20	0.004222	2.53	315.83	244.92	0.39
B1	18.94	1500.00	1296.40	1298.61		1298.79	0.004988	3.39	442.85	251.17	0.45
B1	18.84	200.00	1293.61	1294.25		1294.34	0.018695	2.43	82.23	210.49	0.68
B1	18.84	800.00	1293.61	1294.88		1295.04	0.010597	3.14	251.84	296.41	0.59
B1	18.84	1500.00	1293.61	1295.33		1295.57	0.008748	3.74	391.08	316.90	0.57
B1	18.75	200.00	1290.90	1291.77		1291.79	0.002361	1.22	164.41	248.25	0.26
B1	18.75	800.00	1290.90	1292.58		1292.65	0.002626	2.11	380.01	280.08	0.31
B1	18.75	1500.00	1290.90	1293.15		1293.27	0.002762	2.71	550.87	306.22	0.34
B1	18.67	200.00	1288.29	1288.95	1288.95	1289.15	0.041642	3.57	56.06	144.79	1.01
B1	18.67	800.00	1288.29	1289.50	1289.50	1289.89	0.033439	5.01	159.82	210.47	1.01
B1	18.67	1500.00	1288.29	1289.91	1289.91	1290.48	0.029593	6.02	249.19	226.73	1.01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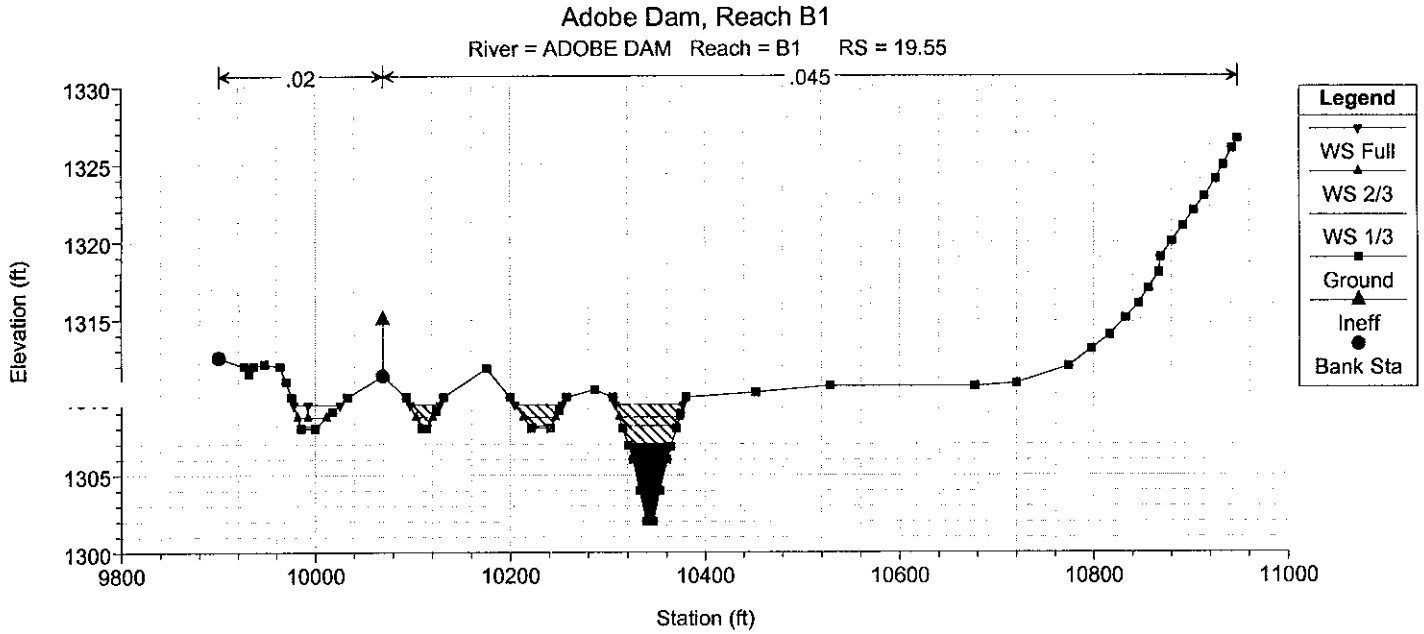
.02
.02
Legend
WS 1/3
WS 2/3
WS Full
Ground
Ineff
Bank Sta
Elevation (ft)
1330
1325
1320
1315
1310
1305
9800
10000
10200
10400
10600
10800
11000
11200
Station (ft)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.045
Legend
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WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
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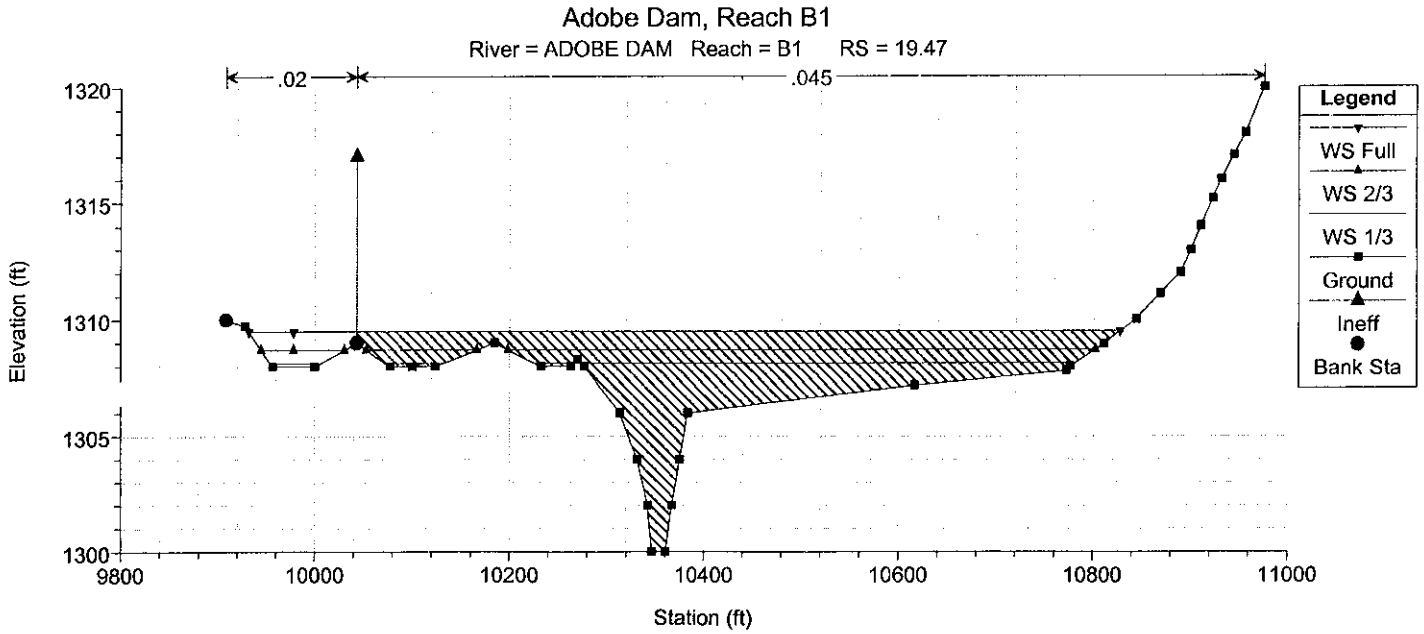
1325
1320
1315
1305
1300
9800
10000
10200
10400
10600
10800
11000
Station (ft)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WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
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1305
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9800
10000
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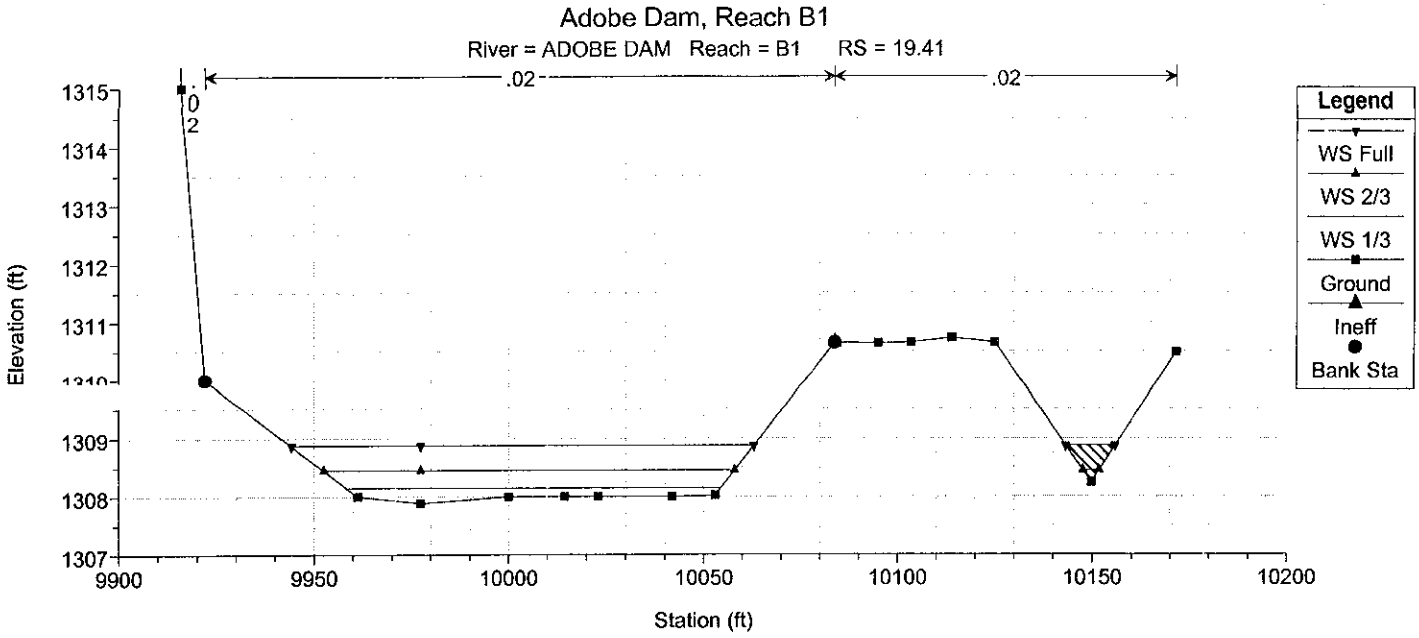
10400
10600
10800
11000
Station (ft)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WS 1/3
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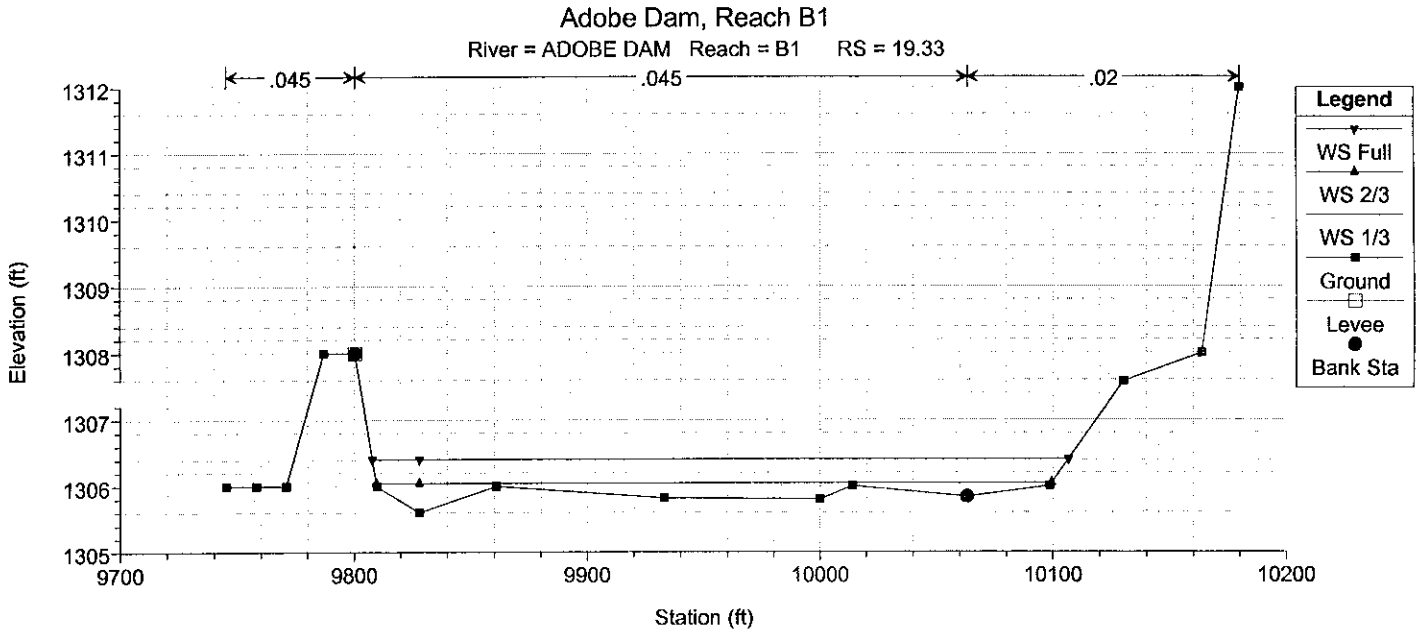
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.045
.02
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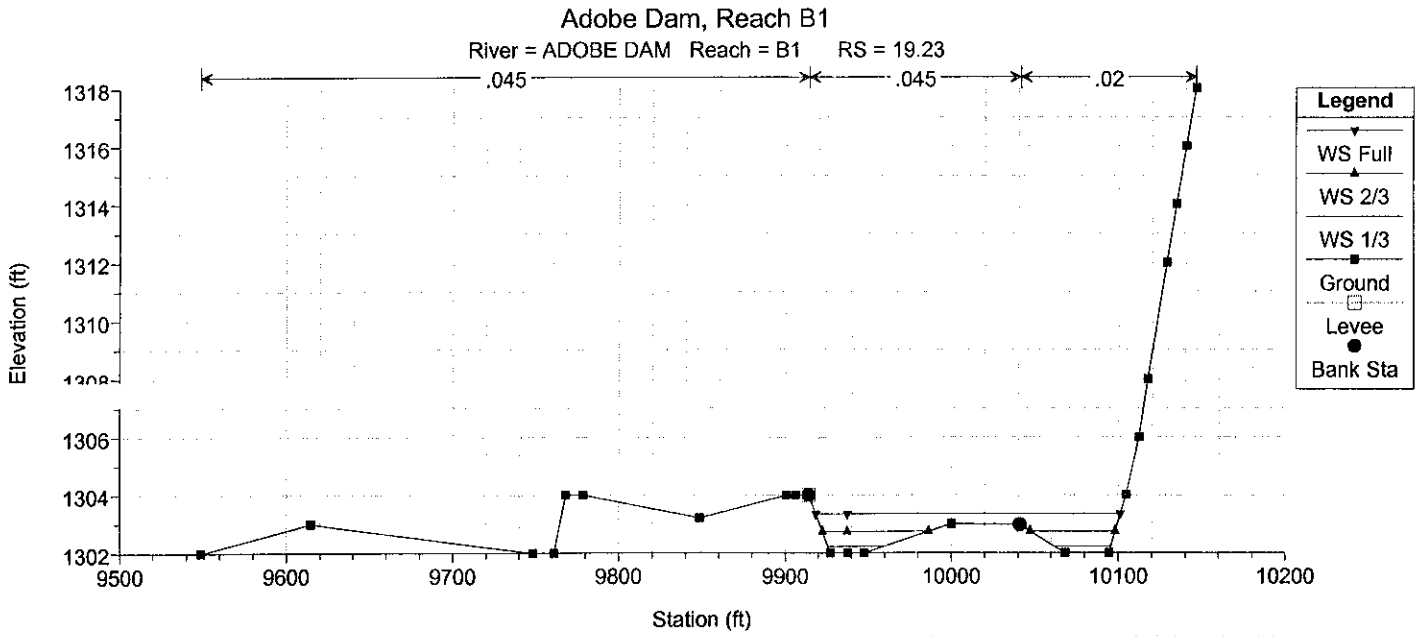
WS 2/3
WS 1/3
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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.02
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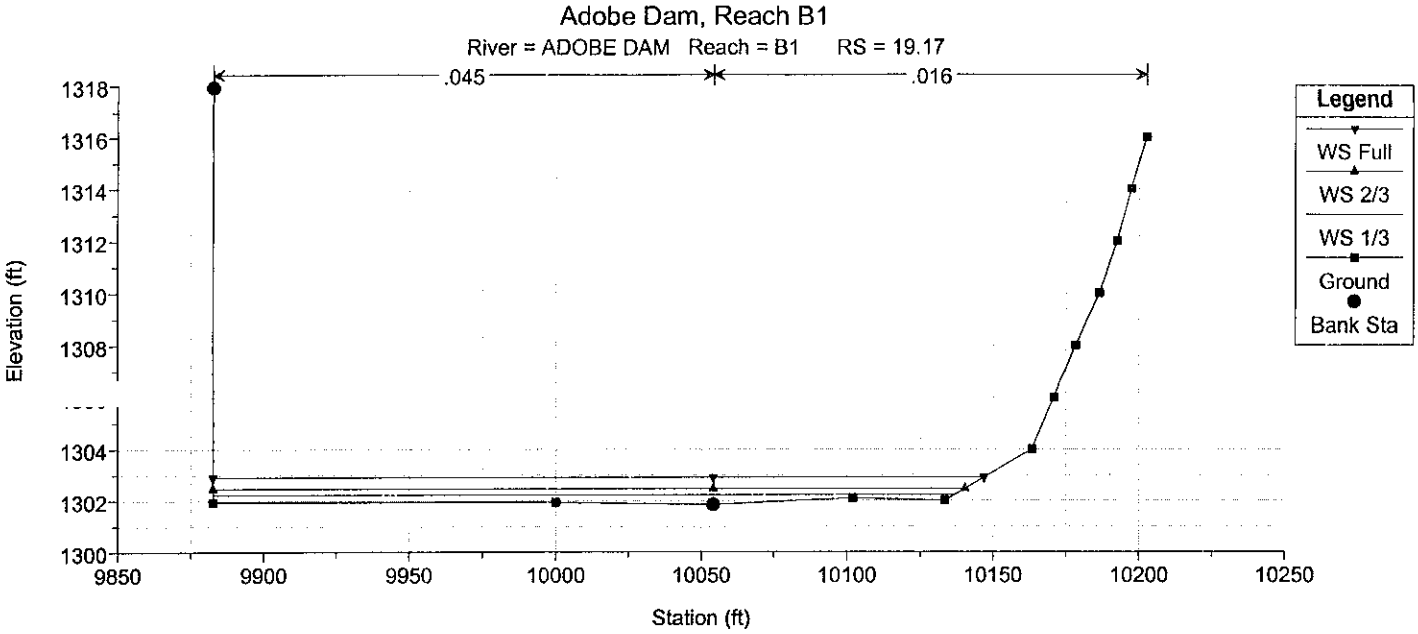
WS 1/3
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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WS 1/3
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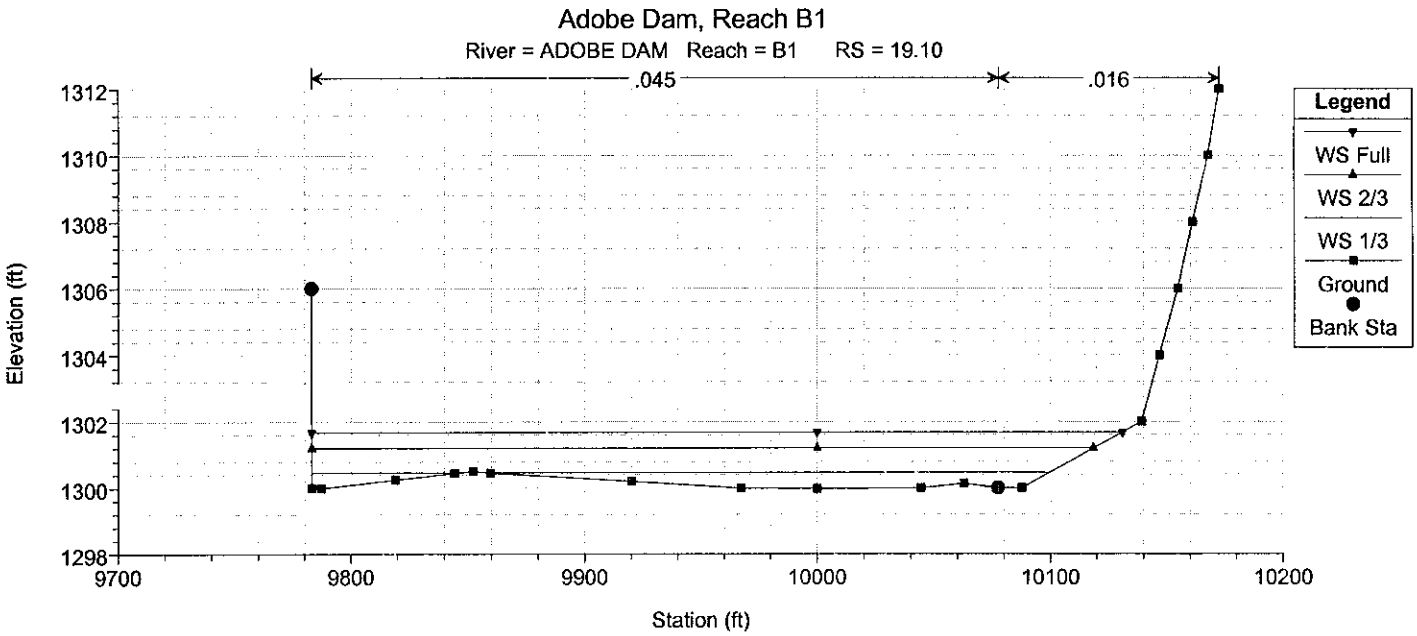
Bank Sta
Elevation (ft)
Station (ft)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WS 1/3
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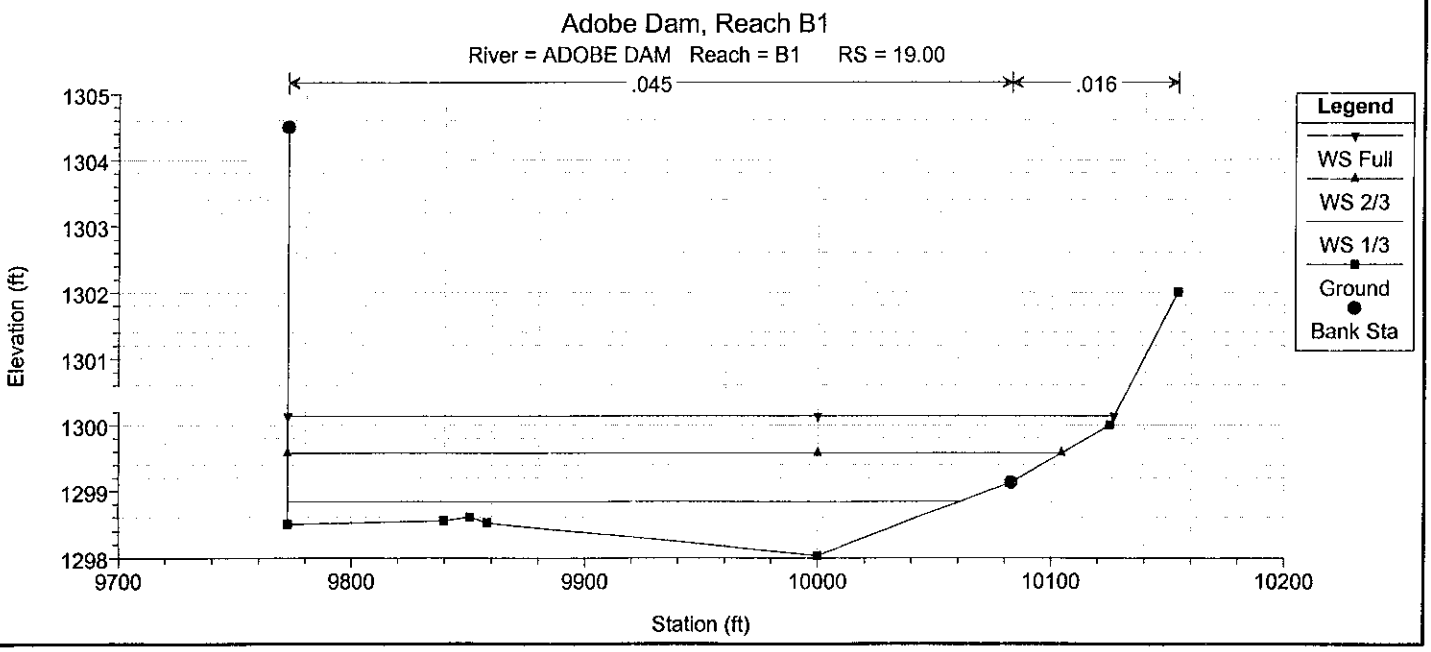
Bank Sta
Elevation (ft)
Station (ft)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Bank Sta
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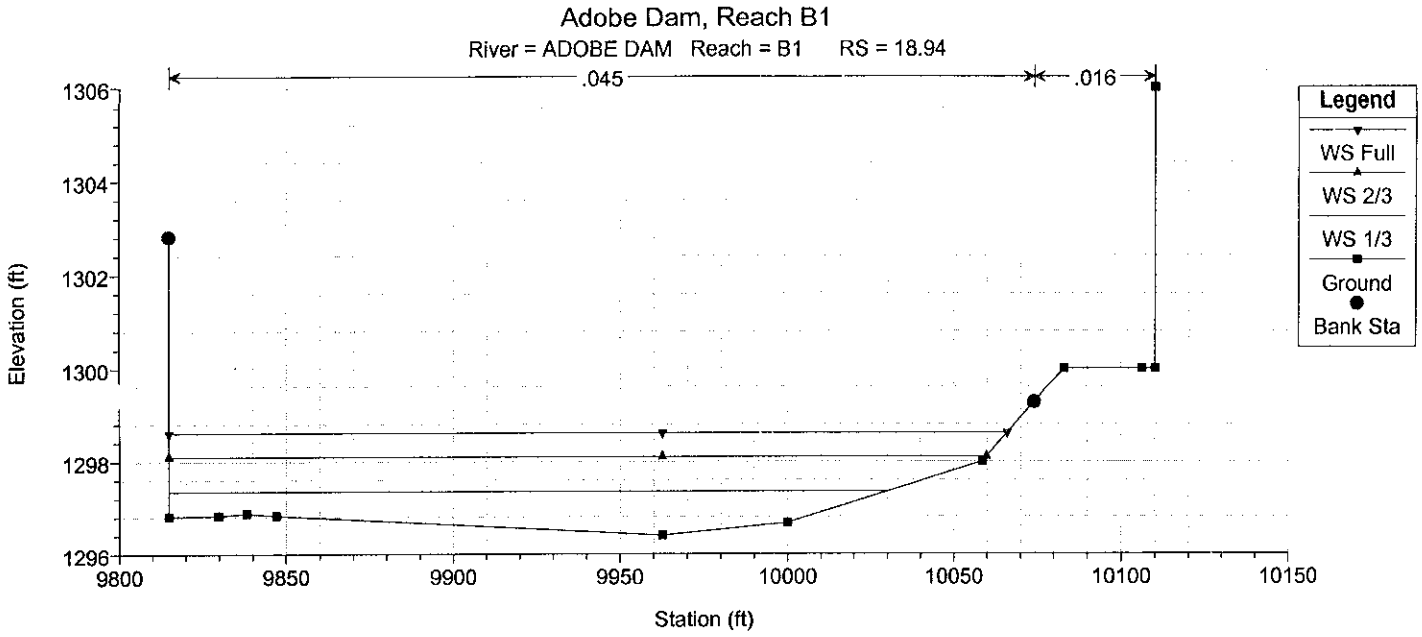
Station (ft)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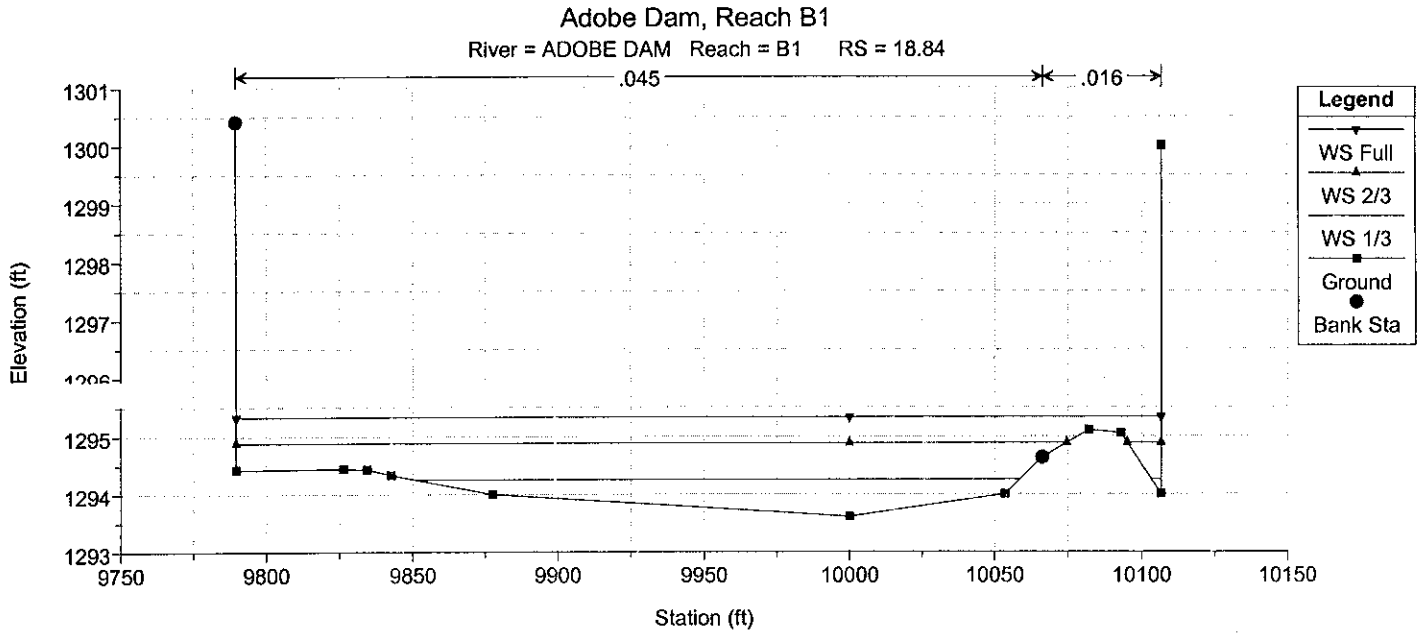
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)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WS 1/3
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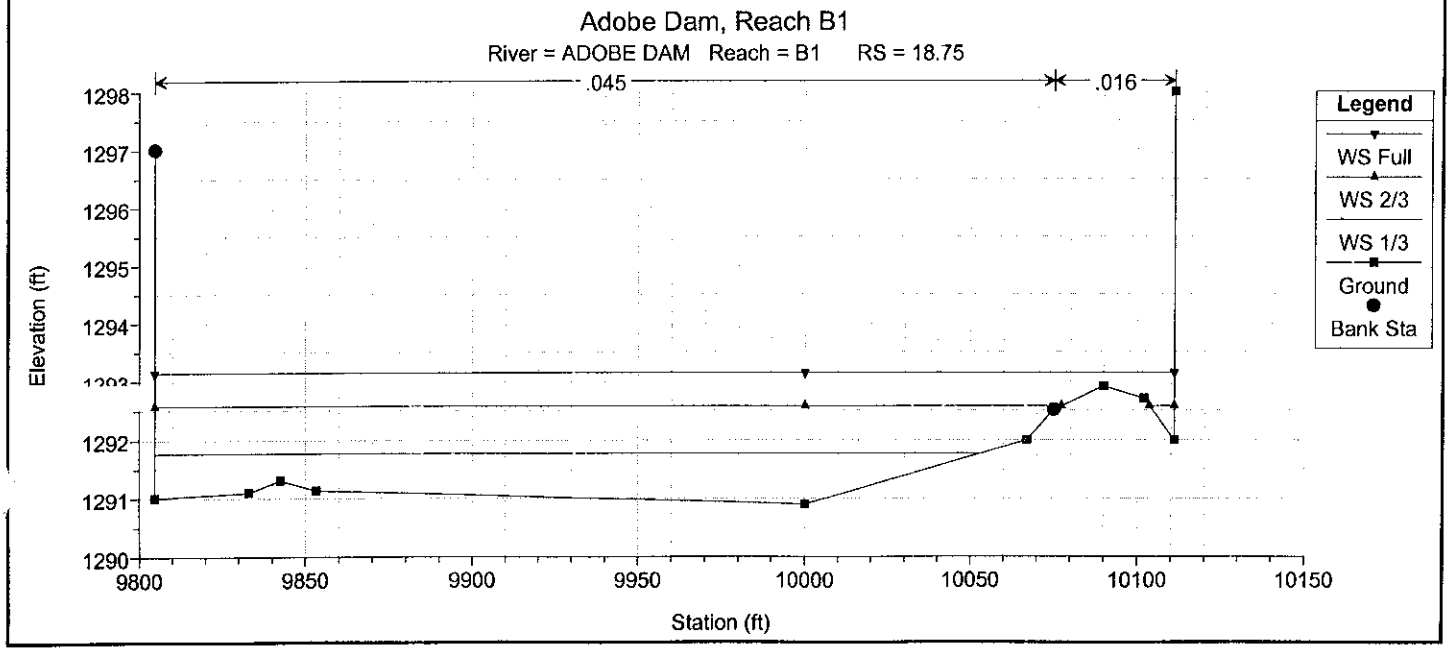
Bank Sta
Elevation (ft)
Station (ft)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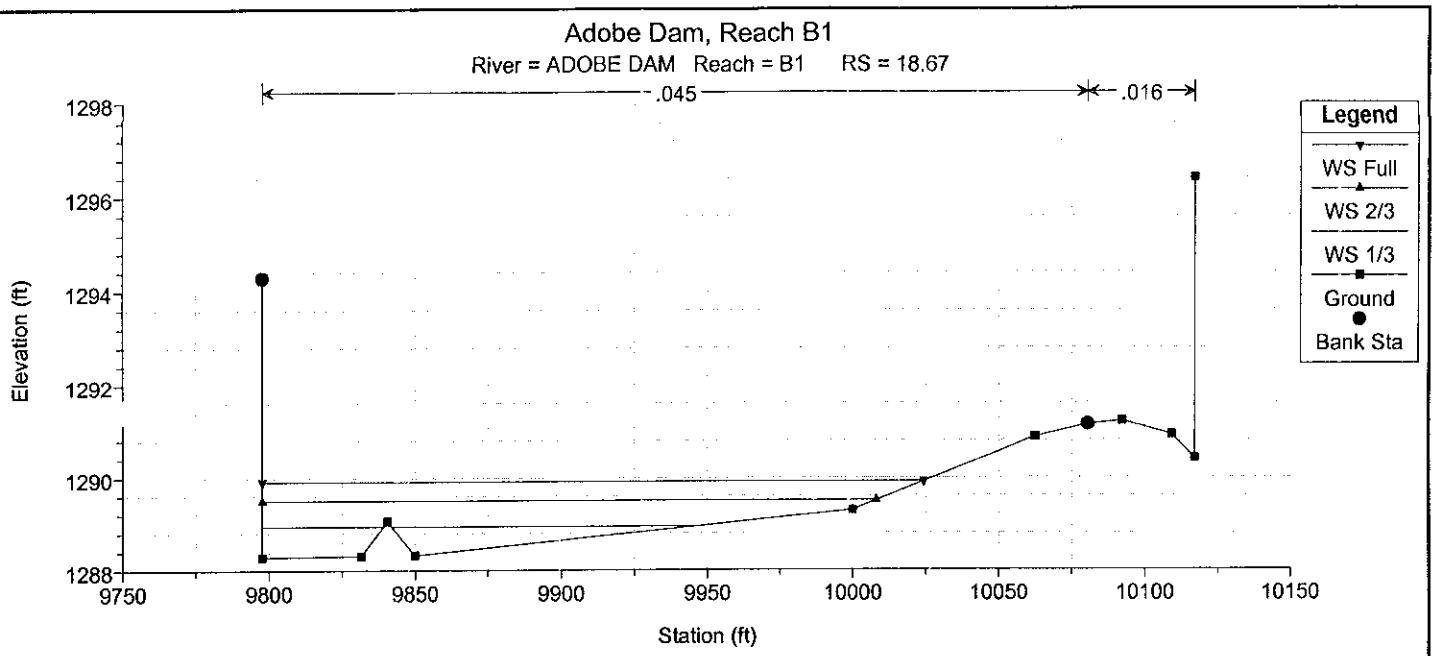
WS 1/3
Ground
Bank Sta
Elevation (ft)
Station (ft)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.016
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
1298
1296
1294
1292
1290
1288
9750
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)

ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX F: REACH C HYDRAULICS
HEC-RAS MODELS ADC1 AND ADC2

Adobe Dam
Spillway Delineation Study

Appendix F: Reach C Hydraulics
HEC-RAS Models ADC1 and ADC2

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- 1.2 Carmel Park Grading Plans
- 1.3 Calculations

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- 2.1 Summary Sheet
- 2.2 59th Avenue Weirflow Calculations
- 2.3 Utopia Road Culvert Capacity Calculations
- 2.4 HEC-RAS Summary Tables
- 2.5 HEC-RAS Model Printout for ADC1
- 2.6 HEC-RAS Model Printout for ADC2

3 Skunk Creek HEC-2
- 4.1 Summary Sheet
- 4.2 HEC-2 Model Printout

1 Flow Through the Carmel Park Subdivision

Flow Through the Carmel Park Subdivision

Description

When flow reaches the intersection of 51st Avenue and the southern frontage road, a portion of the flow heads south within 51st Avenue. The flow in 51st Avenue enters the Carmel Park subdivision at Oraibi Drive, flows through the subdivision and park, and ends up in the 55th Avenue drainage Channel just south of Utopia Road. The analysis described in this section was used to determine the extents of flooding through the subdivision. Street capacity and sideweir calculations are included, along with excerpts from the *Grading and Drainage Plans for Carmel Park* prepared by Coe & Van Loo (Ref. Plan Set Bibliography in Appendix B).

Assumptions

- The low point along 51st Avenue occurs at the Oraibi Drive entrance to the subdivision. Normal depth computations for Oraibi Drive at that location indicate that for the full flow of 1100 cfs, the flow depth is approximately 2.0 feet. Elevations at the Wikieup Lane entrance to the subdivision are more than 2.2 feet higher than elevations at the Oraibi Drive entrance, therefore it was assumed that all flow would enter the subdivision at Oraibi Drive.
- Pad elevations were used to determine what portions of the subdivision would be inundated by the three flows. Flow was assumed to move between lots, ignoring walls and fences.

Method of Analysis

Normal depth computations for Oraibi Drive were used to determine the flow depths for each of the three flows. The computations are included in this section, and are summarized as follows:

Flow Event	Q (cfs)	Flow Depth (ft)
1/3	400	1.44
2/3	700	1.88
Full	1100	2.37

At the point where the flow in Oraibi Drive reaches the park, sideweir calculations were used to determine the amount of flow that weirs into the park. It was determined that all but 100 cfs flows through the park, with the remaining 100 cfs carried west within Oraibi Drive.

Results

Approximate flooding areas and depths for each of the 1/3, 2/3, and Full flows are shown on the spillway delineation maps. The 1/3 flow creates flow depths of approximately 0 to 1.5 feet, the 2/3 flow creates flow depths of approximately 0 to 2 feet, and the full flow creates flow depths of approximately 0 to 3 feet. A majority of the flow will be carried within the streets, however the possibility exists that flow may pond to deeper than three feet at local low spots.

Sideweir Calculations at Oraibi Drive and Carmel Park

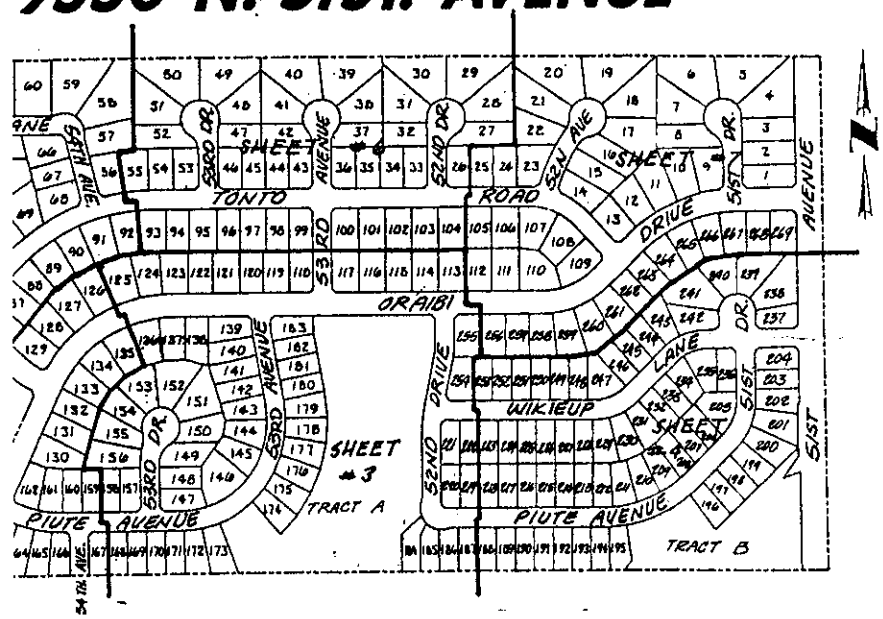
$Q = CLH^{3/2}$

Where: C= 3
L = weir length = 376 feet
H = flow depth

Flow Event, Q Total	Flow Depth at Upstream End of Weir[1] (ft)	Flow Depth at Downstream End of Weir (ft)	Average Flow Depth (ft)	Q Weir[2] through Park (cfs)	Flow West in Oraibi Drive[3] (cfs)	Q_{TOTAL} (cfs)
1/3, 1100 cfs	1.87	0.5	0.94	1000	100	1100
2/3, 700 cfs	1.38	0.5	0.69	600	100	700
Full, 400 cfs	0.94	0.5	0.47	300	100	400

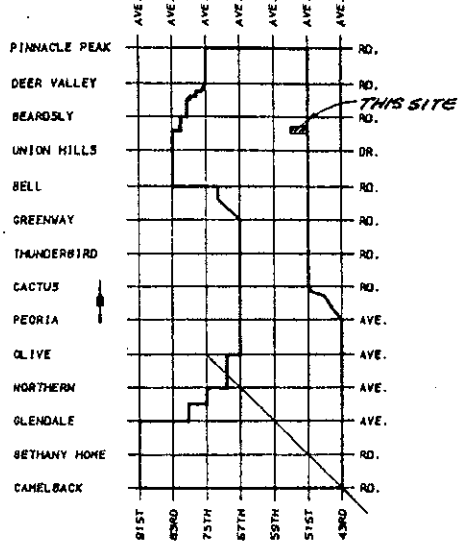
Notes:
(1) Equals flow depth from Oraibi Drive normal depth computations for total flow, minus 0.5 feet curb depth.
(2) Rounded to the nearest 100 cfs
(3) Equals the full-curb capacity of Oraibi Drive from normal depth computations.

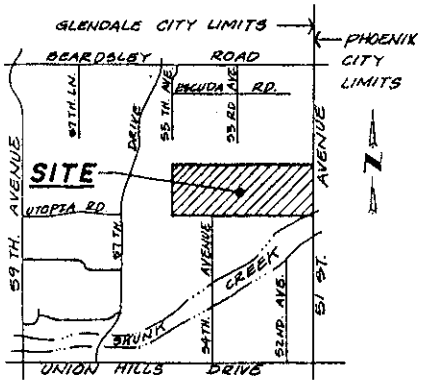
ADING DRAINAGE PLANS FOR CARMEL PARK 9550 N. 51ST. AVENUE



INDEX MAP

N. T. S.





VICINITY MAP

N.T.S.

	PLANS SUBMITTED TO	PLANS REVIEWED BY	PERMIT RECEIVED
ARIZONA PUBLIC SERVICE - ELECTRICAL	SUBDIVISION DEPT.	DARRELL JOHNSON	
SOUTHWEST GAS CORPORATION - GAS	ELTON BUELL	ELTON BUELL	
SALT RIVER PROJECT - IRRIGATION	BOB MAURER	BOB MAURER	
SALT RIVER PROJECT - ELECTRICAL	N/A	N/A	N/A
U.S. WEST COMMUNICATIONS TELE. CO.	ROBERT FRIESS	JIM GREENO	
REPUBLIC CABLE TV	CARL McKAY	CARL McKAY	
(OTHER) *	ALLEN GATTIS	J.T. SAVAGE	

*AGENCIES ALSO REQUIRING PERMITS WHEN INVOLVED ARE: MARICOPA COUNTY HIGHWAY DEPT., ARIZONA STATE HIGHWAY DEPT., CITY OF PHOENIX, CITY OF PEORIA, SANTA FE RAILROAD, & *EL PASO NATURAL GAS.

"I HEREBY CERTIFY THAT THIS DESIGN IS BASED ON ACCURATE FIELD DATA WHICH HAS BEEN CHECKED IN THE FIELD WITHIN 60 DAYS PRIOR TO SUBMISSION FOR CITY APPROVAL."

BY: Jeff Phister DATE: 3-5-92

DEVELOPER

CONTINENTAL HOMES
7001 N. SCOTTSDALE ROAD, SUITE 2050
SCOTTSDALE, ARIZONA 85250
PHONE (602) 483-0006

ENGINEER

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12TH STREET
PHOENIX, ARIZONA 85014
PHONE (602) 264-6831

BENCHMARK

BRASS CAP FLUSH AT THE INTERSECTION OF 57TH DRIVE AND UTOPIA ROAD
ELEV. = 1279.90
(CITY OF GLENDALE)

APPROVALS

BY: P.E. 3-19-92
LAND DEVELOPMENT ENGINEER DATE

THIS INFORMATION IS SHOWN FOR [illegible] ONLY & WHILE EVERY EFFORT [illegible] EN IN ITS COMPILATION [illegible] "NOALE ENGINEERING [illegible] GUARTEE THE ACCURACY [illegible] HE INFORMATION [illegible]

THIS DRAWING [illegible] DO NOT SCALE.

AS-BUILT CERTIFICATION

"AS-BUILT CERTIFICATION"
I CERTIFY THAT THE "AS-BUILT" INFORMATION SHOWN HEREON WAS OBTAINED UNDER MY DIRECT SUPERVISION AND IS CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

NAME LARRY E. SULLIVAN (SEAL)

REGISTERED LAND SURVEYOR CERTIFICATE NO. 22702

CARMEL PARK

COE & VAN LOO

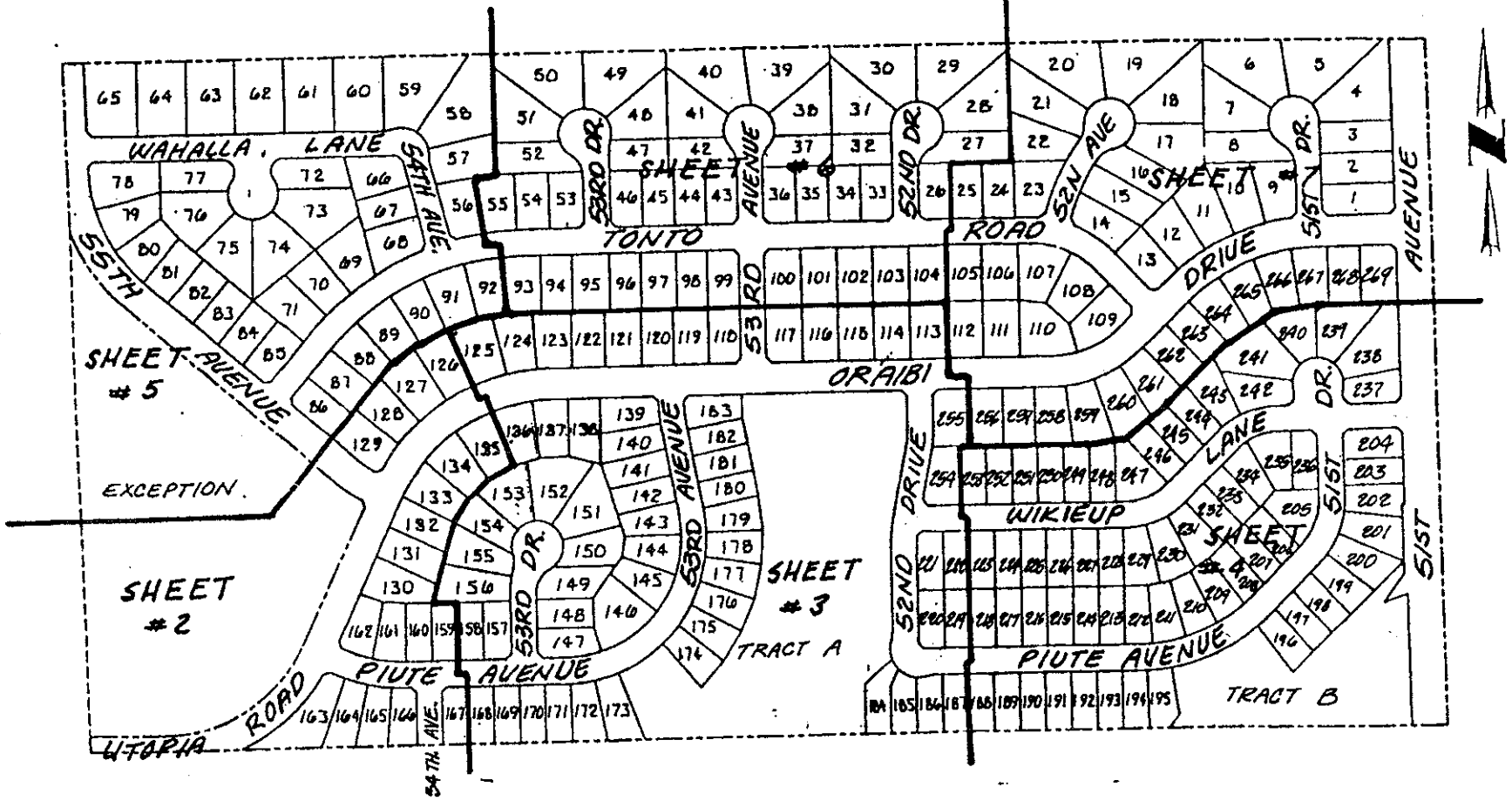
4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

		REVISIONS	DATE	BY
DESIGNED	G.W.E.			
DRAWN	B.J.G.			
CHECKED	G.P.S.			
DATE	1-92			

GRADING & DRAINAGE PLANS

19720 EUGENE P. SMITH

GRADING DRAINAGE PLANS
FOR
CARMEL PARK
19550 N. 51ST. AVENUE



INDEX MAP
N. T. S.

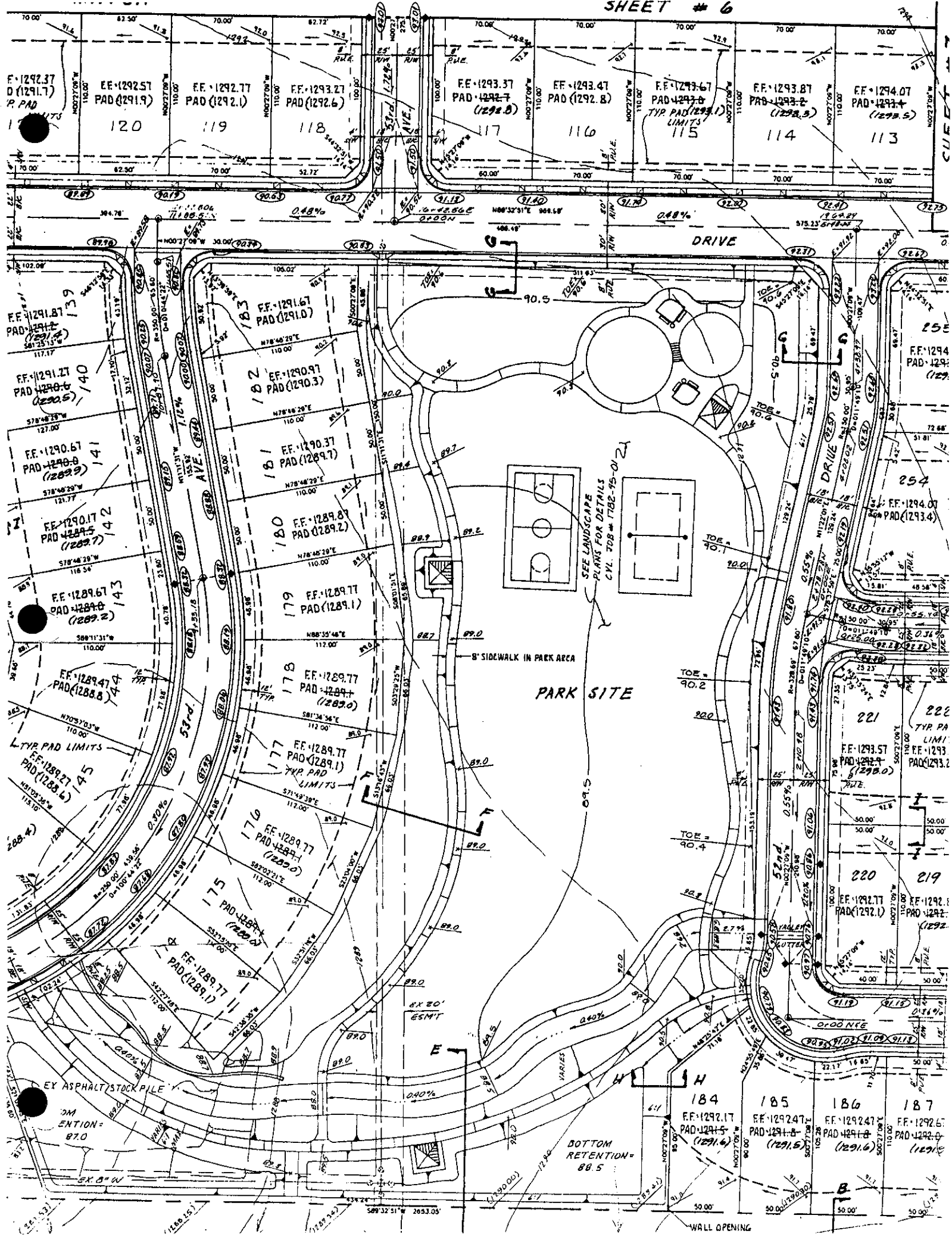
PLANS	PLANS	PERMIT

PINNACLE
DEER VAL
BEARDSL
UNION H
BELL
GREENWA
THUNDER
CACTUS
PEORIA
OLIVE
NORTHER
GLENDAL
BETHAN
CAMELB

GLE
BEA
67TH LN.
SITI
UTOPIA
59TH AVENUE
UNIO

DEVELOPE

SHEET # 6


PARK SITE
SEE LANDSCAPE PLANS FOR DETAILS CVL. TOB # 1782-95-01
8' SIDEWALK IN PARK AREA
DRIVE
53rd. AVE.
52nd. DRIVE
TYP. PAD LIMITS
EX ASPHALT STOCK PILE
BOTTOM RETENTION = 88.5
WALL OPENING
EX 8" W
EX 20' ESM'T
0.48%
0.55%
0.40%
0.30%
0.36%
0.56%
112%
89.5
90.5
89.0
90.0
90.1
90.2
90.4
120
119
118
117
116
115
114
113
139
140
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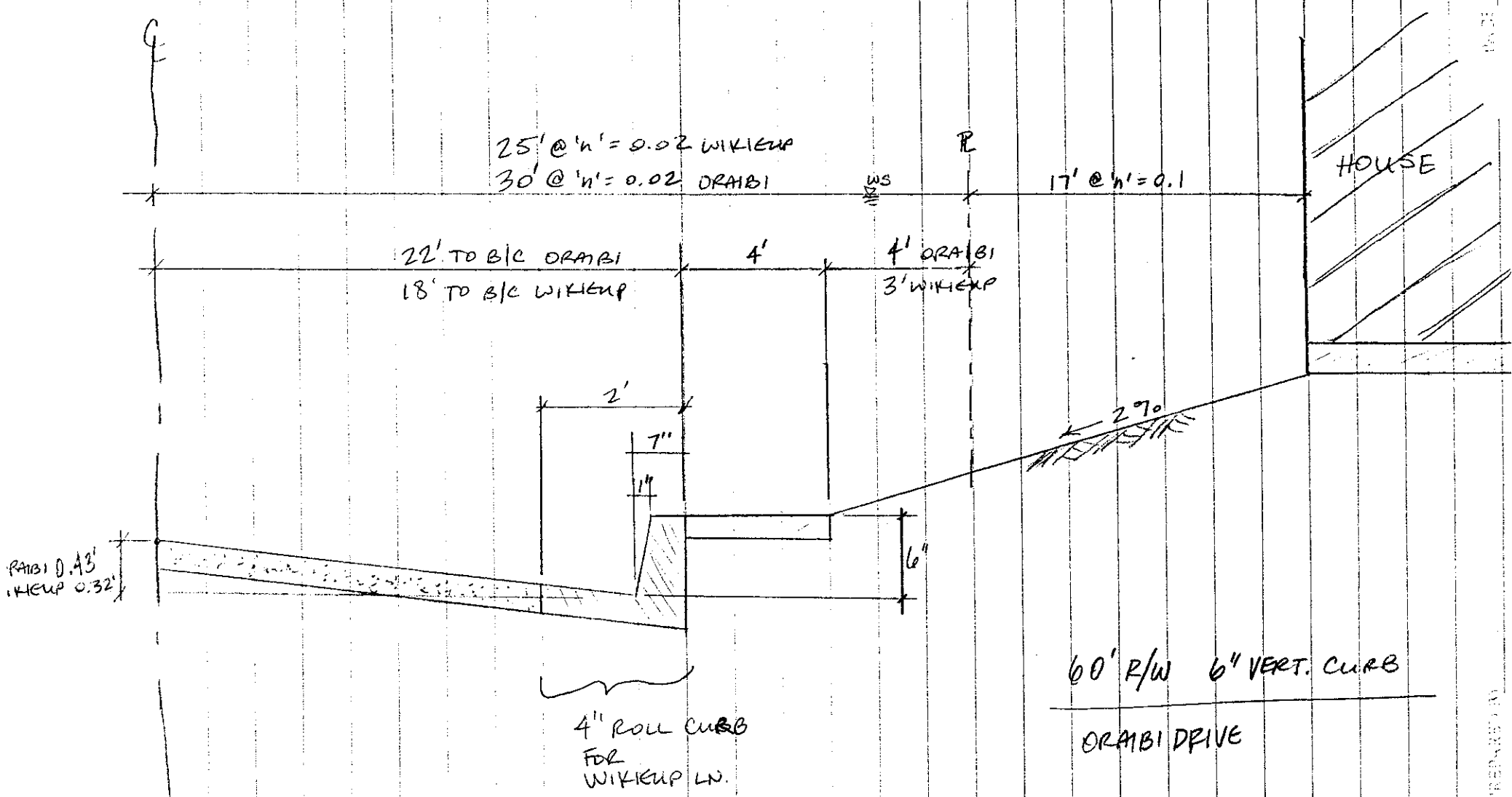


TYPICAL HALF-STREET

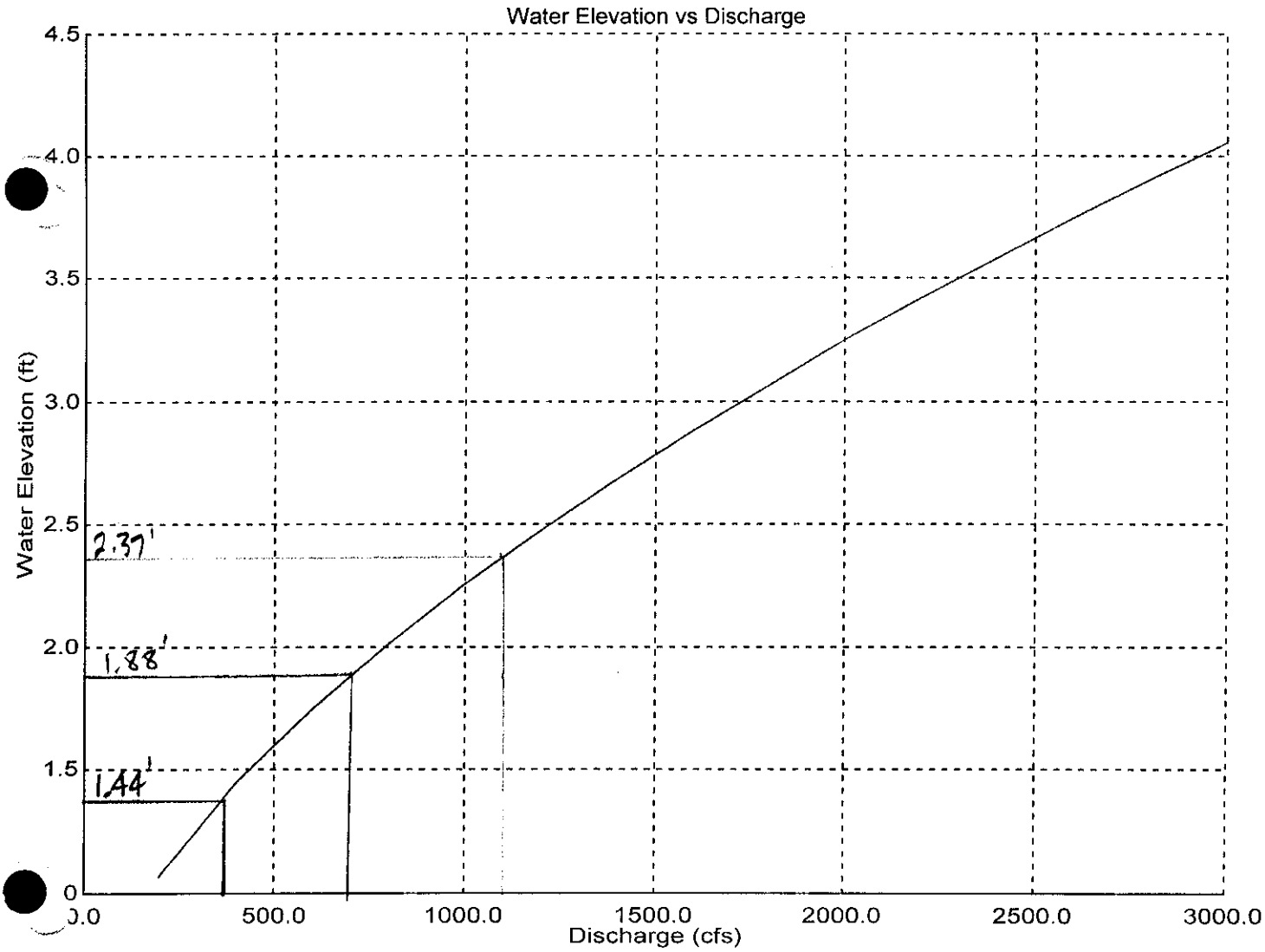
CARMEL PARK

Oraibi Drive, S=0.48%
Plotted Curves for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.48%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.004800 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	3,000.00	200.00 cfs



Oraibi Drive, S=0.48%
Rating Table for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.48%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.004800 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	3,000.00	200.00 cfs

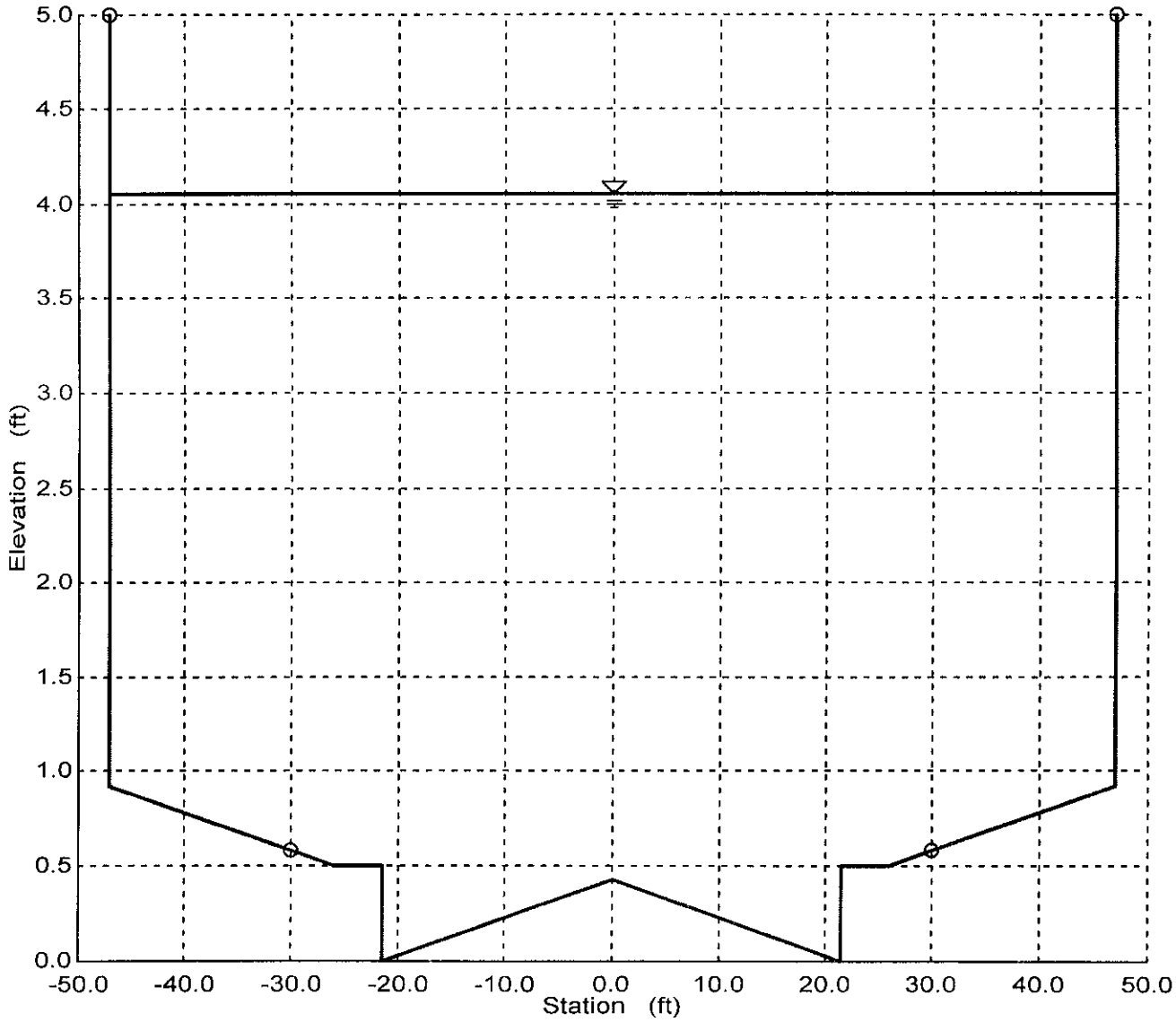
Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
0.00	0.026	N/A	0.00
200.00	0.021	1.06	3.54
400.00	0.023	1.44	4.35
600.00	0.024	1.75	4.97
700			1.88
800.00	0.025	2.01	5.49
1,000.00	0.025	2.26	5.94
1100			2.37
1,200.00	0.025	2.48	6.34
1,400.00	0.025	2.69	6.70
1,600.00	0.025	2.88	7.04
1,800.00	0.026	3.07	7.35
2,000.00	0.026	3.25	7.64
2,200.00	0.026	3.42	7.92
2,400.00	0.026	3.59	8.18
2,600.00	0.026	3.75	8.43
2,800.00	0.026	3.90	8.66
3,000.00	0.026	4.05	8.89

Oraibi Drive, S=0.48%
Cross Section for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.48%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.026	
Channel Slope	0.004800	ft/ft
Water Surface Elevation	4.05	ft
Discharge	3,000.00	cfs

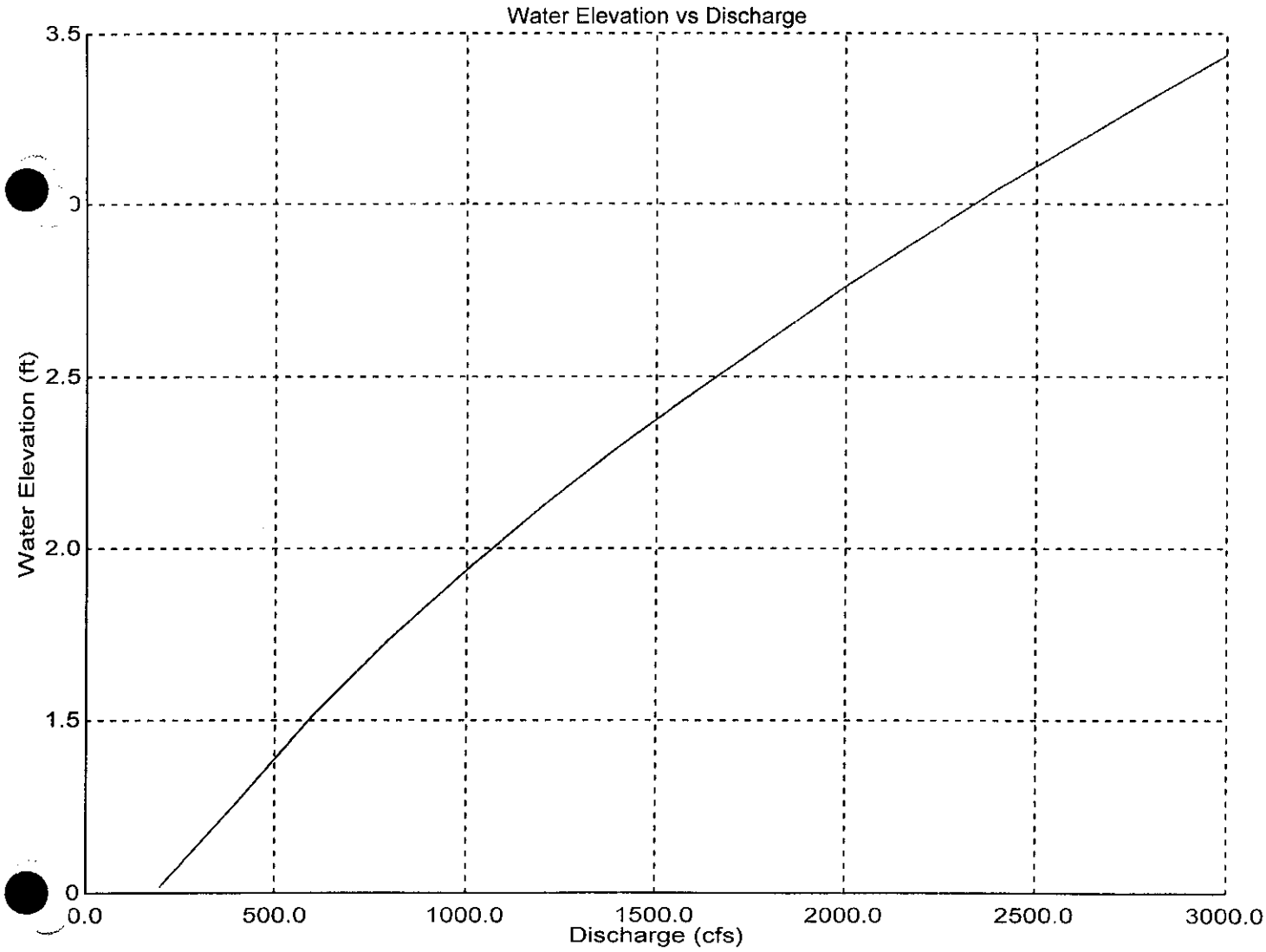


Oraibi Drive, S=0.88%
Plotted Curves for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.88%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.008800 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	3,000.00	200.00 cfs



Oraibi Drive, S=0.88%
Rating Table for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.88%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Constant Data	
Channel Slope	0.008800 ft/ft

Input Data			
	Minimum	Maximum	Increment
Discharge	0.00	3,000.00	200.00 cfs

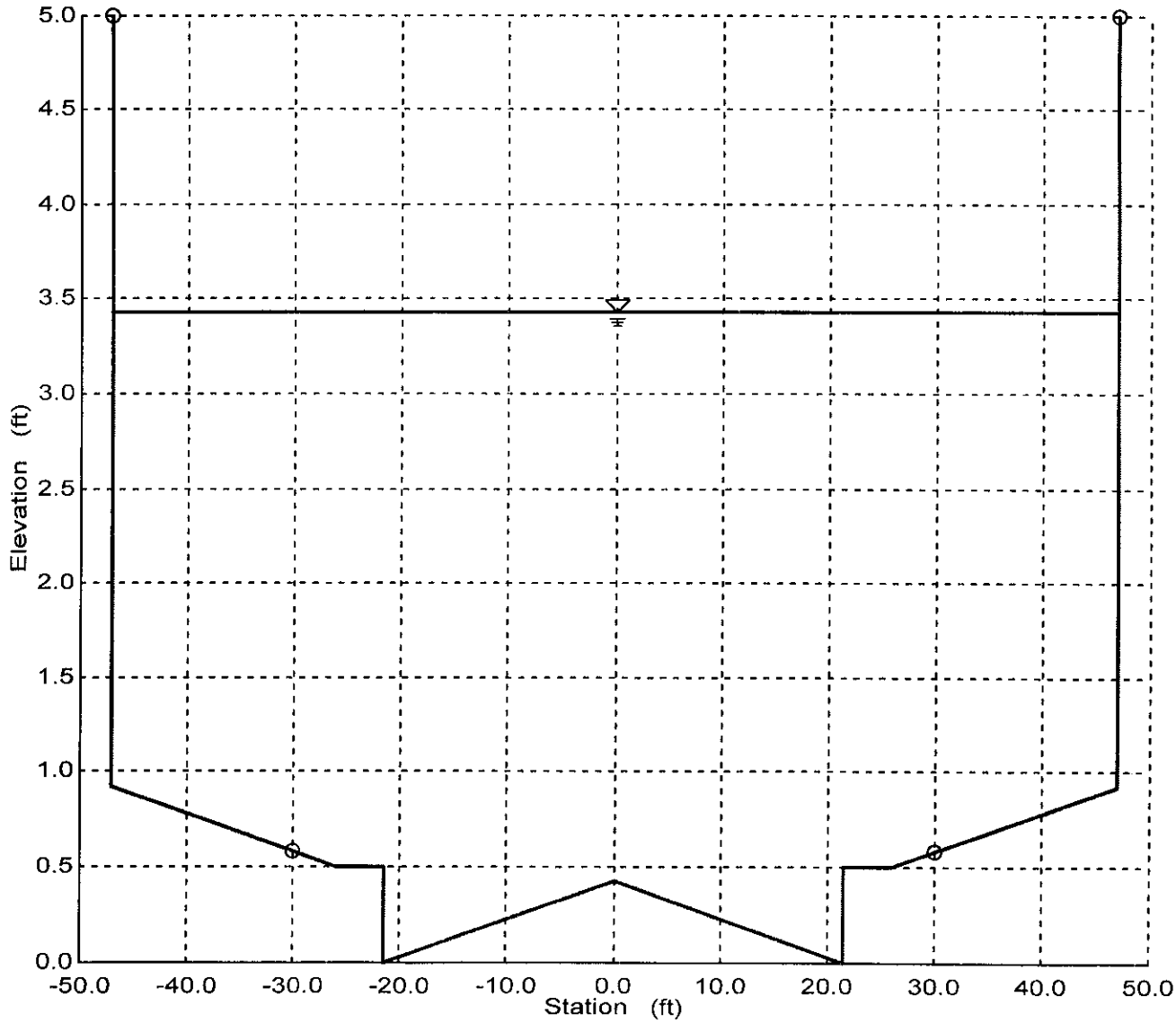
Rating Table

Discharge (cfs)	Wtd. Mannings Coefficient	Water Surface Elevation (ft)	Velocity (ft/s)
0.00	0.026	N/A	0.00
200.00	0.020	1.02	4.66
400.00	0.022	1.26	5.36
600.00	0.023	1.51	6.08
800.00	0.024	1.74	6.69
1,000.00	0.024	1.94	7.23
1,200.00	0.025	2.12	7.70
1,400.00	0.025	2.29	8.14
1,600.00	0.025	2.46	8.54
1,800.00	0.025	2.61	8.91
2,000.00	0.025	2.76	9.26
2,200.00	0.026	2.91	9.58
2,400.00	0.026	3.04	9.90
2,600.00	0.026	3.18	10.19
2,800.00	0.026	3.31	10.48
3,000.00	0.026	3.43	10.75

Oraibi Drive, S=0.88%
Cross Section for Irregular Channel

Project Description	
Project File	g:\filedir\99\990006-02hydro\carmel.fm2
Worksheet	Oraibi Drive, S=0.88%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.026	
Channel Slope	0.008800	ft/ft
Water Surface Elevation	3.43	ft
Discharge	3,000.00	cfs



2 HEC-RAS Models ADC1 and ADC2

Summary Sheet for HEC-RAS Models ADC1 and ADC2

Description

The combination of HEC-RAS Models ADC1 and ADC2 was created to model spillway flow which reaches the 55th Avenue drainage channel, located along the 55th Avenue alignment south of the Loop 101 Freeway. As the capacity of the 5-10' x 4' concrete box culverts at Utopia Road is exceeded, flow breaks out of the channel and continues south and west towards Skunk Creek and 59th Avenue. Model ADC1 follows the flow which breaks out of the channel north of Utopia Road. Model ADC2 follows the flow which remains in the channel south of Utopia Road. Each model has a separate hydraulic baseline (10,000 sta). Sources of flow include: the Arrowhead Lakes outlet (See Appendix D), flow from the east along the south side of the Loop 101 Freeway (See Appendix E), and flow from the east through the Carmel Park subdivision (See Section 1 of this Appendix).

Assumptions

- A three-foot wall along the western side of 57th Avenue was assumed as the western endpoint for the flow at cross-sections 18.52 and 18.37.
- Residential subdivision walls along the eastern side of the channel were modeled as blocked obstructions.
- A Skunk Creek HEC-2 model was created using a combination of the HEC-2 models from the *Skunk Creek Master Plan Final Report* and the *Final Design Report: Skunk Creek Channel Improvements* (See References section, Appendix B). This model was used to generate the starting water surfaces at the downstream end of the channel.
- Uneven weir calculations at 59th Avenue were used as the starting water surfaces at the downstream end of Model ADC1.

Method of Analysis

1. To determine the capacity of the channel, a HEC-RAS model of the 55th Avenue drainage channel was run for a range of flows. The channel model indicates that upstream of the culvert at Utopia Road, the channel has an approximate capacity of 5000 cfs, downstream of the culvert the channel has an approximate capacity of 6000 cfs, and the culvert itself has an approximate capacity of 1800 cfs. Box culvert hydraulic calculations performed using Dodson's *Hydrocalc* software also indicate that the capacity of the 5-10' x 4' concrete box culverts at Utopia Road is approximately 1800 cfs.

2. The HEC-RAS model of the entire channel was run for each of the 1/3, 2/3, and full flows to determine the amount of flow that overtops the channel bank just upstream of Utopia Road.

Summary Sheet for HEC-RAS Models ADC1 and ADC2 (cont'd.)

3. HEC-RAS model ADC1 was created for the flow which overtops the channel bank upstream of Utopia Road. An iterative process was used to determine the flow distribution at cross-section 17.80, where flow west of the building continues west toward 59th Avenue, and flow east of the building continues south toward Skunk Creek.

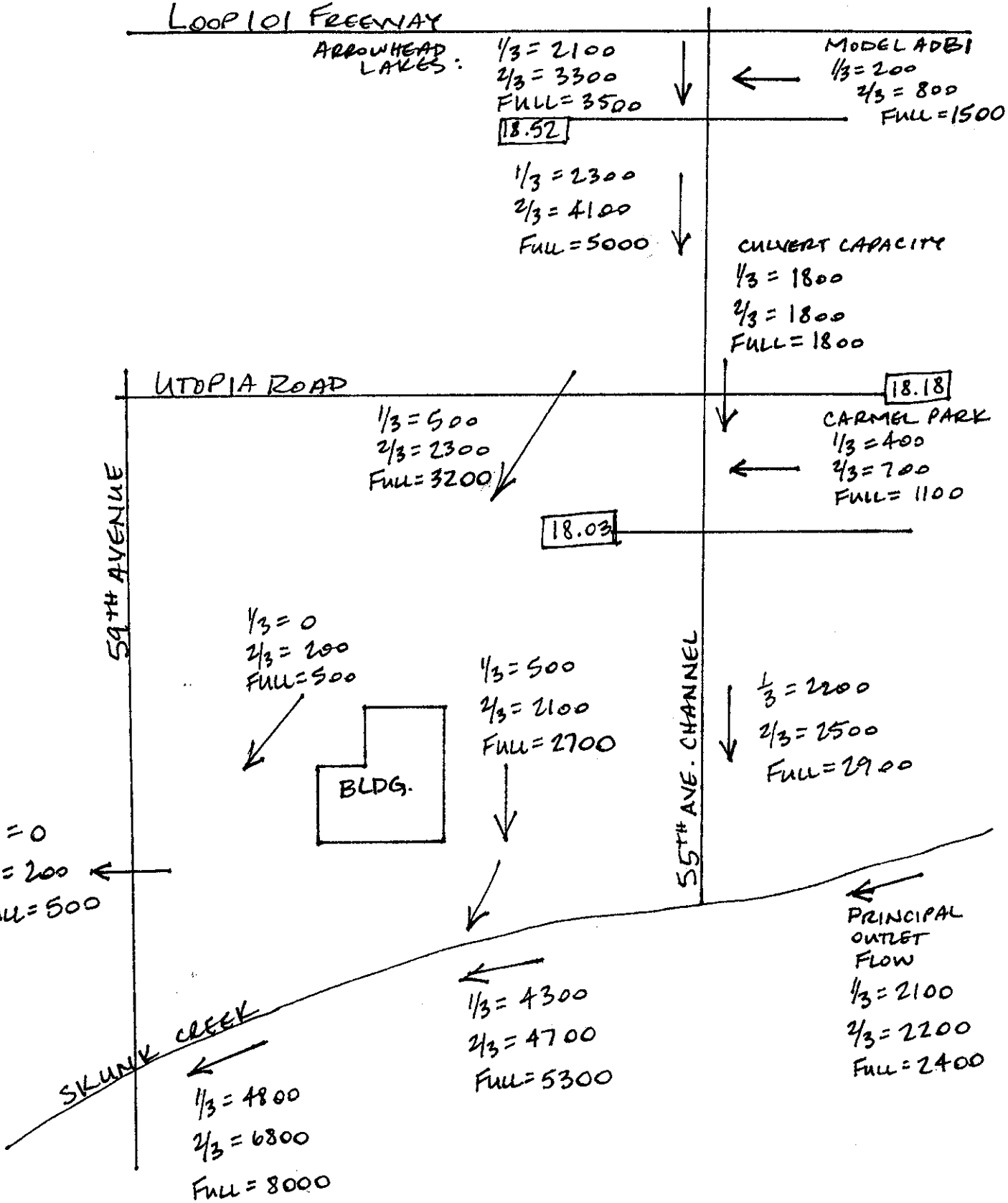
4. HEC-RAS model ADC2 was created to model the downstream portion of the channel, including the culvert capacity flow and flow from the east through the Carmel Park subdivision.

Results

The resulting delineations for the 1/3, 2/3, and Full flows are shown on the spillway delineation maps. Flows occurring in model ADC1 are summarized as follows:

Flow Split Summary, 55th Avenue South of Loop 101 Freeway

Discharge (cfs)	**1/3**	**2/3**	**Full**
55th Avenue channel immediately South of Freeway	2300	4100	5000
55th Avenue channel culvert at Utopia Road	1800	1800	1800
Utopia Road overflow	500	2300	3200
South to Skunk Creek	500	2100	2700
West to Kimberly Way	0	200	500



SECTION C FLOW SCHEMATIC (CFS)

MARCH 8, 2001

59th AVENUE
N. of SKUNK CREEK

```
*******************************************
    UNEVEN WEIR FLOW PROGRAM
    FORTRAN VERSION 1.0
*******************************************
    PROJECT:  99006-02
    ENGINEER:  KVM
    DATE:  12/19/2000
    TIME:  21:55.10


-------------------------------------------
    INPUT PARAMETERS
-------------------------------------------
    STARTING WSEL:       1266.00
    MAXIMUM WSEL:        1268.00
    STEP SIZE:              0.20
    BREADTH OF WEIR:      861.00


*******************************************
    INPUT ELEVATION/STATION TABLE.
    PROJECT:  99006-02
    DATE:  12/19/2000
    TIME:  21:55.10
*******************************************
    POINT    ELEVATION    STATION
    -----    ---------    -------
        1      1270.00    9205.00
        2      1268.00    9622.00
        3      1266.00    9965.00
        4      1266.00   10000.00
        5      1265.90   10035.00
        6      1266.00   10084.00
        7      1268.00   10483.00
        8      1270.00   10622.00
        9      1272.00   10767.00
       10      1274.00   10930.00


*******************************************
    WEIR COEFFICIENT TABLE
    PROJECT:  99006-02
    DATE:  12/19/2000
    TIME:  21:55.10
*******************************************
    INPUT COEFFICENT VALUES.

POINT     HEAD     COEFFICIENT
-----     ----     -----------
    1     0.00          3.0000
    2     5.00          3.0000


*******************************************
    UNEVEN WEIR FLOW PROGRAM
    FORTRAN VERSION 1.0
    PROJECT:  99006-02
    DATE:  12/19/2000
    TIME:  21:55.10
*******************************************
    ELEVATION     DISCHARGE (CFS)
    ---------     ---------------
      1266.00               3.19
      1266.20              48.99
      1266.40             147.74
      1266.60             304.96
      1266.80             527.29
      1267.00             821.00
      1267.20            1191.95
      1267.40            1645.61
      1267.60            2187.15
      1267.80            2821.47
```

0 CFS, 1265.90
200 CFS, 1266.47
500 CFS, 1266.78
600 CFS, 1266.85

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW (MODEL ADC1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	5000	1288.20	6.97	0.33	6.90	3.89
ADOBE DAM/C1	18.37	5000	1286.80	6.61	0.36	7.10	4.13
ADOBE DAM/C1	18.28	5000	1284.32	10.22	0.38	5.82	2.98
ADOBE DAM/C1	18.20	3200	1282.92	4.10	0.39	5.42	1.57
ADOBE DAM/C1	18.02	3200	1276.74	5.03	0.45	1.74	0.79
ADOBE DAM/C1	17.95	3200	1273.62	3.50	0.48	2.62	1.50
ADOBE DAM/C1	17.80	3200	1270.71	3.82	0.54	2.71	0.98
ADOBE DAM/C1	17.66	500	1266.78	2.38	0.59	0.88	0.51

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 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 7.58 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW (MODEL ADC1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	4100	1287.62	6.53	0.35	6.32	4.33
ADOBE DAM/C1	18.37	4100	1286.27	6.14	0.38	6.57	4.36
ADOBE DAM/C1	18.28	4100	1283.79	9.98	0.41	5.28	3.14
ADOBE DAM/C1	18.20	2300	1282.54	3.77	0.42	5.04	1.47
ADOBE DAM/C1	18.02	2300	1276.58	4.54	0.49	1.58	0.65
ADOBE DAM/C1	17.95	2300	1273.31	3.13	0.51	2.31	1.33
ADOBE DAM/C1	17.80	2300	1270.45	3.74	0.58	2.45	0.75
ADOBE DAM/C1	17.66	200	1266.47	1.98	0.63	0.57	0.34

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 AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 6.71 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW (MODEL ADC1)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	2300	1286.06	5.49	0.39	4.76	3.37
ADOBE DAM/C1	18.37	2300	1284.80	4.90	0.43	5.10	3.65
ADOBE DAM/C1	18.28	2300	1282.81	7.98	0.46	4.31	2.39
ADOBE DAM/C1	18.20	500	1281.25	2.64	0.47	3.75	1.09
ADOBE DAM/C1	18.02	500	1276.10	2.97	0.57	1.10	0.27
ADOBE DAM/C1	17.95	500	1272.18	2.20	0.61	1.18	0.66
ADOBE DAM/C1	17.80	500	1269.18	3.12	0.70	1.18	0.98
ADOBE DAM/C1	17.66	0	1265.92	0.11	0.77	0.01	0.01

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 AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 8.42 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW (MODEL ADC2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	2300	1286.06	5.49	0.39	4.76	3.37
ADOBE DAM/C2	18.37	2300	1284.79	4.92	0.43	5.09	3.64
ADOBE DAM/C2	18.28	2300	1283.79	5.60	0.46	5.28	3.14
ADOBE DAM/C2	18.18	1800	1282.96	4.41	0.48	5.46	2.85
ADOBE DAM/C2	18.17	1800	1281.40	5.85	0.49	3.90	2.42
ADOBE DAM/C2	18.03	2200	1279.60	5.27	0.52	4.50	3.11
ADOBE DAM/C2	17.91	2200	1277.04	7.92	0.55	9.54	2.57
ADOBE DAM/C2	17.87	2200	1275.16	8.33	0.56	2.86	2.13

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 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 8.42 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW (MODEL ADC2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	4100	1287.60	6.56	0.35	6.30	4.32
ADOBE DAM/C2	18.37	4100	1286.20	6.24	0.38	6.50	4.41
ADOBE DAM/C2	18.28	4100	1284.02	9.29	0.41	5.52	3.19
ADOBE DAM/C2	18.18	1800	1283.10	4.20	0.42	5.60	2.92
ADOBE DAM/C2	18.17	1800	1281.60	5.39	0.43	4.10	2.51
ADOBE DAM/C2	18.03	2500	1279.90	5.46	0.46	4.80	3.31
ADOBE DAM/C2	17.91	2500	1277.24	8.36	0.49	9.74	2.71
ADOBE DAM/C2	17.87	2500	1275.35	8.68	0.50	3.05	2.30

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 AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 6.71 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW (MODEL ADC2)

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VEL (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	5000	1288.20	6.97	0.33	6.90	3.89
ADOBE DAM/C2	18.37	5000	1286.79	6.62	0.36	7.09	4.13
ADOBE DAM/C2	18.28	5000	1284.33	10.18	0.38	5.83	2.99
ADOBE DAM/C2	18.18	1800	1283.36	3.85	0.39	5.86	3.05
ADOBE DAM/C2	18.17	1800	1282.02	4.59	0.40	4.52	2.63
ADOBE DAM/C2	18.03	2900	1280.44	5.26	0.44	5.34	3.02
ADOBE DAM/C2	17.91	2900	1277.47	8.93	0.47	9.97	2.87
ADOBE DAM/C2	17.87	2900	1275.60	9.07	0.48	3.30	2.52

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 AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 7.58 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

```
                    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: Adobe Dam, Reach C1
Project File : ADC1.prj
Run Date and Time: 03/08/2001 10:23:12 AM

Project in English units

Study Name: Adobe Dam Spillway Delineation 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 Adobe Dam spillway.

Model
Name: ADC1
Model Description: 55th Ave channel model of flow upstream of Utopia Road, which breaks out of the channel between sections 18.28 and 18.20. Northern boundary is section 18.52, just south of the Loop 101 Freeway. Southern boundary is section 17.66, at 59th Avenue. Downstream boundary condition is water surface elevation at 59th Avenue, analyzed as an uneven weir.

Flow Profiles:
Profile #1, 1/3 Flow
Sections 18.52 to 18.28, Q=2300 cfs
Sections 18.20 to 17.80, Q=500 cfs
Section 17.66 Q=0 cfs
Profile #2, 2/3 Flow
Sections 18.52 to 18.28, Q=4100 cfs
Sections 18.20 to 17.66, Q=2300 cfs
Section 17.66 Q=200 cfs
Profile #3, Full Flow
Sections 18.52 to 18.28, Q=5000 cfs
Sections 18.20 to 17.66, Q=3200 cfs
Section 17.66, Q=500 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 990006-02

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 C1, 55th Avenue Channel
Plan File : g:\Filedir\99\990006-02Hydro\Reach C\ADC1.p01

Geometry Title: Reach C1, 55th Avenue Channel
Geometry File : g:\Filedir\99\990006-02Hydro\Reach C\ADC1.g01

```
          Flow Title     : Reach C1, 55th Avenue Channel
          Flow File      : g:\Filedir\99\990006-02Hydro\Reach C\ADC1.f01

Plan Summary Information:
Number of:  Cross Sections =    8    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 C1, 55th Avenue Channel
Flow File : g:\Filedir\99\990006-02Hydro\Reach C\ADC1.f01

Flow Data (cfs)

River	Reach	RS	1/3	2/3	Full
ADOBE DAM	C1	18.52	2300	4100	5000
ADOBE DAM	C1	18.20	500	2300	3200
ADOBE DAM	C1	17.66	.01	200	500

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
ADOBE DAM	C1	1/3	Known WS = 1286.06	Known WS = 1265.9
ADOBE DAM	C1	2/3	Known WS = 1287.62	Known WS = 1266.47
ADOBE DAM	C1	Full	Known WS = 1288.14	Known WS = 1266.78

GEOMETRY DATA

Geometry Title: Reach C1, 55th Avenue Channel
Geometry File : g:\Filedir\99\990006-02Hydro\Reach C\ADC1.g01

CROSS SECTION RIVER: ADOBE DAM
REACH: C1 RS: 18.52

INPUT
Description: Northern Boundary of HEC-RAS Model ADC1
1/3 Q=2300 cfs
2/3
Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9495	1292	9610	1290	9920	1288	9970	1282	10000	1281.3
10040	1282	10070	1288	10090	1289	10110	1289	10140	1288.5
10190	1288	10300	1286	10325	1283.8	10350	1286	10420	1286
10510	1285								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9495	.03	9920	.027	10070	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9920	10070	796.35	796.35	796.35	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10090	10420	1292

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10420	10510	1289

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1286.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.47	Wt. n-Val.		0.027	
W.S. Elev (ft)	1286.06	Reach Len. (ft)	796.35	796.35	796.35
Crit W.S. (ft)	1284.66	Flow Area (sq ft)		419.02	
E.G. Slope (ft/ft)	0.001979	Area (sq ft)		419.02	62.73
Q Total (cfs)	2300.00	Flow (cfs)		2300.00	
Top Width (ft)	247.67	Top Width (ft)		124.18	123.49
Vel Total (ft/s)	5.49	Avg. Vel. (ft/s)		5.49	
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	51695.9	Conv. (cfs)		51695.9	
Length Wtd. (ft)	796.35	Wetted Per. (ft)		124.84	
Min Ch El (ft)	1281.30	Shear (lb/sq ft)		0.41	
Alpha	1.00	Stream Power (lb/ft s)		2.28	
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)	6.81	22.23	28.14
C & E Loss (ft)	0.03	Cum SA (acres)	5.93	21.00	31.95

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)	1288.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.027	
W.S. Elev (ft)	1287.62	Reach Len. (ft)	796.35	796.35	796.35
Crit W.S. (ft)	1285.89	Flow Area (sq ft)		627.84	
E.G. Slope (ft/ft)	0.002009	Area (sq ft)		627.84	320.68
Q Total (cfs)	4100.00	Flow (cfs)		4100.00	
Top Width (ft)	353.74	Top Width (ft)		144.88	208.87
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)		6.53	
Max Chl Dpth (ft)	6.32	Hydr. Depth (ft)		4.33	
Conv. Total (cfs)	91463.1	Conv. (cfs)		91463.1	
Length Wtd. (ft)	796.35	Wetted Per. (ft)		145.78	
Min Ch El (ft)	1281.30	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		3.53	
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	16.27	49.54	73.08
C & E Loss (ft)	0.02	Cum SA (acres)	14.31	37.54	48.09

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)	1288.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.	0.030	0.027	0.030
W.S. Elev (ft)	1288.20	Reach Len. (ft)	796.35	796.35	796.35
Crit W.S. (ft)	1286.41	Flow Area (sq ft)	3.03	714.18	0.39
E.G. Slope (ft/ft)	0.002036	Area (sq ft)	3.03	714.18	452.86
Q Total (cfs)	5000.00	Flow (cfs)	1.45	4998.36	0.19
Top Width (ft)	434.42	Top Width (ft)	30.67	150.00	253.74
Vel Total (ft/s)	6.97	Avg. Vel. (ft/s)	0.48	7.00	0.48
Max Chl Dpth (ft)	6.90	Hydr. Depth (ft)	0.10	4.76	0.10
Conv. Total (cfs)	110797.8	Conv. (cfs)	32.2	110761.5	4.1
Length Wtd. (ft)	796.35	Wetted Per. (ft)	30.67	150.97	3.96
Min Ch El (ft)	1281.30	Shear (lb/sq ft)	0.01	0.60	0.01
Alpha	1.01	Stream Power (lb/ft s)	0.01	4.21	0.01
Frctn Loss (ft)	1.44	Cum Volume (acre-ft)	20.59	61.30	93.25
C & E Loss (ft)	0.02	Cum SA (acres)	16.23	41.06	53.07

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 9920.00	9970.00	255.96	68.80	34.11	11.13	2.03	3.72
9970.00	10020.00	1420.17	224.17	50.01	61.75	4.48	6.34
10020.00	RB 10070.00	623.86	126.05	40.72	27.12	3.13	4.95

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 9920.00	9970.00	609.38	131.40	47.13	14.86	2.81	4.64
9970.00	10020.00	2341.84	301.78	50.01	57.12	6.04	7.76
10020.00	RB 10070.00	1148.78	194.66	48.64	28.02	4.05	5.90

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)
9778.33	9920.00	1.45	3.03	30.67	0.03	0.10	0.48
LB 9920.00	9970.00	817.15	159.89	50.36	16.34	3.20	5.11
9970.00	10020.00	2758.88	330.89	50.01	55.18	6.62	8.34
10020.00	RB 10070.00	1422.33	223.39	50.60	28.45	4.47	6.37
10070.00	10216.67	0.19	0.39	3.96	0.00	0.10	0.48

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: C1 RS: 18.37

INPUT
Description: 1/3 Q=2300 cfs
2/3 Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9660	1286.5	9760	1286	9840	1288	9900	1286.8	9940	1286
9955	1282	10000	1280	10020	1279.7	10040	1280	10070	1284
10077.5	1286	10085	1287	10280	1285	10450	1284	10480	1283
10640	1283.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9660	.03	9940	.027	10077.5	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9940 10077.5 510 494.56 490 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10085	10640	1290

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9660	9900	1290

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1285.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.027	
W.S. Elev (ft)	1284.80	Reach Len. (ft)	510.00	494.56	490.00
Crit W.S. (ft)	1283.11	Flow Area (sq ft)		469.21	
E.G. Slope (ft/ft)	0.001423	Area (sq ft)		469.21	342.17
Q Total (cfs)	2300.00	Flow (cfs)		2300.00	
Top Width (ft)	454.92	Top Width (ft)		128.52	326.40
Vel Total (ft/s)	4.90	Avg. Vel. (ft/s)		4.90	
Max Chl Dpth (ft)	5.10	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	60976.2	Conv. (cfs)		60976.2	
Length Wtd. (ft)	494.56	Wetted Per. (ft)		129.30	
Min Ch El (ft)	1279.70	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		1.58	
Frctn Loss (ft)	1.31	Cum Volume (acre-ft)	6.81	14.11	24.44
C & E Loss (ft)	0.06	Cum SA (acres)	5.93	18.69	27.84

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)	1286.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.	0.030	0.027	0.030
W.S. Elev (ft)	1286.27	Reach Len. (ft)	510.00	494.56	490.00
Crit W.S. (ft)	1284.27	Flow Area (sq ft)	1.82	665.58	0.27
E.G. Slope (ft/ft)	0.001546	Area (sq ft)	1.82	665.58	945.93
Q Total (cfs)	4100.00	Flow (cfs)	0.93	4098.93	0.14
Top Width (ft)	636.79	Top Width (ft)	13.48	137.50	485.81
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)	0.51	6.16	0.51
Max Chl Dpth (ft)	6.57	Hydr. Depth (ft)	0.13	4.84	0.13
Conv. Total (cfs)	104287.7	Conv. (cfs)	23.7	104260.5	3.5
Length Wtd. (ft)	494.56	Wetted Per. (ft)	13.48	138.60	2.04
Min Ch El (ft)	1279.70	Shear (lb/sq ft)	0.01	0.46	0.01
Alpha	1.01	Stream Power (lb/ft s)	0.01	2.85	0.01
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	16.25	37.72	61.50
C & E Loss (ft)	0.10	Cum SA (acres)	14.19	34.96	41.74

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The 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)	1287.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.	0.030	0.027	0.030
W.S. Elev (ft)	1286.80	Reach Len. (ft)	510.00	494.56	490.00
Crit W.S. (ft)	1284.74	Flow Area (sq ft)	15.88	738.09	2.38
E.G. Slope (ft/ft)	0.001617	Area (sq ft)	15.88	738.09	1216.72
Q Total (cfs)	5000.00	Flow (cfs)	17.12	4980.32	2.55
Top Width (ft)	718.53	Top Width (ft)	39.85	137.50	541.18
Vel Total (ft/s)	6.61	Avg. Vel. (ft/s)	1.08	6.75	1.07
Max Chl Dpth (ft)	7.10	Hydr. Depth (ft)	0.40	5.37	0.40
Conv. Total (cfs)	124359.9	Conv. (cfs)	425.9	123870.6	63.5
Length Wtd. (ft)	494.61	Wetted Per. (ft)	39.86	138.60	6.03
Min Ch El (ft)	1279.70	Shear (lb/sq ft)	0.04	0.54	0.04
Alpha	1.04	Stream Power (lb/ft s)	0.04	3.63	0.04
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	20.42	48.03	77.99
C & E Loss (ft)	0.10	Cum SA (acres)	15.59	38.44	45.81

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 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 9940.00	9985.83	503.11	122.26	41.74	21.87	2.96	4.12
9985.83	10031.67	1268.90	221.13	45.85	55.17	4.82	5.74
10031.67	RB 10077.50	527.99	125.82	41.71	22.96	3.04	4.20

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)
9846.67	9940.00	0.93	1.82	13.48	0.02	0.13	0.51
LB 9940.00	9985.83	997.25	186.82	46.39	24.32	4.08	5.34
9985.83	10031.67	2072.17	288.38	45.85	50.54	6.29	7.19
10031.67	RB 10077.50	1029.52	190.38	46.36	25.11	4.15	5.41
10077.50	10265.00	0.14	0.27	2.04	0.00	0.13	0.51

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9846.67	9940.00	17.12	15.88	39.86	0.34	0.40	1.08
LB 9940.00	9985.83	1254.89	210.99	46.39	25.10	4.60	5.95
9985.83	10031.67	2434.56	312.55	45.85	48.69	6.82	7.79
10031.67	RB 10077.50	1290.87	214.55	46.36	25.82	4.68	6.02
10077.50	10265.00	2.55	2.38	6.03	0.05	0.40	1.07

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: ADOBE DAM
REACH: C1 RS: 18.28

INPUT
Description: 1/3 Q=2300 cfs
2/3 Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9487	1286	9717	1284.4	9767	1284.1	9797	1284	9827	1280
9867	1281.5	9887	1278.5	9917	1280	9937	1286	10002	1284.5
10057	1285.1	10127	1285	10267	1284	10497	1282	10537	1281
10592	1282	10627	1282	10717	1281.5	10852	1281.7	10972	1281.5
11122	1282								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9487	.03	9797	.027	9937	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9797 9937 425 404.74 395 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9937	10057	1286	10057	11122	1288

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9487	9767	1288

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1283.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.		0.027	
W.S. Elev (ft)	1282.81	Reach Len. (ft)	425.00	404.74	395.00
Crit W.S. (ft)	1282.63	Flow Area (sq ft)		288.28	
E.G. Slope (ft/ft)	0.006630	Area (sq ft)		288.28	754.14
Q Total (cfs)	2300.00	Flow (cfs)		2300.00	
Top Width (ft)	838.71	Top Width (ft)		120.45	718.25
Vel Total (ft/s)	7.98	Avg. Vel. (ft/s)		7.98	

Max Chl Dpth (ft)	4.31	Hydr. Depth (ft)		2.39	
Conv. Total (cfs)	28247.9	Conv. (cfs)		28247.9	
Length Wtd. (ft)	404.74	Wetted Per. (ft)		121.34	
Min Ch El (ft)	1278.50	Shear (lb/sq ft)		0.98	
Alpha	1.00	Stream Power (lb/ft s)		7.85	
Frctn Loss (ft)	2.17	Cum Volume (acre-ft)	6.81	9.81	18.28
C & E Loss (ft)	0.26	Cum SA (acres)	5.93	17.28	21.96

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)	1285.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.027	
W.S. Elev (ft)	1283.78	Reach Len. (ft)	425.00	404.74	395.00
Crit W.S. (ft)	1283.76	Flow Area (sq ft)		410.69	
E.G. Slope (ft/ft)	0.007252	Area (sq ft)		410.69	1507.96
Q Total (cfs)	4100.00	Flow (cfs)		4100.00	
Top Width (ft)	961.22	Top Width (ft)		131.00	830.22
Vel Total (ft/s)	9.98	Avg. Vel. (ft/s)		9.98	
Max Chl Dpth (ft)	5.28	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	48146.5	Conv. (cfs)		48146.5	
Length Wtd. (ft)	404.74	Wetted Per. (ft)		132.10	
Min Ch El (ft)	1278.50	Shear (lb/sq ft)		1.41	
Alpha	1.00	Stream Power (lb/ft s)		14.05	
Frctn Loss (ft)	2.17	Cum Volume (acre-ft)	16.24	31.61	47.70
C & E Loss (ft)	0.40	Cum SA (acres)	14.11	33.43	34.33

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 energy loss was 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)	1285.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.66	Wt. n-Val.	0.030	0.027	
W.S. Elev (ft)	1284.32	Reach Len. (ft)	425.00	404.74	395.00
Crit W.S. (ft)	1284.32	Flow Area (sq ft)	7.96	481.37	
E.G. Slope (ft/ft)	0.006542	Area (sq ft)	7.96	481.37	1966.05
Q Total (cfs)	5000.00	Flow (cfs)	13.10	4986.90	
Top Width (ft)	1063.53	Top Width (ft)	30.00	134.38	899.14
Vel Total (ft/s)	10.22	Avg. Vel. (ft/s)	1.65	10.36	
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	0.27	3.58	
Conv. Total (cfs)	61819.5	Conv. (cfs)	162.0	61657.5	
Length Wtd. (ft)		Wetted Per. (ft)	30.22	135.57	
Min Ch El (ft)	1278.50	Shear (lb/sq ft)	0.11	1.45	
Alpha	1.03	Stream Power (lb/ft s)	0.18	15.02	
Frctn Loss (ft)		Cum Volume (acre-ft)	20.28	41.10	60.09
C & E Loss (ft)		Cum SA (acres)	15.18	36.89	37.71

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 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)
LB 9797.00	9843.67	478.57	71.27	37.95	20.81	1.89	6.71
9843.67	9890.33	870.80	111.10	46.91	37.86	2.38	7.84
9890.33	RB 9937.00	950.64	105.91	36.48	41.33	2.94	8.98

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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 9797.00	9843.67	941.08	111.58	45.31	22.95	2.48	8.43
9843.67	9890.33	1616.87	156.54	46.91	39.44	3.35	10.33
9890.33	RB 9937.00	1542.05	142.57	39.87	37.61	3.63	10.82

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 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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9693.67	9797.00	13.10	7.96	30.22	0.26	0.27	1.65
LB 9797.00	9843.67	1220.66	136.17	46.94	24.41	2.92	8.96
9843.67	9890.33	1967.93	181.31	46.91	39.36	3.89	10.85
9890.33	RB 9937.00	1798.31	163.89	41.72	35.97	3.99	10.97

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 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: ADOBE DAM
REACH: C1 RS: 18.20

INPUT
Description: Flow decreased by 1800 cfs, the capacity of the 5-10' x 4' CBC at Utopia Road.
1/3 Q=500 cfs
2/3 Q=2300 cfs
Full Q=3200 cfs
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9284	1286	9504	1284	9539	1282	9579	1280	9594	1277.5
9624	1278	9674	1284	9709	1281	9744	1279.8	9794	1279.8
9839	1280	9904	1282	9924	1283	9944	1283	9969	1282
10009	1281.3	10074	1281.3	10114	1282	10164	1282.8	10234	1283
10294	1282	10424	1280.4	10464	1280.1	10494	1280.1	10589	1280
10684	1280	10744	1280	10784	1280.5	10819	1280	10894	1280
10934	1280	10964	1280	11044	1281	11094	1281	11264	1282

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9284	.03	9504	.027	9674	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9674	10234	910	926.91	940	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9494	9674	1286	10234	11264	1286

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9284	9494	

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft) 1281.36 Element Left OB Channel Right OB

Vel Head (ft)	0.11	Wt. n-Val.		0.030	
W.S. Elev (ft)	1281.25	Reach Len. (ft)	910.00	926.91	940.00
Crit W.S. (ft)	1280.72	Flow Area (sq ft)		189.37	
E.G. Slope (ft/ft)	0.002534	Area (sq ft)	202.48	189.37	748.43
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	1053.33	Top Width (ft)	97.18	173.70	782.45
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)		2.64	
Max Chl Dpth (ft)	3.75	Hydr. Depth (ft)		1.09	
Conv. Total (cfs)	9933.3	Conv. (cfs)		9933.3	
Length Wtd. (ft)	926.91	Wetted Per. (ft)		173.75	
Min Ch El (ft)	1279.80	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.46	
Frctn Loss (ft)	5.12	Cum Volume (acre-ft)	5.82	7.59	11.47
C & E Loss (ft)	0.00	Cum SA (acres)	5.46	15.91	15.16

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1282.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.030	
W.S. Elev (ft)	1282.54	Reach Len. (ft)	910.00	926.91	940.00
Crit W.S. (ft)	1281.93	Flow Area (sq ft)		610.03	
E.G. Slope (ft/ft)	0.003473	Area (sq ft)	349.93	610.03	1930.07
Q Total (cfs)	2300.00	Flow (cfs)		2300.00	
Top Width (ft)	1549.68	Top Width (ft)	132.16	415.42	1002.10
Vel Total (ft/s)	3.77	Avg. Vel. (ft/s)		3.77	
Max Chl Dpth (ft)	5.04	Hydr. Depth (ft)		1.47	
Conv. Total (cfs)	39026.5	Conv. (cfs)		39026.5	
Length Wtd. (ft)	926.91	Wetted Per. (ft)		415.58	
Min Ch El (ft)	1279.80	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		1.20	
Frctn Loss (ft)	5.85	Cum Volume (acre-ft)	14.53	26.86	32.12
C & E Loss (ft)	0.01	Cum SA (acres)	13.47	30.89	26.03

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

E.G. Elev (ft)	1283.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.030	
W.S. Elev (ft)	1282.92	Reach Len. (ft)	910.00	926.91	940.00
Crit W.S. (ft)	1282.24	Flow Area (sq ft)		781.18	
E.G. Slope (ft/ft)	0.003735	Area (sq ft)	402.81	781.18	2320.96
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	1663.42	Top Width (ft)	142.12	496.06	1025.24
Vel Total (ft/s)	4.10	Avg. Vel. (ft/s)		4.10	
Max Chl Dpth (ft)	5.42	Hydr. Depth (ft)		1.57	
Conv. Total (cfs)	52358.8	Conv. (cfs)		52358.8	
Length Wtd. (ft)	926.91	Wetted Per. (ft)		496.25	
Min Ch El (ft)	1279.80	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		1.50	
Frctn Loss (ft)	6.03	Cum Volume (acre-ft)	18.27	35.24	40.65
C & E Loss (ft)	0.01	Cum SA (acres)	14.34	33.96	28.98

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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 9674.00	9860.67	494.08	183.77	154.67	98.82	1.19	2.69
9860.67	10047.33	5.92	5.60	19.08	1.18	0.29	1.06

```
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 9674.00	9860.67	1772.71	391.50	169.67	77.07	2.31	4.53
9860.67	10047.33	358.66	141.26	145.79	15.59	0.97	2.54
10047.33	RB 10234.00	168.63	77.28	100.11	7.33	0.77	2.18

```
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.
```

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 9674.00	9860.67	2314.02	457.76	174.19	72.31	2.63	5.06
9860.67	10047.33	612.14	200.80	163.16	19.13	1.23	3.05
10047.33	RB 10234.00	273.84	122.62	158.90	8.56	0.77	2.23

```
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: C1                 RS: 18.02

INPUT
Description: 1/3 Q=500 cfs
2/3 Q=2300 cfs
Full Q=3200 cfs
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    8664    1284    8794    1280    8844  1278.5    8924    1276    8964  1275.1
    8994    1276    9004    1276    9024    1282    9044    1280    9464    1278
    9514    1277    9679    1276    9729  1275.9    9754    1276    9784  1275.9
    9804    1276    9834  1276.3    9884  1276.2    9904    1276    9954  1275.6
   10154    1276   10264  1275.5   10354    1276   10369    1277   10394    1276
   10544    1275   10684    1276   10794  1277.8   10904  1278.4   11254 1277.25
   11564  1278.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    8664     .03    8844    .027    9024     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9514   10369             420   404.2     380            .1        .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
    8844    9024    1284   10369   11564    1284
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    8664    8844
```

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1276.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.10	Reach Len. (ft)	420.00	404.20	380.00
Crit W.S. (ft)	1276.10	Flow Area (sq ft)		168.26	
E.G. Slope (ft/ft)	0.020249	Area (sq ft)	40.03	168.26	175.70
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	997.28	Top Width (ft)	83.68	614.62	298.98
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)		2.97	

Max Chl Dpth (ft)	1.10	Hydr. Depth (ft)		0.27	
Conv. Total (cfs)	3513.7	Conv. (cfs)		3513.7	
Length Wtd. (ft)	404.20	Wetted Per. (ft)		614.63	
Min Ch El (ft)	1275.50	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		1.03	
Frctn Loss (ft)	2.80	Cum Volume (acre-ft)	3.29	3.79	1.49
C & E Loss (ft)	0.02	Cum SA (acres)	3.57	7.53	3.49

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 #2/3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1276.90				
Vel Head (ft)	0.32	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.58	Reach Len. (ft)	420.00	404.20	380.00
Crit W.S. (ft)	1276.58	Flow Area (sq ft)		507.00	
E.G. Slope (ft/ft)	0.014872	Area (sq ft)	83.58	507.00	326.80
Q Total (cfs)	2300.00	Flow (cfs)		2300.00	
Top Width (ft)	1219.05	Top Width (ft)	100.40	778.93	339.72
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)		4.54	
Max Chl Dpth (ft)	1.58	Hydr. Depth (ft)		0.65	
Conv. Total (cfs)	18859.8	Conv. (cfs)		18859.8	
Length Wtd. (ft)	404.20	Wetted Per. (ft)		778.96	
Min Ch El (ft)	1275.50	Shear (lb/sq ft)		0.60	
Alpha	1.00	Stream Power (lb/ft s)		2.74	
Frctn Loss (ft)	2.17	Cum Volume (acre-ft)	10.00	14.98	7.76
C & E Loss (ft)	0.05	Cum SA (acres)	11.04	18.19	11.55

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

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1277.13				
Vel Head (ft)	0.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.74	Reach Len. (ft)	420.00	404.20	380.00
Crit W.S. (ft)	1276.74	Flow Area (sq ft)		636.13	
E.G. Slope (ft/ft)	0.014195	Area (sq ft)	100.39	636.13	383.22
Q Total (cfs)	3200.00	Flow (cfs)		3200.00	
Top Width (ft)	1268.10	Top Width (ft)	106.15	808.22	353.73
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)		5.03	
Max Chl Dpth (ft)	1.74	Hydr. Depth (ft)		0.79	
Conv. Total (cfs)	26858.4	Conv. (cfs)		26858.4	
Length Wtd. (ft)	404.20	Wetted Per. (ft)		808.25	
Min Ch El (ft)	1275.50	Shear (lb/sq ft)		0.70	
Alpha	1.00	Stream Power (lb/ft s)		3.51	
Frctn Loss (ft)	2.23	Cum Volume (acre-ft)	13.02	20.16	11.47
C & E Loss (ft)	0.06	Cum SA (acres)	11.75	20.09	14.10

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 #1/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9514.00	9799.00	36.33	19.59	137.20	7.27	0.14	1.85
9799.00	10084.00	207.40	65.54	205.85	41.48	0.32	3.16
10084.00	RB 10369.00	256.27	83.13	271.57	51.25	0.31	3.08

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 #2/3

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9514.00	9799.00	373.98	102.98	215.27	16.26	0.48	3.63
9799.00	10084.00	866.36	190.72	285.00	37.67	0.67	4.54
10084.00	RB 10369.00	1059.66	213.30	278.68	46.07	0.77	4.97

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 (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9514.00	9799.00	564.49	140.19	242.12	17.64	0.58	4.03
9799.00	10084.00	1215.60	237.10	285.00	37.99	0.83	5.13
10084.00	RB 10369.00	1419.91	258.84	281.13	44.37	0.92	5.49

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 RIVER: ADOBE DAM
REACH: C1 RS: 17.95

INPUT
Description: 1/3 Q=500 cfs
2/3 Q=2300 cfs
Full Q=3200 cfs
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8198	1281.5	8408	1282	8418	1286	8428	1282	8468	1284
8501	1280	8518	1278	8538	1274	8578	1273.8	8608	1274
8638	1278	8648	1280	8868	1277	9258	1275.6	9350	1274
9360	1274	9375	1273.9	9390	1274	9410	1274	9445	1272
9528	1271	9668	1271.5	9898	1274.3	10100	1271.9	10135	1271.559
10140	1271.51	10145	1271.528	10378	1272.36	10558	1273	10918	1273.5
11128	1276.2	11168	1276	11178	1276.6	11188	1276	11548	1275.8
11868	1276.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
   8198     .03    8501    .027    8648     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9410   10140              820  749.48    640          .1          .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
    8198    8648    1286   10140   11868    1286

CROSS SECTION OUTPUT    Profile #1/3

  E.G. Elev (ft)            1272.25   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.08   Wt. n-Val.                            0.030
  W.S. Elev (ft)            1272.18   Reach Len. (ft)            820.00     749.48    640.00
  Crit W.S. (ft)            1271.86   Flow Area (sq ft)                     226.92
  E.G. Slope (ft/ft)       0.003458   Area (sq ft)                          226.92     62.14
  Q Total (cfs)              500.00   Flow (cfs)                            500.00
  Top Width (ft)             531.44   Top Width (ft)                        344.88    186.55
  Vel Total (ft/s)             2.20   Avg. Vel. (ft/s)                        2.20
  Max Chl Dpth (ft)            1.18   Hydr. Depth (ft)                        0.66
  Conv. Total (cfs)          8502.2   Conv. (cfs)                          8502.2
  Length Wtd. (ft)           784.74   Wetted Per. (ft)                     344.90
  Min Ch El (ft)            1271.00   Shear (lb/sq ft)                        0.14
  Alpha                        1.00   Stream Power (lb/ft s)                  0.31
  Frctn Loss (ft)              2.91   Cum Volume (acre-ft)         3.09       1.95      0.46
  C & E Loss (ft)              0.01   Cum SA (acres)               3.17       3.08      1.37

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 #2/3

  E.G. Elev (ft)            1273.46   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.15   Wt. n-Val.                            0.030
  W.S. Elev (ft)            1273.31   Reach Len. (ft)            820.00     749.48    640.00
  Crit W.S. (ft)            1272.66   Flow Area (sq ft)                     734.00
  E.G. Slope (ft/ft)       0.002742   Area (sq ft)                          734.00    472.85
  Q Total (cfs)             2300.00   Flow (cfs)                           2300.00
  Top Width (ft)            1191.11   Top Width (ft)                        552.59    638.52
  Vel Total (ft/s)             3.13   Avg. Vel. (ft/s)                        3.13
  Max Chl Dpth (ft)            2.31   Hydr. Depth (ft)                        1.33
  Conv. Total (cfs)         43926.6   Conv. (cfs)                         43926.6
  Length Wtd. (ft)           781.26   Wetted Per. (ft)                     552.65
  Min Ch El (ft)            1271.00   Shear (lb/sq ft)                        0.23
  Alpha                        1.00   Stream Power (lb/ft s)                  0.71
  Frctn Loss (ft)              2.75   Cum Volume (acre-ft)         9.60       9.22      4.28
  C & E Loss (ft)              0.01   Cum SA (acres)              10.55      12.01      7.28

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

  E.G. Elev (ft)            1273.81   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.19   Wt. n-Val.                            0.030
  W.S. Elev (ft)            1273.62   Reach Len. (ft)            820.00     749.48    640.00
  Crit W.S. (ft)            1272.91   Flow Area (sq ft)                     914.54
  E.G. Slope (ft/ft)       0.002907   Area (sq ft)                          914.54    701.58
  Q Total (cfs)             3200.00   Flow (cfs)                           3200.00
  Top Width (ft)            1396.79   Top Width (ft)                        609.69    787.10
  Vel Total (ft/s)             3.50   Avg. Vel. (ft/s)                        3.50
  Max Chl Dpth (ft)            2.62   Hydr. Depth (ft)                        1.50
  Conv. Total (cfs)         59351.6   Conv. (cfs)                         59351.6
  Length Wtd. (ft)           779.22   Wetted Per. (ft)                     609.77
  Min Ch El (ft)            1271.00   Shear (lb/sq ft)                        0.27
  Alpha                        1.00   Stream Power (lb/ft s)                  0.95
  Frctn Loss (ft)              2.85   Cum Volume (acre-ft)        12.53      12.97      6.74
  C & E Loss (ft)              0.01   Cum SA (acres)              11.24      13.51      9.13

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     Right Sta        Flow       Area       W.P.    % Conv.    Hydr D.   Velocity
```

(ft)	(ft)	(cfs)	(sq ft)	(ft)		(ft)	(ft/s)
LB 9410.00	9653.33	425.78	175.78	211.43	85.16	0.83	2.42
9653.33	9896.67	44.28	29.09	70.22	8.86	0.41	1.52
9896.67	RB 10140.00	29.94	22.06	63.25	5.99	0.35	1.36

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 9410.00	9653.33	1566.25	425.85	231.24	68.10	1.84	3.68
9653.33	9896.67	390.31	160.88	163.05	16.97	0.99	2.43
9896.67	RB 10140.00	343.45	147.27	158.37	14.93	0.93	2.33

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 9410.00	9653.33	2069.45	498.52	236.68	64.67	2.11	4.15
9653.33	9896.67	595.06	215.49	188.57	18.60	1.14	2.76
9896.67	RB 10140.00	535.49	200.53	184.52	16.73	1.09	2.67

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: ADOBE DAM
REACH: C1 RS: 17.80

INPUT
Description: 1/3 Q=500 cfs
2/3 Q=2300 cfs
Full Q=3200 cfs
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8700	1274	8753	1273	8773	1272	8784	1268	8790	1266
8847	1266	8859	1268	8876	1271	8900	1271	8918	1270
8927	1268	8959	1268	9030	1270	9119	1270.5	9192	1270
9274	1270	9327	1270.5	9390	1270	9430	1269	9458	1268.5
9487	1268	9655	1269	9845	1269.2	9975	1269	10000	1269
10224	1270	10410	1270	10424	1270.3	10438	1270	10515	1270
10520	1270.2	10540	1270	10580	1270	10650	1270.2	10808	1271
11025	1272	11066	1273	11317	1274	11360	1274.9	11400	1274.3
11428	1275.8	11440	1275.7						

Manning's n Values num= 1

Sta	n Val
8700	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10224	10520	860	762.91	620	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10520	11440	1276

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8784	8859	1268	9390	10250	1276

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1269.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030		
W.S. Elev (ft)	1269.18	Reach Len. (ft)	860.00	762.91	620.00
Crit W.S. (ft)	1268.82	Flow Area (sq ft)	160.48		
E.G. Slope (ft/ft)	0.004005	Area (sq ft)	160.48		
Q Total (cfs)	500.00	Flow (cfs)	500.00		
Top Width (ft)	164.28	Top Width (ft)	164.28		
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)	3.12		
Max Chl Dpth (ft)	1.18	Hydr. Depth (ft)	0.98		
Conv. Total (cfs)	7901.2	Conv. (cfs)	7901.2		

Length Wtd. (ft)	860.00	Wetted Per. (ft)	164.74	
Min Ch El (ft)	1270.00	Shear (lb/sq ft)	0.24	
Alpha	1.00	Stream Power (lb/ft s)	0.76	
Frctn Loss (ft)	3.37	Cum Volume (acre-ft)	1.58	0.00
C & E Loss (ft)	0.04	Cum SA (acres)	1.62	0.11

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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)	1270.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.030	0.030	
W.S. Elev (ft)	1270.45	Reach Len. (ft)	860.00	762.91	620.00
Crit W.S. (ft)	1270.33	Flow Area (sq ft)	497.87	116.52	
E.G. Slope (ft/ft)	0.004745	Area (sq ft)	497.87	116.52	55.49
Q Total (cfs)	2300.00	Flow (cfs)	2073.22	226.78	
Top Width (ft)	996.50	Top Width (ft)	547.33	270.00	179.18
Vel Total (ft/s)	3.74	Avg. Vel. (ft/s)	4.16	1.95	
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)	0.91	0.43	
Conv. Total (cfs)	33389.4	Conv. (cfs)	30097.2	3292.2	
Length Wtd. (ft)	843.45	Wetted Per. (ft)	548.69	270.46	
Min Ch El (ft)	1270.00	Shear (lb/sq ft)	0.27	0.13	
Alpha	1.14	Stream Power (lb/ft s)	1.12	0.25	
Frctn Loss (ft)	4.11	Cum Volume (acre-ft)	4.91	1.91	0.39
C & E Loss (ft)	0.06	Cum SA (acres)	5.40	4.93	1.28

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.

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1270.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.030	0.030	
W.S. Elev (ft)	1270.71	Reach Len. (ft)	860.00	762.91	620.00
Crit W.S. (ft)	1270.53	Flow Area (sq ft)	650.00	187.78	
E.G. Slope (ft/ft)	0.004730	Area (sq ft)	650.00	187.78	109.66
Q Total (cfs)	3200.00	Flow (cfs)	2698.77	501.23	
Top Width (ft)	1083.97	Top Width (ft)	582.67	270.00	231.30
Vel Total (ft/s)	3.82	Avg. Vel. (ft/s)	4.15	2.67	
Max Chl Dpth (ft)	2.71	Hydr. Depth (ft)	1.12	0.70	
Conv. Total (cfs)	46528.1	Conv. (cfs)	39240.1	7287.9	
Length Wtd. (ft)	833.74	Wetted Per. (ft)	584.37	270.72	
Min Ch El (ft)	1270.00	Shear (lb/sq ft)	0.33	0.20	
Alpha	1.07	Stream Power (lb/ft s)	1.36	0.55	
Frctn Loss (ft)	4.04	Cum Volume (acre-ft)	6.42	3.48	0.78
C & E Loss (ft)	0.05	Cum SA (acres)	5.75	5.94	1.65

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)
8700.00	9208.00	500.00	160.48	164.74	100.00	0.98	3.12

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.

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)

8700.00	9208.00	1976.27	444.85	378.07	85.92	1.18	4.44
9208.00	9716.00	96.95	53.02	170.61	4.22	0.31	1.83
9716.00	10224.00						
LB 10224.00	10322.67	64.97	32.63	73.12	2.82	0.45	1.99
10322.67	10421.33	84.04	42.92	98.67	3.65	0.44	1.96
10421.33	RB 10520.00	77.78	40.97	98.67	3.38	0.42	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)
8700.00	9208.00	2453.18	549.25	401.65	76.66	1.37	4.47
9208.00	9716.00	245.59	100.75	182.72	7.67	0.55	2.44
9716.00	10224.00						
LB 10224.00	10322.67	139.89	51.80	73.38	4.37	0.71	2.70
10322.67	10421.33	184.99	68.96	98.67	5.78	0.70	2.68
10421.33	RB 10520.00	176.36	67.01	98.67	5.51	0.68	2.63

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: C1 RS: 17.66

INPUT
Description: Southern Boudary of HEC-RAS Model ADC1
1/3 Q=0 cfs
2/3 Q=200
cfs
Full Q=500 cfs
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9205	1270	9622	1268	9965	1266	10000	1266	10035	1265.9
10084	1266	10483	1268	10622	1270	10767	1272	10930	1274

Manning's n Values num= 1

Sta	n Val
9205	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9622	10483	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #1/3

E.G. Elev (ft)	1265.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
W.S. Elev (ft)	1265.91	Reach Len. (ft)			
Crit W.S. (ft)	1265.91	Flow Area (sq ft)		0.09	
E.G. Slope (ft/ft)	0.003374	Area (sq ft)		0.09	
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	12.41	Top Width (ft)		12.41	
Vel Total (ft/s)	0.11	Avg. Vel. (ft/s)		0.11	
Max Chl Dpth (ft)	0.01	Hydr. Depth (ft)		0.01	
Conv. Total (cfs)	0.2	Conv. (cfs)		0.2	
Length Wtd. (ft)		Wetted Per. (ft)		12.41	
Min Ch El (ft)	1265.90	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #2/3

E.G. Elev (ft)	1266.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.030	
W.S. Elev (ft)	1266.47	Reach Len. (ft)			
Crit W.S. (ft)	1266.35	Flow Area (sq ft)		101.10	
E.G. Slope (ft/ft)	0.006603	Area (sq ft)		101.10	
Q Total (cfs)	200.00	Flow (cfs)		200.00	

Top Width (ft)	293.36	Top Width (ft)	293.36
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)	1.98
Max Chl Dpth (ft)	0.57	Hydr. Depth (ft)	0.34
Conv. Total (cfs)	2461.3	Conv. (cfs)	2461.3
Length Wtd. (ft)		Wetted Per. (ft)	293.36
Min Ch El (ft)	1265.90	Shear (lb/sq ft)	0.14
Alpha	1.00	Stream Power (lb/ft s)	0.28
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)	1266.87	Element			
Vel Head (ft)	0.09	Wt. n-Val.		0.030	
W.S. Elev (ft)	1266.78	Reach Len. (ft)			
Crit W.S. (ft)	1266.58	Flow Area (sq ft)		209.89	
E.G. Slope (ft/ft)	0.005619	Area (sq ft)		209.89	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	408.39	Top Width (ft)		408.39	
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)		2.38	
Max Chl Dpth (ft)	0.88	Hydr. Depth (ft)		0.51	
Conv. Total (cfs)	6670.2	Conv. (cfs)		6670.2	
Length Wtd. (ft)		Wetted Per. (ft)		408.40	
Min Ch El (ft)	1265.90	Shear (lb/sq ft)		0.18	
Alpha	1.00	Stream Power (lb/ft s)		0.43	
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)
9909.00	10196.00	0.01	0.09	12.41	100.00	0.01	0.11

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 9622.00	9909.00	1.18	1.76	24.60	0.59	0.07	0.67
9909.00	10196.00	198.82	99.33	268.76	99.41	0.37	2.00

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 9622.00	9909.00	22.03	17.64	77.78	4.41	0.23	1.25
9909.00	10196.00	474.30	187.49	287.00	94.86	0.65	2.53
10196.00	RB 10483.00	3.66	4.77	43.62	0.73	0.11	0.77

SUMMARY OF MANNING'S N VALUES

River:ADOBE DAM

Reach	River Sta.	n1	n2	n3
C1	18.52	.03	.027	.03
C1	18.37	.03	.027	.03
C1	18.28	.03	.027	.03
C1	18.20	.03	.027	.03
C1	18.02	.03	.027	.03
C1	17.95	.03	.027	.03
C1	17.80	.03		
C1	17.66	.03		

SUMMARY OF REACH LENGTHS

River: ADOBE DAM

Reach	River Sta.	Left	Channel	Right

C1	18.52	796.35	796.35	796.35
C1	18.37	510	494.56	490
C1	18.28	425	404.74	395
C1	18.20	910	926.91	940
C1	18.02	420	404.2	380
C1	17.95	820	749.48	640
C1	17.80	860	762.91	620
C1	17.66	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: ADOBE DAM

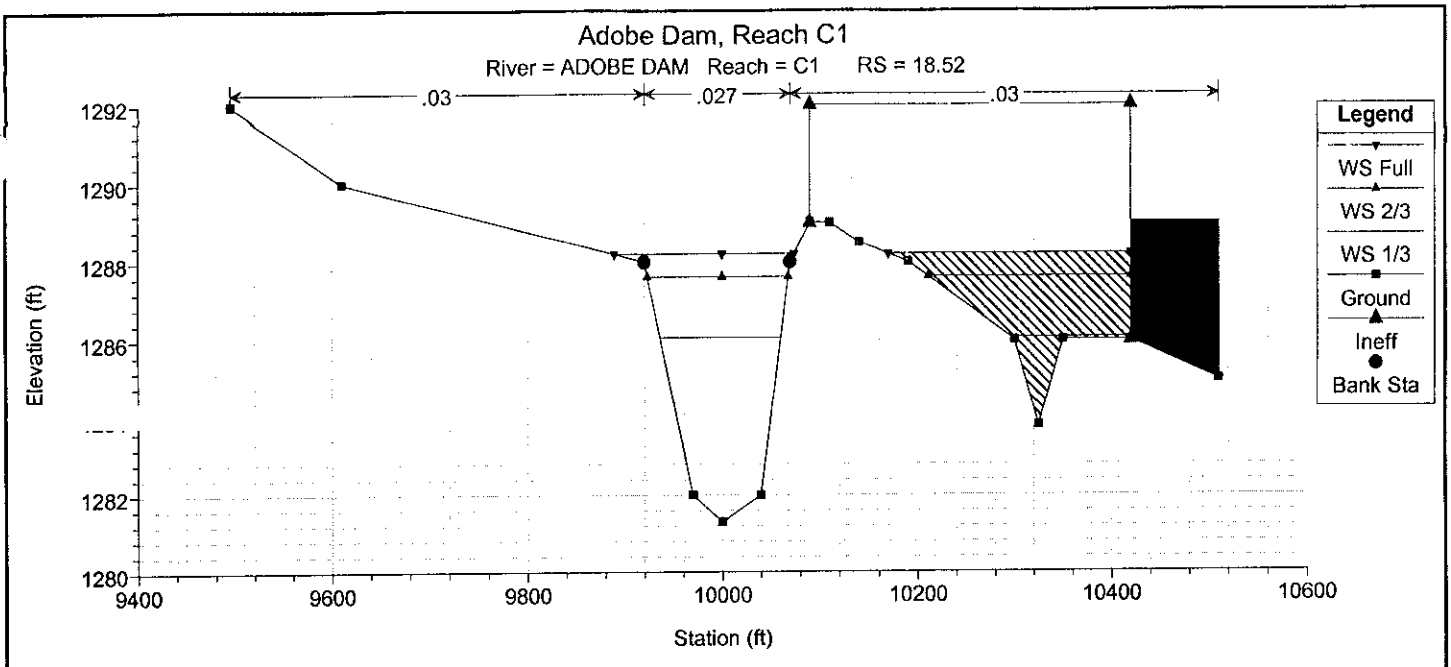
Reach	River Sta.	Contr.	Expan.
C1	18.52	.1	.3
C1	18.37	.1	.3
C1	18.28	.1	.3
C1	18.20	.1	.3
C1	18.02	.1	.3
C1	17.95	.1	.3
C1	17.80	.1	.3
C1	17.66	.1	.3

HEC-RAS Plan: ADC1 River: ADOBE DAM Reach: C1

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)	
C1	18.52	2300.00	1281.30	1286.06	1284.66	1286.53	0.001979	5.49	419.02	247.67	0.53
C1	18.52	4100.00	1281.30	1287.62	1285.89	1288.28	0.002009	6.53	627.84	353.74	0.55
C1	18.52	5000.00	1281.30	1288.20	1286.41	1288.96	0.002036	7.00	717.61	434.42	0.57
C1	18.37	2300.00	1279.70	1284.80	1283.11	1285.18	0.001423	4.90	469.21	454.92	0.45
C1	18.37	4100.00	1279.70	1286.27	1284.27	1286.86	0.001546	6.16	667.67	636.79	0.49
C1	18.37	5000.00	1279.70	1286.80	1284.74	1287.50	0.001617	6.75	756.35	718.53	0.51
C1	18.28	2300.00	1278.50	1282.81	1282.63	1283.80	0.006630	7.98	288.28	838.71	0.91
C1	18.28	4100.00	1278.50	1283.78	1283.76	1285.33	0.007252	9.98	410.69	961.22	0.99
C1	18.28	5000.00	1278.50	1284.32	1284.32	1285.98	0.006542	10.36	489.33	1063.53	0.96
C1	18.20	500.00	1279.80	1281.25	1280.72	1281.36	0.002534	2.64	189.37	1053.33	0.45
C1	18.20	2300.00	1279.80	1282.54	1281.93	1282.76	0.003473	3.77	610.03	1549.68	0.55
C1	18.20	3200.00	1279.80	1282.92	1282.24	1283.18	0.003735	4.10	781.18	1663.42	0.58
C1	18.02	500.00	1275.50	1276.10	1276.10	1276.24	0.020249	2.97	168.26	997.28	1.00
C1	18.02	2300.00	1275.50	1276.58	1276.58	1276.90	0.014872	4.54	507.00	1219.05	0.99
C1	18.02	3200.00	1275.50	1276.74	1276.74	1277.13	0.014195	5.03	636.13	1268.10	1.00
C1	17.95	500.00	1271.00	1272.18	1271.86	1272.25	0.003458	2.20	226.92	531.44	0.48
C1	17.95	2300.00	1271.00	1273.31	1272.66	1273.46	0.002742	3.13	734.00	1191.11	0.48
C1	17.95	3200.00	1271.00	1273.62	1272.91	1273.81	0.002907	3.50	914.54	1396.79	0.50
C1	17.80	500.00	1270.00	1269.18	1268.82	1269.33	0.004005		160.48	164.28	0.00
C1	17.80	2300.00	1270.00	1270.45	1270.33	1270.70	0.004745	1.95	614.39	996.50	0.52
C1	17.80	3200.00	1270.00	1270.71	1270.53	1270.96	0.004730	2.67	837.78	1083.97	0.56
C1	17.66	0.01	1265.90	1265.91	1265.91	1265.92	0.003374	0.11	0.09	12.41	0.22
C1	17.66	200.00	1265.90	1266.47	1266.35	1266.53	0.006603	1.98	101.10	293.36	0.59
C1	17.66	500.00	1265.90	1266.78	1266.58	1266.87	0.005619	2.38	209.89	408.39	0.59

HEC-RAS Plan: ADC1 River: ADOBE DAM Reach: C1

Reach	River Sta	Q Total	W.S. Elev	Flow Area	Vel Total	Length Chnl	Max Chl Dpth	Hydr Depth
		(cfs)	(ft)	(sq ft)	(ft/s)	(ft)	(ft)	(ft)
C1	18.52	2300.00	1286.06	419.02	5.49	796.35	4.76	3.37
C1	18.52	4100.00	1287.62	627.84	6.53	796.35	6.32	4.33
C1	18.52	5000.00	1288.20	717.61	6.97	796.35	6.90	3.89
C1	18.37	2300.00	1284.80	469.21	4.90	494.56	5.10	3.65
C1	18.37	4100.00	1286.27	667.67	6.14	494.56	6.57	4.36
C1	18.37	5000.00	1286.80	756.35	6.61	494.56	7.10	4.13
C1	18.28	2300.00	1282.81	288.28	7.98	404.74	4.31	2.39
C1	18.28	4100.00	1283.78	410.69	9.98	404.74	5.28	3.14
C1	18.28	5000.00	1284.32	489.33	10.22	404.74	5.82	2.98
C1	18.20	500.00	1281.25	189.37	2.64	926.91	3.75	1.09
C1	18.20	2300.00	1282.54	610.03	3.77	926.91	5.04	1.47
C1	18.20	3200.00	1282.92	781.18	4.10	926.91	5.42	1.57
C1	18.02	500.00	1276.10	168.26	2.97	404.20	1.10	0.27
C1	18.02	2300.00	1276.58	507.00	4.54	404.20	1.58	0.65
C1	18.02	3200.00	1276.74	636.13	5.03	404.20	1.74	0.79
C1	17.95	500.00	1272.18	226.92	2.20	749.48	1.18	0.66
C1	17.95	2300.00	1273.31	734.00	3.13	749.48	2.31	1.33
C1	17.95	3200.00	1273.62	914.54	3.50	749.48	2.62	1.50
C1	17.80	500.00	1269.18	160.48	3.12	762.91	1.18	0.98
C1	17.80	2300.00	1270.45	614.39	3.74	762.91	2.45	0.75
C1	17.80	3200.00	1270.71	837.78	3.82	762.91	2.71	0.98
C1	17.66	0.01	1265.91	0.09	0.11		0.01	0.01
C1	17.66	200.00	1266.47	101.10	1.98		0.57	0.34
C1	17.66	500.00	1266.78	209.89	2.38		0.88	0.51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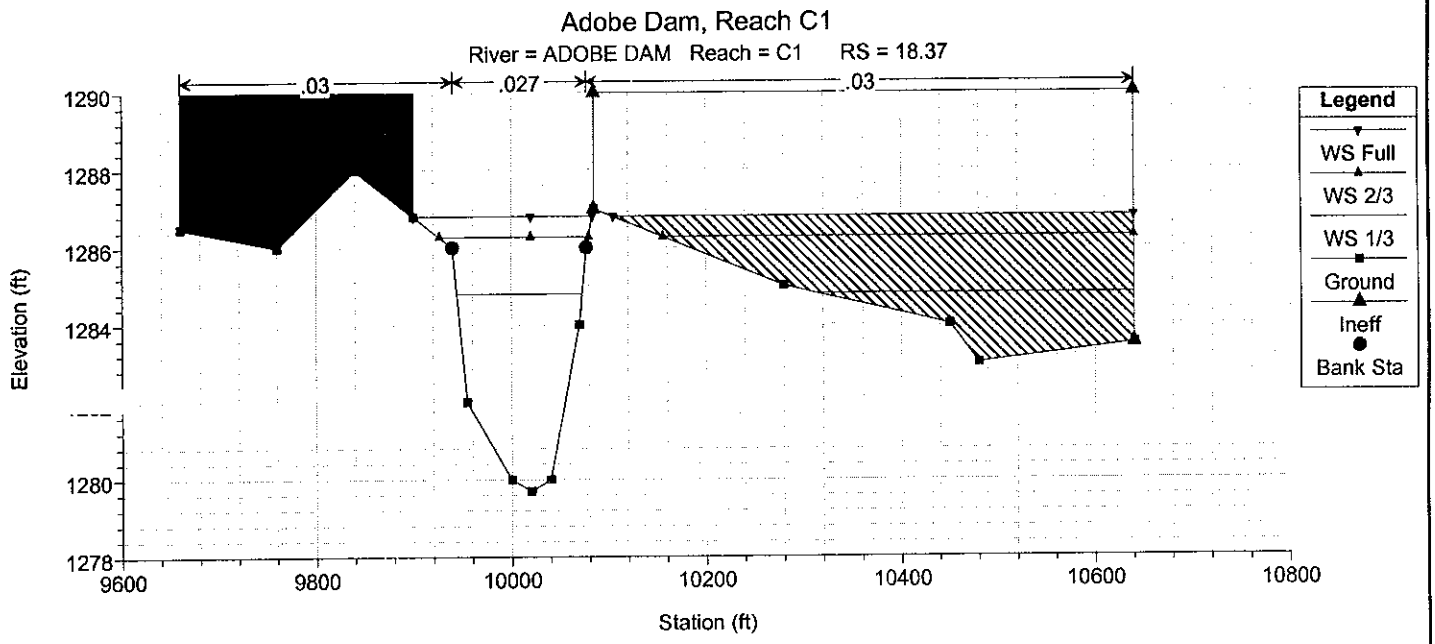
.027
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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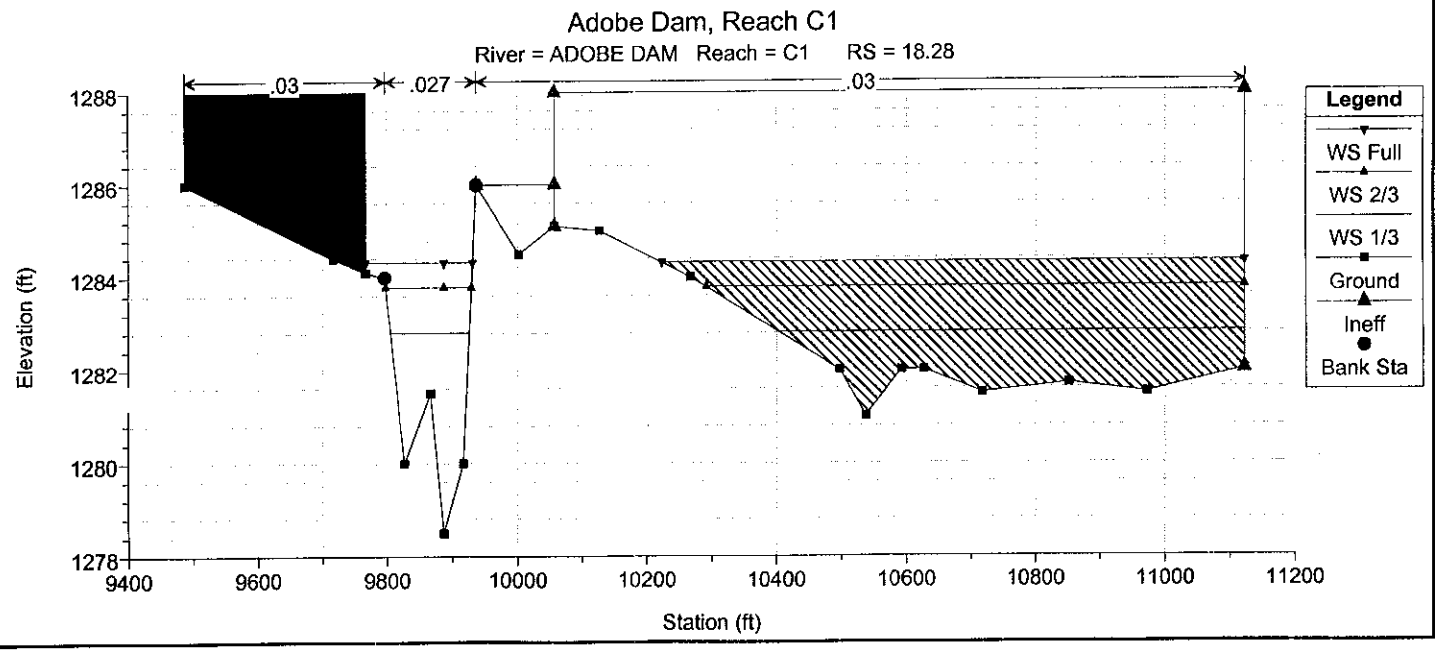
River = ADOBE DAM Reach = C1 RS = 18.37
.03
.027
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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.027
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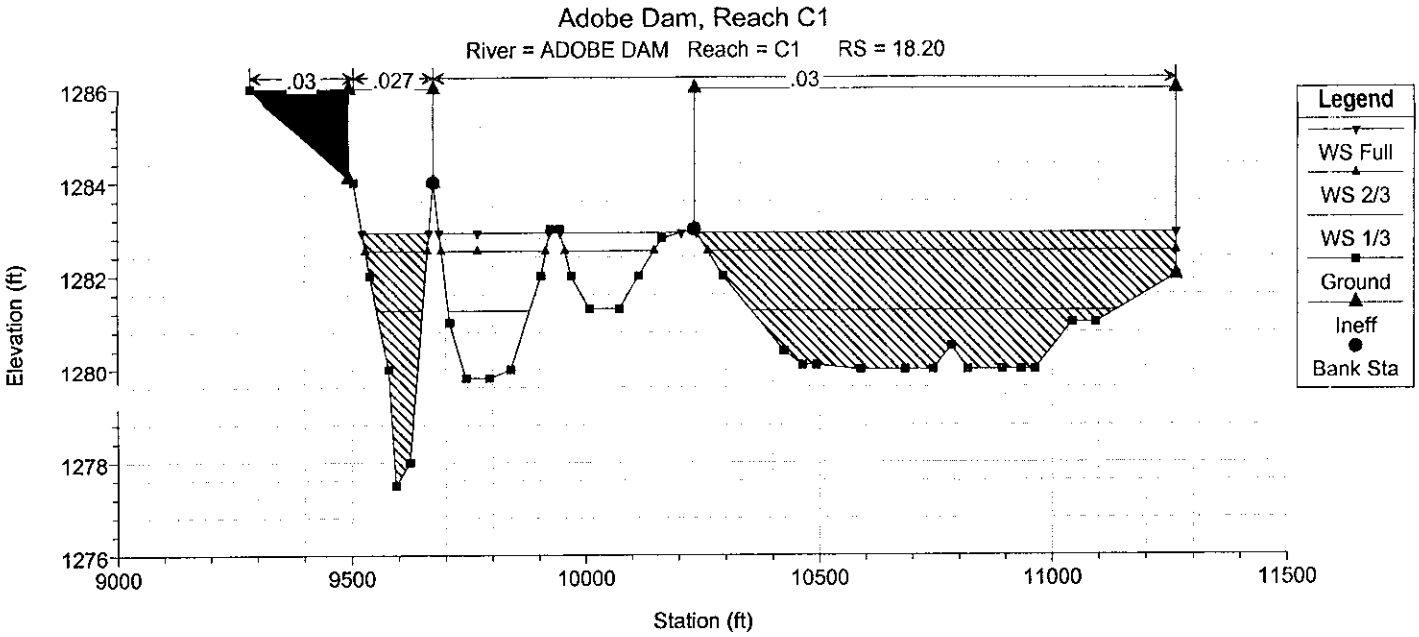
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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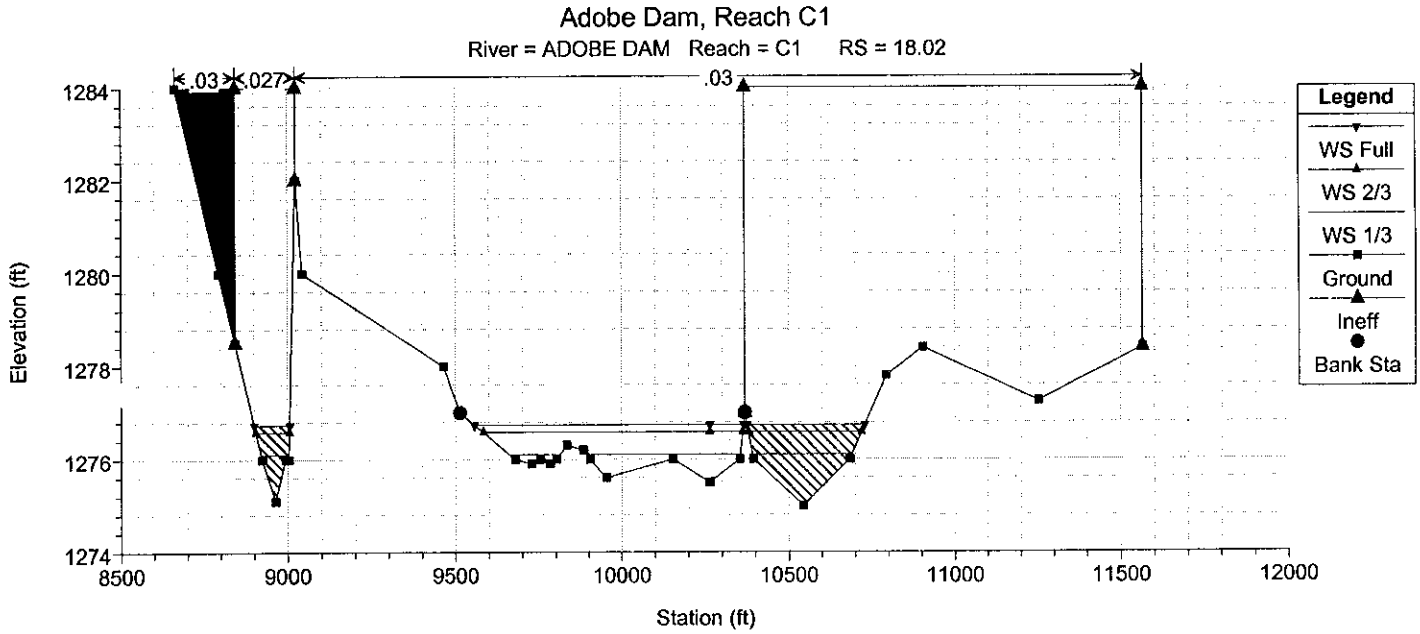
.03
.027
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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River = ADOBE DAM Reach = C1 RS = 18.02
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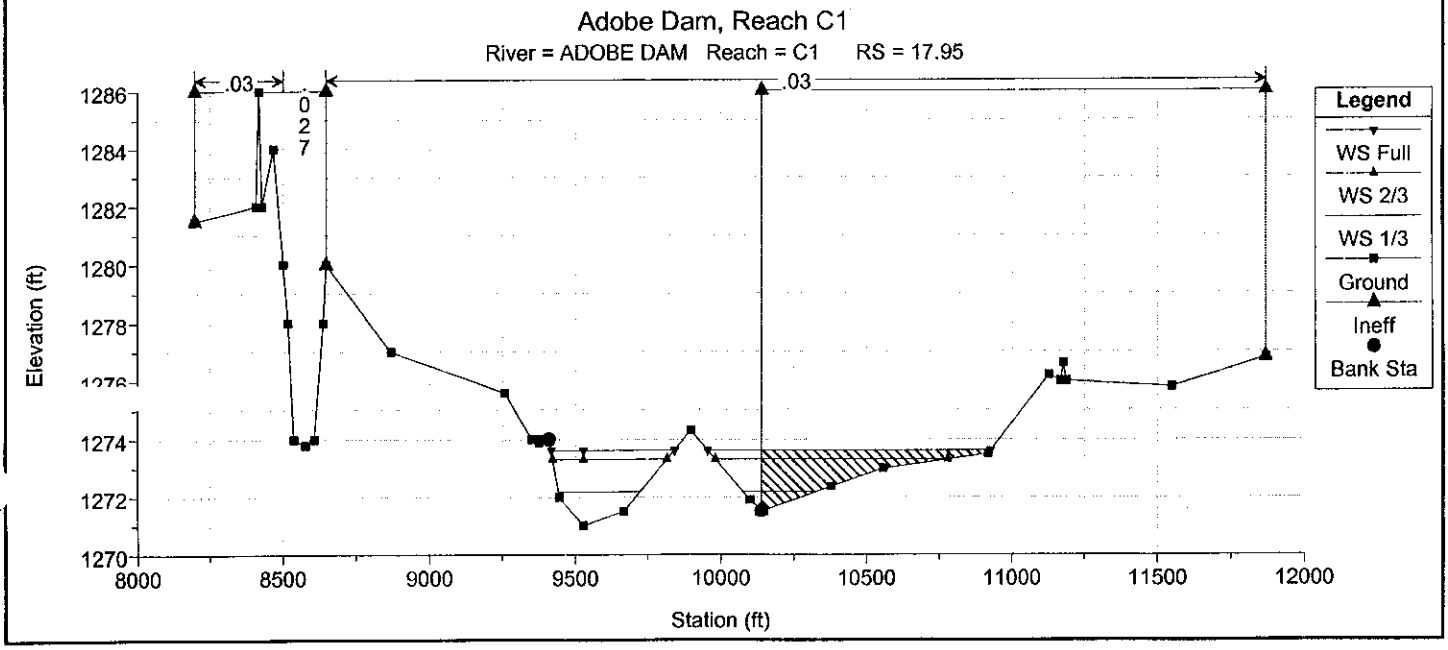
.027
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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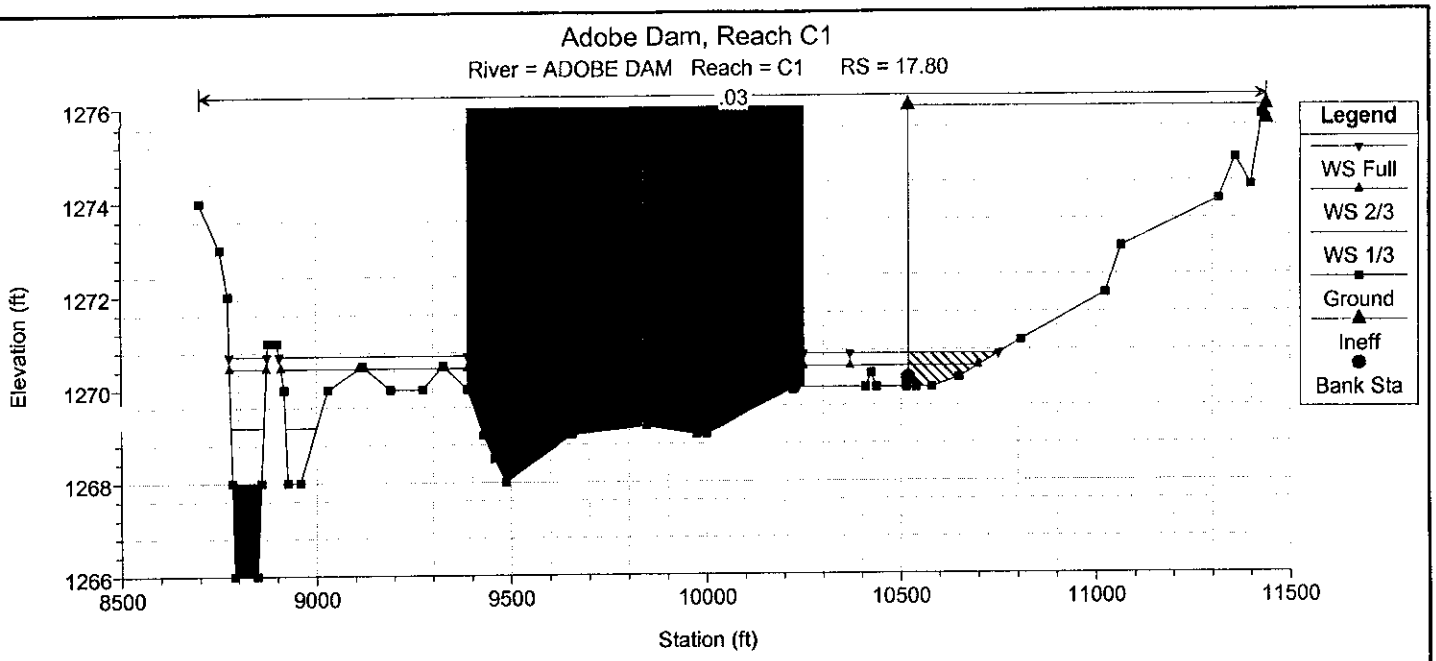
.027
.03
Elevation (ft)
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta


Adobe Dam, Reach C1
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Elevation (ft)
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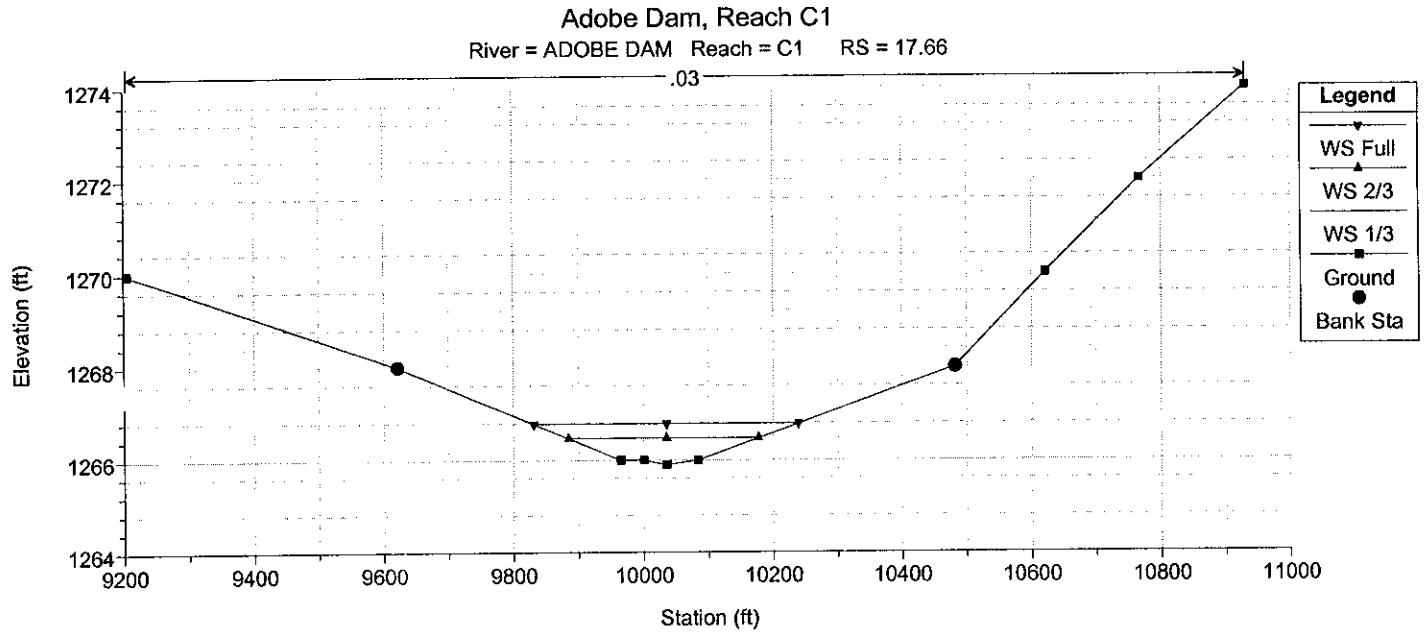
1274
1272
1270
1268
1266
8500
9000
9500
10000
10500
11000
11500
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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.03
Elevation (ft)
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1272
1270
1268
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1264
9200
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Bank Sta

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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
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PROJECT DATA
Project Title: Adobe Dam, Reach C2
Project File : ADC2.prj
Run Date and Time: 03/08/2001 2:10:04 PM

Project in English units

Study Name: Adobe Dam Spillway Delineation 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 Adobe Dam spillway.

Model Name: ADC2
Model Description: 55th Ave channel model of flow downstream of Utopia Road. Northern boundary is section 18.52, just south of the Loop 101 Freeway. Southern boundary is section 17.87, at the confluence with Skunk Creek. Downstream boundary condition is the water surface elevation in Skunk Creek at section 22700 from the Skunk Creek HEC-RAS model.

Flow Profiles: Profile #1, 1/3 Flow
Sections 18.52 to 18.28, Q=2300 cfs
Sections 18.18 to 18.17, Q=1800 cfs
Sections 18.03 to 17.87, Q=2200 cfs

Profile #2, 2/3 Flow
Sections 18.52 to 18.28, Q=4100 cfs
Sections 18.18 to 18.17, Q=1800 cfs
Sections 18.03 to 17.87, Q=2500 cfs.

Profile #3, Full Flow
Sections 18.52 to 18.28, Q=5000 cfs
Sections 18.18 to 18.17, Q=1800 cfs
Sections 18.03 to 17.87, Q=2900 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 990006-02

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 C2, 55th Avenue Channel
Plan File : C:\WINDOWS\Desktop\adobe dam\Reach C\ADC2.p01

Geometry Title: Reach C2, 55th Avenue Channel
Geometry File : C:\WINDOWS\Desktop\adobe dam\Reach C\ADC2.g01

```
          Flow Title     : Reach C2, 55th Avenue Channel
          Flow File      : C:\WINDOWS\Desktop\adobe dam\Reach C\ADC2.f01

Plan Summary Information:
Number of:  Cross Sections =    8    Mulitple Openings =    0
            Culverts       =    1    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 C2, 55th Avenue Channel
Flow File : C:\WINDOWS\Desktop\adobe dam\Reach C\ADC2.f01

Flow Data (cfs)

  River          Reach          RS                1/3            2/3            Full
  ADOBE DAM      C2             18.52            2300           4100           5000
  ADOBE DAM      C2             18.18            1800           1800           1800
  ADOBE DAM      C2             18.03            2200           2500           2900


Boundary Conditions

  River          Reach          Profile                   Upstream                Downstream

  ADOBE DAM      C2             1/3                 Known WS = 1286.06      Known WS = 1271.29
  ADOBE DAM      C2             2/3                  Known WS = 1287.6      Known WS = 1271.44
  ADOBE DAM      C2             Full                Known WS = 1288.14      Known WS = 1271.62


GEOMETRY DATA

Geometry Title: Reach C2, 55th Avenue Channel
Geometry File : C:\WINDOWS\Desktop\adobe dam\Reach C\ADC2.g01

CROSS SECTION          RIVER: ADOBE DAM
REACH: C2                 RS: 18.52

INPUT
Description: Northern Boundary of HEC-RAS Model ADC2
1/3 Q=2300 cfs
2/3
            Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    9495    1292    9610    1290    9920    1288    9970    1282   10000  1281.3
   10040    1282   10070    1288   10090    1289   10110    1289   10140  1288.5
   10190    1288   10300    1286   10325  1283.8   10350    1286   10420    1286
   10510    1285

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    9495     .03    9920    .027   10070     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9920   10070           796.35  796.35  796.35            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   10090   10420    1292
Blocked Obstructions     num=       1
```

Sta L	Sta R	Elev
10420	10510	1289

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1288.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.	0.030	0.027	0.030
W.S. Elev (ft)	1288.20	Reach Len. (ft)	796.35	796.35	796.35
Crit W.S. (ft)	1286.41	Flow Area (sq ft)	3.01	714.05	0.39
E.G. Slope (ft/ft)	0.002038	Area (sq ft)	3.01	714.05	452.64
Q Total (cfs)	5000.00	Flow (cfs)	1.43	4998.38	0.18
Top Width (ft)	434.18	Top Width (ft)	30.54	150.00	253.64
Vel Total (ft/s)	6.97	Avg. Vel. (ft/s)	0.48	7.00	0.48
Max Chl Dpth (ft)	6.90	Hydr. Depth (ft)	0.10	4.76	0.10
Conv. Total (cfs)	110764.3	Conv. (cfs)	31.8	110728.4	4.1
Length Wtd. (ft)	796.35	Wetted Per. (ft)	30.54	150.97	3.95
Min Ch El (ft)	1281.30	Shear (lb/sq ft)	0.01	0.60	0.01
Alpha	1.01	Stream Power (lb/ft s)	0.01	4.21	0.01
Frctn Loss (ft)	1.44	Cum Volume (acre-ft)	0.36	42.22	270.57
C & E Loss (ft)	0.02	Cum SA (acres)	1.25	11.56	91.46

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)
9778.33	9920.00	1.43	3.01	30.54	0.03	0.10	0.48
LB 9920.00	9970.00	817.02	159.85	50.36	16.34	3.20	5.11
9970.00	10020.00	2759.08	330.85	50.01	55.18	6.62	8.34
10020.00	RB 10070.00	1422.28	223.35	50.60	28.45	4.47	6.37
10070.00	10216.67	0.18	0.39	3.95	0.00	0.10	0.48

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.

CROSS SECTION RIVER: ADOBE DAM
REACH: C2 RS: 18.37

INPUT
Description: 1/3 Q=2300 cfs
2/3 Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9660	1286.5	9760	1286	9840	1288	9900	1286.8	9940	1286
9955	1282	10000	1280	10020	1279.7	10040	1280	10070	1284
10077.5	1286	10085	1287	10280	1285	10450	1284	10480	1283
10640	1283.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9660	.03	9940	.027	10077.5	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9940	10077.5	494.98	494.98	494.98	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10085	10640	1290

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9660	9900	1290

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1287.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.	0.030	0.027	0.030
W.S. Elev (ft)	1286.79	Reach Len. (ft)	494.98	494.98	494.98
Crit W.S. (ft)	1284.74	Flow Area (sq ft)	15.73	737.58	2.36
E.G. Slope (ft/ft)	0.001620	Area (sq ft)	15.73	737.58	1214.74
Q Total (cfs)	5000.00	Flow (cfs)	16.93	4980.54	2.53
Top Width (ft)	717.96	Top Width (ft)	39.66	137.50	540.80
Vel Total (ft/s)	6.62	Avg. Vel. (ft/s)	1.08	6.75	1.07
Max Chl Dpth (ft)	7.09	Hydr. Depth (ft)	0.40	5.36	0.40
Conv. Total (cfs)	124213.1	Conv. (cfs)	420.7	123729.8	62.7

Length Wtd. (ft)	494.98	Wetted Per. (ft)	39.67	138.60	6.00
Min Ch El (ft)	1279.70	Shear (lb/sq ft)	0.04	0.54	0.04
Alpha	1.04	Stream Power (lb/ft s)	0.04	3.64	0.04
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	0.18	28.95	255.33
C & E Loss (ft)	0.09	Cum SA (acres)	0.60	8.93	84.20

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 #Full

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9846.67	9940.00	16.93	15.73	39.67	0.34	0.40	1.08
LB 9940.00	9985.83	1254.68	210.82	46.39	25.09	4.60	5.95
9985.83	10031.67	2435.19	312.39	45.85	48.70	6.82	7.80
10031.67	RB 10077.50	1290.68	214.38	46.36	25.81	4.68	6.02
10077.50	10265.00	2.53	2.36	6.00	0.05	0.40	1.07

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: ADOBE DAM
REACH: C2 RS: 18.28

INPUT
Description: 1/3 Q=2300 cfs
2/3 Q=4100 cfs
Full Q=5000 cfs
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9620	1286	9850	1284.4	9900	1284.1	9930	1284	9960	1280
10000	1281.5	10020	1278.5	10050	1280	10070	1286	10135	1284.5
10190	1285.1	10260	1285	10400	1284	10630	1282	10670	1281
10725	1282	10760	1282	10850	1281.5	10985	1281.7	11105	1281.5
11255	1282								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9620	.03	9930	.027	10070	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930	10070	494.4	494.4	494.4	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10070	11255	1288

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9620	9900	1288

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1285.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.	0.030	0.027	
W.S. Elev (ft)	1284.33	Reach Len. (ft)	494.40	494.40	494.40
Crit W.S. (ft)	1284.33	Flow Area (sq ft)	8.29	482.83	
E.G. Slope (ft/ft)	0.006476	Area (sq ft)	8.29	482.83	1975.83
Q Total (cfs)	5000.00	Flow (cfs)	13.94	4986.06	
Top Width (ft)	1065.08	Top Width (ft)	30.00	134.42	900.66
Vel Total (ft/s)	10.18	Avg. Vel. (ft/s)	1.68	10.33	
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)	0.28	3.59	
Conv. Total (cfs)	62131.2	Conv. (cfs)	173.2	61958.0	
Length Wtd. (ft)	494.40	Wetted Per. (ft)	30.23	135.61	
Min Ch El (ft)	1278.50	Shear (lb/sq ft)	0.11	1.44	
Alpha	1.03	Stream Power (lb/ft s)	0.19	14.87	
Frctn Loss (ft)	1.70	Cum Volume (acre-ft)	0.05	22.01	237.21

C & E Loss (ft)	0.43	Cum SA (acres)	0.21	7.39	76.01

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 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.
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)
9826.67	9930.00	13.94	8.29	30.23	0.28	0.28	1.68
LB 9930.00	9976.67	1222.19	136.68	46.94	24.44	2.93	8.94
9976.67	10023.33	1967.37	181.82	46.91	39.35	3.90	10.82
10023.33	RB 10070.00	1796.50	164.34	41.76	35.93	4.00	10.93

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 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.
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: ADOBE DAM
REACH: C2 RS: 18.18

INPUT
Description: Flow remaining in channel is equal to the capacity of the 5=10' x 4' CBC.
1/3 Q=1800 cfs
2/3 Q=1800 cfs
Full Q=1800 cfs
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9690	1286	9910	1284	9945	1282	9985	1280	10000	1277.5
10030	1278	10080	1284						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9690	.03	9910	.027	10080	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9910	10080	71.91	71.91	71.91	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9690	9900	

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1283.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.027	
W.S. Elev (ft)	1283.36	Reach Len. (ft)	71.91	71.91	71.91
Crit W.S. (ft)	1281.38	Flow Area (sq ft)		467.66	
E.G. Slope (ft/ft)	0.001113	Area (sq ft)		467.66	
Q Total (cfs)	1800.00	Flow (cfs)		1800.00	
Top Width (ft)	153.45	Top Width (ft)		153.45	
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)		3.85	
Max Chl Dpth (ft)	5.86	Hydr. Depth (ft)		3.05	
Conv. Total (cfs)	53955.2	Conv. (cfs)		53955.2	
Length Wtd. (ft)	71.91	Wetted Per. (ft)		154.07	
Min Ch El (ft)	1277.50	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.81	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	16.62	225.99
C & E Loss (ft)		Cum SA (acres)	0.04	5.76	70.90

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 9910.00	9966.67	111.22	57.36	45.52	6.18	1.26	1.94
9966.67	10023.33	1148.30	254.51	56.90	63.79	4.49	4.51
10023.33	RB 10080.00	540.47	155.79	51.65	30.03	3.04	3.47

CULVERT RIVER: ADOBE DAM
REACH: C2 RS: 18.175

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9900	1283.2	1277	9970	1283	1277	10000	1282.9	1277
10250	1282	1277	10520	1280	1277	10750	1279	1277
11160	1280	1277	11240	1280	1277			

Upstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9690	1286	9910	1284	9945	1282	9985	1280	10000	1277.5
10030	1278	10080	1284						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9690	.03	9910	.027	10080	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
9910	10080	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9690	9900	

Downstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9900	1283.2	1277	9970	1283	1276	10000	1282.9	1276
10250	1282	1276	10520	1280	1276	10750	1279	1276
11160	1280	1276	11240	1280	1276			

Downstream Bridge Cross Section Data
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9790	1282.5	9905	1282	9927.5	1281	9950	1280	9975	1278
10000	1277.5	10030	1278	10043	1281	10050	1282		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9790	.03	9905	.027	10050	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
9905	10050	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9790	9900	1286

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

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	4	10

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.

```
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10      60       .011                   .5                1
Number of Barrels =  5
Upstream   Elevation =  1277.5
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
  9996.4 10006.7   10017 10027.3 10037.6
Downstream Elevation =  1277.3
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
  9991.4 10001.7   10012 10022.3 10032.6

CULVERT OUTPUT    Profile #Full
Culvert ID : Culvert #1

  Culv Q (cfs)            1574.99   Culv Vel In (ft/s)         7.87
  # Barrels                     5   Culv Vel Out (ft/s)        7.87
  Q Barrel (cfs)           315.00   Culv Inv El Up (ft)     1277.50
  E.G. US. (ft)           1283.59   Culv Inv El Dn (ft)     1277.30
  W.S. US. (ft)           1283.36   Culv Frctn Ls (ft)         0.13
  Delta EG (ft)              1.24   Culv Ext Lss (ft)          0.64
  Delta WS (ft)              1.34   Culv Ent Lss (ft)          0.48
  E.G. IC (ft)            1283.36   Q Weir (cfs)             225.01
  E.G. OC (ft)            1283.59   Weir Sta Lft (ft)       9917.16
  Culvert Control          Outlet   Weir Sta Rgt (ft)      10076.59
  Culv WS In (ft)         1281.50   Weir Submerg               0.00
  Culv WS Out (ft)        1281.30   Weir Max Depth (ft)        0.94
  Culv Nml Depth (ft)               Weir Avg Depth (ft)        0.65
  Culv Crt Depth (ft)        3.14   Wr Flw Area (sq ft)      104.41
  Culv Ful Lngh (ft)        60.00   Min Top Rd (ft)         1282.72


CROSS SECTION           RIVER: ADOBE DAM
REACH: C2                  RS: 18.17

INPUT
Description: 1/3 Q=1800 cfs
2/3 Q=1800 cfs
Full Q=1800 cfs
Station Elevation Data     num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    9790  1282.5    9905    1282  9927.5    1281    9950    1280    9975    1278
   10000  1277.5   10030    1278   10043    1281   10050    1282

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    9790     .03    9905    .027   10050     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9905   10050            731.23  731.23  731.23              .1       .3
Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
    9790    9900    1286

CROSS SECTION OUTPUT    Profile #Full

  E.G. Elev (ft)          1282.35   Element                   Left OB    Channel   Right OB
  Vel Head (ft)              0.33   Wt. n-Val.                  0.030      0.027
  W.S. Elev (ft)          1282.02   Reach Len. (ft)            731.23     731.23     731.23
  Crit W.S. (ft)                    Flow Area (sq ft)            0.04     392.41
  E.G. Slope (ft/ft)     0.001852   Area (sq ft)                 0.04     392.41
  Q Total (cfs)           1800.00   Flow (cfs)                   0.00    1800.00
  Top Width (ft)           149.21   Top Width (ft)               4.21     145.00
  Vel Total (ft/s)           4.59   Avg. Vel. (ft/s)             0.09       4.59
  Max Chl Dpth (ft)          4.52   Hydr. Depth (ft)             0.01       2.71
  Conv. Total (cfs)       41829.8   Conv. (cfs)                   0.1    41829.8
  Length Wtd. (ft)         731.23   Wetted Per. (ft)             4.21     145.56
  Min Ch El (ft)          1277.50   Shear (lb/sq ft)             0.00       0.31
  Alpha                      1.00   Stream Power (lb/ft s)       0.00       1.43
  Frctn Loss (ft)            1.47   Cum Volume (acre-ft)         0.00      15.91     225.99
  C & E Loss (ft)            0.01   Cum SA (acres)               0.04       5.51      70.90


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.
```

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)
9866.67	9905.00	0.00	0.04	4.21	0.00	0.01	0.09
LB 9905.00	9953.33	120.61	53.00	48.39	6.70	1.10	2.28
9953.33	10001.67	946.92	182.50	48.41	52.61	3.78	5.19
10001.67	RB 10050.00	732.47	156.91	48.77	40.69	3.25	4.67

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was 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: ADOBE DAM
REACH: C2 RS: 18.03

INPUT
Description: Flow increase due to flow through Carmel Park.
1/3 Q=2200 cfs
2/3 Q=2500 cfs
Full Q=2900 cfs
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9700	1284	9830	1280	9880	1280	9920	1280	9960	1276
10000	1275.1	10030	1276	10040	1276	10060	1280	10070	1282
10110	1279.5	10230	1278	10320	1278	10550	1277.2	10730	1278
10810	1278	10850	1278	10900	1278.3	11190	1276	11300	1275.5
11420	1278.5	11870	1278.8	11940	1278.4	12290	1275.5	12600	1276.1
12650	1276								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9700	.03	9880	.027	10070	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9880	10070	608.79	608.79	608.79	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10070	12650	1284

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9700	9880	

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1280.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.027	
W.S. Elev (ft)	1280.44	Reach Len. (ft)	608.79	608.79	608.79
Crit W.S. (ft)	1278.82	Flow Area (sq ft)		551.06	
E.G. Slope (ft/ft)	0.002107	Area (sq ft)		551.06	7695.95
Q Total (cfs)	2900.00	Flow (cfs)		2900.00	
Top Width (ft)	2737.23	Top Width (ft)		182.20	2555.03
Vel Total (ft/s)	5.26	Avg. Vel. (ft/s)		5.26	
Max Chl Dpth (ft)	5.34	Hydr. Depth (ft)		3.02	
Conv. Total (cfs)	63172.5	Conv. (cfs)		63172.5	
Length Wtd. (ft)	608.79	Wetted Per. (ft)		183.30	
Min Ch El (ft)	1275.10	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		2.08	
Frctn Loss (ft)	2.08	Cum Volume (acre-ft)		7.99	161.40
C & E Loss (ft)	0.08	Cum SA (acres)		2.76	49.45

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 #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	9943.33	107.85	55.05	63.89	3.72	0.87	1.96

9943.33	10006.67	1734.68	290.60	63.43	59.82	4.59	5.97
10006.67	RB 10070.00	1057.47	205.41	55.98	36.46	3.70	5.15

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: ADOBE DAM
REACH: C2 RS: 17.91

INPUT
Description: 1/3 Q=2200 cfs
2/3 Q=2500 cfs
Full Q=2900 cfs
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9620	1281.5	9830	1282	9840	1286	9850	1282	9890	1284
9923	1280	9940	1278	9960	1274	10000	1273.8	10030	1274
10060	1278	10070	1280	10290	1277	10680	1275.6	10830	1272.5
10890	1267.5	10950	1271	11090	1271.5	11320	1274.3	11560	1271.5
11980	1273	12340	1273.5	12500	1274.2	12550	1274	12600	1276
12970	1275.8	13290	1275.5	13350	1276.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9620	.03	9923	.027	10070	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9923	10070	252.76	252.76	252.76	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9620	9890	1286	10070	13350	1286

CROSS SECTION OUTPUT Profile #Full

E.G. Elev (ft)	1278.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.		0.027	
W.S. Elev (ft)	1277.47	Reach Len. (ft)	252.76	252.76	252.76
Crit W.S. (ft)	1277.30	Flow Area (sq ft)		324.76	
E.G. Slope (ft/ft)	0.006512	Area (sq ft)		324.76	10773.12
Q Total (cfs)	2900.00	Flow (cfs)		2900.00	
Top Width (ft)	3207.55	Top Width (ft)		113.33	3094.21
Vel Total (ft/s)	8.93	Avg. Vel. (ft/s)		8.93	
Max Chl Dpth (ft)	9.97	Hydr. Depth (ft)		2.87	
Conv. Total (cfs)	35937.2	Conv. (cfs)		35937.2	
Length Wtd. (ft)	252.76	Wetted Per. (ft)		113.91	
Min Ch El (ft)	1273.80	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)		10.35	
Frctn Loss (ft)	1.83	Cum Volume (acre-ft)		1.87	32.34
C & E Loss (ft)	0.00	Cum SA (acres)		0.70	9.98

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was 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 9923.00	9972.00	560.99	72.00	29.68	19.34	2.45	7.79
9972.00	10021.00	1785.06	176.23	49.00	61.55	3.60	10.13
10021.00	RB 10070.00	553.95	76.53	35.23	19.10	2.19	7.24

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: ADOBE DAM
REACH: C2 RS: 17.87

INPUT
Description: Southern Boundary of HEC-RAS Model ADC2
1/3 Q=2200 cfs
2/3
Q=2500 cfs
Full Q=2900 cfs
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9840	1278.5	9900	1278	9935	1276	9945	1274	9960	1273
10000	1272.3	10040	1273	10060	1274	10065	1276	10070	1278
10120	1277	10270	1275.3	10490	1276.2	10620	1275.5	10800	1272.5
10870	1277.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9840	.03	9900	.027	10070	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9900	10070	0	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10070	10870	1279

CROSS SECTION OUTPUT Profile #Full

			Left OB	Channel	Right OB
E.G. Elev (ft)	1276.88	Element			
Vel Head (ft)	1.28	Wt. n-Val.		0.027	
W.S. Elev (ft)	1275.60	Reach Len. (ft)			
Crit W.S. (ft)	1275.60	Flow Area (sq ft)		319.62	
E.G. Slope (ft/ft)	0.007987	Area (sq ft)		319.62	372.58
Q Total (cfs)	2900.00	Flow (cfs)		2900.00	
Top Width (ft)	471.00	Top Width (ft)		127.03	343.97
Vel Total (ft/s)	9.07	Avg. Vel. (ft/s)		9.07	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		2.52	
Conv. Total (cfs)	32448.5	Conv. (cfs)		32448.5	
Length Wtd. (ft)		Wetted Per. (ft)		127.57	
Min Ch El (ft)	1272.30	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		11.34	
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 #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	9956.67	186.29	29.69	19.87	6.42	1.51	6.28
9956.67	10013.33	1680.76	168.97	56.68	57.96	2.98	9.95
10013.33	RB 10070.00	1032.95	120.97	51.02	35.62	2.39	8.54

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:ADOBE DAM

Reach	River Sta.	n1	n2	n3
C2	18.52	.03	.027	.03
C2	18.37	.03	.027	.03
C2	18.28	.03	.027	.03
C2	18.18	.03	.027	.03
C2	18.175	Culvert		
C2	18.17	.03	.027	.03
C2	18.03	.03	.027	.03
C2	17.91	.03	.027	.03
C2	17.87	.03	.027	.03

SUMMARY OF REACH LENGTHS

River: ADOBE DAM

Reach	River Sta.	Left	Channel	Right
C2	18.52	796.35	796.35	796.35
C2	18.37	494.98	494.98	494.98
C2	18.28	494.4	494.4	494.4
C2	18.18	71.91	71.91	71.91
C2	18.175	Culvert		
C2	18.17	731.23	731.23	731.23
C2	18.03	608.79	608.79	608.79
C2	17.91	252.76	252.76	252.76
C2	17.87	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: ADOBE DAM

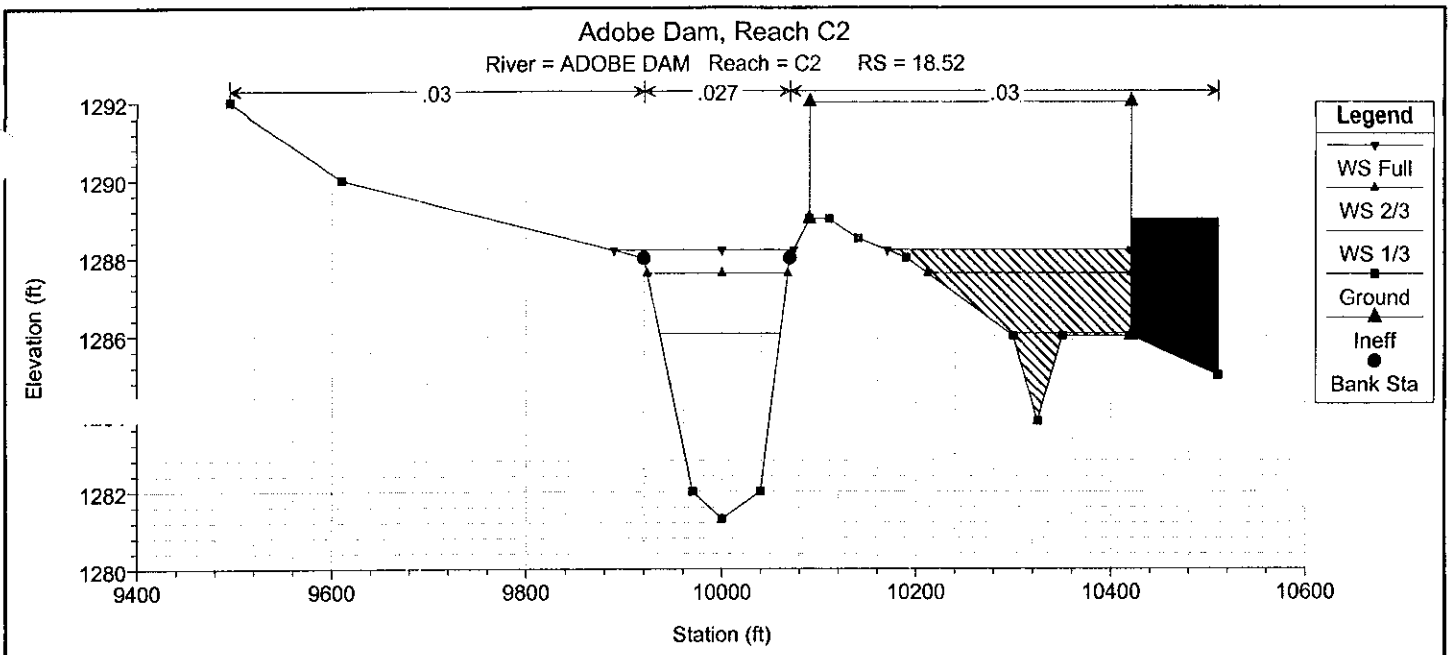
Reach	River Sta.	Contr.	Expan.
C2	18.52	.1	.3
C2	18.37	.1	.3
C2	18.28	.1	.3
C2	18.18	.1	.3
C2	18.175	Culvert	
C2	18.17	.1	.3
C2	18.03	.1	.3
C2	17.91	.1	.3
C2	17.87	.1	.3

HEC-RAS Plan: ADC2 River: ADOBE DAM Reach: C2

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)	
C2	18.52	2300.00	1281.30	1286.06	1284.66	1286.53	0.001983	5.49	418.76	247.53	0.53
C2	18.52	4100.00	1281.30	1287.60	1285.89	1288.27	0.002032	6.56	625.38	352.58	0.56
C2	18.52	5000.00	1281.30	1288.20	1286.41	1288.96	0.002038	7.00	717.45	434.18	0.57
C2	18.37	2300.00	1279.70	1284.79	1283.11	1285.17	0.001436	4.92	467.81	452.99	0.45
C2	18.37	4100.00	1279.70	1286.20	1284.27	1286.81	0.001622	6.25	657.29	626.14	0.50
C2	18.37	5000.00	1279.70	1286.79	1284.74	1287.50	0.001620	6.75	755.68	717.96	0.51
C2	18.28	2300.00	1278.50	1283.78	1282.65	1284.27	0.002281	5.60	410.74	961.27	0.56
C2	18.28	4100.00	1278.50	1284.02	1283.76	1285.36	0.005842	9.29	441.46	995.80	0.90
C2	18.28	5000.00	1278.50	1284.33	1284.33	1285.98	0.006476	10.33	491.12	1065.08	0.96
C2	18.18	1800.00	1277.50	1282.96	1281.40	1283.26	0.001597	4.41	408.01	143.06	0.46
C2	18.18	1800.00	1277.50	1283.10	1281.38	1283.37	0.001403	4.20	428.55	146.72	0.43
C2	18.18	1800.00	1277.50	1283.36	1281.38	1283.59	0.001113	3.85	467.66	153.45	0.39
C2	18.175	Culvert									
C2	18.17	1800.00	1277.50	1281.40		1281.93	0.003496	5.85	307.75	127.23	0.66
C2	18.17	1800.00	1277.50	1281.60		1282.05	0.002830	5.39	333.94	133.16	0.60
C2	18.17	1800.00	1277.50	1282.02		1282.35	0.001852	4.59	392.44	149.21	0.49
C2	18.03	2200.00	1275.10	1279.60	1278.31	1280.04	0.002033	5.27	417.11	2675.69	0.53
C2	18.03	2500.00	1275.10	1279.90	1278.54	1280.37	0.002009	5.46	457.98	2684.99	0.53
C2	18.03	2900.00	1275.10	1280.44	1278.82	1280.87	0.002107	5.26	551.06	2737.23	0.53
C2	17.91	2200.00	1273.80	1277.04	1276.78	1278.02	0.005921	7.92	277.68	3171.03	0.87
C2	17.91	2500.00	1273.80	1277.24	1277.01	1278.32	0.006155	8.36	299.04	3187.82	0.90
C2	17.91	2900.00	1273.80	1277.47	1277.30	1278.70	0.006512	8.93	324.76	3207.55	0.93
C2	17.87	2200.00	1272.30	1275.16	1275.16	1276.24	0.008381	8.33	264.01	320.58	1.01
C2	17.87	2500.00	1272.30	1275.35	1275.35	1276.52	0.008231	8.68	287.98	353.95	1.01
C2	17.87	2900.00	1272.30	1275.60	1275.60	1276.88	0.007987	9.07	319.62	471.00	1.01

HEC-RAS Plan: ADC2 River: ADOBE DAM Reach: C2

Reach	River Sta	Q Total	W.S. Elev	Flow Area	Vel Total	Length Chnl	Max Chl Dpth	Hydr Depth
		(cfs)	(ft)	(sq ft)	(ft/s)	(ft)	(ft)	(ft)
C2	18.52	2300.00	1286.06	418.76	5.49	796.35	4.76	3.37
C2	18.52	4100.00	1287.60	625.38	6.56	796.35	6.30	4.32
C2	18.52	5000.00	1288.20	717.45	6.97	796.35	6.90	3.89
C2	18.37	2300.00	1284.79	467.81	4.92	494.98	5.09	3.64
C2	18.37	4100.00	1286.20	657.29	6.24	494.98	6.50	4.41
C2	18.37	5000.00	1286.79	755.68	6.62	494.98	7.09	4.13
C2	18.28	2300.00	1283.78	410.74	5.60	494.40	5.28	3.14
C2	18.28	4100.00	1284.02	441.46	9.29	494.40	5.52	3.19
C2	18.28	5000.00	1284.33	491.12	10.18	494.40	5.83	2.99
C2	18.18	1800.00	1282.96	408.01	4.41	71.91	5.46	2.85
C2	18.18	1800.00	1283.10	428.55	4.20	71.91	5.60	2.92
C2	18.18	1800.00	1283.36	467.66	3.85	71.91	5.86	3.05
C2	18.175	Culvert						
C2	18.17	1800.00	1281.40	307.75	5.85	731.23	3.90	2.42
C2	18.17	1800.00	1281.60	333.94	5.39	731.23	4.10	2.51
C2	18.17	1800.00	1282.02	392.44	4.59	731.23	4.52	2.63
C2	18.03	2200.00	1279.60	417.11	5.27	608.79	4.50	3.11
C2	18.03	2500.00	1279.90	457.98	5.46	608.79	4.80	3.31
C2	18.03	2900.00	1280.44	551.06	5.26	608.79	5.34	3.02
C2	17.91	2200.00	1277.04	277.68	7.92	252.76	9.54	2.57
C2	17.91	2500.00	1277.24	299.04	8.36	252.76	9.74	2.71
C2	17.91	2900.00	1277.47	324.76	8.93	252.76	9.97	2.87
C2	17.87	2200.00	1275.16	264.01	8.33		2.86	2.13
C2	17.87	2500.00	1275.35	287.98	8.68		3.05	2.30
C2	17.87	2900.00	1275.60	319.62	9.07		3.30	2.52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Station (ft)
Legend
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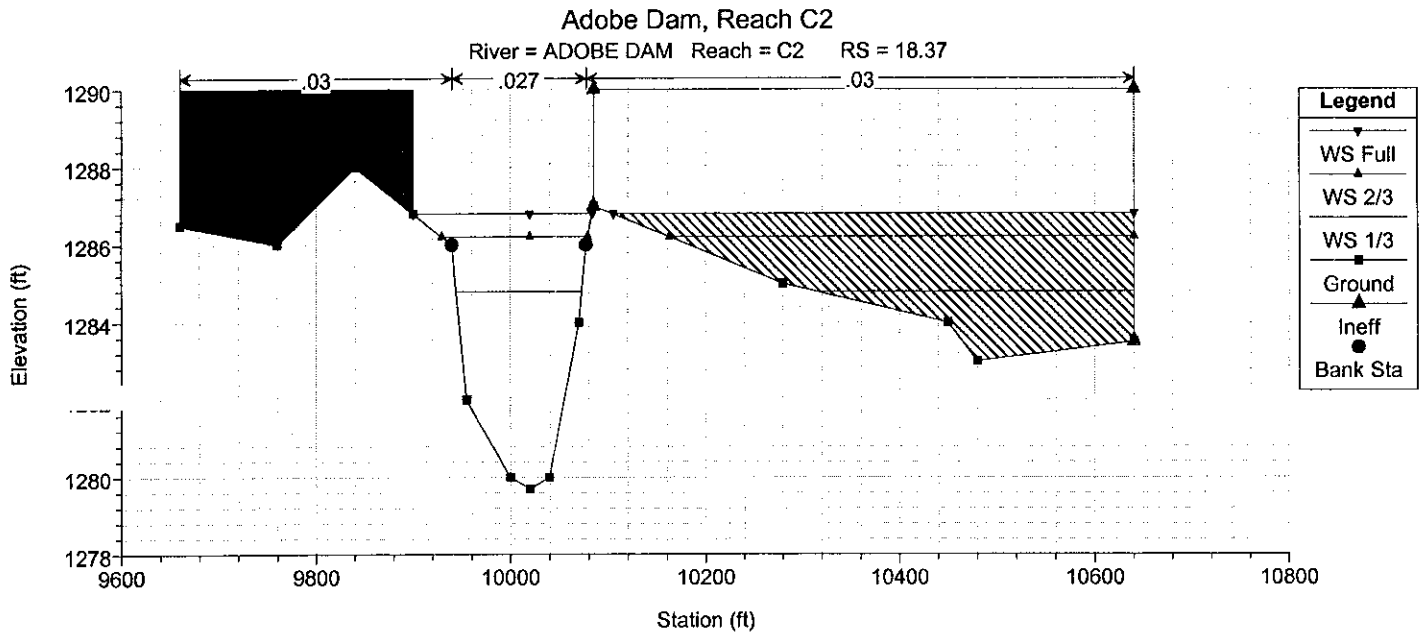
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta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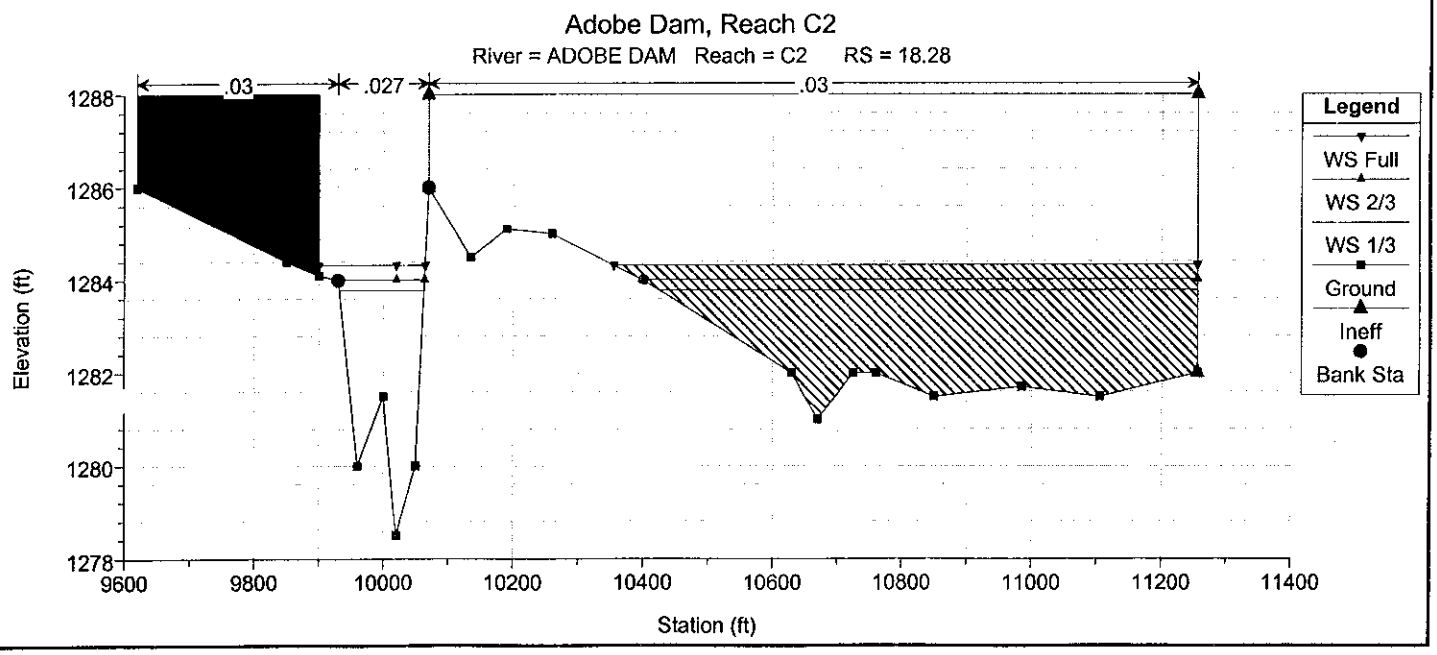
WS 1/3
Ground
Ineff
Bank Sta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WS 1/3
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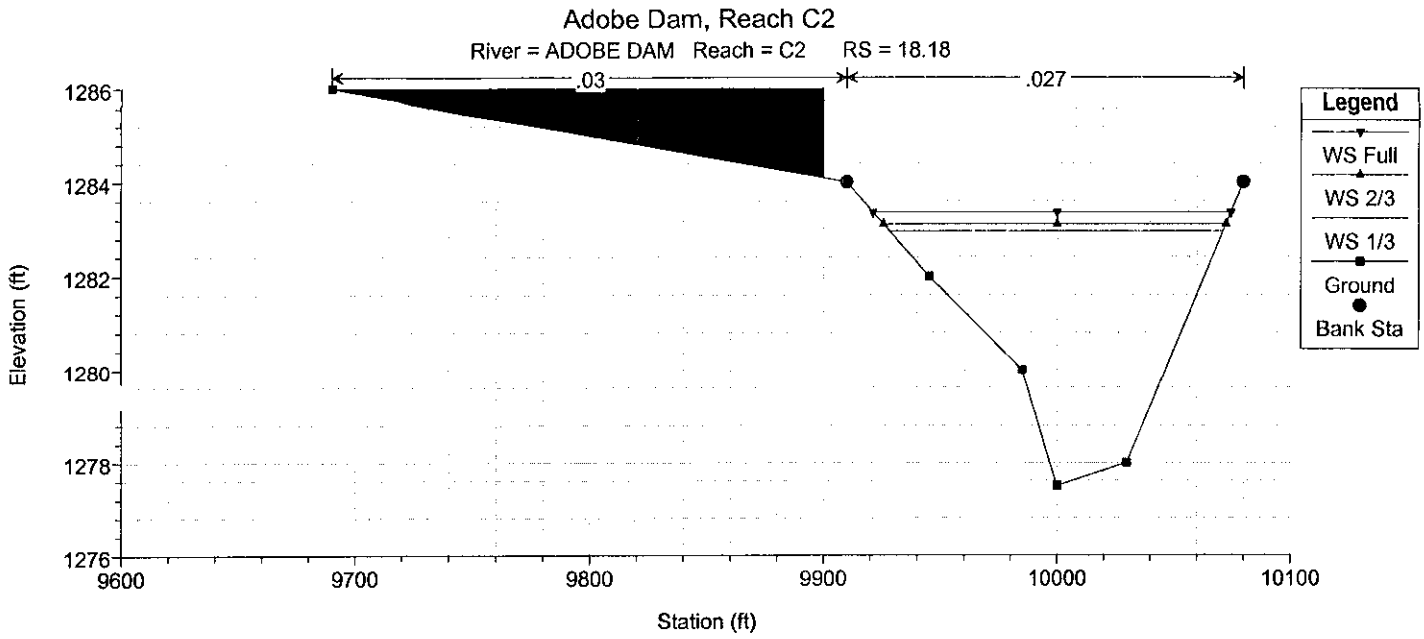
Ineff
Bank Sta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WS 1/3
Ground
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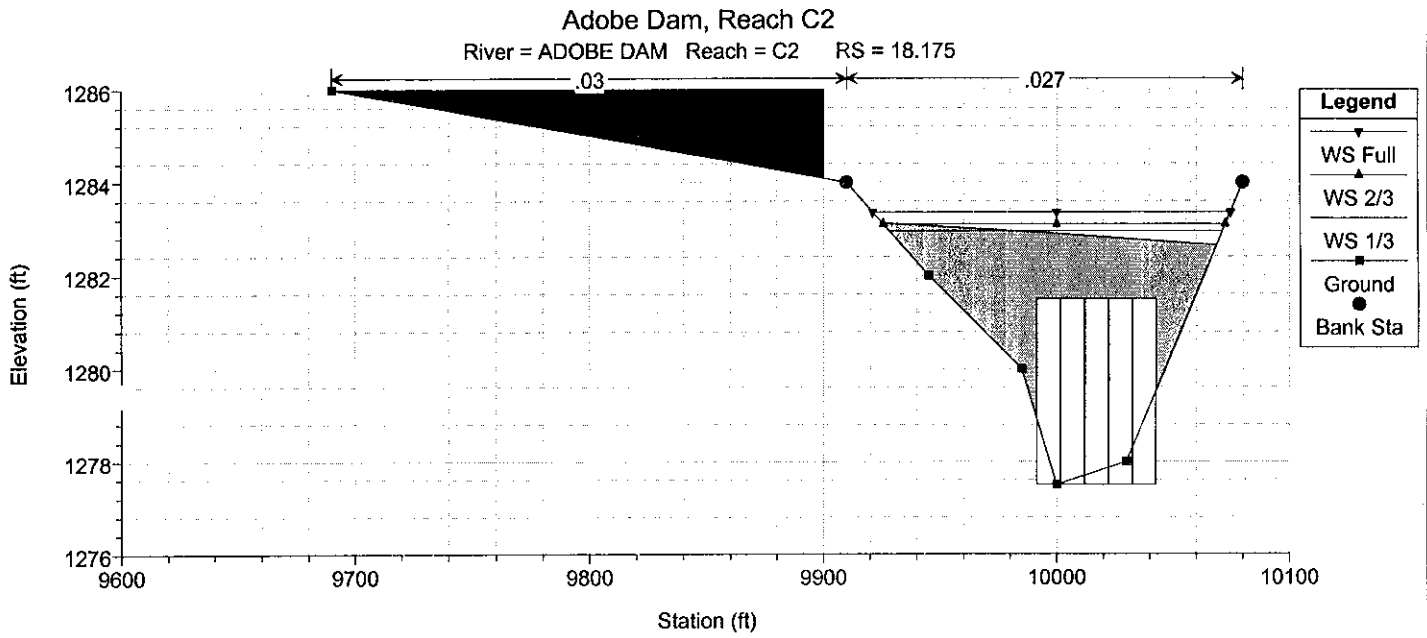
9700
9800
9900
10000
10100
Station (ft)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WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
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9700
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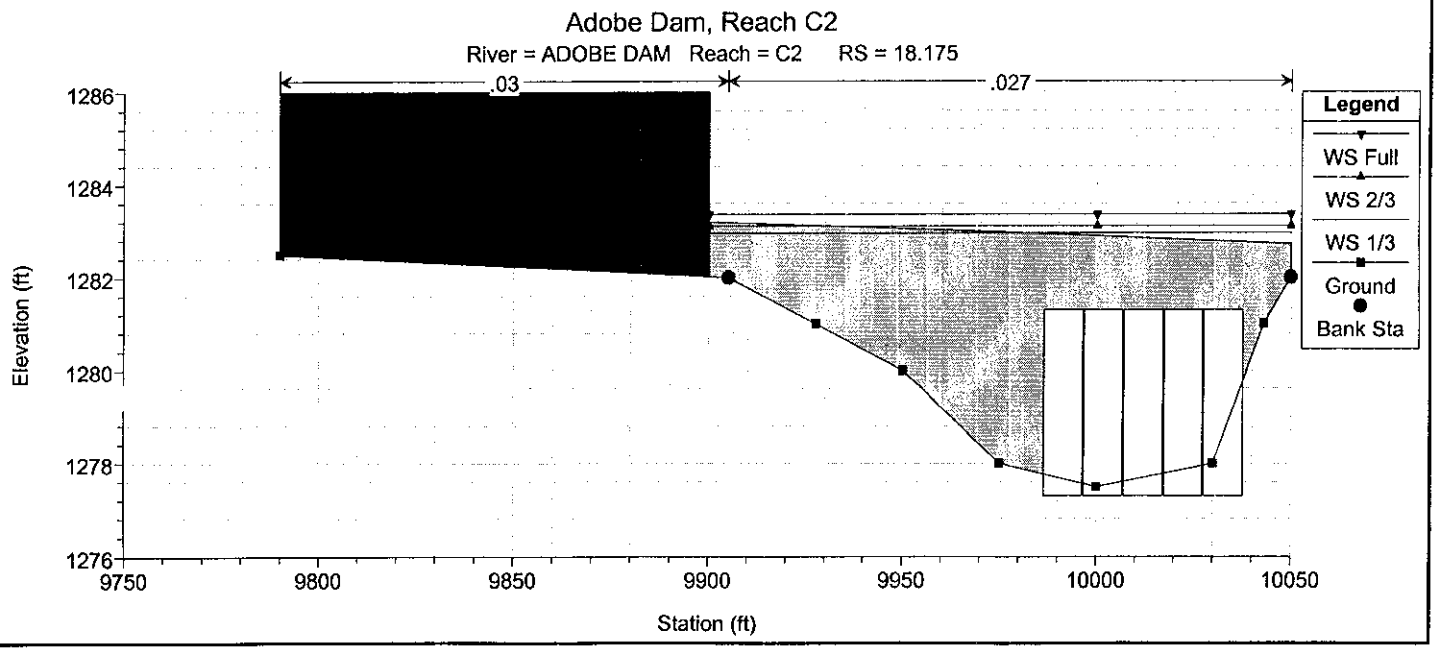
9900
10000
10100
Station (ft)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WS 2/3
WS 1/3
Ground
Bank Sta
Elevation (ft)
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9850
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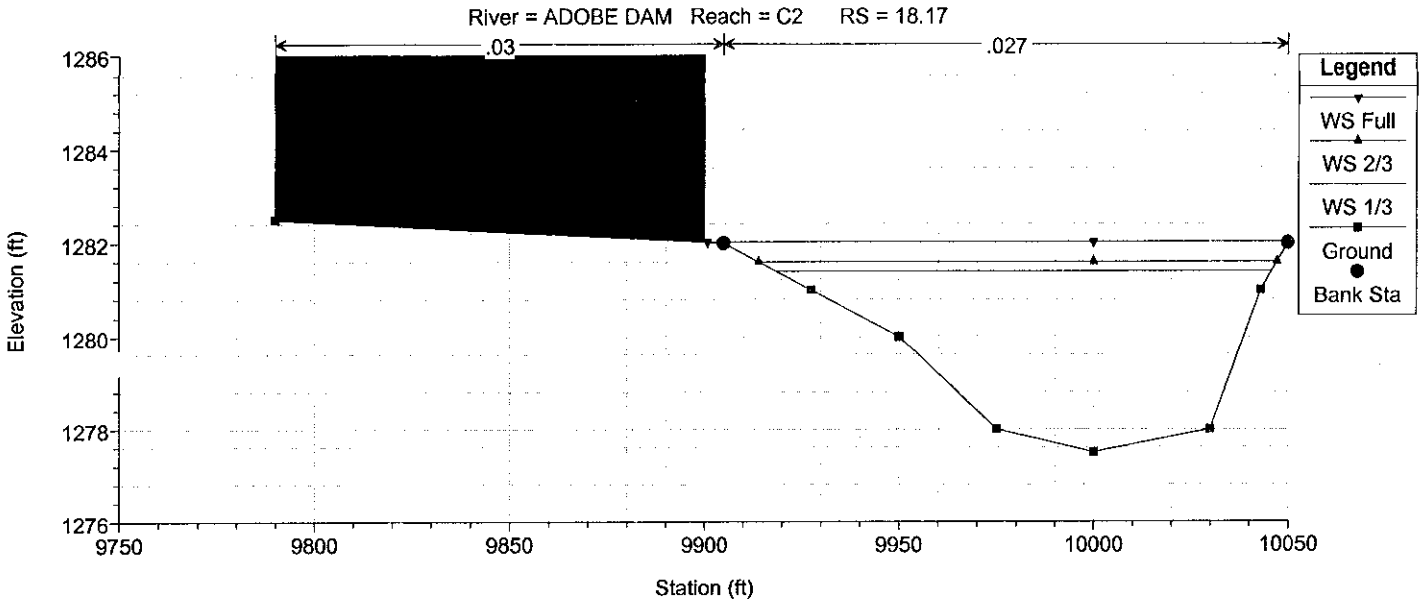
9950
10000
10050
Station (ft)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WS 1/3
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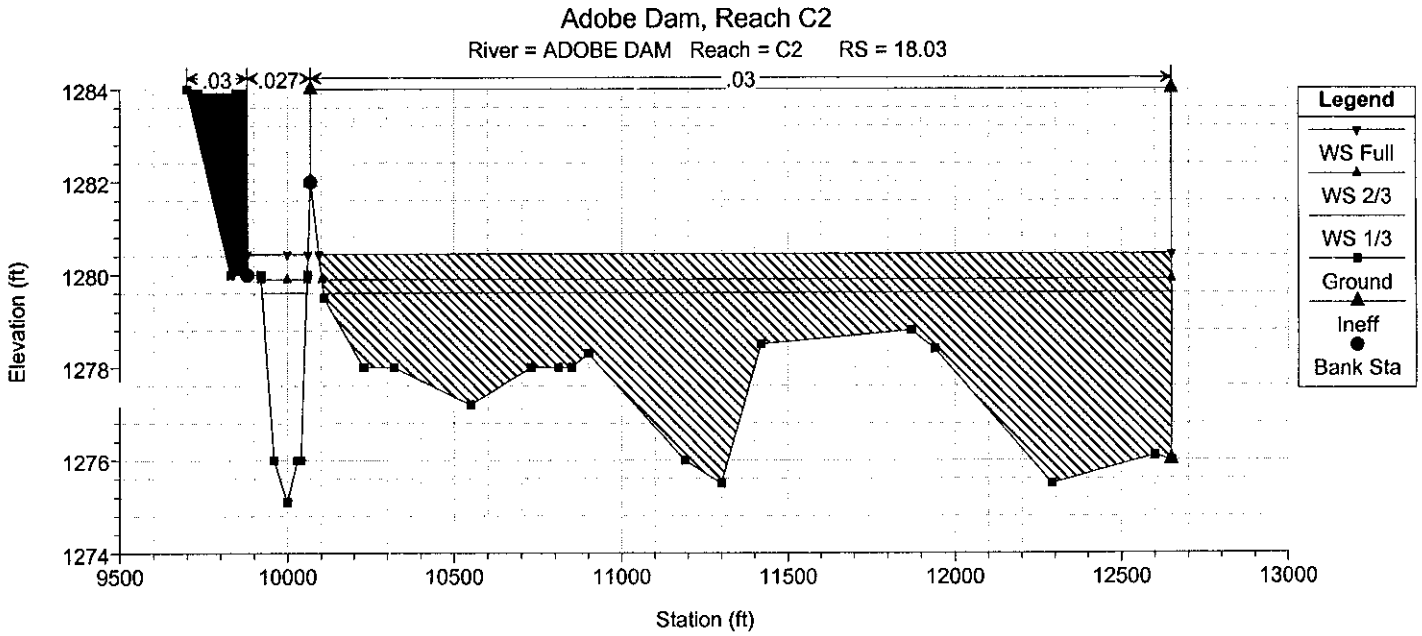
Bank Sta
Elevation (ft)
Station (ft)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WS 2/3
WS 1/3
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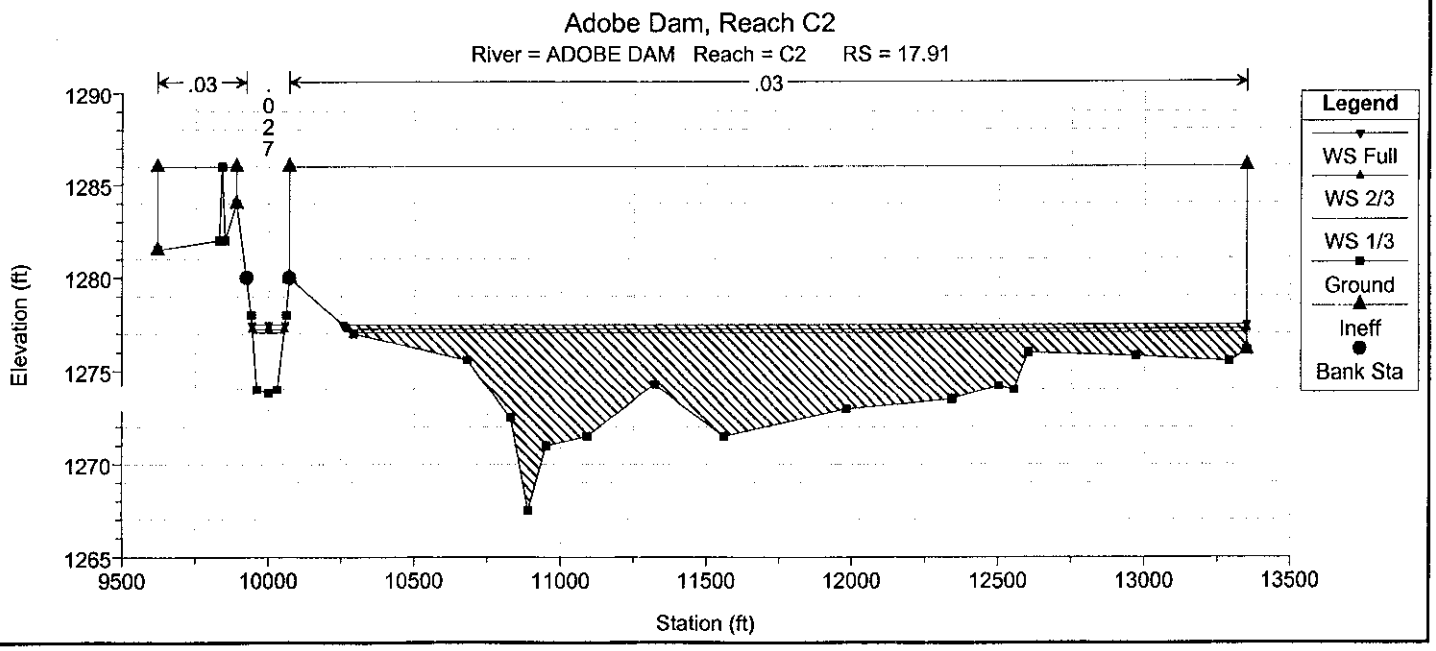
Bank Sta
Elevation (ft)
Station (ft)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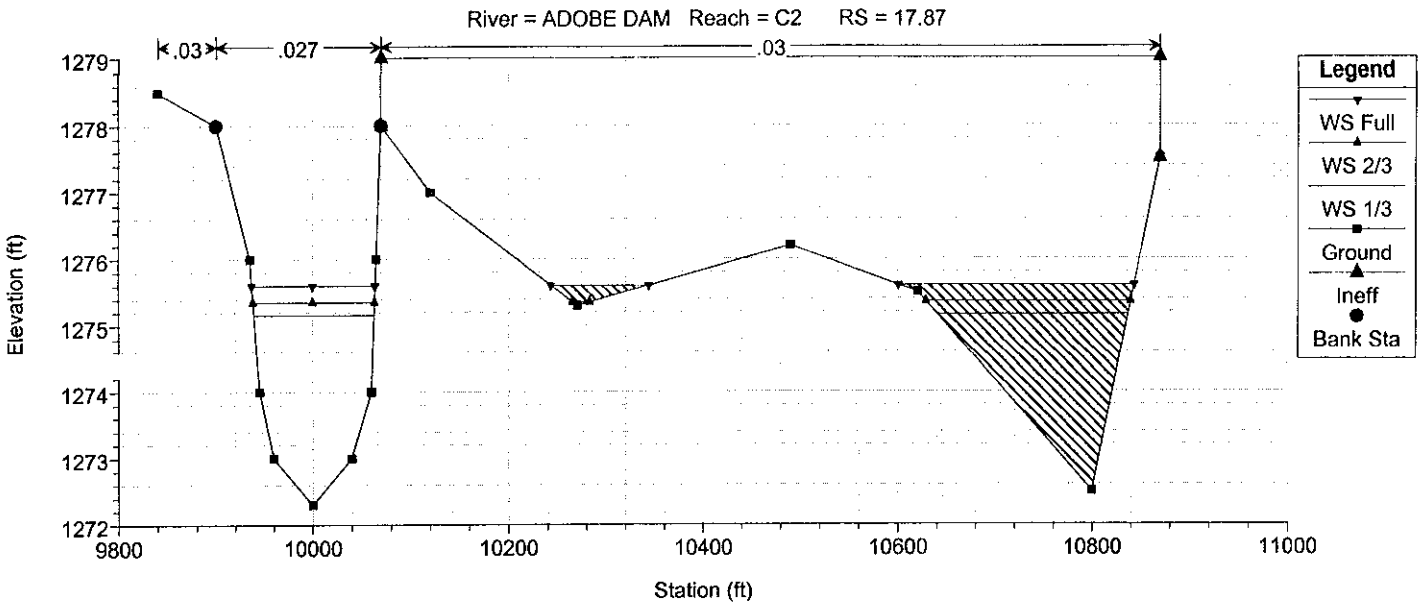
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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1274
1273
1272
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS Full
WS 2/3
WS 1/3
Ground
Ineff
Bank Sta

3 Skunk Creek HEC-2

Summary Sheet for Skunk Creek

Description

Simons, Li and Associates and Sverdrup produced HEC-2 Models of Skunk Creek. They have been combined to produce one HEC-2 model of Skunk Creek, beginning at the spillway. The addition of the flow affecting Skunk Creek due to this study has been added to the model.

Assumptions

- The Simons Li model has a baseline station of approximately 2000. The Sverdrup model has the baseline at 1000. The stations of the Sverdrup model were modified to match the Simons Li model.
- The models were not consistent with cross-section numbering. The cross-section east of 51st Avenue was originally 2517 on the Sverdrup model and 26120 on the Simons Li model. The spillway to 51st Avenue is the Sverdrup model; therefore, these cross-sections were modified by a constant of 404 to match the Simons Li model.

Method of Analysis

The models were joined at 51st Avenue. The cross-section east of 51st Avenue are from the Sverdrup model, while the cross-sections west of 51st Avenue are from the Simons Li model. Flow in the creek is as follows:

Area	1/3 Flow (cfs)	2/3 Flow (cfs)	Full Flow (cfs)
Spillway to 55th Avenue Channel	2100	2200	2400
55th Avenue Channel to 59th Avenue	4300	4700	5300
West of 59th Avenue	4800	6800	8000

Results

The HEC-2 Model is located at the end of this summary. Flow is contained within Skunk Creek for the 1/3, 2/3, and full flow events.

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 *                                        *
 *  RUN DATE    19DEC00    TIME   10:57:13 *
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*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
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X     X  X        X     X            X
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  Version   4.6.2;  May 1991
 *************************************


 T1      PROJECT NO. 13255                          4/10/95
 T2      SKUNK CREEK DRAINAGE DESIGN        FILE:SKEXIST.IH2
 T3      EXISTING CONDITIONS
 T4      100-YEAR, 24-HOUR DESIGN STORM
 T5      SUBCRITICAL FLOW

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 2                   0      .008                                     1179.5

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       1                  -1                                                  7                   15


 J3  VARIABLE CODES FOR SUMMARY PRINTOUT

      38         8         26         4         25         5         17         43         1         33
      42                   38        68         43        29         30          8        64         65
     150


 NC    0.045     0.045     0.035      0.1       0.3

         STREAMFLOW IN SKUNK CREEK BELOW CONFLUENCE WITH ACDC
 QT        2      8400      2268


 NC                                   0.3       0.5

          EXISTING 51ST AVENUE BRIDGE
          SKEW ANGLE = 10 DEGREES LEFT
          DOWNSTREAM FACE
 X1    25608        10       900      1050         0         0         0      .9848
 X3       10                          900      1303.83    1047.7    1304.0
 GR   1300.7       866    1295.4       900      1291.7     900.1      1285       910      1285      1040
 GR   1286.2      1042    1291.5      1050     1295.64      1050    1300.5      1125    1301.4      1151

1
   19DEC00      10:57:13                                                                                PAGE    2


 SB     1.05       1.6       2.6                   130         5      1320         1    1285.8      1285
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          EXISTING 51ST AVENUE BRIDGE
          UPSTREAM FACE
X1    25716          8      928.1       1078        108        108        108      .9848
X2                             1    1295.63    1303.83                             1.33      .9848
X3       10                            928    1303.83     1075.8     1304.0
BT        2        928    1303.83    1295.54     1078.1    1304.00    1295.63
GR   1303.8        928    1295.54        928    1291.99      928.1     1285.8        937     1286.2       1068
GR   1292.6       1078    1295.63     1078.1     1304.0     1078.1


NC                                       0.1        0.3

          CONTINUE SOIL CEMENT BANK LINING
X1    25773          8        905       1108         70         45         57
GR     1296        850       1296        905       1286        940     1286.5        960       1286        970
GR   1286.5       1070       1302       1108       1304       1135


NC     .020       .020       .035

          BEGIN EXISTING GABIONS
X1    25921          8        910       1130        150        145        148
X3       10
GR   1295.8        830     1295.9        880    1296.09        910    1286.98        940    1287.17       1100
GR   1296.3       1130    1296.62       1150    1296.62       1170

          EXISTING ARMORED SANITARY SEWER PIPE (TOP OF CONCRETE ARMOR)

X1    26120          9        895       1165        200        195        199
X3       10
GR   1297.5         80       1297        895       1290        915     1289.3        920     1289.5       1140
GR   1297.5       1165     1297.5       1175       1297       1180       1298       1300


X1    26393          8        880       1129        270        275        273
GR     1299        740       1299        880     1290.5        895     1290.5        908     1290.5       1048
GR     1290       1095       1299       1129       1300       1150


X1    26681          5        865       1135        295        280        288
GR     1300        800       1300        865       1293        890       1293       1110       1301       1135


X1    26880          6        850       1150        200        200        199
X3       10
GR     1302        800       1302        850       1296        880       1296       1125       1302       1150
GR     1302       1200

          MANNING n-VALUE FOR NATURAL CHANNEL
          CINDER BLOCK FENCES ON BOTH BANKS
1
    19DEC00      10:57:13                                                                          PAGE     3


NC     .020       .020       .072

          GABIONS END
  ******REACH 8******
X1    27022          8      840.1       1155        155        130        142
GR     1310        840       1304      840.1       1298        870     1297.5        898     1297.5       1075
GR     1298       1130       1304       1155       1310     1155.1


X1    27339          8      865.1       1158        325        305        317
GR     1312        865       1306      865.1       1300        884       1298        890       1298       1132
GR     1300       1139       1306       1158       1312     1158.1

          EXISTING GRADE CONTROL STRUCTURE
          DOWNSTREAM LIP OF ENERGY DISSIPATOR

NC     .020       .020      0.045         .6         .8

X1    27550          6        890     1130.1        230        200        211
GR     1307        870       1307        890     1298.2        891     1298.2       1130       1307     1130.1
GR     1307       1150

          CONCRETE APRON
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X1    27551        6       890    1130.1        1        1        1
GR     1307      870      1307       890   1296.9      891   1296.9     1130     1307   1130.1
GR     1307     1150

       CONCRETE APRON

X1    27566        6       890    1130.1       15       15       15
GR     1307      870      1307       890   1296.9      891   1296.9     1130     1307   1130.1
GR     1307     1150


NC     .020     .020      .014        .3       .5

       EXISTING WEIR STRUCTURE ON WEST SIDE OF 48TH AVENUE
       WITH 20-FOOT NOTCH FOR LOW FLOWS
X1    27567       10       890    1100.1        1        1        1
GR     1308      870    1307.1       890  1301.93    890.1  1301.93      985  1299.84    985.1
GR   1299.8     1005    1301.9    1005.1  1301.93     1100  1307.06   1100.1     1308     1150

        BACK OF WALK EAST SIDE OF 48TH AVENUE
        48TH AVENUE DIP CROSSING

X1    27621       11       845     1190       54       54       54
X3                             850                 1140
GR     1306      795      1304       845  1302.42      870   1301.5      900   1300.9      950
GR   1300.8      980    1300.9      1010   1301.2     1055   1301.5     1080   1302.3     1120
GR     1304     1190

       MANNING n-VALUE FOR NATURAL CHANNEL
1
   19DEC00      10:57:13                                                                PAGE    4


       CONTINUE CINDER BLOCK FENCES ON BOTH BANKS

NC     .020     .020      .072       0.1      0.3

X1    27636        9     850.1      1160       15       15       15
GR     1314      850      1308     850.1     1302      880     1300      890     1299     1000
GR     1300     1120      1302      1140     1308     1160     1314   1160.1


X1    27850       16     853.1      1151      200      230      214
GR     1314      853      1308     853.1     1306      861     1304      870     1302      876
GR     1300      929      1300       958     1300      967     1300     1000     1300     1091
GR     1300     1122      1302      1130     1304     1139     1306     1144     1308     1151
GR     1314   1151.1


X1    28143       12     852.1      1146      295      290      293
GR     1314      852      1308     852.1     1306      859     1304      866     1302      871
GR     1300      961      1300       988     1302     1116     1304     1128     1306     1135
GR     1308     1146      1314    1146.1


X1    28621       11      420      1118      480      475      478
GR     1318      414      1312     414.1     1312      420     1302      454     1300      960
GR   1299.8      970      1300       986     1302     1085     1308     1118     1308     1120
GR     1314   1120.1

       STREAMFLOW IN SKUNK CREEK
       UPSTREAM FROM CONFLUENCE WITH SCATTER WASH

QT        2     2600      1730

       EXISTING GRADE CONTROL STRUCTURE
       DOWNSTREAM FACE OF ENERGY DISSIPATOR
NC     .020     .020      .045        .6       .8

X1    28817       13      935      1047      300      170      196
X3                             950     1312     1030     1311
GR     1316      910      1310     910.1     1310      919     1309      935     1306      941
GR     1301      944    1300.7       984     1301     1029     1306     1036     1309     1047
GR     1310     1058      1310      1069     1316   1069.1


       CONCRETE APRON

X1    28818        9      950    1029.1        1        1        1
GR     1316      915      1310     915.1   1309.4      950   1299.0     950.1   1299.0     1029
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GR   1308.5     1029.1     1308.5       1050        1310        1068        1316      1068.1

        CONCRETE APRON
        BASE OF GRADE CONTROL STRUCTURE
1
   19DEC00      10:57:13                                                                    PAGE    5


X1    28836          9        950     1029.1          18          18          18
GR     1316        915       1310      915.1      1309.4         950      1299.0      950.1     1299.0       1029
GR   1308.5     1029.1     1308.5       1050        1310        1068        1316      1068.1


NC     .020       .020       .014         .3          .5

        UPSTREAM FACE OF EXISTING GRADE CONTROL STRUCTURE
  ******REACH 9*******
X1    28837         11      920.1       1068           1           1           1
GR     1316        920     1310.4      920.1        1308         936        1306        942     1303.9        945
GR   1302.9        985     1303.6       1030        1306        1037      1309.5       1068       1310       1070
GR     1316     1070.1

        MANNING n-VALUE FOR NATURAL CHANNEL

NC     .020       .020       .072        0.1         0.3

X1    29140         10      930.1       1063         305         305         303
GR     1318        930       1312      930.1        1310         941        1308        951       1306        960
GR   1303.8       1005       1306       1047        1308        1054        1310       1063       1316     1063.1


X1    29371         12      935.1       1071         230         230         231
GR     1318        935       1312      935.1        1310         944        1308        953       1306        975
GR   1304.5       1005       1306       1035        1308        1045        1310       1057       1312       1064
GR     1314       1071       1320     1071.1

        EXISTING WAHALLA CONCRETE BOX CULVERT
        SKEW ANGLE 35 DEGREES RIGHT
        DOWNSTREAM FACE OF CULVERT

NC     .014       .014       .014         .3          .5

X1    29548         10      965.8     1034.1         195         170         177      .8192
X3       10                            965.8     1315.66      1034.1     1315.66
GR     1314        961       1312      965.8     1310.73       965.8     1304.75      965.9     1304.75        980
GR   1304.7        986    1304.75       1034     1310.73      1034.1        1312     1034.1       1314       1037


SB     1.25       1.56        2.9                    56           4         300          0     1304.71      1304.7

        EXISTING WAHALLA CONCRETE BOX CULVERT (5) 10'X 6'
        UPSTREAM FACE
        CONCRETE APRON
X1    29626          6      965.8     1034.1          78          78          78      .8192
X2                             1    1310.79     1315.65                                2.0       .8192
X3       10                            965.8     1315.66      1034.1     1315.66
BT        2      965.8    1315.66    1310.75      1034.1     1315.66      1310.7
GR   1315.6      965.8    1310.75      965.8     1304.75       965.9     1304.71       1034     1310.7      1034.1
GR   1315.6     1034.1

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   19DEC00      10:57:13                                                                    PAGE    6


NC     .014       .014       .014         .6          .8

        CONCRETE APRON
        BASE OF EXISTING GRADE CONTROL DROP STRUCTURE
X1    29639          6        970     1028.1          13          13          13
GR   1315.6      969.9    1310.75        970     1304.75       970.1      1304.7       1028     1310.7      1028.1
GR   1315.6     1028.2

        TOP OF EXISTING GRADE CONTROL STRUCTURE
  ******REACH 10******

X1    29640          6        950     1040.1           1           1           1      .8192
CI      995     1310.7       .028          0           0       -73.7
GR     1316        930       1316        950     1310.75       950.1      1310.7       1040       1316     1040.1
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GR     1316       1060

NC    0.040      0.040      0.035        0.1        0.3

X1    29753         10      940.1       1060         95        135        113
CI     1000      .0020       .028          2          2        -70
GR     1316      940.1       1314        949       1312        956       1310        968       1309       1000
GR     1310       1015       1312       1033       1314       1041     1315.5       1060     1315.4       1140

X1    29908         11        950       1050        140        170        155
CI     1000                  .028          2          2        -70
GR     1316      945.1       1316        950       1314        954       1312        962       1310        984
GR   1309.7       1000       1310       1014       1312       1030       1314       1040       1316       1050
GR     1318       1300

X1    30136         12        940       1048        210        240        228
CI     1000                  .028          2          2        -70
GR     1317      937.1       1317        940       1316        945       1314        958       1312        966
GR     1311       1000       1312       1018       1314       1028       1316       1039       1317       1048
GR     1318       1056       1319       1195

        EXISTING SHOTCRETE CHANNEL BANK LINING

NC     .022       .040       .028

X1    30392         12      955.1       1068        255        255        256
CI                                                          0.01
GR     1324        955       1318      955.1       1316        964       1314        976       1312        986
GR     1312       1022       1314       1031       1316       1038       1318       1050       1320       1068
GR     1320       1158       1322       1208
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X1    30628          8        955       1045        230        240        236
GR     1326        945       1320      945.1       1320        955     1312.9        970     1312.9       1010
GR   1312.9       1030       1320       1045       1322       1075

X1    30836          8        955       1043        195        220        208
GR     1327        945       1321      945.1       1321        955     1313.6        970     1313.6       1030
GR     1321       1043       1322       1070       1324       1125

X1    30961          8        960       1045        120        130        125
GR     1326        950       1320      950.1       1320        960     1313.8        973     1313.8       1035
GR     1320       1045       1322       1080       1324       1280

X1    31271          8        955       1045        310        310        310
GR     1328        930       1322      930.1       1322        955     1314.2        970     1314.2       1030
GR     1322       1045       1322       1100       1324       1170

X1    31582          7        970       1058        320        290        311
GR     1328        940       1322      940.1       1322        970     1315.5        983     1315.5       1045
GR     1322       1058       1324       1160

NC     .014       .014       .014         .3         .5

        END EXISTING SHOTCRETE LINING
        43RD AVENUE & BEARDSLEY ROAD
        EXISTING CONCRETE BOX CULVERT (5) 10'X 6'
        SKEW ANGLE 35 DEGREES LEFT AT OUTLET;
  ******REACH 11******
X1    31687          6      965.8      1034.1        110         95        105      .8192
X3       10
GR     1322        958    1321.81       965.8    1315.72      965.9    1315.91       1034    1321.91     1034.1
GR     1322       1049

SB     1.25       1.56        2.9                     56          5        300          0     1317.2    1315.72

        43RD AVENUE & BEARDSLEY ROAD
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        EXISTING CONCRETE BOX CULVERT
        25 DEGREES RIGHT AT INLET
        UPSTREAM FACE; CONCRETE APRON

X1    32163         6     969.1    1031.1       505       440       476     .9063
X2                              1    1323.3   1331.53                           2.0      .9063
X3       10                            969   1331.53    1025.2    1332.3
BT       -5       969   1331.53   1331.53       969   1331.53    1323.3    1031.1    1332.3    1323.2
BT            1031.1    1332.3    1332.3      1134    1332.3    1332.3
GR   1327.1       969    1324.3     969.1    1317.3     969.2    1317.2      1031    1324.2    1031.1
GR   1327.0    1031.2

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   19DEC00      10:57:13                                                                          PAGE    8


NC     .014      .014      .014        .6        .8

        CONCRETE APRON
        BASE OF EXISTING GRADE CONTROL STRUCTURE
X1    32173         6     969.1    1031.1        10        10        10
GR   1327.1       969    1324.3     969.1    1317.3     969.2    1317.2      1031    1324.2    1031.1
GR   1327.0    1031.2

        TOP OF EXIST GRADE CONTROL DROP STRUCTURE
        BEGIN EXISTING SHOTCRETE CHANNEL BANK LINING
        WEIGHTED MEAN CHANNEL n-VALUE;


NC   0.022     0.022      .028       0.1       0.3

X1    32174         8       973    1029.1         1         1         1
GR     1328       937    1327.5       945    1327.1       973    1320.1     973.1    1320.2      1029
GR   1327.0    1029.1    1327.5      1085    1327.5      1132

        STREAMFLOW IN SKUNK CREEK UPSTREAM FROM BEARDSLEY ROAD

QT        2      1730      1730

X1    32240         8       962      1047        55        70        66
X3       10
GR     1330       740      1328       900      1328       962    1321.5       975    1321.5      1035
GR     1328      1047      1330      1120      1340      1150


NC     .014      .014      .014        .3        .5

        END EXISTING SHOTCRETE CHANNEL BANK LINING
        EXISTING GRADE CONTROL STRUCTURE
        NO DROP STRUCTURE
X1    32476         9       930      1043       250       220       236
X3       10
GR     1330       780      1330       905      1332       930    1330.7       960    1322.5       972
GR   1322.5      1033    1330.8      1043      1332      1060      1340      1110

        EXISTING GRADE CONTROL STRUCTURE
        UPSTREAM SIDE

X1    32518         9       930    1042.1        42        42        42
X3       10
GR     1330       780      1330       905      1332       930    1330.7       963    1323.3     963.1
GR   1323.2      1042    1330.8    1042.1      1334      1050      1340      1086

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   19DEC00      10:57:13                                                                          PAGE    9


NC   0.125     0.125     0.057       0.1       0.3

X1    32615        12       929      1036        95       100        97
GR     1330       829      1330       929      1328       962      1326       970      1324       986
GR     1324      1010      1326      1017      1328      1025      1330      1036      1332      1070
GR     1334      1089      1336      1104


X1    32728        10       939      1044       115       110       113
GR     1330       839      1330       939      1328       949      1326       980      1324      1011
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GR     1324       1031       1326       1036       1328       1040       1330       1044       1348       1086


X1    32974         11        945       1141        245        245        246
X3                                                           1035       1335
GR     1332        845       1332        945       1330        947       1328        951       1326        954
GR   1325.5        970       1326        990       1328       1073       1330       1080       1332       1141
GR     1340       1157

        ABRUPT EXPANSION AT END OF EXISTING SPILLWAY LEVEES

NC                                       .6         .8

        BEGIN EXIST LEVEE ON RIGHT BANK, ADOBE DAM SPILLWAY CHANNEL
X1    33108          9        908       1018        140        135        134
X3       10
GR     1334        605       1332        775       1330        908       1328        910       1326        930
GR     1326        958       1328       1003       1334       1018       1335       1025


NC     .040       .040       .040         .1         .3

        BEGIN EXIST LEVEE ON LEFT BANK, ADOBE DAM SPILLWAY CHANNEL
X1    33699          7        962       1030        600        590        591
X3       10
GR   1340.5        950       1340        962       1330        986     1328.2       1000       1330       1005
GR     1340       1030     1340.5       1035


X1    34078          8        956       1038        380        375        379
X3       10
GR     1342        950       1342        956       1330        987       1329        990       1329       1007
GR     1330       1010       1342       1038     1342.5       1045

1
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


*PROF 1

CCHV=      .100 CEHV=      .300
CCHV=      .300 CEHV=      .500
*SECNO 25608.000

3470 ENCROACHMENT STATIONS=      900.0    1047.7  TYPE=      1  TARGET=      147.700
 ELENCL=   1303.83  ELENCR=   1304.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1303.83 ELREA=      1295.64

 25608.000      5.47   1290.47       .00   1179.50   1292.44      1.97       .00       .00   1303.83
    8400.0        .0    8400.0        .0        .0     744.9        .0        .0        .0   1295.64
       .00       .00     11.28       .00      .000      .035      .000      .000   1285.00    901.37
   .008150        0.        0.        0.         0         0         5       .00    144.29   1045.67


FLOW DISTRIBUTION FOR SECNO=  25608.00          CWSEL=   1290.47

STA=     901.    1047.
  PER Q=    100.0
   AREA=    744.9
    VEL=     11.3
  DEPTH=      5.2


SPECIAL BRIDGE

5227 DOWNSTREAM ELEV IS    1289.31 , NOT    1290.47 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.05      1.60      2.60       .00    130.00      5.00   1320.00      1.00   1285.80   1285.00

*SECNO 25716.000
CLASS B LOW FLOW
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3420 BRIDGE W.S.=    1290.52 BRIDGE VELOCITY=      12.60     CALCULATED CHANNEL AREA=       613.

 EGPRS      EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD     WEIRLN
                                                               AREA
      .00   1293.59      .00         0.     8400.     1320.     1325.     1295.63   1303.83         0.


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   19DEC00      10:57:13                                                                                    PAGE   11

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3470 ENCROACHMENT STATIONS=      928.0    1075.8  TYPE=      1  TARGET=      147.800
 ELENCL=   1303.83  ELENCR=   1304.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1291.99 ELREA=      1292.60

 25716.000      6.17   1291.97       .00       .00   1293.59      1.62      1.15       .00   1291.99
    8400.0        .0    8400.0        .0        .0     823.2        .0       1.9        .4   1292.60
       .00       .00     10.20       .00      .000      .035      .000      .000   1285.80    928.12
   .005982      108.      108.      108.         0         0         0       .00    146.63   1074.76


FLOW DISTRIBUTION FOR SECNO=  25716.00          CWSEL=   1291.97

STA=     928.    1076.
  PER Q=    100.0
   AREA=    823.2
    VEL=     10.2
  DEPTH=      5.6

CCHV=      .100 CEHV=      .300
*SECNO 25773.000
 25773.000      6.76   1292.76       .00       .00   1293.91      1.15       .28       .05   1296.00
    8400.0        .0    8400.0        .0        .0     974.2        .0       3.1        .6   1302.00
       .00       .00      8.62       .00      .000      .035      .000      .000   1286.00    916.34
   .004059       70.       57.       45.         3         0         0       .00    169.00   1085.35


FLOW DISTRIBUTION FOR SECNO=  25773.00          CWSEL=   1292.76

STA=     916.    1108.
  PER Q=    100.0
   AREA=    974.2
    VEL=      8.6
  DEPTH=      5.8

*SECNO 25921.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1296.09 ELREA=      1296.30

 25921.000      6.68   1293.66       .00       .00   1294.43       .76       .48       .04   1296.09
    8400.0        .0    8400.0        .0        .0    1197.2        .0       6.8       1.2   1296.30
       .01       .00      7.02       .00      .000      .035      .000      .000   1286.98    917.99
   .002601      150.      148.      145.         2         0         0       .00    203.35   1121.34


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   19DEC00      10:57:13                                                                                    PAGE   12

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


FLOW DISTRIBUTION FOR SECNO=  25921.00          CWSEL=   1293.66

STA=     918.    1130.
  PER Q=    100.0
   AREA=   1197.2
    VEL=      7.0
```

```
  DEPTH=      5.9

*SECNO 26120.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1297.00 ELREA=      1297.50

 26120.000      4.95   1294.25       .00       .00   1295.08       .83       .63       .02   1297.00
    8400.0        .0    8400.0        .0        .0    1151.1        .0      12.2       2.2   1297.50
       .02       .00      7.30       .00      .000      .035      .000      .000   1289.30    902.86
   .003929      200.      199.      195.         2         0         0       .00    251.99   1154.84


FLOW DISTRIBUTION FOR SECNO=  26120.00          CWSEL=   1294.25

STA=     903.    1165.
  PER Q=    100.0
   AREA=   1151.1
    VEL=      7.3
  DEPTH=      4.6

*SECNO 26393.000
 26393.000      5.31   1295.31       .00       .00   1296.31      1.00      1.18       .05   1299.00
    8400.0        .0    8400.0        .0        .0    1046.5        .0      19.1       3.7   1299.00
       .03       .00      8.03       .00      .000      .035      .000      .000   1290.00    886.52
   .004754      270.      273.      275.         2         0         0       .00    228.52   1115.04


FLOW DISTRIBUTION FOR SECNO=  26393.00          CWSEL=   1295.31

STA=     887.    1129.
  PER Q=    100.0
   AREA=   1046.5
    VEL=      8.0
  DEPTH=      4.6

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   19DEC00      10:57:13                                                                                    PAGE    13


    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 26681.000
 26681.000      3.86   1296.86       .00       .00   1298.21      1.35      1.80       .11   1300.00
    8400.0        .0    8400.0        .0        .0     900.7        .0      25.5       5.3   1301.00
       .04       .00      9.33       .00      .000      .035      .000      .000   1293.00    876.19
   .008597      295.      288.      280.         2         0         0       .00    245.89   1122.08


FLOW DISTRIBUTION FOR SECNO=  26681.00          CWSEL=   1296.86

STA=     876.    1135.
  PER Q=    100.0
   AREA=     900.7
    VEL=      9.3
  DEPTH=      3.7

*SECNO 26880.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1302.00 ELREA=      1302.00

 26880.000      3.25   1299.25   1299.25       .00   1300.79      1.54      2.03       .06   1302.00
    8400.0        .0    8400.0        .0        .0     844.2        .0      29.5       6.5   1302.00
       .04       .00      9.95       .00      .000      .035      .000      .000   1296.00    863.76
   .012337      200.      199.      200.         4        11         0       .00    274.78   1138.54


FLOW DISTRIBUTION FOR SECNO=  26880.00          CWSEL=   1299.25

STA=     864.    1150.
  PER Q=    100.0
   AREA=     844.2
    VEL=      9.9
  DEPTH=      3.1
```

```
*SECNO 27022.000

3301 HV CHANGED MORE THAN HVINS

 27022.000      4.63   1302.13       .00       .00   1302.82       .69      1.95       .08   1304.00
    8400.0        .0    8400.0        .0        .0    1259.9        .0      32.9       7.4   1304.00
       .05       .00      6.67       .00      .000      .072      .000      .000   1297.50    849.44
   .015310      155.      142.      130.         3         0         0       .00    297.75   1147.19


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   19DEC00      10:57:13                                                                          PAGE   14

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

FLOW DISTRIBUTION FOR SECNO=  27022.00          CWSEL=   1302.13

STA=      849.    1155.
  PER Q=    100.0
   AREA=   1259.9
    VEL=      6.7
  DEPTH=      4.2

*SECNO 27339.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.88

 27339.000      6.86   1304.86       .00       .00   1305.20       .33      2.34       .04   1306.00
    8400.0        .0    8400.0        .0        .0    1811.9        .0      44.1       9.6   1306.00
       .07       .00      4.64       .00      .000      .072      .000      .000   1298.00    868.68
   .004340      325.      317.      305.         3         0         0       .00    285.72   1154.40


FLOW DISTRIBUTION FOR SECNO=  27339.00          CWSEL=   1304.86

STA=      869.    1158.
  PER Q=    100.0
   AREA=   1811.9
    VEL=      4.6
  DEPTH=      6.3

CCHV=      .600 CEHV=      .800
*SECNO 27550.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.60

 27550.000      7.20   1305.40       .00       .00   1305.76       .37       .54       .03   1307.00
    8400.0        .0    8400.0        .0        .0    1723.8        .0      52.7      10.8   1307.00
       .08       .00      4.87       .00      .000      .045      .000      .000   1298.20    890.18
   .001690      230.      211.      200.         3         0         0       .00    239.90   1130.08


FLOW DISTRIBUTION FOR SECNO=  27550.00          CWSEL=   1305.40

STA=      890.    1130.
  PER Q=    100.0
   AREA=   1723.8
    VEL=      4.9
  DEPTH=      7.2

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   19DEC00      10:57:13                                                                          PAGE   15

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 27551.000
 27551.000      8.68   1305.58       .00       .00   1305.83       .25       .00       .07   1307.00
    8400.0        .0    8400.0        .0        .0    2078.9        .0      52.7      10.8   1307.00
       .08       .00      4.04       .00      .000      .045      .000      .000   1296.90    890.14
   .000919        1.        1.        1.         2         0         0       .00    239.95   1130.09
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FLOW DISTRIBUTION FOR SECNO=  27551.00          CWSEL=   1305.58

STA=      890.    1130.
  PER Q=    100.0
   AREA=   2078.9
    VEL=      4.0
  DEPTH=      8.7

*SECNO 27566.000
 27566.000      8.70   1305.60       .00       .00   1305.85       .25       .01       .00   1307.00
    8400.0        .0    8400.0        .0        .0    2083.6        .0      53.4      10.9   1307.00
       .08       .00      4.03       .00      .000      .045      .000      .000   1296.90    890.14
   .000912       15.       15.       15.         0         0         0       .00    239.95   1130.09


FLOW DISTRIBUTION FOR SECNO=  27566.00          CWSEL=   1305.60

STA=      890.    1130.
  PER Q=    100.0
   AREA=   2083.6
    VEL=      4.0
  DEPTH=      8.7

CCHV=      .300 CEHV=      .500
*SECNO 27567.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 27567.000      5.58   1305.38   1305.38       .00   1307.24      1.86       .00       .80   1307.10
    8400.0        .0    8400.0        .0        .0     767.2        .0      53.4      10.9   1307.06
       .08       .00     10.95       .00      .000      .014      .000      .000   1299.80    890.03
   .002022        1.        1.        1.        20        14         0       .00    210.03   1100.07


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   19DEC00      10:57:13                                                                          PAGE   16


    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


FLOW DISTRIBUTION FOR SECNO=  27567.00          CWSEL=   1305.38

STA=      890.    1100.
  PER Q=    100.0
   AREA=    767.2
    VEL=     10.9
  DEPTH=      3.7

*SECNO 27621.000
3280 CROSS SECTION  27621.00 EXTENDED      3.32 FEET


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.03


3470 ENCROACHMENT STATIONS=      850.0    1140.0  TYPE=      1  TARGET=      290.000
 27621.000      6.52   1307.32       .00       .00   1307.71       .39       .03       .44 100000.00
    8400.0        .0    8400.0        .0        .0    1684.2        .0      55.0      11.2 100000.00
       .08       .00      4.99       .00      .000      .014      .000      .000   1300.80    850.00
   .000220       54.       54.       54.         4         0         0       .00    290.00   1140.00


FLOW DISTRIBUTION FOR SECNO=  27621.00          CWSEL=   1307.32

STA=      850.    1190.
  PER Q=    100.0
   AREA=   1684.2
    VEL=      5.0
```

```
  DEPTH=      5.8

 CCHV=     .100 CEHV=     .300
 *SECNO 27636.000

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .29

  27636.000      8.50   1307.50       .00       .00   1307.73       .23       .01       .02   1308.00
     8400.0        .0    8400.0        .0        .0    2159.4        .0      55.6      11.3   1308.00
        .08       .00      3.89       .00      .000      .072      .000      .000   1299.00    852.61
    .002640       15.       15.       15.         2         0         0       .00    305.71   1158.32


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    19DEC00      10:57:13                                                                                PAGE   17

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 FLOW DISTRIBUTION FOR SECNO=  27636.00          CWSEL=   1307.50

 STA=      853.    1160.
   PER Q=    100.0
    AREA=   2159.4
     VEL=      3.9
   DEPTH=      7.1

 *SECNO 27850.000
  27850.000      8.06   1308.06       .00       .00   1308.31       .24       .57       .00   1308.00
     8400.0        .0    8400.0        .0        .0    2121.4        .0      66.1      12.8   1308.00
        .10       .00      3.96       .00      .000      .072      .000      .000   1300.00    853.10
    .002710      200.      214.      230.         2         0         0       .00    297.90   1151.00


 FLOW DISTRIBUTION FOR SECNO=  27850.00          CWSEL=   1308.06

 STA=      853.    1151.
   PER Q=    100.0
    AREA=   2121.4
     VEL=      4.0
   DEPTH=      7.1

 *SECNO 28143.000
  28143.000      8.84   1308.84       .00       .00   1309.08       .24       .78       .00   1308.00
     8400.0        .0    8400.0        .0        .0    2135.1        .0      80.5      14.8   1308.00
        .12       .04      3.93       .04      .020      .072      .020      .000   1300.00    852.09
    .002601      295.      293.      290.         0         0         0       .00    293.93   1146.01


 FLOW DISTRIBUTION FOR SECNO=  28143.00          CWSEL=   1308.84

 STA=      852.    1146.
   PER Q=    100.0
    AREA=   2135.1
     VEL=      3.9
   DEPTH=      7.3

 *SECNO 28621.000
1
    19DEC00      10:57:13                                                                                PAGE   18

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.81

  28621.000      9.61   1309.41       .00       .00   1309.45       .04       .34       .02   1312.00
     8400.0        .0    8396.7       3.3        .0    5572.7       2.8     122.8      20.2   1308.00
        .21       .00      1.51      1.18      .000      .072      .020      .000   1299.80    428.81
    .000329      480.      478.      475.         2         0         0       .00    691.21   1120.02
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```
FLOW DISTRIBUTION FOR SECNO=  28621.00          CWSEL=   1309.41

STA=      429.    1118.    1120.
  PER Q=    100.0       .0
   AREA=   5572.7      2.8
    VEL=      1.5      1.2
  DEPTH=      8.1      1.4

CCHV=      .600 CEHV=      .800
*SECNO 28817.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .18


3470 ENCROACHMENT STATIONS=       950.0    1030.0  TYPE=       1  TARGET=        80.000
 ELENCL=   1312.00  ELENCR=   1311.00
 28817.000      8.75   1309.45       .00       .00   1309.67       .22       .08       .15   1312.00
    2600.0        .0    2600.0        .0        .0     688.5        .0     136.9      22.0   1311.00
       .22       .00      3.78       .00      .000      .045      .000      .000   1300.70    950.00
   .000951      300.      196.      170.         2         0         0       .00     80.00   1030.00


FLOW DISTRIBUTION FOR SECNO=  28817.00          CWSEL=   1309.45

STA=      950.    1047.
  PER Q=    100.0
   AREA=    688.5
    VEL=      3.8
  DEPTH=      8.6

*SECNO 28818.000
 28818.000     10.58   1309.58       .00       .00   1309.72       .14       .00       .05   1309.40
    2600.0        .3    2552.8      46.9        .9     835.8      29.5     136.9      22.0   1308.50
       .22       .33      3.05      1.59      .020      .045      .020      .000   1299.00    939.57
   .000496        1.        1.        1.         2         0         0       .00    123.38   1062.95


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   19DEC00      10:57:13                                                                                                PAGE   19

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


FLOW DISTRIBUTION FOR SECNO=  28818.00          CWSEL=   1309.58

STA=      940.      950.     1029.     1050.     1063.
  PER Q=       .0      98.2       1.5        .3
   AREA=       .9     835.8      22.6       7.0
    VEL=       .3       3.1       1.7       1.1
  DEPTH=       .1      10.6       1.1        .5

*SECNO 28836.000
 28836.000     10.59   1309.59       .00       .00   1309.73       .14       .01       .00   1309.40
    2600.0        .4    2551.8      47.9       1.1     836.9      30.0     137.2      22.0   1308.50
       .22       .35      3.05      1.60      .020      .045      .020      .000   1299.00    938.81
   .000494       18.       18.       18.         0         0         0       .00    124.30   1063.11


FLOW DISTRIBUTION FOR SECNO=  28836.00          CWSEL=   1309.59

STA=      939.      950.     1029.     1050.     1063.
  PER Q=       .0      98.1       1.5        .3
   AREA=      1.1     836.9      22.8       7.2
    VEL=       .3       3.0       1.8       1.1
  DEPTH=       .1      10.6       1.1        .5

CCHV=      .300 CEHV=      .500
*SECNO 28837.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.63

 28837.000      6.64   1309.54       .00       .00   1309.78       .25       .00       .05   1310.40
    2600.0        .0    2600.0        .0        .0     653.9        .0     137.2      22.0   1309.50
       .22       .00      3.98       .01      .000      .014      .000      .000   1302.90    925.81
   .000186        1.        1.        1.         2         0         0       .00    142.34   1068.15
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```
FLOW DISTRIBUTION FOR SECNO=  28837.00          CWSEL=   1309.54

STA=      926.    1068.
  PER Q=     100.0
   AREA=     653.9
    VEL=       4.0
  DEPTH=       4.6

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   19DEC00      10:57:13                                                                                    PAGE   20

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

CCHV=      .100 CEHV=      .300
*SECNO 29140.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .12

 29140.000      5.73   1309.53       .00        .00   1310.04       .51        .18        .08   1312.00
    2600.0        .0    2600.0        .0         .0     455.0        .0      141.1       22.9   1310.00
       .24       .00      5.71       .00       .000      .072      .000       .000    1303.80    943.32
   .012748      305.      303.      305.          2         0         0        .00     117.59   1060.91

FLOW DISTRIBUTION FOR SECNO=  29140.00          CWSEL=   1309.53

STA=      943.    1063.
  PER Q=     100.0
   AREA=     455.0
    VEL=       5.7
  DEPTH=       3.9

*SECNO 29371.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.50

 29371.000      7.15   1311.65       .00        .00   1311.94       .29       1.88        .02   1312.00
    2600.0        .0    2600.0        .0         .0     598.0        .0      143.9       23.6   1314.00
       .25       .00      4.35       .00       .000      .072      .000       .000    1304.50    936.70
   .005633      230.      231.      230.          2         0         0        .00     126.04   1062.74

FLOW DISTRIBUTION FOR SECNO=  29371.00          CWSEL=   1311.65

STA=      937.    1071.
  PER Q=     100.0
   AREA=     598.0
    VEL=       4.3
  DEPTH=       4.7

CCHV=      .300 CEHV=      .500
*SECNO 29548.000
1
   19DEC00      10:57:13                                                                                    PAGE   21

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.63

3470 ENCROACHMENT STATIONS=      965.8    1034.1  TYPE=      1  TARGET=       68.300
 ELENCL=   1315.66  ELENCR=   1315.66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1315.66 ELREA=      1312.00

 29548.000      6.92   1311.62       .00        .00   1312.34       .73        .19        .22   1315.66
    2600.0        .0    2600.0        .0         .0     379.5        .0      145.9       23.9   1312.00
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       .26       .00      6.85       .00      .000      .014      .000      .000   1304.70    965.80
   .000427      195.      177.      170.         2         0         0       .00     55.08   1020.88

FLOW DISTRIBUTION FOR SECNO=  29548.00          CWSEL=   1311.62

STA=     966.    1021.
  PER Q=    100.0
   AREA=    379.5
    VEL=      6.9
  DEPTH=      6.9

SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.25      1.56      2.90       .00     56.00      4.00    300.00       .00   1304.71   1304.70

*SECNO 29626.000
PRESSURE FLOW

 EGPRS      EGLWC      H3       QWEIR      QPR       BAREA   TRAPEZOID      ELLC     ELTRD     WEIRLN
                                                              AREA
   1313.44   1312.50      .22        0.     2600.      300.      316.     1310.79   1315.65        0.


3470 ENCROACHMENT STATIONS=      965.8    1034.1  TYPE=      1  TARGET=       68.300
 ELENCL=   1315.66  ELENCR=   1315.66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1365.60 ELREA=      1315.60

1
   19DEC00      10:57:13                                                                          PAGE   22

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 29626.000      8.23   1312.94       .00       .00   1313.44       .50      1.09       .00   1365.60
    2600.0        .0    2600.0        .0        .0     458.9        .0     146.6      24.0   1315.60
       .26       .00      5.67       .00      .000      .014      .000      .000   1304.71    965.80
   .000242       78.       78.       78.         2         0         0       .00     55.95   1021.75

FLOW DISTRIBUTION FOR SECNO=  29626.00          CWSEL=   1312.94

STA=     966.    1022.
  PER Q=    100.0
   AREA=    458.9
    VEL=      5.7
  DEPTH=      8.2

CCHV=      .600 CEHV=      .800
*SECNO 29639.000
 29639.000      8.31   1313.01       .00       .00   1313.46       .45       .00       .03   1310.75
    2600.0        .0    2600.0        .0        .1     480.8        .1     146.8      24.0   1310.70
       .27       .01      5.41       .01      .014      .014      .014      .000   1304.70    969.95
   .000198       13.       13.       13.         2         0         0       .00     58.19   1028.15

FLOW DISTRIBUTION FOR SECNO=  29639.00          CWSEL=   1313.01

STA=     970.    1028.
  PER Q=    100.0
   AREA=    480.8
    VEL=      5.4
  DEPTH=      8.3

*SECNO 29640.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
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 29640.000      3.39   1314.09   1314.09       .00   1315.80      1.70       .00      1.00   1316.00
    2600.0        .0    2600.0        .0        .0     248.3        .0     146.8      24.0   1316.00
       .27       .00     10.47       .00      .000      .014      .000      .000   1310.70    946.41
   .002163        1.        1.        1.        20        18         0       .00     73.75   1020.16


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   19DEC00      10:57:13                                                                          PAGE   23

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 FLOW DISTRIBUTION FOR SECNO=  29640.00          CWSEL=   1314.09

 STA=     946.    1020.
   PER Q=    100.0
    AREA=    248.3
     VEL=     10.5
   DEPTH=      3.4

 CCHV=     .100 CEHV=     .300
 *SECNO 29753.000
 3280 CROSS SECTION  29753.00 EXTENDED       .37 FEET


 3301 HV CHANGED MORE THAN HVINS

 29753.000      6.77   1315.77       .00       .00   1316.17       .40       .24       .13   1316.00
    2600.0        .0    2579.8      20.2        .0     505.4      25.4     147.8      24.4   1315.50
       .27       .00      5.10       .79      .000      .035      .040      .000   1309.00    941.13
   .002125       95.      113.      135.         4         0         0       .00    198.87   1140.00


 FLOW DISTRIBUTION FOR SECNO=  29753.00          CWSEL=   1315.77

 STA=     941.    1060.    1140.
   PER Q=     99.2       .8
    AREA=    505.4     25.4
     VEL=      5.1       .8
   DEPTH=      4.3       .3

 *SECNO 29908.000
 3280 CROSS SECTION  29908.00 EXTENDED       .04 FEET

 29908.000      6.34   1316.04       .00       .00   1316.57       .53       .36       .04   1316.00
    2600.0        .1    2599.9        .0        .2     446.9        .1     149.5      25.0   1316.00
       .28       .23      5.82       .15      .040      .035      .040      .000   1309.70    945.10
   .002596      140.      155.      170.         2         0         0       .00    110.38   1055.48


 FLOW DISTRIBUTION FOR SECNO=  29908.00          CWSEL=   1316.04

1
   19DEC00      10:57:13                                                                          PAGE   24

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 STA=     945.     950.    1050.    1055.
   PER Q=       .0    100.0       .0
    AREA=       .2    446.9       .1
     VEL=       .2      5.8       .1
   DEPTH=       .0      4.5       .0

 *SECNO 30136.000
 30136.000      5.68   1316.68       .00       .00   1317.41       .73       .78       .06   1317.00
    2600.0        .0    2600.0        .0        .0     379.0        .0     151.7      25.5   1317.00
       .29       .00      6.86       .00      .000      .035      .000      .000   1311.00    941.61
   .004680      210.      228.      240.         2         0         0       .00    103.50   1045.11


 FLOW DISTRIBUTION FOR SECNO=  30136.00          CWSEL=   1316.68
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STA=      942.    1048.
  PER Q=     100.0
   AREA=     379.0
    VEL=       6.9
  DEPTH=       3.7

*SECNO 30392.000
 30392.000      5.59   1317.59       .00       .00   1318.44       .85       .99       .04   1318.00
    2600.0        .0    2600.0        .0        .0     350.4        .0     153.8      26.1   1320.00
       .30       .00      7.42       .00      .000      .028      .000      .000   1312.00    956.95
   .003272      255.      256.      255.         2         0         0       .00     90.57   1047.51


FLOW DISTRIBUTION FOR SECNO=  30392.00          CWSEL=   1317.59

STA=      957.    1068.
  PER Q=     100.0
   AREA=     350.4
    VEL=       7.4
  DEPTH=       3.9

*SECNO 30628.000
 30628.000      5.48   1318.38       .00       .00   1319.06       .68       .60       .02   1320.00
    2600.0        .0    2600.0        .0        .0     392.1        .0     155.9      26.6   1320.00
       .31       .00      6.63       .00      .000      .028      .000      .000   1312.90    958.43
   .002052      230.      236.      240.         2         0         0       .00     83.15   1041.57


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   19DEC00      10:57:13                                                                                PAGE   25

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


FLOW DISTRIBUTION FOR SECNO=  30628.00          CWSEL=   1318.38

STA=      958.    1045.
  PER Q=     100.0
   AREA=     392.1
    VEL=       6.6
  DEPTH=       4.7

*SECNO 30836.000
 30836.000      5.17   1318.77       .00       .00   1319.57       .81       .48       .04   1321.00
    2600.0        .0    2600.0        .0        .0     360.6        .0     157.7      27.0   1321.00
       .32       .00      7.21       .00      .000      .028      .000      .000   1313.60    959.53
   .002568      195.      208.      220.         2         0         0       .00     79.55   1039.08


FLOW DISTRIBUTION FOR SECNO=  30836.00          CWSEL=   1318.77

STA=      960.    1043.
  PER Q=     100.0
   AREA=     360.6
    VEL=       7.2
  DEPTH=       4.5

*SECNO 30961.000
 30961.000      5.37   1319.17       .00       .00   1319.88       .70       .29       .01   1320.00
    2600.0        .0    2600.0        .0        .0     386.8        .0     158.7      27.2   1320.00
       .32       .00      6.72       .00      .000      .028      .000      .000   1313.80    961.73
   .002117      120.      125.      130.         2         0         0       .00     81.94   1043.67


FLOW DISTRIBUTION FOR SECNO=  30961.00          CWSEL=   1319.17

STA=      962.    1045.
  PER Q=     100.0
   AREA=     386.8
    VEL=       6.7
  DEPTH=       4.7

*SECNO 31271.000
 31271.000      5.64   1319.84       .00       .00   1320.50       .66       .62       .00   1322.00
    2600.0        .0    2600.0        .0        .0     399.8        .0     161.5      27.8   1322.00
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       .33       .00      6.50       .00      .000      .028      .000      .000   1314.20    959.15
   .001889      310.      310.      310.         2         0         0       .00     81.70   1040.85

1
   19DEC00      10:57:13                                                                                PAGE   26

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 FLOW DISTRIBUTION FOR SECNO=  31271.00          CWSEL=   1319.84

 STA=     959.    1045.
   PER Q=    100.0
    AREA=    399.8
     VEL=      6.5
   DEPTH=      4.9

 *SECNO 31582.000
  31582.000      4.93   1320.43       .00       .00   1321.26       .84       .71       .05   1322.00
     2600.0        .0    2600.0        .0        .0     354.0        .0     164.2      28.4   1322.00
       .35       .00      7.35       .00      .000      .028      .000      .000   1315.50    973.15
   .002816      320.      311.      290.         2         0         0       .00     81.71   1054.85

 FLOW DISTRIBUTION FOR SECNO=  31582.00          CWSEL=   1320.43

 STA=     973.    1058.
   PER Q=    100.0
    AREA=    354.0
     VEL=      7.3
   DEPTH=      4.3

 CCHV=      .300 CEHV=      .500
 *SECNO 31687.000

 3301 HV CHANGED MORE THAN HVINS

 3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1321.81 ELREA=      1321.91

  31687.000      4.47   1320.19       .00       .00   1321.95      1.76       .23       .46   1321.81
     2600.0        .0    2600.0        .0        .0     244.5        .0     164.9      28.5   1321.91
       .35       .00     10.63       .00      .000      .014      .000      .000   1315.72    964.41
   .001699      110.      105.       95.         3         0         0       .00     55.91   1020.32

 FLOW DISTRIBUTION FOR SECNO=  31687.00          CWSEL=   1320.19

 STA=     964.    1020.
   PER Q=    100.0
    AREA=    244.5
     VEL=     10.6
   DEPTH=      4.4

1
   19DEC00      10:57:13                                                                                PAGE   27

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 SPECIAL BRIDGE

 5227 DOWNSTREAM ELEV IS    1318.94 , NOT    1320.19 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

 SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
      1.25      1.56      2.90       .00     56.00      5.00    300.00       .00   1317.20   1315.72

 *SECNO 32163.000

 3301 HV CHANGED MORE THAN HVINS
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.50

CLASS B LOW FLOW

3420 BRIDGE W.S.=    1320.78 BRIDGE VELOCITY=      11.79     CALCULATED CHANNEL AREA=       183.

 EGPRS      EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC     ELTRD     WEIRLN
                                                                 AREA
   1322.01   1323.95      .00        0.     2600.      300.      311.     1323.30   1331.53        0.


3470 ENCROACHMENT STATIONS=      969.0    1025.2  TYPE=      1  TARGET=       56.200
 ELENCL=   1331.53  ELENCR=   1332.30

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1324.30 ELREA=      1332.30

 32163.000      5.71   1322.91       .00       .00   1323.95      1.04      2.00       .00   1324.30
    2600.0        .0    2600.0        .0        .0    317.1        .0     168.0      29.1   1332.30
       .36       .00      8.20       .00      .000     .014      .000      .000   1317.20    969.11
   .000756      505.      476.      440.         0        0         0       .00     56.09   1025.19


FLOW DISTRIBUTION FOR SECNO=  32163.00          CWSEL=   1322.91

STA=     969.    1025.
  PER Q=    100.0
   AREA=    317.1
    VEL=      8.2
  DEPTH=      5.7

1
   19DEC00      10:57:13                                                                          PAGE   28


    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


CCHV=      .600 CEHV=      .800
*SECNO 32173.000
 32173.000      6.24   1323.44       .00       .00   1324.15       .72       .01       .20   1324.30
    2600.0        .0    2600.0        .0        .0    382.9        .0     168.1      29.2   1324.20
       .36       .00      6.79       .00      .000     .014      .000      .000   1317.20    969.11
   .000459       10.       10.       10.         3        0         0       .00     61.98   1031.09


FLOW DISTRIBUTION FOR SECNO=  32173.00          CWSEL=   1323.44

STA=     969.    1031.
  PER Q=    100.0
   AREA=    382.9
    VEL=      6.8
  DEPTH=      6.2

CCHV=      .100 CEHV=      .300
*SECNO 32174.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 32174.000      4.10   1324.20   1324.20       .00   1326.24      2.05       .00       .40   1327.10
    2600.0        .0    2600.0        .0        .0    226.6        .0     168.1      29.2   1327.00
       .36       .00     11.48       .00      .000     .028      .000      .000   1320.10    973.04
   .008667        1.        1.        1.        20       14         0       .00     56.02   1029.06


FLOW DISTRIBUTION FOR SECNO=  32174.00          CWSEL=   1324.20

STA=     973.    1029.
  PER Q=    100.0
   AREA=    226.6
    VEL=     11.5
  DEPTH=      4.0
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*SECNO 32240.000
1
   19DEC00      10:57:13                                                                                                PAGE   29

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.57


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1328.00 ELREA=      1328.00

 32240.000      4.70   1326.20       .00        .00   1326.65       .44        .24        .16   1328.00
    1730.0        .0    1730.0        .0        .0     324.8        .0      168.5       29.3   1328.00
       .37       .00      5.33       .00       .000      .028      .000       .000    1321.50    965.59
   .001565       55.       66.       70.          4         0         0        .00      78.09   1043.68


FLOW DISTRIBUTION FOR SECNO=  32240.00          CWSEL=   1326.20

STA=      966.    1047.
  PER Q=     100.0
   AREA=     324.8
    VEL=       5.3
  DEPTH=       4.2

CCHV=      .300 CEHV=      .500
*SECNO 32476.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1332.00 ELREA=      1330.80

 32476.000      3.82   1326.32       .00        .00   1327.05       .73        .26        .15   1332.00
    1730.0        .0    1730.0        .0        .0     252.2        .0      170.1       29.7   1330.80
       .38       .00      6.86       .00       .000      .014      .000       .000    1322.50    966.42
   .000811      250.      236.      220.          2         0         0        .00      71.18   1037.60


FLOW DISTRIBUTION FOR SECNO=  32476.00          CWSEL=   1326.32

STA=      966.    1043.
  PER Q=     100.0
   AREA=     252.2
    VEL=       6.9
  DEPTH=       3.5

1
   19DEC00      10:57:13                                                                                                PAGE   30

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 32518.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1332.00 ELREA=      1330.80

 32518.000      3.13   1326.33       .00        .00   1327.12       .79        .04        .03   1332.00
    1730.0        .0    1730.0        .0        .0     243.1        .0      170.3       29.7   1330.80
       .38       .00      7.12       .00       .000      .014      .000       .000    1323.20    963.06
   .001108       42.       42.       42.          2         0         0        .00      78.98   1042.04


FLOW DISTRIBUTION FOR SECNO=  32518.00          CWSEL=   1326.33

STA=      963.    1042.
  PER Q=     100.0
   AREA=     243.1
    VEL=       7.1
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  DEPTH=       3.1

CCHV=      .100 CEHV=      .300
*SECNO 32615.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 32615.000      3.97   1327.97   1327.97       .00   1329.42      1.45       .31       .20   1330.00
    1730.0        .0    1730.0        .0        .0     179.2        .0     170.8      29.9   1330.00
       .38       .00      9.65       .00      .000      .057      .000      .000   1324.00    962.11
   .034485       95.       97.      100.        20        11         0       .00     62.77   1024.89


FLOW DISTRIBUTION FOR SECNO=  32615.00          CWSEL=   1327.97

STA=      962.    1036.
  PER Q=     100.0
   AREA=     179.2
    VEL=       9.7
  DEPTH=       2.9

1
   19DEC00      10:57:13                                                                          PAGE   31

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


*SECNO 32728.000
3280 CROSS SECTION  32728.00 EXTENDED       .20 FEET


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.18

 32728.000      6.19   1330.19       .00       .00   1330.43       .24       .89       .12   1330.00
    1730.0       4.8    1725.2        .0      20.2     440.2        .0     171.6      30.2   1330.00
       .39       .24      3.92       .01      .125      .057      .125      .000   1324.00    839.00
   .003414      115.      113.      110.         3         0         0       .00    205.47   1044.47


FLOW DISTRIBUTION FOR SECNO=  32728.00          CWSEL=   1330.19

STA=      839.     939.    1044.
  PER Q=       .3     99.7
   AREA=     20.2    440.2
    VEL=       .2      3.9
  DEPTH=       .2      4.2

*SECNO 32974.000

3470 ENCROACHMENT STATIONS=          .0    1035.0  TYPE=      1  TARGET=     1034.999
 32974.000      5.53   1331.03       .00       .00   1331.30       .27       .86       .01   1332.00
    1730.0        .0    1730.0        .0        .0     413.6        .0     174.1      31.1   1335.00
       .41       .00      4.18       .00      .000      .057      .000      .000   1325.50    945.96
   .003596      245.      246.      245.         3         0         0       .00     89.04   1035.00


FLOW DISTRIBUTION FOR SECNO=  32974.00          CWSEL=   1331.03

STA=      946.    1141.
  PER Q=     100.0
   AREA=     413.6
    VEL=       4.2
  DEPTH=       4.6

1
   19DEC00      10:57:13                                                                          PAGE   32

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
```

```
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


CCHV=      .600 CEHV=      .800
*SECNO 33108.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1330.00 ELREA=      1334.00

 33108.000      5.56   1331.56       .00       .00   1331.75       .19       .40       .05   1330.00
    1730.0      41.1    1688.9        .0      80.9     473.0        .0     175.6      31.5   1334.00
       .42       .51      3.57       .00      .125      .057      .000      .000   1326.00    804.27
   .002539      140.      134.      135.         2         0         0       .00    207.63   1011.90


FLOW DISTRIBUTION FOR SECNO=  33108.00          CWSEL=   1331.56

STA=     804.     908.    1018.
  PER Q=      2.4      97.6
   AREA=     80.9     473.0
    VEL=       .5       3.6
  DEPTH=       .8       4.6

CCHV=      .100 CEHV=      .300
*SECNO 33699.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1340.00 ELREA=      1340.00

 33699.000      6.41   1334.61   1334.61       .00   1336.50      1.89      3.08       .51   1340.00
    1730.0        .0    1730.0        .0        .0    156.9        .0     180.4      33.2   1340.00
       .43       .00     11.03       .00      .000      .040      .000      .000   1328.20    974.93
   .016099      600.      591.      590.        20         8         0       .00     41.60   1016.53


FLOW DISTRIBUTION FOR SECNO=  33699.00          CWSEL=   1334.61

STA=     975.    1030.
  PER Q=    100.0
   AREA=    156.9
    VEL=     11.0
  DEPTH=      3.8

1
   19DEC00      10:57:13                                                                          PAGE    33


    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


*SECNO 34078.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.96


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1342.00 ELREA=      1342.00

 34078.000      8.84   1337.84       .00       .00   1338.21       .38      1.56       .15   1342.00
    1730.0        .0    1730.0        .0        .0     351.8        .0     182.6      33.7   1342.00
       .45       .00      4.92       .00      .000      .040      .000      .000   1329.00    966.73
   .001843      380.      379.      375.         3         0         0       .00     61.58   1028.31


FLOW DISTRIBUTION FOR SECNO=  34078.00          CWSEL=   1337.84

STA=     967.    1038.
  PER Q=    100.0
   AREA=    351.8
    VEL=      4.9
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  DEPTH=      5.7

1
   19DEC00      10:57:13                                                                                PAGE   34

 T1      PROJECT NO. 13255                          4/10/95
 T2      SKUNK CREEK DRAINAGE DESIGN        FILE:SKEXIST.IH2
 T3      EXISTING CONDITIONS
 T4      10-YEAR, 24-HOUR DESIGN STORM
 T5      SUBCRITICAL FLOW

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 3                   0      .006                                      1175

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      15                  -1                                                  7                   15


1
   19DEC00      10:57:13                                                                                PAGE   35

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 *PROF 2

 CCHV=      .100 CEHV=      .300
 CCHV=      .300 CEHV=      .500
 *SECNO 25608.000

 3470 ENCROACHMENT STATIONS=      900.0    1047.7  TYPE=      1  TARGET=      147.700
  ELENCL=   1303.83  ELENCR=   1304.00

 3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1303.83 ELREA=      1295.64

  25608.000      2.74   1287.74       .00   1175.00   1288.35       .61       .00       .00   1303.83
     2268.0        .0    2268.0        .0        .0     361.9        .0        .0        .0   1295.64
        .00       .00      6.27       .00      .000      .035      .000      .000   1285.00    905.35
    .006017        0.        0.        0.         0         0         4       .00    136.26   1041.61


 FLOW DISTRIBUTION FOR SECNO=  25608.00          CWSEL=   1287.74

 STA=      905.    1047.
   PER Q=     100.0
    AREA=     361.9
     VEL=       6.3
   DEPTH=       2.7


 SPECIAL BRIDGE

 SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
      1.05      1.60      2.60       .00    130.00      5.00   1320.00      1.00   1285.80   1285.00

 *SECNO 25716.000

 3301 HV CHANGED MORE THAN HVINS


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .53

 CLASS A LOW FLOW

 3420 BRIDGE W.S.=    1288.04 BRIDGE VELOCITY=       6.74     CALCULATED CHANNEL AREA=       285.
1
   19DEC00      10:57:13                                                                                PAGE   36

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
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    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 EGPRS     EGLWC     H3        QWEIR     QLOW      BAREA   TRAPEZOID     ELLC      ELTRD     WEIRLN
                                                             AREA
      .00  1289.19      .13        0.     2268.     1320.     1325.     1295.63   1303.83        0.


3470 ENCROACHMENT STATIONS=      928.0    1075.8  TYPE=      1  TARGET=      147.800
 ELENCL=   1303.83  ELENCR=   1304.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1291.99 ELREA=      1292.60

 25716.000      2.07   1287.87       .00       .00   1289.19      1.32       .84       .00   1291.99
    2268.0        .0    2268.0        .0        .0     246.0        .0        .8        .3   1292.60
       .00       .00      9.22       .00      .000      .035      .000      .000   1285.80    933.94
   .021313      108.      108.      108.         0         0         0       .00    134.50   1068.44


FLOW DISTRIBUTION FOR SECNO=  25716.00          CWSEL=   1287.87

STA=     934.    1076.
  PER Q=    100.0
   AREA=    246.0
    VEL=      9.2
  DEPTH=      1.8

CCHV=     .100 CEHV=     .300
*SECNO 25773.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.29

 25773.000      3.27   1289.27       .00       .00   1289.72       .45       .45       .09   1296.00
    2268.0        .0    2268.0        .0        .0     420.7        .0      1.2        .5   1302.00
       .01       .00      5.39       .00      .000      .035      .000      .000   1286.00    928.56
   .004049       70.       57.       45.         3         0         0       .00    148.24   1076.79


FLOW DISTRIBUTION FOR SECNO=  25773.00          CWSEL=   1289.27

1
   19DEC00      10:57:13                                                                                    PAGE    37

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


STA=     929.    1108.
  PER Q=    100.0
   AREA=    420.7
    VEL=      5.4
  DEPTH=      2.8

*SECNO 25921.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1296.09 ELREA=      1296.30

 25921.000      2.95   1289.93       .00       .00   1290.27       .34       .54       .01   1296.09
    2268.0        .0    2268.0        .0        .0     482.6        .0      2.7       1.1   1296.30
       .01       .00      4.70       .00      .000      .035      .000      .000   1286.98    930.30
   .003278      150.      148.      145.         2         0         0       .00    178.75   1109.05


FLOW DISTRIBUTION FOR SECNO=  25921.00          CWSEL=   1289.93

STA=     930.    1130.
  PER Q=    100.0
   AREA=    482.6
    VEL=      4.7
  DEPTH=      2.7

*SECNO 26120.000
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .47

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1297.00 ELREA=      1297.50

 26120.000      1.59   1290.89   1290.86       .00   1291.59       .70      1.21       .11   1297.00
    2268.0        .0    2268.0        .0        .0     338.7        .0       4.6       2.0   1297.50
       .02       .00      6.70       .00      .000      .035      .000      .000   1289.30    912.45
   .015040      200.      199.      195.         5        11         0       .00    231.90   1144.35

FLOW DISTRIBUTION FOR SECNO=  26120.00          CWSEL=   1290.89

STA=     912.    1165.
  PER Q=    100.0
   AREA=    338.7
    VEL=      6.7
  DEPTH=      1.5

1
   19DEC00      10:57:13                                                                                PAGE   38

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO 26393.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.19

 26393.000      2.96   1292.96       .00       .00   1293.24       .29      1.61       .04   1299.00
    2268.0        .0    2268.0        .0        .0     527.1        .0       7.3       3.4   1299.00
       .04       .00      4.30       .00      .000      .035      .000      .000   1290.00    890.65
   .003139      270.      273.      275.         1         0         0       .00    215.56   1106.21

FLOW DISTRIBUTION FOR SECNO=  26393.00          CWSEL=   1292.96

STA=     891.    1129.
  PER Q=    100.0
   AREA=    527.1
    VEL=      4.3
  DEPTH=      2.4

*SECNO 26681.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 26681.000      1.47   1294.47   1294.47       .00   1295.20       .73      1.74       .13   1300.00
    2268.0        .0    2268.0        .0        .0     331.1        .0      10.2       4.9   1301.00
       .05       .00      6.85       .00      .000      .035      .000      .000   1293.00    884.74
   .016044      295.      288.      280.         2         8         0       .00    229.86   1114.60

FLOW DISTRIBUTION FOR SECNO=  26681.00          CWSEL=   1294.47

STA=     885.    1135.
  PER Q=    100.0
   AREA=    331.1
    VEL=      6.9
  DEPTH=      1.4

*SECNO 26880.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1302.00 ELREA=      1302.00

 26880.000      1.47   1297.47       .00       .00   1298.05       .58      2.84       .02   1302.00
    2268.0        .0    2268.0        .0        .0     371.7        .0      11.8       6.0   1302.00
       .06       .00      6.10       .00      .000      .035      .000      .000   1296.00    872.62
   .012754      200.      199.      200.         3         0         0       .00    258.53   1131.15

1
   19DEC00      10:57:13                                                                                PAGE   39

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
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```
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=  26880.00          CWSEL=   1297.47

STA=     873.    1150.
  PER Q=    100.0
   AREA=    371.7
    VEL=      6.1
  DEPTH=      1.4

*SECNO 27022.000
 27022.000      2.23   1299.73       .00       .00   1299.97       .24      1.89       .03   1304.00
    2268.0        .0    2268.0        .0        .0     573.5        .0      13.3       6.9   1304.00
       .07       .00      3.95       .00      .000      .072      .000      .000   1297.50    861.36
   .013858      155.      142.      130.         2         0         0       .00    275.86   1137.22

FLOW DISTRIBUTION FOR SECNO=  27022.00          CWSEL=   1299.73

STA=     861.    1155.
  PER Q=    100.0
   AREA=    573.5
    VEL=      4.0
  DEPTH=      2.1

*SECNO 27339.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.22

 27339.000      3.59   1301.59       .00       .00   1301.69       .10      1.70       .01   1306.00
    2268.0        .0    2268.0        .0        .0     910.9        .0      18.7       8.8   1306.00
       .11       .00      2.49       .00      .000      .072      .000      .000   1298.00    878.99
   .002821      325.      317.      305.         4         0         0       .00    265.06   1144.04

FLOW DISTRIBUTION FOR SECNO=  27339.00          CWSEL=   1301.59

STA=     879.    1158.
  PER Q=    100.0
   AREA=    910.9
    VEL=      2.5
  DEPTH=      3.4

1
   19DEC00      10:57:13                                                                          PAGE   40

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CCHV=      .600 CEHV=      .800
*SECNO 27550.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.63

 27550.000      3.73   1301.93       .00       .00   1302.03       .10       .34       .00   1307.00
    2268.0        .0    2268.0        .0        .0     893.7        .0      23.1      10.1   1307.00
       .13       .00      2.54       .00      .000      .045      .000      .000   1298.20    890.58
   .001060      230.      211.      200.         3         0         0       .00    239.47   1130.04

FLOW DISTRIBUTION FOR SECNO=  27550.00          CWSEL=   1301.93

STA=     891.    1130.
  PER Q=    100.0
   AREA=    893.7
    VEL=      2.5
  DEPTH=      3.7

*SECNO 27551.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.67

 27551.000      5.11   1302.01       .00       .00   1302.06       .05       .00       .03   1307.00
```

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    2268.0        .0    2268.0        .0        .0    1222.4        .0      23.1      10.1   1307.00
       .13       .00      1.86       .00      .000      .045      .000      .000   1296.90    890.49
   .000379        1.        1.        1.         2         0         0       .00    239.56   1130.05


 FLOW DISTRIBUTION FOR SECNO=  27551.00          CWSEL=   1302.01

 STA=     890.    1130.
   PER Q=    100.0
    AREA=   1222.4
     VEL=      1.9
   DEPTH=      5.1

 *SECNO 27566.000
  27566.000      5.11   1302.01       .00       .00   1302.07       .05       .01       .00   1307.00
    2268.0        .0    2268.0        .0        .0    1225.0        .0      23.5      10.2   1307.00
       .13       .00      1.85       .00      .000      .045      .000      .000   1296.90    890.49
   .000376       15.       15.       15.         0         0         0       .00    239.56   1130.05


1
   19DEC00      10:57:13                                                                                PAGE   41

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 FLOW DISTRIBUTION FOR SECNO=  27566.00          CWSEL=   1302.01

 STA=     890.    1130.
   PER Q=    100.0
    AREA=   1225.0
     VEL=      1.9
   DEPTH=      5.1

 CCHV=      .300 CEHV=      .500
 *SECNO 27567.000

 3301 HV CHANGED MORE THAN HVINS

 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  27567.000      3.49   1303.29   1303.29       .00   1304.03       .73       .00       .34   1307.10
    2268.0        .0    2268.0        .0        .0     330.1        .0      23.5      10.2   1307.06
       .13       .00      6.87       .00      .000      .014      .000      .000   1299.80    890.07
   .002388        1.        1.        1.        20        18         0       .00    209.95   1100.03


 FLOW DISTRIBUTION FOR SECNO=  27567.00          CWSEL=   1303.29

 STA=     890.    1100.
   PER Q=    100.0
    AREA=    330.1
     VEL=      6.9
   DEPTH=      1.6

 *SECNO 27621.000
 3280 CROSS SECTION  27621.00 EXTENDED       .09 FEET


 3301 HV CHANGED MORE THAN HVINS


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.20


 3470 ENCROACHMENT STATIONS=      850.0    1140.0  TYPE=      1  TARGET=      290.000
1
   19DEC00      10:57:13                                                                                PAGE   42

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST
```

```
 27621.000      3.29   1304.09       .00       .00   1304.23       .14       .03       .18 100000.00
    2268.0        .0    2268.0        .0        .0     747.2        .0      24.2      10.5 100000.00
       .14       .00      3.04       .00      .000      .014      .000      .000   1300.80    850.00
   .000233       54.       54.       54.         3         0         0       .00    290.00   1140.00


FLOW DISTRIBUTION FOR SECNO=  27621.00          CWSEL=   1304.09

STA=     850.    1190.
  PER Q=    100.0
   AREA=    747.2
    VEL=      3.0
  DEPTH=      2.6

CCHV=     .100 CEHV=     .300
*SECNO 27636.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .44

 27636.000      5.19   1304.19       .00       .00   1304.25       .06       .01       .01   1308.00
    2268.0        .0    2268.0        .0        .0    1195.3        .0      24.5      10.6   1308.00
       .14       .00      1.90       .00      .000      .072      .000      .000   1299.00    869.07
   .001215       15.       15.       15.         2         0         0       .00    278.24   1147.31


FLOW DISTRIBUTION FOR SECNO=  27636.00          CWSEL=   1304.19

STA=     869.    1160.
  PER Q=    100.0
   AREA=   1195.3
    VEL=      1.9
  DEPTH=      4.3

*SECNO 27850.000
 27850.000      4.48   1304.48       .00       .00   1304.55       .07       .29       .00   1308.00
    2268.0        .0    2268.0        .0        .0    1099.9        .0      30.2      11.9   1308.00
       .17       .00      2.06       .00      .000      .072      .000      .000   1300.00    867.84
   .001560      200.      214.      230.         2         0         0       .00    272.36   1140.20


1
   19DEC00      10:57:13                                                                          PAGE    43

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


FLOW DISTRIBUTION FOR SECNO=  27850.00          CWSEL=   1304.48

STA=     868.    1151.
  PER Q=    100.0
   AREA=   1099.9
    VEL=      2.1
  DEPTH=      4.0

*SECNO 28143.000
 28143.000      4.97   1304.97       .00       .00   1305.05       .07       .50       .00   1308.00
    2268.0        .0    2268.0        .0        .0    1037.1        .0      37.4      13.7   1308.00
       .21       .00      2.19       .00      .000      .072      .000      .000   1300.00    862.60
   .001863      295.      293.      290.         2         0         0       .00    268.81   1131.40


FLOW DISTRIBUTION FOR SECNO=  28143.00          CWSEL=   1304.97

STA=     863.    1146.
  PER Q=    100.0
   AREA=   1037.1
    VEL=      2.2
  DEPTH=      3.9

*SECNO 28621.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.84

 28621.000      5.48   1305.28       .00       .00   1305.29       .01       .24       .01   1312.00
    2268.0        .0    2268.0        .0        .0    2777.1        .0      58.3      18.8   1308.00
```

```
      .37       .00       .82       .00      .000      .072      .000      .000   1299.80    442.85
   .000231      480.      478.      475.         2         0         0       .00    660.19   1103.04

 FLOW DISTRIBUTION FOR SECNO=  28621.00          CWSEL=   1305.28

 STA=      443.    1118.
   PER Q=     100.0
    AREA=    2777.1
     VEL=        .8
   DEPTH=       4.2

1
    19DEC00       10:57:13                                                                                PAGE    44

     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 CCHV=      .600 CEHV=      .800
 *SECNO 28817.000

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .20

 3470 ENCROACHMENT STATIONS=       950.0     1030.0  TYPE=       1  TARGET=        80.000
  ELENCL=   1312.00  ELENCR=   1311.00
  28817.000      4.61   1305.31       .00       .00   1305.68       .36       .10       .28   1312.00
     1730.0        .0    1730.0        .0        .0     357.2        .0      65.3      20.5   1311.00
        .38       .00      4.84       .00      .000      .045      .000      .000   1300.70    950.00
   .003332      300.      196.      170.         2         0         0       .00     80.00   1030.00

 FLOW DISTRIBUTION FOR SECNO=  28817.00          CWSEL=   1305.31

 STA=      950.    1047.
   PER Q=     100.0
    AREA=     357.2
     VEL=       4.8
   DEPTH=       4.5

 *SECNO 28818.000

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.83

  28818.000      6.62   1305.62       .00       .00   1305.79       .17       .00       .12   1309.40
     1730.0        .0    1730.0        .0        .0     523.2        .0      65.3      20.5   1308.50
        .38       .00      3.31       .00      .000      .045      .000      .000   1299.00    950.04
   .000990        1.        1.        1.         2         0         0       .00     79.03   1029.07

 FLOW DISTRIBUTION FOR SECNO=  28818.00          CWSEL=   1305.62

 STA=      950.    1029.
   PER Q=     100.0
    AREA=     523.2
     VEL=       3.3
   DEPTH=       6.6

1
    19DEC00       10:57:13                                                                                PAGE    45

     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *SECNO 28836.000
  28836.000      6.64   1305.64       .00       .00   1305.81       .17       .02       .00   1309.40
     1730.0        .0    1730.0        .0        .0     525.5        .0      65.6      20.5   1308.50
        .38       .00      3.29       .00      .000      .045      .000      .000   1299.00    950.04
   .000977       18.       18.       18.         1         0         0       .00     79.03   1029.07

 FLOW DISTRIBUTION FOR SECNO=  28836.00          CWSEL=   1305.64
```

```
STA=      950.    1029.
  PER Q=     100.0
   AREA=     525.5
    VEL=       3.3
  DEPTH=       6.6

CCHV=      .300 CEHV=      .500
*SECNO 28837.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 28837.000      2.73   1305.63   1305.63       .00   1306.74      1.11       .00       .47   1310.40
    1730.0        .0    1730.0        .0        .0     204.5        .0      65.6      20.5   1309.50
       .38       .00      8.46       .00      .000      .014      .000      .000   1302.90    942.53
   .002262        1.        1.        1.        20        18         0       .00     93.40   1035.92


FLOW DISTRIBUTION FOR SECNO=  28837.00          CWSEL=   1305.63

STA=      943.    1068.
  PER Q=     100.0
   AREA=     204.5
    VEL=       8.5
  DEPTH=       2.2

CCHV=      .100 CEHV=      .300
*SECNO 29140.000
1
   19DEC00      10:57:13                                                                                PAGE   46


    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .28

 29140.000      3.99   1307.79   1307.20       .00   1308.45       .67      1.67       .04   1312.00
    1730.0        .0    1730.0        .0        .0     263.5        .0      67.2      21.2   1310.00
       .39       .00      6.56       .00      .000      .072      .000      .000   1303.80    951.98
   .028464      305.      303.      305.         9        11         0       .00    101.26   1053.24


FLOW DISTRIBUTION FOR SECNO=  29140.00          CWSEL=   1307.79

STA=      952.    1063.
  PER Q=     100.0
   AREA=     263.5
    VEL=       6.6
  DEPTH=       2.6

*SECNO 29371.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.37

 29371.000      6.10   1310.60       .00       .00   1310.81       .21      2.31       .05   1312.00
    1730.0        .0    1730.0        .0        .0     470.4        .0      69.1      21.8   1314.00
       .41       .00      3.68       .00      .000      .072      .000      .000   1304.50    941.36
   .005057      230.      231.      230.         2         0         0       .00    117.72   1059.08


FLOW DISTRIBUTION FOR SECNO=  29371.00          CWSEL=   1310.60

STA=      941.    1071.
  PER Q=     100.0
   AREA=     470.4
    VEL=       3.7
  DEPTH=       4.0

CCHV=      .300 CEHV=      .500
*SECNO 29548.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  4.06
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1
   19DEC00      10:57:13                                                                                                PAGE   47

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3470 ENCROACHMENT STATIONS=      965.8    1034.1  TYPE=      1  TARGET=       68.300
 ELENCL=   1315.66  ELENCR=   1315.66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1315.66 ELREA=      1312.00

 29548.000      5.93   1310.63       .00        .00   1311.07       .44        .14        .12   1315.66
    1730.0        .0    1730.0        .0        .0     324.2        .0       70.8       22.1   1312.00
       .42       .00      5.34       .00       .000      .014      .000       .000    1304.70    965.80
   .000307      195.      177.      170.         2         0         0        .00      55.08   1020.88


FLOW DISTRIBUTION FOR SECNO=  29548.00          CWSEL=   1310.63

STA=     966.    1021.
  PER Q=    100.0
   AREA=    324.2
    VEL=      5.3
  DEPTH=      5.9


SPECIAL BRIDGE

SB  XK        XKOR       COFQ       RDLEN      BWC        BWP        BAREA      SS         ELCHU      ELCHD
     1.25      1.56       2.90        .00      56.00       4.00     300.00        .00    1304.71    1304.70

*SECNO 29626.000
PRESSURE FLOW


 EGPRS      EGLWC      H3         QWEIR      QPR        BAREA    TRAPEZOID      ELLC       ELTRD      WEIRLN
                                                                    AREA
   1311.43   1311.15       .11        0.      1730.      300.      316.      1310.79    1315.65        0.


3470 ENCROACHMENT STATIONS=      965.8    1034.1  TYPE=      1  TARGET=       68.300
 ELENCL=   1315.66  ELENCR=   1315.66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1365.60 ELREA=      1315.60

 29626.000      6.35   1311.06       .00        .00   1311.43       .37        .36        .00   1365.60
    1730.0        .0    1730.0        .0        .0     353.8        .0       71.4       22.2   1315.60
       .42       .00      4.89       .00       .000      .014      .000       .000    1304.71    965.80
   .000237       78.       78.       78.         2         0         0        .00      55.95   1021.75


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   19DEC00      10:57:13                                                                                                PAGE   48

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


FLOW DISTRIBUTION FOR SECNO=  29626.00          CWSEL=   1311.06

STA=     966.    1022.
  PER Q=    100.0
   AREA=    353.8
    VEL=      4.9
  DEPTH=      6.3

CCHV=      .600 CEHV=      .800
*SECNO 29639.000
 29639.000      6.42   1311.12       .00        .00   1311.45       .34        .00        .02   1310.75
    1730.0        .0    1730.0        .0        .0     370.8        .0       71.5       22.3   1310.70
```

```
       .43       .02      4.67       .02      .000      .014      .000      .000   1304.70    969.99
   .000209       13.       13.       13.         2         0         0       .00     58.12   1028.11


FLOW DISTRIBUTION FOR SECNO=  29639.00          CWSEL=   1311.12

STA=     970.    1028.
  PER Q=    100.0
   AREA=    370.8
    VEL=      4.7
  DEPTH=      6.4

*SECNO 29640.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 29640.000      2.59   1313.29   1313.29       .00   1314.59      1.30       .00       .77   1316.00
    1730.0        .0    1730.0        .0        .0     189.3        .0      71.5      22.3   1316.00
       .43       .00      9.14       .00      .000      .014      .000      .000   1310.70    946.43
   .002305        1.        1.        1.        20        18         0       .00     73.73   1020.15


FLOW DISTRIBUTION FOR SECNO=  29640.00          CWSEL=   1313.29

STA=     946.    1020.
  PER Q=    100.0
   AREA=    189.3
    VEL=      9.1
  DEPTH=      2.6

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   19DEC00      10:57:13                                                                          PAGE    49

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


CCHV=     .100 CEHV=     .300
*SECNO 29753.000

3301 HV CHANGED MORE THAN HVINS

 29753.000      5.61   1314.61       .00       .00   1314.94       .33       .25       .10   1316.00
    1730.0        .0    1730.0        .0        .0     375.2        .0      72.2      22.5   1315.50
       .43       .00      4.61       .00      .000      .035      .000      .000   1309.00    946.31
   .002112       95.       113.      135.         3         0         0       .00    102.34   1048.65


FLOW DISTRIBUTION FOR SECNO=  29753.00          CWSEL=   1314.61

STA=     946.    1060.
  PER Q=    100.0
   AREA=    375.2
    VEL=      4.6
  DEPTH=      3.7

*SECNO 29908.000
 29908.000      5.22   1314.92       .00       .00   1315.32       .41       .36       .02   1316.00
    1730.0        .0    1730.0        .0        .0     338.2        .0      73.5      22.8   1316.00
       .44       .00      5.11       .00      .000      .035      .000      .000   1309.70    952.17
   .002609      140.       155.      170.         2         0         0       .00     92.41   1044.58


FLOW DISTRIBUTION FOR SECNO=  29908.00          CWSEL=   1314.92

STA=     952.    1050.
  PER Q=    100.0
   AREA=    338.2
    VEL=      5.1
  DEPTH=      3.7

*SECNO 30136.000
 30136.000      4.57   1315.57       .00       .00   1316.19       .62       .81       .07   1317.00
    1730.0        .0    1730.0        .0        .0     272.7        .0      75.1      23.3   1317.00
```

```
       .45       .00      6.34       .00      .000      .035      .000      .000   1311.00    947.79
   .005061      210.      228.      240.         2         0         0       .00     88.84   1036.64


1
   19DEC00      10:57:13                                                                                PAGE   50

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 FLOW DISTRIBUTION FOR SECNO=  30136.00          CWSEL=   1315.57

 STA=     948.    1048.
   PER Q=    100.0
    AREA=    272.7
     VEL=      6.3
   DEPTH=      3.1

 *SECNO 30392.000
  30392.000      4.55   1316.55       .00       .00   1317.23       .68      1.02       .02   1318.00
     1730.0        .0    1730.0        .0        .0     262.2        .0      76.7      23.8   1320.00
        .46       .00      6.60       .00      .000      .028      .000      .000   1312.00    961.56
   .003213      255.      256.      255.         0         0         0       .00     79.73   1041.29


 FLOW DISTRIBUTION FOR SECNO=  30392.00          CWSEL=   1316.55

 STA=     962.    1068.
   PER Q=    100.0
    AREA=    262.2
     VEL=      6.6
   DEPTH=      3.3

 *SECNO 30628.000
  30628.000      4.43   1317.33       .00       .00   1317.82       .49       .57       .02   1320.00
     1730.0        .0    1730.0        .0        .0     307.1        .0      78.2      24.2   1320.00
        .47       .00      5.63       .00      .000      .028      .000      .000   1312.90    960.65
   .001896      230.      236.      240.         2         0         0       .00     78.71   1039.35


 FLOW DISTRIBUTION FOR SECNO=  30628.00          CWSEL=   1317.33

 STA=     961.    1045.
   PER Q=    100.0
    AREA=    307.1
     VEL=      5.6
   DEPTH=      3.9

 *SECNO 30836.000
  30836.000      4.10   1317.70       .00       .00   1318.30       .60       .45       .03   1321.00
     1730.0        .0    1730.0        .0        .0     278.0        .0      79.6      24.6   1321.00
        .48       .00      6.22       .00      .000      .028      .000      .000   1313.60    961.68
   .002505      195.      208.      220.         2         0         0       .00     75.53   1037.21


1
   19DEC00      10:57:13                                                                                PAGE   51

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 FLOW DISTRIBUTION FOR SECNO=  30836.00          CWSEL=   1317.70

 STA=     962.    1043.
   PER Q=    100.0
    AREA=    278.0
     VEL=      6.2
   DEPTH=      3.7

 *SECNO 30961.000
  30961.000      4.27   1318.07       .00       .00   1318.59       .52       .28       .01   1320.00
     1730.0        .0    1730.0        .0        .0     298.9        .0      80.4      24.8   1320.00
```

```
       .49       .00      5.79       .00      .000      .028      .000      .000   1313.80    964.04
   .002052      120.      125.      130.         2         0         0       .00     77.86   1041.89


FLOW DISTRIBUTION FOR SECNO=  30961.00          CWSEL=   1318.07

STA=     964.    1045.
  PER Q=    100.0
   AREA=    298.9
    VEL=      5.8
  DEPTH=      3.8

*SECNO 31271.000
 31271.000      4.51   1318.71       .00       .00   1319.19       .48       .60       .00   1322.00
    1730.0        .0    1730.0        .0        .0     309.8        .0      82.6      25.4   1322.00
       .50       .00      5.58       .00      .000      .028      .000      .000   1314.20    961.33
   .001808      310.      310.      310.         2         0         0       .00     77.35   1038.67


FLOW DISTRIBUTION FOR SECNO=  31271.00          CWSEL=   1318.71

STA=     961.    1045.
  PER Q=    100.0
   AREA=    309.8
    VEL=      5.6
  DEPTH=      4.0

*SECNO 31582.000
 31582.000      3.80   1319.30       .00       .00   1319.96       .66       .72       .05   1322.00
    1730.0        .0    1730.0        .0        .0     264.7        .0      84.6      25.9   1322.00
       .52       .00      6.54       .00      .000      .028      .000      .000   1315.50    975.39
   .003026      320.      311.      290.         0         0         0       .00     77.21   1052.61


1
   19DEC00      10:57:13                                                                          PAGE    52

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=  31582.00          CWSEL=   1319.30

STA=     975.    1058.
  PER Q=    100.0
   AREA=    264.7
    VEL=      6.5
  DEPTH=      3.4

CCHV=      .300 CEHV=      .500
*SECNO 31687.000

3301 HV CHANGED MORE THAN HVINS


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1321.81 ELREA=      1321.91

 31687.000      3.50   1319.22       .00       .00   1320.50      1.28       .23       .31   1321.81
    1730.0        .0    1730.0        .0        .0     190.6        .0      85.2      26.1   1321.91
       .52       .00      9.08       .00      .000      .014      .000      .000   1315.72    964.42
   .001658      110.      105.       95.         2         0         0       .00     55.88   1020.30


FLOW DISTRIBUTION FOR SECNO=  31687.00          CWSEL=   1319.22

STA=     964.    1020.
  PER Q=    100.0
   AREA=    190.6
    VEL=      9.1
  DEPTH=      3.4


SPECIAL BRIDGE

5227 DOWNSTREAM ELEV IS    1318.17 , NOT    1319.22 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
```

```
     1.25      1.56      2.90       .00     56.00      5.00    300.00       .00   1317.20   1315.72

 *SECNO 32163.000

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.45

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   19DEC00      10:57:13                                                                                    PAGE   53

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 CLASS B LOW FLOW

 3420 BRIDGE W.S.=    1319.75 BRIDGE VELOCITY=      10.30     CALCULATED CHANNEL AREA=       130.

  EGPRS      EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC     ELTRD     WEIRLN
                                                                  AREA
       .00   1322.35      .00        0.     1730.      300.      311.     1323.30   1331.53        0.


 3470 ENCROACHMENT STATIONS=      969.0    1025.2  TYPE=      1  TARGET=       56.200
  ELENCL=   1331.53  ELENCR=   1332.30

 3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1324.30 ELREA=      1332.30

  32163.000      4.35   1321.55       .00       .00   1322.35       .80      1.85       .00   1324.30
     1730.0        .0    1730.0        .0        .0     240.9        .0      87.5      26.7   1332.30
        .54       .00      7.18       .00      .000      .014      .000      .000   1317.20    969.13
    .000791      505.      476.      440.         0         0         0       .00     56.07   1025.19


 FLOW DISTRIBUTION FOR SECNO=  32163.00          CWSEL=   1321.55

 STA=      969.    1025.
   PER Q=    100.0
    AREA=    240.9
     VEL=      7.2
   DEPTH=      4.3

 CCHV=      .600 CEHV=      .800
 *SECNO 32173.000
  32173.000      4.76   1321.96       .00       .00   1322.51       .55       .01       .15   1324.30
     1730.0        .0    1730.0        .0        .0     291.4        .0      87.6      26.7   1324.20
        .54       .00      5.94       .00      .000      .014      .000      .000   1317.20    969.13
    .000478       10.       10.       10.         3         0         0       .00     61.93   1031.07


 FLOW DISTRIBUTION FOR SECNO=  32173.00          CWSEL=   1321.96

 STA=      969.    1031.
   PER Q=    100.0
    AREA=    291.4
     VEL=      5.9
   DEPTH=      4.7

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   19DEC00      10:57:13                                                                                    PAGE   54

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 CCHV=      .100 CEHV=      .300
 *SECNO 32174.000

 3301 HV CHANGED MORE THAN HVINS

 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  32174.000      3.14   1323.24   1323.24       .00   1324.80      1.56       .00       .30   1327.10
```

```
    1730.0        .0    1730.0        .0        .0     172.6        .0      87.6     26.7   1327.00
       .54       .00     10.02       .00      .000      .028      .000      .000  1320.10    973.06
   .009115        1.        1.        1.        20        14         0       .00    55.99   1029.04


FLOW DISTRIBUTION FOR SECNO=  32174.00          CWSEL=   1323.24

STA=     973.    1029.
  PER Q=    100.0
   AREA=    172.6
    VEL=     10.0
  DEPTH=      3.1

*SECNO 32240.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1328.00 ELREA=      1328.00

 32240.000      2.85   1324.35   1324.35       .00   1325.68      1.33       .58       .02   1328.00
    1730.0        .0    1730.0        .0        .0     186.9        .0      87.9     26.8   1328.00
       .54       .00      9.26       .00      .000      .028      .000      .000  1321.50    969.29
   .008588       55.       66.       70.        20        11         0       .00    70.98   1040.27


FLOW DISTRIBUTION FOR SECNO=  32240.00          CWSEL=   1324.35

STA=     969.    1047.
  PER Q=    100.0
   AREA=    186.9
    VEL=      9.3
  DEPTH=      2.6

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   19DEC00      10:57:13                                                                          PAGE   55


    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


CCHV=      .300 CEHV=      .500
*SECNO 32476.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1332.00 ELREA=      1330.80

 32476.000      2.85   1325.35   1325.35       .00   1326.71      1.36       .90       .01   1332.00
    1730.0        .0    1730.0        .0        .0     184.9        .0      88.9     27.2   1330.80
       .55       .00      9.36       .00      .000      .014      .000      .000  1322.50    967.82
   .002149      250.      236.      220.         4         5         0       .00    68.61   1036.44


FLOW DISTRIBUTION FOR SECNO=  32476.00          CWSEL=   1325.35

STA=     968.    1043.
  PER Q=    100.0
   AREA=    184.9
    VEL=      9.4
  DEPTH=      2.7

*SECNO 32518.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1332.00 ELREA=      1330.80

 32518.000      2.51   1325.71   1325.71       .00   1326.94      1.24       .09       .04   1332.00
    1730.0        .0    1730.0        .0        .0     193.8        .0      89.1     27.3   1330.80
       .55       .00      8.93       .00      .000      .014      .000      .000  1323.20    963.07
   .002314       42.       42.       42.        20        11         0       .00    78.97   1042.03


FLOW DISTRIBUTION FOR SECNO=  32518.00          CWSEL=   1325.71
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```
 STA=      963.    1042.
   PER Q=    100.0
    AREA=    193.8
     VEL=      8.9
   DEPTH=      2.5

1
    19DEC00      10:57:13                                                                                    PAGE   56

     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 CCHV=      .100 CEHV=      .300
 *SECNO 32615.000
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  32615.000      3.97   1327.97   1327.97       .00   1329.42       1.45       .57       .06   1330.00
     1730.0        .0    1730.0        .0        .0     179.2         .0      89.5      27.4   1330.00
        .55       .00      9.65       .00      .000      .057       .000      .000   1324.00    962.12
    .034506       95.       97.      100.        20        14          0       .00     62.77   1024.88

 FLOW DISTRIBUTION FOR SECNO=  32615.00          CWSEL=   1327.97

 STA=      962.    1036.
   PER Q=    100.0
    AREA=    179.2
     VEL=      9.7
   DEPTH=      2.9

 *SECNO 32728.000
 3280 CROSS SECTION  32728.00 EXTENDED       .20 FEET

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.18

  32728.000      6.19   1330.19       .00       .00   1330.43       .24       .89       .12   1330.00
     1730.0       4.8    1725.2        .0      20.2     440.2        .0      90.3      27.8   1330.00
        .56       .24      3.92       .01      .125      .057      .125      .000   1324.00    839.00
    .003414      115.      113.      110.         3         0         0       .00    205.47   1044.47

 FLOW DISTRIBUTION FOR SECNO=  32728.00          CWSEL=   1330.19

 STA=      839.     939.    1044.
   PER Q=       .3     99.7
    AREA=     20.2    440.2
     VEL=       .2      3.9
   DEPTH=       .2      4.2

1
    19DEC00      10:57:13                                                                                    PAGE   57

     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *SECNO 32974.000

 3470 ENCROACHMENT STATIONS=          .0    1035.0  TYPE=       1  TARGET=     1034.999
  32974.000      5.53   1331.03       .00       .00   1331.30       .27       .86       .01   1332.00
     1730.0        .0    1730.0        .0        .0     413.6        .0      92.8      28.6   1335.00
        .58       .00      4.18       .00      .000      .057      .000      .000   1325.50    945.96
    .003596      245.      246.      245.         3         0         0       .00     89.04   1035.00

 FLOW DISTRIBUTION FOR SECNO=  32974.00          CWSEL=   1331.03

 STA=      946.    1141.
```

```
  PER Q=    100.0
   AREA=    413.6
    VEL=      4.2
  DEPTH=      4.6

CCHV=     .600 CEHV=     .800
*SECNO 33108.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1330.00 ELREA=      1334.00

 33108.000      5.56   1331.56       .00       .00   1331.75       .19       .40       .05   1330.00
    1730.0      41.1    1688.9        .0      80.9     473.0        .0      94.3      29.1   1334.00
       .59       .51      3.57       .00      .125      .057      .000      .000   1326.00    804.26
   .002538      140.      134.      135.         2         0         0       .00    207.64   1011.90


FLOW DISTRIBUTION FOR SECNO=  33108.00          CWSEL=   1331.56

STA=     804.     908.    1018.
  PER Q=      2.4      97.6
   AREA=     80.9     473.0
    VEL=       .5       3.6
  DEPTH=       .8       4.6

CCHV=     .100 CEHV=     .300
*SECNO 33699.000

3301 HV CHANGED MORE THAN HVINS

1
   19DEC00      10:57:13                                                                                PAGE    58


    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1340.00 ELREA=      1340.00

 33699.000      6.41   1334.61   1334.61       .00   1336.50      1.89      3.07       .51   1340.00
    1730.0        .0    1730.0        .0        .0     156.9        .0      99.1      30.8   1340.00
       .60       .00     11.03       .00      .000      .040      .000      .000   1328.20    974.93
   .016097      600.      591.      590.        20         8         0       .00     41.60   1016.53


FLOW DISTRIBUTION FOR SECNO=  33699.00          CWSEL=   1334.61

STA=     975.    1030.
  PER Q=    100.0
   AREA=    156.9
    VEL=     11.0
  DEPTH=      3.8

*SECNO 34078.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.96


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1342.00 ELREA=      1342.00

 34078.000      8.84   1337.84       .00       .00   1338.21       .38      1.56       .15   1342.00
    1730.0        .0    1730.0        .0        .0     351.8        .0     101.3      31.2   1342.00
       .62       .00      4.92       .00      .000      .040      .000      .000   1329.00    966.73
   .001843      380.      379.      375.         3         0         0       .00     61.58   1028.31


FLOW DISTRIBUTION FOR SECNO=  34078.00          CWSEL=   1337.84

STA=     967.    1038.
  PER Q=    100.0
   AREA=    351.8
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VEL= 4.9
DEPTH= 5.7

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THIS RUN EXECUTED 19DEC00 10:57:13

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

EXISTING CONDITIONS

SUMMARY PRINTOUT

	SECNO	DEPTH	VCH	TOPWID	AREA	10*KS	K*XNCH	Q	CWSEL	K*CHSL	ELMIN
	25608.000	5.47	11.28	144.29	744.92	81.50	35.00	8400.00	1290.47	.00	1285.00
	25608.000	2.74	6.27	136.26	361.94	60.17	35.00	2268.00	1287.74	.00	1285.00
*	25716.000	6.17	10.20	146.63	823.21	59.82	35.00	8400.00	1291.97	7.41	1285.80
*	25716.000	2.07	9.22	134.50	246.03	213.13	35.00	2268.00	1287.87	7.41	1285.80
	25773.000	6.76	8.62	169.00	974.21	40.59	35.00	8400.00	1292.76	3.51	1286.00
*	25773.000	3.27	5.39	148.24	420.70	40.49	35.00	2268.00	1289.27	3.51	1286.00
	25921.000	6.68	7.02	203.35	1197.25	26.01	35.00	8400.00	1293.66	6.62	1286.98
	25921.000	2.95	4.70	178.75	482.65	32.78	35.00	2268.00	1289.93	6.62	1286.98
	26120.000	4.95	7.30	251.99	1151.08	39.29	35.00	8400.00	1294.25	11.66	1289.30
*	26120.000	1.59	6.70	231.90	338.74	150.40	35.00	2268.00	1290.89	11.66	1289.30
	26393.000	5.31	8.03	228.52	1046.46	47.54	35.00	8400.00	1295.31	2.56	1290.00
*	26393.000	2.96	4.30	215.56	527.05	31.39	35.00	2268.00	1292.96	2.56	1290.00
	26681.000	3.86	9.33	245.89	900.70	85.97	35.00	8400.00	1296.86	10.42	1293.00
*	26681.000	1.47	6.85	229.86	331.08	160.44	35.00	2268.00	1294.47	10.42	1293.00
*	26880.000	3.25	9.95	274.78	844.23	123.37	35.00	8400.00	1299.25	15.08	1296.00
	26880.000	1.47	6.10	258.53	371.66	127.54	35.00	2268.00	1297.47	15.08	1296.00
	27022.000	4.63	6.67	297.75	1259.85	153.10	72.00	8400.00	1302.13	10.56	1297.50
	27022.000	2.23	3.95	275.86	573.55	138.58	72.00	2268.00	1299.73	10.56	1297.50
*	27339.000	6.86	4.64	285.72	1811.91	43.40	72.00	8400.00	1304.86	1.58	1298.00
*	27339.000	3.59	2.49	265.06	910.94	28.21	72.00	2268.00	1301.59	1.58	1298.00
*	27550.000	7.20	4.87	239.90	1723.79	16.90	45.00	8400.00	1305.40	.95	1298.20
*	27550.000	3.73	2.54	239.47	893.68	10.60	45.00	2268.00	1301.93	.95	1298.20

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	SECNO	DEPTH	VCH	TOPWID	AREA	10*KS	K*XNCH	Q	CWSEL	K*CHSL	ELMIN
	27551.000	8.68	4.04	239.95	2078.93	9.19	45.00	8400.00	1305.58	-1299.93	1296.90
*	27551.000	5.11	1.86	239.56	1222.45	3.79	45.00	2268.00	1302.01	-1299.93	1296.90
	27566.000	8.70	4.03	239.95	2083.56	9.12	45.00	8400.00	1305.60	.00	1296.90
	27566.000	5.11	1.85	239.56	1224.96	3.76	45.00	2268.00	1302.01	.00	1296.90
*	27567.000	5.58	10.95	210.03	767.16	20.22	14.00	8400.00	1305.38	2900.02	1299.80
*	27567.000	3.49	6.87	209.95	330.15	23.88	14.00	2268.00	1303.29	2900.02	1299.80
*	27621.000	6.52	4.99	290.00	1684.22	2.20	14.00	8400.00	1307.32	18.52	1300.80
*	27621.000	3.29	3.04	290.00	747.21	2.33	14.00	2268.00	1304.09	18.52	1300.80
*	27636.000	8.50	3.89	305.71	2159.45	26.40	72.00	8400.00	1307.50	-120.00	1299.00
*	27636.000	5.19	1.90	278.24	1195.28	12.15	72.00	2268.00	1304.19	-120.00	1299.00

	27850.000	8.06	3.96	297.90	2121.41	27.10	72.00	8400.00	1308.06	4.67	1300.00
	27850.000	4.48	2.06	272.36	1099.85	15.60	72.00	2268.00	1304.48	4.67	1300.00
	28143.000	8.84	3.93	293.93	2135.07	26.01	72.00	8400.00	1308.84	.00	1300.00
	28143.000	4.97	2.19	268.81	1037.08	18.63	72.00	2268.00	1304.97	.00	1300.00
*	28621.000	9.61	1.51	691.21	5575.52	3.29	72.00	8400.00	1309.41	-.42	1299.80
*	28621.000	5.48	.82	660.19	2777.09	2.31	72.00	2268.00	1305.28	-.42	1299.80
*	28817.000	8.75	3.78	80.00	688.52	9.51	45.00	2600.00	1309.45	4.59	1300.70
*	28817.000	4.61	4.84	80.00	357.18	33.32	45.00	1730.00	1305.31	4.59	1300.70
	28818.000	10.58	3.05	123.38	866.31	4.96	45.00	2600.00	1309.58	-1699.95	1299.00
*	28818.000	6.62	3.31	79.03	523.19	9.90	45.00	1730.00	1305.62	-1699.95	1299.00
	28836.000	10.59	3.05	124.30	867.93	4.94	45.00	2600.00	1309.59	.00	1299.00
	28836.000	6.64	3.29	79.03	525.45	9.77	45.00	1730.00	1305.64	.00	1299.00
*	28837.000	6.64	3.98	142.34	653.88	1.86	14.00	2600.00	1309.54	3900.02	1302.90
*	28837.000	2.73	8.46	93.40	204.53	22.62	14.00	1730.00	1305.63	3900.02	1302.90
*	29140.000	5.73	5.71	117.59	455.03	127.48	72.00	2600.00	1309.53	2.97	1303.80
*	29140.000	3.99	6.56	101.26	263.54	284.64	72.00	1730.00	1307.79	2.97	1303.80
*	29371.000	7.15	4.35	126.04	598.03	56.33	72.00	2600.00	1311.65	3.03	1304.50
*	29371.000	6.10	3.68	117.72	470.42	50.57	72.00	1730.00	1310.60	3.03	1304.50
*	29548.000	6.92	6.85	55.08	379.48	4.27	14.00	2600.00	1311.62	1.13	1304.70
*	29548.000	5.93	5.34	55.08	324.18	3.07	14.00	1730.00	1310.63	1.13	1304.70
	29626.000	8.23	5.67	55.95	458.85	2.42	14.00	2600.00	1312.94	.13	1304.71
	29626.000	6.35	4.89	55.95	353.84	2.37	14.00	1730.00	1311.06	.13	1304.71
	29639.000	8.31	5.41	58.19	480.92	1.98	14.00	2600.00	1313.01	-.77	1304.70
	29639.000	6.42	4.67	58.12	370.79	2.09	14.00	1730.00	1311.12	-.77	1304.70

1

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	SECNO	DEPTH	VCH	TOPWID	AREA	10*KS	K*XNCH	Q	CWSEL	K*CHSL	ELMIN
*	29640.000	3.39	10.47	73.75	248.33	21.63	14.00	2600.00	1314.09	6000.00	1310.70
*	29640.000	2.59	9.14	73.73	189.25	23.05	14.00	1730.00	1313.29	6000.00	1310.70
	29753.000	6.77	5.10	198.87	530.78	21.25	35.00	2600.00	1315.77	-15.04	1309.00
	29753.000	5.61	4.61	102.34	375.22	21.12	35.00	1730.00	1314.61	-15.04	1309.00
	29908.000	6.34	5.82	110.38	447.22	25.96	35.00	2600.00	1316.04	4.52	1309.70
	29908.000	5.22	5.11	92.41	338.24	26.09	35.00	1730.00	1314.92	4.52	1309.70
	30136.000	5.68	6.86	103.50	379.01	46.80	35.00	2600.00	1316.68	5.70	1311.00
	30136.000	4.57	6.34	88.84	272.70	50.61	35.00	1730.00	1315.57	5.70	1311.00
	30392.000	5.59	7.42	90.57	350.43	32.72	28.00	2600.00	1317.59	3.91	1312.00
	30392.000	4.55	6.60	79.73	262.16	32.13	28.00	1730.00	1316.55	3.91	1312.00
	30628.000	5.48	6.63	83.15	392.11	20.52	28.00	2600.00	1318.38	3.81	1312.90
	30628.000	4.43	5.63	78.71	307.09	18.96	28.00	1730.00	1317.33	3.81	1312.90
	30836.000	5.17	7.21	79.55	360.56	25.68	28.00	2600.00	1318.77	3.37	1313.60
	30836.000	4.10	6.22	75.53	278.04	25.05	28.00	1730.00	1317.70	3.37	1313.60
	30961.000	5.37	6.72	81.94	386.78	21.17	28.00	2600.00	1319.17	1.60	1313.80
	30961.000	4.27	5.79	77.86	298.91	20.52	28.00	1730.00	1318.07	1.60	1313.80
	31271.000	5.64	6.50	81.70	399.77	18.89	28.00	2600.00	1319.84	1.29	1314.20
	31271.000	4.51	5.58	77.35	309.76	18.08	28.00	1730.00	1318.71	1.29	1314.20
	31582.000	4.93	7.35	81.71	353.96	28.16	28.00	2600.00	1320.43	4.18	1315.50
	31582.000	3.80	6.54	77.21	264.68	30.26	28.00	1730.00	1319.30	4.18	1315.50
	31687.000	4.47	10.63	55.91	244.54	16.99	14.00	2600.00	1320.19	2.09	1315.72
	31687.000	3.50	9.08	55.88	190.59	16.58	14.00	1730.00	1319.22	2.09	1315.72
*	32163.000	5.71	8.20	56.09	317.06	7.56	14.00	2600.00	1322.91	3.11	1317.20
*	32163.000	4.35	7.18	56.07	240.94	7.91	14.00	1730.00	1321.55	3.11	1317.20
	32173.000	6.24	6.79	61.98	382.86	4.59	14.00	2600.00	1323.44	.00	1317.20

	32173.000	4.76	5.94	61.93	291.36	4.78	14.00	1730.00	1321.96	.00	1317.20
*	32174.000	4.10	11.48	56.02	226.55	86.67	28.00	2600.00	1324.20	2900.02	1320.10
*	32174.000	3.14	10.02	55.99	172.64	91.15	28.00	1730.00	1323.24	2900.02	1320.10
*	32240.000	4.70	5.33	78.09	324.81	15.65	28.00	1730.00	1326.20	21.21	1321.50
*	32240.000	2.85	9.26	70.98	186.88	85.88	28.00	1730.00	1324.35	21.21	1321.50
	32476.000	3.82	6.86	71.18	252.19	8.11	14.00	1730.00	1326.32	4.24	1322.50
*	32476.000	2.85	9.36	68.61	184.90	21.49	14.00	1730.00	1325.35	4.24	1322.50
	32518.000	3.13	7.12	78.98	243.14	11.08	14.00	1730.00	1326.33	16.67	1323.20
*	32518.000	2.51	8.93	78.97	193.79	23.14	14.00	1730.00	1325.71	16.67	1323.20

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	SECNO	DEPTH	VCH	TOPWID	AREA	10*KS	K*XNCH	Q	CWSEL	K*CHSL	ELMIN
*	32615.000	3.97	9.65	62.77	179.23	344.85	57.00	1730.00	1327.97	8.25	1324.00
*	32615.000	3.97	9.65	62.77	179.19	345.06	57.00	1730.00	1327.97	8.25	1324.00
*	32728.000	6.19	3.92	205.47	460.36	34.14	57.00	1730.00	1330.19	.00	1324.00
*	32728.000	6.19	3.92	205.47	460.39	34.14	57.00	1730.00	1330.19	.00	1324.00
	32974.000	5.53	4.18	89.04	413.62	35.96	57.00	1730.00	1331.03	6.10	1325.50
	32974.000	5.53	4.18	89.04	413.62	35.96	57.00	1730.00	1331.03	6.10	1325.50
	33108.000	5.56	3.57	207.63	553.92	25.39	57.00	1730.00	1331.56	3.73	1326.00
	33108.000	5.56	3.57	207.64	553.95	25.38	57.00	1730.00	1331.56	3.73	1326.00
*	33699.000	6.41	11.03	41.60	156.88	160.99	40.00	1730.00	1334.61	3.72	1328.20
*	33699.000	6.41	11.03	41.60	156.88	160.97	40.00	1730.00	1334.61	3.72	1328.20
*	34078.000	8.84	4.92	61.58	351.80	18.43	40.00	1730.00	1337.84	2.11	1329.00
*	34078.000	8.84	4.92	61.58	351.80	18.43	40.00	1730.00	1337.84	2.11	1329.00

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EXISTING CONDITIONS

SUMMARY PRINTOUT

	SECNO	FRCH	Q	CLSTA	BW	DEPTH	VEXR	VEXT
	25608.000	.87	8400.00	.00	.01	5.47	.00	.00
	25608.000	.68	2268.00	.00	.01	2.74	.00	.00
*	25716.000	.76	8400.00	.00	.01	6.17	.00	.00
*	25716.000	1.20	2268.00	.00	.01	2.07	.00	.00
	25773.000	.63	8400.00	.00	.01	6.76	.00	.00
*	25773.000	.56	2268.00	.00	.01	3.27	.00	.00
	25921.000	.51	8400.00	.00	.01	6.68	.00	.00
	25921.000	.50	2268.00	.00	.01	2.95	.00	.00
	26120.000	.60	8400.00	.00	.01	4.95	.00	.00
*	26120.000	.98	2268.00	.00	.01	1.59	.00	.00
	26393.000	.66	8400.00	.00	.01	5.31	.00	.00
*	26393.000	.48	2268.00	.00	.01	2.96	.00	.00
	26681.000	.86	8400.00	.00	.01	3.86	.00	.00
*	26681.000	1.01	2268.00	.00	.01	1.47	.00	.00
*	26880.000	1.00	8400.00	.00	.01	3.25	.00	.00
	26880.000	.90	2268.00	.00	.01	1.47	.00	.00
	27022.000	.57	8400.00	.00	.01	4.63	.00	.00
	27022.000	.48	2268.00	.00	.01	2.23	.00	.00
*	27339.000	.32	8400.00	.00	.01	6.86	.00	.00
*	27339.000	.24	2268.00	.00	.01	3.59	.00	.00
*	27550.000	.32	8400.00	.00	.01	7.20	.00	.00

*	27550.000	.23	2268.00	.00	.01	3.73	.00	.00
	27551.000	.24	8400.00	.00	.01	8.68	.00	.00
*	27551.000	.14	2268.00	.00	.01	5.11	.00	.00
	27566.000	.24	8400.00	.00	.01	8.70	.00	.00
	27566.000	.14	2268.00	.00	.01	5.11	.00	.00
*	27567.000	1.01	8400.00	.00	.01	5.58	.00	.00
*	27567.000	.97	2268.00	.00	.01	3.49	.00	.00
*	27621.000	.36	8400.00	.00	.01	6.52	.00	.00
*	27621.000	.33	2268.00	.00	.01	3.29	.00	.00
*	27636.000	.26	8400.00	.00	.01	8.50	.00	.00
*	27636.000	.16	2268.00	.00	.01	5.19	.00	.00

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	SECNO	FRCH	Q	CLSTA	BW	DEPTH	VEXR	VEXT
	27850.000	.26	8400.00	.00	.01	8.06	.00	.00
	27850.000	.18	2268.00	.00	.01	4.48	.00	.00
	28143.000	.26	8400.00	.00	.01	8.84	.00	.00
	28143.000	.20	2268.00	.00	.01	4.97	.00	.00
*	28621.000	.09	8400.00	.00	.01	9.61	.00	.00
*	28621.000	.07	2268.00	.00	.01	5.48	.00	.00
*	28817.000	.23	2600.00	.00	.01	8.75	.00	.00
*	28817.000	.40	1730.00	.00	.01	4.61	.00	.00
	28818.000	.17	2600.00	.00	.01	10.58	.00	.00
*	28818.000	.23	1730.00	.00	.01	6.62	.00	.00
	28836.000	.17	2600.00	.00	.01	10.59	.00	.00
	28836.000	.23	1730.00	.00	.01	6.64	.00	.00
*	28837.000	.33	2600.00	.00	.01	6.64	.00	.00
*	28837.000	1.01	1730.00	.00	.01	2.73	.00	.00
*	29140.000	.51	2600.00	.00	.01	5.73	.00	.00
*	29140.000	.72	1730.00	.00	.01	3.99	.00	.00
*	29371.000	.35	2600.00	.00	.01	7.15	.00	.00
*	29371.000	.32	1730.00	.00	.01	6.10	.00	.00
*	29548.000	.46	2600.00	.00	.01	6.92	.00	.00
*	29548.000	.39	1730.00	.00	.01	5.93	.00	.00
	29626.000	.35	2600.00	.00	.01	8.23	.00	.00
	29626.000	.34	1730.00	.00	.01	6.35	.00	.00
	29639.000	.33	2600.00	.00	.01	8.31	.00	.00
	29639.000	.33	1730.00	.00	.01	6.42	.00	.00
*	29640.000	1.01	2600.00	.00	.01	3.39	.00	.00
*	29640.000	1.01	1730.00	.00	.01	2.59	.00	.00
	29753.000	.44	2600.00	.00	.01	6.77	.00	.00
	29753.000	.42	1730.00	.00	.01	5.61	.00	.00
	29908.000	.49	2600.00	.00	.01	6.34	.00	.00
	29908.000	.47	1730.00	.00	.01	5.22	.00	.00
	30136.000	.63	2600.00	.00	.01	5.68	.00	.00
	30136.000	.64	1730.00	.00	.01	4.57	.00	.00
	30392.000	.66	2600.00	.00	.01	5.59	.00	.00
	30392.000	.64	1730.00	.00	.01	4.55	.00	.00

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SECNO FRCH Q CLSTA BW DEPTH VEXR VEXT

	30628.000	.54	2600.00	.00	.01	5.48	.00	.00
	30628.000	.50	1730.00	.00	.01	4.43	.00	.00
	30836.000	.60	2600.00	.00	.01	5.17	.00	.00
	30836.000	.57	1730.00	.00	.01	4.10	.00	.00
	30961.000	.55	2600.00	.00	.01	5.37	.00	.00
	30961.000	.52	1730.00	.00	.01	4.27	.00	.00
	31271.000	.52	2600.00	.00	.01	5.64	.00	.00
	31271.000	.49	1730.00	.00	.01	4.51	.00	.00
	31582.000	.62	2600.00	.00	.01	4.93	.00	.00
	31582.000	.62	1730.00	.00	.01	3.80	.00	.00
	31687.000	.90	2600.00	.00	.01	4.47	.00	.00
	31687.000	.87	1730.00	.00	.01	3.50	.00	.00
*	32163.000	.61	2600.00	.00	.01	5.71	.00	.00
*	32163.000	.61	1730.00	.00	.01	4.35	.00	.00
	32173.000	.48	2600.00	.00	.01	6.24	.00	.00
	32173.000	.48	1730.00	.00	.01	4.76	.00	.00
*	32174.000	1.01	2600.00	.00	.01	4.10	.00	.00
*	32174.000	1.01	1730.00	.00	.01	3.14	.00	.00
*	32240.000	.46	1730.00	.00	.01	4.70	.00	.00
*	32240.000	1.01	1730.00	.00	.01	2.85	.00	.00
	32476.000	.64	1730.00	.00	.01	3.82	.00	.00
*	32476.000	1.00	1730.00	.00	.01	2.85	.00	.00
	32518.000	.71	1730.00	.00	.01	3.13	.00	.00
*	32518.000	1.00	1730.00	.00	.01	2.51	.00	.00
*	32615.000	1.01	1730.00	.00	.01	3.97	.00	.00
*	32615.000	1.01	1730.00	.00	.01	3.97	.00	.00
*	32728.000	.34	1730.00	.00	.01	6.19	.00	.00
*	32728.000	.34	1730.00	.00	.01	6.19	.00	.00
	32974.000	.34	1730.00	.00	.01	5.53	.00	.00
	32974.000	.34	1730.00	.00	.01	5.53	.00	.00
	33108.000	.29	1730.00	.00	.01	5.56	.00	.00
	33108.000	.29	1730.00	.00	.01	5.56	.00	.00
*	33699.000	1.00	1730.00	.00	.01	6.41	.00	.00
*	33699.000	1.00	1730.00	.00	.01	6.41	.00	.00

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	SECNO	FRCH	Q	CLSTA	BW	DEPTH	VEXR	VEXT
*	34078.000	.36	1730.00	.00	.01	8.84	.00	.00
*	34078.000	.36	1730.00	.00	.01	8.84	.00	.00

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EXISTING CONDITIONS

SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
25608.000	.00	.00	.00	1285.00	8400.00	1290.47	.00	1292.44	81.50	11.28	744.92	930.47
25608.000	.00	.00	.00	1285.00	2268.00	1287.74	.00	1288.35	60.17	6.27	361.94	292.38
* 25716.000	108.00	1303.83	1295.63	1285.80	8400.00	1291.97	.00	1293.59	59.82	10.20	823.21	1086.04

```
 * 25716.000    108.00   1303.83   1295.63   1285.80   2268.00   1287.87       .00   1289.19    213.13      9.22    246.03
 155.36

   25773.000     57.00       .00       .00   1286.00   8400.00   1292.76       .00   1293.91     40.59      8.62    974.21
1318.44
 * 25773.000     57.00       .00       .00   1286.00   2268.00   1289.27       .00   1289.72     40.49      5.39    420.70
 356.43

   25921.000    148.00       .00       .00   1286.98   8400.00   1293.66       .00   1294.43     26.01      7.02   1197.25
1646.91
   25921.000    148.00       .00       .00   1286.98   2268.00   1289.93       .00   1290.27     32.78      4.70    482.65
 396.11

   26120.000    199.00       .00       .00   1289.30   8400.00   1294.25       .00   1295.08     39.29      7.30   1151.08
1340.19
 * 26120.000    199.00       .00       .00   1289.30   2268.00   1290.89   1290.86   1291.59    150.40      6.70    338.74
 184.93

   26393.000    273.00       .00       .00   1290.00   8400.00   1295.31       .00   1296.31     47.54      8.03   1046.46
1218.29
 * 26393.000    273.00       .00       .00   1290.00   2268.00   1292.96       .00   1293.24     31.39      4.30    527.05
 404.84

   26681.000    288.00       .00       .00   1293.00   8400.00   1296.86       .00   1298.21     85.97      9.33    900.70
 905.96
 * 26681.000    288.00       .00       .00   1293.00   2268.00   1294.47   1294.47   1295.20    160.44      6.85    331.08
 179.06

 * 26880.000    199.00       .00       .00   1296.00   8400.00   1299.25   1299.25   1300.79    123.37      9.95    844.23
 756.25
   26880.000    199.00       .00       .00   1296.00   2268.00   1297.47       .00   1298.05    127.54      6.10    371.66
 200.83

   27022.000    142.00       .00       .00   1297.50   8400.00   1302.13       .00   1302.82    153.10      6.67   1259.85
 678.88
   27022.000    142.00       .00       .00   1297.50   2268.00   1299.73       .00   1299.97    138.58      3.95    573.55
 192.66

 * 27339.000    317.00       .00       .00   1298.00   8400.00   1304.86       .00   1305.20     43.40      4.64   1811.91
1275.02
 * 27339.000    317.00       .00       .00   1298.00   2268.00   1301.59       .00   1301.69     28.21      2.49    910.94
 427.01

 * 27550.000    211.00       .00       .00   1298.20   8400.00   1305.40       .00   1305.76     16.90      4.87   1723.79
2043.56
 * 27550.000    211.00       .00       .00   1298.20   2268.00   1301.93       .00   1302.03     10.60      2.54    893.68
 696.50

   27551.000      1.00       .00       .00   1296.90   8400.00   1305.58       .00   1305.83      9.19      4.04   2078.93
2770.88
 * 27551.000      1.00       .00       .00   1296.90   2268.00   1302.01       .00   1302.06      3.79      1.86   1222.45
1165.37

   27566.000     15.00       .00       .00   1296.90   8400.00   1305.60       .00   1305.85      9.12      4.03   2083.56
2780.89
   27566.000     15.00       .00       .00   1296.90   2268.00   1302.01       .00   1302.07      3.76      1.85   1224.96
1169.30

 * 27567.000      1.00       .00       .00   1299.80   8400.00   1305.38   1305.38   1307.24     20.22     10.95    767.16
1868.09
 * 27567.000      1.00       .00       .00   1299.80   2268.00   1303.29   1303.29   1304.03     23.88      6.87    330.15
 464.10

 * 27621.000     54.00       .00       .00   1300.80   8400.00   1307.32       .00   1307.71      2.20      4.99   1684.22
5669.33
 * 27621.000     54.00       .00       .00   1300.80   2268.00   1304.09       .00   1304.23      2.33      3.04    747.21
1484.58

 * 27636.000     15.00       .00       .00   1299.00   8400.00   1307.50       .00   1307.73     26.40      3.89   2159.45
1634.99
 * 27636.000     15.00       .00       .00   1299.00   2268.00   1304.19       .00   1304.25     12.15      1.90   1195.28
 650.62

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   19DEC00      10:57:13                                                                                          PAGE   68

      SECNO      XLCH      ELTRD      ELLC      ELMIN       Q       CWSEL     CRIWS      EG       10*KS      VCH       AREA
  .01K
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27850.000	214.00	.00	.00	1300.00	8400.00	1308.06	.00	1308.31	27.10	3.96	2121.41
1613.64											
27850.000	214.00	.00	.00	1300.00	2268.00	1304.48	.00	1304.55	15.60	2.06	1099.85
574.30											
28143.000	293.00	.00	.00	1300.00	8400.00	1308.84	.00	1309.08	26.01	3.93	2135.07
1646.95											
28143.000	293.00	.00	.00	1300.00	2268.00	1304.97	.00	1305.05	18.63	2.19	1037.08
525.42											
* 28621.000	478.00	.00	.00	1299.80	8400.00	1309.41	.00	1309.45	3.29	1.51	5575.52
4628.29											
* 28621.000	478.00	.00	.00	1299.80	2268.00	1305.28	.00	1305.29	2.31	.82	2777.09
1492.44											
* 28817.000	196.00	.00	.00	1300.70	2600.00	1309.45	.00	1309.67	9.51	3.78	688.52
842.90											
* 28817.000	196.00	.00	.00	1300.70	1730.00	1305.31	.00	1305.68	33.32	4.84	357.18
299.72											
28818.000	1.00	.00	.00	1299.00	2600.00	1309.58	.00	1309.72	4.96	3.05	866.31
1167.23											
* 28818.000	1.00	.00	.00	1299.00	1730.00	1305.62	.00	1305.79	9.90	3.31	523.19
549.88											
28836.000	18.00	.00	.00	1299.00	2600.00	1309.59	.00	1309.73	4.94	3.05	867.93
1170.09											
28836.000	18.00	.00	.00	1299.00	1730.00	1305.64	.00	1305.81	9.77	3.29	525.45
553.61											
* 28837.000	1.00	.00	.00	1302.90	2600.00	1309.54	.00	1309.78	1.86	3.98	653.88
1904.10											
* 28837.000	1.00	.00	.00	1302.90	1730.00	1305.63	1305.63	1306.74	22.62	8.46	204.53
363.76											
* 29140.000	303.00	.00	.00	1303.80	2600.00	1309.53	.00	1310.04	127.48	5.71	455.03
230.28											
* 29140.000	303.00	.00	.00	1303.80	1730.00	1307.79	1307.20	1308.45	284.64	6.56	263.54
102.54											
* 29371.000	231.00	.00	.00	1304.50	2600.00	1311.65	.00	1311.94	56.33	4.35	598.03
346.41											
* 29371.000	231.00	.00	.00	1304.50	1730.00	1310.60	.00	1310.81	50.57	3.68	470.42
243.28											
* 29548.000	177.00	.00	.00	1304.70	2600.00	1311.62	.00	1312.34	4.27	6.85	379.48
1258.09											
* 29548.000	177.00	.00	.00	1304.70	1730.00	1310.63	.00	1311.07	3.07	5.34	324.18
986.93											
29626.000	78.00	1315.65	1310.79	1304.71	2600.00	1312.94	.00	1313.44	2.42	5.67	458.85
1671.03											
29626.000	78.00	1315.65	1310.79	1304.71	1730.00	1311.06	.00	1311.43	2.37	4.89	353.84
1122.84											
29639.000	13.00	.00	.00	1304.70	2600.00	1313.01	.00	1313.46	1.98	5.41	480.92
1845.98											
29639.000	13.00	.00	.00	1304.70	1730.00	1311.12	.00	1311.45	2.09	4.67	370.79
1197.10											
* 29640.000	1.00	.00	.00	1310.70	2600.00	1314.09	1314.09	1315.80	21.63	10.47	248.33
559.11											
* 29640.000	1.00	.00	.00	1310.70	1730.00	1313.29	1313.29	1314.59	23.05	9.14	189.25
360.31											
29753.000	113.00	.00	.00	1309.00	2600.00	1315.77	.00	1316.17	21.25	5.10	530.78
564.08											
29753.000	113.00	.00	.00	1309.00	1730.00	1314.61	.00	1314.94	21.12	4.61	375.22
376.48											
29908.000	155.00	.00	.00	1309.70	2600.00	1316.04	.00	1316.57	25.96	5.82	447.22
510.27											
29908.000	155.00	.00	.00	1309.70	1730.00	1314.92	.00	1315.32	26.09	5.11	338.24
338.70											
30136.000	228.00	.00	.00	1311.00	2600.00	1316.68	.00	1317.41	46.80	6.86	379.01
380.06											
30136.000	228.00	.00	.00	1311.00	1730.00	1315.57	.00	1316.19	50.61	6.34	272.70
243.18											

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   30392.000    256.00       .00       .00   1312.00   2600.00   1317.59       .00   1318.44     32.72      7.42    350.43
 454.50
   30392.000    256.00       .00       .00   1312.00   1730.00   1316.55       .00   1317.23     32.13      6.60    262.16
 305.19

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   19DEC00      10:57:13                                                                                          PAGE   69

      SECNO      XLCH     ELTRD      ELLC     ELMIN         Q     CWSEL     CRIWS        EG     10*KS       VCH      AREA
 .01K

   30628.000    236.00       .00       .00   1312.90   2600.00   1318.38       .00   1319.06     20.52      6.63    392.11
 573.96
   30628.000    236.00       .00       .00   1312.90   1730.00   1317.33       .00   1317.82     18.96      5.63    307.09
 397.27

   30836.000    208.00       .00       .00   1313.60   2600.00   1318.77       .00   1319.57     25.68      7.21    360.56
 513.09
   30836.000    208.00       .00       .00   1313.60   1730.00   1317.70       .00   1318.30     25.05      6.22    278.04
 345.62

   30961.000    125.00       .00       .00   1313.80   2600.00   1319.17       .00   1319.88     21.17      6.72    386.78
 565.09
   30961.000    125.00       .00       .00   1313.80   1730.00   1318.07       .00   1318.59     20.52      5.79    298.91
 381.86

   31271.000    310.00       .00       .00   1314.20   2600.00   1319.84       .00   1320.50     18.89      6.50    399.77
 598.14
   31271.000    310.00       .00       .00   1314.20   1730.00   1318.71       .00   1319.19     18.08      5.58    309.76
 406.90

   31582.000    311.00       .00       .00   1315.50   2600.00   1320.43       .00   1321.26     28.16      7.35    353.96
 489.99
   31582.000    311.00       .00       .00   1315.50   1730.00   1319.30       .00   1319.96     30.26      6.54    264.68
 314.52

   31687.000    105.00       .00       .00   1315.72   2600.00   1320.19       .00   1321.95     16.99     10.63    244.54
 630.85
   31687.000    105.00       .00       .00   1315.72   1730.00   1319.22       .00   1320.50     16.58      9.08    190.59
 424.90

 * 32163.000    476.00   1331.53   1323.30   1317.20   2600.00   1322.91       .00   1323.95      7.56      8.20    317.06
 945.57
 * 32163.000    476.00   1331.53   1323.30   1317.20   1730.00   1321.55       .00   1322.35      7.91      7.18    240.94
 615.02

   32173.000     10.00       .00       .00   1317.20   2600.00   1323.44       .00   1324.15      4.59      6.79    382.86
1213.79
   32173.000     10.00       .00       .00   1317.20   1730.00   1321.96       .00   1322.51      4.78      5.94    291.36
 791.10

 * 32174.000      1.00       .00       .00   1320.10   2600.00   1324.20   1324.20   1326.24     86.67     11.48    226.55
 279.28
 * 32174.000      1.00       .00       .00   1320.10   1730.00   1323.24   1323.24   1324.80     91.15     10.02    172.64
 181.21

 * 32240.000     66.00       .00       .00   1321.50   1730.00   1326.20       .00   1326.65     15.65      5.33    324.81
 437.30
 * 32240.000     66.00       .00       .00   1321.50   1730.00   1324.35   1324.35   1325.68     85.88      9.26    186.88
 186.68

   32476.000    236.00       .00       .00   1322.50   1730.00   1326.32       .00   1327.05      8.11      6.86    252.19
 607.66
 * 32476.000    236.00       .00       .00   1322.50   1730.00   1325.35   1325.35   1326.71     21.49      9.36    184.90
 373.18

   32518.000     42.00       .00       .00   1323.20   1730.00   1326.33       .00   1327.12     11.08      7.12    243.14
 519.83
 * 32518.000     42.00       .00       .00   1323.20   1730.00   1325.71   1325.71   1326.94     23.14      8.93    193.79
 359.67

 * 32615.000     97.00       .00       .00   1324.00   1730.00   1327.97   1327.97   1329.42    344.85      9.65    179.23
  93.16
 * 32615.000     97.00       .00       .00   1324.00   1730.00   1327.97   1327.97   1329.42    345.06      9.65    179.19
  93.13

 * 32728.000    113.00       .00       .00   1324.00   1730.00   1330.19       .00   1330.43     34.14      3.92    460.36
 296.07
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 *  32728.000    113.00       .00       .00   1324.00   1730.00   1330.19       .00   1330.43     34.14      3.92    460.39
296.09

   32974.000    246.00       .00       .00   1325.50   1730.00   1331.03       .00   1331.30     35.96      4.18    413.62
288.48
   32974.000    246.00       .00       .00   1325.50   1730.00   1331.03       .00   1331.30     35.96      4.18    413.62
288.48

   33108.000    134.00       .00       .00   1326.00   1730.00   1331.56       .00   1331.75     25.39      3.57    553.92
343.35
   33108.000    134.00       .00       .00   1326.00   1730.00   1331.56       .00   1331.75     25.38      3.57    553.95
343.37

 *  33699.000    591.00       .00       .00   1328.20   1730.00   1334.61   1334.61   1336.50    160.99     11.03    156.88
136.35
 *  33699.000    591.00       .00       .00   1328.20   1730.00   1334.61   1334.61   1336.50    160.97     11.03    156.88
136.35

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   19DEC00      10:57:13                                                                                          PAGE    70

      SECNO       XLCH      ELTRD       ELLC      ELMIN         Q      CWSEL      CRIWS        EG     10*KS       VCH      AREA
 .01K

 *  34078.000    379.00       .00       .00   1329.00   1730.00   1337.84       .00   1338.21     18.43      4.92    351.80
402.99
 *  34078.000    379.00       .00       .00   1329.00   1730.00   1337.84       .00   1338.21     18.43      4.92    351.80
402.99

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   19DEC00      10:57:13                                                                                          PAGE    71

 EXISTING CONDITIONS

 SUMMARY PRINTOUT TABLE  150

      SECNO         Q      CWSEL     DIFWSP     DIFWSX     DIFKWS    TOPWID      XLCH

   25608.000   8400.00   1290.47        .00        .00     110.97    144.29        .00
   25608.000   2268.00   1287.74      -2.73        .00     112.74    136.26        .00

 *  25716.000   8400.00   1291.97        .00       1.51        .00    146.63     108.00
 *  25716.000   2268.00   1287.87      -4.11        .13        .00    134.50     108.00

   25773.000   8400.00   1292.76        .00        .79        .00    169.00      57.00
 *  25773.000   2268.00   1289.27      -3.49       1.40        .00    148.24      57.00

   25921.000   8400.00   1293.66        .00        .90        .00    203.35     148.00
   25921.000   2268.00   1289.93      -3.74        .66        .00    178.75     148.00

   26120.000   8400.00   1294.25        .00        .59        .00    251.99     199.00
 *  26120.000   2268.00   1290.89      -3.36        .97        .00    231.90     199.00

   26393.000   8400.00   1295.31        .00       1.06        .00    228.52     273.00
 *  26393.000   2268.00   1292.96      -2.35       2.06        .00    215.56     273.00

   26681.000   8400.00   1296.86        .00       1.56        .00    245.89     288.00
 *  26681.000   2268.00   1294.47      -2.39       1.52        .00    229.86     288.00

 *  26880.000   8400.00   1299.25        .00       2.39        .00    274.78     199.00
   26880.000   2268.00   1297.47      -1.77       3.00        .00    258.53     199.00

   27022.000   8400.00   1302.13        .00       2.88        .00    297.75     142.00
   27022.000   2268.00   1299.73      -2.40       2.26        .00    275.86     142.00

 *  27339.000   8400.00   1304.86        .00       2.74        .00    285.72     317.00
 *  27339.000   2268.00   1301.59      -3.27       1.86        .00    265.06     317.00

 *  27550.000   8400.00   1305.40        .00        .53        .00    239.90     211.00
 *  27550.000   2268.00   1301.93      -3.46        .34        .00    239.47     211.00

   27551.000   8400.00   1305.58        .00        .19        .00    239.95       1.00
 *  27551.000   2268.00   1302.01      -3.57        .08        .00    239.56       1.00

   27566.000   8400.00   1305.60        .00        .02        .00    239.95      15.00
   27566.000   2268.00   1302.01      -3.58        .01        .00    239.56      15.00
```

*	27567.000	8400.00	1305.38	.00	-.22	.00	210.03	1.00
*	27567.000	2268.00	1303.29	-2.08	1.28	.00	209.95	1.00
*	27621.000	8400.00	1307.32	.00	1.94	.00	290.00	54.00
*	27621.000	2268.00	1304.09	-3.23	.80	.00	290.00	54.00
*	27636.000	8400.00	1307.50	.00	.17	.00	305.71	15.00
*	27636.000	2268.00	1304.19	-3.30	.10	.00	278.24	15.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	27850.000	8400.00	1308.06	.00	.57	.00	297.90	214.00
	27850.000	2268.00	1304.48	-3.58	.29	.00	272.36	214.00
	28143.000	8400.00	1308.84	.00	.78	.00	293.93	293.00
	28143.000	2268.00	1304.97	-3.87	.49	.00	268.81	293.00
*	28621.000	8400.00	1309.41	.00	.57	.00	691.21	478.00
*	28621.000	2268.00	1305.28	-4.13	.31	.00	660.19	478.00
*	28817.000	2600.00	1309.45	.00	.04	.00	80.00	196.00
*	28817.000	1730.00	1305.31	-4.14	.03	.00	80.00	196.00
	28818.000	2600.00	1309.58	.00	.13	.00	123.38	1.00
*	28818.000	1730.00	1305.62	-3.96	.31	.00	79.03	1.00
	28836.000	2600.00	1309.59	.00	.01	.00	124.30	18.00
	28836.000	1730.00	1305.64	-3.94	.02	.00	79.03	18.00
*	28837.000	2600.00	1309.54	.00	-.05	.00	142.34	1.00
*	28837.000	1730.00	1305.63	-3.91	-.01	.00	93.40	1.00
*	29140.000	2600.00	1309.53	.00	.00	.00	117.59	303.00
*	29140.000	1730.00	1307.79	-1.75	2.15	.00	101.26	303.00
*	29371.000	2600.00	1311.65	.00	2.11	.00	126.04	231.00
*	29371.000	1730.00	1310.60	-1.05	2.82	.00	117.72	231.00
*	29548.000	2600.00	1311.62	.00	-.03	.00	55.08	177.00
*	29548.000	1730.00	1310.63	-.99	.02	.00	55.08	177.00
	29626.000	2600.00	1312.94	.00	1.32	.00	55.95	78.00
	29626.000	1730.00	1311.06	-1.88	.43	.00	55.95	78.00
	29639.000	2600.00	1313.01	.00	.07	.00	58.19	13.00
	29639.000	1730.00	1311.12	-1.89	.06	.00	58.12	13.00
*	29640.000	2600.00	1314.09	.00	1.08	.00	73.75	1.00
*	29640.000	1730.00	1313.29	-.80	2.18	.00	73.73	1.00
	29753.000	2600.00	1315.77	.00	1.67	.00	198.87	113.00
	29753.000	1730.00	1314.61	-1.16	1.31	.00	102.34	113.00
	29908.000	2600.00	1316.04	.00	.28	.00	110.38	155.00
	29908.000	1730.00	1314.92	-1.13	.31	.00	92.41	155.00
	30136.000	2600.00	1316.68	.00	.63	.00	103.50	228.00
	30136.000	1730.00	1315.57	-1.11	.65	.00	88.84	228.00
	30392.000	2600.00	1317.59	.00	.91	.00	90.57	256.00
	30392.000	1730.00	1316.55	-1.03	.98	.00	79.73	256.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	30628.000	2600.00	1318.38	.00	.79	.00	83.15	236.00
	30628.000	1730.00	1317.33	-1.05	.77	.00	78.71	236.00
	30836.000	2600.00	1318.77	.00	.39	.00	79.55	208.00
	30836.000	1730.00	1317.70	-1.06	.38	.00	75.53	208.00
	30961.000	2600.00	1319.17	.00	.41	.00	81.94	125.00
	30961.000	1730.00	1318.07	-1.10	.37	.00	77.86	125.00

	31271.000	2600.00	1319.84	.00	.67	.00	81.70	310.00
	31271.000	1730.00	1318.71	-1.13	.64	.00	77.35	310.00
	31582.000	2600.00	1320.43	.00	.58	.00	81.71	311.00
	31582.000	1730.00	1319.30	-1.13	.59	.00	77.21	311.00
	31687.000	2600.00	1320.19	.00	-.23	.00	55.91	105.00
	31687.000	1730.00	1319.22	-.97	-.08	.00	55.88	105.00
*	32163.000	2600.00	1322.91	.00	2.71	.00	56.09	476.00
*	32163.000	1730.00	1321.55	-1.36	2.33	.00	56.07	476.00
	32173.000	2600.00	1323.44	.00	.53	.00	61.98	10.00
	32173.000	1730.00	1321.96	-1.48	.41	.00	61.93	10.00
*	32174.000	2600.00	1324.20	.00	.76	.00	56.02	1.00
*	32174.000	1730.00	1323.24	-.96	1.28	.00	55.99	1.00
*	32240.000	1730.00	1326.20	.00	2.01	.00	78.09	66.00
*	32240.000	1730.00	1324.35	-1.85	1.12	.00	70.98	66.00
	32476.000	1730.00	1326.32	.00	.11	.00	71.18	236.00
*	32476.000	1730.00	1325.35	-.97	1.00	.00	68.61	236.00
	32518.000	1730.00	1326.33	.00	.01	.00	78.98	42.00
*	32518.000	1730.00	1325.71	-.63	.35	.00	78.97	42.00
*	32615.000	1730.00	1327.97	.00	1.64	.00	62.77	97.00
*	32615.000	1730.00	1327.97	.00	2.27	.00	62.77	97.00
*	32728.000	1730.00	1330.19	.00	2.22	.00	205.47	113.00
*	32728.000	1730.00	1330.19	.00	2.22	.00	205.47	113.00
	32974.000	1730.00	1331.03	.00	.84	.00	89.04	246.00
	32974.000	1730.00	1331.03	.00	.84	.00	89.04	246.00
	33108.000	1730.00	1331.56	.00	.53	.00	207.63	134.00
	33108.000	1730.00	1331.56	.00	.53	.00	207.64	134.00
*	33699.000	1730.00	1334.61	.00	3.05	.00	41.60	591.00
*	33699.000	1730.00	1334.61	.00	3.05	.00	41.60	591.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	34078.000	1730.00	1337.84	.00	3.22	.00	61.58	379.00
*	34078.000	1730.00	1337.84	.00	3.22	.00	61.58	379.00

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ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX G: HYDROLOGY

Adobe Dam
Spillway Delineation Study

Appendix G: Hydrology

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1 Arrowhead Lakes Volume Analysis
- 1.1 Summary Sheet
- 1.2 Calculations

2 HEC-1 Analysis
- 3.1 Summary Sheet
- 3.2 Model Printout
- Figure G-1: HEC-1 Schematic

1 Arrowhead Lakes Volume Analysis

Summary Sheet for Arrowhead Lakes Volume Analysis

Description

Flow from the Adobe Dam Emergency Spillway flows west along the north side of the Loop 101 Freeway, and enters the Arrowhead Lakes subdivision, located north and west of the intersection of Beardsley Road and 51st Avenue. Arrowhead Lakes subdivision contains a system of lakes at differing water surface elevations. During a significant flooding event, flow into the lakes system will ultimately outfall to the box culvert outlet structure at 55th Avenue and Beardsley Road. The outlet structure consists of 6-4'x10' concrete box culverts, and a masonry wall along the top of the box culverts which connects to the masonry wall surrounding the subdivision. Ponding can therefore occur within the lakes system, providing flow attenuation through the subdivision. Hydraulic analysis of the outlet structure is included in Section 2 of Appendix D of this report.

Method of Analysis

A TR-20 model from *Arrowhead Ranch Development, Specific Area Plan, Storm Drainage Plan*, by Dibble and Associates, Inc., April 20, 1992, was used to determine the rating curves for each of the lakes. A copy of the TR-20 model is included in Appendix B of this report. The rating curves for the individual lakes were summed, to create one stage-storage rating curve for the entire lakes system.

Results

The resulting combined stage-storage curve data was used in the HEC-1 model.

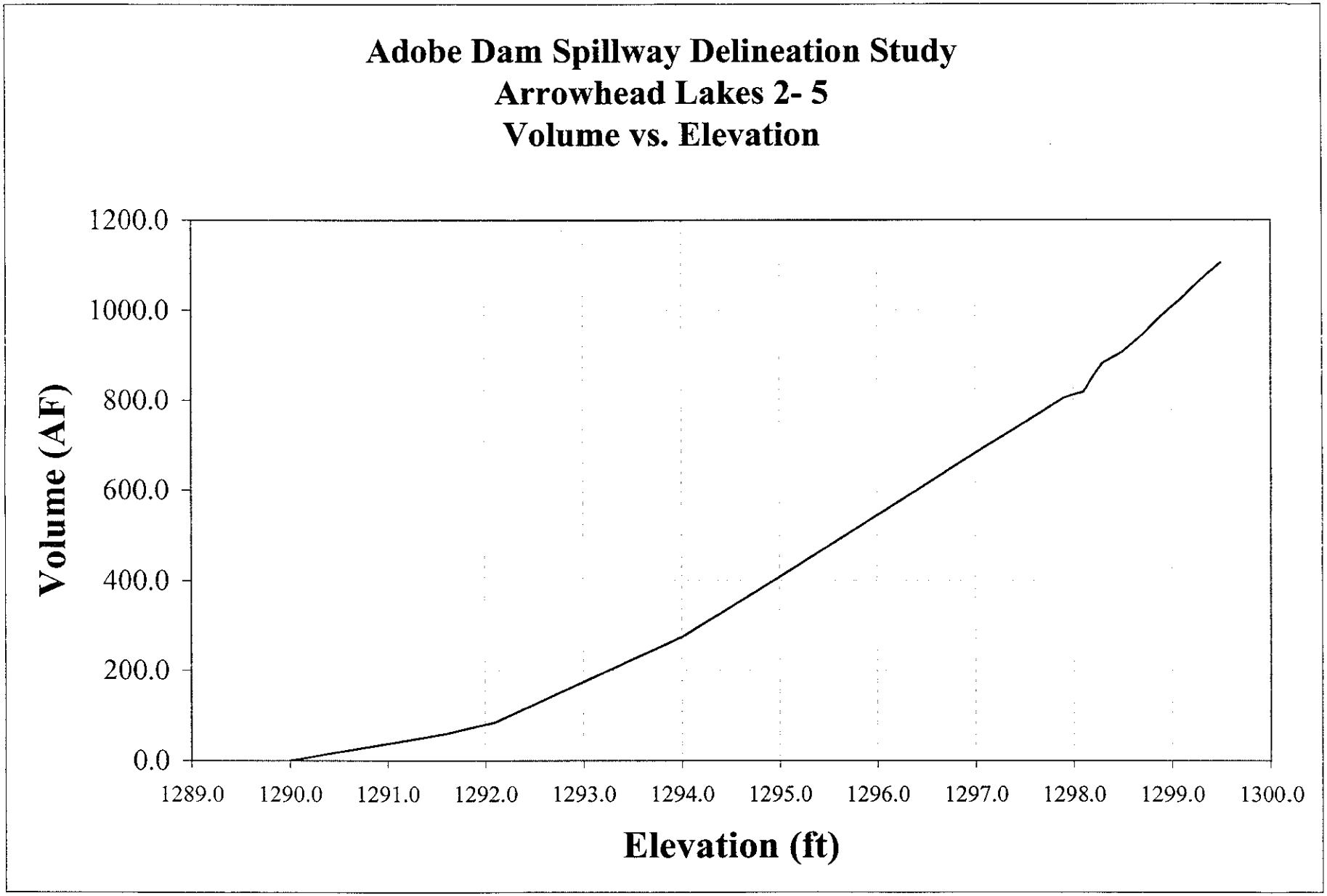
Adobe Dam Spillway Delineation Study

Arrowhead Lakes Stage-Storage Summary

	Storage (AF)					
WS Elev	Sed Basin 1	Lake 2	Lake 3	Lake 4	Lake 5	Total
1290.0					0.0	0.0
1290.5					18.4	18.4
1291.0					37.0	37.0
1291.5					55.6	55.6
1292.0			0.0	0.0	74.4	74.4
1292.5			11.8	18.7	93.2	123.7
1293.0			23.7	37.5	112.2	173.4
1293.5			35.7	56.4	131.2	223.3
1294.0	0.0	0.0	47.9	75.5	150.3	273.7
1294.5	5.8	16.4	60.2	94.6	169.4	346.4
1295.0	11.6	33.1	72.6	113.8	188.5	419.6
1295.5	17.5	49.8	85.1	133.1	207.6	493.1
1296.0	23.4	66.8	97.7	152.5	226.7	567.1
1296.5	29.3	83.9	110.3	171.9	245.8	641.2
1297.0	35.3	101.1	122.9	191.3	264.9	715.5
1297.5	41.3	118.6	135.5	210.7	284.0	790.1
1298.0	47.3	136.2	148.1	230.1	303.1	864.8

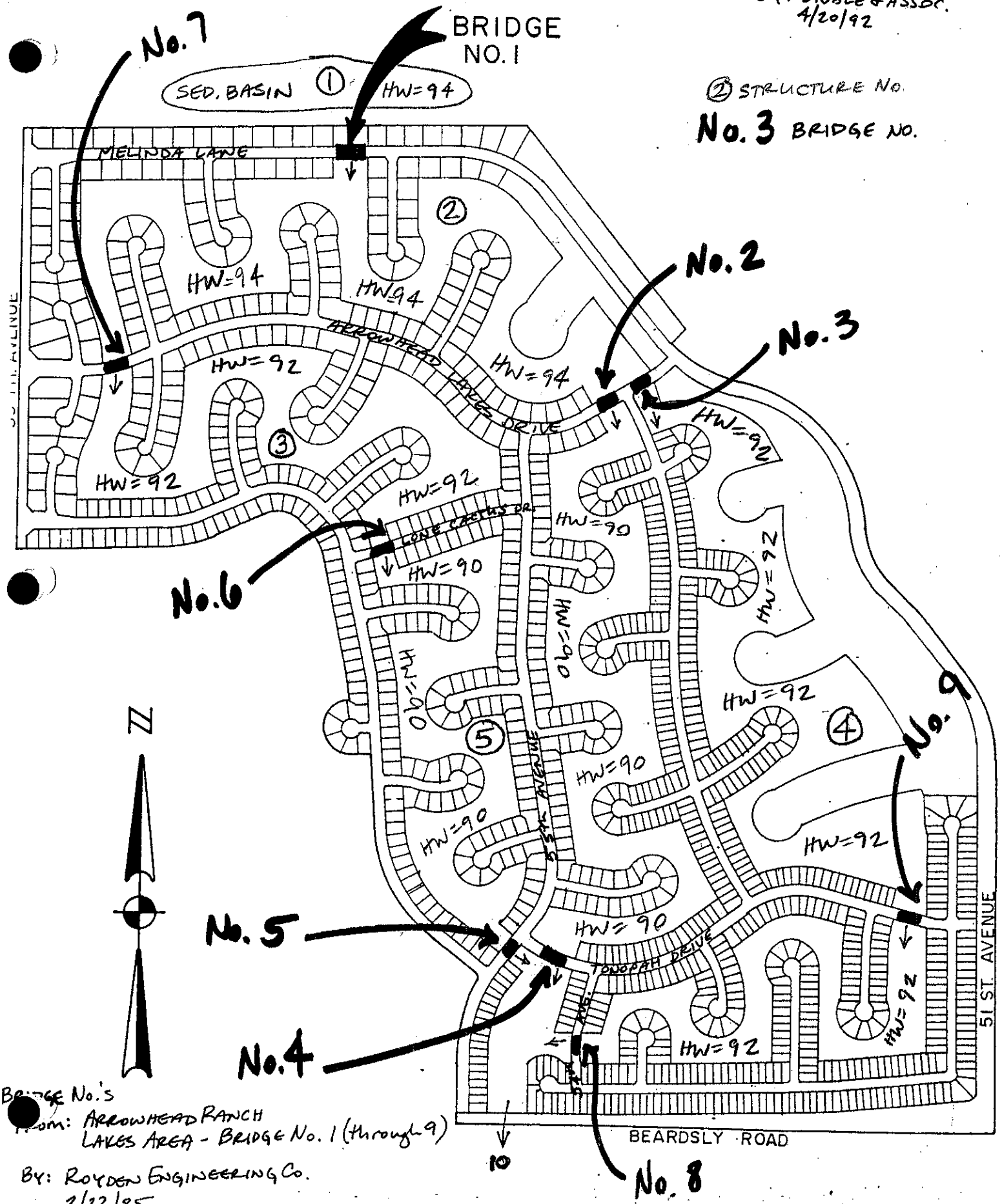
Notes: (1) WS Elev and Storage data from *Arrowhead Ranch Development, Specific Area Plan, Storm Drainage Plan*, by Dibble and Associates, April 20, 1992.

(2) Storage volumes in lower-right corner of table are extrapolated from the last incremental storage volume increase shown in *Storm Drainage Plan*.


Adobe Dam Spillway Delineation Study
Arrowhead Lakes 2- 5
Volume vs. Elevation
Volume (AF)
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
1289.0
1290.0
1291.0
1292.0
1293.0
1294.0
1295.0
1296.0
1297.0
1298.0
1299.0
1300.0
Elevation (ft)

HW ELEV. FROM: ARROWHEAD RANCH SPECIFIC AREA PLAN STORM DRAINAGE PLA

BY: DIBBLE & ASSOC. 4/20/92



Bridge No.'s
From: ARROWHEAD RANCH LAKES AREA - BRIDGE No. 1 (through 9)

BY: ROYDEN ENGINEERING CO.
2/22/85

LOCATION MAP

Adobe Dam Spillway Delineation Study
Arrowhead Lakes Weir Summary

Bridge I.D.	Roadway	Structure (1)	L1 (ft)	L2 (ft)	Side Slopes (H:V)	Weir Elev	HW Elev	100-Yr WSEL
1	Melinda Lane	Sed Basin 1	91.5	139.0	1.25:1	1288.00	1294.00	1297.09
2	Arrowhead Lakes Drive	Lake 2	45.5	92.0	1.25:1	1284.00	1290.00	1293.11
3	Arrowhead Lakes Drive	Lake 2	20.5	45.5	1.25:1	1286.00	1292.00	1295.07
4	Tonopah Drive	Lake 5	57.5	92.0	1.25:1	1284.00	1290.00	1293.11
5	55th Avenue	Lake 5	12.0	26.5	0.75:1	1284.00	1290.00	1293.11
6	Lone Cactus Drive	Lake 3	12.0	26.0	0.75:1	1284.00	1290.00	1293.11
7	Arrowhead Lakes Drive	Lake 2	20.5	45.0	1.25:1	1286.00	1292.00	1295.11
8	54th Avenue	Lake 4	12.0	26.0	0.75:1	1284.00	1290.00	1293.11
9	Tonopah Drive	Lake 4	20.5	44.5	1.25:1	1286.00	1292.00	1295.11

Notes:

(1) Structure from *Arrowhead Ranch Development, Specific Area Plan, Storm Drainage Plan*, by Dibble and Associates, April 20, 1992.
(2) Bridge I.D., Weir Length, and elevations from *Arrowhead Ranch Lakes Area Bridge No. 1* through *Bridge No. 9*, Royden Engineering Co., February 22, 1985.

2 HEC-1 Analysis

Summary Sheet for HEC-1 Analysis

Description

A hydrology model was developed for the study are using the Corps' HEC-1 model. This model was primarily created to model flow attenuation through the Arrowhead Lakes subdivision, and to track flow splits throughout the study area.

Assumptions

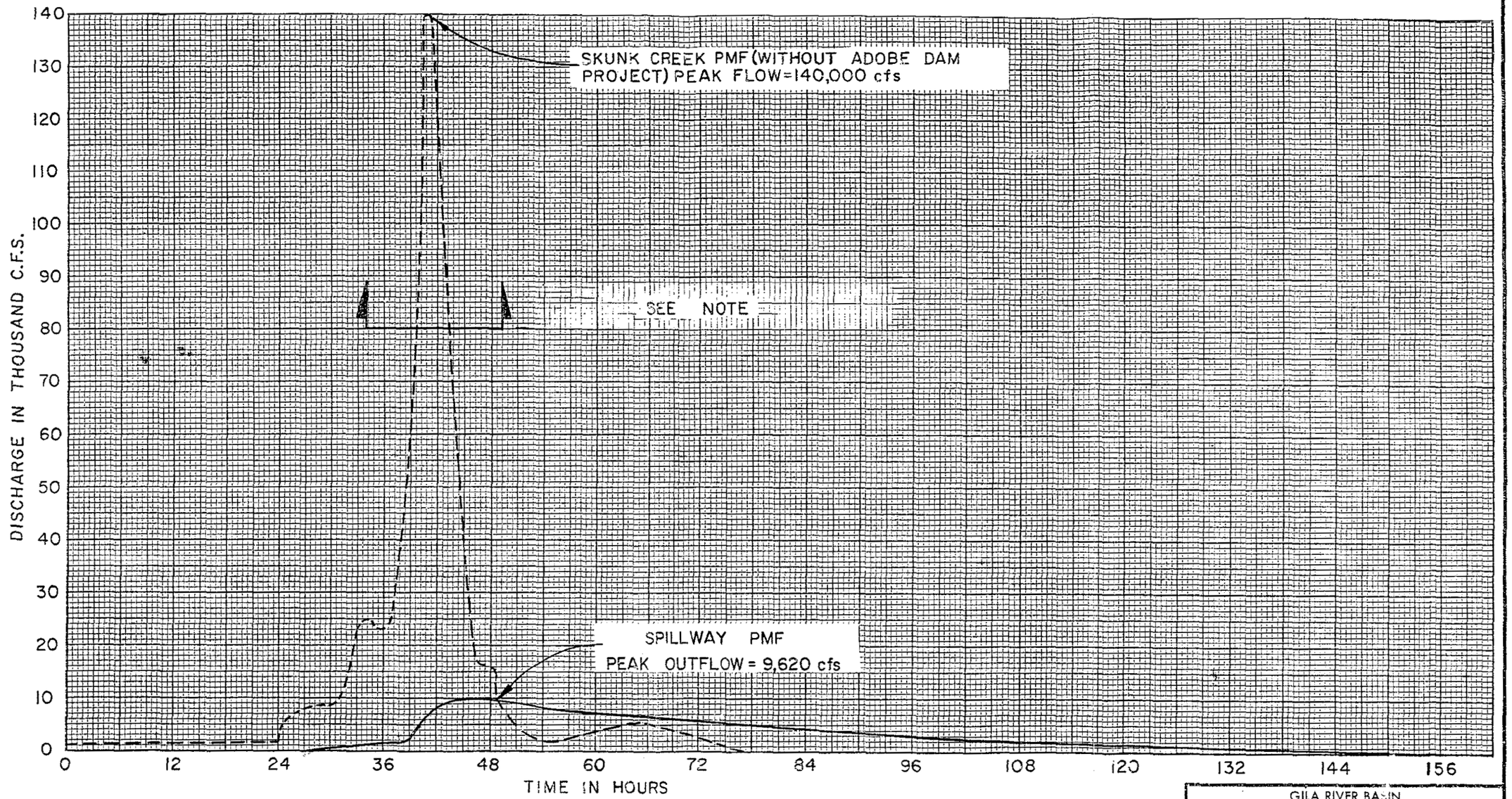
- No channel routing was used in the HEC-1 model, as the corresponding losses were not ultimately modeled in HEC-RAS.
- Reservoir storage routing was used to represent ponding within the Arrowhead Lakes subdivision.

Method of Analysis

Inflow hydrographs were created using the Probable Maximum Flood hydrograph from the US Army Corps *Design Memorandum No. 3* for Adobe Dam, April 1979, a copy of which follows this summary. Flow splits throughout the study were modeled as flow diverts, based upon hydraulic analysis at each flow split location. A HEC-1 model schematic (Figure G-1), and the HEC-1 model output are both included in this appendix.

Results

Ponding within the Arrowhead Lakes subdivision provides approximately 270 cfs of flow attenuation, however the non-attenuated values were used in the HEC-RAS modeling due to the relatively small magnitude of flow attenuation.



NOTE:
A SMALL PERCENTAGE OF FLOWS IN EXCESS OF 80,000cfs WILL FLOW NORTH OF BEARDSLEY ROAD

GILA RIVER BASIN,
NEW RIVER & PHOENIX CITY STREAMS, ARIZONA
ADOBE DAM
PROBABLE MAXIMUM FLOOD
ROUTINGS
DOWNSTREAM OF SPILLWAY

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

APPENDIX I FIGURE 8

Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85003-1136
Tel: (602) 252-8384
Fax: (602) 252-8385

ADOBE DAM SPILLWAY
HEC-1 SCHEMATIC

FIGURE G-1

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   13MAR01  TIME  18:05:46  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************


                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX         XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND
HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE
INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE
FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE
FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                   HEC-1 INPUT
 PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID   ADOBE DAM SPILLWAY DELINEATION STUDY
            2           ID   FCD 98-32
            3           ID   PREPARED BY HOSKIN ENGINEERING CONSULTANTS, INC.
            4           ID   HEC JOB NO. 990006-02
            5           ID
            6           ID   FILENAME:      AD.DAT
            7           ID   DATE:         3-12-01
            8           ID
            9           ID   SKUNK CREEK WATERSHED - FUTURE CONDITIONS
           10           ID   100-YEAR STORM, FULL SPILLWAY FLOW
           11           ID
                        *DIAGRAM
           12           IT      60  7AUG00    1200     140
           13           IO       3
                        *

           14           KK    AD-E
           15           KM   ADOBE DAM EMERGENCY SPILLWAY HYDROGRAPH FOR THE PROBABLE MAXIMUM FLOOD
           16           KM   BASED ON GRAPH FROM USACE
           17           IN     180
           18           BA    8.64
           19           QI       0     500    1000    1500    2200    8300    9620    9600    9100    8200
           20           QI    7600    7300    6900    6600    6200    5800    5400    5000    4600    4200
           21           QI    4000    3700    3300    2900    2600    2200    2000    1900    1800    1600
           22           QI    1500    1300    1200    1100    1000     900     800     700     600     500
           23           QI     400     300     200     100       0
                        *

           24           KK   DIV1
           25           KM   FLOW SPLIT AT LOOP 101 FREEWAY;
           26           KM   DIV1 = WEST TO ARROWHEAD LAKES SUBDIVISION
           27           KM   LP101 = SOUTH ACROSS FREEWAY
           28           DT   LP101
           29           DI       0    3200    6400    9600
           30           DQ       0       0     100     400
                        *
```

```
 31          KK   DIV2
 32          KM   FLOW SPLIT AT 51ST AVE AND BEARDSLEY RD NORTH OF FREEWAY;
 33          KM   DIV2 =  WEST TO ARROWHEAD LAKES SUBDIVISION
 34          KM   AVE51 = SOUTH ON 51ST AVE
 35          DT   AVE51
 36          DI       0    3200    6300    9200
 37          DQ       0     600    1400    2200
             *

 38          KK   DIV3
 39          KM   FLOW SPLIT AT 51ST AVE AND BEARDSLEY RD NORTH OF FREEWAY;
 40          KM   DIV3 = WEST TO ARROWHEAD LAKES SUBDIVISION
 41          KM   BDSLY1 = WEST ALONG BEARDSLEY RD
 42          DT  BDSLY1
 43          DI       0    2600    4900    7000
 44          DQ       0    1300    2300    3300
             *
1                                          HEC-1 INPUT
 PAGE  2

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 45          KK   RLAKE
 46          KM   ROUTE DIV3 THROUGH LAKES WITHIN ARROWHEAD LAKES SUBDIVISION
 47          RS       1    ELEV  1288.5
 48          SV       0     3.7    14.7    29.6    44.4    59.4    84.3   123.7   223.3   340.6
 49          SV   448.6   502.8   557.5   612.6   668.4   722.2   776.3   817.5   906.0  1106.0
 50          SE  1288.5  1290.1  1290.4  1290.8  1291.2  1291.6  1292.1  1292.5  1293.5  1294.5
 51          SE  1295.3  1295.7  1296.1  1296.5  1296.9  1297.3  1297.7  1298.1  1298.5  1299.5
 52          SQ    1682  2160.0  2280.0  2400.0  2520.0  2640.0  2760.0  2880.0  3120.0  3360.0
 53          SQ  3559.2  3754.3  3994.6  4270.0  4574.4  4902.5  5253.9  5623.3  6017.2  7073.2
             *

 54          KK   DIV4
 55          KM   SPLIT FLOW AT ARROWHEAD LAKES OUTLET STRUCTURE;
 56          KM   DIV4 = EXITS ARROWHEAD LAKES SUBDIVISION THROUGH
 57          KM          6-4'X10'CBC UNDER BEARDSLEY RD
 58          KM   WEIR = EXITS ARROWHEAD LAKES SUBDIVISION BY WEIRING OVER ROAD AT NORTHWEST
 59          KM          CORNER OF LAKE IMMEDIATELY NORTH OF OUTLET STRUCTURE
 60          DT   WEIR
 61          DI       0    1300    2600    3700
 62          DQ       0       0     800    1400
             *

 63          KK   RTR3
 64          KM   RETRIEVE FLOW IN BEARDSLEY RD FROM 51ST AVE SPLIT
 65          DR  BDSLY1
             *

 66          KK   CO-1
 67          KM   COMBINE FLOW IN BEARDSLEY RD AT 55TH AVE AND
 68          KM   FLOW FROM ARROWHEAD LAKES OUTLET STRUCTURE BOX CULVERTS
 69          HC       2
             *

 70          KK   DIV5
 71          KM   FLOW SPLIT AT ARROWHEAD LAKES OUTLET STRUCTURE AND BEARDSLY RD
 72          KM   DIV5 = TOTAL FLOW IN OUTLET STRUCTURE AT BEARDSLEY RD
 73          KM   BDSLY2 = FLOW WEST IN BEARDSLEY FROM OUTLET AT 55TH AVE
 74          DT  BDSLY2
 75          DI       0    2600    4100    5600
 76          DQ       0     500     800    2100
             *

 77          KK   RTR1
 78          KM   RETRIEVE FLOW WHICH CROSSES LOOP 101 FREEWAY EAST OF 51ST AVE
 79          DR   LP101
             *

 80          KK   RTR2
 81          KM   RETRIEVE FLOW IN 51ST AVE FROM FLOW SPLIT NORTH OF LOOP 101 FREEWAY
 82          DR   AVE51
             *
1                                          HEC-1 INPUT
 PAGE  3

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
 83          KK   CO-3
 84          KM   COMBINE FLOW FROM 51ST AVE AND SOUTH SIDE OF LOOP 101 FREEWAY
 85          HC       2
             *

 86          KK   DIV6
 87          KM   FLOW SPLIT AT 51ST AVE AND LOOP 101 FREEWAY, SOUTH OF FREEWAY;
 88          KM   DIV6 = WEST ALONG SOUTH SIDE OF FREEWAY TOWARDS 55TH AVE
 89          KM   51STS = SOUTH ALONG 51ST AVE TO CARMEL PARK SUBDIVISION
 90          DT   51STS
 91          DI       0     600    1500    2600
 92          DQ       0     400     700    1100
             *

 93          KK   CO-4
 94          KM   COMBINE FLOW FROM ARROWHEAD LAKES OUTLET STRUCTURE AND FLOW ALONG
 95          KM   SOUTH SIDE OF FREEWAY, AT NORTH END OF 55TH AVENUE CHANNEL
 96          HC       2
             *

 97          KK   DIV7
 98          KM   FLOW OVERTOPPING 55TH AVE CHANNEL BANK NORTH OF UTOPIA RD
 99          KM   DIV7 = CAPACITY OF 5-4'x10'CBC AT UTOPIA RD, CONTINUES SOUTH IN CHANNEL
100          KM   55W = SOUTHWEST ACROSS UTOPIA RD
101          DT     55W
102          DI       0    2300    4100    5000
103          DQ       0     500    2300    3200
             *

104          KK   RTR6
105          KM   RETRIEVE FLOW IN 51ST AVE SOUTH OF LOOP 101
106          DR   51STS
             *

107          KK   CO-5
108          KM   COMBINE 55TH AVE CHANNEL FLOW AND FLOW THROUGH CARMEL PARK SUBDIVISION
109          HC       2
             *

110          KK    AD-P
111          KM   PRINCIPAL SPILLWAY HYDROGRAPH
112          IN     180
113          BA    8.64
114          QI    1890    1900    1950    2050    2150    2250    2360    2360    2330    2305
115          QI    2280    2263    2240    2220    2200    2180    2160    2140    2120    2105
116          QI    2090    2075    2060    2050    2040    2030    2020    2008    1998    1990
117          QI    1980    1970    1960    1950    1945    1938    1930    1925    1922    1915
118          QI    1910    1905    1900    1895    1890
             *
1                                          HEC-1 INPUT
 PAGE  4

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

119          KK   CO-6
120          KM   COMBINE FLOW AT CONFLUENCE OF 55TH AVE CHANNEL AND SKUNK CREEK
121          HC       2
             *

122          KK   RTR7
123          KM   RETRIEVE FLOW HEADING SOUTHWEST FROM UTOPIA RD AND 55TH AVE CHANNEL
124          DR     55W
             *

125          KK      SC
126          KM   FLOW SPLIT AROUND BUILDING NORTH OF SKUNK CREEK AND EAST OF 59TH AVE
127          KM   SC = SOUTH TO SKUNK CREEK
128          KM   59 = WEST TO 59TH AVE
129          DT      59
130          DI       0     500    2300    3200
131          DQ       0       0     200     500
             *

132          KK    CO-7
133          KM   COMBINE SKUNK CREEK FLOW AND FLOW INTO CREEK BETWEEN 55TH AVE AND 59TH AVE
134          HC       2
             *

135          KK   RTR59
```

```
136          KM   RETRIEVE FLOW WEST OF 59TH AVE
137          DR      59
             *

138          KK   CO-8
139          KM   FLOW WEST OF 59TH AVE REJOINS SKUNK CREEK AT 71ST AVE CHANNEL
140          HC       2
             *

141          KK   RTR5
142          KM   RETRIEVE FLOW IN BEARDSLEY RD AT ARROWHEAD LAKES OUTLET STRUCTURE
143          DR  BDSLY2
             *

144          KK  BDSLY3
145          KM   WEIR INTO LOOP 101 FREEWAY EAST OF 59TH AVE
146          KM   BDSLY3 = WEST IN BEARDSLEY, STREET CAPACITY IS 100 CFS
147          KM   FWY1 = WEIR INTO FREEWAY EAST OF 59TH AVE
148          DT    FWY1
149          DI       0     500     800    2100
150          DQ       0     400     700    2000
             *

151          KK   RTR4
152          KM   RETRIEVE FLOW THROUGH SUBDIVISION WEST OF ARROWHEAD LAKES
153          DR   WEIR
             *
1                                                HEC-1 INPUT
 PAGE  5
        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


154          KK    CO-2
155          KM   COMBINE FLOW IN BEARDSLEY RD WITH FLOW FROM 59TH AVE;
156          KM   THE COMBINED FLOW ENTERS LOOP 101 FREEWAY THROUGH
157          KM   WEST-BOUND ON-RAMP AT 59TH AVE
158          HC       2
             *

159          KK   RTRF1
160          KM   RETRIEVE FLOW IN FREEWAY EAST OF 59TH AVE
161          DR    FWY1
             *

162          KK     FWY
163          KM   COMBINE FLOWS IN LOOP 101 FREEWAY
164          HC       2
             *
165          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   14         AD-E
                .
                .
   28           .-------->   LP101
   24       DIV1
                .
                .
   35           .-------->   AVE51
   31       DIV2
                .
                .
   42           .-------->  BDSLY1
   38       DIV3
               V
               V
   45       RLAKE
                .
                .
   60           .-------->   WEIR
   54       DIV4
                .
                .
   65           .            .<--------  BDSLY1
   63           .       RTR3
```

```
                .           .
                .           .
 66        CO-1 ............
                .
                .
 74             .-------> BDSLY2
 70        DIV5
                .
                .
 79             .           .<-------   LP101
 77             .       RTR1
                .           .
                .           .
 82             .           .           .<-------   AVE51
 80             .           .       RTR2
                .           .           .
                .           .           .
 83             .       CO-3 ............
                .           .
                .           .
 90             .           .-------->  51STS
 86             .       DIV6
                .           .
                .           .
 93        CO-4 ............
                .
                .
101             .-------->     55W
 97        DIV7
                .
                .
106             .           .<-------   51STS
104             .       RTR6
                .           .
                .           .
107        CO-5 ............
                .
                .
110             .        AD-P
                .           .
                .           .
119        CO-6 ............
                .
                .
124             .           .<-------     55W
122             .       RTR7
                .           .
                .           .
129             .           .-------->     59
125             .          SC
                .           .
                .           .
132         CO-7............
                .
                .
137             .           .<-------     59
135             .       RTR59
                .           .
                .           .
138        CO-8 ............
                .
                .
143             .           .<-------  BDSLY2
141             .       RTR5
                .           .
                .           .
148             .           .-------->    FWY1
144             .      BDSLY3
                .           .
                .           .
153             .           .           .<-------   WEIR
151             .           .       RTR4
                .           .           .
                .           .           .
154             .        CO-2............
                .           .
                .           .
161             .           .           .<-------    FWY1
159             .           .       RTRF1
                .           .           .
```

```
                .          .          .
  162           .        FWY...........

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
****************************************
 *                                      *                                *                                *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                *    U.S. ARMY CORPS OF ENGINEERS  *
 *              JUN   1998              *                                *    HYDROLOGIC ENGINEERING CENTER *
 *           VERSION 4.1                *                                *          609 SECOND STREET     *
 *                                      *                                *       DAVIS, CALIFORNIA 95616  *
 *  RUN DATE   13MAR01  TIME  18:05:46  *                                *          (916) 756-1104        *
 *                                      *                                *                                *
 ****************************************
****************************************
```

ADOBE DAM SPILLWAY DELINEATION STUDY
FCD 98-32
PREPARED BY HOSKIN ENGINEERING CONSULTANTS, INC.
HEC JOB NO. 990006-02

FILENAME: AD.DAT
DATE: 3-12-01

SKUNK CREEK WATERSHED - FUTURE CONDITIONS
100-YEAR STORM, FULL SPILLWAY FLOW

```
  13 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN          60  MINUTES IN COMPUTATION INTERVAL
                       IDATE      7AUG 0  STARTING DATE
                       ITIME        1200  STARTING TIME
                          NQ         140  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     13AUG 0  ENDING DATE
                      NDTIME        0700  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL    1.00 HOURS
                      TOTAL TIME BASE  139.00 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT


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

            **************
            *            *
  14 KK     *     AD-E   *
            *            *
            **************
```

ADOBE DAM EMERGENCY SPILLWAY HYDROGRAPH FOR THE PROBABLE MAXIMUM FLOOD
BASED ON GRAPH FROM USACE

```
  17 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN         180  TIME INTERVAL IN MINUTES
                      JXDATE      7AUG 0  STARTING DATE
                      JXTIME        1200  STARTING TIME

               SUBBASIN RUNOFF DATA

  18 BA          SUBBASIN CHARACTERISTICS
```

```
                    TAREA        8.64  SUBBASIN AREA

                                                                  ***

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

                        HYDROGRAPH AT STATION     AD-E

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    9620.     18.00                 9516.        8248.        5380.        3162.
                         (INCHES)   10.240       35.501       69.467       78.826
                          (AC-FT)    4719.       16359.       32010.       36323.

                        CUMULATIVE AREA =    8.64 SQ MI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            *            *
   24 KK    *     DIV1   *
            *            *
            **************
                           FLOW SPLIT AT LOOP 101 FREEWAY;
                           DIV1 = WEST TO ARROWHEAD LAKES SUBDIVISION
                           LP101 = SOUTH ACROSS FREEWAY

     DT          DIVERSION
                      ISTAD       LP101  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00   3200.00   6400.00   9600.00

     DQ      DIVERTED FLOW         .00       .00    100.00    400.00

                                                                  ***

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

                        DIVERSION HYDROGRAPH    LP101

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+     402.     18.00                  392.         273.         114.          59.
                         (INCHES)    .422        1.177        1.469        1.469
                          (AC-FT)     194.         542.         677.         677.

                        CUMULATIVE AREA =    8.64 SQ MI

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

                        HYDROGRAPH AT STATION    DIV1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    9218.     18.00                 9124.        7974.        5266.        3103.
                         (INCHES)    9.818       34.324       67.999       77.358
                          (AC-FT)    4524.       15817.       31334.       35646.

                        CUMULATIVE AREA =    8.64 SQ MI


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              *            *
   31 KK      *     DIV2   *
              *            *
              **************
                              FLOW SPLIT AT 51ST AVE AND BEARDSLEY RD NORTH OF FREEWAY;
                              DIV2 =  WEST TO ARROWHEAD LAKES SUBDIVISION
                              AVE51 = SOUTH ON 51ST AVE

     DT          DIVERSION
                       ISTAD       AVE51  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00   3200.00   6300.00   9200.00

     DQ      DIVERTED FLOW         .00    600.00   1400.00   2200.00

                                                                  ***

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

                          DIVERSION HYDROGRAPH    AVE51

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    2205.     18.00                2179.       1862.       1158.         670.
                         (INCHES)   2.345       8.014      14.957       16.712
                          (AC-FT)   1081.       3693.       6892.        7701.

                         CUMULATIVE AREA =    8.64 SQ MI


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

                          HYDROGRAPH AT STATION    DIV2

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    7013.     18.00                6945.       6112.       4108.        2433.
                         (INCHES)   7.473      26.310      53.042       60.646
                          (AC-FT)   3444.      12124.      24442.       27946.

                         CUMULATIVE AREA =    8.64 SQ MI


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              **************
              *            *
   38 KK      *     DIV3   *
              *            *
              **************
                              FLOW SPLIT AT 51ST AVE AND BEARDSLEY RD NORTH OF FREEWAY;
                              DIV3 = WEST TO ARROWHEAD LAKES SUBDIVISION
                              BDSLY1 = WEST ALONG BEARDSLEY RD

     DT          DIVERSION
                       ISTAD      BDSLY1  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00   2600.00   4900.00   7000.00

     DQ      DIVERTED FLOW         .00   1300.00   2300.00   3300.00

                                                                  ***

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

                          DIVERSION HYDROGRAPH   BDSLY1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    3306.     18.00                3274.       2877.       1961.        1168.
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                    (INCHES)     3.523      12.385      25.323      29.125
                     (AC-FT)     1623.       5707.      11669.      13421.

                    CUMULATIVE AREA =    8.64 SQ MI

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

                     HYDROGRAPH AT STATION    DIV3

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    3707.     18.00                3671.       3235.       2147.       1264.
                    (INCHES)      3.951      13.925      27.719      31.521
                     (AC-FT)      1820.       6416.      12773.      14525.

                    CUMULATIVE AREA =    8.64 SQ MI


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            *            *
  45 KK     *     RLAKE  *
            *            *
            **************
                      ROUTE DIV3 THROUGH LAKES WITHIN ARROWHEAD LAKES SUBDIVISION

               HYDROGRAPH ROUTING DATA

  47 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC     1288.50  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

  48 SV            STORAGE          .0       3.7      14.7      29.6      44.4      59.4      84.3     123.7
  223.3     340.6
                                  448.6     502.8     557.5     612.6     668.4     722.2     776.3     817.5
  906.0    1106.0

  50 SE          ELEVATION     1288.50   1290.10   1290.40   1290.80   1291.20   1291.60   1292.10   1292.50
 1293.50   1294.50
                                1295.30   1295.70   1296.10   1296.50   1296.90   1297.30   1297.70   1298.10
 1298.50   1299.50

  52 SQ          DISCHARGE       1682.     2160.     2280.     2400.     2520.     2640.     2760.     2880.
  3120.     3360.
                                  3559.     3754.     3995.     4270.     4574.     4903.     5254.     5623.
  6017.     7073.
                                                                  ***

 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     1682. TO     2160.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK
INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER
REACH.)

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

                     HYDROGRAPH AT STATION    RLAKE

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    3436.     25.00                3414.       3192.       2336.       2021.
                    (INCHES)      3.674      13.738      30.167      50.379
                     (AC-FT)      1693.       6330.      13901.      23214.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    139.00-HR
+  (AC-FT)      (HR)
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     382.     25.00                  370.        263.         82.          4.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR    139.00-HR
+   (FEET)      (HR)
   1294.81     25.00               1294.72     1293.80     1290.76      1289.67

                          CUMULATIVE AREA =    8.64 SQ MI


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            *            *
   54 KK    *     DIV4   *
            *            *
            **************
                           SPLIT FLOW AT ARROWHEAD LAKES OUTLET STRUCTURE;
                           DIV4 = EXITS ARROWHEAD LAKES SUBDIVISION THROUGH
                                  6-4'X10'CBC UNDER BEARDSLEY RD
                           WEIR = EXITS ARROWHEAD LAKES SUBDIVISION BY WEIRING OVER ROAD AT NORTHWEST
                                  CORNER OF LAKE IMMEDIATELY NORTH OF OUTLET STRUCTURE

     DT          DIVERSION
                      ISTAD       WEIR   DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW        .00   1300.00   2600.00   3700.00

     DQ      DIVERTED FLOW        .00       .00    800.00   1400.00

                                                                 ***

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

                        DIVERSION HYDROGRAPH    WEIR

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1256.     25.00                  1244.       1123.        623.         436.
                        (INCHES)     1.339       4.832       8.049       10.874
                         (AC-FT)      617.       2227.       3709.        5011.

                          CUMULATIVE AREA =    8.64 SQ MI

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

                        HYDROGRAPH AT STATION    DIV4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2180.     25.00                  2170.       2069.       1713.        1585.
                        (INCHES)     2.335       8.905      22.118       39.505
                         (AC-FT)     1076.       4104.      10192.       18204.

                          CUMULATIVE AREA =    8.64 SQ MI


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            **************
            *            *
   63 KK    *     RTR3   *
            *            *
            **************
                           RETRIEVE FLOW IN BEARDSLEY RD FROM 51ST AVE SPLIT

   65 DR          RETRIEVE DIVERSION HYDROGRAPH
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                    ISTAD      BDSLY1  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                        HYDROGRAPH AT STATION    RTR3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    3306.     18.00                 3274.       2877.       1961.        1168.
                        (INCHES)     3.523      12.385      25.323       29.125
                         (AC-FT)     1623.       5707.      11669.       13421.

                        CUMULATIVE AREA =      .00 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   66 KK    *     CO-1   *
            *            *
            **************
                           COMBINE FLOW IN BEARDSLEY RD AT 55TH AVE AND
                           FLOW FROM ARROWHEAD LAKES OUTLET STRUCTURE BOX CULVERTS

   69 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION    CO-1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    5428.     21.00                 5379.       4934.       3674.        2753.
                        (INCHES)     5.788      21.237      47.441       68.630
                         (AC-FT)     2667.       9786.      21861.       31625.

                        CUMULATIVE AREA =    8.64 SQ MI


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

            **************
            *            *
   70 KK    *     DIV5   *
            *            *
            **************
                           FLOW SPLIT AT ARROWHEAD LAKES OUTLET STRUCTURE AND BEARDSLY RD
                           DIV5 = TOTAL FLOW IN OUTLET STRUCTURE AT BEARDSLEY RD
                           BDSLY2 = FLOW WEST IN BEARDSLEY FROM OUTLET AT 55TH AVE

     DT          DIVERSION
                       ISTAD      BDSLY2  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00   2600.00   4100.00   5600.00

     DQ      DIVERTED FLOW         .00    500.00    800.00   2100.00

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

                        DIVERSION HYDROGRAPH   BDSLY2
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  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    1951.     21.00                1908.       1523.        906.         633.
                         (INCHES)    2.053       6.556      11.694       15.768
                          (AC-FT)     946.       3021.       5388.        7266.

                         CUMULATIVE AREA =    8.64 SQ MI


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

                          HYDROGRAPH AT STATION    DIV5

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    3477.     21.00                3470.       3411.       2768.        2120.
                         (INCHES)    3.735      14.683      35.747       52.861
                          (AC-FT)    1721.       6766.      16472.       24359.

                         CUMULATIVE AREA =    8.64 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   77 KK    *     RTR1   *
            *            *
            **************
                            RETRIEVE FLOW WHICH CROSSES LOOP 101 FREEWAY EAST OF 51ST AVE

   79 DR          RETRIEVE DIVERSION HYDROGRAPH
                       ISTAD       LP101  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                          HYDROGRAPH AT STATION    RTR1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+     402.     18.00                 392.        273.        114.          59.
                         (INCHES)     .422       1.177       1.469        1.469
                          (AC-FT)     194.        542.        677.         677.

                         CUMULATIVE AREA =     .00 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   80 KK    *     RTR2   *
            *            *
            **************
                            RETRIEVE FLOW IN 51ST AVE FROM FLOW SPLIT NORTH OF LOOP 101 FREEWAY

   82 DR          RETRIEVE DIVERSION HYDROGRAPH
                       ISTAD       AVE51  DIVERSION HYDROGRAPH IDENTIFICATION

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                    HYDROGRAPH AT STATION    RTR2

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2205.     18.00                2179.       1862.       1158.         670.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)    1081.       3693.       6892.        7701.

                        CUMULATIVE AREA =     .00 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   83 KK    *     CO-3   *
            *            *
            **************
                           COMBINE FLOW FROM 51ST AVE AND SOUTH SIDE OF LOOP 101 FREEWAY

   85 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                         HYDROGRAPH AT STATION    CO-3

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2607.     18.00                2571.       2135.       1272.         729.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)    1275.       4235.       7569.        8378.

                        CUMULATIVE AREA =     .00 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   86 KK    *     DIV6   *
            *            *
            **************
                           FLOW SPLIT AT 51ST AVE AND LOOP 101 FREEWAY, SOUTH OF FREEWAY;
                           DIV6 = WEST ALONG SOUTH SIDE OF FREEWAY TOWARDS 55TH AVE
                           51STS = SOUTH ALONG 51ST AVE TO CARMEL PARK SUBDIVISION

     DT          DIVERSION
                       ISTAD       51STS  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00    600.00   1500.00   2600.00

     DQ      DIVERTED FLOW         .00    400.00    700.00   1100.00

                                                                  ***

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

                         DIVERSION HYDROGRAPH    51STS

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1103.     18.00                1090.        931.        617.         367.
                        (INCHES)     .000        .000        .000         .000
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                    (AC-FT)      540.       1847.       3672.       4211.

                    CUMULATIVE AREA =     .00 SQ MI

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

                      HYDROGRAPH AT STATION    DIV6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1504.     18.00                1482.       1204.        655.         363.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)     735.       2389.       3897.        4167.

                    CUMULATIVE AREA =     .00 SQ MI


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


            **************
            *            *
   93 KK    *     CO-4   *
            *            *
            **************
                           COMBINE FLOW FROM ARROWHEAD LAKES OUTLET STRUCTURE AND FLOW ALONG
                           SOUTH SIDE OF FREEWAY, AT NORTH END OF 55TH AVENUE CHANNEL

   96 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                      HYDROGRAPH AT STATION    CO-4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    4977.     21.00                4949.       4610.       3423.        2483.
                        (INCHES)    5.326      19.842      44.204       61.903
                         (AC-FT)    2454.       9143.      20369.       28525.

                    CUMULATIVE AREA =    8.64 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            **************
            *            *
   97 KK    *     DIV7   *
            *            *
            **************
                           FLOW OVERTOPPING 55TH AVE CHANNEL BANK NORTH OF UTOPIA RD
                           DIV7 = CAPACITY OF 5-4'x10'CBC AT UTOPIA RD, CONTINUES SOUTH IN CHANNEL
                           55W = SOUTHWEST ACROSS UTOPIA RD

     DT          DIVERSION
                       ISTAD         55W  DIVERSION HYDROGRAPH IDENTIFICATION

     DI            INFLOW          .00   2300.00   4100.00   5000.00

     DQ      DIVERTED FLOW         .00    500.00   2300.00   3200.00

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                    DIVERSION HYDROGRAPH      55W

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    3177.     21.00                3149.       2810.       1667.        1018.
                        (INCHES)    3.389      12.094      21.529       25.377
                         (AC-FT)    1562.       5573.       9921.       11694.

                        CUMULATIVE AREA =    8.64 SQ MI


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

                    HYDROGRAPH AT STATION    DIV7

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1800.     13.00                1800.       1800.       1756.        1465.
                        (INCHES)    1.937       7.748      22.675       36.526
                         (AC-FT)     893.       3570.      10449.       16831.

                        CUMULATIVE AREA =    8.64 SQ MI


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


            **************
            *            *
  104 KK    *     RTR6   *
            *            *
            **************
                      RETRIEVE FLOW IN 51ST AVE SOUTH OF LOOP 101

  106 DR          RETRIEVE DIVERSION HYDROGRAPH
                        ISTAD       51STS  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                    HYDROGRAPH AT STATION    RTR6

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1103.     18.00                1090.        931.        617.         367.
                        (INCHES)    1.172       4.008       7.969        9.139
                         (AC-FT)     540.       1847.       3672.        4211.

                        CUMULATIVE AREA =     .00 SQ MI


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


            **************
            *            *
  107 KK    *     CO-5   *
            *            *
            **************
                      COMBINE 55TH AVE CHANNEL FLOW AND FLOW THROUGH CARMEL PARK SUBDIVISION

  109 HC          HYDROGRAPH COMBINATION
                        ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

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                    HYDROGRAPH AT STATION     CO-5

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2903.     18.00                2890.        2731.        2373.        1832.
                        (INCHES)    3.109       11.756       30.643       45.665
                         (AC-FT)    1433.        5417.       14121.       21042.

                        CUMULATIVE AREA =    8.64 SQ MI


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

            **************
            *            *
  110 KK    *     AD-P   *
            *            *
            **************
                     PRINCIPAL SPILLWAY HYDROGRAPH

  112 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN         180  TIME INTERVAL IN MINUTES
                      JXDATE      7AUG 0  STARTING DATE
                      JXTIME        1200  STARTING TIME

               SUBBASIN RUNOFF DATA

  113 BA          SUBBASIN CHARACTERISTICS
                       TAREA        8.64  SUBBASIN AREA

                                                                 ***

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

                    HYDROGRAPH AT STATION     AD-P

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2360.     18.00                2354.        2297.        2169.        2056.
                        (INCHES)    2.533        9.887       28.014       51.260
                         (AC-FT)    1167.        4556.       12909.       23620.

                        CUMULATIVE AREA =    8.64 SQ MI


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

            **************
            *            *
  119 KK    *    CO-6    *
            *            *
            **************
                     COMBINE FLOW AT CONFLUENCE OF 55TH AVE CHANNEL AND SKUNK CREEK

  121 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                 ***

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

                    HYDROGRAPH AT STATION     CO-6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     139.00-HR
+   (CFS)       (HR)
                          (CFS)
```

```
+    5263.     18.00                  5243.       5028.       4541.       3888.
                          (INCHES)    2.821      10.821      29.321      48.462
                           (AC FT)    2600.       9973.      27022.      44663.

                          CUMULATIVE AREA =   17.28 SQ MI


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

              **************
              *            *
  122 KK      *     RTR7   *
              *            *
              **************
                                RETRIEVE FLOW HEADING SOUTHWEST FROM UTOPIA RD AND 55TH AVE CHANNEL

  124 DR          RETRIEVE DIVERSION HYDROGRAPH
                        ISTAD         55W  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                    ***

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

                          HYDROGRAPH AT STATION    RTR7

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+    3177.     21.00                 3149.       2810.       1667.       1018.
                          (INCHES)    1.695       6.047      10.765      12.689
                           (AC-FT)    1562.       5573.       9921.      11694.

                          CUMULATIVE AREA =     .00 SQ MI


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

              **************
              *            *
  125 KK      *        SC  *
              *            *
              **************
                                FLOW SPLIT AROUND BUILDING NORTH OF SKUNK CREEK AND EAST OF 59TH AVE
                                SC = SOUTH TO SKUNK CREEK
                                59 = WEST TO 59TH AVE

     DT           DIVERSION
                        ISTAD          59  DIVERSION HYDROGRAPH IDENTIFICATION

     DI              INFLOW         .00     500.00   2300.00   3200.00

     DQ       DIVERTED FLOW         .00        .00    200.00    500.00

                                                                    ***

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

                          DIVERSION HYDROGRAPH       59

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                            (CFS)
+     492.     21.00                  483.        371.        170.         88.
                          (INCHES)     .000        .000        .000        .000
                           (AC-FT)    240.        736.       1010.       1010.

                          CUMULATIVE AREA =     .00 SQ MI

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

```
                    HYDROGRAPH AT STATION       SC

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    2685.     21.00                2666.       2440.       1497.         930.
                       (INCHES)      .000        .000        .000         .000
                        (AC-FT)     1322.       4839.       8911.       10684.

                       CUMULATIVE AREA =     .00 SQ MI


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


            **************
            *            *
  132 KK    *      CO-7  *
            *            *
            **************
                          COMBINE SKUNK CREEK FLOW AND FLOW INTO CREEK BETWEEN 55TH AVE AND 59TH AVE

  134 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                    HYDROGRAPH AT STATION     CO-7

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    7945.     21.00                7909.       7466.       6039.        4818.
                       (INCHES)     4.256      16.068      38.990       60.055
                        (AC-FT)     3922.      14808.      35933.       55346.

                       CUMULATIVE AREA =   17.28 SQ MI


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


            **************
            *            *
  135 KK    *     RTR59  *
            *            *
            **************
                          RETRIEVE FLOW WEST OF 59TH AVE

  137 DR          RETRIEVE DIVERSION HYDROGRAPH
                       ISTAD          59  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                    HYDROGRAPH AT STATION    RTR59

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+     492.     21.00                 483.        371.        170.          88.
                       (INCHES)      .260        .799       1.096        1.096
                        (AC-FT)      240.        736.       1010.        1010.

                       CUMULATIVE AREA =     .00 SQ MI
```

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

              **************
              *            *
  138 KK      *     CO-8   *
              *            *
              **************
                              FLOW WEST OF 59TH AVE REJOINS SKUNK CREEK AT 71ST AVE CHANNEL

  140 HC            HYDROGRAPH COMBINATION
                          ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                          ***

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

                            HYDROGRAPH AT STATION    CO-8

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR    139.00-HR
+   (CFS)       (HR)
                                 (CFS)
+    8437.     21.00                    8392.        7837.        6208.        4906.
                            (INCHES)    4.516       16.867       40.086       61.151
                             (AC-FT)    4162.       15545.       36943.       56357.

                            CUMULATIVE AREA =   17.28 SQ MI


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

              **************
              *            *
  141 KK      *     RTR5   *
              *            *
              **************
                              RETRIEVE FLOW IN BEARDSLEY RD AT ARROWHEAD LAKES OUTLET STRUCTURE

  143 DR            RETRIEVE DIVERSION HYDROGRAPH
                          ISTAD      BDSLY2  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                          ***

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

                            HYDROGRAPH AT STATION    RTR5

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR    139.00-HR
+   (CFS)       (HR)
                                 (CFS)
+    1951.     21.00                    1908.        1523.         906.         633.
                            (INCHES)    1.027        3.278        5.847        7.884
                             (AC-FT)     946.        3021.        5388.        7266.

                            CUMULATIVE AREA =     .00 SQ MI


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

              **************
              *            *
  144 KK      *    BDSLY3  *
              *            *
              **************
                              WEIR INTO LOOP 101 FREEWAY EAST OF 59TH AVE
                              BDSLY3 = WEST IN BEARDSLEY, STREET CAPACITY IS 100 CFS
                              FWY1 = WEIR INTO FREEWAY EAST OF 59TH AVE
```

```
     DT          DIVERSION
                      ISTAD        FWY1  DIVERSION HYDROGRAPH IDENTIFICATION

     DI             INFLOW         .00    500.00    800.00   2100.00

     DQ      DIVERTED FLOW         .00    400.00    700.00   2000.00

                                                                  ***

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

                         DIVERSION HYDROGRAPH     FWY1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1851.     21.00                1808.       1423.        808.         549.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)     897.       2822.       4806.        6308.

                        CUMULATIVE AREA =     .00 SQ MI


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

                         HYDROGRAPH AT STATION   BDSLY3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+     100.     13.00                 100.        100.         98.          83.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)      50.        198.        583.         958.

                        CUMULATIVE AREA =     .00 SQ MI


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

            **************
            *            *
  151 KK    *     RTR4   *
            *            *
            **************
                          RETRIEVE FLOW THROUGH SUBDIVISION WEST OF ARROWHEAD LAKES

  153 DR          RETRIEVE DIVERSION HYDROGRAPH
                       ISTAD       WEIR   DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                         HYDROGRAPH AT STATION    RTR4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    139.00-HR
+   (CFS)       (HR)
                          (CFS)
+    1256.     25.00                1244.       1123.        623.         436.
                        (INCHES)     .000        .000        .000         .000
                         (AC-FT)     617.       2227.       3709.        5011.

                        CUMULATIVE AREA =     .00 SQ MI


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

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

```
                *            *
  154 KK        *      CO-2  *
                *            *
                **************
                                COMBINE FLOW IN BEARDSLEY RD WITH FLOW FROM 59TH AVE;
                                THE COMBINED FLOW ENTERS LOOP 101 FREEWAY THROUGH
                                WEST-BOUND ON-RAMP AT 59TH AVE

  158 HC            HYDROGRAPH COMBINATION
                          ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                            HYDROGRAPH AT STATION     CO-2

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR    139.00-HR
+   (CFS)        (HR)
                              (CFS)
+    1356.      25.00                  1344.        1223.         721.         520.
                         (INCHES)      .000         .000         .000         .000
                          (AC-FT)      666.        2425.        4292.        5969.

                         CUMULATIVE AREA =      .00 SQ MI


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


                **************
                *            *
  159 KK        *     RTRF1  *
                *            *
                **************
                                RETRIEVE FLOW IN FREEWAY EAST OF 59TH AVE

  161 DR            RETRIEVE DIVERSION HYDROGRAPH
                          ISTAD        FWY1  DIVERSION HYDROGRAPH IDENTIFICATION

                                                                  ***

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

                            HYDROGRAPH AT STATION    RTRF1

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR    139.00-HR
+   (CFS)        (HR)
                              (CFS)
+    1851.      21.00                  1808.        1423.         808.         549.
                         (INCHES)      .000         .000         .000         .000
                          (AC-FT)      897.        2822.        4806.        6308.

                         CUMULATIVE AREA =      .00 SQ MI


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


                **************
                *            *
  162 KK        *       FWY  *
                *            *
                **************
                                COMBINE FLOWS IN LOOP 101 FREEWAY

  164 HC            HYDROGRAPH COMBINATION
                          ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

HYDROGRAPH AT STATION FWY

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	139.00-HR
		(CFS)				
3150.	22.00		3107.	2640.	1529.	1069.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	1541.	5236.	9097.	12277.

CUMULATIVE AREA = .00 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

MAXIMUM	TIME OF OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	STAGE
MAX STAGE									
	HYDROGRAPH AT	AD-E	9620.	18.00	9516.	8248.	5380.	8.64	
	DIVERSION TO	LP101	402.	18.00	392.	273.	114.	8.64	
	HYDROGRAPH AT	DIV1	9218.	18.00	9124.	7974.	5266.	8.64	
	DIVERSION TO	AVE51	2205.	18.00	2179.	1862.	1158.	8.64	
	HYDROGRAPH AT	DIV2	7013.	18.00	6945.	6112.	4108.	8.64	
	DIVERSION TO	BDSLY1	3306.	18.00	3274.	2877.	1961.	8.64	
	HYDROGRAPH AT	DIV3	3707.	18.00	3671.	3235.	2147.	8.64	
	ROUTED TO	RLAKE	3436.	25.00	3414.	3192.	2336.	8.64	
1294.81	25.00								
	DIVERSION TO	WEIR	1256.	25.00	1244.	1123.	623.	8.64	
	HYDROGRAPH AT	DIV4	2180.	25.00	2170.	2069.	1713.	8.64	
	HYDROGRAPH AT	RTR3	3306.	18.00	3274.	2877.	1961.	.00	
	2 COMBINED AT	CO-1	5428.	21.00	5379.	4934.	3674.	8.64	
	DIVERSION TO	BDSLY2	1951.	21.00	1908.	1523.	906.	8.64	
	HYDROGRAPH AT	DIV5	3477.	21.00	3470.	3411.	2768.	8.64	
	HYDROGRAPH AT	RTR1	402.	18.00	392.	273.	114.	.00	
	HYDROGRAPH AT	RTR2	2205.	18.00	2179.	1862.	1158.	.00	
	2 COMBINED AT	CO-3	2607.	18.00	2571.	2135.	1272.	.00	
	DIVERSION TO	51STS	1103.	18.00	1090.	931.	617.	.00	

+	HYDROGRAPH AT	DIV6	1504.	18.00	1482.	1204.	655.	.00
+	2 COMBINED AT	CO-4	4977.	21.00	4949.	4610.	3423.	8.64
+	DIVERSION TO	55W	3177.	13.00	3149.	2810.	1667.	8.64
+	HYDROGRAPH AT	DIV7	1800.	13.00	1800.	1800.	1756.	8.64
+	HYDROGRAPH AT	RTR6	1103.	18.00	1090.	931.	617.	.00
+	2 COMBINED AT	CO-5	2903.	18.00	2890.	2731.	2373.	8.64
+	HYDROGRAPH AT	AD-P	2360.	18.00	2354.	2297.	2169.	8.64
+	2 COMBINED AT	CO-6	5263.	18.00	5243.	5028.	4541.	17.28
+	HYDROGRAPH AT	RTR7	3177.	21.00	3149.	2810.	1667.	.00
+	DIVERSION TO	59	492.	21.00	483.	371.	170.	.00
+	HYDROGRAPH AT	SC	2685.	21.00	2666.	2440.	1497.	.00
+	2 COMBINED AT	CO-7	7945.	21.00	7909.	7466.	6039.	17.28
+	HYDROGRAPH AT	RTR59	492.	21.00	483.	371.	170.	.00
+	2 COMBINED AT	CO-8	8437.	21.00	8392.	7837.	6208.	17.28
+	HYDROGRAPH AT	RTR5	1951.	21.00	1908.	1523.	906.	.00
+	DIVERSION TO	FWY1	1851.	13.00	1808.	1423.	808.	.00
+	HYDROGRAPH AT	BDSLY3	100.	13.00	100.	100.	98.	.00
+	HYDROGRAPH AT	RTR4	1256.	25.00	1244.	1123.	623.	.00
+	2 COMBINED AT	CO-2	1356.	25.00	1344.	1223.	721.	.00
+	HYDROGRAPH AT	RTRF1	1851.	21.00	1808.	1423.	808.	.00
+	2 COMBINED AT	FWY	3150.	22.00	3107.	2640.	1529.	.00

*** NORMAL END OF HEC-1 ***

ADOBE DAM
SPILLWAY DELINEATION STUDY
(FCD 98-32)

APPENDIX H: COMPUTER FILES

Adobe Dam
Spillway Delineation Study

Appendix H: Computer Files

Table of Contents

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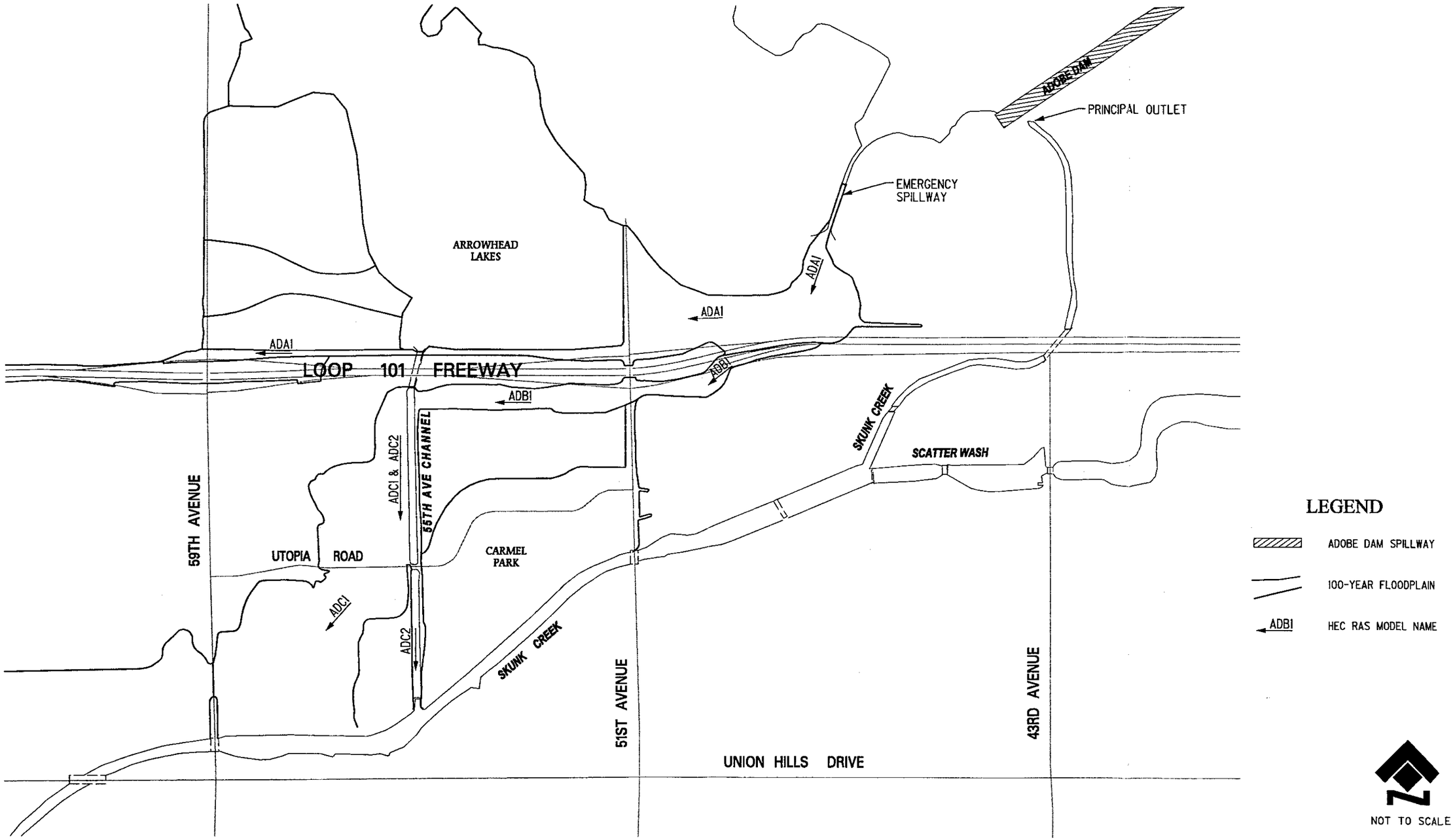
1 Figure H-1: HEC-RAS Index Map

2 Spillway Delineation Maps (11" x 17")

3 CD With Models, Report, Photos, and GIS

4 CD Contents



Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85003-1136
Tel: (602) 252-8384
Fax: (602) 252-8385

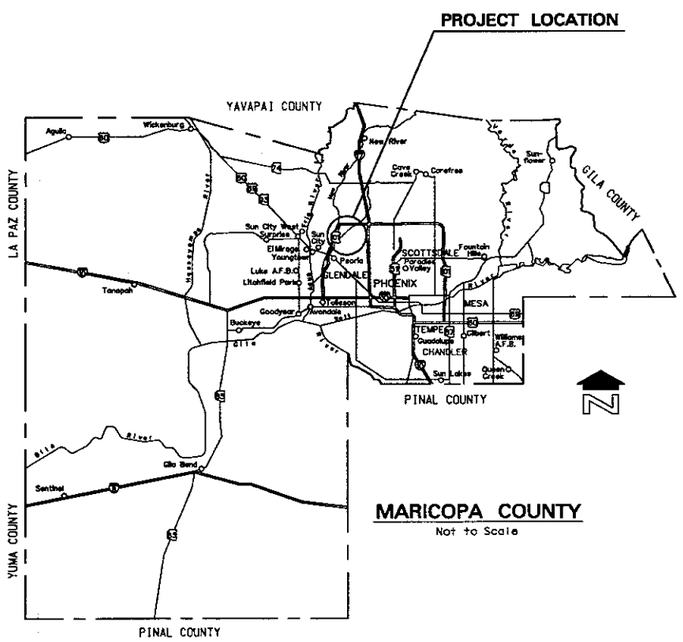
ADOBE DAM SPILLWAY
HEC-RAS INDEX MAP

FIGURE H-1

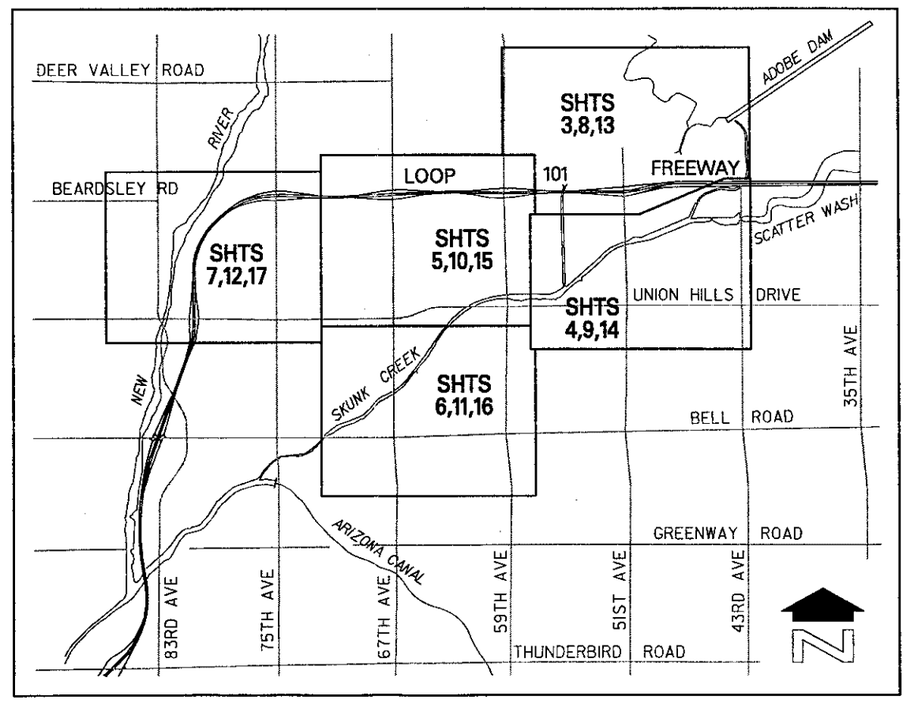
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM
SPILLWAY DELINEATION STUDY

FCD CONTRACT NO. 98-32



MARICOPA COUNTY
Not to Scale



VICINITY MAP
Not to Scale

AERIAL MAPPING

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.
FLIGHT DATES: 7-8-1991 & 8-11-1999

SUPPLEMENTAL FIELD SURVEY

ADDITIONAL FIELD SURVEY CONDUCTED BY PROJECT ENGINEERING CONSULTANTS, LTD.

DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

HYDROLOGY/HYDRAULICS

HOSKIN ENGINEERING CONSULTANTS
323 W. ROOSEVELT STREET, STE. 200
PHOENIX, AZ 85003
(602) 252-8384

DEI PROFESSIONAL SERVICES, INC.
6225 NORTH 24TH STREET, STE. 200
PHOENIX, AZ 85016
(602) 954-0038

SHEET INDEX

1	COVER SHEET
2	FLOW DIAGRAM
3-7	FULL FLOW MAPS
8-12	2/3 FLOW MAPS
13-17	1/3 FLOW MAPS

NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
323 West Roosevelt Street
Suite 200
Phoenix, Arizona 85003-1156
Tel: (602) 252-8384
Fax: (602) 252-8385

DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

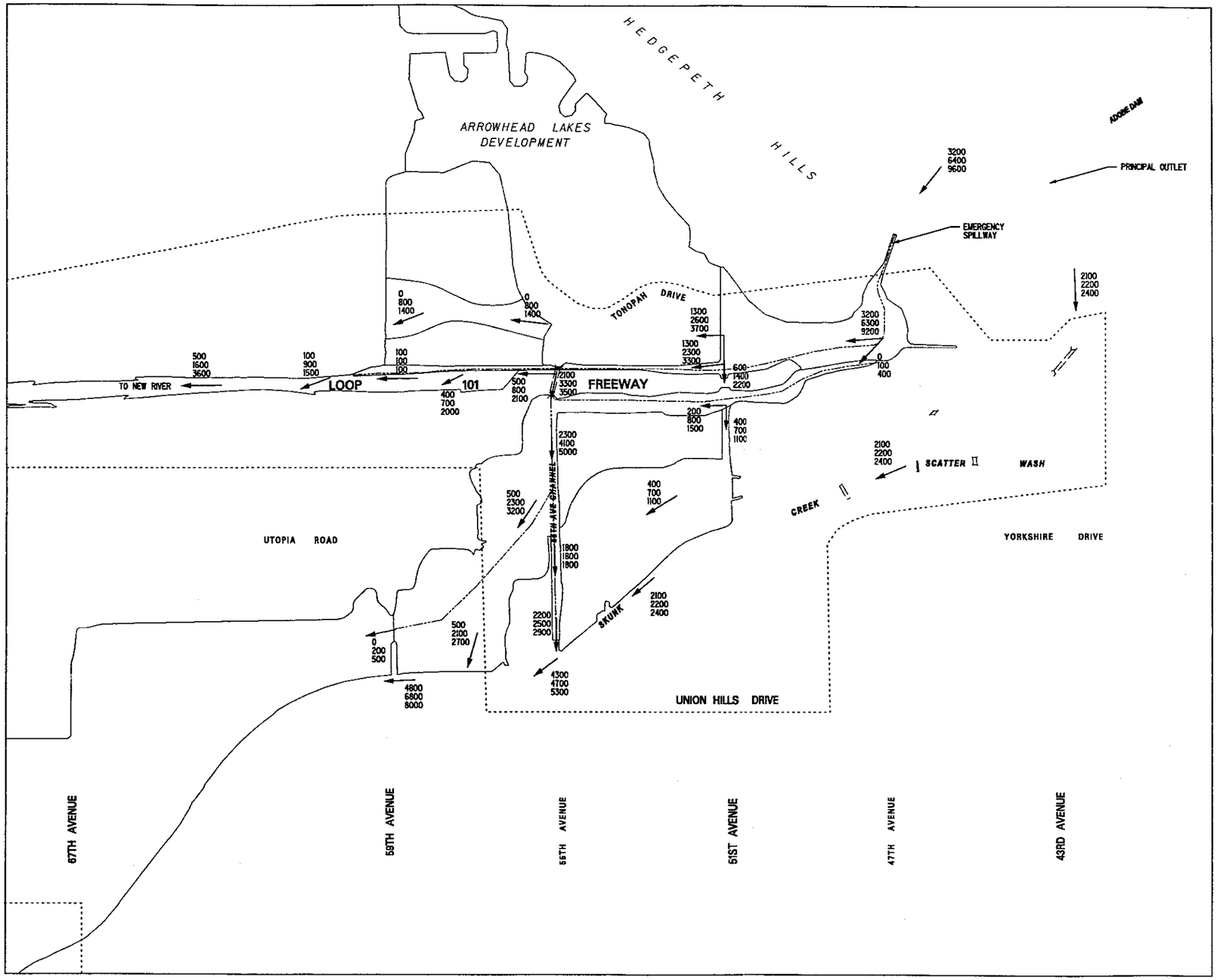
	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARION Date Signed ARIZONA, U.S.A.

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

COVER SHEET

E:\filedir\99\990006 - spillway inundation studies\02-adobe dam\planset dgns\cover-s01.dgn
08/14/01



LEGEND

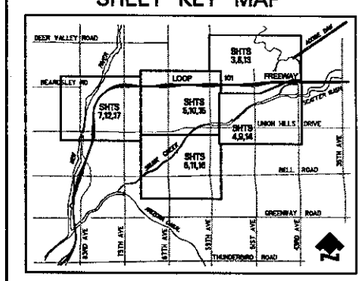
SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

FLOW VALUES
1/3 FLOW 0= 3200 CFS — 3200
2/3 FLOW 0= 6300 CFS — 6300
FULL FLOW 0= 9400 CFS — 9400

AERIAL MAPPING BY
KENNEY AERIAL MAPPING, INC.
FLIGHT DATE: 8-11-1999
(ALL OTHER AREAS FLOWN 7-8-1991)

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin Engineering Consultants, Inc.
525 West Roosevelt Street
Suite 200
Phoenix, Arizona 85005-1136
Tel: (602) 252-8384
Fax: (602) 252-8385

DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

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

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

FLOW DIAGRAM

SHEET 2 OF 17

800' 0' 800' 1600'
SCALE: 1" = 800 FEET

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

g:\filedir\99\990008 - spillway inundation studies\02-adobe dam\planset dgns\flowdata-s02.dgn
06/14/01

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	5000	1288.20	6.97	0.33	6.90	3.89

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	5000	1288.20	6.97	0.33	6.90	3.89

NOTES:
1. AVERAGE VELOCITY IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVERAGE DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.52 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 7.58 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADB1

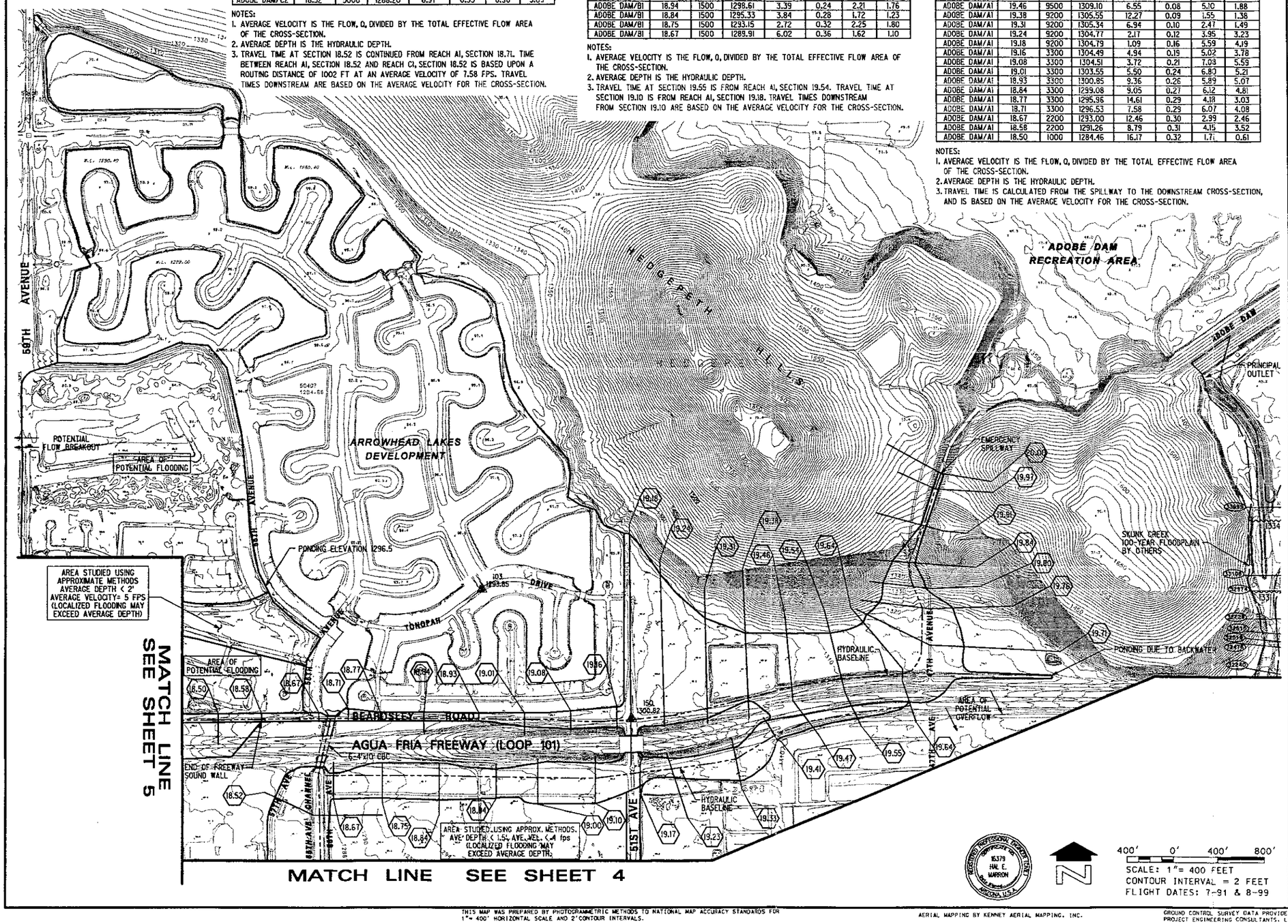
RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	100	1309.53	2.11	0.06	2.51	1.00
ADOBE DAM/B1	19.47	100	1309.49	0.80	0.12	9.48	1.13
ADOBE DAM/B1	19.41	400	1308.87	4.27	0.23	0.99	0.79
ADOBE DAM/B1	19.33	400	1306.41	2.53	0.26	0.81	0.53
ADOBE DAM/B1	19.23	400	1303.33	2.59	0.32	1.33	0.84
ADOBE DAM/B1	19.17	400	1302.90	1.64	0.35	1.05	0.92
ADOBE DAM/B1	19.10	1500	1301.68	2.99	0.16	1.70	1.44
ADOBE DAM/B1	19.00	1500	1300.13	2.72	0.20	2.09	1.56
ADOBE DAM/B1	18.94	1500	1298.61	3.39	0.24	2.21	1.76
ADOBE DAM/B1	18.84	1500	1295.33	3.84	0.28	1.72	1.23
ADOBE DAM/B1	18.75	1500	1293.15	2.72	0.32	2.25	1.80
ADOBE DAM/B1	18.67	1500	1289.91	6.02	0.36	1.62	1.10

NOTES:
1. AVERAGE VELOCITY IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVERAGE DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIME AT SECTION 19.55 IS FROM REACH A1, SECTION 19.54. TRAVEL TIME AT SECTION 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADA1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	9600	1389.36	18.29	0.00	13.36	10.34
ADOBE DAM/A1	19.97	9600	1386.31	21.31	0.00	11.81	9.16
ADOBE DAM/A1	19.91	9600	1379.08	25.66	0.01	10.80	7.90
ADOBE DAM/A1	19.84	9600	1352.71	35.86	0.01	3.86	1.33
ADOBE DAM/A1	19.80	9600	1335.30	13.33	0.01	3.47	1.93
ADOBE DAM/A1	19.76	9600	1322.96	10.34	0.02	3.36	1.41
ADOBE DAM/A1	19.71	9600	1317.89	7.00	0.02	2.36	1.50
ADOBE DAM/A1	19.64	9600	1315.01	5.88	0.04	9.01	1.90
ADOBE DAM/A1	19.54	9500	1311.41	9.05	0.06	7.41	1.59
ADOBE DAM/A1	19.46	9500	1309.10	6.55	0.08	5.10	1.88
ADOBE DAM/A1	19.38	9200	1305.55	12.27	0.09	1.55	1.36
ADOBE DAM/A1	19.31	9200	1305.34	6.94	0.10	2.47	1.49
ADOBE DAM/A1	19.24	9200	1304.77	2.17	0.12	3.95	3.23
ADOBE DAM/A1	19.18	9200	1304.79	1.09	0.16	5.59	4.19
ADOBE DAM/A1	19.16	3300	1304.49	4.94	0.19	5.02	3.78
ADOBE DAM/A1	19.08	3300	1304.51	3.72	0.21	7.03	5.59
ADOBE DAM/A1	19.01	3300	1303.55	5.50	0.24	6.80	5.21
ADOBE DAM/A1	18.93	3300	1300.85	9.36	0.26	5.89	5.07
ADOBE DAM/A1	18.84	3300	1299.08	9.05	0.27	6.12	4.81
ADOBE DAM/A1	18.77	3300	1295.96	14.61	0.29	4.18	3.03
ADOBE DAM/A1	18.71	3300	1296.53	7.58	0.29	6.07	4.08
ADOBE DAM/A1	18.67	2200	1293.00	12.46	0.30	2.99	2.46
ADOBE DAM/A1	18.58	2200	1291.26	8.79	0.31	4.15	3.52
ADOBE DAM/A1	18.50	1000	1284.46	16.17	0.32	1.71	0.61

NOTES:
1. AVERAGE VELOCITY IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECTIVE FLOW AREA OF THE CROSS-SECTION.
2. AVERAGE 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 BASE LINE
CROSS SECTION (19.87) CROSS SECTION DESIGNATION
CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)
100-YEAR FLOODPLAIN BOUNDARY
100-YEAR WATER SURFACE ELEVATION 1334
ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
150	1300.82	970987.256	423345.167
103	1293.85	972111.693	422046.014

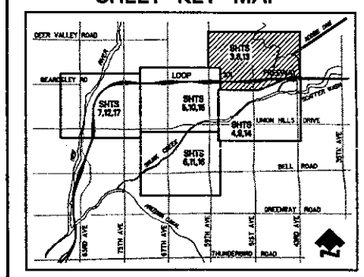
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

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.

FULL FLOW

SHEET 3 OF 17

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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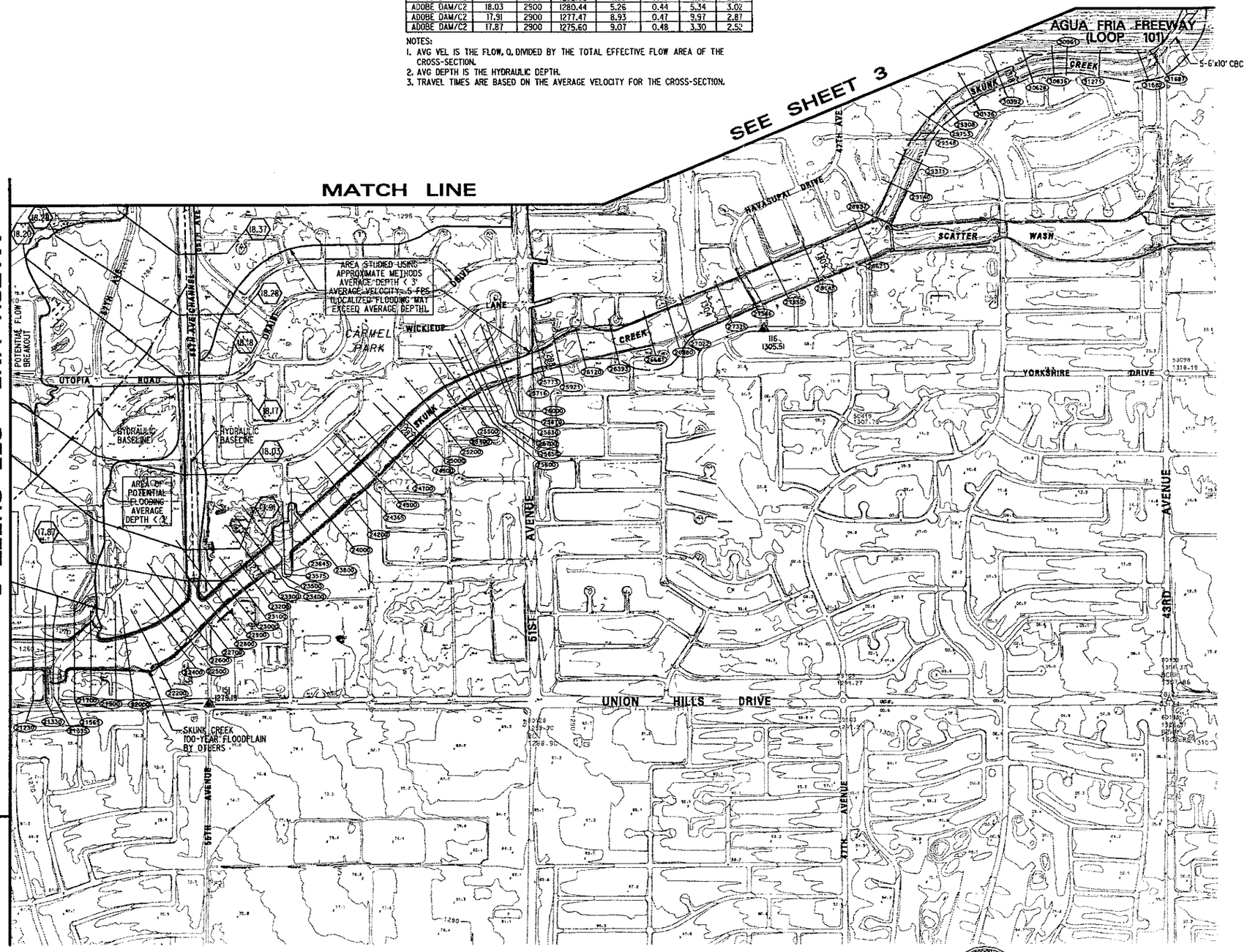
HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.37	5000	1286.80	6.61	0.36	7.10	4.13
ADOBE DAM/C1	18.28	5000	1284.32	10.22	0.38	5.82	2.98
ADOBE DAM/C1	18.20	3200	1282.92	4.10	0.39	5.42	1.57

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.37	5000	1286.79	6.62	0.36	7.09	4.13
ADOBE DAM/C2	18.28	5000	1284.33	10.18	0.38	5.83	2.99
ADOBE DAM/C2	18.18	1800	1283.36	3.85	0.39	5.86	3.05
ADOBE DAM/C2	18.17	1800	1282.02	4.59	0.40	4.52	2.63
ADOBE DAM/C2	18.03	2900	1280.44	5.26	0.44	5.34	3.02
ADOBE DAM/C2	17.91	2900	1277.47	8.93	0.47	9.97	2.87
ADOBE DAM/C2	17.87	2900	1275.60	9.07	0.48	3.30	2.52

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 TIMES ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
116	1305.51	968740.846	425354.846
151	1279.19	965701.276	420825.648

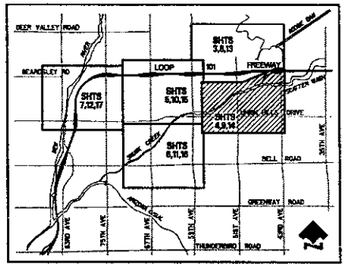
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

FULL FLOW

SHEET 4 OF 17

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.

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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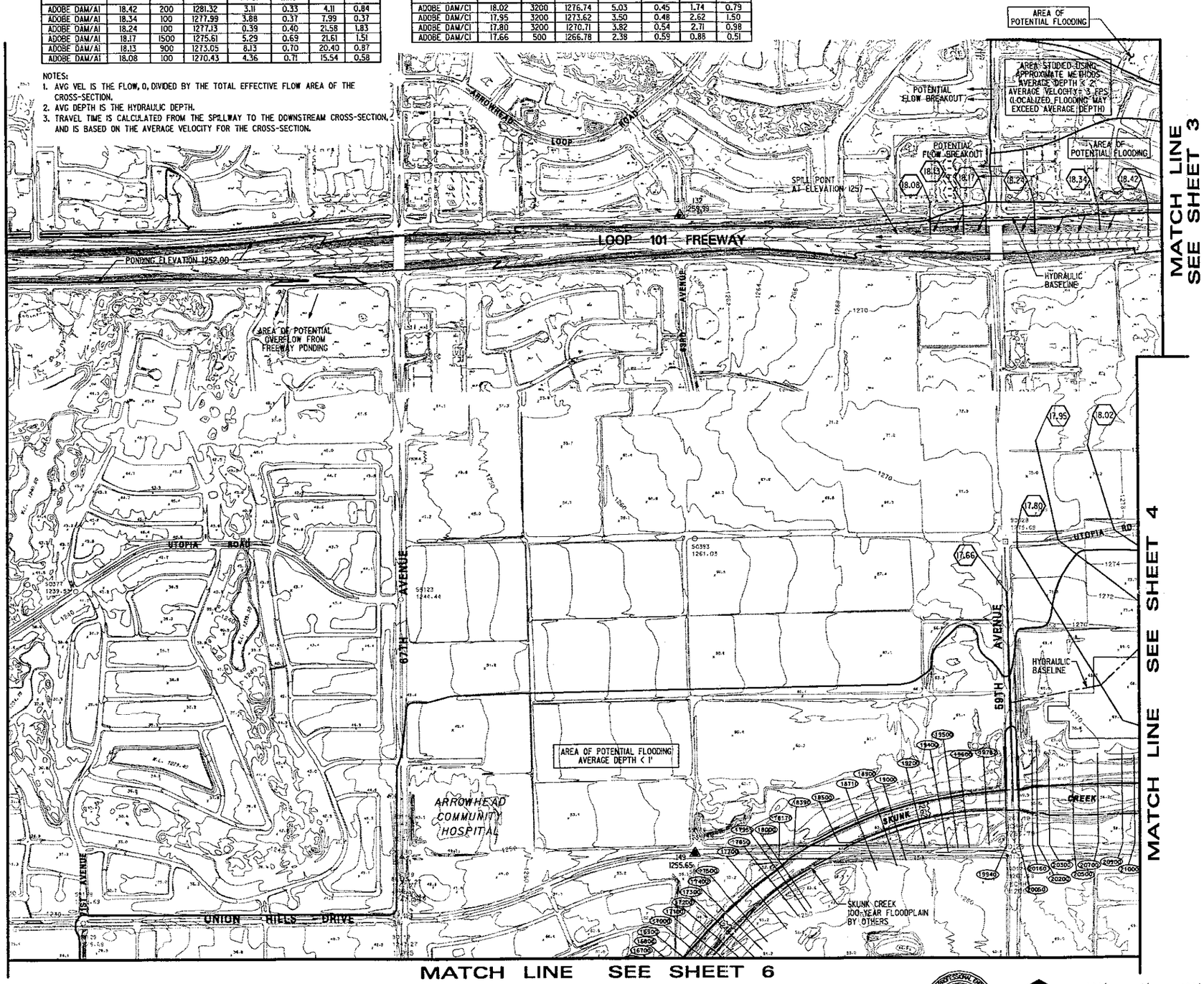
HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADA1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	18.42	200	1281.32	3.11	0.33	4.11	0.84
ADOBE DAM/A1	18.34	100	1277.99	3.88	0.37	7.99	0.37
ADOBE DAM/A1	18.24	100	1277.13	0.39	0.40	21.58	1.83
ADOBE DAM/A1	18.17	1500	1275.61	5.29	0.69	21.61	1.51
ADOBE DAM/A1	18.13	900	1273.05	8.13	0.70	20.40	0.87
ADOBE DAM/A1	18.08	100	1270.43	4.36	0.71	15.54	0.58

HEC-RAS SUMMARY, ADOBE DAM FULL FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.02	3200	1276.74	5.03	0.45	1.74	0.79
ADOBE DAM/C1	17.95	3200	1273.62	3.50	0.48	2.62	1.50
ADOBE DAM/C1	17.80	3200	1270.71	3.82	0.54	2.71	0.98
ADOBE DAM/C1	17.66	500	1266.78	2.38	0.59	0.88	0.51

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 BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
132	1259.99	970940.819	415429.442
149	1255.65	965658.791	415531.158

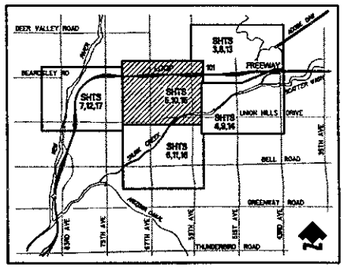
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16379 HAL E. MARSON 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	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

FULL FLOW

SHEET 5 OF 17

N

400' 0' 400' 800'

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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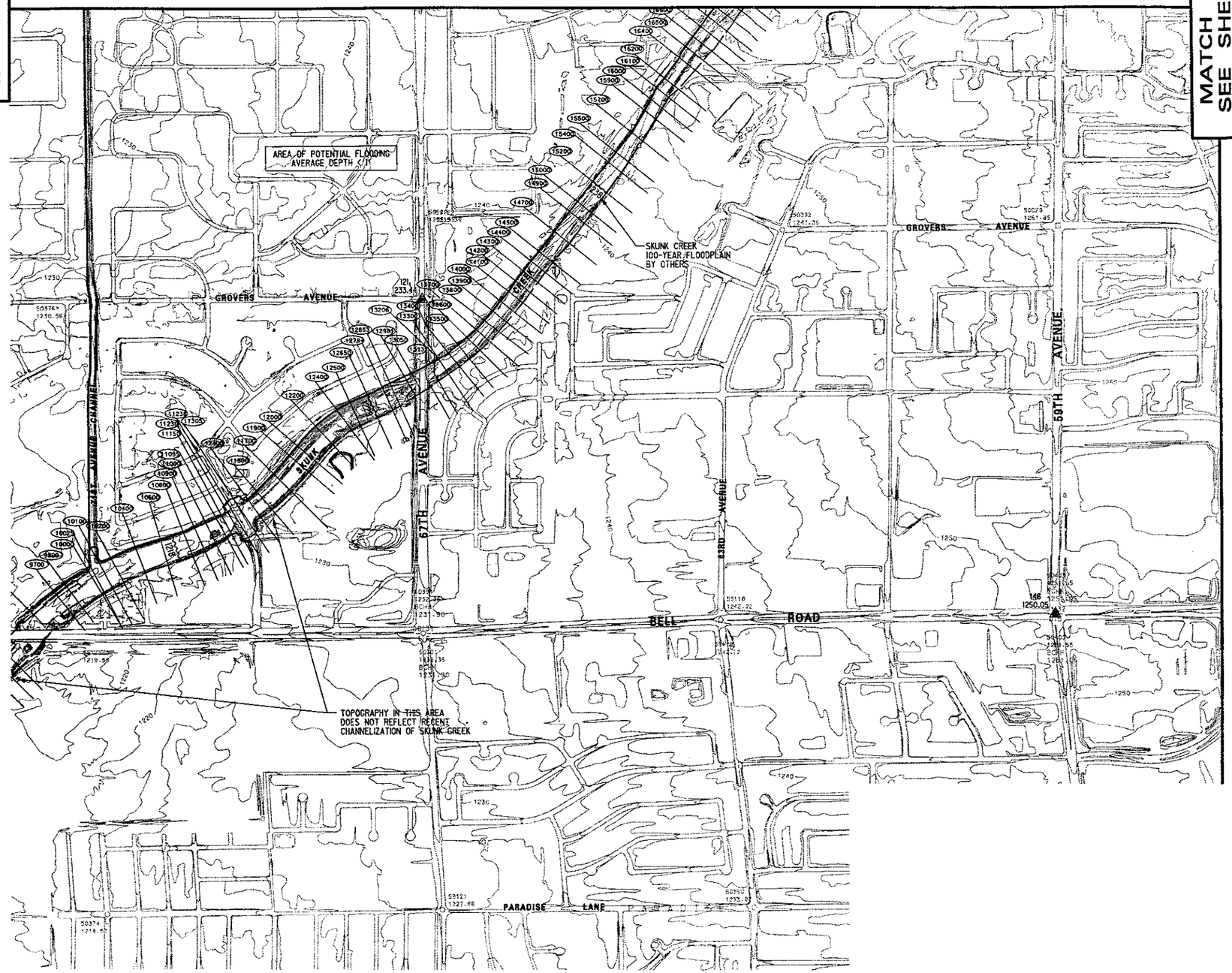
MATCH LINE SEE SHT 7

MATCH LINE SEE SHEET 5

MATCH LINE SEE SHEET 4



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	19.87 (CROSS SECTION DESIGNATION)
CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS	24000
100-YEAR FLOODPLAIN BOUNDARY	
100-YEAR WATER SURFACE ELEVATION	1334
ELEVATION REFERENCE MARKS	103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
121	1233.44	962477.813	413094.990
146	1250.05	959979.394	418098.407

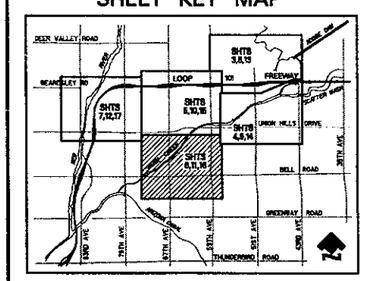
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
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REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

FULL FLOW

SHEET 6 OF 17

400' 0' 400' 800'

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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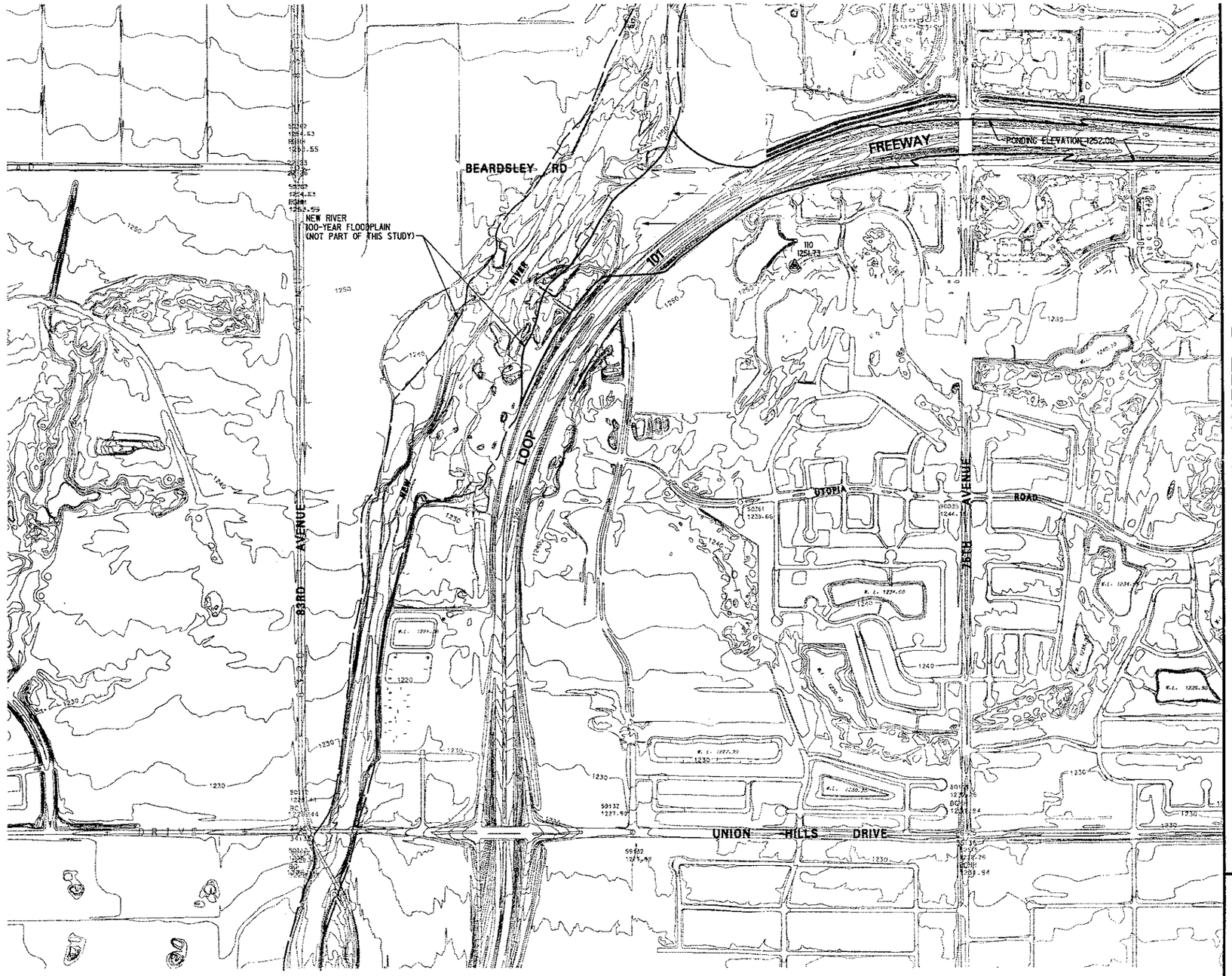


LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION — 19.87 — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS — 24000

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION — 1334

ELEVATION REFERENCE MARKS — 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
110	1251.73	969589.038	406456.694

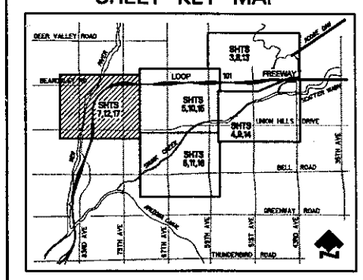
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE 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	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

FULL FLOW

SHEET 7 OF 17

400' 0' 400' 800'

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

g:\filedir\96\990006 - spillway inundation studies\02-adobe dam\planset dgns\pla400n07.dgn
06/14/01

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	4100	1287.62	6.53	0.35	6.32	4.33

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	4100	1287.60	6.56	0.35	6.30	4.32

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 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.71 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 6.71 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADB1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	0					
ADOBE DAM/B1	19.47	0					
ADOBE DAM/B1	19.41	100	1308.45	2.17	0.10	0.57	0.44
ADOBE DAM/B1	19.33	100	1306.04	2.00	0.15	0.44	0.17
ADOBE DAM/B1	19.23	100	1302.74	1.68	0.23	0.74	0.52
ADOBE DAM/B1	19.17	100	1302.46	0.76	0.27	0.61	0.51
ADOBE DAM/B1	19.10	800	1301.19	2.39	0.17	1.21	1.00
ADOBE DAM/B1	18.00	800	1299.58	2.22	0.22	1.54	1.09
ADOBE DAM/B1	18.94	800	1298.10	2.53	0.27	1.70	1.29
ADOBE DAM/B1	18.84	800	1294.88	3.18	0.32	1.27	0.85
ADOBE DAM/B1	18.75	800	1292.58	2.11	0.37	1.68	1.36
ADOBE DAM/B1	18.67	800	1289.51	5.01	0.42	1.21	0.76

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 19.41 IS FROM REACH A1, SECTION 19.38. TRAVEL TIME AT SECTION 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADA1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	6400	1386.60	16.40	0.00	10.60	8.34
ADOBE DAM/A1	19.97	6400	1383.80	19.30	0.00	9.30	7.31
ADOBE DAM/A1	19.91	6400	1376.86	23.37	0.01	8.58	6.37
ADOBE DAM/A1	19.84	6400	1352.37	31.61	0.01	3.52	1.08
ADOBE DAM/A1	19.80	6400	1335.01	10.44	0.01	3.18	1.70
ADOBE DAM/A1	19.76	6400	1322.33	11.08	0.02	2.73	1.30
ADOBE DAM/A1	19.71	6400	1317.48	6.31	0.03	1.95	1.21
ADOBE DAM/A1	19.64	6400	1314.33	6.11	0.04	8.32	1.24
ADOBE DAM/A1	19.54	6400	1310.85	9.20	0.07	6.85	1.17
ADOBE DAM/A1	19.46	6400	1306.65	5.74	0.08	4.64	1.58
ADOBE DAM/A1	19.38	6300	1305.17	11.38	0.10	1.17	1.12
ADOBE DAM/A1	19.31	6300	1304.98	6.25	0.11	2.11	1.17
ADOBE DAM/A1	19.24	6300	1303.91	2.02	0.12	3.09	2.42
ADOBE DAM/A1	19.18	6300	1303.93	0.93	0.17	4.73	3.37
ADOBE DAM/A1	19.16	2300	1302.92	5.82	0.20	3.45	2.34
ADOBE DAM/A1	19.08	2300	1302.93	3.60	0.22	5.50	4.16
ADOBE DAM/A1	19.01	2300	1301.97	5.35	0.25	5.22	4.30
ADOBE DAM/A1	18.93	2300	1300.05	7.74	0.27	5.09	4.28
ADOBE DAM/A1	18.84	2300	1298.04	8.04	0.29	5.08	3.77
ADOBE DAM/A1	18.77	2300	1295.41	12.43	0.30	3.63	2.48
ADOBE DAM/A1	18.71	2300	1295.66	6.71	0.31	5.20	3.21
ADOBE DAM/A1	18.67	800	1291.30	14.57	0.32	1.30	0.76
ADOBE DAM/A1	18.58	800	1289.31	7.16	0.33	2.20	1.57
ADOBE DAM/A1	18.50	300	1284.60	3.91	0.34	1.85	0.73

NOTES:
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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 BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
150	1300.82	970987.256	423345.167
103	1293.85	972111.693	422046.014

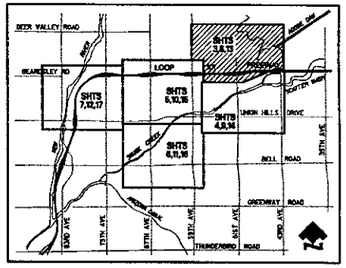
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

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.

2/3 FLOW

SHEET 8 OF 17

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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08/14/01

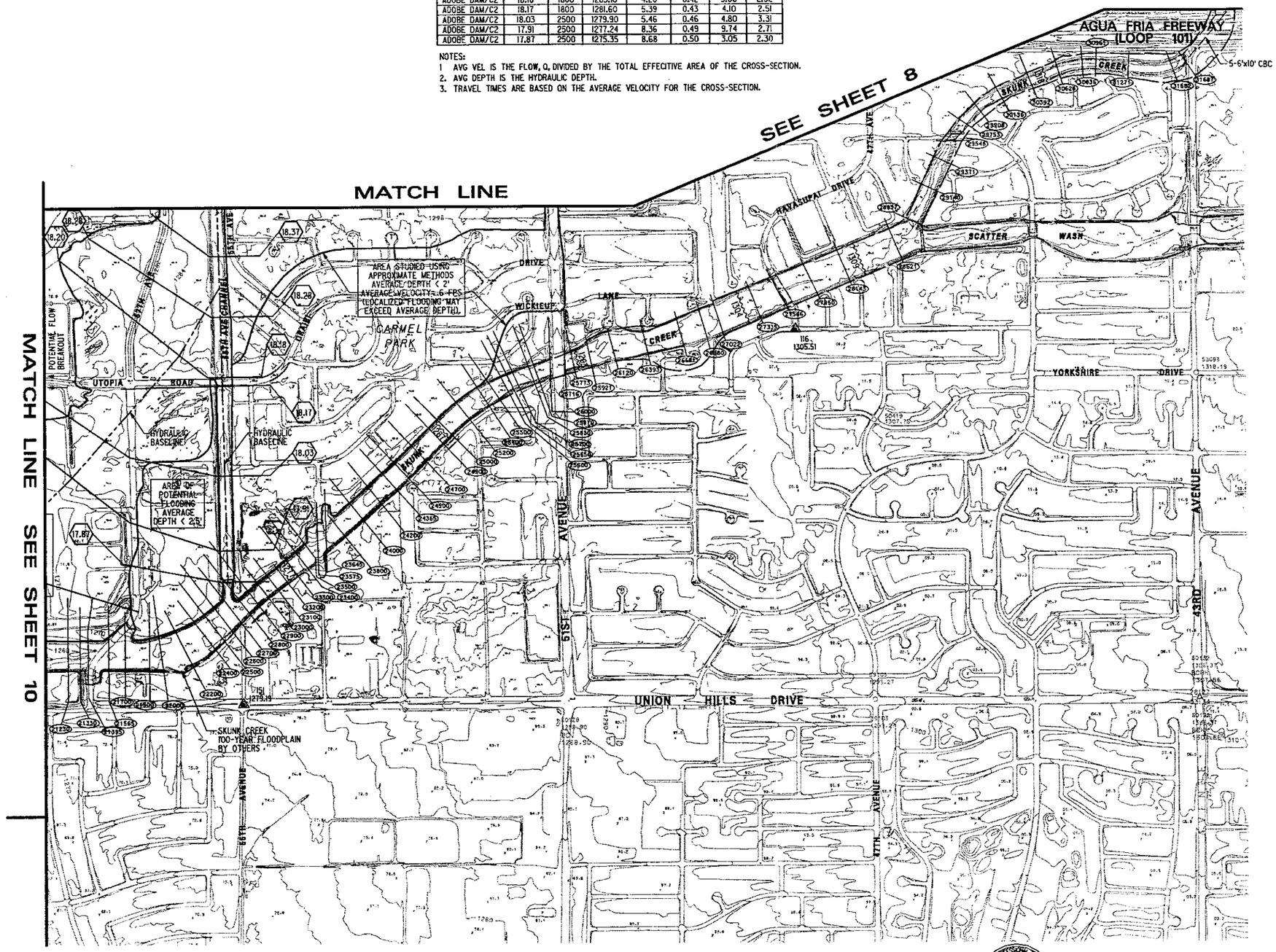
HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.37	4100	1286.27	6.14	0.38	6.57	4.36
ADOBE DAM/C1	18.28	4100	1283.79	9.98	0.41	5.28	3.14
ADOBE DAM/C1	18.20	2300	1282.54	3.77	0.42	5.04	1.47

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	4100	1287.60	6.56	0.35	6.30	4.32
ADOBE DAM/C2	18.37	4100	1286.20	6.24	0.38	6.50	4.41
ADOBE DAM/C2	18.28	4100	1284.02	9.29	0.41	5.52	3.19
ADOBE DAM/C2	18.18	1800	1283.10	4.20	0.42	5.60	2.92
ADOBE DAM/C2	18.17	1800	1281.60	5.39	0.43	4.10	2.51
ADOBE DAM/C2	18.03	2500	1279.90	5.46	0.46	4.80	3.31
ADOBE DAM/C2	17.91	2500	1277.24	8.36	0.49	9.74	2.71
ADOBE DAM/C2	17.87	2500	1275.35	8.68	0.50	3.05	2.30

NOTES:
1. AVG VEL IS THE FLOW, Q, DIVIDED BY THE TOTAL EFFECITIVE AREA OF THE CROSS-SECTION.
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIMES ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
116	1305.51	968740.846	425354.846
151	1279.19	965701.276	420825.648

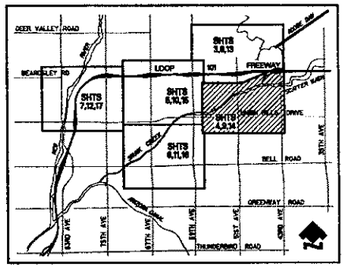
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE 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	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

2/3 FLOW

SHEET 9 OF 17

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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08/14/01

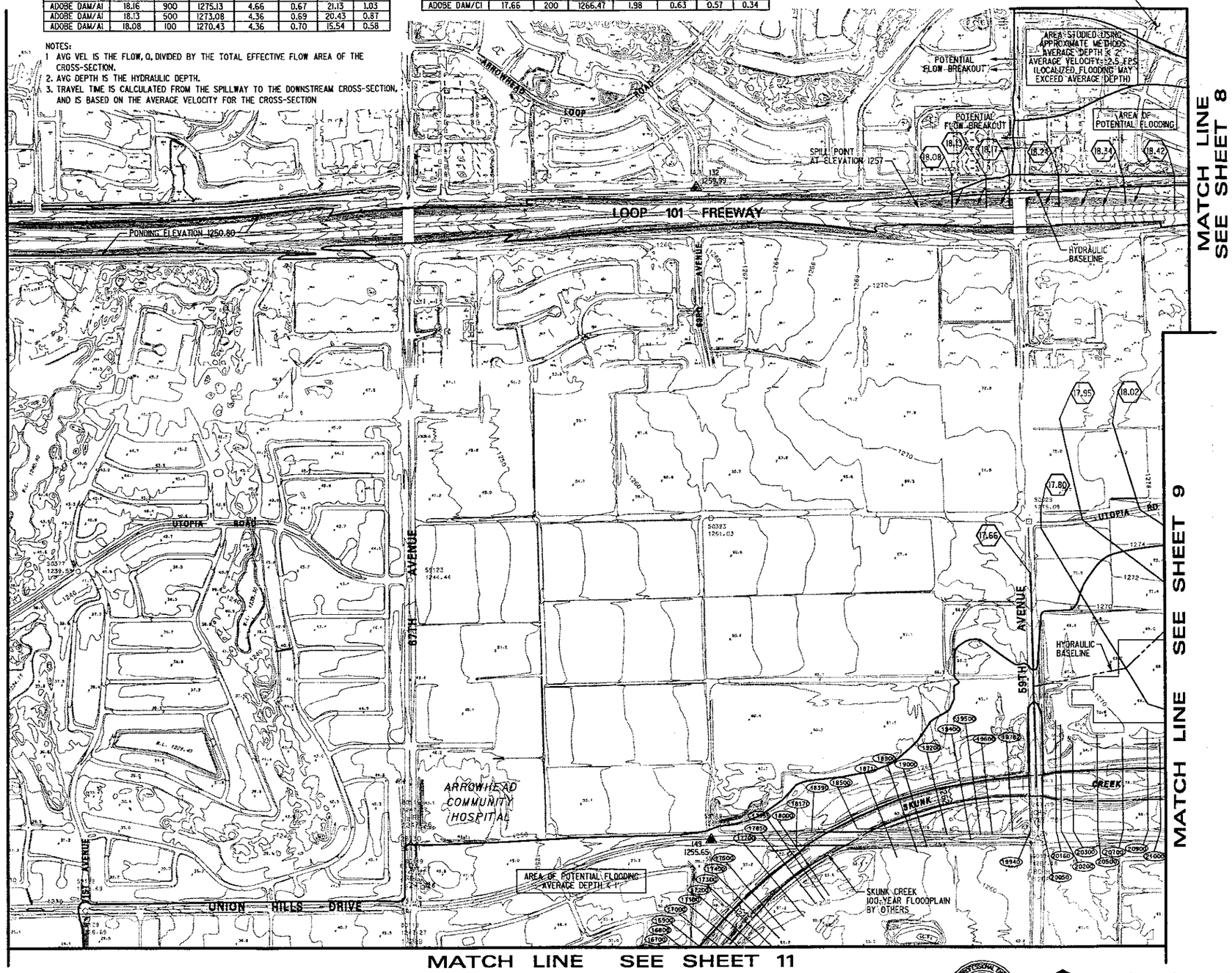
HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADAI

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/AI	18.42	100	1281.14	1.99	0.37	3.93	0.65
ADOBE DAM/AI	18.34	100	1277.99	3.89	0.43	7.99	0.37
ADOBE DAM/AI	18.24	100	1276.60	0.55	0.47	21.05	1.30
ADOBE DAM/AI	18.16	900	1275.13	4.66	0.67	21.13	1.03
ADOBE DAM/AI	18.13	500	1273.08	4.36	0.69	20.43	0.87
ADOBE DAM/AI	18.08	100	1270.43	4.36	0.70	15.54	0.58

HEC-RAS SUMMARY, ADOBE DAM 2/3 FLOW, MODEL NO. ADCI

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/CI	18.02	2300	1276.58	4.54	0.49	1.58	0.65
ADOBE DAM/CI	17.95	2300	1273.31	3.13	0.51	2.31	1.33
ADOBE DAM/CI	17.80	2300	1270.45	3.74	0.58	2.45	0.75
ADOBE DAM/CI	17.66	200	1266.47	1.98	0.63	0.57	0.34

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



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
132	1259.99	970940.819	415429.442
149	1255.65	965658.791	415531.158

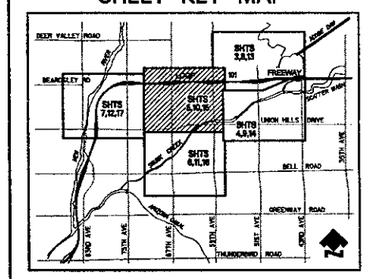
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
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REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 19690 PAUL W.R. HOSKIN ARIZONA U.S.A.

2/3 FLOW

SHEET 10 OF 17

SCALE: 1" = 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

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AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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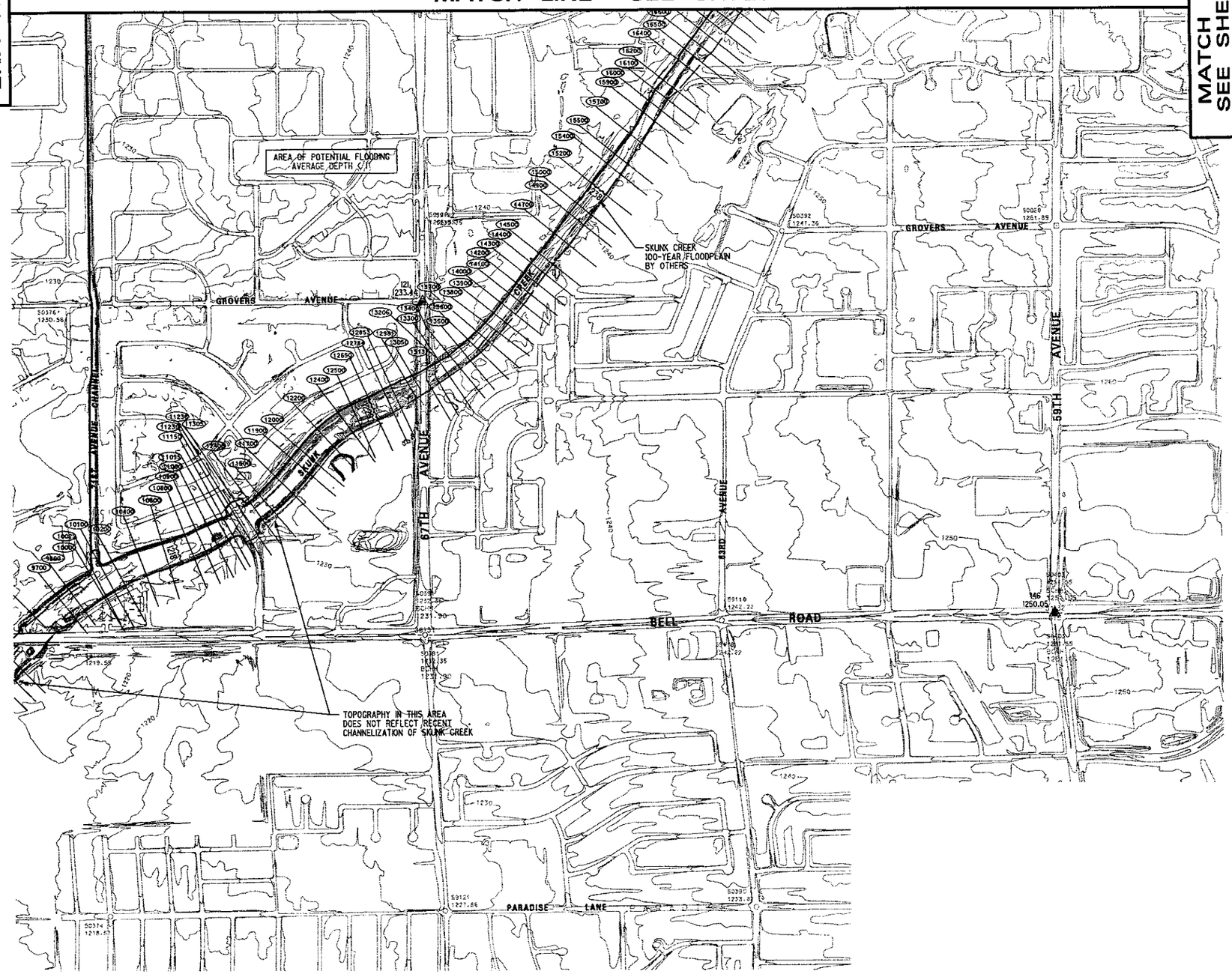
06/14/01

MATCH LINE SEE SHT 12

MATCH LINE SEE SHEET 10

MATCH LINE SEE SHEET 9



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87 — CROSS SECTION DESIGNATION)

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION (1334)

ELEVATION REFERENCE MARKS (103 / 1293.85)

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
121	1233.44	962477.813	413094.990
146	1250.05	959979.394	418098.407

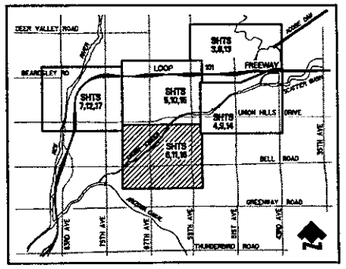
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

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

2/3 FLOW

SHEET 11 OF 17

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

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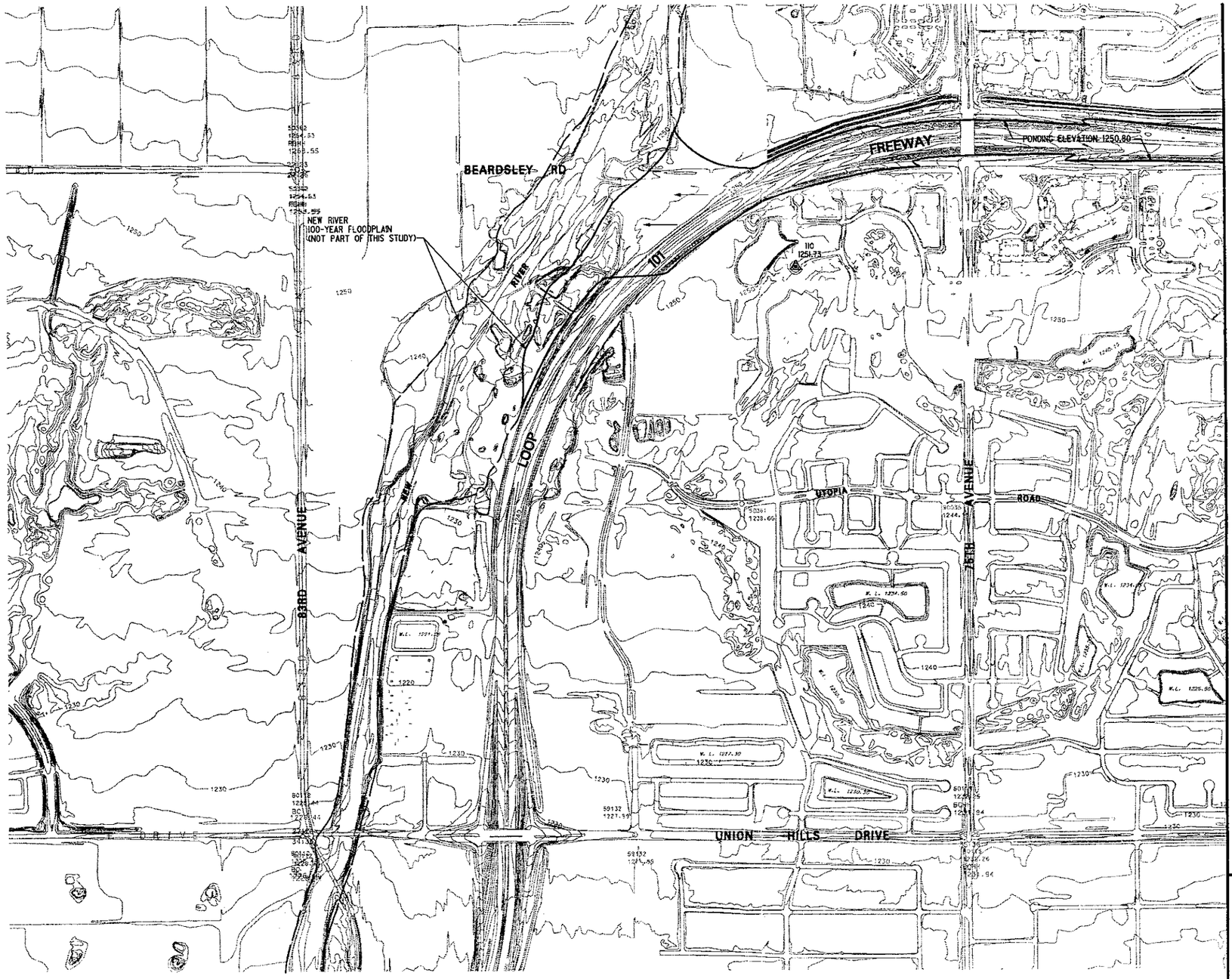


LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION. BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
110	1251.73	969589.038	406456.694

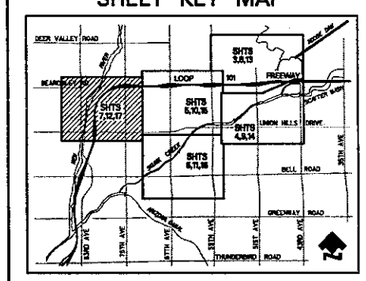
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

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
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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 15379 HAL E. MARRON ARIZONA U.S.A.

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

2/3 FLOW

SHEET 12 OF 17

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL, SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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08/14/01

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.52	2300	1286.06	5.49	0.39	4.76	3.37

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.52	2300	1286.06	5.49	0.39	4.76	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 AT SECTION 18.52 IS CONTINUED FROM REACH A1, SECTION 18.71. TIME BETWEEN REACH A1, SECTION 18.71 AND REACH C1, SECTION 18.52 IS BASED UPON A ROUTING DISTANCE OF 1002 FT AT AN AVERAGE VELOCITY OF 8.42 FPS. TRAVEL TIMES DOWNSTREAM ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADB1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/B1	19.64	0	NO FLOW IN THIS SECTION				
ADOBE DAM/B1	19.55	0					
ADOBE DAM/B1	19.47	0					
ADOBE DAM/B1	19.41	0					
ADOBE DAM/B1	19.33	0					
ADOBE DAM/B1	19.23	0					
ADOBE DAM/B1	19.17	0					
ADOBE DAM/B1	19.10	200	1300.47	2.00	0.17	0.49	0.33
ADOBE DAM/B1	18.00	200	1298.85	1.52	0.24	0.81	0.46
ADOBE DAM/B1	18.94	200	1298.36	1.40	0.31	0.95	0.66
ADOBE DAM/B1	18.84	200	1294.25	2.43	0.41	0.64	0.39
ADOBE DAM/B1	18.75	200	1291.77	1.22	0.47	0.87	0.66
ADOBE DAM/B1	18.67	200	1288.95	3.57	0.56	0.66	0.39

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 19.10 IS FROM REACH A1, SECTION 19.18. TRAVEL TIMES DOWNSTREAM FROM SECTION 19.10 ARE BASED ON THE AVARAGE VELOCITY FOR THE CROSS-SECTION

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADA1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/A1	20.00	3200	1383.14	13.51	0.00	7.14	5.66
ADOBE DAM/A1	19.97	3200	1380.74	16.02	0.00	6.24	4.91
ADOBE DAM/A1	19.91	3200	1374.09	19.70	0.01	5.81	4.33
ADOBE DAM/A1	19.84	3200	1351.90	25.32	0.01	3.05	0.97
ADOBE DAM/A1	19.80	3200	1334.39	7.99	0.02	2.56	1.21
ADOBE DAM/A1	19.76	3200	1321.68	9.71	0.02	2.08	1.02
ADOBE DAM/A1	19.71	3200	1317.23	3.93	0.03	1.70	1.03
ADOBE DAM/A1	19.64	3200	1313.27	10.07	0.06	1.27	3.14
ADOBE DAM/A1	19.54	3200	1309.67	12.77	0.07	5.67	3.52
ADOBE DAM/A1	19.46	3200	1307.48	7.01	0.08	3.48	1.13
ADOBE DAM/A1	19.38	3200	1304.69	9.85	0.10	0.69	0.69
ADOBE DAM/A1	19.31	3200	1304.60	4.70	0.11	1.73	0.81
ADOBE DAM/A1	19.24	3200	1302.81	1.86	0.13	1.99	1.36
ADOBE DAM/A1	19.18	3200	1302.83	0.70	0.17	3.63	2.39
ADOBE DAM/A1	19.16	1300	1302.17	4.81	0.22	2.70	1.64
ADOBE DAM/A1	19.08	1300	1301.34	3.26	0.25	3.90	2.70
ADOBE DAM/A1	19.01	1300	1300.31	4.82	0.28	3.56	2.89
ADOBE DAM/A1	18.93	1300	1299.02	5.78	0.30	4.05	3.24
ADOBE DAM/A1	18.84	1300	1296.82	6.72	0.33	3.85	2.55
ADOBE DAM/A1	18.77	1300	1296.03	5.63	0.34	4.25	3.10
ADOBE DAM/A1	18.71	1300	1293.86	8.42	0.36	3.40	2.08
ADOBE DAM/A1	18.67	600	1291.43	9.36	0.36	1.43	0.89
ADOBE DAM/A1	18.58	600	1289.12	6.14	0.38	2.01	1.37
ADOBE DAM/A1	18.50	200	1284.39	3.60	0.40	1.64	0.56

NOTES:
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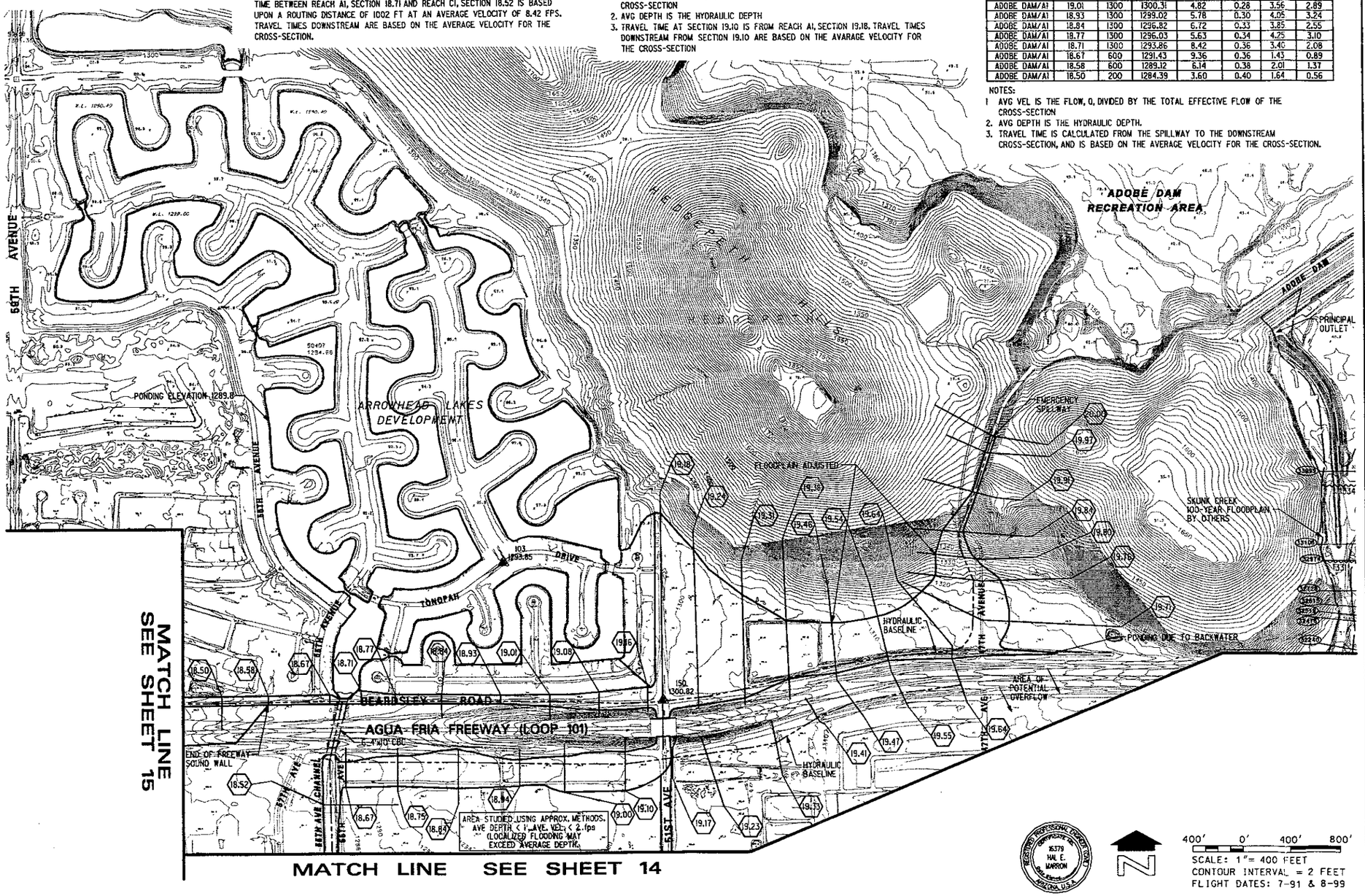
3. TRAVEL TIME IS CALCULATED FROM THE SPILLWAY TO THE DOWNSTREAM CROSS-SECTION, AND IS BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION.



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY
HYDRAULIC BASE LINE
CROSS SECTION (19.87) — CROSS SECTION DESIGNATION
CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)
100-YEAR FLOODPLAIN BOUNDARY
100-YEAR WATER SURFACE ELEVATION 1334
ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
150	1300.82	970987.276	423345.167
103	1293.85	972111.693	422046.014

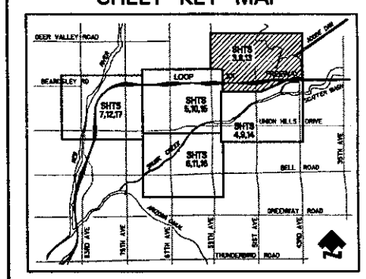
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

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.

1/3 FLOW

SHEET 13 OF 17

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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08/14/01

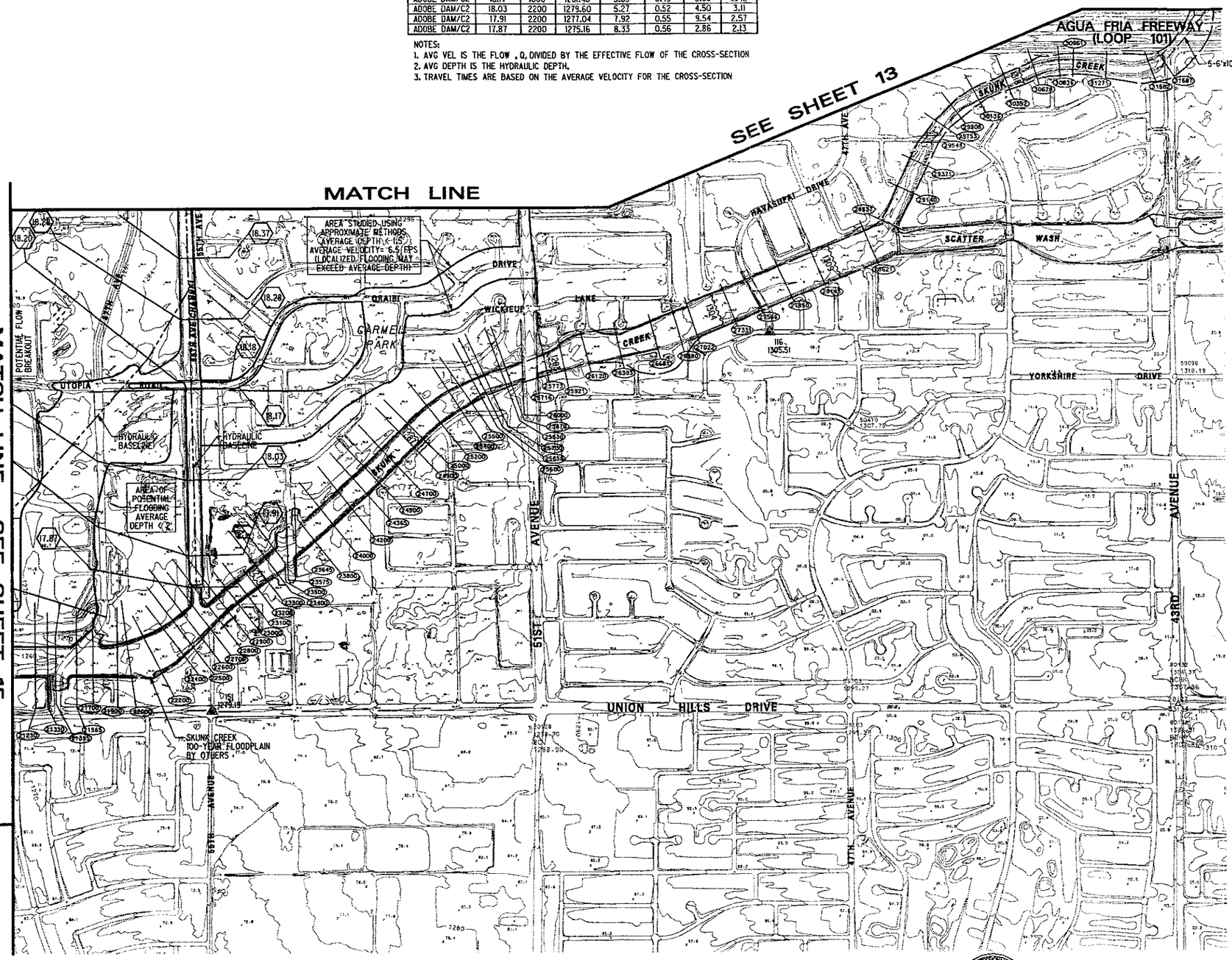
HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADC1

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C1	18.37	2300	1284.80	4.90	0.43	5.10	3.65
ADOBE DAM/C1	18.28	2300	1282.81	7.98	0.46	4.31	2.39
ADOBE DAM/C1	18.20	500	1281.25	2.64	0.47	3.75	1.09

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADC2

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/C2	18.37	2300	1284.79	4.92	0.43	5.09	3.64
ADOBE DAM/C2	18.28	2300	1283.79	5.60	0.46	5.28	3.14
ADOBE DAM/C2	18.18	1800	1282.96	4.41	0.48	5.46	2.85
ADOBE DAM/C2	18.17	1800	1281.40	5.85	0.49	3.90	2.42
ADOBE DAM/C2	18.03	2200	1279.60	5.27	0.52	4.50	3.11
ADOBE DAM/C2	17.91	2200	1277.04	7.92	0.55	9.54	2.57
ADOBE DAM/C2	17.87	2200	1275.16	8.33	0.56	2.86	2.13

NOTES:
1. AVG VEL IS THE FLOW , Q, DIVIDED BY THE EFFECTIVE FLOW OF THE CROSS-SECTION
2. AVG DEPTH IS THE HYDRAULIC DEPTH.
3. TRAVEL TIMES ARE BASED ON THE AVERAGE VELOCITY FOR THE CROSS-SECTION



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
116	1305.51	968740.846	425354.853
151	1279.19	965701.276	420825.648

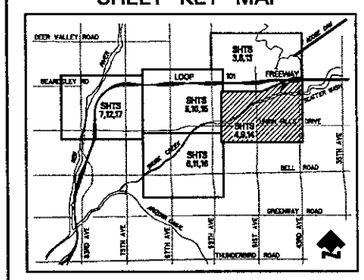
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

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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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE 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	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

1/3 FLOW

SHEET 14 OF 17

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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08/14/01

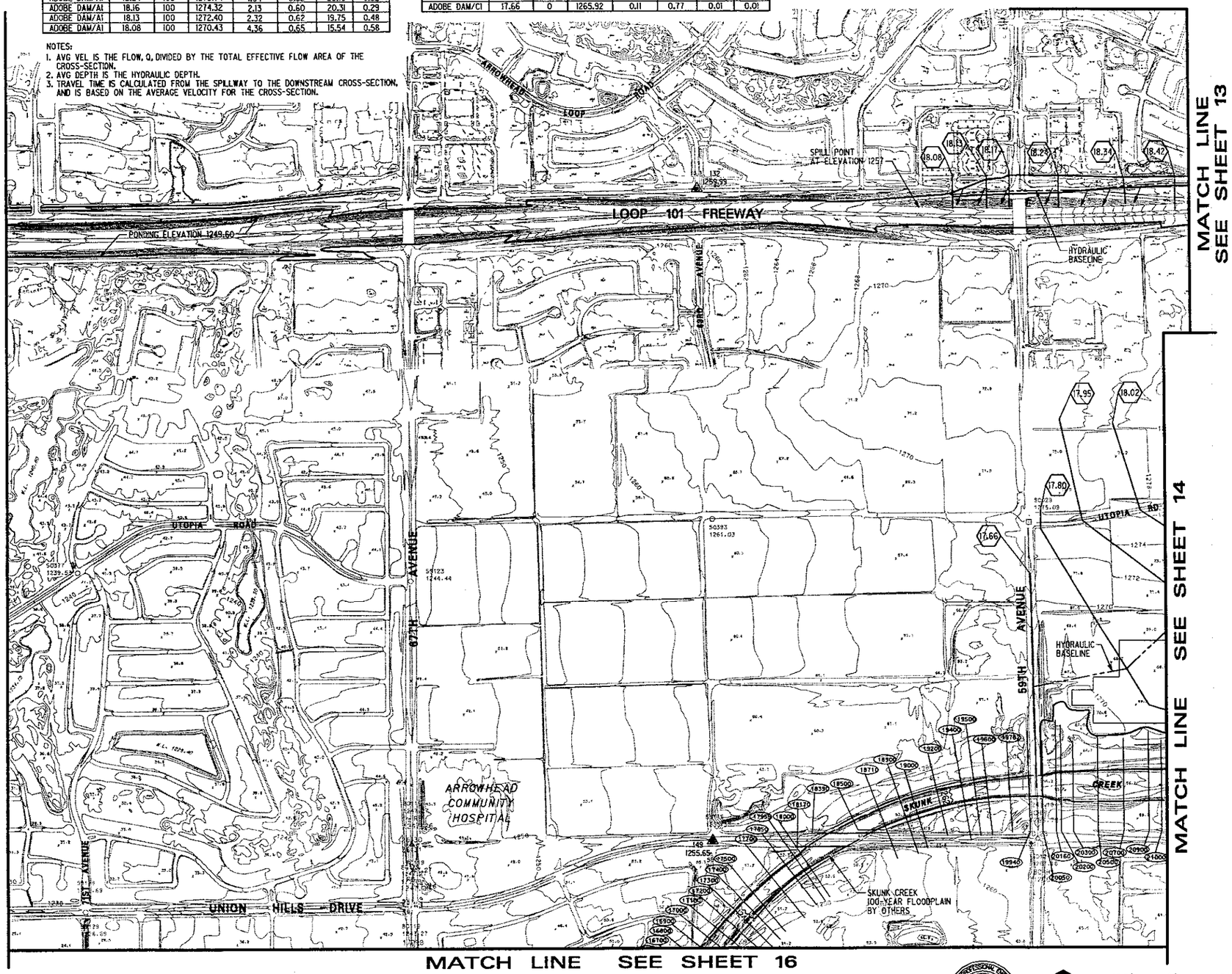
HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADAI

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/AI	18.42	100	1281.14	1.99	0.43	3.93	0.65
ADOBE DAM/AI	18.34	100	1277.99	3.89	0.49	7.99	0.37
ADOBE DAM/AI	18.24	100	1275.74	1.54	0.52	20.19	0.52
ADOBE DAM/AI	18.16	100	1274.32	2.13	0.60	20.31	0.29
ADOBE DAM/AI	18.13	100	1272.40	2.32	0.62	19.75	0.48
ADOBE DAM/AI	18.08	100	1270.43	4.36	0.65	15.54	0.58

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.

HEC-RAS SUMMARY, ADOBE DAM 1/3 FLOW, MODEL NO. ADCI

RIVER/REACH	X-SEC	Q (CFS)	WS ELEV (FT)	AVG VELOCITY (FPS)	TRAVEL TIME (HRS)	MAX DEPTH (FT)	AVG DEPTH (FT)
ADOBE DAM/CI	18.02	500	1276.10	2.97	0.57	1.10	0.27
ADOBE DAM/CI	17.95	500	1272.18	2.20	0.61	1.18	0.66
ADOBE DAM/CI	17.80	500	1269.18	3.12	0.70	1.18	0.98
ADOBE DAM/CI	17.66	0	1265.92	0.11	0.77	0.01	0.01



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
132	1259.99	970940.819	415429.442
149	1255.65	965658.791	415531.158

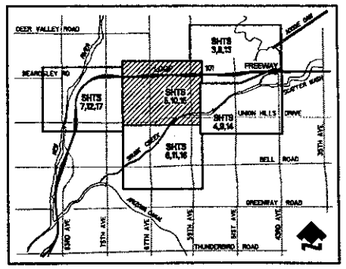
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

1/3 FLOW

SHEET 15 OF 17

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.

N

400' 0' 400' 800'

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

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AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

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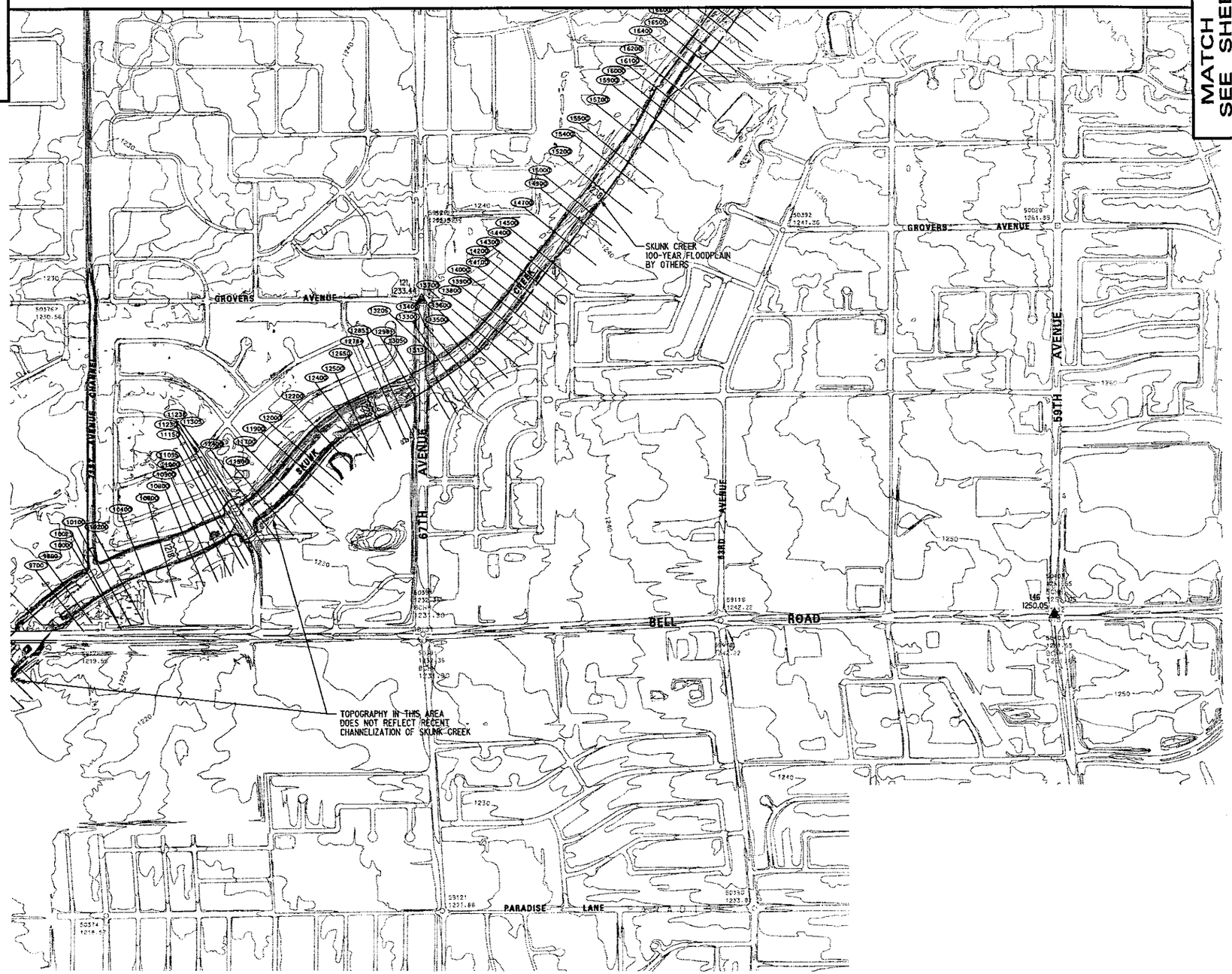
06/14/01

MATCH LINE SEE SHT 17

MATCH LINE SEE SHEET 15

MATCH LINE SEE SHEET 14



LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
121	1233.44	962477.813	413094.990
146	1250.05	959979.394	418098.407

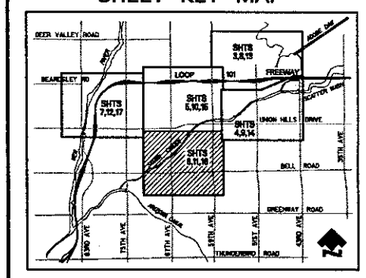
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

NOTES

1-THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10.000 UNLESS NOTED OTHERWISE

SHEET KEY MAP



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DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

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PLANS CHK.	P. W. R. HOSKIN	6-14-1

1/3 FLOW

SHEET 16 OF 17

400' 0' 400' 800'

SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

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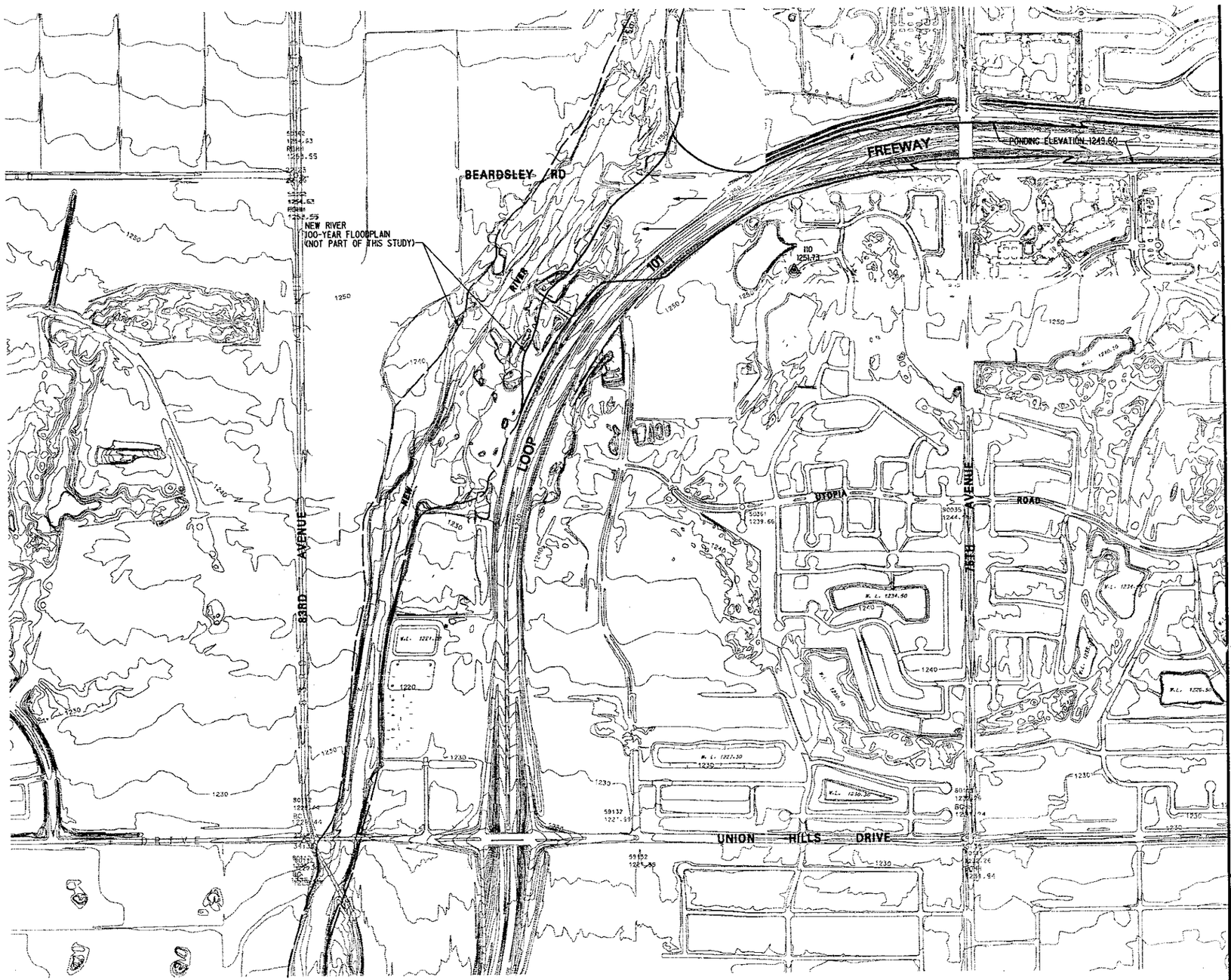


LEGEND

SPILLWAY FLOW FLOODPLAIN BOUNDARY

HYDRAULIC BASE LINE

CROSS SECTION (19.87) — CROSS SECTION DESIGNATION

CROSS SECTION FROM SKUNK CREEK CHANNELIZATION, BY OTHERS (24000)

100-YEAR FLOODPLAIN BOUNDARY

100-YEAR WATER SURFACE ELEVATION 1334

ELEVATION REFERENCE MARKS 103 1293.85

ELEVATION REFERENCE MARKS

I.D. NO.	ELEV.	NORTHING	EASTING
110	1251.73	969589.038	406456.694

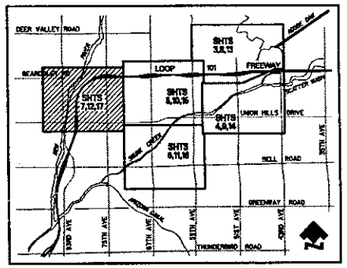
DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1927.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM OF 1929.

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 85003-1136
Tel. (602) 252-8984
Fax (602) 252-8585

DEI PROFESSIONAL SERVICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ADOBE DAM

SPILLWAY DELINEATION STUDY

F.C.D. CONTRACT NO. 98-32

	BY	DATE
DESIGN	K. VAN METER	6-14-1
DESIGN CHK.	P. W. R. HOSKIN	6-14-1
PLANS	J. C. CLEVER	6-14-1
PLANS CHK.	P. W. R. HOSKIN	6-14-1

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

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 16378 HAL E. MARRON ARIZONA U.S.A.

400' 0' 400' 800'
SCALE: 1"= 400 FEET
CONTOUR INTERVAL = 2 FEET
FLIGHT DATES: 7-91 & 8-99

1/3 FLOW

SHEET 17 OF 17

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 400' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

AERIAL MAPPING BY KENNEY AERIAL MAPPING, INC.

GROUND CONTROL SURVEY DATA PROVIDED BY PROJECT ENGINEERING CONSULTANTS, LTD

g:\filedir\99\990006 - spillway inundation studies\02-adobe dam\planset dgn\pln400n17.dgn
08/14/01

FCD 98-32
ADOBE DAM SPILLWAY DELINEATION STUDY
CD CONTENTS

HEC-RAS:
ADA.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach A1
ADB.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach B1
ADC1.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach C1
ADC2.f01, .g01, .o01, .p01, .prj, .r01, .rep = Reach C2

REPORT:
all are Microsoft Word 2000 format
AA-Main Report.doc
A-General Documentation.doc
B-Data Collection.doc
C-Field Recon.doc
D-Model ADA.doc
E-Model ADB.doc
F-Models ADC1 and ADC2.doc
G-Hydrology.doc
H-Computer Files.doc

HEC-2:
SKEXIST.dat, .out, .t95 = Skunk Creek model; Combination of models prepared by Simons Li & Associates, and Sverdrup

HEC-1:
AD.dat, .out = Skunk Creek Wathershed, Future Conditions 100-year Storm; model created for this study

PHOTOS:
Adobe-01.bmp through Adobe-93.jpg = field photos

GIS DELIVERABLE CHECK LIST

DXF:	XLS:
bridge.dxf	
carto.dxf	carto.xls
culvert.dxf	
	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	

DGN files to include: (only files that have data tables)

pln400s03.dgn
pln400s04.dgn
pln400s05.dgn
pln400s08.dgn
pln400s09.dgn
pln400s10.dgn
pln400s13.dgn
pln400s14.dgn
pln400s15.dgn