FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INDIAN BEND WASH FLOODPLAIN DELINEATION STUDY

40th Street to 32nd Street
FCD 93-05

HYDRAULICS REPORT

JANUARY 1998

sla Simons, Li & Associates, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 00-09-617P

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street, 11th Floor
Phoenix, AZ 85003-1611

Community: City of Phoenix, AZ
Community No.: 040051
Panels Affected: 04013C1660 F and 1680 F
Effective Date of This Revision: AUG 22 2000

102-D-A

Dear Mayor Rimsza:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated April 11, 2000, Mr. Michael W. Duncan, P.E., Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of channelization along Indian Bend Wash from 40th Street to Hearn Road, installation of reinforced-concrete arch culverts under State Route 51 and Thunderbird Road and a reinforced-concrete box culvert (RCB) at 36th Street, and modifications to the existing RCBs at Sweetwater Road. This request follows up on a Conditional Letter of Map Revision issued on June 8, 1998.

All data required to complete our review of this request were submitted with letters from Ms. Cindy D. White, P.E., Floodplain Manager, City of Phoenix, and Mr. Duncan.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations and floodway boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Indian Bend Wash from 40th Street to approximately 400 feet upstream of Hearn Road. As a result of the modifications, the Base Flood Elevations (BFEs) for Indian Bend Wash and the widths of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, and the regulatory floodway decreased. The base flood is contained in the channel from 40th Street to Hearn Road. The modifications are shown on the enclosed annotated copies of FIRM Panels 04013C1660 F and 04013C1680 F; Profile Panels 216P(a), 217P, and 218P; and affected portions of the Floodway Data Table. Profile Panel 216P was removed from the FIS report as a result of the modifications. This Letter of Map Revision (LOMR) hereby revises the above-referenced panels of the effective FIRM and the affected portions of the FIS report, both dated September 30, 1995.

The modifications are effective as of the date shown above. The map panels as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 1,100 feet upstream of 40th Street	1,392	1,389
Approximately 150 feet upstream of Sweetwater Avenue	1,398	1,397
Approximately 400 feet upstream of State Route 51	1,412	1,406

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the modified BFEs will be given in the *Arizona Republic* on or about September 14 and September 21, 2000. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local
newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are processing a revised FIRM and FIS report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS report were submitted to your community for review on December 23, 1997, and May 29, 1998. Please note that updated road base information for your community has been incorporated into the revised Preliminary FIRM. For display purposes, this updated information is shown on the enclosed annotated copies of FIRM Panels 04013C1660 F and 04013C1680 F. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

The floodway is provided to your community as a tool to regulate floodplain development. Therefore, the floodway modifications described in this LOMR, while acceptable to FEMA, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

The basis of this LOMR is, in whole or in part, a channel-modification/culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel and culverts rests with your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM and FIS report to which the regulations apply and the modifications described in this LOMR.

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at **www.fema.gov/impact**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Chief, Community Mitigation Programs Branch, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7184. If you have any questions regarding this LOMR, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosures

cc: Mr. Ray Dovalina, P.E.
Floodplain Manager
City of Phoenix

Mr. Michael W. Duncan, P.E.
Engineering Division
Flood Control District of Maricopa County

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF PHOENIX, MARICOPA COUNTY, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 30, 1995, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Phoenix, Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate channelization along Indian Bend Wash from 40th Street to Hearn Road, installation of reinforced-concrete arch culverts under State Route 51 and Thunderbird Road and a reinforced-concrete box culvert (RCB) at 36th Street, and modifications to the existing RCBs at Sweetwater Road. This analysis has resulted in a revised delineation of the regulatory floodway, a decrease in SFHA width, and decreased BFEs for Indian Bend Wash from 40th Street to approximately 400 feet upstream of Hearn Road. The aforementioned channelized portion of Indian Bend Wash contains the base flood. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 1,100 feet upstream of 40th Street	1,392	1,389
Approximately 150 feet upstream of Sweetwater Avenue	1,398	1,397
Approximately 400 feet upstream of State Route 51	1,412	1,406

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street, 11th Floor
Phoenix, AZ 85003-1611

National Flood Insurance Program
NFIP
Administered by FEMA

Need Information on Flood Hazard Maps?

A wealth of information is only a click away at: **www.fema.gov/mit/tsd**

Homeowners will find:

- A helpful tutorial: "How to Challenge a Flood Risk Determination"
- Answers to Frequently Asked Questions, including, "Why do I need flood insurance?" "What are the different flood hazard zone designations and what do they mean?" and "What is a base flood elevation?

Insurance Agents and Bankers will find:

- Information on the National Flood Insurance Reform Act of 1994, which affects lenders
- Pages containing information on how to become a "Write Your Own" insurance agent
- Pages containing flood insurance rate information and a listing of map determination companies

Engineers and Surveyors will find:

- A listing of National Flood Insurance Program (NFIP) approved and test version software with links to free downloads
- Forms and fee schedules for requesting a map change or back-up study data
- A link to a listing of training courses and conferences related to emergency management

Floodplain Managers and Community Officials will find:

- The compendium of map change actions and the Guide for Community Officials
- A listing of key contacts at FEMA with direct e-mail links
- Forms necessary to initiate requests for back-up study data

All Four Constituent groups will find:

FEMA MAP ASSISTANCE CENTER
FMAC
1-877-FEMA MAP

- NFIP policies and regulations
- Forms for making map change requests
- The answers to over 80 Frequently Asked Questions
- Access to a database containing the status of recent requests for map changes
- Numerous reports and guidance documents in both Adobe Acrobat .PDF and MS Word formats
- Information on Map Modernization initiatives with direct e-mail links to FEMA Task Leaders
- A subscription service providing free news on the latest developments in flood hazard mapping via e-mail
- E-mail links to Map Specialists at the FEMA Map Assistance Center (1-877-FEMA MAP)

Questions and suggestions? Contact John Magnotti at 202-646-3932, or john.magnotti@fema.gov

Want to talk to a Map Specialist about Flood Hazard Mapping?

If your home or business is located in the floodplain, you will need to purchase and maintain flood insurance. If you have a mortgage, your bank will require it.

FEMA MAP ASSISTANCE CENTER

FMAC

1-877-FEMA MAP

For all your flood hazard map questions, call toll-free:

1-877-FEMA MAP (1-877-336-2627)

or visit our Web Site at www.fema.gov/mit/tsd

FEMA's flood hazard maps— also called Flood Insurance Rate Maps or FIRMs— are used to determine your property's flood risk. Increasing development, severe weather events, and other activities in the floodplain will change the flood risks shown on the maps. FEMA is working hard to update and modernize all of the flood hazard maps. However, with more than 18,000 communities participating in the National Flood Insurance Program (NFIP), this will take time. Meanwhile, the FEMA Map Assistance Center (FMAC) has a staff of trained professionals ready to help

Typical flood hazard map questions we answer:

Property Owner: "My home has never flooded. Why do I need flood insurance?"

Real Estate Agent: "I think the previous owner had an exemption from flood insurance— is there a record of this exemption?"

Developers and Engineers: "What is the status of my request for a map change? How long will it take?"

Community Officials: "How do I request a physical revision to a flood map?"

Lenders: "How can we help our customers whose homes are located in a flood zone?"

Other important National Flood Insurance Program toll-free numbers:

- To purchase flood hazard maps for a nominal fee... **1-800-358-9616**
- For general flood insurance information... **1-800-427-4661**
- To order any current FEMA publication... **1-800-480-2520**
- For lender questions on flood policy coverage and rates... **1-800-611-6125**
- For agent questions on policy coverage and rates... **1-800-720-1093**

National Flood Insurance Program

NFIP

Administered by FEMA

Federal Emergency Management Agency

Office of Emergency Information and Media Affairs, Washington, D.C. 20472 (202) 646-4600

FACT SHEET

PROJECT IMPACT
Building a Disaster Resistant Community

BACKGROUND

PROJECT IMPACT is an initiative developed by FEMA Director James Lee Witt to challenge the country to undertake actions that protect families, businesses and communities by reducing the effects of natural disasters. This initiative includes a national awareness campaign, the selection of pilot communities that demonstrate the benefits of hazard mitigation through a partnership approach, and an outreach effort to businesses and communities using a new guidebook that offers a formula for a community or business to follow to become disaster resistant.

RATIONALE

The increasing number and severity of natural disasters the past decade demands that action be taken to reduce the threat that hurricanes, severe storms, earthquakes, floods and wildfires impose upon the economic stability, economic future and safety of the citizens of the U.S. As the federal agency responsible for emergency management, FEMA is committed to reducing disaster losses by focusing the energy of businesses, citizens, and communities in the U.S. on the importance of reducing their susceptibility to the impact of natural disasters.

There are three primary tenets of the PROJECT IMPACT initiative:

- *Mitigation is a local issue.* It is best addressed by a local partnership that involves government, businesses and private citizens.

- *Private sector participation is essential.* Disasters threaten the economic and commercial growth of our cities, towns, villages and counties. Without the participation of the private sector, comprehensive solutions will not be developed.

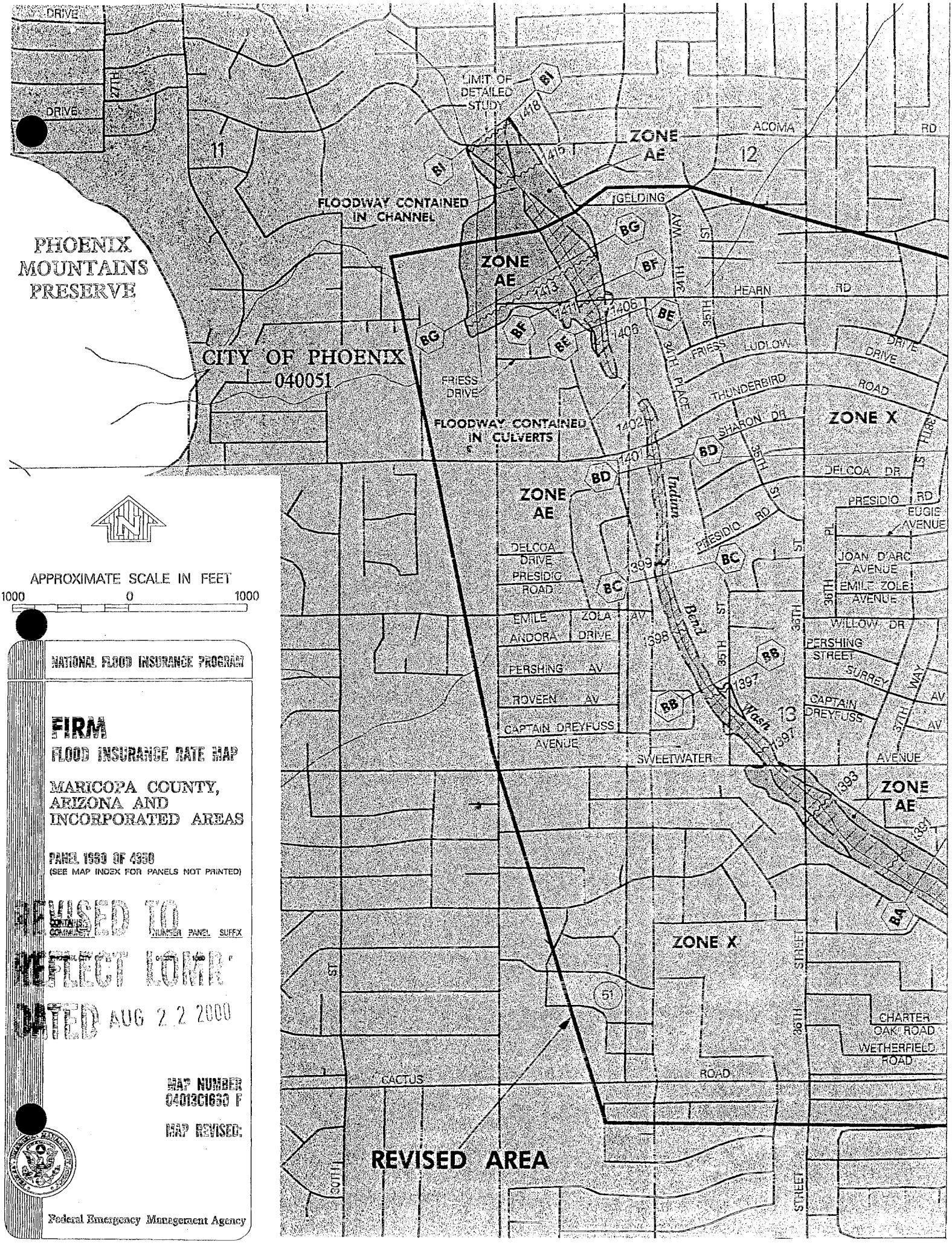
- *Mitigation is a long-term effort that requires long-term investment.* Disaster losses will not be eliminated overnight.

PILOT COMMUNITIES

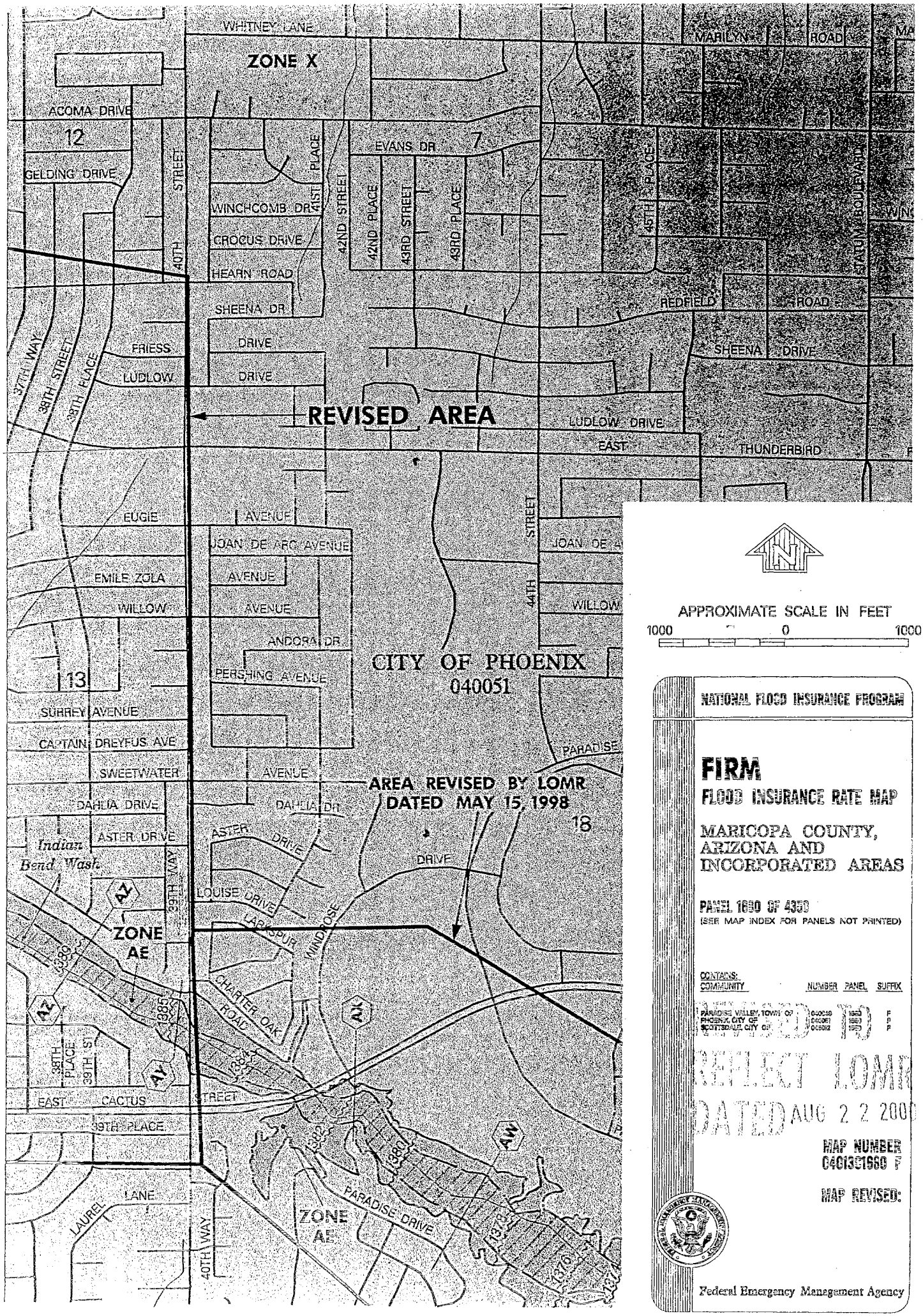
Director Witt and FEMA have worked closely with seven communities throughout the U.S. to develop a PROJECT IMPACT plan that localities, businesses and citizens can follow to build disaster resistant communities where they live and work. Director Witt will participate in events in each of these communities to congratulate them on their foresight, commitment, and contribution to a disaster resistant nation.

PROJECT IMPACT GUIDEBOOK

The guidebook presents that steps a community can take to become disaster resistant. It also provides examples of the actions and resources available to accomplish this goal.


PHOENIX MOUNTAINS PRESERVE
CITY OF PHOENIX
040051
LIMIT OF DETAILED STUDY
FLOODWAY CONTAINED IN CHANNEL
FLOODWAY CONTAINED IN CULVERTS
ZONE AE
ZONE X
ACOMA RD
GELDING WAY
HEARN RD
FRIESS DRIVE
LUDLOW DRIVE
THUNDERBIRD ROAD
SHARON DR
DELCOA DR
PRESIDIO RD
EUGIS AVENUE
JOAN D'ARC AVENUE
EMILE ZOLA AVENUE
WILLOW DR
PERSHING STREET
SURREY WAY
CAPTAIN DREYFUSS AVENUE
SWEETWATER AVENUE
CHARTER OAK ROAD
WETHERFIELD ROAD
CACTUS ROAD
34TH PLACE
35TH ST
36TH ST
37TH AV
30TH ST
27TH DRIVE
Indian Bend Wash
JOINS PANEL 1660
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1650 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
REVISED TO REFLECT LOMR DATED AUG 22 2000
MAP NUMBER 04013C1650 F
MAP REVISED:
Federal Emergency Management Agency
REVISED AREA

JOINS PANEL 1660



FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Indian Bend Wash (continued)								
AY	76,000[3]	430	2,042	2.9	1,384.8	1,384.8	1,385.8	1.0
AZ	76,900[3]	215	942	6.4	1,388.6	1,388.6	1,388.6	0.0
BA	77,800[3]	200	1,045	5.7	1,390.7	1,390.7	1,390.7	0.0
BB	80,311[3]	109	586	4.1	1,397.1	1,397.1	1,397.1	0.0
BC	81,433[3]	98	443	5.4	1,398.8	1,398.8	1,398.8	0.0
BD	82,335[3]	90	411	5.8	1,401.0	1,401.0	1,401.0	0.0
BE	83,625[3]	90	500	4.8	1,405.8	1,405.8	1,405.9	0.1
BF	83,936[3]	140	290	8.3	1,410.6	1,410.6	1,410.9	0.3
BG	84,276[3]	140	415	5.8	1,412.7	1,412.7	1,413.5	0.8
BH	1.973[1]	--[2]	538	4.5	1,414.8	1,414.8	1,415.2	0.4
BI	2.060[1]	404	509	4.7	1,418.0	1,418.0	1,418.0	0.0

REVISED DATA

[1] Miles above Cactus Road
[2] Coincident with Channel Banks
[3] Feet Above Confluence with Salt River Along Profile Baseline

REVISED TO REFLECT LOMR DATED AUG 2 2 2000

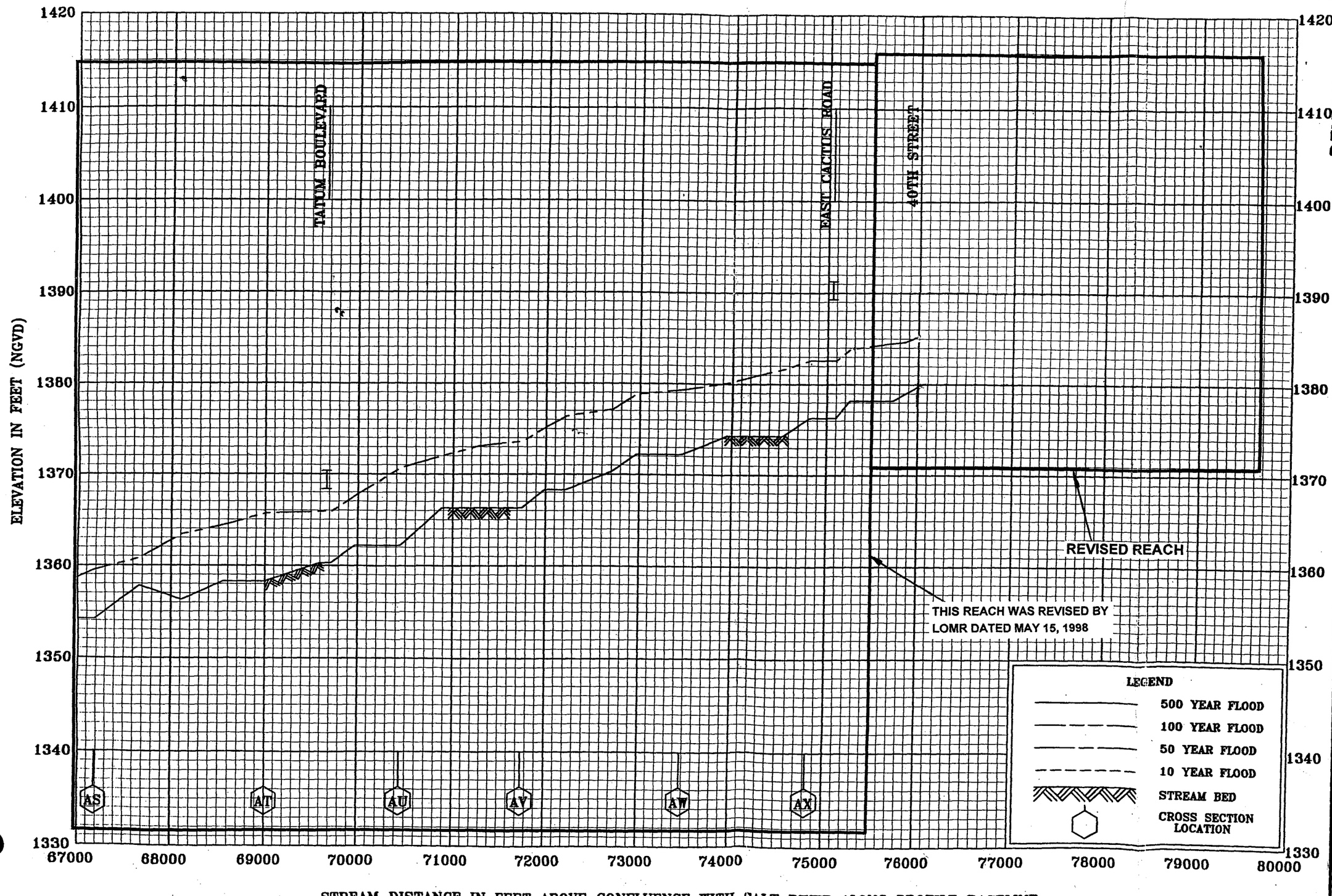
TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

INDIAN BEND WASH



REVISED TO REFLECT LOMR DATED AUG 2 2 2000

FLOOD PROFILES

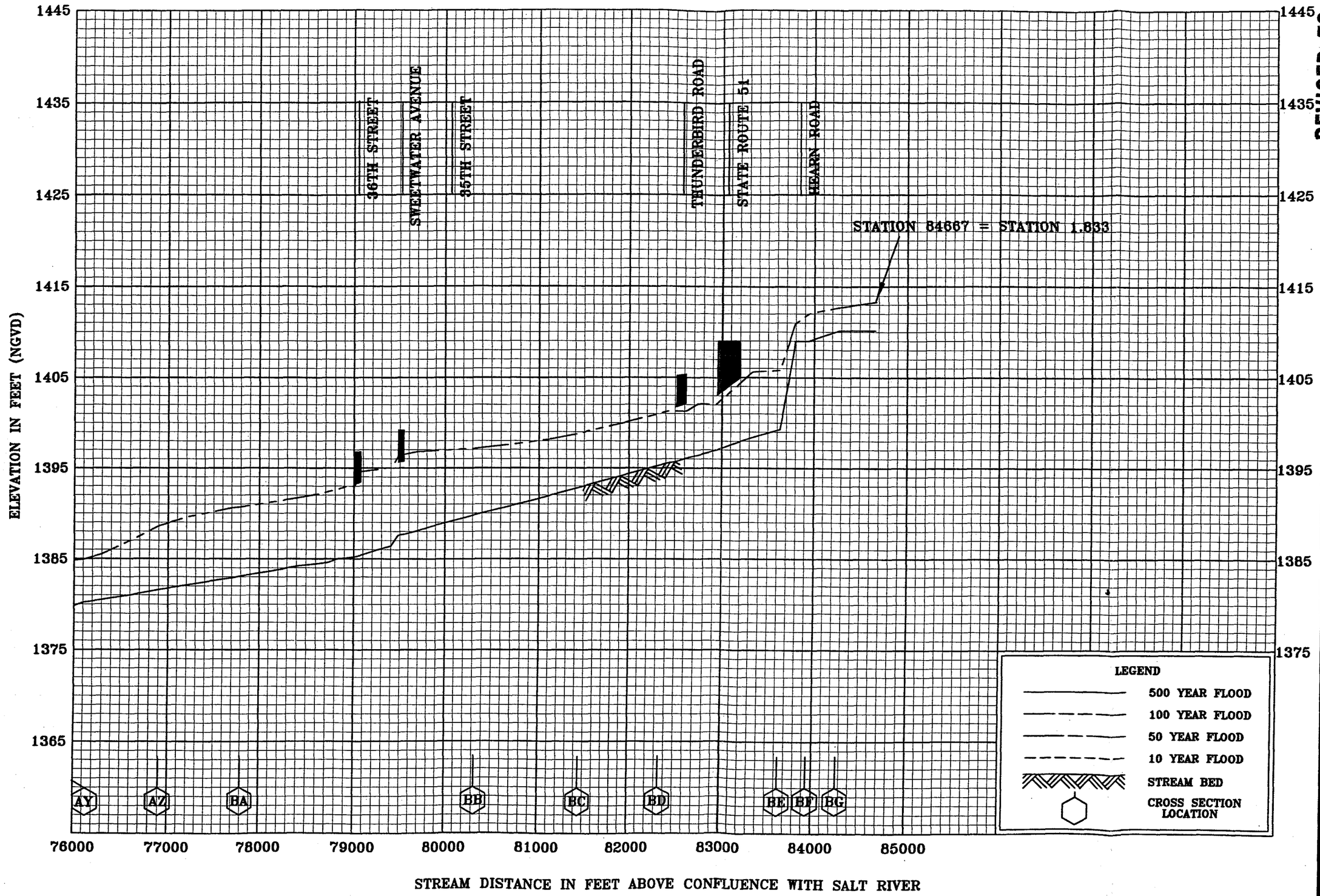
INDIAN BEND WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

216PA



REVISED TO REFLECT LOMR DATED AUG 2 2 2000

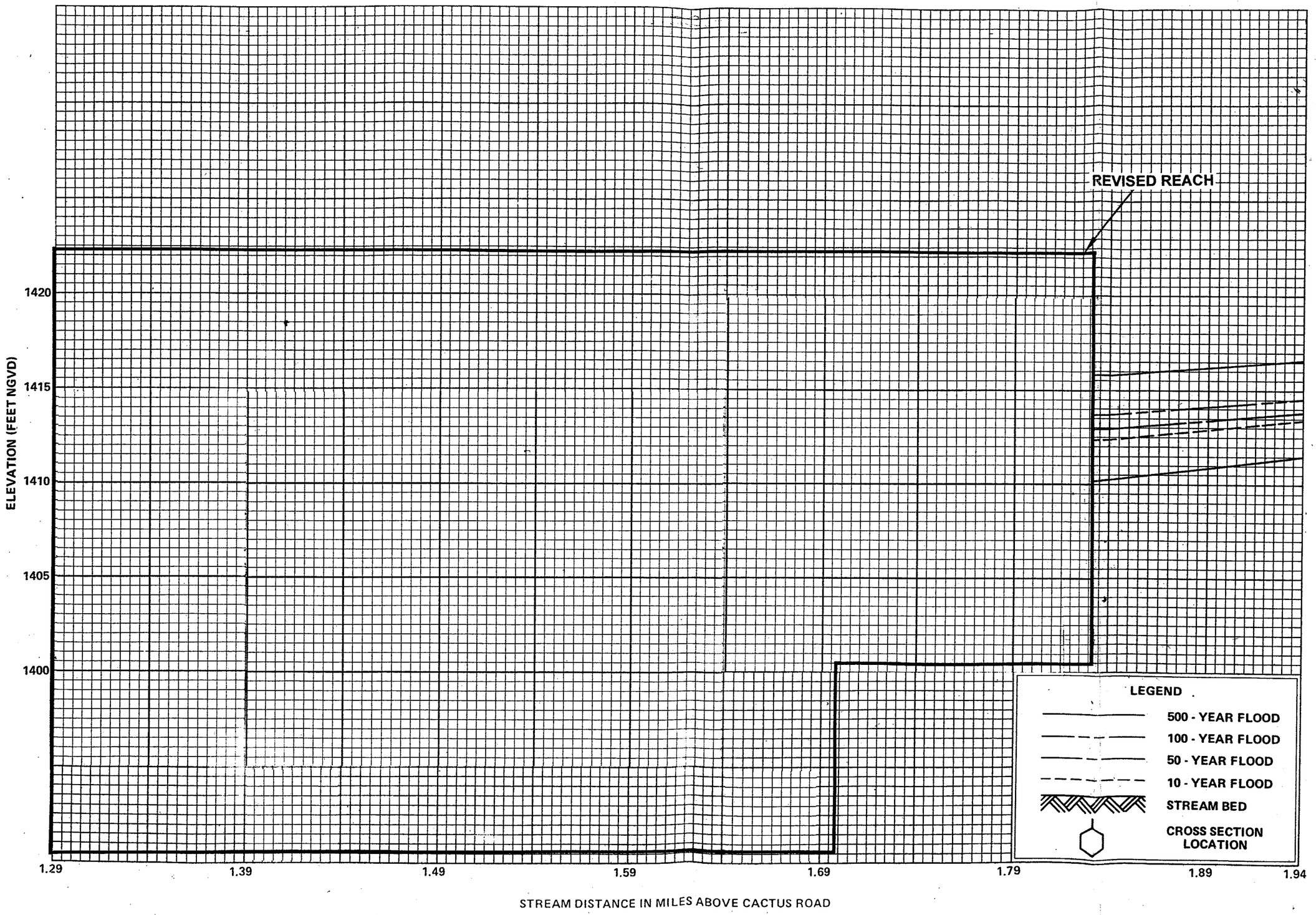
FLOOD PROFILES

INDIAN BEND WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS



REVISED TO REFLECT LOMR DATED AUG 2 2 2000

FLOOD PROFILES

INDIAN BEND WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

Federal Emergency Management Agency

Washington, D.C. 20472

JUN 0 8 1998

FLOOD CONTROL DISTRICT
RECEIVED
JUN 12 1998
CHENG | P & PM
PIO | REG
ADMIN | PWLMGT
FINANCE | FILE
O & M
ENGR
REMARKS

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 98-09-484R

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street, 11th Floor
Phoenix, Arizona 85003-1611

Community: City of Phoenix, Arizona
Community No.: 040051

104

Dear Mayor Rimsza:

This responds to a request that the Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 18, 1998, Mr. Afshin Ahouraiyan, Engineering Division, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that proposed channelization along Indian Bend Wash from 40th Street to Hearn Road, reinforced-concrete arch culverts under State Route 51 and Thunderbird Road, modifications to the existing reinforced-concrete box culverts (RCBs) at Sweetwater Road, and an RCB at 36th Street would have on the flood hazard information shown on the effective FIRM and FIS report.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Ahouraiyan.

We have completed our review of the submitted data and the flood data used to prepare the effective FIRM for your community. The submitted existing conditions HEC-2 hydraulic computer model, dated January 9, 1998, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as shown on the plans entitled "Floodplain Delineation Study for Indian Bend Wash 40th Street to 32nd Street," prepared by Simons, Li and Associates, Inc., dated January 14, 1998, and the data listed below are received, the floodplain boundaries of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) will be delineated as shown on the above-mentioned plans.

As a result of the proposed project, the base flood elevations (BFEs) and width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, will decrease along the entire study reach. The maximum decrease in SFHA width, 2,450 feet, will occur approximately 650 feet downstream of Hearn Road. The width of the regulatory floodway will also decrease along the entire study reach. The maximum decrease in floodway width, 450 feet, will occur at Sweetwater Avenue.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIS report and FIRM.

FLOODPLAIN DELINEATION STUDY
FOR
INDIAN BEND WASH
40th STREET TO 32nd STREET

TECHNICAL DATA NOTEBOOK

REQUEST FOR CONDITIONAL LETTER OF MAP REVISION

Prepared for:

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 West Durango
Phoenix, AZ 85009

Prepared by:

SIMONS, LI & ASSOCIATES, INC
4600 S. Mill Avenue, Suite 200
Tempe, Arizona 85282
(602) 491-1393

Registered Professional Engineer (Civil)
CERTIFICATE
21560
DENNIS L.
RICHARDS
Date Signed 1/14/98
ARIZONA, U.S.A.

JANUARY, 1998

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Registered Professional Engineer (Civil)
CERTIFICATE NO. 21560
DENNIS L. RICHARDS
Date Signed 1/14/99
ARIZONA, U.S.A.

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TECHNICAL DATA NOTEBOOK

Floodplain Delineation Study for Indian Bend Wash
40th Street to 32nd Street

SECTION 1: INTRODUCTION

This study documents the hydraulic analysis conducted in support of a request for a Conditional Letter of Map Revision (CLOMR) for Indian Bend Wash from 40th Street to 32nd Street. The CLOMR request is required due to the planned channelization of Indian Bend Wash from 40th Street to Hearn Road. The study includes a new floodplain/floodway delineation from 40th Street to 32nd Street and Acoma Road which reflects the hydraulic consequences of the proposed channelization project.

This study was conducted as part of Contract No. 93-05, "Floodplain Delineation for Indian Bend Wash," administered by the Flood Control District of Maricopa County. As shown in Figure 1, the proposed channelization is located entirely within the City of Phoenix.

The proposed channelization is being done in conjunction with the construction of Arizona State Highway Route 51. Design and construction of the highway project is being funded and administered by the Arizona Department of Transportation (ADOT). Long-term maintenance of the Indian Bend Wash channel will be provided by the City of Phoenix. The objectives of the channelization are twofold:

1) Provide drainage facilities for State Route 51 (Squaw Peak Freeway), and

2) Remove properties adjacent to Indian Bend Wash, between Hearn Road to 40th Street, from the 100-year floodplain.

The project will include the construction of an excavated channel with local inflow points provided at Sweetwater Channel and the Emile Zola Channel. The project includes channel linings, new reinforced concrete arch culverts under SR-51 and Thunderbird Road, a modification to the existing reinforced concrete box culvert at Sweetwater Road, and a new reinforced concrete box culvert at 36th Street. The final construction drawings used to define the proposed channel and above structures are included as Appendix G.

The proposed project will alter the width of the 100-year floodplain and floodway due to reduced water-surface elevations, especially within the limits of the channelization. Backup calculations and mapping are provided to demonstrate the hydraulic adequacy of the proposed channelization plan. The proposed conditions HEC-2 model consists of the channelization design model to Hearn Road coupled with existing conditions cross-sections upstream to 32nd Street and Acoma Road.

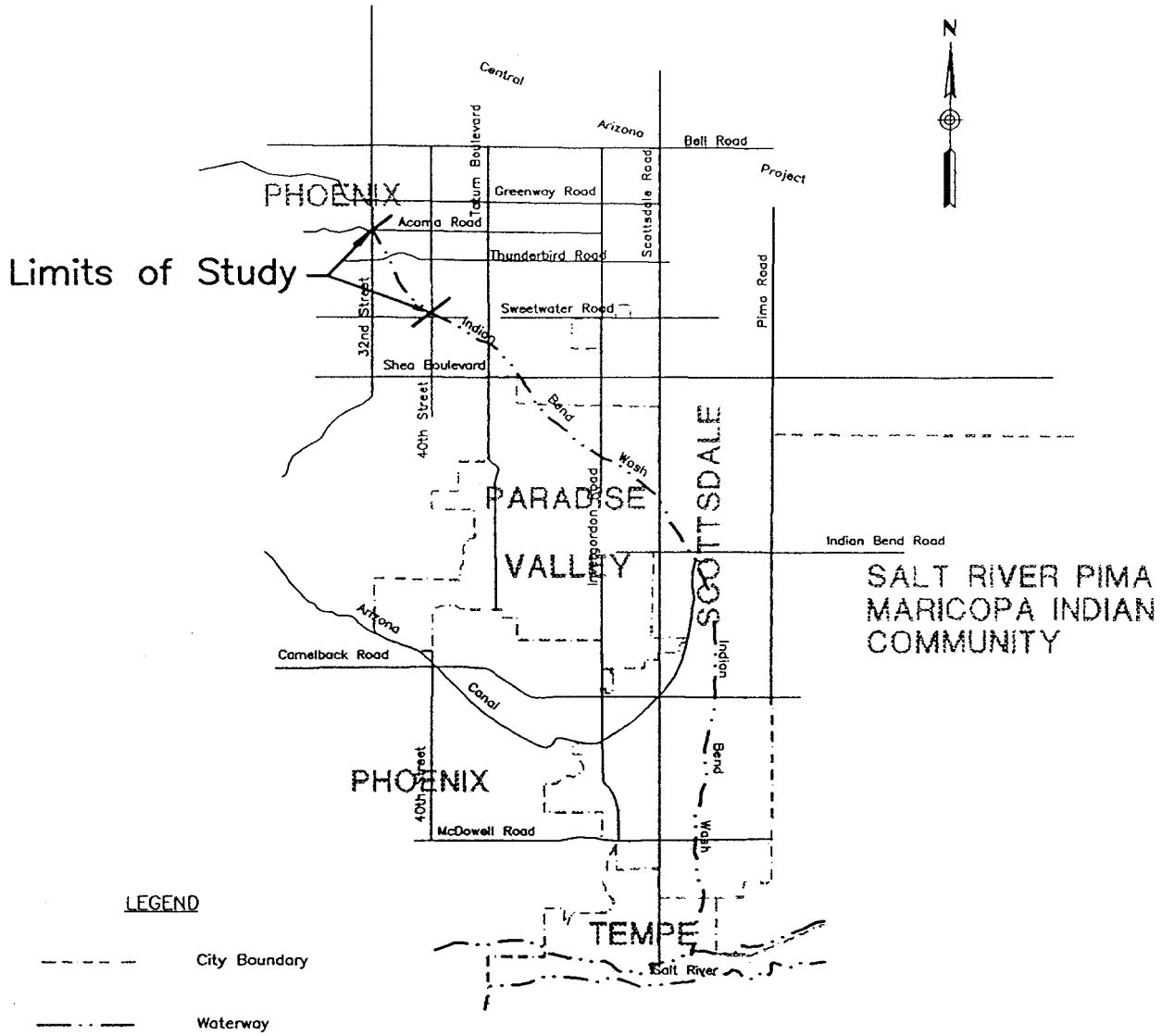


Figure 1 Location Map

SECTION 2: ADWR AND FEMA FORMS

2.1 Study Documentation Abstract

STUDY DOCUMENTATION ABSTRACT		INITIAL STUDY	RESTUDY	LOMR	OTHER
SECTION 1: GENERAL INFORMATION					
1A	COMMUNITY	City of Phoenix			
1B	COMMUNITY NUMBER	040051			
1C	COUNTY	Maricopa			
1D	STATE	Arizona			
1E	DATE STUDY ACCEPTED				
1F	STUDY CONTRACTOR CONTRACT(S) ADDRESS PHONE	Simons, Li & Associates, Inc. (SLA) Dennis Richards, P.E. 4600 South Mill Avenue, Suite 200 Tempe, AZ 85282 (602) 491-1393			
1G	TECH REVIEWER (FEMA) PHONE				
1H	FEMA REGIONAL REVIEWER PHONE				
1I	STATE REVIEWER PHONE	Arizona Department of Water Resources (602) 417-2400			
1J	LOCAL REVIEWER PHONE	City of Phoenix, Ray Acuna (602) 262-4026 Flood Control District of Maricopa County Afshin Ahouraiyan (602) 506-1501			
1K	RIVER OR STREAM NAME	Indian Bend Wash			
1L	REACH DESCRIPTION	40th Street to 32nd Street			
1K	STUDY TYPE	River Channelization CLOMR			
SECTION 2: MAPPING INFORMATION					
2A	USGS QUAD SHEET(S)	Sunnyslope, Arizona 7.5 Minute USGS QUAD			
2B	MAPPING FOR HYDROLOGIC STUDY TYPE/SOURCE SCALE DATE				
2C	MAPPING FOR HYDRAULIC STUDY TYPE/SOURCE SCALE DATE	DTM/Arizona Department of Transportation One-foot Contour Flown 6/94			

SECTION 3: HYDROLOGY		
3A	MODEL OR METHOD USED (including vendor and version description)	
3B	STORM DURATION	
3C	HYETOGRAPH	
3D	FREQUENCIES DETERMINED	
3E	LIST OF GAGES USED IN FREQUENCY ANALYSIS OR CALIBRATIONS (Location, Years of Record, Gage Ownership)	
3F	RAINFALL AND REFERENCE	
3G	UNIQUE CONDITIONS AND PROBLEMS	
3H	COORDINATION OF Q'S (Agency, Date, Comments)	
SECTION 4: HYDRAULICS		
4A	MODEL OR METHOD USED (Including Vendor and Version Description)	HEC-2, Version 4.6.2
4B	REGIME	Subcritical
4C	FREQUENCIES FOR WHICH PROFILE WERE COMPUTED	100-Year
4D	METHOD OF FLOODWAY CALCULATION	Method 1
4E	UNIQUE CONDITIONS AND PROBLEMS	See Report, Section 5.7
ADDITIONAL STUDY INFORMATION		
ITEM		
Backup Report	Complete Report Provided with Technical Appendices including FEMA Forms, HEC-2 Input and Output, and Design Drawings for the Proposed Channelization.	

2.2 Application/Certification Forms

The required FEMA application and certification forms (MT-2, Forms 1, 2, 4, 5, 6, and 7) are included as Appendix H.

SECTION 3: SURVEY AND MAPPING INFORMATION

3.1 Field Survey Information

The control survey for the project mapping was done by the Arizona Department of Transportation (ADOT). A listing of the control point locations and elevations is provided in Appendix C. Control Point No. 7086 at 32nd Street and Thunderbird Road was used to determine the conversion factor (-2.92 ft.) between the vertical datum of 1929 and 1988 for the starting water-surface elevation.

3.2 Mapping Description

The topographic mapping used for the design of the channelization project and the hydraulic analysis conducted for this CLOMR request was developed by the Arizona Department of Transportation (ADOT) in DTM format. The mapping is one-foot contour, based on 1929 NGVD. The aerial photography was taken in June, 1994.

FEMA maps used for this study include FIRM Nos. 04013C1660 F and 04013C1680 F, dated September 30, 1995.

SECTION 4: HYDROLOGIC ANALYSIS

4.1 Method Description

The effective Flood Insurance Study (FIS), 100-year peak discharges were used in the CLOMR analysis. Table 5 in Section 7.1 of this report compares these discharges to the 100-year peak discharges used for the channelization project design. The design discharges were obtained from the "Draft Final Drainage Report for SR-51, Squaw Peak Highway" prepared by BRW, Inc. (1). The BRW hydrology was derived from the "Final Hydrology Report for the Squaw Peak Highway" developed by Baker Engineers, Inc., November 1993 (4).

SECTION 5: HYDRAULIC ANALYSIS

5.1 Method Description

The Indian Bend Wash drains a highly urbanized watershed located in northeast Phoenix. In the area of the proposed project, the Wash is a broad, shallow, grass-lined channel. The effective FIS is not available for this channel, therefore, it was not possible to develop a duplicate effective model. At the direction of FEMA's technical evaluation contractor (Sheila Norlin, Baker Engineering), a pre-project (existing conditions) floodplain model was developed to quantify the relative changes resulting from the proposed project. In addition, a floodplain and floodway model was developed for the post-project conditions from 40th Street to 32nd Street and Acoma Road.

The floodplain and floodway hydraulics and water-surface elevations for the project reach were defined using the U.S. Army Corps of Engineers' HEC-2 Water Surface Profile Model (Version 4.6.2) (7). The starting water surface at 40th Street was obtained from the pending LOMR request for Indian Bend Wash, Salt River to 40th Street. This elevation was adjusted to the channelization project mapping datum by subtracting 2.92 feet. (A common elevation reference point at 32nd Street and Thunderbird Road was used to determine the conversion factor).

The proposed post-project conditions model is a modification of the channelization design model developed by BRW, Inc. The BRW model was modified to include the existing channel geometry adjacent to the proposed channelization, and extended to 32nd Street using existing conditions cross-sections from the project mapping. The existing conditions model was derived from the proposed post-project conditions model by removing the channel improvement cards (CI) and the culvert cards (SC) used by BRW for project design, and modifying the culvert at Sweetwater Avenue to the existing four-cell 10'x8' reinforced concrete box.

5.2 Study Work Maps

Figure 2 is a schematic that identifies the major features along the proposed project reach of Indian Bend Wash. Figure 3 is a reduced copy of the study work maps which depicts the proposed floodplain and floodway boundaries for the study reach of Indian Bend Wash.

5.3 Parameter Estimation

Hydraulic parameters, developed by BRW, Inc. during the channelization project design, were used in the post-project model for the channelized section. Additional parameter information was developed, as required, to model the floodplain adjacent to the channelized section and the floodplain and floodway upstream to 32nd Street and Acoma Road.

5.3.1 Roughness Coefficients

The Manning's roughness coefficients were chosen based on field surveys and aerial photographs. An n-value of 0.035 was used for the grassed, main channel and 0.040 was used for the overbank areas in the existing conditions model. For the proposed conditions model, an n-value of 0.035 was used for the main channel in areas of grass and grass-paver lining, 0.025 was used in areas with soil cement, and 0.040 was used for overbank areas.

5.3.2 Expansion and Contraction Coefficients

An expansion coefficient of 0.3 was used to compute losses from channel section to section. A value of 0.5 was used for losses associated with the sudden expansions at culvert outlets. A contraction coefficient of 0.1 was used to compute losses from channel section to section. A value of 0.3 was used for the sudden contractions at culvert inlets. These values are consistent with those recommended by the HEC-2 user's manual.

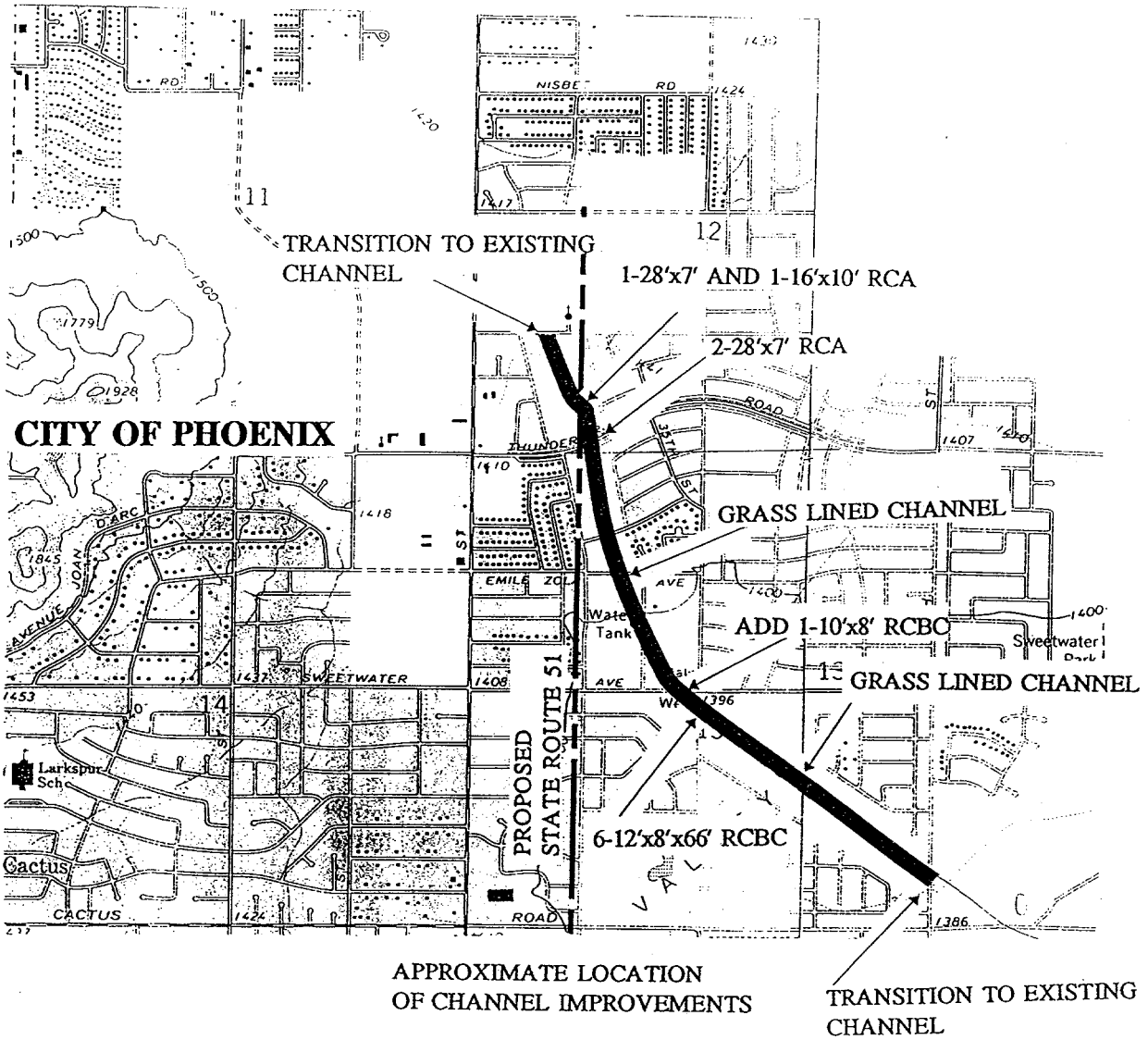
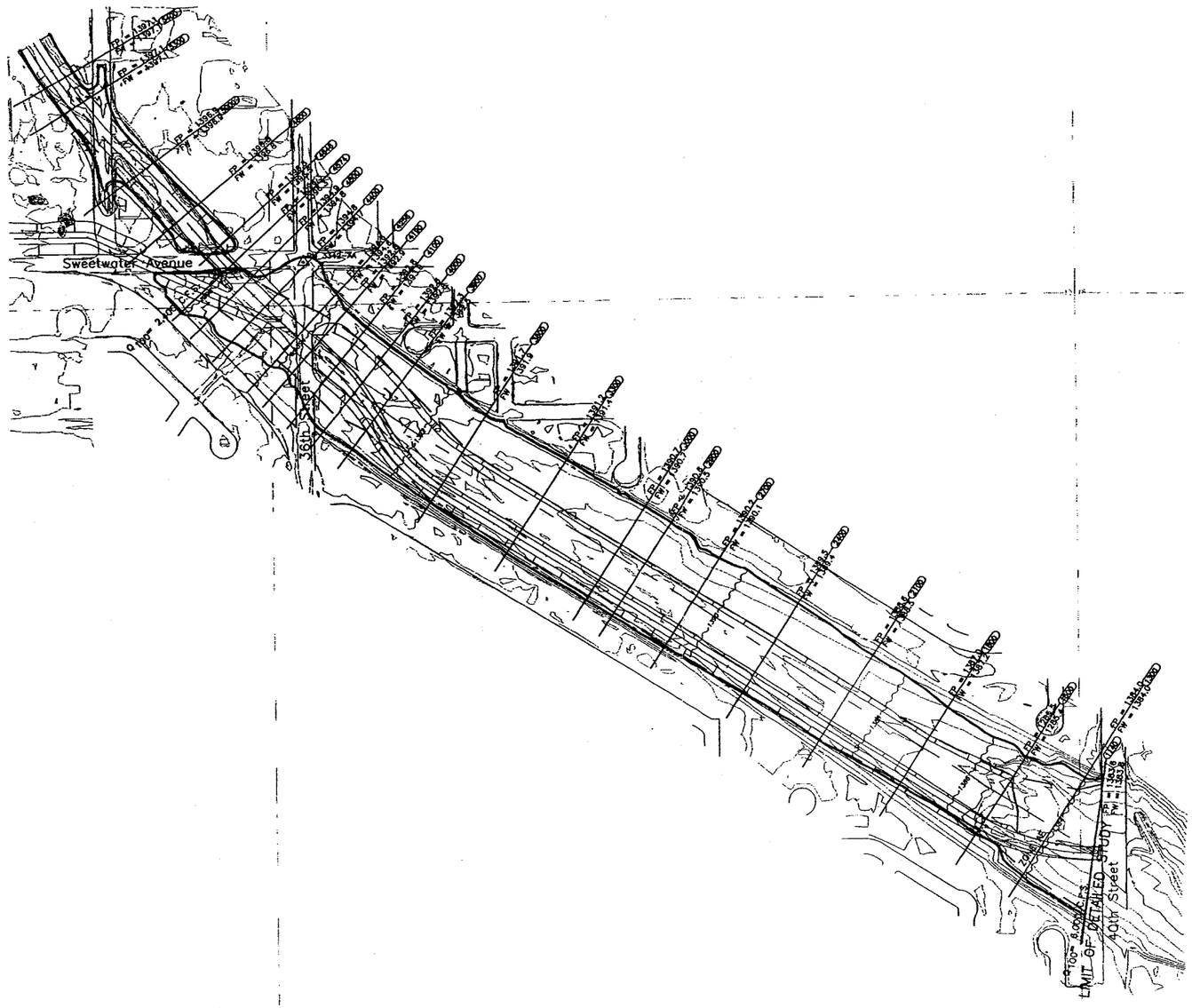


Figure 2 Project Features



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93-05

LEGEND

SECTION LINE	
CORPORATE BOUNDARY	
100-YEAR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE	
CROSS-SECTION	FP=FLOODPLAIN WSE / FW=FLOODWAY WSE (1.452)
BASE FLOOD ELEVATION	1100
ELEVATION REFERENCE MARK	RM

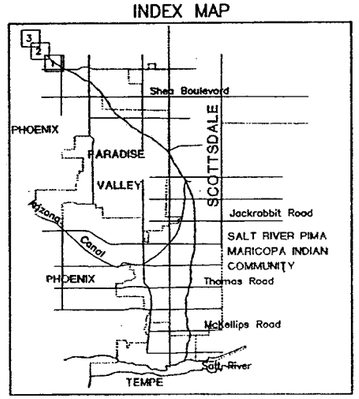
ELEVATION REFERENCE MARKS

RM#	ELEVATION (NGVD '29)	DESCRIPTION
7086	1,409.01	City of Phoenix brass cap in handhole, 32nd Street and Thunderbird Road.
3342-AA	1,394.41	City of Phoenix 3" brass cap in handhole, 36th Street and Sweetwater.

NOTES

1. CROSS-SECTION STATION 2,000 IS THE HYDRAULIC BASELINE EXCEPT WHERE NOTED.
2. STARTING WSE AT SECTION 1140 = LOMR ELEV. (SECT. 14.650) -2.9 FEET.

INDEX MAP



200' 0' 200' 400'

SCALE: 1" = 200'

CONTOUR INTERVAL = 1 FOOT

sla SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	LX	1/14/98	
DESIGN CHK.	BSB	1/14/98	RECOMMENDED BY: DATE
PLANS	BAL	1/14/98	APPROVED BY: DATE
PLANS CHK.	BSB	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY:		DATE:	SHEET 1 OF 3

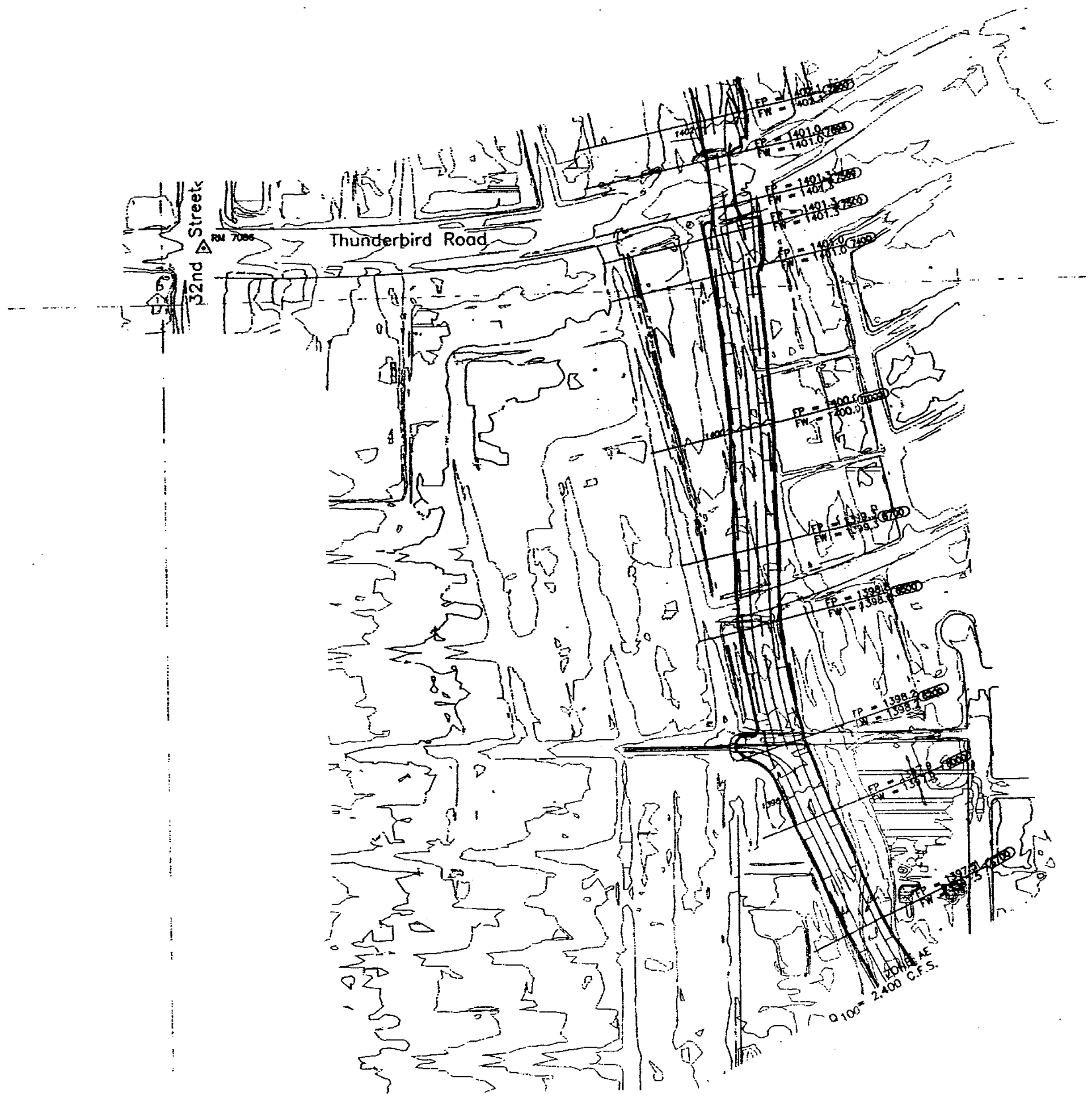
The base topographic mapping used to conduct the floodplain delineation study for Indian Bend Wash was prepared and certified by the Arizona Department of Transportation (ADOT). This mapping is based on aerial photography taken in June 1994 and was provided to Simons Li & Associates, Inc. in digital form by ADOT. Simons Li & Associates, Inc. takes no responsibility for the accuracy or content of the base topographic mapping.

Figure 3a

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93–05



LEGEND

SECTION LINE

CORPORATE BOUNDARY

100–YEAR FLOODPLAIN BOUNDARY

FLOODWAY BOUNDARY

HYDRAULIC BASE LINE

CROSS–SECTION — FP=FLOODPLAIN WSE, FW=FLOODWAY WSE

BASE FLOOD ELEVATION — 1160

ELEVATION REFERENCE MARK — RM

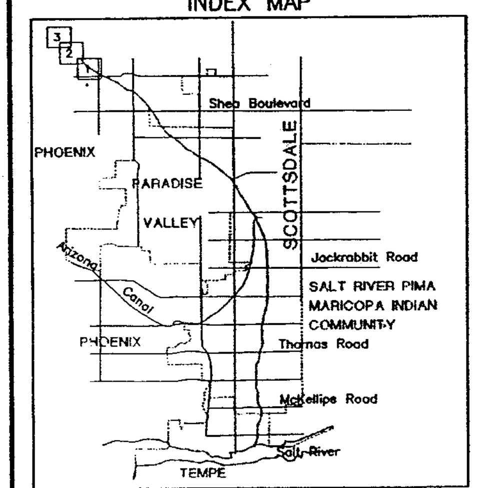
ELEVATION REFERENCE MARKS

RM#	ELEVATION (NAVD '29)	DESCRIPTION
7086	1,409.01	City of Phoenix brass cap in handhole, 32nd Street and Thunderbird Road.
3342–AA	1,394.41	City of Phoenix 3" brass cap in handhole, 36th Street and Sweetwater.

NOTES

1. CROSS–SECTION STATION 2,000 IS THE HYDRAULIC BASELINE EXCEPT WHERE NOTED.

INDEX MAP



200' 0' 200' 400'

SCALE: 1"= 200'

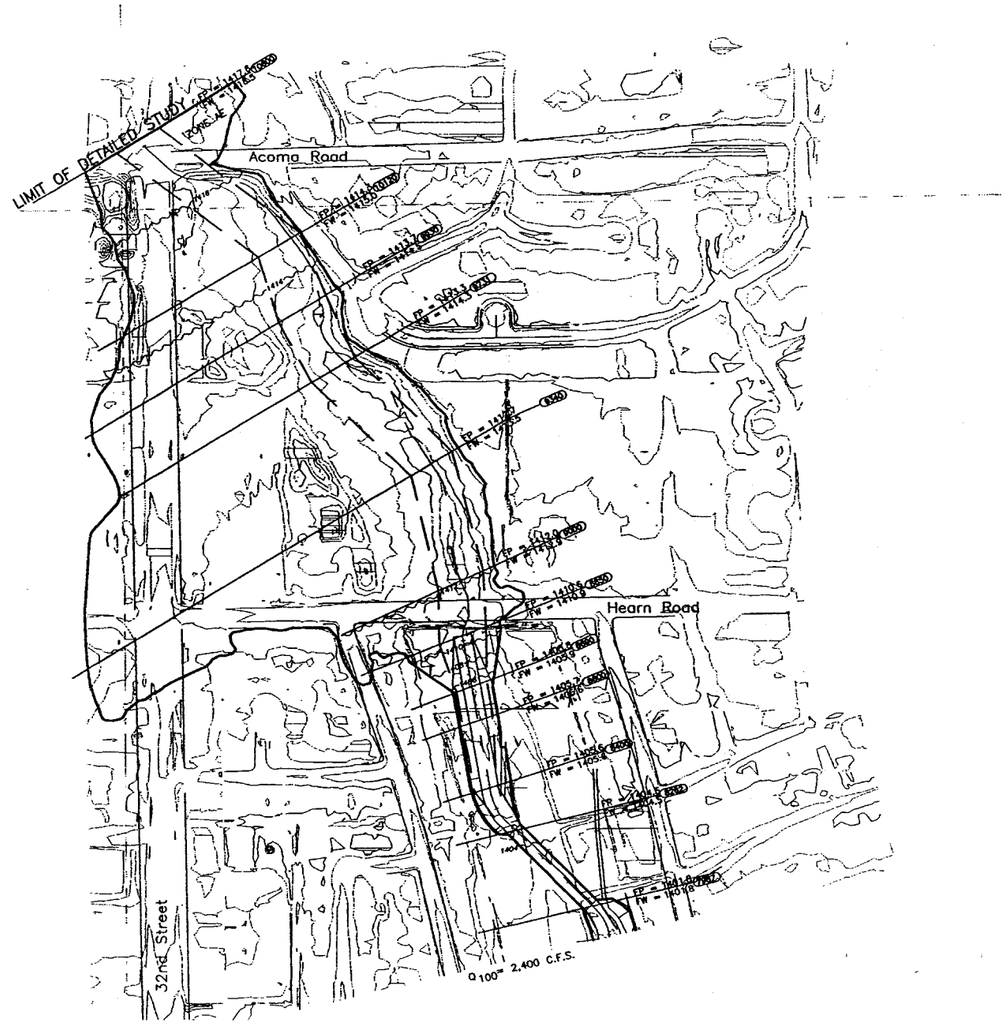
CONTOUR INTERVAL = 1 FOOT

The base topographic mapping used to conduct the floodplain delineation study for Indian Bend Wash was prepared and certified by the Arizona Department of Transportation (ADOT). This mapping is based on aerial photography taken in June 1994 and was provided to Simons Li & Associates, Inc. in digital form by ADOT. Simons Li & Associates, Inc. takes no responsibility for the accuracy or content of the base topographic mapping.

sla SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	LX	1/14/98	RECOMMENDED BY: DATE
DESIGN CHK.	BSB	1/14/98	APPROVED BY: DATE
PLANS	BAL	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
PLANS CHK.	BSB	1/14/98	SHEET 2 of 3
SUBMITTED BY:		DATE:	

Figure 3b



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93-05

LEGEND

SECTION LINE	
CORPORATE BOUNDARY	
100-YEAR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE	
CROSS-SECTION	FP=FLOODPLAIN WSE FW=FLOODWAY WSE (1,432)
BASE FLOOD ELEVATION	1160
ELEVATION REFERENCE MARK	RM

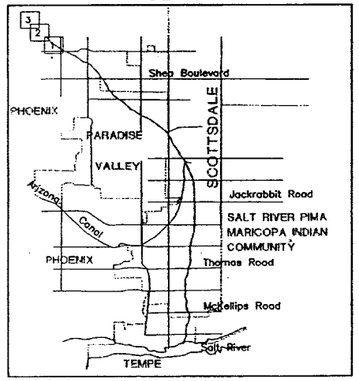
ELEVATION REFERENCE MARKS

RM#	ELEVATION (NAVD '29)	DESCRIPTION
7086	1,409.01	City of Phoenix brass cap in handhole, 32nd Street and Thunderbird Road.
3342-AA	1,394.41	City of Phoenix 3" brass cap in handhole, 36th Street and Sweetwater.

NOTES

1. CROSS-SECTION STATION 2,000 IS THE HYDRAULIC BASELINE EXCEPT WHERE NOTED.

INDEX MAP



200' 0' 200' 400'

SCALE: 1"= 200'
CONTOUR INTERVAL = 1 FOOT

SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	LX	1/14/98	
DESIGN CHK.	BSB	1/14/98	RECOMMENDED BY: DATE
PLANS	BAL	1/14/98	APPROVED BY: DATE
PLANS CHK.	BSB	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY: DATE:			SHEET 3 OF 3

Figure 3c

5.4 Cross-Section Description

Topographic mapping from the ADOT DTM (6) was used to obtain complete cross-section information for the proposed channel and adjacent ground, as well as additional cross-sections to extend the floodplain delineation study limits to 32nd Street and Acoma Road. Cross sections were drawn approximately perpendicular to the anticipated flow paths in the channel and overbanks. The cross-sections are labeled using standard engineering stationing with the distance referenced in feet above Cactus Road, as measured along the channel baseline (ref. work maps). A key to cross-section labeling between the currently effective FIS and the CLOMR mapping is provided in Table 1.

Table 1: KEY TO CROSS-SECTION LABELING

Proposed Project Station	FIS Effective Designation	CLOMR Designation
1140	AY	BG
1500	AZ	BH
2100	BA	BI
4190		BJ
4500		BK
4646	BB	BL
5300	BC	BM
6500	BD	BN
7400	BE	BO
8690	BF	BP
8850		BQ
9340	BG	BR
10120	BH	BS
10600	BI	BT

The cross sections are defined by data points oriented left to right, looking downstream. Each data point consists of an elevation and corresponding station number. The intersection of each cross section and the channel baseline is assigned station number 2,000 feet. Each point in the cross section is defined relative to the channel baseline with stations less than 2,000 to the left and greater than 2,000 to the right.

To preserve the design hydraulics, the cross-sections are located and oriented according to the BRW design model within the channelization project reach. At culverts, extra cross-sections were taken immediately upstream and downstream to define sudden changes in geometry through the openings. Locations of selected cross-sections used in this study are shown on the work maps. Cross-section plots at are included in Appendix E.

5.5 Modeling Considerations

The existing and proposed conditions HEC-2 models were developed for subcritical flow profile computations. The culverts in the study reach of Indian Bend Wash were modeled using the special culvert routine of the HEC-2 Model. Culvert dimensions were obtained from design and as-built plans. Dimensions from as-built plans were verified during the field reconnaissance survey.

5.5.1 Hydraulic Jump/Drop Analysis

During the 100-year event, a potential hydraulic jump occurs at the bottom of the drop section which begins the channelization project (Sec. 8850). The flow passes through critical at the drop and is quickly inundated by high tailwater at Section 8690. The drop has been modeled using closely spaced cross-sections, so the energy losses can be sufficiently described using the standard subcritical computational algorithms of the HEC-2 model. No special computational techniques were employed.

5.5.2 Bridges and Culverts

The HEC-2 computer program provides a special culvert routine for computing losses through culverts. The special culvert routine is similar to the special bridge routine except the Federal Highway Administration's (FHWA) standard equations for culvert hydraulics are used to compute losses through these structures.

5.5.3 Levees and Dikes

There are no levees or dikes proposed in the design.

5.5.4 Islands and Flow Splits

There are no islands or flow splits in the design.

5.5.5 Ineffective Flow Areas

Ineffective flow areas were defined, as appropriate, on the overbank areas and at culvert entrances and exits to accurately model expanding and contracting flow. Flow was allowed to expanded at a rate of 4:1 and contracted at a rate of 1:1 relative to the flowline. The expansion and contraction coefficients used in the model were described in Section 5.3.2.

5.5.6 Supercritical Flow

Any supercritical flow that may occur along the project reach of Indian Bend Wash, during the 100-year event, is isolated and very short. A potential location has been identified downstream of the drop section at the beginning of the channelization. A supercritical flow at this location would be quickly inundated by the high tailwater elevation immediately downstream. This area has been modeled with closely spaced cross-sections, so the energy losses can be sufficiently described using the standard subcritical computational algorithms of the HEC-2 model.

5.6 Floodway Modeling

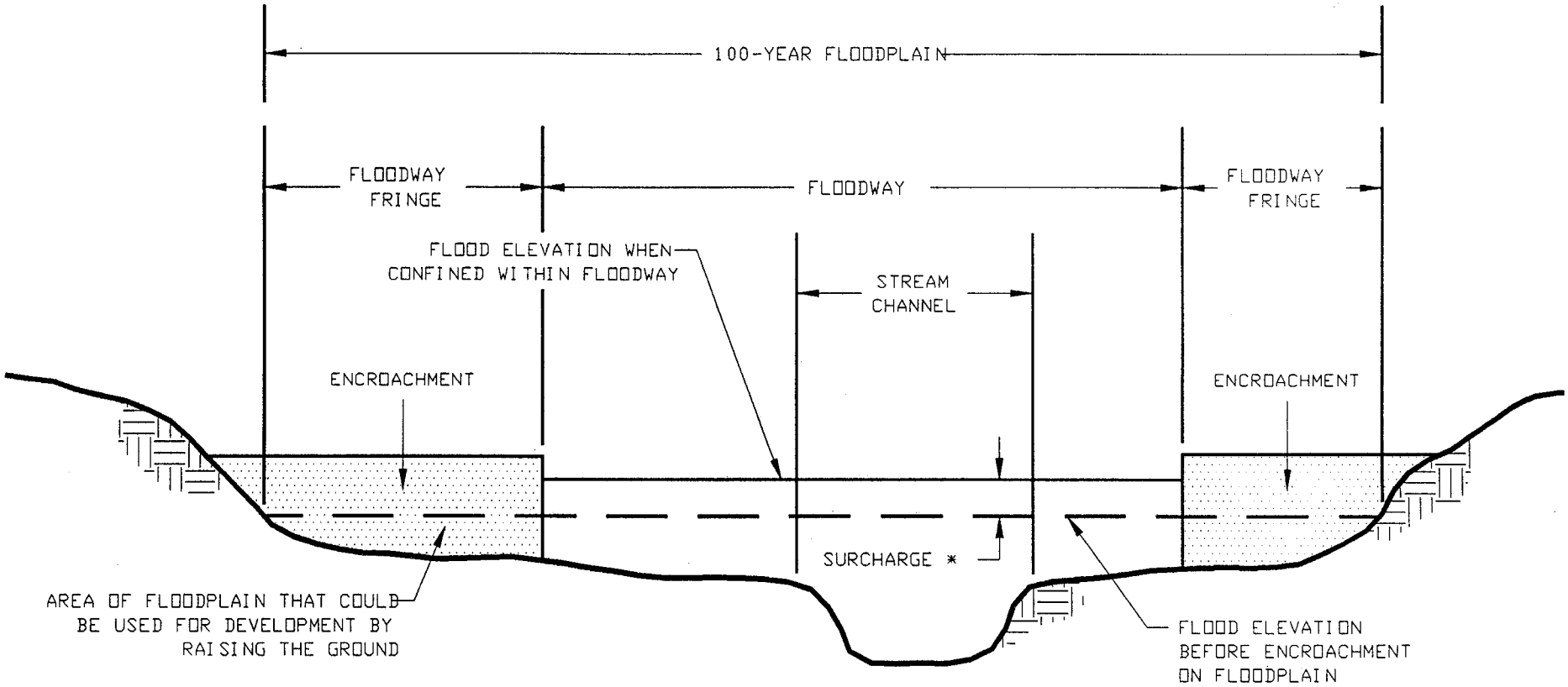
The floodway concept is used to define the amount of floodplain encroachment that is considered acceptable for development. The principle is that limited encroachment is likely to have an insignificant effect on all but the severest flood events. A floodway consists of the main channel of a stream plus sufficient overbank area to convey the 100-year flood without increasing flood heights by more than a specified depth. Federal standards limit the increase to one foot above the base flood elevation; however, some jurisdictions have stricter standards. Normally, the floodway is determined by encroaching on the floodplain to reduce the conveyance by equal amounts on each side. The encroachment is increased gradually until the maximum allowable increase in depth is achieved. The typical relationship between the floodway, floodway fringe, and the floodplain are shown in Figure 4. The floodway presented in this study was determined using a one-foot maximum rise, except within the channelized section. Within the channelized section, the floodway boundaries were set at the limits of excavation.

5.7 Problems Encountered

The effective FIS is not available for Indian Bend Wash, Therefore, it was not possible to develop a duplicate effective model to quantify the changes resulting from the proposed channelization project. At the direction of FEMA's technical evaluation contractor (Sheila Norlin, Baker Engineering), a pre-project (existing conditions) floodplain model was developed for this purpose.

The project design model developed for the channel improvements to Indian Bend Wash, as part of the overall State Route 51 project, was created assuming all Indian Bend Wash flows.would enter the proposed channelization at the upstream end. The post-project HEC-2 CLOMR model, which incorporated the adjacent topography at the upstream end of the channel, revealed that this was not the case. A low lying area on the west side of the channel near Hearn Road remains in the floodplain. This area is identified on the floodplain work map and exhibits.

Due to insufficient mapping, the following cross-sections were extended vertically by the HEC-2 program for the existing conditions floodplain: 4400, 4646, 4800, 5000, 5300, 5400, 5700, 9731, and 9930. The automatic extensions ranged from 0.23 feet at Section 5700 to 1.82 feet at Section 5000. For the proposed conditions floodplain, extensions were required at Sections 9731 and 9930 only. The range was 0.30 and 0.66 feet, respectively. These two cross-sections are located upstream of the project reach.



LINE A-B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C-D IS THE FLOOD ELEVATION AFTER ENCROACHMENT

* SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

SIMONS, LI & ASSOCIATES, INC.

Indian Bend Wash Floodplain Delineation Study

Floodway Definition Sketch

Figure 4

5.8 Calibration

The starting water surface at 40th Street was obtained from the pending LOMR request for Indian Bend Wash, Salt River to 40th Street. This elevation was adjusted to the channelization project mapping datum. Since the effective HEC-2 model is not available for Indian Bend Wash, the water-surface elevations resulting from the analysis models were compared to the available effective FIS water-surface information (2). The effective FIS information used included the FIRM and FLOODWAY maps, the profile plots, and the floodway data tables for the study reach.

5.9 Final Results

Table 2 compares the existing conditions floodplain with the effective floodplain, using water-surface elevations taken from the FIS Floodway Data Table, and the proposed post-project floodway. The table demonstrates that the existing conditions floodplain is lower than the effective FIS floodplain and that the proposed floodway is significantly lower than the effective FIS floodplain within the project limits. Upstream of the project limits, the proposed floodway is above the effective FIS floodplain, but not by more than 0.5 feet.

Table 2: Water Surface Elevation Comparison
Existing and Project Conditions vs. FIS

CROSS-SECTION NUMBER	EXISTING CONDITION FLOODPLAIN	F.I.S. FLOODPLAIN	POST PROJECT FLOODWAY	DIFFERENCE (EXIST. F.P.-FIS.F.P.)	DIFFERENCE (FIS F.P.-PROP.F.W.)
1140 (AY)	1383.6	1385.7	1383.8	-2.1	1.9
1500 (AZ)	1385.9	1388.6	1385.4	-2.7	3.2
2100 (BA)	1390.5	1391.5	1388.5	-1.0	3.0
4646 (BB)	1397.5	1398.1	1396.5	-0.6	1.6
5300 (BC)	1399.9	1399.9	1397.1	0.0	2.8
6500 (BD)	1402.6	1404.3	1398.8	-1.7	5.5
7400 (BE)	1405.9	1407.3	1401.0	-1.4	6.3
8690 (BF)	1410.7	1411.9	1405.9	-1.2	6.0
9340 (BG)	1412.6	1413.7	1413.5	-1.1	0.2
10120 (BH)	1414.4	1414.8	1415.0	-0.5	-0.2
10600 (BI)	1417.6	1418.0	1418.5	-0.4	-0.5
(AY) - Effective FIS Cross-section Label					

Table 3 compares the existing conditions floodplain with the proposed post-project floodplain and floodway. From this table, it can be seen that the proposed floodplain is lower than the existing conditions floodplain at all cross-sections within the project limits. Table 2 also shows that the proposed floodway has essentially the same water-surface elevation as the proposed floodplain within the project limits, but rises above the floodplain elevation upstream of the project limits. The maximum proposed floodway rise above the proposed floodplain is one foot at Section 9731.

The freeboard for the post-project floodplain within the project limits is provided in Table 4. A freeboard of one foot or more is provided at all cross-sections. Figures 5 and 6 of Section 7.3 present a plan view of the impact of the proposed channelization project on the currently effective floodplain and floodway boundaries, respectively.

The effect of the project will be to reduce the 100-year water surface elevations and, therefore, floodplain and floodway widths within the project reach. The resulting change in water surface profile is reasonable considering the new channel is being excavated below existing ground. The channelization project meets the objective of removing property from the 100-year floodplain from 40th Street to Hearn Road, while providing a drainage outlet for SR-51.

HEC-2 input and output listings for the existing and proposed conditions models are presented in Appendix E, along with plots of the channel cross-sections.

Table 3: Water Surface Elevation Comparison Existing vs. Project Conditions

CROSS-SECTION NUMBER	EXISTING CONDITION FLOODPLAIN	POST PROJECT FLOODPLAIN	POST PROJECT FLOODWAY	DIFFERENCE (EXIST. F.P.-PROP.F.P.)	DIFFERENCE (PROP. F.W.-PROP.F.P.)
1140	1383.6	1383.6	1383.8	0.0	0.2
1300	1384.3	1384.0	1384.0	0.3	0.0
1500	1385.9	1385.5	1385.4	0.4	-0.1
1800	1388.8	1387.0	1387.2	1.8	0.2
2100	1390.5	1388.6	1388.5	1.9	-0.1
2400	1391.5	1389.5	1389.4	2.0	-0.1
2700	1392.1	1390.2	1390.1	1.9	-0.1
2900	1392.4	1390.6	1390.5	1.8	-0.1
3000	1392.5	1390.7	1390.7	1.8	0.0
3300	1392.8	1391.2	1391.4	1.6	0.2
3600	1393.3	1391.7	1391.9	1.6	0.2
3900	1393.9	1392.3	1392.5	1.6	0.2
4000	1394.2	1392.6	1392.8	1.6	0.2
4100	1394.4	1392.8	1393.0	1.6	0.2
4190	1394.8	1392.8	1392.9	2.0	0.1
4256	1395.5	1394.6	1394.6	0.9	0.0
4400	1396.6	1394.8	1394.7	1.8	-0.1
4500	1397.0	1394.9	1394.8	2.1	-0.1
4573	1396.9	1393.3	1393.2	3.6	-0.1
4574	1396.9	1396.3	1396.3	0.6	0.0
4646	1397.5	1396.5	1396.5	1.0	0.0
4800	1399.6	1396.8	1396.8	2.8	0.0
5000	1399.8	1396.9	1396.9	2.9	0.0
5300	1399.9	1397.1	1397.1	2.8	0.0
5400	1399.9	1397.1	1397.1	2.8	0.0
5700	1400.2	1397.5	1397.5	2.7	0.0
6000	1400.9	1397.9	1397.9	3.0	0.0
6200	1401.5	1398.2	1398.2	3.3	0.0
6500	1402.6	1398.8	1398.8	3.8	0.0
6700	1403.5	1399.3	1399.3	4.2	0.0
7000	1404.7	1400.0	1400.0	4.7	0.0
7400	1405.9	1401.0	1401.0	4.9	0.0
7500	1406.3	1401.3	1401.3	5.0	0.0
7569	1406.7	1401.3	1401.3	5.4	0.0
7696	1406.9	1401.0	1401.0	5.9	0.0
7800	1407.4	1402.1	1402.1	5.3	0.0
7987	1408.4	1401.8	1401.8	6.6	0.0
8262	1409.2	1404.5	1404.5	4.7	0.0
8400	1409.5	1405.6	1405.6	3.9	0.0
8600	1410.3	1405.7	1405.6	4.5	-0.1
8690	1410.7	1405.8	1405.9	4.9	0.1
8850	1411.4	1410.6	1410.9	0.8	0.3
8851	1411.4	1410.9	1411.6	0.5	0.7
9000	1411.8	1412.0	1412.9	-0.2	0.9
9340	1412.6	1412.7	1413.5	-0.1	0.8
9731	1413.3	1413.3	1414.3	0.0	1.0
9930	1413.7	1413.7	1414.5	0.0	0.8
10120	1414.4	1414.3	1415.0	0.0	0.7
10600	1417.6	1417.6	1418.5	0.0	0.9

Table 4: Proposed Conditions Freeboard

CROSS-SECTION NUMBER	POST PROJECT FLOODPLAIN	TOP OF BANK ELEVATION		FREEBOARD	
		EAST BANK	WEST BANK	EAST BANK	WEST BANK
1140	1383.6	1386.0	1388.9	2.4	5.3
1300	1384.0	1388.5	1388.7	4.5	4.7
1500	1385.5	1389.4	1389.5	3.9	4.0
1800	1387.0	1389.6	1390.8	2.6	3.8
2100	1388.6	1391.5	1392.2	2.9	3.6
2400	1389.5	1392.0	1392.5	2.5	3.0
2700	1390.2	1392.9	1393.4	2.7	3.2
2900	1390.6	1393.3	1393.6	2.7	3.0
3000	1390.7	1394.1	1393.9	3.4	3.2
3300	1391.2	1395.1	1394.3	3.9	3.1
3600	1391.7	1395.4	1396.5	3.7	4.8
3900	1392.3	1394.9	1395.6	2.6	3.3
4000	1392.6	1395.9	1396.0	3.3	3.4
4100	1392.8	1395.6	1394.4	2.8	1.6
4190	1392.8	1395.9	1394.8	3.1	2.0
4256	1394.6	1396.0	1396.0	1.4	1.4
4400	1394.8	1396.0	1396.5	1.2	1.7
4500	1394.9	1396.4	1396.7	1.5	1.8
4573	1393.3	1396.5	1396.6	3.2	3.3
4574	1396.3	1397.4	1397.4	1.1	1.1
4646	1396.5	1397.9	1397.9	1.4	1.4
4800	1396.8	1397.9	1397.9	1.1	1.1
5000	1396.9	1397.9	1397.9	1.0	1.0
5300	1397.1	1398.4	1398.1	1.3	1.0
5400	1397.1	1398.5	1398.3	1.4	1.2
5700	1397.5	1399.5	1399.3	2.0	1.8
6000	1397.9	1399.8	1399.9	1.9	2.0
6200	1398.2	1399.5	1400.6	1.3	2.4
6500	1398.8	1400.1	1400.2	1.3	1.4
6700	1399.3	1401.3	1402.6	2.0	3.3
7000	1400.0	1402.1	1402.9	2.1	2.9
7400	1401.0	1404.9	1403.2	3.9	2.2
7500	1401.3	1404.9	1404.1	3.6	2.8
7569	1401.3	1405.0	1404.0	3.7	2.7
7696	1401.0	1406.0	1405.0	5.0	4.0
7800	1402.1	1407.0	1406.0	4.9	3.9
7987	1401.8	1407.0	1406.5	5.2	4.7
8262	1404.5	1407.0	1407.0	2.5	2.5
8400	1405.6	1407.0	1407.5	1.4	1.9
8600	1405.7	1407.8	1408.0	2.1	2.3
8690	1405.8	1408.7	1408.0	2.9	2.2

SECTION 6: EROSION AND SEDIMENT TRANSPORT ANALYSIS

6.1 Method Description

The proposed channel is to be grass-lined throughout with the addition of soil cement lining and bank protection between 36th Street and Sweetwater Avenue, and at the beginning of the channelized section. Grass paver blocks are also being used between the Thunderbird Road and the SR-51 crossings. No erosion/sediment transport analysis was conducted for the proposed project conditions. Long-term maintenance of the channel will be provided by the City of Phoenix.

SECTION 7: DRAFT FIS REPORT DATA

7.1 Summary of Discharges

A comparison of the effective FIS discharges used in this CLOMR analysis to the channelization project design discharges is presented below in Table 5.

Table 5: Hydrology

Location	Current Effective FIS 100-Year Discharges (cfs)	Channelization Design 100-Year Discharges (cfs)
32nd Street	2400	--
Above Hearn Road	--	1883
Below Hearn Road	--	2794
Thunderbird Road	--	--
Sweetwater Road	--	3227
36th Street	6000	7128
40th Street	--	7325
Cactus Road	9000	--

7.2 Floodway Data

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION[2]		
CROSS SECTION	DISTANCE[1]	WIDTH (ft)	SECTION AREA (sq ft)	MEAN VELOCITY (ft/s)	WITH FLOODWAY (ft)	WITHOUT FLOODWAY (ft)	DIFFERENCE (ft)
BG	1,140	427	1056	5.7	1383.8	1383.6	0.2
BH	1,500	220	757	7.9	1385.4	1385.5	-0.1
BI	2,100	215	940	6.4	1388.5	1388.6	-0.1
BJ	4,190	189	880	6.8	1392.9	1392.8	0.1
BK	4,500	150	1144	5.2	1394.8	1394.9	-0.1
BL	4,646	65	575	4.2	1396.5	1396.5	0.0
BM	5,300	113	622	3.9	1397.1	1397.1	0.0
BN	6,500	98	443	5.4	1398.8	1398.8	0.0
BO	7,400	90	411	5.8	1401.0	1401.0	0.0
BP	8,690	90	500	4.8	1405.9	1405.8	0.1
BQ	8,850	140	290	8.3	1410.9	1410.6	0.3
BR	9,340	140	415	5.8	1413.5	1412.7	0.8
BS	10,120	140	290	8.3	1415.0	1414.3	0.7
BT	10,600	140	310	7.8	1418.5	1417.6	0.9

[1] Feet above Cactus Road

[2] 1929 Datum

TABLE 5

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SIMONS, LI & ASSOCIATES, INC.

FLOODWAY DATA

INDIAN BEND WASH

7.3 Annotated FIRM Maps

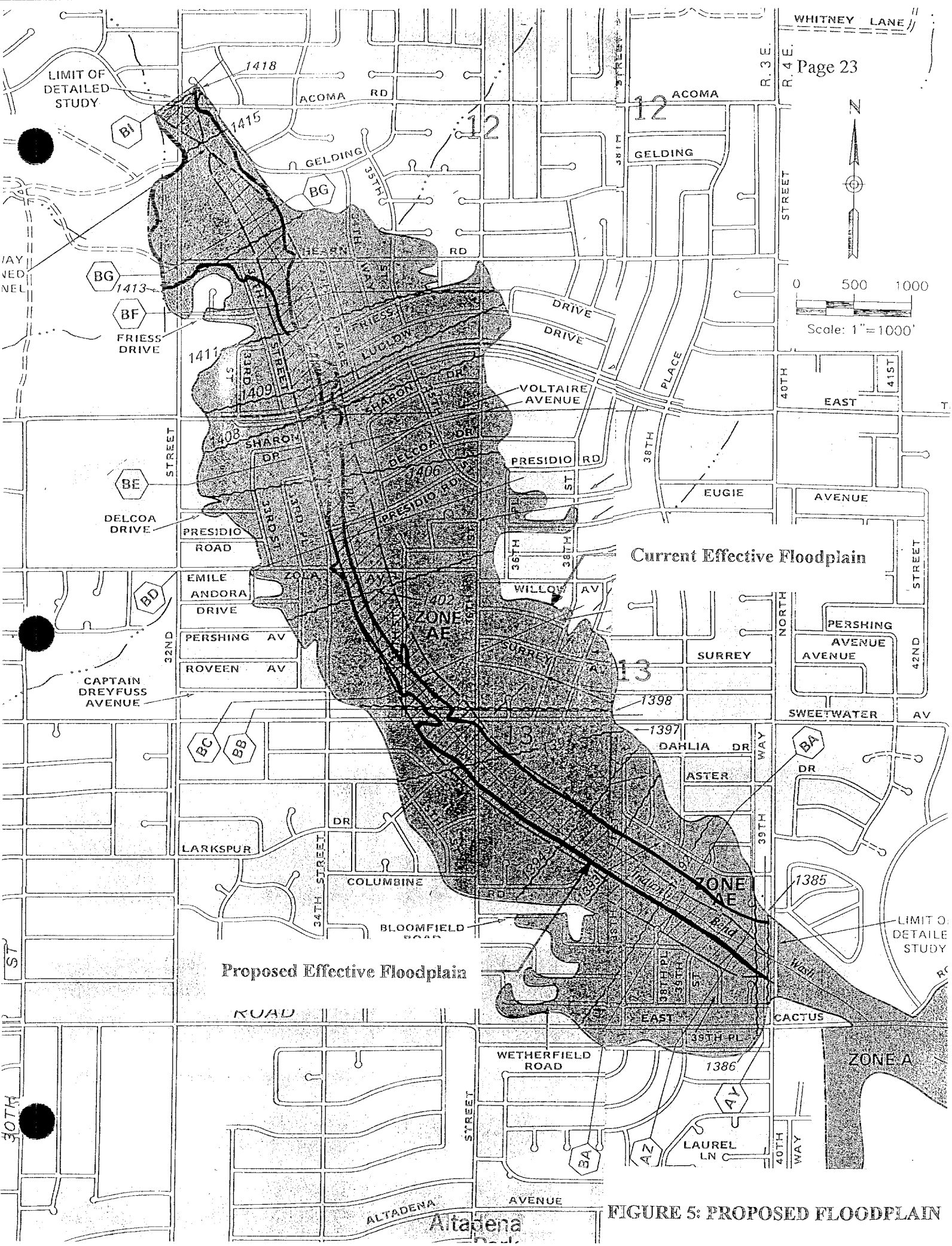


FIGURE 5: PROPOSED FLOODPLAIN

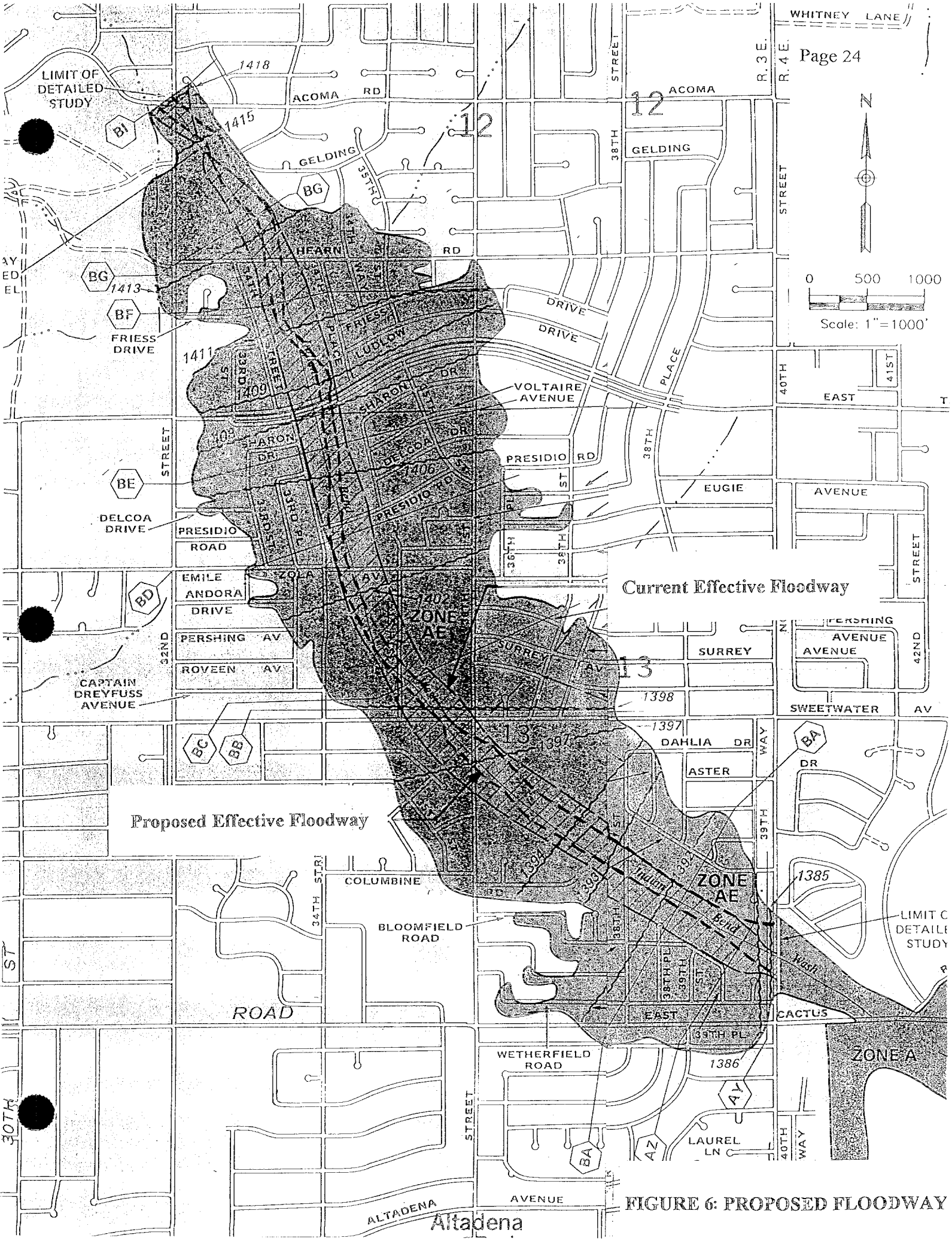
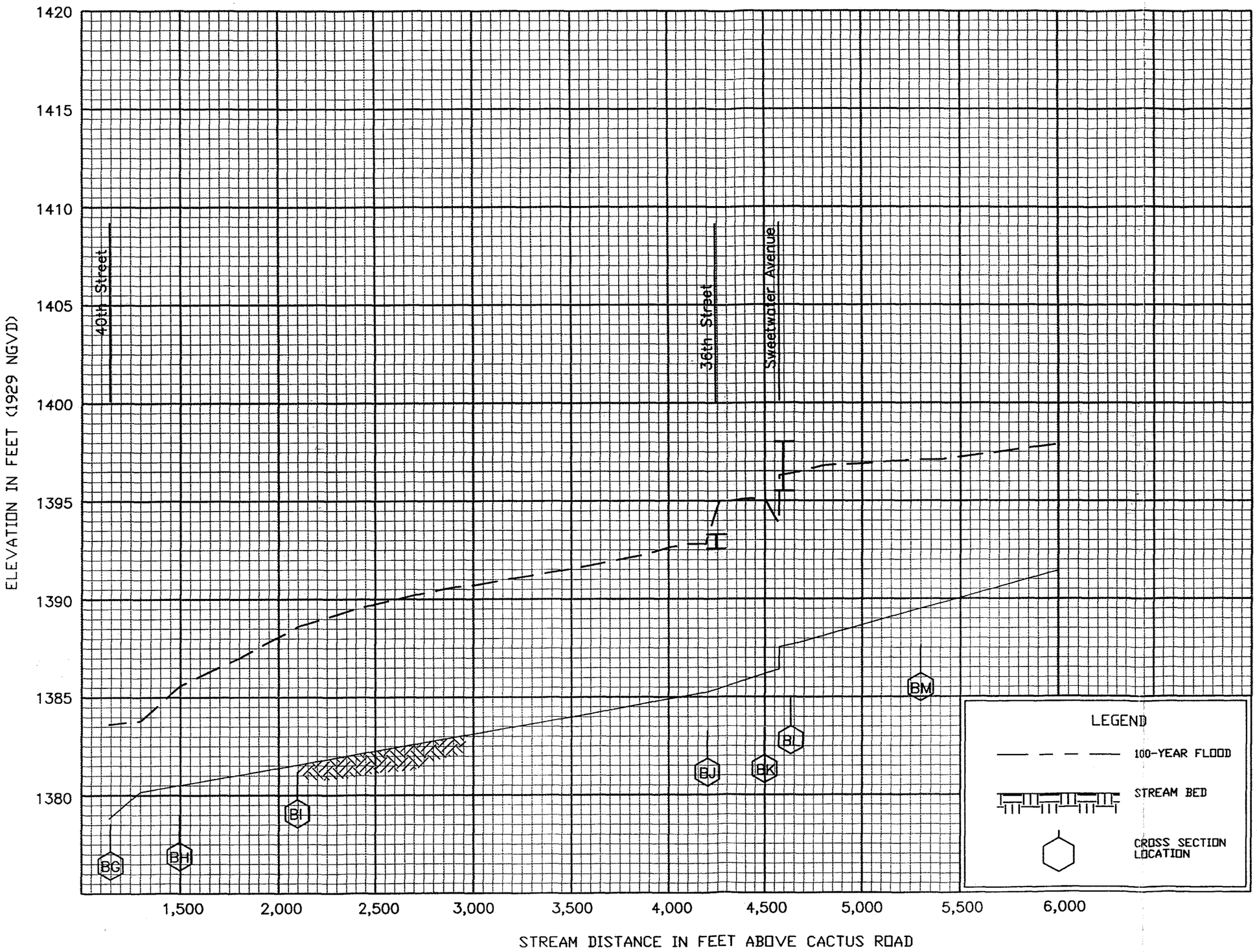


FIGURE 6: PROPOSED FLOODWAY

7.4 Flood Profiles



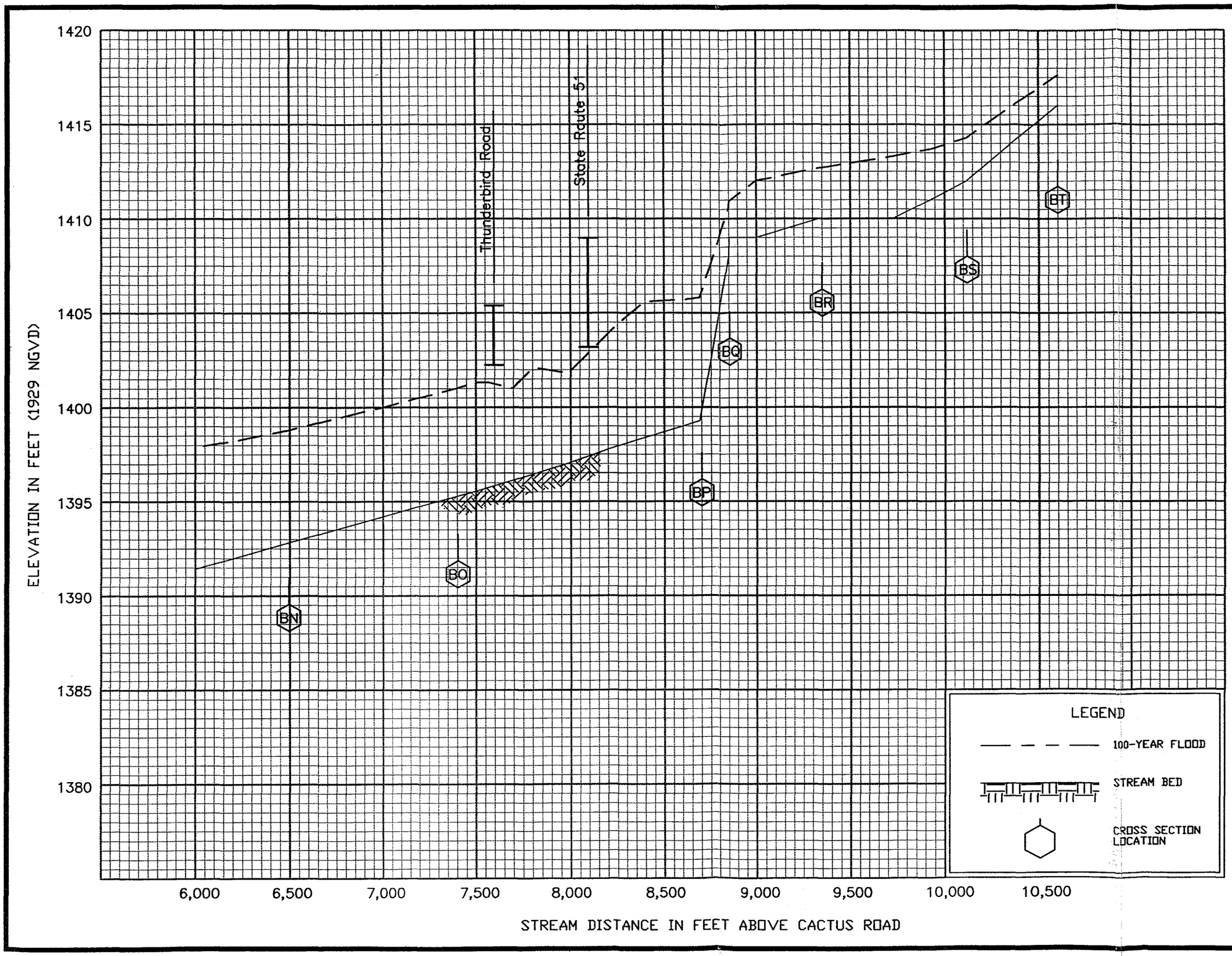
FLOOD PROFILES

INDIAN BEND WASH
40th STREET TO 32nd STREET

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(FLOOD CONTROL DISTRICT)

SHEET 1



FLOOD PROFILES

INDIAN BEND WASH
40th STREET TO 32nd STREET

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(FLOOD CONTROL DISTRICT)

SHEET 2

APPENDIX A

REFERENCES

REFERENCES

1. Draft Final Drainage Report, SR 51 - Squaw Peak Highway, BRW, Inc., March 1996.

2. Flood Insurance Study for Maricopa County, Arizona, FEMA, September 30, 1995.

3. Initial Drainage Report for State Route 51, Thunderbird Road to Bell Road, HDR Engineering, September, 1995.

4. Final Hydrology Report, Squaw Peak Highway, Michael Baker Jr., Inc. for ADOT, November 1993.

5. Concept Drainage Report, Squaw Peak Highway - Section 4, Michael Baker Jr., Inc. for ADOT, April 1993.

6. DTM Topopgraphy for the State Route 51 Extension from Shea Blvd. to Bell Road, Arizona Department of Transportation.

7. HEC-2 Model User's Manual, U.S. Army Corps of Engineers, Version 4.6.2, May 1991.

APPENDIX B

GENERAL DOCUMENTATION AND CORRESPONDENCE

FLOODPLAIN DELINEATION FOR INDIAN BEND WASH
FCD 93-05

CHANGE ORDER NO. 1
SCOPE OF WORK

I. INTRODUCTION

Supplementary work items were requested by the Flood Control District of Maricopa County (FCDMC). The work items outlined below include work which was not in the original Scope of Work. This change order includes additional budget for Simons, Li & Associates, Inc.

II. DESCRIPTION OF SERVICES

TASK A. REVIEW AND UPDATE DATA FOR A CONDITIONAL LETTER OF MAP REVISION

Simons, Li & Associates, Inc. (SLA) will provide to the FCDMC professional engineering services in conjunction with the Conditional Letter of Map Revision (CLOMR) for that portion of Indian Bend Wash effected by the Squaw Peak Parkway. The CLOMR will be prepared and documented for submittal to the Federal Emergency Management Agency (FEMA) and formatted according to Arizona Department of Water Resources (ADWR) technical guidelines. The purpose of the CLOMR is to document the impact of the proposed transportation improvements and their associated drainage system on the existing 100-year floodplain and floodway. Products to be rendered to the FCDMC include a completed CLOMR application with all necessary supporting documentation.

This Scope of Work reflects a normal engineering approach and budget for completing a CLOMR. The FCDMC will submit appropriate fees to FEMA in support of this CLOMR.

Task A-1: Obtain and review the plans and hydraulic models for the proposed improvements. This is required as the existing Scope of Work focuses on existing conditions.

One field visit is included in this task. The purpose of this field visit will be to field verify assumptions and values of hydraulic parameters used in the hydraulic analyses for the proposed facilities. The field visit will photo-document the existing conditions where the proposed facilities will be located. Several coordination meetings will be required between FCDMC, ADOT, City of Phoenix, SLA and the consultants preparing the construction drawings for the Squaw Peak Parkway.

Task A-2: Integrate the proposed facilities into the SLA HEC-2 model, utilizing HEC-2 models collected in Task A-1, if possible. Perform hydraulic analysis to accurately reflect the proposed conditions and provide delineations of the future floodplain, floodway, and water surface profiles in the Indian Bend Wash. SLA will use the aerial mapping already available.

Task A-3: Provide an analysis to document that the system will provide adequate protection from a 100-year flood. If existing plans and reports adequately demonstrate the following items, some of this task may be bypassed. The analysis will include 1) a demonstration of available freeboard; 2) evidence that all drainage structures that penetrate the levees, if any, have been fitted with adequate closure devices to prevent backflow; 3) analysis of the embankment protection to show that the levees will not be subject to erosion; 4) information on stability of the embankment and foundation; and 5) an interior drainage analysis of drainage originating on the landward side of the levees. This scope of work does not include manhours for a settlement analysis to demonstrate the potential for loss of freeboard. This analysis, if required, would need to be performed by a geotechnical engineer.

TASK B: PACKAGING THE CONDITIONAL LETTER OF MAP REVISION

Task B-1: Prepare a report containing the documentation of the findings from the previous tasks and revised floodplain mapping in the FEMA format for submittal to the FCDMC and ADWR for review. Complete and appropriate FEMA official forms such as: "Revisions Requestor and Community Official Form" (Form 1); "Certification by Registered Professional Engineer" (Form 2); "Riverine and Hydraulic Analysis Form" (Form 4); "Riverine/Coastal Mapping Form" (Form 5); "Channelization Form" (Form 6); and "Levee/Floodwall System Analyses Form" (Form 8), if required. The CLOMR will be formatted according to the Arizona Department of Water Resources publication titled "Instruction for Organizing and Submitting Technical Documentation for Flood Studies" (Revised, September, 1991). Prepare all necessary maps, exhibits, floodplain/floodway delineations, hydraulic analyses, figures, illustrations, descriptions, and completed forms as backup support of the CLOMR.

Task B-2: Submit the report to the City of Phoenix, FCDMC and ADWR for review. Revise the report as necessary according to the FCDMC's and ADWR's comments.

Task B-3: After obtaining the City of Phoenix and the FCDMC's endorsement of the study, submit the study and endorsement to FEMA for review. Provide additional data and information or make revisions as necessary if requested by the reviewing agency (FEMA). Coordinate with the FCDMC and FEMA for necessary revisions and adjustments to the CLOMR.

It is normal for FEMA reviewers to have many comments with regard to an application, and it is difficult to estimate the time required to address these comments and make the necessary revisions and adjustments.

RECORD OF CONVERSATION

SIMONS, LI & ASSOCIATES, INC.

DATE: 10/7/97 PROJECT NAME/NO.: IBW PAZ-MC-16

RECORDED BY: Liang Xu OWNER/CLIENT: FCDMC

TALKED WITH: Bart B. OF: SLA

NATURE OF CONVERSATION:

INCOMING ☐ OFFICE ☒

TELEPHONE: MEETING:

OUTGOING ☐ SITE ☐

ITEMS DISCUSSED: BRW HEC-2 model

In the BRW HEC-2 model, the CR data stations are increasing from right bank to left bank when looking downstream, which is conflicting with what the HEC-2 manual defines. Some modifications will be made to adjust the CR data.

cc Bart ☐ INFORMATION ☒ ACTION

Federal Emergency Management Agency

Washington, D.C. 20472

JUN 0 8 1998

FLOOD CONTROL DISTRICT
RECEIVED
JUN 1 2 1998
CHENG | P & PM
PIO | REG
ADMIN | PWLMGT
FINANCE | FILE
O & M
ENGS
REMARKS

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 98-09-484R

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street, 11th Floor
Phoenix, Arizona 85003-1611

Community: City of Phoenix, Arizona
Community No.: 040051

104

Dear Mayor Rimsza:

This responds to a request that the Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 18, 1998, Mr. Afshin Ahouraiyan, Engineering Division, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that proposed channelization along Indian Bend Wash from [illegible] Hearn Road, reinforced-concrete arch culverts under State Route 51 and Thunderbird Road, [illegible] reinforced-concrete box culverts (RCBs) at Sweetwater Road, and an RCB at [illegible] od hazard information shown on the effective FIRM and FIS report.

491-1396
fax

All data required to complete our review [illegible] onal Letter of Map Revision (CLOMR) were submitted with letters fro[illegible]

We have completed our review of the submitted data an[illegible] d to prepare the effective FIRM for your community. The submitted existing conditions HEC-2 hydraulic computer model, dated January 9, 1998, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as shown on the plans entitled "Floodplain Delineation Study for Indian Bend Wash 40th Street to 32nd Street," prepared by Simons, Li and Associates, Inc., dated January 14, 1998, and the data listed below are received, the floodplain boundaries of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) will be delineated as shown on the above-mentioned plans.

As a result of the proposed project, the base flood elevations (BFEs) and width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, will decrease along the entire study reach. The maximum decrease in SFHA width, 2,450 feet, will occur approximately 650 feet downstream of Hearn Road. The width of the regulatory floodway will also decrease along the entire study reach. The maximum decrease in floodway width, 450 feet, will occur at Sweetwater Avenue.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIS report and FIRM.

06/18/98 10:04 ☎602 506 4601 MARICOPA CO. FCD 002

- Detailed application and certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requester and Community Official Form," and Form 2, entitled "Certification by Registered Professional Engineer and/or Land Surveyor," must be included. (Copies of these forms are enclosed.)

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

  Form 3, entitled "Hydrologic Analysis Form"

  Form 4, entitled "Riverine Hydraulic Analysis Form"

  Form 5, entitled "Riverine/Coastal Mapping Form"

  Form 6, entitled "Channelization Form"

  Form 7, entitled "Bridge/Culvert Form"

  Hydraulic analyses, for as-built conditions, of the base flood and the floodway must be submitted with Form 4, and a topographic work map showing the revised floodplain and floodway boundaries must be submitted with Form 5.

- Effective October 1, 1996, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. FEMA established flat review and processing fees for most types of requests. Effective March 10, 1997, FEMA modified the fee schedule that became effective on October 1. In accordance with this schedule, the fee for your map revision request will be $2,300 and must be received before we can begin processing your request. Payment of this fee shall be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card. The payment must be forwarded to the following address:

  Federal Emergency Management Agency
  Fee-Collection System Administrator
  P.O. Box 3173
  Merrifield, VA 22116-3173

- As-built plans, certified by a registered professional engineer, of all proposed project elements

- Community acknowledgment of the map revision request

- Certification that all fill placed in the currently effective base floodplain and below the proposed BFE is compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method issued by the American Society for Testing and Materials (ASTM Standard D-698) or an acceptable equivalent method for all areas to be removed from the base floodplain

- A copy of the public notice distributed by your community stating your community's intent to revise the floodway, or a statement by your community that it has notified all affected property owners and affected adjacent jurisdictions

- A letter stating that your community will adopt and enforce the modified floodway, OR, if the State has jurisdiction over either the floodway or its adoption by your community, a copy of your community's letter to the appropriate State agency notifying it of the floodway modification and a copy of the letter from that agency stating its approval of the modification

- An officially adopted maintenance and operation plan for the proposed channel and culverts. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

- The submitted hydraulic analysis shows extended warnings at Cross Sections 9930 and 9731. Please include additional ground elevation data for these locations to eliminate all extended cross-section messages.

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because the BFEs would change as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the revised BFEs based on scientific or technical data.

The basis of this CLOMR is, in whole or in part, a channel-modification/culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel and culvert rests with your community.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by contacting the Director, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this CLOMR, please contact Mr. Mike Grimm of our staff in Washington, DC, either by telephone at (202) 646-2878 or by facsimile at (202) 646-4596.

Sincerely,

Mike Grimm
Project Engineer, Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E.
Chief, Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: Mr. Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix Street
Transportation Department

Mr. Afshin Ahouraiyan ✓
Engineering Division
Flood Control District of Maricopa County

AAZ-MC-16

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

2801 West Durango Street · Phoenix, Arizona 85009
Telephone: (602) 506-1501
Fax: (602) 506-4601
TT: (602) 506-5897

COVER SHEET

TO: Bart Bergendahl

Company or Department: SLA & Associates **Fax #** 491-1396

FROM: Afshin Ahouraiyan

Number of pages being sent including Cover Sheet: 2

Comments: Good afternoon Bart: I got a call from Baker Engineers having the following question on the IBW CLOMR. Give me a call to discuss these before calling Baker. 1) What version of AutoCad was used for the drawings 2) Re-submit the maps with better written contour elevation information. Not able to read the contour numbers from the map 3) why are X3 cards used for cross sections 5000, 4800, 4646 4) Eliminate the extended cross section messages for x-sections 9930 & 9731.

The name of the individual @ Baker reviewing the CLOMR is James Stitzel Phone # 703-960-8800 ext 5262.

Attached is the copy of letter coming to you re: HIS deliverables for the LOMR.

Give me a call when you get this fax & we'll discuss the issues. Thanks,
Afshin

A. Ahouraiyan

Afshin Ahouraiyan
Hydrologist

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

January 14, 1998

Mr. Pedro Calza
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

RE: FLOODPLAIN DELINEATION FOR INDIAN BEND WASH, 40TH STREET TO 32ND STREET AND ACOMA ROAD

Dear Pedro:

Enclosed for your information and use is the final documentation needed to support the District's request for a Conditional Letter of Map Revision (CLOMR) for the above referenced section of Indian Bend Wash. The documentation has been revised in accordance with the comments received from Hasan Mushtaq during our December 26, 1997 meeting at the District office. The submittal includes the Technical Data Notebook (TDN), the HEC-2 model input/output files on disk, the AutoCAD mapping files on disk, and the full-size study work maps. The TDN has been prepared in accordance with the new State Standard for Flood Study Technical Documentation, SS1-97, and its attachment SSA1-97, which became effective November 1, 1997.

If you have any questions or require further information on the submittal, please do not hesitate to contact me.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

DLR/ad

Attachments

[PAZ-MC-16]
rwpw6.1:let20.tdn

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AZ-MC-16

REC 1997

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
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TT (602) 506-5897

BOARD OF DIRECTORS
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DEC 26 1997

Dennis L Richards, P.E.
Simons, Li & Associates, Inc.
4600 S. Mill Avenue
Suite 200
Tempe, Arizona 85282

Subject: **Review comments on the Conditional Letter of Map Revision (CLOMR) on Indian Bend Wash, From 40th Street to 32nd Street (FCD 93-05).**

Dear Mr. Richards :

Review of the Conditional Letter of Map Revision (CLOMR) submittal package, on the above-mentioned study, has been completed. A review meeting was held at 1:30 PM on December 26, 1997, between Simons, Li & Associates and the District, to discuss the review comments in details. Please address the review comments as per discussion during the meeting.

Should additional information be required, please do not hesitate to contact me at (602) 506-4528.

Sincerely,

Hasan Mushtaq, Ph.D., P.E.
Engineering Division

RECEIVED JUN 23 1997
AZ-MC-16

FLOOD CONTROL DISTRICT
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JUN 19 1997

Dennis L Richards, P.E.
Simons, Li & Associates, Inc.
4600 S. Mill Avenue
Suite 200
Tempe, Arizona 85282

Subject : **Review of the HEC-2 submittal for the Floodplain Delineation Study for Indian Bend Wash, From 40th Street to 32nd Street (FCD 93-05).**

Dear Mr. Richards :

I have completed reviewing the revised hydraulic modeling for the above-mentioned project. The review comments, dated May 22, 1997, have been addressed in this revised model. However, there are some additional review comments on this current submittal. These review comments are as following :

(1) The contraction and expansion coefficients used in this study are different than the ranges suggested in the HEC-2 Water Surface Profile manual. A justification of using different values is needed in the text portion of the report accompanying the FEMA submittal.

(2) Cross sections 1150, 1200, 4400, 4500, 9731, and 9930, has cross-section extended messages. It is recommended that these cross-section extended messages be eliminated. If any of these messages cannot be eliminated completely, an explanation is needed to be included in the text portion of the report accompanying the FEMA submittal.

(3) As a part of the CLOMR submittal to FEMA, the final design plans for the structures within the study reach will be required. Therefore, the HEC-2 hydraulic modeling should reflect the final design of these structures at their respective locations.

Once the above-mentioned comments are addressed in the existing hydraulic model, you may go ahead and develop the Method 4 Floodway model. Should additional information be required, please do not hesitate to contact me at (602) 506-1501.

Sincerely,

Hasan Mushtaq, P.E.
Engineering Division

AZ-MC-16

RECEIVED JUN 9 1997

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JUN 5 1997

Dennis L Richards, P.E.
Simons, Li & Associates, Inc.
4600 S. Mill Avenue
Suite 200
Tempe, Arizona 85282

Subject : Review of the HEC-2 submittal for the Floodplain Delineation Study for Indian Bend Wash, From Thunderbird Road to 32nd Street (FCD 93-05).

Dear Mr. Richards :

A review of the HEC-2 modeling, submitted for the Floodplain Delineation Study for Indian Bend Wash, from Thunderbird Road to approximately 32nd Street, is completed. Please find the following comments on the above mentioned submittal. These review comments are required to be addressed prior to any further evaluation of the hydraulic model.

(1) X3 records are missing from cross sections 7696 and 8262.

(2) The SC records at cross sections 7696 and 8262 are missing some data.

(3) Cross sections 7987, 8600, 8690, 8850, 8851, 9000, 9731 and 9930 have more than 100 GR points. Please refer to Page VII-56 of the HEC-2 Water Surface Profiles, September 1990, US Army Corps of Engineers, manual for the limits on the number of GR points.

(4) For locations where channel improvements are made, the allowable maximum number of GR points should be less than 100, depending upon the number of additional GR points generated by the CHIMP routine.

(5) Channel improvements need to terminated at a cross section, with a BW value of 0.01. Please see Page VII-49 for reference.

(6) The submitted HEC-2 model does not cover the hydraulic modeling from approximately 40th Street to Thunderbird Road. Please include this stretch of the hydraulic modeling for the purposes of the Conditional Letter of Map Revision.

Should additional information be required, please do not hesitate to contact me at (602) 506-1501.

Sincerely,

Hasan Mushtaq, P.E.
Engineering Division

SIMONS, LI & ASSOCIATES, INC.
4600 South Mill Avenue, Suite 200
Tempe, Arizona 85282-6759
602/491-1393 Fax: 602/491-1396

MEMORANDUM

DATE: June 17, 1996

TO: Afshin Ahouraiyan
Flood Control District

FROM: Dennis L. Richards DL Richards

SUBJECT: INDIAN BEND WASH - CLOMR @ SR 51

Per your request for additional information regarding the CLOMR, I have asked Tim Morrison to expand on the information he previously furnished to you.

The HEC-2 model received was supplemented by SLA with additional cross sections upstream of Hearn Road to provide a tie with the FEMA mapped floodplain. The model revealed a break out in the right overbank (i.e., down 34th). Discussions with BRW and HDR indicated this has been a recognized problem by the consultants and ADOT.

The HEC-2 analysis for the proposed CLOMR for SR 51 (Squaw Peak Freeway) indicated that channel improvements should probably extend upstream of Hearn Road. This will lower the water surface elevation and prevent the breakout at Hearn Road.

If you have any questions, or need additional information please feel free to give me a call. I will be providing coordination for this project at least for the present time. If you need to get in touch with me, please ask my staff to page me.

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

DATE: 30 SEP 96

TEL #: (602) 491-1393
FAX #: (602) 491-1396

TO: David Schaab

FROM: Mike Ternak

FAX #: 230-9189

OF PAGES (includes this cover page): 2

PROJECT NO.: IBW/ SR-51 Channelization

SUBJECT: HEC-2 Model

The changes we made to the HEC-2 Model for the CLOMR are described on the enclosed sheet. Call if you have questions.

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1) Invert elevations at Thunderbird Road Culvert :

Downstream face of the culvert (Section 7569)

	BRW Design (ft.)	SLA Modified (ft.)
Channel invert	1395.74	1396.19
Culvert outlet	1394.08	1396.19

Upstream face of the culvert (Section 7696)

	BRW Design (ft.)	SLA Modified (ft.)
Channel invert	1396.12	1396.22
Culvert inlet	1394.46	1396.22

The culvert outlet is designed (BRW) at an elevation of 1394.08 ft., which is lower than the ground geometry (1395.74 ft.) downstream of the culvert face. This may cause a potential ponding problem at the downstream face of the culvert.

The modified file has culvert inlet and outlet elevations consistent with the channel improvement.

2) Channel depth at the upstream end of the channel.

The existing BRW design (HEC-2 data file) starts channelization at section 8690 with a channel depth of 10 ft.

The SLA modified file starts channelization at section 8850, as shown on the BRW design plans. The channel depth at this section is assumed to be 1 ft. Therefore, we have added a revised cross-section at 8850 in order to provide a more realistic transition.

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

506-1501

DATE: 5/24/96

TEL #: (602) 491-1393
FAX #: (602) 491-1396

TO: Afshin Ahourayan FROM: Tim Morrison

FAX #: 506-4601

OF PAGES (includes this cover page): 1

PROJECT NO.:

SUBJECT: Indian Bend Wash - CLOM @ SR 51

NOTE:

This will lower the W.S.E. and prevent the break-out

THIS FAX IS PURSUANT TO OUR TELEPHONE CONVERSATION THIS DATE.

AS YOU ARE AWARE THE BRW HEC-2 WAS SUPPLEMENTED BY SLA WITH ADDITIONAL CROSS SECTIONS UPSTREAM OF HEARN ROAD TO PROVIDE A TIE WITH THE FEMA MAPPED FLOODPLAIN.

THE HEC-2 ANALYSIS FOR THE PROPOSED CLOMR FOR SR-51 (SQUAW PEAK HIGHWAY) INDICATES THAT CHANNEL IMPROVEMENTS PROBABLY SHOULD EXTEND UPSTREAM OF HEARN ROAD. SOME MEASURE IS REQUIRED TO PREVENT THE BREAK-OUT OF FLOWS AT HEARN ROAD.

The model revealed a break out in the right overbank (ie, down 34th street). Discussions with BRW and HDR indicated this has been a recognised problem by the consultants and ADOT.

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

January 16, 1996

Afshin Ahouraiyan
2801 West Durango
Phoenix, Arizona 85009

RE: Indian Bend Wash CLOMR

Dear Afshin:

We have conducted an initial review of the information you provided this office, prepared by HDR and BRW. We have itemized our observations below for your review and comment. We believe many of the comments can be resolved once we meet with ADOT and the consultants (if not previously resolved in the 60% and subsequent submittal by BRW and HDR). We will coordinate with you on any meetings, as your presence will be most beneficial in resolution of these and other matters.

1) Dave Schaub (BRW) stated in his 12/27/95 letter that some modification of the HEC-1 model is still anticipated. Inclusion of the HEC-1 model provided, pending modification by BRW, may be premature.

2) The "Initial Drainage Report For SR 51" uses a design discharge based on the 50 year event. Is the data for the 100-year event available? Additionally, the section of the Squaw Peak under design by HDR is within the 100-year floodplain as depicted on the Flood Insurance Rate Map, Panel No. 04013C1660. Has the 50-year storm drain design been checked to determine its response during a 100-year event?

3) The HEC-2 provided by BRW (dated 12/27/95) reflects a previous configuration (for example the culvert under Thunderbird Road is represented in the HEC-2 model as 318 feet long, but is 435 feet long in the 60% BRW submittal). Direct inclusion of the BRW supplied HEC-2 into the SLA model does not appear possible.

4) Once the BRW hydrology is utilized for the CLOMR, inclusion of the same hydrology for the entire LOMR submittal may be appropriate.

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Tim Morrison will be contacting you within a few days to set up the initial meetings. If you have any questions or comments, please call him at 491-1393.

Sincerely,

SIMONS, LI & ASSCIATES, INC.

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

December 13, 1995

Mr. Afshin Ahouraiyan
Flood Control District of Maricopa County
2801 West Durango St.
Phoenix, AZ 85009

RE: CONTRACT FCD 93-05, FLOODPLAIN DELINEATION FOR INDIAN BEND WASH CHANGE ORDER NO. 1 - SCOPE OF WORK/COST PROPOSAL

Dear Afshin:

Enclosed please find a proposed Scope of Work/Cost Proposal for supplementary work items requested by the Flood Control District of Maricopa County (District). The work items outlined in the attached Scope of Work includes work which was not in the original Scope of Work. A cost proposal for conducting this additional work is included with this change order request.

Simons, Li & Associates, Inc. (SLA) will provide to the District professional engineering services in conjunction with the Conditional Letter of Map Revision (CLOMR) for that portion of Indian Bend Wash effected by the Squaw Peak Parkway. The CLOMR will be prepared and documented for submittal to the Federal Emergency Management Agency (FEMA) and formatted according to Arizona Department of Water Resources (ADWR) technical guidelines. The purpose of the CLOMR is to document the impact of the proposed transportation improvements and their associated drainage systems on the existing 100-year floodplain and floodway. Products to be rendered to the District include a completed CLOMR application and revised floodplain mapping.

If you have any questions or comments, please contact Tim Morrison at 491-1393.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

TDM/hlk

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FLOOD CONTROL DISTF T
OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTE OF TRANSMITTAL

DATE	JOB NO
08-16-95	
ATTENTION	
RE:	

TO Mr. Tim Morrison
Simons Li & Associates

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

RECEIVED AUG 1 8 1995

COPIES	DATE	NO.	DESCRIPTION
1			Set of Plans for improvements to IBW due to SR51.
1			HEC-2 model (diskette)

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS The above are forwarded to you for the start of the CLOMR Procedures for areas that will be affected to the improvement. The Q used in the HEC-2 run is in accordance to the Baker Engineering hydrology for the concept Drainage report, dated April 93 and is correct. If there are any questions please call me or Pedro Calza at 506-1501.

Afshin Ahouraiyan

COPY TO PAC.

SIGNED: A. Ahouraiyan

6010.000 R8.93

AZ-MC-16 MEETING 6-09-97

HIS DELIVERABLE BY SLA - CHANGES BY ~~SLA~~ FCD

SUBMIT FORMS AS LOMR - CHECKING WITH SCOTTSDALE AND CITY OF SCOTTSDALE

SQUAW PEAK — 40TH TO ACOMA — CLOMR

1. CHECK ON CULVERT INFORMATION FROM RAY ACUNA

OUTLINE TASKS FOR 2 PROJECTS

1.) IBW
2.) CLOMR

CULVERT AT SWEETWATER IS 6" HIGHER THAN SHOWN ACCORDING TO RAY ACUÑA

ATTENDEES: D.L. RICHARDS
LIANG XU
AFSHIN AHOURAIYAN
HASAN MUSHTAQ

SIMONS, LI & ASSOCIATES, INC.
4600 South Mill Avenue, Suite 200
Tempe, Arizona 85282-6759
602/491-1393 Fax: 602/491-1396

MEETING MINUTES

PROJECT: PAZ-MC-16

DATE: April 19, 1995 TIME: 9:30 a.m.

LOCATION: Flood Control District of Maricopa County Offices

SUBJECT: City of Scottsdale Storm Water Master Plan

ATTENDEES: Pedro Calza, FCD
Afshin Ahouraiyan, FCD
Bill Erickson, COS
Dennis Richards, SLA
Bob Eichinger, SLA

Items Discussed:

1. FCD received from ADOT 30% submittal of Squaw Peak Parkway Shea Boulevard to Thunderbird RAM-600-2-514.

2. City of Scottsdale waiting for base mapping from Michael Baker. Mapping may be available in June. City extended Boyle's contract to January, 1996. City stated Boyle may be able to complete Storm Water Master Plan from Doubletree Ranch Road to CAP in 90 days from receiving mapping. City will attempt to deliver mapping and hydrology to FCD in September.

3. Floodplain delineation study put on hold until City can deliver Master Plan hydrology to FCD in September. FCD directed SLA to submit letter of request for extending the project schedule to January, 1996.

4. Master Plan hydrology to be delivered by City to FCD in September will have been reviewed and approved by the City.

AZ-MC-66

Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

MEETING ATTENDANCE ROSTER

Project: FLOODPLAIN DELINEATION FOR INDIAN BEND WASH

Project No.: FCD 93-05

Date: APRIL 19 1995 Time: 9:30 AM

Location: FLOOD CONTROL DISTRICT OF MARICOPA COUNTY NEW RIVER ROOM

NAME	ORGANIZATION	TELEPHONE
BOB EICHINGER	SIMONS, LI + ASSOCIATES, INC.	491-1393
PEDRO CALZA	FCDMC	506-4697
Afshin Ahouraiyan	FCDMC	506-4519
DENNIS RICHARDS	SIMONS, LI & ASSOCIATES	491-1393
BILL ERICKSON	City of SCOTTSDALE	994-7652

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INDIAN BEND WASH FLOODPLAIN DELINEATION
CONTRACT NO. FCD 93-05

MEETING AGENDA

February 7, 1995

I. Introduction

II. Work Completed to Date

- Draft Data Collection Report, June 1994
- As-builts obtained for structure crossings
- Preliminary HEC-1 Model for Squaw Peak Area, Conversion of TR20 Model
- Field Reconnaissance of Study Reach

III. On-going Tasks

- Data Collection, Retention/Detention Basins - City of Phoenix
- Hydrology
  - SRPMIC Contributing Watershed
  - City of Tempe Contributing Watershed
  - Doubletree Ranch Study
- Floodplain Delineation
  - Field Reconnaissance Report and estimation of Manning's "n" values
  - Location and alignment of cross-sections

IV. Progress Report - Scottsdale Stormwater Master Plan

V. ERM Elevations/Descriptions

VI. Project Schedule

VII. Other

SIMONS, LI & ASSOCIATES, INC.
4600 South Mill Avenue, Suite 200
Tempe, Arizona 85282-6759
602/491-1393 Fax: 602/491-1396

MEETING MINUTES

PROJECT: Floodplain Delineation for Indian Bend Wash
FCD 93-05
SLA Project No. PAZ-MC-16

DATE: February 7, 1995 TIME: 9:00 am

LOCATION: Flood Control District of Maricopa County
2801 West Durango Street, Phoenix, AZ 85009

SUBJECT: Project Update and Coordination

ATTENDEES: Jim Bond, City of Tempe (COT)
Bill Erickson, City of Scottsdale (COS)
Pedro Calza, Flood Control District (FCD)
Afshin Ahouraiyan, FCD
Dave Meinhart, FCD
Dennis Richards, Simons, Li & Assoicates, Inc. (SLA)
Bob Eichinger, SLA
Tim Morrision, SLA

City of Scottsdale Mapping. City provided to SLA DTM of IBW. COS will check with Baker Engineers regarding elevation reference marks (ERM's). SLA obtained from COS survey elevation equation between NAVD 88/NGVD 29. Baker sent revised quarter section map to SLA after SLA notified Baker of mapping discrepancy of quarter section map south of McKellips. Baker to send revisions to FCD and COS. COS has preliminary runoff estimated up to Doubletree Ranch Road. COS is receiving one map at a time north of Doubletree Ranch Road. Anticipated delivery of mapping to COS up to Central Arizona Project will be in March.

Work Completed to Date. Draft data collection report submitted to FCD in June, 1994. SLA will update at final submittal. As-built plans have been obtained for all structure crossings by SLA. SLA submitted preliminary HEC-1 model for Squaw Peak subbasin. SLA has completed field reconnaissance of IBW for study of "n" values.

On-Going Tasks. SLA's review of PVSP study and field visits have found several detention basins in Phoenix. SLA will obtain as-builts for these basins. Hydrology for SRPMIC will be based on SLA's Outer Loop hydrology models. Work on hold until Boyle's study is available for Pima/Shea. City of Tempe contributing watershed is relatively minor and work will begin on this area during the week of February 13.

City of Tempe will have minimal involvement with floodplain delineation study. COT

requested copy of final products.

Doubletree Ranch Road Study. Afshin will discuss with Greg Rodzenko as to status of project. There will be consultant coordination between IBW and Doubletree study. Tatum Wash hydrology being conducted by FCD. Afshin to update SLA regarding status of Tatum Wash study. A draft of "n" value report should be provided to FCD at end of February. Cross-sections have been cut to Shea Boulevard. City of will provide "as-built" plans of baseball batting cage park at Camelback Road.

Scope remains to use City of Scottsdale hydrology for IBW study. SLA will use as much of outside hydrology models as possible and combine into one watershed model.

FCD requested a revised project schedule and fee schedule.

Boyle is scheduled to be done with hydrology for Storm Water Master Plan in mid-May. Boyle will model Scottsdale Ranch Lake with detention routine.

cc: Attendees

Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

January 26, 1995

Mr. Pedro Calza
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

RE: FLOODPLAIN DELINEATION FOR INDIAN BEND WASH
FCD 93-05

Dear Pedro:

We enclose two (2) copies of minutes of the meeting held at the District Offices on January 25, 1995, at 9:00 am, to discuss the above referenced project. The meeting focused on the conversion of the Squaw Peak Highway TR20 hydrology model of Indian Bend Wash to a HEC-1 model of the same subwatershed.

If you have any questions regarding the meeting or submitted materials, please call Bob Eichinger.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

DLR/RAE/kb

Enclosure

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MEETING MINUTES

Project: Floodplain Delineation for Indian Bend Wash

Project No.: FCD 93-05

Meeting Date: January 25, 1995 Time: 9:00 am

Meeting Place: * Flood Control District of Maricopa County

Attendees: Afshin Ahouraiyan, FCD
Bob Eichinger, Simons, Li & Associates, Inc.

****

Items Discussed:

1. SLA submitted a preliminary HEC-1 hydrology model developed from the existing conditions TR20 model of Indian Bend Wash from the Squaw Peak Highway Final Hydrology Report. Included in the submittal was a watershed map of IBW to Shea Boulevard. The map indicated subbasins, concentration points, and routing reach locations.

2. SLA and FCD discussed the hydrologic backup data obtained by SLA from Michael Baker and AN-West which was used to develop the TR20 Model.

3. SLA submitted subbasin parameters (basin area, curve number, time of concentration) and routing reach parameter (length, slope, section) spreadsheets used for input into the HEC-1 model.

4. FCD stated that a review of the submitted materials will be conducted and will take approximately two weeks.

5. FCD will contact City of Scottsdale to check if new City basin reports are available from the City's Storm Water Master Plan. FCD will also ask if mapping is available for Scottsdale between the Arizona Canal and the Central Arizona Project.

6. FCD will provide SLA topographic mapping of the watershed developed for the Doubletree Ranch Road improvements project. This mapping was recently completed.

August 29, 1994

Mr. Timothy Kelly, P.E.
Michael Baker Engineers
1313 E. Osborne, Suite 150
Phoenix, Arizona 85014

RE: SQUAW PEAK HIGHWAY
Contract No. 87-40

Dear Mr. Kelly:

Simons, Li & Associates, Inc. (SLA) extends our appreciation for allowing SLA to review hydrologic information and back-up data for the above referenced project. This data will assist SLA in conducting a Flood Insurance Study of Indian Bend Wash on behalf of the Flood Control District of Maricopa County.

We have enclosed a list of data items that SLA collected during our recent visit to your office.

Again, Thank-you for your courtesy.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Robert A. Eichinger, P.E.
Project Engineer

Enclosure

cc: Pedro Calza, FCD

RAE/rv

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List of Data Items Obtained from Michael Baker Engineers

(Office visit 8/29/94)

1. Indian Bend Wash 100-yr (existing) HEC-2 hardcopy 40th Street to Sweetwater (Michael Baker)

2. Squaw Peak Highway Section 4 Hydrology (Future Conditions)

   - Development of Muskigum routing co-efficients
   - Proposed Channel between Shea & Sweetwater
   - Proposed Conditions Reaches 17, 19, 99
   - Concept Drainage Improvements Cost Estimate
   - Precipitation Values
   - Existing/Proposed TR-20 hydrology models (hard copy)

3. Yost and Gardner Engineers. Master Drainage Study Indian Bend Wash. City of Phoenix April 1973.

4. A-N West Inc. Hydrologic information/calculations for Squaw Peak Highway.

5. Michael Baker Engineers. Hydrology Report Squaw Peak Extension (draft). Mountain View Road to Central Arizona Project. Draft (Alexandria, VA).

MINUTES OF MEETING

Project: FLOODPLAIN DELINEATION FOR INDIAN BEND WASH

Project No: FCD 93-05

Date: August 4, 1994 Time: 2:00 p.m.

Location: Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

ATTENDEES:

Pedro Calza, FCD
Rat Acuña, City of Phoenix
Dennis Richards, SLA
Bob Eichinger, SLA

ITEMS DISCUSSED:

1. Jim Phipps (FCD - Public Information Officer) suggests public meeting to present IBW FIS. Pedro suggests waiting until study has generated a minimal product for presentation. Ray will discuss merits of public meeting with Jim Phipps.

2. FCD, City of Phoenix, and SLA discussed whether a CLOMR may be appropriate to submit to FEMA based on concept designs for Squaw Peak Highway. Pedro stated FCD has never submitted CLOMR based on concept design, only on design plans. Pedro has contacted Baker (Virginia) to discuss feasibility of submitting CLOMR based on concept design. Ray wants to start CLOMR process up-front instead of at the end of the Squaw Peak Highway project. CLOMR application will reflect only that area of IBW and Squaw Peak Highway within City of Phoenix. Ray is encouraging ADOT that CLOMR needs to be processed by ADOT. City of Phoenix will obtain concept design of Squaw Peak from ADOT. FCD will continue discussions with FEMA (Baker, VA). SLA may develop CLOMR as part of IBW FIS/Squaw Peak Highway.

3. SLA submitted revised project schedule to FCD.

4. SLA mailed IBW FIS letters to Paradise Valley (Bill Meade) and City of Tempe (Lee Quaas). SLA will follow-up to arrange meetings to discuss project with these individuals. SLA to contact FCD when meetings arranged.

AC 11-16

Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

MEETING ATTENDANCE ROSTER

Project: FLOODPLAIN DELINEATION FBW

Project No.: FCD 93-05

Date: 8/4/94 Time: 2:00 PM

Location: FLOOD CONTROL DISTRICT

NAME	ORGANIZATION	ADDRESS	TELEPHONE	FAX NO.
PEDRO CALZA	FCD	2801 W DURANGO	506-1501	506-4601
Ray Acuña	City of Phoenix	200 W Washington	262-4026	
DENNIS RICHARDS	SIMONS, LI & ASSOC	4600 S. MILL AVE.	491-1393	491-1396
BOB EICHINGER	SIMONS, LI + ASSOC			

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sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

July 21, 1994

Mr. Pedro Calza
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

RE: **FLOODPLAIN DELINEATION FOR INDIAN BEND WASH**
FCD 93-05

Dear Pedro:

We have enclosed one (1) copy of minutes of the meeting held at the Flood Control District on July 19, 1994 at 10:00 a.m. to discuss the above referenced project.

If you have any questions or comments, please call.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Robert A. Eichinger

Robert A. Eichinger, P.E.
Project Engineer

Enclosure

RAE/rav

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4600 South Mill Avenue, Suite 200 • Tempe, AZ 85282 • Phone: (602) 491-1393 • Fax: (602) 491-1396
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MINUTES OF MEETING

Project: FLOODPLAIN DELINEATION FOR INDIAN BEND WASH

Project No: FCD 93-05

Date: July 21, 1994 Time: 10:00 a.m.

Location: Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

ATTENDEES:

See attached meeting sign-in sheet.

ITEMS DISCUSSED:

1. SLA summarized the areas of the IBW watershed that have existing hydrology studies/models. These areas include Squaw Peak Highway (Michael Baker, TR20); Pima-Shea and Hayden-Shea (Boyle, HEC-1); Tatum Boulevard (Kaminski-Hubbard, HEC-1); Pima Freeway/Outer Loop (Simons, Li & Associates, HEC-1); Paradise Valley-Scottsdale-Phoenix Drainage Study (Collar, Williams, White; SCS Method I); City of Scottsdale Storm Water Master Plan (Boyle, HEC-1 under development).

2. Areas without hydrologic models include IBW south of McKellips (Tempe), and portions of Paradise Valley, Scottsdale, and Phoenix west of Invergordon. SLA and FCD discussed these areas and agreed they need to have a hydrologic model developed according to FCD criteria.

3. SLA and FCD discussed hydrologic methods to be applied for the development of models for the identified areas without existing models. These methods are described in the Scope of Work.

4. SLA provided to the District a list of deliverables that the FCD is to furnish SLA under the Scope of Work. These are:

   a. Lotus spreadsheet and procedures for soils
   b. Soils data map (GIS files)
   c. Parameter estimation references
   d. Base maps - digital mapping

5. Requested items from FCD are:
   a. Land use map (GIS files)
   b. 100 year HEC-1 models City of Scottsdale Storm Water Master Plan
   c. Hydrologic schematics for City of Scottsdale models.

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 6/10/97 PROJECT NAME/NO.: IBW MC-16

RECORDED BY: Liang Xu OWNER/CLIENT: MCFCD

TALKED WITH: Afshin Ahouraiyan OF

NATURE OF CONVERSATION:

TELEPHONE: INCOMING [X] OUTGOING [ ]

MEETING: OFFICE [ ] SITE [ ]

ITEMS DISCUSSED: I talked with Afshin From FCD about the flow we will use in HEC-2 model. He suggested the following numbers based on HEC-1 model and consulting with Scottsdale city.

Location	Q (cfs)
32nd street	4,500
40th street	5,000
Cactus Road	7,000
Tatum Blvd	8,500
Shea Blvd — 56th street	10,500
60th street — Invergordon Road	11,500
Bernell channel	14,500
Scottsdale Road — Con. of Ari. Canal	15,000
Con. of Arizonal Canal — Salt River	19,000

Liang.

cc: Dennis

[X] INFORMATION [ ] ACTION

ADMIN\FORMS.SLA\RECORD.S-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 9 DEC 96 PROJECT NAME/NO.: IBW (MC-16)

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: AFSHIN OF FCDMC

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☒

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

1. BRW/BAKER Post Project Work Map for SR-51 HEC-1 Model. Afshin said that neither BRW or Baker have an updated workmap. They apparently used the pre-project workmap and did not update it to reflect the revised modeling. The only sub-basins that were divided further were sub basin 6 & 28.
AFSHINS DIRECTION WAS TO USE THE PRE-PROJECT WORK MAP!!

2. The FEMA literature search for effective IBW models has resulted in matches in zones X – AZ thru Paradise Valley Map only. The District will be acquiring the data for these areas. For areas upstream & downstream of Paradise Valley, Afshin wants us to submit CLOMR as if no effective model exists.

3. He received a call from City of Scottsdale. They are concerned over a number of areas adjacent to the wash that are cussently in the floodplain that "should not be". He is going to try & arrange a conference call to discuss these areas.

cc: Dennis
Liang, Kaan

☒ INFORMATION ☐ ACTION

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 10/17 - 10/22/96 PROJECT NAME/NO.: IBW/MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: FCDMC

TALKED WITH: See Below OF

NATURE OF CONVERSATION: Detention Basin Info

TELEPHONE: INCOMING ☐ OUTGOING ☒

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

Ray Acuña: Did not have any detention information. Referred me to COP Dev. Services Mike Cuzimano or 262-49 Parks & Rec. Bruce Swanson 262-4997

Mike Cuzimano w/ Dev Services: Never returned messages

* Bruce Swanson: Would need to Identify Parks interested in and they may have as-built information. He referred me to Paul Kino w/ Dev. Services 262-4997

Paul Kino: Did not have any information. May have been thrown-in. He referred me to Dave Burris (Former Flood Plain Administrator) 262-7038 or to Street Transportation Dept. 495-2066

* Dave Burris: Any Basins were designed as SCS Class A structures w/ 24" CMP outlets. Some backup may be @ ADWK. He referred me to Al Sanchez 256-3444

* Al Sanchez: Serrano Park has no detention. Referred me to Street

STREET TRANSPORTATION: Identified Detention Basins @

~~1) 62ND & Paradise Lane (S. of Bell between 56TH & 64TH)~~

3) Serrano Park (Sweetwater & 56TH)

cc: Liang

☐ INFORMATION ☐ ACTION

ADMIN\FORMS.SLA\RECORD.S-1

3.) Paradise Park (56TH ST & Paradise Lane)
4.) Crossed-Arrows Park (Acoma & 61ST ST)
5.) Jackrabbit Park (Paradise Ln between 58TH & 61ST)
6.) Sandpiper Park (66TH ST & Hearn Road)

Referred Me to David Evans & Assoc. (DEA)
Terri Mintz 956-4850
They have recently incorporated into HEC-1

Terri Mintz: They have recently incorporated 62ND ST & Paradise Lane (Jackrabbit Park?) into a HEC-1 model & Crossed-Arrows Park into HEC-1.
* Flows from the North & East of Jackrabbit Park are being diverted into the Park
Everything is being routed to Sereno Park.

She said she has for the 2 parks:
-HEC-1 w/ Elev-Stage-Volume
& Elev-Volume-Discharge

Will have ready to pick-up on Thursday
Call her then to confirm.
Their office is on 32ND St & Camelback

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 10/8/96 PROJECT NAME/NO.: IBW / MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: AFSHIN OF FCDMC

NATURE OF CONVERSATION: Mapping of Floodplain between Cactus & Tatum

TELEPHONE: INCOMING ☒ OUTGOING ☐

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED: AFSHIN spoke to Val-Tec. They are preparing to submit a LOMR for IBW between Cactus & Tatum. They have new topography that has just been surveyed & are planning on using discharges through this reach that will be interpolated from the FIS's for this area.

AFSHIN has set up a meeting at his office on Wednesday Oct 16 @ 9:00 am for SLA to meet w/ him & Val-Tec to ensure what they are doing is consistent w/ what SLA will be doing.

AFSHIN is concerned that the discharges Val-Tec intends on using are not the same as SLA will use through the same reach.

For the CLOMR, SLA has used the BRW Discharges for SR-51 which were developed from Baker's original work on SR-51 SLA has also converted the Baker TR-20 Model to a HEC-1 Model

cc: Dennis ☒ INFORMATION ☐ ACTION

ADMIN\FORMS.SLA\RECORD.S-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 4 OCT 96 PROJECT NAME/NO.: IBW / MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: AFSHIN OF FC District

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☒ OUTGOING ☐

MEETING: OFFICE ☐ SITE ☐

I. ITEMS DISCUSSED: AFSHIN informed me that the District is going to pay the fee & request that the FEMA Technical Library in Alexandria perform a search to look for the effective IBW models that are missing. I am not optomistic they will find anything more than we already have, which is partial hard copies of multiple & floodway runs.

Without this information we cannot duplicate or tie into the effective FIS which is a standard requirement for a CLOMR submittal & part of a complete submittal package. This potentially impacts all 3 CLOMRs for 1) SR-51, 2) Scottsdale Road Bridge & 3) IBW Delineation.

II. There are also some potential problems we have identified in the BRW HEC-2 model for IBW channelization for SR-51

III. I would like to meet with you to discuss how we could best handle these issues in order to finalize & mail the SR-51 CLOMR

cc: Dennis ☐ INFORMATION ☒ ACTION III.

ADMIN\FORMS.SLA\RECORD.S-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 2 OCT 96 PROJECT NAME/NO.: MC-16 / SR51 CLOMR

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: Dave Schaub OF BRW

NATURE OF CONVERSATION: HEC-2 Model(s)

TELEPHONE: INCOMING ☒ OUTGOING ☐

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

1. He is going to mail us a copy of the Sweetwater Channel HEC-2 model SWTHEC2.DAT. He thinks we may already have a copy.

2. T-Bird Culverts:
   - There are 2 comment cards/sheets associated with this that explains what BRW did.
   - There are 2 Arched Barrels that come into wash
   - 1 of them is at the channel bottom
   - 1 of them is 3' Deeper
   - BRW Averaged the 2
   - To eliminate ponding with the lower one, there is a pipe that drains the low area back into the wash.
   - He feels that the way they modelled it is basically correct.
   - Make sure we read comment cards
   - The same thing happens at the SR-51 crossing

cc: Kaan ☒ INFORMATION ☐ ACTION

ADMIN\FORMS.SLA\RECORD.S-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 30 SEP 96 PROJECT NAME/NO.: SR 51 CLOMR

RECORDED BY: Mike Ternak OWNER/CLIENT: FCD of MC

TALKED WITH: Ray Acuña OF Phoenix

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☑

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

I asked Ray if they had the effective model for the IBW (32ND st & 40TH st).

He said they did not & if anyone has it, it would be the Flood Control District.

CC:

☐ INFORMATION ☐ ACTION

ADNMFORMS SLAIRECORD.S.L

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 30 SEP 96 PROJECT NAME/NO.: SRSI CLOMR

RECORDED BY: Mike Ternak OWNER/CLIENT: FCD of MC

TALKED WITH: John Svechosky OF Michael Baker

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☑

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED: EFFECTIVE MODEL FOR IBW FIS (32ND ST. & 40TH S

1. John said they only have hard copies of the input for the floodway and multiple run from a model dated 10/21/82. The copy is in very poor quality, not good enough to copy. We would need to borrow & return to them if we want to use and recode the information.

2. John thinks this information is part of the current effective model for the FIRM Dated Apr 88.

3. I told him that most current FIRM is dated September, 15, 1996 & must be based on some more recent modelling. He was going to check one more time to see if he could find any more recent modelling.

CC: ☐ INFORMATION ☐ ACTION

ADMIN\FORMS.SLA\RECORD.S-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 19 SEP 96 PROJECT NAME/NO.: MC-16

RECORDED BY: Mike Tennah OWNER/CLIENT: FCD of MC

TALKED WITH: AFSHIN H. OF " "

NATURE OF CONVERSATION: CLOMR for SR-51 & HEC-1 Model

TELEPHONE: INCOMING ☐ OUTGOING ☒

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

1. I let AFSHIN know that the floodplain mapping for the revised FIRM/CLOMR would be ready in the morning. He said he would send a runner over or come pick it up himself. I need to call him in morning when ready.

2. I told him we did not have any current soils or land use mapping. He was going to get us the most current soils/land use, covering the entire watershed, on an auto-cad format.

3. I told him we would be submitting the HEC-1 Model of watershed to Scottsdale Road w/ a "Draft" working copy of the hydrologic base map.

4. I asked about detention basins in the area between Baker's work & COS. He said yes there is some large detention basins & he would like those incorporated into the model before we submit.

CC: ☒ INFORMATION ☐ ACTION

ADMIN/FORMS SLAIRFORD 5-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 16 ~~AUG~~ SEP 96 PROJECT NAME/NO.: IBW / MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: FCD

TALKED WITH: AFSHIN H. OF FCD

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☒ OUTGOING ☐

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

1. AFSHIN REQUESTED STATUS OF SR-51 CLOMR MAPPING FOR THEIR BRIEFING. I INFORMED HIM WE WOULD BE COMPLETING OUR ANALYSIS ON WEDNESDAY, 18 SEP 96 & WOULD GET HIM THE RESULTS ON WED OR THURSDAY. THEIR BRIEFING IS ON MONDAY 23 SEP (Dick Persault).

2. I asked status of Scottsdale Hydrology, when we might receive approved model. AFSHIN said he has many comments that need to be addressed and it might be some time.

3. He requested a copy of our comprehensive HEC-1 model upstream of Scottsdale Road. He would like to review it and provide us comments in advance of our submitting the overall hydrology report. Included in this material he would like to review is Base mapping, soil maps, etc.

cc:

☒ INFORMATION ☐ ACTION

ADMIN/FORMS SLA/RECORD 5-1

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 13 SEP 96 PROJECT NAME/NO.: IBW MC-16

RECORDED BY: Mike Tarnak OWNER/CLIENT: MC

TALKED WITH: Pedro Calza / AFSHIN OF MC FC DISTRICT

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☒ OUTGOING ☐

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

Pedro wanted to know if we would be able to complete the SR-51 CLOMR mapping with what we have for mapping.

I informed him we had existing ground topography from ADOT on a 3D file and a separate HEC-2 file with the channel design X-sections. We would need to combine these 2 files in order to complete mapping using BOS HEC-2 CAD.

He asked if we could do the mapping by hand. I told him we could compute water surface elevations by hand, but mapping requires the complete topography.

He wanted us to do it as cheaply as possible since they have no money for any change orders.

I told him we would know this afternoon if the HEC-2 X-SECTIONS COULD BE INCORPORATED. I told him I would call him before 4:00 pm. & let him know if we can complete.

CC: ☒ INFORMATION ☐ ACTION

ADMIN/FORMS SL/RECORD S.L

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 12 SEP 96 PROJECT NAME/NO.: IBW Del. MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: AFSHIN H. OF MC

NATURE OF CONVERSATION: SR-51 CLOMR

TELEPHONE: INCOMING ☐ OUTGOING ☑

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

AFSHIN WAS GOING TO CHECK ON STATUS OF LETTER FROM PHX (Ray Acuña) to not lengthen channel u/s of Hearn Rd.

AFSHIN WAS GOING TO CONTACT BRW TO SEE IF THEY HAVE TOPOGRAPHY WE NEED w/ CHANNEL DESIGN SO SLA CAN COMPLETE MAPPING OF BREAKOUT @ HEARN ROAD.

→ Based on a conference call at 4:00pm, BRW's channel DESIGN WAS PERFORMED BY HAND (ie Drawn X-SECTION) WHICH WERE INPUT DIRECTLY INTO HEC-2 MODEL

∴ SLA HAS NO 3D FILE w/ BOTH TOPOGRAPHY & CHANNEL DESIGN.

cc: ☐ INFORMATION ☐ ACTION

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

Communication Contact Report

DATE: Aug. 27, 1996

PROJECT: AZ-MC-16 PROJECT NO.:

RECORDED BY: DENNIS BY PHONE: ✓ IN PERSON:

TALKED WITH: AFSHIN, FCD TELEPHONE NO.: 506-1501

SUBJECT: THE CITY OF PHOENIX WOULD LIKE TO PROCEED WITH THE CLOMR OF IBW EVEN THOUGH THERE ARE SOME HOMES STILL IN THE FLOODPLAIN. THEY ARE SENDING A LETTER TO THE DISTRICT.

AFSHIN WOULD LIKE TO KNOW IF WE HAVE A MAP OF THE NEW FLOODPLAIN OR IF WE COULD GENERATE ONE IN THE NEAR FUTURE.

ACTION REQUIRED: CONTINUE WORK ON CLOMR. FURNISH FLOODPLAIN MAP TO DISTRICT.

ACTION TAKEN:

ORIGINAL TO: FILE CC: MIKE

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 10 AUG 96 PROJECT NAME/NO.: MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: FCD

TALKED WITH: AFSHIN OF FCD

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☒

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED: I provided AFSHIN with a summary of the problems we are having modeling the upstream end of the IBW-SR51 channel.

1) Current model is based on channel extending u/s of Hearn Road. This results in all IBW discharges to enter channel at the u/s end.
2) By not extending the channel, there is a breakout on the west side of channel down 34TH ST.
3) SLA has no topography on the west side of the channel required to determine exactly the extent of the breakout & its overflow area.
4) SLA is trying to obtain additional DTM data from ADOT to cover this area.

cc:

☒ INFORMATION ☐ ACTION

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 29 AUG 96 PROJECT NAME/NO.: AZ-MC-16

RECORDED BY: Mike Ternak OWNER/CLIENT: MC

TALKED WITH: AFSHIN, FCD OF FCDMC

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☑

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

I informed Afshin that our "draft" CLOMR mapping does not include the upstream transition between start of channel and current Floodplain.

He wanted to wait until we have completed before we send him a copy of revised mapping.

When we send copy of map, he would like a copy of HEC-2 models to review also.

cc: Dennis

☑ INFORMATION ☐ ACTION

ADMIN\FORMS.SLA\RECORD.S-1

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

Communication Contact Report

DATE: Aug. 27, 1996

PROJECT: AZ-MC-16 PROJECT NO.: _____

RECORDED BY: DENNIS BY PHONE: ✓ IN PERSON: ___

TALKED WITH: AFSHIN, FCD TELEPHONE NO.: 506-1501

SUBJECT: THE CITY OF PHOENIX WOULD LIKE TO PROCEED WITH THE CLOMR OF IBW EVEN THOUGH THERE ARE SOME HOMES STILL IN THE FLOODPLAIN. THEY ARE SENDING A LETTER TO THE DISTRICT.

AFSHIN WOULD LIKE TO KNOW IF WE HAVE A MAP OF THE NEW FLOODPLAIN OR IF WE COULD GENERATE ONE IN THE NEAR FUTURE.

ACTION REQUIRED: CONTINUE WORK ON CLOMR. FURNISH FLOODPLAIN MAP TO DISTRICT.

ACTION TAKEN: _____

ORIGINAL TO: FILE CC: MIKE

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 5/15/96 PROJECT NAME/NO.: PAE MC 16

RECORDED BY: Tim Morrison OWNER/CLIENT: FCD of MC

TALKED WITH: Pedro Calza OF FCD of MC

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☐

MEETING: OFFICE ☒ SITE ☐

ITEMS DISCUSSED:

IBW CLOMR above Hearn Road:

I presented information regarding the possible break-out of IBW upstream of Hearn Rd.

Pedro directed me to check and see if extending the proposed channel upstream of Hearn Rd. would prevent the break-out.

Afshin Ahouraiyan was present @ the meeting.

Afshin was going to check with Ray Acuna C.O.P. regarding the CLOMR @ this location.

TM

cc: Dennis Richards ☒ INFORMATION ☐ ACTION

RECORD OF CONVERSATION

Simons, Li & Associates, Inc.

DATE: 4/30/96 PROJECT NAME/NO.: PAZ-MC16

RECORDED BY: Tim Morrison OWNER/CLIENT: FCDMC/ADOT/COP

TALKED WITH: David Schaub OF BRW

NATURE OF CONVERSATION:

TELEPHONE: INCOMING ☐ OUTGOING ☒

MEETING: OFFICE ☐ SITE ☐

ITEMS DISCUSSED:

Continued discussion of split flow @ Hearn Rd.

BRW is looking @ split flow down 34th St., analysis not complete until next week due to design schedule.

Dave 100-year will still be in the road

Note; CLOMR May leave most properties East of IBW & North of Thunderbird Rd in the 100-year floodplain

TM

cc: Dennis Richards

☒ INFORMATION ☐ ACTION

SIMONS, LI & Associates, Inc.

RECORD OF CONVERSATION

Date: 1-25-96 Project No. PAZMC16

Recorded By: TIM MORRISON Client: FCDMC

Talked With: AFSHIN AHOURAIYAN Of FLOOD CONTROL

Telephone: Incoming __ Outgoing __ Meeting: Office __ Site XX FCDMC Office

Items Discussed :

Met with Afshin of FCDMC and Steve Miller of HDR regarding the upper reaches of Indian Bend Wash and specifically the CLOMR for the Squaw Peak near Thunderbird Road and IBW.

The following was discussed:

1) HDR has revised Baker hydrology (Steve had performed the original with AN West back in the 80's). The portion under study by HDR is north and east of the freeway not affected by the IBW. AFSHIN indicated that the BRW hydrology should be used. It was agreed to submit the CLOMR based on new HEC-2 for IBW noting hydraulic isolation from IBW of the area east IBW in the HDR design section. Should FEMA request a 100-year analysis for the stormdrains in the HDR design section, HDR would perform the analysis at that time.

2) BRW has made major revisions to the box culvert and channel alignment within the last month. The exact configuration of the area where HDR and BRW interface is still in a state of flux.

3) HDR has performed no HEC-2 for IBW, as this was in the scope for BRW.

4) As of this date no formal transmittal of hydrology for Scottsdale has been received by the Flood Control District.

Information XX Action __

xc: file, DLR

APPENDIX C

SURVEY FIELD NOTES

Arizona Department of Transportation

206 South Seventeenth Avenue • Phoenix, Arizona 85007-3213

Jane Dee Hull
Governor

Larry S. Bonine
Director

INTERMODAL TRANSPORTATION DIVISION

GEODESY SERVICE
1739 WEST JACKSON, MAIL DROP 203P
PHOENIX, ARIZONA 85007
BOB PHILLIPS (602) 255-8566
* RON HENDERSON (602) 255-8567
~~DON BLOODWORTH (602) 256-8947~~ J.D. Hemingway
CONNIE BROWN (602) 255-8563 John 255-8566
FAX (602) 407-3291

FACSIMILE TRANSMISSION

DATE: 12/5/97

TO: Bart Bergendahl

FROM: John

FAX: ( ) 491-1393

TOTAL Number of Pages Sending (Including this page): 4

ADDITIONAL COMMENTS:

Will send any additional Discription Cards that you might need on mon. Please come to our office if you need any Color Photo's of that area.

1929 DATUM (ADOT)
vs '88 (COS)

C:\L3342\NGT3342.PTS
Last Modified: 6-15-94 at 2:41:30p

06/15/94
File Size: 4,792 bytes

7030	1447.480	BC AT 32ND ST & MTN VIEW RD
NBMP7	1359.394	ALUM CAP AT SR 51 & NORTHERN NB LANES AT MP7
TBM400	1340.381	AC IN HND HLE 500FT WEST SR 51 ON NORTHERN MEDC/L
7032	1424.549	BC AT 32ND ST & SHEA BLVD
8050	1420.949	BC AT 32ND ST & DESERT COVE
3342-J	1415.888	CITY OF PHX BC AT 33RD ST & DESERT COVE
8037	1411.881	BC AT 34TH ST & DESERT COVE
8055	1408.849	BC AT 34TH ST & CHOLLA ST
3342-N	1405.441	CITY OF PHX BC AT 34TH ST & SUNNYSIDE DR
7066	1401.438	BC AT 34TH ST & CACTUS RD
3342-7	1402.095	BC AT 34TH ST & WETHERSFIELD RD N OF CACTUS RD
3342-S	1400.566	BC AT 34TH ST & COLUMBINE DR
3342-8	1399.783	8073 BC AT 34TH ST & SWEETWATER AVE
3342-AD	1399.964	PK NAIL AT 34TH ST & EMILE ZOLA AVE
3342-11	1405.473	8089 BC AT 34TH ST & THUNDERBIRD RD
* → 7086	1409.014	BC IN HH AT 32ND ST & THUNDERBIRD RD. ✓
8090	1415.985	BC IN HND HLE AT 32ND ST & ACOMA ✓
3342-AQ	1425.118	5/8 INCH REBAR ON 32ND ST N OF SUNNYSIDE 125FT ES
7134	1428.029	BC IN HND HLE AT 32ND ST & GREENWAY
7135	1440.682	BC IN HND HLE AT 32ND ST & PARADISE
7136	1454.079	BC IN HND HLE AT 32ND ST & BELL RD
7172	1464.973	BC IN HND HLE AT 32ND ST & GROVERS
1750015	1524.508	BC AT CAP CANAL
2268009	1521.319	BC AT 40TH ST & UTOPIA
1000	1485.532	BC AT 32ND ST & ROSEMONTE
1750016	1510.832	BC AT 32ND ST & BEARDSLEY
1750017	1496.353	BC AT 32ND ST & UTOPIA
5156	1493.983	BC AT 35TH PLACE & ROSEMONTE
5154	1503.489	BC AT 38TH ST & ROSEMONTE
1750018	1481.994	BC AT 32ND ST & UNION HILLS
3342-1	1437.956	PK NAIL N33RD ST 600FT N OF MTN VIEW
3342-B	1441.605	PK NAIL TURQUIOSE AV 700FT E OF 33RD ST
7034	1420.167	BC IN HH 36TH ST & SHEA BLVD
3342-A	1440.341	PK NAIL C/L ONYX AV 40FT W 32ND ST
3342-C	1429.239	COP 3" BC C/L 31ST ST & COCHISE RD
3342-2	1426.209	COP 3" BC 31ST ST & SHEA BLVD
3342-F	1426.470	PK NAIL PRK LOT 600FT W OF 32ND 600FT N OF SHEA
3342-G	1422.006	PK NAIL PRK LOT 100FT E OF 32ND 300FT N OF SHEA
3342-3	1420.857	5/8" REBAR 900FT E OF 32ND 200FT N SHEA
3342-H	1422.764	PK NAIL SW CORNER SHEA & 35TH ST
3342-E	[illegible]	[illegible]

COS Control Point #205 @ 32nd & T-Bird – elev. 1411.93'
1409.01
Δ = 2.92'

3342-C	1429.239	COP 3" BC C/L 31ST ST & COCHISE RD
3342-2	1426.209	COP 3" BC 31ST ST & SHEA BLVD
3342-F	1426.470	PK NAIL PRK LOT 600FT W OF 32ND 600FT N OF SHEA
3342-G	1422.006	PK NAIL PRK LOT 100FT E OF 32ND 300FT N OF SHEA
3342-3	1420.857	5/8" REBAR 900FT E OF 32ND 200FT N SHEA
3342-H	1422.764	PK NAIL SW CORNER SHEA & 35TH ST
3342-E	1425.626	COP 3" BC C/L COCHISE RD 600FT W 36TH ST
3342-K	1413.586	PK NAIL MERCER LN 75FT E 36TH ST
3342-5	1410.590	MCED 4" BC C/L 33RD PL 150FT S CHOLLA
3342-L	1413.260	PK NAIL CHOLLA 0.08MI E 32ND ST
3342-AY	1407.661	PK NAIL S SIDE CACTUS 300FT E OF 32ND
3342-6	1411.061	PK NAIL C/L CACTUS 200FT W 32ND ST
LOOK	1389.263	ADOT 3" AC SE COR BRIDGE IND BND WASH & CACTUS
3342-X	1385.088	PK NAIL IN ASPH PVMT 42ND ST N OF CACTUS
3342-10	1377.413	5/8" REBAR IN WASH 200FT NW OF BRIDGE ON CACTUS
3342-W	1386.137	5/8" REBAR INDIAN BEND WASH 600FT W OF 40TH ST
3342-9	1389.681	5/8" REBAR 1000FT E OF 36TH ST 800FT S SWTWTR
3342-AA	1394.411	COP 3" BC IN HH 36TH ST & SWEETWATER
3342-Z	1397.108	COP 3" BC FLUSH 35TH ST & SWEETWATER
3342-AE	1399.378	COP 3" BC FLUSH 35TH ST & WILLOW
3342-AC	1398.560	5/8" REBAR FLUSH 800FT NNW 3342-8
3342-AZ	1398.266	PK NAIL C/L CACTUS 1800FT E OF 32ND ST
3342-18	1393.665	COP 3" BC IN HH C/L CACTUS & 36TH ST
3342-Q	1396.089	PK NAIL C/L 36TH ST 700FT S CACTUS
3342-T	1393.377	COP 3" BC FLUSH C/L 36TH ST 700FT N CACTUS
7122	1430.148	COP BC IN HH 0.65'BELOW GRNWY & 36TH ST
VIEW	1448.715	ADOT AC IN CONC WLK AT SE COR BRIDGE
3342-12	1416.866	COP BC FLUSH ACOMA & N 32ND PL
3342-AM	1417.816	PK NAIL IN C/L ACOMA 100FT E 33RD PL
3342-13	1415.823	COP BC FLUSH C/L ACOMA & N 34TH PL
3342-AT	1428.380	PK NAIL SW COR GREENWAY & 33RD PL
3342-AV	1433.372	PK NAIL C/L WALTANN 200FT E OF 34TH ST
3342-17	1434.920	PK NAIL C/L WALTANN 200FT W OF 36TH ST
3342-AU	1430.167	5/8" REBAR C/L GREENWAY 700FT W OF 36TH ST
3342-16	1433.389	COP BC GREENWAY & 38TH ST
3342-AR	1429.623	PK NAIL IN N 38TH ST & GREENWAY
3342-AX	1436.340	PK NAIL IN WALTANN AT 38TH ST

ALL VERT REAL PNA
SITE TO RIVER
H 263 9640
CHAD HUBER

ARIZONA DEPARTMENT OF TRANSPORTATION

PHOTOGRAMMETRY AND MAPPING DIVISION

TRIANGULATION STATION DESCRIPTION ~~OR RECOVERY~~ NOTE

P&M JOB # 3342

NAME OF STATION 3342-5 (0025)

COUNTY MARICOPA

ESTABLISHED ~~OR RECOVERED~~ BY G.R EDWARDS

DATE 06-08-94

DESCRIBED BY D. BENSON

CONDITION GOOD

DETAILED STATEMENT

a. General Location 33 PL & CHOLLA N.E. PHOENIX

b. To Reach FROM 32ST & SHEA BLVD. GO NORTH 1/2 MI. TO CHOLLA. TURN EAST, (RT.) PROCEED 0.19 MI TO 33 PL (A CUL D'SAC) TURN SOUTH (RT.) POINT IS B.C. AT CENTER OF CUL D'SAC.

c. Station Mark 3½" B.C. FLUSH MARICOPA CO. ENGINEERING DEPT.

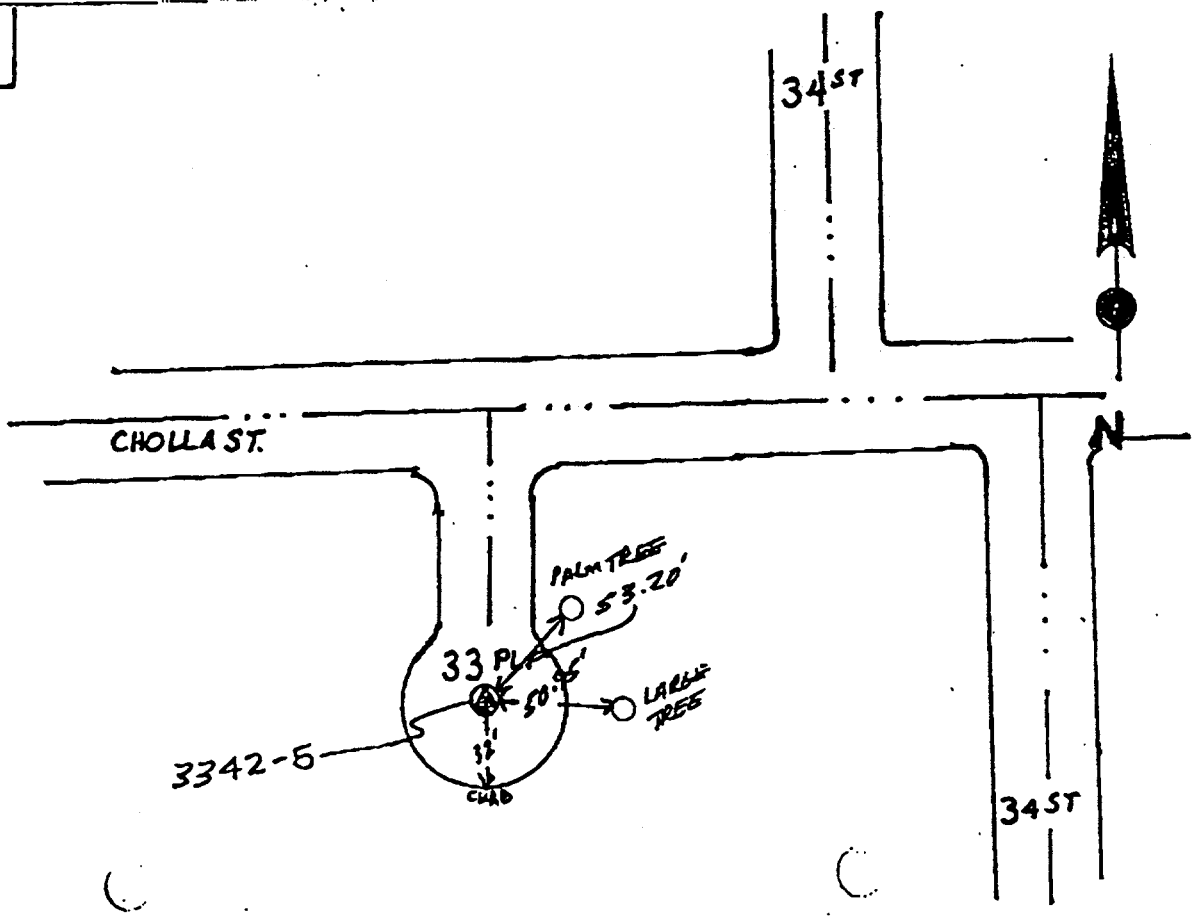
d. Reference Marks 32' N. OF BACK OF CURB
50.95' W.N.W. OF LARGE TREE
53.20' S.WEST OF PALM TREE (SOUTHERN MOST)

e. Azimuth Mark NONE

(Continue on back of page if necessary)

66-4301 3/78

3342-5



APPENDIX E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

APPENDIX E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

HEC-2 MODEL

EXISTING CONDITIONS

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AC
*   4190DOWNSTREAM FACE OF 36TH STREET CULVERT
*   4256UPSTREAM FACE OF 36TH STREET CULVERT
*   4574DOWNSTREAM FACE OF SWEETWATER AVENUE
*   6200INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
*   7569DOWNSTREAM FACE OF THUNDERBIRD ROAD
*   7569START SLA MODIFICATION BY USING THE MOST RECENT TOPO
*   7696UPSTREAM FACE OF THUNDERBIRD ROAD
*   8850CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND
T1  INDIAN BEND WASH - EXISTING CONTIONS IBW-EX.DAT(100-YEAR HYDRAULICS)
J1            2                                          6000  1383.6
J2   -1             -1                                     -6
J3   38      43       1      26       8       4      42      68
NC  0.04    0.04   0.035     0.1     0.3
* BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
* MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
* UPSTREAM OF 40TH STREET
* A LOW FLOW FJORD
X1  1140      11    1750    2250
GR1384.3    1750  1382.9 1775.43  1381.4 1839.04 1379.98  1936.6  1380.7 1983.43
GR1378.8    2000 1380.28 2014.39 1380.54 2051.73 1383.74  2185.7 1387.28 2219.72
GR1388.9    2250
X1  1300      16    1750    2250     100     100     100
GR1387.8    1750 1388.45 1770.68 1385.55  1786.5 1384.74 1799.46 1383.07 1856.74
GR1381.8 1887.29 1380.44 1903.17  1381.2  1973.2 1381.14 2016.92 1380.34 2060.34
GR1381.8 2088.74 1382.49 2118.63 1384.07 2185.07 1385.39 2206.99 1388.56 2228.78
GR1388.7    2250
X1  1500      17    1750    2250     200     200     200
GR1389.2    1750  1389.4 1773.12 1387.72 1799.56 1386.16 1850.89 1383.85 1872.42
GR1382.0 1895.26  1383.6    1925 1382.32  1962.4  1383.9    2000 1382.72 2069.69
GR1382.9 2096.32  1384.4 2109.45 1383.25 2126.25 1384.39 2135.22 1387.56 2198.01
GR1389.5 2220.96  1389.4    2250
X1  1800      13    1750    2250     300     300     300
GR1389.6    1750 1389.16 1762.53  1389.6 1792.73 1387.38 1832.64    1386 1903.39
GR1385.9    1955 1385.45 1990.27    1386 2009.13 1385.68 2116.55 1386.53 2127.73
GR1387.4 2171.71 1389.33  2212.5  1390.8    2250
X1  2100      13    1750    2250     300     300     300
GR1391.5    1750 1391.48 1787.95  1388.7 1828.31 1387.07 1888.31 1387.06  1966.1
GR1386.5 1986.12 1386.26 2030.61  1386.9 2049.35 1387.45 2113.79 1388.14 2154.02
GR1389.3 2188.89 1392.22 2216.69  1391.9    2250
X1  2400      13    1750    2250     300     300     300
GR1392.0    1750 1391.14 1798.58  1390.2 1807.62 1388.41 1859.25 1387.42 1922.94
GR1387.5 1976.71 1387.13 1998.34  1387.2  2086.8 1387.89 2102.94 1388.52 2143.27
GR1390.3 2192.62  1391.6 2201.89  1392.5    2250
X1  2700      14    1750    2250     300     300     300
GR1392.7    1750 1392.94 1793.99 1391.03 1806.34  1388.3 1898.05 1386.87 1986.56
GR1387.6 2023.99 1387.24 2082.12 1387.77 2091.94  1387.6 2112.76 1387.97 2159.09
GR1391.0 2185.33 1393.41 2201.07 1392.31 2208.72  1393.3    2250
X1  2900      15    1750    2250     200     200     200
GR1393.3    1750 1392.89 1801.03 1389.81 1819.78 1387.87  1863.1  1387.2 1938.92
GR1387.6 1970.25 1386.89 1981.15  1387.3 2045.98 1387.67 2100.77  1387.8 2139.68
GR1389.6 2173.15 1393.81 2198.44 1393.03 2208.91 1393.44 2225.17  1393.6    2250
X1  3000      18    1750    2250     100     100     100
GR1394.1    1750 1393.92 1796.15  1389.4 1823.52  1388.5  1839.9 1387.88 1910.54
GR1387.1 1941.45  1387.9  1970.6  1387.1  1983.4 1387.85 2016.18 1387.16 2056.63
GR1387.7 2104.74 1388.31 2115.79  1387.9 2130.95 1388.38 2161.63 1389.74 2175.57
GR1393.9 2197.15 1393.59 2202.58  1393.5    2250
X1  3300      15    1750    2250     300     300     300
GR1394.9    1750 1395.09 1774.57 1394.19 1781.81 1392.69 1806.74  1389.4 1830.93
GR1388.9 1851.32 1388.79 1913.21 1388.27 1983.55  1388.7 2016.49  1387.9 2084.39
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GR1389.1 2101.96 1388.25 2130.01 1389.81 2169.06 1394.19 2195.37  1394.3    2250
X1  3600      16    1750    2250     304     298     300
GR1394.2    1750  1395.4  1773.9 1394.67 1796.99 1391.76 1823.58 1390.14 1846.54
GR1[illegible].2  1923.3 1388.98 2023.94 1389.35 2058.77  1389.1 2074.13 1388.47 2095.39
G[illegible].8 2120.82 1389.44 2150.36 1394.64 2189.78 1396.52 2197.03 1394.86 2210.31
GR1395.2    2250
X1  3900      13    1750    2250     305     295     300
GR1394.0    1750 1394.87 1797.84  1390.7 1836.32 1390.05 1862.53 1390.37 1884.86
GR1389.8 1971.99 1390.19    2000  1389.3 2033.15 1390.12 2044.86 1390.53 2102.09
GR1391.0 2152.88 1395.62 2202.99  1395.6    2250
X1  4000      14    1730    2230      95     105     100
GR1395.8    1730 1395.91 1747.03 1395.12 1783.34  1390.4 1826.66 1389.99  1863.1
GR1390.0 1952.71 1389.94    1980 1389.26 1992.49  1390.7 2021.85  1391.5 2123.11
GR1392.7 2160.23 1395.97 2181.02 1394.23 2210.34  1394.2    2230
X1  4100      13    1750    2250     102      98     100
GR1395.6    1750 1395.29 1760.75  1395.3 1803.96 1391.35 1837.06 1390.84 1872.95
GR1391.6 1951.84 1389.66 1967.24  1389.5 1999.58 1389.75 2031.06 1391.73  2045.3
GR1392.0  2102.3 1393.97 2188.47  1394.5    2250
NC                          0.3     0.5
*
* DOWNSTREAM FACE OF 36TH STREET CULVERT
X1  4190      41 1962.97 2016.12      92      88      90
X3    10                    1962 1391.39    2038  1391.5
GR1395.5    1750 1395.43 1765.79 1395.51 1772.58  1395.4 1788.36 1395.41 1794.56
GR1395.9 1796.56 1395.43 1801.76 1394.25 1810.31 1393.48 1815.32 1392.37 1826.56
GR1391.2 1838.79 1391.41 1846.56 1391.62 1866.04 1391.63  1880.5 1391.68  1883.8
GR1391.8 1906.99 1391.87 1931.62 1391.86 1946.17 1391.63 1962.97 1391.34  1973.2
GR1391.3 1980.49 1391.54 1989.34 1391.92 1991.85 1392.21 1997.87 1392.53 2016.12
GR1393.1 2066.27 1392.91 2082.04 1392.98 2116.12 1393.06 2130.97 1393.07 2143.46
G[illegible].3 2155.84 1393.44 2159.36 1393.58 2179.75 1394.03 2186.24 1394.47 2193.86
G[illegible]4.7 2201.87 1394.84 2211.54 1394.68 2221.18  1394.5 2227.31 1394.62  2234.1
GR1394.9    2250
* UPSTREAMFACE OF 36TH STREET CULVERT
X1  4256      36 1959.69 2041.79      69      63      66
* X3    10                    1962 1392.39    2038  1392.5
GR1396.4    1750 1395.96 1771.49 1395.95 1774.76 1395.52 1787.18 1395.94 1796.05
GR1394.8 1800.72 1393.55 1808.33 1392.82 1819.99 1392.46 1834.42  1392.1  1855.6
GR1392.4 1876.29 1392.44 1877.35 1392.28 1897.95  1392.3 1929.39 1392.85 1959.69
GR1393.2 1987.55 1393.32 1994.42 1393.24 1999.46 1393.37  2003.5 1393.17 2027.24
GR1393.2 2041.79 1393.09 2052.72 1393.23    2075 1393.44  2095.1 1393.48 2101.75
GR1393.5 2117.84 1393.56 2125.07 1393.77 2147.73 1394.19 2157.19 1394.17    2162
GR1393.8 2180.47 1395.01 2195.29 1395.08 2207.47 1394.51 2225.04 1394.76 2237.62
GR1396.0    2270
NC  0.04    0.04   0.035
X1  4400      17    1750    2255     149     141     145
GR  1396    1585    1396    1655    1396    1670  1395.1    1750 1394.45 1755.97
GR1394.2 1784.39  1393.8 1839.18 1394.15 1868.69  1394.0 1952.69 1392.42 1975.34
GR1392.3 2015.92  1393.9 2044.57 1393.99 2073.99  1394.4 2172.58 1396.13 2194.99
GR1396.5 2220.29  1396.0    2255
NC                          0.1     0.3
X1  4500      15    1700    2270     102      98     100
GR1397.2    1700 1395.59 1768.42 1395.45 1852.33 1395.62 1897.79  1396.4 1913.92
GR1395.6 1950.65 1392.39 1975.16 1392.31 2021.91 1394.21 2050.07  1394.5 2082.25
GR1394.8 2162.39 1395.38 2181.35 1396.69 2199.14 1396.94 2226.35  1397.1    2270
G[illegible]  1    2400
[illegible]573      44    1600    2260      75      71      73
X3     0                  1967.5          2032.5
GR1397.0    1600 1395.94 1763.42 1395.87 1793.42  1395.9 1811.82 1395.91  1823.8
GR1395.8 1828.38 1395.83 1847.89 1395.94 1870.75  1395.9 1882.63 1395.75 1894.46
GR1395.9 1903.33 1396.46 1925.48 1396.07 1932.16  1396.2 1939.44 1396.54 1959.68
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GR1396.3  1987.5 1397.11 1993.04 1391.79 1996.32  1390.3 1999.02 1391.39 2003.43
GR1389.9  2007.9 1390.32 2015.63  1391.2 2021.56  1391.9 2027.89 1391.83 2029.35
GR1393.0 2035.33 1394.34  2044.7 1394.46 2047.14  1394.6 2059.81 1394.63 2068.52
GR1395.1 2082.63 1395.11 2101.09 1395.29 2117.16  1395.1 2136.65 1395.22  2153.8
[illegible].3 2163.33  1395.5 2184.28 1395.96 2192.28  1396.4 2201.68 1396.43 2211.06
GR1396.6  2223.4 1396.52 2226.18 1396.57 2237.49  1397.0    2260
*  DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
*  EXISTING4-10'x8 ' CBC
X1  4574      44    1600    2260       1       1       1
X3    10                 1967.5          2032.5
GR1397.0    1600 1395.94 1763.42 1395.87 1793.42  1395.9 1811.82 1395.91  1823.8
GR1395.8 1828.38 1395.83 1847.89 1395.94 1870.75  1395.9 1882.63 1395.75 1894.46
GR1395.9 1903.33 1396.46 1925.48 1396.07 1932.16  1396.2 1939.44 1396.54 1959.68
GR1396.3  1987.5 1397.11 1993.04 1391.79 1996.32  1390.3 1999.02 1391.39 2003.43
GR1389.9  2007.9 1390.32 2015.63  1391.2 2021.56  1391.9 2027.89 1391.83 2029.35
GR1393.0 2035.33 1394.34  2044.7 1394.46 2047.14  1394.6 2059.81 1394.63 2068.52
GR1395.1 2082.63 1395.11 2101.09 1395.29 2117.16  1395.1 2136.65 1395.22  2153.8
GR1395.3 2163.33  1395.5 2184.28 1395.96 2192.28  1396.4 2201.68 1396.43 2211.06
GR1396.6  2223.4 1396.52 2226.18 1396.57 2237.49  1397.0    2260
SC 4.013     0.2    2.63     500       8      10      72    11.4 1387.69 1387.55
* UPSTREAMFACE OF SWEETWATER AVENUE CULVERT
* EXISTING4-10'x8 ' CBC PLUS 2-10'X8'
X1  4646      39    1750    2250      74      70      72
X2                     2            1398
X3    10                 1967.5          2032.5
GR1395.9    1750 1395.97 1772.27 1396.08  1790.4  1396.1  1843.7 1396.12 1856.75
GR1395.9 1866.58 1396.02 1869.14 1395.84  1880.5  1395.9 1901.71  1395.9 1921.82
GR1395.9 1925.66 1395.95  1946.5 1395.31 1966.28  1392.5 1976.44 1391.51 1979.59
GR1390.9  1992.4  1390.9 1999.72 1397.39  2005.8  1396.8 2010.32 1396.36 2012.87
[illegible]6.4 2020.14 1396.46 2041.68 1396.29 2068.85  1396.6 2073.46 1396.69  2080.7
[illegible]97.0 2088.77 1395.78 2093.11 1395.97 2103.89    1396 2121.59 1396.11 2144.33
GR1396.0 2162.46 1396.07 2177.19 1396.64 2188.42  1396.7 2205.23 1396.71 2221.11
GR1396.8 2223.21 1396.75 2228.66 1396.88 2243.53  1396.8    2250
X1  4800      17    1750    2250     157     151     154
X3     0                    1927            2075
GR  1398    1544    1398    1614    1397    1710  1396.6    1750 1396.52 1807.92
GR1396.2 1865.03 1396.43 1897.93 1396.26 1949.28  1393.4 1965.96 1393.69 1987.18
GR1393.3 2031.17 1395.98 2044.35  1396.9  2063.9  1397.0 2112.28 1396.23 2200.32
GR1396.7    2250    1398    2420
NC                           0.1     0.3
X1  5000      18    1570    2470     208     192     200
* X3     0                    1934            2070
GR  1399    1570 1398.07 1757.14  1396.9 1785.16 1397.03 1846.14    1397 1924.43
GR1394.0 1944.09  1393.8 1973.29  1394.3 2013.33 1398.46 2049.04  1398.7 2098.09
GR1396.0 2116.97 1395.63 2137.72 1396.76 2178.45 1397.56 2205.96  1397.2    2230
GR  1398    2305    1400    2315    1398    2470
X1  5300      14    1465    2385     309     291     300
* X3     0                   1941.5          2057.5
GR  1399    1465 1397.81 1715.55  1397.6 1791.13 1397.82 1841.87 1395.45  1880.1
GR1396.0 1899.79  1395.5 1918.51  1394.6 1962.51 1395.17 2013.02  1397.4  2028.8
GR1398.1 2067.51 1397.99 2100.77    1398    2180    1400    2385
X1  5400      18    1670    2400     102      98     100
* X3     0                   1941.5          2057.5
GR1399.4    1670 1398.98 1707.95 1397.58 1769.63 1397.86 1800.72 1397.18 1848.43
[illegible]398 1880.47 1398.49 1939.19  1397.1 1948.98 1395.35 1983.21 1395.56  2037.6
[illegible]7.1 2048.74 1398.26 2075.91 1398.06 2120.88 1399.06  2134.9 1398.43 2144.26
GR1398.3    2170    1399    2310    1400    2400
X1  5700      16    1625    2175     305     295     300
* X3     0                    1941            2057
GR  1400    1625 1397.85  1684.1 1398.29 1732.32 1398.79 1761.79 1401.49 1775.76
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GR1398.6 1784.11 1398.75 1856.28 1400.18 1868.62 1399.46 1904.35 1397.59 1920.98
GR1396.8 1932.77 1396.12 1997.39 1398.56  2022.4 1399.11 2089.75 1399.32 2121.15
GR  1401    2175
X1  [illegible]00      19    1645    2280     310     290     300
*[illegible]  0                    1943            2059
GR1401.2    1645 1401.15 1675.54 1399.44 1699.45 1399.29 1709.68 1400.24 1720.04
GR1399.6 1763.67  1399.3 1786.67 1399.81 1845.16 1398.41 1860.53 1397.24 1912.79
GR1399.5 1956.47 1399.19 1966.98 1400.01 2002.26  1399.5 2025.72 1399.86 2088.49
GR1399.7    2145    1400    2160    1400    2235    1401    2280
* INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
X1  6200      14    1635    2430     203     197     200
* X3     0                    1936            2058
GR  1402    1635 1400.22  1641.7  1400.2 1729.65 1400.45 1831.28 1399.06 1849.14
GR1399.3 1904.49 1398.74 1934.25  1398.8 1986.26 1400.64 2022.68 1400.41 2067.73
GR1401.0 2079.61 1400.79 2094.85  1400.9    2135    1402    2430
X1  6500      16    1445    2255     308     292     300
* X3     0                    1948            2054
GR  1403    1445  1401.8 1669.99 1401.09 1702.37 1401.04  1778.6  1401.8 1840.48
GR1400.6  1867.5 1399.17 1899.73 1399.72 1929.38 1399.78 1956.12    1402 1982.73
GR1402.1 2029.53  1401.2 2080.16  1401.6 2109.68 1400.89 2142.02  1401.8    2165
GR  1403    2255
X1  6700      19    1705    2585     200     200     200
* X3     0                    1943            2060
GR1404.3    1705 1402.48 1746.94  1403.2 1758.01 1402.49 1767.51 1402.79 1791.25
GR1403.2 1820.53 1402.77  1842.2  1402.8 1897.94 1401.34 1917.14 1401.32 1952.93
GR1401.5 2002.75 1402.46 2012.84  1402.6 2078.46 1402.83 2123.04 1401.68 2140.76
GR1402.9 2146.48 1401.35 2184.17  1402.2    2205    1404    2585
X1  7000      18    1760    2610     300     300     300
GR1405.5    1760 1403.86  1773.2  1403.4 1800.43 1403.14 1833.58  1403.2 1896.62
G[illegible].7 1929.69 1402.14 1956.06 1402.13 2009.95 1402.88 2066.78 1403.27 2083.74
G[illegible].2 2145.35 1403.67 2184.97 1404.13 2199.78 1403.39 2207.45 1402.16 2237.88
GR1403.3    2260    1404    2490  1404.7    2610
X1  7400      16    1815    2840     400     400     400
GR1406.5    1815 1405.61 1863.39 1404.96 1891.23  1404.9 1955.29  1404.7 1998.94
GR1403.1 2049.22 1403.43 2101.21 1404.65 2122.18 1405.18 2192.19  1404.9 2241.07
GR1406.0 2246.99 1404.75 2251.02 1405.69 2256.25 1404.16 2274.59  1404.4    2315
GR1406.2    2840
X1  7500      14    1775    2750     100     100     100
GR1407.0    1775 1405.46 1866.36  1405.6 1883.11 1405.43 1991.35 1404.16 2025.71
GR1403.5 2057.51 1404.12 2120.74  1405.9 2134.04 1405.79 2179.72 1404.98 2251.95
GR1405.6 2269.05 1404.14  2300.5  1404.9    2325    1707    2750
NC  0.04    0.04   0.035     0.3     0.5
*
*  DOWNSTREAM FACE OF THUNDERBIRD ROAD
*
X1  7569      23    1460 3224.85      69      69      69
* X3    10                    1962            2020
GR  1407    1460    1407 1715.07    1407  1728.1    1406 1863.49    1405 1983.06
GR  1404 2033.73    1404 2123.07    1405 2276.62    1405 2286.71    1405 2448.38
GR  1406 2627.64    1407    2753    1407 2757.17    1407 2845.37    1407 2867.28
GR  1407 2867.82    1407 2867.95    1407 2870.79    1407 2871.89    1407 2874.19
GR  1408 2912.98    1408 2979.37    1411 3224.85
*
*  UPSTREAM FACE OF THUNDERBIRD ROAD
*
[illegible]696      66  650.03 3118.14     128     128     128
* X3    10                    1501            1559
GR  1408  650.03    1407    1110    1406 1408.18    1406 1416.55    1406 1432.02
GR  1406 1466.92    1406 1513.59    1405 1583.82    1404  1631.4    1404 1633.08
GR  1404 1636.15    1404 1639.74    1404 1639.92    1404 1641.59    1405  1685.4
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GR  1406 1705.15    1406 1712.36    1406 1712.52    1406 1724.07    1406 1727.28
GR  1407 1729.23    1406 1729.51    1406 1731.46    1406 1731.95    1406 1732.66
GR  1407 1734.57    1406 1734.72    1406 1746.02    1406 1766.04    1406 1819.57
GR  1407 1826.92    1407 1826.97    1407 1835.41    1407 1839.21    1407 1839.41
    1407 1839.62    1407 1839.66    1407 1839.68    1407 1840.25    1407 1840.42
GR  1407 1840.73    1407 1841.01    1407 1885.56    1407 1951.21    1406 1966.77
GR  1406 2000.05    1406 2144.24    1406 2149.31    1406  2215.1    1406  2218.3
GR  1407 2423.85    1408 2608.05    1409 2636.71    1409 2689.16    1410 2717.21
GR  1411 2749.75    1411 2780.34    1410 2839.54    1409 2948.81    1409 2961.02
GR  1410 2983.04    1411 2991.19    1412 2999.34    1413 3030.61    1413  3031.1
GR  1412 3118.14
X1  7800      70  864.07 3201.38     104     104     104
GR  1408  864.07    1407     1230    1407 1295.55    1407 1384.65    1407  1417.6
GR  1407 1534.46    1407 1547.78    1407 1554.15    1407 1568.22    1407 1569.74
GR  1406 1691.81    1405 1708.21    1405 1779.76    1406 1812.02    1407 1964.72
GR  1408 2000.96    1408 2055.49    1407 2072.04    1406 2087.02    1406 2104.05
GR  1407 2128.47    1407 2194.27    1407 2195.38    1407 2199.62    1407  2200.1
GR  1407 2209.13    1407 2209.72    1407 2210.02    1407 2210.04    1407 2218.49
GR  1407 2218.96    1407 2236.11    1407 2236.22    1407 2248.89    1407  2250.5
GR  1407 2250.57    1407 2251.85    1407 2251.92    1407 2252.06    1407 2254.36
GR  1407 2254.65    1407 2255.04    1407 2255.06    1407 2257.73    1407 2257.96
GR  1407 2259.67    1407 2259.68    1407 2259.94    1407 2262.61    1407  2263.6
GR  1407 2267.66    1407 2272.53    1407  2273.6    1407 2277.66    1407 2278.63
GR  1407 2430.16    1407 2463.72    1408  2485.7    1408 2553.48    1408 2570.52
GR  1408 2574.48    1408 2618.88    1408 2623.82    1408 2640.43    1408 2757.81
GR  1408 2771.01    1408 2807.13    1409 2877.21    1410 3084.48    1411 3201.38
X1  7987      90  608.19 2984.31     197     197     197
* X3     10                  1456            1502
GR  1409  608.19    1409     1110    1409 1124.92    1408 1227.14    1407 1245.35
    1407  1246.3    1408  1275.7    1408 1397.98    1407 1532.65    1406  1553.3
GR  1406 1636.36    1407 1783.34    1407 1798.67    1408 1825.84    1409 1849.98
GR  1409 1858.59    1408  1913.7    1407 1926.73    1407 1957.16    1408 1972.32
GR  1409 1990.28    1409 2014.39    1409 2014.72    1409 2014.82    1409 2017.75
GR  1408 2041.98    1408  2121.1    1408 2225.63    1408 2269.22    1408 2370.04
GR  1408 2379.67    1409 2403.37    1410  2404.9    1411 2406.56    1411 2555.99
GR  1411 2621.66    1410 2648.43    1410 2648.52    1409  2651.9    1409 2651.93
GR  1409 2652.47    1409 2653.86    1409 2653.93    1409 2653.94    1410 2654.16
GR  1410 2654.34    1409 2654.82    1409 2654.98    1409 2655.96    1409 2656.14
GR  1409  2656.5    1409 2656.51    1409 2657.37    1409 2657.61    1409 2657.62
GR  1410 2659.55    1410 2659.75    1410 2663.01    1410 2663.67    1410 2676.27
GR  1410 2684.89    1410 2684.97    1410 2685.44    1410 2685.58    1410 2685.78
GR  1410 2687.56    1410 2687.94    1410  2690.3    1410 2690.86    1410  2690.9
GR  1410 2691.09    1410 2691.14    1410 2691.28    1410 2706.97    1410 2709.03
GR  1410 2714.06    1410  2716.3    1410 2716.34    1410 2716.37    1410 2717.28
GR  1410 2718.04    1410 2719.29    1410  2723.4    1410 2729.71    1410 2782.26
GR  1410 2810.17    1410  2844.2    1411  2855.4    1411 2973.49    1411 2984.31
NC 0.025    0.025   0.025
X1  8262      44  512.92 2649.24     275     275     275
GR  1411  512.92    1409     1030    1408 1106.32    1408 1130.75    1409 1138.89
GR  1409 1230.46    1408 1384.81    1407 1406.51    1407 1510.06    1408 1534.86
GR  1408 1538.06    1408 1538.85    1408 1545.46    1408 1547.42    1408 1563.13
GR  1408  1605.7    1409 1673.82    1410 1722.35    1410 1728.72    1410 1729.33
GR  1410 1741.22    1409 1786.13    1408 1789.24    1408 1931.41    1409 2081.75
GR  1410 2105.48    1410 2107.34    1409 2172.49    1409 2200.24    1410 2206.82
    1411 2216.61    1412  2276.9    1412 2278.96    1412 2281.96    1412     2292
    1411 2371.28    1411 2421.75    1411 2449.27    1411 2492.46    1411 2546.63
GR  1411 2557.05    1411 2631.01    1411 2641.92    1412 2649.24
X1  8400      67  856.92 2679.27     130     130     130
GR  1411  856.92    1410     1110    1411 1233.95    1411 1234.34    1411 1245.45
GR  1411 1248.77    1411 1254.92    1411 1256.32    1411 1261.21    1411  1262.1
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GR	1411	1262.91	1411	1263.59	1411	1264.28	1411	1279.11	1410	1319.63
GR	1409	1333.17	1409	1354.71	1410	1466.57	1409	1505.27	1408	1630.85
GR	1407	1638.84	1407	1722.75	1408	1745.25	1409	1878.81	1409	1885.4
GR	1409	1921.09	1410	1947.45	1410	2004.86	1409	2014.93	1408	2026.74
[illegible]	08	2036.58	1409	2116.52	1410	2126.21	1410	2127.76	1410	2129.14
GR	1410	2129.47	1410	2132.07	1410	2132.57	1410	2134.21	1410	2134.28
GR	1410	2134.32	1410	2134.92	1410	2135.33	1410	2138.68	1410	2142.3
GR	1410	2143.89	1410	2147	1410	2147.94	1410	2209.77	1410	2211.84
GR	1410	2213.42	1410	2213.84	1410	2215.75	1410	2215.76	1410	2215.86
GR	1410	2216.06	1410	2216.07	1410	2273.45	1410	2281.58	1409	2393.09
GR	1409	2395.42	1410	2432.15	1411	2546.36	1412	2656.46	1412	2660.77
GR	1412	2676.94	1412	2679.27						
X1	8600	90	1133.86	3179.03	200	200	200			
GR	1412	1110	1412	1133.86	1412	1233.13	1412	1241.37	1412	1253.24
GR	1412	1254.97	1412	1258.56	1412	1263.13	1412	1274.23	1412	1281.06
GR	1412	1304.18	1412	1306.13	1412	1318.08	1412	1318.09	1412	1318.51
GR	1412	1319.78	1412	1322.69	1412	1323.71	1412	1326.44	1412	1327.42
GR	1412	1330.15	1412	1330.22	1412	1330.69	1412	1331	1412	1332.85
GR	1412	1332.86	1412	1333.04	1412	1333.13	1411	1373.31	1411	1414.28
GR	1411	1504.46	1411	1533.14	1411	1613.37	1410	1647.95	1410	1658.97
GR	1411	1670.92	1411	1748.67	1410	1771.49	1410	1774.05	1410	1796.22
GR	1410	1796.5	1410	1908.77	1409	1915.23	1409	1949.99	1409	1953.25
GR	1409	1953.36	1409	1953.37	1409	1953.47	1409	1953.47	1409	1954.25
GR	1410	1954.28	1408	2029.92	1409	2062.65	1409	2146.76	1409	2148.06
GR	1409	2152.41	1409	2156.07	1409	2168.46	1409	2173.63	1409	2181.99
GR	1409	2182.68	1410	2229.65	1410	2308.33	1409	2318.15	1409	2357.34
GR	1410	2375.91	1409	2490.42	1409	2498.84	1409	2499.7	1409	2538.08
GR	1410	2592.52	1411	2723.15	1411	2726.46	1411	2886.31	1412	2950.45
GR	1412	2950.46	1412	2950.74	1412	2950.75	1412	2950.78	1412	2951.06
[illegible]	12	2953.02	1412	2953.09	1412	2953.35	1412	2956.5	1411	3015.15
GR	1411	3015.46	1412	3105.83	1412	3142.29	1412	3156.35	1413	3179.03
X1	8690	90	1080	3203.86	90	90	90			
GR	1413	1080	1413	1201.62	1412	1270.57	1411	1381.7	1411	1432.29
GR	1411	1622.83	1411	1772.29	1410	1933.62	1409	1960.23	1409	2053.43
GR	1411	2290.35	1411	2299.96	1410	2319.37	1409	2340.38	1409	2360.47
GR	1410	2382.57	1411	2461.67	1411	2523.2	1411	2524.9	1411	2525.12
GR	1411	2526.36	1411	2526.58	1411	2529.38	1411	2530.2	1411	2530.33
GR	1411	2530.37	1411	2537.17	1411	2539.91	1411	2540.97	1411	2541.15
GR	1411	2542.9	1411	2543.52	1411	2544.12	1411	2544.22	1411	2545.11
GR	1411	2545.55	1411	2546.35	1411	2548.68	1411	2552.96	1411	2560.56
GR	1411	2577.6	1411	2578.41	1411	2580.89	1411	2581.32	1411	2582.75
GR	1411	2583.1	1411	2584.49	1411	2585.46	1411	2589.83	1411	2589.84
GR	1411	2590.97	1411	2591.42	1411	2593.72	1411	2593.88	1411	2594.78
GR	1411	2594.8	1411	2594.91	1411	2595.64	1411	2600.2	1411	2600.27
GR	1411	2602.5	1411	2602.56	1411	2604.35	1411	2604.45	1411	2607.13
GR	1411	2607.3	1411	2611.77	1411	2611.78	1411	2612.45	1411	2612.46
GR	1411	2612.85	1411	2612.85	1411	2613.03	1411	2613.07	1411	2613.63
GR	1411	2613.7	1411	2613.73	1411	2615.7	1411	2616.89	1411	2616.89
GR	1411	2617.19	1411	2617.27	1410	2678.72	1410	2789.04	1412	2990.9
GR	1412	2991.85	1411	3075.65	1411	3077.75	1412	3109.82	1412	3203.86
X1	8850	90	1020	3253.96	160	160	160			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
[illegible]	09	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
[illegible]	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59

GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
[illegible]	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
X1	8851	90	1020	3253.96	1	1	1			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
X1	9000	90	950	3172.52	150	150	150			
[illegible]	1414	950	1414	1136.81	1413	1315.28	1413	1501.06	1413	1692.5
GR	1412	1719.17	1412	1750.48	1412	1750.92	1412	1751.69	1412	1752.06
GR	1412	1752.73	1412	1753.22	1412	1754.17	1412	1754.55	1412	1755.32
GR	1412	1759.46	1412	1771.05	1412	1771.42	1412	1773.49	1412	1773.58
GR	1412	1773.87	1412	1774.19	1412	1775.87	1412	1776.79	1412	1778.84
GR	1412	1780.78	1412	1781.45	1412	1782.97	1412	1783.88	1412	1848.08
GR	1411	1902.72	1410	1933.54	1409	1983.96	1409	1984.11	1409	1985.19
GR	1409	1985.26	1409	1985.37	1409	1985.38	1409	1986.05	1409	1986.1
GR	1409	1986.93	1409	1987.01	1409	2001.17	1409	2004.4	1409	2008.97
GR	1409	2011.35	1409	2016.04	1409	2018.72	1410	2054.46	1411	2270.97
GR	1411	2337.3	1411	2383.58	1412	2399.21	1412	2485.56	1411	2534.15
GR	1411	2544.46	1411	2546.14	1411	2548.4	1411	2548.68	1411	2549.64
GR	1411	2550.31	1411	2551.99	1411	2552.61	1411	2553.14	1411	2555.46
GR	1411	2557.01	1411	2557.87	1411	2558.14	1411	2562.73	1411	2566.32
GR	1411	2574.93	1411	2581.44	1412	2656.61	1412	2657.17	1412	2665.6
GR	1412	2665.66	1412	2665.76	1412	2668.87	1412	2792.48	1412	2898.1
GR	1412	2904.48	1412	2923.58	1412	2928.66	1412	2965.87	1411	3035.9
GR	1411	3036	1411	3037.04	1411	3037.04	1412	3058.29	1413	3172.52
X1	9340	39	970	3055	365	310	340			
GR	1415	970	1416	990	1416	1005	1415	1160	1415	1215
GR	1416	1315	1416	1340	1415	1385	1414	1480	1413	1680
GR	1413	1690	1414	1695	1414	1697	1413	1700	1413	1710
GR	1413	1810	1412	1860	1411	1870	1410	1910	1410	1960
GR	1411	2050	1412	2150	1413	2180	1413	2210	1412	2230
GR	1411	2240	1411	2295	1412	2297	1413	2305	1414	2345
[illegible]	1414	2370	1413	2420	1412	2430	1412	2700	1412	2720
[illegible]	1412	2740	1412	2800	1413	2985	1413	3055		
X1	9731	90	760	2773.41	390	390	390			
GR	1418	760	1418	922.34	1418	922.4	1418	922.43	1418	922.43
GR	1418	928.22	1418	928.32	1418	929.93	1418	929.94	1418	930.06
GR	1418	930.53	1418	930.54	1418	930.55	1418	930.61	1418	931.15

GR	1418	931.15	1418	931.23	1418	944.85	1418	947.36	1418	950.6
GR	1418	951.25	1418	956.72	1418	958.21	1418	958.21	1418	958.28
GR	1418	958.56	1418	958.63	1418	958.68	1418	958.69	1418	958.77
GR	1418	958.79	1418	964.02	1418	965.06	1418	965.36	1418	965.86
GR	1418	965.95	1418	968.93	1418	969.48	1418	969.73	1418	969.78
GR	1418	970.35	1418	970.45	1418	973.91	1418	974.21	1418	977.24
GR	1418	977.5	1418	977.7	1417	1006.47	1417	1047.64	1417	1050.75
GR	1417	1060.43	1417	1063.48	1417	1068.87	1417	1070.37	1417	1072.21
GR	1417	1074.65	1417	1078.54	1417	1082.36	1417	1089.56	1417	1095.1
GR	1417	1111.87	1417	1112.38	1417	1115.19	1417	1117.85	1417	1136.64
GR	1417	1136.64	1417	1137.18	1417	1137.31	1416	1220.86	1415	1306.6
GR	1415	1321.67	1416	1349.77	1416	1452.86	1415	1776.17	1414	1804.87
GR	1413	1931.54	1412	1948.34	1411	1967.28	1410	1985.74	1410	2059.52
GR	1411	2094.96	1412	2165.75	1413	2563.47	1413	2566.11	1413	2691.1
GR	1413	2773.41	1413	2773.6	1413	2774.13	1413	2774.63	1413	2774.65
X1	9930	90	810	2599.07	203	203	203			
GR	1419	810	1419	947.42	1418	1088.3	1418	1251.74	1418	1253.15
GR	1418	1255.5	1418	1258.42	1418	1258.54	1418	1258.84	1418	1259.77
GR	1418	1261.36	1418	1262.77	1418	1266.01	1418	1269.27	1417	1329.2
GR	1416	1356.04	1415	1384.98	1415	1403.54	1416	1413.27	1417	1422.94
GR	1417	1457.51	1417	1458.08	1417	1484.49	1416	1735.65	1415	1870.22
GR	1414	1882.6	1414	1884.75	1414	1920.8	1413	1940.15	1412	1965.06
GR	1411	1985.36	1411	2054.46	1412	2135.63	1413	2174.95	1414	2205.27
GR	1414	2254.2	1414	2254.82	1414	2255.03	1414	2258.78	1414	2260.2
GR	1414	2262.39	1414	2263.11	1414	2263.82	1414	2265.21	1414	2267.2
GR	1414	2269.28	1414	2271.46	1414	2272.12	1414	2272.7	1414	2275.18
GR	1414	2278.3	1414	2278.35	1414	2278.38	1414	2279.18	1414	2280.06
GR	1414	2280.07	1414	2280.07	1414	2280.23	1414	2280.4	1414	2280.4
GR	1414	2280.4	1414	2280.61	1414	2280.83	1414	2281.51	1414	2282.3
GR	1414	2284.42	1414	2287.41	1414	2287.8	1414	2288.44	1414	2289.99
GR	1414	2292.95	1414	2293.08	1414	2293.38	1414	2293.71	1414	2294.46
GR	1414	2294.67	1414	2295.16	1414	2297.89	1414	2306.33	1414	2310.05
GR	1414	2312.76	1414	2316.49	1414	2319.2	1414	2326.43	1414	2327.11
GR	1415	2358.47	1415	2379.63	1414	2428.07	1413	2506.01	1413	2599.07
X1	10120	24	1140	2590	193	193	193			
GR	1418	1140	1418	1500	1417	1530	1417	1540	1417	1625
GR	1417	1760	1416	1790	1415	1815	1414	1860	1413	1870
GR	1412	1880	1412	1940	1413	2030	1414	2180	1415	2270
GR	1415	2290	1414	2300	1413	2380	1412	2390	1412	2410
GR	1413	2430	1414	2470	1415	2490	1416	2590		
X1	10600	6	1670	2170	480	480	480			
GR	1418	1670	1417	1740	1417	1830	1416	1920	1417	2170
GR	1418	2200								
EJ										
ER										

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1*******************************************
*  HEC-2 WATER SURFACE PROFILES            *
*                                          *
*  Version   4.6.2;  May 1991              *
*                                          *
*  RUN DATE    08JAN98    TIME   16:07:35  *
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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1

08JAN98 16:07:35 PAGE 1

THIS RUN EXECUTED 08JAN98 16:07:35

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*************************************
-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
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THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT 96

AC
4190DOWNSTREAM FACE OF 36TH STREET CULVERT
4256UPSTREAM FACE OF 36TH STREET CULVERT
4574DOWNSTREAM FACE OF SWEETWATER AVENUE
6200INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
7569DOWNSTREAM FACE OF THUNDERBIRD ROAD
7569START SLA MODIFICATION BY USING THE MOST RECENT TOPO
7696UPSTREAM FACE OF THUNDERBIRD ROAD
8850CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND

T1 INDIAN BEND WASH - EXISTING CONTIONS IBW-EX.DAT(100-YEAR HYDRAULICS)

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2						6000	1383.6	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1		-1					-6		

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

```
    38        43        1        26        8        4        42        68

NC    0.04      0.04      0.035     0.1      0.3
 BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
 CH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
 UPSTREAM OF 40TH STREET
  A LOW FLOW FJORD
X1    1140      11      1750      2250
GR   1384.3    1750    1382.9   1775.43   1381.4   1839.04   1379.98   1936.6   1380.7   1983.43
GR   1378.8    2000   1380.28   2014.39   1380.54   2051.73   1383.74   2185.7   1387.28   2219.72
GR   1388.9    2250

X1    1300      16      1750      2250      100      100      100
GR   1387.8    1750   1388.45   1770.68   1385.55   1786.5   1384.74   1799.46   1383.07   1856.74
GR   1381.8   1887.29  1380.44   1903.17   1381.2   1973.2   1381.14   2016.92   1380.34   2060.34
GR   1381.8   2088.74  1382.49   2118.63   1384.07   2185.07   1385.39   2206.99   1388.56   2228.78
GR   1388.7    2250
1
   08JAN98      16:07:35                                                                    PAGE    2


X1    1500      17      1750      2250      200      200      200
GR   1389.2    1750    1389.4   1773.12   1387.72   1799.56   1386.16   1850.89   1383.85   1872.42
GR   1382.0   1895.26  1383.6    1925     1382.32   1962.4   1383.9    2000     1382.72   2069.69
GR   1382.9   2096.32  1384.4   2109.45   1383.25   2126.25   1384.39   2135.22   1387.56   2198.01
GR   1389.5   2220.96  1389.4    2250

X1    1800      13      1750      2250      300      300      300
GR   1389.6    1750   1389.16   1762.53   1389.6   1792.73   1387.38   1832.64    1386     1903.39
GR   1385.9    1955   1385.45   1990.27    1386    2009.13   1385.68   2116.55   1386.53   2127.73
GR   1387.4   2171.71  1389.33   2212.5    1390.8    2250

X1    2100      13      1750      2250      300      300      300
GR   1391.5    1750   1391.48   1787.95   1388.7   1828.31   1387.07   1888.31   1387.06    1966.1
GR   1386.5   1986.12  1386.26   2030.61   1386.9   2049.35   1387.45   2113.79   1388.14   2154.02
GR   1389.3   2188.89  1392.22   2216.69   1391.9    2250

X1    2400      13      1750      2250      300      300      300
GR   1392.0    1750   1391.14   1798.58   1390.2   1807.62   1388.41   1859.25   1387.42   1922.94
GR   1387.5   1976.71  1387.13   1998.34   1387.2   2086.8   1387.89   2102.94   1388.52   2143.27
GR   1390.3   2192.62   1391.6   2201.89   1392.5    2250

X1    2700      14      1750      2250      300      300      300
GR   1392.7    1750   1392.94   1793.99   1391.03   1806.34   1388.3    1898.05   1386.87   1986.56
GR   1387.6   2023.99  1387.24   2082.12   1387.77   2091.94   1387.6    2112.76   1387.97   2159.09
GR   1391.0   2185.33  1393.41   2201.07   1392.31   2208.72   1393.3     2250

X1    2900      15      1750      2250      200      200      200
GR   1393.3    1750   1392.89   1801.03   1389.81   1819.78   1387.87    1863.1   1387.2   1938.92
GR   1387.6   1970.25  1386.89   1981.15   1387.3   2045.98   1387.67   2100.77   1387.8   2139.68
GR   1389.6   2173.15  1393.81   2198.44   1393.03   2208.91   1393.44   2225.17   1393.6     2250

X1    3000      18      1750      2250      100      100      100
GR   1394.1    1750   1393.92   1796.15   1389.4   1823.52   1388.5    1839.9   1387.88   1910.54
GR   1387.1   1941.45  1387.9    1970.6   1387.1   1983.4   1387.85   2016.18   1387.16   2056.63
GR   1387.7   2104.74  1388.31   2115.79   1387.9   2130.95   1388.38   2161.63   1389.74   2175.57
GR   1393.9   2197.15  1393.59   2202.58   1393.5    2250

X1    3300      15      1750      2250      300      300      300
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GR   1394.9      1750    1395.09   1774.57   1394.19   1781.81   1392.69   1806.74   1389.4    1830.93
GR   1388.9   1851.32   1388.79   1913.21   1388.27   1983.55    1388.7   2016.49   1387.9    2084.39
GR   1389.1   2101.96   1388.25   2130.01   1389.81   2169.06   1394.19   2195.37   1394.3       2250

     3600        16      1750      2250       304       298       300
GR   1394.2      1750    1395.4    1773.9    1394.67   1796.99   1391.76   1823.58   1390.14   1846.54
GR   1389.2    1923.3   1388.98   2023.94   1389.35   2058.77    1389.1   2074.13   1388.47   2095.39
GR   1388.8   2120.82   1389.44   2150.36   1394.64   2189.78   1396.52   2197.03   1394.86   2210.31
GR   1395.2      2250
1
   08JAN98      16:07:35                                                                          PAGE    3


X1     3900        13      1750      2250       305       295       300
GR   1394.0      1750    1394.87   1797.84    1390.7   1836.32   1390.05   1862.53   1390.37   1884.86
GR   1389.8   1971.99   1390.19      2000    1389.3   2033.15   1390.12   2044.86   1390.53   2102.09
GR   1391.0   2152.88   1395.62   2202.99    1395.6      2250

X1     4000        14      1730      2230        95       105       100
GR   1395.8      1730    1395.91   1747.03   1395.12   1783.34    1390.4   1826.66   1389.99    1863.1
GR   1390.0   1952.71   1389.94      1980   1389.26   1992.49   1390.7   2021.85    1391.5   2123.11
GR   1392.7   2160.23   1395.97   2181.02   1394.23   2210.34    1394.2      2230

X1     4100        13      1750      2250       102        98       100
GR   1395.6      1750    1395.29   1760.75   1395.3   1803.96   1391.35   1837.06   1390.84   1872.95
GR   1391.6   1951.84   1389.66   1967.24   1389.5   1999.58   1389.75   2031.06   1391.73    2045.3
GR   1392.0    2102.3   1393.97   2188.47   1394.5      2250

                                     0.3       0.5

  DOWNSTREAM FACE OF 36TH STREET CULVERT
X1     4190        41   1962.97   2016.12        92        88        90
X3       10                          1962   1391.39      2038    1391.5
GR   1395.5      1750    1395.43   1765.79   1395.51   1772.58    1395.4   1788.36   1395.41   1794.56
GR   1395.9   1796.56   1395.43   1801.76   1394.25   1810.31   1393.48   1815.32   1392.37   1826.56
GR   1391.2   1838.79   1391.41   1846.56   1391.62   1866.04   1391.63    1880.5   1391.68    1883.8
GR   1391.8   1906.99   1391.87   1931.62   1391.86   1946.17   1391.63   1962.97   1391.34    1973.2
GR   1391.3   1980.49   1391.54   1989.34   1391.92   1991.85   1392.21   1997.87   1392.53   2016.12
GR   1393.1   2066.27   1392.91   2082.04   1392.98   2116.12   1393.06   2130.97   1393.07   2143.46
GR   1393.3   2155.84   1393.44   2159.36   1393.58   2179.75   1394.03   2186.24   1394.47   2193.86
GR   1394.7   2201.87   1394.84   2211.54   1394.68   2221.18    1394.5   2227.31   1394.62    2234.1
GR   1394.9      2250
  UPSTREAMFACE OF 36TH STREET CULVERT

X1     4256        36   1959.69   2041.79        69        63        66
  X3     10                   1962 1392.39     2038   1392.5
GR   1396.4      1750    1395.96   1771.49   1395.95   1774.76   1395.52   1787.18   1395.94   1796.05
GR   1394.8   1800.72   1393.55   1808.33   1392.82   1819.99   1392.46   1834.42    1392.1    1855.6
GR   1392.4   1876.29   1392.44   1877.35   1392.28   1897.95    1392.3   1929.39   1392.85   1959.69
GR   1393.2   1987.55   1393.32   1994.42   1393.24   1999.46   1393.37    2003.5   1393.17   2027.24
GR   1393.2   2041.79   1393.09   2052.72   1393.23      2075   1393.44    2095.1   1393.48   2101.75
GR   1393.5   2117.84   1393.56   2125.07   1393.77   2147.73   1394.19   2157.19   1394.17      2162
GR   1393.8   2180.47   1395.01   2195.29   1395.08   2207.47   1394.51   2225.04   1394.76   2237.62
     1396.0      2270

NC     0.04      0.04     0.035
X1     4400        17      1750      2255       149       141       145
GR     1396      1585      1396      1655      1396      1670    1395.1      1750   1394.45   1755.97
GR   1394.2   1784.39    1393.8   1839.18   1394.15   1868.69    1394.0   1952.69   1392.42   1975.34
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GR   1392.3    2015.92    1393.9    2044.57    1393.99    2073.99    1394.4    2172.58    1396.13    2194.99
GR   1396.5    2220.29    1396.0       2255
1
   08JAN98      16:07:35                                                                                  PAGE    4

NC                                     0.1        0.3
X1     4500         15       1700       2270        102         98       100
GR   1397.2       1700    1395.59    1768.42    1395.45    1852.33    1395.62    1897.79     1396.4    1913.92
GR   1395.6    1950.65    1392.39    1975.16    1392.31    2021.91    1394.21    2050.07     1394.5    2082.25
GR   1394.8    2162.39    1395.38    2181.35    1396.69    2199.14    1396.94    2226.35     1397.1       2270

QT       1       2400
X1     4573         44       1600       2260         75         71         73
X3        0                          1967.5                2032.5
GR   1397.0       1600    1395.94    1763.42    1395.87    1793.42     1395.9    1811.82    1395.91     1823.8
GR   1395.8    1828.38    1395.83    1847.89    1395.94    1870.75     1395.9    1882.63    1395.75    1894.46
GR   1395.9    1903.33    1396.46    1925.48    1396.07    1932.16     1396.2    1939.44    1396.54    1959.68
GR   1396.3     1987.5    1397.11    1993.04    1391.79    1996.32     1390.3    1999.02    1391.39    2003.43
GR   1389.9     2007.9    1390.32    2015.63     1391.2    2021.56     1391.9    2027.89    1391.83    2029.35
GR   1393.0    2035.33    1394.34     2044.7    1394.46    2047.14     1394.6    2059.81    1394.63    2068.52
GR   1395.1    2082.63    1395.11    2101.09    1395.29    2117.16     1395.1    2136.65    1395.22     2153.8
GR   1395.3    2163.33     1395.5    2184.28    1395.96    2192.28     1396.4    2201.68    1396.43    2211.06
GR   1396.6     2223.4    1396.52    2226.18    1396.57    2237.49     1397.0       2260
   DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
   EXISTING4-10'x8 ' CBC

X1     4574         44       1600       2260          1          1          1
       10                          1967.5                2032.5
GR   1397.0       1600    1395.94    1763.42    1395.87    1793.42     1395.9    1811.82    1395.91     1823.8
GR   1395.8    1828.38    1395.83    1847.89    1395.94    1870.75     1395.9    1882.63    1395.75    1894.46
GR   1395.9    1903.33    1396.46    1925.48    1396.07    1932.16     1396.2    1939.44    1396.54    1959.68
GR   1396.3     1987.5    1397.11    1993.04    1391.79    1996.32     1390.3    1999.02    1391.39    2003.43
GR   1389.9     2007.9    1390.32    2015.63     1391.2    2021.56     1391.9    2027.89    1391.83    2029.35
GR   1393.0    2035.33    1394.34     2044.7    1394.46    2047.14     1394.6    2059.81    1394.63    2068.52
GR   1395.1    2082.63    1395.11    2101.09    1395.29    2117.16     1395.1    2136.65    1395.22     2153.8
GR   1395.3    2163.33     1395.5    2184.28    1395.96    2192.28     1396.4    2201.68    1396.43    2211.06
GR   1396.6     2223.4    1396.52    2226.18    1396.57    2237.49     1397.0       2260

SC    4.013        0.2       2.63        500          8         10         72       11.4    1387.69    1387.55
  UPSTREAMFACE OF SWEETWATER AVENUE CULVERT
  EXISTING4-10'x8 ' CBC PLUS 2-10'X8'
X1     4646         39       1750       2250         74         70         72
X2                               2                1398
X3       10                          1967.5                2032.5
GR   1395.9       1750    1395.97    1772.27    1396.08    1790.4     1396.1     1843.7    1396.12    1856.75
GR   1395.9    1866.58    1396.02    1869.14    1395.84    1880.5     1395.9    1901.71     1395.9    1921.82
GR   1395.9    1925.66    1395.95     1946.5    1395.31    1966.28    1392.5    1976.44    1391.51    1979.59
GR   1390.9     1992.4     1390.9    1999.72    1397.39     2005.8    1396.8    2010.32    1396.36    2012.87
GR   1396.4    2020.14    1396.46    2041.68    1396.29    2068.85    1396.6    2073.46    1396.69     2080.7
GR   1397.0    2088.77    1395.78    2093.11    1395.97    2103.89      1396    2121.59    1396.11    2144.33
GR   1396.0    2162.46    1396.07    2177.19    1396.64    2188.42    1396.7    2205.23    1396.71    2221.11
GR   1396.8    2223.21    1396.75    2228.66    1396.88    2243.53    1396.8       2250

   08JAN98      16:07:35                                                                                  PAGE    5

X1     4800         17       1750       2250        157        151        154
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X3      0                       1927                2075
GR    1398      1544      1398      1614      1397      1710      1396.6      1750      1396.52      1807.92
GR  1396.2   1865.03   1396.43   1897.93   1396.26   1949.28      1393.4   1965.96      1393.69      1987.18
    1393.3   2031.17   1395.98   2044.35    1396.9    2063.9      1397.0   2112.28      1396.23      2200.32
    1396.7      2250      1398      2420

NC                                  0.1       0.3
X1    5000        18      1570      2470       208       192         200
  X3      0                1934            2070
GR    1399      1570   1398.07   1757.14    1396.9   1785.16      1397.03   1846.14         1397      1924.43
GR  1394.0   1944.09    1393.8   1973.29    1394.3   2013.33      1398.46   2049.04       1398.7      2098.09
GR  1396.0   2116.97   1395.63   2137.72   1396.76   2178.45      1397.56   2205.96       1397.2         2230
GR    1398      2305      1400      2315      1398      2470

X1    5300        14      1465      2385       309       291         300
  X3      0                1941.5          2057.5
GR    1399      1465   1397.81   1715.55    1397.6   1791.13      1397.82   1841.87      1395.45       1880.1
GR  1396.0   1899.79    1395.5   1918.51    1394.6   1962.51      1395.17   2013.02       1397.4       2028.8
GR  1398.1   2067.51   1397.99   2100.77      1398      2180         1400      2385

X1    5400        18      1670      2400       102        98         100
  X3      0                1941.5          2057.5
GR  1399.4      1670   1398.98   1707.95   1397.58   1769.63      1397.86   1800.72      1397.18      1848.43
GR    1398   1880.47   1398.49   1939.19    1397.1   1948.98      1395.35   1983.21      1395.56       2037.6
GR  1397.1   2048.74   1398.26   2075.91   1398.06   2120.88      1399.06    2134.9      1398.43      2144.26
GR  1398.3      2170      1399      2310      1400      2400

X1    5700        16      1625      2175       305       295         300
  X3      0                1941            2057
    1400      1625   1397.85    1684.1   1398.29   1732.32      1398.79   1761.79      1401.49      1775.76
GR  1398.6   1784.11   1398.75   1856.28   1400.18   1868.62      1399.46   1904.35      1397.59      1920.98
GR  1396.8   1932.77   1396.12   1997.39   1398.56    2022.4      1399.11   2089.75      1399.32      2121.15
GR    1401      2175

X1    6000        19      1645      2280       310       290         300
  X3      0                1943            2059
GR  1401.2      1645   1401.15   1675.54   1399.44   1699.45      1399.29   1709.68      1400.24      1720.04
GR  1399.6   1763.67    1399.3   1786.67   1399.81   1845.16      1398.41   1860.53      1397.24      1912.79
GR  1399.5   1956.47   1399.19   1966.98   1400.01   2002.26      1399.5    2025.72      1399.86      2088.49
GR  1399.7      2145      1400      2160      1400      2235         1401      2280
  INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL

X1    6200        14      1635      2430       203       197         200
  X3      0                1936            2058
GR    1402      1635   1400.22    1641.7    1400.2   1729.65      1400.45   1831.28      1399.06      1849.14
GR  1399.3   1904.49   1398.74   1934.25    1398.8   1986.26      1400.64   2022.68      1400.41      2067.73
GR  1401.0   2079.61   1400.79   2094.85    1400.9      2135         1402      2430
1
   08JAN98      16:07:35                                                                                  PAGE    6


X1    6500        16      1445      2255       308       292         300
  X3      0                1948            2054
    1403      1445    1401.8   1669.99   1401.09   1702.37      1401.04    1778.6       1401.8      1840.48
    1400.6   1867.5   1399.17   1899.73   1399.72   1929.38      1399.78   1956.12         1402      1982.73
GR  1402.1   2029.53   1401.2   2080.16    1401.6   2109.68      1400.89   2142.02       1401.8         2165
GR    1403      2255

X1    6700        19      1705      2585       200       200         200
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  X3     0                1943          2060
GR    1404.3      1705    1402.48    1746.94    1403.2    1758.01    1402.49    1767.51    1402.79    1791.25
GR    1403.2   1820.53    1402.77     1842.2    1402.8    1897.94    1401.34    1917.14    1401.32    1952.93
GR    1401.5   2002.75    1402.46    2012.84    1402.6    2078.46    1402.83    2123.04    1401.68    2140.76
GR    1402.9   2146.48    1401.35    2184.17    1402.2       2205       1404       2585

X1     7000        18       1760       2610       300       300        300
GR    1405.5      1760    1403.86     1773.2    1403.4    1800.43    1403.14    1833.58     1403.2    1896.62
GR    1403.7   1929.69    1402.14    1956.06    1402.13   2009.95    1402.88    2066.78    1403.27    2083.74
GR    1404.2   2145.35    1403.67    2184.97    1404.13   2199.78    1403.39    2207.45    1402.16    2237.88
GR    1403.3      2260       1404       2490    1404.7       2610

X1     7400        16       1815       2840       400       400        400
GR    1406.5      1815    1405.61    1863.39    1404.96   1891.23     1404.9    1955.29     1404.7    1998.94
GR    1403.1   2049.22    1403.43    2101.21    1404.65   2122.18    1405.18    2192.19     1404.9    2241.07
GR    1406.0   2246.99    1404.75    2251.02    1405.69   2256.25    1404.16    2274.59     1404.4       2315
GR    1406.2      2840

X1     7500        14       1775       2750       100       100        100
GR    1407.0      1775    1405.46    1866.36    1405.6    1883.11    1405.43    1991.35    1404.16    2025.71
GR    1403.5   2057.51    1404.12    2120.74    1405.9    2134.04    1405.79    2179.72    1404.98    2251.95
GR    1405.6   2269.05    1404.14     2300.5    1404.9       2325       1707       2750

NC      0.04      0.04      0.035        0.3       0.5

  DOWNSTREAM FACE OF THUNDERBIRD ROAD

X1     7569        23       1460    3224.85        69        69         69
  X3     10                1962          2020
GR     1407      1460       1407    1715.07      1407    1728.1       1406    1863.49       1405    1983.06
GR     1404   2033.73       1404    2123.07      1405   2276.62       1405    2286.71       1405    2448.38
GR     1406   2627.64       1407       2753      1407   2757.17       1407    2845.37       1407    2867.28
GR     1407   2867.82       1407    2867.95      1407   2870.79       1407    2871.89       1407    2874.19
GR     1408   2912.98       1408    2979.37      1411   3224.85

  UPSTREAM FACE OF THUNDERBIRD ROAD

X1     7696        66     650.03    3118.14       128       128        128
  X3     10                1501          1559
GR     1408    650.03       1407       1110      1406   1408.18       1406    1416.55       1406    1432.02
GR     1406   1466.92       1406    1513.59      1405   1583.82       1404     1631.4       1404    1633.08
GR     1404   1636.15       1404    1639.74      1404   1639.92       1404    1641.59       1405     1685.4
GR     1406   1705.15       1406    1712.36      1406   1712.52       1406    1724.07       1406    1727.28
GR     1407   1729.23       1406    1729.51      1406   1731.46       1406    1731.95       1406    1732.66
1
  08JAN98      16:07:35                                                                          PAGE     7

GR     1407   1734.57       1406    1734.72      1406   1746.02       1406    1766.04       1406    1819.57
GR     1407   1826.92       1407    1826.97      1407   1835.41       1407    1839.21       1407    1839.41
GR     1407   1839.62       1407    1839.66      1407   1839.68       1407    1840.25       1407    1840.42
GR     1407   1840.73       1407    1841.01      1407   1885.56       1407    1951.21       1406    1966.77
GR     1406   2000.05       1406    2144.24      1406   2149.31       1406     2215.1       1406     2218.3
GR     1407   2423.85       1408    2608.05      1409   2636.71       1409    2689.16       1410    2717.21
GR     1411   2749.75       1411    2780.34      1410   2839.54       1409    2948.81       1409    2961.02
GR     1410   2983.04       1411    2991.19      1412   2999.34       1413    3030.61       1413     3031.1
GR     1412   3118.14

X1     7800        70     864.07    3201.38       104       104        104
```

GR	1408	864.07	1407	1230	1407	1295.55	1407	1384.65	1407	1417.6
GR	1407	1534.46	1407	1547.78	1407	1554.15	1407	1568.22	1407	1569.74
GR	1406	1691.81	1405	1708.21	1405	1779.76	1406	1812.02	1407	1964.72
GR	1408	2000.96	1408	2055.49	1407	2072.04	1406	2087.02	1406	2104.05
	1407	2128.47	1407	2194.27	1407	2195.38	1407	2199.62	1407	2200.1
GR	1407	2209.13	1407	2209.72	1407	2210.02	1407	2210.04	1407	2218.49
GR	1407	2218.96	1407	2236.11	1407	2236.22	1407	2248.89	1407	2250.5
GR	1407	2250.57	1407	2251.85	1407	2251.92	1407	2252.06	1407	2254.36
GR	1407	2254.65	1407	2255.04	1407	2255.06	1407	2257.73	1407	2257.96
GR	1407	2259.67	1407	2259.68	1407	2259.94	1407	2262.61	1407	2263.6
GR	1407	2267.66	1407	2272.53	1407	2273.6	1407	2277.66	1407	2278.63
GR	1407	2430.16	1407	2463.72	1408	2485.7	1408	2553.48	1408	2570.52
GR	1408	2574.48	1408	2618.88	1408	2623.82	1408	2640.43	1408	2757.81
GR	1408	2771.01	1408	2807.13	1409	2877.21	1410	3084.48	1411	3201.38

X1	7987	90	608.19	2984.31	197	197	197			
X3	10		1456	1502						
GR	1409	608.19	1409	1110	1409	1124.92	1408	1227.14	1407	1245.35
GR	1407	1246.3	1408	1275.7	1408	1397.98	1407	1532.65	1406	1553.3
GR	1406	1636.36	1407	1783.34	1407	1798.67	1408	1825.84	1409	1849.98
GR	1409	1858.59	1408	1913.7	1407	1926.73	1407	1957.16	1408	1972.32
GR	1409	1990.28	1409	2014.39	1409	2014.72	1409	2014.82	1409	2017.75
GR	1408	2041.98	1408	2121.1	1408	2225.63	1408	2269.22	1408	2370.04
GR	1408	2379.67	1409	2403.37	1410	2404.9	1411	2406.56	1411	2555.99
GR	1411	2621.66	1410	2648.43	1410	2648.52	1409	2651.9	1409	2651.93
GR	1409	2652.47	1409	2653.86	1409	2653.93	1409	2653.94	1410	2654.16
GR	1410	2654.34	1409	2654.82	1409	2654.98	1409	2655.96	1409	2656.14
GR	1409	2656.5	1409	2656.51	1409	2657.37	1409	2657.61	1409	2657.62
GR	1410	2659.55	1410	2659.75	1410	2663.01	1410	2663.67	1410	2676.27
	1410	2684.89	1410	2684.97	1410	2685.44	1410	2685.58	1410	2685.78
	1410	2687.56	1410	2687.94	1410	2690.3	1410	2690.86	1410	2690.9
GR	1410	2691.09	1410	2691.14	1410	2691.28	1410	2706.97	1410	2709.03
GR	1410	2714.06	1410	2716.3	1410	2716.34	1410	2716.37	1410	2717.28
GR	1410	2718.04	1410	2719.29	1410	2723.4	1410	2729.71	1410	2782.26
GR	1410	2810.17	1410	2844.2	1411	2855.4	1411	2973.49	1411	2984.31

NC	0.025	0.025	0.025							
X1	8262	44	512.92	2649.24	275	275	275			
GR	1411	512.92	1409	1030	1408	1106.32	1408	1130.75	1409	1138.89
GR	1409	1230.46	1408	1384.81	1407	1406.51	1407	1510.06	1408	1534.86
GR	1408	1538.06	1408	1538.85	1408	1545.46	1408	1547.42	1408	1563.13
GR	1408	1605.7	1409	1673.82	1410	1722.35	1410	1728.72	1410	1729.33
GR	1410	1741.22	1409	1786.13	1408	1789.24	1408	1931.41	1409	2081.75

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GR	1410	2105.48	1410	2107.34	1409	2172.49	1409	2200.24	1410	2206.82
GR	1411	2216.61	1412	2276.9	1412	2278.96	1412	2281.96	1412	2292
GR	1411	2371.28	1411	2421.75	1411	2449.27	1411	2492.46	1411	2546.63
GR	1411	2557.05	1411	2631.01	1411	2641.92	1412	2649.24		

X1	8400	67	856.92	2679.27	130	130	130			
GR	1411	856.92	1410	1110	1411	1233.95	1411	1234.34	1411	1245.45
	1411	1248.77	1411	1254.92	1411	1256.32	1411	1261.21	1411	1262.1
	1411	1262.91	1411	1263.59	1411	1264.28	1411	1279.11	1410	1319.63
GR	1409	1333.17	1409	1354.71	1410	1466.57	1409	1505.27	1408	1630.85
GR	1407	1638.84	1407	1722.75	1408	1745.25	1409	1878.81	1409	1885.4
GR	1409	1921.09	1410	1947.45	1410	2004.86	1409	2014.93	1408	2026.74
GR	1408	2036.58	1409	2116.52	1410	2126.21	1410	2127.76	1410	2129.14

GR	1410	2129.47	1410	2132.07	1410	2132.57	1410	2134.21	1410	2134.28
GR	1410	2134.32	1410	2134.92	1410	2135.33	1410	2138.68	1410	2142.3
GR	1410	2143.89	1410	2147	1410	2147.94	1410	2209.77	1410	2211.84
GR	1410	2213.42	1410	2213.84	1410	2215.75	1410	2215.76	1410	2215.86
[illegible]	1410	2216.06	1410	2216.07	1410	2273.45	1410	2281.58	1409	2393.09
GR	1409	2395.42	1410	2432.15	1411	2546.36	1412	2656.46	1412	2660.77
GR	1412	2676.94	1412	2679.27						
X1	8600	90	1133.86	3179.03	200	200	200			
GR	1412	1110	1412	1133.86	1412	1233.13	1412	1241.37	1412	1253.24
GR	1412	1254.97	1412	1258.56	1412	1263.13	1412	1274.23	1412	1281.06
GR	1412	1304.18	1412	1306.13	1412	1318.08	1412	1318.09	1412	1318.51
GR	1412	1319.78	1412	1322.69	1412	1323.71	1412	1326.44	1412	1327.42
GR	1412	1330.15	1412	1330.22	1412	1330.69	1412	1331	1412	1332.85
GR	1412	1332.86	1412	1333.04	1412	1333.13	1411	1373.31	1411	1414.28
GR	1411	1504.46	1411	1533.14	1411	1613.37	1410	1647.95	1410	1658.97
GR	1411	1670.92	1411	1748.67	1410	1771.49	1410	1774.05	1410	1796.22
GR	1410	1796.5	1410	1908.77	1409	1915.23	1409	1949.99	1409	1953.25
GR	1409	1953.36	1409	1953.37	1409	1953.47	1409	1953.47	1409	1954.25
GR	1410	1954.28	1408	2029.92	1409	2062.65	1409	2146.76	1409	2148.06
GR	1409	2152.41	1409	2156.07	1409	2168.46	1409	2173.63	1409	2181.99
GR	1409	2182.68	1410	2229.65	1410	2308.33	1409	2318.15	1409	2357.34
GR	1410	2375.91	1409	2490.42	1409	2498.84	1409	2499.7	1409	2538.08
GR	1410	2592.52	1411	2723.15	1411	2726.46	1411	2886.31	1412	2950.45
GR	1412	2950.46	1412	2950.74	1412	2950.75	1412	2950.78	1412	2951.06
GR	1412	2953.02	1412	2953.09	1412	2953.35	1412	2956.5	1411	3015.15
GR	1411	3015.46	1412	3105.83	1412	3142.29	1412	3156.35	1413	3179.03
X1	8690	90	1080	3203.86	90	90	90			
[illegible]	1413	1080	1413	1201.62	1412	1270.57	1411	1381.7	1411	1432.29
GR	1411	1622.83	1411	1772.29	1410	1933.62	1409	1960.23	1409	2053.43
GR	1411	2290.35	1411	2299.96	1410	2319.37	1409	2340.38	1409	2360.47
GR	1410	2382.57	1411	2461.67	1411	2523.2	1411	2524.9	1411	2525.12
GR	1411	2526.36	1411	2526.58	1411	2529.38	1411	2530.2	1411	2530.33
GR	1411	2530.37	1411	2537.17	1411	2539.91	1411	2540.97	1411	2541.15
GR	1411	2542.9	1411	2543.52	1411	2544.12	1411	2544.22	1411	2545.11
GR	1411	2545.55	1411	2546.35	1411	2548.68	1411	2552.96	1411	2560.56
GR	1411	2577.6	1411	2578.41	1411	2580.89	1411	2581.32	1411	2582.75
GR	1411	2583.1	1411	2584.49	1411	2585.46	1411	2589.83	1411	2589.84
GR	1411	2590.97	1411	2591.42	1411	2593.72	1411	2593.88	1411	2594.78
GR	1411	2594.8	1411	2594.91	1411	2595.64	1411	2600.2	1411	2600.27

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GR	1411	2602.5	1411	2602.56	1411	2604.35	1411	2604.45	1411	2607.13
GR	1411	2607.3	1411	2611.77	1411	2611.78	1411	2612.45	1411	2612.46
GR	1411	2612.85	1411	2612.85	1411	2613.03	1411	2613.07	1411	2613.63
GR	1411	2613.7	1411	2613.73	1411	2615.7	1411	2616.89	1411	2616.89
GR	1411	2617.19	1411	2617.27	1410	2678.72	1410	2789.04	1412	2990.9
GR	1412	2991.85	1411	3075.65	1411	3077.75	1412	3109.82	1412	3203.86
X1	8850	90	1020	3253.96	160	160	160			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
[illegible]	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24

GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
[illegible]	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
[illegible]	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
X1	8851	90	1020	3253.96	1	1	1			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
[illegible]	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
X1	9000	90	950	3172.52	150	150	150			
GR	1414	950	1414	1136.81	1413	1315.28	1413	1501.06	1413	1692.5
GR	1412	1719.17	1412	1750.48	1412	1750.92	1412	1751.69	1412	1752.06
GR	1412	1752.73	1412	1753.22	1412	1754.17	1412	1754.55	1412	1755.32
GR	1412	1759.46	1412	1771.05	1412	1771.42	1412	1773.49	1412	1773.58
GR	1412	1773.87	1412	1774.19	1412	1775.87	1412	1776.79	1412	1778.84
GR	1412	1780.78	1412	1781.45	1412	1782.97	1412	1783.88	1412	1848.08

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GR	1411	1902.72	1410	1933.54	1409	1983.96	1409	1984.11	1409	1985.19
GR	1409	1985.26	1409	1985.37	1409	1985.38	1409	1986.05	1409	1986.1
GR	1409	1986.93	1409	1987.01	1409	2001.17	1409	2004.4	1409	2008.97
GR	1409	2011.35	1409	2016.04	1409	2018.72	1410	2054.46	1411	2270.97
GR	1411	2337.3	1411	2383.58	1412	2399.21	1412	2485.56	1411	2534.15
GR	1411	2544.46	1411	2546.14	1411	2548.4	1411	2548.68	1411	2549.64
GR	1411	2550.31	1411	2551.99	1411	2552.61	1411	2553.14	1411	2555.46
GR	1411	2557.01	1411	2557.87	1411	2558.14	1411	2562.73	1411	2566.32
GR	1411	2574.93	1411	2581.44	1412	2656.61	1412	2657.17	1412	2665.6
GR	1412	2665.66	1412	2665.76	1412	2668.87	1412	2792.48	1412	2898.1
GR	1412	2904.48	1412	2923.58	1412	2928.66	1412	2965.87	1411	3035.9
[illegible]	1411	3036	1411	3037.04	1411	3037.04	1412	3058.29	1413	3172.52
X1	9340	39	970	3055	365	310	340			
GR	1415	970	1416	990	1416	1005	1415	1160	1415	1215
GR	1416	1315	1416	1340	1415	1385	1414	1480	1413	1680
GR	1413	1690	1414	1695	1414	1697	1413	1700	1413	1710

GR	1413	1810	1412	1860	1411	1870	1410	1910	1410	1960
GR	1411	2050	1412	2150	1413	2180	1413	2210	1412	2230
GR	1411	2240	1411	2295	1412	2297	1413	2305	1414	2345
[illegible]	1414	2370	1413	2420	1412	2430	1412	2700	1412	2720
[illegible]	1412	2740	1412	2800	1413	2985	1413	3055		
X1	9731	90	760	2773.41	390	390	390			
GR	1418	760	1418	922.34	1418	922.4	1418	922.43	1418	922.43
GR	1418	928.22	1418	928.32	1418	929.93	1418	929.94	1418	930.06
GR	1418	930.53	1418	930.54	1418	930.55	1418	930.61	1418	931.15
GR	1418	931.15	1418	931.23	1418	944.85	1418	947.36	1418	950.6
GR	1418	951.25	1418	956.72	1418	958.21	1418	958.21	1418	958.28
GR	1418	958.56	1418	958.63	1418	958.68	1418	958.69	1418	958.77
GR	1418	958.79	1418	964.02	1418	965.06	1418	965.36	1418	965.86
GR	1418	965.95	1418	968.93	1418	969.48	1418	969.73	1418	969.78
GR	1418	970.35	1418	970.45	1418	973.91	1418	974.21	1418	977.24
GR	1418	977.5	1418	977.7	1417	1006.47	1417	1047.64	1417	1050.75
GR	1417	1060.43	1417	1063.48	1417	1068.87	1417	1070.37	1417	1072.21
GR	1417	1074.65	1417	1078.54	1417	1082.36	1417	1089.56	1417	1095.1
GR	1417	1111.87	1417	1112.38	1417	1115.19	1417	1117.85	1417	1136.64
GR	1417	1136.64	1417	1137.18	1417	1137.31	1416	1220.86	1415	1306.6
GR	1415	1321.67	1416	1349.77	1416	1452.86	1415	1776.17	1414	1804.87
GR	1413	1931.54	1412	1948.34	1411	1967.28	1410	1985.74	1410	2059.52
GR	1411	2094.96	1412	2165.75	1413	2563.47	1413	2566.11	1413	2691.1
GR	1413	2773.41	1413	2773.6	1413	2774.13	1413	2774.63	1413	2774.65
X1	9930	90	810	2599.07	203	203	203			
GR	1419	810	1419	947.42	1418	1088.3	1418	1251.74	1418	1253.15
GR	1418	1255.5	1418	1258.42	1418	1258.54	1418	1258.84	1418	1259.77
[illegible]	1418	1261.36	1418	1262.77	1418	1266.01	1418	1269.27	1417	1329.2
[illegible]	1416	1356.04	1415	1384.98	1415	1403.54	1416	1413.27	1417	1422.94
GR	1417	1457.51	1417	1458.08	1417	1484.49	1416	1735.65	1415	1870.22
GR	1414	1882.6	1414	1884.75	1414	1920.8	1413	1940.15	1412	1965.06
GR	1411	1985.36	1411	2054.46	1412	2135.63	1413	2174.95	1414	2205.27
GR	1414	2254.2	1414	2254.82	1414	2255.03	1414	2258.78	1414	2260.2
GR	1414	2262.39	1414	2263.11	1414	2263.82	1414	2265.21	1414	2267.2
GR	1414	2269.28	1414	2271.46	1414	2272.12	1414	2272.7	1414	2275.18

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GR	1414	2278.3	1414	2278.35	1414	2278.38	1414	2279.18	1414	2280.06
GR	1414	2280.07	1414	2280.07	1414	2280.23	1414	2280.4	1414	2280.4
GR	1414	2280.4	1414	2280.61	1414	2280.83	1414	2281.51	1414	2282.3
GR	1414	2284.42	1414	2287.41	1414	2287.8	1414	2288.44	1414	2289.99
GR	1414	2292.95	1414	2293.08	1414	2293.38	1414	2293.71	1414	2294.46
GR	1414	2294.67	1414	2295.16	1414	2297.89	1414	2306.33	1414	2310.05
GR	1414	2312.76	1414	2316.49	1414	2319.2	1414	2326.43	1414	2327.11
GR	1415	2358.47	1415	2379.63	1414	2428.07	1413	2506.01	1413	2599.07
X1	10120	24	1140	2590	193	193	193			
GR	1418	1140	1418	1500	1417	1530	1417	1540	1417	1625
GR	1417	1760	1416	1790	1415	1815	1414	1860	1413	1870
GR	1412	1880	1412	1940	1413	2030	1414	2180	1415	2270
[illegible]	1415	2290	1414	2300	1413	2380	1412	2390	1412	2410
[illegible]	1413	2430	1414	2470	1415	2490	1416	2590		
X1	10600	6	1670	2170	480	480	480			
GR	1418	1670	1417	1740	1417	1830	1416	1920	1417	2170
GR	1418	2200								

ECNO	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
0

CCHV= .100 CEHV= .300
*SECNO 1140.000

1140.000	4.80	1383.60	.00	1383.60	1384.19	.59	.00	.00	1384.30
6000.0	.0	6000.0	.0	.0	970.6	.0	.0	.0	1388.90
.00	.00	6.18	.00	.000	.035	.000	.000	1378.80	1762.72
.006881	0.	0.	0.	0	0	0	.00	417.12	2179.84

*SECNO 1300.000

1300.000	3.92	1384.26	.00	.00	1384.99	.73	.75	.04	1387.80
6000.0	.0	6000.0	.0	.0	878.0	.0	2.1	.9	1388.70
.00	.00	6.83	.00	.000	.035	.000	.000	1380.34	1815.92
.008259	100.	100.	100.	2	0	0	.00	372.30	2188.23

*SECNO 1500.000

00.000	3.93	1385.93	.00	.00	1386.87	.94	1.82	.06	1389.20
6000.0	.0	6000.0	.0	.0	772.2	.0	5.9	2.5	1389.40
.01	.00	7.77	.00	.000	.035	.000	.000	1382.00	1853.04
.010053	200.	200.	200.	2	0	0	.00	312.68	2165.71

*SECNO 1800.000

1800.000	3.35	1388.80	.00	.00	1389.44	.64	2.55	.03	1389.60
6000.0	.0	6000.0	.0	.0	933.4	.0	11.8	4.9	1390.80
.02	.00	6.43	.00	.000	.035	.000	.000	1385.45	1807.06
.007269	300.	300.	300.	2	0	0	.00	394.30	2201.36

*SECNO 2100.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.46

2100.000	4.25	1390.51	.00	.00	1390.91	.41	1.45	.02	1391.50
6000.0	.0	6000.0	.0	.0	1174.5	.0	19.0	7.6	1391.90
.04	.00	5.11	.00	.000	.035	.000	.000	1386.26	1802.05
.003427	300.	300.	300.	3	0	0	.00	398.35	2200.40

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

*SECNO 2400.000

2400.000	4.33	1391.46	.00	.00	1391.78	.31	.86	.01	1392.00
6000.0	.0	6000.0	.0	.0	1333.9	.0	27.7	10.5	1392.50
.06	.00	4.50	.00	.000	.035	.000	.000	1387.13	1780.28
.002411	300.	300.	300.	2	0	0	.00	420.64	2200.92

*SECNO 2700.000

2700.000	5.23	1392.10	.00	.00	1392.35	.25	.57	.01	1392.70
6000.0	.0	6000.0	.0	.0	1489.8	.0	37.4	13.3	1393.30
.08	.00	4.03	.00	.000	.035	.000	.000	1386.87	1799.43
.001525	300.	300.	300.	2	0	0	.00	393.08	2192.51

*SECNO 2900.000

2900.000	5.51	1392.40	.00	.00	1392.60	.19	.24	.01	1393.30
6000.0	.0	6000.0	.0	.0	1699.8	.0	44.7	15.1	1393.60
.10	.00	3.53	.00	.000	.035	.000	.000	1386.89	1803.99
.000959	200.	200.	200.	2	0	0	.00	386.00	2189.99

*SECNO 3000.000

3000.000	5.40	1392.50	.00	.00	1392.70	.20	.10	.00	1394.10
6000.0	.0	6000.0	.0	.0	1684.0	.0	48.6	15.9	1393.50
.10	.00	3.56	.00	.000	.035	.000	.000	1387.10	1804.76
.000987	100.	100.	100.	2	0	0	.00	385.12	2189.88

*SECNO 3300.000

3300.000	4.92	1392.82	.00	.00	1393.07	.25	.36	.02	1394.90
6000.0	.0	6000.0	.0	.0	1482.3	.0	59.5	18.6	1394.30
.12	.00	4.05	.00	.000	.035	.000	.000	1387.90	1804.60
.001496	300.	300.	300.	2	0	0	.00	382.53	2187.13

*SECNO 3600.000

3600.000	4.82	1393.29	.00	.00	1393.59	.30	.50	.01	1394.20
6000.0	.0	6000.0	.0	.0	1364.1	.0	69.3	21.2	1395.20
.14	.00	4.40	.00	.000	.035	.000	.000	1388.47	1809.61
.001886	304.	300.	298.	2	0	0	.00	369.92	2179.54

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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

*SECNO 3900.000

3900.000	4.60	1393.90	.00	.00	1394.25	.35	.65	.02	1394.00
6000.0	.0	6000.0	.0	.0	1261.3	.0	78.4	23.7	1395.60
.16	.00	4.76	.00	.000	.035	.000	.000	1389.30	1806.76
.002517	305.	300.	295.	2	0	0	.00	377.61	2184.37

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*SECNO 4000.000
  4000.000      4.90   1394.16      .00      .00   1394.50      .35      .25      .00   1395.80
  6000.0         .0    6000.0       .0       .0    1268.1       .0     81.3     24.6   1394.20
     .17        .00      4.73      .00     .000      .035     .000     .000  1389.26   1792.19
   .002470      95.      100.      105.        2         0        0      .00   377.29   2169.48


*SECNO 4100.000
  4100.000      4.91   1394.41      .00      .00   1394.87      .46      .33      .03   1395.60
  6000.0         .0    6000.0       .0       .0    1104.7       .0     84.0     25.5   1394.50
     .17        .00      5.43      .00     .000      .035     .000     .000  1389.50   1811.45
   .004624     102.      100.       98.        0         0        0      .00   427.67   2239.12


CCHV=     .300 CEHV=     .500
*SECNO 4190.000

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     1962.0    2038.0  TYPE=      1  TARGET=       76.000
 ELENCL=   1391.39  ELENCR=   1391.50
  4190.000      3.63   1394.83      .00      .00   1395.55      .72      .55      .13   1391.63
  6000.0      3188.5   1278.0    1533.5    451.5     159.1    313.5     86.1     26.4   1392.53
     .18        7.06      8.03     4.89     .040      .035     .040     .000  1391.20   1806.13
   .008301      92.       90.       88.        2         0        0      .00   437.98   2245.83


*SECNO 4256.000
  4256.000      3.40   1395.50      .00      .00   1396.11      .61      .53      .03   1392.85
  6000.0      3201.8   1247.1    1551.1    473.8     191.8    326.0     87.5     27.1   1393.20
     .18        6.76      6.50     4.76     .040      .035     .040     .000  1392.10   1797.81
   .007568      69.       66.       63.        3         0        0      .00   459.37   2257.19


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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


*SECNO 4400.000
3280 CROSS SECTION   4400.00 EXTENDED       .61 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.43

  4400.000      4.31   1396.61      .00      .00   1396.94      .32      .74      .08   1395.10
  6000.0       284.7   5715.3       .0    137.4    1228.6       .0     91.5     29.0   1396.00
     .19        2.07      4.65      .00     .040      .035     .000     .000  1392.30   1585.00
   .003676     149.      145.      141.        2         0        0      .00   670.00   2255.00


CCHV=     .100 CEHV=     .300
*SECNO 4500.000
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3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .66

00.000	4.68	1396.99	.00	.00	1397.54	.55	.53	.07	1397.20
000.0	.0	6000.0	.0	.0	1008.2	.0	94.2	30.4	1397.10
.19	.00	5.95	.00	.000	.035	.000	.000	1392.31	1709.00
.008355	102.	100.	98.	3	0	0	.00	530.54	2239.53

*SECNO 4573.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .34

3470 ENCROACHMENT STATIONS= 1967.5 2032.5 TYPE= 1 TARGET= 65.000

4573.000	7.03	1396.93	.00	.00	1398.52	1.59	.67	.31	100000.00
2400.0	.0	2400.0	.0	.0	237.0	.0	95.3	30.9	100000.00
.19	.00	10.13	.00	.000	.035	.000	.000	1389.90	1967.50
.011714	75.	73.	71.	3	0	0	.00	63.65	2032.50

*SECNO 4574.000

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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

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 1967.5 2032.5 TYPE= 1 TARGET= 65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

4574.000	7.04	1396.94	.00	.00	1398.53	1.59	.01	.00	100000.00
2400.0	.0	2400.0	.0	.0	237.4	.0	95.3	30.9	100000.00
.19	.00	10.11	.00	.000	.035	.000	.000	1389.90	1967.50
.011658	1.	1.	1.	0	0	0	.00	63.70	2032.50

SPECIAL CULVERT

CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
4	.013	.20	2.63	500.00	8.00	10.00	72.00	11	4	1387.69	1387.55

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE 4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 4646.000

SPECIAL CULVERT OUTLET CONTROL + WEIR FLOW EG = 1398.09
EG OF 1398.09 LESS THAN XEG OF 1398.53
3280 CROSS SECTION 4646.00 EXTENDED .72 FEET

SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1395.32	1398.10	.00	34.	2388.	10.561	320.0	1398.00	500.

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3710 WSEL ASSUMED BASED ON MIN DIFF
3693 PROBABLE MINIMUM SPECIFIC ENERGY

3470 ENCROACHMENT STATIONS= 1967.5 2032.5 TYPE= 1 TARGET= 65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

4646.000	6.62	1397.52	1397.46	.00	1399.25	1.73	.90	-.90	100000.00
2400.0	.0	2400.0	.0	.0	227.3	.0	95.6	31.0	100000.00
.20	.00	10.56	.00	.000	.035	.000	.000	1390.90	1967.50
.013368	74.	72.	70.	20	11	0	.00	65.00	2032.50

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

*SECNO 4800.000
3280 CROSS SECTION 4800.00 EXTENDED 1.57 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.95

3470 ENCROACHMENT STATIONS= 1927.0 2075.0 TYPE= 1 TARGET= 148.000

4800.000	6.26	1399.56	.00	.00	1399.74	.18	.34	.16	100000.00
2400.0	.0	2400.0	.0	.0	702.6	.0	97.3	31.4	100000.00
.21	.00	3.42	.00	.000	.035	.000	.000	1393.30	1927.00
.000858	157.	154.	151.	1	0	0	.00	148.00	2075.00

.100 CEHV= .300
*SECNO 5000.000

3265 DIVIDED FLOW

3280 CROSS SECTION 5000.00 EXTENDED 1.82 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.91

[illegible]0.000	6.02	1399.82	.00	.00	1399.84	.02	.08	.02	1399.00
2400.0	.0	2400.0	.0	.0	2084.2	.0	103.7	33.7	1398.00
.26	.00	1.15	.00	.000	.035	.000	.000	1393.80	1570.00
.000236	208.	200.	192.	3	0	0	.00	885.13	2470.00

*SECNO 5300.000

3280 CROSS SECTION 5300.00 EXTENDED .90 FEET

5300.000	5.30	1399.90	.00	.00	1399.92	.02	.08	.00	1399.00
2400.0	.0	2400.0	.0	.0	1939.1	.0	117.5	39.9	1400.00
.32	.00	1.24	.00	.000	.035	.000	.000	1394.60	1465.00
.000310	309.	300.	291.	2	0	0	.00	909.54	2374.54

1

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

[illegible]O 5400.000

[illegible] CROSS SECTION 5400.00 EXTENDED .53 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .63

5400.000	4.58	1399.93	.00	.00	1399.98	.05	.05	.01	1399.40
2400.0	.0	2400.0	.0	.0	1344.8	.0	121.3	41.8	1400.00
.34	.00	1.78	.00	.000	.035	.000	.000	1395.35	1670.00
.000774	102.	100.	98.	0	0	0	.00	723.29	2393.29

*SECNO 5700.000

3265 DIVIDED FLOW

3280 CROSS SECTION 5700.00 EXTENDED .23 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .64

5700.000	4.11	1400.23	.00	.00	1400.34	.11	.35	.02	1400.00
2400.0	.0	2400.0	.0	.0	896.2	.0	129.0	46.0	1401.00
.37	.00	2.68	.00	.000	.035	.000	.000	1396.12	1625.00
.001907	305.	300.	295.	2	0	0	.00	515.20	2150.35

*SECNO 6000.000

6000.000	3.68	1400.92	.00	.00	1401.05	.13	.70	.01	1401.20
2400.0	.0	2400.0	.0	.0	835.7	.0	135.0	49.9	1401.00
.40	.00	2.87	.00	.000	.035	.000	.000	1397.24	1678.82

.002926	310.	300.	290.	2	0	0	.00	597.39	2276.21

*SECNO 6200.000

[illegible].000	2.80	1401.54	.00	.00	1401.67	.13	.62	.00	1402.00
2400.0	.0	2400.0	.0	.0	842.0	.0	138.8	52.8	1402.00
.42	.00	2.85	.00	.000	.035	.000	.000	1398.74	1636.72
.003330	203.	200.	197.	2	0	0	.00	670.78	2307.50

*SECNO 6500.000

6500.000	3.43	1402.60	.00	.00	1402.73	.13	1.05	.00	1403.00
2400.0	.0	2400.0	.0	.0	831.1	.0	144.6	57.5	1403.00
.45	.00	2.89	.00	.000	.035	.000	.000	1399.17	1520.76
.003709	308.	300.	292.	2	0	0	.00	703.94	2224.69

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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

*SECNO 6700.000

6700.000	2.19	1403.51	.00	.00	1403.67	.16	.94	.01	1404.30
[illegible]400.0	.0	2400.0	.0	.0	737.1	.0	148.2	60.9	1404.00
.46	.00	3.26	.00	.000	.035	.000	.000	1401.32	1723.22
.006110	200.	200.	200.	2	0	0	.00	758.18	2481.41

*SECNO 7000.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.62

7000.000	2.53	1404.66	.00	.00	1404.75	.08	1.07	.01	1405.50
2400.0	.0	2400.0	.0	.0	1025.9	.0	154.3	66.4	1404.70
.50	.00	2.34	.00	.000	.035	.000	.000	1402.13	1766.66
.002322	300.	300.	300.	2	0	0	.00	838.61	2605.27

*SECNO 7400.000

3265 DIVIDED FLOW

7400.000	2.75	1405.85	.00	.00	1405.96	.11	1.21	.01	1406.50
2400.0	.0	2400.0	.0	.0	883.7	.0	163.0	74.3	1406.20
.54	.00	2.72	.00	.000	.035	.000	.000	1403.10	1850.87
.004090	400.	400.	400.	1	0	0	.00	882.87	2735.11

[illegible]O 7500.000

[illegible]00.000	2.78	1406.28	.00	.00	1406.52	.24	.52	.04	1407.00
2400.0	.0	2400.0	.0	.0	608.1	.0	164.7	75.9	1707.00
.55	.00	3.95	.00	.000	.035	.000	.000	1403.50	1817.65
.006832	100.	100.	100.	2	0	0	.00	509.30	2326.94

CCHV= .300 CEHV= .500

*SECNO 7569.000

WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.62

7569.000	2.68	1406.68	.00	.00	1406.73	.05	.14	.06	1407.00
2400.0	.0	2400.0	.0	.0	1384.6	.0	166.3	77.0	1411.00
.56	.00	1.73	.00	.000	.035	.000	.000	1404.00	1771.63
.000996	69.	69.	69.	2	0	0	.00	941.06	2712.69

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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

*SECNO 7696.000

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .51

6.000	2.88	1406.88	.00	.00	1406.97	.09	.23	.02	1408.00
2400.0	.0	2400.0	.0	.0	988.2	.0	169.8	80.1	1412.00
.57	.00	2.43	.00	.000	.035	.000	.000	1404.00	1145.63
.003904	128.	128.	128.	3	0	0	.00	1126.11	2399.29

*SECNO 7800.000

3265 DIVIDED FLOW

7800.000	2.40	1407.40	.00	.00	1407.52	.12	.53	.01	1408.00
2400.0	.0	2400.0	.0	.0	877.8	.0	172.0	83.0	1411.00
.58	.00	2.73	.00	.000	.035	.000	.000	1405.00	1083.13
.007025	104.	104.	104.	2	0	0	.00	1303.28	2472.54

*SECNO 7987.000

3265 DIVIDED FLOW

7987.000	2.40	1408.40	.00	.00	1408.49	.09	.96	.01	1409.00
2400.0	.0	2400.0	.0	.0	1001.6	.0	176.3	88.4	1411.00
.61	.00	2.40	.00	.000	.035	.000	.000	1406.00	1186.19
.003584	197.	197.	197.	2	0	0	.00	1094.11	2389.17

*SECNO 8262.000

3265 DIVIDED FLOW

8262.000	2.17	1409.17	.00	.00	1409.27	.11	.78	.01	1411.00

2400.0	.0	2400.0	.0	.0	919.5	.0	182.4	95.1	1412.00
.64	.00	2.61	.00	.000	.025	.000	.000	1407.00	985.03
.002288	275.	275.	275.	3	0	0	.00	1045.02	2201.38

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 8400.000

3265 DIVIDED FLOW

8400.000	2.49	1409.49	.00	.00	1409.67	.18	.36	.04	1411.00
2400.0	.0	2400.0	.0	.0	704.9	.0	184.8	97.8	1412.00
.65	.00	3.40	.00	.000	.025	.000	.000	1407.00	1326.58
.003350	130.	130.	130.	2	0	0	.00	715.83	2413.31

*SECNO 8600.000

3265 DIVIDED FLOW

0.000	2.25	1410.25	.00	.00	1410.43	.18	.76	.00	1412.00
2400.0	.0	2400.0	.0	.0	709.5	.0	188.0	101.4	1413.00
.66	.00	3.38	.00	.000	.025	.000	.000	1408.00	1639.33
.004335	200.	200.	200.	3	0	0	.00	881.87	2625.07

*SECNO 8690.000

3265 DIVIDED FLOW

8690.000	1.68	1410.68	.00	.00	1410.92	.24	.46	.03	1413.00
2400.0	.0	2400.0	.0	.0	609.6	.0	189.4	103.1	1412.00
.67	.00	3.94	.00	.000	.025	.000	.000	1409.00	1824.50
.006069	90.	90.	90.	2	0	0	.00	777.50	2857.31

*SECNO 8850.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.59

8850.000	2.43	1411.43	.00	.00	1411.53	.11	.58	.04	1413.00
2400.0	.0	2400.0	.0	.0	912.8	.0	192.2	106.5	1414.00
.69	.00	2.63	.00	.000	.025	.000	.000	1409.00	1793.83
.002393	160.	160.	160.	2	0	0	.00	1061.24	2855.07

NO 8851.000

8851.000	2.43	1411.43	.00	.00	1411.54	.11	.00	.00	1413.00
2400.0	.0	2400.0	.0	.0	918.0	.0	192.2	106.5	1414.00
.69	.00	2.61	.00	.000	.025	.000	.000	1409.00	1792.92
.002351	1.	1.	1.	0	0	0	.00	1062.33	2855.25

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

*SECNO 9000.000

3265 DIVIDED FLOW

9000.000	2.76	1411.76	.00	.00	1411.90	.14	.35	.02	1414.00
2400.0	.0	2400.0	.0	.0	807.5	.0	195.2	109.7	1413.00
.70	.00	2.97	.00	.000	.025	.000	.000	1409.00	1861.16
.002251	150.	150.	150.	2	0	0	.00	746.30	3053.20

*SECNO 9340.000

3265 DIVIDED FLOW

9340.000	2.56	1412.56	.00	.00	1412.68	.12	.78	.01	1415.00
2400.0	.0	2400.0	.0	.0	861.7	.0	201.7	116.1	1413.00
.74	.00	2.79	.00	.000	.025	.000	.000	1410.00	1832.22
.002312	365.	340.	310.	1	0	0	.00	895.37	2902.80

*SECNO 9731.000
3280 CROSS SECTION 9731.00 EXTENDED .32 FEET

9731.000	3.32	1413.32	.00	.00	1413.41	.10	.73	.01	1418.00
2400.0	.0	2399.6	.4	.0	969.6	.4	209.9	124.0	1413.00
.78	.00	2.47	.90	.000	.025	.025	.000	1410.00	1891.62
.001528	390.	390.	390.	2	0	0	.00	883.03	2774.65

*SECNO 9930.000

3265 DIVIDED FLOW

3280 CROSS SECTION 9930.00 EXTENDED .66 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .68

9930.000	2.66	1413.66	.00	.00	1413.94	.28	.44	.09	1419.00
2400.0	.0	2400.0	.0	.0	568.6	.0	213.5	127.1	1413.00
.79	.00	4.22	.00	.000	.025	.000	.000	1411.00	1927.29
.003296	203.	203.	203.	2	0	0	.00	412.68	2599.07

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 10120.000

3265 DIVIDED FLOW

10120.000	2.35	1414.35	.00	.00	1414.54	.20	.58	.02	1418.00
2400.0	.0	2400.0	.0	.0	673.1	.0	216.2	129.2	1416.00
.81	.00	3.57	.00	.000	.025	.000	.000	1412.00	1844.54
.002729	193.	193.	193.	2	0	0	.00	546.68	2476.87

*SECNO 10600.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

10600.000	1.59	1417.59	1417.59	.00	1418.05	.47	2.22	.13	1418.00
2400.0	.0	2386.8	13.2	.0	434.3	5.2	222.4	134.9	1417.00
.83	.00	5.50	2.56	.000	.025	.025	.000	1416.00	1698.94
.009530	480.	480.	480.	20	19	0	.00	488.65	2187.60

THIS RUN EXECUTED 08JAN98 16:07:40

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	VCH	DEPTH	TOPWID	ELMIN	FRCH
	1140.000	6000.00	1383.60	6.18	4.80	417.12	1378.80	.71
	1300.000	6000.00	1384.26	6.83	3.92	372.30	1380.34	.78
	1500.000	6000.00	1385.93	7.77	3.93	312.68	1382.00	.87
	1800.000	6000.00	1388.80	6.43	3.35	394.30	1385.45	.74
*	2100.000	6000.00	1390.51	5.11	4.25	398.35	1386.26	.52

2400.000	6000.00	1391.46	4.50	4.33	420.64	1387.13	.45
2700.000	6000.00	1392.10	4.03	5.23	393.08	1386.87	.36
900.000	6000.00	1392.40	3.53	5.51	386.00	1386.89	.30
3000.000	6000.00	1392.50	3.56	5.40	385.12	1387.10	.30
3300.000	6000.00	1392.82	4.05	4.92	382.53	1387.90	.36
3600.000	6000.00	1393.29	4.40	4.82	369.92	1388.47	.40
3900.000	6000.00	1393.90	4.76	4.60	377.61	1389.30	.46
4000.000	6000.00	1394.16	4.73	4.90	377.29	1389.26	.45
4100.000	6000.00	1394.41	5.43	4.91	427.67	1389.50	.60
4190.000	6000.00	1394.83	8.03	3.63	437.98	1391.20	.82
4256.000	6000.00	1395.50	6.50	3.40	459.37	1392.10	.75
* 4400.000	6000.00	1396.61	4.65	4.31	670.00	1392.30	.53

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SECNO	Q	CWSEL	VCH	DEPTH	TOPWID	ELMIN	FRCH
4500.000	6000.00	1396.99	5.95	4.68	530.54	1392.31	.76
* 4573.000	2400.00	1396.93	10.13	7.03	63.65	1389.90	.93
4574.000	2400.00	1396.94	10.11	7.04	63.70	1389.90	.93
* 4646.000	2400.00	1397.52	10.56	6.62	65.00	1390.90	1.00
* 4800.000	2400.00	1399.56	3.42	6.26	148.00	1393.30	.28
* 5000.000	2400.00	1399.82	1.15	6.02	885.13	1393.80	.13
5300.000	2400.00	1399.90	1.24	5.30	909.54	1394.60	.15
* 5400.000	2400.00	1399.93	1.78	4.58	723.29	1395.35	.23
* 5700.000	2400.00	1400.23	2.68	4.11	515.20	1396.12	.36
6000.000	2400.00	1400.92	2.87	3.68	597.39	1397.24	.43
6200.000	2400.00	1401.54	2.85	2.80	670.78	1398.74	.45
6500.000	2400.00	1402.60	2.89	3.43	703.94	1399.17	.47
6700.000	2400.00	1403.51	3.26	2.19	758.18	1401.32	.58
* 7000.000	2400.00	1404.66	2.34	2.53	838.61	1402.13	.37
7400.000	2400.00	1405.85	2.72	2.75	882.87	1403.10	.48

	7500.000	2400.00	1406.28	3.95	2.78	509.30	1403.50	.64
*	7569.000	2400.00	1406.68	1.73	2.68	941.06	1404.00	.25
	696.000	2400.00	1406.88	2.43	2.88	1126.11	1404.00	.48
	7800.000	2400.00	1407.40	2.73	2.40	1303.28	1405.00	.61
	7987.000	2400.00	1408.40	2.40	2.40	1094.11	1406.00	.46
	8262.000	2400.00	1409.17	2.61	2.17	1045.02	1407.00	.53
	8400.000	2400.00	1409.49	3.40	2.49	715.83	1407.00	.74
	8600.000	2400.00	1410.25	3.38	2.25	881.87	1408.00	.70
	8690.000	2400.00	1410.68	3.94	1.68	777.50	1409.00	.90
*	8850.000	2400.00	1411.43	2.63	2.43	1061.24	1409.00	.50
	8851.000	2400.00	1411.43	2.61	2.43	1062.33	1409.00	.50

1

	SECNO	Q	CWSEL	VCH	DEPTH	TOPWID	ELMIN	FRCH
	9000.000	2400.00	1411.76	2.97	2.76	746.30	1409.00	.64
	9340.000	2400.00	1412.56	2.79	2.56	895.37	1410.00	.55
	9731.000	2400.00	1413.32	2.47	3.32	883.03	1410.00	.42
*	9930.000	2400.00	1413.66	4.22	2.66	412.68	1411.00	.81
	10120.000	2400.00	1414.35	3.57	2.35	546.68	1412.00	.61
*	10600.000	2400.00	1417.59	5.50	1.59	488.65	1416.00	1.01

1

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 2100.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4400.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4500.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

ING SECNO= 4573.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 4646.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 4646.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF
CAUTION SECNO= 4646.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

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WARNING SECNO=   4800.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   5000.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   5400.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   5700.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   7000.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   7569.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   7696.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   8850.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   9930.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  10600.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  10600.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  10600.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
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APPENDIX E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

HEC-2 MODEL

PROPOSED CONDITIONS

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AC
*   1140BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
*   1140MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
*   1140UPSTREAM OF 40TH STREET
*   1140A LOW FLOW FJORD
*   4190DOWNSTREAM FACE OF 36TH STREET CULVERT
*   41906-12'x8' CONCRETE BOX CULVERT
*   4190ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
*   4256UPSTREAM FACE OF 36TH STREET CULVERT
*   42566-12'x8' CONCRETE BOX CULVERT
*   4256ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
*   4574DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
*   4574EXISTING 4-10'x8' CBC PLUS 2-10'X8'
*   4646UPSTREAM FACE OF SWEETWATER AVENUE CULVERT
*   4646EXISTING 4-10'x8' CBC PLUS 2-10'X8'
*   6200INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
*   7569DOWNSTREAM FACE OF THUNDERBIRD ROAD CULVERT
*   7569START SLA MODIFICATION BY USING THE MOST RECENT TOPO
*   75691-28'x7' CONCRETE ARCH PLUS 1-28'x10.32 CONCRETE ARCH
*   7569CROWN ELEVATIONS OF ARCHES ARE THE SAME, THE 28'X7' ARCH HAS
*   7569FLOW LINE ELEVATIONS OF 1395.74 OUTLET, 1396.12 INLET
*   7569THIS HEC-2 MODELS THE TWO ARCHES AS 2-28'x7.63' CONCRETE ARCHES
*   7696UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
*   76961-28'x7' CONCRETE ARCH PLUS 1-28'X10.32 CONCRETE ARCH
*   7987DOWNSTREAM FACE OF SR 51 CULVERT
*   7987THIS HEC-2 MODELS THE 1-28'X7' & 1-16'X10.7' ARCHES FOR THE
*   7987WEST SIDE FLOW ONLY.
*   7987FLOW LINE ELEVATION OF 16'x10.32' ARCH IS 1-FOOT ABOVE THE FLOW
*   7987LINE OF THE 28'x7' ARCH, WHICH IS EQUAL TO CHANNEL FLOW LINE
*   8262UPSTREAM FACE OF SR 51 CULVERT
*   82621-28'x7' & 1-16'X10.7' CBC FOR THE WEST SIDE FLOW ONLY.
*   8262MODELED AS A 2-23'X5.72' CBC
*   8850CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND
T1      INDIAN BEND WASH - CHANNEL IMPROVEMENTS,FILE: IBW_CHI.DAT(100-YEAR HYDRAULICS)
T2      40TH STREET TO ACOMA ROAD
T3      FLOWS FROM FIS STUDY
J1            2                                          6000 1383.58
J2    1             -1                                     -6
J3   110            150            200
NC  0.04    0.04   0.035     0.1     0.3
* BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
* MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
* UPSTREAM OF 40TH STREET
* A LOW FLOW FJORD
ET                  7.1                           1765    2195
X1  1140      11    1750    2250
CI2011.1 1379.87   0.035       4       4      40    0.01
GR1384.3    1750  1381.9 1775.43  1381.4 1839.04 1379.98  1936.6  1380.7 1983.43
GR1378.8    2000 1380.28 2014.39 1380.54 2051.73 1383.04  2205.7 1387.28 2219.72
GR1388.9    2250
ET                  7.1                           1850    2150
X1  1300      16    1750    2250     100     100     100
CI2080.6 1380.16   0.035       4       4      40    0.01
GR    7.8    1750 1388.45 1770.68 1385.55  1786.5 1384.74 1799.46 1383.07 1856.74
      1.8 1887.29 1380.44 1903.17  1381.2  1973.2 1381.14 2016.92 1380.34 2060.34
GR1381.8 2088.74 1382.49 2118.63 1384.07 2185.07 1385.39 2206.99 1388.56 2228.78
GR1388.7    2250
ET                  7.1                           1930    2150
X1  1500      17    1750    2250     200     200     200
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CI2116.3 1380.51   0.035       4       4      40    0.01
CI  2046 1382.21   0.035       8       8     200    0.01
GR1389.2    1750  1389.4 1773.12 1387.72 1799.56 1386.16 1850.89 1383.85 1872.42
GR1382.0 1895.26  1383.6    1925 1382.32  1962.4  1383.9    2000 1382.72 2069.69
[illegible].9 2096.32  1384.4 2109.45 1383.25 2126.25 1384.39 2135.22 1387.56 2198.01
[illegible]89.5 2220.96  1389.4    2250
ET                  7.1                            1960    2160
X1  1800      13    1750    2250     300     300     300
CI2119.6 1381.03   0.035       4       4      40    0.01
CI2049.5 1383.49   0.035       8       8     150    0.01
GR1389.6    1750 1389.16 1762.53  1389.6 1792.73 1387.38 1832.64    1386 1903.39
GR1385.9    1955 1385.45 1990.27    1386 2009.13 1385.68 2116.55 1386.53 2127.73
GR1387.4 2171.71 1389.33  2212.5  1390.8    2250
ET                  7.1                            1955    2175
X1  2100      13    1750    2250     300     300     300
CI2122.6 1381.55   0.035       4       4      40    0.01
CI2052.5 1384.55   0.035       8       8     150    0.01
GR1391.5    1750 1391.48 1787.95  1388.7 1828.31 1387.07 1888.31 1387.06  1966.1
GR1386.5 1986.12 1386.26 2030.61  1386.9 2049.35 1387.45 2113.79 1388.14 2154.02
GR1389.3 2188.89 1392.22 2216.69  1391.9    2250
ET                  7.1                            1960    2180
X1  2400      13    1750    2250     300     300     300
CI2125.5 1382.07   0.035       4       4      40    0.01
CI2055.5 1385.07   0.035       8       8     150    0.01
GR1392.0    1750 1391.14 1798.58  1390.2 1807.62 1388.41 1859.25 1387.42 1922.94
GR1387.5 1976.71 1387.13 1998.34  1387.2  2086.8 1387.89 2102.94 1388.52 2143.27
GR1390.3 2192.62  1391.6 2201.89  1392.5    2250
ET                  7.1                            1965    2175
X1  2700      14    1750    2250     300     300     300
[illegible]4.6 1382.59   0.035       4       4      40    0.01
[illegible]4.4 1385.09   0.035       8       8     150    0.01
GR1392.7    1750 1392.94 1793.99 1391.03 1806.34  1388.3 1898.05 1386.87 1986.56
GR1387.6 2023.99 1387.24 2082.12 1387.77 2091.94  1387.6 2112.76 1387.97 2159.09
GR1391.0 2185.33 1393.41 2201.07 1392.31 2208.72  1393.3    2250
ET                  7.1                            1965    2170
X1  2900      15    1750    2250     200     200     200
CI2122.8 1382.94   0.035       4       4      40    0.01
CI  2053 1385.94   0.035       8       8     150    0.01
GR1393.3    1750 1392.89 1801.03 1389.81 1819.78 1387.87  1863.1  1387.2 1938.92
GR1387.6 1970.25 1386.89 1981.15  1387.3 2045.98 1387.67 2100.77  1387.8 2139.68
GR1389.6 2173.15 1393.81 2198.44 1393.03 2208.91 1393.44 2225.17  1393.6    2250
ET                  7.1                            1965    2165
X1  3000      18    1750    2250     100     100     100
CI2121.8 1383.11   0.035       4       4      40    0.01
CI  2052 1386.11   0.035       8       8     150    0.01
GR1394.1    1750 1393.92 1796.15  1389.4 1823.52  1388.5  1839.9 1387.88 1910.54
GR1387.1 1941.45  1387.9  1970.6  1387.1  1983.4 1387.85 2016.18 1387.16 2056.63
GR1387.7 2104.74 1388.31 2115.79  1387.9 2130.95 1388.38 2161.63 1389.74 2175.57
GR1393.9 2197.15 1393.59 2202.58  1393.5    2250
ET                  7.1                            1960    2165
X1  3300      15    1750    2250     300     300     300
CI2119.1 1383.63   0.035       4       4      40    0.01
CI  2049 1386.63   0.035       8       8     150    0.01
GR1394.9    1750 1395.09 1774.57 1394.19 1781.81 1392.69 1806.74  1389.4 1830.93
[illegible]3.9 1851.32 1388.79 1913.21 1388.27 1983.55  1388.7 2016.49  1387.9 2084.39
[illegible].1 2101.96 1388.25 2130.01 1389.81 2169.06 1394.19 2195.37  1394.3    2250
ET                  7.1                            1955    2170
X1  3600      16    1750    2250     304     298     300
CI2118.3 1384.15 305.035       4       4      40    0.01
CI2048.5 1387.15 305.035       8       8     150    0.01
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GR1394.2    1750  1395.4  1773.9 1394.67 1796.99 1391.76 1823.58 1390.14 1846.54
GR1389.2  1923.3 1388.98 2023.94 1389.35 2058.77  1389.1 2074.13 1388.47 2095.39
GR1388.8 2120.82 1389.44 2150.36 1394.64 2189.78 1396.52 2197.03 1394.86 2210.31
GR1395.2    2250
                    7.1                          1890    2140
X[illegible]5900      13    1750    2250     305     295     300
CI2045.6 1384.71 320.035       4       4      47    0.01
CI  1968 1387.71 320.035       8       8      94    0.01
GR1394.0    1750 1394.87 1797.84  1390.7 1836.32 1390.05 1862.53 1390.37 1884.86
GR1389.8 1971.99 1390.19    2000  1389.3 2033.15 1390.12 2044.86 1390.53 2102.09
GR1391.0 2152.88 1395.62 2202.99  1395.6    2250
ET                  7.1                          1860    2095
X1  4000      14    1730    2230      95     105     100
CI2017.4 1384.89 102.035       4       4      60    0.01
CI  1940 1387.89 102.035       8       8      80    0.01
GR1395.8    1730 1395.91 1747.03 1395.12 1783.34  1390.4 1826.66 1389.99  1863.1
GR1390.0 1952.71 1389.94    1980 1389.26 1992.49  1390.7 2021.85  1391.5 2123.11
GR1392.7 2160.23 1395.97 2181.02 1394.23 2210.34  1394.2    2230
NC  0.04    0.04    0.03
ET                  7.1                          1870    2100
X1  4100      13    1750    2250     102      98     100
CI2002.7 1385.06 100.035       4       4      72    0.01
CI  1929 1388.06 100.035       8       8      62    0.01
GR1395.6    1750 1395.29 1760.75  1395.3 1803.96 1391.35 1837.06 1390.84 1872.95
GR1391.6 1951.84 1389.66 1967.24  1389.5 1999.58 1389.75 2031.06 1391.73  2045.3
GR1392.0  2102.3 1393.97 2188.47  1394.4    2250
NC                          0.3     0.5
* DOWNSTREAM FACE OF 36TH STREET CULVERT
* 6-12'x8'CONCRETE BOX CULVERT
[illegible]DWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
                    7.1                          1880    2100
X1  4190      41 1962.97 2016.12      92      88      90
CI  2000 1385.23  87.035       4       4      76    0.01
CI                                         0.01    0.01
X3    10
GR1395.5    1750 1395.43 1765.79 1395.51 1772.58  1395.4 1788.36 1395.41 1794.56
GR1395.9 1796.56 1395.43 1801.76 1394.25 1810.31 1393.48 1815.32 1392.37 1826.56
GR1391.2 1838.79 1391.41 1846.56 1391.62 1866.04 1391.63  1880.5 1391.68  1883.8
GR1391.8 1906.99 1391.87 1931.62 1391.86 1946.17 1391.63 1962.97 1391.34  1973.2
GR1391.3 1980.49 1391.54 1989.34 1391.92 1991.85 1392.21 1997.87 1392.53 2016.12
GR1393.1 2066.27 1392.91 2082.04 1392.98 2116.12 1393.06 2130.97 1393.07 2143.46
GR1393.3 2155.84 1393.44 2159.36 1393.58 2179.75 1394.03 2186.24 1394.47 2193.86
GR1394.7 2201.87 1394.84 2211.54 1394.68 2221.18  1394.5 2227.31 1394.62  2234.1
GR1394.7    2250
SC 6.013     0.3    2.63       0       8      12      66    11.4 1385.42 1385.22
* UPSTREAMFACE OF 36TH STREET CULVERT
* 6-12'x8'CONCRETE BOX CULVERT
* ROADWAY OVERFLOW OCCURS  DURING THE 100-YEAR EVENT
ET                  7.1                          1890    2100
X1  4256      36 1959.69 2041.79      69      63      66
CI  2000 1385.42  66.025       4       4      76    0.01
X2                    2         1393.39
X3    10
BT   -10 1819.99 1392.82       0    1820  1393.5       0    1925  1394.5       0
B[illegible]      1946.9 1394.67       0    1947 1396.67       0    2000 1396.81       0
[illegible]         2053  1396.6       0  2053.1  1394.6       0    2075  1394.4       0
BT       2147.73 1393.77       0
GR1396.4    1750 1395.96 1771.49 1395.95 1774.76 1395.52 1787.18 1395.94 1796.05
GR1394.8 1800.72 1393.55 1808.33 1392.82 1819.99 1392.46 1834.42  1392.1  1855.6
GR1392.4 1876.29 1392.44 1877.35 1392.28 1897.95  1392.3 1929.39 1392.85 1959.69
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GR1393.2 1987.55 1393.32 1994.42 1393.24 1999.46 1393.37  2003.5 1393.17 2027.24
GR1393.2 2041.79 1393.09 2052.72 1393.23    2075 1393.44  2095.1 1393.48 2101.75
GR1393.5 2117.84 1393.56 2125.07 1393.77 2147.73 1394.19 2157.19 1394.17    2162
GR1393.8 2180.47 1395.01 2195.29 1395.08 2207.47 1394.51 2225.04 1394.76 2237.62
[illegible].1    2250
E[illegible]                 7.1                          1940    2100
X1  4400      14    1750    2250     149     141     145
CI  2000 1385.86 147.025       4       4      72    0.01
CI  2026 1385.86 147.025       4       4      40    0.01
GR1395.1    1750 1394.45 1755.97 1394.16 1784.39  1393.8 1839.18 1394.15 1868.69
GR1394.0 1952.69 1392.42 1975.34 1392.31 2015.92  1393.9 2044.57 1393.99 2073.99
GR1394.4 2172.58 1396.13 2194.99 1396.45 2220.29  1395.8    2250
NC                          0.1     0.3
ET                           7.1                          1965    2115
X1  4500      15    1700    2270     102      98     100
CI  2000 1386.17 100.025       4       4      65    0.01
CI  2056 1386.17 100.025       4       4      56    0.01
GR1397.2    1700 1395.59 1768.42 1395.45 1852.33 1395.62 1897.79  1396.4 1913.92
GR1395.6 1950.65 1392.39 1975.16 1392.31 2021.91 1394.21 2050.07  1394.5 2082.25
GR1394.8 2162.39 1395.38 2181.35 1396.69 2199.14 1396.94 2226.35  1397.1    2270
ET                           7.1                          1975    2080
X1  4573      44    1750    2250      75      71      73
CI  2000  1386.4  74.035       4       4      65    0.01
CI                                        0.01    0.01
X3     0                  1967.5          2032.5
GR1395.8    1750 1395.94 1763.42 1395.87 1793.42  1395.9 1811.82 1395.91  1823.8
GR1395.8 1828.38 1395.83 1847.89 1395.94 1870.75  1395.9 1882.63 1395.75 1894.46
GR1395.9 1903.33 1396.46 1925.48 1396.07 1932.16  1396.2 1939.44 1396.54 1959.68
GR1396.3  1987.5 1397.11 1993.04 1391.79 1996.32  1390.3 1999.02 1391.39 2003.43
[illegible]9.9  2007.9 1390.32 2015.63  1391.2 2021.56  1391.9 2027.89 1391.83 2029.35
[illegible]3.0 2035.33 1394.34  2044.7 1394.46 2047.14  1394.6 2059.81 1394.63 2068.52
GR1395.1 2082.63 1395.11 2101.09 1395.29 2117.16  1395.1 2136.65 1395.22  2153.8
GR1395.3 2163.33  1395.5 2184.28 1395.96 2192.28  1396.4 2201.68 1396.43 2211.06
GR1396.6  2223.4 1396.52 2226.18 1396.57 2237.49  1396.4    2250
*  DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
*  EXISTING4-10'x8 ' CBC PLUS 2-10'X8'
QT     2    2400    2400
ET                           7.1                          1975    2080
X1  4574      44    1750    2250       1       1       1
CI  2000 1387.55  74.035       4       4      65    0.01
X3    10                  1967.5          2032.5
GR1395.8    1750 1395.94 1763.42 1395.87 1793.42  1395.9 1811.82 1395.91  1823.8
GR1395.8 1828.38 1395.83 1847.89 1395.94 1870.75  1395.9 1882.63 1395.75 1894.46
GR1395.9 1903.33 1396.46 1925.48 1396.07 1932.16  1396.2 1939.44 1396.54 1959.68
GR1396.3  1987.5 1397.11 1993.04 1391.79 1996.32  1390.3 1999.02 1391.39 2003.43
GR1389.9  2007.9 1390.32 2015.63  1391.2 2021.56  1391.9 2027.89 1391.83 2029.35
GR1393.0 2035.33 1394.34  2044.7 1394.46 2047.14  1394.6 2059.81 1394.63 2068.52
GR1395.1 2082.63 1395.11 2101.09 1395.29 2117.16  1395.1 2136.65 1395.22  2153.8
GR1395.3 2163.33  1395.5 2184.28 1395.96 2192.28  1396.4 2201.68 1396.43 2211.06
GR1396.6  2223.4 1396.52 2226.18 1396.57 2237.49  1396.4    2250
SC 6.013     0.2    2.63     500       8      10      72    11.4 1387.69 1387.55
* UPSTREAMFACE OF SWEETWATER AVENUE CULVERT
* EXISTING4-10'x8 ' CBC PLUS 2-10'X8'
NC  0.04    0.04   0.035
E[illegible]                 7.1                          1980    2035
[illegible]46      39    1750    2250      74      70      72
CI  2000 1387.69  74.035       4       4      65    0.01
X2                     2            1398
X3    10                  1967.5          2032.5
GR1395.9    1750 1395.97 1772.27 1396.08  1790.4  1396.1  1843.7 1396.12 1856.75
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GR1395.9 1866.58 1396.02 1869.14 1395.84  1880.5  1395.9 1901.71  1395.9 1921.82
GR1395.9 1925.66 1395.95  1946.5 1395.31 1966.28  1392.5 1976.44 1391.51 1979.59
GR1390.9  1992.4  1390.9 1999.72 1397.39  2005.8  1396.8 2010.32 1396.36 2012.87
GR1396.4 2020.14 1396.46 2041.68 1396.29 2068.85  1396.6 2073.46 1396.69  2080.7
[illegible].0 2088.77 1395.78 2093.11 1395.97 2103.89    1396 2121.59 1396.11 2144.33
G[illegible]96.0 2162.46 1396.07 2177.19 1396.64 2188.42  1396.7 2205.23 1396.71 2221.11
GR1396.8 2223.21 1396.75 2228.66 1396.88 2243.53  1396.8    2250
ET                   7.1                            1945    2055
X1  4800      17    1750    2250     157     151     154
CI2000.9 1388.11 152.035       4       4      50    0.01
X3     0                    1927            2075
GR  1398    1544    1398    1614    1397    1710  1396.6    1750 1396.52 1807.92
GR1396.2 1865.03 1396.43 1897.93 1396.26 1949.28  1393.4 1965.96 1393.69 1987.18
GR1393.3 2031.17 1395.98 2044.35  1396.9  2063.9  1397.0 2112.28 1396.23 2200.32
GR1396.7    2250    1398    2420
NC                           0.1     0.3
ET                   7.1                            1945    2055
X1  5000      15    1730    2230     208     192     200
CI2002.1 1388.66 202.035       4       4      50    0.01
X3     0                    1934            2070
GR1397.7    1730 1398.07 1757.14  1396.9 1785.16 1397.03 1846.14    1397 1924.43
GR1394.0 1944.09  1393.8 1973.29  1394.3 2013.33 1398.46 2049.04  1398.7 2098.09
GR1396.0 2116.97 1395.63 2137.72 1396.76 2178.45 1397.56 2205.96  1397.2    2230
ET                   7.1                            1945    2050
X1  5300      13    1680    2180     309     291     300
CI1999.4 1389.49 306.035       4       4      50    0.01
X3     0                  1941.5          2057.5
GR1398.4    1680 1397.81 1715.55  1397.6 1791.13 1397.82 1841.87 1395.45  1880.1
GR1396.0 1899.79  1395.5 1918.51  1394.6 1962.51 1395.17 2013.02  1397.4  2028.8
[illegible]3.1 2067.51 1397.99 2100.77    1398    2180
[illegible]                  7.1                            1945    2060
X1  5400      16    1670    2170     102      98     100
CI1999.4 1389.76 102.035       4       4      50    0.01
X3     0                  1941.5          2057.5
GR1399.4    1670 1398.98 1707.95 1397.58 1769.63 1397.86 1800.72 1397.18 1848.43
GR  1398 1880.47 1398.49 1939.19  1397.1 1948.98 1395.35 1983.21 1395.56  2037.6
GR1397.1 2048.74 1398.26 2075.91 1398.06 2120.88 1399.06  2134.9 1398.43 2144.26
GR1398.3    2170
ET                   7.1                            1955    2050
X1  5700      16    1655    2155     305     295     300
CI1999.3 1390.59 306.035       4       4      50    0.01
X3     0                    1941            2057
GR1397.9    1655 1397.85  1684.1 1398.29 1732.32 1398.79 1761.79 1401.49 1775.76
GR1398.6 1784.11 1398.75 1856.28 1400.18 1868.62 1399.46 1904.35 1397.59 1920.98
GR1396.8 1932.77 1396.12 1997.39 1398.56  2022.4 1399.11 2089.75 1399.32 2121.15
GR1398.8    2155
ET                   7.1                            1950    2050
X1  6000      16    1645    2145     310     290     300
CI2000.8 1391.42 307.035       4       4      50    0.01
X3     0                    1943            2059
GR1401.2    1645 1401.15 1675.54 1399.44 1699.45 1399.29 1709.68 1400.24 1720.04
GR1399.6 1763.67  1399.3 1786.67 1399.81 1845.16 1398.41 1860.53 1397.24 1912.79
GR1399.5 1956.47 1399.19 1966.98 1400.01 2002.26  1399.5 2025.72 1399.86 2088.49
GR1399.7    2145
*[illegible]'AN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
[illegible]                  7.1                            1950    2050
X1  6200      13    1635    2135     203     197     200
CI1996.9 1391.98 203.035       4       4      50    0.01
X3     0                    1936            2058
GR1400.5    1635 1400.22  1641.7  1400.2 1729.65 1400.45 1831.28 1399.06 1849.14
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GR1399.3 1904.49 1398.74 1934.25  1398.8 1986.26 1400.64 2022.68 1400.41 2067.73
GR1401.0 2079.61 1400.79 2094.85  1400.9    2135
ET                   7.1                          1950    2050
X1  6500      15    1665    2165     308     292     300
[illegible].8 1392.82 306.035       4       4      50    0.01
X[illegible]  0                   1948            2054
GR1402.4    1665  1401.8 1669.99 1401.09 1702.37 1401.04  1778.6  1401.8 1840.48
GR1400.6  1867.5 1399.17 1899.73 1399.72 1929.38 1399.78 1956.12    1402 1982.73
GR1402.1 2029.53  1401.2 2080.16  1401.6 2109.68 1400.89 2142.02  1401.8    2165
ET                   7.1                          1950    2050
X1  6700      18    1705    2205     200     200     200
CI2001.6 1393.37 202.035       4       4      50    0.01
X3     0                   1943            2060
GR1404.3    1705 1402.48 1746.94  1403.2 1758.01 1402.49 1767.51 1402.79 1791.25
GR1403.2 1820.53 1402.77  1842.2  1402.8 1897.94 1401.34 1917.14 1401.32 1952.93
GR1401.5 2002.75 1402.46 2012.84  1402.6 2078.46 1402.83 2123.04 1401.68 2140.76
GR1402.9 2146.48 1401.35 2184.17  1402.2    2205
ET                   7.1                          1955    2045
X1  7000      16    1760    2260     300     300     300
CI  1999 1394.19 300.035       4       4      50    0.01
GR1405.5    1760 1403.86  1773.2  1403.4 1800.43 1403.14 1833.58  1403.2 1896.62
GR1403.7 1929.69 1402.14 1956.06 1402.13 2009.95 1402.88 2066.78 1403.27 2083.74
GR1404.2 2145.35 1403.67 2184.97 1404.13 2199.78 1403.39 2207.45 1402.16 2237.88
GR1403.3    2260
ET                   7.1                          1955    2045
X1  7400      15    1815    2315     400     400     400
CI2000.5 1395.28 400.035       4       4      50    0.01
GR1406.5    1815 1405.61 1863.39 1404.96 1891.23  1404.9 1955.29  1404.7 1998.94
GR1403.1 2049.22 1403.43 2101.21 1404.65 2122.18 1405.18 2192.19  1404.9 2241.07
[illegible]6.0 2246.99 1404.75 2251.02 1405.69 2256.25 1404.16 2274.59  1404.4    2315
                     7.1                          1950    2060
X1  7500      13    1825    2325     100     100     100
CI1998.9 1395.55 100.035       4       4      56    0.01
GR1405.9    1825 1405.46 1866.36  1405.6 1883.11 1405.43 1991.35 1404.16 2025.71
GR1403.5 2057.51 1404.12 2120.74  1405.9 2134.04 1405.79 2179.72 1404.98 2251.95
GR1405.6 2269.05 1404.14  2300.5  1404.9    2325
NC  0.04    0.04   0.035     0.3     0.5
*
*  DOWNSTREAM FACE OF THUNDERBIRD ROAD  CULVERT
*
ET                   7.1                          1970    2025
X1  7569      23    1460 3224.85      69      69      69
CI  1991 1395.74  77.025       4       4      58    0.01
X3    10                   1962            2020
GR  1407    1460    1407 1715.07    1407  1728.1    1406 1863.49    1405 1983.06
GR  1404 2033.73    1404 2123.07    1405 2276.62    1405 2286.71    1405 2448.38
GR  1406 2627.64    1407    2753    1407 2757.17    1407 2845.37    1407 2867.28
GR  1407 2867.82    1407 2867.95    1407 2870.79    1407 2871.89    1407 2874.19
GR  1408 2912.98    1408 2979.37    1411 3224.85
SC 2.013     0.3    2.63     150    7.63      28     127    11.4 1394.46 1394.08
*
*  UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
*
ET                   7.1                          1495    1565
X[illegible]696      66  650.03 3118.14     128     128     128
[illegible]530 1396.12 110.025       4       4      58    0.01
X2                     2 1402.22 1405.41
X3    10                   1501            1559
GR  1408  650.03    1407    1110    1406 1408.18    1406 1416.55    1406 1432.02
GR  1406 1466.92    1406 1513.59    1405 1583.82    1404  1631.4    1404 1633.08
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GR  1404 1636.15    1404 1639.74    1404 1639.92    1404 1641.59    1405  1685.4
GR  1406 1705.15    1406 1712.36    1406 1712.52    1406 1724.07    1406 1727.28
GR  1407 1729.23    1406 1729.51    1406 1731.46    1406 1731.95    1406 1732.66
GR  1407 1734.57    1406 1734.72    1406 1746.02    1406 1766.04    1406 1819.57
[illegible]07 1826.92    1407 1826.97    1407 1835.41    1407 1839.21    1407 1839.41
G[illegible]407 1839.62    1407 1839.66    1407 1839.68    1407 1840.25    1407 1840.42
GR  1407 1840.73    1407 1841.01    1407 1885.56    1407 1951.21    1406 1966.77
GR  1406 2000.05    1406 2144.24    1406 2149.31    1406  2215.1    1406  2218.3
GR  1407 2423.85    1408 2608.05    1409 2636.71    1409 2689.16    1410 2717.21
GR  1411 2749.75    1411 2780.34    1410 2839.54    1409 2948.81    1409 2961.02
GR  1410 2983.04    1411 2991.19    1412 2999.34    1413 3030.61    1413  3031.1
GR  1412 3118.14
ET                    7.1                             1940    2050
X1  7800      70  864.07 3201.38     104     104      104
CI  2000 1396.44 113.025       4       4      60     0.01
GR  1408  864.07    1407    1230    1407 1295.55    1407 1384.65    1407  1417.6
GR  1407 1534.46    1407 1547.78    1407 1554.15    1407 1568.22    1407 1569.74
GR  1406 1691.81    1405 1708.21    1405 1779.76    1406 1812.02    1407 1964.72
GR  1408 2000.96    1408 2055.49    1407 2072.04    1406 2087.02    1406 2104.05
GR  1407 2128.47    1407 2194.27    1407 2195.38    1407 2199.62    1407  2200.1
GR  1407 2209.13    1407 2209.72    1407 2210.02    1407 2210.04    1407 2218.49
GR  1407 2218.96    1407 2236.11    1407 2236.22    1407 2248.89    1407  2250.5
GR  1407 2250.57    1407 2251.85    1407 2251.92    1407 2252.06    1407 2254.36
GR  1407 2254.65    1407 2255.04    1407 2255.06    1407 2257.73    1407 2257.96
GR  1407 2259.67    1407 2259.68    1407 2259.94    1407 2262.61    1407  2263.6
GR  1407 2267.66    1407 2272.53    1407  2273.6    1407 2277.66    1407 2278.63
GR  1407 2430.16    1407 2463.72    1408  2485.7    1408 2553.48    1408 2570.52
GR  1408 2574.48    1408 2618.88    1408 2623.82    1408 2640.43    1408 2757.81
GR  1408 2771.01    1408 2807.13    1409 2877.21    1410 3084.48    1411 3201.38
*
[illegible]NSTREAM FACE OF SR51 CULVERT
*
ET                    7.1                             1930    2030
X1  7987      90  608.19 2984.31     197     197      197
CI  1479 1397.02 200.025       4       4      46     0.01
X3    10                    1456            1502
GR  1409  608.19    1409    1110    1409 1124.92    1408 1227.14    1407 1245.35
GR  1407  1246.3    1408  1275.7    1408 1397.98    1407 1532.65    1406  1553.3
GR  1406 1636.36    1407 1783.34    1407 1798.67    1408 1825.84    1409 1849.98
GR  1409 1858.59    1408  1913.7    1407 1926.73    1407 1957.16    1408 1972.32
GR  1409 1990.28    1409 2014.39    1409 2014.72    1409 2014.82    1409 2017.75
GR  1408 2041.98    1408  2121.1    1408 2225.63    1408 2269.22    1408 2370.04
GR  1408 2379.67    1409 2403.37    1410  2404.9    1411 2406.56    1411 2555.99
GR  1411 2621.66    1410 2648.43    1410 2648.52    1409  2651.9    1409 2651.93
GR  1409 2652.47    1409 2653.86    1409 2653.93    1409 2653.94    1410 2654.16
GR  1410 2654.34    1409 2654.82    1409 2654.98    1409 2655.96    1409 2656.14
GR  1409  2656.5    1409 2656.51    1409 2657.37    1409 2657.61    1409 2657.62
GR  1410 2659.55    1410 2659.75    1410 2663.01    1410 2663.67    1410 2676.27
GR  1410 2684.89    1410 2684.97    1410 2685.44    1410 2685.58    1410 2685.78
GR  1410 2687.56    1410 2687.94    1410  2690.3    1410 2690.86    1410  2690.9
GR  1410 2691.09    1410 2691.14    1410 2691.28    1410 2706.97    1410 2709.03
GR  1410 2714.06    1410  2716.3    1410 2716.34    1410 2716.37    1410 2717.28
GR  1410 2718.04    1410 2719.29    1410  2723.4    1410 2729.71    1410 2782.26
GR  1410 2810.17    1410  2844.2    1411  2855.4    1411 2973.49    1411 2984.31
N[illegible]025   0.025   0.025
[illegible]013     0.3    2.63     150    5.72      23     318    11.4 1398.24 1397.28
*
* UPSTREAM  FACE OF SR51 CULVERT
*
ET                    7.1                             1970    2055
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X1	8262	44	512.92	2649.24	275	275	275				
CI	1488	1397.98	270.025	4	4	46	0.01				
X2			2	1403.08	1409.1						
X3	10			1465		1511					
[illegible]	11	512.92	1409	1030	1408	1106.32	1408	1130.75	1409	1138.89	
GR	1409	1230.46	1408	1384.81	1407	1406.51	1407	1510.06	1408	1534.86	
GR	1408	1538.06	1408	1538.85	1408	1545.46	1408	1547.42	1408	1563.13	
GR	1408	1605.7	1409	1673.82	1410	1722.35	1410	1728.72	1410	1729.33	
GR	1410	1741.22	1409	1786.13	1408	1789.24	1408	1931.41	1409	2081.75	
GR	1410	2105.48	1410	2107.34	1409	2172.49	1409	2200.24	1410	2206.82	
GR	1411	2216.61	1412	2276.9	1412	2278.96	1412	2281.96	1412	2292	
GR	1411	2371.28	1411	2421.75	1411	2449.27	1411	2492.46	1411	2546.63	
GR	1411	2557.05	1411	2631.01	1411	2641.92	1412	2649.24			
ET			7.1				1955	2045			
X1	8400	67	856.92	2679.27	130	130	130				
CI	2000	1398.4	130.035	4	4	50	0.01				
GR	1411	856.92	1410	1110	1411	1233.95	1411	1234.34	1411	1245.45	
GR	1411	1248.77	1411	1254.92	1411	1256.32	1411	1261.21	1411	1262.1	
GR	1411	1262.91	1411	1263.59	1411	1264.28	1411	1279.11	1410	1319.63	
GR	1409	1333.17	1409	1354.71	1410	1466.57	1409	1505.27	1408	1630.85	
GR	1407	1638.84	1407	1722.75	1408	1745.25	1409	1878.81	1409	1885.4	
GR	1409	1921.09	1410	1947.45	1410	2004.86	1409	2014.93	1408	2026.74	
GR	1408	2036.58	1409	2116.52	1410	2126.21	1410	2127.76	1410	2129.14	
GR	1410	2129.47	1410	2132.07	1410	2132.57	1410	2134.21	1410	2134.28	
GR	1410	2134.32	1410	2134.92	1410	2135.33	1410	2138.68	1410	2142.3	
GR	1410	2143.89	1410	2147	1410	2147.94	1410	2209.77	1410	2211.84	
GR	1410	2213.42	1410	2213.84	1410	2215.75	1410	2215.76	1410	2215.86	
GR	1410	2216.06	1410	2216.07	1410	2273.45	1410	2281.58	1409	2393.09	
GR	1409	2395.42	1410	2432.15	1411	2546.36	1412	2656.46	1412	2660.77	
[illegible]	[illegible]12	2676.94	1412	2679.27							
[illegible]			7.1				1955	2045			
X1	8600	90	1133.86	3179.03	200	200	200				
CI	2020	1399	200.025	4	4	50	0.01				
GR	1412	1110	1412	1133.86	1412	1233.13	1412	1241.37	1412	1253.24	
GR	1412	1254.97	1412	1258.56	1412	1263.13	1412	1274.23	1412	1281.06	
GR	1412	1304.18	1412	1306.13	1412	1318.08	1412	1318.09	1412	1318.51	
GR	1412	1319.78	1412	1322.69	1412	1323.71	1412	1326.44	1412	1327.42	
GR	1412	1330.15	1412	1330.22	1412	1330.69	1412	1331	1412	1332.85	
GR	1412	1332.86	1412	1333.04	1412	1333.13	1411	1373.31	1411	1414.28	
GR	1411	1504.46	1411	1533.14	1411	1613.37	1410	1647.95	1410	1658.97	
GR	1411	1670.92	1411	1748.67	1410	1771.49	1410	1774.05	1410	1796.22	
GR	1410	1796.5	1410	1908.77	1409	1915.23	1409	1949.99	1409	1953.25	
GR	1409	1953.36	1409	1953.37	1409	1953.47	1409	1953.47	1409	1954.25	
GR	1410	1954.28	1408	2029.92	1409	2062.65	1409	2146.76	1409	2148.06	
GR	1409	2152.41	1409	2156.07	1409	2168.46	1409	2173.63	1409	2181.99	
GR	1409	2182.68	1410	2229.65	1410	2308.33	1409	2318.15	1409	2357.34	
GR	1410	2375.91	1409	2490.42	1409	2498.84	1409	2499.7	1409	2538.08	
GR	1410	2592.52	1411	2723.15	1411	2726.46	1411	2886.31	1412	2950.45	
GR	1412	2950.46	1412	2950.74	1412	2950.75	1412	2950.78	1412	2951.06	
GR	1412	2953.02	1412	2953.09	1412	2953.35	1412	2956.5	1411	3015.15	
GR	1411	3015.46	1412	3105.83	1412	3142.29	1412	3156.35	1413	3179.03	
ET			7.1				1955	2045			
X1	8690	90	1080	3203.86	90	90	90				
CI	2000	1399.27	90.025	4	4	50	0.01				
[illegible]	[illegible]13	1080	1413	1201.62	1412	1270.57	1411	1381.7	1411	1432.29	
[illegible]	[illegible]411	1622.83	1411	1772.29	1410	1933.62	1409	1960.23	1409	2053.43	
GR	1411	2290.35	1411	2299.96	1410	2319.37	1409	2340.38	1409	2360.47	
GR	1410	2382.57	1411	2461.67	1411	2523.2	1411	2524.9	1411	2525.12	
GR	1411	2526.36	1411	2526.58	1411	2529.38	1411	2530.2	1411	2530.33	
GR	1411	2530.37	1411	2537.17	1411	2539.91	1411	2540.97	1411	2541.15	

GR	1411	2542.9	1411	2543.52	1411	2544.12	1411	2544.22	1411	2545.11
GR	1411	2545.55	1411	2546.35	1411	2548.68	1411	2552.96	1411	2560.56
GR	1411	2577.6	1411	2578.41	1411	2580.89	1411	2581.32	1411	2582.75
GR	1411	2583.1	1411	2584.49	1411	2585.46	1411	2589.83	1411	2589.84
[illegible]	[illegible]11	2590.97	1411	2591.42	1411	2593.72	1411	2593.88	1411	2594.78
[illegible]	[illegible]411	2594.8	1411	2594.91	1411	2595.64	1411	2600.2	1411	2600.27
GR	1411	2602.5	1411	2602.56	1411	2604.35	1411	2604.45	1411	2607.13
GR	1411	2607.3	1411	2611.77	1411	2611.78	1411	2612.45	1411	2612.46
GR	1411	2612.85	1411	2612.85	1411	2613.03	1411	2613.07	1411	2613.63
GR	1411	2613.7	1411	2613.73	1411	2615.7	1411	2616.89	1411	2616.89
GR	1411	2617.19	1411	2617.27	1410	2678.72	1410	2789.04	1412	2990.9
GR	1412	2991.85	1411	3075.65	1411	3077.75	1412	3109.82	1412	3203.86
ET			7.1				1930	2070		
X1	8850	90	1020	3253.96	160	160	160			
CI	2000	1408	160.025	4	4	65	0.01			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
[illegible]	[illegible]411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
[illegible]	[illegible]411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
ET			7.1				1930	2070		
X1	8851	90	1020	3253.96	1	1	1			
CI						0.01				
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
GR	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
[illegible]			7.1				1930	2070		
[illegible]	[illegible]00	90	950	3172.52	150	150	150			
GR	1414	950	1414	1136.81	1413	1315.28	1413	1501.06	1413	1692.5
GR	1412	1719.17	1412	1750.48	1412	1750.92	1412	1751.69	1412	1752.06
GR	1412	1752.73	1412	1753.22	1412	1754.17	1412	1754.55	1412	1755.32
GR	1412	1759.46	1412	1771.05	1412	1771.42	1412	1773.49	1412	1773.58

GR	1412	1773.87	1412	1774.19	1412	1775.87	1412	1776.79	1412	1778.84
GR	1412	1780.78	1412	1781.45	1412	1782.97	1412	1783.88	1412	1848.08
GR	1411	1902.72	1410	1933.54	1409	1983.96	1409	1984.11	1409	1985.19
GR	1409	1985.26	1409	1985.37	1409	1985.38	1409	1986.05	1409	1986.1
[illegible]	[illegible]09	1986.93	1409	1987.01	1409	2001.17	1409	2004.4	1409	2008.97
[illegible]	[illegible]409	2011.35	1409	2016.04	1409	2018.72	1410	2054.46	1411	2270.97
GR	1411	2337.3	1411	2383.58	1412	2399.21	1412	2485.56	1411	2534.15
GR	1411	2544.46	1411	2546.14	1411	2548.4	1411	2548.68	1411	2549.64
GR	1411	2550.31	1411	2551.99	1411	2552.61	1411	2553.14	1411	2555.46
GR	1411	2557.01	1411	2557.87	1411	2558.14	1411	2562.73	1411	2566.32
GR	1411	2574.93	1411	2581.44	1412	2656.61	1412	2657.17	1412	2665.6
GR	1412	2665.66	1412	2665.76	1412	2668.87	1412	2792.48	1412	2898.1
GR	1412	2904.48	1412	2923.58	1412	2928.66	1412	2965.87	1411	3035.9
GR	1411	3036	1411	3037.04	1411	3037.04	1412	3058.29	1413	3172.52
ET			7.1				1930	2070		
X1	9340	39	970	3055	365	310	340			
GR	1415	970	1416	990	1416	1005	1415	1160	1415	1215
GR	1416	1315	1416	1340	1415	1385	1414	1480	1413	1680
GR	1413	1690	1414	1695	1414	1697	1413	1700	1413	1710
GR	1413	1810	1412	1860	1411	1870	1410	1910	1410	1960
GR	1411	2050	1412	2150	1413	2180	1413	2210	1412	2230
GR	1411	2240	1411	2295	1412	2297	1413	2305	1414	2345
GR	1414	2370	1413	2420	1412	2430	1412	2700	1412	2720
GR	1412	2740	1412	2800	1413	2985	1413	3055		
ET			7.1				1970	2110		
X1	9731	90	760	2773.41	390	390	390			
GR	1418	760	1418	922.34	1418	922.4	1418	922.43	1418	922.43
GR	1418	928.22	1418	928.32	1418	929.93	1418	929.94	1418	930.06
GR	1418	930.53	1418	930.54	1418	930.55	1418	930.61	1418	931.15
[illegible]	[illegible]418	931.15	1418	931.23	1418	944.85	1418	947.36	1418	950.6
[illegible]	[illegible]418	951.25	1418	956.72	1418	958.21	1418	958.21	1418	958.28
GR	1418	958.56	1418	958.63	1418	958.68	1418	958.69	1418	958.77
GR	1418	958.79	1418	964.02	1418	965.06	1418	965.36	1418	965.86
GR	1418	965.95	1418	968.93	1418	969.48	1418	969.73	1418	969.78
GR	1418	970.35	1418	970.45	1418	973.91	1418	974.21	1418	977.24
GR	1418	977.5	1418	977.7	1417	1006.47	1417	1047.64	1417	1050.75
GR	1417	1060.43	1417	1063.48	1417	1068.87	1417	1070.37	1417	1072.21
GR	1417	1074.65	1417	1078.54	1417	1082.36	1417	1089.56	1417	1095.1
GR	1417	1111.87	1417	1112.38	1417	1115.19	1417	1117.85	1417	1136.64
GR	1417	1136.64	1417	1137.18	1417	1137.31	1416	1220.86	1415	1306.6
GR	1415	1321.67	1416	1349.77	1416	1452.86	1415	1776.17	1414	1804.87
GR	1413	1931.54	1412	1948.34	1411	1967.28	1410	1985.74	1410	2059.52
GR	1411	2094.96	1412	2165.75	1413	2563.47	1413	2566.11	1413	2691.1
GR	1413	2773.41	1413	2773.6	1413	2774.13	1413	2774.63	1413	2774.65
ET			7.1				1980	2120		
X1	9930	90	810	2599.07	203	203	203			
GR	1419	810	1419	947.42	1418	1088.3	1418	1251.74	1418	1253.15
GR	1418	1255.5	1418	1258.42	1418	1258.54	1418	1258.84	1418	1259.77
GR	1418	1261.36	1418	1262.77	1418	1266.01	1418	1269.27	1417	1329.2
GR	1416	1356.04	1415	1384.98	1415	1403.54	1416	1413.27	1417	1422.94
GR	1417	1457.51	1417	1458.08	1417	1484.49	1416	1735.65	1415	1870.22
GR	1414	1882.6	1414	1884.75	1414	1920.8	1413	1940.15	1412	1965.06
GR	1411	1985.36	1411	2054.46	1412	2135.63	1413	2174.95	1414	2205.27
GR	1414	2254.2	1414	2254.82	1414	2255.03	1414	2258.78	1414	2260.2
[illegible]	[illegible]414	2262.39	1414	2263.11	1414	2263.82	1414	2265.21	1414	2267.2
[illegible]	[illegible]414	2269.28	1414	2271.46	1414	2272.12	1414	2272.7	1414	2275.18
GR	1414	2278.3	1414	2278.35	1414	2278.38	1414	2279.18	1414	2280.06
GR	1414	2280.07	1414	2280.07	1414	2280.23	1414	2280.4	1414	2280.4
GR	1414	2280.4	1414	2280.61	1414	2280.83	1414	2281.51	1414	2282.3
GR	1414	2284.42	1414	2287.41	1414	2287.8	1414	2288.44	1414	2289.99

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GR  1414 2292.95    1414 2293.08    1414 2293.38    1414 2293.71    1414 2294.46
GR  1414 2294.67    1414 2295.16    1414 2297.89    1414 2306.33    1414 2310.05
GR  1414 2312.76    1414 2316.49    1414  2319.2    1414 2326.43    1414 2327.11
GR  1415 2358.47    1415 2379.63    1414 2428.07    1413 2506.01    1413 2599.07
E                    7.1                             1970    2110
X   120      24     1140    2590     193     193     193
GR  1418    1140    1418    1500    1417    1530    1417    1540    1417    1625
GR  1417    1760    1416    1790    1415    1815    1414    1860    1413    1870
GR  1412    1880    1412    1940    1413    2030    1414    2180    1415    2270
GR  1415    2290    1414    2300    1413    2380    1412    2390    1412    2410
GR  1413    2430    1414    2470    1415    2490    1416    2590
ET                   7.1                             1930    2070
X1 10600       6    1670    2170     480     480     480
GR  1418    1670    1417    1740    1417    1830    1416    1920    1417    2170
GR  1418    2200
EJ
T1      INDIAN BEND WASH - CHANNEL IMPROVEMENTS,FILE: IBW_CHI.DAT(100-YEAR HYDRAULICS)
T2      40TH STREET TO ACOMA ROAD
J1            3                                         6000 1383.78
J2    15             -1                                   -6
ER
```

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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    09JAN98    TIME   09:03:02 *
 *****************************************
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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1

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THIS RUN EXECUTED 09JAN98 09:03:02

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*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************
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```
T1      INDIAN BEND WASH - CHANNEL IMPROVEMENTS,FILE: IBW_CHI.DAT(100-YEAR HYDRA
T2      40TH STREET TO ACOMA ROAD
T3      FLOWS FROM FIS STUDY

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                                                         6000   1383.58

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1                 -1                                                -6


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    110                 150                 200

      0.04       0.04       0.035       0.1         0.3
 BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
 MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
 UPSTREAM OF 40TH STREET
 A LOW FLOW FJORD
ET                          7.1                                       1765       2195
```

```
BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
UPSTREAM OF 40TH STREET
A LOW FLOW FJORD
   1140       11     1750     2250
  2011.1  1379.87    0.035        4        4       40     0.01
GR 1384.3     1750   1381.9  1775.43   1381.4  1839.04  1379.98   1936.6   1380.7  1983.43
GR 1378.8     2000  1380.28  2014.39  1380.54  2051.73  1383.04   2205.7  1387.28  2219.72
GR 1388.9     2250

ET                     7.1                                1850     2150
X1    1300       16     1750     2250      100      100      100
CI  2080.6  1380.16    0.035        4        4       40     0.01
GR 1387.8     1750  1388.45  1770.68  1385.55   1786.5  1384.74  1799.46  1383.07  1856.74
GR 1381.8  1887.29  1380.44  1903.17   1381.2   1973.2  1381.14  2016.92  1380.34  2060.34
GR 1381.8  2088.74  1382.49  2118.63  1384.07  2185.07  1385.39  2206.99  1388.56  2228.78
GR 1388.7     2250

ET                     7.1                                1930     2150
X1    1500       17     1750     2250      200      200      200
CI  2116.3  1380.51    0.035        4        4       40     0.01
CI    2046  1382.21    0.035        8        8      200     0.01
GR 1389.2     1750   1389.4  1773.12  1387.72  1799.56  1386.16  1850.89  1383.85  1872.42
GR 1382.0  1895.26   1383.6     1925  1382.32   1962.4   1383.9     2000  1382.72  2069.69
1
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GR 1382.9  2096.32   1384.4  2109.45  1383.25  2126.25  1384.39  2135.22  1387.56  2198.01
   1389.5  2220.96   1389.4     2250

ET                     7.1                                1960     2160
X1    1800       13     1750     2250      300      300      300
CI  2119.6  1381.03    0.035        4        4       40     0.01
CI  2049.5  1383.49    0.035        8        8      150     0.01
GR 1389.6     1750  1389.16  1762.53   1389.6  1792.73  1387.38  1832.64     1386  1903.39
GR 1385.9     1955  1385.45  1990.27     1386  2009.13  1385.68  2116.55  1386.53  2127.73
GR 1387.4  2171.71  1389.33   2212.5   1390.8     2250

ET                     7.1                                1955     2175
X1    2100       13     1750     2250      300      300      300
CI  2122.6  1381.55    0.035        4        4       40     0.01
CI  2052.5  1384.55    0.035        8        8      150     0.01
GR 1391.5     1750  1391.48  1787.95   1388.7  1828.31  1387.07  1888.31  1387.06   1966.1
GR 1386.5  1986.12  1386.26  2030.61   1386.9  2049.35  1387.45  2113.79  1388.14  2154.02
GR 1389.3  2188.89  1392.22  2216.69   1391.9     2250

ET                     7.1                                1960     2180
X1    2400       13     1750     2250      300      300      300
CI  2125.5  1382.07    0.035        4        4       40     0.01
CI  2055.5  1385.07    0.035        8        8      150     0.01
GR 1392.0     1750  1391.14  1798.58   1390.2  1807.62  1388.41  1859.25  1387.42  1922.94
GR 1387.5  1976.71  1387.13  1998.34   1387.2  2086.8  1387.89  2102.94  1388.52  2143.27
GR 1390.3  2192.62   1391.6  2201.89   1392.5     2250

                       7.1                                1965     2175
X1    2700       14     1750     2250      300      300      300
CI  2124.6  1382.59    0.035        4        4       40     0.01
CI  2054.4  1385.09    0.035        8        8      150     0.01
GR 1392.7     1750  1392.94  1793.99  1391.03  1806.34   1388.3  1898.05  1386.87  1986.56
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GR	1387.6	2023.99	1387.24	2082.12	1387.77	2091.94	1387.6	2112.76	1387.97	2159.09
GR	1391.0	2185.33	1393.41	2201.07	1392.31	2208.72	1393.3	2250		
ET			7.1				1965	2170		
	2900	15	1750	2250	200	200	200			
	2122.8	1382.94	0.035	4	4	40	0.01			
CI	2053	1385.94	0.035	8	8	150	0.01			
GR	1393.3	1750	1392.89	1801.03	1389.81	1819.78	1387.87	1863.1	1387.2	1938.92
GR	1387.6	1970.25	1386.89	1981.15	1387.3	2045.98	1387.67	2100.77	1387.8	2139.68
GR	1389.6	2173.15	1393.81	2198.44	1393.03	2208.91	1393.44	2225.17	1393.6	2250
ET			7.1				1965	2165		
X1	3000	18	1750	2250	100	100	100			
CI	2121.8	1383.11	0.035	4	4	40	0.01			
CI	2052	1386.11	0.035	8	8	150	0.01			
GR	1394.1	1750	1393.92	1796.15	1389.4	1823.52	1388.5	1839.9	1387.88	1910.54
GR	1387.1	1941.45	1387.9	1970.6	1387.1	1983.4	1387.85	2016.18	1387.16	2056.63
GR	1387.7	2104.74	1388.31	2115.79	1387.9	2130.95	1388.38	2161.63	1389.74	2175.57
GR	1393.9	2197.15	1393.59	2202.58	1393.5	2250				

1

ET			7.1				1960	2165		
X1	3300	15	1750	2250	300	300	300			
CI	2119.1	1383.63	0.035	4	4	40	0.01			
CI	2049	1386.63	0.035	8	8	150	0.01			
GR	1394.9	1750	1395.09	1774.57	1394.19	1781.81	1392.69	1806.74	1389.4	1830.93
	1388.9	1851.32	1388.79	1913.21	1388.27	1983.55	1388.7	2016.49	1387.9	2084.39
	1389.1	2101.96	1388.25	2130.01	1389.81	2169.06	1394.19	2195.37	1394.3	2250
ET			7.1				1955	2170		
X1	3600	16	1750	2250	304	298	300			
CI	2118.3	1384.15	305.035	4	4	40	0.01			
CI	2048.5	1387.15	305.035	8	8	150	0.01			
GR	1394.2	1750	1395.4	1773.9	1394.67	1796.99	1391.76	1823.58	1390.14	1846.54
GR	1389.2	1923.3	1388.98	2023.94	1389.35	2058.77	1389.1	2074.13	1388.47	2095.39
GR	1388.8	2120.82	1389.44	2150.36	1394.64	2189.78	1396.52	2197.03	1394.86	2210.31
GR	1395.2	2250								
ET			7.1				1890	2140		
X1	3900	13	1750	2250	305	295	300			
CI	2045.6	1384.71	320.035	4	4	47	0.01			
CI	1968	1387.71	320.035	8	8	94	0.01			
GR	1394.0	1750	1394.87	1797.84	1390.7	1836.32	1390.05	1862.53	1390.37	1884.86
GR	1389.8	1971.99	1390.19	2000	1389.3	2033.15	1390.12	2044.86	1390.53	2102.09
GR	1391.0	2152.88	1395.62	2202.99	1395.6	2250				
ET			7.1				1860	2095		
X1	4000	14	1730	2230	95	105	100			
CI	2017.4	1384.89	102.035	4	4	60	0.01			
CI	1940	1387.89	102.035	8	8	80	0.01			
GR	1395.8	1730	1395.91	1747.03	1395.12	1783.34	1390.4	1826.66	1389.99	1863.1
	1390.0	1952.71	1389.94	1980	1389.26	1992.49	1390.7	2021.85	1391.5	2123.11
	1392.7	2160.23	1395.97	2181.02	1394.23	2210.34	1394.2	2230		
NC	0.04	0.04	0.03							
ET			7.1				1870	2100		
X1	4100	13	1750	2250	102	98	100			

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CI   2002.7   1385.06   100.035       4       4      72    0.01
CI     1929   1388.06   100.035       8       8      62    0.01
GR   1395.6      1750   1395.29  1760.75  1395.3  1803.96  1391.35  1837.06  1390.84  1872.95
GR   1391.6   1951.84   1389.66  1967.24  1389.5  1999.58  1389.75  2031.06  1391.73   2045.3
     1392.0    2102.3   1393.97  2188.47  1394.4     2250

NC                                   0.3     0.5
  DOWNSTREAM FACE OF 36TH STREET CULVERT
  6-12'x8'CONCRETE BOX CULVERT
  ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
ET                          7.1                                  1880     2100
       DOWNSTREAM FACE OF 36TH STREET CULVERT
1
   09JAN98      09:03:02                                                                          PAGE    4


       6-12'x8' CONCRETE BOX CULVERT
       ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
X1     4190        41   1962.97  2016.12      92      88      90
CI     2000   1385.23    87.035       4       4      76    0.01
CI                                                 0.01    0.01
X3       10
GR   1395.5      1750   1395.43  1765.79  1395.51  1772.58   1395.4  1788.36  1395.41  1794.56
GR   1395.9   1796.56   1395.43  1801.76  1394.25  1810.31  1393.48  1815.32  1392.37  1826.56
GR   1391.2   1838.79   1391.41  1846.56  1391.62  1866.04  1391.63   1880.5  1391.68   1883.8
GR   1391.8   1906.99   1391.87  1931.62  1391.86  1946.17  1391.63  1962.97  1391.34   1973.2
GR   1391.3   1980.49   1391.54  1989.34  1391.92  1991.85  1392.21  1997.87  1392.53  2016.12
GR   1393.1   2066.27   1392.91  2082.04  1392.98  2116.12  1393.06  2130.97  1393.07  2143.46
GR   1393.3   2155.84   1393.44  2159.36  1393.58  2179.75  1394.03  2186.24  1394.47  2193.86
     1394.7   2201.87   1394.84  2211.54  1394.68  2221.18   1394.5  2227.31  1394.62   2234.1
     1394.7      2250

SC    6.013       0.3      2.63        0       8      12      66     11.4  1385.42  1385.22
  UPSTREAMFACE OF 36TH STREET CULVERT
  6-12'x8'CONCRETE BOX CULVERT
  ROADWAY OVERFLOW OCCURS  DURING THE 100-YEAR EVENT
ET                          7.1                                  1890     2100
       UPSTREAM FACE OF 36TH STREET CULVERT
       6-12'x8' CONCRETE BOX CULVERT
       ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
X1     4256        36   1959.69  2041.79      69      63      66
CI     2000   1385.42    66.025       4       4      76    0.01
X2                             2            1393.39
X3       10
BT      -10   1819.99   1392.82       0    1820  1393.5       0    1925   1394.5       0
BT            1946.9   1394.67       0    1947  1396.67       0    2000  1396.81       0
BT              2053    1396.6       0  2053.1   1394.6       0    2075   1394.4       0
BT            2147.73   1393.77       0
GR   1396.4      1750   1395.96  1771.49  1395.95  1774.76  1395.52  1787.18  1395.94  1796.05
GR   1394.8   1800.72   1393.55  1808.33  1392.82  1819.99  1392.46  1834.42   1392.1   1855.6
GR   1392.4   1876.29   1392.44  1877.35  1392.28  1897.95   1392.3  1929.39  1392.85  1959.69
GR   1393.2   1987.55   1393.32  1994.42  1393.24  1999.46  1393.37   2003.5  1393.17  2027.24
GR   1393.2   2041.79   1393.09  2052.72  1393.23     2075  1393.44   2095.1  1393.48  2101.75
GR   1393.5   2117.84   1393.56  2125.07  1393.77  2147.73  1394.19  2157.19  1394.17     2162
     1393.8   2180.47   1395.01  2195.29  1395.08  2207.47  1394.51  2225.04  1394.76  2237.62
     1395.1      2250

ET                          7.1                                  1940     2100
X1     4400        14      1750     2250     149     141     145
CI     2000   1385.86   147.025       4       4      72    0.01
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CI     2026    1385.86    147.025        4        4       40     0.01
GR   1395.1       1750    1394.45  1755.97  1394.16  1784.39   1393.8  1839.18  1394.15  1868.69
GR   1394.0    1952.69    1392.42  1975.34  1392.31  2015.92   1393.9  2044.57  1393.99  2073.99
GR   1394.4    2172.58    1396.13  2194.99  1396.45  2220.29   1395.8     2250
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NC                                  0.1      0.3
ET                          7.1                          1965     2115
X1     4500         15       1700     2270      102       98      100
CI     2000    1386.17    100.025        4        4       65     0.01
CI     2056    1386.17    100.025        4        4       56     0.01
GR   1397.2       1700    1395.59  1768.42  1395.45  1852.33   1395.62  1897.79   1396.4  1913.92
GR   1395.6    1950.65    1392.39  1975.16  1392.31  2021.91   1394.21  2050.07   1394.5  2082.25
GR   1394.8    2162.39    1395.38  2181.35  1396.69  2199.14   1396.94  2226.35   1397.1     2270

ET                          7.1                          1975     2080
X1     4573         44       1750     2250       75       71       73
CI     2000     1386.4     74.035        4        4       65     0.01
CI                                                     0.01     0.01
X3        0                          1967.5               2032.5
GR   1395.8       1750    1395.94  1763.42  1395.87  1793.42   1395.9  1811.82  1395.91   1823.8
GR   1395.8    1828.38    1395.83  1847.89  1395.94  1870.75   1395.9  1882.63  1395.75  1894.46
GR   1395.9    1903.33    1396.46  1925.48  1396.07  1932.16   1396.2  1939.44  1396.54  1959.68
GR   1396.3     1987.5    1397.11  1993.04  1391.79  1996.32   1390.3  1999.02  1391.39  2003.43
GR   1389.9     2007.9    1390.32  2015.63   1391.2  2021.56   1391.9  2027.89  1391.83  2029.35
GR   1393.0    2035.33    1394.34   2044.7  1394.46  2047.14   1394.6  2059.81  1394.63  2068.52
     1395.1    2082.63    1395.11  2101.09  1395.29  2117.16   1395.1  2136.65  1395.22   2153.8
     1395.3    2163.33     1395.5  2184.28  1395.96  2192.28   1396.4  2201.68  1396.43  2211.06
GR   1396.6     2223.4    1396.52  2226.18  1396.57  2237.49   1396.4     2250
   DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
   EXISTING4-10'x8 ' CBC PLUS 2-10'X8'

QT        2       2400       2400
ET                          7.1                          1975     2080
        DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
        EXISTING 4-10'x8' CBC PLUS 2-10'X8'
X1     4574         44       1750     2250        1        1        1
CI     2000    1387.55     74.035        4        4       65     0.01
X3       10                          1967.5               2032.5
GR   1395.8       1750    1395.94  1763.42  1395.87  1793.42   1395.9  1811.82  1395.91   1823.8
GR   1395.8    1828.38    1395.83  1847.89  1395.94  1870.75   1395.9  1882.63  1395.75  1894.46
GR   1395.9    1903.33    1396.46  1925.48  1396.07  1932.16   1396.2  1939.44  1396.54  1959.68
GR   1396.3     1987.5    1397.11  1993.04  1391.79  1996.32   1390.3  1999.02  1391.39  2003.43
GR   1389.9     2007.9    1390.32  2015.63   1391.2  2021.56   1391.9  2027.89  1391.83  2029.35
GR   1393.0    2035.33    1394.34   2044.7  1394.46  2047.14   1394.6  2059.81  1394.63  2068.52
GR   1395.1    2082.63    1395.11  2101.09  1395.29  2117.16   1395.1  2136.65  1395.22   2153.8
GR   1395.3    2163.33     1395.5  2184.28  1395.96  2192.28   1396.4  2201.68  1396.43  2211.06
GR   1396.6     2223.4    1396.52  2226.18  1396.57  2237.49   1396.4     2250

SC   6.013        0.2       2.63      500        8       10       72     11.4  1387.69  1387.55
  UPSTREAMFACE OF SWEETWATER AVENUE CULVERT
  XISTING4-10'x8 ' CBC PLUS 2-10'X8'
     0.04       0.04      0.035
ET                          7.1                          1980     2035
1
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UPSTREAM FACE OF SWEETWATER AVENUE CULVERT
EXISTING 4-10'x8' CBC PLUS 2-10'X8'

X1	4646	39	1750	2250	74	70	72			
	2000	1387.69	74.035	4	4	65	0.01			
			2		1398					
X3	10			1967.5		2032.5				
GR	1395.9	1750	1395.97	1772.27	1396.08	1790.4	1396.1	1843.7	1396.12	1856.75
GR	1395.9	1866.58	1396.02	1869.14	1395.84	1880.5	1395.9	1901.71	1395.9	1921.82
GR	1395.9	1925.66	1395.95	1946.5	1395.31	1966.28	1392.5	1976.44	1391.51	1979.59
GR	1390.9	1992.4	1390.9	1999.72	1397.39	2005.8	1396.8	2010.32	1396.36	2012.87
GR	1396.4	2020.14	1396.46	2041.68	1396.29	2068.85	1396.6	2073.46	1396.69	2080.7
GR	1397.0	2088.77	1395.78	2093.11	1395.97	2103.89	1396	2121.59	1396.11	2144.33
GR	1396.0	2162.46	1396.07	2177.19	1396.64	2188.42	1396.7	2205.23	1396.71	2221.11
GR	1396.8	2223.21	1396.75	2228.66	1396.88	2243.53	1396.8	2250		
ET			7.1				1945	2055		
X1	4800	17	1750	2250	157	151	154			
CI	2000.9	1388.11	152.035	4	4	50	0.01			
X3	0			1927		2075				
GR	1398	1544	1398	1614	1397	1710	1396.6	1750	1396.52	1807.92
GR	1396.2	1865.03	1396.43	1897.93	1396.26	1949.28	1393.4	1965.96	1393.69	1987.18
GR	1393.3	2031.17	1395.98	2044.35	1396.9	2063.9	1397.0	2112.28	1396.23	2200.32
GR	1396.7	2250	1398	2420						
NC				0.1	0.3					
ET			7.1				1945	2055		
X1	5000	15	1730	2230	208	192	200			
CI	2002.1	1388.66	202.035	4	4	50	0.01			
	0			1934		2070				
	1397.7	1730	1398.07	1757.14	1396.9	1785.16	1397.03	1846.14	1397	1924.43
GR	1394.0	1944.09	1393.8	1973.29	1394.3	2013.33	1398.46	2049.04	1398.7	2098.09
GR	1396.0	2116.97	1395.63	2137.72	1396.76	2178.45	1397.56	2205.96	1397.2	2230
ET			7.1				1945	2050		
X1	5300	13	1680	2180	309	291	300			
CI	1999.4	1389.49	306.035	4	4	50	0.01			
X3	0			1941.5		2057.5				
GR	1398.4	1680	1397.81	1715.55	1397.6	1791.13	1397.82	1841.87	1395.45	1880.1
GR	1396.0	1899.79	1395.5	1918.51	1394.6	1962.51	1395.17	2013.02	1397.4	2028.8
GR	1398.1	2067.51	1397.99	2100.77	1398	2180				
ET			7.1				1945	2060		
X1	5400	16	1670	2170	102	98	100			
CI	1999.4	1389.76	102.035	4	4	50	0.01			
X3	0			1941.5		2057.5				
GR	1399.4	1670	1398.98	1707.95	1397.58	1769.63	1397.86	1800.72	1397.18	1848.43
GR	1398	1880.47	1398.49	1939.19	1397.1	1948.98	1395.35	1983.21	1395.56	2037.6
GR	1397.1	2048.74	1398.26	2075.91	1398.06	2120.88	1399.06	2134.9	1398.43	2144.26
GR	1398.3	2170								

1

			7.1				1955	2050		
X1	5700	16	1655	2155	305	295	300			
CI	1999.3	1390.59	306.035	4	4	50	0.01			
X3	0			1941		2057				
GR	1397.9	1655	1397.85	1684.1	1398.29	1732.32	1398.79	1761.79	1401.49	1775.76

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GR   1398.6    1784.11   1398.75   1856.28   1400.18   1868.62   1399.46   1904.35   1397.59   1920.98
GR   1396.8    1932.77   1396.12   1997.39   1398.56   2022.4    1399.11   2089.75   1399.32   2121.15
GR   1398.8    2155

                          7.1                                     1950      2050
X1     6000        16     1645      2145       310       290       300
CI   2000.8   1391.42   307.035         4         4        50      0.01
X3        0                          1943                 2059
GR   1401.2      1645   1401.15   1675.54   1399.44   1699.45   1399.29   1709.68   1400.24   1720.04
GR   1399.6   1763.67    1399.3   1786.67   1399.81   1845.16   1398.41   1860.53   1397.24   1912.79
GR   1399.5   1956.47   1399.19   1966.98   1400.01   2002.26    1399.5   2025.72   1399.86   2088.49
GR   1399.7      2145
  INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL

ET                        7.1                                     1950      2050
        INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
X1     6200        13     1635      2135       203       197       200
CI   1996.9   1391.98   203.035         4         4        50      0.01
X3        0                          1936                 2058
GR   1400.5      1635   1400.22    1641.7    1400.2   1729.65   1400.45   1831.28   1399.06   1849.14
GR   1399.3   1904.49   1398.74   1934.25   1398.8    1986.26   1400.64   2022.68   1400.41   2067.73
GR   1401.0   2079.61   1400.79   2094.85   1400.9      2135

ET                        7.1                                     1950      2050
X1     6500        15     1665      2165       308       292       300
CI   2000.8   1392.82   306.035         4         4        50      0.01
X3        0                          1948                 2054
GR   1402.4      1665    1401.8   1669.99   1401.09   1702.37   1401.04    1778.6    1401.8   1840.48
GR   1400.6    1867.5   1399.17   1899.73   1399.72   1929.38   1399.78   1956.12      1402   1982.73
     1402.1   2029.53    1401.2   2080.16    1401.6   2109.68   1400.89   2142.02    1401.8      2165

ET                        7.1                                     1950      2050
X1     6700        18     1705      2205       200       200       200
CI   2001.6   1393.37   202.035         4         4        50      0.01
X3        0                          1943                 2060
GR   1404.3      1705   1402.48   1746.94    1403.2   1758.01   1402.49   1767.51   1402.79   1791.25
GR   1403.2   1820.53   1402.77    1842.2   1402.8    1897.94   1401.34   1917.14   1401.32   1952.93
GR   1401.5   2002.75   1402.46   2012.84   1402.6    2078.46   1402.83   2123.04   1401.68   2140.76
GR   1402.9   2146.48   1401.35   2184.17   1402.2       2205

ET                        7.1                                     1955      2045
X1     7000        16     1760      2260       300       300       300
CI     1999   1394.19   300.035         4         4        50      0.01
GR   1405.5      1760   1403.86    1773.2   1403.4   1800.43   1403.14   1833.58    1403.2   1896.62
GR   1403.7   1929.69   1402.14   1956.06   1402.13   2009.95   1402.88   2066.78   1403.27   2083.74
GR   1404.2   2145.35   1403.67   2184.97   1404.13   2199.78   1403.39   2207.45   1402.16   2237.88
GR   1403.3      2260
1
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ET                        7.1                                     1955      2045
X1     7400        15     1815      2315       400       400       400
     2000.5   1395.28   400.035         4         4        50      0.01
     1406.5      1815   1405.61   1863.39   1404.96   1891.23    1404.9   1955.29    1404.7   1998.94
GR   1403.1   2049.22   1403.43   2101.21   1404.65   2122.18   1405.18   2192.19    1404.9   2241.07
GR   1406.0   2246.99   1404.75   2251.02   1405.69   2256.25   1404.16   2274.59    1404.4      2315

ET                        7.1                                     1950      2060
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X1     7500        13      1825      2325       100       100       100
CI     1998.9   1395.55   100.035         4         4        56      0.01
GR     1405.9      1825   1405.46   1866.36    1405.6   1883.11   1405.43   1991.35   1404.16   2025.71
GR     1403.5   2057.51   1404.12   2120.74    1405.9   2134.04   1405.79   2179.72   1404.98   2251.95
GR     1405.6   2269.05   1404.14    2300.5    1404.9      2325

NC      0.04      0.04     0.035       0.3       0.5

   DOWNSTREAM FACE OF THUNDERBIRD ROAD  CULVERT

ET                          7.1                                   1970      2025
        DOWNSTREAM FACE OF THUNDERBIRD ROAD CULVERT
        START SLA MODIFICATION BY USING THE MOST RECENT TOPO
        1-28'x7' CONCRETE ARCH PLUS 1-28'x10.32 CONCRETE ARCH
        CROWN ELEVATIONS OF ARCHES ARE THE SAME, THE 28'X7' ARCH HAS
        FLOW LINE ELEVATIONS OF 1395.74 OUTLET, 1396.12 INLET
        THIS HEC-2 MODELS THE TWO ARCHES AS 2-28'x7.63' CONCRETE ARCHES
X1     7569        23      1460   3224.85        69        69        69
CI     1991   1395.74    77.025         4         4        58      0.01
X3       10                          1962                  2020
GR     1407      1460      1407   1715.07      1407    1728.1      1406   1863.49      1405   1983.06
GR     1404   2033.73      1404   2123.07      1405   2276.62      1405   2286.71      1405   2448.38
GR     1406   2627.64      1407      2753      1407   2757.17      1407   2845.37      1407   2867.28
GR     1407   2867.82      1407   2867.95      1407   2870.79      1407   2871.89      1407   2874.19
GR     1408   2912.98      1408   2979.37      1411   3224.85

SC    2.013       0.3      2.63       150      7.63        28       127      11.4   1394.46   1394.08

   UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT

                            7.1                                   1495      1565
        UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
        1-28'x7' CONCRETE ARCH PLUS 1-28'X10.32 CONCRETE ARCH
X1     7696        66    650.03   3118.14       128       128       128
CI     1530   1396.12   110.025         4         4        58      0.01
X2                           2   1402.22    1405.41
X3       10                          1501                  1559
GR     1408    650.03      1407      1110      1406   1408.18      1406   1416.55      1406   1432.02
GR     1406   1466.92      1406   1513.59      1405   1583.82      1404    1631.4      1404   1633.08
GR     1404   1636.15      1404   1639.74      1404   1639.92      1404   1641.59      1405    1685.4
GR     1406   1705.15      1406   1712.36      1406   1712.52      1406   1724.07      1406   1727.28
GR     1407   1729.23      1406   1729.51      1406   1731.46      1406   1731.95      1406   1732.66
GR     1407   1734.57      1406   1734.72      1406   1746.02      1406   1766.04      1406   1819.57
GR     1407   1826.92      1407   1826.97      1407   1835.41      1407   1839.21      1407   1839.41
GR     1407   1839.62      1407   1839.66      1407   1839.68      1407   1840.25      1407   1840.42
1
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GR     1407   1840.73      1407   1841.01      1407   1885.56      1407   1951.21      1406   1966.77
GR     1406   2000.05      1406   2144.24      1406   2149.31      1406    2215.1      1406    2218.3
GR     1407   2423.85      1408   2608.05      1409   2636.71      1409   2689.16      1410   2717.21
GR     1411   2749.75      1411   2780.34      1410   2839.54      1409   2948.81      1409   2961.02
GR     1410   2983.04      1411   2991.19      1412   2999.34      1413   3030.61      1413    3031.1
       1412   3118.14

ET                          7.1                                   1940      2050
X1     7800        70    864.07   3201.38       104       104       104
CI     2000   1396.44   113.025         4         4        60      0.01
GR     1408    864.07      1407      1230      1407   1295.55      1407   1384.65      1407   1417.6
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GR     1407    1534.46      1407    1547.78      1407    1554.15      1407    1568.22      1407    1569.74
GR     1406    1691.81      1405    1708.21      1405    1779.76      1406    1812.02      1407    1964.72
GR     1408    2000.96      1408    2055.49      1407    2072.04      1406    2087.02      1406    2104.05
GR     1407    2128.47      1407    2194.27      1407    2195.38      1407    2199.62      1407     2200.1
       1407    2209.13      1407    2209.72      1407    2210.02      1407    2210.04      1407    2218.49
       1407    2218.96      1407    2236.11      1407    2236.22      1407    2248.89      1407     2250.5
GR     1407    2250.57      1407    2251.85      1407    2251.92      1407    2252.06      1407    2254.36
GR     1407    2254.65      1407    2255.04      1407    2255.06      1407    2257.73      1407    2257.96
GR     1407    2259.67      1407    2259.68      1407    2259.94      1407    2262.61      1407     2263.6
GR     1407    2267.66      1407    2272.53      1407     2273.6      1407    2277.66      1407    2278.63
GR     1407    2430.16      1407    2463.72      1408     2485.7      1408    2553.48      1408    2570.52
GR     1408    2574.48      1408    2618.88      1408    2623.82      1408    2640.43      1408    2757.81
GR     1408    2771.01      1408    2807.13      1409    2877.21      1410    3084.48      1411    3201.38

  DOWNSTREAM FACE OF SR51 CULVERT


ET                          7.1                                      1930        2030
        DOWNSTREAM FACE OF SR 51 CULVERT
        THIS HEC-2 MODELS THE 1-28'X7' & 1-16'X10.7' ARCHES FOR THE
        WEST SIDE FLOW ONLY.
        FLOW LINE ELEVATION OF 16'x10.32' ARCH IS 1-FOOT ABOVE THE FLOW
        LINE OF THE 28'x7' ARCH, WHICH IS EQUAL TO CHANNEL FLOW LINE
X1     7987         90     608.19    2984.31       197         197         197
CI     1479    1397.02    200.025          4         4          46        0.01
X3       10                             1456                   1502
GR     1409     608.19      1409      1110      1409    1124.92      1408    1227.14      1407    1245.35
GR     1407     1246.3      1408    1275.7      1408    1397.98      1407    1532.65      1406     1553.3
GR     1406    1636.36      1407    1783.34      1407    1798.67      1408    1825.84      1409    1849.98
       1409    1858.59      1408     1913.7      1407    1926.73      1407    1957.16      1408    1972.32
       1409    1990.28      1409    2014.39      1409    2014.72      1409    2014.82      1409    2017.75
GR     1408    2041.98      1408     2121.1      1408    2225.63      1408    2269.22      1408    2370.04
GR     1408    2379.67      1409    2403.37      1410     2404.9      1411    2406.56      1411    2555.99
GR     1411    2621.66      1410    2648.43      1410    2648.52      1409     2651.9      1409    2651.93
GR     1409    2652.47      1409    2653.86      1409    2653.93      1409    2653.94      1410    2654.16
GR     1410    2654.34      1409    2654.82      1409    2654.98      1409    2655.96      1409    2656.14
GR     1409     2656.5      1409    2656.51      1409    2657.37      1409    2657.61      1409    2657.62
GR     1410    2659.55      1410    2659.75      1410    2663.01      1410    2663.67      1410    2676.27
GR     1410    2684.89      1410    2684.97      1410    2685.44      1410    2685.58      1410    2685.78
GR     1410    2687.56      1410    2687.94      1410     2690.3      1410    2690.86      1410     2690.9
GR     1410    2691.09      1410    2691.14      1410    2691.28      1410    2706.97      1410    2709.03
GR     1410    2714.06      1410     2716.3      1410    2716.34      1410    2716.37      1410    2717.28
GR     1410    2718.04      1410    2719.29      1410     2723.4      1410    2729.71      1410    2782.26
1
   09JAN98      09:03:02                                                                          PAGE    10


GR     1410    2810.17      1410     2844.2      1411     2855.4      1411    2973.49      1411    2984.31

NC    0.025      0.025      0.025
SC    2.013        0.3       2.63       150      5.72         23       318       11.4   1398.24    1397.28

  UPSTREAM  FACE OF SR51 CULVERT

                            7.1                                      1970        2055
        UPSTREAM FACE OF SR 51 CULVERT
        1-28'x7' & 1-16'X10.7' CBC FOR THE WEST SIDE FLOW ONLY.
        MODELED AS A 2-23'X5.72' CBC
X1     8262         44     512.92    2649.24       275         275         275
CI     1488    1397.98    270.025          4         4          46        0.01
```

X2			2	1403.08	1409.1					
X3	10			1465		1511				
GR	1411	512.92	1409	1030	1408	1106.32	1408	1130.75	1409	1138.89
GR	1409	1230.46	1408	1384.81	1407	1406.51	1407	1510.06	1408	1534.86
	1408	1538.06	1408	1538.85	1408	1545.46	1408	1547.42	1408	1563.13
	1408	1605.7	1409	1673.82	1410	1722.35	1410	1728.72	1410	1729.33
GR	1410	1741.22	1409	1786.13	1408	1789.24	1408	1931.41	1409	2081.75
GR	1410	2105.48	1410	2107.34	1409	2172.49	1409	2200.24	1410	2206.82
GR	1411	2216.61	1412	2276.9	1412	2278.96	1412	2281.96	1412	2292
GR	1411	2371.28	1411	2421.75	1411	2449.27	1411	2492.46	1411	2546.63
GR	1411	2557.05	1411	2631.01	1411	2641.92	1412	2649.24		
ET			7.1				1955	2045		
X1	8400	67	856.92	2679.27	130	130	130			
CI	2000	1398.4	130.035	4	4	50	0.01			
GR	1411	856.92	1410	1110	1411	1233.95	1411	1234.34	1411	1245.45
GR	1411	1248.77	1411	1254.92	1411	1256.32	1411	1261.21	1411	1262.1
GR	1411	1262.91	1411	1263.59	1411	1264.28	1411	1279.11	1410	1319.63
GR	1409	1333.17	1409	1354.71	1410	1466.57	1409	1505.27	1408	1630.85
GR	1407	1638.84	1407	1722.75	1408	1745.25	1409	1878.81	1409	1885.4
GR	1409	1921.09	1410	1947.45	1410	2004.86	1409	2014.93	1408	2026.74
GR	1408	2036.58	1409	2116.52	1410	2126.21	1410	2127.76	1410	2129.14
GR	1410	2129.47	1410	2132.07	1410	2132.57	1410	2134.21	1410	2134.28
GR	1410	2134.32	1410	2134.92	1410	2135.33	1410	2138.68	1410	2142.3
GR	1410	2143.89	1410	2147	1410	2147.94	1410	2209.77	1410	2211.84
GR	1410	2213.42	1410	2213.84	1410	2215.75	1410	2215.76	1410	2215.86
GR	1410	2216.06	1410	2216.07	1410	2273.45	1410	2281.58	1409	2393.09
GR	1409	2395.42	1410	2432.15	1411	2546.36	1412	2656.46	1412	2660.77
GR	1412	2676.94	1412	2679.27						
			7.1				1955	2045		
X1	8600	90	1133.86	3179.03	200	200	200			
CI	2020	1399	200.025	4	4	50	0.01			
GR	1412	1110	1412	1133.86	1412	1233.13	1412	1241.37	1412	1253.24
GR	1412	1254.97	1412	1258.56	1412	1263.13	1412	1274.23	1412	1281.06
GR	1412	1304.18	1412	1306.13	1412	1318.08	1412	1318.09	1412	1318.51
GR	1412	1319.78	1412	1322.69	1412	1323.71	1412	1326.44	1412	1327.42
GR	1412	1330.15	1412	1330.22	1412	1330.69	1412	1331	1412	1332.85
GR	1412	1332.86	1412	1333.04	1412	1333.13	1411	1373.31	1411	1414.28
GR	1411	1504.46	1411	1533.14	1411	1613.37	1410	1647.95	1410	1658.97
GR	1411	1670.92	1411	1748.67	1410	1771.49	1410	1774.05	1410	1796.22

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GR	1410	1796.5	1410	1908.77	1409	1915.23	1409	1949.99	1409	1953.25
GR	1409	1953.36	1409	1953.37	1409	1953.47	1409	1953.47	1409	1954.25
GR	1410	1954.28	1408	2029.92	1409	2062.65	1409	2146.76	1409	2148.06
GR	1409	2152.41	1409	2156.07	1409	2168.46	1409	2173.63	1409	2181.99
GR	1409	2182.68	1410	2229.65	1410	2308.33	1409	2318.15	1409	2357.34
GR	1410	2375.91	1409	2490.42	1409	2498.84	1409	2499.7	1409	2538.08
GR	1410	2592.52	1411	2723.15	1411	2726.46	1411	2886.31	1412	2950.45
GR	1412	2950.46	1412	2950.74	1412	2950.75	1412	2950.78	1412	2951.06
GR	1412	2953.02	1412	2953.09	1412	2953.35	1412	2956.5	1411	3015.15
	1411	3015.46	1412	3105.83	1412	3142.29	1412	3156.35	1413	3179.03
ET			7.1				1955	2045		
X1	8690	90	1080	3203.86	90	90	90			
CI	2000	1399.27	90.025	4	4	50	0.01			
GR	1413	1080	1413	1201.62	1412	1270.57	1411	1381.7	1411	1432.29

GR	1411	1622.83	1411	1772.29	1410	1933.62	1409	1960.23	1409	2053.43
GR	1411	2290.35	1411	2299.96	1410	2319.37	1409	2340.38	1409	2360.47
GR	1410	2382.57	1411	2461.67	1411	2523.2	1411	2524.9	1411	2525.12
GR	1411	2526.36	1411	2526.58	1411	2529.38	1411	2530.2	1411	2530.33
	1411	2530.37	1411	2537.17	1411	2539.91	1411	2540.97	1411	2541.15
	1411	2542.9	1411	2543.52	1411	2544.12	1411	2544.22	1411	2545.11
GR	1411	2545.55	1411	2546.35	1411	2548.68	1411	2552.96	1411	2560.56
GR	1411	2577.6	1411	2578.41	1411	2580.89	1411	2581.32	1411	2582.75
GR	1411	2583.1	1411	2584.49	1411	2585.46	1411	2589.83	1411	2589.84
GR	1411	2590.97	1411	2591.42	1411	2593.72	1411	2593.88	1411	2594.78
GR	1411	2594.8	1411	2594.91	1411	2595.64	1411	2600.2	1411	2600.27
GR	1411	2602.5	1411	2602.56	1411	2604.35	1411	2604.45	1411	2607.13
GR	1411	2607.3	1411	2611.77	1411	2611.78	1411	2612.45	1411	2612.46
GR	1411	2612.85	1411	2612.85	1411	2613.03	1411	2613.07	1411	2613.63
GR	1411	2613.7	1411	2613.73	1411	2615.7	1411	2616.89	1411	2616.89
GR	1411	2617.19	1411	2617.27	1410	2678.72	1410	2789.04	1412	2990.9
GR	1412	2991.85	1411	3075.65	1411	3077.75	1412	3109.82	1412	3203.86
ET			7.1				1930	2070		

CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND

X1	8850	90	1020	3253.96	160	160	160			
CI	2000	1408	160.025	4	4	65	0.01			
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
GR	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84
GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
GR	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53

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GR	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
ET			7.1				1930	2070		
X1	8851	90	1020	3253.96	1	1	1			
CI						0.01				
GR	1413	1020	1413	1066.06	1414	1157.96	1414	1225.35	1413	1257.01
GR	1412	1403.8	1412	1419.91	1412	1686.97	1411	1873.38	1410	1988.67
GR	1409	1992.76	1409	2005.76	1409	2006.54	1409	2006.97	1409	2007.12
GR	1409	2007.34	1409	2007.34	1409	2007.47	1409	2007.47	1409	2008.6
GR	1409	2009.03	1409	2009.13	1409	2009.14	1409	2010.61	1409	2010.72
GR	1409	2011.33	1409	2011.33	1409	2011.66	1409	2011.68	1409	2011.83
	1409	2012.03	1409	2012.04	1409	2012.06	1409	2012.14	1409	2012.24
	1409	2012.24	1409	2012.25	1409	2012.58	1409	2012.61	1409	2018.76
GR	1409	2022.36	1409	2022.86	1409	2023.28	1409	2026.03	1409	2028.59
GR	1409	2028.79	1409	2029.01	1409	2030.56	1409	2032.37	1409	2032.38
GR	1409	2032.4	1409	2032.51	1409	2032.66	1409	2034.3	1409	2037.44
GR	1409	2045.64	1409	2049.97	1409	2054.27	1409	2062.15	1410	2140.84

GR	1410	2206.71	1410	2227.78	1410	2233.96	1410	2235.7	1411	2263.13
GR	1411	2353.92	1410	2367.07	1410	2404.23	1411	2418.56	1411	2497.93
GR	1411	2532.07	1411	2615.26	1411	2618.99	1411	2621.18	1411	2630.08
GR	1411	2634.79	1411	2753.69	1411	2812.11	1411	2840	1412	2875.32
	1412	2959.23	1412	2974.51	1412	2986.82	1412	3001.14	1412	3034.53
	1412	3061.92	1413	3096.4	1414	3181.83	1414	3248.62	1414	3253.96
ET			7.1				1930	2070		
X1	9000	90	950	3172.52	150	150	150			
GR	1414	950	1414	1136.81	1413	1315.28	1413	1501.06	1413	1692.5
GR	1412	1719.17	1412	1750.48	1412	1750.92	1412	1751.69	1412	1752.06
GR	1412	1752.73	1412	1753.22	1412	1754.17	1412	1754.55	1412	1755.32
GR	1412	1759.46	1412	1771.05	1412	1771.42	1412	1773.49	1412	1773.58
GR	1412	1773.87	1412	1774.19	1412	1775.87	1412	1776.79	1412	1778.84
GR	1412	1780.78	1412	1781.45	1412	1782.97	1412	1783.88	1412	1848.08
GR	1411	1902.72	1410	1933.54	1409	1983.96	1409	1984.11	1409	1985.19
GR	1409	1985.26	1409	1985.37	1409	1985.38	1409	1986.05	1409	1986.1
GR	1409	1986.93	1409	1987.01	1409	2001.17	1409	2004.4	1409	2008.97
GR	1409	2011.35	1409	2016.04	1409	2018.72	1410	2054.46	1411	2270.97
GR	1411	2337.3	1411	2383.58	1412	2399.21	1412	2485.56	1411	2534.15
GR	1411	2544.46	1411	2546.14	1411	2548.4	1411	2548.68	1411	2549.64
GR	1411	2550.31	1411	2551.99	1411	2552.61	1411	2553.14	1411	2555.46
GR	1411	2557.01	1411	2557.87	1411	2558.14	1411	2562.73	1411	2566.32
GR	1411	2574.93	1411	2581.44	1412	2656.61	1412	2657.17	1412	2665.6
GR	1412	2665.66	1412	2665.76	1412	2668.87	1412	2792.48	1412	2898.1
GR	1412	2904.48	1412	2923.58	1412	2928.66	1412	2965.87	1411	3035.9
GR	1411	3036	1411	3037.04	1411	3037.04	1412	3058.29	1413	3172.52
ET			7.1				1930	2070		
	9340	39	970	3055	365	310	340			
	1415	970	1416	990	1416	1005	1415	1160	1415	1215
GR	1416	1315	1416	1340	1415	1385	1414	1480	1413	1680
GR	1413	1690	1414	1695	1414	1697	1413	1700	1413	1710
GR	1413	1810	1412	1860	1411	1870	1410	1910	1410	1960
GR	1411	2050	1412	2150	1413	2180	1413	2210	1412	2230
GR	1411	2240	1411	2295	1412	2297	1413	2305	1414	2345
GR	1414	2370	1413	2420	1412	2430	1412	2700	1412	2720

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GR	1412	2740	1412	2800	1413	2985	1413	3055		
ET			7.1				1970	2110		
X1	9731	90	760	2773.41	390	390	390			
GR	1418	760	1418	922.34	1418	922.4	1418	922.43	1418	922.43
GR	1418	928.22	1418	928.32	1418	929.93	1418	929.94	1418	930.06
GR	1418	930.53	1418	930.54	1418	930.55	1418	930.61	1418	931.15
GR	1418	931.15	1418	931.23	1418	944.85	1418	947.36	1418	950.6
GR	1418	951.25	1418	956.72	1418	958.21	1418	958.21	1418	958.28
GR	1418	958.56	1418	958.63	1418	958.68	1418	958.69	1418	958.77
GR	1418	958.79	1418	964.02	1418	965.06	1418	965.36	1418	965.86
GR	1418	965.95	1418	968.93	1418	969.48	1418	969.73	1418	969.78
GR	1418	970.35	1418	970.45	1418	973.91	1418	974.21	1418	977.24
	1418	977.5	1418	977.7	1417	1006.47	1417	1047.64	1417	1050.75
	1417	1060.43	1417	1063.48	1417	1068.87	1417	1070.37	1417	1072.21
GR	1417	1074.65	1417	1078.54	1417	1082.36	1417	1089.56	1417	1095.1
GR	1417	1111.87	1417	1112.38	1417	1115.19	1417	1117.85	1417	1136.64
GR	1417	1136.64	1417	1137.18	1417	1137.31	1416	1220.86	1415	1306.6
GR	1415	1321.67	1416	1349.77	1416	1452.86	1415	1776.17	1414	1804.87

GR	1413	1931.54	1412	1948.34	1411	1967.28	1410	1985.74	1410	2059.52
GR	1411	2094.96	1412	2165.75	1413	2563.47	1413	2566.11	1413	2691.1
GR	1413	2773.41	1413	2773.6	1413	2774.13	1413	2774.63	1413	2774.65

			7.1				1980	2120		
	9930	90	810	2599.07	203	203	203			
GR	1419	810	1419	947.42	1418	1088.3	1418	1251.74	1418	1253.15
GR	1418	1255.5	1418	1258.42	1418	1258.54	1418	1258.84	1418	1259.77
GR	1418	1261.36	1418	1262.77	1418	1266.01	1418	1269.27	1417	1329.2
GR	1416	1356.04	1415	1384.98	1415	1403.54	1416	1413.27	1417	1422.94
GR	1417	1457.51	1417	1458.08	1417	1484.49	1416	1735.65	1415	1870.22
GR	1414	1882.6	1414	1884.75	1414	1920.8	1413	1940.15	1412	1965.06
GR	1411	1985.36	1411	2054.46	1412	2135.63	1413	2174.95	1414	2205.27
GR	1414	2254.2	1414	2254.82	1414	2255.03	1414	2258.78	1414	2260.2
GR	1414	2262.39	1414	2263.11	1414	2263.82	1414	2265.21	1414	2267.2
GR	1414	2269.28	1414	2271.46	1414	2272.12	1414	2272.7	1414	2275.18
GR	1414	2278.3	1414	2278.35	1414	2278.38	1414	2279.18	1414	2280.06
GR	1414	2280.07	1414	2280.07	1414	2280.23	1414	2280.4	1414	2280.4
GR	1414	2280.4	1414	2280.61	1414	2280.83	1414	2281.51	1414	2282.3
GR	1414	2284.42	1414	2287.41	1414	2287.8	1414	2288.44	1414	2289.99
GR	1414	2292.95	1414	2293.08	1414	2293.38	1414	2293.71	1414	2294.46
GR	1414	2294.67	1414	2295.16	1414	2297.89	1414	2306.33	1414	2310.05
GR	1414	2312.76	1414	2316.49	1414	2319.2	1414	2326.43	1414	2327.11
GR	1415	2358.47	1415	2379.63	1414	2428.07	1413	2506.01	1413	2599.07

ET			7.1				1970	2110		
X1	10120	24	1140	2590	193	193	193			
GR	1418	1140	1418	1500	1417	1530	1417	1540	1417	1625
GR	1417	1760	1416	1790	1415	1815	1414	1860	1413	1870
	1412	1880	1412	1940	1413	2030	1414	2180	1415	2270
	1415	2290	1414	2300	1413	2380	1412	2390	1412	2410
GR	1413	2430	1414	2470	1415	2490	1416	2590		

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ET			7.1				1930	2070		
X1	10600	6	1670	2170	480	480	480			
GR	1418	1670	1417	1740	1417	1830	1416	1920	1417	2170
GR	1418	2200								

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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

0

[illegible]= .100 CEHV= .300

[illegible]NO 1140.000

[illegible]MP CLSTA= 2011.10 CELCH= 1379.87 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00

EXCAVATION DATA

AEX= 9.2SQ-FT VEXR= .0K*CU-YD VEXT= .0K*CU-YD

BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
UPSTREAM OF 40TH STREET
A LOW FLOW FJORD

40.000	4.78	1383.58	.00	1383.58	1384.04	.46	.00	.00	1384.30
6000.0	.0	6000.0	.0	.0	1096.6	.0	.0	.0	1388.90
.00	.00	5.47	.00	.000	.035	.000	.000	1378.80	1757.63
.005068	0.	0.	0.	0	0	0	.00	449.86	2207.49

*SECNO 1300.000
CHIMP CLSTA= 2080.60 CELCH= 1380.16 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 55.0SQ-FT VEXR= .1K*CU-YD VEXT= .1K*CU-YD

1300.000	3.86	1384.02	.00	.00	1384.80	.78	.66	.10	1387.80
6000.0	.0	6000.0	.0	.0	844.3	.0	2.2	.9	1388.70
.00	.00	7.11	.00	.000	.035	.000	.000	1380.16	1824.23
.008958	100.	100.	100.	2	0	0	.00	358.65	2182.88

*SECNO 1500.000
CHIMP CLSTA= 2116.30 CELCH= 1380.51 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00
CHIMP CLSTA= 2046.00 CELCH= 1382.21 BW= 200.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 351.6SQ-FT VEXR= 1.5K*CU-YD VEXT= 1.6K*CU-YD

1500.000	4.98	1385.49	.00	.00	1386.07	.58	1.25	.02	1389.20
6000.0	.0	6000.0	.0	.0	979.0	.0	6.4	2.5	1389.40
.01	.00	6.13	.00	.000	.035	.000	.000	1380.51	1857.15
.004613	200.	200.	200.	2	0	0	.00	315.08	2172.23

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

*SECNO 1800.000
CHIMP CLSTA= 2119.60 CELCH= 1381.03 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00
CHIMP CLSTA= 2049.50 CELCH= 1383.49 BW= 150.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 596.5SQ-FT VEXR= 5.3K*CU-YD VEXT= 6.9K*CU-YD

1800.000	5.98	1387.01	.00	.00	1387.72	.71	1.61	.04	1389.60
6000.0	.0	6000.0	.0	.0	888.3	.0	12.8	4.6	1390.80
.03	.00	6.75	.00	.000	.035	.000	.000	1381.03	1851.70
.006298	300.	300.	300.	3	0	0	.00	311.81	2163.51

*SECNO 2100.000
CHIMP CLSTA= 2122.60 CELCH= 1381.55 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00
CHIMP CLSTA= 2052.50 CELCH= 1384.55 BW= 150.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 648.5SQ-FT VEXR= 6.9K*CU-YD VEXT= 13.8K*CU-YD

```
  2100.000      7.07   1388.62       .00       .00   1389.06       .44      1.32       .03   1391.50
    6000.0        .0    6000.0        .0        .0    1121.4        .0      19.8       6.9   1391.90
       .04       .00      5.35       .00      .000      .035      .000      .000   1381.55   1830.90
   .003253      300.      300.      300.         1         0         0       .00    340.02   2170.92


*SECNO 2400.000
CHIMP CLSTA=    2125.50 CELCH=    1382.07 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2055.50 CELCH=    1385.07 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     660.0SQ-FT     VEXR=       7.3K*CU-YD     VEXT=       21.1K*CU-YD

  2400.000      7.47   1389.54       .00       .00   1389.90       .36       .82       .01   1392.00
    6000.0        .0    6000.0        .0        .0    1249.5        .0      27.9       9.2   1392.50
       .06       .00      4.80       .00      .000      .035      .000      .000   1382.07   1826.87
   .002344      300.      300.      300.         2         0         0       .00    348.48   2175.35


*SECNO 2700.000
CHIMP CLSTA=    2124.60 CELCH=    1382.59 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2054.40 CELCH=    1385.09 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     582.0SQ-FT     VEXR=       6.9K*CU-YD     VEXT=       28.0K*CU-YD

  2700.000      7.61   1390.20       .00       .00   1390.50       .30       .60       .01   1392.70
    6000.0        .0    6000.0        .0        .0    1359.5        .0      36.9      11.6   1393.30
       .08       .00      4.41       .00      .000      .035      .000      .000   1382.59   1834.16
   .001740      300.      300.      300.         2         0         0       .00    344.26   2178.42


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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


*SECNO 2900.000
CHIMP CLSTA=    2122.80 CELCH=    1382.94 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2053.00 CELCH=    1385.94 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     450.1SQ-FT     VEXR=       3.8K*CU-YD     VEXT=       31.8K*CU-YD

  2900.000      7.63   1390.57       .00       .00   1390.83       .26       .32       .00   1393.30
    6000.0        .0    6000.0        .0        .0    1461.0        .0      43.4      13.3   1393.60
       .09       .00      4.11       .00      .000      .035      .000      .000   1382.94   1815.18
   .001473      200.      200.      200.         2         0         0       .00    363.77   2178.95


*SECNO 3000.000
CHIMP CLSTA=    2121.80 CELCH=    1383.11 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2052.00 CELCH=    1386.11 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     445.3SQ-FT     VEXR=       1.7K*CU-YD     VEXT=       33.5K*CU-YD

  3000.000      7.60   1390.71       .00       .00   1390.98       .26       .15       .00   1394.10
```

6000.0	.0	6000.0	.0	.0	1462.5	.0	46.7	14.1	1393.50
.10	.00	4.10	.00	.000	.035	.000	.000	1383.11	1815.52
.001476	100.	100.	100.	1	0	0	.00	365.13	2180.66

NO 3300.000

CHIMP CLSTA= 2119.10 CELCH= 1383.63 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00

CHIMP CLSTA= 2049.00 CELCH= 1386.63 BW= 150.00 STCHL= 1750.00 STCHR= 2250.00

EXCAVATION DATA

AEX= 506.6SQ-FT VEXR= 5.3K*CU-YD VEXT= 38.7K*CU-YD

3300.000	7.54	1391.17	.00	.00	1391.47	.29	.48	.01	1394.90
6000.0	.0	6000.0	.0	.0	1376.6	.0	56.5	16.6	1394.30
.12	.00	4.36	.00	.000	.035	.000	.000	1383.63	1817.95
.001767	300.	300.	300.	1	0	0	.00	359.25	2177.20

*SECNO 3600.000

CHIMP CLSTA= 2118.30 CELCH= 1384.15 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00

CHIMP CLSTA= 2048.50 CELCH= 1387.15 BW= 150.00 STCHL= 1750.00 STCHR= 2250.00

EXCAVATION DATA

AEX= 521.3SQ-FT VEXR= 5.8K*CU-YD VEXT= 44.6K*CU-YD

3600.000	7.57	1391.72	.00	.00	1392.03	.32	.56	.01	1394.20
6000.0	.0	6000.0	.0	.0	1324.1	.0	66.0	19.1	1395.20
.14	.00	4.53	.00	.000	.035	.000	.000	1384.15	1824.20
.001902	304.	305.	298.	2	0	0	.00	344.36	2168.56

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

*SECNO 3900.000

CHIMP CLSTA= 2045.60 CELCH= 1384.71 BW= 47.00 STCHL= 1750.00 STCHR= 2250.00

CHIMP CLSTA= 1968.00 CELCH= 1387.71 BW= 94.00 STCHL= 1750.00 STCHR= 2250.00

EXCAVATION DATA

AEX= 578.5SQ-FT VEXR= 6.5K*CU-YD VEXT= 51.1K*CU-YD

3900.000	7.64	1392.35	.00	.00	1392.69	.34	.65	.01	1394.00
6000.0	.0	6000.0	.0	.0	1276.7	.0	75.5	21.6	1395.60
.15	.00	4.70	.00	.000	.035	.000	.000	1384.71	1821.11
.002164	305.	320.	295.	2	0	0	.00	346.38	2167.50

*SECNO 4000.000

CHIMP CLSTA= 2017.40 CELCH= 1384.89 BW= 60.00 STCHL= 1730.00 STCHR= 2230.00

CHIMP CLSTA= 1940.00 CELCH= 1387.89 BW= 80.00 STCHL= 1730.00 STCHR= 2230.00

VATION DATA

615.2SQ-FT VEXR= 2.3K*CU-YD VEXT= 53.3K*CU-YD

4000.000	7.69	1392.58	.00	.00	1392.91	.33	.21	.00	1395.80
6000.0	.0	6000.0	.0	.0	1307.9	.0	78.6	22.4	1394.20
.16	.00	4.59	.00	.000	.035	.000	.000	1384.89	1806.66

```
   .002023      95.      102.      105.        2        0        0      .00    349.83   2156.49


*SECNO 4100.000
CHIMP CLSTA=    2002.70 CELCH=    1385.06 BW=      72.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    1929.00 CELCH=    1388.06 BW=      62.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     686.4SQ-FT     VEXR=       2.4K*CU-YD     VEXT=       55.7K*CU-YD

  4100.000      7.69   1392.75       .00       .00   1393.14       .39       .22       .02   1395.60
    6000.0        .0    6000.0        .0        .0    1200.0        .0      81.4      23.2   1394.40
       .17       .00      5.00       .00      .000      .035      .000      .000   1385.06   1825.32
   .002295      102.      100.       98.         2         0         0       .00    309.84   2135.15


CCHV=     .300 CEHV=     .500
*SECNO 4190.000
CHIMP CLSTA=    2000.00 CELCH=    1385.23 BW=      76.00 STCHL=    1935.45 STCHR=    2069.33
EXCAVATION DATA
AEX=     725.1SQ-FT     VEXR=       2.3K*CU-YD     VEXT=       58.0K*CU-YD

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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


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1391.87 ELREA=      1393.06

       DOWNSTREAM FACE OF 36TH STREET CULVERT
       6-12'x8' CONCRETE BOX CULVERT
       ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
  4190.000      7.54   1392.77       .00       .00   1393.55       .77       .22       .19   1391.87
    6000.0     245.2    5754.8        .0     119.7     799.3        .0      83.6      23.7   1393.06
       .17      2.05      7.20       .00      .040      .035      .000      .000   1385.23   1822.47
   .002671       92.       87.       88.         2         0         0       .00    245.71   2068.18


SPECIAL CULVERT

SC  CUNO      CUNV      ENTLC     COFQ      RDLEN     RISE      SPAN      CULVLN    CHRT      SCL       ELCHU     ELCHD
     6         .013      .30       2.63      .00       8.00      12.00     66.00     11        4         1385.42   1385.22

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE  4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 4256.000
CHIMP CLSTA=    2000.00 CELCH=    1385.42 BW=      76.00 STCHL=    1934.14 STCHR=    2069.09
EXCAVATION DATA
AEX=     813.4SQ-FT     VEXR=       1.9K*CU-YD     VEXT=       59.9K*CU-YD


SPECIAL CULVERT OUTLET CONTROL + WEIR FLOW EG =   1395.00
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3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.18

IAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1394.97	1395.38	1.46	482.	5547.	5.385	576.0	1393.39	222.

UPSTREAM FACE OF 36TH STREET CULVERT
6-12'x8' CONCRETE BOX CULVERT
ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT

4256.000	9.17	1394.59	.00	.00	1395.00	.41	1.46	.00	1392.39
6000.0	409.9	5493.0	97.1	276.7	1020.0	110.5	85.3	24.2	1393.19
.17	1.48	5.39	.88	.040	.025	.040	.000	1385.42	1801.98
.000563	69.	66.	63.	2	0	0	.00	394.89	2229.19

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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

NO 4400.000
CHIMP CLSTA= 2000.00 CELCH= 1385.86 BW= 72.00 STCHL= 1750.00 STCHR= 2250.00
CHIMP CLSTA= 2026.00 CELCH= 1385.86 BW= 40.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 821.4SQ-FT VEXR= 4.5K*CU-YD VEXT= 64.3K*CU-YD

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

4400.000	8.92	1394.78	.00	.00	1395.15	.37	.13	.01	1395.10
6000.0	.0	6000.0	.0	.0	1225.7	.0	89.8	25.6	1395.80
.18	.00	4.90	.00	.000	.025	.000	.000	1385.86	1752.97
.001659	149.	147.	141.	2	0	0	.00	424.50	2177.46

CCHV= .100 CEHV= .300
*SECNO 4500.000
CHIMP CLSTA= 2000.00 CELCH= 1386.17 BW= 65.00 STCHL= 1700.00 STCHR= 2270.00
CHIMP CLSTA= 2056.00 CELCH= 1386.17 BW= 56.00 STCHL= 1700.00 STCHR= 2270.00
EXCAVATION DATA
AEX= 1123.6SQ-FT VEXR= 3.6K*CU-YD VEXT= 67.9K*CU-YD

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.71

00.000	8.76	1394.93	.00	.00	1395.24	.31	.09	.01	1397.20
6000.0	.0	6000.0	.0	.0	1337.6	.0	92.7	26.3	1397.10
.19	.00	4.49	.00	.000	.025	.000	.000	1386.17	1932.45
.000565	102.	100.	98.	2	0	0	.00	234.26	2166.71

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*SECNO 4573.000
CHIMP CLSTA=    2000.00 CELCH=    1386.40 BW=      65.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
        764.1SQ-FT     VEXR=       2.6K*CU-YD     VEXT=       70.5K*CU-YD


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .24

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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



3470 ENCROACHMENT STATIONS=     1967.5    2032.5  TYPE=      1  TARGET=       65.000
  4573.000      6.93   1393.33       .00       .00   1396.08      2.75       .11       .73 100000.00
    6000.0        .0    6000.0        .0        .0     450.7        .0      94.2      26.6 100000.00
       .19       .00     13.31       .00      .000      .035      .000      .000   1386.40   1967.50
   .009624       75.       74.       71.         4         0         0       .00     65.00   2032.50


ECNO 4574.000
CHIMP CLSTA=    2000.00 CELCH=    1387.55 BW=      65.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     611.9SQ-FT     VEXR=       1.9K*CU-YD     VEXT=       72.4K*CU-YD


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.43


3470 ENCROACHMENT STATIONS=     1967.5    2032.5  TYPE=      1  TARGET=       65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

        DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
        EXISTING 4-10'x8' CBC PLUS 2-10'X8'
  4574.000      8.74   1396.29       .00       .00   1396.57       .28       .24       .25 100000.00
    2400.0        .0    2400.0        .0        .0     568.2        .0      95.1      26.7 100000.00
       .19       .00      4.22       .00      .000      .035      .000      .000   1387.55   1967.50
   .000755        1.       74.        1.         3         0         0       .00     65.00   2032.50


IAL CULVERT

SC  CUNO      CUNV      ENTLC     COFQ      RDLEN     RISE      SPAN      CULVLN    CHRT      SCL       ELCHU     ELCHD
     6         .013      .20      2.63     500.00     8.00     10.00     72.00     11        4       1387.69   1387.55
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CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE 4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 4646.000
'D CLSTA= 2000.00 CELCH= 1387.69 BW= 65.00 STCHL= 1750.00 STCHR= 2250.00
.VATION DATA
AEX= 692.3SQ-FT VEXR= 1.8K*CU-YD VEXT= 74.2K*CU-YD

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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

SPECIAL CULVERT OUTLET CONTROL
EGIC = 1393.516 EGOC = 1396.805 PCWSE= 1396.292 ELTRD= 1398.000

SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1393.52	1396.81	.24	0.	2400.	4.174	480.0	1398.00	0.

3470 ENCROACHMENT STATIONS= 1967.5 2032.5 TYPE= 1 TARGET= 65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

UPSTREAM FACE OF SWEETWATER AVENUE CULVERT
EXISTING 4-10'x8' CBC PLUS 2-10'X8'

4646.000	8.84	1396.53	.00	.00	1396.81	.27	.24	.00	100000.00
2400.0	.0	2400.0	.0	.0	574.9	.0	96.1	26.8	100000.00
.20	.00	4.17	.00	.000	.035	.000	.000	1387.69	1967.50
.000729	74.	74.	70.	2	0	0	.00	65.00	2032.50

*SECNO 4800.000
CHIMP CLSTA= 2000.90 CELCH= 1388.11 BW= 50.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 449.9SQ-FT VEXR= 3.2K*CU-YD VEXT= 77.4K*CU-YD

3470 ENCROACHMENT STATIONS= 1927.0 2075.0 TYPE= 1 TARGET= 148.000

4800.000	8.64	1396.75	.00	.00	1396.92	.16	.10	.01	100000.00
2400.0	.0	2400.0	.0	.0	737.8	.0	98.4	27.2	100000.00
.21	.00	3.25	.00	.000	.035	.000	.000	1388.11	1927.00
.000618	157.	152.	151.	2	0	0	.00	133.78	2060.78

CC'''= .100 CEHV= .300
.0 5000.000
CHIMP CLSTA= 2002.10 CELCH= 1388.66 BW= 50.00 STCHL= 1730.00 STCHR= 2230.00
EXCAVATION DATA
AEX= 503.5SQ-FT VEXR= 3.6K*CU-YD VEXT= 81.0K*CU-YD

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= 1934.0 2070.0 TYPE= 1 TARGET= 136.000

5000.000	8.21	1396.87	.00	.00	1397.05	.17	.13	.00	100000.00
2400.0	.0	2400.0	.0	.0	720.1	.0	101.7	27.8	100000.00
.23	.00	3.33	.00	.000	.035	.000	.000	1388.66	1934.00
.000623	208.	202.	192.	1	0	0	.00	125.98	2059.98

*SECNO 5300.000
CHIMP CLSTA= 1999.40 CELCH= 1389.49 BW= 50.00 STCHL= 1680.00 STCHR= 2180.00
EXCAVATION DATA
AEX= 469.6SQ-FT VEXR= 5.5K*CU-YD VEXT= 86.5K*CU-YD

3470 ENCROACHMENT STATIONS= 1941.5 2057.5 TYPE= 1 TARGET= 116.000

5300.000	7.57	1397.06	.00	.00	1397.29	.23	.23	.02	100000.00
2400.0	.0	2400.0	.0	.0	622.6	.0	106.5	28.6	100000.00
.25	.00	3.85	.00	.000	.035	.000	.000	1389.49	1941.50
.000885	309.	306.	291.	0	0	0	.00	113.18	2054.68

*SECNO 5400.000
CHIMP CLSTA= 1999.40 CELCH= 1389.76 BW= 50.00 STCHL= 1670.00 STCHR= 2170.00
EXCAVATION DATA
AEX= 457.7SQ-FT VEXR= 1.8K*CU-YD VEXT= 88.2K*CU-YD

3470 ENCROACHMENT STATIONS= 1941.5 2057.5 TYPE= 1 TARGET= 116.000

5400.000	7.37	1397.13	.00	.00	1397.39	.26	.10	.01	100000.00
2400.0	.0	2400.0	.0	.0	586.2	.0	107.9	28.9	100000.00
.26	.00	4.09	.00	.000	.035	.000	.000	1389.76	1944.91
.001009	102.	102.	98.	0	0	0	.00	108.99	2053.90

*SECNO 5700.000
CHIMP CLSTA= 1999.30 CELCH= 1390.59 BW= 50.00 STCHL= 1655.00 STCHR= 2155.00
EXCAVATION DATA
AEX= 515.9SQ-FT VEXR= 5.5K*CU-YD VEXT= 93.8K*CU-YD

3470 ENCROACHMENT STATIONS= 1941.0 2057.0 TYPE= 1 TARGET= 116.000

5700.000	6.87	1397.46	.00	.00	1397.77	.31	.36	.01	100000.00
2400.0	.0	2400.0	.0	.0	538.0	.0	111.8	29.6	100000.00
.28	.00	4.46	.00	.000	.035	.000	.000	1390.59	1941.00
.001380	305.	306.	295.	2	0	0	.00	110.77	2051.77

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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


*SECNO 6000.000
CHIMP CLSTA=    2000.80 CELCH=    1391.42 BW=      50.00 STCHL=    1645.00 STCHR=    2145.00
EXCAVATION DATA
AEX=     672.5SQ-FT     VEXR=       6.8K*CU-YD     VEXT=      100.5K*CU-YD


3470 ENCROACHMENT STATIONS=     1943.0    2059.0  TYPE=      1  TARGET=      116.000
  6000.000      6.46   1397.88       .00       .00   1398.25       .37       .47       .02 100000.00
    2400.0        .0    2400.0        .0        .0     489.8        .0     115.4      30.4 100000.00
       .29       .00      4.90       .00      .000      .035      .000      .000   1391.42   1949.96
   .001671      310.      307.      290.         2         0         0       .00    101.67   2051.64


*SECNO 6200.000
CHIMP CLSTA=    1996.90 CELCH=    1391.98 BW=      50.00 STCHL=    1635.00 STCHR=    2135.00
EXCAVATION DATA
AEX=     612.2SQ-FT     VEXR=       4.8K*CU-YD     VEXT=      105.4K*CU-YD


3470 ENCROACHMENT STATIONS=     1936.0    2058.0  TYPE=      1  TARGET=      122.000
        INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
  6200.000      6.24   1398.22       .00       .00   1398.62       .41       .36       .01 100000.00
    2400.0        .0    2400.0        .0        .0     467.3        .0     117.7      30.9 100000.00
       .31       .00      5.14       .00      .000      .035      .000      .000   1391.98   1946.96
   .001909      203.      203.      197.         2         0         0       .00     99.88   2046.84


*SECNO 6500.000
CHIMP CLSTA=    2000.80 CELCH=    1392.82 BW=      50.00 STCHL=    1665.00 STCHR=    2165.00
EXCAVATION DATA
AEX=     734.9SQ-FT     VEXR=       7.6K*CU-YD     VEXT=      113.0K*CU-YD


3470 ENCROACHMENT STATIONS=     1948.0    2054.0  TYPE=      1  TARGET=      106.000
  6500.000      5.99   1398.81       .00       .00   1399.27       .46       .63       .01 100000.00
    2400.0        .0    2400.0        .0        .0     443.2        .0     120.9      31.6 100000.00
       .32       .00      5.41       .00      .000      .035      .000      .000   1392.82   1951.83
   .002217      308.      306.      292.         2         0         0       .00     97.94   2049.77


*SECNO 6700.000
CHIMP CLSTA=    2001.60 CELCH=    1393.37 BW=      50.00 STCHL=    1705.00 STCHR=    2205.00
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


EXCAVATION DATA
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3470 ENCROACHMENT STATIONS= 1962.0 2020.0 TYPE= 1 TARGET= 58.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

DOWNSTREAM FACE OF THUNDERBIRD ROAD CULVERT
START SLA MODIFICATION BY USING THE MOST RECENT TOPO
1-28'x7' CONCRETE ARCH PLUS 1-28'x10.32 CONCRETE ARCH
CROWN ELEVATIONS OF ARCHES ARE THE SAME, THE 28'X7' ARCH HAS
FLOW LINE ELEVATIONS OF 1395.74 OUTLET, 1396.12 INLET
THIS HEC-2 MODELS THE TWO ARCHES AS 2-28'x7.63' CONCRETE ARCHES

7569.000	5.53	1401.27	.00	.00	1402.14	.87	.16	.22	100000.00
2400.0	.0	2400.0	.0	.0	320.7	.0	131.4	33.9	100000.00
.37	.00	7.48	.00	.000	.025	.000	.000	1395.74	1962.00
.002045	69.	77.	69.	2	0	0	.00	58.00	2020.00

SPECIAL CULVERT

SC	CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
	2	.013	.30	2.63	150.00	7.63	28.00	127.00	11	4	1394.46	1394.08

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE 4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 7696.000
CHIMP CLSTA= 1530.00 CELCH= 1396.12 BW= 58.00 STCHL= 650.03 STCHR= 3118.14
EXCAVATION DATA
AEX= 914.6SQ-FT VEXR= 3.6K*CU-YD VEXT= 145.9K*CU-YD

SPECIAL CULVERT OUTLET CONTROL
EGIC = 1400.560 EGOC = 1401.196 PCWSE= 1401.269 ELTRD= 1405.410

5150, EG OF 1401.20 LESS THAN XEG OF 1402.14
SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1400.56	1401.20	.00	0.	2400.	8.415	427.3	1405.41	0.

1

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= 1501.0 1559.0 TYPE= 1 TARGET= 58.000

[illegible]5 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
1-28'x7' CONCRETE ARCH PLUS 1-28'X10.32 CONCRETE ARCH

7696.000	4.92	1401.04	.00	.00	1402.14	1.10	.00	.00	100000.00
2400.0	.0	2400.0	.0	.0	285.2	.0	132.2	34.1	100000.00

```
      .38       .00      8.42       .00      .000      .025      .000      .000   1396.12   1501.00
   .002954      128.      110.      128.         4         0         0       .00     58.00   1559.00


 CNO 7800.000
 IP CLSTA=    2000.00 CELCH=    1396.44 BW=      60.00 STCHL=     864.07 STCHR=    3201.38
EXCAVATION DATA
AEX=    1156.2SQ-FT     VEXR=       4.3K*CU-YD     VEXT=      150.3K*CU-YD


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.70

  7800.000      5.69   1402.13       .00       .00   1402.53       .40       .18       .21   1408.00
    2400.0        .0    2400.0        .0        .0     470.3        .0     133.1      34.3   1411.00
       .38       .00      5.10       .00      .000      .025      .000      .000   1396.44   1947.26
   .001022      104.      113.      104.         3         0         0       .00    105.48   2052.74


*SECNO 7987.000
CHIMP CLSTA=    1479.00 CELCH=    1397.02 BW=      46.00 STCHL=     608.19 STCHR=    2984.31
EXCAVATION DATA
AEX=     907.7SQ-FT     VEXR=       7.6K*CU-YD     VEXT=      157.9K*CU-YD


3301 HV CHANGED MORE THAN HVINS


 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .44


3470 ENCROACHMENT STATIONS=     1456.0    1502.0  TYPE=      1  TARGET=       46.000
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


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

       DOWNSTREAM FACE OF SR 51 CULVERT
       THIS HEC-2 MODELS THE 1-28'X7' & 1-16'X10.7' ARCHES FOR THE
       WEST SIDE FLOW ONLY.
       FLOW LINE ELEVATION OF 16'x10.32' ARCH IS 1-FOOT ABOVE THE FLOW
       LINE OF THE 28'x7' ARCH, WHICH IS EQUAL TO CHANNEL FLOW LINE
  7987.000      4.78   1401.80       .00       .00   1403.65      1.85       .40       .72 100000.00
    2400.0        .0    2400.0        .0        .0     219.9        .0     134.7      34.6 100000.00
       .39       .00     10.91       .00      .000      .025      .000      .000   1397.02   1456.00
   .005379      197.      200.      197.         3         0         0       .00     46.00   1502.00


SPECIAL CULVERT
```

SC	CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
	2	.013	.30	2.63	150.00	5.72	23.00	318.00	11	4	1398.24	1397.28

T 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
LE 4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 8262.000
CHIMP CLSTA= 1488.00 CELCH= 1397.98 BW= 46.00 STCHL= 512.92 STCHR= 2649.24
EXCAVATION DATA
AEX= 767.0SQ-FT VEXR= 8.4K*CU-YD VEXT= 166.3K*CU-YD

SPECIAL CULVERT OUTLET CONTROL
EGIC = 1405.252 EGOC = 1405.464 PCWSE= 1401.800 ELTRD= 1409.100

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.59

SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1405.25	1405.46	1.81	0.	2400.	8.054	263.1	1409.10	0.

0 ENCROACHMENT STATIONS= 1465.0 1511.0 TYPE= 1 TARGET= 46.000

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

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

UPSTREAM FACE OF SR 51 CULVERT
1-28'x7' & 1-16'X10.7' CBC FOR THE WEST SIDE FLOW ONLY.
MODELED AS A 2-23'X5.72' CBC

8262.000	6.48	1404.46	.00	.00	1405.46	1.01	1.81	.00	100000.00
2400.0	.0	2400.0	.0	.0	298.0	.0	136.3	34.9	100000.00
.40	.00	8.05	.00	.000	.025	.000	.000	1397.98	1465.00
.002115	275.	270.	275.	3	0	0	.00	46.00	1511.00

*SECNO 8400.000
CHIMP CLSTA= 2000.00 CELCH= 1398.40 BW= 50.00 STCHL= 856.92 STCHR= 2679.27
VATION DATA
1013.1SQ-FT VEXR= 4.3K*CU-YD VEXT= 170.6K*CU-YD

3301 HV CHANGED MORE THAN HVINS

8400.000	7.20	1405.60	.00	.00	1405.88	.28	.19	.22	1411.00
2400.0	.0	2400.0	.0	.0	568.1	.0	137.6	35.1	1412.00
.41	.00	4.22	.00	.000	.035	.000	.000	1398.40	1946.17
.001102	130.	130.	130.	2	0	0	.00	107.65	2053.83

*SECNO 8600.000
CHIMP CLSTA= 2020.00 CELCH= 1399.00 BW= 50.00 STCHL= 1133.86 STCHR= 3179.03
EXCAVATION DATA
AEX= 883.6SQ-FT VEXR= 7.0K*CU-YD VEXT= 177.6K*CU-YD

8600.000	6.75	1405.75	.00	.00	1406.08	.33	.18	.03	1412.00
2400.0	.0	2400.0	.0	.0	519.6	.0	140.1	35.6	1413.00
.42	.00	4.62	.00	.000	.025	.000	.000	1399.00	1968.01
.000722	200.	200.	200.	2	0	0	.00	103.99	2071.99

*SECNO 8690.000
CHIMP CLSTA= 2000.00 CELCH= 1399.27 BW= 50.00 STCHL= 1080.00 STCHR= 3203.86
EXCAVATION DATA
AEX= 878.5SQ-FT VEXR= 2.9K*CU-YD VEXT= 180.5K*CU-YD

8690.000	6.53	1405.80	.00	.00	1406.16	.36	.07	.02	1413.00
2400.0	.0	2400.0	.0	.0	497.3	.0	141.2	35.8	1412.00
.42	.00	4.83	.00	.000	.025	.000	.000	1399.27	1948.87
.000817	90.	90.	90.	2	0	0	.00	102.26	2051.13

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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

*SECNO 8850.000
CHIMP CLSTA= 2000.00 CELCH= 1408.00 BW= 65.00 STCHL= 1020.00 STCHR= 3253.96
EXCAVATION DATA
AEX= 102.0SQ-FT VEXR= 2.9K*CU-YD VEXT= 183.5K*CU-YD

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND

8850.000	2.57	1410.57	1410.57	.00	1411.12	.55	.31	.10	1413.00
2400.0	.0	2400.0	.0	.0	402.3	.0	142.8	36.7	1414.00
.43	.00	5.97	.00	.000	.025	.000	.000	1408.00	1922.99
.009381	160.	160.	160.	20	19	0	.00	381.15	2412.39

*SECNO 8851.000

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

8851.000	1.89	1410.89	1410.89	.00	1411.37	.48	.01	.02	1413.00
2400.0	.0	2400.0	.0	.0	432.5	.0	142.8	36.7	1414.00
.43	.00	5.55	.00	.000	.025	.000	.000	1409.00	1885.69
.008816	1.	1.	1.	20	15	0	.00	436.21	2417.03

*SECNO 9000.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.95

9000.000	3.01	1412.01	.00	.00	1412.10	.09	.61	.12	1414.00
2400.0	.0	2400.0	.0	.0	1010.7	.0	145.3	39.8	1413.00
.45	.00	2.37	.00	.000	.025	.000	.000	1409.00	1718.84
.002325	150.	150.	150.	2	0	0	.00	1340.84	3059.68

*SECNO 9340.000

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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

3265 DIVIDED FLOW

9340.000	2.67	1412.67	.00	.00	1412.77	.10	.66	.00	1415.00
2400.0	.0	2400.0	.0	.0	965.9	.0	153.0	48.7	1413.00
.49	.00	2.48	.00	.000	.025	.000	.000	1410.00	1826.51
.001661	365.	340.	310.	4	0	0	.00	929.95	2923.91

*SECNO 9731.000
3280 CROSS SECTION 9731.00 EXTENDED .30 FEET

9731.000	3.30	1413.30	.00	.00	1413.40	.10	.63	.00	1418.00
2400.0	.0	2399.7	.3	.0	956.2	.4	161.6	56.8	1413.00
.53	.00	2.51	.89	.000	.025	.025	.000	1410.00	1893.53
.001595	390.	390.	390.	2	0	0	.00	881.12	2774.65

*SECNO 9930.000

3265 DIVIDED FLOW

3280 CROSS SECTION 9930.00 EXTENDED .66 FEET

WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .70

9930.000	2.66	1413.66	.00	.00	1413.94	.28	.45	.09	1419.00
2400.0	.0	2400.0	.0	.0	568.5	.0	165.2	59.8	1413.00
.54	.00	4.22	.00	.000	.025	.000	.000	1411.00	1927.30

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   .003297      203.      203.      203.         2         0         0       .00    412.63   2599.07


*SECNO 10120.000

3265 DIVIDED FLOW

  10120.000      2.34   1414.34       .00       .00   1414.54       .20       .58       .02   1418.00
     2400.0        .0    2400.0        .0        .0     673.5        .0     167.9      61.9   1416.00
        .56       .00      3.56       .00      .000      .025      .000      .000   1412.00   1844.51
   .002723      193.      193.      193.         2         0         0       .00    546.80   2476.88


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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


*SECNO 10600.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
  10600.000      1.59   1417.59   1417.59       .00   1418.05       .47      2.22       .13   1418.00
     2400.0        .0    2386.8      13.2        .0     434.3       5.2     174.1      67.6   1417.00
        .58       .00      5.50      2.56      .000      .025      .025      .000   1416.00   1698.93
   .009521      480.      480.      480.        20        19         0       .00    488.67   2187.60


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T1      INDIAN BEND WASH - CHANNEL IMPROVEMENTS,FILE: IBW_CHI.DAT(100-YEAR HYDRA
T2      40TH STREET TO ACOMA ROAD

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                                                         6000    1383.78

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     15                  -1                                                -6

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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 2
0
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CCHV=     .100 CEHV=     .300
*SECNO 1140.000
CHIMP CLSTA=    2011.10 CELCH=    1379.87 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=       9.2SQ-FT     VEXR=        .0K*CU-YD     VEXT=        .0K*CU-YD


3470 ENCROACHMENT STATIONS=     1765.0    2195.0  TYPE=      1  TARGET=      430.000
        BEGIN INDIAN BEND WASH IMPROVED CHANNEL, SECTION NUMBERS
        MATCH APPROXIMATE R/W STATIONS OF INDIAN BEND WASH
        UPSTREAM OF 40TH STREET
        A LOW FLOW FJORD
  1140.000      4.98   1383.78       .00   1383.58   1384.19       .41       .00       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1172.9        .0        .0        .0 100000.00
       .00       .00      5.12       .00      .000      .035      .000      .000   1378.80   1765.00
   .003834        0.        0.        0.         0         0         0       .00    430.00   2195.00


*SECNO 1300.000
CHIMP CLSTA=    2080.60 CELCH=    1380.16 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=      55.0SQ-FT     VEXR=        .1K*CU-YD     VEXT=        .1K*CU-YD


3470 ENCROACHMENT STATIONS=     1850.0    2150.0  TYPE=      1  TARGET=      300.000
  1300.000      3.85   1384.01       .00   1384.02   1384.84       .83       .53       .13 100000.00
    6000.0        .0    6000.0        .0        .0     821.3        .0       2.3        .8 100000.00
       .00       .00      7.31       .00      .000      .035      .000      .000   1380.16   1850.00
   .007797      100.      100.      100.         2         0         0       .00    300.00   2150.00


*SECNO 1500.000
CHIMP CLSTA=    2116.30 CELCH=    1380.51 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2046.00 CELCH=    1382.21 BW=     200.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     351.6SQ-FT     VEXR=       1.5K*CU-YD     VEXT=       1.6K*CU-YD


3470 ENCROACHMENT STATIONS=     1930.0    2150.0  TYPE=      1  TARGET=      220.000
  1500.000      4.86   1385.37       .00   1385.49   1386.34       .96      1.45       .04 100000.00
    6000.0        .0    6000.0        .0        .0     761.5        .0       5.9       2.0 100000.00
       .01       .00      7.88       .00      .000      .035      .000      .000   1380.51   1930.00
   .006782      200.      200.      200.         2         0         0       .00    220.00   2150.00


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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


*SECNO 1800.000
CHIMP CLSTA=    2119.60 CELCH=    1381.03 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2049.50 CELCH=    1383.49 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
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AEX=     596.5SQ-FT     VEXR=       5.3K*CU-YD     VEXT=       6.9K*CU-YD


3470 ENCROACHMENT STATIONS=     1960.0    2160.0  TYPE=      1  TARGET=      200.000
  00.000      6.14   1387.17       .00   1387.01   1387.98       .81      1.63       .02 100000.00
  6000.0        .0    6000.0        .0        .0     831.3        .0      11.4       3.5 100000.00
     .02       .00      7.22       .00      .000      .035      .000      .000   1381.03   1960.00
 .004439      300.      300.      300.         2         0         0       .00    200.00   2160.00


*SECNO 2100.000
CHIMP CLSTA=    2122.60 CELCH=    1381.55 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2052.50 CELCH=    1384.55 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     648.5SQ-FT     VEXR=       6.9K*CU-YD     VEXT=      13.8K*CU-YD


3470 ENCROACHMENT STATIONS=     1955.0    2175.0  TYPE=      1  TARGET=      220.000
 2100.000      6.94   1388.49       .00   1388.62   1389.12       .63      1.13       .02 100000.00
  6000.0        .0    6000.0        .0        .0      940.6        .0      17.5       4.9 100000.00
     .04       .00      6.38       .00      .000      .035      .000      .000   1381.55   1955.00
 .003216      300.      300.      300.         2         0         0       .00    215.33   2170.33


*SECNO 2400.000
CHIMP CLSTA=    2125.50 CELCH=    1382.07 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2055.50 CELCH=    1385.07 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     660.0SQ-FT     VEXR=       7.3K*CU-YD     VEXT=      21.1K*CU-YD


3470 ENCROACHMENT STATIONS=     1960.0    2180.0  TYPE=      1  TARGET=      220.000
 2400.000      7.36   1389.43       .00   1389.54   1389.96       .53       .83       .01 100000.00
  6000.0        .0    6000.0        .0        .0     1029.5        .0      24.3       6.4 100000.00
     .05       .00      5.83       .00      .000      .035      .000      .000   1382.07   1960.00
 .002383      300.      300.      300.         2         0         0       .00    214.95   2174.95


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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


*SECNO 2700.000
CHIMP CLSTA=    2124.60 CELCH=    1382.59 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2054.40 CELCH=    1385.09 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     582.0SQ-FT     VEXR=       6.9K*CU-YD     VEXT=      28.0K*CU-YD


  0 ENCROACHMENT STATIONS=     1965.0    2175.0  TYPE=      1  TARGET=      210.000
 2700.000      7.54   1390.13       .00   1390.20   1390.58       .45       .61       .01 100000.00
  6000.0        .0    6000.0        .0        .0     1119.6        .0      31.7       7.9 100000.00
     .07       .00      5.36       .00      .000      .035      .000      .000   1382.59   1965.00
 .001763      300.      300.      300.         2         0         0       .00    210.00   2175.00
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*SECNO 2900.000
CHIMP CLSTA=    2122.80 CELCH=    1382.94 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2053.00 CELCH=    1385.94 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     450.1SQ-FT     VEXR=       3.8K*CU-YD     VEXT=       31.8K*CU-YD


3470 ENCROACHMENT STATIONS=     1965.0    2170.0  TYPE=      1  TARGET=      205.000
  2900.000      7.54   1390.48       .00   1390.57   1390.99       .51       .39       .02 100000.00
    6000.0        .0    6000.0        .0        .0    1046.8        .0      36.7       8.8 100000.00
       .08       .00      5.73       .00      .000      .035      .000      .000   1382.94   1965.00
   .002144      200.      200.      200.         2         0         0       .00    205.00   2170.00


*SECNO 3000.000
CHIMP CLSTA=    2121.80 CELCH=    1383.11 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2052.00 CELCH=    1386.11 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     445.3SQ-FT     VEXR=       1.7K*CU-YD     VEXT=       33.5K*CU-YD


3470 ENCROACHMENT STATIONS=     1965.0    2165.0  TYPE=      1  TARGET=      200.000
  3000.000      7.58   1390.69       .00   1390.71   1391.20       .51       .21       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1045.3        .0      39.1       9.3 100000.00
       .08       .00      5.74       .00      .000      .035      .000      .000   1383.11   1965.00
   .002098      100.      100.      100.         1         0         0       .00    200.00   2165.00
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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


*SECNO 3300.000
CHIMP CLSTA=    2119.10 CELCH=    1383.63 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2049.00 CELCH=    1386.63 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     506.6SQ-FT     VEXR=       5.3K*CU-YD     VEXT=       38.7K*CU-YD


3470 ENCROACHMENT STATIONS=     1960.0    2165.0  TYPE=      1  TARGET=      205.000
  3300.000      7.70   1391.33       .00   1391.17   1391.81       .48       .60       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1082.3        .0      46.4      10.7 100000.00
       .09       .00      5.54       .00      .000      .035      .000      .000   1383.63   1960.00
   .001925      300.      300.      300.         0         0         0       .00    205.00   2165.00


*SECNO 3600.000
CHIMP CLSTA=    2118.30 CELCH=    1384.15 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2048.50 CELCH=    1387.15 BW=     150.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     521.3SQ-FT     VEXR=       5.8K*CU-YD     VEXT=       44.6K*CU-YD
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3470 ENCROACHMENT STATIONS=     1955.0    2170.0  TYPE=      1  TARGET=      215.000
  3600.000      7.78   1391.93       .00   1391.72   1392.38       .45       .57       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1115.6        .0      54.1      12.1 100000.00
       .11       .00      5.38       .00      .000      .035      .000      .000   1384.15   1955.00
   .001828      304.      305.      298.         0         0         0       .00    214.44   2169.44


*SECNO 3900.000
CHIMP CLSTA=    2045.60 CELCH=    1384.71 BW=      47.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    1968.00 CELCH=    1387.71 BW=      94.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     578.5SQ-FT     VEXR=       6.5K*CU-YD     VEXT=       51.1K*CU-YD


3470 ENCROACHMENT STATIONS=     1890.0    2140.0  TYPE=      1  TARGET=      250.000
  3900.000      7.86   1392.57       .00   1392.35   1392.97       .40       .59       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1182.9        .0      62.5      13.8 100000.00
       .13       .00      5.07       .00      .000      .035      .000      .000   1384.71   1890.00
   .001847      305.      320.      295.         2         0         0       .00    250.00   2140.00


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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


*SECNO 4000.000
CHIMP CLSTA=    2017.40 CELCH=    1384.89 BW=      60.00 STCHL=    1730.00 STCHR=    2230.00
CHIMP CLSTA=    1940.00 CELCH=    1387.89 BW=      80.00 STCHL=    1730.00 STCHR=    2230.00
EXCAVATION DATA
AEX=     615.2SQ-FT     VEXR=       2.3K*CU-YD     VEXT=       53.3K*CU-YD


3470 ENCROACHMENT STATIONS=     1860.0    2095.0  TYPE=      1  TARGET=      235.000
  4000.000      7.87   1392.76       .00   1392.58   1393.15       .39       .18       .00 100000.00
    6000.0        .0    6000.0        .0        .0    1197.9        .0      65.3      14.4 100000.00
       .13       .00      5.01       .00      .000      .035      .000      .000   1384.89   1860.00
   .001636       95.      102.      105.         0         0         0       .00    235.00   2095.00


*SECNO 4100.000
CHIMP CLSTA=    2002.70 CELCH=    1385.06 BW=      72.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    1929.00 CELCH=    1388.06 BW=      62.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     686.4SQ-FT     VEXR=       2.4K*CU-YD     VEXT=       55.7K*CU-YD


3470 ENCROACHMENT STATIONS=     1870.0    2100.0  TYPE=      1  TARGET=      230.000
  4100.000      7.85   1392.91       .00   1392.75   1393.33       .41       .17       .01 100000.00
    6000.0        .0    6000.0        .0        .0    1161.1        .0      68.0      14.9 100000.00
       .14       .00      5.17       .00      .000      .035      .000      .000   1385.06   1870.00
   .001754      102.      100.       98.         2         0         0       .00    230.00   2100.00
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CCHV=     .300 CEHV=     .500
*SECNO 4190.000
CHIMP CLSTA=    2000.00 CELCH=    1385.23 BW=      76.00 STCHL=    1935.45 STCHR=    2069.33
EXCAVATION DATA
      725.1SQ-FT     VEXR=       2.3K*CU-YD     VEXT=       58.0K*CU-YD


3470 ENCROACHMENT STATIONS=     1880.0    2100.0  TYPE=      1  TARGET=      220.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1391.87 ELREA=      1393.06

       DOWNSTREAM FACE OF 36TH STREET CULVERT
       6-12'x8' CONCRETE BOX CULVERT
       ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
  4190.000      7.68   1392.91       .00   1392.77   1393.70       .79       .18       .19   1391.87
    6000.0     127.4    5872.6        .0      62.5     817.7        .0      70.1      15.4   1393.06
       .14      2.04      7.18       .00      .040      .035      .000      .000   1385.23   1880.00
   .002593       92.       87.       88.         2         0         0       .00    188.73   2068.73


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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


SPECIAL CULVERT

SC  CUNO      CUNV      ENTLC     COFQ      RDLEN     RISE      SPAN      CULVLN    CHRT      SCL       ELCHU     ELCHD
     6         .013      .30      2.63       .00      8.00     12.00     66.00     11         4      1385.42   1385.22

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE  4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 4256.000
CHIMP CLSTA=    2000.00 CELCH=    1385.42 BW=      76.00 STCHL=    1934.14 STCHR=    2069.09
EXCAVATION DATA
AEX=     813.4SQ-FT     VEXR=       1.9K*CU-YD     VEXT=       59.9K*CU-YD


5175, 20 TRIALS OF QELTRD NOT ENOUGH; ASSUMED =  2979.337


SPECIAL CULVERT OUTLET CONTROL + WEIR FLOW EG =   1395.05

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.02

SPECIAL CULVERT

    EGIC      EGOC        H4     QWEIR     QCULV       VCH     ACULV     ELTRD    WEIRLN
  1394.97   1395.42      1.35      517.     5528.     5.714     576.0   1393.39      222.


3470 ENCROACHMENT STATIONS=     1890.0    2100.0  TYPE=      1  TARGET=      210.000
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        UPSTREAM FACE OF 36TH STREET CULVERT
        6-12'x8' CONCRETE BOX CULVERT
        ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT
  4256.000      9.13   1394.55      .00   1394.59   1395.05      .49      1.35      .00   1392.39
    6000.0     156.8    5802.9     40.3      99.7    1015.5     38.0      71.6     15.7   1393.19
       .15      1.57      5.71     1.06      .040      .025     .040      .000   1385.42   1890.00
   .000638       69.       66.      63.         2         0        0       .00    210.00   2100.00


*SECNO 4400.000
CHIMP CLSTA=    2000.00 CELCH=    1385.86 BW=      72.00 STCHL=    1750.00 STCHR=    2250.00
CHIMP CLSTA=    2026.00 CELCH=    1385.86 BW=      40.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     821.4SQ-FT     VEXR=       4.5K*CU-YD     VEXT=       64.3K*CU-YD


3470 ENCROACHMENT STATIONS=     1940.0    2100.0  TYPE=      1  TARGET=      160.000
  4400.000      8.78   1394.64      .00   1394.78   1395.17      .53       .11      .02 100000.00
    6000.0        .0    6000.0       .0        .0    1025.0       .0      75.3     16.3 100000.00
       .15       .00      5.85      .00      .000      .025     .000      .000   1385.86   1940.00
   .000849      149.      147.     141.         2         0        0       .00    160.00   2100.00


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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


CCHV=      .100 CEHV=      .300
*SECNO 4500.000
CHIMP CLSTA=    2000.00 CELCH=    1386.17 BW=      65.00 STCHL=    1700.00 STCHR=    2270.00
CHIMP CLSTA=    2056.00 CELCH=    1386.17 BW=      56.00 STCHL=    1700.00 STCHR=    2270.00
EXCAVATION DATA
AEX=    1123.6SQ-FT     VEXR=       3.6K*CU-YD     VEXT=       67.9K*CU-YD


3470 ENCROACHMENT STATIONS=     1965.0    2115.0  TYPE=      1  TARGET=      150.000
  4500.000      8.68   1394.85      .00   1394.93   1395.25      .40       .06      .01 100000.00
    6000.0        .0    6000.0       .0        .0    1181.4       .0      77.8     16.6 100000.00
       .16       .00      5.08      .00      .000      .025     .000      .000   1386.17   1965.00
   .000508      102.      100.      98.         2         0        0       .00    150.00   2115.00


*SECNO 4573.000
CHIMP CLSTA=    2000.00 CELCH=    1386.40 BW=      65.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     764.1SQ-FT     VEXR=       2.6K*CU-YD     VEXT=       70.5K*CU-YD


' HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .23
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3470 ENCROACHMENT STATIONS=     1967.5    2032.5  TYPE=      1  TARGET=       65.000
  4573.000      6.87   1393.27       .00   1393.33   1396.07      2.80       .10       .72 100000.00
    6000.0        .0    6000.0        .0        .0     446.6        .0      79.2      16.8 100000.00
       .16       .00     13.43       .00      .000      .035      .000      .000   1386.40   1967.50
    009899       75.       74.       71.         4         0         0       .00     65.00   2032.50


*SECNO 4574.000
CHIMP CLSTA=    2000.00 CELCH=    1387.55 BW=      65.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     611.9SQ-FT     VEXR=       1.9K*CU-YD     VEXT=       72.4K*CU-YD


3301 HV CHANGED MORE THAN HVINS

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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


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.45


3470 ENCROACHMENT STATIONS=     1967.5    2032.5  TYPE=      1  TARGET=       65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

       DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
       EXISTING 4-10'x8' CBC PLUS 2-10'X8'
  4574.000      8.74   1396.29       .00   1396.29   1396.56       .28       .24       .25 100000.00
    2400.0        .0    2400.0        .0        .0     567.9        .0      80.1      16.9 100000.00
       .16       .00      4.23       .00      .000      .035      .000      .000   1387.55   1967.50
   .000757        1.       74.        1.         3         0         0       .00     65.00   2032.50


SPECIAL CULVERT

SC  CUNO      CUNV      ENTLC     COFQ      RDLEN     RISE      SPAN      CULVLN    CHRT      SCL       ELCHU     ELCHD
     6         .013      .20       2.63      500.00    8.00      10.00     72.00     11        4         1387.69   1387.55

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE  4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 4646.000
CHIMP CLSTA=    2000.00 CELCH=    1387.69 BW=      65.00 STCHL=    1750.00 STCHR=    2250.00
EXCAVATION DATA
AEX=     692.3SQ-FT     VEXR=       1.8K*CU-YD     VEXT=       74.2K*CU-YD


SPECIAL CULVERT OUTLET CONTROL
EGIC =   1393.516  EGOC =   1396.801  PCWSE=   1396.288  ELTRD=   1398.000

SPECIAL CULVERT
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EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1393.52	1396.80	.24	0.	2400.	4.177	480.0	1398.00	0.

3470 ENCROACHMENT STATIONS= 1967.5 2032.5 TYPE= 1 TARGET= 65.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

UPSTREAM FACE OF SWEETWATER AVENUE CULVERT
EXISTING 4-10'x8' CBC PLUS 2-10'X8'

4646.000	8.84	1396.53	.00	1396.53	1396.80	.27	.24	.00	100000.00
2400.0	.0	2400.0	.0	.0	574.6	.0	81.0	17.0	100000.00
.17	.00	4.18	.00	.000	.035	.000	.000	1387.69	1967.50
.000730	74.	74.	70.	2	0	0	.00	65.00	2032.50

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

*SECNO 4800.000
CHIMP CLSTA= 2000.90 CELCH= 1388.11 BW= 50.00 STCHL= 1750.00 STCHR= 2250.00
EXCAVATION DATA
AEX= 449.9SQ-FT VEXR= 3.2K*CU-YD VEXT= 77.4K*CU-YD

3470 ENCROACHMENT STATIONS= 1927.0 2075.0 TYPE= 1 TARGET= 148.000

4800.000	8.64	1396.75	.00	1396.75	1396.91	.16	.10	.01	100000.00
2400.0	.0	2400.0	.0	.0	737.2	.0	83.3	17.4	100000.00
.18	.00	3.26	.00	.000	.035	.000	.000	1388.11	1927.00
.000619	157.	152.	151.	2	0	0	.00	133.69	2060.69

CCHV= .100 CEHV= .300
*SECNO 5000.000
CHIMP CLSTA= 2002.10 CELCH= 1388.66 BW= 50.00 STCHL= 1730.00 STCHR= 2230.00
EXCAVATION DATA
AEX= 503.5SQ-FT VEXR= 3.6K*CU-YD VEXT= 81.0K*CU-YD

3470 ENCROACHMENT STATIONS= 1934.0 2070.0 TYPE= 1 TARGET= 136.000

5000.000	8.21	1396.87	.00	1396.87	1397.04	.17	.13	.00	100000.00
2400.0	.0	2400.0	.0	.0	719.6	.0	86.7	18.0	100000.00
.20	.00	3.34	.00	.000	.035	.000	.000	1388.66	1934.00
.000624	208.	202.	192.	1	0	0	.00	125.97	2059.97

*SECNO 5300.000
CHIMP CLSTA= 1999.40 CELCH= 1389.49 BW= 50.00 STCHL= 1680.00 STCHR= 2180.00
EXCAVATION DATA
AEX= 469.6SQ-FT VEXR= 5.5K*CU-YD VEXT= 86.5K*CU-YD

```
3470 ENCROACHMENT STATIONS=     1941.5    2057.5  TYPE=      1  TARGET=      116.000
  5300.000      7.56   1397.05       .00   1397.06   1397.29       .23       .23       .02 100000.00
    2400.0        .0    2400.0        .0        .0     622.2        .0      91.4      18.8 100000.00
       .22       .00      3.86       .00      .000      .035      .000      .000   1389.49   1941.50
   .000887      309.      306.      291.         0         0         0       .00    113.16   2054.66


*SECNO 5400.000
CHIMP CLSTA=    1999.40 CELCH=    1389.76 BW=      50.00 STCHL=    1670.00 STCHR=    2170.00
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


EXCAVATION DATA
AEX=      457.7SQ-FT      VEXR=       1.8K*CU-YD      VEXT=       88.2K*CU-YD


3470 ENCROACHMENT STATIONS=     1941.5    2057.5  TYPE=      1  TARGET=      116.000
  5400.000      7.37   1397.13       .00   1397.13   1397.39       .26       .10       .01 100000.00
    2400.0        .0    2400.0        .0        .0     585.8        .0      92.8      19.1 100000.00
       .23       .00      4.10       .00      .000      .035      .000      .000   1389.76   1944.92
   .001011      102.      102.       98.         0         0         0       .00    108.96   2053.88


*SECNO 5700.000
CHIMP CLSTA=    1999.30 CELCH=    1390.59 BW=      50.00 STCHL=    1655.00 STCHR=    2155.00
EXCAVATION DATA
AEX=      515.9SQ-FT      VEXR=       5.5K*CU-YD      VEXT=       93.8K*CU-YD


3470 ENCROACHMENT STATIONS=     1941.0    2057.0  TYPE=      1  TARGET=      116.000
  5700.000      6.87   1397.46       .00   1397.46   1397.76       .31       .36       .01 100000.00
    2400.0        .0    2400.0        .0        .0     537.6        .0      96.8      19.9 100000.00
       .25       .00      4.46       .00      .000      .035      .000      .000   1390.59   1941.00
   .001383      305.      306.      295.         2         0         0       .00    110.76   2051.76


*SECNO 6000.000
CHIMP CLSTA=    2000.80 CELCH=    1391.42 BW=      50.00 STCHL=    1645.00 STCHR=    2145.00
EXCAVATION DATA
AEX=      672.5SQ-FT      VEXR=       6.8K*CU-YD      VEXT=      100.5K*CU-YD


3470 ENCROACHMENT STATIONS=     1943.0    2059.0  TYPE=      1  TARGET=      116.000
  6000.000      6.46   1397.88       .00   1397.88   1398.25       .37       .47       .02 100000.00
    2400.0        .0    2400.0        .0        .0     489.6        .0     100.4      20.6 100000.00
       .26       .00      4.90       .00      .000      .035      .000      .000   1391.42   1949.97
   .001674      310.      307.      290.         2         0         0       .00    101.65   2051.63


*SECNO 6200.000
CHIMP CLSTA=    1996.90 CELCH=    1391.98 BW=      50.00 STCHL=    1635.00 STCHR=    2135.00
EXCAVATION DATA
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AEX=     612.2SQ-FT     VEXR=       4.8K*CU-YD     VEXT=      105.4K*CU-YD

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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


3470 ENCROACHMENT STATIONS=     1936.0    2058.0  TYPE=      1  TARGET=      122.000
        INDIAN BEND WASH CONFLUENCE AND EMILE ZOLA CHANNEL
  6200.000      6.23   1398.21       .00   1398.22   1398.62       .41       .36       .01 100000.00
    2400.0        .0    2400.0        .0        .0     467.1        .0     102.6      21.1 100000.00
       .28       .00      5.14       .00      .000      .035      .000      .000   1391.98   1946.97
   .001911      203.      203.      197.         2         0         0       .00     99.87   2046.83


*SECNO 6500.000
CHIMP CLSTA=    2000.80 CELCH=    1392.82 BW=      50.00 STCHL=    1665.00 STCHR=    2165.00
EXCAVATION DATA
AEX=     734.9SQ-FT     VEXR=       7.6K*CU-YD     VEXT=      113.0K*CU-YD


3470 ENCROACHMENT STATIONS=     1948.0    2054.0  TYPE=      1  TARGET=      106.000
  6500.000      5.99   1398.81       .00   1398.81   1399.27       .46       .63       .01 100000.00
    2400.0        .0    2400.0        .0        .0     443.1        .0     105.8      21.8 100000.00
       .29       .00      5.42       .00      .000      .035      .000      .000   1392.82   1951.84
   .002218      308.      306.      292.         2         0         0       .00     97.93   2049.76


*SECNO 6700.000
CHIMP CLSTA=    2001.60 CELCH=    1393.37 BW=      50.00 STCHL=    1705.00 STCHR=    2205.00
EXCAVATION DATA
AEX=     718.7SQ-FT     VEXR=       5.4K*CU-YD     VEXT=      118.4K*CU-YD


3470 ENCROACHMENT STATIONS=     1943.0    2060.0  TYPE=      1  TARGET=      117.000
  6700.000      5.89   1399.26       .00   1399.26   1399.74       .48       .46       .01 100000.00
    2400.0        .0    2400.0        .0        .0     433.1        .0     107.9      22.2 100000.00
       .30       .00      5.54       .00      .000      .035      .000      .000   1393.37   1953.04
   .002366      200.      202.      200.         2         0         0       .00     97.11   2050.15


*SECNO 7000.000
CHIMP CLSTA=    1999.00 CELCH=    1394.19 BW=      50.00 STCHL=    1760.00 STCHR=    2260.00
EXCAVATION DATA
AEX=     671.7SQ-FT     VEXR=       7.7K*CU-YD     VEXT=      126.1K*CU-YD


3470 ENCROACHMENT STATIONS=     1955.0    2045.0  TYPE=      1  TARGET=       90.000
  000.000      5.77   1399.96       .00   1399.98   1400.47       .51       .72       .01 100000.00
    2400.0        .0    2400.0        .0        .0     418.3        .0     110.8      22.9 100000.00
       .32       .00      5.74       .00      .000      .035      .000      .000   1394.19   1955.00
   .002451      300.      300.      300.         1         0         0       .00     90.00   2045.00
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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


*SECNO 7400.000
CHIMP CLSTA=    2000.50 CELCH=    1395.28 BW=      50.00 STCHL=    1815.00 STCHR=    2315.00
EXCAVATION DATA
AEX=     776.8SQ-FT     VEXR=      10.7K*CU-YD     VEXT=      136.9K*CU-YD


3470 ENCROACHMENT STATIONS=     1955.0    2045.0  TYPE=      1  TARGET=      90.000
  7400.000      5.67   1400.95       .00   1401.00   1401.48       .53      1.01       .01 100000.00
    2400.0        .0    2400.0        .0        .0     410.5        .0     114.6      23.7 100000.00
       .34       .00      5.85       .00      .000      .035      .000      .000   1395.28   1955.00
   .002603      400.      400.      400.         2         0         0       .00     90.00   2045.00


*SECNO 7500.000
CHIMP CLSTA=    1998.90 CELCH=    1395.55 BW=      56.00 STCHL=    1825.00 STCHR=    2325.00
EXCAVATION DATA
AEX=     864.1SQ-FT     VEXR=       3.0K*CU-YD     VEXT=      139.9K*CU-YD


3 ENCROACHMENT STATIONS=     1950.0    2060.0  TYPE=      1  TARGET=     110.000
  00.000      5.74   1401.29       .00   1401.33   1401.73       .44       .23       .01 100000.00
    2400.0        .0    2400.0        .0        .0     452.9        .0     115.6      23.9 100000.00
       .34       .00      5.30       .00      .000      .035      .000      .000   1395.55   1950.00
   .002127      100.      100.      100.         2         0         0       .00     99.87   2049.87


CCHV=      .300 CEHV=      .500
*SECNO 7569.000
CHIMP CLSTA=    1991.00 CELCH=    1395.74 BW=      58.00 STCHL=    1460.00 STCHR=    3224.85
EXCAVATION DATA
AEX=     848.0SQ-FT     VEXR=       2.4K*CU-YD     VEXT=      142.4K*CU-YD


3470 ENCROACHMENT STATIONS=     1962.0    2020.0  TYPE=      1  TARGET=      58.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

        DOWNSTREAM FACE OF THUNDERBIRD ROAD CULVERT
        START SLA MODIFICATION BY USING THE MOST RECENT TOPO
        1-28'x7' CONCRETE ARCH PLUS 1-28'x10.32 CONCRETE ARCH
        CROWN ELEVATIONS OF ARCHES ARE THE SAME, THE 28'X7' ARCH HAS
        FLOW LINE ELEVATIONS OF 1395.74 OUTLET, 1396.12 INLET
        THIS HEC-2 MODELS THE TWO ARCHES AS 2-28'x7.63' CONCRETE ARCHES
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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
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   SLOPE      XLOBL      XLCH      XLOBR     ITRIAL     IDC       ICONT     CORAR     TOPWID    ENDST


 7569.000      5.49   1401.23       .00   1401.27   1402.11       .88       .16       .22 100000.00
   2400.0        .0    2400.0        .0       .0     318.6        .0     116.3      24.1 100000.00
      .34       .00      7.53       .00      .000      .025      .000      .000   1395.74   1962.00
  .002089       69.       77.       69.         2         0         0       .00     58.00   2020.00



SPECIAL CULVERT

SC  CUNO      CUNV      ENTLC     COFQ      RDLEN     RISE      SPAN      CULVLN    CHRT      SCL       ELCHU     ELCHD
    2          .013      .30      2.63    150.00      7.63     28.00    127.00     11        4       1394.46   1394.08

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
SCALE  4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 7696.000
CHIMP CLSTA=    1530.00 CELCH=    1396.12 BW=      58.00 STCHL=     650.03 STCHR=    3118.14
EXCAVATION DATA
AEX=     914.6SQ-FT     VEXR=       3.6K*CU-YD     VEXT=      145.9K*CU-YD


SPECIAL CULVERT OUTLET CONTROL
EGIC =   1400.560  EGOC =   1401.186  PCWSE=   1401.232  ELTRD=   1405.410

5150, EG OF  1401.19 LESS THAN XEG OF  1402.11
SPECIAL CULVERT

   EGIC      EGOC       H4      QWEIR     QCULV      VCH      ACULV     ELTRD    WEIRLN
  1400.56   1401.19      .00       0.     2400.     8.495     427.3   1405.41       0.



3470 ENCROACHMENT STATIONS=     1501.0    1559.0  TYPE=      1  TARGET=       58.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

       UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
       1-28'x7' CONCRETE ARCH PLUS 1-28'X10.32 CONCRETE ARCH
 7696.000      4.87   1400.99       .00   1401.04   1402.11      1.12       .00       .00 100000.00
   2400.0        .0    2400.0        .0       .0     282.5        .0     117.0      24.2 100000.00
      .35       .00      8.49       .00      .000      .025      .000      .000   1396.12   1501.00
  .003042      128.      110.      128.         4         0         0       .00     58.00   1559.00


*SECNO 7800.000
CHIMP CLSTA=    2000.00 CELCH=    1396.44 BW=      60.00 STCHL=     864.07 STCHR=    3201.38
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


EXCAVATION DATA
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AEX=    1156.2SQ-FT     VEXR=       4.3K*CU-YD     VEXT=      150.3K*CU-YD


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.73


3470 ENCROACHMENT STATIONS=     1940.0    2050.0  TYPE=      1  TARGET=      110.000
  7800.000      5.66   1402.10       .00   1402.13   1402.51       .41       .18       .21 100000.00
    2400.0        .0    2400.0        .0        .0     466.7        .0     118.0      24.4 100000.00
       .35       .00      5.14       .00      .000      .025      .000      .000   1396.44   1947.37
   .001019      104.      113.      104.         3         0         0       .00    102.63   2050.00


*SECNO 7987.000
CHIMP CLSTA=    1479.00 CELCH=    1397.02 BW=      46.00 STCHL=     608.19 STCHR=    2984.31
EXCAVATION DATA
AEX=     907.7SQ-FT     VEXR=       7.6K*CU-YD     VEXT=      157.9K*CU-YD


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .43


3470 ENCROACHMENT STATIONS=     1456.0    1502.0  TYPE=      1  TARGET=       46.000

    OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=    100000.00 ELREA=    100000.00

       DOWNSTREAM FACE OF SR 51 CULVERT
       THIS HEC-2 MODELS THE 1-28'X7' & 1-16'X10.7' ARCHES FOR THE
       WEST SIDE FLOW ONLY.
       FLOW LINE ELEVATION OF 16'x10.32' ARCH IS 1-FOOT ABOVE THE FLOW
       LINE OF THE 28'x7' ARCH, WHICH IS EQUAL TO CHANNEL FLOW LINE
  7987.000      4.75   1401.77       .00   1401.80   1403.64      1.88       .40       .73 100000.00
    2400.0        .0    2400.0        .0        .0     218.4        .0     119.6      24.8 100000.00
       .36       .00     10.99       .00      .000      .025      .000      .000   1397.02   1456.00
   .005498      197.      200.      197.         3         0         0       .00     46.00   1502.00


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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


    IAL CULVERT

SC  CUNO       CUNV       ENTLC      COFQ       RDLEN      RISE       SPAN       CULVLN     CHRT       SCL        ELCHU      ELCHD
     2          .013       .30       2.63      150.00      5.72      23.00      318.00      11         4       1398.24    1397.28

CHART 11 - BOX CULVERT; SKEWED HEADWALL; CHAMFERED OR BEVELED INLET EDGES
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SCALE 4 - HEADWALL SKEWED 10 TO 45 DEGREES; INLET EDGES BEVELED

*SECNO 8262.000
CHIMP CLSTA= 1488.00 CELCH= 1397.98 BW= 46.00 STCHL= 512.92 STCHR= 2649.24
VATION DATA
= 767.0SQ-FT VEXR= 8.4K*CU-YD VEXT= 166.3K*CU-YD

SPECIAL CULVERT OUTLET CONTROL
EGIC = 1405.252 EGOC = 1405.468 PCWSE= 1401.766 ELTRD= 1409.100

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.61

SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1405.25	1405.47	1.83	0.	2400.	8.046	263.1	1409.10	0.

3470 ENCROACHMENT STATIONS= 1465.0 1511.0 TYPE= 1 TARGET= 46.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 100000.00 ELREA= 100000.00

UPSTREAM FACE OF SR 51 CULVERT
1-28'x7' & 1-16'X10.7' CBC FOR THE WEST SIDE FLOW ONLY.
MODELED AS A 2-23'X5.72' CBC

8262.000	6.48	1404.46	.00	1404.46	1405.47	1.01	1.83	.00	100000.00
2400.0	.0	2400.0	.0	.0	298.3	.0	121.2	25.0	100000.00
.37	.00	8.05	.00	.000	.025	.000	.000	1397.98	1465.00
.002109	275.	270.	275.	3	0	0	.00	46.00	1511.00

*SECNO 8400.000
CHIMP CLSTA= 2000.00 CELCH= 1398.40 BW= 50.00 STCHL= 856.92 STCHR= 2679.27

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

EXCAVATION DATA
AEX= 1013.1SQ-FT VEXR= 4.3K*CU-YD VEXT= 170.6K*CU-YD

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.42

3470 ENCROACHMENT STATIONS= 1955.0 2045.0 TYPE= 1 TARGET= 90.000

```
  8400.000      7.17   1405.57       .00   1405.60   1405.87       .30       .19       .21 100000.00
    2400.0        .0    2400.0        .0        .0     545.5        .0     122.4      25.2 100000.00
       .38       .00      4.40       .00      .000      .035      .000      .000   1398.40   1955.00
   .001053      130.      130.      130.         2         0         0       .00     90.00   2045.00


*SECNO 8600.000
CHIMP CLSTA=    2020.00 CELCH=    1399.00 BW=      50.00 STCHL=    1133.86 STCHR=    3179.03
EXCAVATION DATA
AEX=     883.6SQ-FT     VEXR=       7.0K*CU-YD     VEXT=      177.6K*CU-YD


3470 ENCROACHMENT STATIONS=     1955.0    2045.0  TYPE=      1  TARGET=       90.000
  8600.000      6.68   1405.68       .00   1405.75   1406.18       .50       .21       .10 100000.00
    2400.0        .0    2400.0        .0        .0     423.1        .0     124.6      25.6 100000.00
       .39       .00      5.67       .00      .000      .025      .000      .000   1399.00   1968.29
   .001057      200.      200.      200.         2         0         0       .00     76.71   2045.00


*SECNO 8690.000
CHIMP CLSTA=    2000.00 CELCH=    1399.27 BW=      50.00 STCHL=    1080.00 STCHR=    3203.86
EXCAVATION DATA
AEX=     878.5SQ-FT     VEXR=       2.9K*CU-YD     VEXT=      180.5K*CU-YD


3470 ENCROACHMENT STATIONS=     1955.0    2045.0  TYPE=      1  TARGET=       90.000
  8690.000      6.67   1405.94       .00   1405.80   1406.30       .36       .08       .04 100000.00
    2400.0        .0    2400.0        .0        .0     500.4        .0     125.6      25.8 100000.00
       .39       .00      4.80       .00      .000      .025      .000      .000   1399.27   1955.00
   .000706       90.       90.       90.         2         0         0       .00     90.00   2045.00


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   09JAN98      09:03:02                                                                          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


*SECNO 8850.000
CHIMP CLSTA=    2000.00 CELCH=    1408.00 BW=      65.00 STCHL=    1020.00 STCHR=    3253.96
EXCAVATION DATA
AEX=     102.0SQ-FT     VEXR=       2.9K*CU-YD     VEXT=      183.5K*CU-YD


3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

   ENCROACHMENT STATIONS=     1930.0    2070.0  TYPE=      1  TARGET=      140.000
      CHANNELIZED SLA SECTION(1 FT DEPTH) TO TRANSITION INTO EXISTING GROUND
  8850.000      2.89   1410.89   1410.89   1410.57   1411.95      1.06       .26       .35 100000.00
    2400.0        .0    2400.0        .0        .0     290.3        .0     127.1      26.2 100000.00
       .40       .00      8.27       .00      .000      .025      .000      .000   1408.00   1930.00
   .007488      160.      160.      160.        20        18         0       .00    140.00   2070.00
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*SECNO 8851.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
     PROBABLE MINIMUM SPECIFIC ENERGY
     CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     1930.0    2070.0  TYPE=      1  TARGET=      140.000
  8851.000      2.62   1411.62   1411.62   1410.89   1412.68      1.06       .01       .00 100000.00
    2400.0        .0    2400.0        .0        .0     290.9        .0     127.1      26.2 100000.00
       .40       .00      8.25       .00      .000      .025      .000      .000   1409.00   1930.00
   .007526        1.        1.        1.        20        11         0       .00    140.00   2070.00


*SECNO 9000.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.32


3470 ENCROACHMENT STATIONS=     1930.0    2070.0  TYPE=      1  TARGET=      140.000
  9000.000      3.91   1412.91       .00   1412.01   1413.29       .38       .41       .20 100000.00
    2400.0        .0    2400.0        .0        .0     484.5        .0     128.4      26.7 100000.00
       .40       .00      4.95       .00      .000      .025      .000      .000   1409.00   1930.00
   .001398      150.      150.      150.         2         0         0       .00    140.00   2070.00


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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


*SECNO 9340.000
3280 CROSS SECTION   9340.00 EXTENDED       .45 FEET


3470 ENCROACHMENT STATIONS=     1930.0    2070.0  TYPE=      1  TARGET=      140.000
  9340.000      3.45   1413.45       .00   1412.67   1413.96       .52       .60       .07 100000.00
    2400.0        .0    2400.0        .0        .0     415.3        .0     131.9      27.8 100000.00
       .42       .00      5.78       .00      .000      .025      .000      .000   1410.00   1930.00
   .002337      365.      340.      310.         3         0         0       .00    140.00   2070.00


*SECNO 9731.000
3280 CROSS SECTION   9731.00 EXTENDED      1.27 FEET


     WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.63


3470 ENCROACHMENT STATIONS=     1970.0    2110.0  TYPE=      1  TARGET=      140.000
  9731.000      4.27   1414.27       .00   1413.30   1414.56       .29       .53       .07 100000.00
    2400.0        .0    2400.0        .0        .0     557.2        .0     136.3      29.1 100000.00
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      .45       .00      4.31       .00      .000      .025      .000      .000   1410.00   1970.00
  .000884      390.      390.      390.         2         0         0       .00    140.00   2110.00


 :NO 9930.000
 0 CROSS SECTION   9930.00 EXTENDED      1.45 FEET


3470 ENCROACHMENT STATIONS=     1980.0    2120.0  TYPE=      1  TARGET=      140.000
  9930.000      3.45   1414.45       .00   1413.66   1414.88       .43       .24       .07 100000.00
    2400.0        .0    2400.0        .0        .0     455.2        .0     138.6      29.7 100000.00
       .46       .00      5.27       .00      .000      .025      .000      .000   1411.00   1980.00
  .001723      203.      203.      203.         2         0         0       .00    140.00   2120.00


*SECNO 10120.000

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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   09JAN98      09:03:02                                                                                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


3470 ENCROACHMENT STATIONS=     1970.0    2110.0  TYPE=      1  TARGET=      140.000
 10120.000      3.08   1415.08   1415.08   1414.34   1416.14      1.06       .61       .32 100000.00
    2400.0        .0    2400.0        .0        .0     290.1        .0     140.3      30.3 100000.00
       .46       .00      8.27       .00      .000      .025      .000      .000   1412.00   1970.00
  .007627      193.      193.      193.        20        15         0       .00    140.00   2110.00


*SECNO 10600.000
3280 CROSS SECTION  10600.00 EXTENDED      .53 FEET


3470 ENCROACHMENT STATIONS=     1930.0    2070.0  TYPE=      1  TARGET=      140.000
 10600.000      2.53   1418.53       .00   1417.59   1419.46       .93      3.28       .04 100000.00
    2400.0        .0    2400.0        .0        .0     309.6        .0     143.6      31.9 100000.00
       .48       .00      7.75       .00      .000      .025      .000      .000   1416.00   1930.00
  .006150      480.      480.      480.         2         0         0       .00    140.00   2070.00


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   09JAN98      09:03:02                                                                                PAGE   53


                                                                                THIS RUN EXECUTED 09JAN98    09:03:07
*************************************
 HEC-2 WATER SURFACE PROFILES
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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

FLOWS FROM FIS STUDY

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
1140.000	1383.58	.00	1384.04	449.86	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
1140.000	1383.78	.20	1384.19	430.00	.00	6000.00	.00	430.00	1765.00	1750.00	2250.00	2195.00
1300.000	1384.02	.00	1384.80	358.65	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
1300.000	1384.01	.00	1384.84	300.00	.00	6000.00	.00	300.00	1850.00	1750.00	2250.00	2150.00
1500.000	1385.49	.00	1386.07	315.08	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
1500.000	1385.37	-.12	1386.34	220.00	.00	6000.00	.00	220.00	1930.00	1750.00	2250.00	2150.00
1800.000	1387.01	.00	1387.72	311.81	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
1800.000	1387.17	.16	1387.98	200.00	.00	6000.00	.00	200.00	1960.00	1750.00	2250.00	2160.00
2100.000	1388.62	.00	1389.06	340.02	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
2100.000	1388.49	-.13	1389.12	215.33	.00	6000.00	.00	220.00	1955.00	1750.00	2250.00	2175.00
2400.000	1389.54	.00	1389.90	348.48	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
2400.000	1389.43	-.11	1389.96	214.95	.00	6000.00	.00	220.00	1960.00	1750.00	2250.00	2180.00
2700.000	1390.20	.00	1390.50	344.26	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
2700.000	1390.13	-.07	1390.58	210.00	.00	6000.00	.00	210.00	1965.00	1750.00	2250.00	2175.00
2900.000	1390.57	.00	1390.83	363.77	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
2900.000	1390.48	-.09	1390.99	205.00	.00	6000.00	.00	205.00	1965.00	1750.00	2250.00	2170.00
3000.000	1390.71	.00	1390.98	365.13	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
3000.000	1390.69	-.03	1391.20	200.00	.00	6000.00	.00	200.00	1965.00	1750.00	2250.00	2165.00
3300.000	1391.17	.00	1391.47	359.25	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
3300.000	1391.33	.15	1391.81	205.00	.00	6000.00	.00	205.00	1960.00	1750.00	2250.00	2165.00
3600.000	1391.72	.00	1392.03	344.36	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
3600.000	1391.93	.21	1392.38	214.44	.00	6000.00	.00	215.00	1955.00	1750.00	2250.00	2170.00

1

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
3900.000	1392.35	.00	1392.69	346.38	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
3900.000	1392.57	.23	1392.97	250.00	.00	6000.00	.00	250.00	1890.00	1750.00	2250.00	2140.00
4000.000	1392.58	.00	1392.91	349.83	.00	6000.00	.00	.00	.00	1730.00	2230.00	.00
4000.000	1392.76	.18	1393.15	235.00	.00	6000.00	.00	235.00	1860.00	1730.00	2230.00	2095.00

	4100.000	1392.75	.00	1393.14	309.84	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
	4100.000	1392.91	.16	1393.33	230.00	.00	6000.00	.00	230.00	1870.00	1750.00	2250.00	2100.00
	4190.000	1392.77	.00	1393.55	245.71	245.21	5754.79	.00	.00	.00	1935.45	2069.33	.00
	4190.000	1392.91	.14	1393.70	188.73	127.38	5872.63	.00	220.00	1880.00	1935.45	2069.33	2100.00
*	4256.000	1394.59	.00	1395.00	394.89	409.87	5493.05	97.08	.00	.00	1934.14	2069.09	.00
*	4256.000	1394.55	-.03	1395.05	210.00	156.80	5802.91	40.28	210.00	1890.00	1934.14	2069.09	2100.00
*	4400.000	1394.78	.00	1395.15	424.50	.00	6000.00	.00	.00	.00	1750.00	2250.00	.00
	4400.000	1394.64	-.13	1395.17	160.00	.00	6000.00	.00	160.00	1940.00	1750.00	2250.00	2100.00
*	4500.000	1394.93	.00	1395.24	234.26	.00	6000.00	.00	.00	.00	1700.00	2270.00	.00
	4500.000	1394.85	-.08	1395.25	150.00	.00	6000.00	.00	150.00	1965.00	1700.00	2270.00	2115.00
*	4573.000	1393.33	.00	1396.08	65.00	.00	6000.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
*	4573.000	1393.27	-.06	1396.07	65.00	.00	6000.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
*	4574.000	1396.29	.00	1396.57	65.00	.00	2400.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
*	4574.000	1396.29	.00	1396.56	65.00	.00	2400.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
	4646.000	1396.53	.00	1396.81	65.00	.00	2400.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
	4646.000	1396.53	.00	1396.80	65.00	.00	2400.00	.00	65.00	1967.50	1750.00	2250.00	2032.50
	4800.000	1396.75	.00	1396.92	133.78	.00	2400.00	.00	148.00	1927.00	1750.00	2250.00	2075.00
	4800.000	1396.75	.00	1396.91	133.69	.00	2400.00	.00	148.00	1927.00	1750.00	2250.00	2075.00
	5000.000	1396.87	.00	1397.05	125.98	.00	2400.00	.00	136.00	1934.00	1730.00	2230.00	2070.00
	5000.000	1396.87	.00	1397.04	125.97	.00	2400.00	.00	136.00	1934.00	1730.00	2230.00	2070.00
	5300.000	1397.06	.00	1397.29	113.18	.00	2400.00	.00	116.00	1941.50	1680.00	2180.00	2057.50
	5300.000	1397.05	.00	1397.29	113.16	.00	2400.00	.00	116.00	1941.50	1680.00	2180.00	2057.50
	5400.000	1397.13	.00	1397.39	108.99	.00	2400.00	.00	116.00	1941.50	1670.00	2170.00	2057.50
	5400.000	1397.13	.00	1397.39	108.96	.00	2400.00	.00	116.00	1941.50	1670.00	2170.00	2057.50
	5700.000	1397.46	.00	1397.77	110.77	.00	2400.00	.00	116.00	1941.00	1655.00	2155.00	2057.00
	5700.000	1397.46	.00	1397.76	110.76	.00	2400.00	.00	116.00	1941.00	1655.00	2155.00	2057.00
	6000.000	1397.88	.00	1398.25	101.67	.00	2400.00	.00	116.00	1943.00	1645.00	2145.00	2059.00
	6000.000	1397.88	.00	1398.25	101.65	.00	2400.00	.00	116.00	1943.00	1645.00	2145.00	2059.00
	6200.000	1398.22	.00	1398.62	99.88	.00	2400.00	.00	122.00	1936.00	1635.00	2135.00	2058.00
	6200.000	1398.21	.00	1398.62	99.87	.00	2400.00	.00	122.00	1936.00	1635.00	2135.00	2058.00

1

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
6500.000	1398.81	.00	1399.27	97.94	.00	2400.00	.00	106.00	1948.00	1665.00	2165.00	2054.00
6500.000	1398.81	.00	1399.27	97.93	.00	2400.00	.00	106.00	1948.00	1665.00	2165.00	2054.00
6700.000	1399.26	.00	1399.74	97.12	.00	2400.00	.00	117.00	1943.00	1705.00	2205.00	2060.00
6700.000	1399.26	.00	1399.74	97.11	.00	2400.00	.00	117.00	1943.00	1705.00	2205.00	2060.00
7000.000	1399.98	.00	1400.48	96.29	.00	2400.00	.00	.00	.00	1760.00	2260.00	.00
7000.000	1399.96	-.02	1400.47	90.00	.00	2400.00	.00	90.00	1955.00	1760.00	2260.00	2045.00

	7400.000	1401.00	.00	1401.51	95.75	.00	2400.00	.00	.00	.00	1815.00	2315.00	.00
	7400.000	1400.95	-.05	1401.48	90.00	.00	2400.00	.00	90.00	1955.00	1815.00	2315.00	2045.00
	7500.000	1401.33	.00	1401.76	102.24	.00	2400.00	.00	.00	.00	1825.00	2325.00	.00
	7500.000	1401.29	-.04	1401.73	99.87	.00	2400.00	.00	110.00	1950.00	1825.00	2325.00	2060.00
	7569.000	1401.27	.00	1402.14	58.00	.00	2400.00	.00	58.00	1962.00	1460.00	3224.85	2020.00
	7569.000	1401.23	-.04	1402.11	58.00	.00	2400.00	.00	58.00	1962.00	1460.00	3224.85	2020.00
	7696.000	1401.04	.00	1402.14	58.00	.00	2400.00	.00	58.00	1501.00	650.03	3118.14	1559.00
	7696.000	1400.99	-.05	1402.11	58.00	.00	2400.00	.00	58.00	1501.00	650.03	3118.14	1559.00
*	7800.000	1402.13	.00	1402.53	105.48	.00	2400.00	.00	.00	.00	864.07	3201.38	.00
*	7800.000	1402.10	-.03	1402.51	102.63	.00	2400.00	.00	110.00	1940.00	864.07	3201.38	2050.00
*	7987.000	1401.80	.00	1403.65	46.00	.00	2400.00	.00	46.00	1456.00	608.19	2984.31	1502.00
*	7987.000	1401.77	-.03	1403.64	46.00	.00	2400.00	.00	46.00	1456.00	608.19	2984.31	1502.00
*	8262.000	1404.46	.00	1405.46	46.00	.00	2400.00	.00	46.00	1465.00	512.92	2649.24	1511.00
*	8262.000	1404.46	.01	1405.47	46.00	.00	2400.00	.00	46.00	1465.00	512.92	2649.24	1511.00
	8400.000	1405.60	.00	1405.88	107.65	.00	2400.00	.00	.00	.00	856.92	2679.27	.00
*	8400.000	1405.57	-.03	1405.87	90.00	.00	2400.00	.00	90.00	1955.00	856.92	2679.27	2045.00
	8600.000	1405.75	.00	1406.08	103.99	.00	2400.00	.00	.00	.00	1133.86	3179.03	.00
	8600.000	1405.68	-.07	1406.18	76.71	.00	2400.00	.00	90.00	1955.00	1133.86	3179.03	2045.00
	8690.000	1405.80	.00	1406.16	102.26	.00	2400.00	.00	.00	.00	1080.00	3203.86	.00
	8690.000	1405.94	.14	1406.30	90.00	.00	2400.00	.00	90.00	1955.00	1080.00	3203.86	2045.00
	8850.000	1410.57	.00	1411.12	381.15	.00	2400.00	.00	.00	.00	1020.00	3253.96	.00
*	8850.000	1410.89	.32	1411.95	140.00	.00	2400.00	.00	140.00	1930.00	1020.00	3253.96	2070.00
*	8851.000	1410.89	.00	1411.37	436.21	.00	2400.00	.00	.00	.00	1020.00	3253.96	.00
*	8851.000	1411.62	.73	1412.68	140.00	.00	2400.00	.00	140.00	1930.00	1020.00	3253.96	2070.00
*	9000.000	1412.01	.00	1412.10	1340.84	.00	2400.00	.00	.00	.00	950.00	3172.52	.00
*	9000.000	1412.91	.90	1413.29	140.00	.00	2400.00	.00	140.00	1930.00	950.00	3172.52	2070.00
	9340.000	1412.67	.00	1412.77	929.95	.00	2400.00	.00	.00	.00	970.00	3055.00	.00
	9340.000	1413.45	.78	1413.96	140.00	.00	2400.00	.00	140.00	1930.00	970.00	3055.00	2070.00

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	9731.000	1413.30	.00	1413.40	881.12	.00	2399.67	.33	.00	.00	760.00	2773.41	.00
*	9731.000	1414.27	.97	1414.56	140.00	.00	2400.00	.00	140.00	1970.00	760.00	2773.41	2110.00
*	9930.000	1413.66	.00	1413.94	412.63	.00	2400.00	.00	.00	.00	810.00	2599.07	.00
	9930.000	1414.45	.78	1414.88	140.00	.00	2400.00	.00	140.00	1980.00	810.00	2599.07	2120.00
	10120.000	1414.34	.00	1414.54	546.80	.00	2400.00	.00	.00	.00	1140.00	2590.00	.00
	10120.000	1415.08	.74	1416.14	140.00	.00	2400.00	.00	140.00	1970.00	1140.00	2590.00	2110.00
*	10600.000	1417.59	.00	1418.05	488.67	.00	2386.78	13.21	.00	.00	1670.00	2170.00	.00
	10600.000	1418.53	.94	1419.46	140.00	.00	2400.00	.00	140.00	1930.00	1670.00	2170.00	2070.00

S FROM FIS STUDY

SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
1140.000	.00	.00	.00	1378.80	6000.00	1383.58	.00	1384.04	50.68	5.47	1096.64	842.84
1140.000	.00	.00	.00	1378.80	6000.00	1383.78	.00	1384.19	38.34	5.12	1172.91	969.03
1300.000	100.00	.00	.00	1380.16	6000.00	1384.02	.00	1384.80	89.58	7.11	844.34	633.94
1300.000	100.00	.00	.00	1380.16	6000.00	1384.01	.00	1384.84	77.97	7.31	821.29	679.52
1500.000	200.00	.00	.00	1380.51	6000.00	1385.49	.00	1386.07	46.13	6.13	978.97	883.39
1500.000	200.00	.00	.00	1380.51	6000.00	1385.37	.00	1386.34	67.82	7.88	761.50	728.59
1800.000	300.00	.00	.00	1381.03	6000.00	1387.01	.00	1387.72	62.98	6.75	888.34	756.07
1800.000	300.00	.00	.00	1381.03	6000.00	1387.17	.00	1387.98	44.39	7.22	831.26	900.58
2100.000	300.00	.00	.00	1381.55	6000.00	1388.62	.00	1389.06	32.53	5.35	1121.37	1051.97
2100.000	300.00	.00	.00	1381.55	6000.00	1388.49	.00	1389.12	32.16	6.38	940.55	1057.95
2400.000	300.00	.00	.00	1382.07	6000.00	1389.54	.00	1389.90	23.44	4.80	1249.50	1239.35
2400.000	300.00	.00	.00	1382.07	6000.00	1389.43	.00	1389.96	23.83	5.83	1029.47	1229.10
2700.000	300.00	.00	.00	1382.59	6000.00	1390.20	.00	1390.50	17.40	4.41	1359.54	1438.41
2700.000	300.00	.00	.00	1382.59	6000.00	1390.13	.00	1390.58	17.63	5.36	1119.64	1428.92
2900.000	200.00	.00	.00	1382.94	6000.00	1390.57	.00	1390.83	14.73	4.11	1461.00	1563.18
2900.000	200.00	.00	.00	1382.94	6000.00	1390.48	.00	1390.99	21.44	5.73	1046.76	1295.88
3000.000	100.00	.00	.00	1383.11	6000.00	1390.71	.00	1390.98	14.76	4.10	1462.45	1561.93
3000.000	100.00	.00	.00	1383.11	6000.00	1390.69	.00	1391.20	20.98	5.74	1045.29	1309.80
3300.000	300.00	.00	.00	1383.63	6000.00	1391.17	.00	1391.47	17.67	4.36	1376.57	1427.35
3300.000	300.00	.00	.00	1383.63	6000.00	1391.33	.00	1391.81	19.25	5.54	1082.26	1367.44
3600.000	305.00	.00	.00	1384.15	6000.00	1391.72	.00	1392.03	19.02	4.53	1324.06	1375.67
3600.000	305.00	.00	.00	1384.15	6000.00	1391.93	.00	1392.38	18.28	5.38	1115.55	1403.39
3900.000	320.00	.00	.00	1384.71	6000.00	1392.35	.00	1392.69	21.64	4.70	1276.67	1289.79
3900.000	320.00	.00	.00	1384.71	6000.00	1392.57	.00	1392.97	18.47	5.07	1182.87	1396.17
4000.000	102.00	.00	.00	1384.89	6000.00	1392.58	.00	1392.91	20.23	4.59	1307.95	1334.08
4000.000	102.00	.00	.00	1384.89	6000.00	1392.76	.00	1393.15	16.36	5.01	1197.91	1483.38
4100.000	100.00	.00	.00	1385.06	6000.00	1392.75	.00	1393.14	22.95	5.00	1199.98	1252.43
4100.000	100.00	.00	.00	1385.06	6000.00	1392.91	.00	1393.33	17.54	5.17	1161.07	1432.64
4190.000	87.00	.00	.00	1385.23	6000.00	1392.77	.00	1393.55	26.71	7.20	919.07	1161.06
4190.000	87.00	.00	.00	1385.23	6000.00	1392.91	.00	1393.70	25.93	7.18	880.17	1178.30
4256.000	66.00	1393.39	.00	1385.42	6000.00	1394.59	.00	1395.00	5.63	5.39	1407.22	2527.86
* 4256.000	66.00	1393.39	.00	1385.42	6000.00	1394.55	.00	1395.05	6.38	5.71	1153.18	2375.25

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	4400.000	147.00	.00	.00	1385.86	6000.00	1394.78	.00	1395.15	16.59	4.90	1225.67	1472.92
	4400.000	147.00	.00	.00	1385.86	6000.00	1394.64	.00	1395.17	8.49	5.85	1024.97	2058.82
*	4500.000	100.00	.00	.00	1386.17	6000.00	1394.93	.00	1395.24	5.65	4.49	1337.61	2524.73
	4500.000	100.00	.00	.00	1386.17	6000.00	1394.85	.00	1395.25	5.08	5.08	1181.37	2662.43
*	4573.000	74.00	.00	.00	1386.40	6000.00	1393.33	.00	1396.08	96.24	13.31	450.70	611.62
*	4573.000	74.00	.00	.00	1386.40	6000.00	1393.27	.00	1396.07	98.99	13.43	446.61	603.05
*	4574.000	74.00	.00	.00	1387.55	2400.00	1396.29	.00	1396.57	7.55	4.22	568.17	873.29
*	4574.000	74.00	.00	.00	1387.55	2400.00	1396.29	.00	1396.56	7.57	4.23	567.86	872.57
	4646.000	74.00	1398.00	.00	1387.69	2400.00	1396.53	.00	1396.81	7.29	4.17	574.93	889.18
	4646.000	74.00	1398.00	.00	1387.69	2400.00	1396.53	.00	1396.80	7.30	4.18	574.62	888.46
	4800.000	152.00	.00	.00	1388.11	2400.00	1396.75	.00	1396.92	6.18	3.25	737.79	965.79
	4800.000	152.00	.00	.00	1388.11	2400.00	1396.75	.00	1396.91	6.19	3.26	737.20	964.97
	5000.000	202.00	.00	.00	1388.66	2400.00	1396.87	.00	1397.05	6.23	3.33	720.11	961.56
	5000.000	202.00	.00	.00	1388.66	2400.00	1396.87	.00	1397.04	6.24	3.34	719.56	960.44
	5300.000	306.00	.00	.00	1389.49	2400.00	1397.06	.00	1397.29	8.85	3.85	622.60	806.59
	5300.000	306.00	.00	.00	1389.49	2400.00	1397.05	.00	1397.29	8.87	3.86	622.16	805.73
	5400.000	102.00	.00	.00	1389.76	2400.00	1397.13	.00	1397.39	10.09	4.09	586.18	755.56
	5400.000	102.00	.00	.00	1389.76	2400.00	1397.13	.00	1397.39	10.11	4.10	585.76	754.82
	5700.000	306.00	.00	.00	1390.59	2400.00	1397.46	.00	1397.77	13.80	4.46	537.97	645.95
	5700.000	306.00	.00	.00	1390.59	2400.00	1397.46	.00	1397.76	13.83	4.46	537.64	645.36
	6000.000	307.00	.00	.00	1391.42	2400.00	1397.88	.00	1398.25	16.71	4.90	489.81	587.06
	6000.000	307.00	.00	.00	1391.42	2400.00	1397.88	.00	1398.25	16.74	4.90	489.58	586.67
	6200.000	203.00	.00	.00	1391.98	2400.00	1398.22	.00	1398.62	19.09	5.14	467.30	549.33
	6200.000	203.00	.00	.00	1391.98	2400.00	1398.21	.00	1398.62	19.11	5.14	467.10	549.01
	6500.000	306.00	.00	.00	1392.82	2400.00	1398.81	.00	1399.27	22.17	5.41	443.22	509.73
	6500.000	306.00	.00	.00	1392.82	2400.00	1398.81	.00	1399.27	22.18	5.42	443.12	509.57
	6700.000	202.00	.00	.00	1393.37	2400.00	1399.26	.00	1399.74	23.65	5.54	433.23	493.52
	6700.000	202.00	.00	.00	1393.37	2400.00	1399.26	.00	1399.74	23.66	5.54	433.15	493.39
	7000.000	300.00	.00	.00	1394.19	2400.00	1399.98	.00	1400.48	25.26	5.67	423.26	477.48
	7000.000	300.00	.00	.00	1394.19	2400.00	1399.96	.00	1400.47	24.51	5.74	418.31	484.78
	7400.000	400.00	.00	.00	1395.28	2400.00	1401.00	.00	1401.51	26.40	5.76	416.73	467.06
	7400.000	400.00	.00	.00	1395.28	2400.00	1400.95	.00	1401.48	26.03	5.85	410.50	470.38
	7500.000	100.00	.00	.00	1395.55	2400.00	1401.33	.00	1401.76	21.12	5.25	457.34	522.28
	7500.000	100.00	.00	.00	1395.55	2400.00	1401.29	.00	1401.73	21.27	5.30	452.93	520.39

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	7569.000	77.00	.00	.00	1395.74	2400.00	1401.27	.00	1402.14	20.45	7.48	320.74	530.71
	7569.000	77.00	.00	.00	1395.74	2400.00	1401.23	.00	1402.11	20.89	7.53	318.57	525.11
	7696.000	110.00	1405.41	1402.22	1396.12	2400.00	1401.04	.00	1402.14	29.54	8.42	285.19	441.58
	7696.000	110.00	1405.41	1402.22	1396.12	2400.00	1400.99	.00	1402.11	30.42	8.49	282.53	435.11
*	7800.000	113.00	.00	.00	1396.44	2400.00	1402.13	.00	1402.53	10.22	5.10	470.34	750.77
*	7800.000	113.00	.00	.00	1396.44	2400.00	1402.10	.00	1402.51	10.19	5.14	466.72	751.86
*	7987.000	200.00	.00	.00	1397.02	2400.00	1401.80	.00	1403.65	53.79	10.91	219.94	327.23
*	7987.000	200.00	.00	.00	1397.02	2400.00	1401.77	.00	1403.64	54.98	10.99	218.39	323.67
*	8262.000	270.00	1409.10	1403.08	1397.98	2400.00	1404.46	.00	1405.46	21.15	8.05	297.99	521.83
*	8262.000	270.00	1409.10	1403.08	1397.98	2400.00	1404.46	.00	1405.47	21.09	8.05	298.27	522.57
	8400.000	130.00	.00	.00	1398.40	2400.00	1405.60	.00	1405.88	11.02	4.22	568.06	723.06
*	8400.000	130.00	.00	.00	1398.40	2400.00	1405.57	.00	1405.87	10.53	4.40	545.53	739.72
	8600.000	200.00	.00	.00	1399.00	2400.00	1405.75	.00	1406.08	7.22	4.62	519.57	893.40
	8600.000	200.00	.00	.00	1399.00	2400.00	1405.68	.00	1406.18	10.57	5.67	423.14	738.05
	8690.000	90.00	.00	.00	1399.27	2400.00	1405.80	.00	1406.16	8.17	4.83	497.27	839.61
	8690.000	90.00	.00	.00	1399.27	2400.00	1405.94	.00	1406.30	7.06	4.80	500.41	903.18
*	8850.000	160.00	.00	.00	1408.00	2400.00	1410.57	1410.57	1411.12	93.81	5.97	402.34	247.80
*	8850.000	160.00	.00	.00	1408.00	2400.00	1410.89	1410.89	1411.95	74.88	8.27	290.35	277.36
	8851.000	1.00	.00	.00	1409.00	2400.00	1410.89	1410.89	1411.37	88.16	5.55	432.51	255.60
	8851.000	1.00	.00	.00	1409.00	2400.00	1411.62	1411.62	1412.68	75.26	8.25	290.86	276.65
*	9000.000	150.00	.00	.00	1409.00	2400.00	1412.01	.00	1412.10	23.25	2.37	1010.73	497.69
*	9000.000	150.00	.00	.00	1409.00	2400.00	1412.91	.00	1413.29	13.98	4.95	484.46	641.82
	9340.000	340.00	.00	.00	1410.00	2400.00	1412.67	.00	1412.77	16.61	2.48	965.91	588.79
	9340.000	340.00	.00	.00	1410.00	2400.00	1413.45	.00	1413.96	23.37	5.78	415.32	496.46
	9731.000	390.00	.00	.00	1410.00	2400.00	1413.30	.00	1413.40	15.95	2.51	956.62	601.01
*	9731.000	390.00	.00	.00	1410.00	2400.00	1414.27	.00	1414.56	8.84	4.31	557.23	807.22
*	9930.000	203.00	.00	.00	1411.00	2400.00	1413.66	.00	1413.94	32.97	4.22	568.48	417.96
	9930.000	203.00	.00	.00	1411.00	2400.00	1414.45	.00	1414.88	17.23	5.27	455.24	578.14
	10120.000	193.00	.00	.00	1412.00	2400.00	1414.34	.00	1414.54	27.23	3.56	673.45	459.93
*	10120.000	193.00	.00	.00	1412.00	2400.00	1415.08	1415.08	1416.14	76.27	8.27	290.15	274.82
*	10600.000	480.00	.00	.00	1416.00	2400.00	1417.59	1417.59	1418.05	95.21	5.50	439.48	245.96
	10600.000	480.00	.00	.00	1416.00	2400.00	1418.53	.00	1419.46	61.50	7.75	309.61	306.05

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S FROM FIS STUDY

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH

	1140.000	6000.00	1383.58	.00	.00	.00	449.86	.00
	1140.000	6000.00	1383.78	.20	.00	.20	430.00	.00
	1300.000	6000.00	1384.02	.00	.44	.00	358.65	100.00
	1300.000	6000.00	1384.01	.00	.23	.00	300.00	100.00
	1500.000	6000.00	1385.49	.00	1.47	.00	315.08	200.00
	1500.000	6000.00	1385.37	-.12	1.36	-.12	220.00	200.00
	1800.000	6000.00	1387.01	.00	1.52	.00	311.81	300.00
	1800.000	6000.00	1387.17	.16	1.80	.16	200.00	300.00
	2100.000	6000.00	1388.62	.00	1.61	.00	340.02	300.00
	2100.000	6000.00	1388.49	-.13	1.32	-.13	215.33	300.00
	2400.000	6000.00	1389.54	.00	.92	.00	348.48	300.00
	2400.000	6000.00	1389.43	-.11	.94	-.11	214.95	300.00
	2700.000	6000.00	1390.20	.00	.66	.00	344.26	300.00
	2700.000	6000.00	1390.13	-.07	.70	-.07	210.00	300.00
	2900.000	6000.00	1390.57	.00	.36	.00	363.77	200.00
	2900.000	6000.00	1390.48	-.09	.34	-.09	205.00	200.00
	3000.000	6000.00	1390.71	.00	.15	.00	365.13	100.00
	3000.000	6000.00	1390.69	-.03	.21	-.03	200.00	100.00
	3300.000	6000.00	1391.17	.00	.46	.00	359.25	300.00
	3300.000	6000.00	1391.33	.15	.64	.15	205.00	300.00
	3600.000	6000.00	1391.72	.00	.54	.00	344.36	305.00
	3600.000	6000.00	1391.93	.21	.60	.21	214.44	305.00
	3900.000	6000.00	1392.35	.00	.63	.00	346.38	320.00
	3900.000	6000.00	1392.57	.23	.64	.23	250.00	320.00
	4000.000	6000.00	1392.58	.00	.23	.00	349.83	102.00
	4000.000	6000.00	1392.76	.18	.19	.18	235.00	102.00
	4100.000	6000.00	1392.75	.00	.17	.00	309.84	100.00
	4100.000	6000.00	1392.91	.16	.15	.16	230.00	100.00
	4190.000	6000.00	1392.77	.00	.02	.00	245.71	87.00
	4190.000	6000.00	1392.91	.14	.00	.14	188.73	87.00
*	4256.000	6000.00	1394.59	.00	1.82	.00	394.89	66.00
*	4256.000	6000.00	1394.55	-.03	1.64	-.03	210.00	66.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	4400.000	6000.00	1394.78	.00	.19	.00	424.50	147.00
	4400.000	6000.00	1394.64	-.13	.09	-.13	160.00	147.00
*	4500.000	6000.00	1394.93	.00	.16	.00	234.26	100.00
	4500.000	6000.00	1394.85	-.08	.21	-.08	150.00	100.00

*	4573.000	6000.00	1393.33	.00	-1.60	.00	65.00	74.00
*	4573.000	6000.00	1393.27	-.06	-1.58	-.06	65.00	74.00
	4574.000	2400.00	1396.29	.00	2.96	.00	65.00	74.00
	4574.000	2400.00	1396.29	.00	3.02	.00	65.00	74.00
	4646.000	2400.00	1396.53	.00	.24	.00	65.00	74.00
	4646.000	2400.00	1396.53	.00	.24	.00	65.00	74.00
	4800.000	2400.00	1396.75	.00	.22	.00	133.78	152.00
	4800.000	2400.00	1396.75	.00	.22	.00	133.69	152.00
	5000.000	2400.00	1396.87	.00	.12	.00	125.98	202.00
	5000.000	2400.00	1396.87	.00	.12	.00	125.97	202.00
	5300.000	2400.00	1397.06	.00	.18	.00	113.18	306.00
	5300.000	2400.00	1397.05	.00	.19	.00	113.16	306.00
	5400.000	2400.00	1397.13	.00	.08	.00	108.99	102.00
	5400.000	2400.00	1397.13	.00	.08	.00	108.96	102.00
	5700.000	2400.00	1397.46	.00	.32	.00	110.77	306.00
	5700.000	2400.00	1397.46	.00	.33	.00	110.76	306.00
	6000.000	2400.00	1397.88	.00	.42	.00	101.67	307.00
	6000.000	2400.00	1397.88	.00	.42	.00	101.65	307.00
	6200.000	2400.00	1398.22	.00	.34	.00	99.88	203.00
	6200.000	2400.00	1398.21	.00	.34	.00	99.87	203.00
	6500.000	2400.00	1398.81	.00	.60	.00	97.94	306.00
	6500.000	2400.00	1398.81	.00	.60	.00	97.93	306.00
	6700.000	2400.00	1399.26	.00	.45	.00	97.12	202.00
	6700.000	2400.00	1399.26	.00	.45	.00	97.11	202.00
	7000.000	2400.00	1399.98	.00	.72	.00	96.29	300.00
	7000.000	2400.00	1399.96	-.02	.70	-.02	90.00	300.00
	7400.000	2400.00	1401.00	.00	1.02	.00	95.75	400.00
	7400.000	2400.00	1400.95	-.05	1.00	-.05	90.00	400.00
	7500.000	2400.00	1401.33	.00	.33	.00	102.24	100.00
	7500.000	2400.00	1401.29	-.04	.34	-.04	99.87	100.00

1

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	7569.000	2400.00	1401.27	.00	-.06	.00	58.00	77.00
	7569.000	2400.00	1401.23	-.04	-.06	-.04	58.00	77.00
	7696.000	2400.00	1401.04	.00	-.23	.00	58.00	110.00
	7696.000	2400.00	1400.99	-.05	-.24	-.05	58.00	110.00
*	7800.000	2400.00	1402.13	.00	1.09	.00	105.48	113.00
*	7800.000	2400.00	1402.10	-.03	1.11	-.03	102.63	113.00

*	7987.000	2400.00	1401.80	.00	-.33	.00	46.00	200.00
*	7987.000	2400.00	1401.77	-.03	-.33	-.03	46.00	200.00
	8262.000	2400.00	1404.46	.00	2.66	.00	46.00	270.00
	8262.000	2400.00	1404.46	.01	2.70	.01	46.00	270.00
	8400.000	2400.00	1405.60	.00	1.14	.00	107.65	130.00
*	8400.000	2400.00	1405.57	-.03	1.10	-.03	90.00	130.00
	8600.000	2400.00	1405.75	.00	.15	.00	103.99	200.00
	8600.000	2400.00	1405.68	-.07	.11	-.07	76.71	200.00
	8690.000	2400.00	1405.80	.00	.05	.00	102.26	90.00
	8690.000	2400.00	1405.94	.14	.26	.14	90.00	90.00
*	8850.000	2400.00	1410.57	.00	4.77	.00	381.15	160.00
*	8850.000	2400.00	1410.89	.32	4.95	.32	140.00	160.00
*	8851.000	2400.00	1410.89	.00	.32	.00	436.21	1.00
*	8851.000	2400.00	1411.62	.73	.73	.73	140.00	1.00
*	9000.000	2400.00	1412.01	.00	1.12	.00	1340.84	150.00
*	9000.000	2400.00	1412.91	.90	1.29	.90	140.00	150.00
	9340.000	2400.00	1412.67	.00	.66	.00	929.95	340.00
	9340.000	2400.00	1413.45	.78	.54	.78	140.00	340.00
	9731.000	2400.00	1413.30	.00	.63	.00	881.12	390.00
	9731.000	2400.00	1414.27	.97	.83	.97	140.00	390.00
	9930.000	2400.00	1413.66	.00	.36	.00	412.63	203.00
	9930.000	2400.00	1414.45	.78	.17	.78	140.00	203.00
	10120.000	2400.00	1414.34	.00	.68	.00	546.80	193.00
*	10120.000	2400.00	1415.08	.74	.64	.74	140.00	193.00
*	10600.000	2400.00	1417.59	.00	3.24	.00	488.67	480.00
	10600.000	2400.00	1418.53	.94	3.45	.94	140.00	480.00

1

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 4256.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 4256.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4400.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4500.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4573.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 4573.000 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4574.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
WARNING SECNO=   4574.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   7800.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   7800.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   7987.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   7987.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   8262.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   8262.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   8400.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=   8850.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   8850.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   8850.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   8850.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   8850.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   8850.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=   8851.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   8851.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   8851.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   8851.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   8851.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   8851.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=   9000.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   9000.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   9731.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   9930.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  10120.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  10120.000  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  10120.000  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=  10600.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  10600.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
1
   09JAN98      09:03:02                                                                    PAGE   64


CAUTION SECNO=  10600.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

1
   09JAN98      09:03:02                                                                    PAGE   65


FLOODWAY DATA,   FLOWS FROM FIS STUDY
PROFILE NO.  2

            ------- FLOODWAY -------       WATER SURFACE ELEVATION
STATION    WIDTH    SECTION    MEAN       WITH    WITHOUT  DIFFERENCE
                     AREA    VELOCITY  FLOODWAY  FLOODWAY
```

1140.000	430.	1173.	5.1	1383.8	1383.6	.2
1300.000	300.	821.	7.3	1384.0	1384.0	.0
1500.000	220.	761.	7.9	1385.4	1385.5	-.1
1800.000	200.	831.	7.2	1387.2	1387.0	.2
[illegible]100.000	215.	941.	6.4	1388.5	1388.6	-.1
[illegible]00.000	215.	1029.	5.8	1389.4	1389.5	-.1
2700.000	210.	1120.	5.4	1390.1	1390.2	-.1
2900.000	205.	1047.	5.7	1390.5	1390.6	-.1
3000.000	200.	1045.	5.7	1390.7	1390.7	.0
3300.000	205.	1082.	5.5	1391.4	1391.2	.2
3600.000	214.	1116.	5.4	1391.9	1391.7	.2
3900.000	250.	1183.	5.1	1392.5	1392.3	.2
4000.000	235.	1198.	5.0	1392.8	1392.6	.2
4100.000	230.	1161.	5.2	1393.0	1392.8	.2
4190.000	189.	880.	6.8	1392.9	1392.8	.1
4256.000	210.	1153.	5.2	1394.6	1394.6	.0
4400.000	160.	1025.	5.9	1394.7	1394.8	-.1
4500.000	150.	1181.	5.1	1394.8	1394.9	-.1
4573.000	65.	447.	13.4	1393.2	1393.3	-.1
4574.000	65.	568.	4.2	1396.3	1396.3	.0
4646.000	65.	575.	4.2	1396.5	1396.5	.0
4800.000	134.	737.	3.3	1396.8	1396.8	.0
5000.000	126.	720.	3.3	1396.9	1396.9	.0
5300.000	113.	622.	3.9	1397.1	1397.1	.0
5400.000	109.	586.	4.1	1397.1	1397.1	.0
5700.000	111.	538.	4.5	1397.5	1397.5	.0
6000.000	102.	490.	4.9	1397.9	1397.9	.0
6200.000	100.	467.	5.1	1398.2	1398.2	.0
6500.000	98.	443.	5.4	1398.8	1398.8	.0
[illegible]700.000	97.	433.	5.5	1399.3	1399.3	.0
[illegible]00.000	90.	418.	5.7	1400.0	1400.0	.0
[illegible]400.000	90.	411.	5.8	1401.0	1401.0	.0
7500.000	100.	453.	5.3	1401.3	1401.3	.0
7569.000	58.	319.	7.5	1401.3	1401.3	.0
7696.000	58.	283.	8.5	1401.0	1401.0	.0
7800.000	103.	467.	5.1	1402.1	1402.1	.0
7987.000	46.	218.	11.0	1401.8	1401.8	.0
8262.000	46.	298.	8.0	1404.5	1404.5	.0
8400.000	90.	546.	4.4	1405.6	1405.6	.0
8600.000	77.	423.	5.7	1405.6	1405.7	-.1
8690.000	90.	500.	4.8	1405.9	1405.8	.1
8850.000	140.	290.	8.3	1410.9	1410.6	.3

1

FLOODWAY DATA, FLOWS FROM FIS STUDY
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
[illegible]51.000	140.	291.	8.3	1411.6	1410.9	.7
9000.000	140.	484.	5.0	1412.9	1412.0	.9
9340.000	140.	415.	5.8	1413.5	1412.7	.8
9731.000	140.	557.	4.3	1414.3	1413.3	1.0

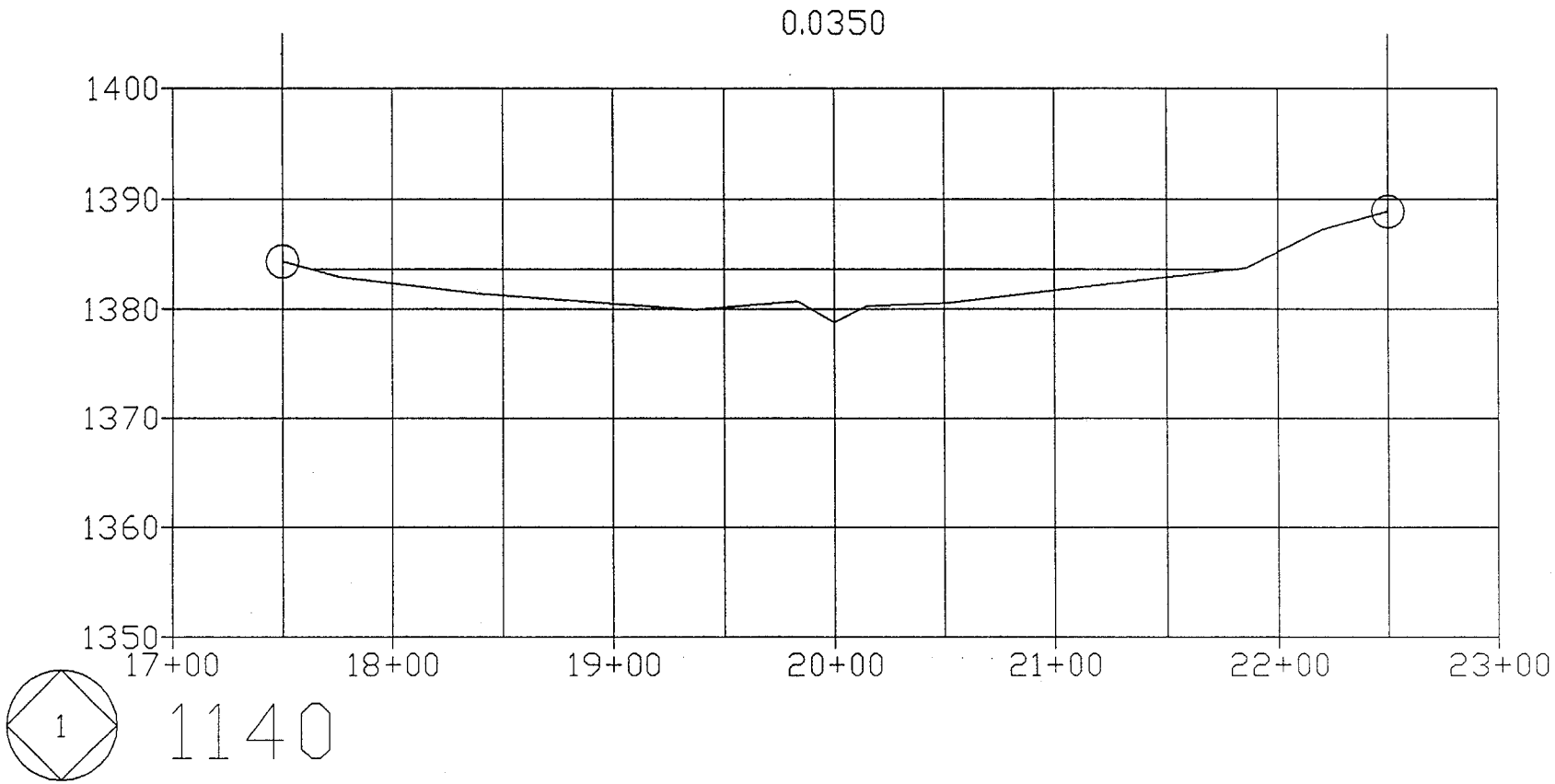
9930.000	140.	455.	5.3	1414.5	1413.7	.8
10120.000	140.	290.	8.3	1415.0	1414.3	.7
10600.000	140.	310.	7.8	1418.5	1417.6	.9

APPENDIX E

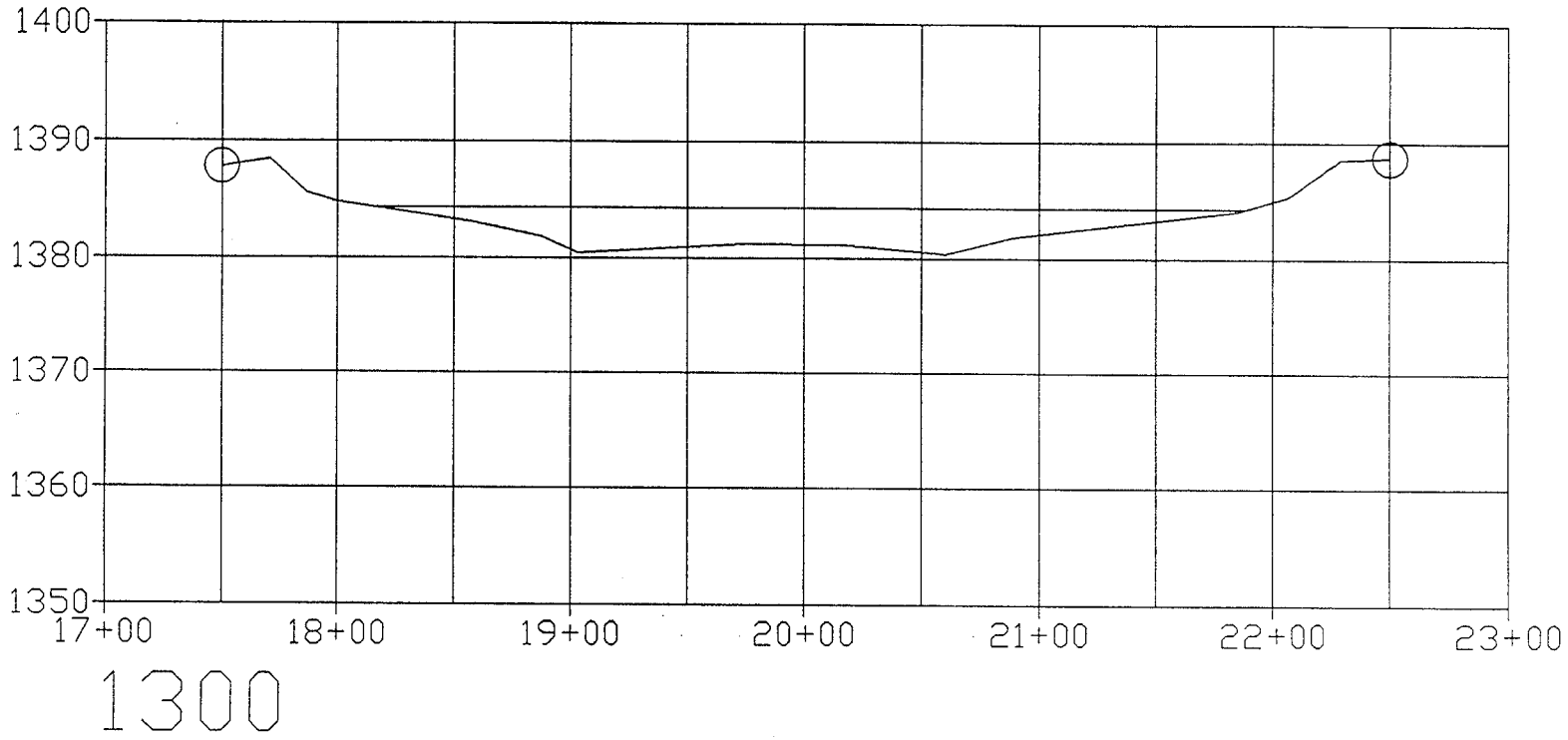
HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

CROSS-SECTION PLOTS

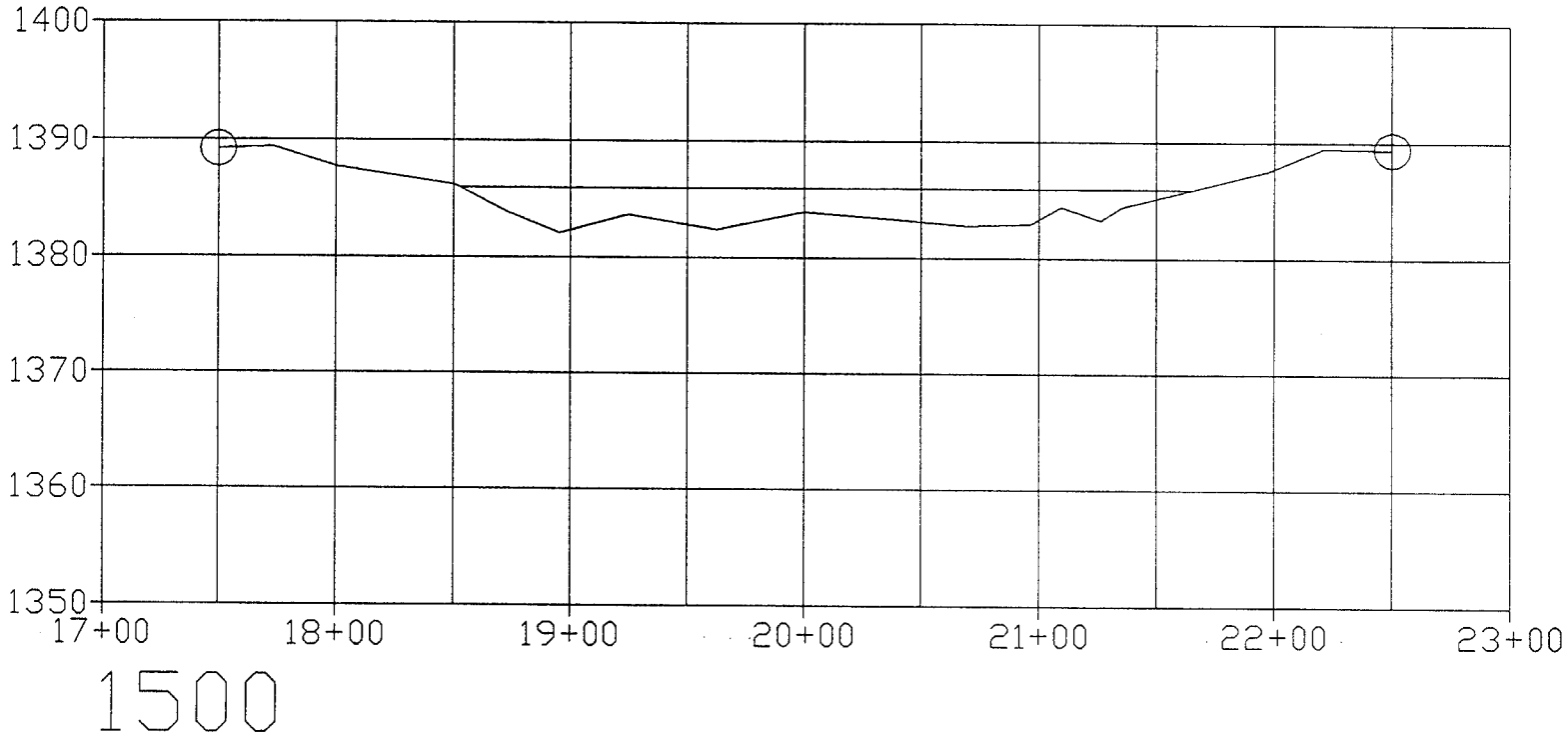
EXISTING CONDITIONS



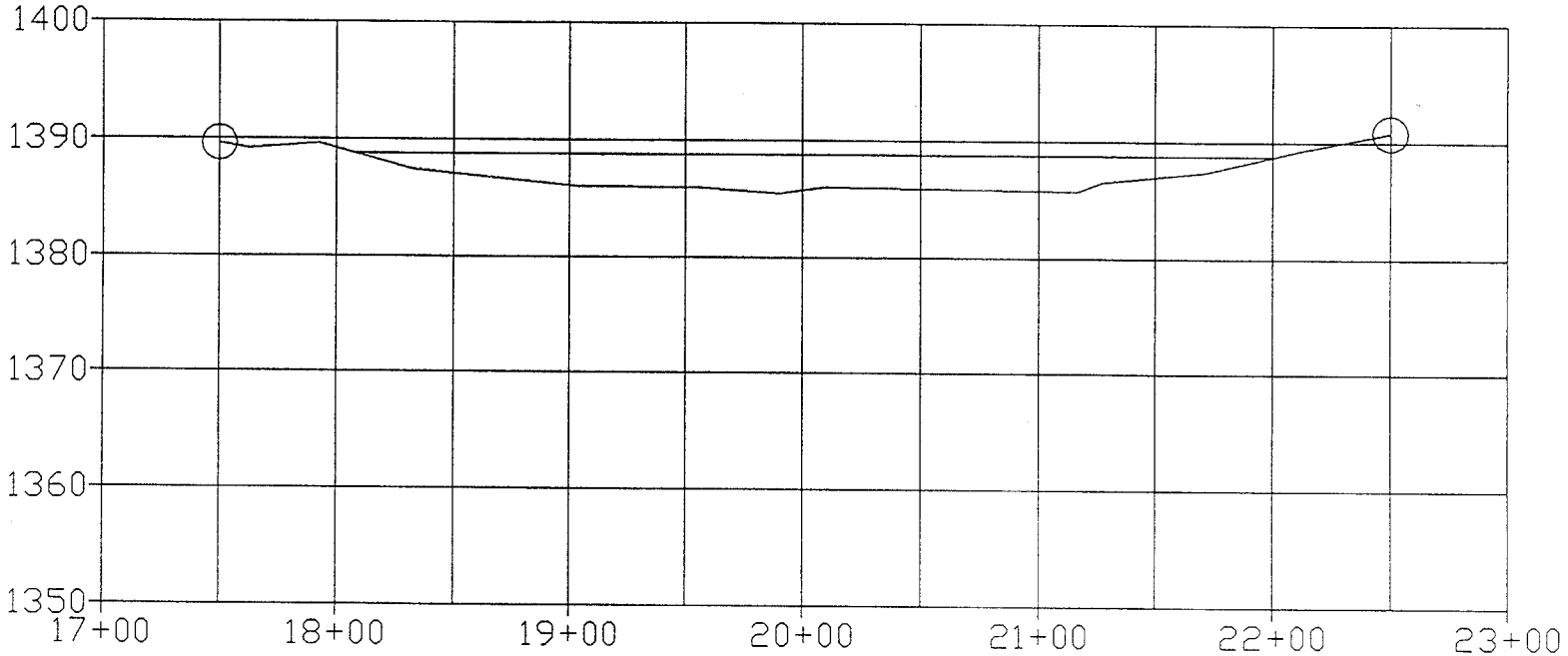
Profile 1
Flow Discharge = 6000.00 cfs
——— Computed Water Surface = 1383.60 ft



Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1384.26 ft

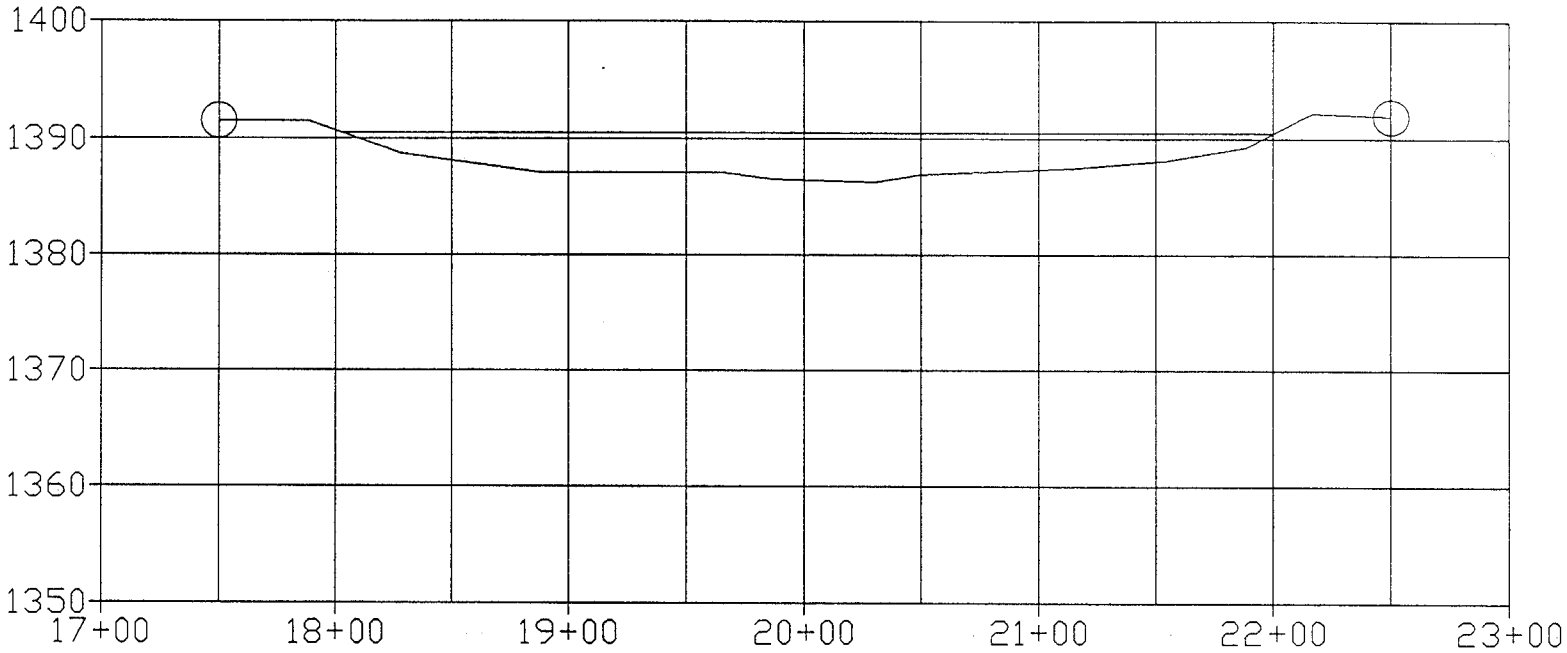


Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1385.93 ft



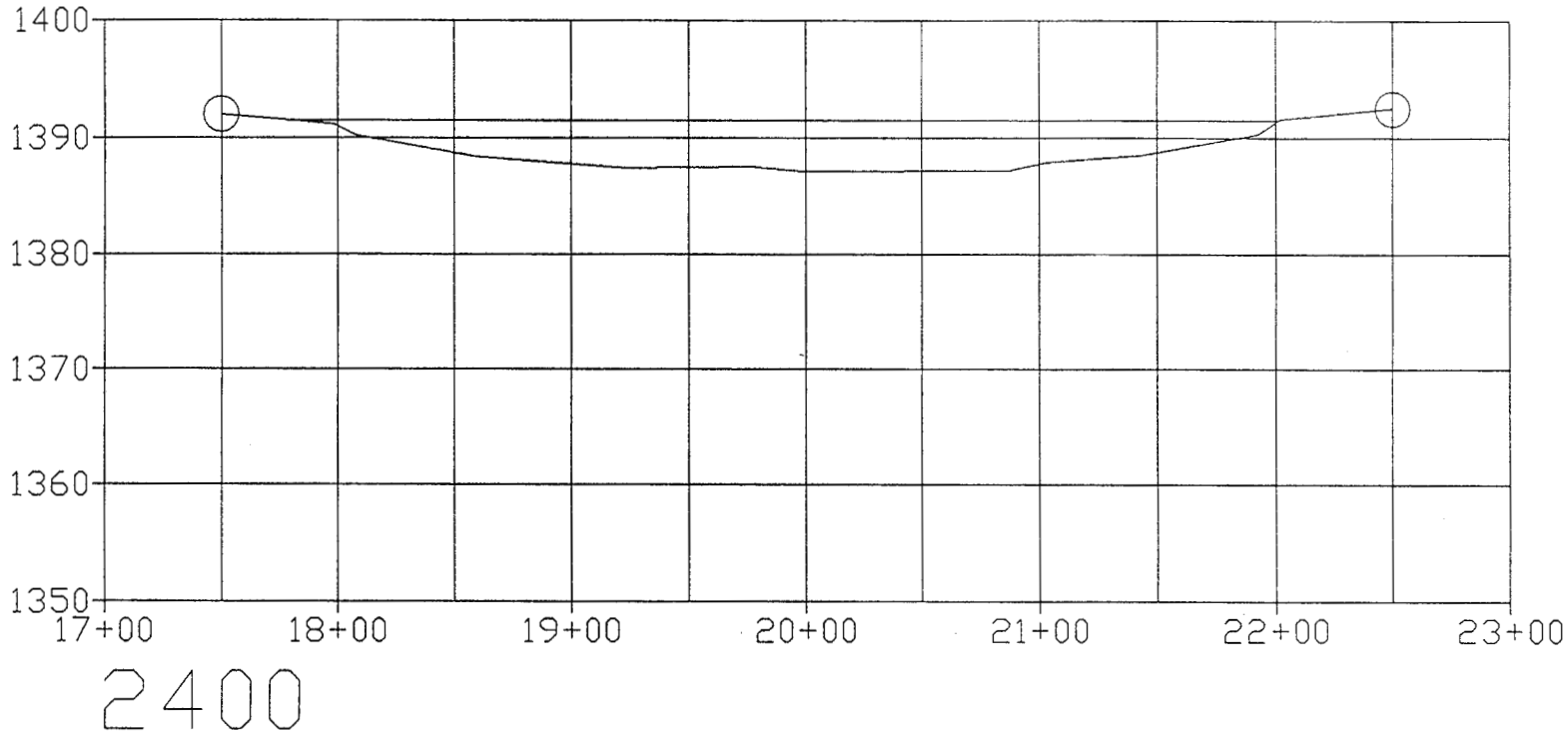
1800

Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1388.80 ft

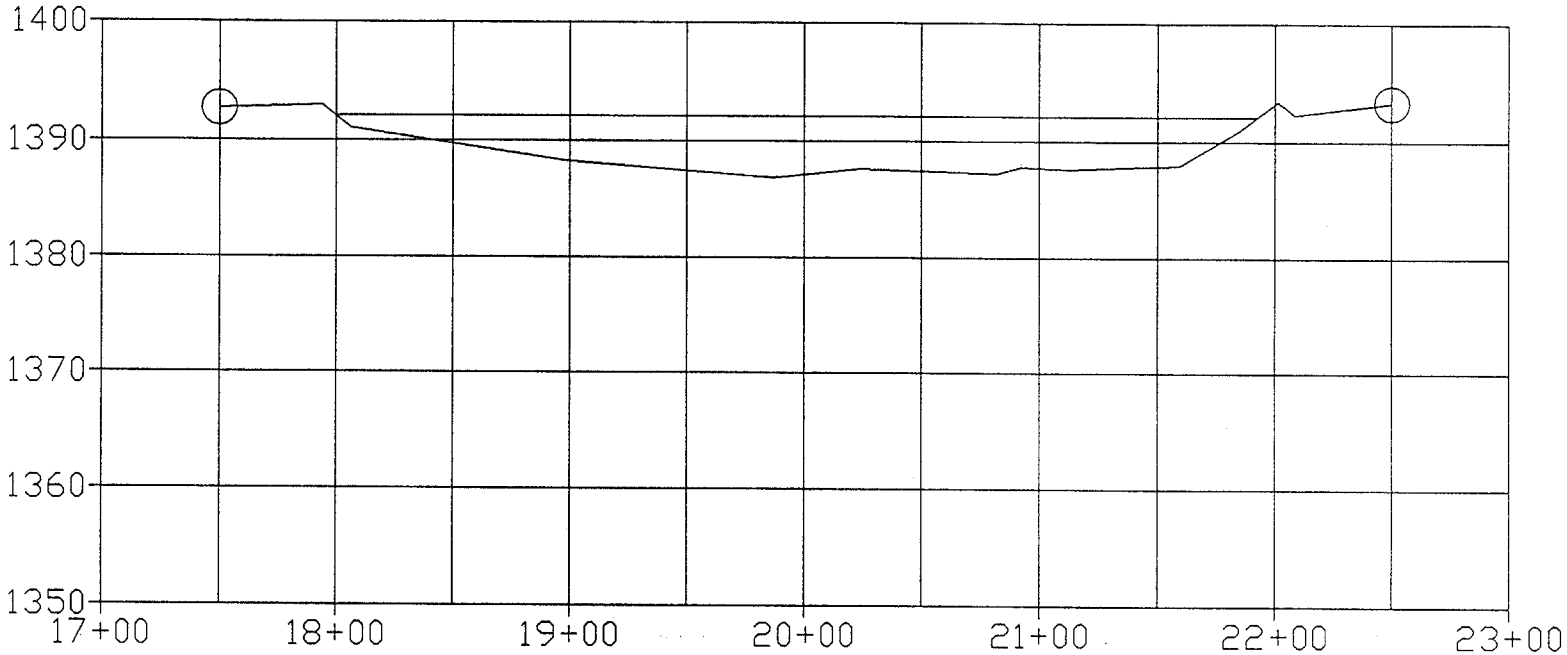


2100

Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1390.50 ft

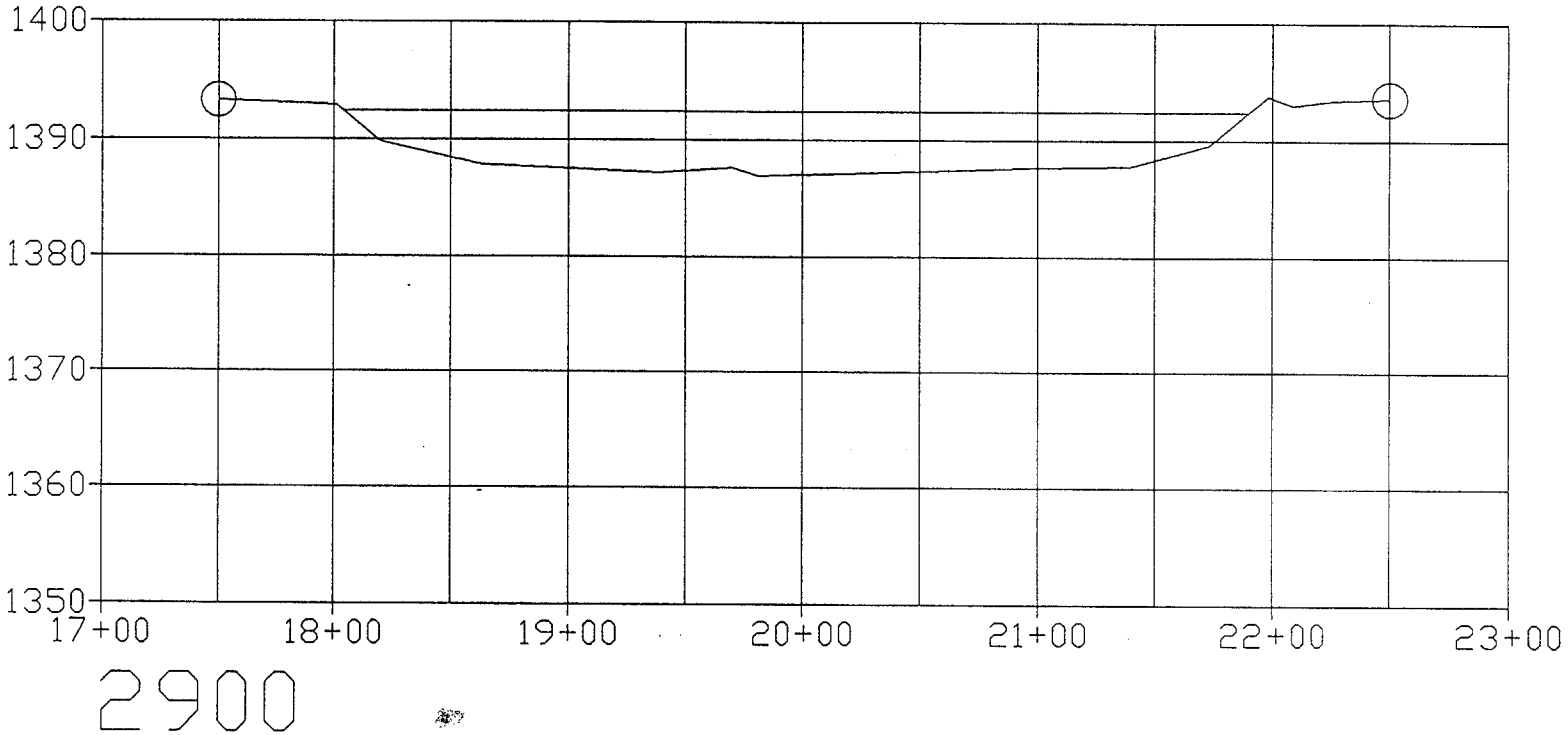


Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1391.46 ft



2700

Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1392.10 ft



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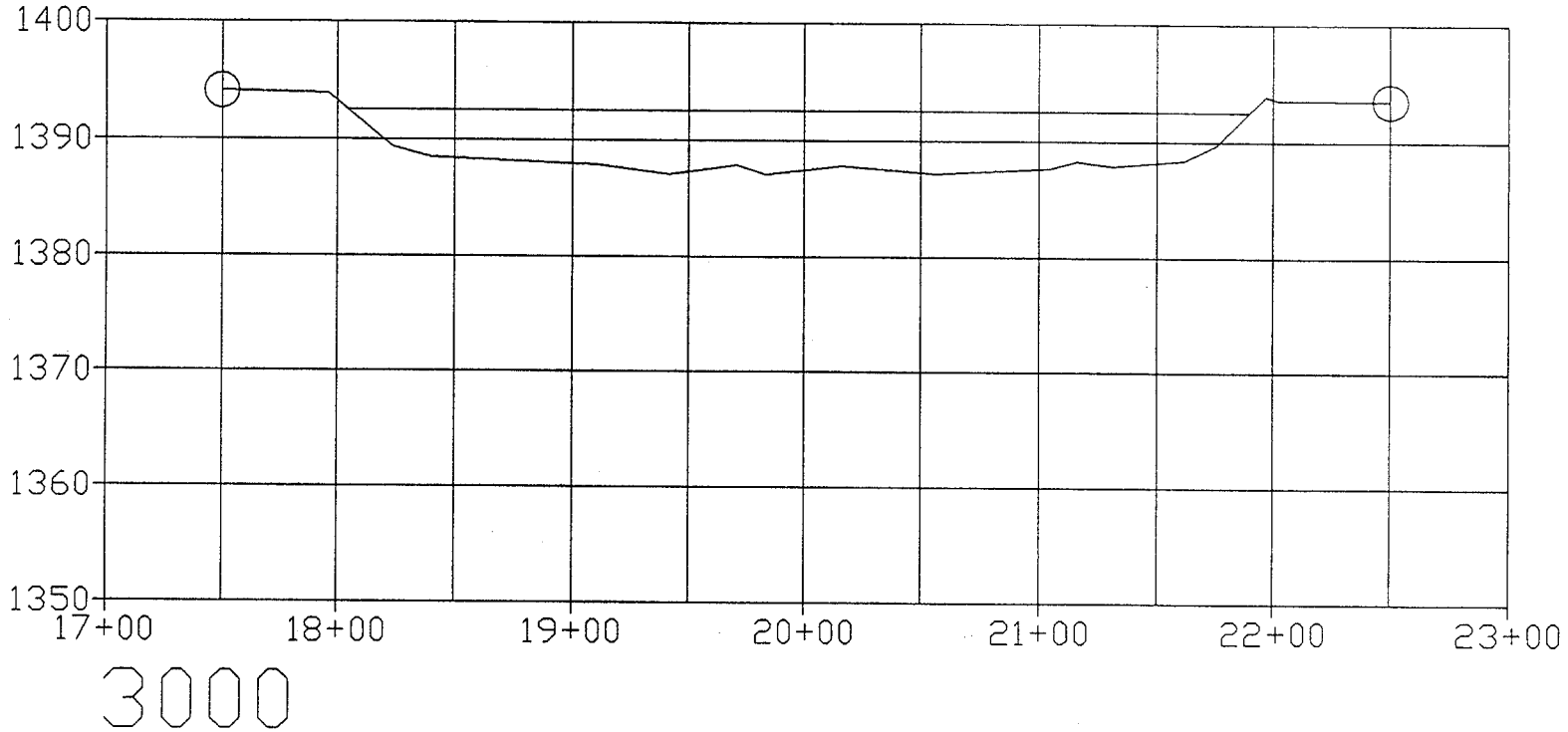
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1392.40 ft



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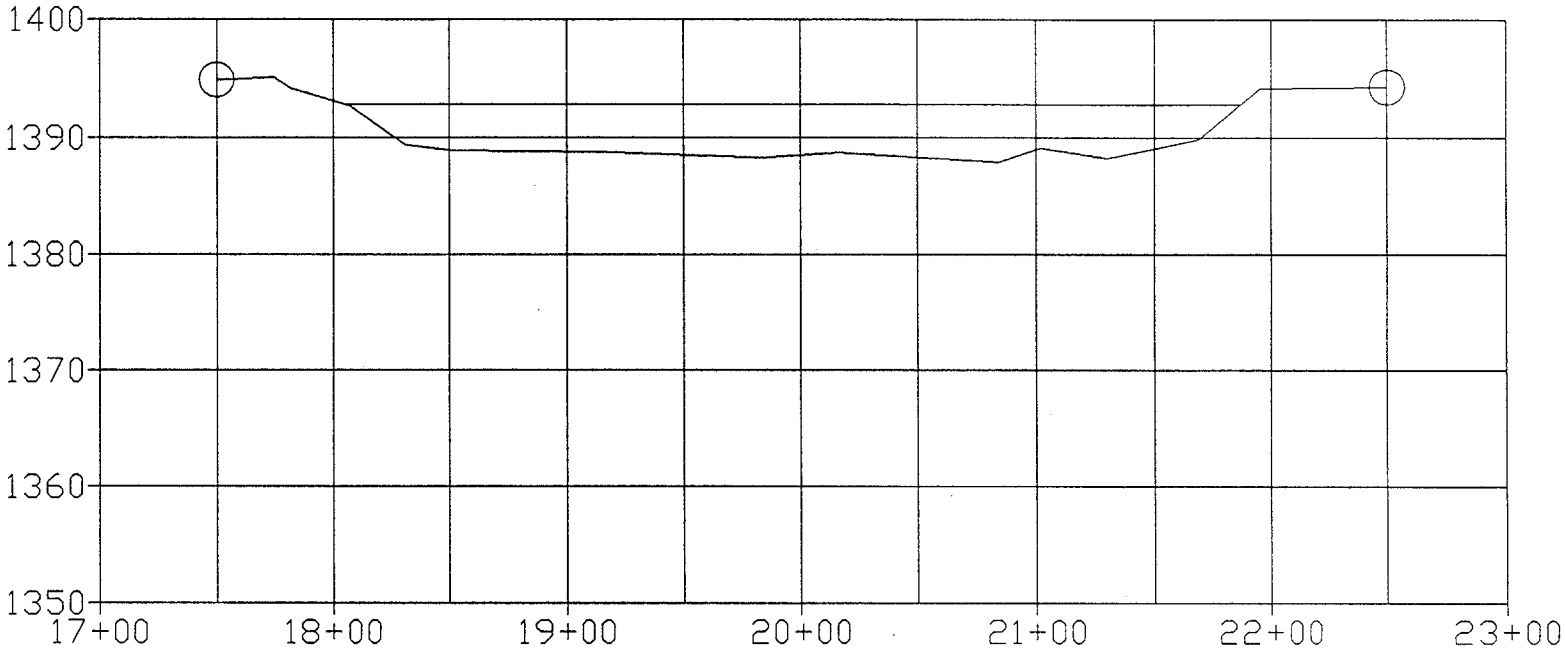
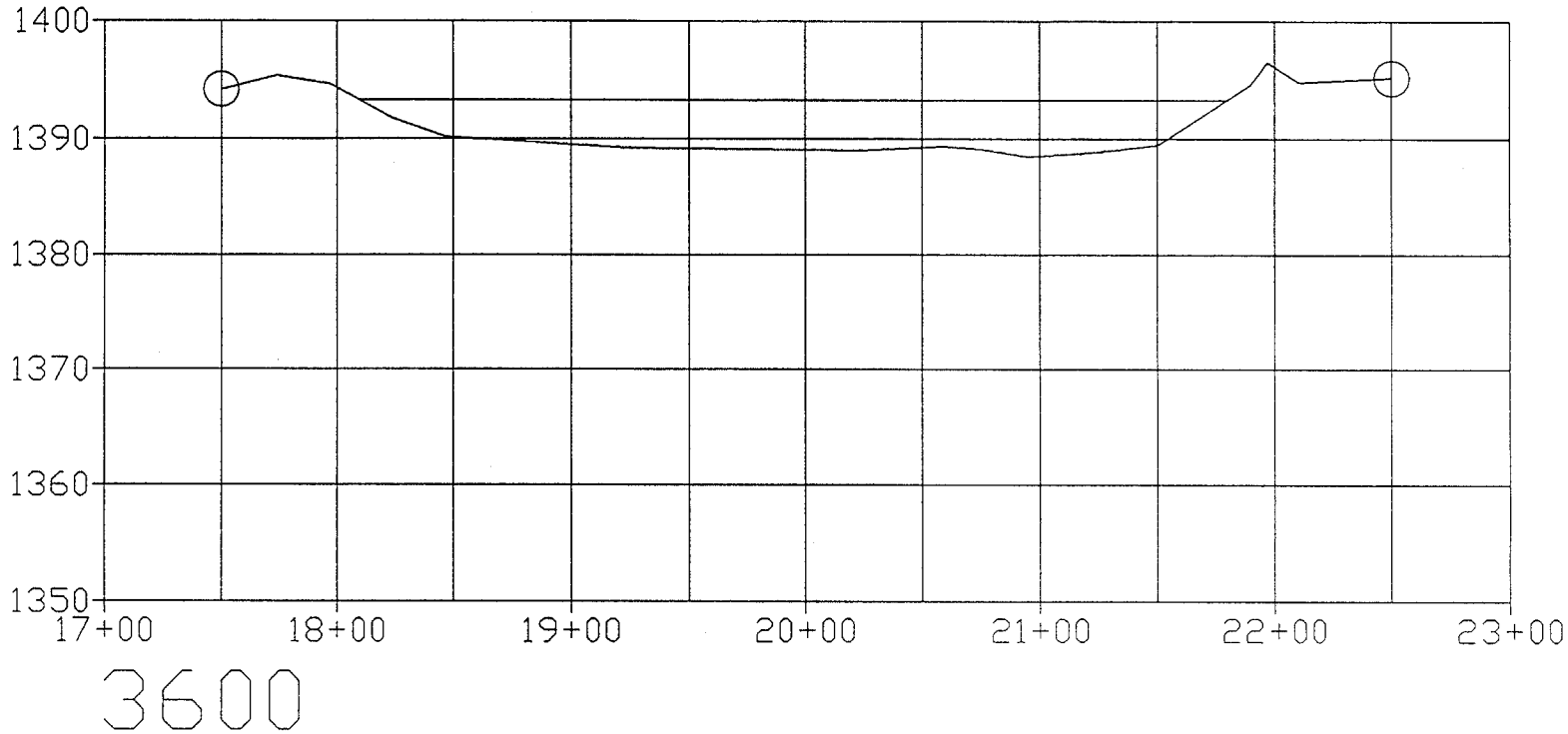
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1392.49 ft



3300

Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1392.81 ft



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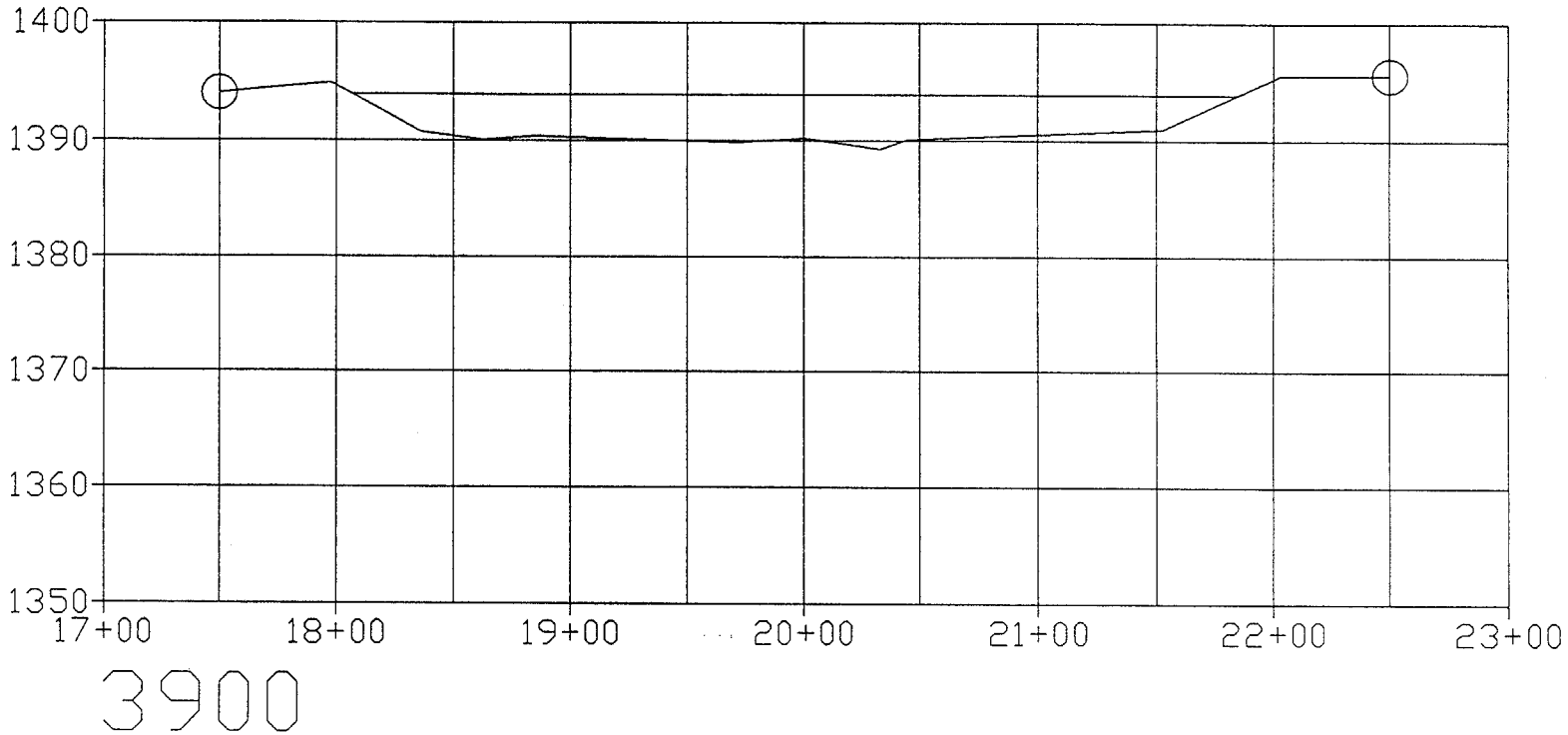
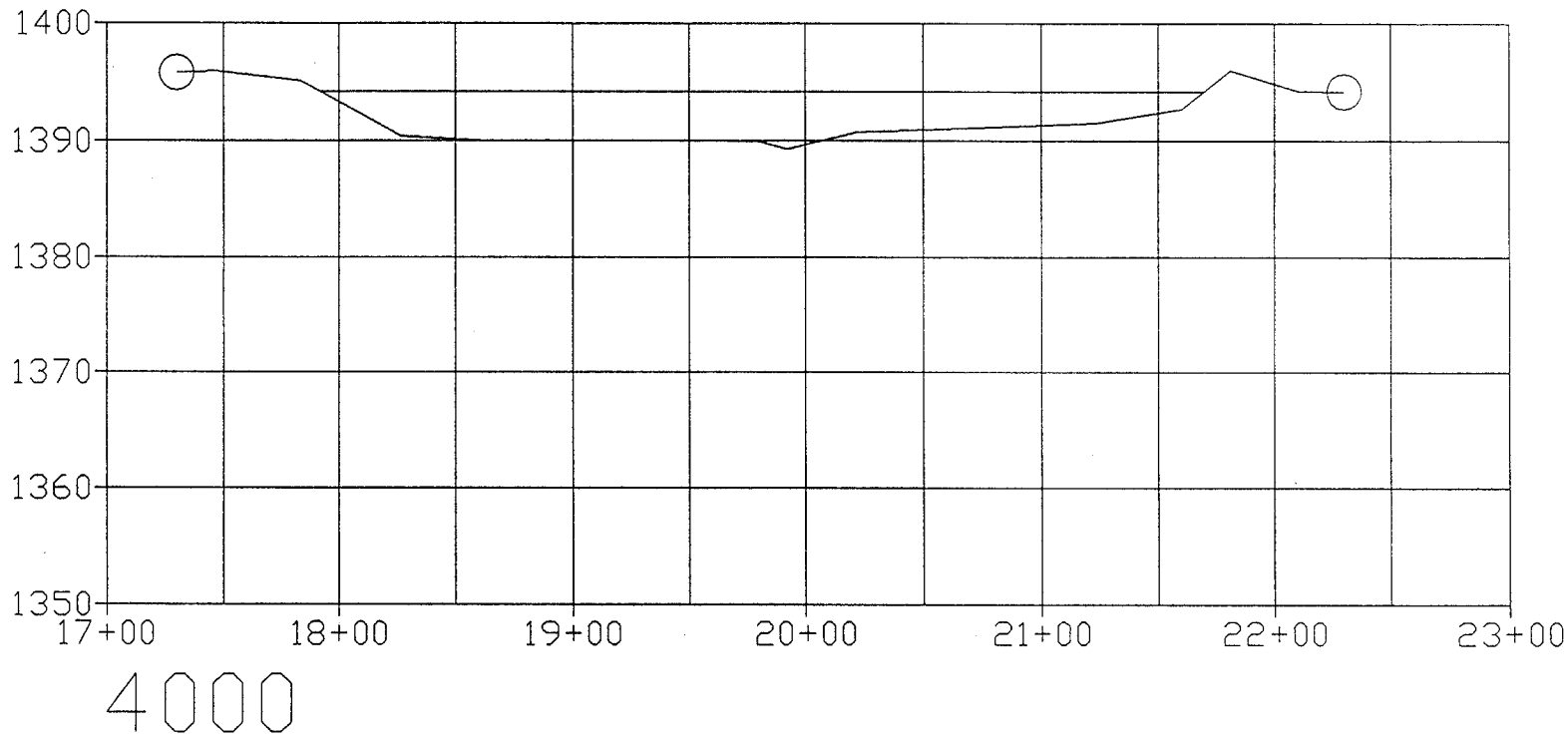
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1393.28 ft



Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1393.90 ft



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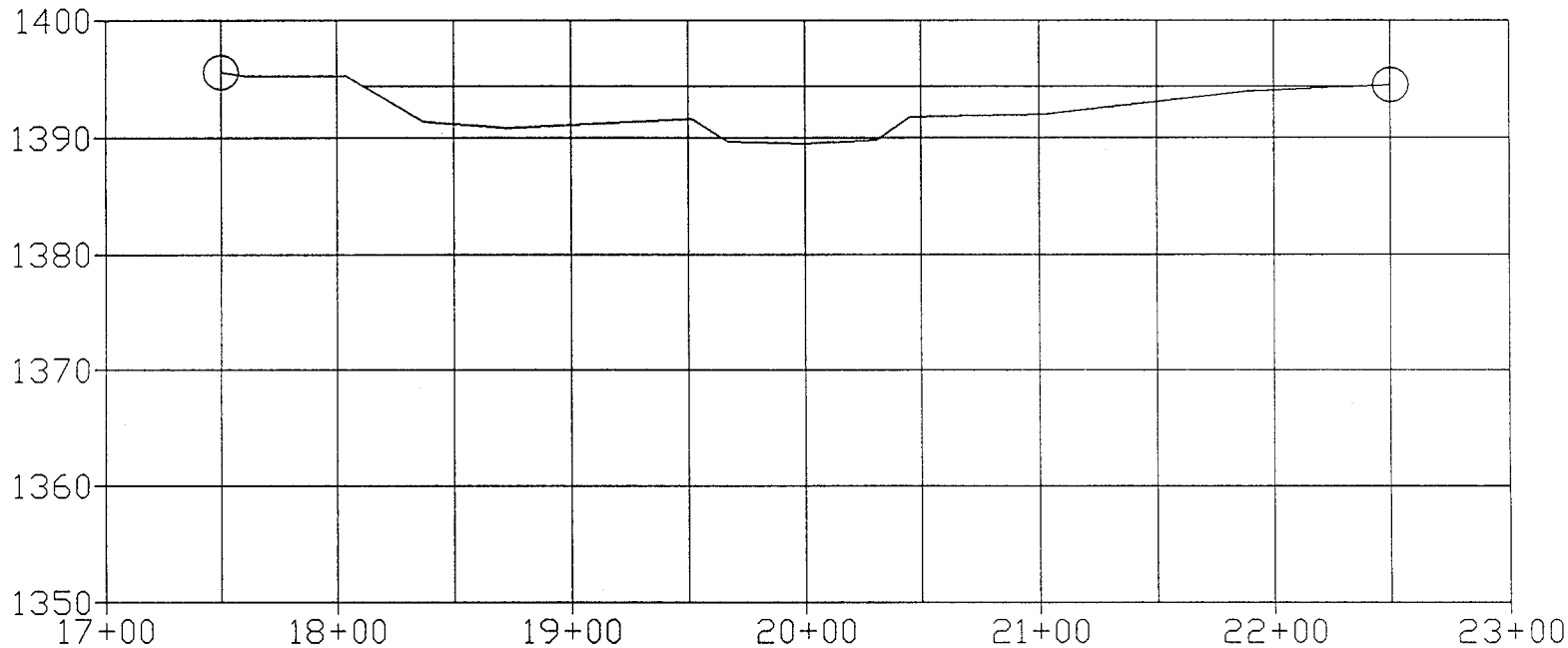
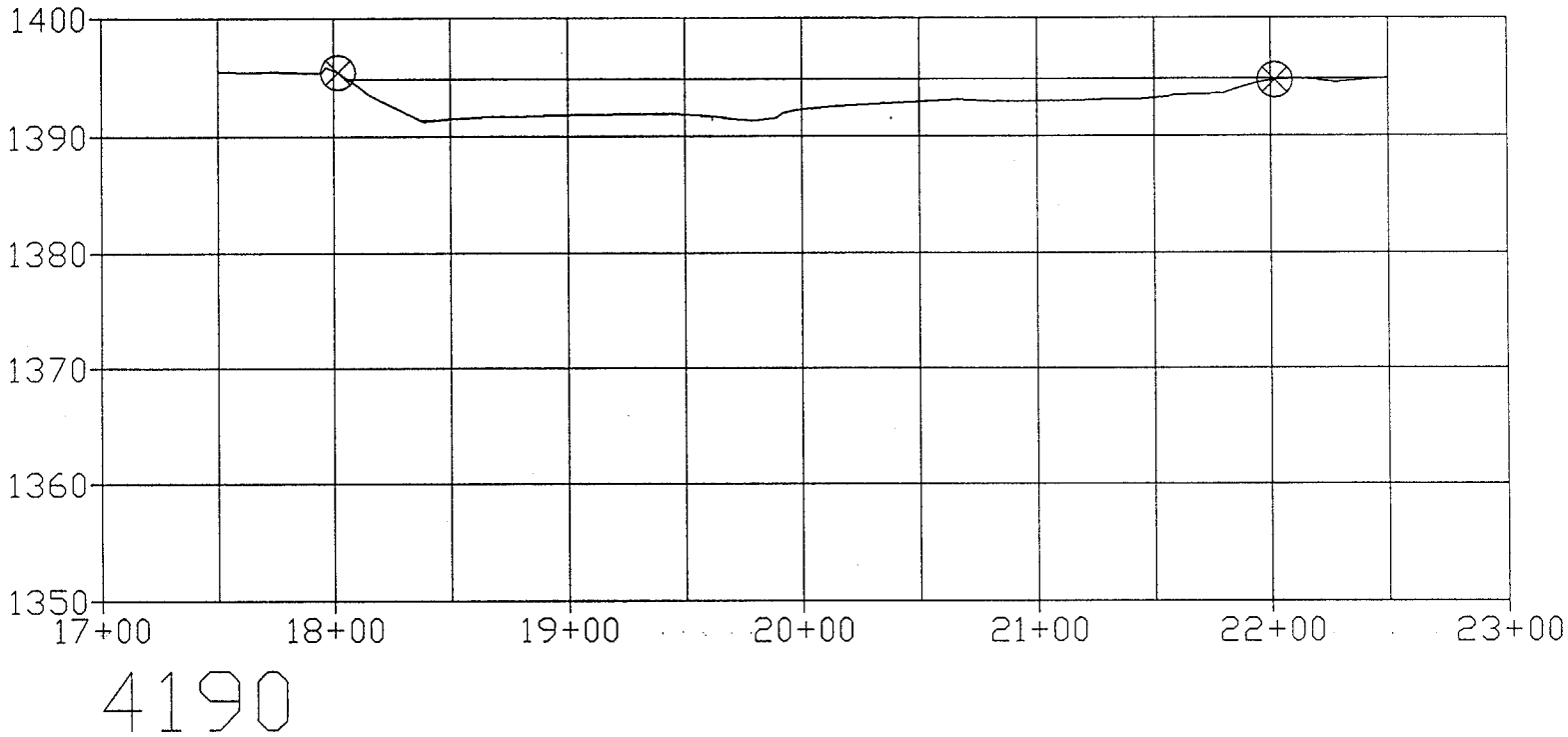
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1394.15 ft

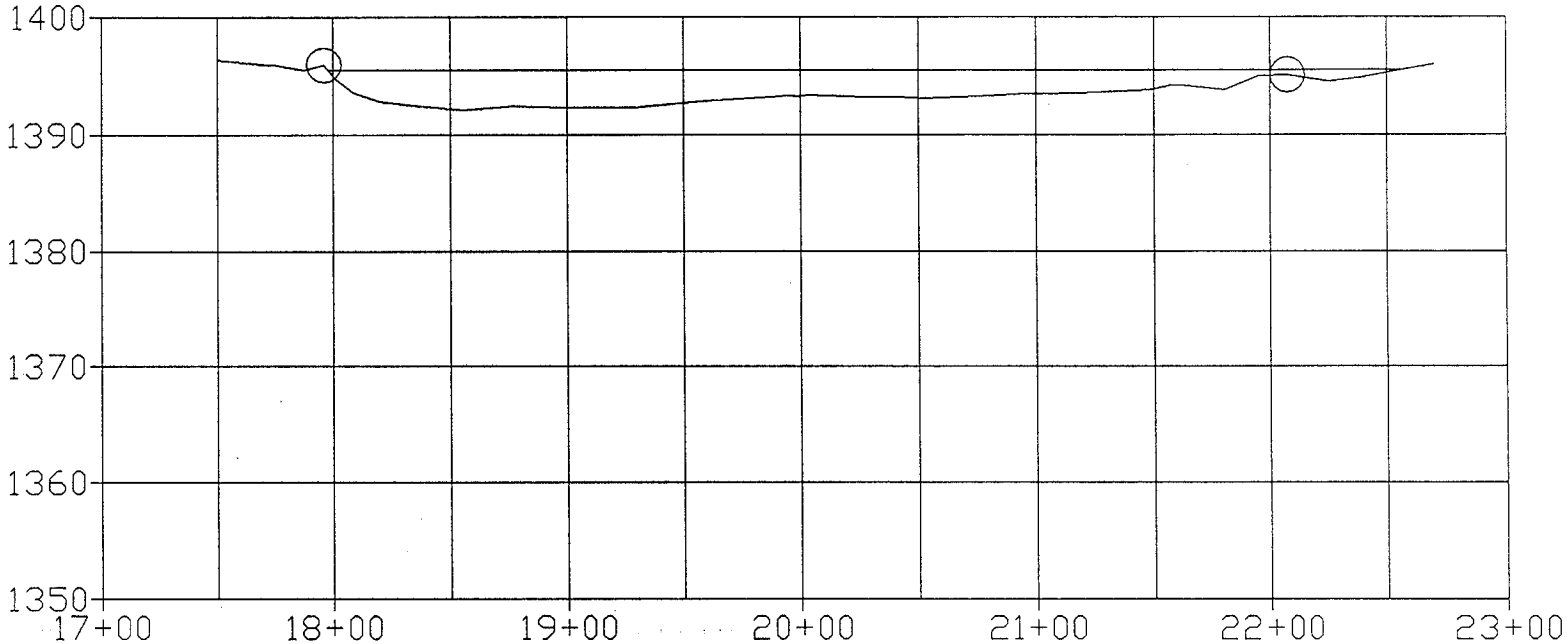


4100

Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1394.41 ft



Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1394.82 ft



4256

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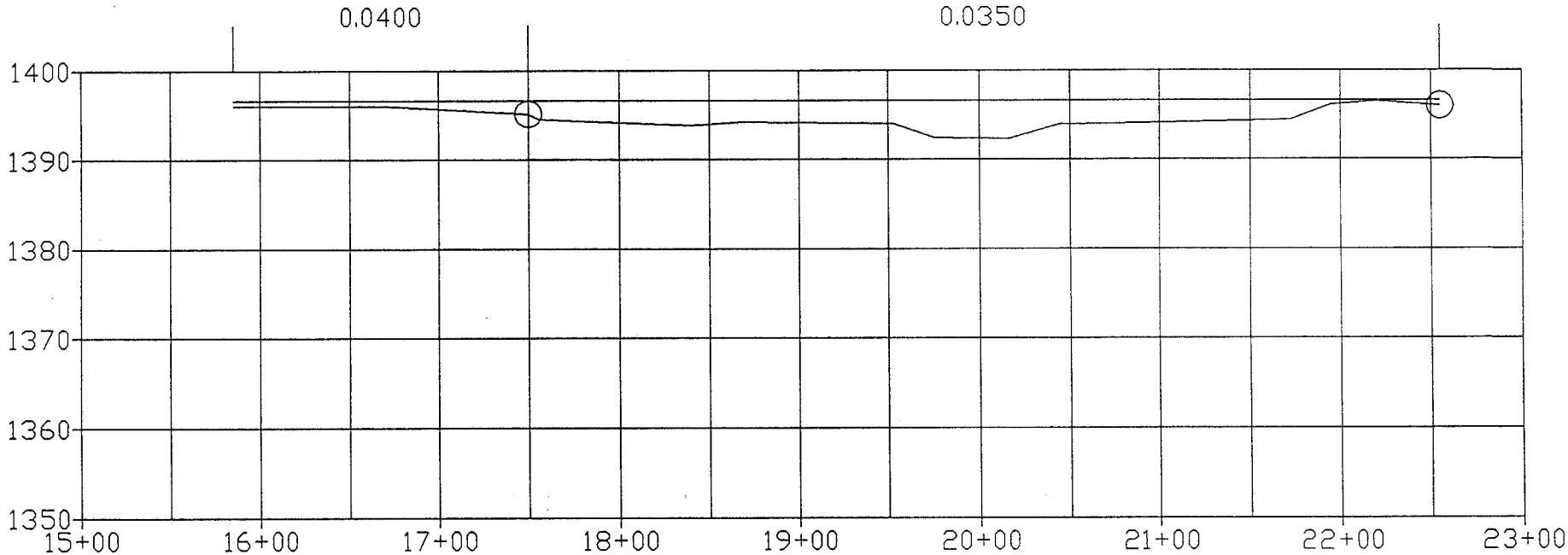
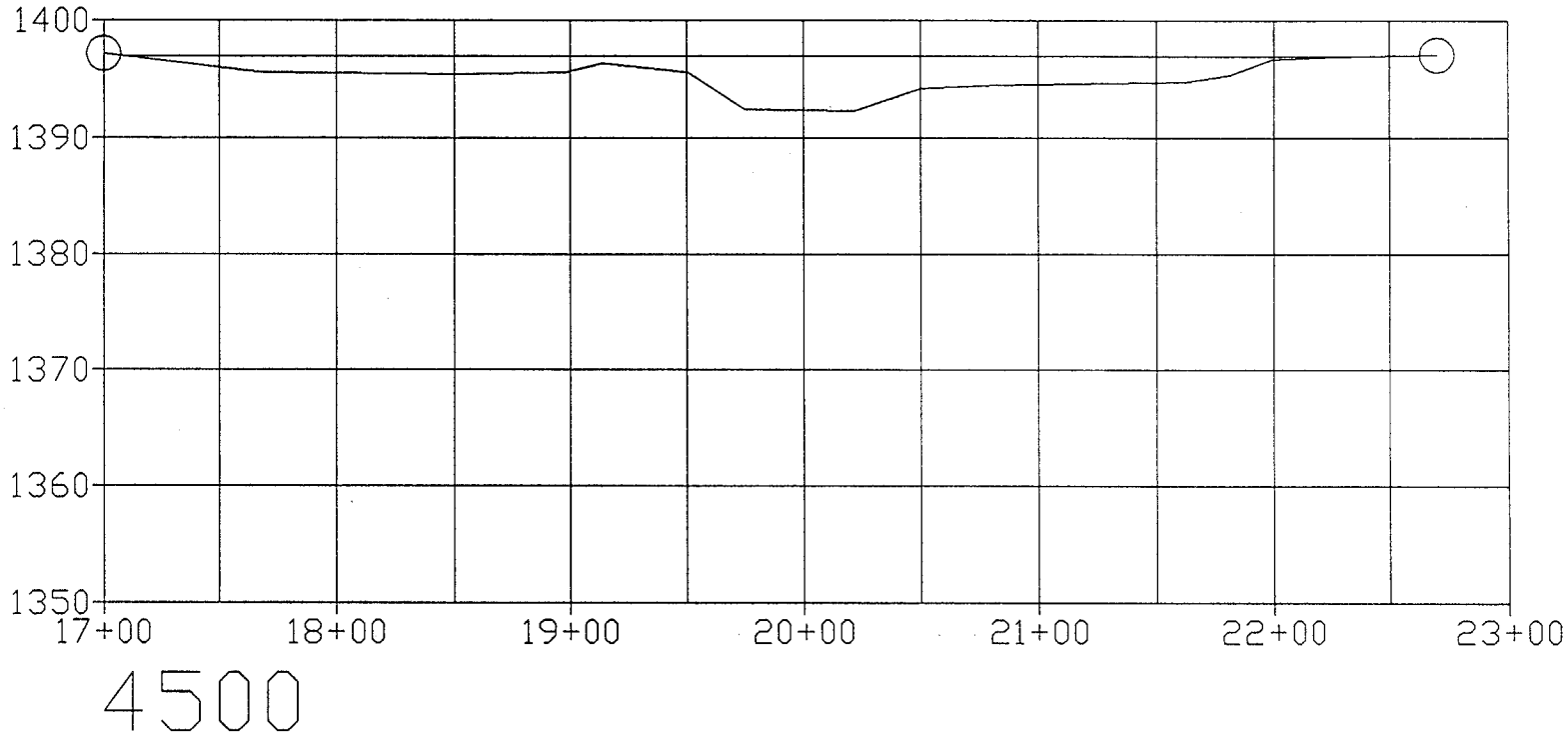
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1395.50 ft

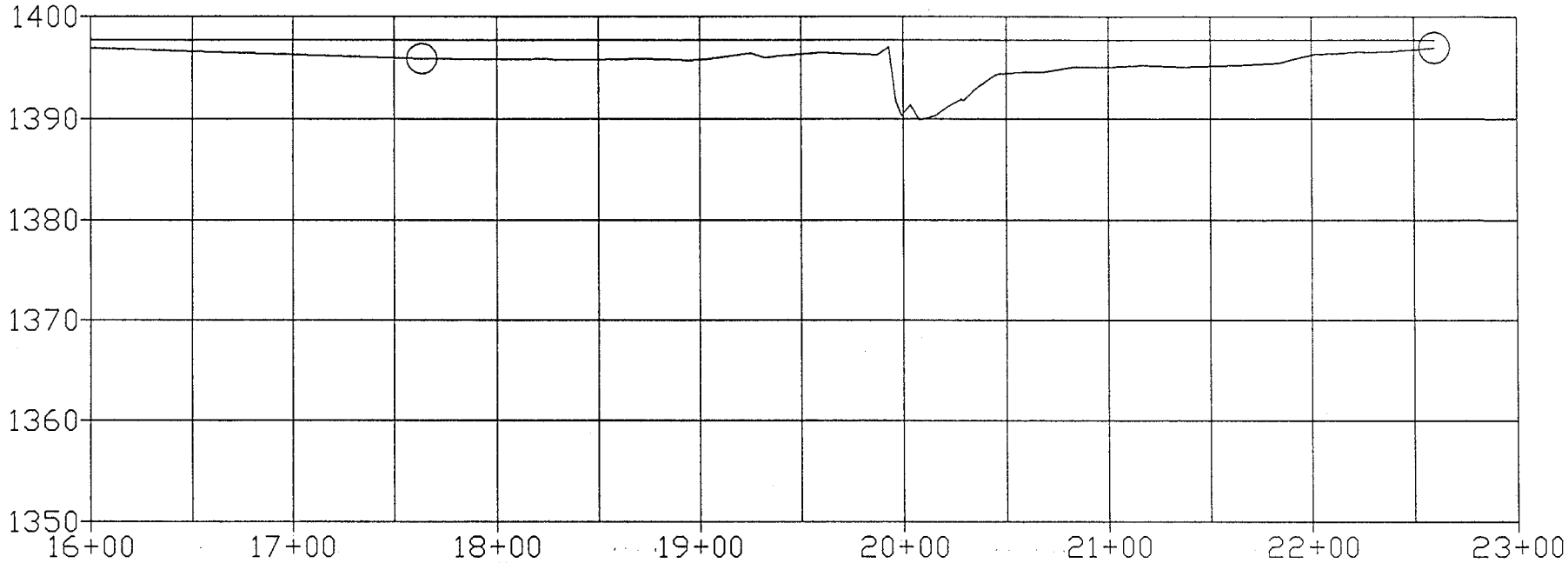


4400

Profile 1
Flow Discharge = 6000.00 cfs
——— Computed Water Surface = 1396.61 ft

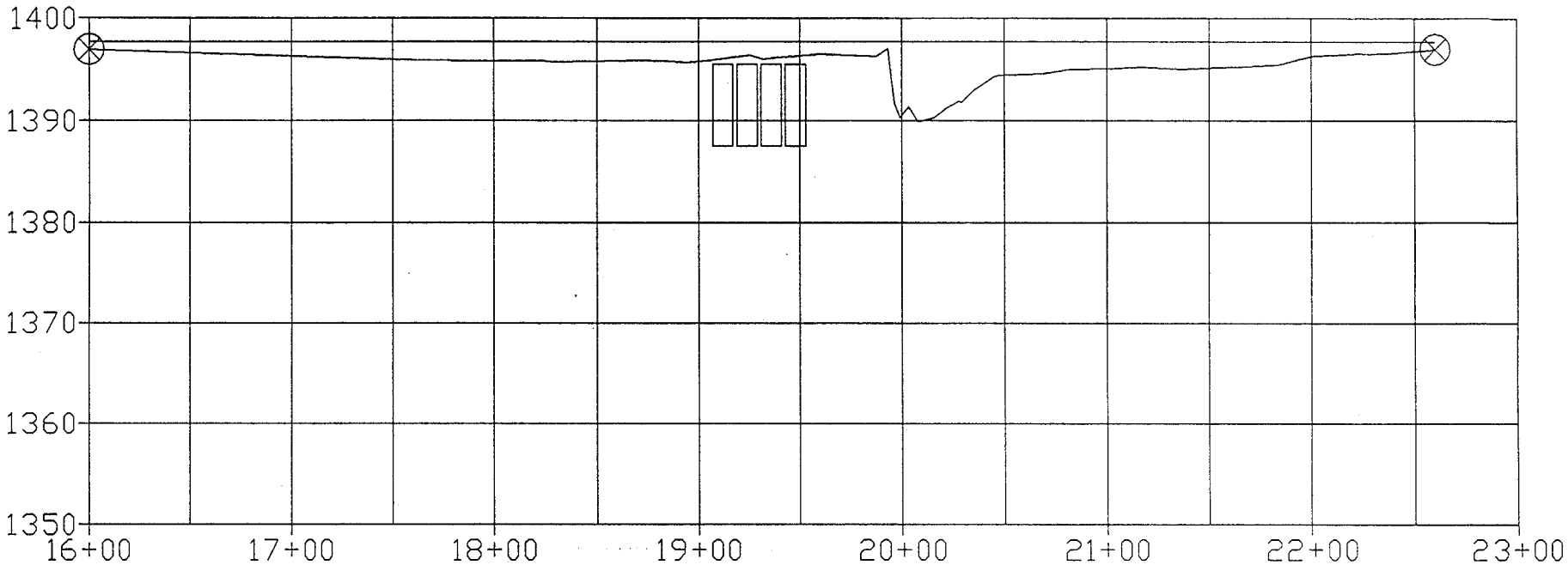


Profile 1
Flow Discharge = 6000.00 cfs
Computed Water Surface = 1396.98 ft



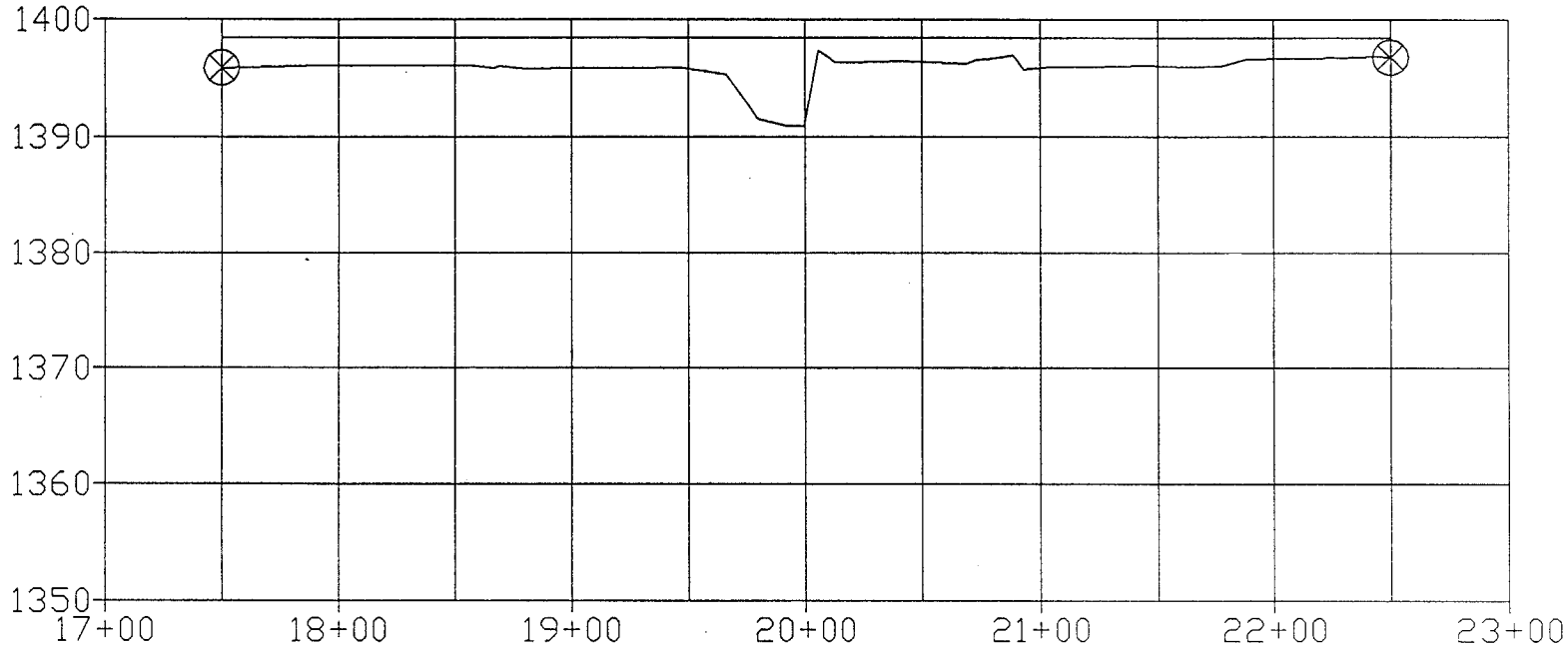
4573

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.93 ft



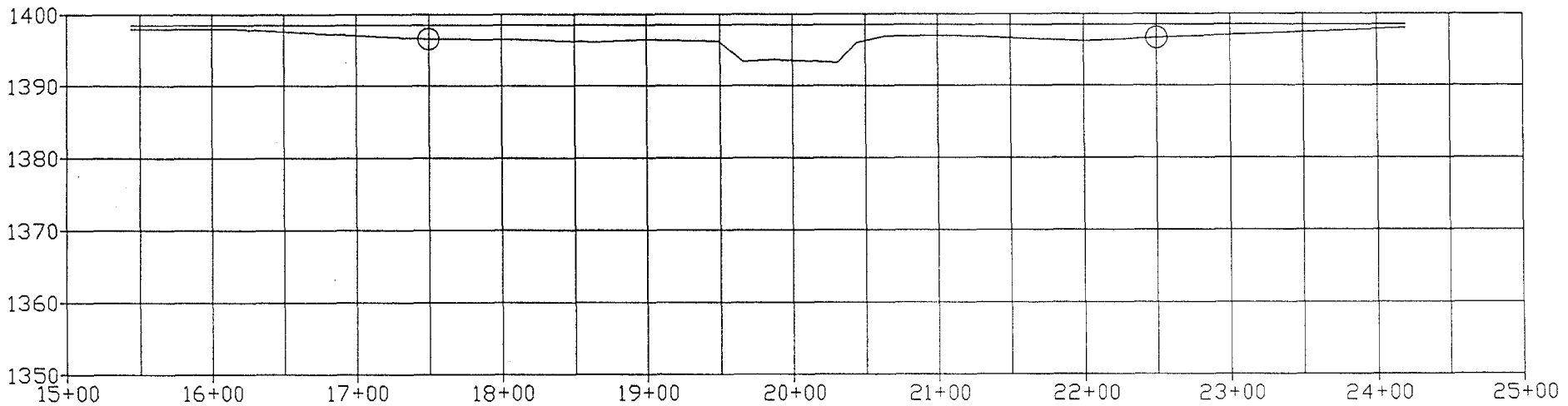
4574

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.93 ft



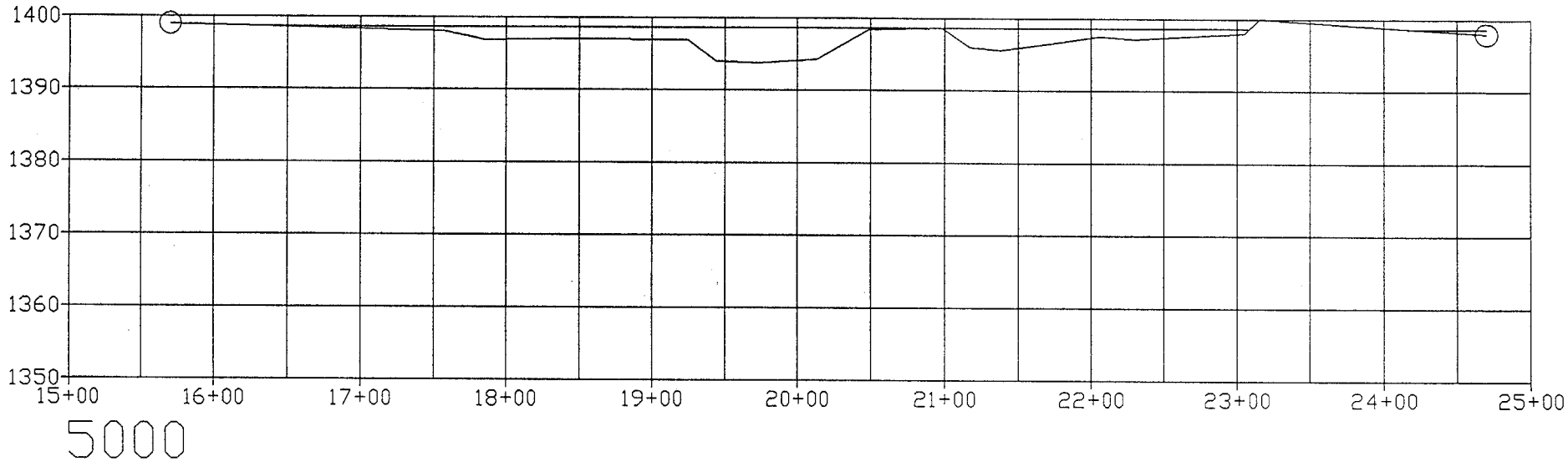
4646

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1397.51 ft

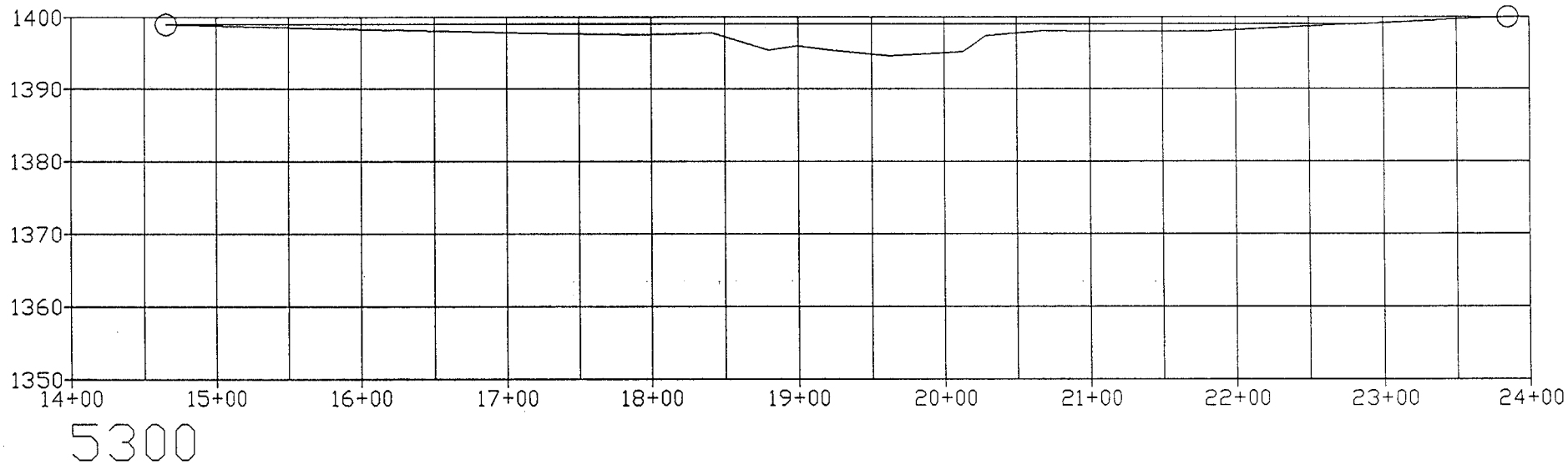


4800

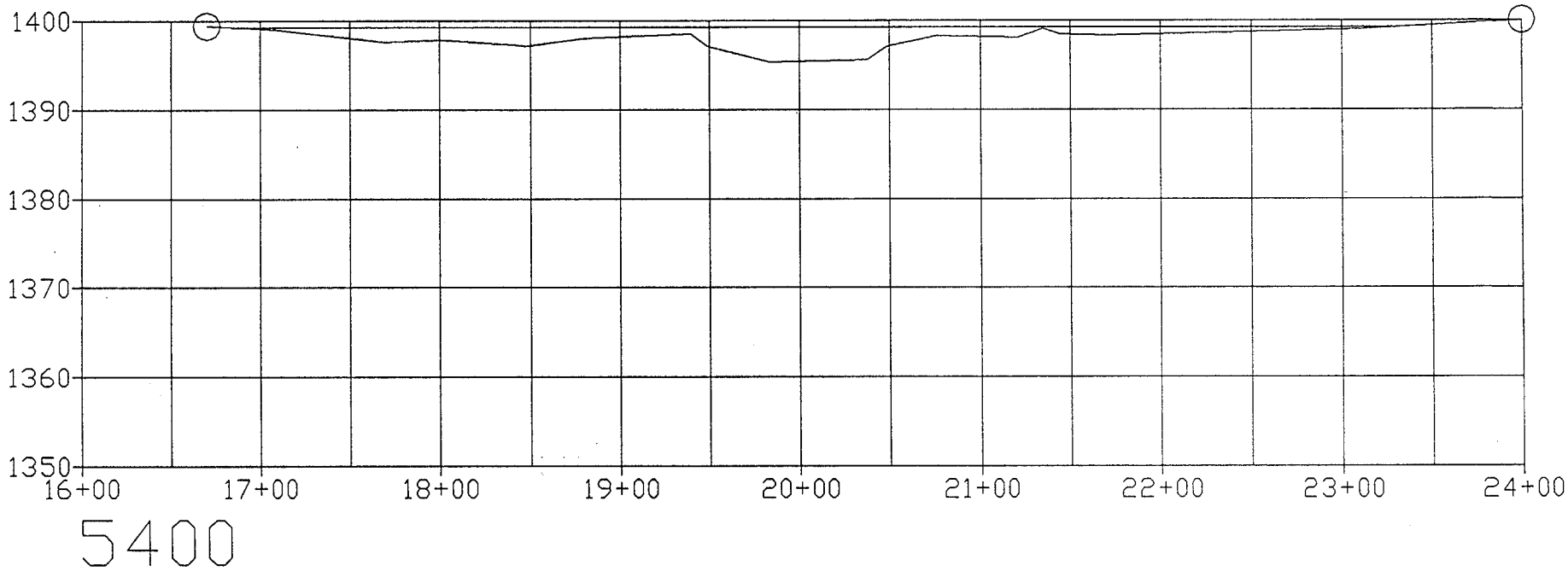
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.60 ft



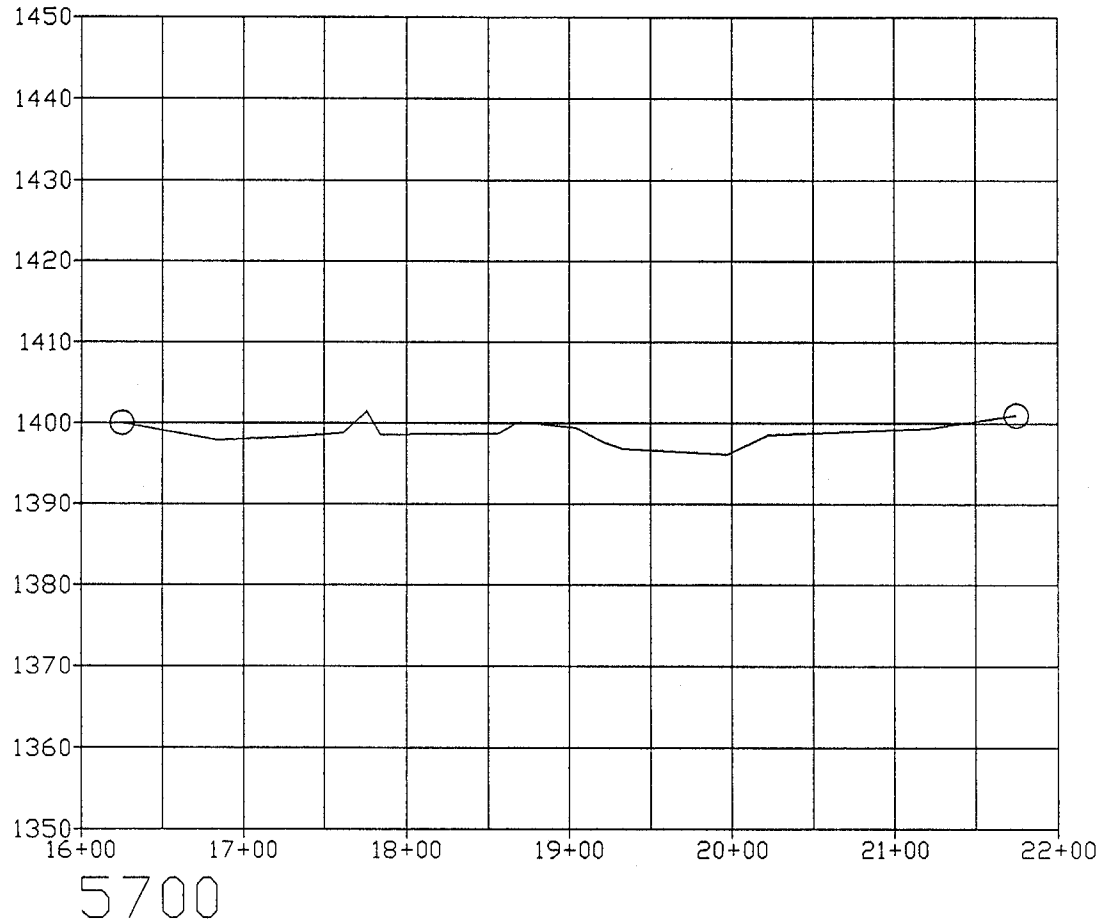
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.75 ft



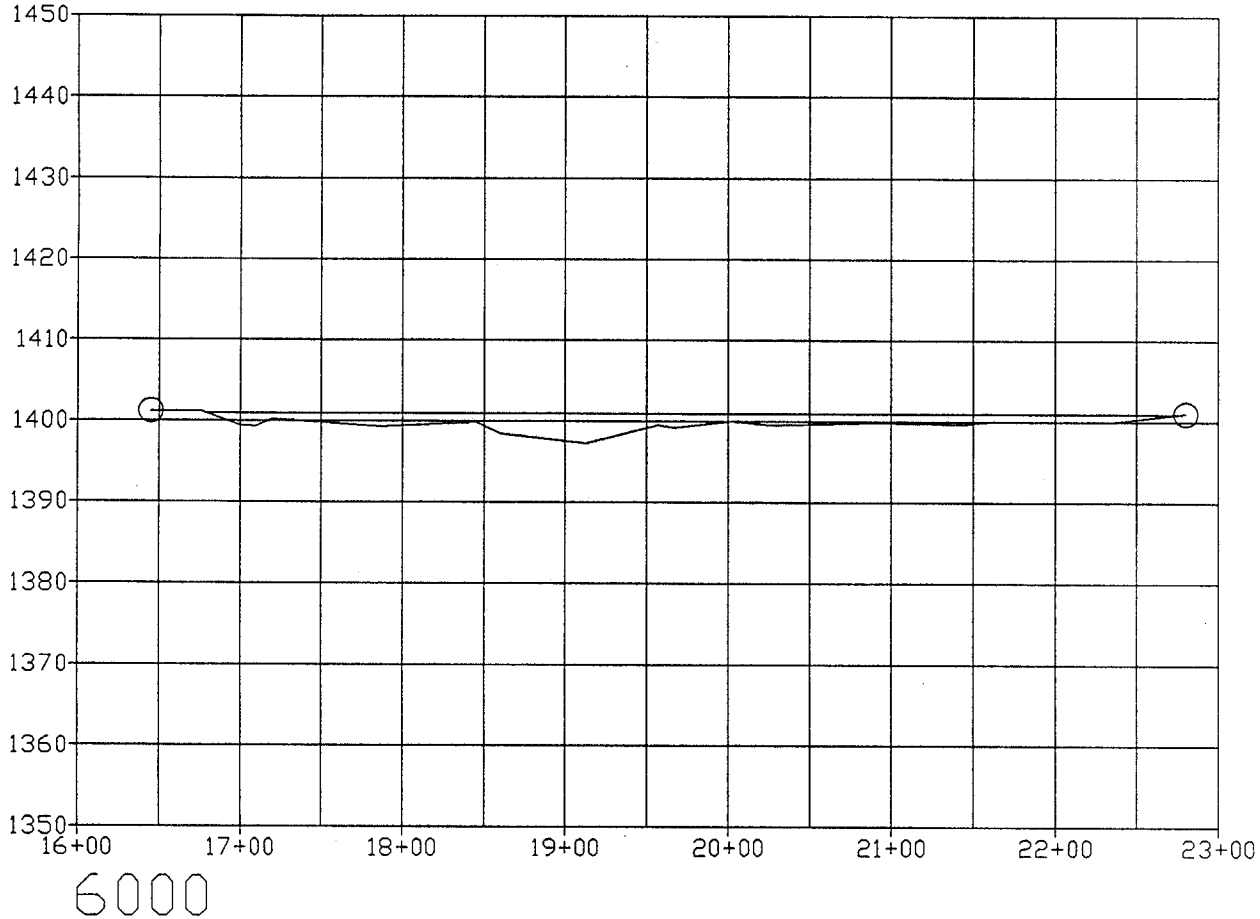
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.86 ft



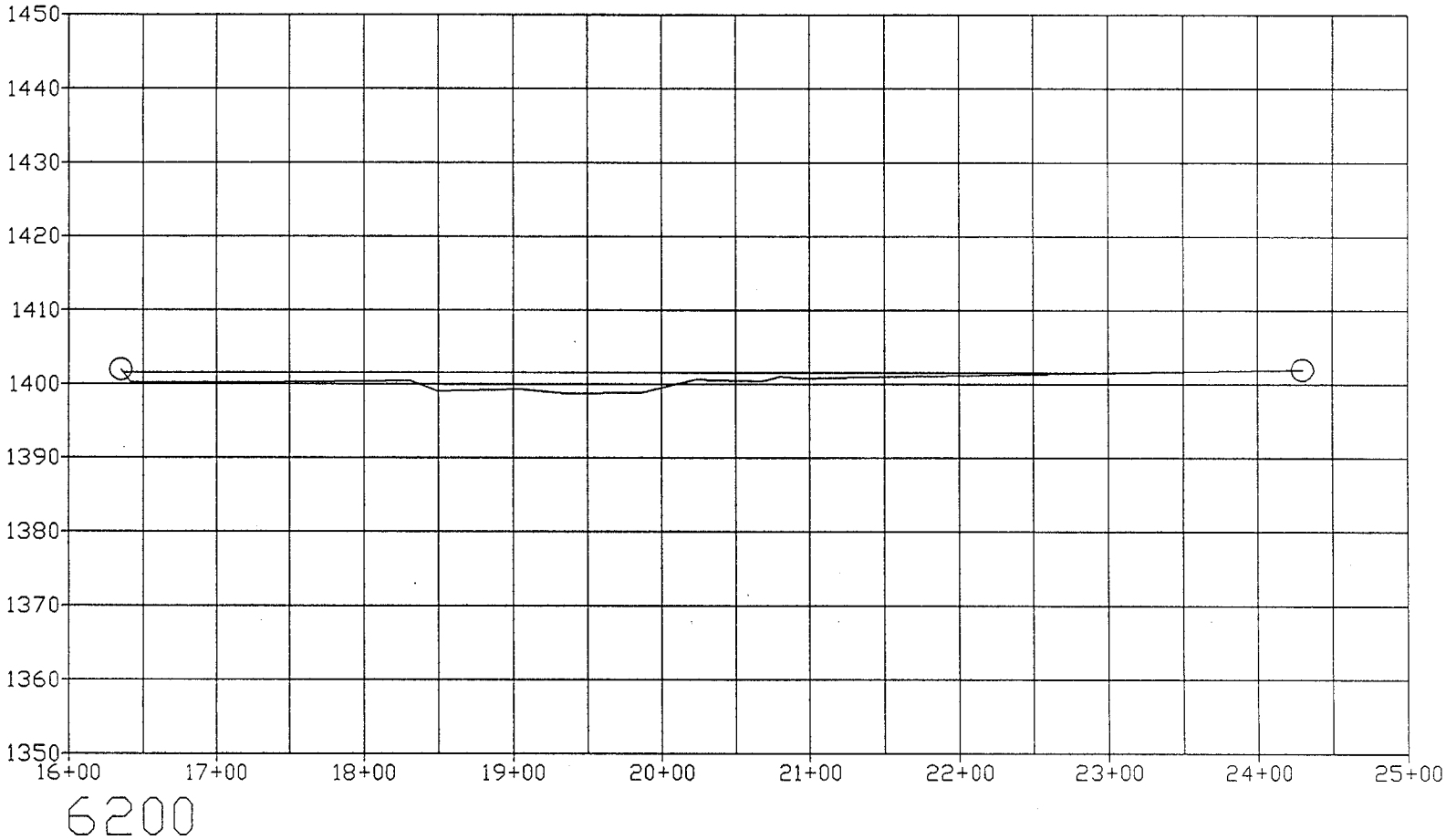
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.81 ft



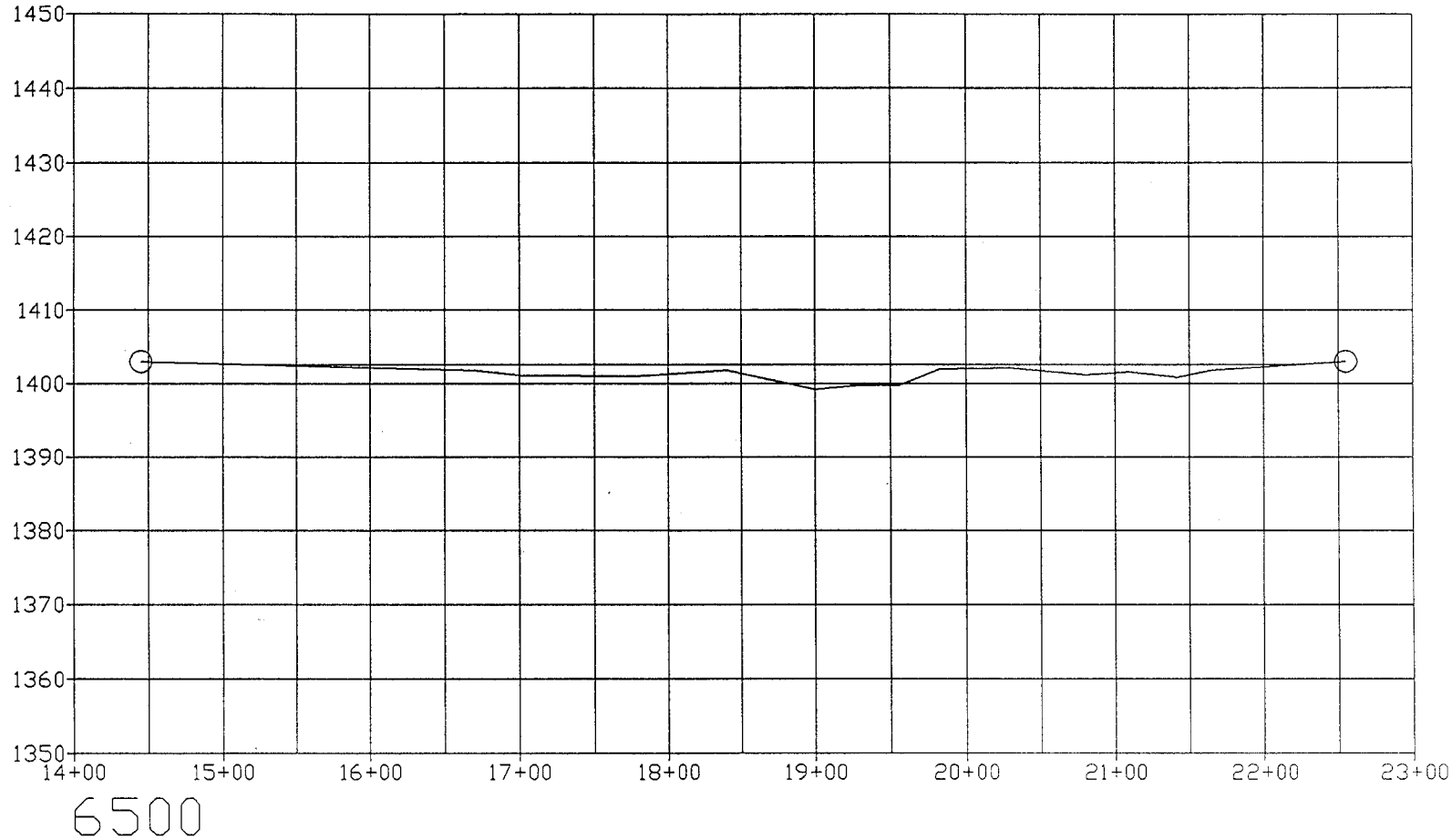
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1400.02 ft



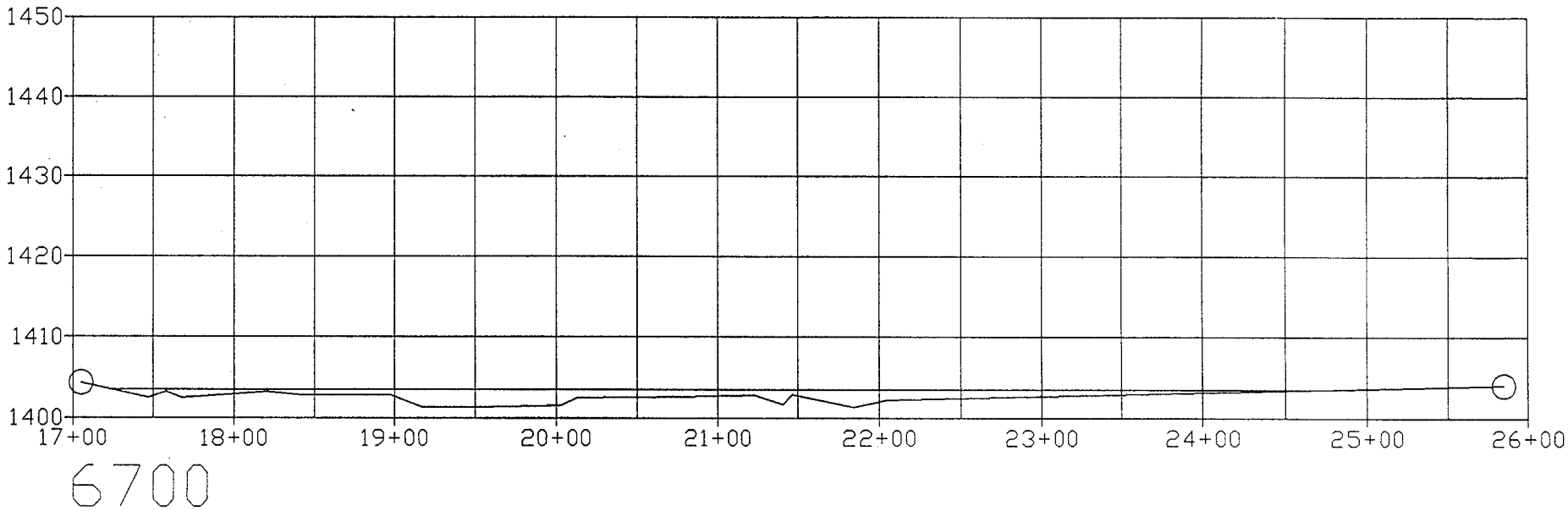
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1400.90 ft



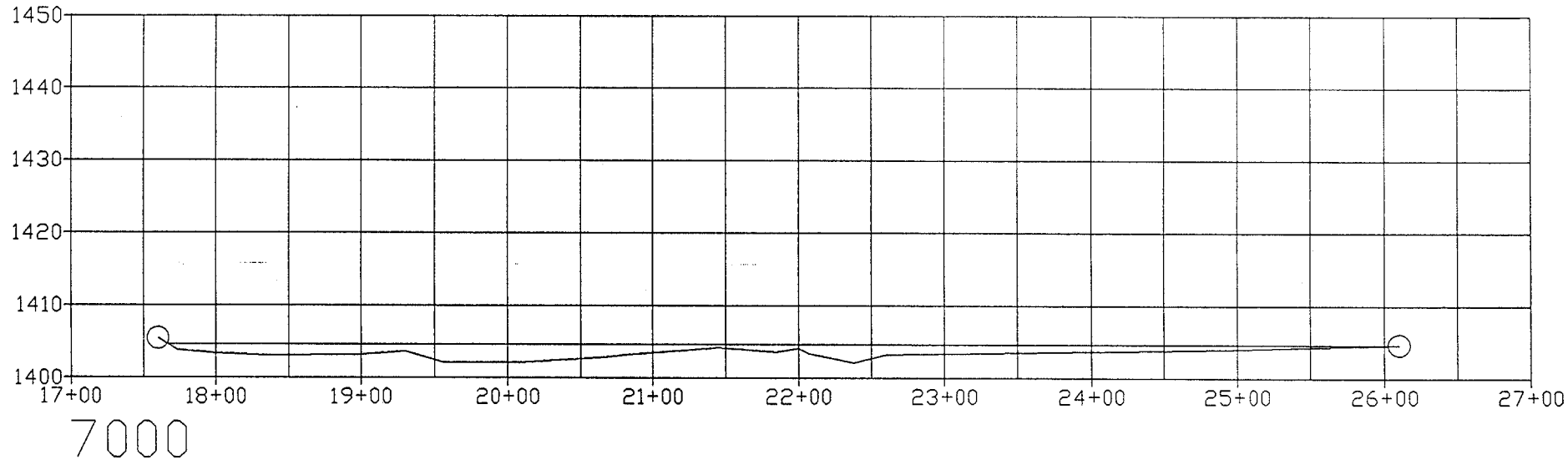
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1401.53 ft



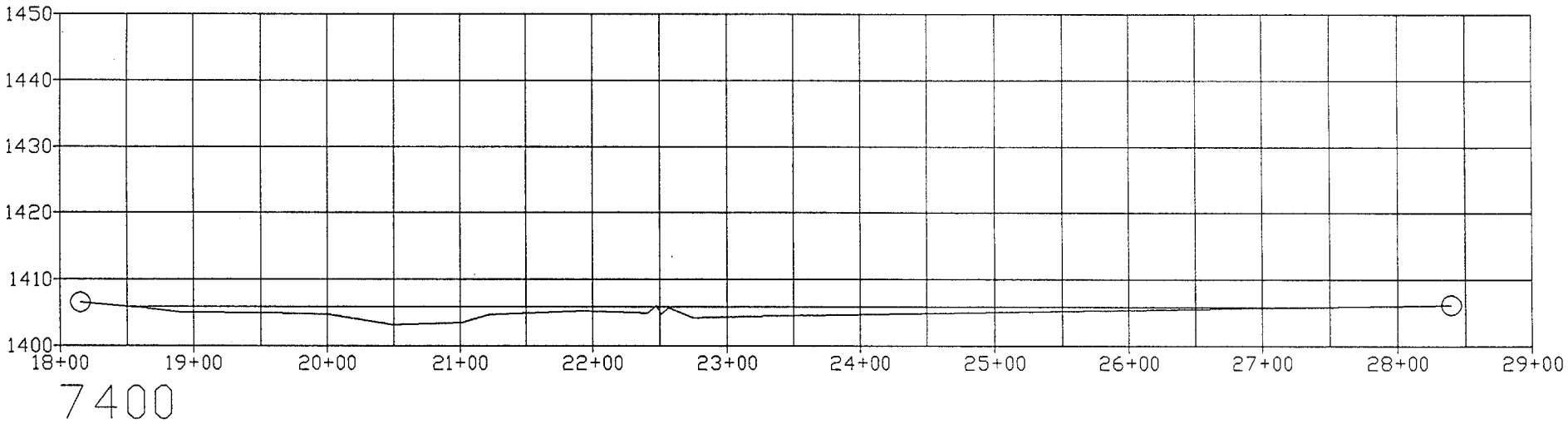
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1402.59 ft



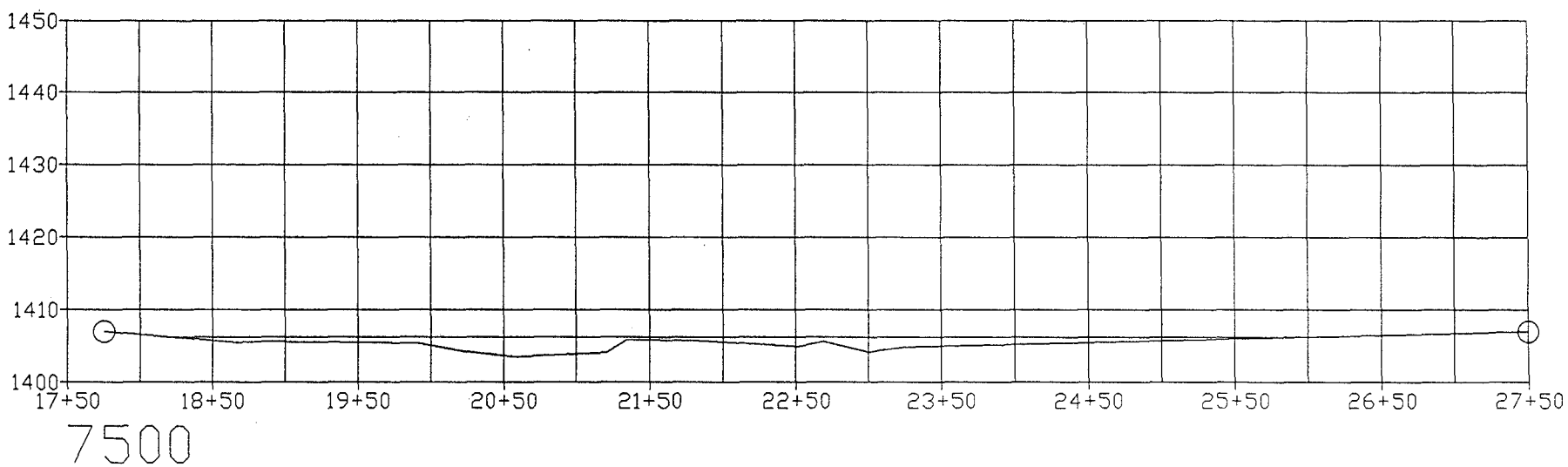
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1403.50 ft



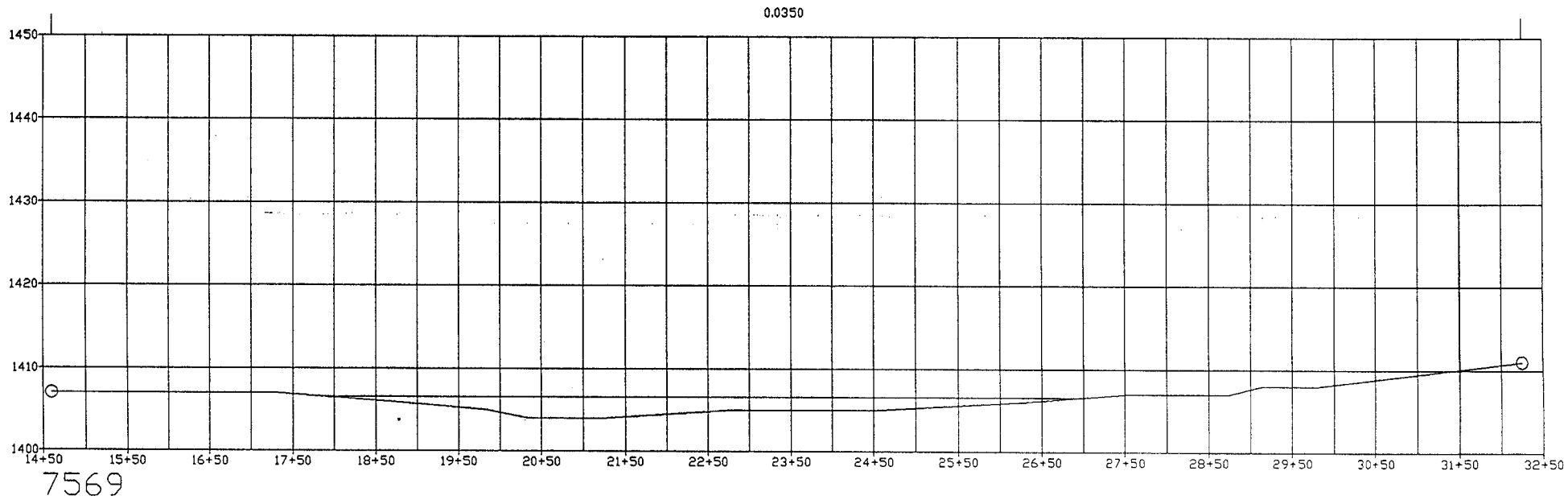
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1404.66 ft



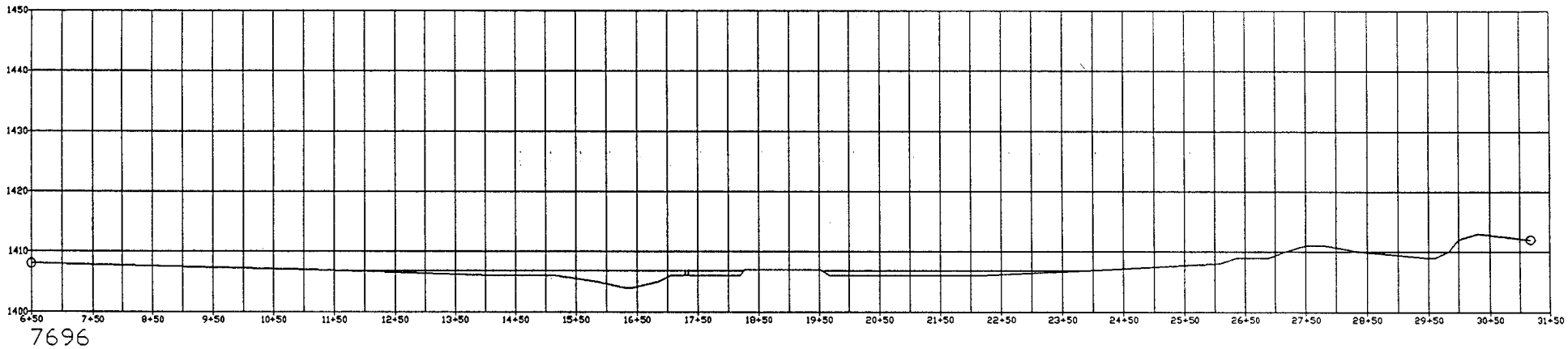
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1405.85 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1406.28 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1406.54 ft

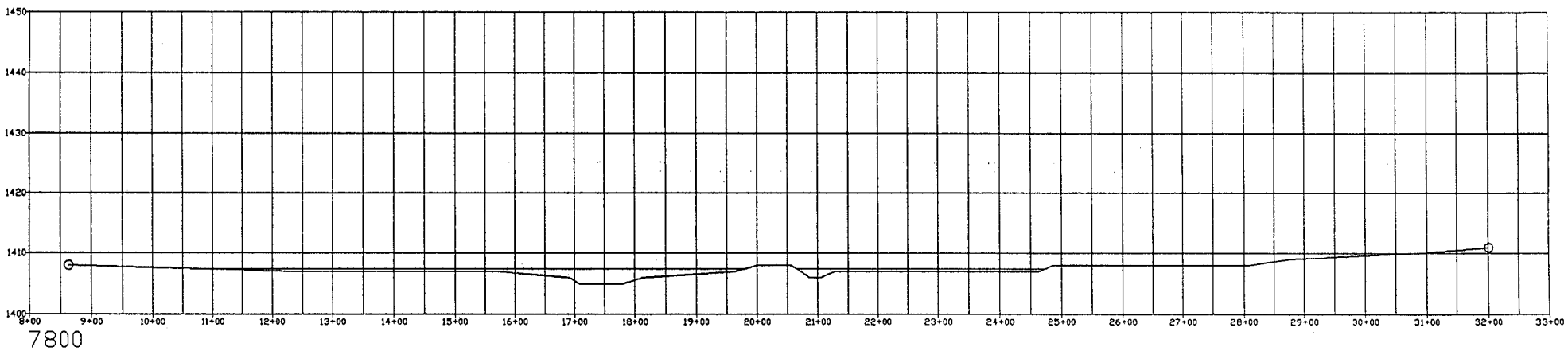


7696

Profile 1

Flow Discharge = 2400.00 cfs

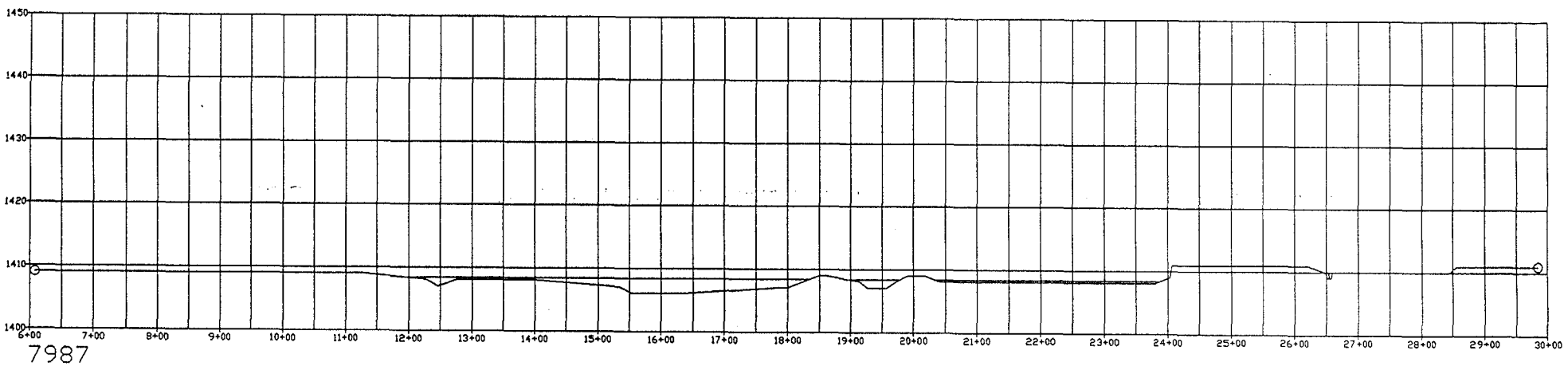
Computed Water Surface = 1406.80 ft



Profile 1

Flow Discharge = 2400.00 cfs

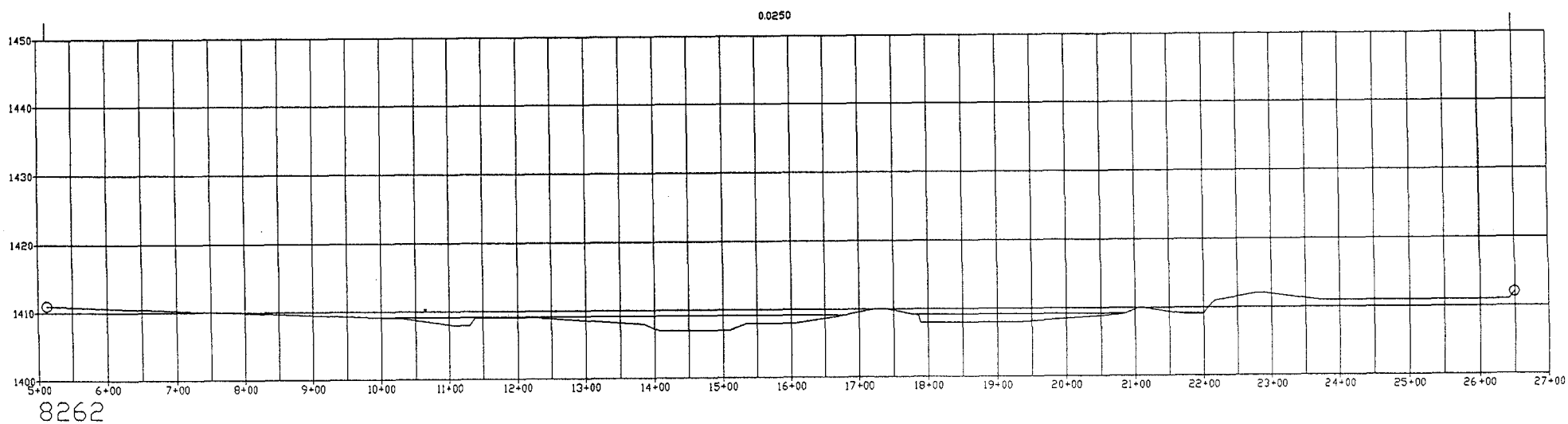
Computed Water Surface = 1407.40 ft



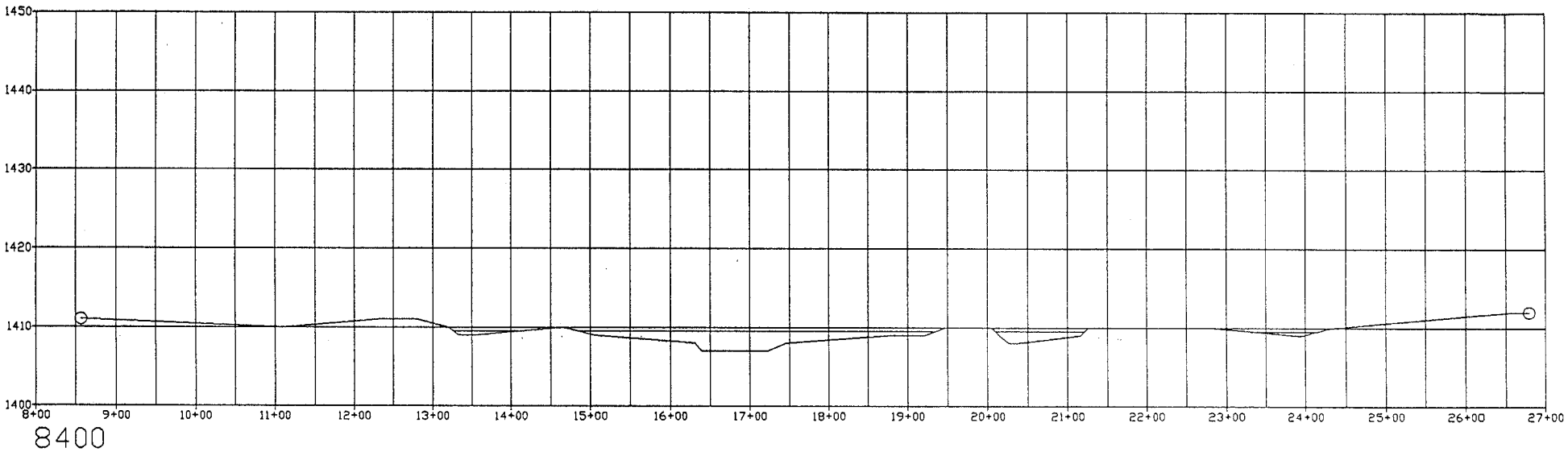
Profile 1

Flow Discharge = 2400.00 cfs

—— Computed Water Surface = 1408.39 ft



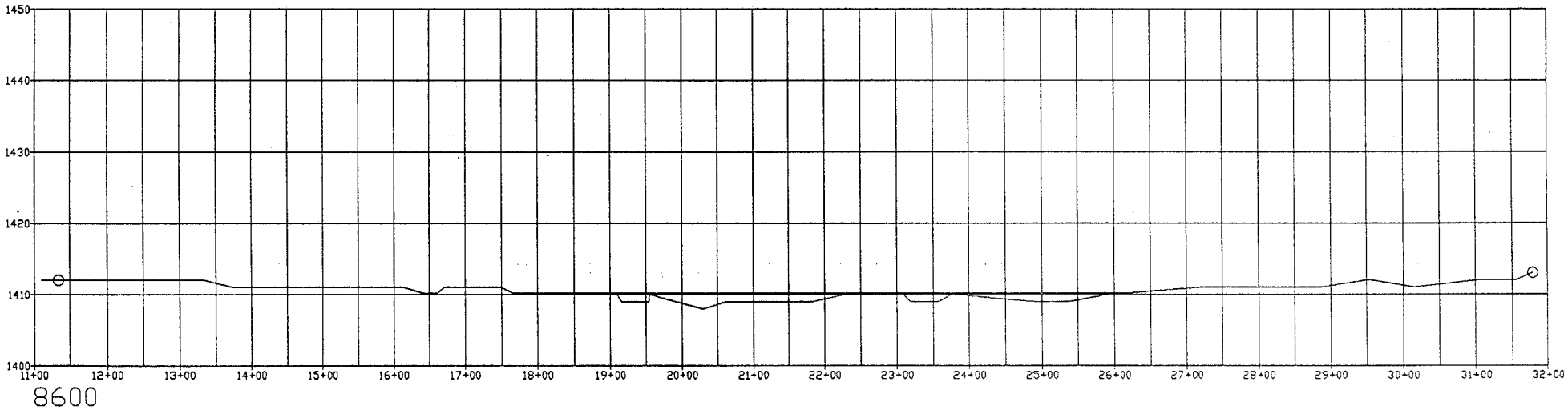
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1409.16 ft



Profile 1

Flow Discharge = 2400.00 cfs

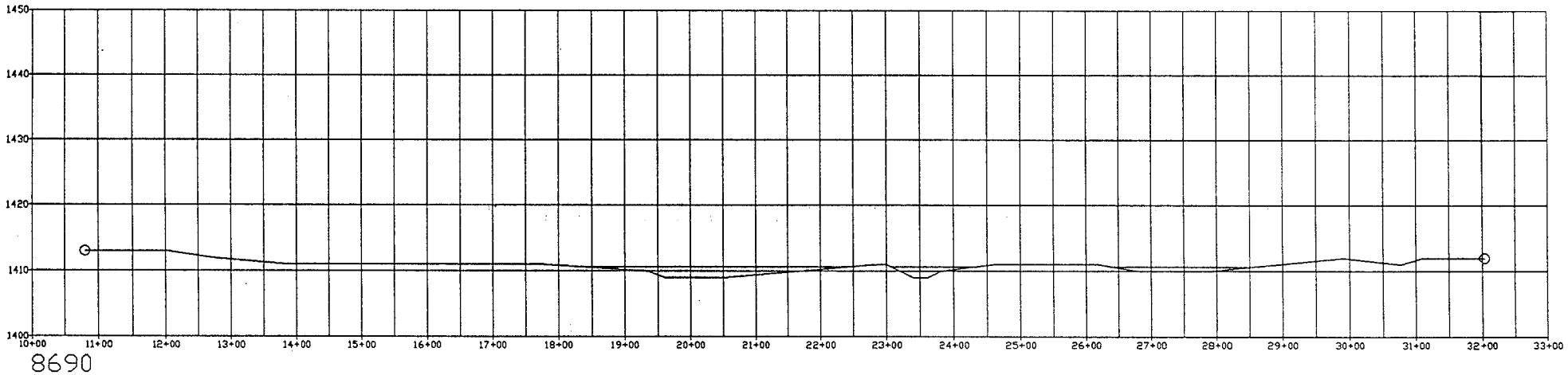
Computed Water Surface = 1409.48 ft



Profile 1

Flow Discharge = 2400.00 cfs

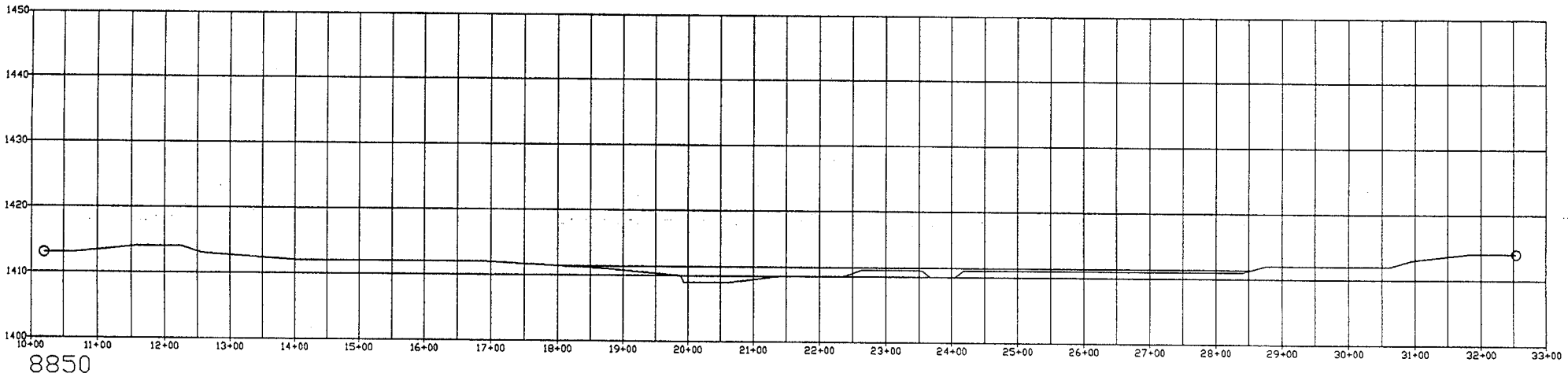
—— Computed Water Surface = 1410.25 ft



Profile 1

Flow Discharge = 2400.00 cfs

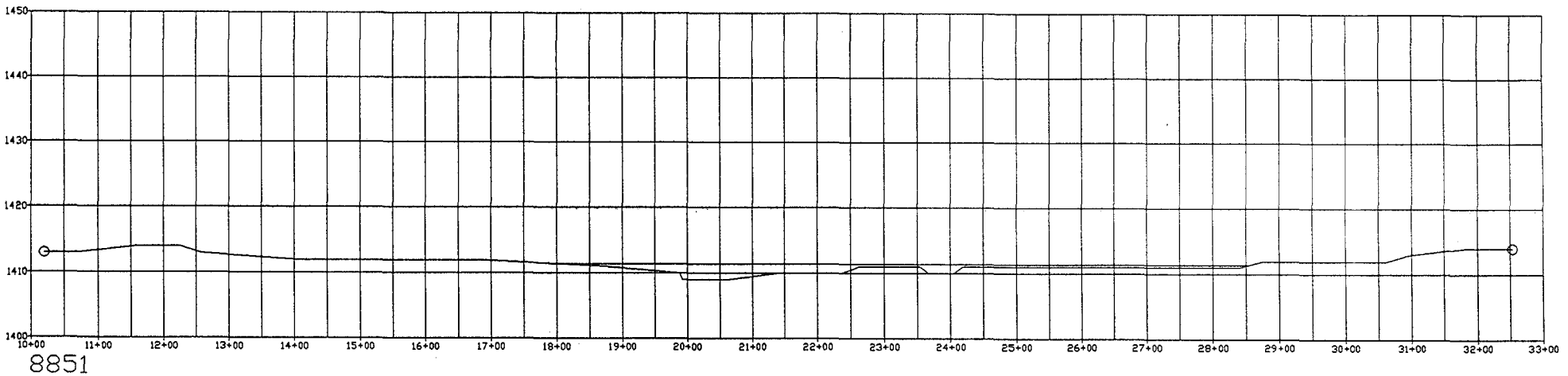
—— Computed Water Surface = 1410.67 ft



Profile 1

Flow Discharge = 2400.00 cfs

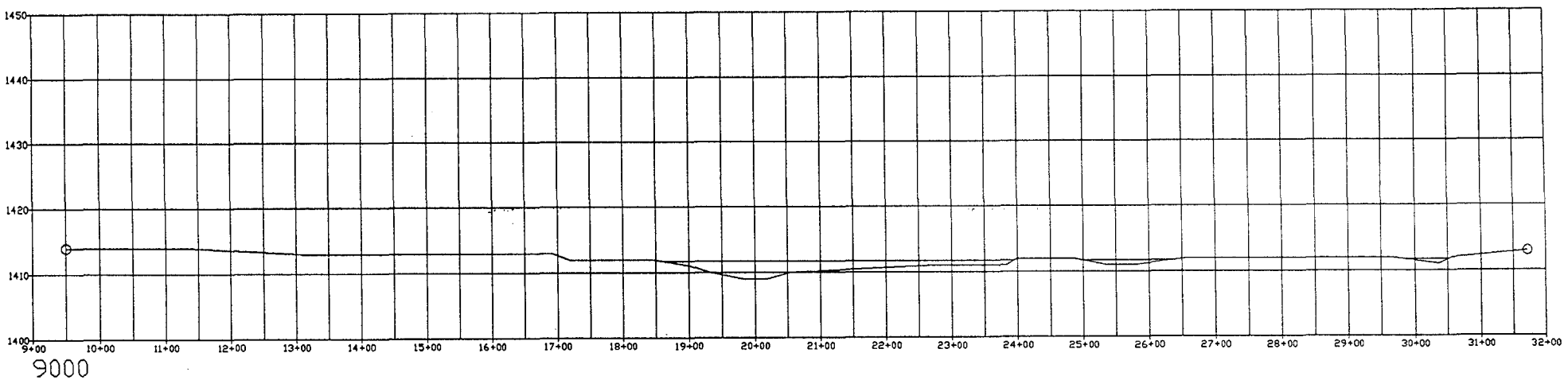
Computed Water Surface = 1411.42 ft



Profile 1

Flow Discharge = 2400.00 cfs

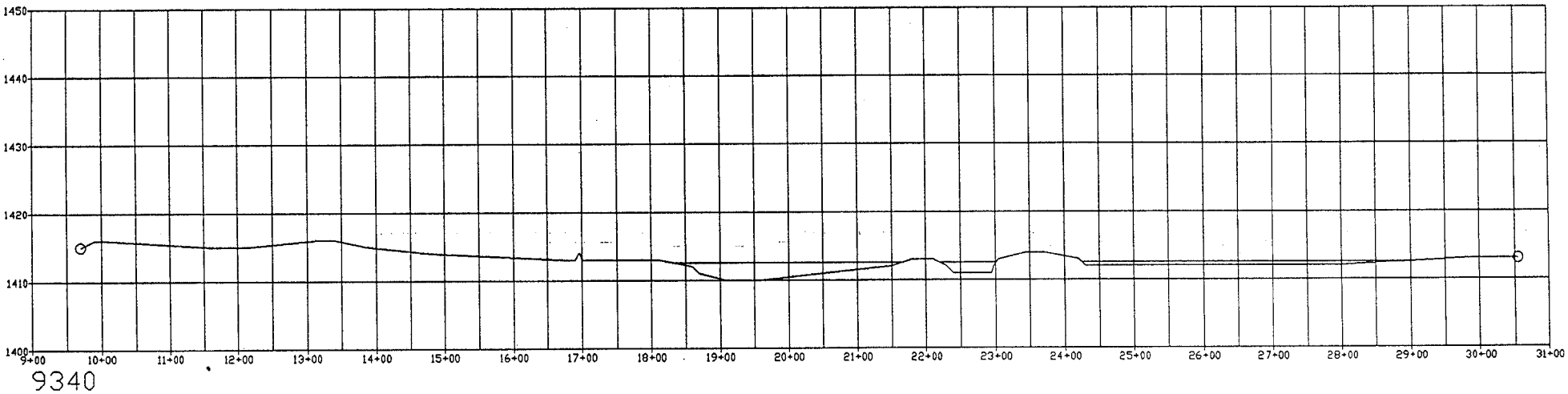
—— Computed Water Surface = 1411.43 ft



Profile 1

Flow Discharge = 2400.00 cfs

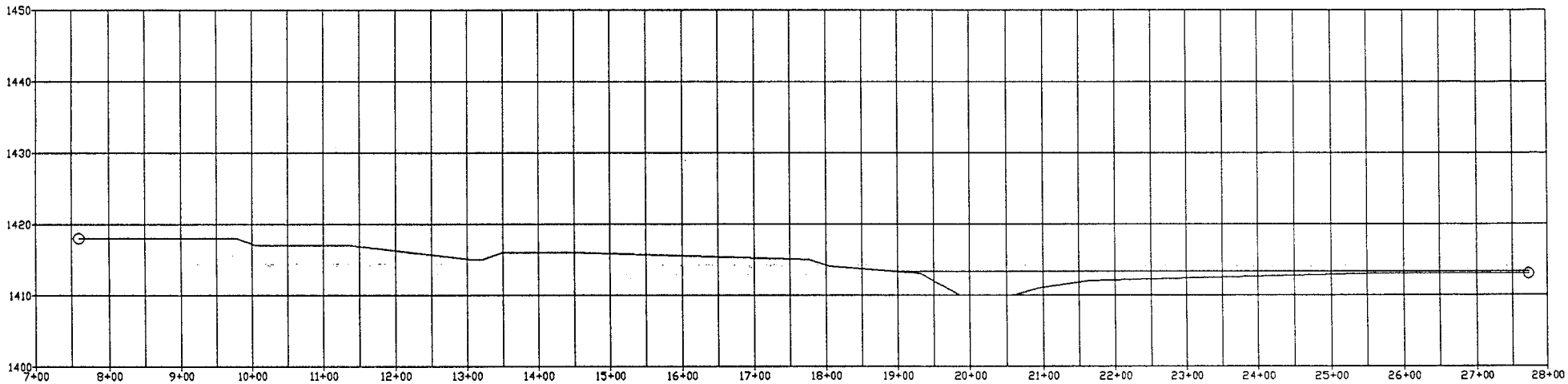
—— Computed Water Surface = 1411.76 ft



Profile 1

Flow Discharge = 2400.00 cfs

—— Computed Water Surface = 1412.55 ft

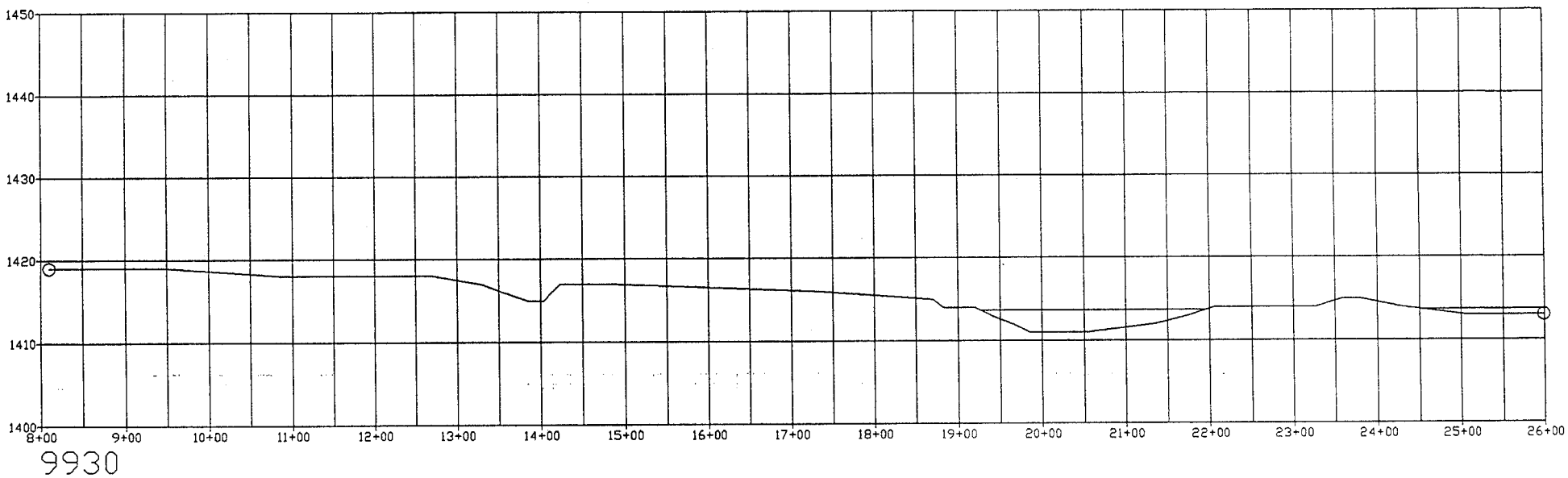


9731

Profile 1

Flow Discharge = 2400.00 cfs

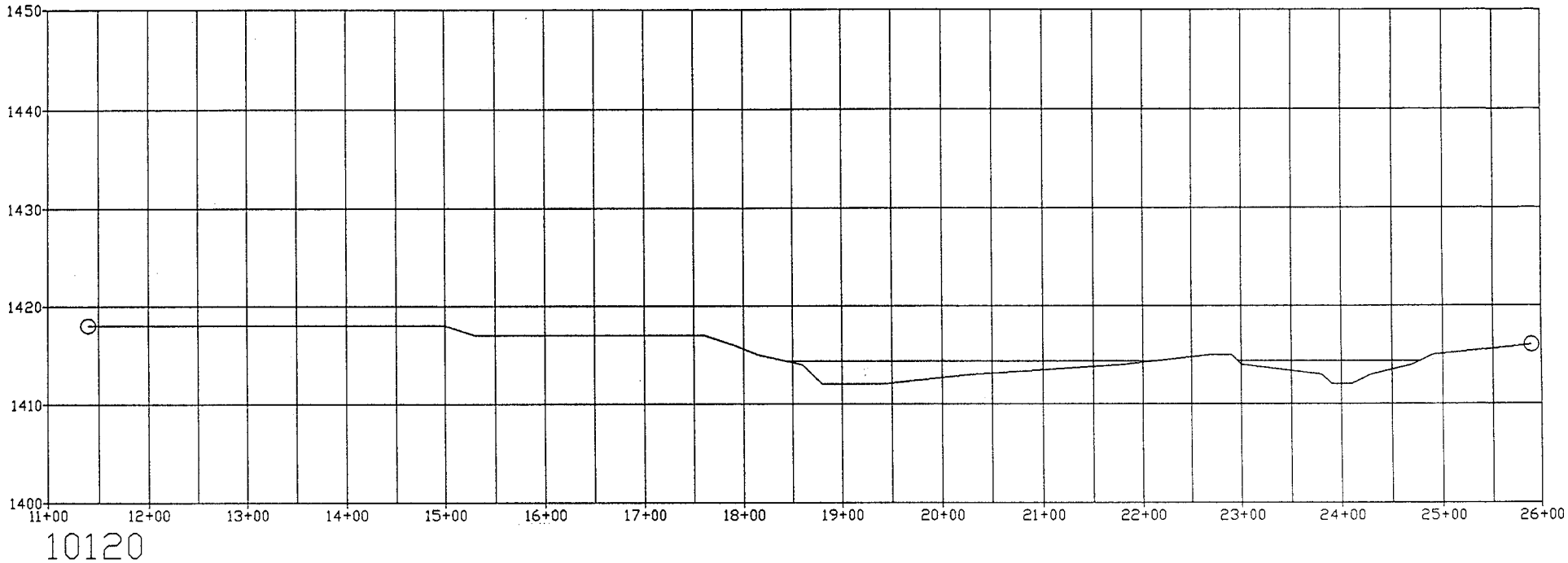
Computed Water Surface = 1413.31 ft



Profile 1

Flow Discharge = 2400.00 cfs

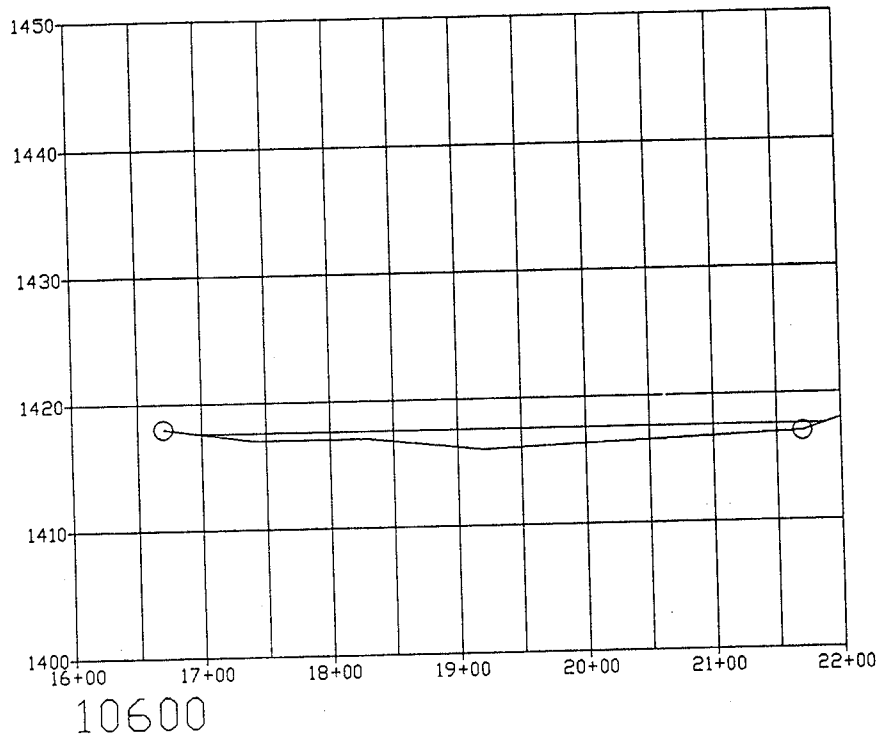
Computed Water Surface = 1413.66 ft



Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1414.34 ft



Profile 1

Flow Discharge = 2400.00 cfs

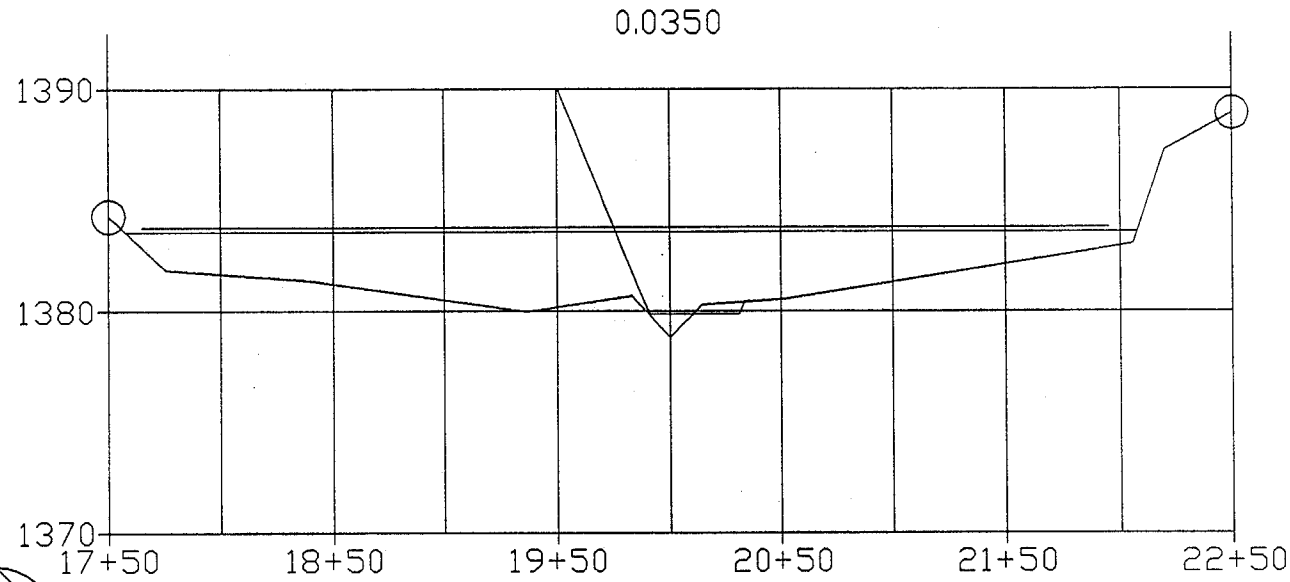
—— Computed Water Surface = 1417.58 ft

APPENDIX E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

CROSS-SECTION PLOTS

PROPOSED CONDITIONS

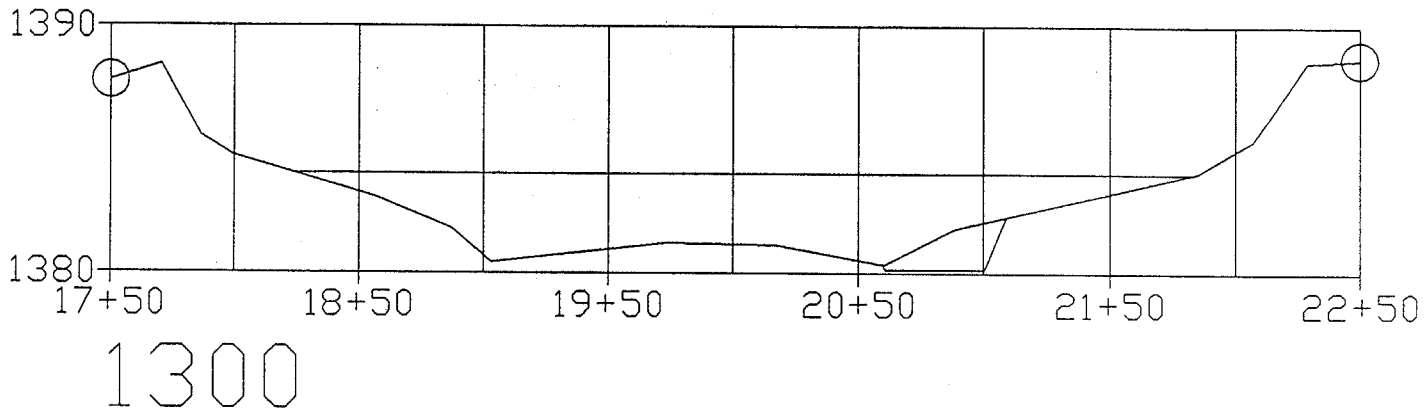


1

1140

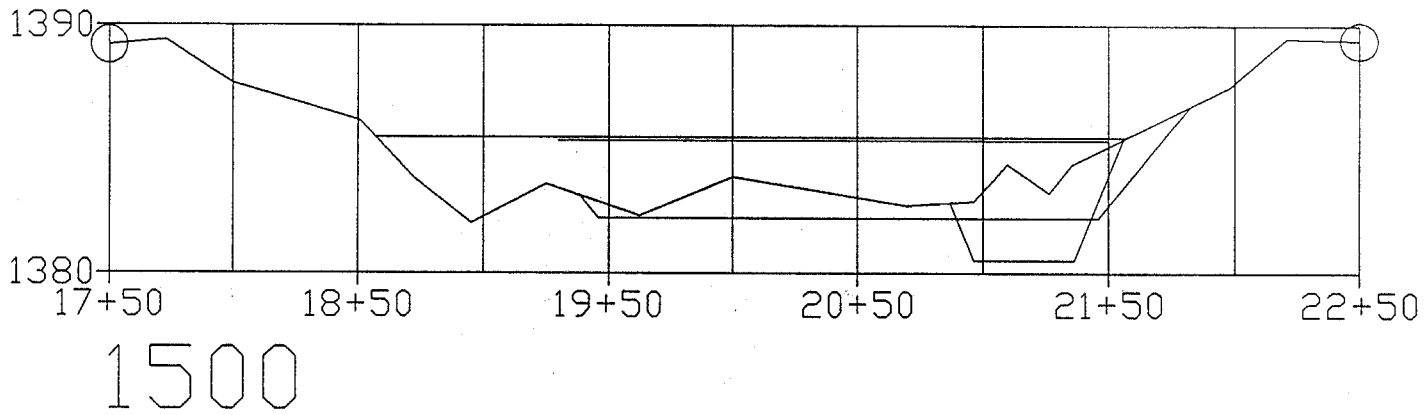
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1383.60 ft

Profile 2
—— Computed Water Surface = 1383.80 ft



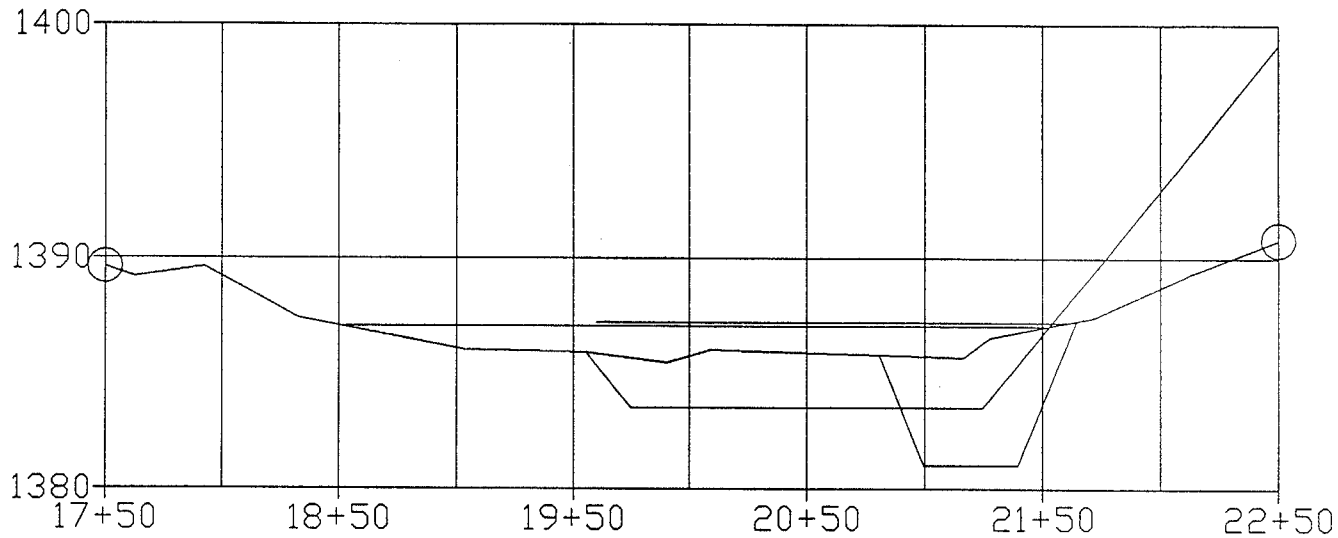
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1384.02 ft

Profile 2
—— Computed Water Surface = 1384.02 ft



Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1385.48 ft

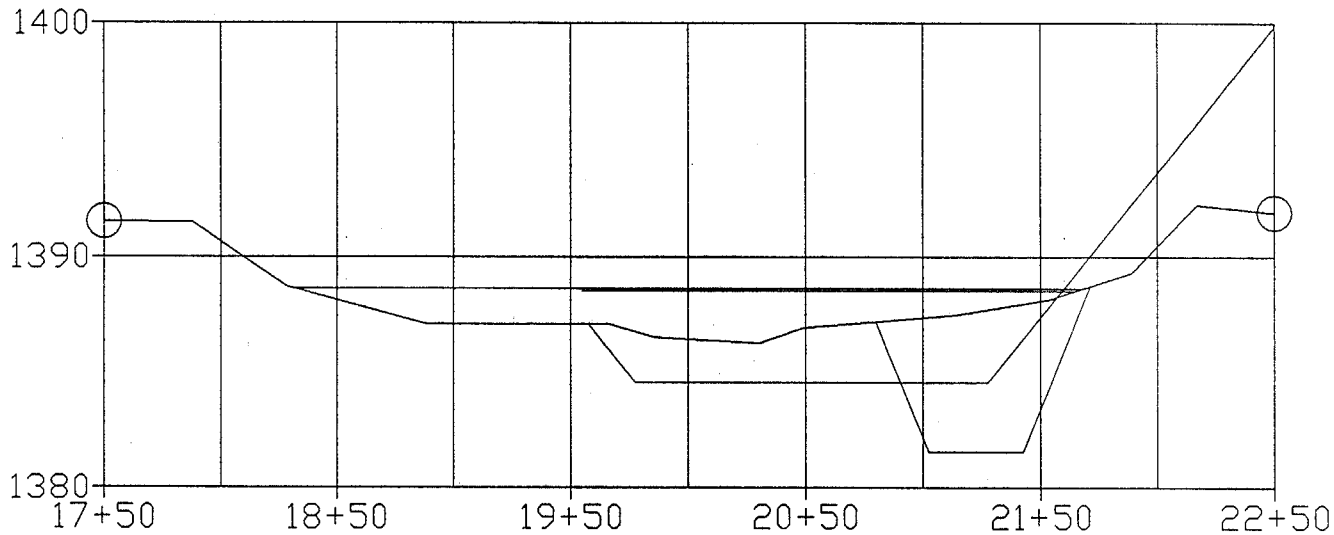
Profile 2
—— Computed Water Surface = 1385.37 ft



1800

Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1387.00 ft

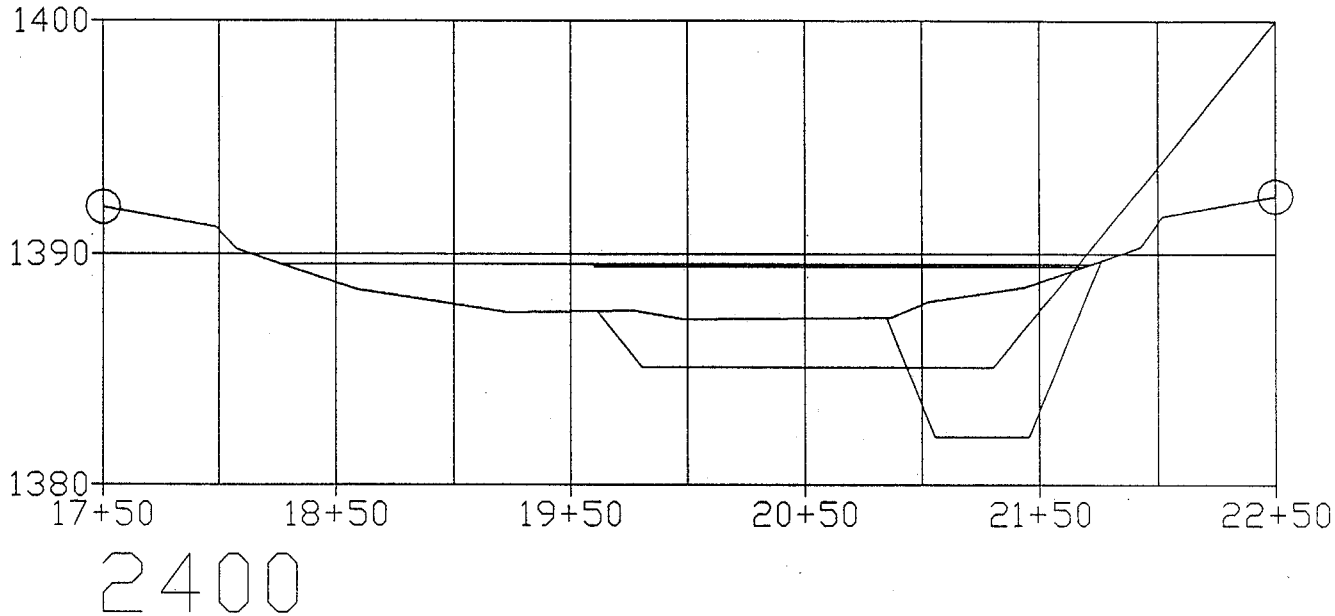
Profile 2
—— Computed Water Surface = 1387.17 ft



2100

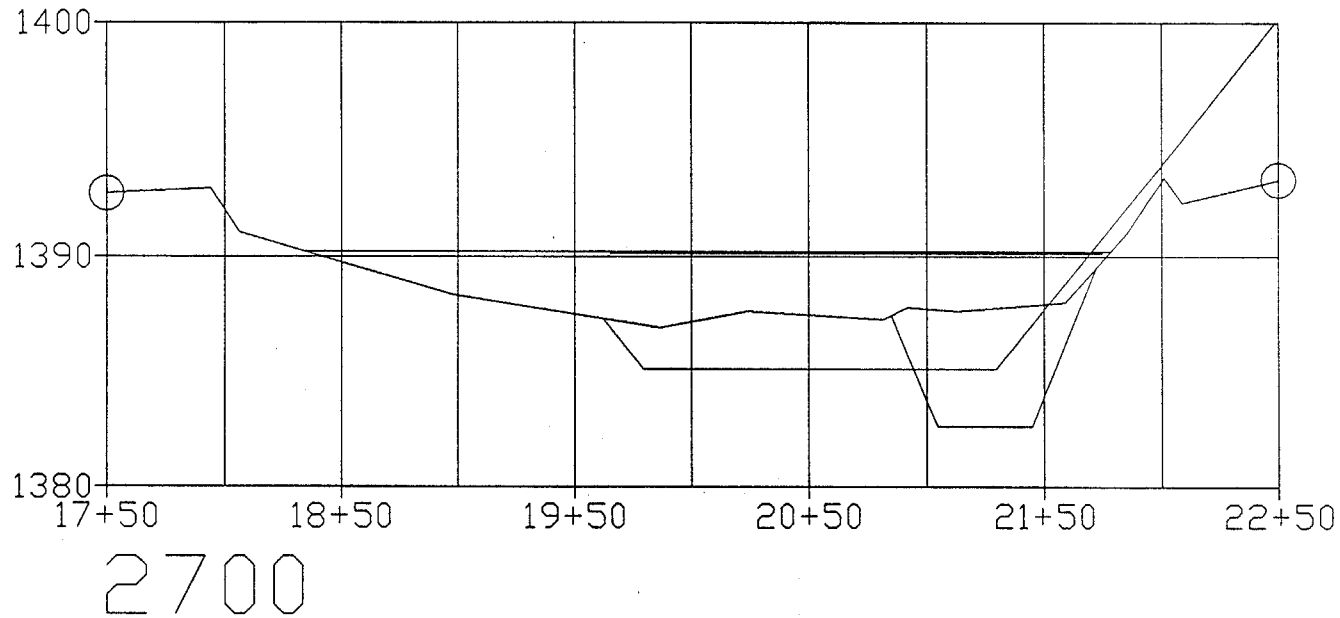
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1388.62 ft

Profile 2
—— Computed Water Surface = 1388.49 ft



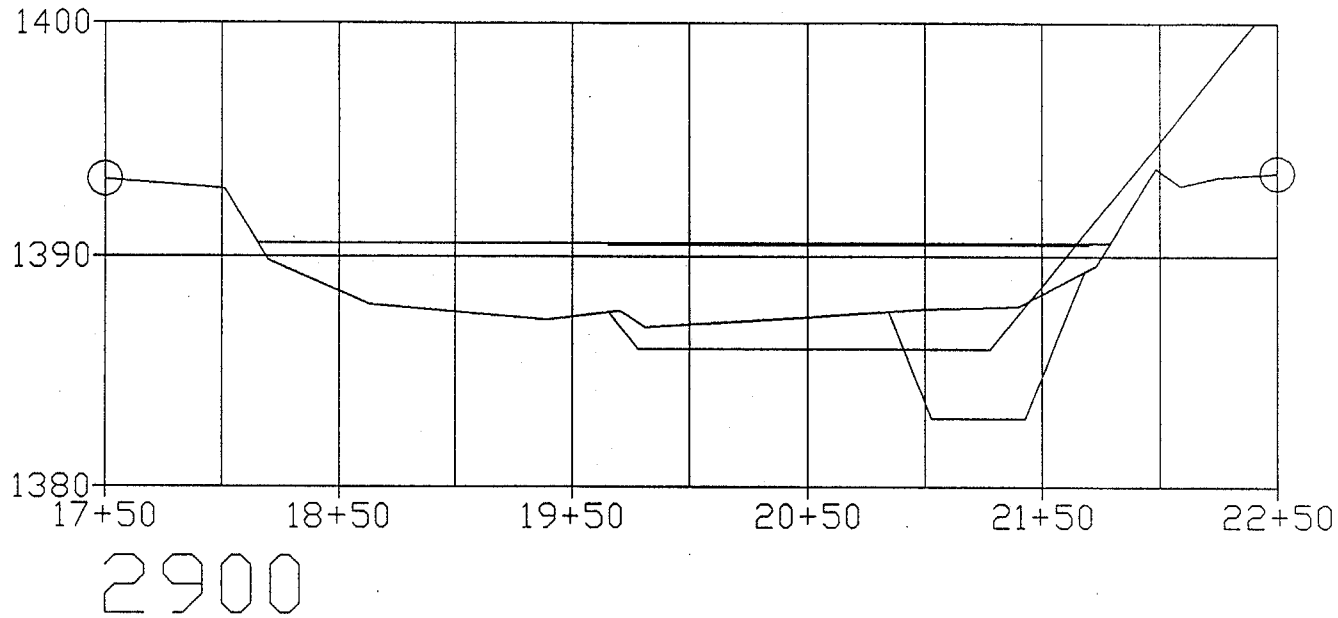
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1389.54 ft

Profile 2
—— Computed Water Surface = 1389.43 ft



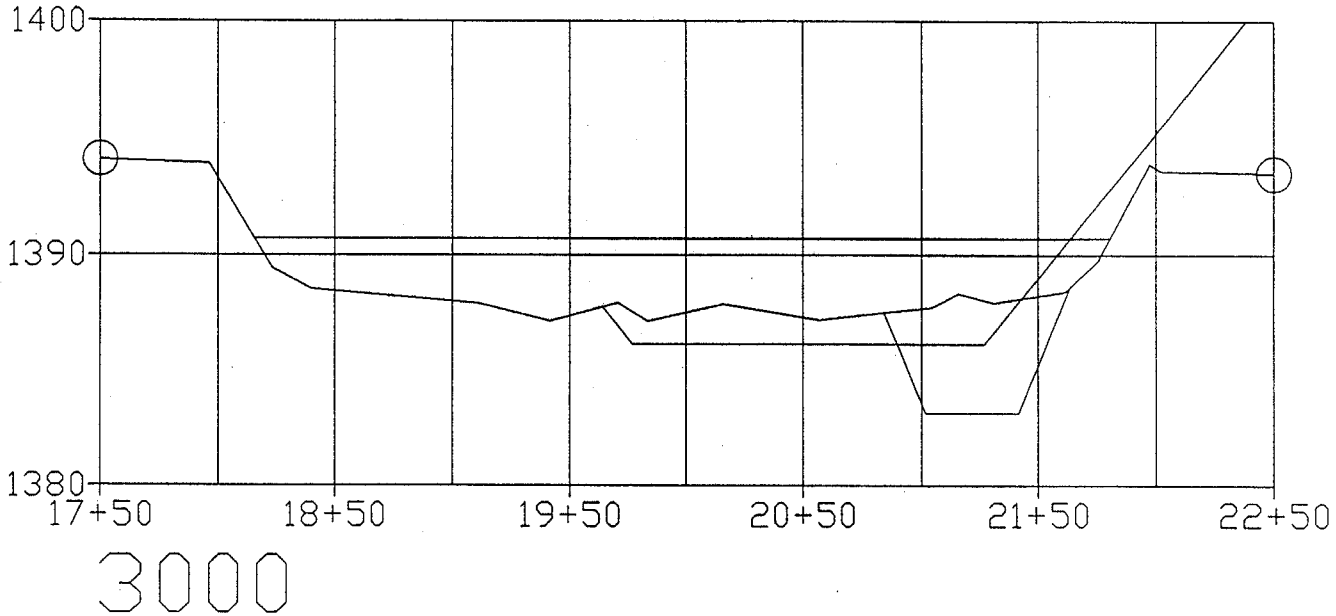
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1390.20 ft

Profile 2
—— Computed Water Surface = 1390.13 ft



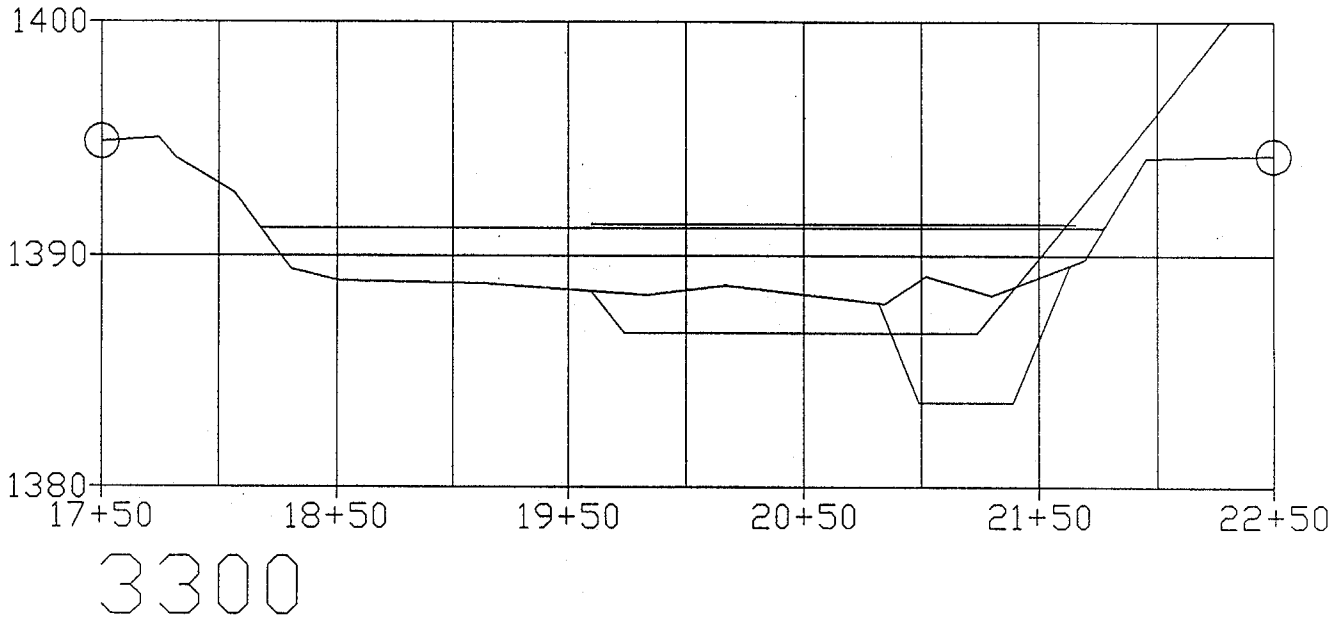
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1390.56 ft

Profile 2
—— Computed Water Surface = 1390.47 ft



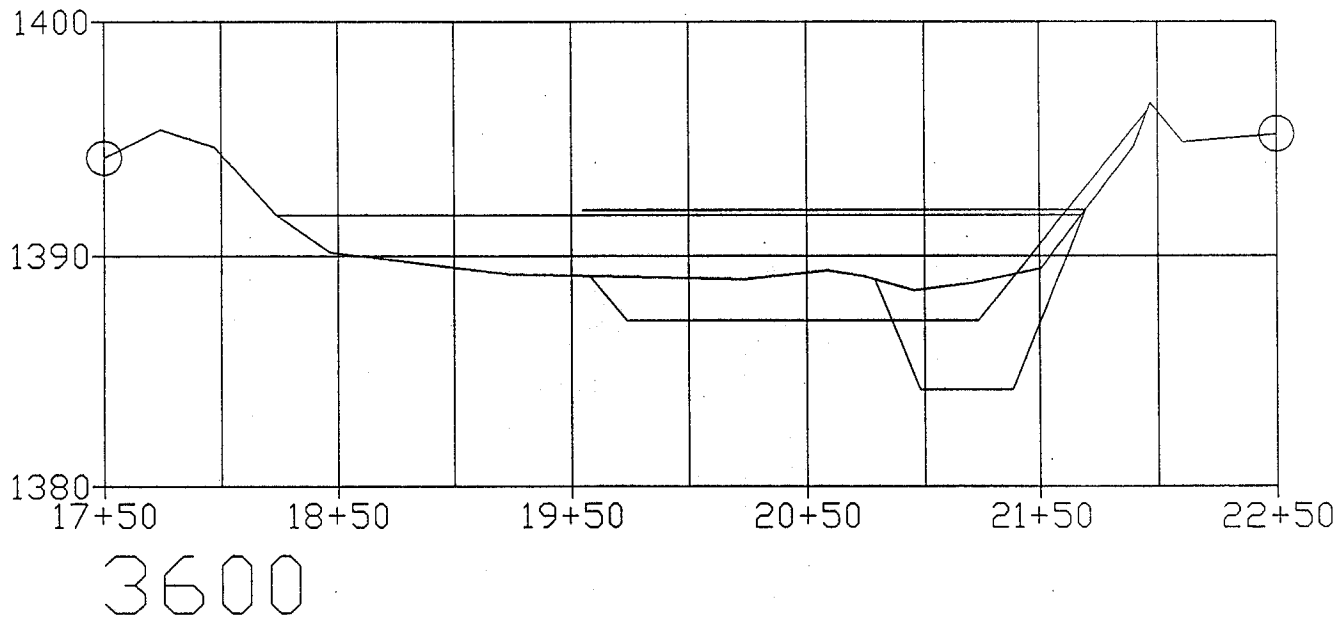
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1390.71 ft

Profile 2
—— Computed Water Surface = 1390.68 ft



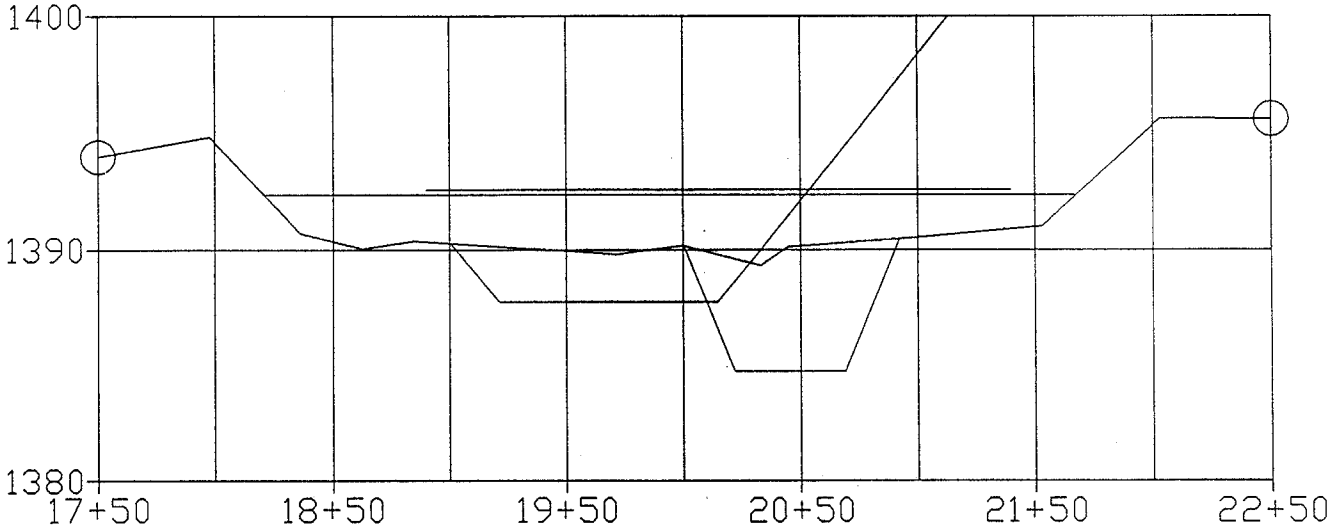
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1391.17 ft

Profile 2
—— Computed Water Surface = 1391.32 ft



Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1391.71 ft

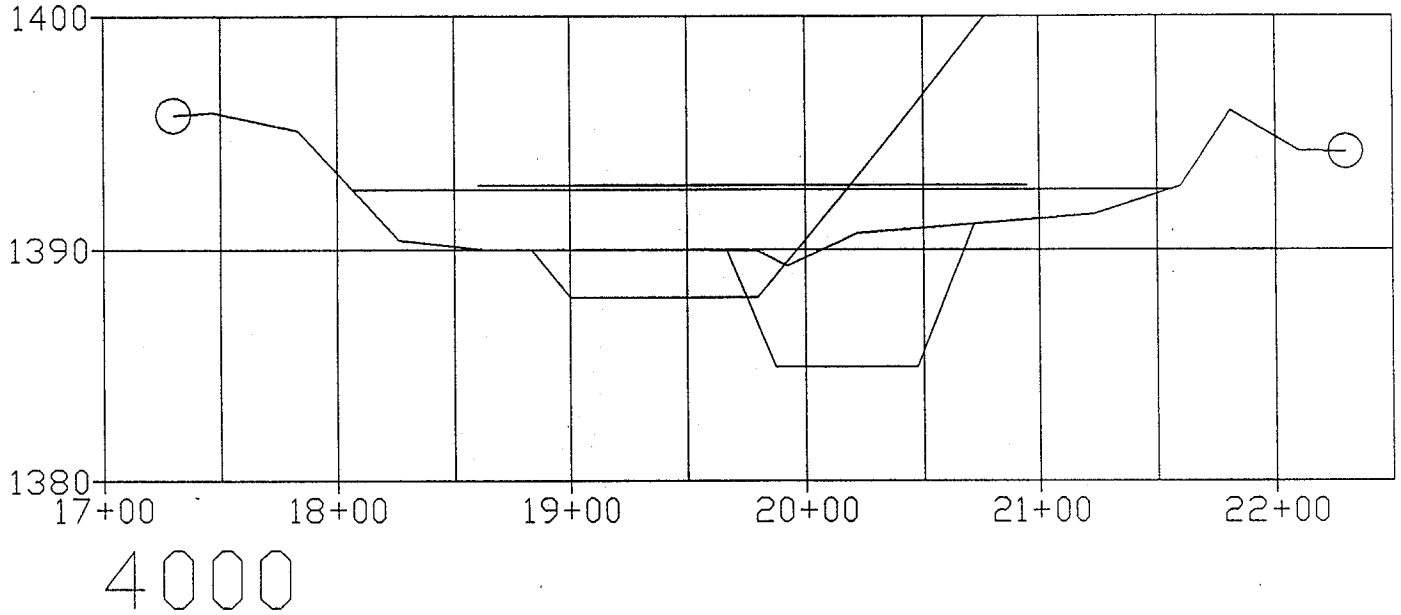
Profile 2
—— Computed Water Surface = 1391.93 ft



3900

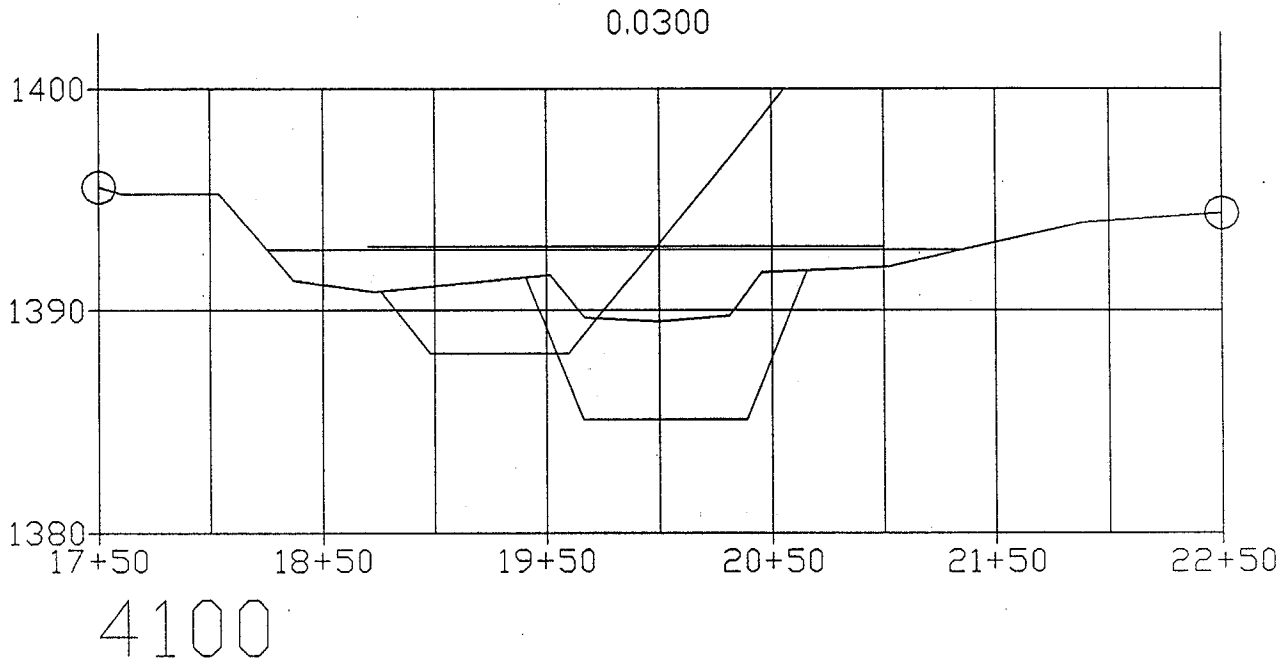
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1392.34 ft

Profile 2
—— Computed Water Surface = 1392.57 ft



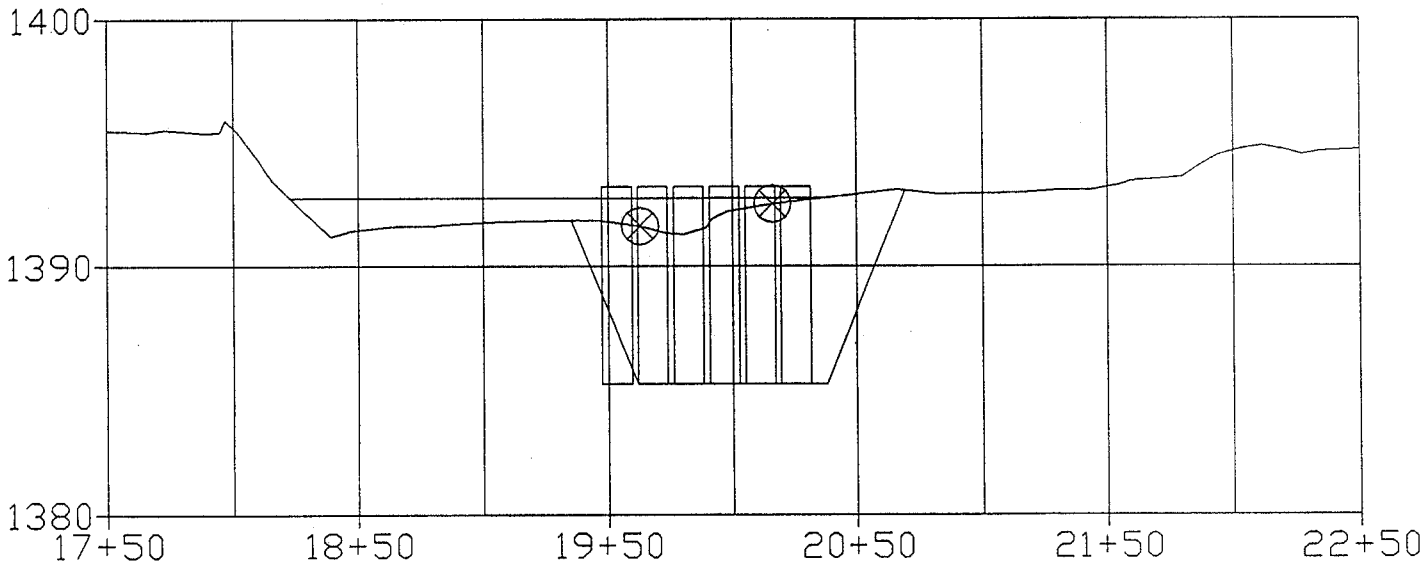
Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1392.58 ft

Profile 2
—— Computed Water Surface = 1392.76 ft

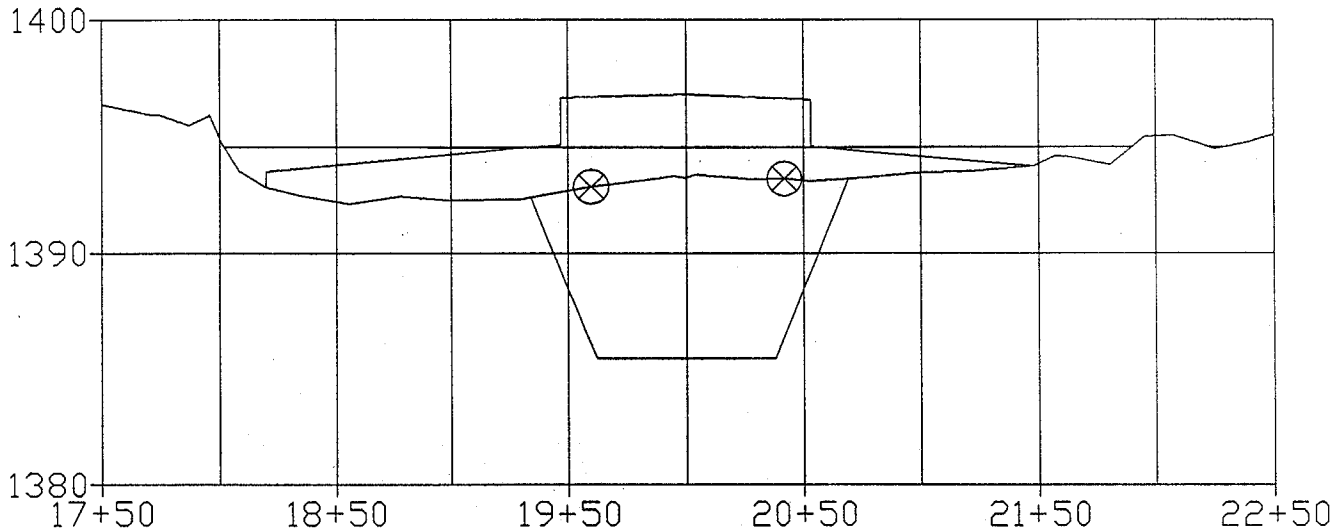


Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1392.75 ft

Profile 2
—— Computed Water Surface = 1392.91 ft



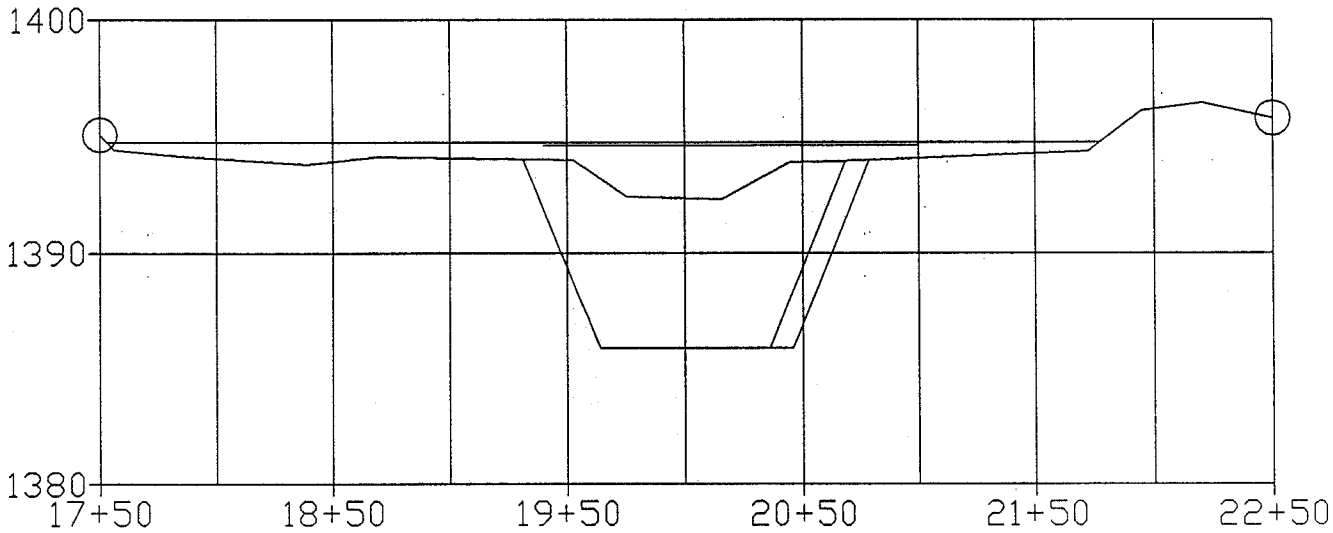
4190



4256

Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1394.58 ft

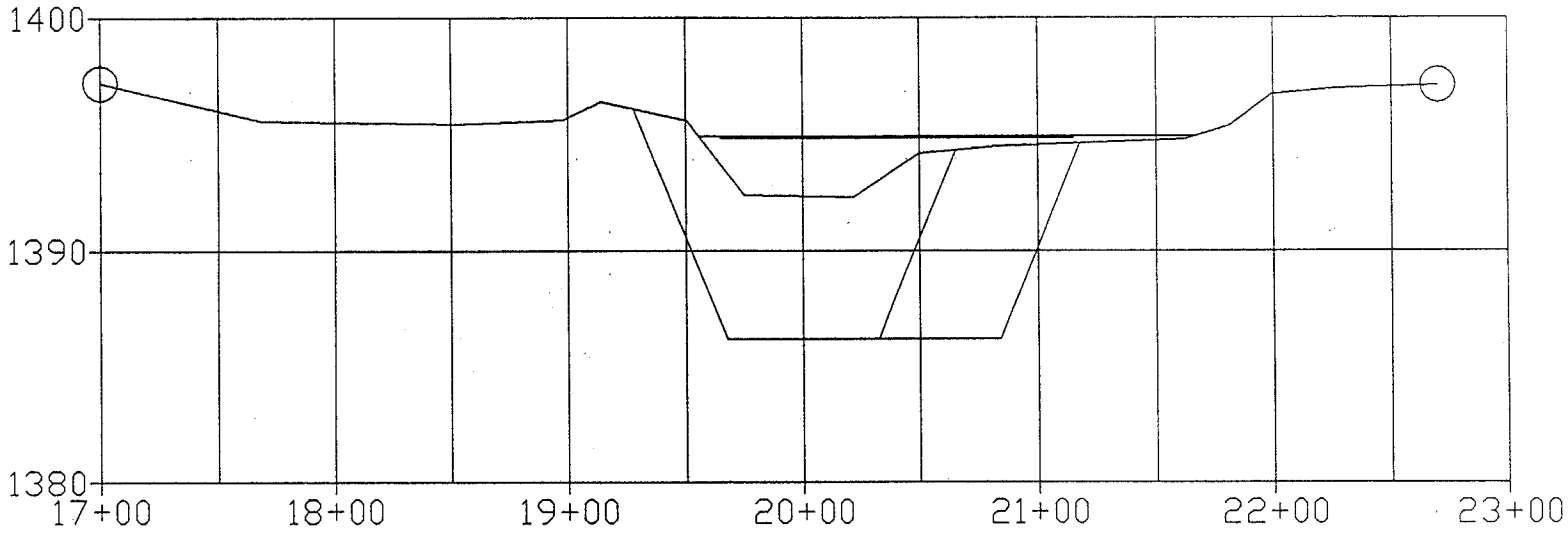
Profile 2
—— Computed Water Surface = 1394.55 ft



4400

Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1394.77 ft

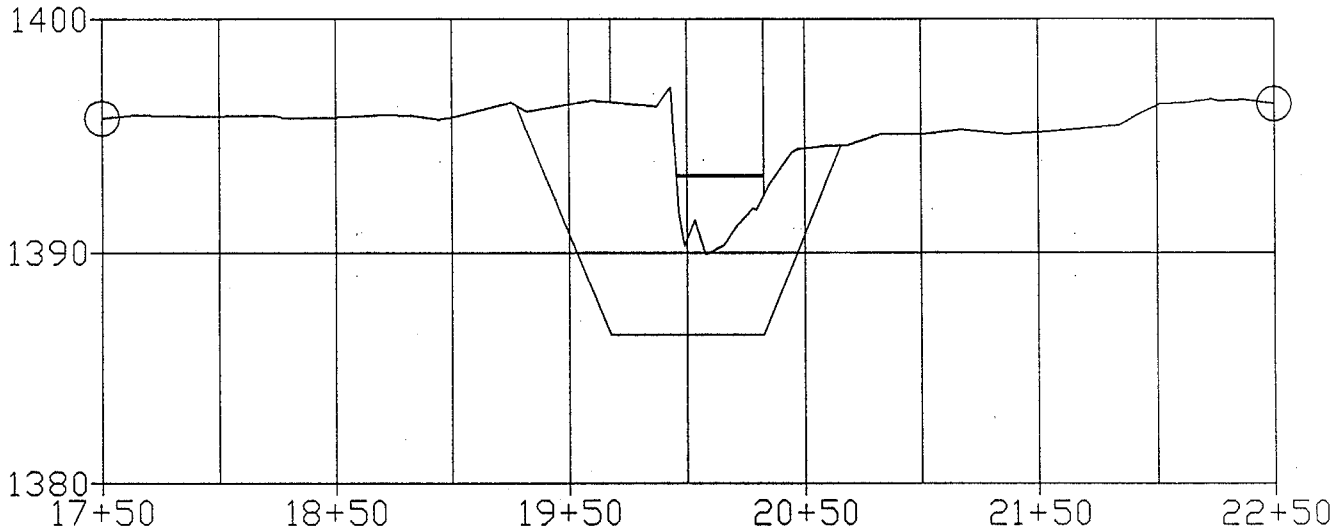
Profile 2
—— Computed Water Surface = 1394.64 ft



4500

Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1394.93 ft

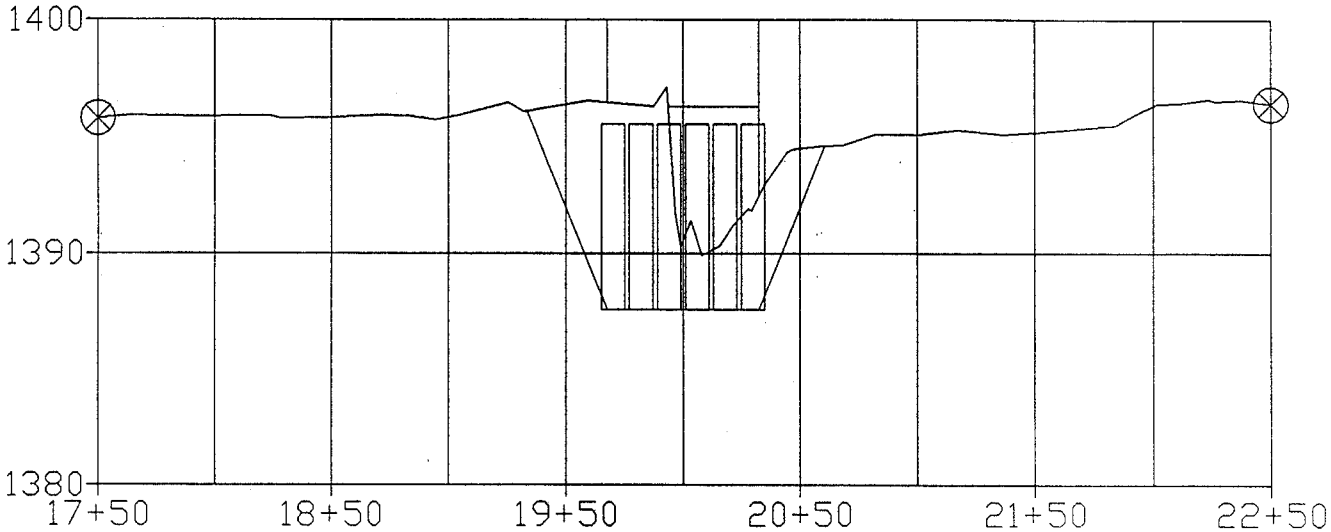
Profile 2
—— Computed Water Surface = 1394.85 ft



4573

Profile 1
Flow Discharge = 6000.00 cfs
—— Computed Water Surface = 1393.33 ft

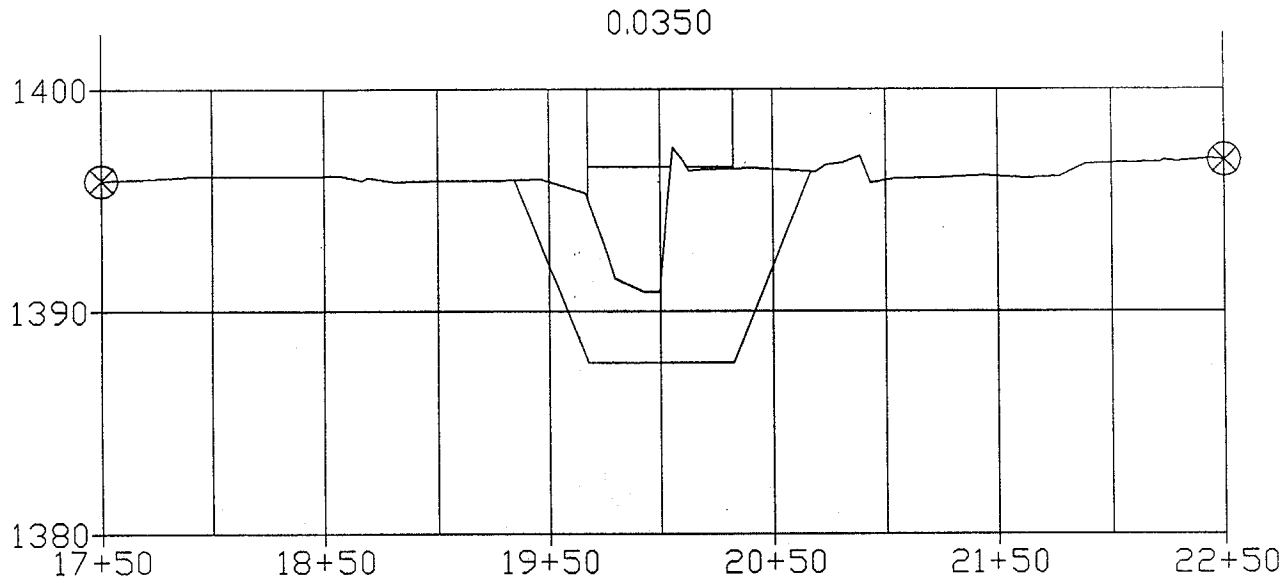
Profile 2
—— Computed Water Surface = 1393.27 ft



4574

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.29 ft

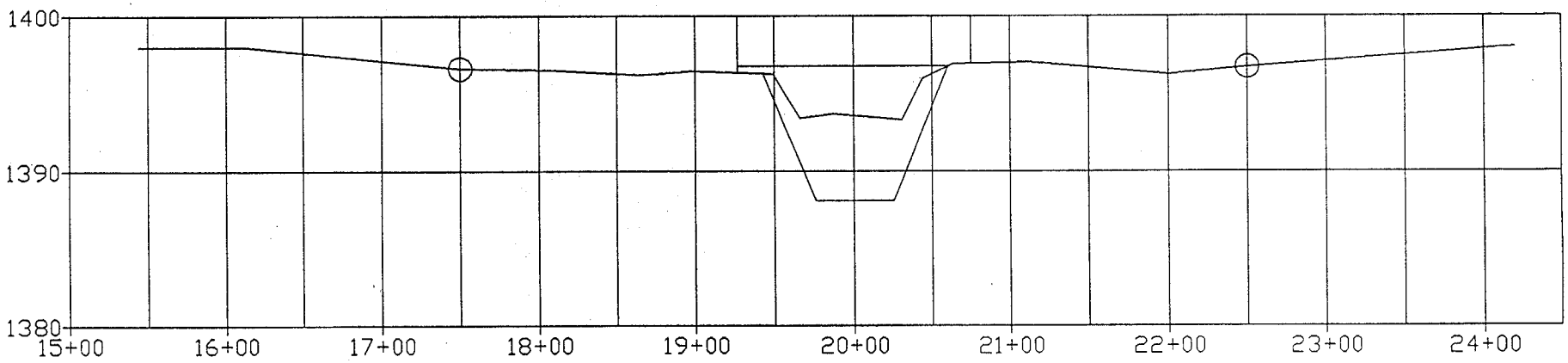
Profile 2
—— Computed Water Surface = 1396.28 ft



4646

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.53 ft

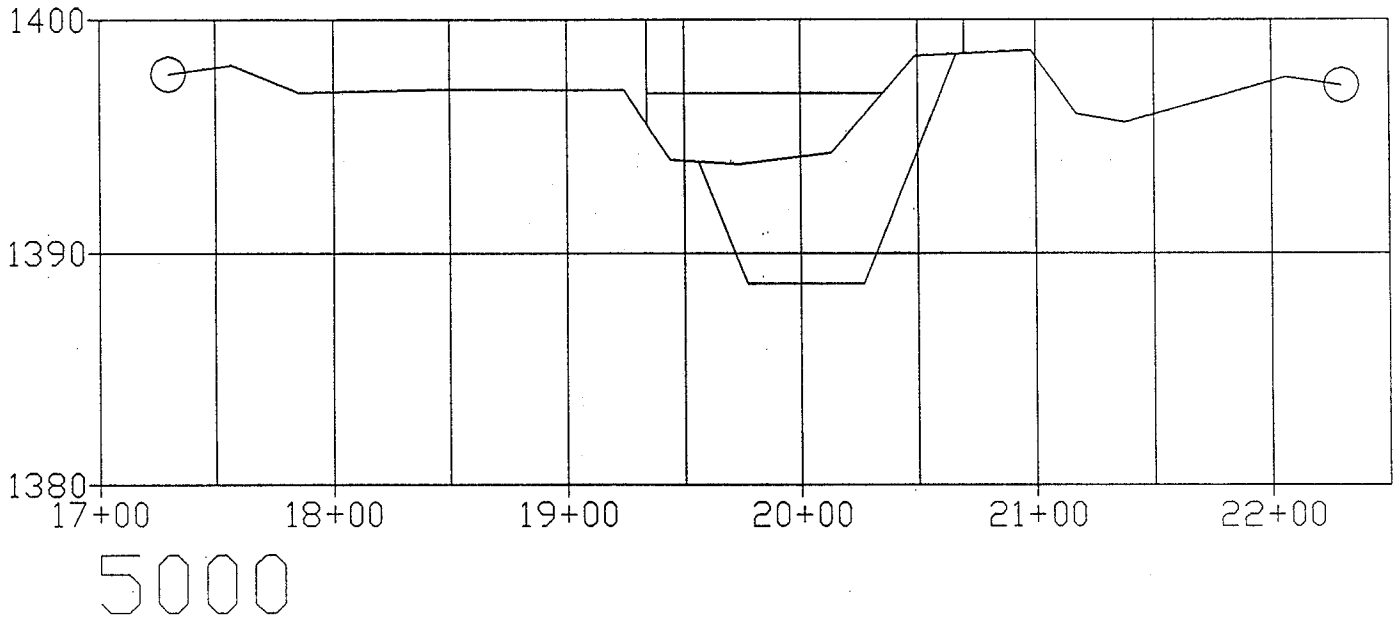
Profile 2
—— Computed Water Surface = 1396.53 ft



4800

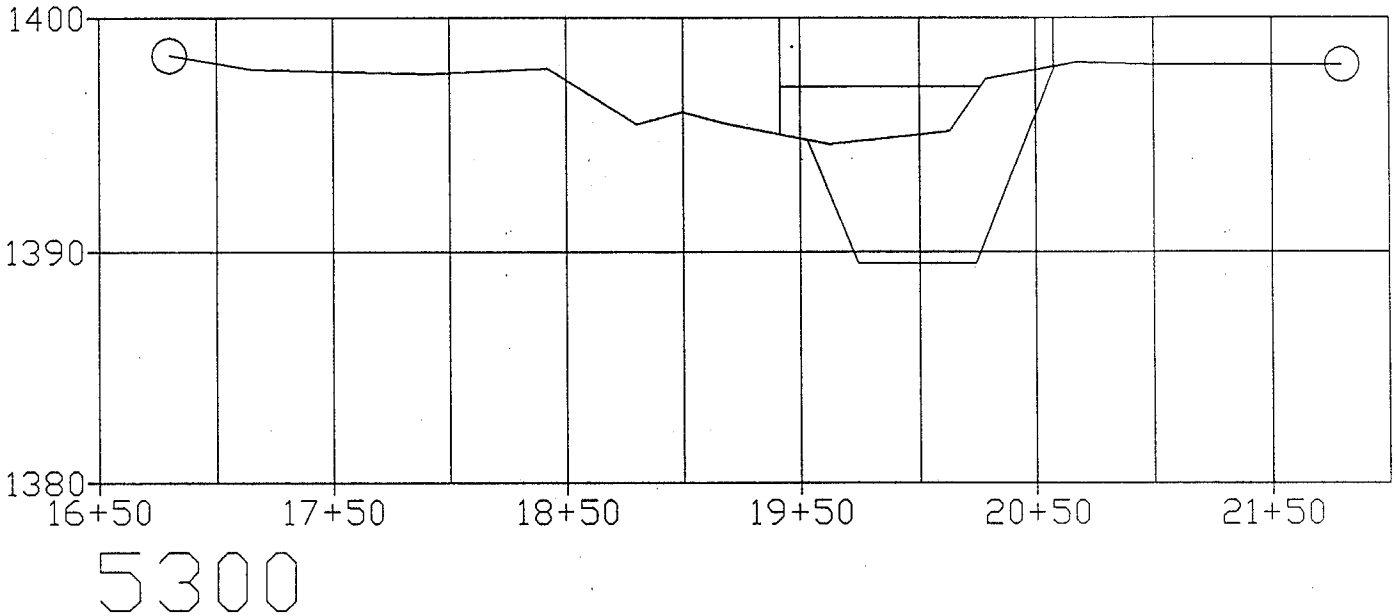
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.75 ft

Profile 2
—— Computed Water Surface = 1396.74 ft



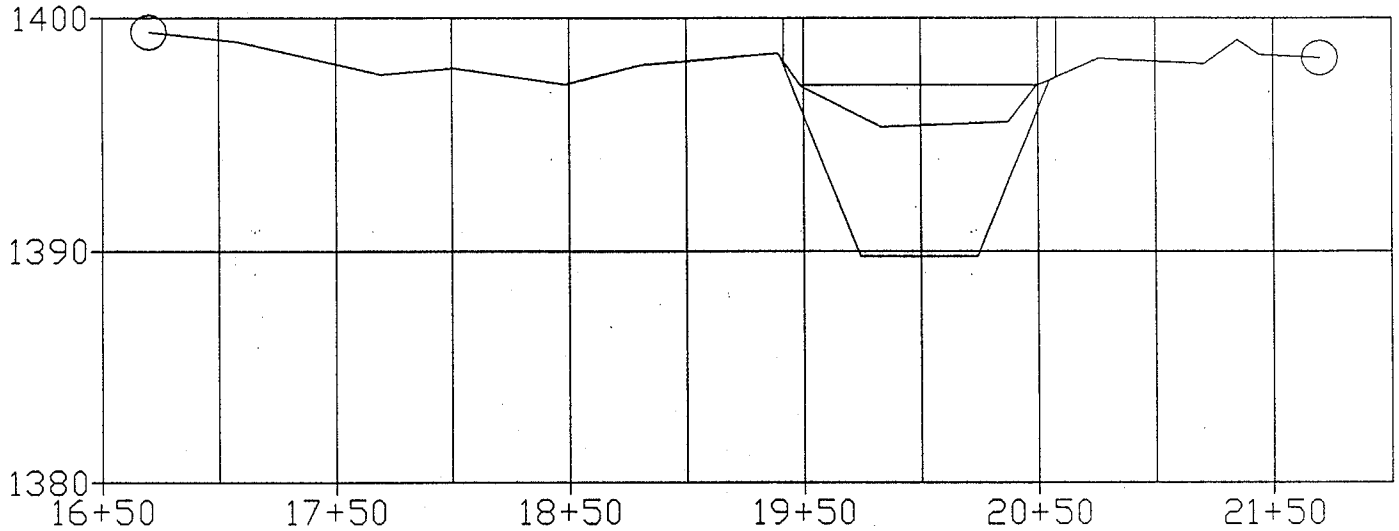
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1396.87 ft

Profile 2
—— Computed Water Surface = 1396.86 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1397.05 ft

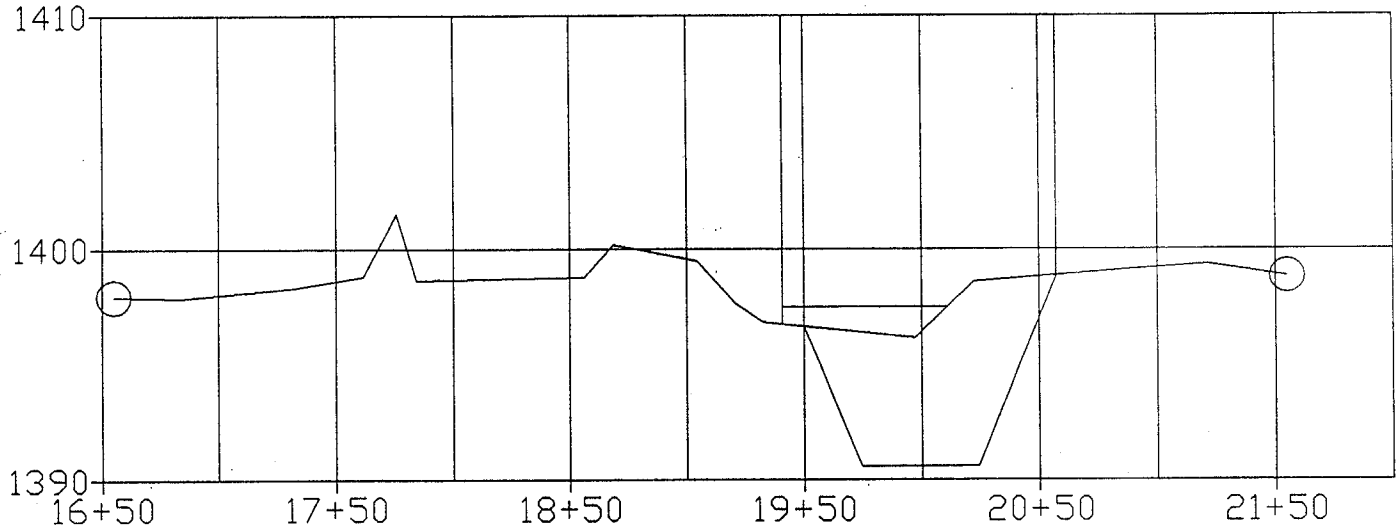
Profile 2
—— Computed Water Surface = 1397.05 ft



5400

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1397.13 ft

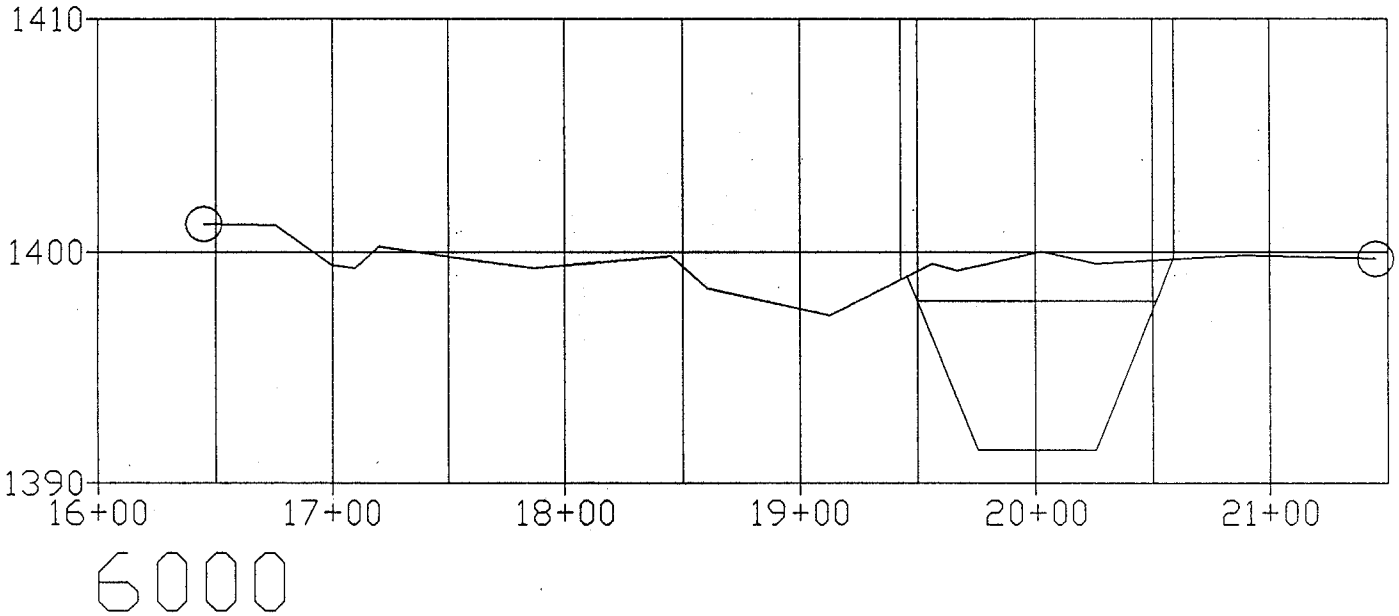
Profile 2
—— Computed Water Surface = 1397.13 ft



5700

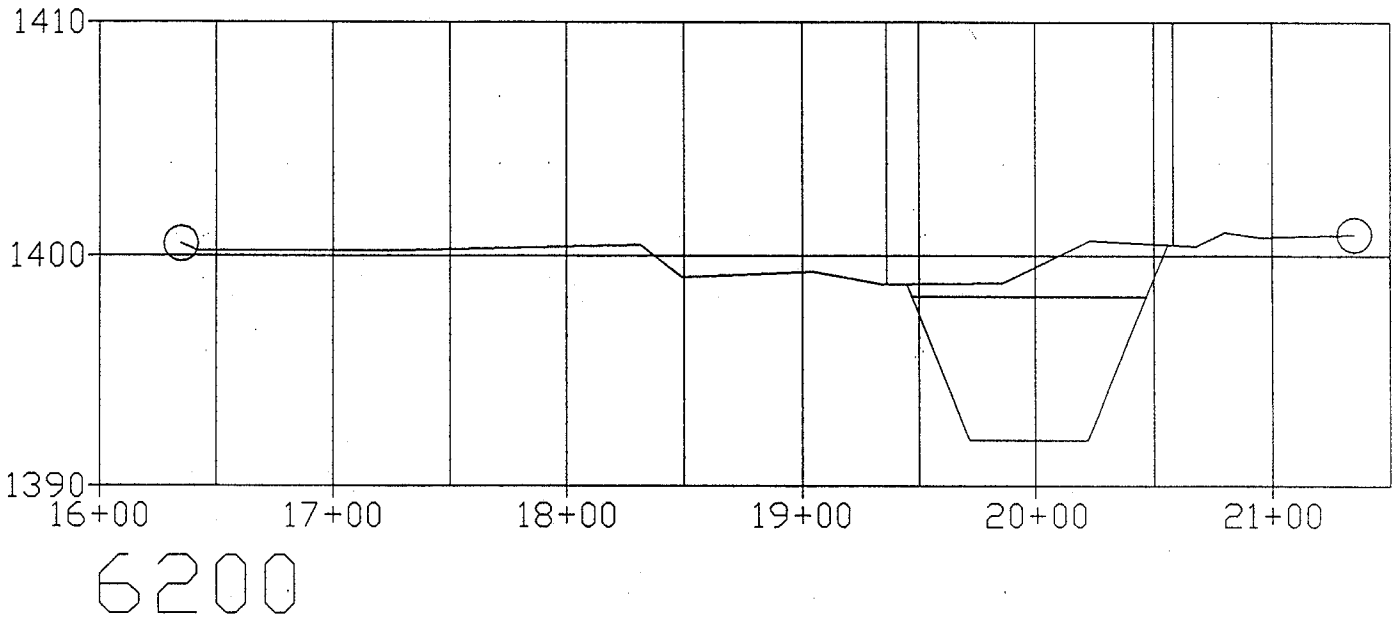
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1397.45 ft

Profile 2
—— Computed Water Surface = 1397.45 ft



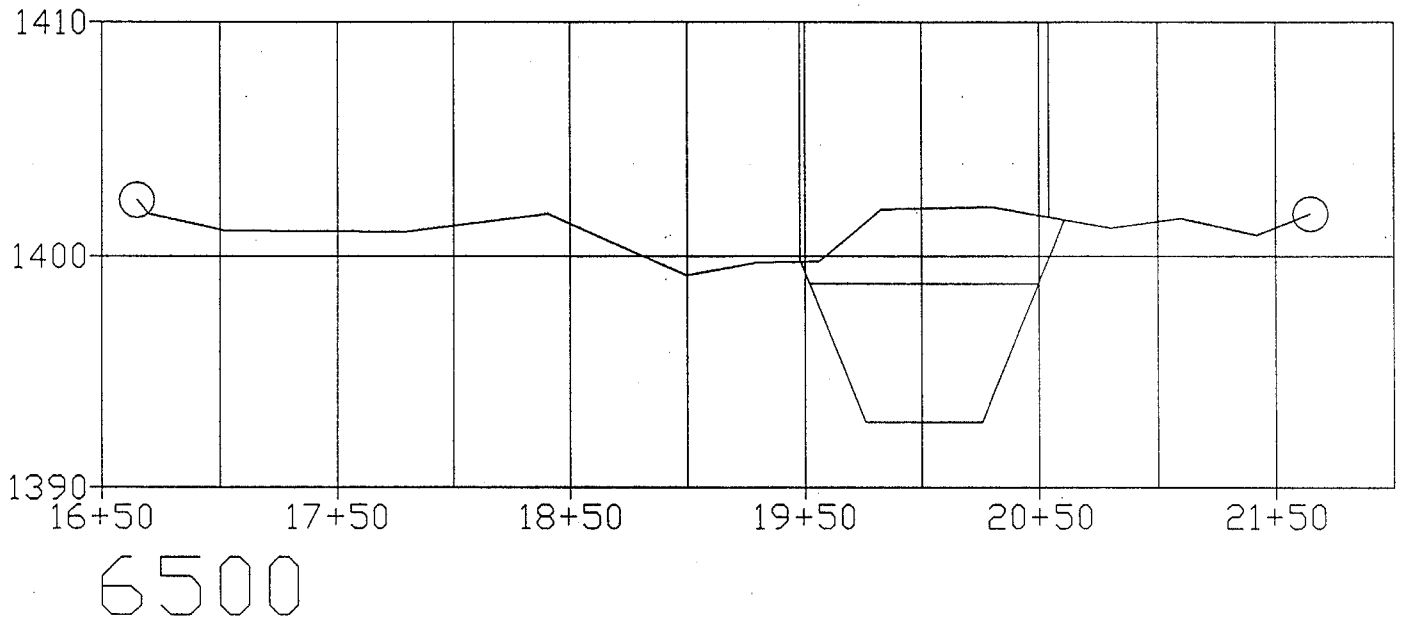
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1397.87 ft

Profile 2
—— Computed Water Surface = 1397.87 ft



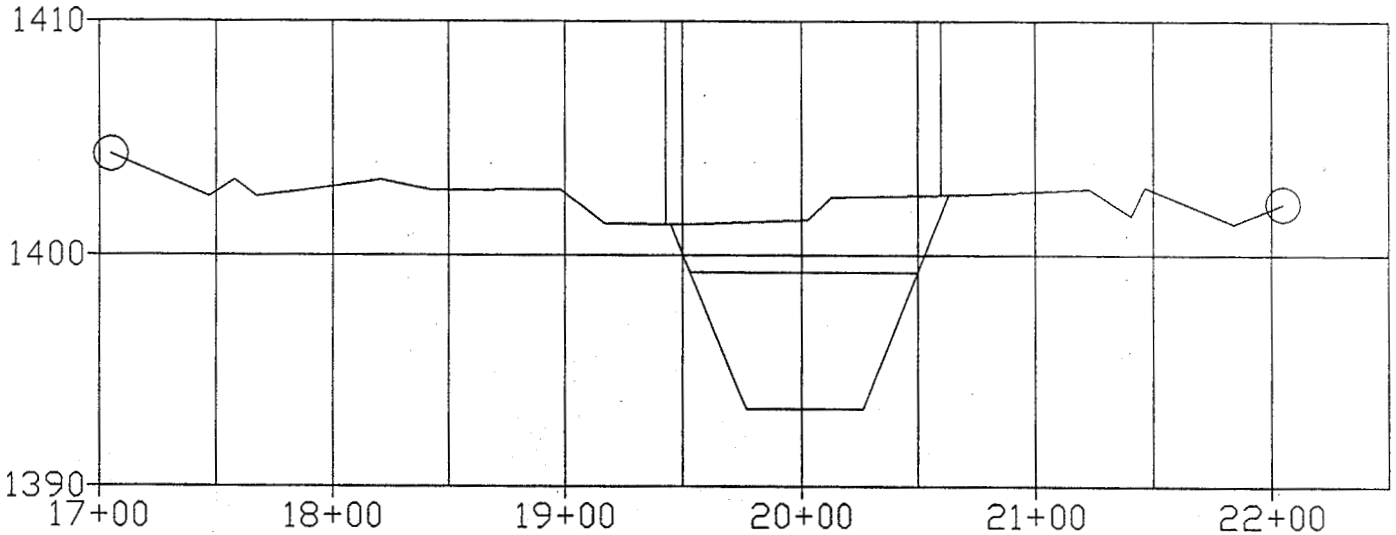
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1398.21 ft

Profile 2
—— Computed Water Surface = 1398.21 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1398.81 ft

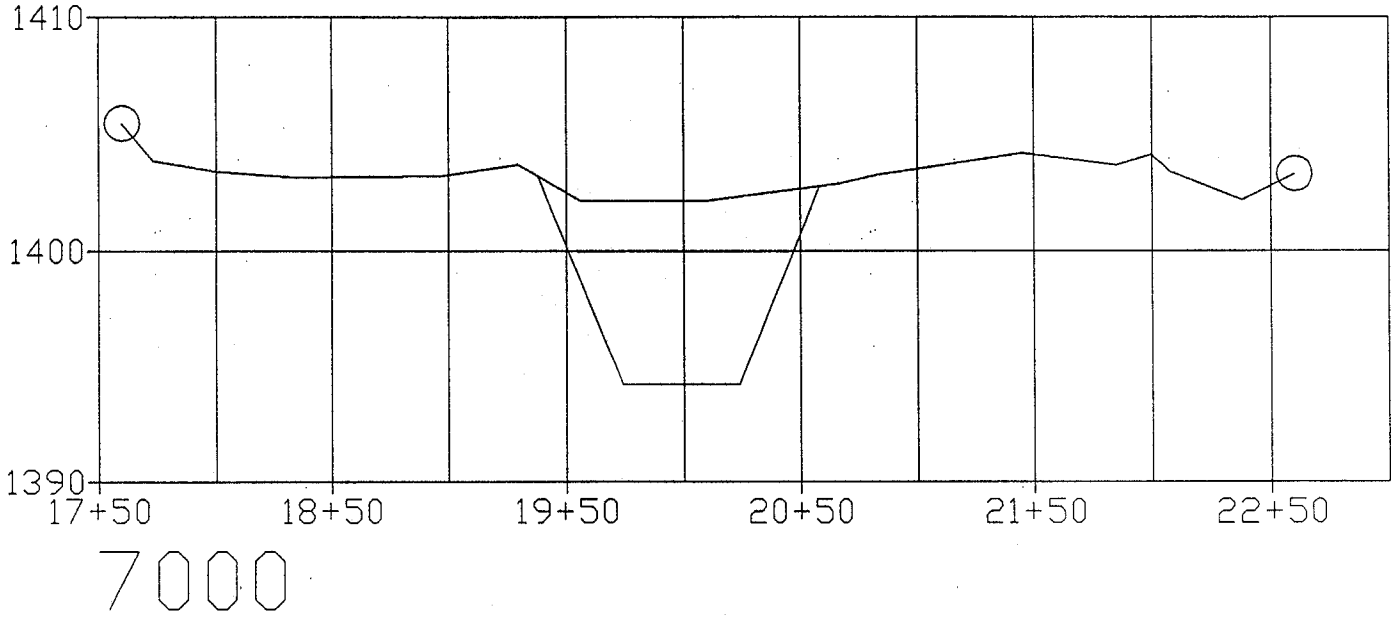
Profile 2
—— Computed Water Surface = 1398.81 ft



6700

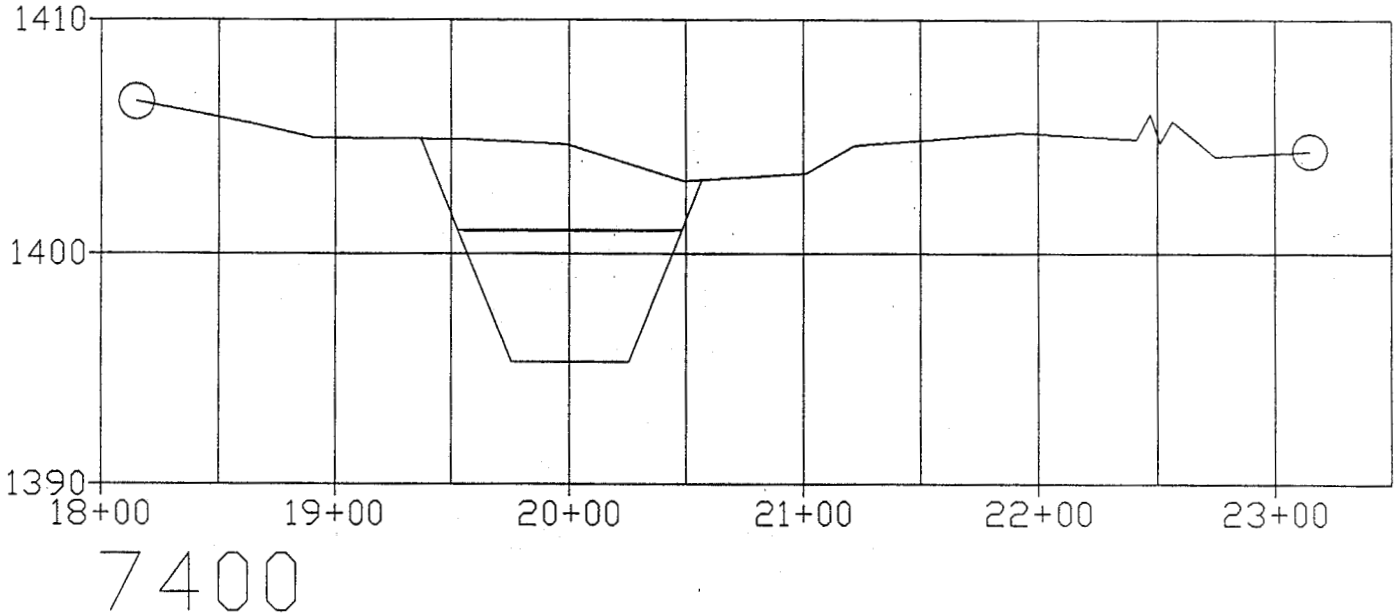
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.26 ft

Profile 2
—— Computed Water Surface = 1399.25 ft



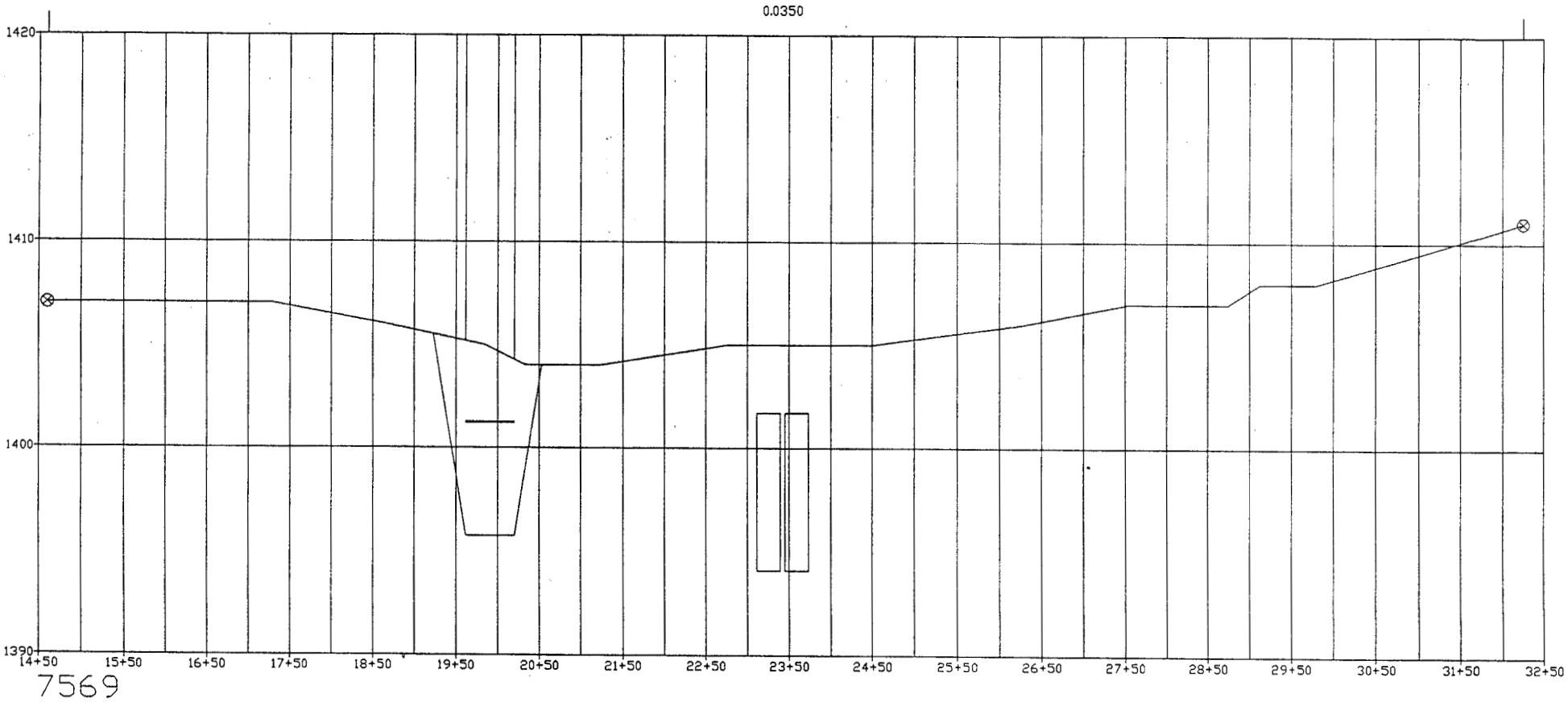
Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1399.97 ft

Profile 2
—— Computed Water Surface = 1399.95 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1400.99 ft

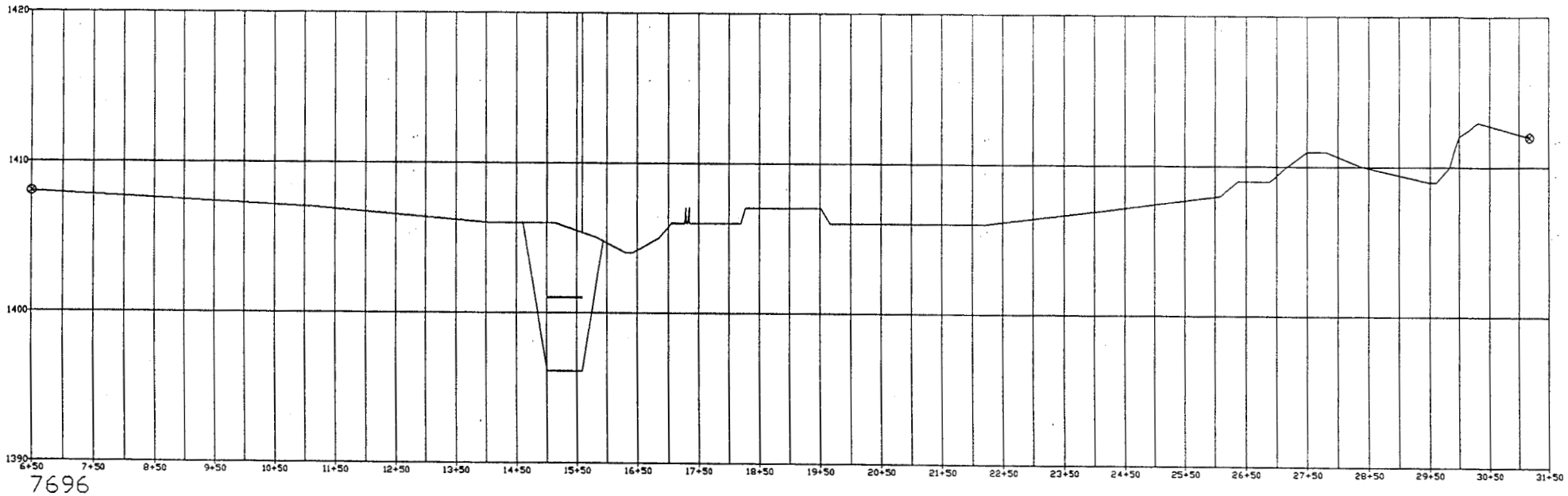
Profile 2
—— Computed Water Surface = 1400.95 ft



7569

Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1401.27 ft

Profile 2
—— Computed Water Surface = 1401.23 ft



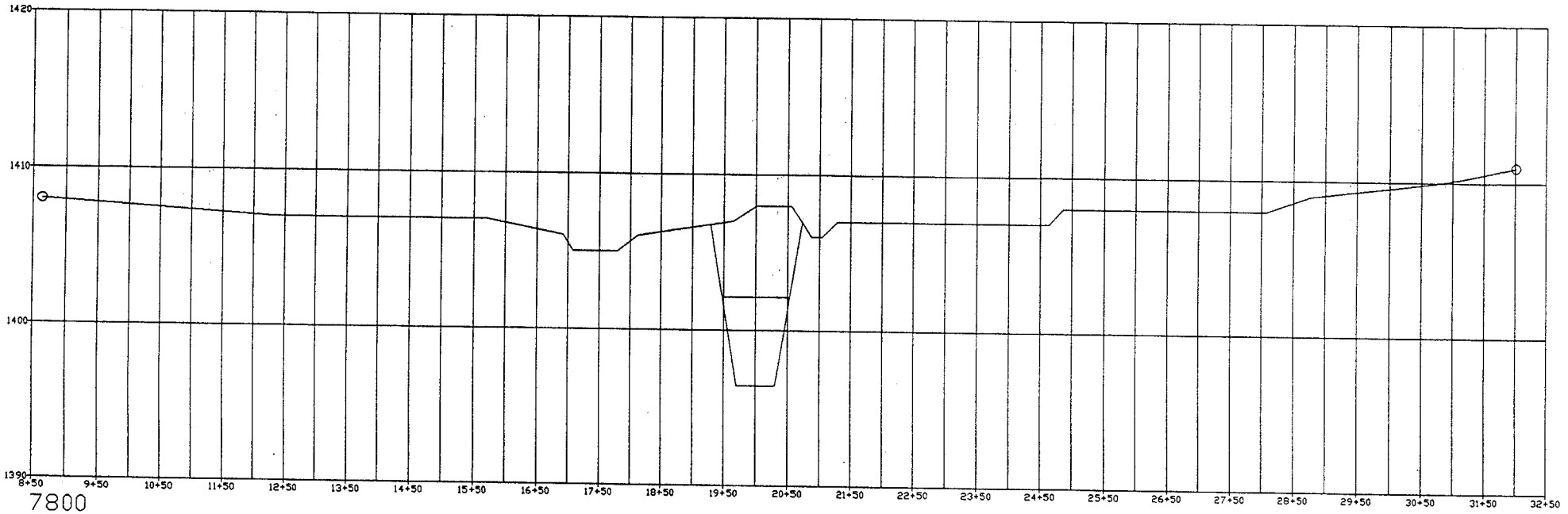
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1401.04 ft

Profile 2

Computed Water Surface = 1400.99 ft



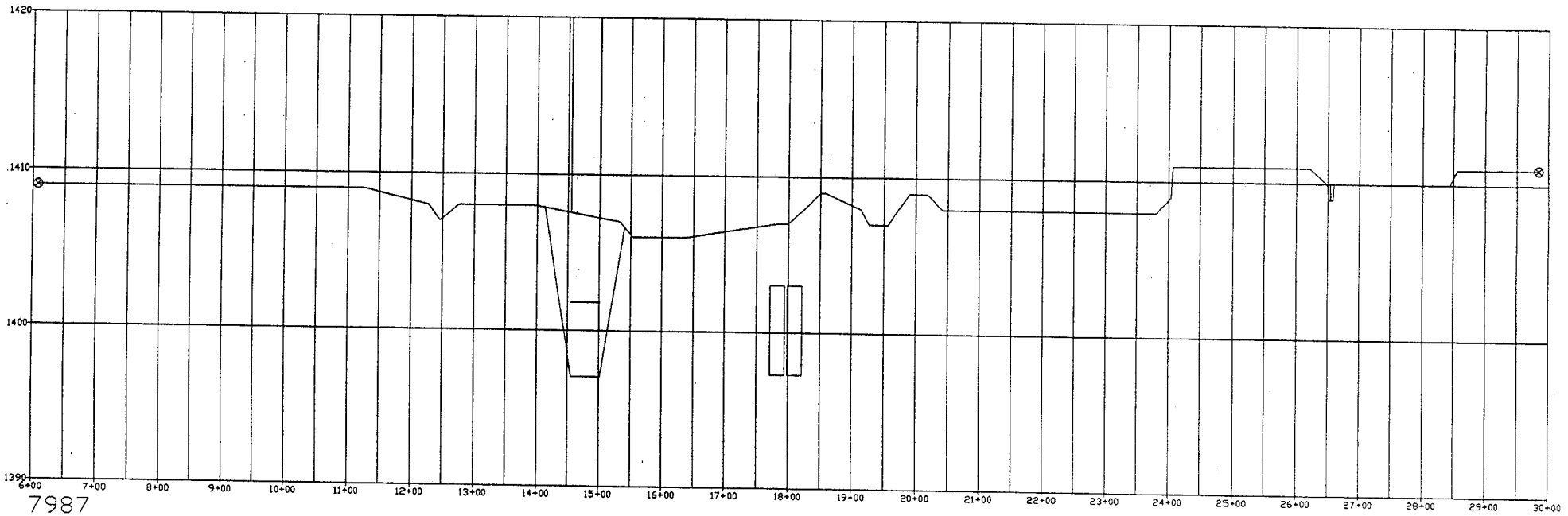
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1402.12 ft

Profile 2

Computed Water Surface = 1402.10 ft



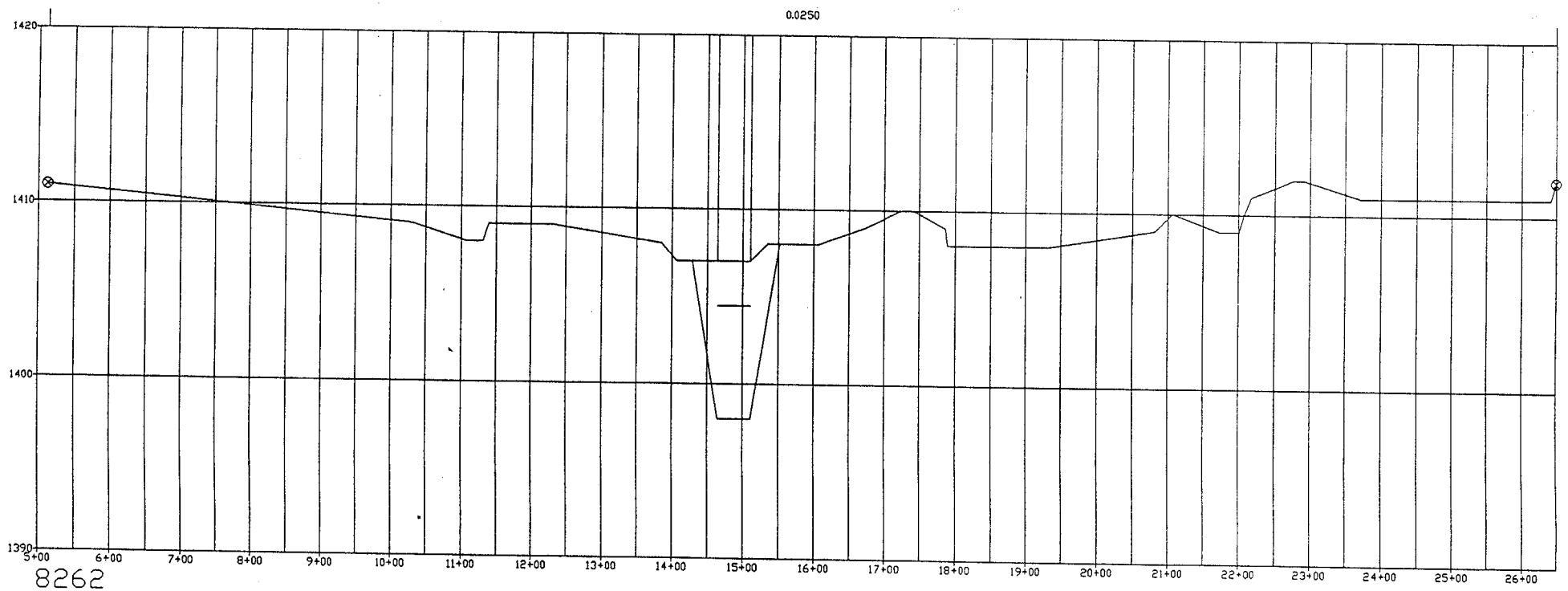
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1401.80 ft

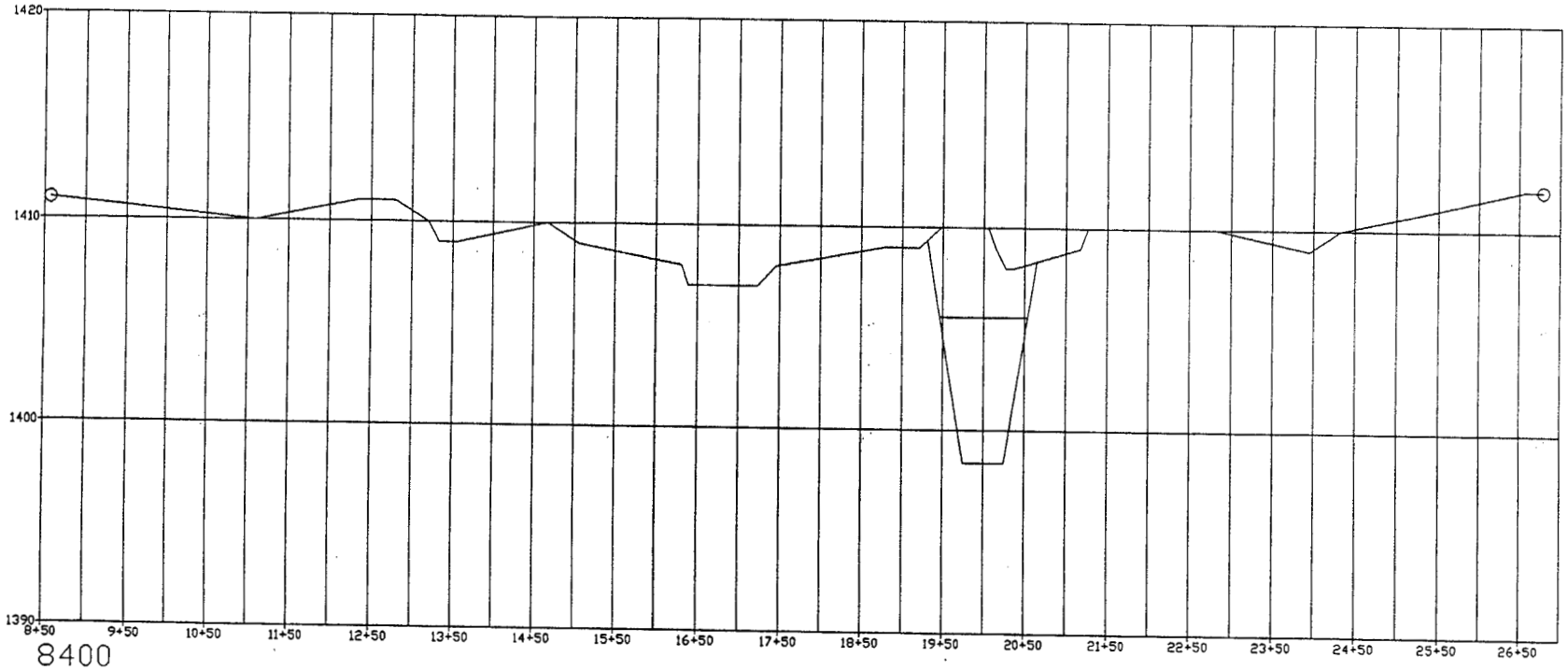
Profile 2

Computed Water Surface = 1401.76 ft



Profile 1
Flow Discharge = 2400.00 cfs
—— Computed Water Surface = 1404.45 ft

Profile 2
—— Computed Water Surface = 1404.46 ft



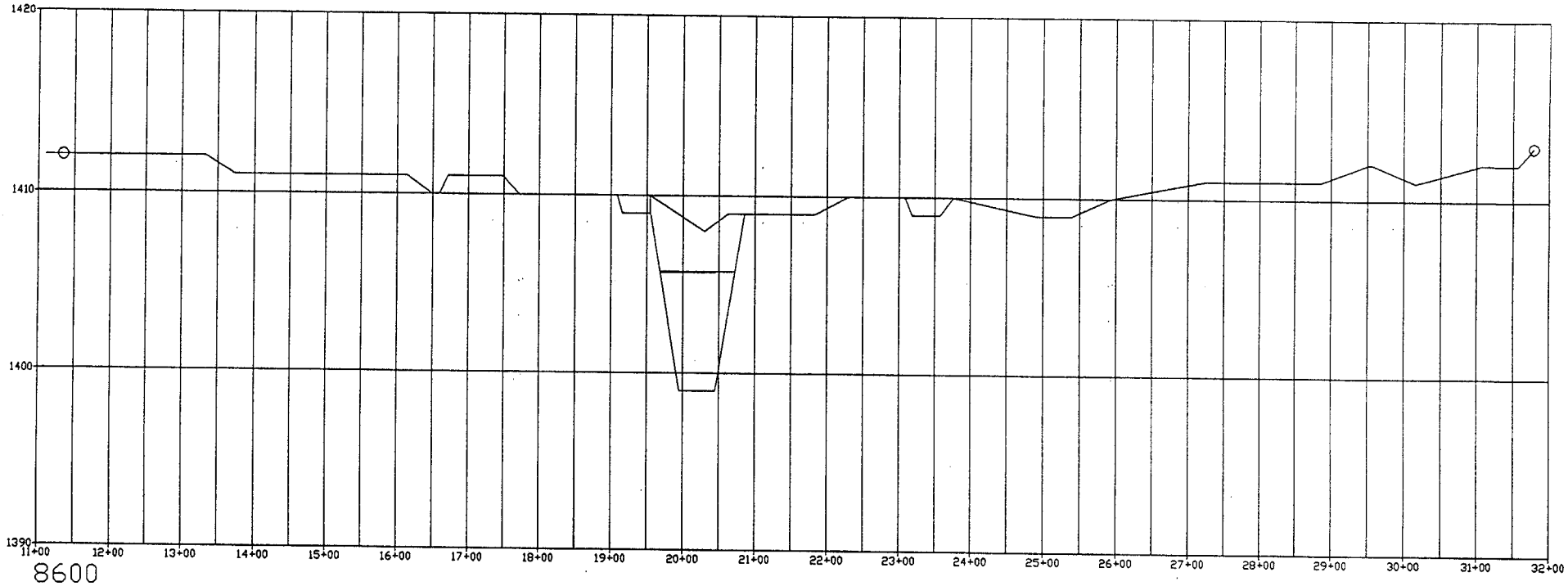
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1405.59 ft

Profile 2

Computed Water Surface = 1405.56 ft



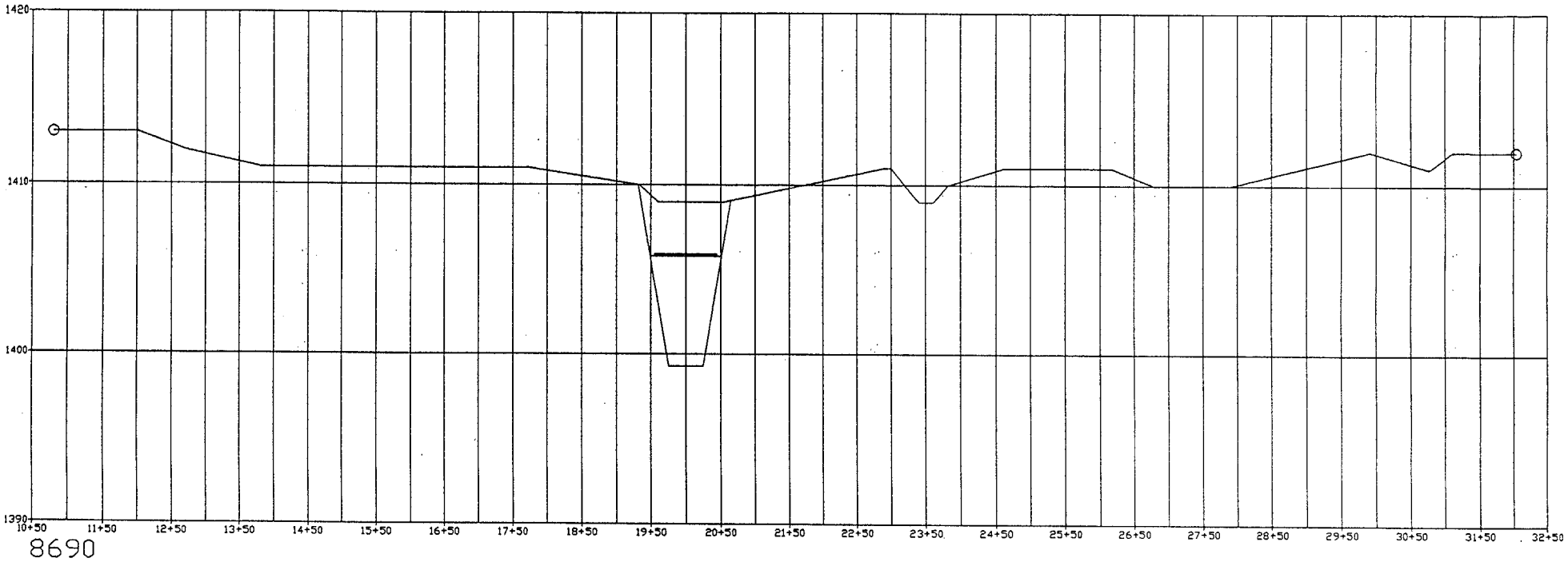
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1405.74 ft

Profile 2

Computed Water Surface = 1405.67 ft



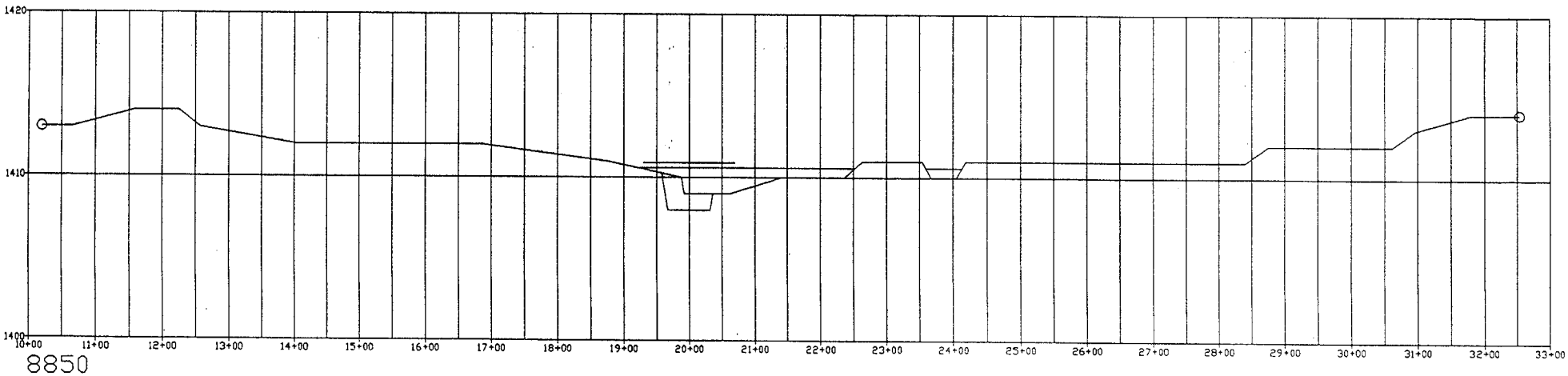
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1405.80 ft

Profile 2

Computed Water Surface = 1405.94 ft



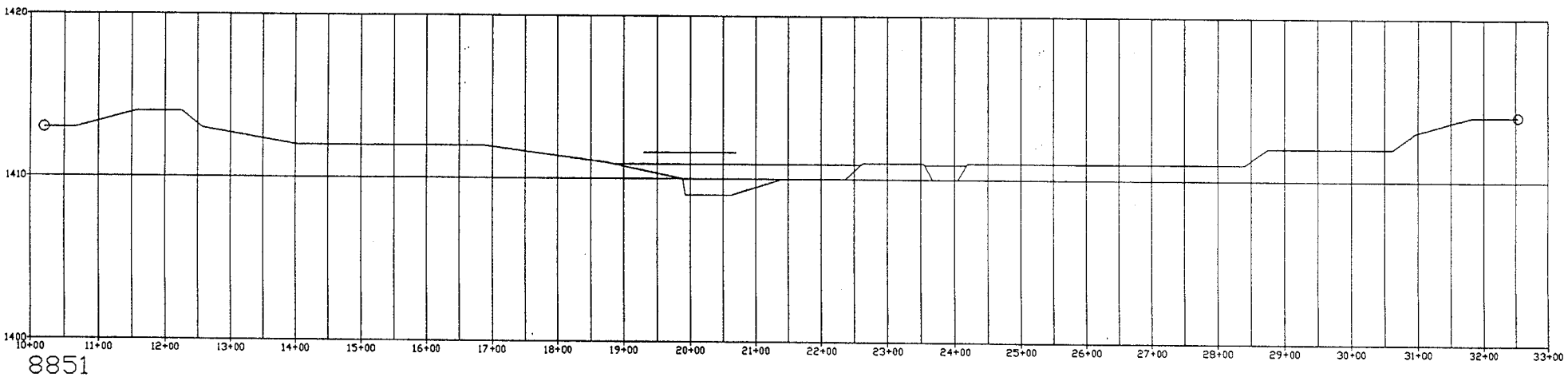
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1410.57 ft

Profile 2

Computed Water Surface = 1410.88 ft



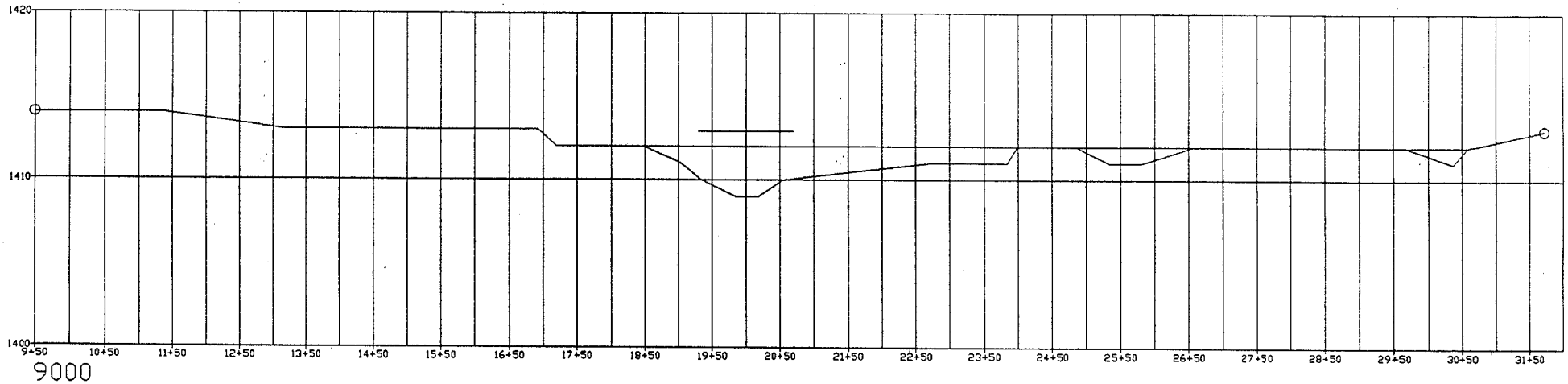
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1410.89 ft

Profile 2

Computed Water Surface = 1411.62 ft



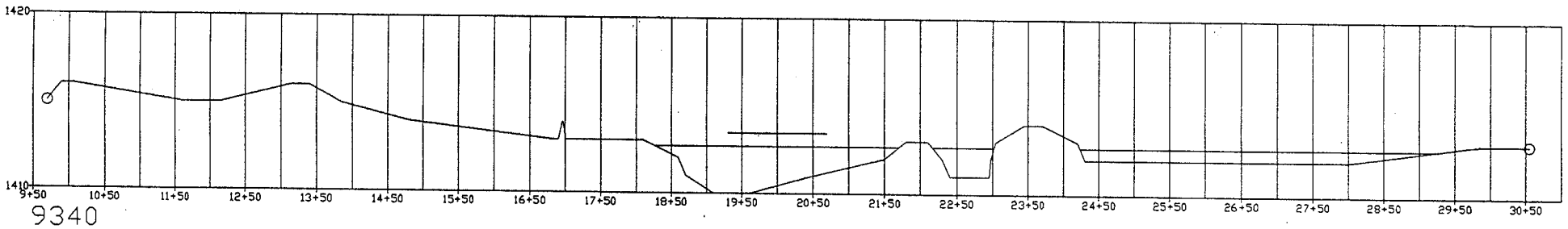
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1412.01 ft

Profile 2

Computed Water Surface = 1412.91 ft



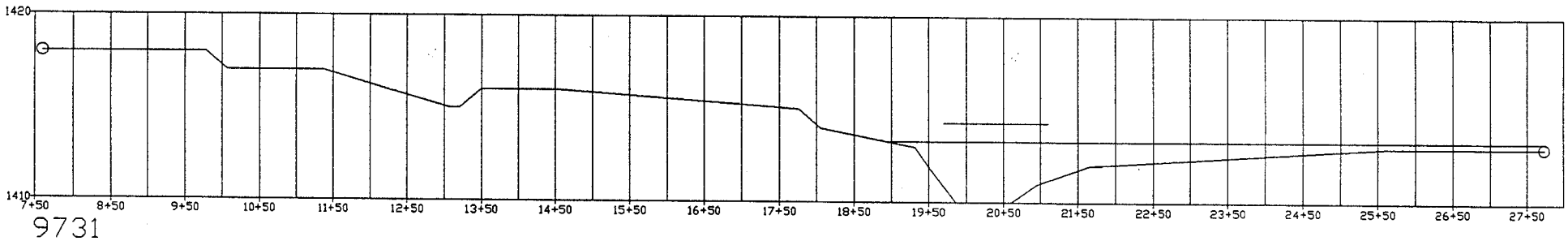
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1412.67 ft

Profile 2

Computed Water Surface = 1413.44 ft



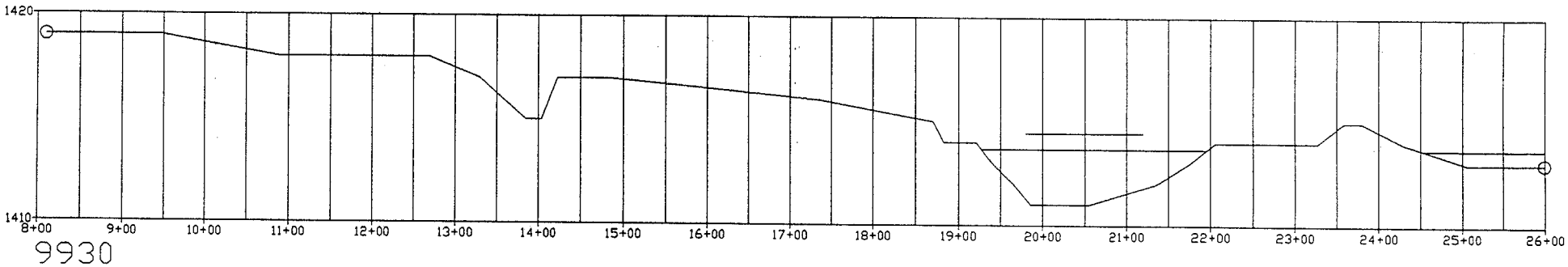
Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1413.30 ft

Profile 2

Computed Water Surface = 1414.27 ft



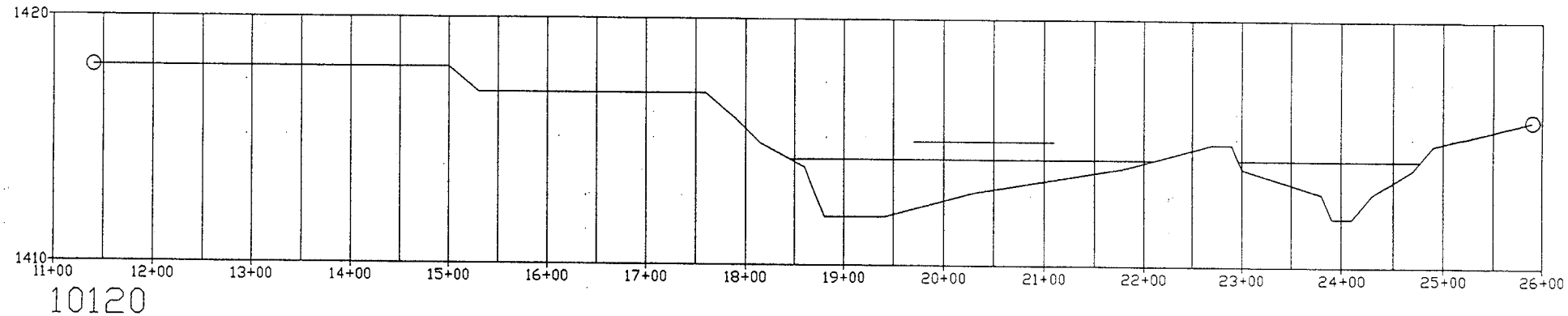
Profile 1

Flow Discharge = 2400.00 cfs

—— Computed Water Surface = 1413.66 ft

Profile 2

—— Computed Water Surface = 1414.44 ft



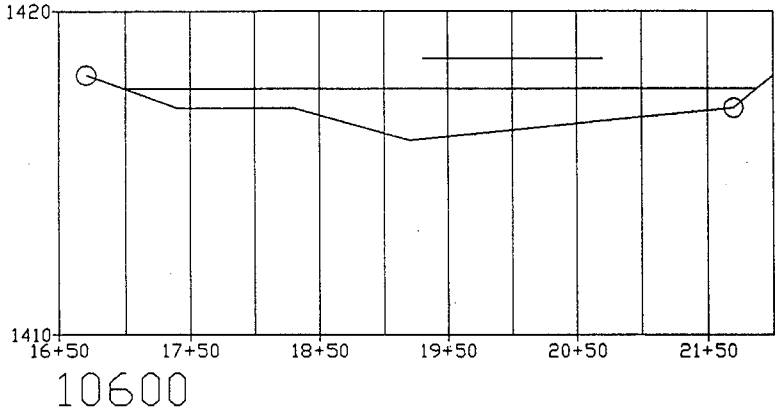
Profile 1

Flow Discharge = 2400.00 cfs

—— Computed Water Surface = 1414.34 ft

Profile 2

—— Computed Water Surface = 1415.08 ft



Profile 1

Flow Discharge = 2400.00 cfs

Computed Water Surface = 1417.58 ft

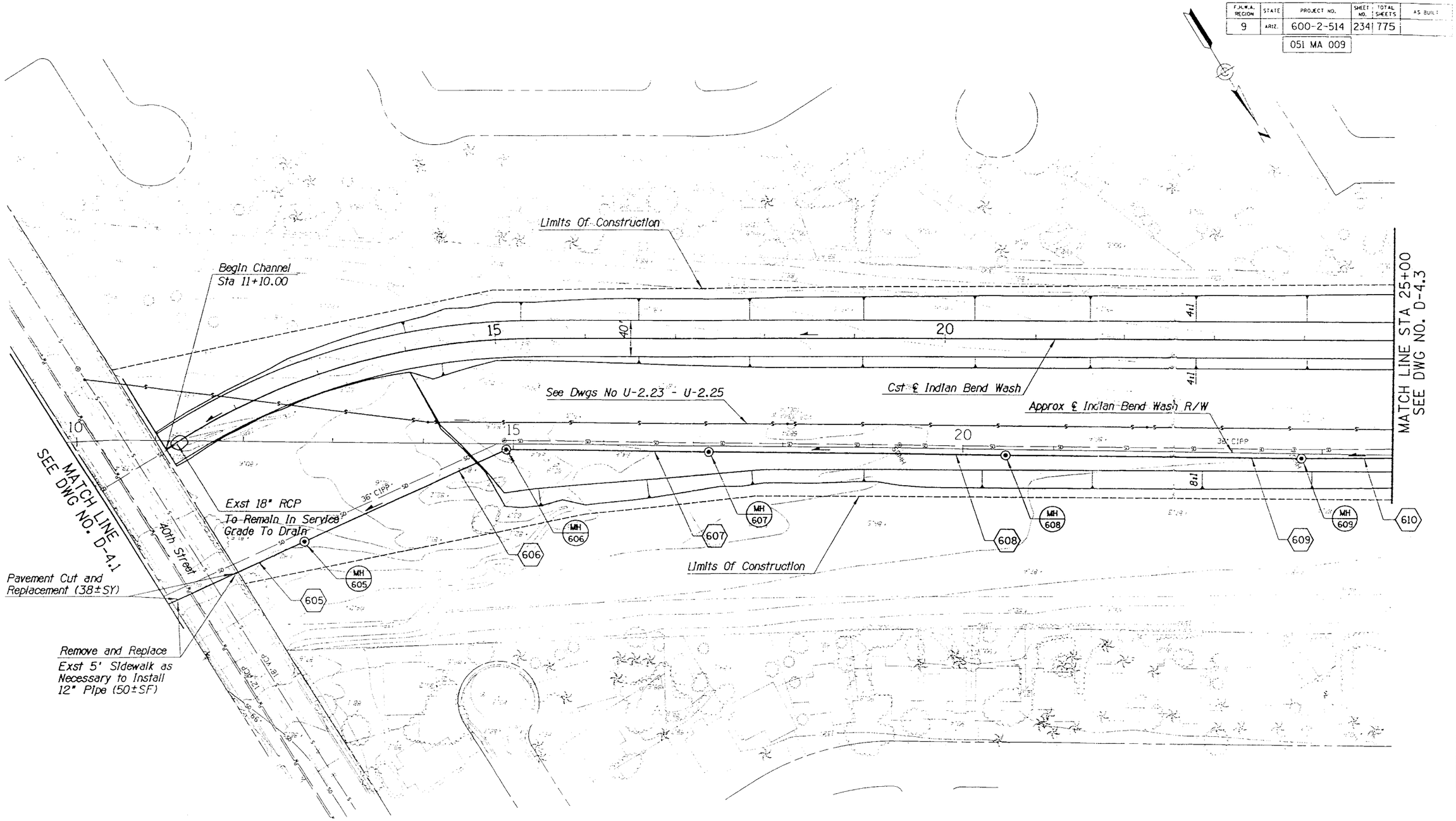
Profile 2

Computed Water Surface = 1418.52 ft

APPENDIX G

FINAL CONSTRUCTION PLANS

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	234	775	
		051 MA 009			



	NAME	DATE
DESIGN	DJS	2/96
DRAWN	MGC	2/96
CHECKED	GAG	2/96

BRW
3003 N. Central Ave.
Suite 700
Phoenix, Arizona 85012
(602) 234-1536

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
40TH ST TO STA 25+00

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-4.2

REDUCED SIZE
DO NOT SCALE

SHEET NO.	REVISED PLANS	REVISIONS	LOCATION	DATE

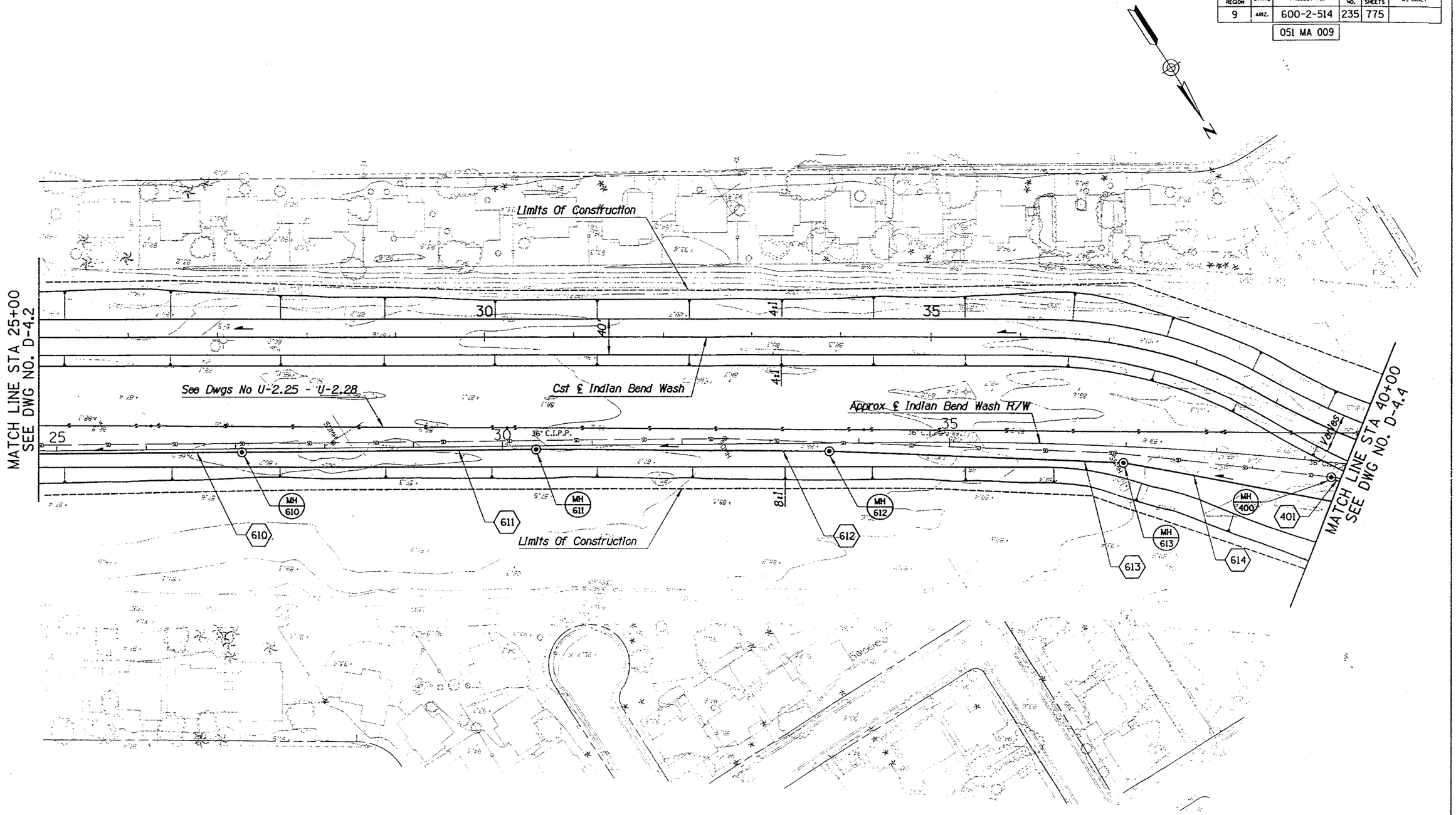
SPDDRIB1.DGN
cccccSYSTIMEccccc

VIEW NAME:

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	235	775	

051 MA 009



REDUCED SIZE
DO NOT SCALE

	NAME	DATE
DESIGN	DJS	5/96
DRAWN	RGH	5/96
CHECKED	CAC	5/96

BRW
3003 N. Central Ave.
Suite 700
Phoenix, Arizona 85012
(602) 234-1151

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
STA 25+00 to 40+00

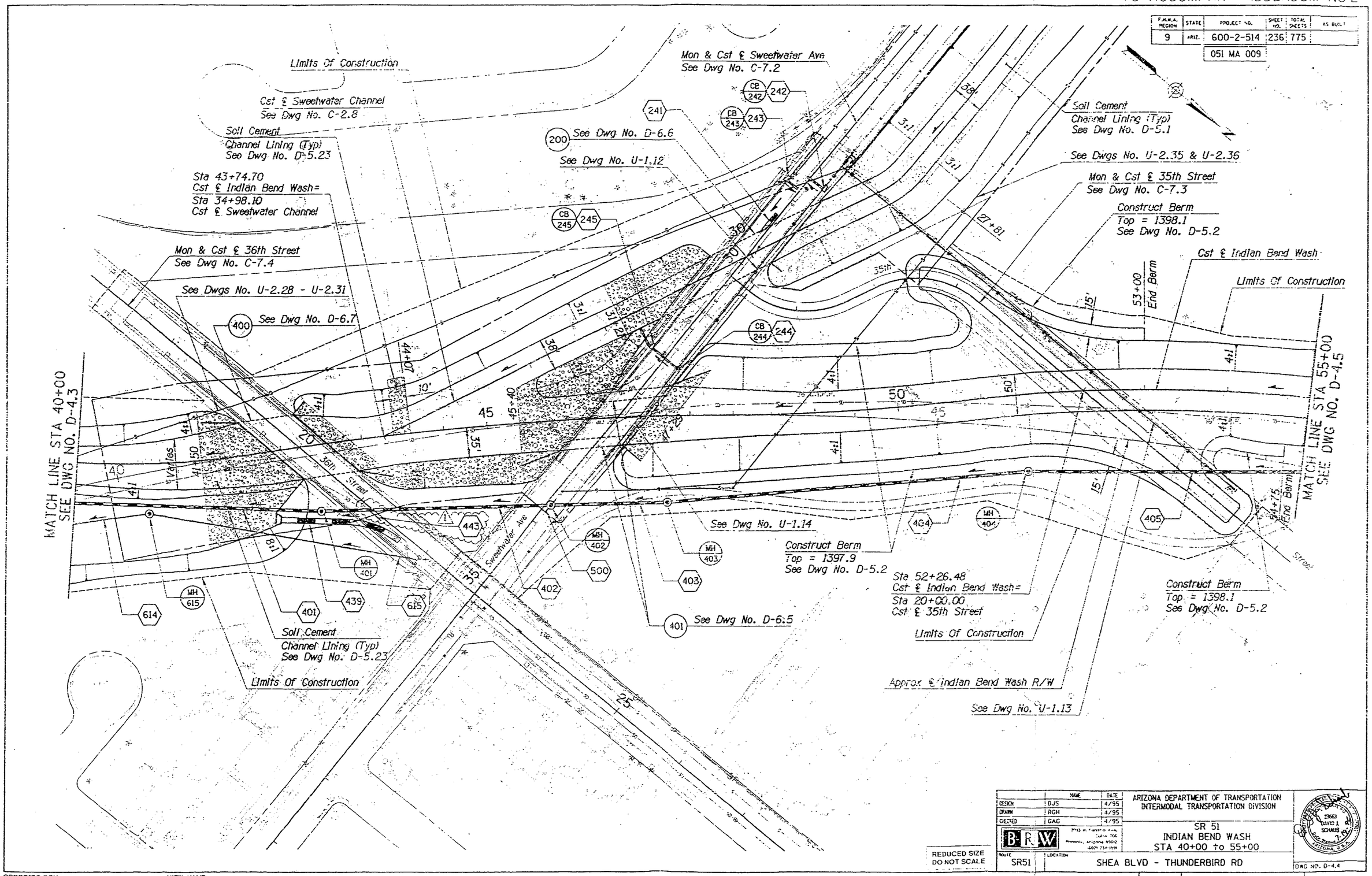
ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-4.3

SPDDRIB2.DGN
VIEW NAME:
ccccccSYSTIMEcccccc

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	236	775	
		051 MA 009			



	NAME	DATE
DESIGN	DJS	4/95
DRAWN	RGH	4/95
CHECKED	GAC	4/95

BRW

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
STA 40+00 to 55+00

ROUTE: SR51 | LOCATION: SHEA BLVD - THUNDERBIRD RD

REDUCED SIZE
DO NOT SCALE

DWG NO. D-4.4

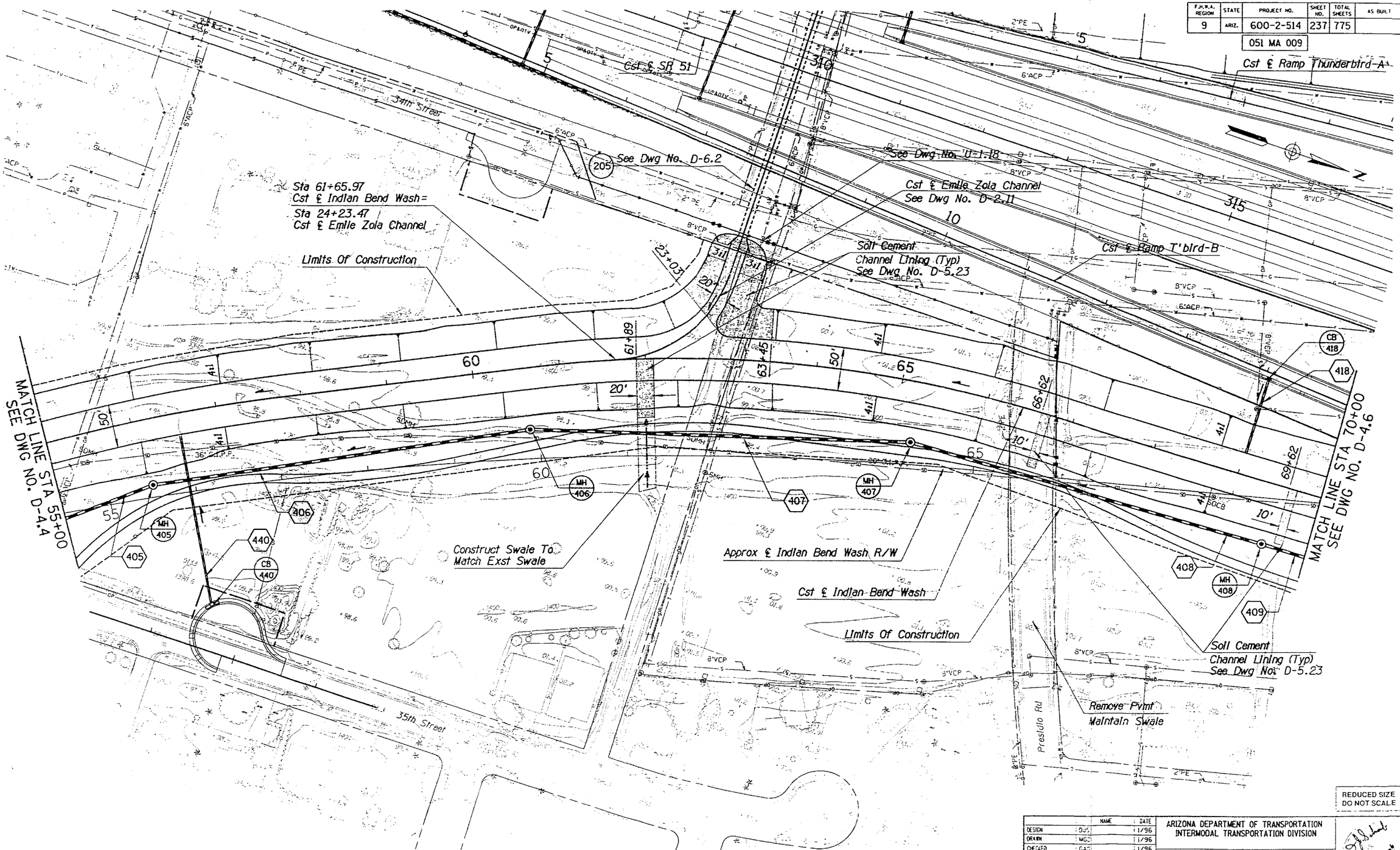
TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

SPDDRIB3.DGN
cccccSYSTIMEcccccc

VIEW NAMES

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	237	775	

051 MA 009



REDUCED SIZE
DO NOT SCALE

	NAME	DATE
DESIGN	DJS	1/96
DRAWN	MGC	1/96
CHECKED	GAG	1/96

BRW
3003 N. Central Ave.
Suite 700
Phoenix, Arizona 85012
(602) 234-1991

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
STA 55+00 to 70+00

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-4.5

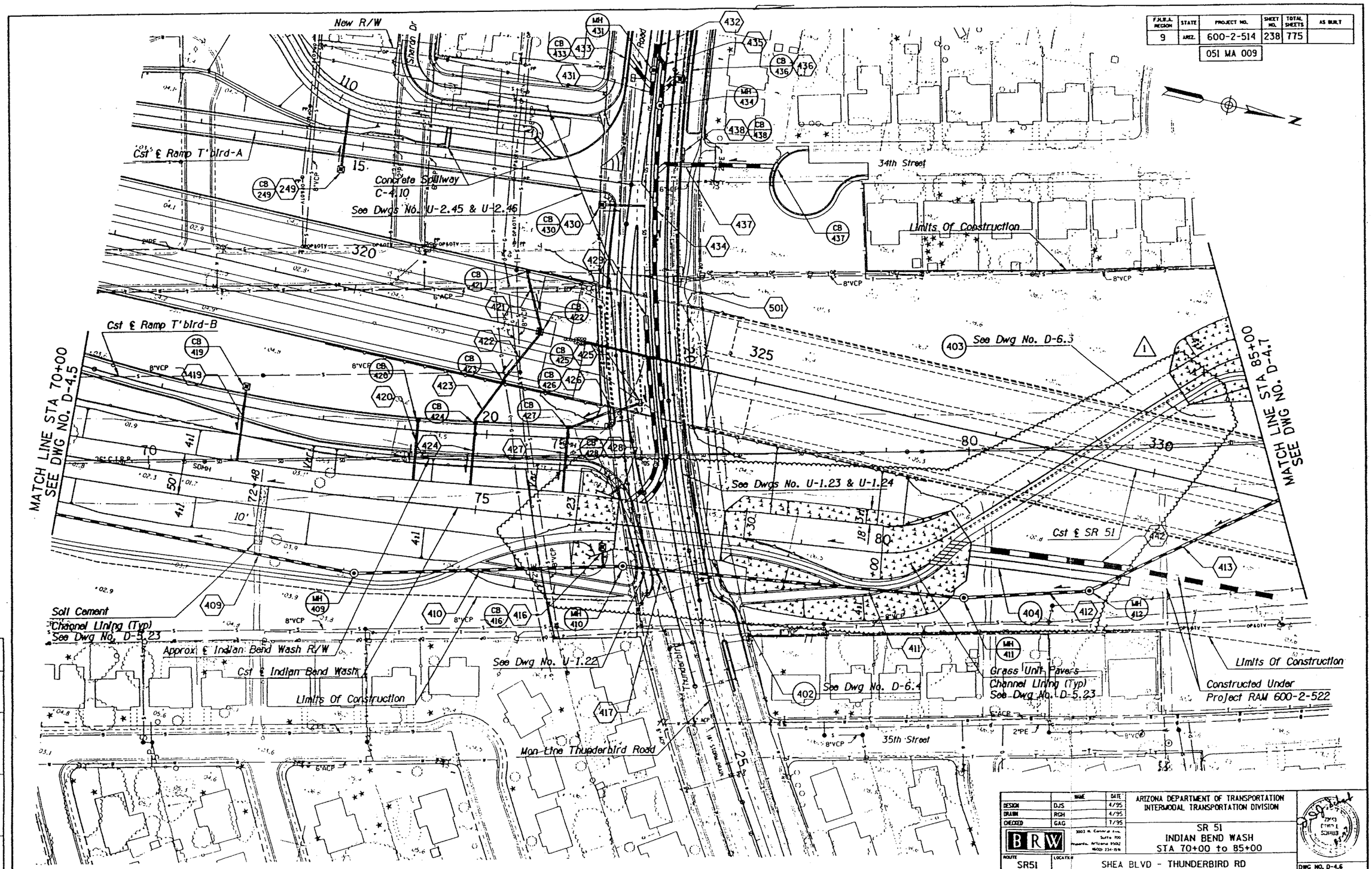
TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

SPDDRIB4.DGN
cccccSYSTIMEccccc

VIEW NAME:

SURVEY NO.	SHEETED PLANS	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	238	775	
		051 MA 009			



	NAME	DATE
DESIGN	DJS	4/95
DRAWN	RGH	4/95
CHECKED	GAG	7/95

BRW
3003 N. Central Ave. Suite 700
Phoenix, Arizona 85012
(602) 234-5151

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
STA 70+00 to 85+00

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-4.6

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

MARK	REVISIONS	LOCATION	DATE	TRACS
1	Rev. DWG. 4.6 & 4.8			

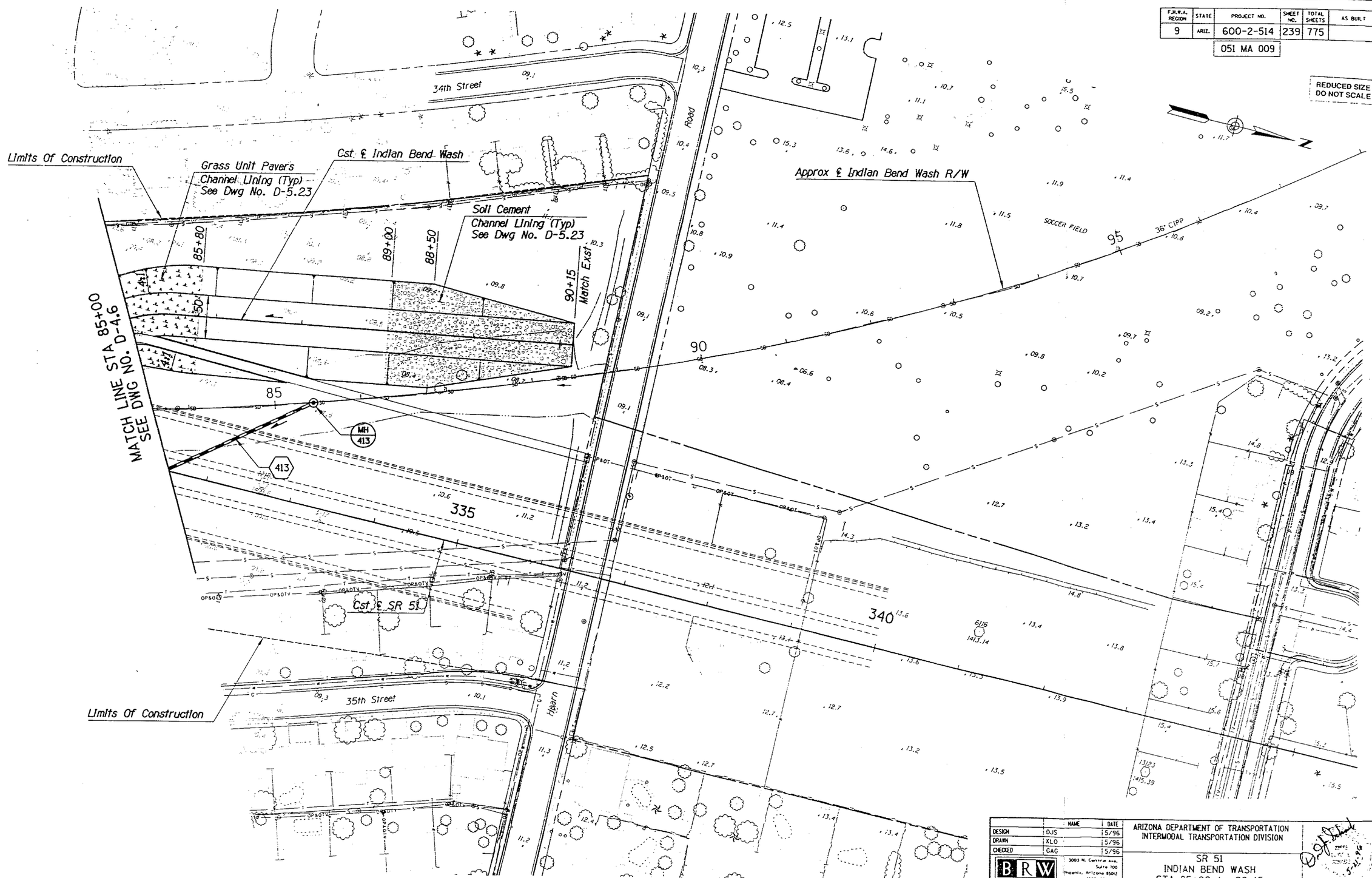
SHEET NO.

SPDORIB5.DGN
VIEW NAME:
ooooSYSTIMEoooooo

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	239	775	

051 MA 009

REDUCED SIZE DO NOT SCALE



	NAME	DATE
DESIGN	DJS	5/96
DRAWN	KLO	5/96
CHECKED	GAC	5/96

BRW
3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1596

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
INDIAN BEND WASH
STA 85+00 to 90+15

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

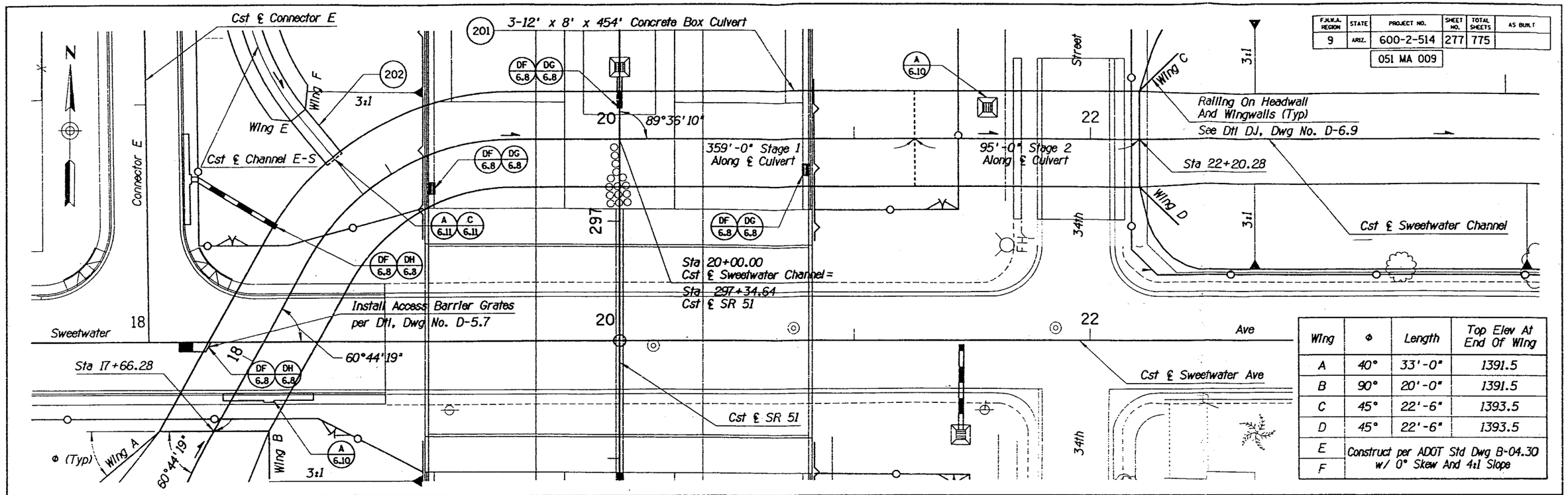
DWG NO. D-4.7

SPDDRIB9.DGN
ccccccSYSTIMEcccccc

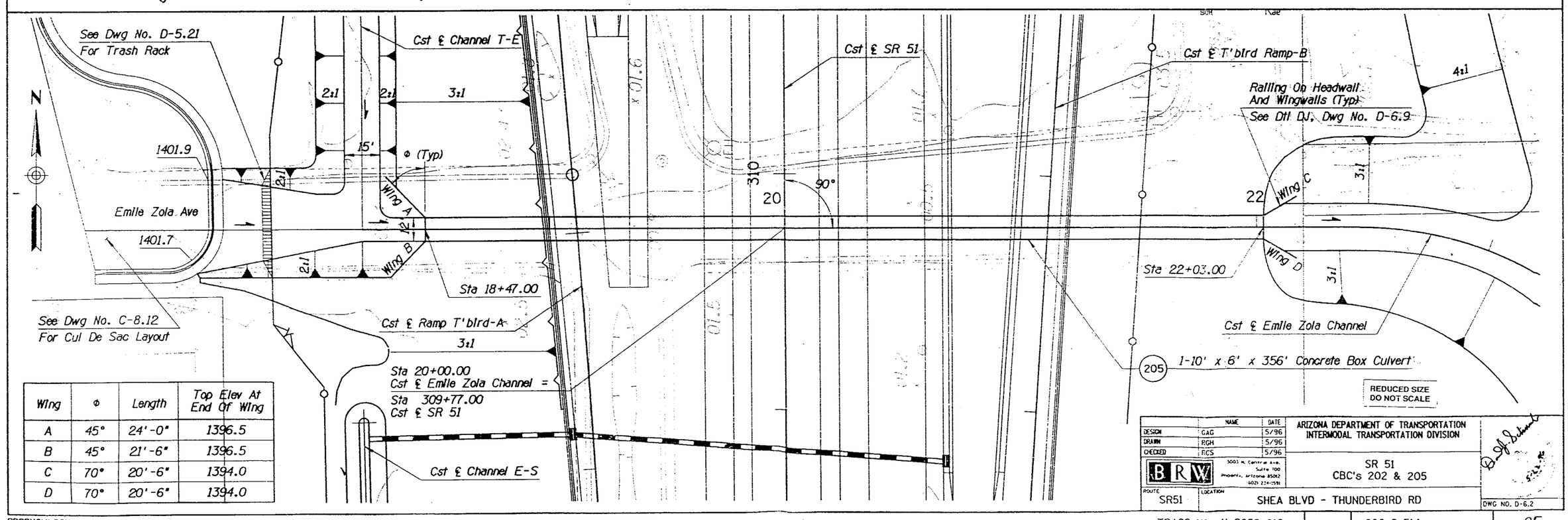
VIEW NAME:

TRACS NO. H 2059 01C | 600-2-514 | OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	277	775	
		051 MA 009			



Wing	Φ	Length	Top Elev At End Of Wing
A	40°	33'-0"	1391.5
B	90°	20'-0"	1391.5
C	45°	22'-6"	1393.5
D	45°	22'-6"	1393.5
E	Construct per ADOT Std Dwg B-04.30 w/ 0° Skew And 4:1 Slope		
F			



Wing	Φ	Length	Top Elev At End Of Wing
A	45°	24'-0"	1396.5
B	45°	21'-6"	1396.5
C	70°	20'-6"	1394.0
D	70°	20'-6"	1394.0

REDUCED SIZE
DO NOT SCALE

	NAME	DATE
DESIGN	CAG	5/96
DRAWN	RGH	5/96
CHECKED	RCS	5/96

BRW
3001 N. Central Ave. Suite 700
Phoenix, Arizona 85012
(602) 224-1591

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC's 202 & 205

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

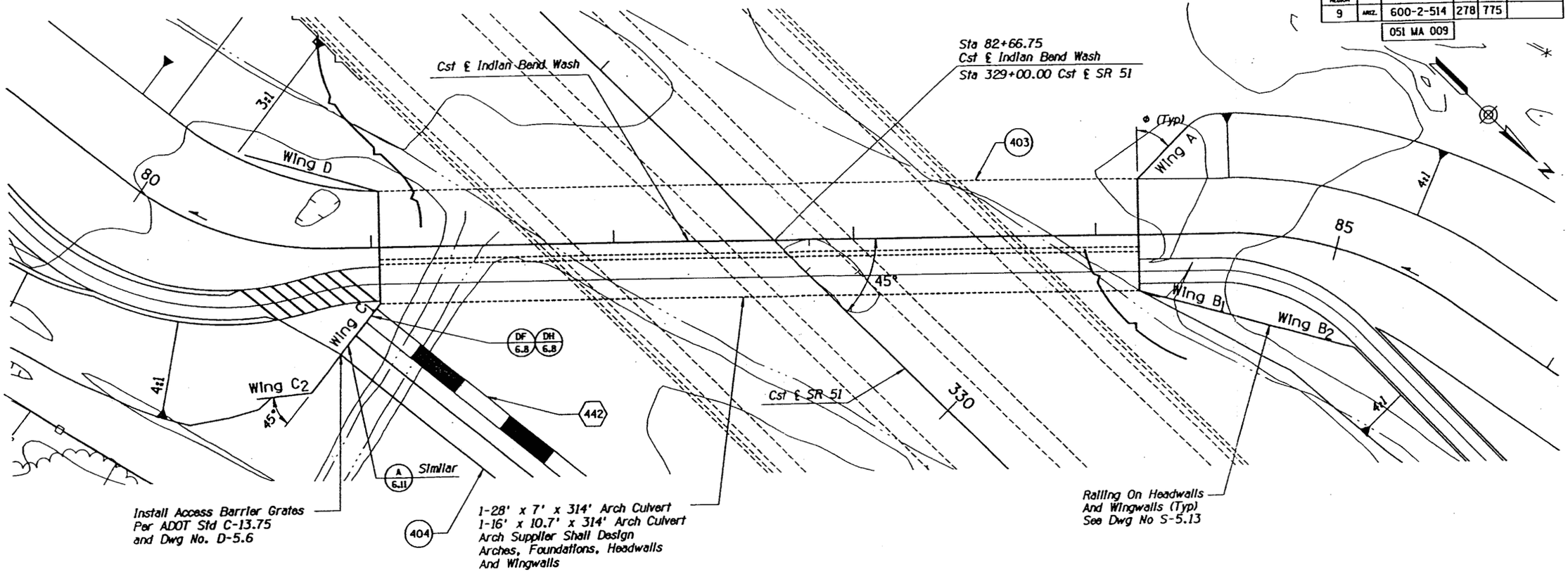
DWG NO. D-6.2

DATE | LOCATION | REVISIONS | APPROVED PLANS | SURVEY NO.

SPSBXSW1.DGN

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	278	775	
		051 MA 009			



Wing	⊕	Length	Top Elev At End Of Wing
A	45°	30'-0"	1403.5
B_1	74°30'	30'-0"	1411.0
B_2	180°	60'-0"	1401.0
C_1	39°30'	46'-6"	1408.25
C_2	45°	22'-6"	1405.5
D	74°	63'-0"	1397.8

1

	NAME	DATE
DESIGN	GAG	1/96
DRAWN	RGH	1/96
CHECKED	DJS	1/96

BRW 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1516

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC 403

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.3

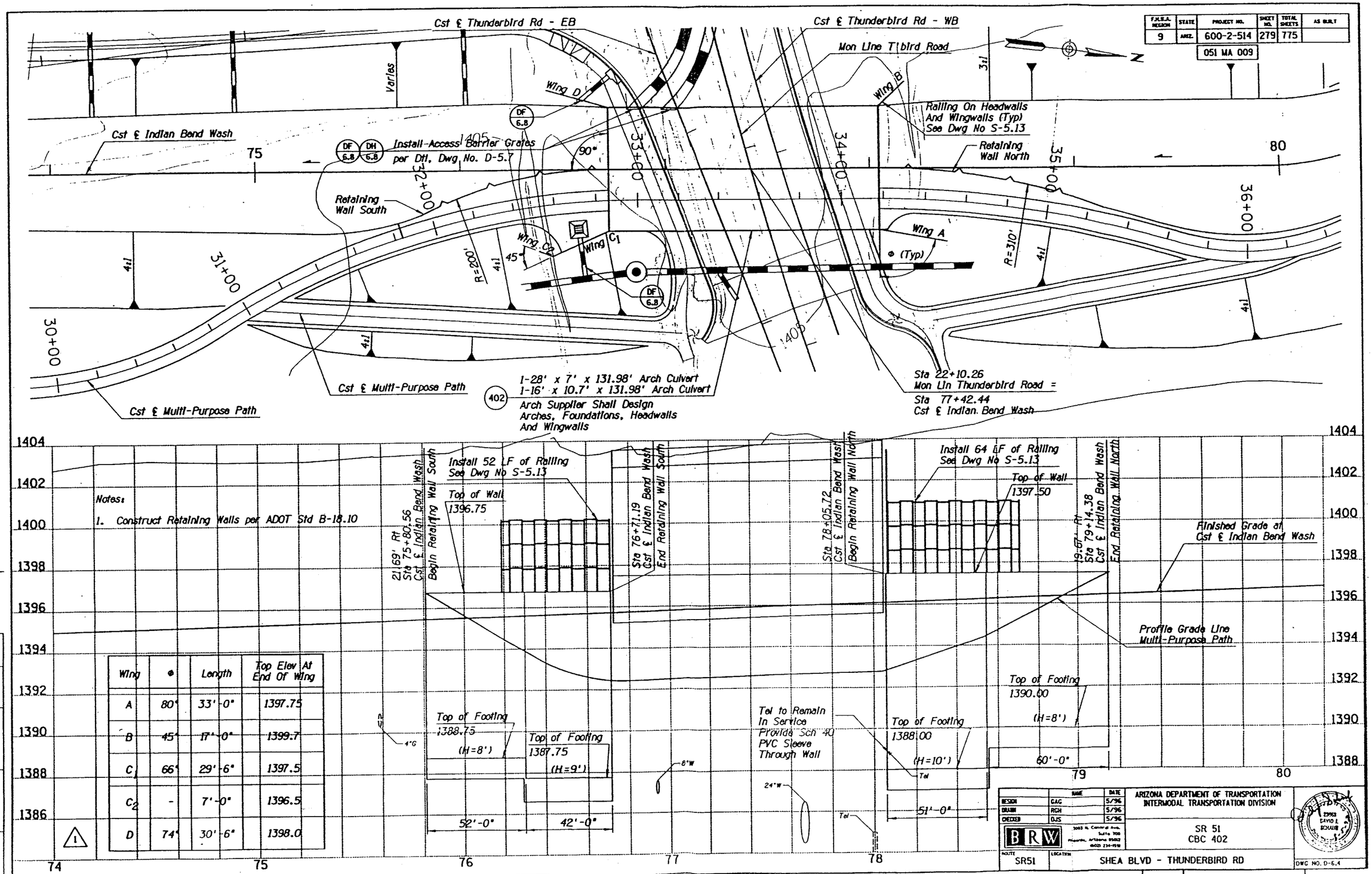
TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

SURVEY NO. | PLOTTED | REVISIONS: Errata Sheet Revised | LOCATION | DATE: 1/17/97

SPS8X181.DGN

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	279	775	

051 MA 009



Notes:

1. Construct Retaining Walls per ADOT Std B-18.10

Wing	●	Length	Top Elev At End Of Wing
A	80°	33'-0"	1397.75
B	45°	17'-0"	1399.7
C_1	66°	29'-6"	1397.5
C_2	-	7'-0"	1396.5
D	74°	30'-6"	1398.0

	NAME	DATE
DESIGN	GAG	5/96
DRAWN	RGH	5/96
CHECKED	DJS	5/96

BRW 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1518

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC 402

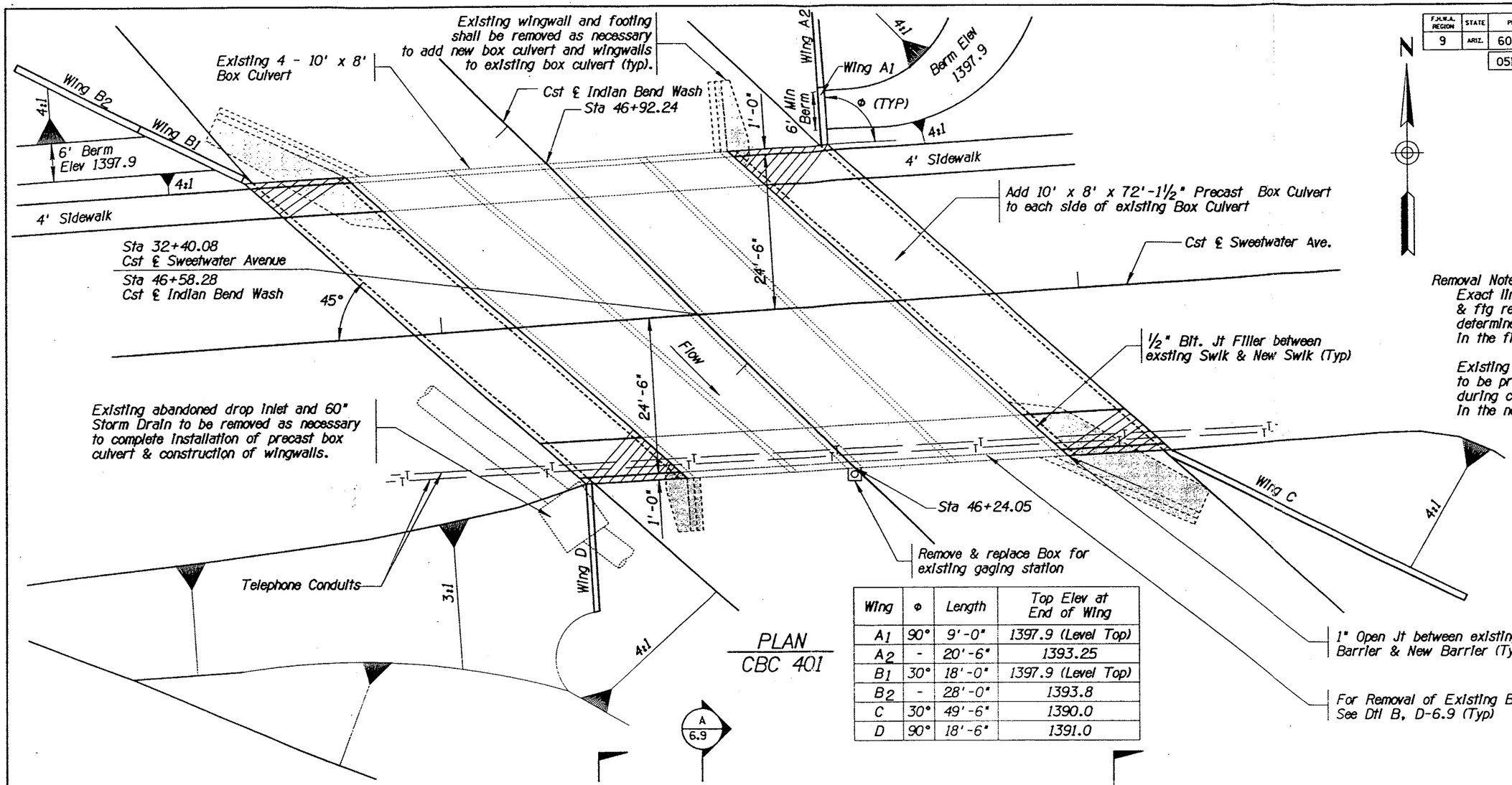
ROUTE SR51 LOCATION SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.4

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

SPSBXTB1.DGN

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	280	775	
		051MA 009			

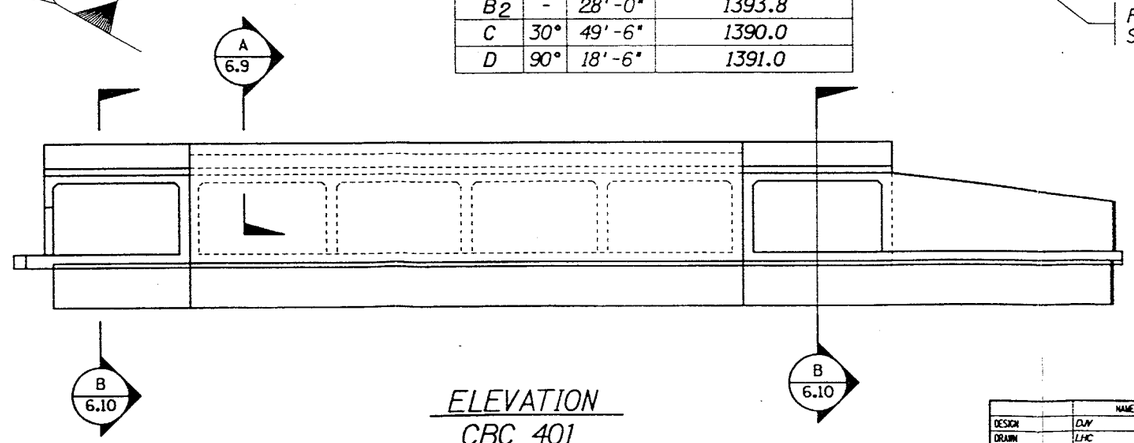


PLAN
CBC 401

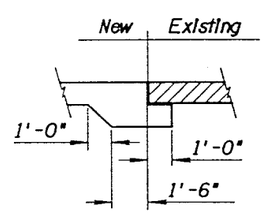
Removal Note:
Exact limits of wingwall & ftg removal shall be determined by the engineer in the field.

Existing telephone conduits to be protected and supported during construction and embedded in the new sidewalk

Wing	Φ	Length	Top Elev at End of Wing
A1	90°	9'-0"	1397.9 (Level Top)
A2	-	20'-6"	1393.25
B1	30°	18'-0"	1397.9 (Level Top)
B2	-	28'-0"	1393.8
C	30°	49'-6"	1390.0
D	90°	18'-6"	1391.0



ELEVATION
CBC 401



PLAN

CUTOFF WALL INTERFACE

Notes:
1. Contractor shall be responsible for designing skewed end sections in cross hatched areas. Contractor shall also be responsible for designing headwall, wingwalls & cutoff walls necessary for the construction of this culvert.
2. Precast / Cast-In-Place Reinforcing Connection to be supplied by contractor.

REDUCED SIZE DO NOT SCALE

	NAME	DATE
DESIGN	DJV	3/96
DRAWN	LHC	3/96
CHECKED	DJS	3/96

BRW — 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1591

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

CBC 401

ROUTE: SR51 | LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.5

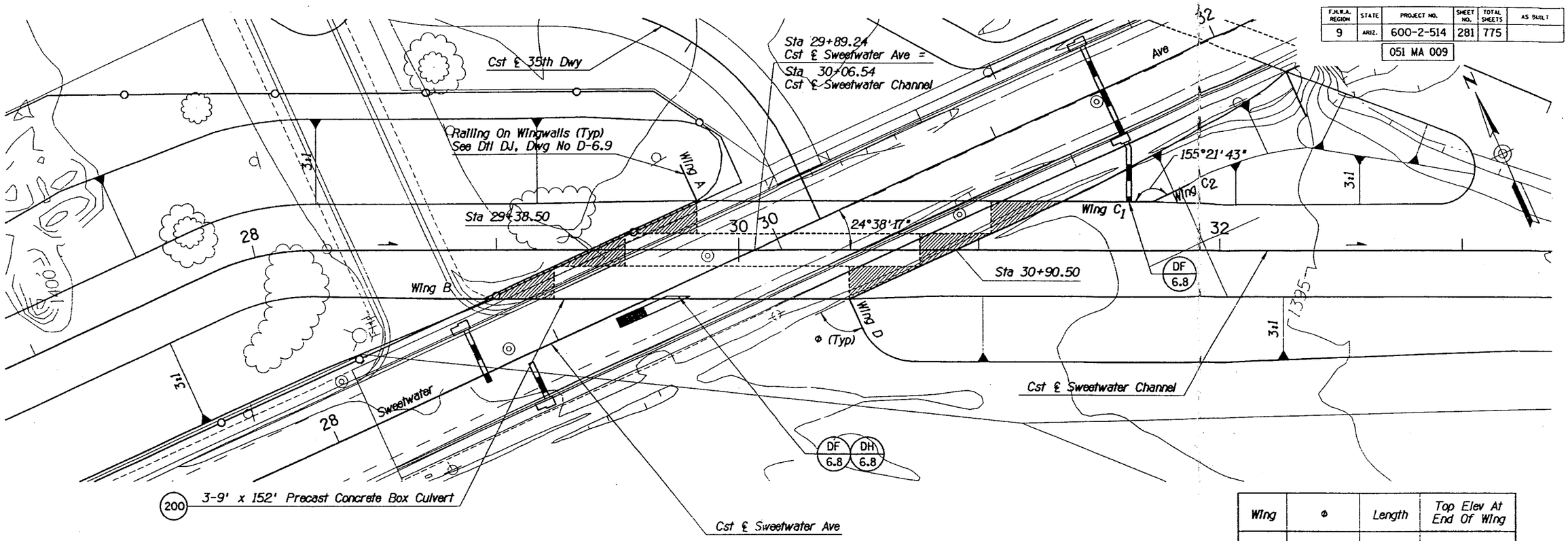
TRACS NO. H 2059 01C | 600-2-514 | OF

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

SPDDT13.DGN
VIEW NAME:
SYSTIME

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	281	775	

051 MA 009



Wing	Φ	Length	Top Elev At End Of Wing
A	90°	16'-0"	1391.5
B	24°38'17"	67'-0"	1387.0
C_1	24°38'17"	37'-0"	1389.0
C_2	-	17'-0"	1389.0
D	90°	15'-6"	1391.5

Notes:

1. *Contractor Shall Be Responsible For Designing Skewed End Sections In Cross Hatched Areas. Contractor Shall Also Be Responsible For Designing Headwall, Wingwalls & Cutoff Walls Necessary For The Construction Of This Culvert.*
2. *Precast/Cast-In-Place Reinforcing Connection to be Supplied by Contractor.*

SURVEY NO.	PLANS+	REVISIONS	LOCATION	DATE

REDUCED SIZE
DO NOT SCALE

	NAME	DATE
DESIGN	GAG	1/96
DRAWN	RGH	1/96
CHECKED	RCS	4/96

BRW — 3003 N. Central Ave., Suite 700, Phoenix, Arizona 85012, (602) 234-1559

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC 200

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.6

SPSBXSW2.DGN

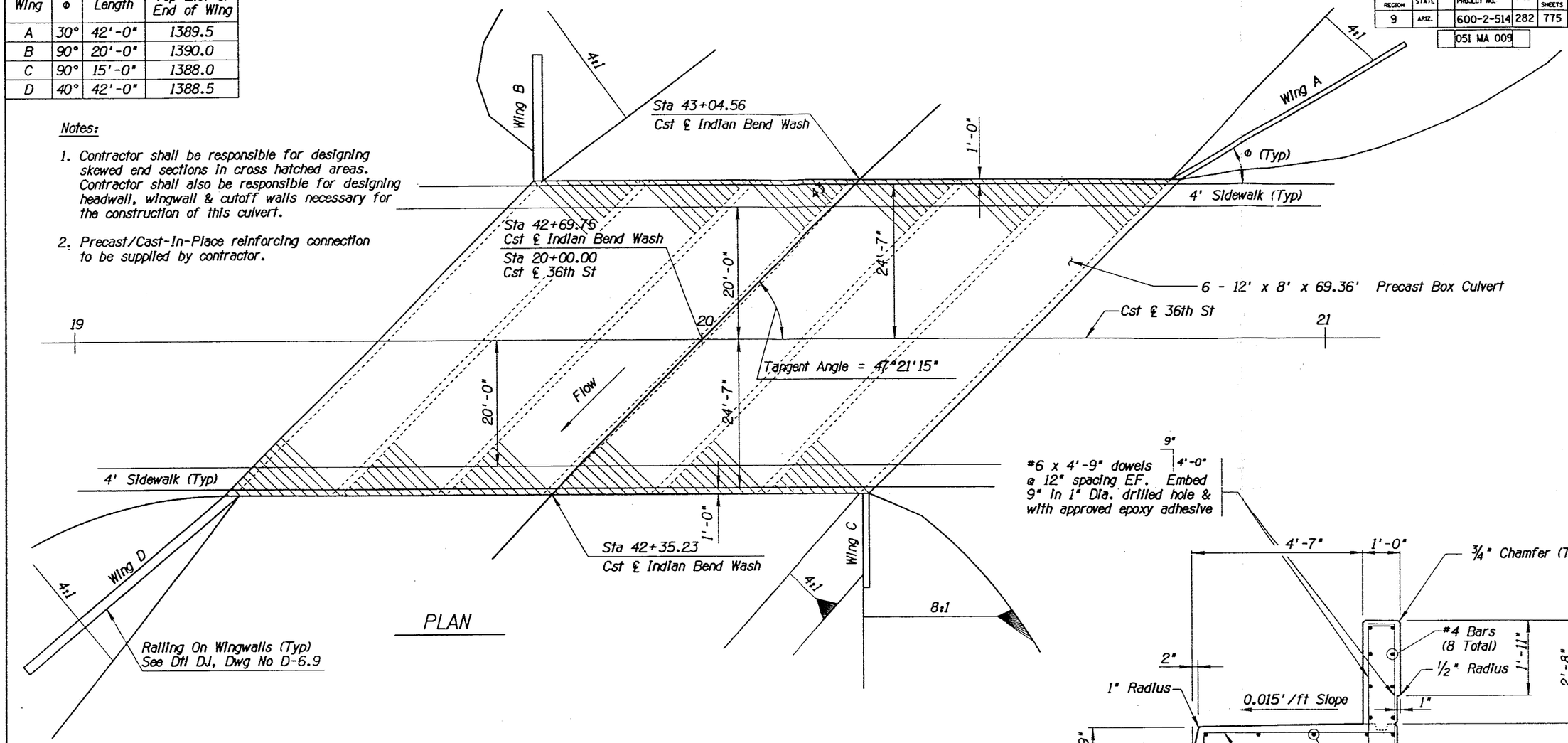
TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

Wing	Φ	Length	Top Elev at End of Wing
A	30°	42'-0"	1389.5
B	90°	20'-0"	1390.0
C	90°	15'-0"	1388.0
D	40°	42'-0"	1388.5

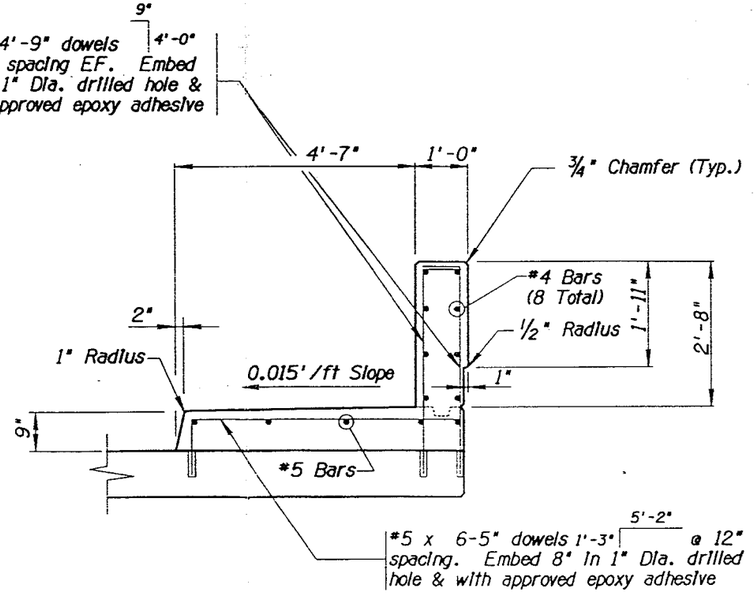
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	282	775	
		051 MA 009			

Notes:

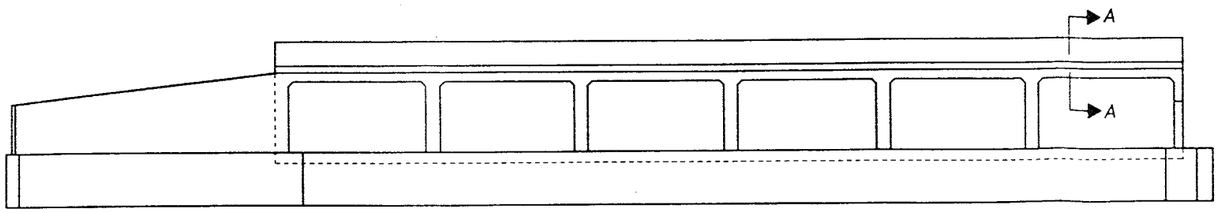
1. Contractor shall be responsible for designing skewed end sections in cross hatched areas. Contractor shall also be responsible for designing headwall, wingwall & cutoff walls necessary for the construction of this culvert.
2. Precast/Cast-In-Place reinforcing connection to be supplied by contractor.



PLAN



SECTION A-A



ELEVATION
CBC 400

REDUCED SIZE
DO NOT SCALE

	NAME NAME	DATE
DESIGN	DJV	3/96
DRAWN	LMC	3/96
CHECKED	DJS	3/96

BRW 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1511

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

CBC 400

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.7

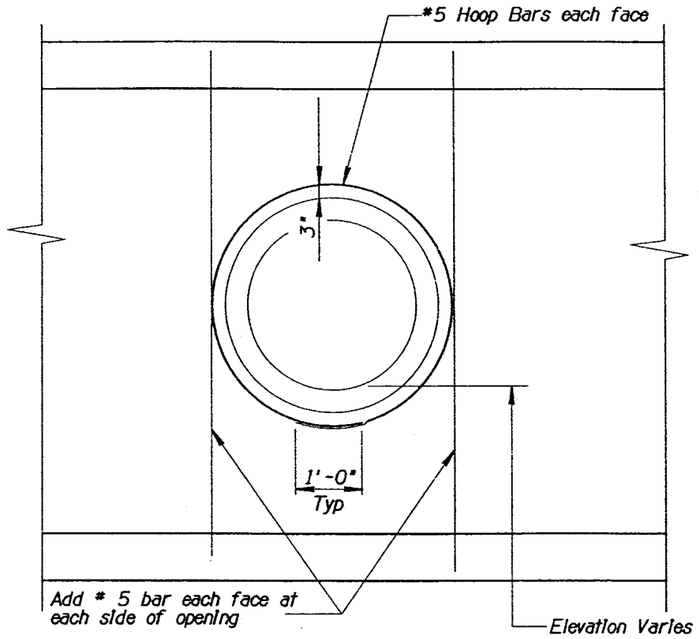
DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

SPDOT12.DGN
ooooooSYSTIMEoooooo

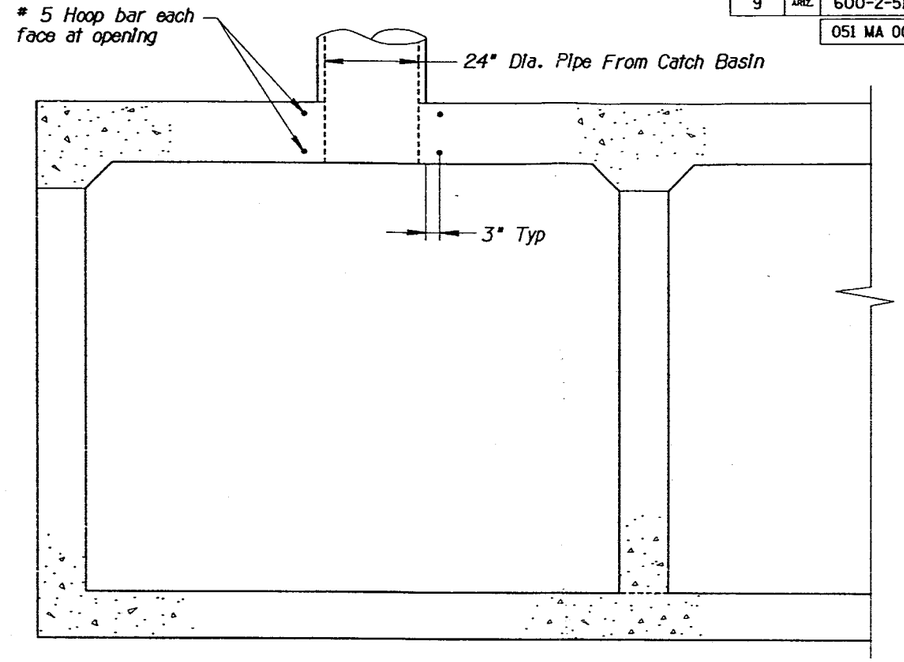
VIEW NAME:

TRACS NO. H 2059 01C | 600-2-514 | OF

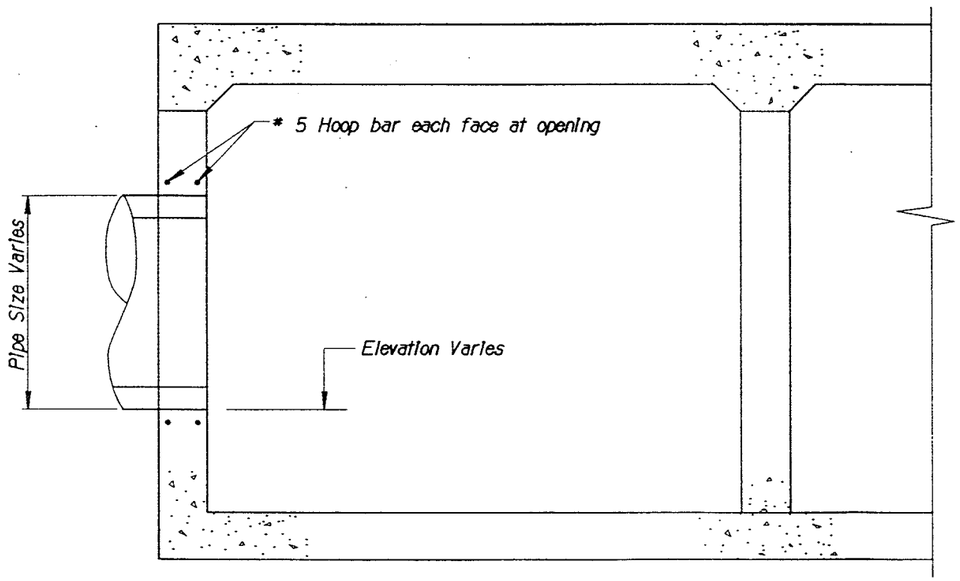
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	283	775	
		051 MA 009			



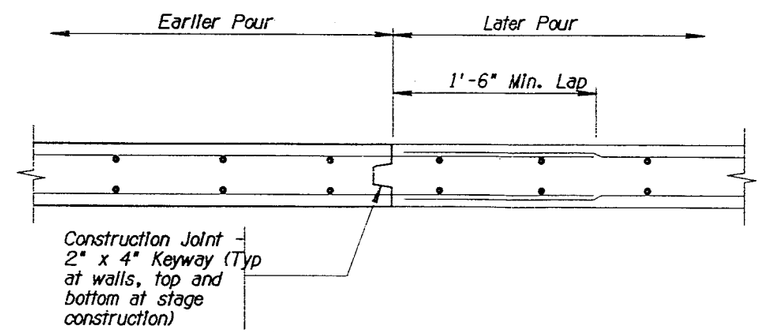
TYPICAL PIPE OPENING REINFORCEMENT (DF / TYP)



TYPICAL PIPE OPENING AT TOP (DG / TYP)



TYPICAL PIPE OPENING AT SIDE (DH / TYP)



TYPICAL CONSTRUCTION JOINT STAGE CONSTRUCTION (DI / TYP)

REDUCED SIZE DO NOT SCALE

	NAME	DATE
DESIGN	DJV	3/96
DRAWN	LHC	3/96
CHECKED	RCS	3/96

BRW — 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1539

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC DETAILS

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

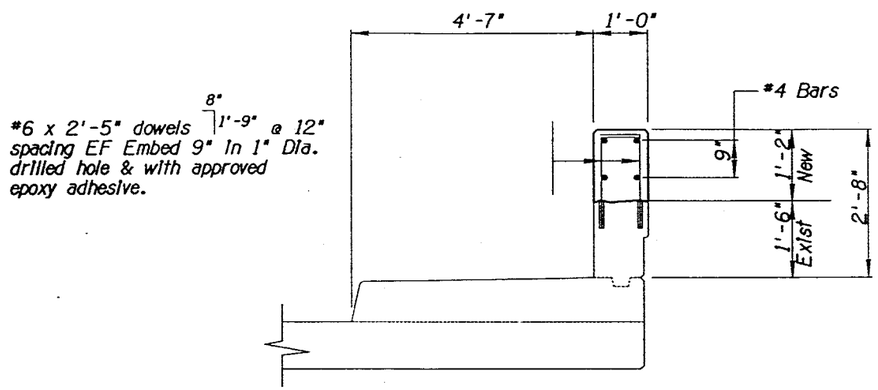
DWC NO. D-6.8

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

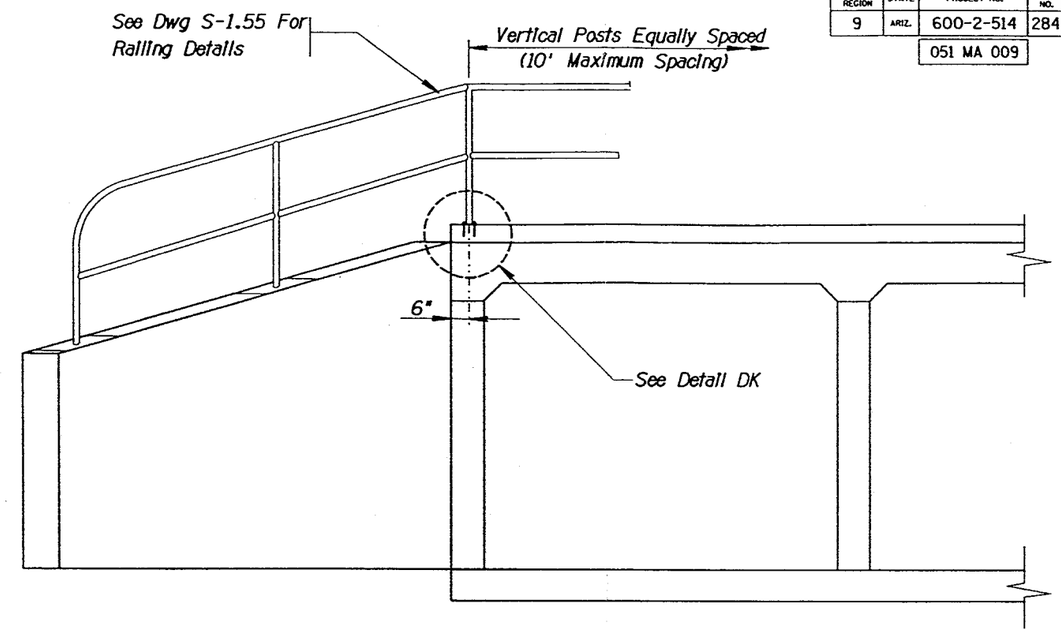
SPDDT14.DGN
ooooSYSTIMEoooooo
VIEW NAME:

SURVEY NO. | PLANS | REVISIONS | LOCATION | DATE

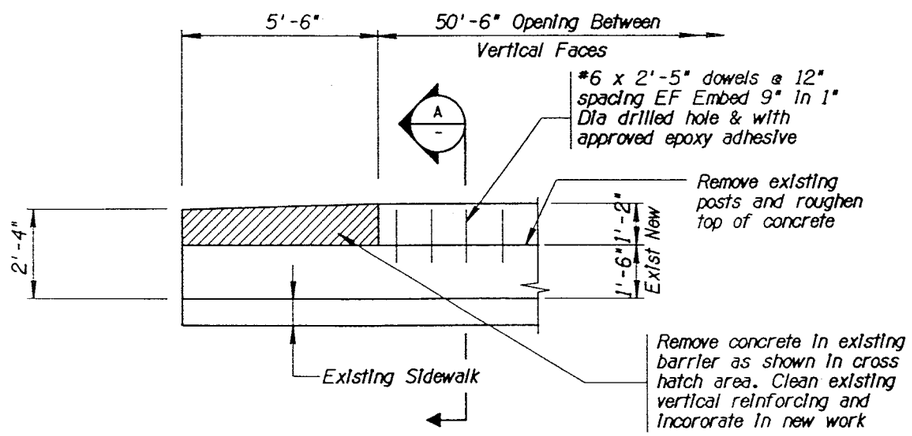
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	284	775	
		051 MA 009			



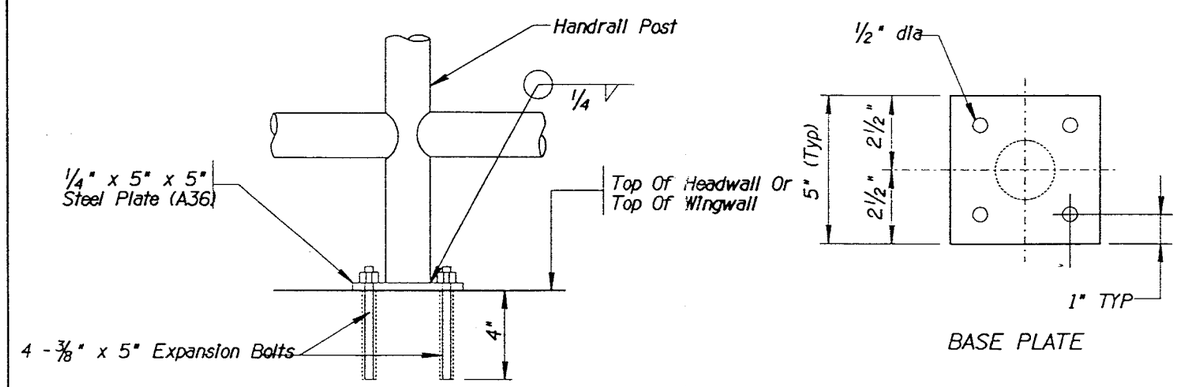
SECTION A / 6.5



RAILING ON HEADWALL AND WINGWALL — DJ / Typ



REMOVALS OF EXISTING BARRIER STRUCTURE 401 — B / 6.5



BASE PLATE

TYPE 2 EXPANSION BOLT ANCHORAGE — DK

REDUCED SIZE DO NOT SCALE

	NAME	DATE
DESIGN	DJV	3/96
DRAWN	LHC	3/96
CHECKED	DJS	3/96

BRW — 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1574

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC DETAILS

ROUTE: SR51
LOCATION: SHEA BLVD - THUNDERBIRD RD

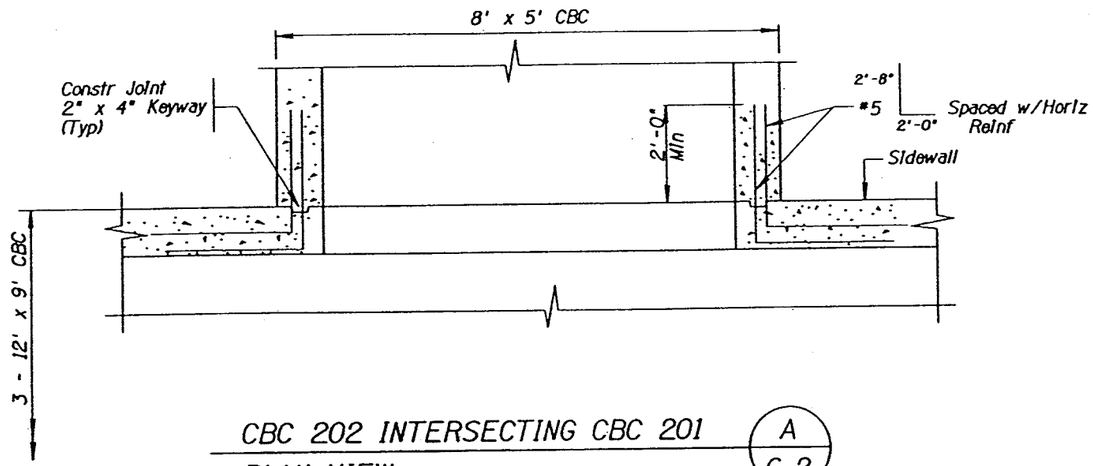
DWG NO. D-6.9

TRACS NO. H 2059 01C | 600-2-514 | ___ OF ___

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

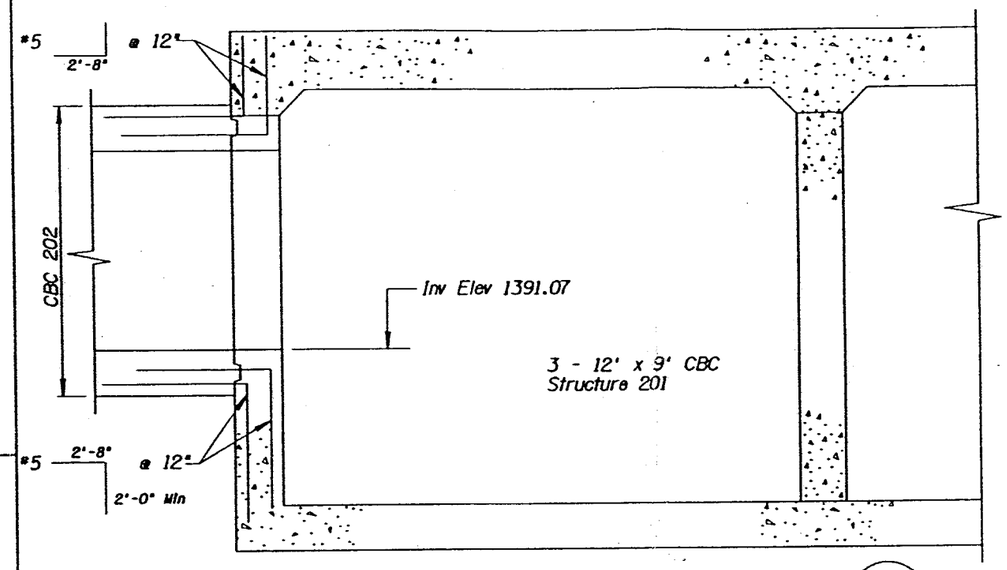
SPDDT15.DGN
VIEW NAME:
ooooSYSTIMEoooooo

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	286	775	
		051 MA 009			



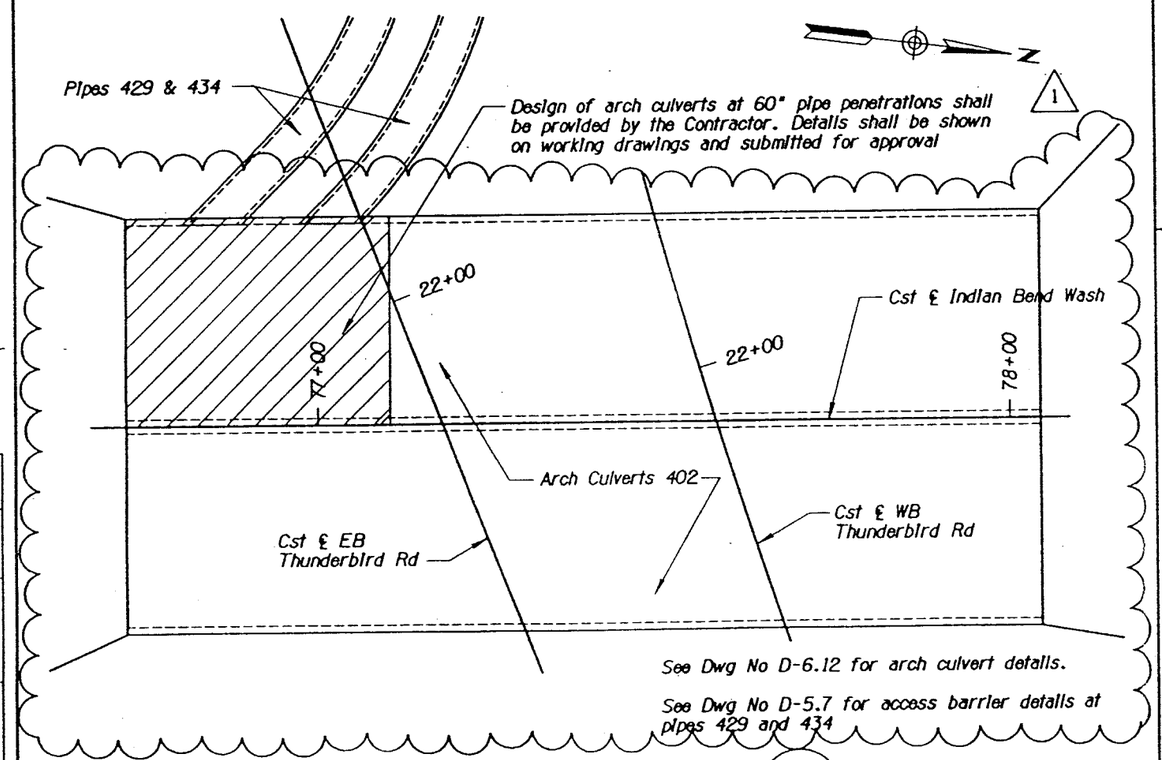
CBC 202 INTERSECTING CBC 201 — A / 6.2

PLAN VIEW



CBC 202 INTERSECTING CBC 201 — C / 6.2

ELEVATION VIEW



PIPE PENETRATIONS AT ARCH CULVERTS 402 — DL

Note:

See ADOT Stds B-02.10 and B-02.30 for Additional Details and Reinforcement Requirements.

	NAME	DATE
DESIGN	DJV	5/96
DRAWN	LHC	5/96
CHECKED	DJS	5/96

BRW — 3003 N. Central Ave., Suite 700, Phoenix, Arizona 85012, (602) 234-1518

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
CBC DETAILS

ROUTE: SR51 — LOCATION: SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.11

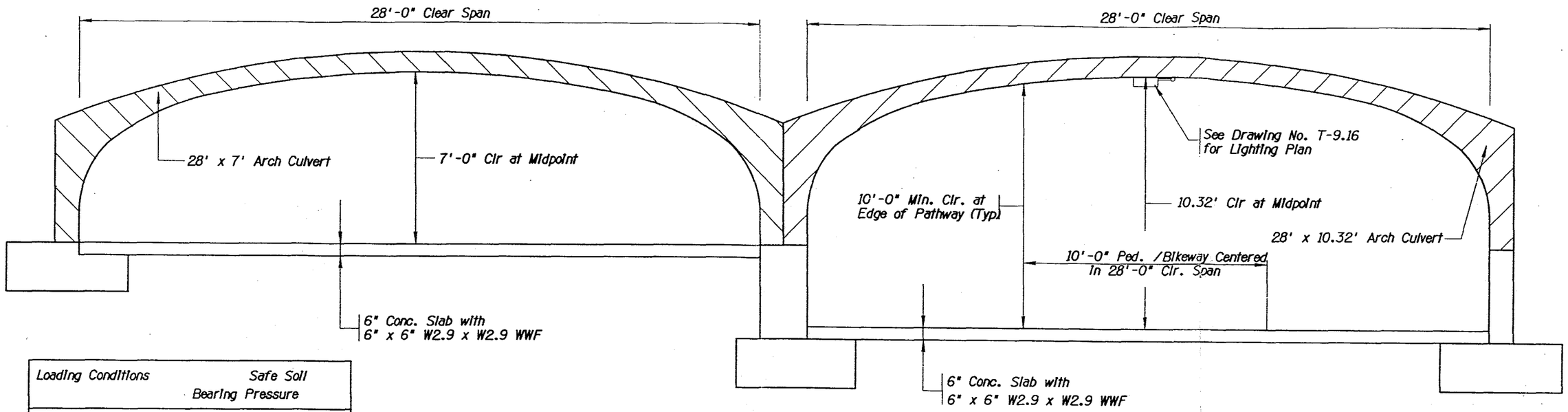
TRACS NO. H 2059 01C — 600-2-514 — ___ OF ___

SHEET NO.	REVISIONS	LOCATION	DATE

SPDOT17.DGN
oooooSYSTIMEoooooo
VIEW NAME:

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-2-514	287	775	

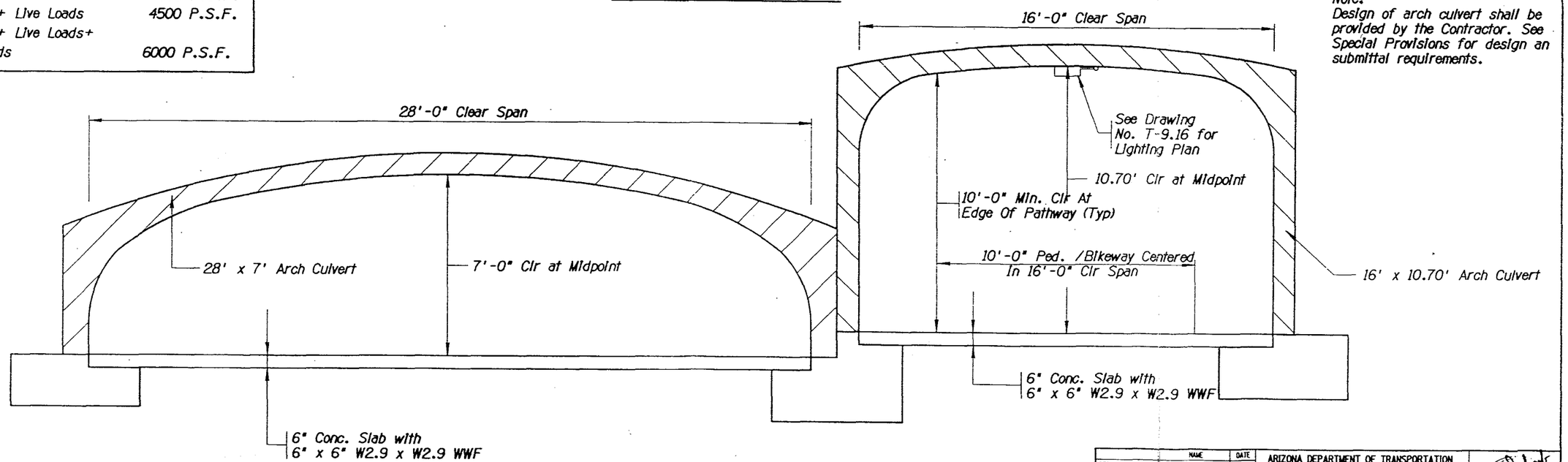
051 MA 009



Loading Conditions	Safe Soil Bearing Pressure
Dead Loads	4000 P.S.F.
Dead Load + Live Loads	4500 P.S.F.
Dead Load + Live Loads+ Seismic Loads	6000 P.S.F.

ARCH CULVERTS 402

Note:
Design of arch culvert shall be provided by the Contractor. See Special Provisions for design an submittal requirements.



ARCH CULVERTS 403

REDUCED SIZE DO NOT SCALE

	NAME	DATE
DESIGN	DJV	3/96
DRAWN	LJNC	3/96
CHECKED	DJS	3/96

BRW 3003 N. Central Ave. Suite 700 Phoenix, Arizona 85012 (602) 234-1591

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SR 51
ARCH CULVERT 402 & 403
DETAILS

ROUTE SR51 LOCATION SHEA BLVD - THUNDERBIRD RD

DWG NO. D-6.12

TRACS NO. H 2059 01C | 600-2-514 | OF

SPDDT18.DGN
ooooSYSTIMEoooooo

VIEW NAME:

SURVEY NO.	RED PLANS	REVISIONS	LOCATION	DATE

APPENDIX G

FINAL CONSTRUCTION PLANS

AS-BUILT PLANS

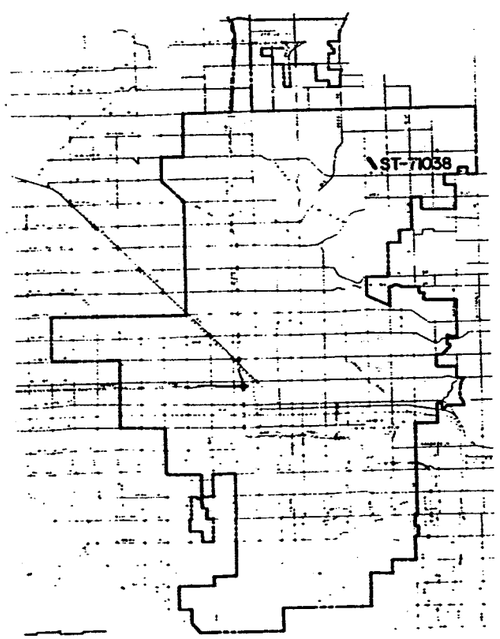
AZ-MC-16

CITY OF PHOENIX
ENGINEERING DEPARTMENT
STORM DRAIN

INDIAN BEND LOW FLOW CHANNEL

ST-71038.00

SWEETWATER AVE. Box Culvert
&
35th St. S.F.R. - Dip



VICINITY MAP

MAYOR
TIMOTHY A. BARROW

CITY COUNCIL

CALVIN C. GOODE
ROSENDO "ROSIE" GUTIERREZ
MARGARET T. HANCE
GARY PETER KLAHR
H.L. "JERRY" LEWKOWITZ
JIM WEEKS

CITY MANAGER — JOHN B. WENTZ
CITY ENGINEER & SUP'T OF STS. — JAMES E. ATTEBERY
STREET MAINT. DIRECTOR — GARY P. FARMER

APPROVALS:

ACTING CITY ENGINEER — DATE 1-21-74

STREET MAINTENANCE DIRECTOR — DATE 12/31/74

I HEREBY CERTIFY THAT THESE ARE OFFICIAL AS-BUILT PLANS

DATE 2-18-77

As-Built: R. J. Spiffel

Inspector: J. Ruiz

Party Chief: E. Rust

Contractor: J.W.J. Contr. Co.

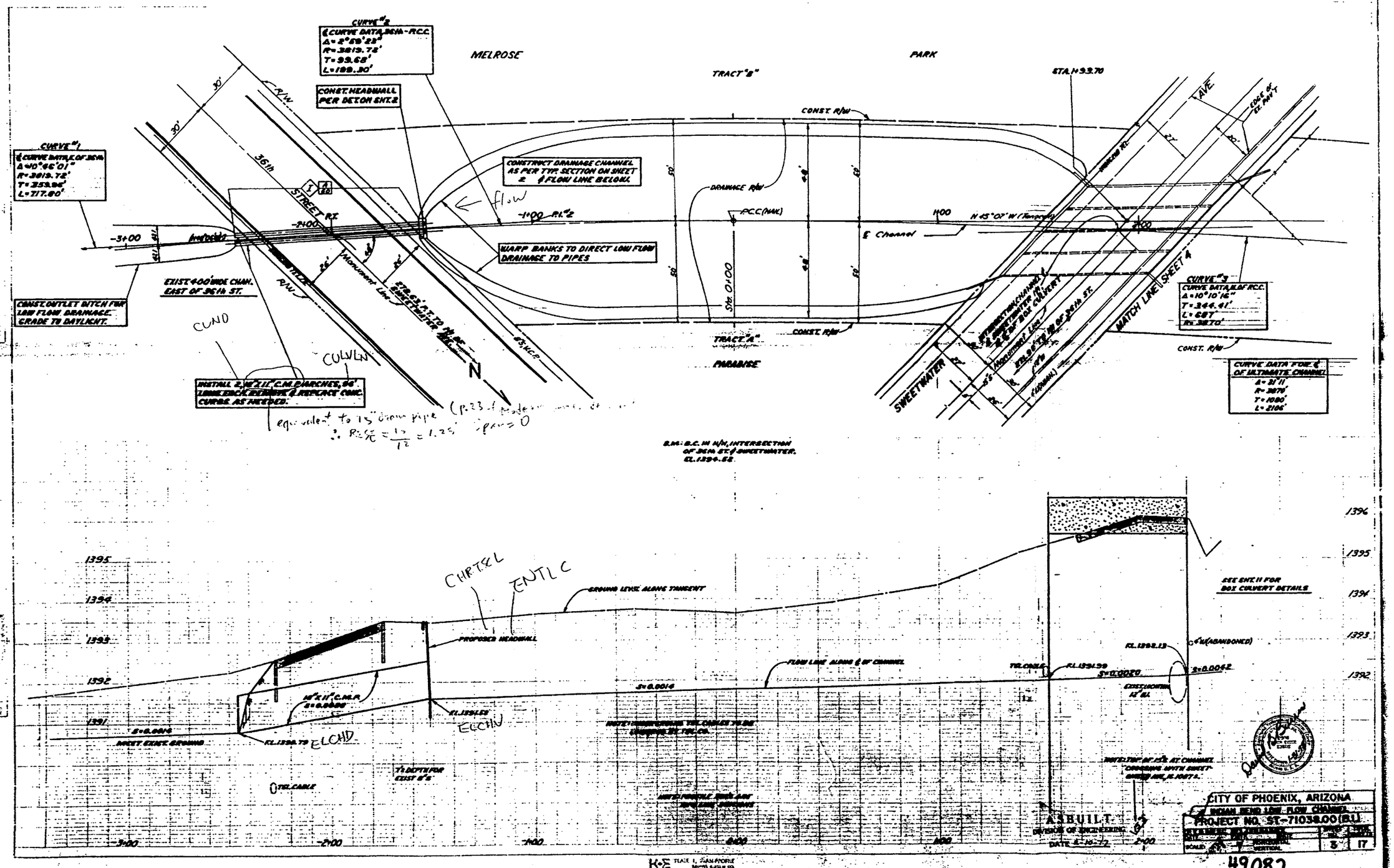
ST-71038.00

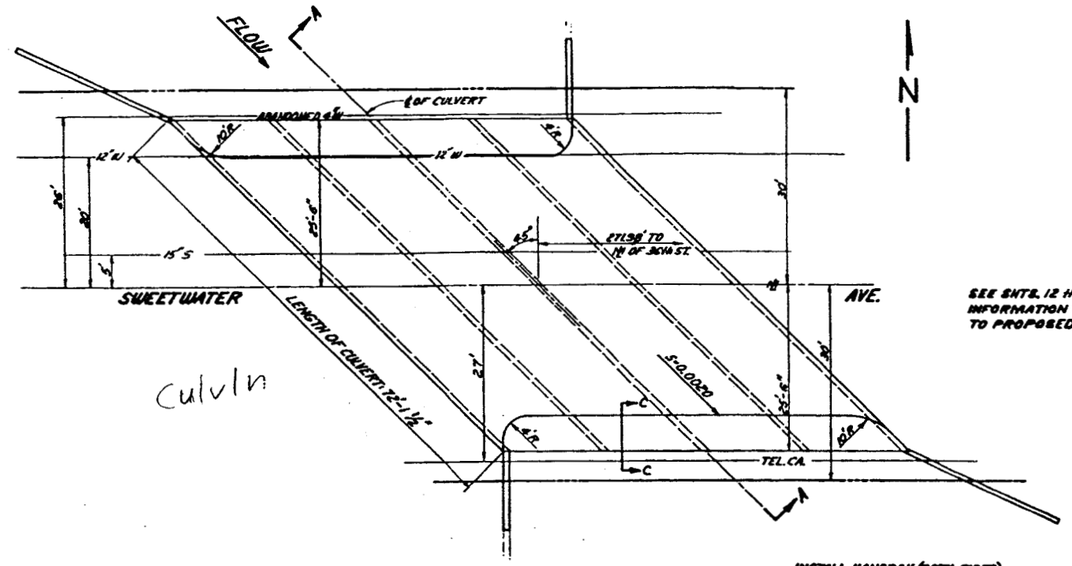
INDEX OF SHEETS

SHEET 1, COVER SHEET
SHEET 2, NOTES, KEY MAP, TYP. SECT., VARIOUS DETAILS
SHEETS 3-7, CHANNEL PLAN & PROFILE
SHEET 8, 35th ST. DIP SECTION
SHEET 9, SWEETWATER AVE. PLAN & PROFILE & WATER/SEWER LINE REBUILDING
SHEET 10, SWEETWATER AVE. DETOUR
SHEET 11-16, BOX CULVERT DETAILS
SHEET 17, HAND RAIL DETAILS

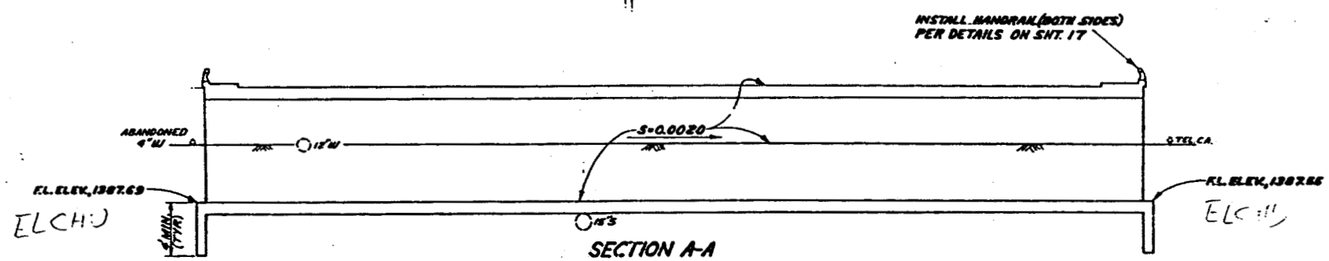
SHEET 1

	NO SERVICES WITHIN PROJECT	PLANS REVIEWED BY	REPORT RECEIVED
ARIZONA PUBLIC SERVICE			
SALT RIVER POWER DISTRICT			
SALT RIVER ASSOCIATION			
MT STATES TEL. & TEL. CO.			
COUNTY HIGHWAY DEP'T.			
ARIZ. STATE HIGHWAY DEP'T.			
WATER & SEWERS DEP'T.			

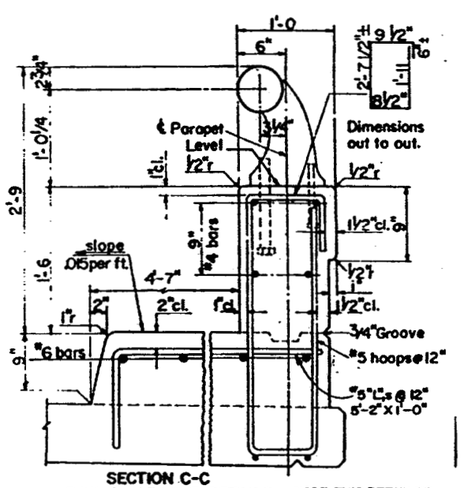

CURVE #2
℄ CURVE DATA, BCH-R.C.C.
Δ=2°59'23"
R=3813.72'
T=99.68'
L=199.30'
CONST. HEADWALL PER DETON SHT. 2
MELROSE
PARK
TRACT "B"
STA. 1+93.70
CONST. R/W
CURVE #1
℄ CURVE DATA, ℄ OF 36th
Δ=10°46'01"
R=3813.72'
T=359.96'
L=717.80'
36th
STREET
R/W
CONSTRUCT DRAINAGE CHANNEL AS PER TYP. SECTION ON SHEET 2 & FLOW LINE BELOW.
flow
-1+00 P.I. #2
DRAINAGE R/W
P.C.C. (NAK)
1+00
N 45°07' W (Temporary)
℄ Channel
-3+00
-2+00
Monument Line
WARP BANKS TO DIRECT LOW FLOW DRAINAGE TO PIPES
EXIST. 400' WIDE CHAN. EAST OF 36th ST.
CONST. OUTLET DITCH FOR LOW FLOW DRAINAGE. GRADE TO DAYLIGHT.
STA. 0+00
TRACT "A"
PARADISE
CULVERT
CULVLN
INSTALL 2, 18'x11' C.M. ARCHES, 66' LONG. BACK REMOVE & REPLACE CONC. CURBS AS NEEDED.
SWEETWATER
MATCH LINE SHEET 4
CURVE #3
CURVE DATA, ℄ OF R.C.C.
Δ=10°10'16"
T=344.41'
L=687'
R=3870'
CURVE DATA FOR ℄ OF ULTIMATE CHANNEL
Δ=31°11'
R=3870'
T=1080'
L=2106'
B.M.: B.C. IN H/H, INTERSECTION OF 36th St. & SWEETWATER. EL. 1394.58
1395
1394
1393
1392
1391
CHRTSL
ENTLC
GROUND LEVEL ALONG TANGENT
PROPOSED HEADWALL
SEE SHT. 11 FOR BOX CULVERT DETAILS
FLOW LINE ALONG ℄ OF CHANNEL
S=0.0014
S=0.0020
S=0.0042
EXIST. GROUND
ELCHD
ELCHN
TEL. CABLE
PROFILE
AS BUILT
DIVISION OF ENGINEERING
DATE 6-10-72
CITY OF PHOENIX, ARIZONA
INDIAN BEND LOW FLOW CHANNEL
PROJECT NO. ST-71038.00(B.L.)
SCALE 1" = 7'
HORIZONTAL
VERTICAL
SHEET 3
TOTAL SHEETS 17
49082



SEE SHTS. 12 thru 17 FOR INFORMATION THAT PERTAINS TO PROPOSED BOX CULVERT.

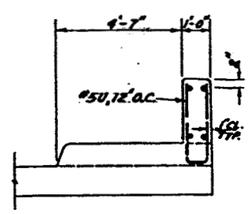


4-SPAN, 10'X8' BOX CULVERT, 45° SKEW LEFT

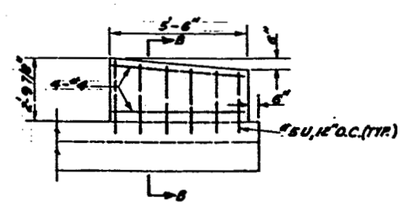


SECTION C-C
S/W & PARAPET DETAILS
Scale: 1 1/2" = 1'-0

NOTE: THIS DETAIL REPLACES PARAPET DET. ON SHT 17.



SECTION B-B



DADO DETAIL
3/8" = 1'-0"

ASBUILT
DIVISION OF ENGINEERING
DATE 2-10-77

CITY OF PHOENIX, ARIZONA				
INDIAN BEND LOW FLOW CHANNEL				
PROJECT NO. ST-71038.00 (B.L.)				
DESIGNED	DRAWN A.S.A.	CHECKED	SHEET NO.	TOTAL SHEETS
DATE	TRACED		11	17
SCALE: 1" =	HORIZONTAL / VERTICAL	7090		

APPENDIX H

APPLICATION/CERTIFICATION FORMS

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)
   - _X_ **Physical change**
     - __ Existing
     - _X_ **Proposed**
   - __ Improved methodology
   - __ Improved data
   - __ Floodway revision
   - __ Other

     Explain **Proposed Channelization of 7850' of Indian Bend Wash, 40th Street to Hearn Road.**
2. Flooding Source: **Indian Bend Wash**
3. Project Name/Identifier: **Indian Bend Wash Channelization**
4. FEMA zone designations affected: **A3 and A6**

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)
5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy, City	Harris, Fort	TX	480301	0005D	02/08/83
040051	**Phoenix, City**	**Maricopa**	**AZ**	**0413C1680F**	**1680F**	
040051	**Phoenix, City**	**Maricopa**	**AZ**	**0413C1660F**	**1660F**	

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding

_X_ **Riverine**
__ Coastal
__ Alluvial Fan
__ Shallow Flooding *(e.g. Zones AO and AH)*
__ Lakes

Affected by wind/wave action
__ Yes
__ No

__ Other (describe)

Structures

_X_ **Channelization**
__ Levee/Floodwall
_X_ **Bridge/Culvert**
__ Dam
__ Coastal
__ Fill
__ Pump Station
__ None
__ Channel Relocation
_X_ **Excavation**
__ Other (describe)

Disciplines*

_X_ **Water Resources**
- __ Hydrology
- _X_ **Hydraulics**
- __ Sediment Transport
- __ Interior Drainage

__ Structural
__ Geotechnical
__ Land Surveying
__ Other (*describe*)

*Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? _X_ Yes __ No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? _X_ Yes __ No

   If yes, give reason: **Proposed Channelization, will contain 100-year discharge.**

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?___Yes X No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

3. PROPOSED ENCROACHMENTS

10. With floodways:

    1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? X Yes __ No

    1B. If yes, does the development cause the 100-year water-surface elevation to increase at any location by more than 0.000 feet? __ Yes X No

11. Without floodways:

    2A. Does the revision request involve fill, new construction, substantial improvement, or other develop-ment in the 100-year floodplain? __ Yes __ No

    2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water-surface elevation to increase at any location by more than one foot (*or other surcharge limit if community or state has adopted more stringent criteria)?* __ Yes __ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision X is __ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? X Yes __ No
14. Does this revision request have the endorsement of the community? X Yes __ No

If no to either of the above questions, please explain:

Please note that community acknowledgment and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? X Yes __ No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by **City of Phoenix** (entity)

with a maximum interval of _____ months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by **City of Phoenix** (entity)

to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, __ has X has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for _X_ performing _X_ overseeing compliance with the maintenance and operation plans of the **Indian Bend Wash Channelization**
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans **(Yet to be developed)**

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials," dated January 1990, this request is for a:

_X_a	CLOMR	A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72)*.
___b.	LOMR	A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. I Parts 60 and 65.)*
___c.	PMR	A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. I, Parts 60 and 65.)*
___d.	Other:	Describe:

8. FORMS INCLUDED

17. Form 2 entitled, "Certification by Registered Professional Engineer and/or Land Surveyor" must be submitted.

The following forms should be included with this request if (check the included forms):

1.	Hydrologic analysis for flooding source differs from that used to develop FIRM	__ Hydrologic Analysis Form (Form 3)
2.	Hydraulic analysis for riverine flooding differs from that used to develop FIRM	_X_ Riverine Hydraulic Analysis Form (Form 4)
3.	The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	_X_ Riverine/Coastal Mapping Form (Form 5)
4.	The request involves any type of channel modification	_X_ Channelization Form (Form 6)
5.	The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	_X_ Bridge/Culvert Form (Form 7)
6.	The request involves a new revised levee/floodwall system	__ Levee/Floodwall System Analysis Form (Form 8)
7.	The request involves analysis of coastal flooding	__ Coastal Analysis Form (Form 9)
8.	The request involves coastal structures credited as providing protection from the 100-year flood	__ Coastal Structures (Form 10)
9.	The request involves an existing, proposed, or modified dam	__ Dam Form (Form 11)
10.	The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	__ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included.
    X Yes __ No
    Initial fee amount: $ 3,100.00

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project.
    __ Yes X No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazards, or solely to provide more detailed data.
    __ Yes __ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.	Note: Signature indicates that the community understands, from the revision requestor, the impacts of the revision on flooding conditions in the community.
Dennis L. Richards Signature of Revision Requestor	Signature of Community Official
Dennis L. Richards, P. E., Vice President Printed Name and Title of Revision Requestor	Michael S. Elligood, P.D., Chief Engineer and General Manager, Flood Control District of Maricopa County Printed Name and Title of Community Official
Simons, Li & Associates, Inc. Company Name	City of Phoenix, Arizona Community Name
(602) 491-1393 Telephone No. Date	Date

Does this request impact any other communities: __ Yes X No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included: X Yes __ No
Initial fee amount: $ 3,100.00

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. ___ Yes ___ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazards, or solely to provide more detailed data. ___ Yes ___ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.	**Note:** Signature indicates that the community understands, from the revision requestor, the impacts of the revision on flooding conditions in the community.
Dennis L. Richards Signature of Revision Requestor	Signature of Community Official
Dennis L. Richards, P. E., Vice President Printed Name and Title of Revision Requestor	**Ray Acuna, Floodplain Manager** Printed Name and Title of Community Official
Simons, Li & Associates, Inc. Company Name	**City of Phoenix, Arizona** Community Name
(602) 491-1393 1/14/98 Telephone No. Date	Date

Does this request impact any other communities: __ Yes X No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2
2. I am licensed with an expertise in: **Hydrology, Hydraulics, Sediment Transport and Interior Drainage.** [example: water resources (*hydrology, hydraulics, sediment transport, interior drainage*)* structural, geotechnical, land surveying.]
3. I have __27__ years experience in the expertise listed above.
4. I have __ prepared _X_ reviewed the attached supporting data and analyses related to my expertise.
5. I _X_ have __ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified: **Hydraulics**
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply) **N/A CLOMR**

   a. __ Viewed all phases of actual construction.
   b. __ Compared plans and specifications with as-built survey information.
   c. __ Examined plans and specifications and compared with completed projects.
   d. __ Other:

8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: **Dennis L. Richards**

Title: **Vice President**

Registration No.: **21560** Expiration Date: **3/31/98**

State: **Arizona**

Type of License: **Civil Engineer**

Dennis L. Richards
Signature

JANUARY 14, 1998
Date

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21560
DENNIS L.
RICHARDS
Date Signed.....
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline
Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**
(One form for each flooding source)

Project Name/Identifier: **Indian Bend Wash Channelization**

1. REACH TO BE REVISED

Downstream Limit: **40th Street**

Upstream Limit: **32nd Street**

2. EFFECTIVE FIS

__ Not studied

__ Studied by approximate methods

Downstream limit of study:
Upstream limit of study:

_X_ Studied by detailed methods

Downstream limit of study: **40th Street**
Upstream limit of study: **32nd Street**

_X_ Floodway delineated

Downstream limit of Floodway: **40th Street**
Upstream limit of Floodway: **32nd Street**

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM? (*Check all that apply*)

__ Not studied in FIS

__ Improved hydrologic data/analysis. Explain:

__ Improved hydraulic analysis. Explain:

_X_ Flood control structure. Explain: **Channelization/excavation of a new channel, 40th Street to Hearn Road.**

__ Other. Explain:

3. RIVERINE HYDRAULIC ANALYSIS FORM
Models Submitted

For areas which have detailed flooding:
Full input and output listings along with files on diskette (*if available*) for each of the models listed below (items 1, 2, 3, 4, and 5) and summary of the source of input parameters used in the models must be provided. The summary must include a complete description of any changes made from model to model (*e.g., duplicate effective model to corrected effective model*). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

For areas which do not have detailed flooding:
Only the 100-year flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 below must be submitted.

	Natural	Floodway
1. Duplicate Effective Model Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (*10-, 50-, 100-, and 500-year multi-profile runs and the floodway run*) must be obtained and then reproduced on the requestor's equipment to produce the duplicate effective model. This is required to assure that the effective model input data has been transferred correctly to the requestor's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.	_	_
2. Corrected Effective Model The corrected effective model is the model that corrects any errors that occur in the duplicate effective model, adds any additional cross sections to the duplicate effective model, or incorporates more detailed topographic information than that used in the currently effective model. The corrected effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.	_	_
3. Existing or Pre-Project Conditions Model The duplicate effective or corrected model is modified to produce the existing or pre-project conditions model to reflect any modifications that have occurred within the floodplain since the date of the effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the corrected effective or duplicate effective model.	X	_
4. Revised or Post-Project Conditions Model The existing or pre-project conditions model (*or duplicate effective or corrected effective model, as appropriate*) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for proposed project this model should reflect proposed conditions.	X	X
5. Other: Please attach a sheet describing all other models submitted.	_	_

6. Hydraulic Analyses (only if hydraulic models are not developed) Please attach all calculations for the existing or pre-project conditions and the revised or post-project conditions. Proceed to Form 5 "Riverine/Coastal Mapping Form."

4. MODEL PARAMETERS (from model used to revise 100-year water-surface elevation)

1. Discharges:	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	**2400 cfs**	**6000 cfs**
500-year		

Attach diagram showing changes in 100-year discharge

2. Explain how the starting water-surface elevations were determined: **From November, 1997, LOMR request for Indian Bend Wash, Salt River to 40th Street, adjusted to project datum at 40th Street.**

3. Give range of friction loss coefficients (Manning's "n") Channel.....**0.035**.....
Overbanks.....**0.040**.....

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

Location	FIS	Revised

Explain:

4. Describe how the cross section geometry data were determined (*e.g., field survey, topographic map, taken from previous study*) and list cross sections that were added.

Design plans prepared by BRW, Inc., based on concept developed by Michael Baker, Jr., Inc., and DTM topographic mapping.

5. Were natural channel banks selected as the location of the left and right channel banks in this model?

_X_ Yes __ No If no, explain why not:

4. MODEL PARAMETERS (Cont'd)

6. Explain how reach lengths for channel and overbanks were determined:

Based on channel geometry of proposed design conditions and change in discharge.

5. RESULTS (from model used to revise 100-year water-surface elevations)

1. Do the results indicate:	
a. Water-surface elevations higher than end points of cross sections?	__ Yes _X_ No
b. Supercritical depth?	_X_ Yes __ No
c. Critical depth?	_X_ Yes __ No
d. Other unique situations	__ Yes _X_ No

If yes to any of the above, attach an explanation that discusses the situation and how it is presented on the profiles, tables, and maps. **See Sections 5.5.1 and 5.5.6 of the TDN report.**

2. What is the maximum change in energy gradient between cross sections?:	**4.96 ft.**
3. What is the distance between the cross sections in 2 above?:	**160 ft.**
5. Floodway determination	
a. What is the maximum surcharge allowed by the community or State?	**1.0 foot**
b. What is the maximum surcharge for the revised conditions?	**1.0 foot**
Specify location	**Sec. 9731**
c. What is the maximum velocity?	**13.3 fps**
Specify location	**Sec. 4573**
d. Are there any negative surcharge values at any cross section? If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.	_X_ Yes __ No

Explain:

The floowday boundaries have been set to coincide with the channel excavation limits. The maximum negative surcharge is 0.1 foot.

5. RESULTS (Cont'd)

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? ___ Yes __X__ No

   If Yes, explain:

7. Do 100-year water-surface elevations increase at any location? ___ Yes __X__ No

   If yes, please attach a list of the locations where the increases occur, state whether or not the increases arelocated on the requestor's property, and provide an explanation of the reason for the increases. *(For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits.)*

Please attach a completed comparison table entitled: Water-Surface Elevation Check (See page 6)

6. REVISED FIRM/FBFM AND FLOOD PROFILES

A. The revised water surface elevations tie into those computed by the effective FIS Model (*10-, 50-, 100-, and 500-year*), downstream of the project at cross section __N/A___ within _____ feet *(vertical)* and upstream of the project at cross section _____ within _____ feet *(vertical)*.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section __N/A__within ____ feet *(vertical)* and upstream of the project at cross section _____ within _____feet *(vertical)*.

C. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studies (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets.

D. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report.

Proceed to Riverine/Coastal Mapping Form

FEDERAL EMERGENCY MANAGMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODIND SOURCE	PROJECT NAME /IDENTIFIER
City of Phoenix	Indian Bend Wash	Indian Bend Wash Channelization

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]
AY	1385.70	1386.20	0.5							1383.6			1383.6	1383.8	0.2
AZ	1388.60	1388.60	0.0							1385.9			1385.5	1385.4	-0.1
BA	1391.50	1391.50	0.0							1390.5			1388.6	1388.5	-0.1
BB	1398.10	1398.20	0.1							1397.5			1396.5	1396.5	0.0
BC	1399.90	1400.00	0.1							1399.9			1397.1	1397.1	0.0
BD	1404.30	1404.30	0.0							1402.6			1398.8	1398.8	0.0
BE	1407.30	1407.50	0.2							1405.9			1401.0	1401.0	0.0
BF	1411.90	1411.90	0.0							1410.7			1405.8	1405.9	0.1
BG	1413.70	1414.00	0.3							1412.6			1412.7	1413.5	0.8
BH	1414.80	1415.20	0.4							1414.4			1414.3	1415.0	0.7
BI	1418.00	1418.00	0.0							1417.6			1417.6	1418.5	0.9

COMMENTS:

1-100-year (natural) Water Surface Elevation 2-Encroachment (floodway) Water Surface Elevation 3-Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE/COASTAL MAPPING FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. MAPPING CHANGES

1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing (*indicate N/A when not applicable*):

	Included
A. Revised approximate 100-year floodplain boundaries (Zone A)	__ Yes __ No X N/A
B. Revised detailed 100- and 500-year floodplain boundaries	X Yes __ No __ N/A
C Revised 100-year floodway boundaries	X Yes __ No __ N/A
D. Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	X Yes __ No __ N/A
E. Stream alignments, road and dam alignments	X Yes __ No __ N/A
F. Current community boundaries	X Yes __ No __ N/A
G. Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map	X Yes __ No __ N/A
H. Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	X Yes __ No __ N/A
I. The requestor's property boundaries and community easements	X Yes __ No __ N/A
J. The signed certification of a registered professional engineer	X Yes __ No __ N/A
K. Location and description of reference marks	X Yes __ No __ N/A
L. Vertical datum (example: NGVD, NAVD, etc.)	X Yes __ No __ N/A
M. Coastal zone designations tie into adjacent areas not being revised	__ Yes __ No X N/A
N. Location and alignment of all coastal transects used to revise the coastal analyses	__ Yes __ No X N/A

If any of the items above are marked no or N/A, please explain: **No Zone A (Approximate Means). Project not in Coastal Zone.**

2. What is the source and date of the updated topographic information (*example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.*)? **Aerial DTM, June 1994**

3. What is the scale and contour interval of the following work maps?

   a. Effective FIS **Not Applicable** scale _____ Contour interval
   b. Revision Request **1" = 200'** scale **1 ft.** Contour interval

   NOTE: Revised topographic information must be of equal or greater detail.

4. Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100-year and500-year floodplains and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revision or adjacent to the area of revision for coastal studies.

Attach additional pages if needed.

1. MAPPING CHANGES (Cont'd)

5. Flood Boundaries and 100-year water surface elevations:

   Has the 100-year floodplain been shifted or increased or the 100-year water surface elevation increased at any location on property other than the requestor's or community's? __ Yes _X_ No

   If yes, please give the location of shift or increase and an explanation for the increase.

a. Have the affected property owners been notified of this shift or increase and the effect it will have on their property? __ Yes __ No

   If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries if a LOMR is being requested.

b. What is the number of insurable structures that will be impacted by this shift or increase?

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM: _X_ Yes __ No

   If yes, explain:

   Floodway boundary is coincident with excavation limit in channelized reach.

7. If a V-zone has been designated, has it been delineated to extend landward to the heel of the primary frontal dune? __ Yes __ No

   If no, explain: **N/A**

8. Manual or digital map submission:

   __ Manual

   _X_ Digital

Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance of submission as possible.

2. EARTH FILL PLACEMENT

1. *The fill is:* ___ Existing _X_ Proposed

Berm required to provide one-foot freeboard between Sweetwater Avenue and 35th Street.

2. Has fill been/will be placed in the regulatory floodway? __ Yes _X_ No

   If yes, please attach completed Riverine Hydraulic Analysis Form.

3. Has fill been/will be placed in floodway fringe (*area between the floodway and 100-year floodplain boundaries*)?
   ___ Yes _X_ No

If yes, then complete A, B, C, and D below.

A. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? __ Yes __ No

   If yes, justify steeper slopes:

B. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.*)
   ___ Yes ___ No

   If no, describe erosion protection provided:

C. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? __ Yes __ No

D. Can structures conceivably be constructed on the fill at any time in the future? __ Yes __ No

   If yes, provide certification of fill compaction (item C. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been/will be placed in a V-zone? **N/A** _ Yes __ No

   If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? __ Yes __ No

   If yes, attach the coastal structures form.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. EXTENT OF CHANNELIZATION

Downstream limit: **40th Street**

Upstream limit: **Hearn Road**

2. CHANNEL DESCRIPTION

1. Describe the inlet to the channel:

   Drop section downstream of existing roadway dip crossing at Hearn Road.

2. Briefly describe the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

   Trapezoidal section: 40 - 50 foot bottom width, 8 foot depth, 4:1 side slopes. Soil cement between 36th Street and Sweetwater Avenue and at Hearn Road. Grass pavers between Thunderbird Road and SR-51. Grass-lined elsewhere.

3. Describe the outlet from the channel:

   Daylight onto existing roadway dip crossing at 40th Street.

4. The channelization includes:

   __ Levees *(Attach Levee Form)*
   __ Drop structures
   __ Superelevated sections
   X Transitions in cross sectional geometry
   __ Debris basin/detention basin
   __ Energy dissipater
   __ Other:

5. Attach the following: **See report for details.**

   a. Certified engineering drawings showing channel alignment and locations of inlet, outlet, and items checked in item 4

   b. Typical cross sections and profiles of channel banks and invert

3. HYDRAULIC CONSIDERATIONS

1. What is the 100-year discharge? **2400 to 6000 cfs**

2. Do the cross sections in the hydraulic model match the typical cross sections in the plans? X Yes __ No

3. Are the channel banks higher than the 100-year flood elevations everywhere? X Yes __ No

4. Are the channel banks higher than the 100-year flood energy grade lines everywhere? X Yes __ No

5. Is the land on both sides of the channel above the adjacent 100-year flood elevation at all points along the channel? X Yes __ No

6. What is the range of freeboard? **1.0 - 5.3 ft.**

7. What is the range of 100-year flood velocities? **2.37 - 13.31 ft./sec.**

8. What is the lining type? (both bottom and sides): **Grass unit pavers, grass lined, and soil cement.**

   Explain how the channel lining prevents erosion and maintains channel stability *(attach documentation)*:

   City of Phoenix to maintain channel.

9. What is the design elevation in the channel based on?

   X Subcritical flow
   __ Critical flow
   __ Supercritical flow
   __ Energy grade line

   Is 100-year flood profile based on the above type of flow? X Yes __ No

   If no, explain:

10. Is there the potential for a hydraulic jump at the following locations?

    Inlet to channel X Yes __ No
    Outlet of channel __ Yes X No
    At Drop Structures __ Yes X No
    At Transitions __ Yes X No
    Other locations. Explain:

    If the answer to any of the above is yes, please explain how the hydraulic jump is controlled and the effects of the hydraulic jump on the stability of the channel.

    Explain:

    The potential hydraulic jump is controlled by the tailwater depth at Section 8690. The channel is lined with soil-cement in the area of the potential jump.

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water-surface elevations and/or the capacity of the channel?__ Yes _X_ No

   B. Based on the conditions of the watershed and stream bed, is there a potential for sediment transport (including scour and deposition) to affect the 100-year water-surface elevations and/or the capacity of the channel?__ Yes _X_ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment (bed) load?

   _____ cfs (attach gradation curve)

   Explain method used to estimate load:

   B. Is the 100-year flood velocity anywhere within the channel less than the 100-year flood velocity of the inlet?__ Yes __ No

   C. Will sediment accumulate anywhere within the channel?__ Yes __ No

   D. Will deposition or scour occur at or near the inlet?__ Yes __ No

   E. Will deposition or scour occur at or near the outlet?__ Yes __ No

Attach documentation showing affects on the Hydrologic and Hydraulic Analyses

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. IDENTIFIER

1 Name of roadway, railroad, etc.: **36th Street**

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): **Sta. 4190 (per BRW., Inc. See attached report).**

3. This revision reflects *(check one of the following):*

_X_ New bridge/culvert not modeled in the FIS

___ Modified bridge/culvert previously modeled in the FIS

___ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) **6 barrel 12' x 8 ' x 66' RCBC**

2. Entrance geometry of culvert/type of bridge opening (e.g, 30 - 75 wing walls with square top edge, sloping embankments, and vertical abutments) **FHWA chart 11-box culvert, skewed headwall, chamfered inlet-scale 4 headwall skewed 10° to 45°.**

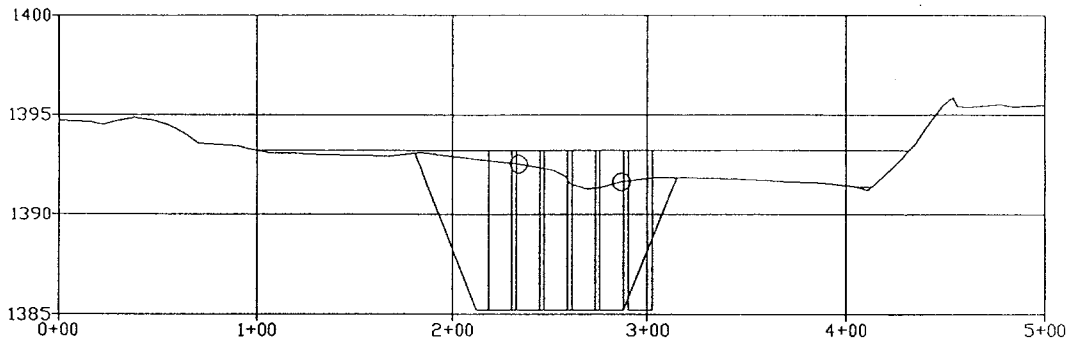
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* **HEC-2 with special culvert routine.**

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A. *One form per new/revised bridge/culvert

3. ANALYSIS

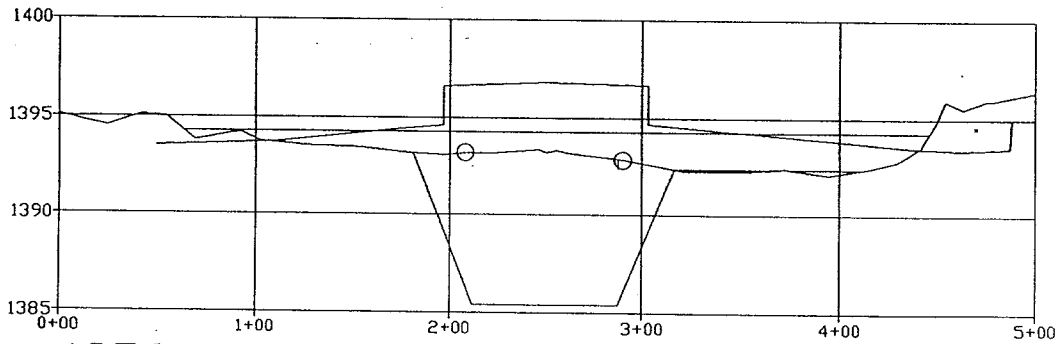
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



4190

DOWNSTREAM FACE OF 36TH STREET CULVERT
6-12'x8' CONCRETE BOX CULVERT
ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

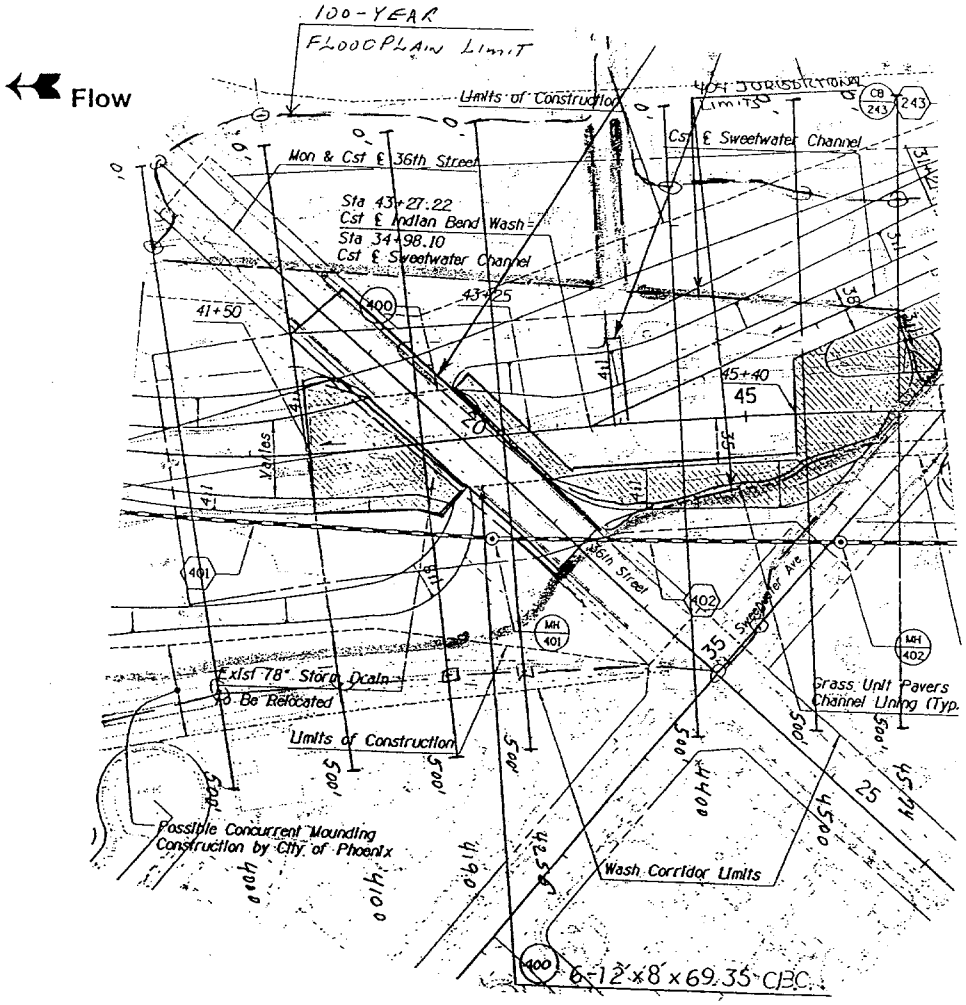


4256

UPSTREAM FACE OF 36TH STREET CULVERT
6-12'x8' CONCRETE BOX CULVERT
ROADWAY OVERFLOW OCCURS DURING THE 100-YEAR EVENT

3. ANALYSIS (Cont'd)

Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	**66'**
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	**576 sq. ft.**
Total culvert/bridge area (ft^2)	**576 sq. ft.**

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks	Left Overbank	Right Overbank
Upstream face	**1392.50**	**1392.39**
Downstream face	**1391.50**	**1391.39**

Minimum Top of Road Elevation	Left Overbank	Right Overbank
Upstream face	**1393.39**	**1393.39**
Downstream face	**1393.39**	**1393.39**

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	**1394.59**	**1395.03**
Downstream face	**1392.77**	**1393.55**

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		**5547**	**482**	**6000**
The maximum depth of flow over the roadway/railroad (ft.)			**1.2**	
Weir length (ft.)			**222**	

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	**394.89**	**394.89**	**210.0**
Downstream face	**245.71**	**245.71**	**188.73**

3. ANALYSIS (Cont'd)

Loss Coefficients	
Entrance loss coefficient	0.30
Manning's "n" value assigned to the structure(s)	0.013
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	
Weir coefficient	2.63
Pier coefficient	
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ___ Yes _X_ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/o conveyance capacity through the bridge/culvert? ___ Yes _X_ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B Will sediment accumulate anywhere through the bridge/culvert? ___ Yes ___ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run)

Method 1.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations):*

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. IDENTIFIER

1 Name of roadway, railroad, etc.: **Sweetwater Avenue**

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): **Sta. 4574 (per BRW., Inc. See attached report).**

3. This revision reflects *(check one of the following):*

___ New bridge/culvert not modeled in the FIS

_X_ Modified bridge/culvert previously modeled in the FIS

___ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) **6 barrel 10' x 8 ' x 72' RCBC**

2. Entrance geometry of culvert/type of bridge opening (e.g, 30 - 75 wing walls with square top edge, sloping embankments, and vertical abutments) **FHWA chart 11-box culvert, skewed headwall, chamfered inlet-scale 4 headwall skewed 10° to 45°.**

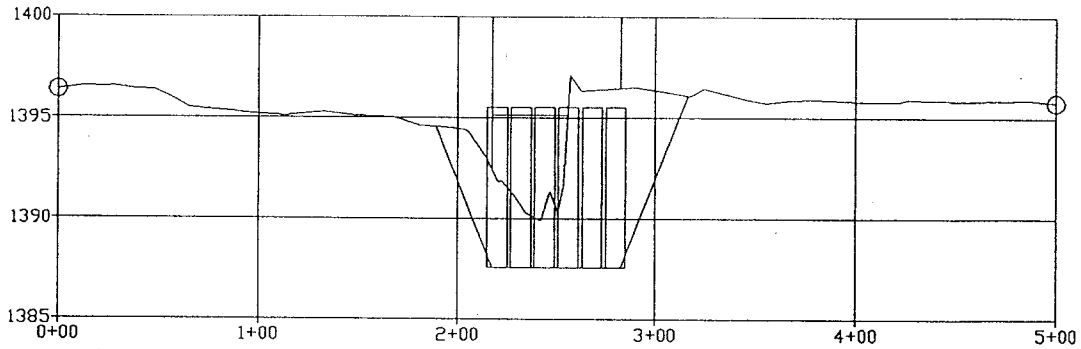
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* **HEC-2 with special culvert routine.**

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A. *One form per new/revised bridge/culvert

3. ANALYSIS

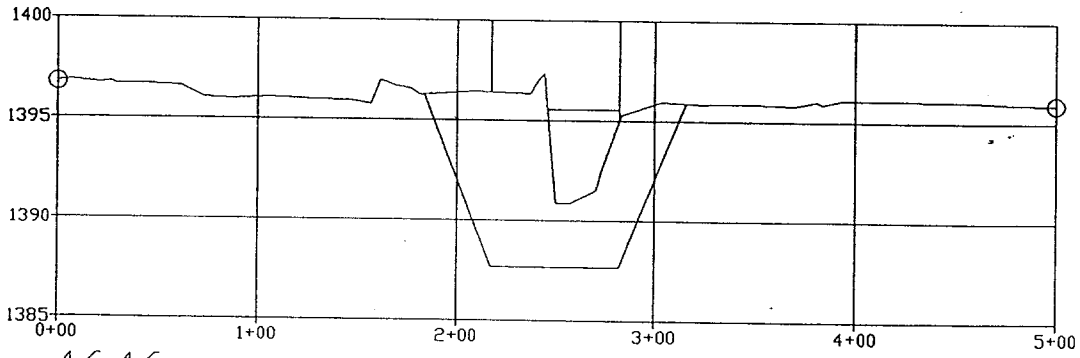
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



4574

DOWNSTREAM FACE OF SWEETWATER AVENUE CULVERT
EXISTING 4-10'x8' CBC PLUS 2-10'X8'

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

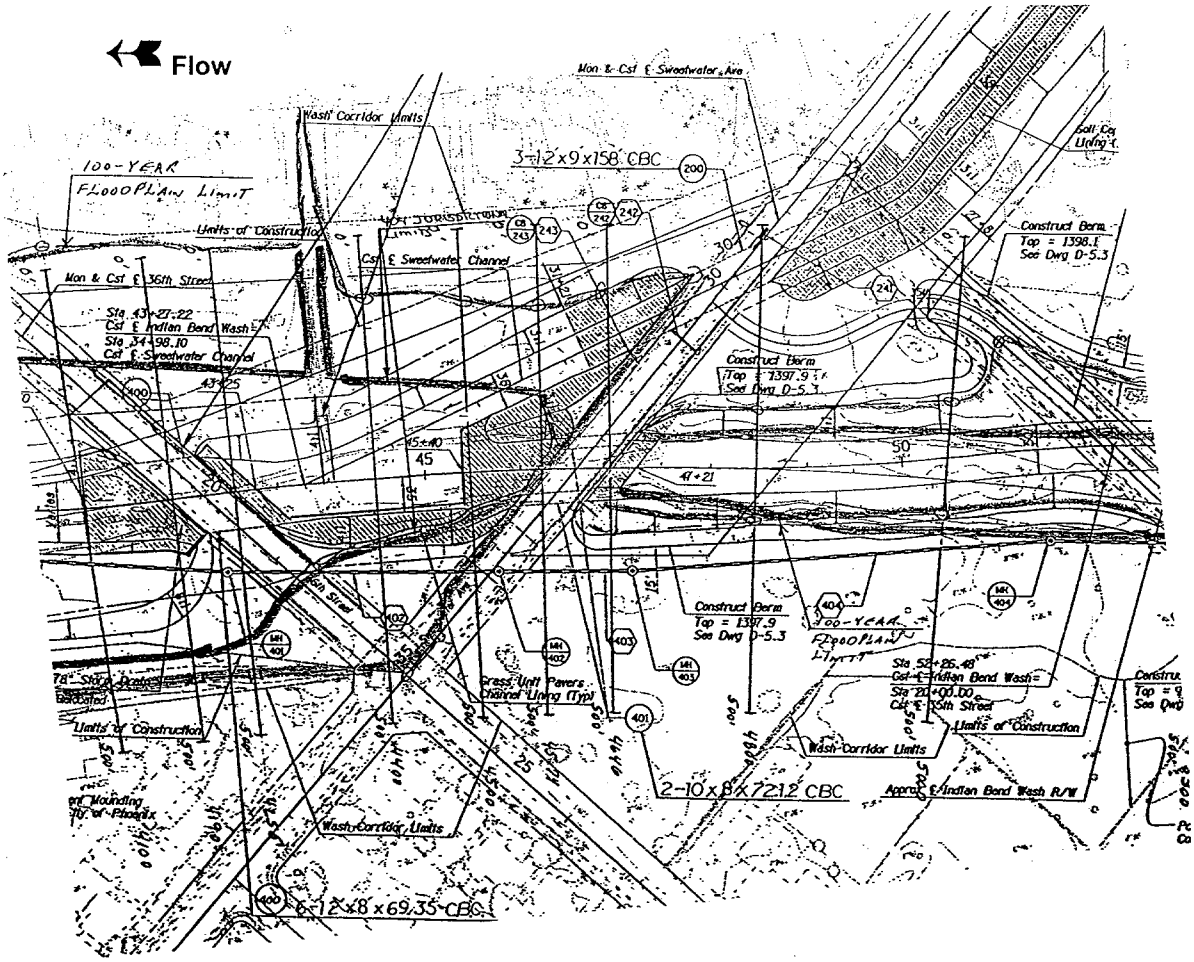


4646

UPSTREAM FACE OF SWEETWATER AVENUE CULVERT
EXISTING 4-10'x8' CBC PLUS 2-10'X8'

3. ANALYSIS (Cont'd)

Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	**72.12'**
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	**480 sq. ft.**
Total culvert/bridge area (ft^2)	**480 sq. ft.**

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks	Left Overbank	Right Overbank
Upstream face	**1400**	**1400**
Downstream face	**1400**	**1400**

Minimum Top of Road Elevation	Left Overbank	Right Overbank
Upstream face	**1398**	**1398**
Downstream face	**1398**	**1398**

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	**1396.53**	**1396.81**
Downstream face	**1396.29**	**1396.57**

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		**2400**		**2400**
The maximum depth of flow over the roadway/railroad (ft.)				
Weir length (ft.)				

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	**65**	**65**	**65**
Downstream face	**65**	**65**	**65**

3. ANALYSIS (Cont'd)

Loss Coefficients	
Entrance loss coefficient	0.20
Manning's "n" value assigned to the structure(s)	0.013
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	
Weir coefficient	2..63
Pier coefficient	
Contraction loss coefficient	0.1
Expansion loss coefficient	0.3

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ___ Yes _X_ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/o conveyance capacity through the bridge/culvert? ___ Yes _X_ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B Will sediment accumulate anywhere through the bridge/culvert? ___ Yes ___ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run)

Method 1.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations):*

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. IDENTIFIER

1 Name of roadway, railroad, etc.: **Thunderbird Avenue**

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): **Sta. 7569 (per BRW., Inc. See attached report).**

3. This revision reflects *(check one of the following):*

_X_ New bridge/culvert not modeled in the FIS

___ Modified bridge/culvert previously modeled in the FIS

___ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) **1 -28' x 7' x 126' RC Arch 1 - 28' x 10' x 126' RC Arch (per BRW, Inc., modeled as 2 - 28' x 7.63' x 127' CBC).**

2. Entrance geometry of culvert/type of bridge opening (e.g, 30 - 75 wing walls with square top edge, sloping embankments, and vertical abutments) **FHWA chart 11-box culvert, skewed headwall, chamfered inlet-scale 4 headwall skewed 10° to 45°.**

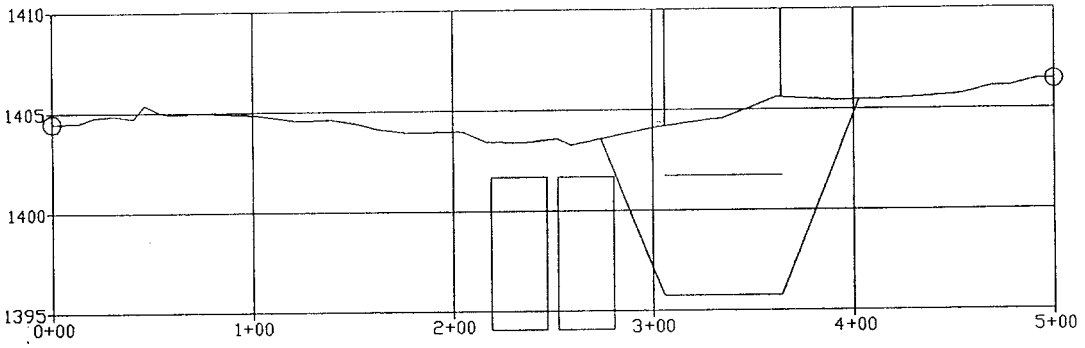
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* **HEC-2 with special culvert routine.**

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A. *One form per new/revised bridge/culvert

3. ANALYSIS

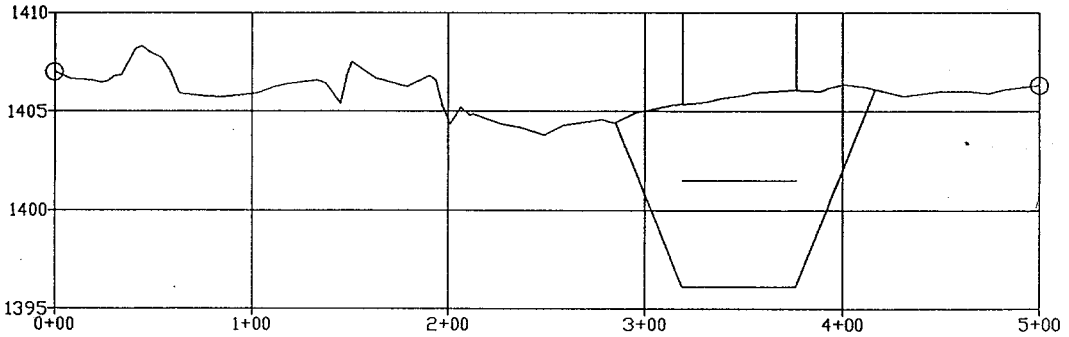
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



7569

DOWNSTREAM FACE OF THUNDERBIRD ROAD CULVERT
1-28'x7' CONCRETE ARCH PLUS 1-28'x10.32 CONCRETE ARCH
CROWN ELEVATIONS OF ARCHES ARE THE SAME, THE 28'X7' ARCH HAS
FLOW LINE ELEVATIONS OF 1395.74 OUTLET, 1396.12 INLET
THIS HEC-2 MODELS THE TWO ARCHES AS 2-28'x7.63' CONCRETE ARCHES

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



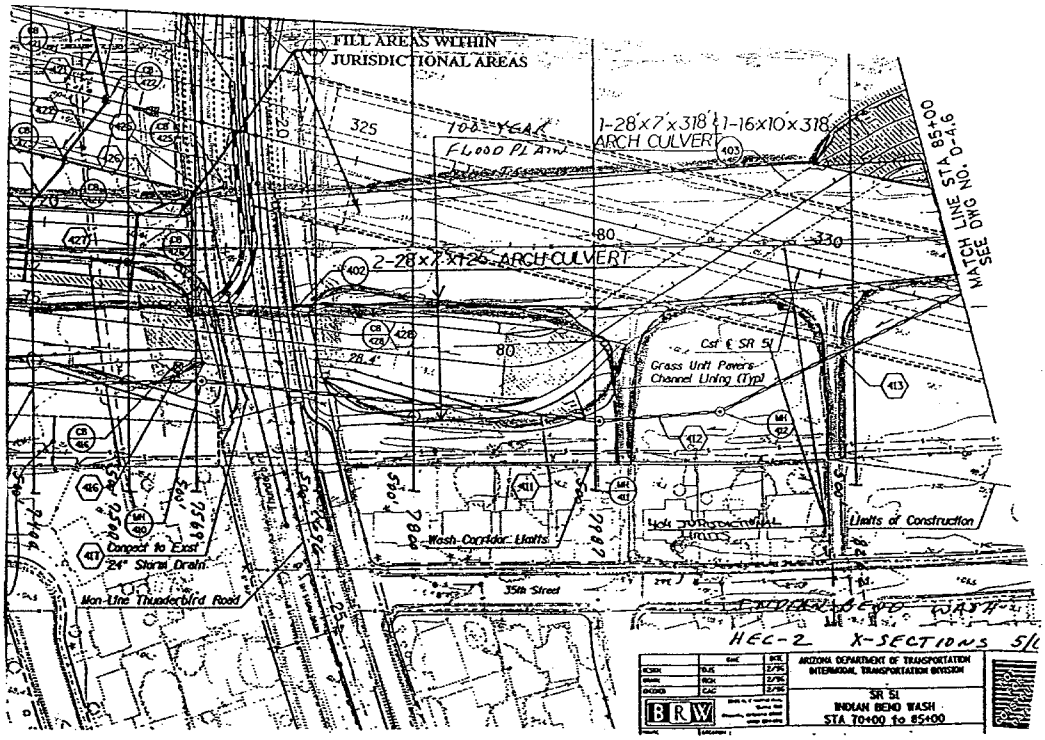
7696

UPSTREAM FACE OF THUNDERBIRD ROAD CULVERT
1-28'x7' CONCRETE ARCH PLUS 1-28'X10.32 CONCRETE ARCH

3. ANALYSIS (Cont'd)

Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).

Flow



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	**127'**
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	**427.3 sq. ft.**
Total culvert/bridge area (ft^2)	**427.3 sq. ft.**

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks	Left Overbank	Right Overbank
Upstream face	**1410**	**1410**
Downstream face	**1410**	**1410**

Minimum Top of Road Elevation	Left Overbank	Right Overbank
Upstream face	**1405.41**	**1405.41**
Downstream face	**1405.41**	**1405.41**

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	**1401.04**	**1402.14**
Downstream face	**1401.27**	**1402.14**

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		**2400**		**2400**
The maximum depth of flow over the roadway/railroad (ft.)				
Weir length (ft.)				

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	**58**	**58**	**58**
Downstream face	**58**	**58**	**58**

3. ANALYSIS (Cont'd)

Loss Coefficients	
Entrance loss coefficient	**0.30**
Manning's "n" value assigned to the structure(s)	**0.013**
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	
Weir coefficient	**2.63**
Pier coefficient	
Contraction loss coefficient	**0.3**
Expansion loss coefficient	**0.5**

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ___ Yes _X_ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/o conveyance capacity through the bridge/culvert? ___ Yes _X_ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B Will sediment accumulate anywhere through the bridge/culvert? ___ Yes ___ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run)

Method 1.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations):*

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: **City of Phoenix**

Flooding Source: **Indian Bend Wash**

Project Name/Identifier: **Indian Bend Wash Channelization**

1. IDENTIFIER

1 Name of roadway, railroad, etc.: **SR 51**

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): **Sta. 7987 (per BRW., Inc. See attached report).**

3. This revision reflects *(check one of the following):*

_X_ New bridge/culvert not modeled in the FIS

___ Modified bridge/culvert previously modeled in the FIS

___ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) **1 - 28' x 7' x 318' RC Arch 1 - 16' x 10' x 313' RC Arch (per BRW, Inc., modeled as 2 - 23' x 5.72' x 318' CBC).**

2. Entrance geometry of culvert/type of bridge opening (e.g, 30 - 75 wing walls with square top edge, sloping embankments, and vertical abutments) **FHWA chart 11-box culvert, skewed headwall, chamfered inlet-scale 4 headwall skewed 10° to 45°.**

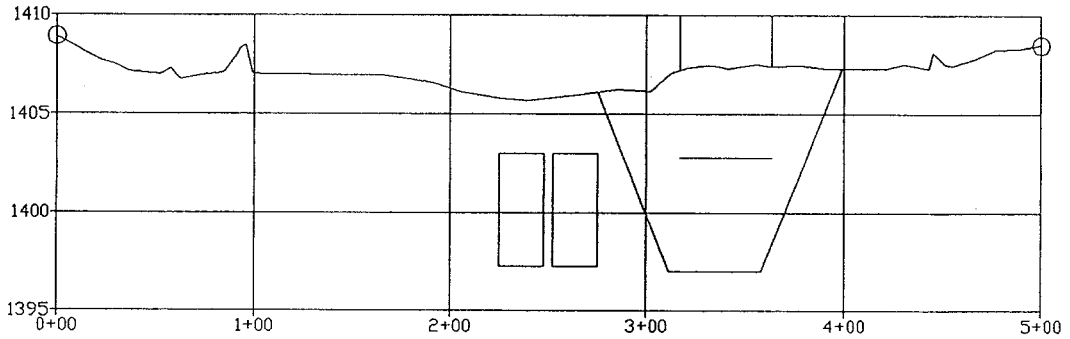
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* **HEC-2 with special culvert routine.**

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A. *One form per new/revised bridge/culvert

3. ANALYSIS

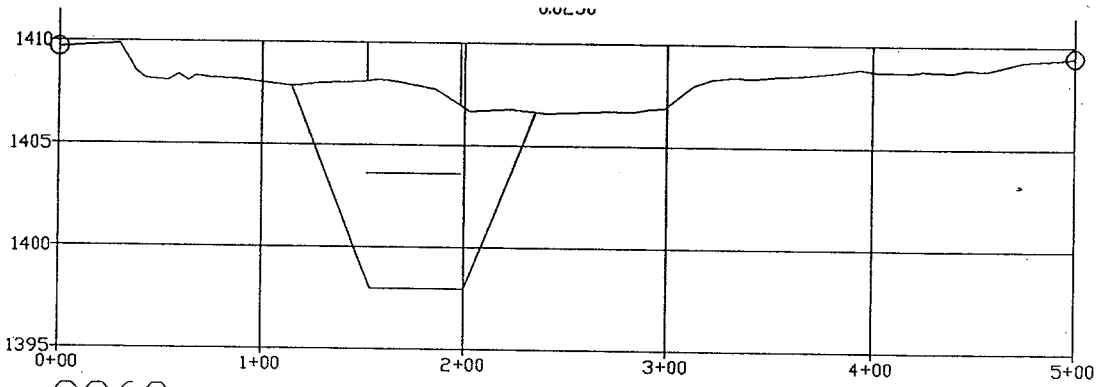
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



7987

DOWNSTREAM FACE OF SR 51 CULVERT
THIS HEC-2 MODELS THE 1-28'X7' & 1-16'X10.7' ARCHES FOR THE WEST SIDE FLOW ONLY.
FLOW LINE ELEVATION OF 16'x10.32' ARCH IS 1-FOOT ABOVE THE FLOW LINE OF THE 28'x7' ARCH, WHICH IS EQUAL TO CHANNEL FLOW LINE

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



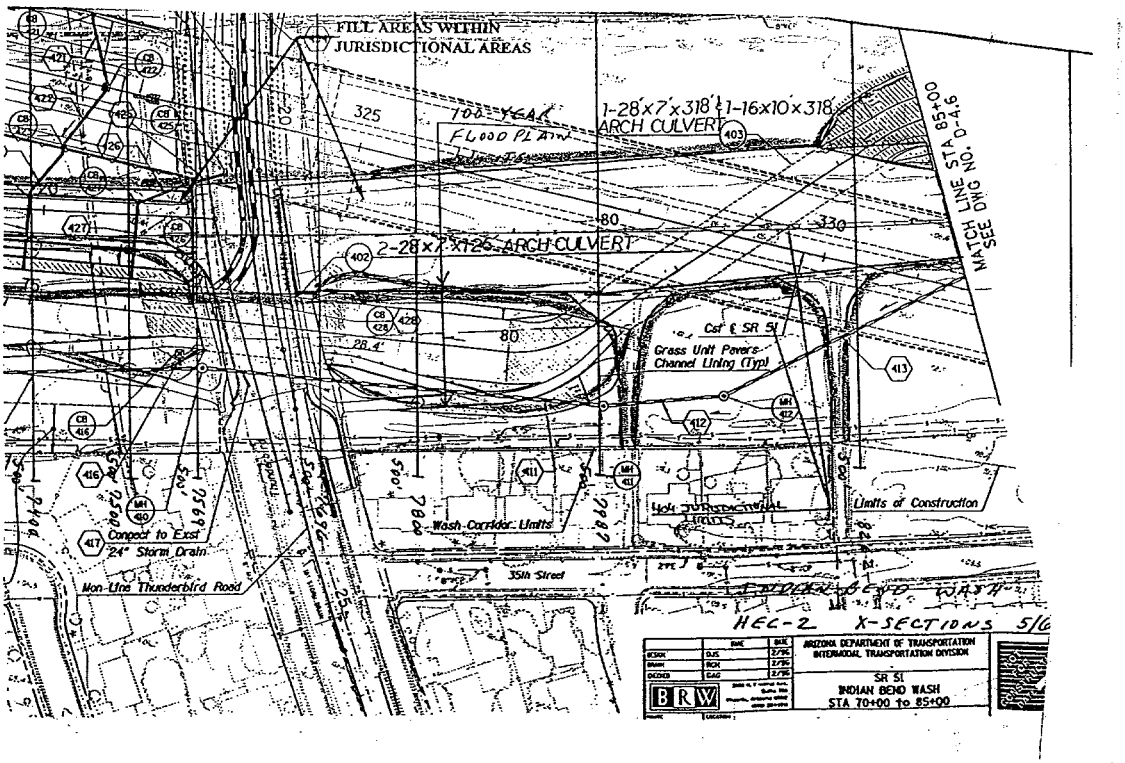
8262

UPSTREAM FACE OF SR 51 CULVERT
1-28'x7' & 1-16'X10.7' CBC FOR THE WEST SIDE FLOW ONLY.
MODELED AS A 2-23'X5.72' CBC

3. ANALYSIS (Cont'd)

Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).

Flow



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	**318**
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	**263.1 sq. ft.**
Total culvert/bridge area (ft^2)	**263.1 sq. ft.**

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks	Left Overbank	Right Overbank
Upstream face	**1407.0**	**1406.5**
Downstream face	**1407.0**	**1407.0**

Minimum Top of Road Elevation	Left Overbank	Right Overbank
Upstream face	**1409.1**	**1409.1**
Downstream face	**1409.1**	**1409.1**

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	**1404.46**	**1405.46**
Downstream face	**1401.80**	**1403.65**

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		**2400**		**2400**
The maximum depth of flow over the roadway/railroad (ft.)				
Weir length (ft.)				

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	**46**	**46**	**46**
Downstream face	**46**	**46**	**46**

3. ANALYSIS (Cont'd)

Loss Coefficients	
Entrance loss coefficient	**0.30**
Manning's "n" value assigned to the structure(s)	**0.013**
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	
Weir coefficient	**2.63**
Pier coefficient	
Contraction loss coefficient	**0.3**
Expansion loss coefficient	**0.5**

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ___ Yes _X_ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/o conveyance capacity through the bridge/culvert? ___ Yes _X_ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B Will sediment accumulate anywhere through the bridge/culvert? ___ Yes ___ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run)

Method 1.

5. FLOODWAY ANALYSIS (Cont'd)

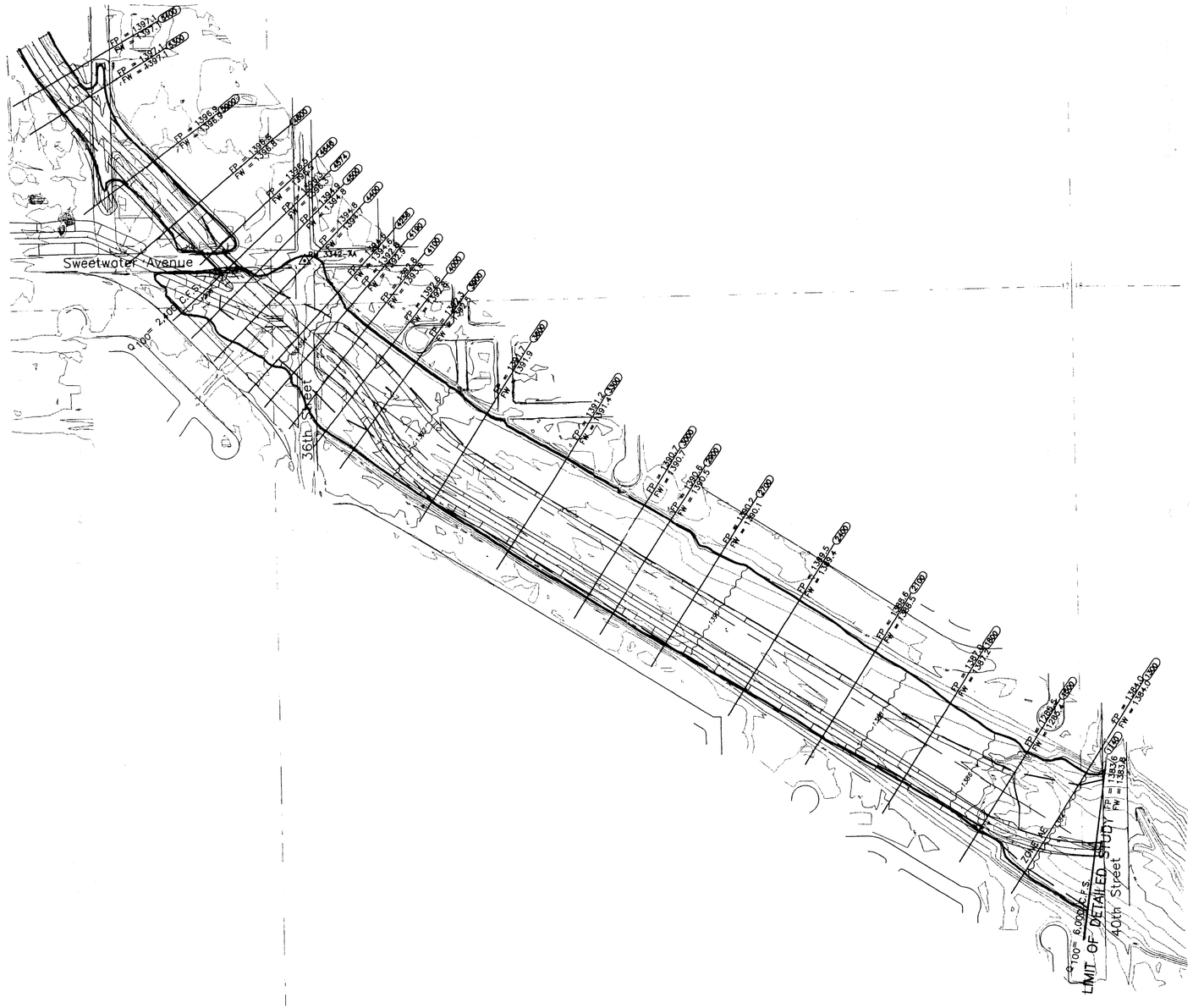
Comments *(explain any unusual situations):*

Attach analysis.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93-05



LEGEND

SECTION LINE	
CORPORATE BOUNDARY	
100-YEAR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE	
CROSS-SECTION	FP=FLOODPLAIN WSE / FW=FLOODWAY WSE (1,432)
BASE FLOOD ELEVATION	1160
ELEVATION REFERENCE MARK	RM

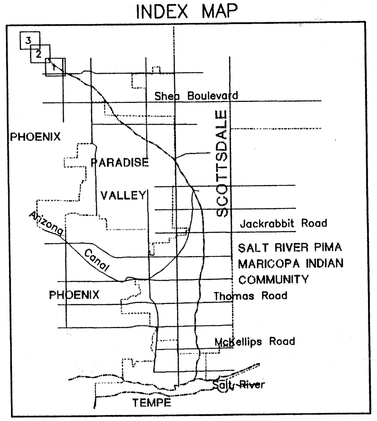
ELEVATION REFERENCE MARKS

RM#	ELEVATION (NAVD 29)	DESCRIPTION
7086	1,409.01	City of Phoenix brass cap in handhole, 32nd Street and Thunderbird Road.
3342-AA	1,394.41	City of Phoenix 3" brass cap in handhole, 36th Street and Sweetwater.

NOTES

1. CROSS-SECTION STATION 2,000 IS THE HYDRAULIC BASELINE EXCEPT WHERE NOTED.
2. STARTING WSE AT SECTION 1140 = LOMR ELEV. (SECT. 14.660) -2.9 FEET.

INDEX MAP



200' 0' 200' 400'

SCALE: 1"= 200'

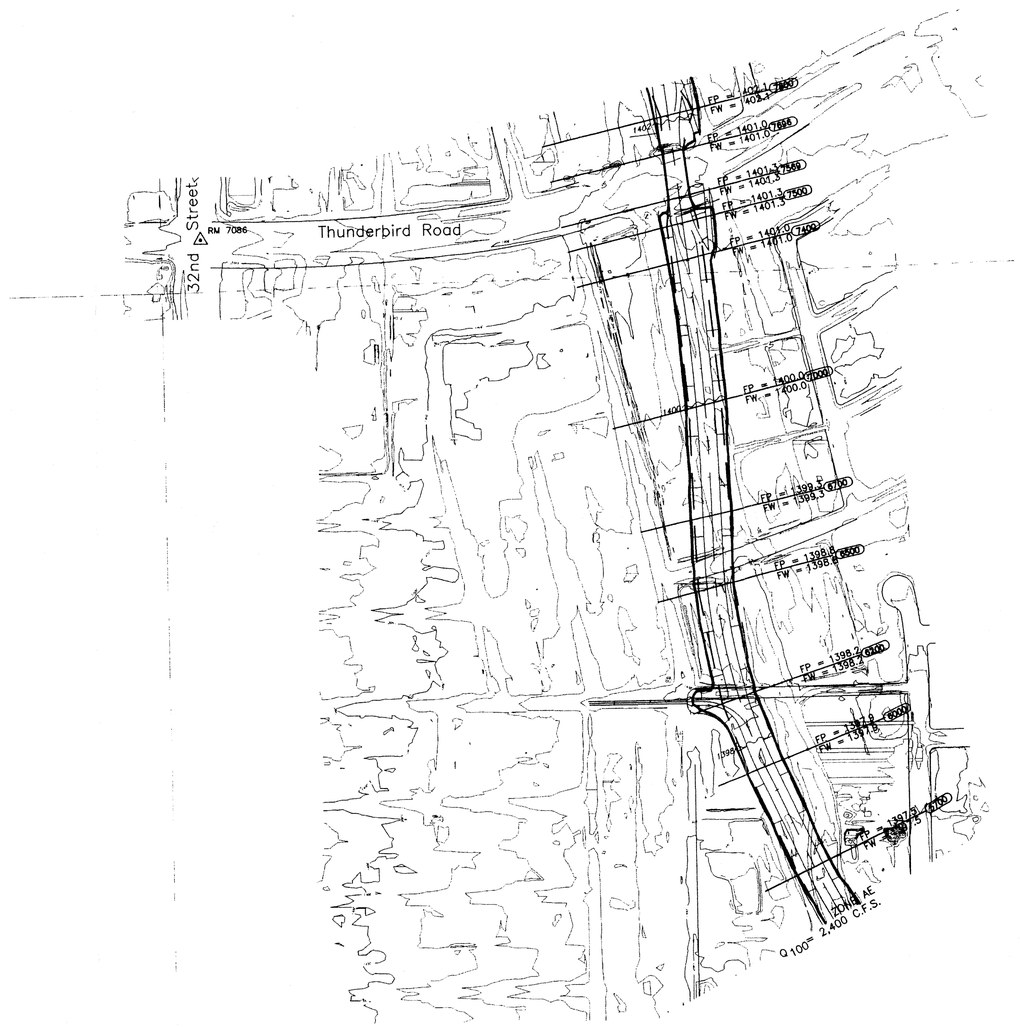
CONTOUR INTERVAL = 1 FOOT

SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	
DESIGN	LX	1/14/98	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	BSB	1/14/98	RECOMMENDED BY: DATE
PLANS	BAL	1/14/98	APPROVED BY: DATE
PLANS CHK.	BSB	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY: DATE:			SHEET 1 OF 3

Registered Professional Engineer (Civil) CERTIFICATE NO. 21560 DENNIS L. RICHARDS ARIZONA, U.S.A. 1/14/98

The base topographic mapping used to conduct the floodplain delineation study for Indian Bend Wash was prepared and certified by the Arizona Department of Transportation (ADOT). This mapping is based on aerial photography taken in June 1994 and was provided to Simons Li & Associates, Inc. in digital form by ADOT. Simons Li & Associates, Inc. takes no responsibility for the accuracy or content of the base topographic mapping.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93-05

LEGEND

SECTION LINE	
CORPORATE BOUNDARY	
100-YEAR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE	
CROSS-SECTION	FP=FLOODPLAIN WSE / FW=FLOODWAY WSE (1.432)
BASE FLOOD ELEVATION	1160
ELEVATION REFERENCE MARK	RM

ELEVATION REFERENCE MARKS

RM#	ELEVATION (NAVD '29)	DESCRIPTION
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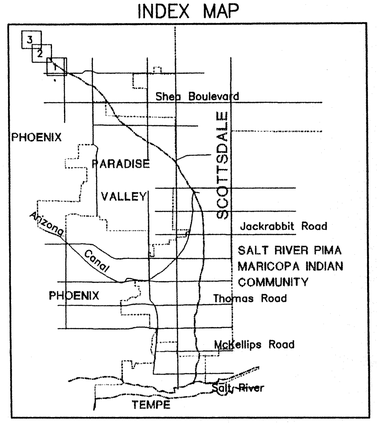
INDEX MAP



200' 0' 200' 400'

SCALE: 1"= 200'

CONTOUR INTERVAL = 1 FOOT

sla SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	LX	1/14/98	RECOMMENDED BY: DATE
DESIGN CHK.	BSB	1/14/98	APPROVED BY: DATE
PLANS	BAL	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
PLANS CHK.	BSB	1/14/98	SHEET 2 OF 3
SUBMITTED BY: DATE:			

Registered Professional Engineer (Civil) CERTIFICATE NO. 21580 DENNIS L. RICHARDS Date Signed 1/14/98 ARIZONA, U.S.A.

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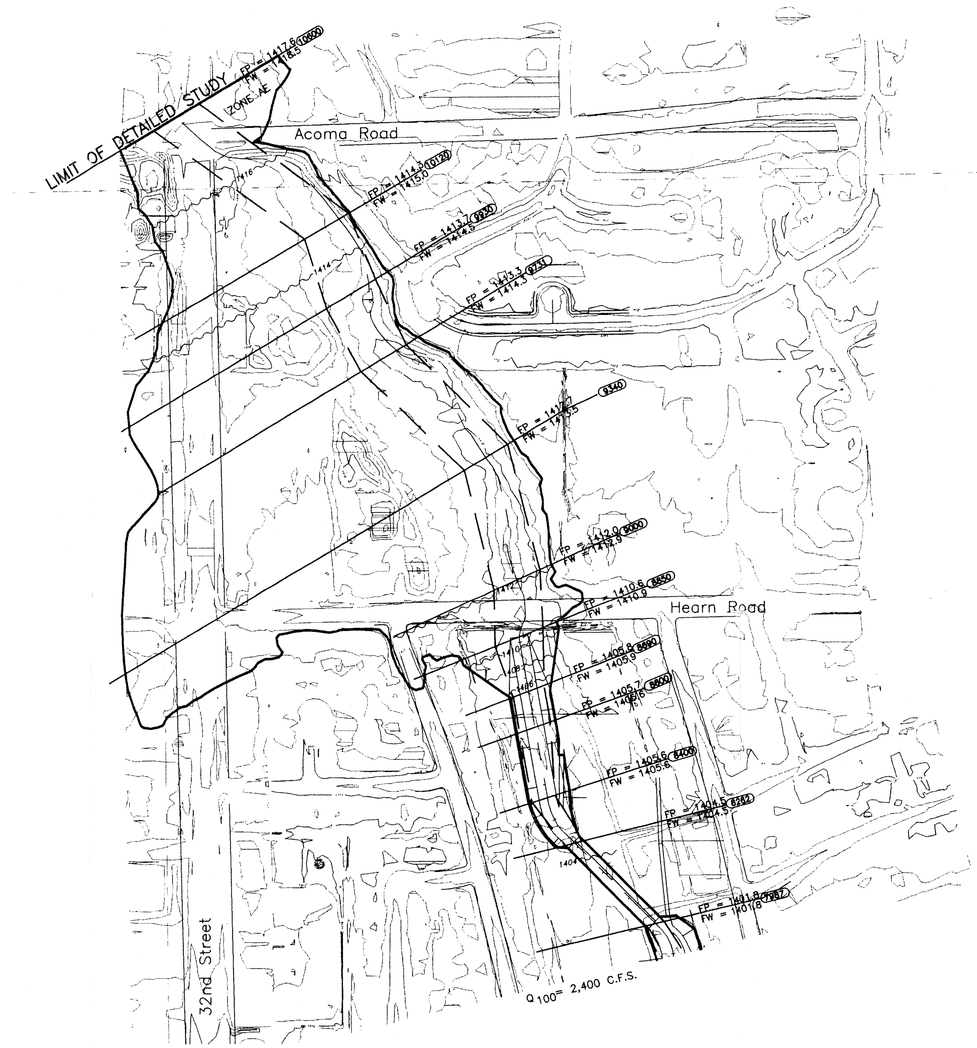

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN DELINEATION STUDY FOR INDIAN BEND WASH 40th STREET TO 32nd STREET

F.C.D. CONTRACT NO. 93-05

LEGEND

SECTION LINE	
CORPORATE BOUNDARY	
100-YEAR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE	
CROSS-SECTION	FP=FLOODPLAIN WSE / FW=FLOODWAY WSE (7,432)
BASE FLOOD ELEVATION	1160
ELEVATION REFERENCE MARK	RM

ELEVATION REFERENCE MARKS

RM#	ELEVATION (NAVD '29)	DESCRIPTION
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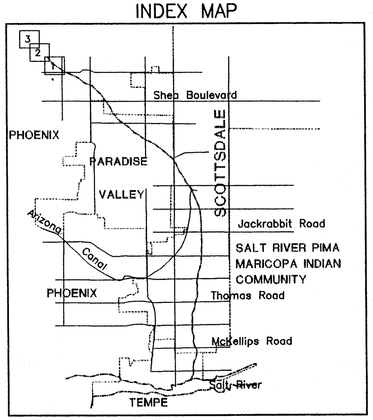
INDEX MAP



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SCALE: 1"= 200'
CONTOUR INTERVAL = 1 FOOT

SIMONS, LI & ASSOCIATES, INC.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	LX	1/14/98	
DESIGN CHK.	BSB	1/14/98	RECOMMENDED BY: DATE
PLANS	BAL	1/14/98	APPROVED BY: DATE
PLANS CHK.	BSB	1/14/98	CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY:		DATE:	SHEET 3 OF 3

Registered Professional Engineer (Civil) CERTIFICATE NO. 21580 DENNIS L. RICHARDS Date Signed 1/14/98 ARIZONA, U.S.A.

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