Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

2/7/93

COMPARATIVE DRAINAGE DESIGN REPORT

FOR

SOSSAMAN CHANNEL
AND
BASIN

BASELINE ROAD TO SOUTHERN AVENUE
SOUTHERN AVENUE TO SIGNAL BUTTE ROAD

FCD PROJECT NO. 91-07

FLOOD CONTROL DISTRICT of MARICOPA COUNTY

Prepared By:

apa GEOTRACK

January 1993

COMPARATIVE DRAINAGE AND DESIGN REPORT

SOSSAMAN CHANNEL AND BASIN

PREPARED FOR:

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

CONTRACT FCD 91-07

Prepared By:

apa GEOTRACK Corporation
1555 East Glendale Avenue
Phoenix, AZ 85020
(602) 265-9550

January 1993

TABLE OF CONTENTS

I. List of Exhibits
List of Calculations

II. Objectives

III. Introduction

A. History of Sossaman Channel
B. Description of Watershed
C. Description of Existing Utilities
D. Agencies Contacted

IV. Southern Avenue:
Hawes Road to Signal Butte Road

A. General Methodology
B. Existing Condition
C. Recommendations

V. Drainage Structure:
Southern Avenue at Hawes Road

A. Existing Condition
B. Future Condition
C. Hydrology
D. Hydraulics
E. Recommendations and Effects to Sossaman Channel

VI. Drainage Structure:
Southern Avenue Channel (Sossaman Road to Hawes Road)

A. Existing Condition
B. Hydrology
C. Hydraulics
D. Recommendations and Effects to Sossaman Channel

VII. Sossaman Channel

A. Hydrology

VIII. Sossaman Channel:
Alternatives

A. No Build
B. Considered Alternatives
-Goals
-Channel Typical Sections and Vertical Alignments
-Channel Linings Alternatives
-Basin and Weir Alternatives

IX. Sossaman Channel:
Alternative I

X. Sossaman Channel:
Alternative II

XI. Sossaman Channel:
Conclusions and Recommendations

XII. Exhibits

XIII. References

XIV. Appendix

A. Calculations
B. Plan of Recommended Alternative - See Following Folders

LIST OF EXHIBITS

EXHIBIT NUMBER	
1-22	Pictures of Existing Conditions
23	Agency Contact List
24-25	Design Concept Plans for Red Mountain Freeway: Coralbell Avenue to US 60
26-27	Watershed Input Node Numbers for HEC-1 Hydrologic Computer Model
28	Subbasin: Watershed for HEC-1 Hydrologic Computer Model

LIST OF CALCULATIONS

- Estimated Costs for Alternative I & II

- HEC-1 output file: SCDENW1, Alternative I, 100 year, 24 hour design storm discharges with subareas northeast of basin routed to basin and with diverted flows from channel to basin.
- Basin Hydrograph of Node C5000 - Earthen Channel Alternative
- Basin volume and invert elevations - Earthen Channel Alternative

- HEC-1 output file: SCDCNW, Alternative II, 100 year, 24 hour design storm discharges with subareas northeast of basin routed to basin and with diverted flows from channel to basin.
- Basin Hydrograph at Node C5000 - Concrete Channel Alternative
- Basin volume and invert elevations - Concrete Channel Alternative

- HEC-2 output file: SCDENW1, Alternative I
- Required and available freeboard requirements, Alternative I
- Distance from right of way to top of channel bank, Alternative I

- HEC-2 output file: SCDCNW, Alternative II
- Required and available freeboard requirements, Alternative II
- Distance from right of way to top of channel bank, Alternative II

- Site 1:	Capacity Analysis:	Existing channel along east side of Ellsworth Road, north of Southern Avenue
- Site 1:	Cross Sections:	Existing channel along east side of Ellsworth Road, north of Southern Avenue
- Site 1:	Capacity Analysis:	Existing single barrel 10' x 3' box culvert along east side of Ellsworth Road, across Southern Avenue
- Site 1:	Capacity Analysis:	Existing channel along east side of Ellsworth Road, south of Southern Avenue
- Site 1:	Cross Sections:	Existing channel along east side of Ellsworth Road, south of Southern Avenue
- Site 2:	Capacity Analysis:	Existing north/south channel, 2600' east of Ellsworth Road, south of Southern Avenue
- Site 2:	Cross Sections:	Existing north/south channel, 2600' east of Ellsworth Road, south of Southern Avenue

- Site 3:	Capacity Analysis:	Existing channel along the east side of Crimson Road, north of Southern Avenue
- Site 3:	Cross Sections:	Existing channel along the east side of Crimson Road, north of Southern Avenue
- Site 3:	Capacity Analysis:	Existing 2 barrel 6' x 2' box culvert along east side of Crimson Road, underneath Southern Avenue
- Site 3:	Capacity Analysis:	Existing channel along the east side of Crimson Road, south of Southern Avenue
- Site 3:	Cross Sections:	Existing channel along the east side of Crimson Road, south of Southern Avenue
- Site 4:	Capacity Analysis:	Existing northeast/southwest channel, 1200' east of Crimson Road at Southern Avenue
- Site 4:	Cross Sections:	Existing northeast/southwest channel, 1200' east of Crimson Road at Southern Avenue
- Site 5:	Capacity Analysis:	Existing northeast/southwest channel, 900' west of Signal Butte Road, south of Southern Avenue
- Site 5:	Cross Sections:	Existing northeast/southwest channel, 900' west of Signal Butte Road, south of Southern Avenue
- Site 6:	Capacity Analysis:	Existing channel along the east side of Signal Butte Road, south of Southern Avenue
- Site 6:	Cross Sections:	Existing channel along the east side of Signal Butte Road, south of Southern Avenue.

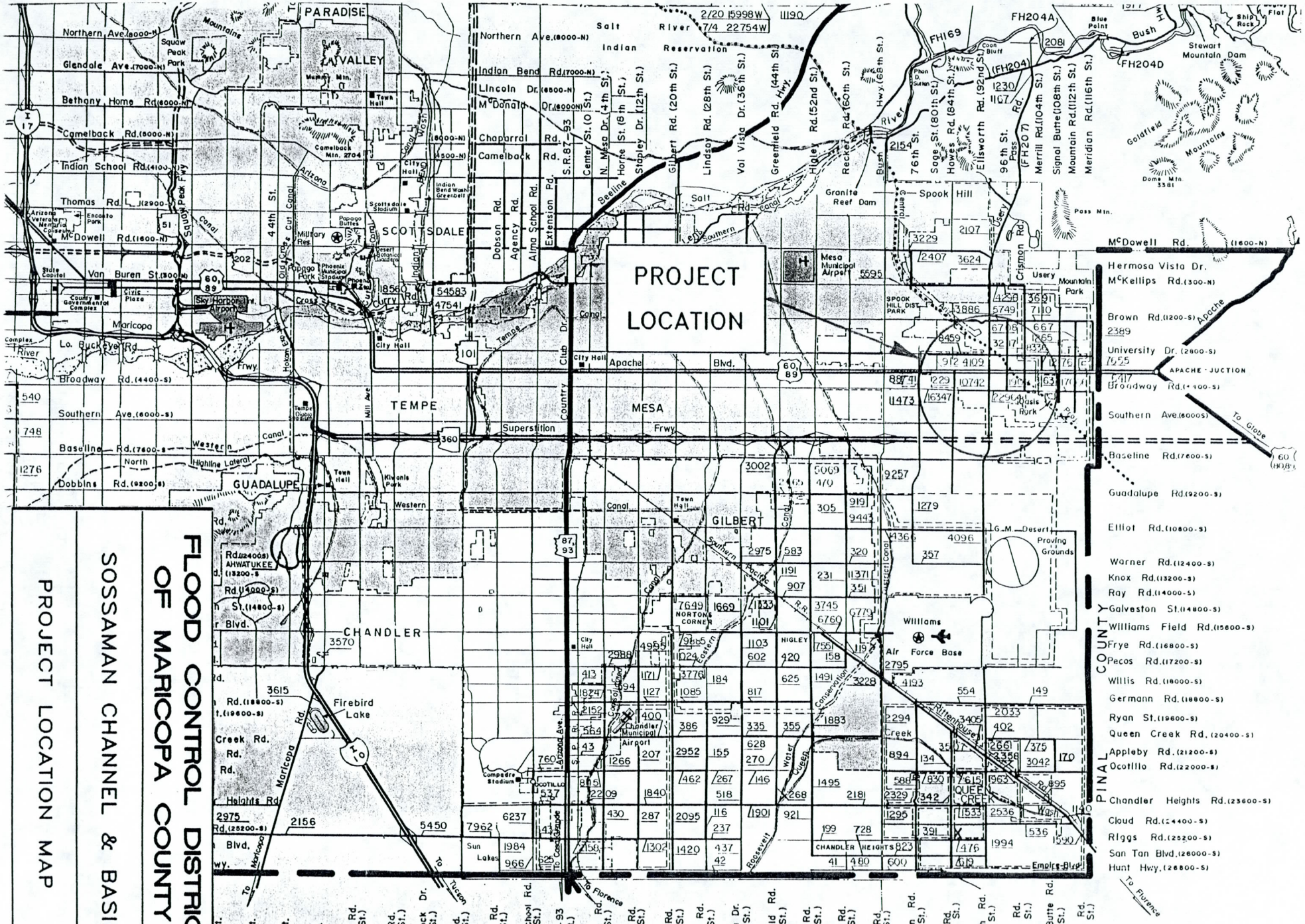
- Site 2: Recommendation's Analysis: 10' bottom width, 3:1 side slopes, gunite channel from Southern Avenue to US 60

- Site 2: Recommendation's Analysis: Single barrel 10' x 4' box culvert underneath Southern Avenue

- Site 3: Recommendation's Analysis: 5' bottom width, 3:1 side slopes gunite channel from 4000' east of Crimson Road to Crimson Road
- Site 3: Recommendation's Analysis: 4 barrel 6' x 5' box culvert underneath Southern Avenue
- Site 3: Recommendation's Analysis: 10' bottom width, 3:1 side slopes gunite channel from Southern Avenue to US 60

- Capacity analysis: Existing 2 Barrel 8' x 4' box culvert Hawes Road underneath Southern Avenue

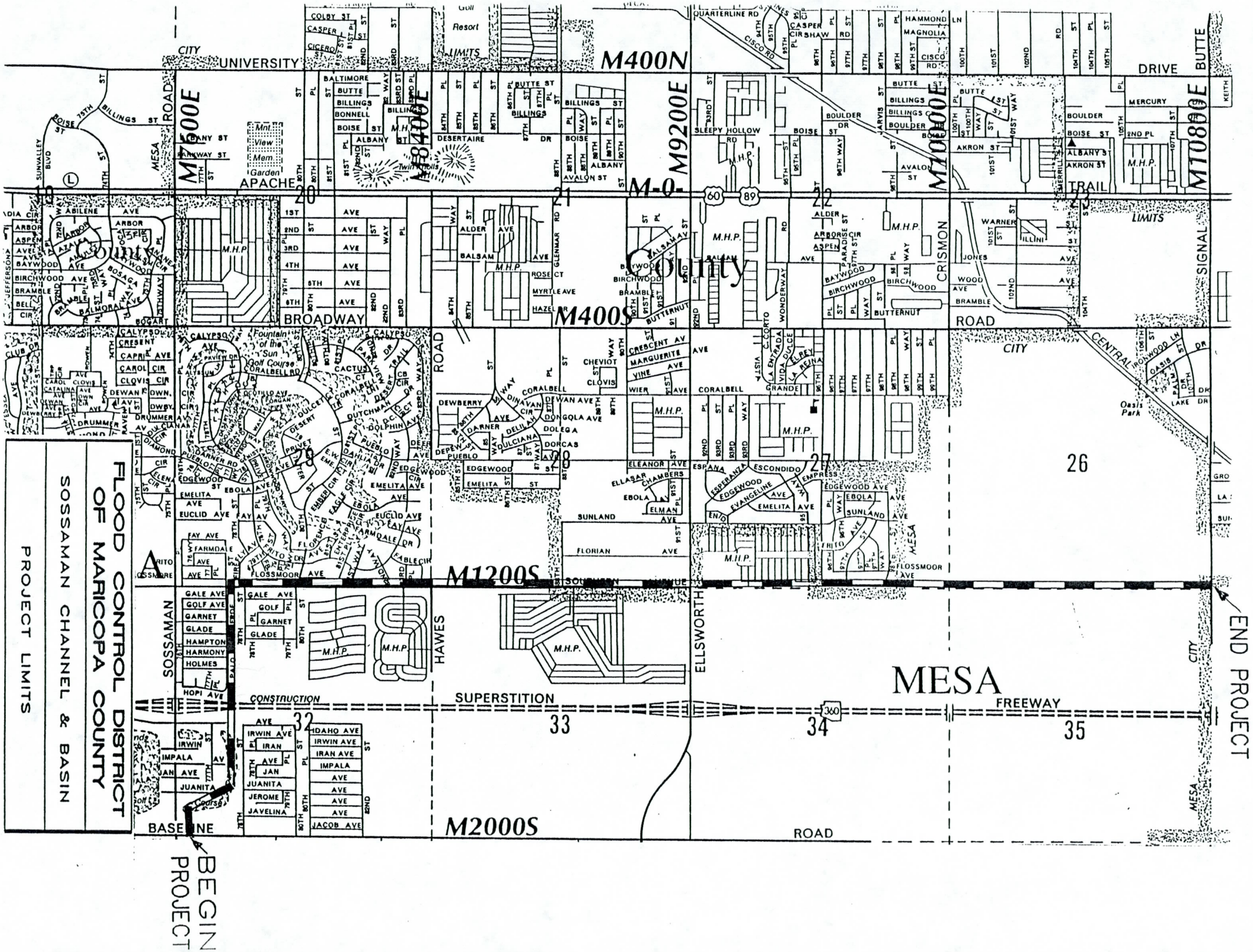
- Capacity Analysis: Basin Outlet: 24" diameter concrete pipe



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

PROJECT LOCATION MAP


FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
SOSSAMAN CHANNEL & BASIN
PROJECT LIMITS
BEGIN PROJECT
END PROJECT
M400N
M-0-
M400S
M1200S
M2000S
M400E
M9200E
M1000E
M1080E
SOSSAMAN
HAWES
ELLSWORTH
CRISMON
SIGNAL BUTTE
BROADWAY
APACHE
TRAIL
DRIVE
ROAD
CONSTRUCTION
SUPERSTITION
FREEWAY
MESA
CITY
LIMITS
County
M.H.P.
Fountain of the Sun Golf Course
Mt. View Mem Garden
Twin Pools
Oasis Park
19
20
21
22
23
26
27
28
29
32
33
34
35

II. OBJECTIVES

The purpose of this project is to identify potential alignments and improvements to the existing Sossaman Channel from Southern Avenue to Baseline Road. The improvements will include a drainage basin located within right of way purchased by the Flood Control District of Maricopa County (FCD) that will, in conjunction with the channel improvements, convey the design 100 year, 24 hour peak runoff flow of 2400 cfs downstream to Baseline Road. The drainage basin will be located north of US 60, east of Sossaman Channel.
Superstition FWY

Phase I of the project requires the completion of the Comparative Drainage Design Report. This document will identify potential alignments, conveyance requirements, storage requirements, right of way requirements, hydraulic analysis, cost estimates, constructability, and maintenance requirements for comparative designs. Specifically, this will require the design of a drainage basin to reduce the design 100 year, 24 hour peak flow through Sossaman Channel at Guadalupe and Sossaman Roads to 2400 cfs. In addition, this report will recommend an alternative to the collection and conveyance of flows crossing Southern Avenue from Hawes Road to Signal Butte Road.

Phase II of the project includes the professional services required to prepare plans, special provisions, bid schedules, estimated quantities, and cost estimates for the design and construction of the selected improvement alternative for Sossaman Channel and Basin: Southern Avenue to Baseline Road.

from — to —

III. INTRODUCTION

A. HISTORY OF SOSSAMAN CHANNEL

Sossaman Channel was designed in 1978 and built by Maricopa County Department of Transportation (MCDOT) in 1981. The original channel was very narrow and was designed to accept smaller design discharges. In the early 1980's, with the design of Sun Valley East housing/recreational area, additional right of way for the channel south of Baseline Road was acquired. The existing channel was widened, improved with velocity dissipation structures, and diverted west at Guadalupe Road to outlet in the Eastern Maricopa Floodway (EMF). The northern portion of the channel, from Southern Avenue to Baseline Road was also improved and widened.

The existing Sossaman Channel begins at Southern Avenue which lies between US 89 and US 60, crossing under US 60 through a 6 barrel 12'x 6' box culvert, heading due south towards Baseline Road where it bends west to cross under Baseline Road through a 4 barrel 10'x 8' box culvert and follows Sossaman Road to Guadalupe Road. The channel ~~continues along~~ outfalls into the Guadalupe Channel ~~Road alignment to the~~ which continues west ~~and~~ where it outlets to the Eastern Maricopa Floodway where these flows eventually outlet to the Gila River. The limits of the channel for this project is between Southern Avenue and Baseline Road. This portion of the existing channel is earthen, varies in cross-section, and receives inflows of water at Southern Avenue from the Southern Avenue Channel, at US 60 from the Arizona Department of Transportation (ADOT) conveyance channel, and at Baseline Road from two 54 inch storm drains.

B. DESCRIPTION OF WATERSHED

The storm water flows within the Apache Junction - Gilbert watershed area are conveyed in a southwesterly direction through sheet flows and small drainage structures which ultimately discharge into the Gila River. Historically, the flows have been obstructed and channelized by the construction of irrigation canals, drainage channels, and United States and Arizona State Highways. The watershed, which encompasses approximately 70 square miles of the east valley, is also delimited by many drainage structures. The northern watershed border is comprised of the Buckhorn Mesa Watershed Project which includes the Spook Hill Floodway and Dam, the Signal Butte Floodway and Dam, the Pass Mountain Diversion and Outlet, the Bulldog Floodway, and the Apache Junction Dam and Floodway. The western watershed border consists of the EMF, completed in 1989. The EMF conveys storm water flows from the northwest to the southeast. The southern watershed border is comprised of the Powerline Floodway near Ray Road, which outlets to the EMF just east of Power Road. The eastern watershed border includes the Northern Diversion and the Powerline Dam.

The major features of the watershed include US 89 and US 60. Both of these roadways run from the east to the west through the watershed. US 60 is approximately 2 miles south of and parallel to US 89. US 89 has a series of overchutes to convey floodwaters across whereas US 60 channelizes the storm water flows within the north portion of right of way and eventually passes the stormwaters through box culverts at Sossaman Channel. In addition, the Central Arizona Project (CAP) canal crosses the watershed from the northwest corner to the southeast corner where intermittent overchutes are provided along this facility to allow storm water flow to continue to the southwest. The General Motors Proving Grounds encompass approximately four square miles of the southern portion of the watershed where storm water flows are controlled by diversions. Sossaman Channel lies within the west portion of the watershed. (See Exhibit 26)

The natural slope of the land conveys storm water from northeast to southwest, while the watershed consists mainly of an alluvial fan area containing sediment deposits transported from the nearby Usery Pass Mountain Range. The land use of the area has been slowly changing from agricultural to low/high-density suburban residential and commercial use within the last fifteen years. The area will continue to grow and change dramatically with the proposed Red Mountain Freeway and its interchange with US 60 east of Hawes Road and north of the existing US 60 (See Exhibit 24 and 25).

C. DESCRIPTION OF EXISTING UTILITIES

Five agencies own utility facilities within or close to the right of way for Sossaman Channel. These agencies include: City of Mesa, Dimension Cable Company, Salt River Project Power, Southwest Gas and US West.

The City of Mesa facilities consist of sanitary sewer, water, and storm drain. A ten inch sanitary sewer line crosses the channel five feet north of the centerline of Southern Avenue. A twenty-four inch sanitary sewer line crosses the channel sixty feet north of the centerline of Baseline Road. A sixteen inch water line and a six inch water line cross the channel twenty feet north and fifty-one feet south of the centerline of Southern Avenue respectively. An eight inch water line crosses the channel approximately 230 feet north of the US 60 right of way to service a fire hydrant east of the channel within the proposed drainage basin area. From this fire hydrant an abandoned eight inch water line continues south to US 60, while an eight inch water line continues north along the 78th Street corridor. An eight inch water line runs parallel to and 50 feet south of US 60. This line continues south along the east side of the channel corridor where it crosses the channel 345' south of US 60. An eight inch water line crosses parallel to and just beyond the limits of the concrete lining north of Baseline Road. A sixteen inch water line crosses the channel forty feet south of the centerline of Baseline Road. Four feet north of this line is an abandoned eight inch water line that crosses the channel. There are no storm drain facilities that lie within the channel right of way. No prior rights are known to exist for these facilities.

The Dimension Cable facilities cross the channel on the south side of Southern Avenue both underground and overheard. Two lines continue south from Southern Avenue one on each side of the channel corridor, the east line terminating approximately 145 feet north of the basin right of way, and the west line terminating within the right of way of US 60. Two lines begin south

of US 60 one on each side of the channel corridor, the east line continuing approximately 800' north of Baseline Road where it departs from the channel corridor and the west line continuing approximately 340' where it departs from the channel corridor. Overhead facilities cross the channel corridor south of Baseline Road. No prior rights are known to exist for these facilities.

The Salt River Project Power facilities parallel the channel corridor on both sides from Southern to US 60 outside the right of way. North of US 60 a line crosses the channel within the highway right of way. An underground line crosses the channel approximately 1600' north of Baseline Road. Overhead power facilities continue to Baseline Road, while underground power facilities continue from US 60 to approximately 800' north of Baseline Road where they depart from the channel corridor. No prior rights are known to exist for these facilities.

The Southwest Gas facilities consist of a four inch gas line that crosses the channel corridor on the south side of Southern Road. In addition, south of US 60 a two inch gas line begins on the east side of the channel and terminates north of Baseline Road. This gas facility alternates from being six feet outside of channel right of way to being three feet inside channel right of way approximately 100' north of Baseline Road. South of Baseline Road, a four inch gas line crosses the channel right of way. No prior rights are known to exist for these facilities.

The US West facilities include one abandoned line crossing Sossaman Channel on the south side of Southern Avenue. Two telephone lines parallel the channel corridor on the west side from Southern Avenue to US 60, one inside of right of way and one three feet outside right of way. On the east side of the channel corridor, a telephone line follows the channel five feet outside of right of way to approximately 145 feet north of the basin right of way. Two lines begin south of US 60 one on each side of the channel corridor, the east line continuing approximately 800' north of Baseline Road where it departs from the channel corridor and the west line continuing

continuing approximately 340' where it departs from the channel corridor. One line crosses the channel corridor approximately 58' south of US 60 right of way. A telephone line crosses the channel 52 feet south of the centerline of Baseline Road. Prior rights have been determined for the facility on the west side of the channel corridor from Southern Avenue to 58' south of US 60 where the 8' easement crosses the channel corridor.

D. AGENCIES CONTACTED

To achieve a coordinated design for the improvements of Sossaman Channel responsible to the goals of not only the FCD but all the users of the right of way the following agencies were contacted: Salt River Project Power, Salt River Valley Users Association, Southwest Gas, Roosevelt Water Conservation District, Queen Creek Irrigation System, Dimension Cable Company, US West, Cable America Inc., City of Mesa and The Arizona Department of Transportation. These agencies provided plans, asbuilts, and cooperation in compiling information in order to present an accurate representation of the existing conditions as well as a coordinated effort in establishing design goals. The design of Sossaman Channel and Basin was based on information provided by all agencies contacted. A detailed list of the agencies can be found on Exhibit 23.

IV. SOUTHERN AVENUE: HAWES ROAD TO SIGNAL BUTTE ROAD

A. GENERAL METHODOLOGY

Survey information was used to develop cross sections approximately 100 feet apart at selected sites. The upstream and downstream sections where then averaged to produce a typical cross section for the reach of interest. The capacity of the typical section was then analyzed using the Manning equation in the form of the PC program FLOWMASTER by Haestad Methods. Manning's "n" values where consistently chosen to provide conservative flow capacity values with respect to existing conditions. The "n" values were typically chosen from the maximum values recommended by the FCD in the drainage and Design Manual, Volume II Hydraulics, Table 5.11. Normal values where used to evaluate improvements. All analysis flow depths allow for freeboard requirements of 1 foot for subcritical flows and 2 feet for super-critical flows. Flows that approached critical flow boundaries were treated as super-critical with regard to freeboard.

With the existing capacities calculated, the design 100 year, 24 hour peak runoff flows were compared to the existing capacity to determine conveyance improvements. The design 100 year, 24 hour peak runoff flows were derived from the East Maricopa County Area Drainage Master Study (EADMS 14) HEC-1 model that was prepared by the FCD. This report will reference the HEC-1 nodes used. Where insufficient capacity was noted, possible conveyance improvements are described.

B. EXISTING CONDITIONS

Site 1: Ellsworth Road at Southern Avenue

HEC-1 node 4305

The HEC-1 analysis yielded a flow of 294 cfs for the design 100 year, 24 hour peak runoff. Topographical information suggested a split of 60% or 176 cfs to the existing channel along the east side of Ellsworth Road, north of Southern Avenue and 40% or 118 cfs to the existing channel along the north side of Southern Avenue, east of Ellsworth Road. The converged flow was used for the channel along the east side of Ellsworth Road, south of Southern Avenue. Analysis of the channel along the east side of Ellsworth Road, north of Southern Avenue determined an existing capacity of 282 cfs or an excess capacity of 105 cfs. Analysis of the single barrel 10' x 3' box culvert conveying water underneath Southern Avenue determined a minimum capacity of 299 cfs with 6" of headwater. Analysis of the channel along the east side of Ellsworth Road, south of Southern Avenue determined an existing capacity of 411 cfs or an excess capacity of 117 cfs. No improvements are recommended for this site.

Site 2: 2600' east of Ellsworth Road at Southern Avenue

HEC-1 node 4273

The HEC-1 analysis yielded a flow of 445 cfs. for the design 100 year, 24 hour peak runoff. Analysis of the north-south channel, south of Southern Avenue determined an existing capacity of 127 cfs or insufficient capacity of 318 cfs. Improvements to this section are discussed in the RECOMMENDATIONS section.

Site 3: Crimson Road at Southern Avenue

HEC-1 node 4251

The HEC-1 analysis yielded a flow of 985 cfs for the design 100 year, 24 hour peak runoff. Analysis of the channel along the east side of Crimson Road, north of Southern Avenue determined an existing capacity of 88 cfs. Analysis of the 2 barrel 6' x 2' box culvert conveying water underneath Southern Avenue determined an existing capacity of 178 cfs. Analysis of the channel south of Southern Avenue, determined an existing capacity of 180 cfs. These results indicate insufficient capacity of 807 cfs. Improvements to this section are discussed in the RECOMMENDATIONS section.

Site 4: 1200' east of Crimson Road at Southern Avenue
HEC-1 node 4224

The HEC-1 analysis yielded a flow of 45 cfs for the design 100 year, 24 hour peak runoff. Analysis of the northeast to southwest channel at Southern Avenue determined an existing capacity of 27 cfs or insufficient capacity of 18 cfs. Improvements to this section are discussed in the RECOMMENDATIONS section.

Site 5: 900' west of Signal Butte Road at Southern Avenue
HEC-1 node 4200

The HEC-1 analysis yielded a flow of 57 cfs for the design 100 year, 24 hour peak runoff. Analysis of the northeast to southwest channel south of Southern Avenue determined an existing capacity of 27 cfs or insufficient capacity of 30 cfs. This is a natural channel that drains to the south to the ADOT channel adjacent to US 60. Improvements to this section are discussed in the RECOMMENDATIONS section.

Site 6: Signal Butte Road at Southern Avenue

HEC-1 node 4194

The HEC-1 analysis yielded a flow of 28 cfs for the design 100 year, 24 hour peak runoff. Analysis of the channel along the east side of Signal Butte Road south of Southern Avenue determined an existing capacity of 202 cfs or an excess capacity of 174 cfs. No improvements are recommended for this site.

C. RECOMMENDATIONS

General Comments

The watershed is in a relatively undeveloped area. Use of onsite retention basins and the installation of storm drain systems as development occurs would greatly decrease the amount of flow currently crossing Southern Avenue as overland flow. Recommendations that follow are based on discharges for the 100 year, 24 hour design storm. The design storm reflects existing conditions without onsite retention that would occur with development. In order to minimize the need for additional right of way side slopes on improved gunite channels would be 3:1 (H:V).

Site 2

This site requires additional facilities to convey 318 cfs from Southern Avenue to US 60. An improved trapezoidal channel with a bottom width of 4 feet constructed of gunite on the existing alignment will provide adequate capacity. The channel will need improvement from Southern Avenue south to the ADOT Channel and continuing into the detention basin located at Ellsworth Road and US 60. This site will require additional facilities to convey 445 cfs underneath Southern Avenue. A single barrel 10' x 4' box culvert will provide adequate capacity.

Site 3 through Site 5

These sites require additional facilities to convey the design discharge. A solution integrating all three sites is as follows:

A new trapezoidal channel with a bottom width of 5 feet constructed of gunite along the north side of Southern Avenue from approximately 4000' east of Crimson Road to Crimson Road

would collect and convey the flows from HEC-1 nodes 4200, 4219 and 4224. The cumulative flow of 270 cfs would result in the channel and arrive at the box culvert east of Crimson Road. The slope of the natural ground in this area would minimize construction costs.

The existing 2 barrel 6'x 2' box culvert along the east side of Crimson Road underneath Southern Avenue has insufficient capacity to convey the existing flows. Replacing the existing culvert with a 4 barrel 6'x 5' box culvert with the top as the roadway surface will provide adequate capacity for the combined flows at Crimson Road and Southern Avenue.

An improved trapezoidal channel along the east side of Crimson Road with a bottom width of 10 feet constructed of gunite on the existing alignment will provide adequate capacity. The channel will need improvement from Southern Avenue south to the ADOT Channel adjacent to US 60. This flow will route to the regional detention basin.

V. DRAINAGE STRUCTURE: SOUTHERN AVENUE AT HAWES ROAD

A. EXISTING CONDITION

The Hawes Road Channel conveys flows from north to south and receives flow from several laterals delivering them to Sossaman Channel via the Southern Avenue Channel. The most dominating feature of the drainageway at Hawes Road is the 2 barrel 8'x 4' box culvert that allows runoff to pass under Southern Avenue. In addition to the box culvert, the structure contains a diversion area to the Southern Avenue Channel directly west of the box culvert. (See Exhibit 12)

The channel approach north of the box culvert is gunite lined with side slopes of approximately 2:1. Field observation has found the box culvert barrels to be obstructed with brush and debris as well as some sedimentation. (see exhibit 13) The structure has no barricade or fence that might provide protection for errant vehicles or pedestrians, however, the headwall for the structure is set back from the traveled way approximately 30 feet. The south side of the structure also contains sedimentation deposits and debris. The channel south of the box culvert to US 60 is gunite lined with side slopes of approximately 2:1 The box culvert headwall on the south side of Southern Avenue is protected by a tubular steel rail fence along the top of the box culvert and on the east wing wall. (See Exhibit 14)

B. FUTURE CONDITION

The future of the Hawes Road Channel and the box culvert at Southern Avenue will be affected by Segment 3 of the proposed Red Mountain Freeway. This segment of the proposed freeway will carry traffic from University Drive south to Southern Avenue where it will interchange with US 60 south of Southern Avenue, east of Hawes Road. (See Exhibits 24 and 25) The proposed

and overland runoff in a lined channel on the east side of the freeway and divert the flows south to Southern Avenue. Along the north side of Southern Avenue, the flows will pass through a culvert under the freeway to a channel along Southern Avenue and discharge to the Hawes Road Channel. Pavement drainage as well as local runoff from Southern Avenue to Baseline Road also will be discharged into the Hawes Road Channel through a storm drain and existing drainage courses. (See Exhibits 24 and 25)

C. HYDROLOGY

To the northeast of the 2 barrel 8'x 4' box culvert underneath Southern Avenue there is undeveloped land sloping towards the southwest to an existing earthen channel along the Hawes Road corridor. Flow from Broadway Road and overland flows, south of Broadway Road enter the channel and continue south to Southern Avenue. At Southern Avenue the flow is divided into the Hawes Road Channel and into the Southern Avenue Channel. The box culvert at Hawes Road accepts a portion of the discharge sending it south in the Hawes Road Channel and eventually into the ADOT Channel along US 60, while the remaining discharge is diverted west into the Southern Avenue Channel.

D. HYDRAULICS

The 2 barrel 8'x 4' box culvert underneath Southern Avenue has an estimated capacity of 280 cfs. Sedimentation and collected debris show evidence of obstructed flows just north of the structure. Hydraulically, the structure and the appendages are positioned in a manner that impedes the flow or divides the discharge disproportionally. Directly south of the structure, a substantial amount of siltation has accumulated to the extent that the capacity of the culverts is reduced.

The HEC-2 analysis of the existing Sossaman Channel including the Southern Avenue Channel to Hawes Road indicates that flows along Southern Avenue overtop the roadway and the box culvert at Hawes Road. Downstream improvements to Sossaman Channel will indirectly improve the conveyance of flows along Southern Avenue and subsequently at Hawes Road. However, the design 100 year, 24 hour peak runoff flow along Southern Avenue will continue to inundate a portion of the roadway.

E. RECOMMENDATIONS AND EFFECTS TO SOSSAMAN CHANNEL

Diversion of flows at Southern Avenue and Hawes Road to either Southern Avenue Channel or Hawes Road Channel will require additional downstream improvements. The existing box culvert crossing Southern Avenue at Sossaman Channel will require an additional barrel to convey the current 1134 cfs from the design 100 year, 24 hour peak runoff. The existing Southern Avenue Channel will require widening to an estimated 13 feet width with 2:1 side slopes. The existing Hawes Road Channel will require similar improvements.

Diverting additional flow at Hawes Road to the Southern Avenue Channel will require additional improvements downstream in conjunction with additional right of way at the proposed basin to accommodate the additional flow. Diverting additional flow to the Hawes Road Channel will require ADOT approval because the Hawes Road Channel discharges into the drainage channel north of US 60. ADOT has stated that increasing the peak discharge into the US 60 channel is not acceptable.

The recommendation of this report is to provide a retention/detention basin northeast of Hawes Road and Southern Avenue in conjunction with the proposed Red Mountain Freeway. The proposed freeway construction includes construction of new drainage facilities along Southern Avenue and will need to address the area of Hawes Road and Southern Avenue. A retention/detention basin will decrease the downstream peak discharges. As a result, no channel improvements would be required for either Southern Avenue Channel or Sossaman Channel and no additional right of way would be required at Sossaman Channel Basin. An interim recommendation is continued maintenance of the Hawes Road Channel and box culvert at Southern Avenue to remove debris and sedimentation. This will allow full utilization of the existing facilities without spending additional monies on facilities that would change due to the proposed Red Mountain Freeway.

VI. DRAINAGE STRUCTURE: SOUTHERN AVENUE CHANNEL

(Sossaman Channel to Hawes Road)

A. EXISTING CONDITION

The existing channel along the north side of the Southern Avenue begins from a diversion at Hawes Road located directly west of the box culvert structure. The channel slopes towards the west ending at a 3 barrel 10'x 6' box culvert at Sossaman Channel underneath of Southern Avenue. The trapezoidal channel is gunite lined with 2:1 sideslopes. The channel has a bottom width of approximately nine feet and is approximately five feet deep with four drops in channel invert elevation. The four drops are approximately 500 feet apart and range from 9 inches to 12 inches. The channel terminates in semi-circular diversion at Sossaman Channel north of Southern Avenue where the flows continue south through the box culvert. (See Exhibits 6, 7, 8 and 9)

B. HYDROLOGY

The HEC-1 analysis yielded a flow of 1134 cfs for the design 100 year, 24 hour peak runoff for the channel along the north side of Southern Avenue from Hawes Road to Southern Avenue. The channel conveys flows from the Hawes Road Channel and the undeveloped land northwest of Hawes Road and Southern Avenue. The existing development north of Southern Avenue from Sossaman Channel to Hawes Road allow flow to pass through the existing block wall at intermittent locations. Major flows are passed through the block wall at street intersections north of the wall. Southern Avenue does not have a closed roadway drainage system. Flow from the crownline of Southern Avenue to the block wall drain to the channel.

C. HYDRAULICS

The HEC-2 analysis of the existing channel along the north side of Southern Avenue from Sossaman Channel to Hawes Road Channel indicates that the design 100 year, 24 hour peak runoff flows along Southern Avenue overtop the roadway while the existing 3 barrel 10'x 6' box culvert at Sossaman Channel under Southern Avenue restrict the flows. The HEC-2 modeling utilized twelve inches for sediment deposition based on field measurements of the existing conditions. The velocity in the Southern Avenue Channel is approximately 11 fps with Froude numbers less than 0.85. The analysis indicates critical flow depth throughout the channel reach.

D. RECOMMENDATIONS AND EFFECTS TO SOSSAMAN CHANNEL

The existing box culvert underneath Southern Avenue at Sossaman Channel will require an additional barrel to convey the current 1325 cfs from the design 100 year, 24 hour peak runoff. The existing Southern Avenue Channel will require widening to an estimated 13 foot width with 2:1 sideslopes to convey the 1134 cfs from the design 100 year, 24 hour peak runoff. The analysis indicates that the channel velocities remain approximately 11 fps with greater Froude numbers and critical depth throughout the channel reach.

The recommendation of this report is to provide a small berm along the unimproved right of way between Southern Avenue and Southern Avenue Channel. The top elevation of the berm would be slightly lower than the existing openings in the bottom of block wall north of the channel, allowing additional capacity within existing facilities. This will eliminate spending significant monies on facilities that would change due to the proposed Red Mountain Freeway. Improvements to the existing Sossaman Channel south of Southern Avenue will indirectly improve the conveyance of flows along Southern Avenue.

VII. SOSSAMAN CHANNEL

A. HYDROLOGY

Sossaman Channel and basin was analyzed using the 100 year, 24 hour design storm peak discharges for the watershed of the East Maricopa County Drainage Master Study (EADMS 14). This data was supplied by the Flood Control District as input and output computer files entitled SOSALT4. The United States Army Corps of Engineers HEC-1 (version 1987) was used to interpret the input files, since subsequent versions of the HEC-1 Computer program were unsuccessful in reading the SOSALT4 input files.

Approximately a third of the watershed represented by this data is applicable to the Sossaman channel and basin project. As a result, the data was abbreviated to represent only the portion relevant to the Sossaman Channel and basin watershed. The output from the computer model of the abbreviated watershed was compared and verified to the original EADMS 14 data prior to the inclusion of the proposed improvements recommended for this project.

The input node numbers for the HEC-1 hydrological computer model are shown on Exhibits 26 and 27. The following modifications were made to the hydrologic model for this project.

A drainage basin is proposed for the area of land located north of US 60 and east of the existing Sossaman Channel. The goal of this basin is to reduce the 100 year, 24 hour design storm peak discharges flowing south to accommodate downstream improvements to Sossaman Channel at Guadalupe Road. The peak discharges for the 100 year storm were limited by the FCD to 850 cfs south of the basin, 1800 cfs at US 60, and 2000 cfs at Baseline Road. The routing length shown on card R4405 was modified from 2500 feet to 2000 feet to represent the portion of Sossaman Channel carrying the design flow from Southern Avenue

to the basin. In the vicinity of the basin, flows in excess of 850 cfs were diverted to the basin at node DV B4405. The remaining routing length of 255 feet for the concrete channel south of the basin to north of US 60 is shown on card R4406. The routing length shown on card R4707 was modified to 322 feet to represent the portion of the channel from the confluence with US 60 Channel to the south end of the existing concrete departure apron. The routing length shown on card R4708 was modified to 2840 feet to represent the portion of the channel from the south end of the existing concrete lining at US 60 to Baseline Road. Mannings "n" values, channel slopes and typical sections were modified to reflect the channel alternatives discussed in Section IX and X.

A field investigation was conducted to verify the existing storm water flow patterns in subbasins 4398 and 4399. The boundaries of subbasins 4398 and 4399 are Southern Avenue on the north, Hawes Road on the east, US 60 on the south and Sossaman Channel on the west. The subbasin can be approximately divided into thirds to represent the existing storm water flow patterns. The eastern third contains a trailer park with access from Southern Avenue and Hawes Road. The trailer park has a block wall around the perimeter that does not contain drainage outlets. Therefore, the storm water within the park drains to a retention basin centrally located within the trailer park. The middle third of this subbasin consists of another trailer park with access from Southern Avenue. This park also contains a block fence around the perimeter; however, the west wall contains drainage outlets. The storm water within the park drains to a fenced retention basin near the southwest corner of the park. Finally, the western third is characterized by single family detached housing with wood or block fencing surrounding the rear area of the lots. These fences concentrate the storm water flows within the local access streets. The primary concentration point of these storm water flows is 78th Street and the secondary concentration point is 80th Street. An evaluation of the existing contours indicates that the natural ground generally slopes towards

the southwest in the direction of the proposed drainage basin. The subbasins are shown on Exhibit 28.

Storm water flows from the eastern third and most of the middle third are represented by subbasin 4398 to flow to the existing drainage channel north of US 60. The western third and a portion of the middle third are represented by subbasin 4399 to terminate near the proposed drainage basin and were routed into the proposed drainage basin. The basin will be designed to accommodate these existing storm water flows as well as all future flows resulting from the improvements to the undeveloped land north and east of the proposed basin. Furthermore, the right of way acquisition for the proposed drainage basin stipulated that the basin be designed to accommodate the developed, onsite retention requirements for this undeveloped land (approximately 17 acres). The total volume required to design the basin size and fill rates is a combination of the storm water flows that were diverted to the drainage basin from Sossaman Channel and the storm water flows conveyed from subbasin 4399. This combination of flows can be found on C5000 which develops the hydrograph at node C5000. The hydrograph of this node was used to size the proposed drainage basin. The design and ultimate sizing of the proposed drainage basin was determined through an iterative process arriving at the most cost effective design.

VIII. ALTERNATIVES

A. NO BUILD

The existing Sossaman Channel is an earthen channel from north of the concrete approach apron at Baseline Road to south of the concrete departure apron at US 60. The channel continues under US 60 with the confluence of US 60 channel just north of the freeway. The channel continues north as a concrete channel to the northern right of way line of US 60. From here the existing Sossaman Channel is an earthen channel to south of the concrete departure apron at Southern Avenue. The existing channel has access roads paralleling both sides of the channel corridor. Ingress and egress to the access roads are at Baseline Road and Southern Road with no ingress or egress at US 60.

The existing channel was analyzed using the design 100 year, 24 hour peak runoff. The HEC-2 model includes sediment depositions based on field measures of the existing conditions. Please note that at Baseline Road after several field visits no deposition was observed. At US 60, six inches of sediment deposition was used for the HEC-2 model while twelve inches of sediment deposition was used at Southern Avenue. The existing channel is head cutting through the remnants of a soil cement floor approximately 400 feet in length, north of bend two. The HEC-2 model of the existing conditions did not include the existing soil cement floor due to its poor condition. The HEC-2 model incorporated cross sections for the existing channel and energy dissipators south of Baseline Road from previous models of Sossaman Channel by ADOT project number SBM 028-1-311PE, 511C. Manning's 'n' values were also utilized from previous ADOT modeling.

The HEC-2 analysis of the existing channel from Baseline Road to Southern Avenue yielded the following results:

- Flows in the south half of Sossaman Channel from Baseline Road to US 60 range in velocity from 5.8 fps to 8.8 fps with most of the cross sections not meeting freeboard requirements. The existing channel side slopes are steeper than 4:1.

- Flows in the north half of Sossaman Channel from US 60 to Southern Avenue range in velocity from 4.9 fps to 10.3 fps with essentially all cross sections not meeting freeboard requirements. The existing channel side slopes are steeper than 4:1.

The No Build Alternative does not reduce the downstream 100 year, 24 hour peak design discharges in Sossaman Channel.

B. CONSIDERED ALTERNATIVES

- GOALS

The following is a listing of alternatives considered for improving the Sossaman Channel alignment, conveyance and storage requirements. The goals of the individual alternatives are to:

1 - Provide a minimum of 15 foot wide access roads on both sides of the channel corridor

2 - Minimize earthwork

3 - Minimize number of drop structures

4 - Establish a high water surface elevation in the channel adjacent to the weir above minimum basin pool elevation to minimize basin excavation

5 - Layout basin to accommodate soccer fields

6 - Meet the requirements of the Drainage Design Manual for Maricopa County Arizona; Volume II - Hydraulics dated September, 1992

6a- Provide freeboard

6b- Meet allowable channel velocities

-CHANNEL TYPICAL SECTIONS AND VERTICAL ALIGNMENTS

1. A continuous channel grade from Baseline Road to US 60 & from US 60 to Southern Avenue was analyzed for the south and north half of Sossaman Channel, respectively. A HEC-1 analysis was performed diverting flows to the basin to determine reduced design 100 year, 24 hour peak discharges. These preliminary discharges were used to evaluate the performance of the channel typical sections. The following channel typical sections were selected for study and those noted carried forward into the next stage of study:

Channel Reach	Channel Lining	Channel Bottom Width	Channel Side slopes	Notes
South Half	Earth	15'	4:1	Continue Forward
		15'	5:1	Continue Forward
		20'	4:1	
		25'	4:1	Continue Forward
North Half	Earth	10'	4:1	Continue Forward
		15'	4:1	Continue Forward
		15'	5:1	
		20'	4:1	Continue Forward
South Half	Concrete	15'	3:1	Continue Forward
		15'	4:1	
		20'	3:1	Continue Forward
		25'	3:1	Continue Forward
North Half	Concrete	10'	3:1	Continue Forward
		15'	3:1	Continue Forward
		15'	4:1	
		20'	3:1	Continue Forward

2. A continuous channel grade from Baseline Road to US 60 resulted in higher than allowable velocities for both the earthen and concrete channel alternatives. Drop Structures were added to decrease the channel slope to slow the flows. Also the existing channel banks south of US 60 have distinctive grade breaks resulting in a significant elevation difference between Baseline Road and US 60. Drop Structures were added in the area of the natural channel bank grade breaks to minimize earthwork and decrease the top width of the channel allowing for access roads. These natural grade breaks occur approximately at survey baseline stations 12+45, 21+50, 23+40, 27+00 and 36+50. HEC-2 analyses were performed and the results were reviewed for permissible water velocities, Froude Numbers requirements, freeboard requirements and available width for access roads.

Where necessary drop structure heights and channel grades were adjusted to arrive at permissible water velocities recommended in Table 5.1 and 5.3 of the Drainage Design Manual, Volume II. The available freeboard was determined from the top of bank elevation and the water surface elevation from the HEC-2 analysis. Where the required freeboard was less than the available freeboard, determined from the above approach, the cross sections from the HEC-2 analysis were reviewed to determine if additional height was available in the overbank areas to accommodate freeboard. In most cases the overbank areas provided the necessary freeboard, while in a few cases minor adjustments to the overbank areas will be necessary. Adjustments in the overbank elevations will be necessary to provide uniform access road grades.

The available width for access roads was determined from the top of bank offset and the right of way. Where the available width was less than 15 feet, the available freeboard was reviewed to determined if freeboard in excess of the minimum were available so the top of bank elevation could be lowered to accommodate the additional width for the access roads.

The earthen channel alternatives, centered within the right of way, essentially on the existing channel's flow line did not accommodate access roads on both sides of the channel corridor from Baseline Road to US 60. The horizontal alignment was shifted to the west 5 feet to provide one access road on the east bank. The alignment was shifted to the west because there is no known access from outside the right of way to the west bank as there is on the east bank.

The following channel typical sections were selected for study and those noted carried forward into the next stage of study.

Channel Reach	Channel Lining	Channel Bottom Width	Channel Sideslopes	Notes
South Half	Earth	15' 15' 25'	4:1 5:1 4:1	Continue Forward
North Half	Earth	10' 15' 20'	4:1 4:1 4:1	Continue Forward
South Half	Concrete	15' 20' 25'	3:1 3:1 3:1	Continue Forward
North Half	Concrete	10' 15' 20'	3:1 3:1 3:1	Continue Forward

-CHANNEL LINING ALTERNATIVES

1. Asphalt Concrete was given consideration; however, the FCD considered asphalt concrete a potential hazard to the environment. The asphalt concrete alternative was not carried forward.

2. Soil Cement, was evaluated. Four soil samples were taken along the channel corridor. Sieve analysis, moisture contents, and plasticity index tests were performed. The sieve analysis indicated a silty fine grained soil with more than 50% passing the number 4 sieve and up to 70% passing the number 200 sieve. Moisture contents were less than 2% with plastic indexes of 3 to 9.

Soil cement designs were tested with the typical soil submitted. Cement contents were varied from 6 to 10% by weight of the soil. Seven day compressive strengths were from 30psi at 6% to 275psi at 10%.

Due to the fine grain size and the lack of natural clay in the soil it may require from 16 to 20% cement. The ideal soil cement strength should be 500psi in seven days according to the portland cement association design criteria.

The required cement content would equal class C concrete according to MAG 725. The soil cement alternative was not carried forward.

3. Gunite Lining was considered. It has been used as a liner in the upstream portion of the channel and appears to be performing well. Thickness and reinforcing designs would need to be performed to determine a structural section; however, the existing gunite channel along the north side of Southern Avenue is 3 inches minimum thickness with either 4" x 4" 12

gauge or 6" x 6" 10 gauge wire mesh. This alternative was carried forward.

4. Roller Compacted Concrete was considered. It has been successfully used on channel liners, embankments and dams. The design would include the use of a local aggregate mixed in place. The mix would have a very low water content with less than a three sack mix. Roller compacted concrete is placed without forms at specified thickness and compacted in the same manner as aggregate base or soil cement. Mix designs are established based upon strength requirements and the aggregate used. A two inch maximum aggregate should be considered to help reduce water velocities expected in the channel. It is anticipated that the lining thickness would be 6 inches. A keyed joint should be considered above the floor to accommodate subsequent wall construction. This alternative was carried forward.

5. An Earthen Channel was considered. The soils evaluations and test results indicate erodible soil unless treated physically or chemically. The undisturbed soils are stable, however, any disturbance will reduce the insitu soil's cohesiveness. During construction, the existing soil should not be excavated. This alternative was carried forward.

Please note that the above estimated designs are only indicated to determine quantities for the selected alternatives.

-BASIN AND WEIR ALTERNATIVES

The basin is sized to accommodate the design 100 year, 24 hour peak discharges in excess of 850 cfs in Sossaman Channel and to accommodate overland flow from subbasin 4399. The basin outlet pipe is located in the southwest corner of the basin to minimize pipe length and slope draining to Sossaman Channel upstream of ADOT right of way. A 24" concrete basin outlet pipe is proposed with a minimum slope providing cleansing velocity during low flows. The outlet pipe was sized and the slope checked to verify the basin will drain within 36 hours. Overflow for the basin will naturally occur in the southwest corner where existing ground is lowest. Elsewhere the existing ground around the basin is elevation 1413.

Initially the basin was sized with 4:1 side slopes and a 15 foot perimeter access road. The diversion weir was sized based on limiting the velocity over the weir to 5 fps. This resulted in a weir length of 350 feet with a maximum depth of flow over the weir of 9 inches. Initially the weir was located north of ADOT right of way. This location minimized weir construction costs. Numerous HEC-2 analyses were performed to determine a water surface elevation in the channel that provided adequate channel freeboard and a basin invert that would gravity drain to Sossaman Channel. None were successful. Subsequent trials without the perimeter access roads were unsuccessful. The weir was shifted north to take advantage of the natural rise in upstream water surface and the basin was checked with a 15 foot perimeter access road. These trials were also unsuccessful.

The final basin has 4:1 side slopes without perimeter access roads on three sides. The diversion weir is located south of the north basin right of way. Full utilization of the basins available right of way is required due to the large volume of flow that must be diverted and retained during the peak. This has resulted in a mildly sloping basin floor.

IX. ALTERNATIVE I

HEC -1 analysis was performed utilizing the improved channel typical section without the diverted flows to the basin to determine the design 100 year, 24 hour peak discharges for the HEC-2 analysis. An initial HEC-2 analysis was performed diverting flow to the basin. The HEC-2 reduces downstream discharges by the amount diverted. These reduced discharges were compared to discharges from a HEC-1 analysis with diverted flows to the basin, to analyze the effect of the diverted flow on the downstream peak discharges. The analysis determined an acceptable solution which resulted in approximately a 4 percent difference in downstream peak discharges.

The proposed channel from Baseline Road to US 60 is an earthen channel with 15 foot bottom width and 4:1 side slopes. Seven drop structures are required to slow the flow and decrease the top width of the channel. As a result of the existing bank grades, a 15 foot wide access road can only be accommodated on the east side of the channel corridor. The east side of the channel corridor is adjacent to low density detached single family housing that utilizes the existing channel access road for ingress and egress to their backyards. The existing utilities along the west side of the corridor do not have prior rights except for US West facilities along the west bank and those that cross the channel corridor 58' south of US 60 right of way; however, the proposed channel alignment does not encroach into the existing utility cover for those facilities along the west bank. The proposed channel alignment slightly encroaches into the existing US West facility crossing the channel corridor, south of US 60. Access to these utilities will be limited.

The Froude numbers, freeboard requirements and reduced discharges for this proposed channel meet the criteria. The channel velocities around bend two exceed the 5 fps limit for

earthen channels and in the area of the bend will require erosion protection. Velocities elsewhere range from 4.6 to 5.4 fps. The HEC-2 analysis of the existing channel resulted in channel velocities in excess of 5.4 fps. The velocities determined by the HEC-2 analysis are mean velocities. The actual velocity of the water adjacent to the channel lining will be less. This has been verified during sight visits that confirmed no visible downstream aggradation in the channel. Slightly higher velocities then those recommended in the FCD design manual would be appropriate for this project.

The proposed channel from US 60 to Southern Avenue is an earthen channel with a 10 foot bottom width and 4:1 side slopes. One additional drop structure had to be added to the vertical alignment to raise the water surface elevation resulting in a higher weir elevation that meets the minimum requirements for the basin floor to gravity drain. The weir elevation could not be raised to its maximum due to upstream violation of the freeboard requirements. The length of the weir is 350 feet. The depth of water in the basin is approximately 6 feet with freeboard provided in excess of 1.5 feet. The required retention is estimated at 42 acre feet. Channel grades are provided in the HEC-2 output.

An alternative to adding an additional drop structure in this reach of channel was to restrict the channel section downstream of the weir. This restriction could be accomplished with a beam/gate across the channel, which would allow water to back up and result in a higher weir elevation. The FCD expressed concern about safety and maintenance operations, therefore this alternative was not carried forward.

For the HEC-2 analysis of this alternative see the file titled "SCDENW1". For the freeboard analysis see the file titled "QP File: SCDENW1F.SOS. For the analysis of the available distance for access roads see the file titled "QP File: SCDENW1D.SOS.

This alternative has an estimated construction cost of $1,419,685.00. The annual maintenance costs for Sossaman Channel from Guadalupe Road to Southern Avenue was provided by the FCD as $33,180.00. This project is approximately 60% of the total length; therefore, the annual maintenance has an estimated cost of $22,000.00 for an earthen lined channel. The present value of 20 years of maintenance costs at 7% interest is $233,000.00, when added to the project costs results in a total cost of $1,652,685.00 for this alternative.

X. ALTERNATIVE II

HEC-1 analysis was performed utilizing the improved channel typical section without the diverted flows to the basin to determine the design 100 year, 24 hour peak discharges for the HEC-2 analysis. An initial HEC-2 analysis was performed diverting flow to the basin. The HEC-2 reduces downstream discharges by the amount diverted. These reduced discharges were compared to discharges from a HEC-1 analysis with diverted flows to the basin, to analyze the effect of the diverted flow on the downstream peak discharges. The analysis determined an acceptable solution which resulted in approximately a 4 percent difference in downstream peak discharges.

The proposed channel from Baseline Road to US 60 is a roller compacted concrete channel with a 15 foot bottom width and 3:1 side slopes. Six drop structures are required to slow the flow and decrease the top width of the channel due to the existing bank grades. A 15 foot wide access road can be accommodated on both sides of the channel corridor. The east side of the corridor is adjacent to low density detached single family housing that utilizes the existing channel access road for ingress and egress to their backyards.

The Froude numbers and freeboard requirements for this proposed channel meet the criteria. The channel velocities are typically less than 9 fps which meet the criteria and flow is subcritical.

The proposed channel from US 60 to Southern Avenue is a roller compacted concrete channel with 10 foot bottom width and 3:1 side slopes. One additional drop structure had to be added to the vertical alignment to raise the water surface elevation resulting in a higher weir elevation that is above the minimum required for the basin floor to gravity drain. The

weir elevation could not be raised to its maximum due to upstream violation of the freeboard requirements. The length of the weir is 395 feet. The weir was legthened from the earthen channel alternative to reduce Froude Numbers in the channel adjacent to the weir. The depth of water in the basin is approximately 6.1 feet with provided freeboard in excess of 1.53 feet. The required retention is slightly more for this alternative due to the improved channel conveyance affecting downstream peak discharges. The required retention is estimated at 42.4 acre feet. Channel grades are provided in the HEC-2 output. Access roads can be accommodated on both sides of the channel corridor. The Froude numbers, freeboard requirements and channel velocities meet the criteria while the flow is subcritical.

An alternative to adding an additional drop structure in this channel reach was to restrict the channel section downstream of the weir. This restriction could be accomplished with a beam/gate across the channel, which would allow water to back up and result in a higher weir elevation. The FCD expressed concern about safety and maintenance operations. This alternative was not carried forward.

For the HEC-2 analysis of this alternative see the file titled "SCDCNW". For the freeboard analysis see the file titled "QP File: SCDCNWF.SOS. For the analysis of the available distance for access roads see the file titled "QP File: SCDCNWD.SOS.

This alternative has an estimated construction cost of $1,822,720.00. The annual maintenance costs for Sossaman Channel from Baseline Road to Southern Avenue is estimated at $12,500.00 every fifth year for sealing cracks, joint repair and sediment removal. The present value of 20 years of maintenance costs at 7% interest is $23,000.00, when added to the project costs results in a total cost of $1,845,720.00 for this alternative.

XI. CONCLUSIONS AND RECOMMENDATIONS

The existing Sossaman Channel is mainly bordered by low density single family detached housing. The undeveloped land surrounding the proposed drainage basin is zoned for similar development. It has been observed during all the site visits that local residents utilize the existing channel corridor for either amusement to ride dirt bikes or access their backyards from the existing channel access roads. Several residents along the west side of the channel south of Southern Avenue have landscaped outside the back property line adjacent to the channel access road.

A design goal established for the project is to design the drainage basin to accommodate the potential for future soccer fields by others. The basin will accommodate soccer fields; however, the basin floor cannot be terraced. The existing overland flows from the area northeast of the basin and the requirement to provide retention for the future development adjacent to the basin necessitated maximum utilization of the basin right of way. In order to utilize the basin right of way to the fullest, access to the basin is limited to 76th Street corridor and from the 20 feet wide access road along the weir. A five foot bench with a ten foot rounding is proposed for 3/4 of the perimeter.

Additional design goals established for the project consist of providing a minimum of 15 feet for access roads, minimizing construction costs and meeting the design requirements of the Drainage Design Manuals for Maricopa County.

Alternative one consists of an earthen channel with 4:1 side slopes, 15 feet access roads along the channel except along the east side south of US 60, and 8 drop structures. The channel velocities are slightly higher than those recommended in Table 5.2 of the Drainage Design Manual Volume II; however, an analysis of the existing channel also resulted in

higher channel velocities. Additional construction costs are required for channel erosion protection around bend two where the velocities are highest. The total project costs for the alternative are estimated at $1,652,685.00. This cost includes $233,000.00 in maintenance costs over a 20 year life at 7% interest. Included in the total project costs is $205,751.00 for engineering contingencies of basin erosion protection, access roads into the channel, etc. and $185,176.00 for construction engineering, supervision, testing, sampling, etc.

Alternative II consists of a roller compacted concrete with 3:1 side slopes, 15 feet access roads along the channel and 7 drop structures. The channel velocities are higher than those of the earthen channel but within the criteria listed in Table 5.3 of the Drainage Design Manual Volume II. The total project costs for the alternative are estimated at $1,845,720.00. This cost includes $23,000.00 in maintenance costs over a 20 year life at 7% interest. Included in the total project costs is $264,162.00 for engineering contingencies of basin erosion protection, access roads into the channel, etc. and $237,746.00 for construction engineering, supervision, testing, sampling, etc.

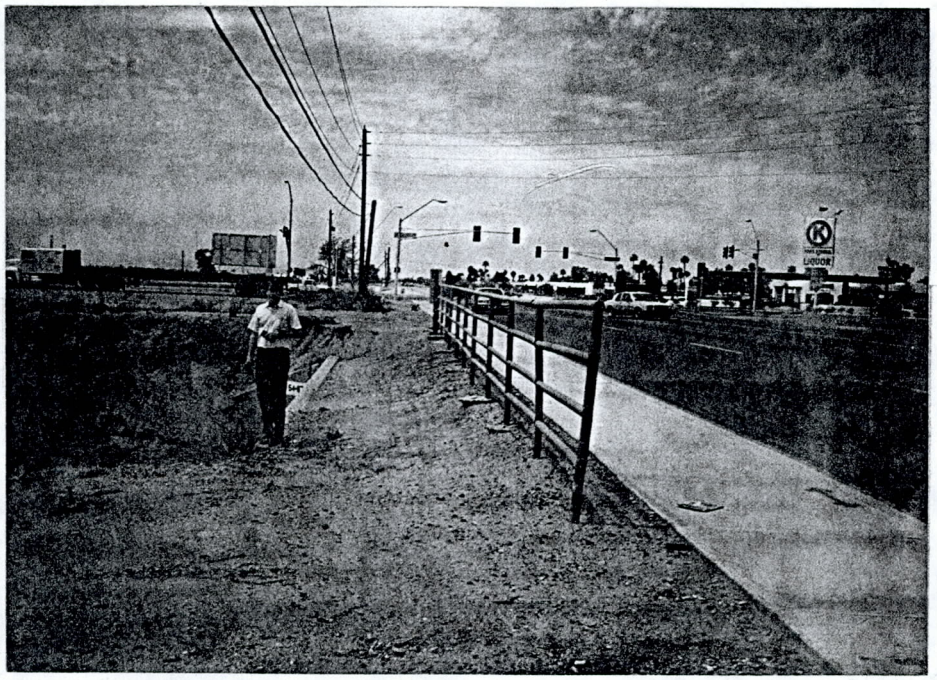
The recommendation of this report for Sossaman Channel improvements from Baseline Road to Southern Avenue is Alternative I. This alternative costs slightly less than Alternative II (Roller Compacted Concrete) and recognizes the surrounding residential land use. Alternative I provides a means for those residents currently using the existing right of way to access the back of their property and most importantly conveys the water at a slower velocity. The flatter side slopes of the earthen channel alternative allow for easier egress from the channel.

XII. EXHIBITS

CONVEYANCE STRUCTURE AT BASELINE ROAD

Exhibit 1: Baseline Road and Sossaman Channel looking south through the 4 - 10' X 8' box culverts used to convey flows under Baseline Road. East of the box culverts are two 54 inch diameter conveyance pipes bringing offsite storm flows from Baseline Rd.

Exhibit 2: Baseline Road and Sossaman Channel, south side looking west at the termination of the structure at Baseline Road.



CONVEYANCE STRUCTURE AT US 60

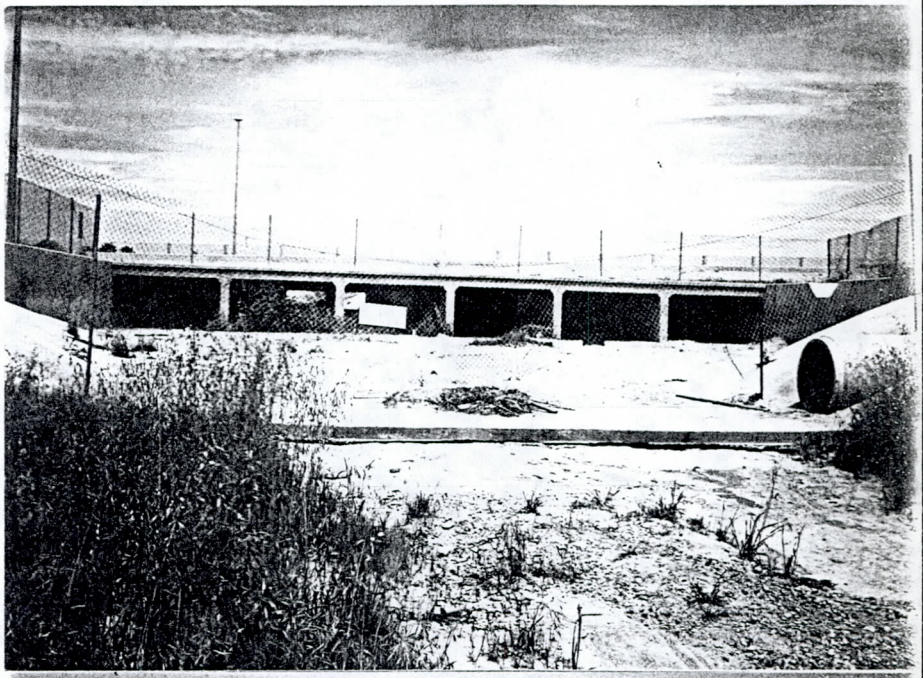


Exhibit 3:

South side of the conveyance structure at US 60 looking north through the 6 - 12 X 6 foot box culverts that channel flow under the Superstition Freeway. The east conveyance pipe brings offsite flows from within ADOT right of way for US 60.

Exhibit 4:

South of US 60 from the conveyance structure at the freeway looking south. The picture is representative of the percentage of low density residential housing that exists along the channel right of way.

Exhibit 5:

North side of structure at US 60 looking south. The junction with the ADOT conveyance bringing offsite flows is directly east of the trapezoidal channel shown.

SOSSAMAN CHANNEL AND DETENTION BASIN SITE

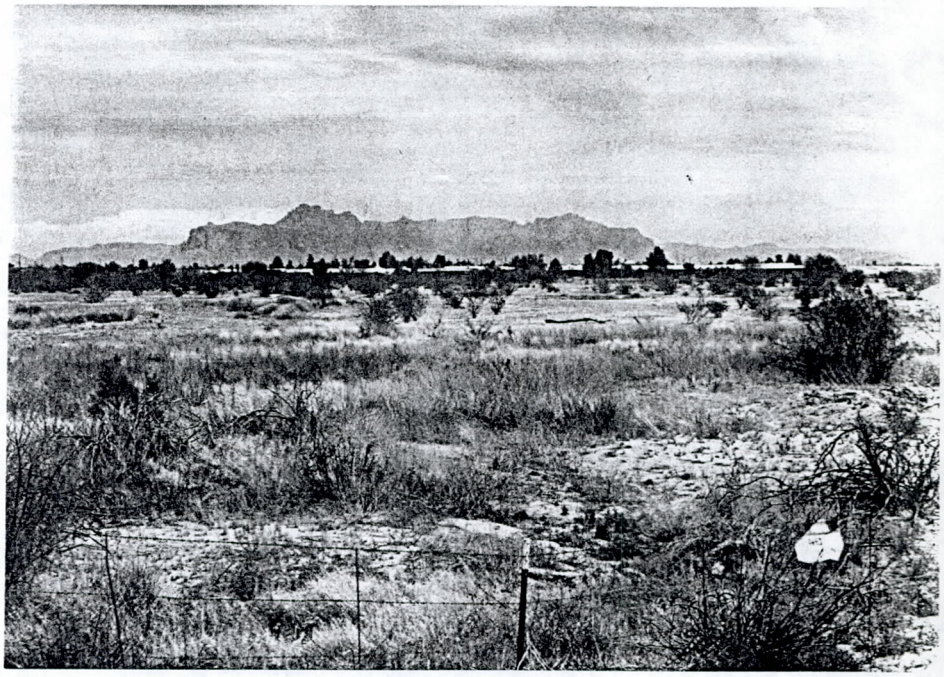


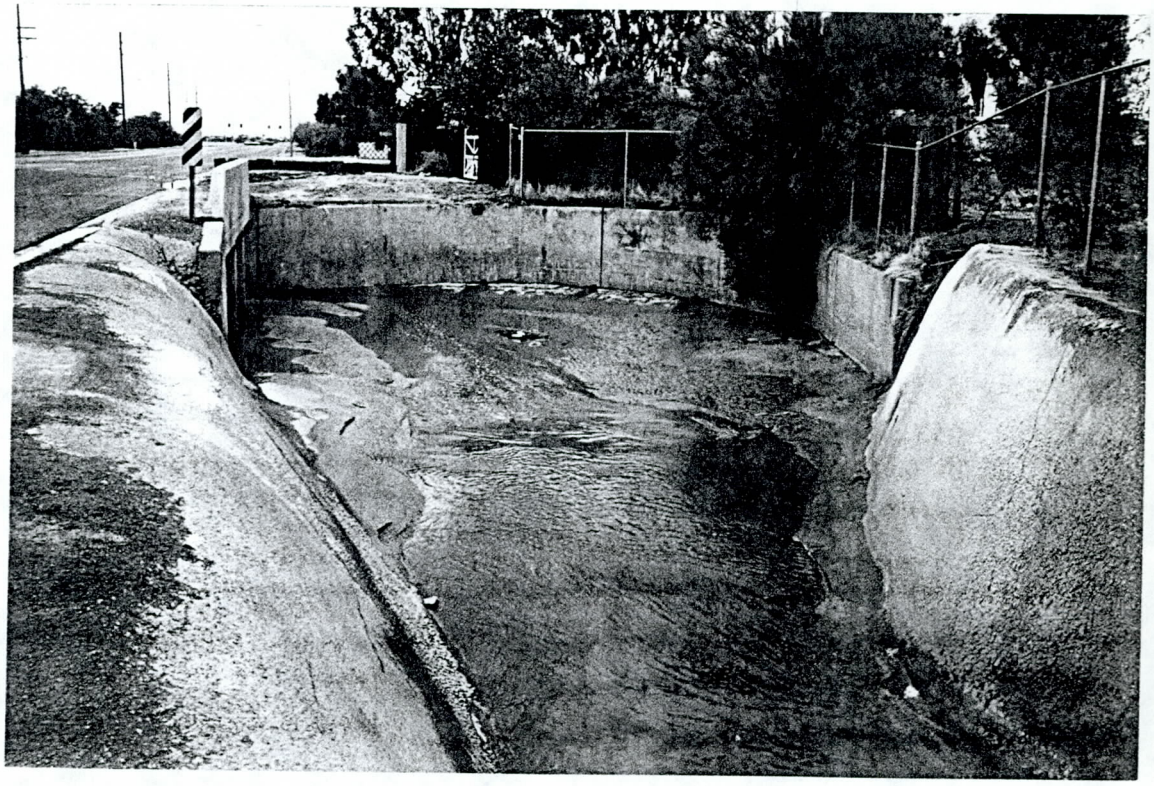
Exhibit 6: The proposed detention basin site looking east.

Exhibit 7: South of Southern Avenue looking south along Sossaman channel. Note that this picture is representative of the northern half of the channel in terms of vegetation growth and channel size.

SOUTHERN AVENUE CONVEYANCE STRUCTURE

Exhibit 8: South side of Southern Avenue looking northeast at the 3 8' X 4' box culverts that convey flows under Southern Avenue. The 30 inch diameter conveyance shown in the east wing wall of the structure carries offsite flows from drainage along Southern Ave.

Exhibit 9: North side of conveyance structure at Southern Avenue looking west. The semi-circular junction of the Southern Avenue channel and Sossaman channel traps sediment.



SOUTHERN AVENUE CHANNEL
FROM HAWES ROAD TO SOSSAMAN CHANNEL

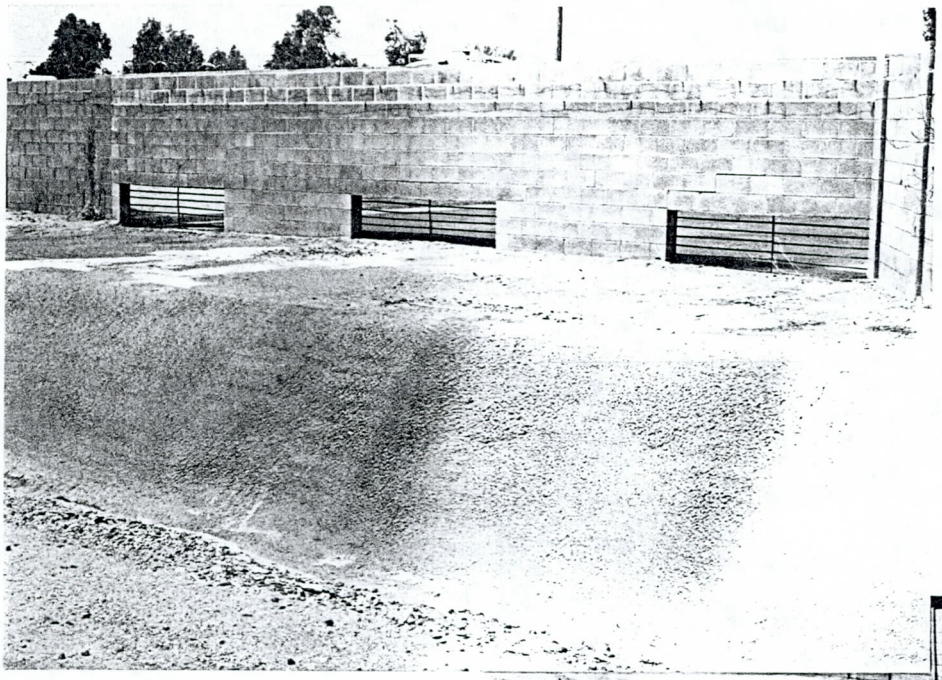


Exhibit 10 & 11:

Representative pictures of the Southern Avenue channel from Hawes Road to Sossaman channel looking north.

These pictures also demonstrate the range in size of the conveyance features that bring storm flows from offsite.

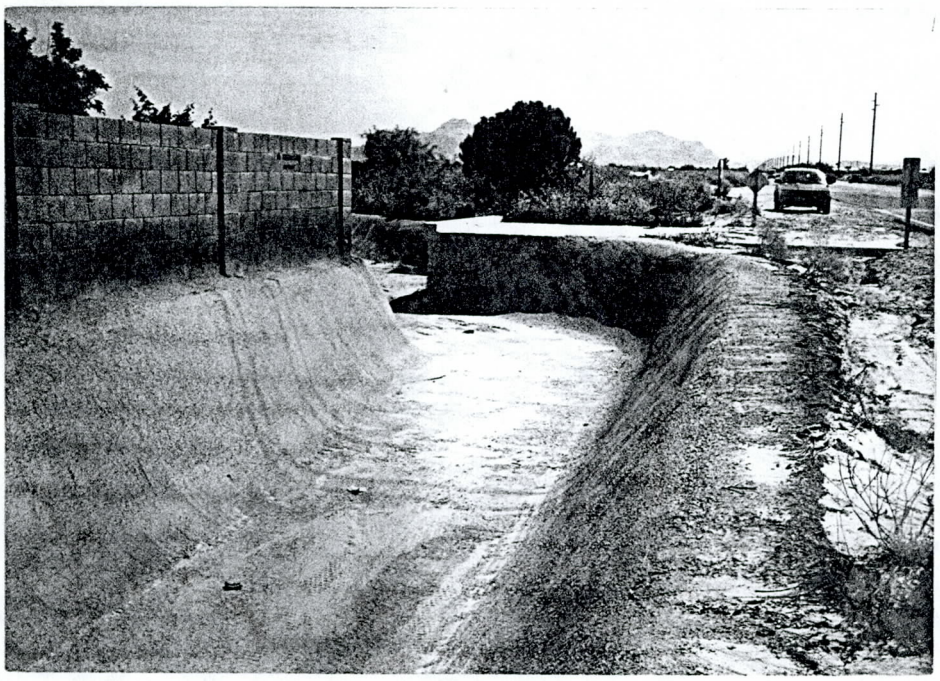


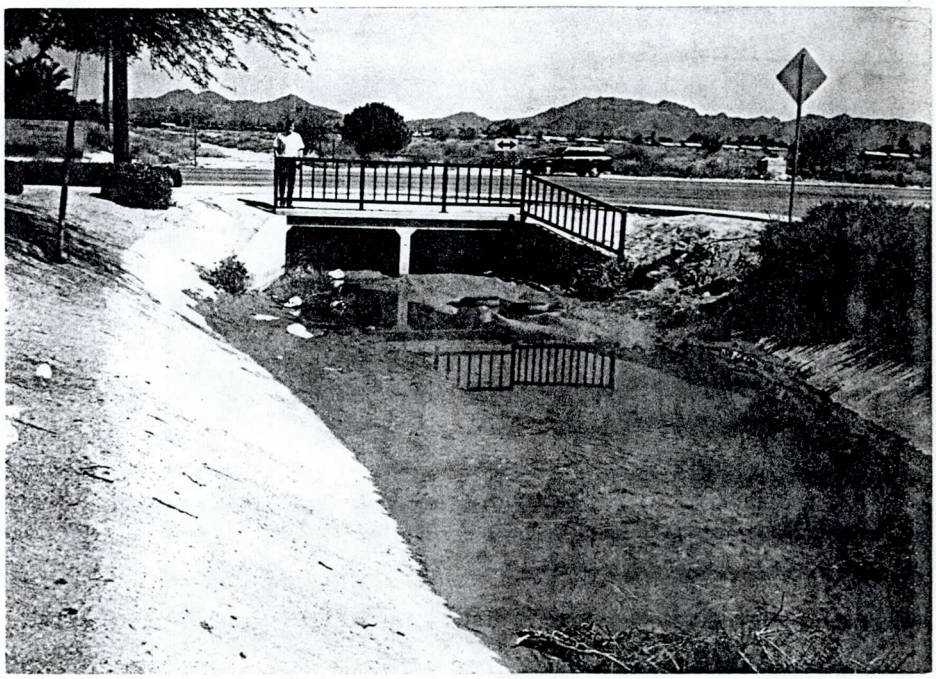
Exhibit 12:

South side of Southern Avenue looking east at the channel. The picture represents the trapezoidal channel shape and the almost vertical side slopes. The picture looks directly at the west side of the box culvert structure at Hawes Road.

CONVEYANCE STRUCTURE
AT HAWES ROAD AND SOUTHERN AVENUE

Exhibit 13: North side of Southern Avenue looking south at the conveyance structure at Hawes Road and Southern Avenue. The picture shows the debris and sedimentation that has been deposited in front of the 2 - 8' X 4' box culverts.

Exhibit 14: South side of Southern Avenue and west of Hawes Road. Looking north the picture shows the sedimentation and debris that is also left downstream. The fence protection around the headwall is shown.



HAWES ROAD - FROM SOUTHERN AVENUE TO US 60

Exhibit 15: West side of Hawes Road looking south down the Hawes Road channel. This is representative of the lined, trapezoidal channel.

Exhibit 16: Hawes Road channel from just north of US 60 looking south at the ADOT conveyance channel.

SOUTHERN AVENUE
FROM SIGNAL BUTTE ROAD TO HAWES ROAD

Exhibit 17: Southern Avenue just west of Signal Butte Road looking west.

Exhibit 18: Southern Avenue west of Signal Butte Road on the south side of roadway. Flows cross Southern Avenue and pond.

SOUTHERN AVENUE
FROM SIGNAL BUTTE ROAD TO HAWES ROAD

Exhibit 19: Southern Avenue east of 97th Street on the north side of the roadway looking north at the conveyance feature bringing offsite flows from nearby residential areas.

Exhibit 20: South side of Southern Avenue west of 96th Street looking south showing conveyance channel with considerable overgrowth.

SOUTHERN AVENUE
FROM SIGNAL BUTTE ROAD TO HAWES ROAD

Exhibit 21: Southern Avenue just west of Ellsworth Road looking west at a small drainage swale on the south side of the roadway.

Exhibit 22: Southern Avenue east of Hawes road looking south at the overgrowth of trees and shrubs that clog and hinder flows through the conveyance areas.

SOSSAMAN CHANNEL & BASIN

AGENCY CONTACT LIST
CONTRACT 91-07
MARICOPA COUNTY
FLOOD CONTROL DISTRICT

APA Geotrack
PROJECT NO. P31D01

DIMENSION CABLE ENGINEERING 115 NORTH 51ST AVENUE PHOENIX, ARIZONA 85043
SOUTHWEST GAS CORPORATION 420-582 P.O. BOX 52075 PHOENIX, ARIZONA 85072-2075
SRP PROPERTY MAPPING DEPARTMENT P.O. BOX 52025 PHOENIX, ARIZONA 85072-2025
US WEST, PUBLIC PROJECTS OFFICE 6350 SOUTH MAPLE AVENUE RM 125 TEMPE, ARIZONA 85283
CITY OF MESA 55 NORTH CENTER STREET MESA, ARIZONA 85281
MARICOPA COUNTY FLOOD CONTROL DISTRICT 2801 W. DURANGO PHOENIX, ARIZONA 85009
ARIZONA DEPARTMENT OF TRANSPORTATION 205 S. 17th AVENUE PHOENIX, ARIZONA 85007
ARIZONA DEPARTMENT OF TRANSPORTATION DISTRICT 1 2140 W. HILTON PHOENIX, ARIZONA 85009

PROJECT\P31D01\CONTACT.LST

RED MOUNTAIN FREEWAY

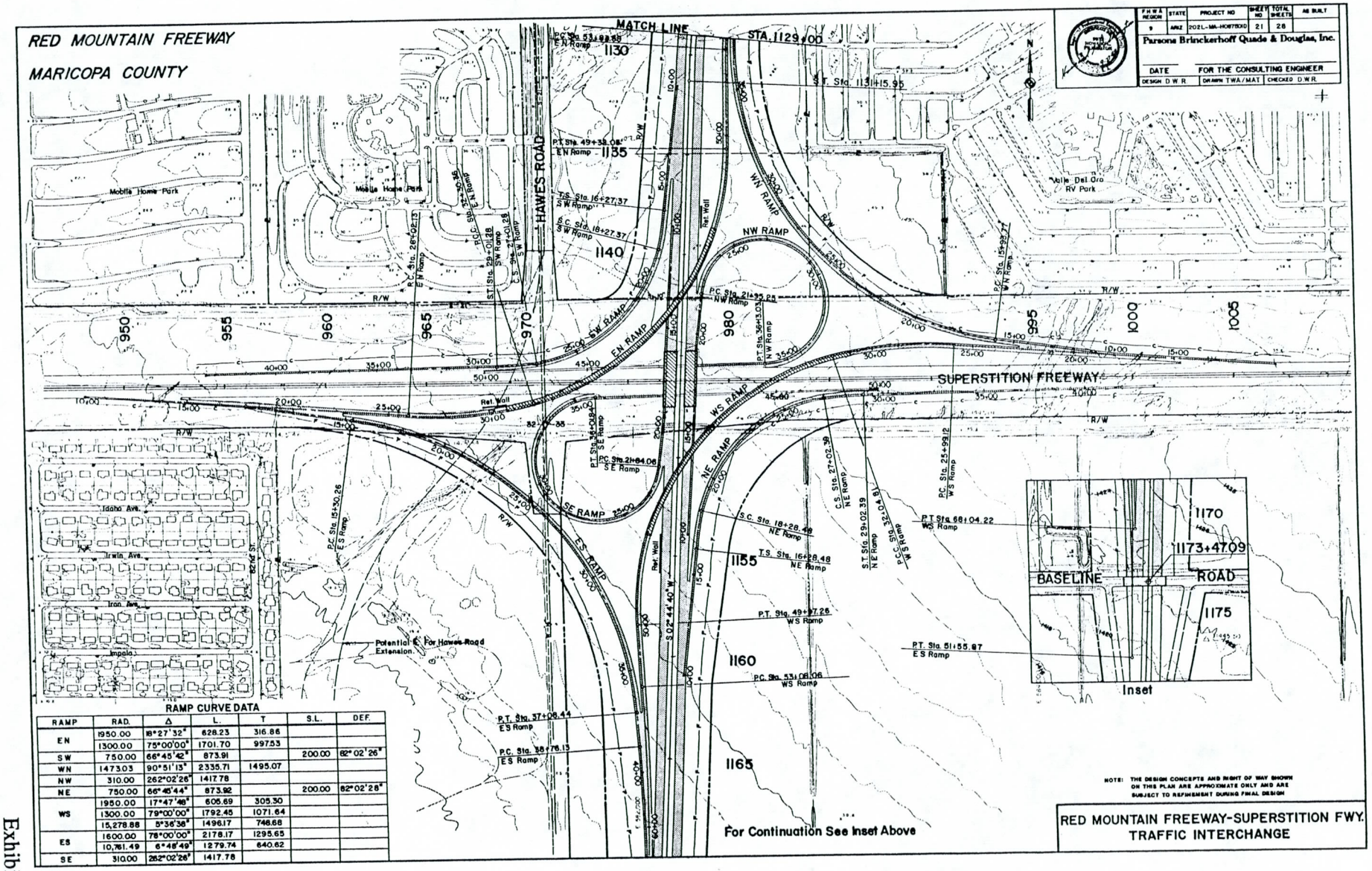
MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO	SHEET NO	TOTAL SHEETS	AS BUILT
9	ARIZ	202L-MA-H067(X)0	21	28	

Parsons Brinckerhoff Quade & Douglas, Inc.

DATE FOR THE CONSULTING ENGINEER

DESIGN D.W.R. DRAWN TWA/MAT CHECKED D.W.R.



NOTE: THE DESIGN CONCEPTS AND RIGHT OF WAY SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND ARE SUBJECT TO REFINEMENT DURING FINAL DESIGN

RED MOUNTAIN FREEWAY-SUPERSTITION FWY. TRAFFIC INTERCHANGE

RAMP CURVE DATA

RAMP	RAD.	Δ	L.	T	S.L.	DEF.
EN	1950.00	18°27'32"	628.23	316.86		
	1300.00	75°00'00"	1701.70	997.53		
SW	750.00	66°45'42"	873.91		200.00	82°02'26"
WN	1473.03	90°51'13"	2335.71	1495.07		
NW	310.00	262°02'26"	1417.78			
NE	750.00	66°45'44"	873.92		200.00	82°02'28"
WS	1950.00	17°47'48"	606.69	305.30		
	1300.00	79°00'00"	1792.45	1071.64		
	15,278.88	5°36'38"	1496.17	748.68		
ES	1600.00	78°00'00"	2178.17	1295.65		
	10,761.49	6°48'49"	1279.74	640.62		
SE	310.00	262°02'28"	1417.78			

Exhibit 24

DESIGN CONCEPT PLANS

Arizona Department of Transportation

RED MOUNTAIN FREEWAY

PARSONS BRINCKERHOFF

DATE: OCT 1988

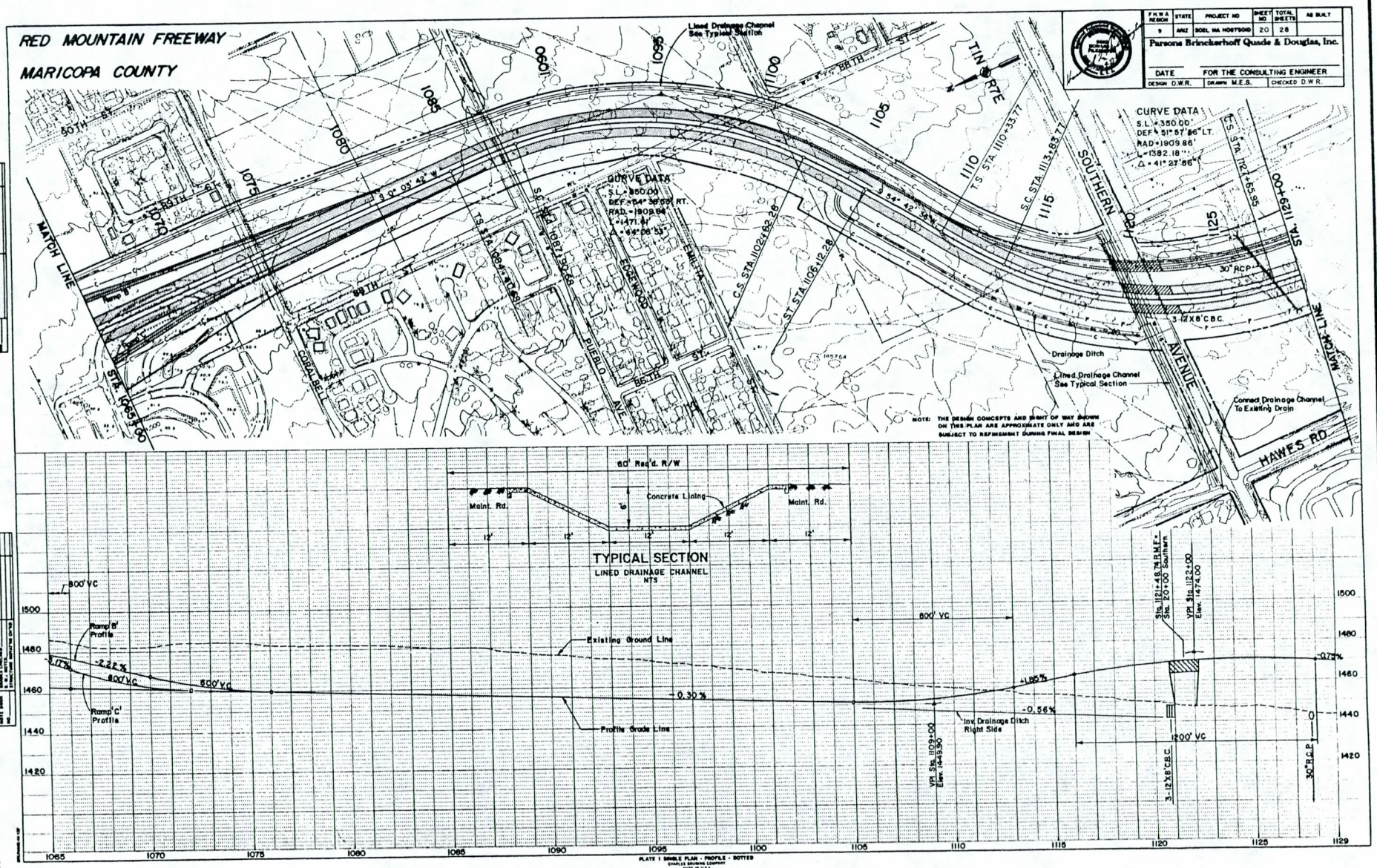


Exhibit 25

DESIGN CONCEPT PLANS

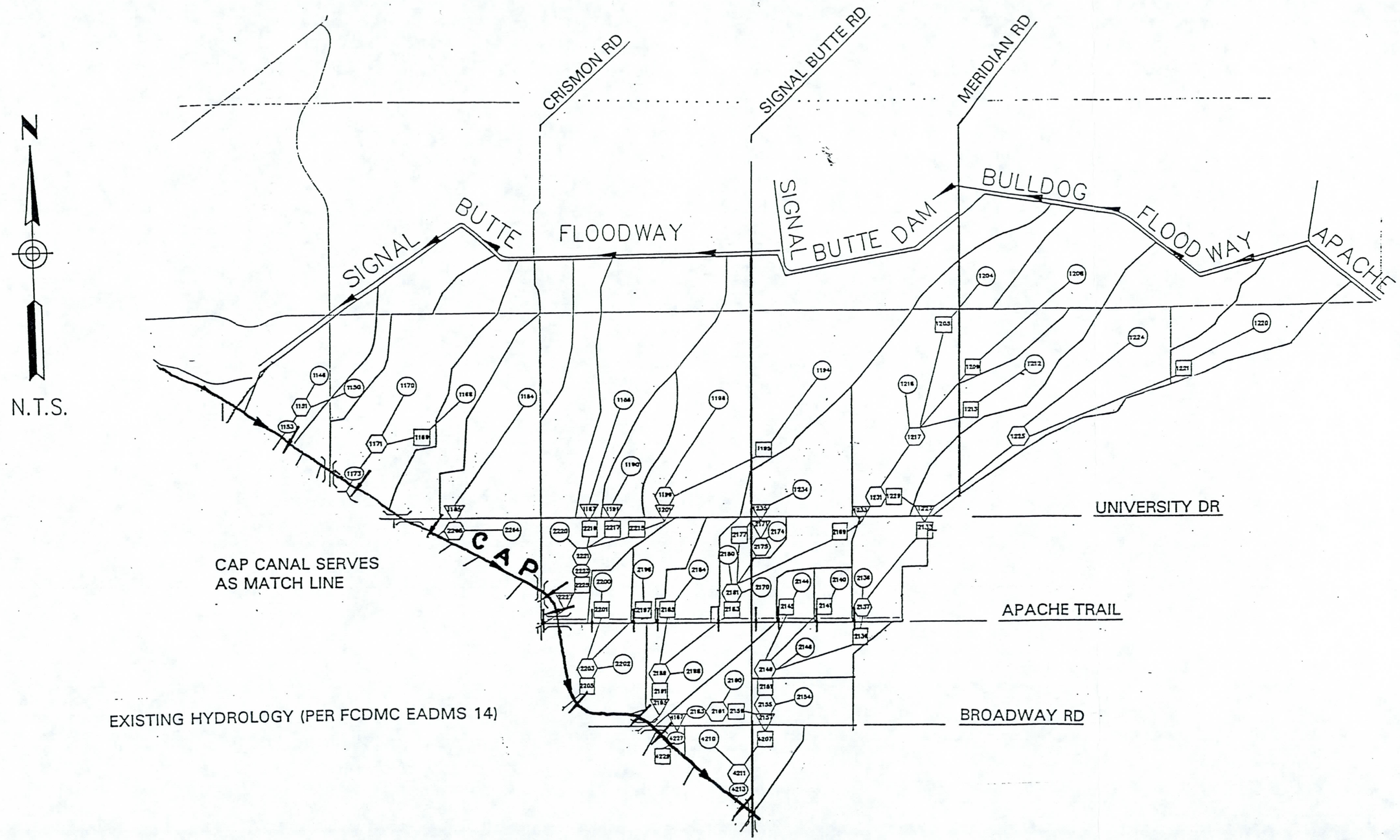
Arizona Department of Transportation

RED MOUNTAIN FREEWAY

PARSONS BRINCKERHOFF

DATE: OCT 1988

PAGE 65



EXISTING HYDROLOGY (PER FCDMC EADMS 14)

Exhibit 26

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SOSSAMAN CHANNEL & BASIN
EFFECTIVE CONTRIBUTORY BASIN: NORTH OF C.A.P.

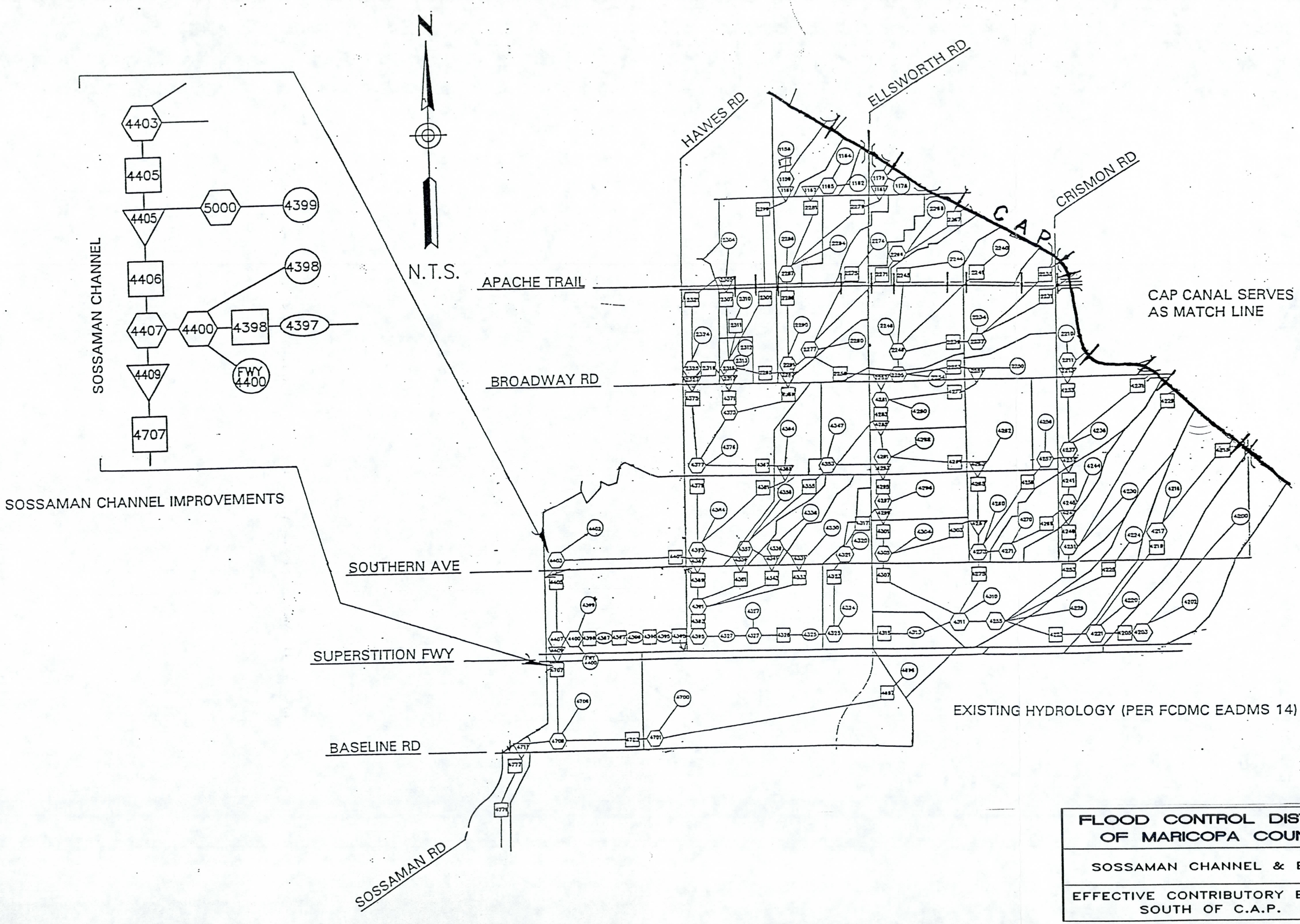


Exhibit 27

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SOSSAMAN CHANNEL & BASIN
EFFECTIVE CONTRIBUTORY BASIN: SOUTH OF C.A.P.

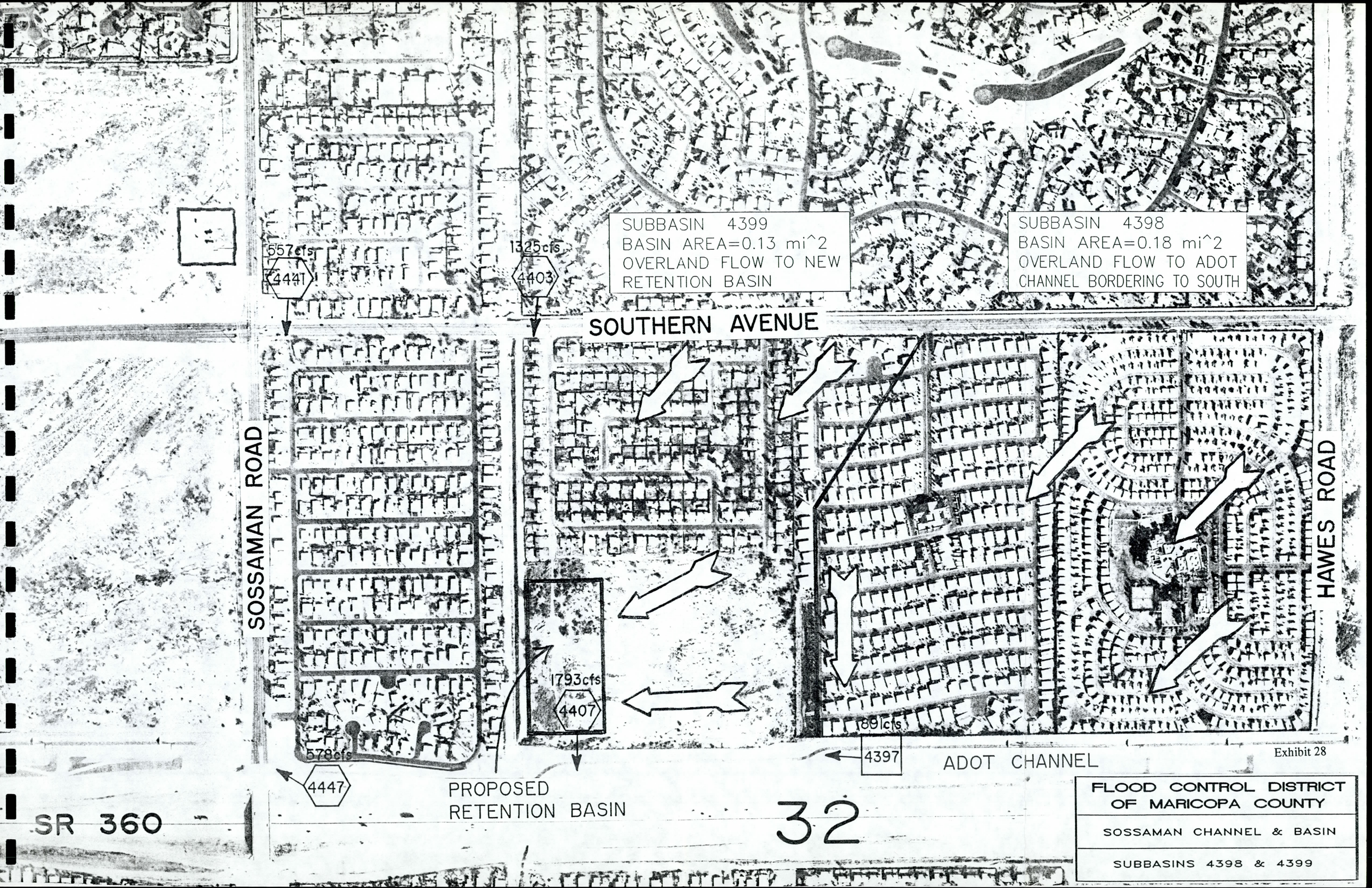


Exhibit 28

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SOSSAMAN CHANNEL & BASIN
SUBBASINS 4398 & 4399

XIII. REFERENCES

XIII. REFERENCES

A. Coe & Van Loo Consulting Engineers, Inc., Final II Drainage Design Report Appendix II for Superstition Freeway (SR 360) Ellsworth Road - Ironwood Drive. Arizona Department of Transportation, May 1988, revised December 1988.

B. Parsons Brinkerhoff Quade & Douglas, Inc. Red Mountain Freeway Lindsay Road to Baseline Road Design Concept Report, October 1988.

C. Flood Control District of Maricopa County, "Drainage Design Manual for Maricopa County, Arizona." Volume I - Hydrology, June 1992.

D. Flood Control District of Maricopa County, "Drainage Design Manual for Maricopa County, Arizona," Volume II - Hydraulics, September 1992.

E. US Army Corps of Engineers, "HEC - 1 Flood Hydrograph Package, User's Manual and Computer Modeling." Hydrologic Engineering Center, September 1981, revised March 1987.

F. US Army Corps of Engineers, "HEC - 2 Water Surface Profiles, User's Manual and Computer Modeling". Hydrologic Engineering Center, September 1990.

G. As Built Plans:

1. ADOT Project No. F-028-1(513)
2. MCDOT Project Nos. 67000 and 68313

XIV. APPENDIX

A. CALCULATIONS

PROJECT: SOSSAMAN CHANNEL AND BASIN

DATE: 06-Feb-93

FCD CONTRACT NO. 91-07
APA PROJECT NO. P31D01

ALTERNATIVE I
EARTH LINED CHANNEL
ENGINEER'S ESTIMATE

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST	EXTENDED AMOUNT
109-1	Mobilization	1	LS	$0.00	$63,376.63
201-1	Clearing and Grubbing	1	LS	$10,000.00	$10,000.00
215-1	Earthwork for Open Channel	20020	CY	$3.00	$60,060.00
215-2	Earthwork for Drainage Basin	117750	CY	$3.00	$353,250.00
215-3	15' Graded Access Road	7512	LF	$2.15	$16,150.80
350-1	Removal of Existing Improvements	1	LS	$10,000.00	$10,000.00
401-1	Traffic Control	1	LS	$20,000.00	$20,000.00
420-1	Chain Link Fence (60")	2440	LF	$6.00	$14,640.00
420-2	Chain Link Gate (14' Double)	2	EA	$1,000.00	$2,000.00
430-1	Landscaping at Basin	1	LS	$3,000.00	$3,000.00
505-1	Concrete Drop Structure	8	EA	$45,000.00	$360,000.00
505-2	Concrete Weir	3060	SY	$16.66	$50,979.60
618-1	24" RGRCP (Basin Outlet Pipe)	106	LF	$50.00	$5,300.00
	Chnl Erosion Protection at Bend Two	1	LS	$60,000.00	$60,000.00
				SUBTOTAL	$1,028,757.03
	ENGINEERING CONTINGENCIES (20%)				$205,751.41
	CONSTRUCTION ENGINEERING (15%)				$185,176.27
	PRESENT VALUE MAINTENANCE COSTS				$233,000.00
			TOTAL ESTIMATED COST:		$1,652,684.70

PROJECT: SOSSAMAN CHANNEL AND BASIN

DATE: 06-Feb-93

FCD CONTRACT NO. 91-07
APA PROJECT NO. P31D01

ALTERNATIVE II
ROLLER COMPACTED CONCRETE LINED CHANNEL
ENGINEER'S ESTIMATE

ITEM NO.	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT COST	EXTENDED AMOUNT
109-1	Mobilization	1	LS	$0.00	$83,988.65
201-1	Clearing and Grubbing	1	LS	$10,000.00	$10,000.00
215-1	Earthwork for Open Channel	4670	CY	$3.00	$14,010.00
215-2	Earthwork for Drainage Basin	118250	CY	$3.00	$354,750.00
215-3	15' Graded Access Road	10454	LF	$2.15	$22,476.10
350-1	Removal of Existing Improvements	1	LS	$10,000.00	$10,000.00
401-1	Traffic Control	1	LS	$20,000.00	$20,000.00
420-1	Chain Link Fence (60")	2440	LF	$6.00	$14,640.00
420-2	Chain Link Gate (14' Double)	2	EA	$1,000.00	$2,000.00
430-1	Landscaping at Basin	1	LS	$3,000.00	$3,000.00
505-1	Concrete Drop Structure	7	EA	$45,000.00	$315,000.00
505-2	Concrete Lined Channel (6")	25730	SY	$16.66	$428,661.80
618-1	24" RGRCP (Basin Outlet Pipe)	106	LF	$50.00	$5,300.00
505-3	Concr Weir-Top & Along Basin Side	2220	SY	$16.66	$36,985.20
				SUBTOTAL	$1,320,811.75
	ENGINEERING CONTINGENCIES (20%)				$264,162.35
	CONSTRUCTION ENGINEERING (15%)				$237,746.12
	PRESENT VALUE MAINTENANCE COSTS				$23,000.00
				TOTAL ESTIMATED COST:	$1,845,720.22

```
1*****************************************                    ****************************************
*                                         *                    *                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)      *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*        FEBRUARY 1981                    *                    * THE HYDROLOGIC ENGINEERING CENTER    *
*       REVISED  6 FEB 87                 *                    *       609 SECOND STREET              *
*                                         *                    *  DAVIS, CALIFORNIA 95616             *
* RUN DATE  02/03/1993  TIME  12:54:19    *                    *  (916) 440-3285 OR (FTS) 448-3285    *
*                                         *                    *                                      *
*****************************************                    ****************************************
```

```
X   X XXXXXXX  XXXXX      X
X   X X     X   X     XX
X   X X     X         X
XXXXXXX XXXX   X    XXXXX  X
X   X X     X         X
X   X X     X   X     X
X   X XXXXXXX  XXXXX     XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL

```
1                          HEC-1 INPUT                          PAGE  1

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1         ID      EASTERN  MARICOPA COUNTY MASTER DRAINAGE PLAN
  2         ID
  3         ID      EAST COUNTY HIGH RESOLUTION MODEL,   DATA FILE:  EMADMS14.DAT
  4         ID
  5         ID      REVISION:       ********** SOSAMAN CHANNEL IMPROVEMENT MODEL *********
  6         ID      AUGUST 10,1992        FILE: SOSALT7.DAT
  7         ID                        BY EVAN HENKE, APA GEOTRACK
  8         ID                   THE FOLLOWING CHANGES ARE MADE TO SOSALT6.DAT TO BUILD
  9         ID                   A MORE ACCURATE MODEL:
 10         ID
 11         ID                    S4399 IS SPLIT INTO TO BASINS, S4398 WHICH MODELS 59%
 12         ID                    OF THE ORIGINAL  AREA AND JOINS TO THE R.O.W CHANNEL TO
 13         ID                    THE SOUTH AND S4399 WHICH MODELS 41% OF THE ORIGINAL
 14         ID                    AND ROUTES TO THE RETENTION BASIN
 15         ID
 16         ID      REVISION:       ********* FILE: SCDENWI.DAT    100 YR  24 HR   W/BASIN
 17         ID      1/30/93        EARTH LINED CHANNEL  CHANGES IN LENGTHS, N VALUES AND S
 18         ID

1461        KK  C4400
1462        KM      COMBINE FLOWS FROM SEWER WITH FLOWS FROM THE R.O.W. CHANNEL
1463        KM      BEFORE FLOWS FROM SOSSAMAN CHANNEL ARE ADDED.
1464        KM      BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:COFY2)
1465        KO     1     2
1466        HC     3

1467        KK  D4387
1468        KM      RETRIEVE D4387; THE FLOW W. FROM SOUTHERN AND HAWES (D326-CVL/933)
1469        DR  D4387
1                          HEC-1 INPUT                          PAGE 36

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
1470      KK  R4401
1471      KM      ROUTE D4387 TO SOSSAMAN CHANNEL (C4403) IN CHANNEL ADJACENT TO SOUTHERN
1472      KM      (RO335-VCL/936)
1473      RK   4000   .007   .020        TRAP    10    1.5

1474      KK  S4402
1475      KM      RUNOFF FROM SUBBASIN S4402 (SUB 350-CVL/992)
1476      BA   .36
1477      LS         85
1478      UK    150   .005    .2    100
1479      RK   3100  .0061   .06   .035   TRAP    40    .01
1480      RK   4350  .0062  .016        TRAP    10    1.5

1481      KK  C4403
1482      KM      COMBINE R4401 AND S4400
1483      HC     2

1484      KK  R4405
1485      KM      ROUTE C4403 S. IN SOSSAMAN CHANNEL FROM SOUTHEN TO
1486      KM      DIVERSION POINT
1487      KO     1     2
1488      RK   2000 .00161   .035        TRAP    10     4

1489      KK DV4405
1490      KM      ESTIMATING THE STORAGE REQUIRED TO LIMIT SOSAMAN CHANNEL TO 850
1491      KM      CFS W/ OVERFLOW TO RETENTION BASIN
1492      KO     1     2
1493      DT  B4405
1494      DI     0    850   1000   1200   1700   2500   3500
1495      DQ     0      0    150    350    850   1650   2650

1496      KK  R4406
1497      KM      ROUTE REMAINING FLOW TO FWY C4407
1498      RK    225  .0045   .016        TRAP    19     2

1499      KK  C4407
1500      KM      COMBINE FLOWS IN SOSSAMAN CHANNEL WITH FLOWS IN R.O.W. CHANNEL
1501      KO     1     2
1502      HC     2

1503      KK DV4409
1504      KM      DIVERT 100% OF RUNOFFS ALONG SOSSAMAN CHANNEL TO R4707
1505      DT  D4409
1506      DI     0   5000
1507      DQ     0   5000

1508      KK  S4696
1509      KM      RUNOFF FROM SUBBASIN S4696
1510      BA  0.043
1511      LS         77
1512      UK    300  0.007    0.2    100
1513      RK   1600  0.009   0.04        TRAP     2     4
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1514      KK  R4697
1515      KM      ROUTE HYDROGRAPH TO C4701
1516      RK   8000  0.005   0.04        TRAP     2     4   YES

1517      KK  S4700
1518      KM      RUNOFF FROM SUBBASIN S4700
1519      BA   0.79
1520      LS         76
1521      UK    600  0.005    0.2    100
1522      RK   6400  0.007   0.04        TRAP     2     4

1523      KK  C4701
```

```
1524      KM      COMBINE HYDROGRAPHS S4700 AND R4697
1525      HC      2

1526      KK  R4703
1527      KM      ROUTE HYDROGRAPH TO C4709
1528      RK   5400  0.0047  0.035        TRAP     3     25

1529      KK  S4706
1530      KM      RUNOFF FROM SUBBASIN S4706
1531      BA  0.261
1532      LS          88
1533      UK    100  0.0035    0.2    100
1534      RK   5800  0.0074   0.02        TRAP     3     25

1535      KK  D4409
1536      KM      RETRIEVE DIVERTED HYDROGRAPH D4409
1537      DR  D4409

1538      KK  R4707
1539      KM      ROUTE HYDROGRAPH D4409 TO C4709
1540      KM      ROUTES FLOWS ACROSS SUPERSTITION
1541      RK    322   .0005   .016        TRAP    65      0

1542      KK  R4708
1543      KM      ROUTES FLOWS FROM SUPERSTITION TO BASELINE
1544      RK   2840 0.00744  0.035        TRAP    15      4

1545      KK  C4708
1546      KM      COMBINE FLOWS FROM R4707 AND S4706
1547      HC      2

1548      KK  C4709
1549      KM      COMBINE FLOWS FROM C4708 AND R4703
1550      KO      2      2
1551      HC      2

1552      KK  R4777
1553      KM      ROUTE HYDROGRAPH S. IN SOSSAMAN CHANNEL (BW=49'), (RO364-CVL)
1554      KO      1      2
1555      RK   1000   .0015   .035        TRAP    40    2.5
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1556      KK  B4405
1557      KM      RETRIEVE DIVERTED HYDROGRAPH B4405
1558      KO      1      2
1559      DR  B4405

1560      KK  S4399
1561      KM      RUNOFF FROM SUBBASIN S4399 (SUB355-CVL/945)
1562      KO      1      2
1563      BA   .127
1564      LS          87
1565      UK    110    .005    .2    100
1566      RK   1800   .0038   .016    .05   TRAP    40    .01
1567      RK   3100   .0026   .016        TRAP   16.6    1.5

1568      KK  C5000
1569      KM      COMBINE FLOWS FROM DIV B4405 AND S4399
1570      KO      1      2
1571      HC      2
1572      ZZ
1*****************************************                    ****************************************
*                                         *                    *                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)      *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*        FEBRUARY 1981                    *                    * THE HYDROLOGIC ENGINEERING CENTER    *
*       REVISED  6 FEB 87                 *                    *        609 SECOND STREET             *
*                                         *                    *    DAVIS, CALIFORNIA 95616           *
```

```
* RUN DATE 02/03/1993  TIME  12:54:19 *                    * (916) 440-3285 OR (FTS) 448-3285  *
*                                     *                  *                                     *
*****************************************                  *****************************************


                EASTERN  MARICOPA COUNTY MASTER DRAINAGE PLAN

                EAST COUNTY HIGH RESOLUTION MODEL,   DATA FILE:  EMADMS14.DAT

                REVISION:       ********** SOSAMAN CHANNEL IMPROVEMENT MODEL *********
                AUGUST 10,1992        FILE: SOSALT7.DAT
                                   BY EVAN HENKE, APA GEOTRACK
                              THE FOLLOWING CHANGES ARE MADE TO SOSALT6.DAT TO BUILD
                              A MORE ACCURATE MODEL:

                              S4399 IS SPLIT INTO TO BASINS, S4398 WHICH MODELS 59%
                              OF THE ORIGINAL AREA AND JOINS TO THE R.O.W CHANNEL TO
                              THE SOUTH AND S4399 WHICH MODELS 41% OF THE ORIGINAL
                              AND ROUTES TO THE RETENTION BASIN

                REVISION:       ********* FILE: SCDENWI.DAT   100 YR  24 HR   W/BASIN
                1/30/93       EARTH LINED CHANNEL  CHANGES IN LENGTHS, N VALUES AND S


 20 IO       OUTPUT CONTROL VARIABLES
             IPRNT         5  PRINT CONTROL
             IPLOT         0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE

  IT       HYDROGRAPH TIME DATA
             NMIN        15  MINUTES IN COMPUTATION INTERVAL
             IDATE     1   0  STARTING DATE
             ITIME      0000  STARTING TIME
               NQ       120  NUMBER OF HYDROGRAPH ORDINATES
            NDDATE     2   0  ENDING DATE
            NDTIME      0545  ENDING TIME
            ICENT        19  CENTURY MARK

          COMPUTATION INTERVAL    .25 HOURS
             TOTAL TIME BASE   29.75 HOURS

      ENGLISH UNITS
         DRAINAGE AREA        SQUARE MILES
         PRECIPITATION DEPTH   INCHES
         LENGTH, ELEVATION     FEET
         FLOW              CUBIC FEET PER SECOND
         STORAGE VOLUME       ACRE-FEET
         SURFACE AREA        ACRES
         TEMPERATURE         DEGREES FAHRENHEIT
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


       **************
       *            *
1484 KK    *    R4405  *
       *            *
       **************

1487 KO       OUTPUT CONTROL VARIABLES
              IPRNT         1  PRINT CONTROL
              IPLOT         2  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE

         HYDROGRAPH ROUTING DATA

1488 RK       KINEMATIC WAVE STREAM ROUTING
                 L      2000.  CHANNEL LENGTH
```

S	.0016	SLOPE
N	.035	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	10.00	BOTTOM WIDTH OR DIAMETER
Z	4.00	SIDE SLOPE

***

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
.4716	1.400	3.75	1000.00

****

HYDROGRAPH AT STATION R4405

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	*	1	0730	31	0.	*	1	1500	61	389.	*	1	2230	91	99.				
1	0015	2	0.	*	1	0745	32	0.	*	1	1515	62	342.	*	1	2245	92	98.				
1	0030	3	0.	*	1	0800	33	0.	*	1	1530	63	311.	*	1	2300	93	96.				
1	0045	4	0.	*	1	0815	34	0.	*	1	1545	64	287.	*	1	2315	94	94.				
1	0100	5	0.	*	1	0830	35	0.	*	1	1600	65	267.	*	1	2330	95	92.				
1	0115	6	0.	*	1	0845	36	0.	*	1	1615	66	249.	*	1	2345	96	90.				
1	0130	7	0.	*	1	0900	37	0.	*	1	1630	67	234.	*	2	0000	97	88.				
1	0145	8	0.	*	1	0915	38	0.	*	1	1645	68	220.	*	2	0015	98	86.				
1	0200	9	0.	*	1	0930	39	0.	*	1	1700	69	207.	*	2	0030	99	84.				
1	0215	10	0.	*	1	0945	40	0.	*	1	1715	70	196.	*	2	0045	100	82.				
1	0230	11	0.	*	1	1000	41	0.	*	1	1730	71	188.	*	2	0100	101	78.				
1	0245	12	0.	*	1	1015	42	0.	*	1	1745	72	180.	*	2	0115	102	73.				
1	0300	13	0.	*	1	1030	43	0.	*	1	1800	73	173.	*	2	0130	103	68.				
1	0315	14	0.	*	1	1045	44	0.	*	1	1815	74	166.	*	2	0145	104	63.				
1	0330	15	0.	*	1	1100	45	0.	*	1	1830	75	160.	*	2	0200	105	57.				
1	0345	16	0.	*	1	1115	46	0.	*	1	1845	76	154.	*	2	0215	106	52.				
1	0400	17	0.	*	1	1130	47	2.	*	1	1900	77	148.	*	2	0230	107	48.				
1	0415	18	0.	*	1	1145	48	9.	*	1	1915	78	142.	*	2	0245	108	44.				
1	0430	19	0.	*	1	1200	49	74.	*	1	1930	79	137.	*	2	0300	109	40.				
1	0445	20	0.	*	1	1215	50	588.	*	1	1945	80	132.	*	2	0315	110	37.				
1	0500	21	0.	*	1	1230	51	1103.	*	1	2000	81	128.	*	2	0330	111	34.				
1	0515	22	0.	*	1	1245	52	1312.	*	1	2015	82	125.	*	2	0345	112	31.				
1	0530	23	0.	*	1	1300	53	1203.	*	1	2030	83	121.	*	2	0400	113	29.				
1	0545	24	0.	*	1	1315	54	1037.	*	1	2045	84	118.	*	2	0415	114	27.				
1	0600	25	0.	*	1	1330	55	884.	*	1	2100	85	115.	*	2	0430	115	25.				
1	0615	26	0.	*	1	1345	56	757.	*	1	2115	86	112.	*	2	0445	116	23.				
1	0630	27	0.	*	1	1400	57	647.	*	1	2130	87	109.	*	2	0500	117	21.				
1	0645	28	0.	*	1	1415	58	554.	*	1	2145	88	106.	*	2	0515	118	20.				
1	0700	29	0.	*	1	1430	59	482.	*	1	2200	89	103.	*	2	0530	119	18.				
1	0715	30	0.	*	1	1445	60	430.	*	1	2215	90	101.	*	2	0545	120	17.				

****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 1312.	12.75	508.	169.	136.	136.

```
         (INCHES)   13.118     17.439     17.439     17.439
         (AC-FT)     252.       335.       335.       335.

         CUMULATIVE AREA =     .36 SQ MI
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


      **************
      *            *
1489 KK     *   DV4405  *
      *            *
      **************

1492 KO       OUTPUT CONTROL VARIABLES
              IPRNT        1  PRINT CONTROL
              IPLOT        2  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE

  DT        DIVERSION
              ISTAD      B4405  DIVERSION HYDROGRAPH IDENTIFICATION

  DI          INFLOW        .00    850.00   1000.00   1200.00   1700.00   2500.00   3500.00

  DQ      DIVERTED FLOW        .00       .00    150.00    350.00    850.00   1650.00   2650.00

                                    ***

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

                         DIVERSION HYDROGRAPH    B4405

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

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0730	31	0.	*	1		1500	61	0.	*	1		2230	91	0.
1		0015	2	0.	*	1		0745	32	0.	*	1		1515	62	0.	*	1		2245	92	0.
1		0030	3	0.	*	1		0800	33	0.	*	1		1530	63	0.	*	1		2300	93	0.
1		0045	4	0.	*	1		0815	34	0.	*	1		1545	64	0.	*	1		2315	94	0.
1		0100	5	0.	*	1		0830	35	0.	*	1		1600	65	0.	*	1		2330	95	0.
1		0115	6	0.	*	1		0845	36	0.	*	1		1615	66	0.	*	1		2345	96	0.
1		0130	7	0.	*	1		0900	37	0.	*	1		1630	67	0.	*	2		0000	97	0.
1		0145	8	0.	*	1		0915	38	0.	*	1		1645	68	0.	*	2		0015	98	0.
1		0200	9	0.	*	1		0930	39	0.	*	1		1700	69	0.	*	2		0030	99	0.
1		0215	10	0.	*	1		0945	40	0.	*	1		1715	70	0.	*	2		0045	100	0.
1		0230	11	0.	*	1		1000	41	0.	*	1		1730	71	0.	*	2		0100	101	0.
1		0245	12	0.	*	1		1015	42	0.	*	1		1745	72	0.	*	2		0115	102	0.
1		0300	13	0.	*	1		1030	43	0.	*	1		1800	73	0.	*	2		0130	103	0.
1		0315	14	0.	*	1		1045	44	0.	*	1		1815	74	0.	*	2		0145	104	0.
1		0330	15	0.	*	1		1100	45	0.	*	1		1830	75	0.	*	2		0200	105	0.
1		0345	16	0.	*	1		1115	46	0.	*	1		1845	76	0.	*	2		0215	106	0.
1		0400	17	0.	*	1		1130	47	0.	*	1		1900	77	0.	*	2		0230	107	0.
1		0415	18	0.	*	1		1145	48	0.	*	1		1915	78	0.	*	2		0245	108	0.
1		0430	19	0.	*	1		1200	49	0.	*	1		1930	79	0.	*	2		0300	109	0.
1		0445	20	0.	*	1		1215	50	0.	*	1		1945	80	0.	*	2		0315	110	0.
1		0500	21	0.	*	1		1230	51	253.	*	1		2000	81	0.	*	2		0330	111	0.
1		0515	22	0.	*	1		1245	52	462.	*	1		2015	82	0.	*	2		0345	112	0.
1		0530	23	0.	*	1		1300	53	353.	*	1		2030	83	0.	*	2		0400	113	0.
1		0545	24	0.	*	1		1315	54	187.	*	1		2045	84	0.	*	2		0415	114	0.
1		0600	25	0.	*	1		1330	55	34.	*	1		2100	85	0.	*	2		0430	115	0.
1		0615	26	0.	*	1		1345	56	0.	*	1		2115	86	0.	*	2		0445	116	0.
1		0630	27	0.	*	1		1400	57	0.	*	1		2130	87	0.	*	2		0500	117	0.
1		0645	28	0.	*	1		1415	58	0.	*	1		2145	88	0.	*	2		0515	118	0.
1		0700	29	0.	*	1		1430	59	0.	*	1		2200	89	0.	*	2		0530	119	0.
1		0715	30	0.	*	1		1445	60	0.	*	1		2215	90	0.	*	2		0545	120	0.

****
****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 462.	12.75	54.	13.	11.	11.
	(INCHES)	1.387	1.387	1.387	1.387
	(AC-FT)	27.	27.	27.	27.

CUMULATIVE AREA = .36 SQ MI

****
****

HYDROGRAPH AT STATION DV4405

****
****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	0730	31	0.	1	1500	61	389.	1	2230	91	99.				
1	0015	2	0.	1	0745	32	0.	1	1515	62	342.	1	2245	92	98.				
1	0030	3	0.	1	0800	33	0.	1	1530	63	311.	1	2300	93	96.				
1	0045	4	0.	1	0815	34	0.	1	1545	64	287.	1	2315	94	94.				
1	0100	5	0.	1	0830	35	0.	1	1600	65	267.	1	2330	95	92.				
1	0115	6	0.	1	0845	36	0.	1	1615	66	249.	1	2345	96	90.				
1	0130	7	0.	1	0900	37	0.	1	1630	67	234.	2	0000	97	88.				
1	0145	8	0.	1	0915	38	0.	1	1645	68	220.	2	0015	98	86.				
1	0200	9	0.	1	0930	39	0.	1	1700	69	207.	2	0030	99	84.				
1	0215	10	0.	1	0945	40	0.	1	1715	70	196.	2	0045	100	82.				
1	0230	11	0.	1	1000	41	0.	1	1730	71	188.	2	0100	101	78.				
1	0245	12	0.	1	1015	42	0.	1	1745	72	180.	2	0115	102	73.				
1	0300	13	0.	1	1030	43	0.	1	1800	73	173.	2	0130	103	68.				
1	0315	14	0.	1	1045	44	0.	1	1815	74	166.	2	0145	104	63.				
1	0330	15	0.	1	1100	45	0.	1	1830	75	160.	2	0200	105	57.				
1	0345	16	0.	1	1115	46	0.	1	1845	76	154.	2	0215	106	52.				
1	0400	17	0.	1	1130	47	2.	1	1900	77	148.	2	0230	107	48.				
1	0415	18	0.	1	1145	48	9.	1	1915	78	142.	2	0245	108	44.				
1	0430	19	0.	1	1200	49	74.	1	1930	79	137.	2	0300	109	40.				
1	0445	20	0.	1	1215	50	588.	1	1945	80	132.	2	0315	110	37.				
1	0500	21	0.	1	1230	51	850.	1	2000	81	128.	2	0330	111	34.				
1	0515	22	0.	1	1245	52	850.	1	2015	82	125.	2	0345	112	31.				
1	0530	23	0.	1	1300	53	850.	1	2030	83	121.	2	0400	113	29.				
1	0545	24	0.	1	1315	54	850.	1	2045	84	118.	2	0415	114	27.				
1	0600	25	0.	1	1330	55	850.	1	2100	85	115.	2	0430	115	25.				
1	0615	26	0.	1	1345	56	757.	1	2115	86	112.	2	0445	116	23.				
1	0630	27	0.	1	1400	57	647.	1	2130	87	109.	2	0500	117	21.				
1	0645	28	0.	1	1415	58	554.	1	2145	88	106.	2	0515	118	20.				
1	0700	29	0.	1	1430	59	482.	1	2200	89	103.	2	0530	119	18.				
1	0715	30	0.	1	1445	60	430.	1	2215	90	101.	2	0545	120	17.				

****
****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 850.	12.50	454.	155.	125.	125.
	(INCHES)	11.731	16.052	16.052	16.052
	(AC-FT)	225.	308.	308.	308.

CUMULATIVE AREA = .36 SQ MI

*** ***

```
      **************
      *            *
1499 KK    *   C4407  *
      *            *
      **************
```

1501 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1502 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

****

HYDROGRAPH AT STATION C4407
SUM OF 2 HYDROGRAPHS

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	1	0730	31	1.	1	1	1500	61	911.	1	1	2230	91	280.	
1	0015	2	0.	1	1	0745	32	1.	1	1	1515	62	836.	1	1	2245	92	276.	
1	0030	3	0.	1	1	0800	33	2.	1	1	1530	63	771.	1	1	2300	93	272.	
1	0045	4	0.	1	1	0815	34	2.	1	1	1545	64	717.	1	1	2315	94	268.	
1	0100	5	0.	1	1	0830	35	2.	1	1	1600	65	671.	1	1	2330	95	263.	
1	0115	6	0.	1	1	0845	36	2.	1	1	1615	66	629.	1	1	2345	96	259.	
1	0130	7	0.	1	1	0900	37	3.	1	1	1630	67	588.	2	2	0000	97	255.	
1	0145	8	0.	1	1	0915	38	3.	1	1	1645	68	552.	2	2	0015	98	251.	
1	0200	9	0.	1	1	0930	39	3.	1	1	1700	69	522.	2	2	0030	99	246.	
1	0215	10	0.	1	1	0945	40	4.	1	1	1715	70	497.	2	2	0045	100	239.	
1	0230	11	0.	1	1	1000	41	5.	1	1	1730	71	477.	2	2	0100	101	230.	
1	0245	12	0.	1	1	1015	42	6.	1	1	1745	72	459.	2	2	0115	102	219.	
1	0300	13	0.	1	1	1030	43	8.	1	1	1800	73	443.	2	2	0130	103	206.	
1	0315	14	0.	1	1	1045	44	11.	1	1	1815	74	428.	2	2	0145	104	193.	
1	0330	15	0.	1	1	1100	45	17.	1	1	1830	75	414.	2	2	0200	105	181.	
1	0345	16	0.	1	1	1115	46	25.	1	1	1845	76	400.	2	2	0215	106	169.	
1	0400	17	0.	1	1	1130	47	42.	1	1	1900	77	387.	2	2	0230	107	159.	
1	0415	18	0.	1	1	1145	48	73.	1	1	1915	78	374.	2	2	0245	108	149.	
1	0430	19	0.	1	1	1200	49	426.	1	1	1930	79	363.	2	2	0300	109	141.	
1	0445	20	0.	1	1	1215	50	1444.	1	1	1945	80	353.	2	2	0315	110	134.	
1	0500	21	0.	1	1	1230	51	1679.	1	1	2000	81	344.	2	2	0330	111	127.	
1	0515	22	0.	1	1	1245	52	1613.	1	1	2015	82	336.	2	2	0345	112	121.	
1	0530	23	0.	1	1	1300	53	1560.	1	1	2030	83	328.	2	2	0400	113	116.	
1	0545	24	0.	1	1	1315	54	1529.	1	1	2045	84	321.	2	2	0415	114	111.	
1	0600	25	0.	1	1	1330	55	1505.	1	1	2100	85	314.	2	2	0430	115	107.	
1	0615	26	1.	1	1	1345	56	1397.	1	1	2115	86	307.	2	2	0445	116	103.	
1	0630	27	1.	1	1	1400	57	1269.	1	1	2130	87	300.	2	2	0500	117	100.	
1	0645	28	1.	1	1	1415	58	1152.	1	1	2145	88	294.	2	2	0515	118	97.	
1	0700	29	1.	1	1	1430	59	1056.	1	1	2200	89	289.	2	2	0530	119	94.	
1	0715	30	1.	1	1	1445	60	977.	1	1	2215	90	284.	2	2	0545	120	91.	

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

 PEAK FLOW    TIME                    MAXIMUM AVERAGE FLOW
                          6-HR      24-HR      72-HR    29.75-HR
+  (CFS)      (HR)
                (CFS)
+   1679.    12.50            969.       366.       295.       295.
              (INCHES)    1.648      2.491      2.491      2.491
              (AC-FT)     480.       726.       726.       726.

              CUMULATIVE AREA =   5.47 SQ MI
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


      **************
      *            *
1556 KK    *   B4405  *
      *            *
      **************

1558 KO        OUTPUT CONTROL VARIABLES
               IPRNT        1  PRINT CONTROL
               IPLOT        2  PLOT CONTROL
               QSCAL        0.  HYDROGRAPH PLOT SCALE

1559 DR        RETRIEVE DIVERSION HYDROGRAPH
               ISTAD      B4405  DIVERSION HYDROGRAPH IDENTIFICATION

                                        ***


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

                          HYDROGRAPH AT STATION    B4405

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

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	0730	31	0.	1	1500	61	0.	1	2230	91	0.				
1	0015	2	0.	1	0745	32	0.	1	1515	62	0.	1	2245	92	0.				
1	0030	3	0.	1	0800	33	0.	1	1530	63	0.	1	2300	93	0.				
1	0045	4	0.	1	0815	34	0.	1	1545	64	0.	1	2315	94	0.				
1	0100	5	0.	1	0830	35	0.	1	1600	65	0.	1	2330	95	0.				
1	0115	6	0.	1	0845	36	0.	1	1615	66	0.	1	2345	96	0.				
1	0130	7	0.	1	0900	37	0.	1	1630	67	0.	2	0000	97	0.				
1	0145	8	0.	1	0915	38	0.	1	1645	68	0.	2	0015	98	0.				
1	0200	9	0.	1	0930	39	0.	1	1700	69	0.	2	0030	99	0.				
1	0215	10	0.	1	0945	40	0.	1	1715	70	0.	2	0045	100	0.				
1	0230	11	0.	1	1000	41	0.	1	1730	71	0.	2	0100	101	0.				
1	0245	12	0.	1	1015	42	0.	1	1745	72	0.	2	0115	102	0.				
1	0300	13	0.	1	1030	43	0.	1	1800	73	0.	2	0130	103	0.				
1	0315	14	0.	1	1045	44	0.	1	1815	74	0.	2	0145	104	0.				
1	0330	15	0.	1	1100	45	0.	1	1830	75	0.	2	0200	105	0.				
1	0345	16	0.	1	1115	46	0.	1	1845	76	0.	2	0215	106	0.				
1	0400	17	0.	1	1130	47	0.	1	1900	77	0.	2	0230	107	0.				
1	0415	18	0.	1	1145	48	0.	1	1915	78	0.	2	0245	108	0.				
1	0430	19	0.	1	1200	49	0.	1	1930	79	0.	2	0300	109	0.				
1	0445	20	0.	1	1215	50	0.	1	1945	80	0.	2	0315	110	0.				
1	0500	21	0.	1	1230	51	253.	1	2000	81	0.	2	0330	111	0.				
1	0515	22	0.	1	1245	52	462.	1	2015	82	0.	2	0345	112	0.				
1	0530	23	0.	1	1300	53	353.	1	2030	83	0.	2	0400	113	0.				
1	0545	24	0.	1	1315	54	187.	1	2045	84	0.	2	0415	114	0.				
1	0600	25	0.	1	1330	55	34.	1	2100	85	0.	2	0430	115	0.				
1	0615	26	0.	1	1345	56	0.	1	2115	86	0.	2	0445	116	0.				
1	0630	27	0.	1	1400	57	0.	1	2130	87	0.	2	0500	117	0.				
1	0645	28	0.	1	1415	58	0.	1	2145	88	0.	2	0515	118	0.				

```
  1   0700  29     0.  *  1   1430  59     0.  *  1   2200  89     0.  *  2   0530 119     0.
  1   0715  30     0.  *  1   1445  60     0.  *  1   2215  90     0.  *  2   0545 120     0.
                   *                  *                  *

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

 PEAK FLOW    TIME                    MAXIMUM AVERAGE FLOW
                          6-HR      24-HR      72-HR    29.75-HR
+  (CFS)      (HR)
                 (CFS)
+    462.    12.75              54.        13.        11.        11.
             (INCHES)      .456       .456       .456       .456
             (AC-FT)       27.        27.        27.        27.

             CUMULATIVE AREA =     .00 SQ MI


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


        **************
        *            *
1560 KK    *    S4399  *
        *            *
        **************

1562 KO        OUTPUT CONTROL VARIABLES
               IPRNT          1  PRINT CONTROL
               IPLOT          2  PLOT CONTROL
               QSCAL         0.  HYDROGRAPH PLOT SCALE

          SUBBASIN RUNOFF DATA

1563 BA        SUBBASIN CHARACTERISTICS
               TAREA        .13  SUBBASIN AREA

           PRECIPITATION DATA

  0 PT       TOTAL STORM STATIONS        1
1228 PW                 WEIGHTS      1.00

 242 PR        RECORDING STATIONS        1
 931 PW                 WEIGHTS      1.00

1564 LS        SCS LOSS RATE
               STRTL        .30  INITIAL ABSTRACTION
               CRVNBR     87.00  CURVE NUMBER
               RTIMP        .00  PERCENT IMPERVIOUS AREA

           KINEMATIC WAVE
1565 UK          OVERLAND-FLOW ELEMENT NO. 1
                   L       110.  OVERLAND FLOW LENGTH
                   S      .0050  SLOPE
                   N       .200  ROUGHNESS COEFFICIENT
                  PA      100.0  PERCENT OF SUBBASIN
1566 RK          COLLECTOR CHANNEL
                   L      1800.  CHANNEL LENGTH
                   S      .0038  SLOPE
                   N       .016  CHANNEL ROUGHNESS COEFFICIENT
                  CA        .05  CONTRIBUTING AREA
                SHAPE       TRAP  CHANNEL SHAPE
                  WD      40.00  BOTTOM WIDTH OR DIAMETER
                   Z        .01  SIDE SLOPE
1567 RK          MAIN CHANNEL
                   L      3100.  CHANNEL LENGTH
                   S      .0026  SLOPE
                   N       .016  CHANNEL ROUGHNESS COEFFICIENT
```

CA .13 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 16.60 BOTTOM WIDTH OR DIAMETER
Z 1.50 SIDE SLOPE
RUPSTQ NO ROUTE UPSTREAM HYDROGRAPH

***

PRECIPITATION STATION DATA

STATION	TOTAL	AVG. ANNUAL	WEIGHT
1	3.65	.00	1.00

TEMPORAL DISTRIBUTIONS

STATION 1, WEIGHT = 1.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.02	.02	.02	.02	.19	.19	.04	.04
.02	.02	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00				

COMPUTED KINEMATIC PARAMETERS

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)
1	.5268	1.667	15.00	55.00
3	.5734	1.609	15.00	900.00
4	.9629	1.507	15.00	1550.00

****

HYDROGRAPH AT STATION S4399

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	*	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1500	61	.03	.00	.03	10.			
1	0015	2	.01	.01	.00	0.	*	1	1515	62	.03	.00	.02	9.			
1	0030	3	.01	.01	.00	0.	*	1	1530	63	.03	.00	.02	8.			
1	0045	4	.01	.01	.00	0.	*	1	1545	64	.02	.00	.02	8.			
1	0100	5	.01	.01	.00	0.	*	1	1600	65	.02	.00	.02	8.			
1	0115	6	.01	.01	.00	0.	*	1	1615	66	.02	.00	.02	7.			
1	0130	7	.01	.01	.00	0.	*	1	1630	67	.02	.00	.02	7.			
1	0145	8	.01	.01	.00	0.	*	1	1645	68	.02	.00	.02	6.			
1	0200	9	.01	.01	.00	0.	*	1	1700	69	.02	.00	.02	6.			
1	0215	10	.01	.01	.00	0.	*	1	1715	70	.02	.00	.02	6.			
1	0230	11	.01	.01	.00	0.	*	1	1730	71	.02	.00	.02	6.			
1	0245	12	.01	.01	.00	0.	*	1	1745	72	.02	.00	.01	6.			
1	0300	13	.01	.01	.00	0.	*	1	1800	73	.02	.00	.01	5.			
1	0315	14	.01	.01	.00	0.	*	1	1815	74	.01	.00	.01	5.			
1	0330	15	.01	.01	.00	0.	*	1	1830	75	.01	.00	.01	5.			
1	0345	16	.01	.01	.00	0.	*	1	1845	76	.01	.00	.01	5.			
1	0400	17	.01	.01	.00	0.	*	1	1900	77	.01	.00	.01	5.			
1	0415	18	.01	.01	.00	0.	*	1	1915	78	.01	.00	.01	4.			
1	0430	19	.01	.01	.00	0.	*	1	1930	79	.01	.00	.01	4.			
1	0445	20	.01	.01	.00	0.	*	1	1945	80	.01	.00	.01	4.			
1	0500	21	.01	.01	.00	0.	*	1	2000	81	.01	.00	.01	4.			
1	0515	22	.01	.01	.00	0.	*	1	2015	82	.01	.00	.01	4.			
1	0530	23	.01	.01	.00	0.	*	1	2030	83	.01	.00	.01	4.			
1	0545	24	.02	.02	.00	0.	*	1	2045	84	.01	.00	.01	4.			
1	0600	25	.02	.02	.00	0.	*	1	2100	85	.01	.00	.01	4.			

1	0615	26	.02	.02	.00	0.	*	1	2115	86	.01	.00	.01	4.
1	0630	27	.02	.02	.00	0.	*	1	2130	87	.01	.00	.01	4.
1	0645	28	.02	.02	.00	0.	*	1	2145	88	.01	.00	.01	4.
1	0700	29	.02	.02	.00	0.	*	1	2200	89	.01	.00	.01	4.
1	0715	30	.02	.02	.00	0.	*	1	2215	90	.01	.00	.01	3.
1	0730	31	.02	.02	.00	0.	*	1	2230	91	.01	.00	.01	3.
1	0745	32	.02	.02	.00	0.	*	1	2245	92	.01	.00	.01	3.
1	0800	33	.02	.02	.00	0.	*	1	2300	93	.01	.00	.01	3.
1	0815	34	.02	.02	.00	0.	*	1	2315	94	.01	.00	.01	3.
1	0830	35	.02	.02	.00	0.	*	1	2330	95	.01	.00	.01	3.
1	0845	36	.03	.02	.01	0.	*	1	2345	96	.01	.00	.01	3.
1	0900	37	.03	.02	.01	0.	*	2	0000	97	.01	.00	.01	3.
1	0915	38	.03	.02	.01	0.	*	2	0015	98	.00	.00	.00	3.
1	0930	39	.03	.02	.01	0.	*	2	0030	99	.00	.00	.00	3.
1	0945	40	.03	.02	.01	1.	*	2	0045	100	.00	.00	.00	2.
1	1000	41	.03	.02	.01	1.	*	2	0100	101	.00	.00	.00	2.
1	1015	42	.04	.03	.02	1.	*	2	0115	102	.00	.00	.00	1.
1	1030	43	.04	.03	.02	2.	*	2	0130	103	.00	.00	.00	1.
1	1045	44	.06	.03	.02	3.	*	2	0145	104	.00	.00	.00	1.
1	1100	45	.06	.03	.03	4.	*	2	0200	105	.00	.00	.00	1.
1	1115	46	.09	.04	.04	5.	*	2	0215	106	.00	.00	.00	1.
1	1130	47	.09	.04	.05	7.	*	2	0230	107	.00	.00	.00	1.
1	1145	48	.69	.24	.46	10.	*	2	0245	108	.00	.00	.00	1.
1	1200	49	.69	.15	.55	61.	*	2	0300	109	.00	.00	.00	0.
1	1215	50	.13	.02	.11	147.	*	2	0315	110	.00	.00	.00	0.
1	1230	51	.13	.02	.11	108.	*	2	0330	111	.00	.00	.00	0.
1	1245	52	.07	.01	.06	55.	*	2	0345	112	.00	.00	.00	0.
1	1300	53	.07	.01	.06	34.	*	2	0400	113	.00	.00	.00	0.
1	1315	54	.05	.01	.04	24.	*	2	0415	114	.00	.00	.00	0.
1	1330	55	.05	.01	.04	18.	*	2	0430	115	.00	.00	.00	0.
1	1345	56	.04	.01	.03	16.	*	2	0445	116	.00	.00	.00	0.
1	1400	57	.04	.00	.03	14.	*	2	0500	117	.00	.00	.00	0.
1	1415	58	.03	.00	.03	12.	*	2	0515	118	.00	.00	.00	0.
1	1430	59	.03	.00	.03	11.	*	2	0530	119	.00	.00	.00	0.
1	1445	60	.03	.00	.03	10.	*	2	0545	120	.00	.00	.00	0.

*

****
****

TOTAL RAINFALL = 3.65, TOTAL LOSS = 1.33, TOTAL EXCESS = 2.32

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 147.	12.25	25.	8.	6.	6.
	(INCHES)	1.835	2.279	2.279	2.279
	(AC-FT)	12.	15.	15.	15.

CUMULATIVE AREA = .13 SQ MI

*** ***

```
        **************
        *            *
1568 KK *   C5000    *
        *            *
        **************
```

1570 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1571 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

****

HYDROGRAPH AT STATION C5000
SUM OF 2 HYDROGRAPHS

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	0730	31	0.	1	1500	61	10.	1	2230	91	3.				
1	0015	2	0.	1	0745	32	0.	1	1515	62	9.	1	2245	92	3.				
1	0030	3	0.	1	0800	33	0.	1	1530	63	8.	1	2300	93	3.				
1	0045	4	0.	1	0815	34	0.	1	1545	64	8.	1	2315	94	3.				
1	0100	5	0.	1	0830	35	0.	1	1600	65	8.	1	2330	95	3.				
1	0115	6	0.	1	0845	36	0.	1	1615	66	7.	1	2345	96	3.				
1	0130	7	0.	1	0900	37	0.	1	1630	67	7.	2	0000	97	3.				
1	0145	8	0.	1	0915	38	0.	1	1645	68	6.	2	0015	98	3.				
1	0200	9	0.	1	0930	39	0.	1	1700	69	6.	2	0030	99	3.				
1	0215	10	0.	1	0945	40	1.	1	1715	70	6.	2	0045	100	2.				
1	0230	11	0.	1	1000	41	1.	1	1730	71	6.	2	0100	101	2.				
1	0245	12	0.	1	1015	42	1.	1	1745	72	6.	2	0115	102	1.				
1	0300	13	0.	1	1030	43	2.	1	1800	73	5.	2	0130	103	1.				
1	0315	14	0.	1	1045	44	3.	1	1815	74	5.	2	0145	104	1.				
1	0330	15	0.	1	1100	45	4.	1	1830	75	5.	2	0200	105	1.				
1	0345	16	0.	1	1115	46	5.	1	1845	76	5.	2	0215	106	1.				
1	0400	17	0.	1	1130	47	7.	1	1900	77	5.	2	0230	107	1.				
1	0415	18	0.	1	1145	48	10.	1	1915	78	4.	2	0245	108	1.				
1	0430	19	0.	1	1200	49	61.	1	1930	79	4.	2	0300	109	0.				
1	0445	20	0.	1	1215	50	147.	1	1945	80	4.	2	0315	110	0.				
1	0500	21	0.	1	1230	51	361.	1	2000	81	4.	2	0330	111	0.				
1	0515	22	0.	1	1245	52	517.	1	2015	82	4.	2	0345	112	0.				
1	0530	23	0.	1	1300	53	387.	1	2030	83	4.	2	0400	113	0.				
1	0545	24	0.	1	1315	54	211.	1	2045	84	4.	2	0415	114	0.				
1	0600	25	0.	1	1330	55	52.	1	2100	85	4.	2	0430	115	0.				
1	0615	26	0.	1	1345	56	16.	1	2115	86	4.	2	0445	116	0.				
1	0630	27	0.	1	1400	57	14.	1	2130	87	4.	2	0500	117	0.				
1	0645	28	0.	1	1415	58	12.	1	2145	88	4.	2	0515	118	0.				
1	0700	29	0.	1	1430	59	11.	1	2200	89	4.	2	0530	119	0.				
1	0715	30	0.	1	1445	60	10.	1	2215	90	3.	2	0545	120	0.				

****

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	29.75-HR
+ 517.	12.75 (CFS)	79.	21.	17.	17.
	(INCHES)	5.766	6.210	6.210	6.210
	(AC-FT)	39.	42.	42.	42.

CUMULATIVE AREA = .13 SQ MI

1
1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+ DIVERSION TO	D4397	244.	12.75	72.	18.	15.	4.83		

	HYDROGRAPH AT						
+	B4397	648.	12.75	463.	193.	156.	4.83
	ROUTED TO						
+	4398	646.	12.75	462.	193.	155.	4.83
	HYDROGRAPH AT						
+	S4398	201.	12.25	36.	11.	9.	.18
	HYDROGRAPH AT						
+	S4400	145.	12.25	21.	7.	5.	.09
	3 COMBINED AT						
+	C4400	865.	12.25	514.	211.	170.	5.11
	HYDROGRAPH AT						
+	D4387	1134.	12.75	442.	148.	119.	.00
	ROUTED TO						
+	R4401	1123.	12.75	442.	148.	119.	.00
	HYDROGRAPH AT						
+	S4402	344.	12.50	64.	20.	16.	.36
	2 COMBINED AT						
+	C4403	1325.	12.50	505.	168.	135.	.36
	ROUTED TO						
+	R4405	1312.	12.75	508.	169.	136.	.36
	DIVERSION TO						
+	B4405	462.	12.50	54.	13.	11.	.36
	HYDROGRAPH AT						
+	DV4405	850.	12.50	454.	155.	125.	.36
	ROUTED TO						
+	R4406	850.	12.75	454.	155.	125.	.36
	2 COMBINED AT						
+	C4407	1679.	12.50	969.	366.	295.	5.47
	DIVERSION TO						
+	D4409	1679.	.25	969.	366.	295.	5.47
	HYDROGRAPH AT						
+	DV4409	0.	.25	0.	0.	0.	5.47
	HYDROGRAPH AT						
+	S4696	21.	12.50	5.	2.	1.	.04
	ROUTED TO						
+	R4697	16.	13.00	5.	2.	1.	.04
	HYDROGRAPH AT						
+	S4700	216.	13.00	89.	30.	24.	.79
	2 COMBINED AT						
+	C4701	232.	13.00	94.	32.	25.	.83
	ROUTED TO						
+	R4703	228.	13.25	93.	31.	25.	.83
	HYDROGRAPH AT						
+	S4706	315.	12.25	53.	17.	13.	.26
	HYDROGRAPH AT						
+	D4409	1679.	12.50	969.	366.	295.	.00
	ROUTED TO						

+		R4707	1670.	12.50	968.	366.	295.	.00
	ROUTED TO							
+		R4708	1630.	12.75	967.	366.	295.	.00
	2 COMBINED AT							
+		C4708	1837.	12.50	1017.	382.	308.	.26
	2 COMBINED AT							
+		C4709	1861.	12.75	1107.	414.	334.	1.09
	ROUTED TO							
+		R4777	1860.	12.75	1105.	414.	334.	1.09
	HYDROGRAPH AT							
+		B4405	462.	12.75	54.	13.	11.	.00
	HYDROGRAPH AT							
+		S4399	147.	12.25	25.	8.	6.	.13
	2 COMBINED AT							
+		C5000	517.	12.75	79.	21.	17.	.13

*** NORMAL END OF HEC-1 ***

HYDROGRAPH VOLUME CALCULATOR

DATA FILE: SCDENW1
CARD: C5000

TIME STEP 15

VOLUME OF WATER UNDER HYDROGRAPH CU. YD.S 67800

PT	CFS	FT^3
1	0	0
2	1	450
3	1	900
4	1	900
5	2	1350
6	3	2250
7	4	3150
8	5	4050
9	7	5400
10	10	7650
11	61	31950
12	147	93600
13	361	228600
14	517	395100
15	387	406800
16	211	269100
17	52	118350
18	16	30600
19	14	13500
20	12	11700
21	11	10350
22	10	9450
23	10	9000
24	9	8550
25	8	7650
26	8	7200
27	8	7200
28	7	6750
29	7	6300
30	6	5850
31	6	5400
32	6	5400

SOSSAMAN RETENTION BASIN ALTERNATE 1: EARTHEN CHANNEL
FILE:SOSVOL1.SOS

RETENTION REQUIRED CU. YD.S 67800
ALL SIDE SLOPES AT 4:1

AVERAGE EXISTING GROUND ELEVATION AROUND BASIN ====== 1413.0

AVERAGE CALCULATED WATER SURFACE ELEVATION IN FRONT
OF WEIR FROM HEC-2 ANALYSIS ====== ====== ====== 1409.8

R.O.W. BENCHES	NORTH =	5	EAST =	5	SOUTH =	5
SUB BASIN LENGTHS						
EAST AREA	NORTH =	345.87	EAST =	800.00		
	SOUTH =	345.87	WEST =	800.00		
MIDDLE AREA	NORTH =	94.54				
	SOUTH =	97.79	"ANGLED"			
WEST AREA	NORTH =	107.98	EAST =	775		
	SOUTH =	106.3				

===== ====== ===== ====== ====== ====== ====== =====

WATER SURFACE DIMENSIONS

EAST AREA		MIDDLE AREA		WEST AREA	
NORTH =	328.1	NORTH =	94.5	NORTH =	108.0
SOUTH =	328.1	SOUTH =	94.5	SOUTH =	106.3
EAST =	764.4	EAST =	764.4	EAST =	739.4
WEST =	764.4	WEST =	739.4	WEST =	739.4

===== ====== ===== ====== ====== ====== ====== =====

	CU. YD.S	A.F.
TOTAL STORAGE VOLUME REQUIRED	67800.00	42.02
TOTAL STORAGE VOLUME PROVIDED	68234.60	42.29
TOTAL EXCAVATION (GRADE TO INVERT)	117731.51	72.97
	≈117750	
WATER DEPTH IN BASIN (FT)	6.05	
AVERAGE BASIN INVERT ELEVATION	1403.75	

ELEV = 1409.8 STEP = 0.05

ELEV	CUMLATIVE	L1	W1	V1	L2	W2	V2
1409.75	599.4	327.87	764.00	12524.6	751.50	94.54	3552.3
1409.70	1198.2	327.67	763.60	12510.4	751.10	94.54	3550.4
1409.65	1796.4	327.47	763.20	12496.3	750.70	94.54	3548.6
1409.60	2394.0	327.27	762.80	12482.1	750.30	94.54	3546.7
1409.55	2991.0	327.07	762.40	12467.9	749.90	94.54	3544.8
1409.50	3587.4	326.87	762.00	12453.7	749.50	94.54	3542.9
1409.45	4183.2	326.67	761.60	12439.6	749.10	94.54	3541.0
1409.40	4778.4	326.47	761.20	12425.4	748.70	94.54	3539.1
1409.35	5373.0	326.27	760.80	12411.3	748.30	94.54	3537.2
1409.30	5966.9	326.07	760.40	12397.2	747.90	94.54	3535.3
1409.25	6560.3	325.87	760.00	12383.1	747.50	94.54	3533.4
1409.20	7153.1	325.67	759.60	12368.9	747.10	94.54	3531.5
1409.15	7745.3	325.47	759.20	12354.8	746.70	94.54	3529.7
1409.10	8336.9	325.27	758.80	12340.7	746.30	94.54	3527.8
1409.05	8927.9	325.07	758.40	12326.7	745.90	94.54	3525.9
1409.00	9518.3	324.87	758.00	12312.6	745.50	94.54	3524.0
1408.95	10108.0	324.67	757.60	12298.5	745.10	94.54	3522.1
1408.90	10697.2	324.47	757.20	12284.4	744.70	94.54	3520.2
1408.85	11285.8	324.27	756.80	12270.4	744.30	94.54	3518.3
1408.80	11873.8	324.07	756.40	12256.3	743.90	94.54	3516.4
1408.75	12461.2	323.87	756.00	12242.3	743.50	94.54	3514.5
1408.70	13048.0	323.67	755.60	12228.3	743.10	94.54	3512.6
1408.65	13634.2	323.47	755.20	12214.2	742.70	94.54	3510.7
1408.60	14219.8	323.27	754.80	12200.2	742.30	94.54	3508.9
1408.55	14804.9	323.07	754.40	12186.2	741.90	94.54	3507.0
1408.50	15389.3	322.87	754.00	12172.2	741.50	94.54	3505.1
1408.45	15973.1	322.67	753.60	12158.2	741.10	94.54	3503.2
1408.40	16556.3	322.47	753.20	12144.2	740.70	94.54	3501.3
1408.35	17138.9	322.27	752.80	12130.2	740.30	94.54	3499.4
1408.30	17721.0	322.07	752.40	12116.3	739.90	94.54	3497.5
1408.25	18302.4	321.87	752.00	12102.3	739.50	94.54	3495.6
1408.20	18883.3	321.67	751.60	12088.4	739.10	94.54	3493.7
1408.15	19463.5	321.47	751.20	12074.4	738.70	94.54	3491.8
1408.10	20043.2	321.27	750.80	12060.5	738.30	94.54	3489.9
1408.05	20622.2	321.07	750.40	12046.5	737.90	94.54	3488.1
1408.00	21200.7	320.87	750.00	12032.6	737.50	94.54	3486.2
1407.95	21778.6	320.67	749.60	12018.7	737.10	94.54	3484.3
1407.90	22355.9	320.47	749.20	12004.8	736.70	94.54	3482.4
1407.85	22932.6	320.27	748.80	11990.9	736.30	94.54	3480.5
1407.80	23508.7	320.07	748.40	11977.0	735.90	94.54	3478.6

1405.60	48275.7	311.27	730.80	11373.8	718.30	94.54	3395.4
1405.55	48825.5	311.07	730.40	11360.3	717.90	94.54	3393.5
1405.50	49374.7	310.87	730.00	11346.8	717.50	94.54	3391.6
1405.45	49923.3	310.67	729.60	11333.2	717.10	94.54	3389.7
1405.40	50471.3	310.47	729.20	11319.7	716.70	94.54	3387.8
1405.35	51018.8	310.27	728.80	11306.2	716.30	94.54	3386.0
1405.30	51565.7	310.07	728.40	11292.7	715.90	94.54	3384.1
1405.25	52112.0	309.87	728.00	11279.3	715.50	94.54	3382.2
1405.20	52657.7	309.67	727.60	11265.8	715.10	94.54	3380.3
1405.15	53202.9	309.47	727.20	11252.3	714.70	94.54	3378.4
1405.10	53747.5	309.27	726.80	11238.9	714.30	94.54	3376.5
1405.05	54291.5	309.07	726.40	11225.4	713.90	94.54	3374.6
1405.00	54834.9	308.87	726.00	11212.0	713.50	94.54	3372.7
1404.95	55377.8	308.67	725.60	11198.5	713.10	94.54	3370.8
1404.90	55920.1	308.47	725.20	11185.1	712.70	94.54	3368.9
1404.85	56461.8	308.27	724.80	11171.7	712.30	94.54	3367.0
1404.80	57002.9	308.07	724.40	11158.3	711.90	94.54	3365.2
1404.75	57543.5	307.87	724.00	11144.9	711.50	94.54	3363.3
1404.70	58083.4	307.67	723.60	11131.5	711.10	94.54	3361.4
1404.65	58622.9	307.47	723.20	11118.1	710.70	94.54	3359.5
1404.60	59161.7	307.27	722.80	11104.7	710.30	94.54	3357.6
1404.55	59700.0	307.07	722.40	11091.4	709.90	94.54	3355.7
1404.50	60237.7	306.87	722.00	11078.0	709.50	94.54	3353.8
1404.45	60774.8	306.67	721.60	11064.7	709.10	94.54	3351.9
1404.40	61311.3	306.47	721.20	11051.3	708.70	94.54	3350.0
1404.35	61847.3	306.27	720.80	11038.0	708.30	94.54	3348.1
1404.30	62382.7	306.07	720.40	11024.6	707.90	94.54	3346.2
1404.25	62917.6	305.87	720.00	11011.3	707.50	94.54	3344.4
1404.20	63451.8	305.67	719.60	10998.0	707.10	94.54	3342.5
1404.15	63985.5	305.47	719.20	10984.7	706.70	94.54	3340.6
1404.10	64518.6	305.27	718.80	10971.4	706.30	94.54	3338.7
1404.05	65051.2	305.07	718.40	10958.1	705.90	94.54	3336.8
1404.00	65583.2	304.87	718.00	10944.8	705.50	94.54	3334.9
1403.95	66114.6	304.67	717.60	10931.6	705.10	94.54	3333.0
1403.90	66645.5	304.47	717.20	10918.3	704.70	94.54	3331.1
1403.85	67175.7	304.27	716.80	10905.0	704.30	94.54	3329.2
1403.80	67705.5	304.07	716.40	10891.8	703.90	94.54	3327.3
1403.75	68234.6	303.87	716.00	10878.5	703.50	94.54	3325.4
1403.70	68763.2	303.67	715.60	10865.3	703.10	94.54	3323.6
1403.65	69291.2	303.47	715.20	10852.1	702.70	94.54	3321.7
1403.60	69818.6	303.27	714.80	10838.9	702.30	94.54	3319.8
1403.55	70345.5	303.07	714.40	10825.7	701.90	94.54	3317.9
1403.50	70871.8	302.87	714.00	10812.5	701.50	94.54	3316.0

FILE : SCDCNW.TXT

```
1****************************************                    ****************************************
*                                      *                    *                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *  U.S. ARMY CORPS OF ENGINEERS        *
*        FEBRUARY 1981                 *                    * THE HYDROLOGIC ENGINEERING CENTER    *
*       REVISED  6 FEB 87              *                    *       609 SECOND STREET              *
*                                      *                    *    DAVIS, CALIFORNIA 95616           *
* RUN DATE 02/03/1993  TIME  13:00:14  *                    *  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *                    *                                      *
****************************************                    ****************************************


                    X   X XXXXXXX  XXXXX       X
                    X   X X     X   X      XX
                    X   X X     X          X
                    XXXXXXX XXXX   X     XXXXX  X
                    X   X X     X          X
                    X   X X     X   X      X
                    X   X XXXXXXX  XXXXX      XXX

     1      ID     EASTERN  MARICOPA COUNTY MASTER DRAINAGE PLAN
     2      ID
     3      ID     EAST COUNTY HIGH RESOLUTION MODEL,   DATA FILE:  EMADMS14.DAT
     4      ID
     5      ID     REVISION:      ********** SOSAMAN CHANNEL IMPROVEMENT MODEL *********
     6      ID     AUGUST 10,1992        FILE: SOSALT7.DAT
     7      ID                     BY EVAN HENKE, APA GEOTRACK
     8      ID                 THE FOLLOWING CHANGES ARE MADE TO SOSALT6.DAT TO BUILD
     9      ID                 A MORE ACCURATE MODEL:
    10      ID
    11      ID                 S4399 IS SPLIT INTO TO BASINS, S4398 WHICH MODELS 59%
    12      ID                 OF THE ORIGINAL AREA AND JOINS TO THE R.O.W CHANNEL TO
    13      ID                 THE SOUTH AND S4399 WHICH MODELS 41% OF THE ORIGINAL
    14      ID                 AND ROUTES TO THE RETENTION BASIN
    15      ID
    16      ID     REVISION:      ********* FILE: SCDCNW.DAT   100 YR  24 HR   W/BASIN
    17      ID                 CONCRETE LINED CHANNEL
    18      ID     1/30/93        CHANGES IN LENGTHS, N VALUES AND SLOPES
    19      ID
  1417      DI     0   807   879   961   1070   1190   1320
  1418      DQ     0     0    19    61    120    190    270

  1419      KK  R4396
  1420      KM      ROUTE FLOWS ALONG FWY. R.O.W. FROM THE DIVERSION WEIR FOR PONDING AT
  1421      KM      STA 966+24 TO THE DIVERSION WEIR FOR PONDING AT STA 961+21
  1422      KM      BY: URS FINAL DRAINAGE REPORTS FOR SUPERSTITION FWY. (URS:RO19B)
  1423      RK   506   .006   .016        TRAP    12     2
1                          HEC-1 INPUT                          PAGE 35

  LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  1424      KK  B4396
  1425      KM      DIVERT FLOWS INTO DETENTION BASIN ABOVE THE SOSSAMAN CHANNEL AT STA
  1426      KM      961+21. DIVERSION TABLE IS FOR A RECTAGULAR WEIR 50 FEET LONG AND 5.05
  1427      KM      FEET ABOVE THE CHANNEL BOTTOM.
  1428      KM      BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:DET9)
  1429      DT  D4396
  1430      DI     0  626.0  660.0   751    861    987   1128
  1431      DQ     0     0    10    51    111    187    278

  1432      KK  R4397
  1433      KM      ROUTE FLOWS ALONG FWY. R.O.W. FROM THE DIVERSION WEIR FOR PONDING AT
  1434      KM      STA 961+21 TO THE DIVERSION WEIR FOR PONDING AT STA 955+21.
  1435      KM      BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:RO190)
  1436      RK   600   .006   .016        TRAP    12     2
```

```
1437    KK  B4397
1438    KM     DIVERT FLOW INTO DETENTION BASIN ABOVE THE SOSSAMAN CHANNEL AT
1439    KM     STA 955+21.  DIVERSION TABLE IS FOR A RECTANGULAR WEIR 50 FEET LONG AND
1440    KM     4.25 FEET ABOVE THE CHANNEL BOTTEM.
1441    KM     BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:DET8)
1442    DT  D4397
1443    DI    0   464   521   627   752   898  1059  1236
1444    DQ    0     0    21    77   152   248   359   486

1445    KK  4398
1446    KM     ROUT FLOWS FROM STA 955+21 TO THE SOSSAMAN CHANNEL AT STA 930+50.
1447    KM     BY: URS FINAL DAINAGE REPORT FOR SUPERSTITION FWY. (URS:RO19D)
1448    RK  2470  .006  .016        TRAP    12     2

1449    KK  S4398
1450    KM     SUBSET OF ORIGINAL AREA, 59% ROUTED TO R.O.W. CHANNEL
1451    KO    1     2
1452    BA  .183
1453    LS         87
1454    UK   110  .005    .2   100
1455    RK  2600  .0038  .016   .05  TRAP    40   .01
1456    RK  4200  .0026  .016        TRAP  16.6   1.5

1457    KK  S4400
1458    KM     ON-SITE RUNOFF COLLECTED BY THE STORM SEWER SYSTEM AND DISCHARGED INTO
1459    KM     THE R.O.W. CHANNEL AT SOSSAMAN CHANNEL.
1460    KM     BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:SUBFY2)
1461    BA  .092
1462    LS         92
1463    UK    35   .33   .06   100
1464    RK    22  .006  .012  .0015  CIRC     2
1465    RK   132  .003  .012  .0015  CIRC     2
1466    RK  9500  .0044  .012        CIRC   4.5
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1467    KK  C4400
1468    KM     COMBINE FLOWS FROM SEWER WITH FLOWS FROM THE R.O.W. CHANNEL
1469    KM     BEFORE FLOWS FROM SOSSAMAN CHANNEL ARE ADDED.
1470    KM     BY: URS FINAL DRAINAGE REPORT FOR SUPERSTITION FWY. (URS:COFY2)
1471    KO    1     2
1472    HC    3

1473    KK  D4387
1474    KM     RETRIEVE D4387; THE FLOW W. FROM SOUTHERN AND HAWES (D326-CVL/933)
1475    KO    1     2
1476    DR  D4387

1477    KK  R4401
1478    KM     ROUTE D4387 TO SOSSAMAN CHANNEL (C4403) IN CHANNEL ADJACENT TO SOUTHERN
1479    KM     (RO335-VCL/936)
1480    RK  4000  .007  .020        TRAP    10   1.5

1481    KK  S4402
1482    KM     RUNOFF FROM SUBBASIN S4402 (SUB 350-CVL/992)
1483    BA   .36
1484    LS         85
1485    UK   150  .005    .2   100
1486    RK  3100  .0061  .06  .035  TRAP    40   .01
1487    RK  4350  .0062  .016        TRAP    10   1.5

1488    KK  C4403
1489    KM     COMBINE R4401 AND S4400
1490    HC    2

1491    KK  R4405
1492    KM     ROUTE C4403 S. IN SOSSAMAN CHANNEL FROM SOUTHEN TO
```

```
1493      KM      DIVERSION POINT
1494      KO     1      2
1495      RK   2000  .00161   .017          TRAP     10      3

1496      KK  DV4405
1497      KM      ESTIMATING THE STORAGE REQUIRED TO LIMIT SOSAMAN CHANNEL TO 850
1498      KM      CFS W/ OVERFLOW TO RETENTION BASIN
1499      KO     1      2
1500      DT   B4405
1501      DI     0    850    1000    1200    1700    2500    3500
1502      DQ     0      0     150     350     850    1650    2650

1503      KK   R4406
1504      KM      ROUTE REMAINING FLOW TO FWY C4407
1505      RK    255   .0045   .016          TRAP     19      2

1506      KK   C4407
1507      KM      COMBINE FLOWS IN SOSSAMAN CHANNEL WITH FLOWS IN R.O.W. CHANNEL
1508      KO     1      2
1509      HC     2
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1510      KK  DV4409
1511      KM      DIVERT 100% OF RUNOFFS ALONG SOSSAMAN CHANNEL TO R4707
1512      DT   D4409
1513      DI     0   5000
1514      DQ     0   5000

1515      KK   S4696
1516      KM      RUNOFF FROM SUBBASIN S4696
1517      BA   0.043
1518      LS          77
1519      UK    300  0.007    0.2    100
1520      RK   1600  0.009   0.04          TRAP      2      4

1521      KK   R4697
1522      KM      ROUTE HYDROGRAPH TO C4701
1523      RK   8000  0.005   0.04          TRAP      2      4    YES

1524      KK   S4700
1525      KM      RUNOFF FROM SUBBASIN S4700
1526      BA   0.79
1527      LS          76
1528      UK    600  0.005    0.2    100
1529      RK   6400  0.007   0.04          TRAP      2      4

1530      KK   C4701
1531      KM      COMBINE HYDROGRAPHS S4700 AND R4697
1532      HC     2

1533      KK   R4703
1534      KM      ROUTE HYDROGRAPH TO C4709
1535      RK   5400 0.0047  0.035          TRAP      3     25

1536      KK   S4706
1537      KM      RUNOFF FROM SUBBASIN S4706
1538      BA   0.261
1539      LS          88
1540      UK    100 0.0035    0.2    100
1541      RK   5800 0.0074   0.02          TRAP      3     25

1542      KK   D4409
1543      KM      RETRIEVE DIVERTED HYDROGRAPH D4409
1544      DR   D4409

1545      KK   R4707
1546      KM      ROUTE HYDROGRAPH D4409 TO C4709
```

```
1547        KM      ROUTES FLOWS ACROSS SUPERSTITION
1548        RK    322  .0005   .016          TRAP     65      0

1549        KK  R4708
1550        KM      ROUTES FLOWS FROM SUPERSTITION TO BASELINE
1551        RK   2840 0.00744  0.017          TRAP     15      3
1                              HEC-1 INPUT                                PAGE 38

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1552        KK  C4708
1553        KM      COMBINE FLOWS FROM R4707 AND S4706
1554        HC      2

1555        KK  C4709
1556        KM      COMBINE FLOWS FROM C4708 AND R4703
1557        KO      2       2
1558        HC      2

1559        KK  R4777
1560        KM      ROUTE HYDROGRAPH S. IN SOSSAMAN CHANNEL (BW=49'), (RO364-CVL)
1561        KO      1       2
1562        RK   1000  .0015   .035          TRAP     40    2.5

1563        KK  B4405
1564        KM      RETRIEVE DIVERTED HYDROGRAPH B4405
1565        KO      1       2
1566        DR  B4405

1567        KK  S4399
1568        KM      RUNOFF FROM SUBBASIN S4399 (SUB355-CVL/945)
1569        KO      1       2
1570        BA   .127
1571        LS           87
1572        UK    110   .005     .2    100
1573        RK   1800  .0038   .016    .05   TRAP     40    .01
1574        RK   3100  .0026   .016          TRAP   16.6    1.5

1575        KK  C5000
1576        KM      COMBINE FLOWS FROM DIV B4405 AND S4399
1577        KO      1       2
1578        HC      2
1579        ZZ

21 IO       OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE

 IT         HYDROGRAPH TIME DATA
              NMIN        15  MINUTES IN COMPUTATION INTERVAL
             IDATE     1   0  STARTING DATE
             ITIME      0000  STARTING TIME
               NQ       120  NUMBER OF HYDROGRAPH ORDINATES
            NDDATE      2   0  ENDING DATE
            NDTIME      0545  ENDING TIME
             ICENT        19  CENTURY MARK

           COMPUTATION INTERVAL     .25 HOURS
              TOTAL TIME BASE   29.75 HOURS

         ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
```

*** ***

```
      **************
      *            *
1467 KK    *   C4400  *
      *            *
      **************
```

1471 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1472 HC HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

***

****

HYDROGRAPH AT STATION C4400
SUM OF 3 HYDROGRAPHS

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	0730	31	1.	1	1500	61	522.	1	2230	91	181.				
1	0015	2	0.	1	0745	32	1.	1	1515	62	493.	1	2245	92	179.				
1	0030	3	0.	1	0800	33	2.	1	1530	63	460.	1	2300	93	176.				
1	0045	4	0.	1	0815	34	2.	1	1545	64	430.	1	2315	94	174.				
1	0100	5	0.	1	0830	35	2.	1	1600	65	403.	1	2330	95	171.				
1	0115	6	0.	1	0845	36	2.	1	1615	66	379.	1	2345	96	169.				
1	0130	7	0.	1	0900	37	3.	1	1630	67	354.	2	0000	97	167.				
1	0145	8	0.	1	0915	38	3.	1	1645	68	332.	2	0015	98	165.				
1	0200	9	0.	1	0930	39	3.	1	1700	69	314.	2	0030	99	162.				
1	0215	10	0.	1	0945	40	4.	1	1715	70	300.	2	0045	100	157.				
1	0230	11	0.	1	1000	41	5.	1	1730	71	289.	2	0100	101	152.				
1	0245	12	0.	1	1015	42	6.	1	1745	72	279.	2	0115	102	145.				
1	0300	13	0.	1	1030	43	8.	1	1800	73	270.	2	0130	103	137.				
1	0315	14	0.	1	1045	44	11.	1	1815	74	262.	2	0145	104	130.				
1	0330	15	0.	1	1100	45	17.	1	1830	75	254.	2	0200	105	123.				
1	0345	16	0.	1	1115	46	24.	1	1845	76	246.	2	0215	106	116.				
1	0400	17	0.	1	1130	47	41.	1	1900	77	239.	2	0230	107	111.				
1	0415	18	0.	1	1145	48	65.	1	1915	78	232.	2	0245	108	105.				
1	0430	19	0.	1	1200	49	354.	1	1930	79	226.	2	0300	109	101.				
1	0445	20	0.	1	1215	50	865.	1	1945	80	220.	2	0315	110	97.				
1	0500	21	0.	1	1230	51	833.	1	2000	81	216.	2	0330	111	93.				
1	0515	22	0.	1	1245	52	763.	1	2015	82	211.	2	0345	112	90.				
1	0530	23	0.	1	1300	53	710.	1	2030	83	207.	2	0400	113	87.				
1	0545	24	0.	1	1315	54	679.	1	2045	84	203.	2	0415	114	85.				
1	0600	25	0.	1	1330	55	655.	1	2100	85	199.	2	0430	115	82.				
1	0615	26	1.	1	1345	56	639.	1	2115	86	195.	2	0445	116	80.				
1	0630	27	1.	1	1400	57	620.	1	2130	87	191.	2	0500	117	79.				
1	0645	28	1.	1	1415	58	597.	1	2145	88	188.	2	0515	118	77.				
1	0700	29	1.	1	1430	59	573.	1	2200	89	186.	2	0530	119	75.				
1	0715	30	1.	1	1445	60	547.	1	2215	90	183.	2	0545	120	74.				

****

```
 PEAK FLOW    TIME                    MAXIMUM AVERAGE FLOW
                          6-HR      24-HR      72-HR    29.75-HR
+  (CFS)      (HR)
                (CFS)
+    865.    12.25            514.       211.       170.       170.
              (INCHES)      .937      1.535      1.535      1.535
              (AC-FT)       255.       418.       418.       418.

              CUMULATIVE AREA =    5.11 SQ MI
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


      **************
      *            *
1491 KK    *    R4405  *
      *            *
      **************

1494 KO        OUTPUT CONTROL VARIABLES
               IPRNT          1  PRINT CONTROL
               IPLOT          2  PLOT CONTROL
               QSCAL         0.  HYDROGRAPH PLOT SCALE

         HYDROGRAPH ROUTING DATA

1495 RK        KINEMATIC WAVE STREAM ROUTING
                 L       2000.  CHANNEL LENGTH
                 S       .0016  SLOPE
                 N        .017  CHANNEL ROUGHNESS COEFFICIENT
                CA         .00  CONTRIBUTING AREA
               SHAPE       TRAP  CHANNEL SHAPE
                WD      10.00  BOTTOM WIDTH OR DIAMETER
                 Z       3.00  SIDE SLOPE

                                        ***


     KINEMATIC STREAM ROUTING USED FOR THIS REACH


       COMPUTED KINEMATIC PARAMETERS
         ALPHA      M     DT (MIN)  DX (FT)
         .9756   1.417      3.00    1000.00

*************************************************************************************************************************
***************
                                HYDROGRAPH AT STATION    R4405

*************************************************************************************************************************
***************
                      *                    *                    *
  DA MON HRMN  ORD    FLOW  *  DA MON HRMN  ORD    FLOW  *  DA MON HRMN  ORD    FLOW  *  DA MON HRMN  ORD    FLOW
                      *                    *                    *
   1   0000   1      0.  *  1   0730  31     0.  *  1   1500  61    381.  *  1   2230  91     99.
   1   0015   2      0.  *  1   0745  32     0.  *  1   1515  62    343.  *  1   2245  92     97.
   1   0030   3      0.  *  1   0800  33     0.  *  1   1530  63    312.  *  1   2300  93     95.
   1   0045   4      0.  *  1   0815  34     0.  *  1   1545  64    288.  *  1   2315  94     93.
   1   0100   5      0.  *  1   0830  35     0.  *  1   1600  65    267.  *  1   2330  95     91.
   1   0115   6      0.  *  1   0845  36     0.  *  1   1615  66    250.  *  1   2345  96     89.
   1   0130   7      0.  *  1   0900  37     0.  *  1   1630  67    234.  *  2   0000  97     87.
   1   0145   8      0.  *  1   0915  38     0.  *  1   1645  68    220.  *  2   0015  98     86.
   1   0200   9      0.  *  1   0930  39     0.  *  1   1700  69    207.  *  2   0030  99     84.
   1   0215  10      0.  *  1   0945  40     0.  *  1   1715  70    196.  *  2   0045 100     81.
   1   0230  11      0.  *  1   1000  41     0.  *  1   1730  71    188.  *  2   0100 101     77.
   1   0245  12      0.  *  1   1015  42     0.  *  1   1745  72    180.  *  2   0115 102     72.
   1   0300  13      0.  *  1   1030  43     0.  *  1   1800  73    173.  *  2   0130 103     67.
```

1	0315	14	0.	*	1	1045	44	0.	*	1	1815	74	166.	*	2	0145	104	61.
1	0330	15	0.	*	1	1100	45	0.	*	1	1830	75	160.	*	2	0200	105	56.
1	0345	16	0.	*	1	1115	46	1.	*	1	1845	76	153.	*	2	0215	106	51.
1	0400	17	0.	*	1	1130	47	5.	*	1	1900	77	147.	*	2	0230	107	46.
1	0415	18	0.	*	1	1145	48	15.	*	1	1915	78	142.	*	2	0245	108	43.
1	0430	19	0.	*	1	1200	49	123.	*	1	1930	79	137.	*	2	0300	109	39.
1	0445	20	0.	*	1	1215	50	578.	*	1	1945	80	132.	*	2	0315	110	36.
1	0500	21	0.	*	1	1230	51	1204.	*	1	2000	81	128.	*	2	0330	111	33.
1	0515	22	0.	*	1	1245	52	1309.	*	1	2015	82	124.	*	2	0345	112	30.
1	0530	23	0.	*	1	1300	53	1177.	*	1	2030	83	121.	*	2	0400	113	28.
1	0545	24	0.	*	1	1315	54	1008.	*	1	2045	84	118.	*	2	0415	114	26.
1	0600	25	0.	*	1	1330	55	859.	*	1	2100	85	115.	*	2	0430	115	24.
1	0615	26	0.	*	1	1345	56	735.	*	1	2115	86	111.	*	2	0445	116	22.
1	0630	27	0.	*	1	1400	57	627.	*	1	2130	87	108.	*	2	0500	117	21.
1	0645	28	0.	*	1	1415	58	536.	*	1	2145	88	105.	*	2	0515	118	19.
1	0700	29	0.	*	1	1430	59	469.	*	1	2200	89	103.	*	2	0530	119	18.
1	0715	30	0.	*	1	1445	60	420.	*	1	2215	90	101.	*	2	0545	120	17.

****
****

```
 PEAK FLOW    TIME                MAXIMUM AVERAGE FLOW
                        6-HR      24-HR      72-HR    29.75-HR
+  (CFS)     (HR)
                (CFS)
+   1309.    12.75          506.       168.       136.       136.
              (INCHES)   13.058     17.381     17.381     17.381
              (AC-FT)    251.       334.       334.       334.

              CUMULATIVE AREA =    .36 SQ MI
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


      **************
      *            *
1496 KK    *   DV4405  *
      *            *
      **************

1499 KO        OUTPUT CONTROL VARIABLES
               IPRNT        1  PRINT CONTROL
               IPLOT        2  PLOT CONTROL
               QSCAL        0.  HYDROGRAPH PLOT SCALE

  DT        DIVERSION
               ISTAD     B4405  DIVERSION HYDROGRAPH IDENTIFICATION

  DI         INFLOW       .00    850.00   1000.00   1200.00   1700.00   2500.00   3500.00

  DQ     DIVERTED FLOW      .00      .00    150.00    350.00    850.00   1650.00   2650.00

                                   ***
```

****
****

DIVERSION HYDROGRAPH B4405

****
****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	*	1	0730	31	0.	*	1	1500	61	0.	*	1	2230	91	0.				
1	0015	2	0.	*	1	0745	32	0.	*	1	1515	62	0.	*	1	2245	92	0.				
1	0030	3	0.	*	1	0800	33	0.	*	1	1530	63	0.	*	1	2300	93	0.				
1	0045	4	0.	*	1	0815	34	0.	*	1	1545	64	0.	*	1	2315	94	0.				

1	0100	5	0.	*	1	0830	35	0.	*	1	1600	65	0.	*	1	2330	95	0.
1	0115	6	0.	*	1	0845	36	0.	*	1	1615	66	0.	*	1	2345	96	0.
1	0130	7	0.	*	1	0900	37	0.	*	1	1630	67	0.	*	2	0000	97	0.
1	0145	8	0.	*	1	0915	38	0.	*	1	1645	68	0.	*	2	0015	98	0.
1	0200	9	0.	*	1	0930	39	0.	*	1	1700	69	0.	*	2	0030	99	0.
1	0215	10	0.	*	1	0945	40	0.	*	1	1715	70	0.	*	2	0045	100	0.
1	0230	11	0.	*	1	1000	41	0.	*	1	1730	71	0.	*	2	0100	101	0.
1	0245	12	0.	*	1	1015	42	0.	*	1	1745	72	0.	*	2	0115	102	0.
1	0300	13	0.	*	1	1030	43	0.	*	1	1800	73	0.	*	2	0130	103	0.
1	0315	14	0.	*	1	1045	44	0.	*	1	1815	74	0.	*	2	0145	104	0.
1	0330	15	0.	*	1	1100	45	0.	*	1	1830	75	0.	*	2	0200	105	0.
1	0345	16	0.	*	1	1115	46	0.	*	1	1845	76	0.	*	2	0215	106	0.
1	0400	17	0.	*	1	1130	47	0.	*	1	1900	77	0.	*	2	0230	107	0.
1	0415	18	0.	*	1	1145	48	0.	*	1	1915	78	0.	*	2	0245	108	0.
1	0430	19	0.	*	1	1200	49	0.	*	1	1930	79	0.	*	2	0300	109	0.
1	0445	20	0.	*	1	1215	50	0.	*	1	1945	80	0.	*	2	0315	110	0.
1	0500	21	0.	*	1	1230	51	354.	*	1	2000	81	0.	*	2	0330	111	0.
1	0515	22	0.	*	1	1245	52	459.	*	1	2015	82	0.	*	2	0345	112	0.
1	0530	23	0.	*	1	1300	53	327.	*	1	2030	83	0.	*	2	0400	113	0.
1	0545	24	0.	*	1	1315	54	158.	*	1	2045	84	0.	*	2	0415	114	0.
1	0600	25	0.	*	1	1330	55	9.	*	1	2100	85	0.	*	2	0430	115	0.
1	0615	26	0.	*	1	1345	56	0.	*	1	2115	86	0.	*	2	0445	116	0.
1	0630	27	0.	*	1	1400	57	0.	*	1	2130	87	0.	*	2	0500	117	0.
1	0645	28	0.	*	1	1415	58	0.	*	1	2145	88	0.	*	2	0515	118	0.
1	0700	29	0.	*	1	1430	59	0.	*	1	2200	89	0.	*	2	0530	119	0.
1	0715	30	0.	*	1	1445	60	0.	*	1	2215	90	0.	*	2	0545	120	0.

****
****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 459.	12.75	54.	14.	11.	11.
	(INCHES)	1.407	1.407	1.407	1.407
	(AC-FT)	27.	27.	27.	27.

CUMULATIVE AREA = .36 SQ MI

****
****

HYDROGRAPH AT STATION DV4405

****
****

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 0000	1	0.	*	1 0730	31	0.	*	1 1500	61	381.	*	1 2230	91	99.
1 0015	2	0.	*	1 0745	32	0.	*	1 1515	62	343.	*	1 2245	92	97.
1 0030	3	0.	*	1 0800	33	0.	*	1 1530	63	312.	*	1 2300	93	95.
1 0045	4	0.	*	1 0815	34	0.	*	1 1545	64	288.	*	1 2315	94	93.
1 0100	5	0.	*	1 0830	35	0.	*	1 1600	65	267.	*	1 2330	95	91.
1 0115	6	0.	*	1 0845	36	0.	*	1 1615	66	250.	*	1 2345	96	89.
1 0130	7	0.	*	1 0900	37	0.	*	1 1630	67	234.	*	2 0000	97	87.
1 0145	8	0.	*	1 0915	38	0.	*	1 1645	68	220.	*	2 0015	98	86.
1 0200	9	0.	*	1 0930	39	0.	*	1 1700	69	207.	*	2 0030	99	84.
1 0215	10	0.	*	1 0945	40	0.	*	1 1715	70	196.	*	2 0045	100	81.
1 0230	11	0.	*	1 1000	41	0.	*	1 1730	71	188.	*	2 0100	101	77.
1 0245	12	0.	*	1 1015	42	0.	*	1 1745	72	180.	*	2 0115	102	72.
1 0300	13	0.	*	1 1030	43	0.	*	1 1800	73	173.	*	2 0130	103	67.
1 0315	14	0.	*	1 1045	44	0.	*	1 1815	74	166.	*	2 0145	104	61.
1 0330	15	0.	*	1 1100	45	0.	*	1 1830	75	160.	*	2 0200	105	56.
1 0345	16	0.	*	1 1115	46	1.	*	1 1845	76	153.	*	2 0215	106	51.

1	0400	17	0.	*	1	1130	47	5.	*	1	1900	77	147.	*	2	0230	107	46.
1	0415	18	0.	*	1	1145	48	15.	*	1	1915	78	142.	*	2	0245	108	43.
1	0430	19	0.	*	1	1200	49	123.	*	1	1930	79	137.	*	2	0300	109	39.
1	0445	20	0.	*	1	1215	50	578.	*	1	1945	80	132.	*	2	0315	110	36.
1	0500	21	0.	*	1	1230	51	850.	*	1	2000	81	128.	*	2	0330	111	33.
1	0515	22	0.	*	1	1245	52	850.	*	1	2015	82	124.	*	2	0345	112	30.
1	0530	23	0.	*	1	1300	53	850.	*	1	2030	83	121.	*	2	0400	113	28.
1	0545	24	0.	*	1	1315	54	850.	*	1	2045	84	118.	*	2	0415	114	26.
1	0600	25	0.	*	1	1330	55	850.	*	1	2100	85	115.	*	2	0430	115	24.
1	0615	26	0.	*	1	1345	56	735.	*	1	2115	86	111.	*	2	0445	116	22.
1	0630	27	0.	*	1	1400	57	627.	*	1	2130	87	108.	*	2	0500	117	21.
1	0645	28	0.	*	1	1415	58	536.	*	1	2145	88	105.	*	2	0515	118	19.
1	0700	29	0.	*	1	1430	59	469.	*	1	2200	89	103.	*	2	0530	119	18.
1	0715	30	0.	*	1	1445	60	420.	*	1	2215	90	101.	*	2	0545	120	17.

****

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

	6-HR	24-HR	72-HR	29.75-HR
+ (CFS) (HR) (CFS)				
+ 850. 12.50	451.	155.	125.	125.
(INCHES)	11.651	15.974	15.974	15.974
(AC-FT)	224.	307.	307.	307.

CUMULATIVE AREA = .36 SQ MI

*** ***

```
      **************
      *            *
1506 KK   *   C4407  *
      *            *
      **************
```

1508 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1509 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

****

HYDROGRAPH AT STATION C4407
SUM OF 2 HYDROGRAPHS

****

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 0000	1	0.	*	1 0730	31	1.	*	1 1500	61	903.	*	1 2230	91	280.
1 0015	2	0.	*	1 0745	32	1.	*	1 1515	62	837.	*	1 2245	92	276.
1 0030	3	0.	*	1 0800	33	2.	*	1 1530	63	772.	*	1 2300	93	272.
1 0045	4	0.	*	1 0815	34	2.	*	1 1545	64	718.	*	1 2315	94	267.
1 0100	5	0.	*	1 0830	35	2.	*	1 1600	65	671.	*	1 2330	95	263.
1 0115	6	0.	*	1 0845	36	2.	*	1 1615	66	629.	*	1 2345	96	258.

1	0130	7	0.	*	1	0900	37	3.	*	1	1630	67	588.	*	2	0000	97	254.
1	0145	8	0.	*	1	0915	38	3.	*	1	1645	68	552.	*	2	0015	98	251.
1	0200	9	0.	*	1	0930	39	3.	*	1	1700	69	521.	*	2	0030	99	246.
1	0215	10	0.	*	1	0945	40	4.	*	1	1715	70	497.	*	2	0045	100	239.
1	0230	11	0.	*	1	1000	41	5.	*	1	1730	71	477.	*	2	0100	101	229.
1	0245	12	0.	*	1	1015	42	6.	*	1	1745	72	459.	*	2	0115	102	217.
1	0300	13	0.	*	1	1030	43	8.	*	1	1800	73	443.	*	2	0130	103	204.
1	0315	14	0.	*	1	1045	44	11.	*	1	1815	74	428.	*	2	0145	104	191.
1	0330	15	0.	*	1	1100	45	17.	*	1	1830	75	414.	*	2	0200	105	179.
1	0345	16	0.	*	1	1115	46	25.	*	1	1845	76	400.	*	2	0215	106	168.
1	0400	17	0.	*	1	1130	47	45.	*	1	1900	77	386.	*	2	0230	107	157.
1	0415	18	0.	*	1	1145	48	79.	*	1	1915	78	374.	*	2	0245	108	148.
1	0430	19	0.	*	1	1200	49	474.	*	1	1930	79	363.	*	2	0300	109	140.
1	0445	20	0.	*	1	1215	50	1433.	*	1	1945	80	353.	*	2	0315	110	133.
1	0500	21	0.	*	1	1230	51	1679.	*	1	2000	81	344.	*	2	0330	111	126.
1	0515	22	0.	*	1	1245	52	1613.	*	1	2015	82	335.	*	2	0345	112	120.
1	0530	23	0.	*	1	1300	53	1560.	*	1	2030	83	328.	*	2	0400	113	115.
1	0545	24	0.	*	1	1315	54	1529.	*	1	2045	84	321.	*	2	0415	114	111.
1	0600	25	0.	*	1	1330	55	1505.	*	1	2100	85	313.	*	2	0430	115	106.
1	0615	26	1.	*	1	1345	56	1376.	*	1	2115	86	306.	*	2	0445	116	103.
1	0630	27	1.	*	1	1400	57	1249.	*	1	2130	87	299.	*	2	0500	117	99.
1	0645	28	1.	*	1	1415	58	1135.	*	1	2145	88	293.	*	2	0515	118	96.
1	0700	29	1.	*	1	1430	59	1044.	*	1	2200	89	288.	*	2	0530	119	93.
1	0715	30	1.	*	1	1445	60	968.	*	1	2215	90	284.	*	2	0545	120	91.

* * *

****
****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 1679.	12.50	966.	365.	295.	295.
	(INCHES)	1.643	2.486	2.486	2.486
	(AC-FT)	479.	725.	725.	725.

CUMULATIVE AREA = 5.47 SQ MI

*** ***

```
      **************
      *            *
1575 KK   *   C5000  *
      *            *
      **************
```

1577 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1578 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

****
****

HYDROGRAPH AT STATION C5000
SUM OF 2 HYDROGRAPHS

****
****

* * *

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
			*						*						*							
1	0000	1	0.	*	1	0730	31	0.	*	1	1500	61	10.	*	1	2230	91	3.				
1	0015	2	0.	*	1	0745	32	0.	*	1	1515	62	9.	*	1	2245	92	3.				
1	0030	3	0.	*	1	0800	33	0.	*	1	1530	63	8.	*	1	2300	93	3.				
1	0045	4	0.	*	1	0815	34	0.	*	1	1545	64	8.	*	1	2315	94	3.				
1	0100	5	0.	*	1	0830	35	0.	*	1	1600	65	8.	*	1	2330	95	3.				
1	0115	6	0.	*	1	0845	36	0.	*	1	1615	66	7.	*	1	2345	96	3.				
1	0130	7	0.	*	1	0900	37	0.	*	1	1630	67	7.	*	2	0000	97	3.				
1	0145	8	0.	*	1	0915	38	0.	*	1	1645	68	6.	*	2	0015	98	3.				
1	0200	9	0.	*	1	0930	39	0.	*	1	1700	69	6.	*	2	0030	99	3.				
1	0215	10	0.	*	1	0945	40	1.	*	1	1715	70	6.	*	2	0045	100	2.				
1	0230	11	0.	*	1	1000	41	1.	*	1	1730	71	6.	*	2	0100	101	2.				
1	0245	12	0.	*	1	1015	42	1.	*	1	1745	72	6.	*	2	0115	102	1.				
1	0300	13	0.	*	1	1030	43	2.	*	1	1800	73	5.	*	2	0130	103	1.				
1	0315	14	0.	*	1	1045	44	3.	*	1	1815	74	5.	*	2	0145	104	1.				
1	0330	15	0.	*	1	1100	45	4.	*	1	1830	75	5.	*	2	0200	105	1.				
1	0345	16	0.	*	1	1115	46	5.	*	1	1845	76	5.	*	2	0215	106	1.				
1	0400	17	0.	*	1	1130	47	7.	*	1	1900	77	5.	*	2	0230	107	1.				
1	0415	18	0.	*	1	1145	48	10.	*	1	1915	78	4.	*	2	0245	108	1.				
1	0430	19	0.	*	1	1200	49	61.	*	1	1930	79	4.	*	2	0300	109	0.				
1	0445	20	0.	*	1	1215	50	147.	*	1	1945	80	4.	*	2	0315	110	0.				
1	0500	21	0.	*	1	1230	51	462.	*	1	2000	81	4.	*	2	0330	111	0.				
1	0515	22	0.	*	1	1245	52	514.	*	1	2015	82	4.	*	2	0345	112	0.				
1	0530	23	0.	*	1	1300	53	361.	*	1	2030	83	4.	*	2	0400	113	0.				
1	0545	24	0.	*	1	1315	54	182.	*	1	2045	84	4.	*	2	0415	114	0.				
1	0600	25	0.	*	1	1330	55	27.	*	1	2100	85	4.	*	2	0430	115	0.				
1	0615	26	0.	*	1	1345	56	16.	*	1	2115	86	4.	*	2	0445	116	0.				
1	0630	27	0.	*	1	1400	57	14.	*	1	2130	87	4.	*	2	0500	117	0.				
1	0645	28	0.	*	1	1415	58	12.	*	1	2145	88	4.	*	2	0515	118	0.				
1	0700	29	0.	*	1	1430	59	11.	*	1	2200	89	4.	*	2	0530	119	0.				
1	0715	30	0.	*	1	1445	60	10.	*	1	2215	90	3.	*	2	0545	120	0.				
			*						*						*							

****
****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 514.	12.75	80.	21.	17.	17.
	(INCHES)	5.823	6.267	6.267	6.267
	(AC-FT)	39.	42.	42.	42.

CUMULATIVE AREA = .13 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S4400	145.	12.25	21.	7.	5.	.09		
+	3 COMBINED AT	C4400	865.	12.25	514.	211.	170.	5.11		
+	HYDROGRAPH AT	D4387	1134.	12.75	442.	148.	119.	.00		
+	ROUTED TO	R4401	1123.	12.75	442.	148.	119.	.00		
+	HYDROGRAPH AT	S4402	344.	12.50	64.	20.	16.	.36		
	2 COMBINED AT									

+	C4403	1325.	12.50	505.	168.	135.	.36
	ROUTED TO						
+	R4405	1309.	12.75	506.	168.	136.	.36
	DIVERSION TO						
+	B4405	459.	12.50	54.	14.	11.	.36
	HYDROGRAPH AT						
+	DV4405	850.	12.50	451.	155.	125.	.36
	ROUTED TO						
+	R4406	850.	12.75	451.	155.	125.	.36
	2 COMBINED AT						
+	C4407	1679.	12.50	966.	365.	295.	5.47
	DIVERSION TO						
+	D4409	1679.	.25	966.	365.	295.	5.47
	HYDROGRAPH AT						
+	DV4409	0.	.25	0.	0.	0.	5.47
	HYDROGRAPH AT						
+	S4696	21.	12.50	5.	2.	1.	.04
	ROUTED TO						
+	R4697	16.	13.00	5.	2.	1.	.04
	HYDROGRAPH AT						
+	S4700	216.	13.00	89.	30.	24.	.79
	2 COMBINED AT						
+	C4701	232.	13.00	94.	32.	25.	.83
	ROUTED TO						
+	R4703	228.	13.25	93.	31.	25.	.83
	HYDROGRAPH AT						
+	S4706	315.	12.25	53.	17.	13.	.26
	HYDROGRAPH AT						
+	D4409	1679.	12.50	966.	365.	295.	.00
	ROUTED TO						
+	R4707	1669.	12.50	965.	365.	295.	.00
	ROUTED TO						
+	R4708	1628.	12.50	964.	365.	295.	.00
	2 COMBINED AT						
+	C4708	1866.	12.50	1014.	382.	308.	.26
	2 COMBINED AT						
+	C4709	1884.	12.50	1104.	413.	333.	1.09
	ROUTED TO						
+	R4777	1859.	12.75	1103.	413.	333.	1.09
	HYDROGRAPH AT						
+	B4405	459.	12.75	54.	14.	11.	.00
	HYDROGRAPH AT						
+	S4399	147.	12.25	25.	8.	6.	.13
	2 COMBINED AT						
+	C5000	514.	12.75	80.	21.	17.	.13

*** NORMAL END OF HEC-1 ***

HYDROGRAPH VOLUME CALCULATOR

DATA FILE: SCDCNW
CARD: C5000

TIME STEP 15

VOLUME OF WATER UNDER HYDROGRAPH CU. YD.S 68400

PT	CFS	FT^3
1	0	0
2	1	450
3	1	900
4	1	900
5	2	1350
6	3	2250
7	4	3150
8	5	4050
9	7	5400
10	10	7650
11	61	31950
12	147	93600
13	462	274050
14	514	439200
15	361	393750
16	182	244350
17	27	94050
18	16	19350
19	14	13500
20	12	11700
21	11	10350
22	10	9450
23	10	9000
24	9	8550
25	8	7650
26	8	7200
27	8	7200
28	7	6750
29	7	6300
30	6	5850
31	6	5400
32	6	5400

SOSSAMAN RETENTION BASIN ALTERNATE 2: ROLLER COMPACTED CONCRETE CHANNEL
FILE:SOSVOL2.SOS

RETENTION REQUIRED CU. YD.S 68400
ALL SIDE SLOPES AT 4:1

AVERAGE EXISTING GROUND ELEVATION AROUND BASIN ====== 1413.0

AVERAGE CALCULATED WATER SURFACE ELEVATION IN FRONT
OF WEIR FROM HEC-2 ANALYSIS ====== ====== ====== 1409.8

R.O.W. BENCHES	NORTH =	5	EAST =	5	SOUTH =	5
SUB BASIN LENGTHS						
EAST AREA	NORTH =	345.87	EAST =	800.00		
	SOUTH =	345.87	WEST =	800.00		
MIDDLE AREA	NORTH =	94.54				
	SOUTH =	97.79	"ANGLED"			
WEST AREA	NORTH =	107.98	EAST =	775		
	SOUTH =	106.3				

===== ====== ===== ====== ====== ====== ====== =====

WATER SURFACE DIMENSIONS

EAST AREA		MIDDLE AREA		WEST AREA	
NORTH =	328.1	NORTH =	94.5	NORTH =	108.0
SOUTH =	328.1	SOUTH =	94.5	SOUTH =	106.3
EAST =	764.4	EAST =	764.4	EAST =	739.4
WEST =	764.4	WEST =	739.4	WEST =	739.4

===== ====== ===== ====== ====== ====== ====== =====

	CU. YD.S	A.F.
TOTAL STORAGE VOLUME REQUIRED	68400.00	42.40
TOTAL STORAGE VOLUME PROVIDED	68763.20	42.62
TOTAL EXCAVATION (GRADE TO INVERT)	118260.11	73.30
	≈118250	
WATER DEPTH IN BASIN (FT)	6.10	
AVERAGE BASIN INVERT ELEVATION	1403.70	

ELEV = 1409.8 STEP = 0.05

ELEV	CUMLATIVE	L1	W1	V1	L2	W2	V2
1409.75	599.4	327.87	764.00	12524.6	751.50	94.54	3552.3
1409.70	1198.2	327.67	763.60	12510.4	751.10	94.54	3550.4
1409.65	1796.4	327.47	763.20	12496.3	750.70	94.54	3548.6
1409.60	2394.0	327.27	762.80	12482.1	750.30	94.54	3546.7
1409.55	2991.0	327.07	762.40	12467.9	749.90	94.54	3544.8
1409.50	3587.4	326.87	762.00	12453.7	749.50	94.54	3542.9
1409.45	4183.2	326.67	761.60	12439.6	749.10	94.54	3541.0
1409.40	4778.4	326.47	761.20	12425.4	748.70	94.54	3539.1
1409.35	5373.0	326.27	760.80	12411.3	748.30	94.54	3537.2
1409.30	5966.9	326.07	760.40	12397.2	747.90	94.54	3535.3
1409.25	6560.3	325.87	760.00	12383.1	747.50	94.54	3533.4
1409.20	7153.1	325.67	759.60	12368.9	747.10	94.54	3531.5
1409.15	7745.3	325.47	759.20	12354.8	746.70	94.54	3529.7
1409.10	8336.9	325.27	758.80	12340.7	746.30	94.54	3527.8
1409.05	8927.9	325.07	758.40	12326.7	745.90	94.54	3525.9
1409.00	9518.3	324.87	758.00	12312.6	745.50	94.54	3524.0
1408.95	10108.0	324.67	757.60	12298.5	745.10	94.54	3522.1
1408.90	10697.2	324.47	757.20	12284.4	744.70	94.54	3520.2
1408.85	11285.8	324.27	756.80	12270.4	744.30	94.54	3518.3
1408.80	11873.8	324.07	756.40	12256.3	743.90	94.54	3516.4
1408.75	12461.2	323.87	756.00	12242.3	743.50	94.54	3514.5
1408.70	13048.0	323.67	755.60	12228.3	743.10	94.54	3512.6
1408.65	13634.2	323.47	755.20	12214.2	742.70	94.54	3510.7
1408.60	14219.8	323.27	754.80	12200.2	742.30	94.54	3508.9
1408.55	14804.9	323.07	754.40	12186.2	741.90	94.54	3507.0
1408.50	15389.3	322.87	754.00	12172.2	741.50	94.54	3505.1
1408.45	15973.1	322.67	753.60	12158.2	741.10	94.54	3503.2
1408.40	16556.3	322.47	753.20	12144.2	740.70	94.54	3501.3
1408.35	17138.9	322.27	752.80	12130.2	740.30	94.54	3499.4
1408.30	17721.0	322.07	752.40	12116.3	739.90	94.54	3497.5
1408.25	18302.4	321.87	752.00	12102.3	739.50	94.54	3495.6
1408.20	18883.3	321.67	751.60	12088.4	739.10	94.54	3493.7
1408.15	19463.5	321.47	751.20	12074.4	738.70	94.54	3491.8
1408.10	20043.2	321.27	750.80	12060.5	738.30	94.54	3489.9
1408.05	20622.2	321.07	750.40	12046.5	737.90	94.54	3488.1
1408.00	21200.7	320.87	750.00	12032.6	737.50	94.54	3486.2
1407.95	21778.6	320.67	749.60	12018.7	737.10	94.54	3484.3
1407.90	22355.9	320.47	749.20	12004.8	736.70	94.54	3482.4
1407.85	22932.6	320.27	748.80	11990.9	736.30	94.54	3480.5
1407.80	23508.7	320.07	748.40	11977.0	735.90	94.54	3478.6

1405.60	48275.7	311.27	730.80	11373.8	718.30	94.54	3395.4
1405.55	48825.5	311.07	730.40	11360.3	717.90	94.54	3393.5
1405.50	49374.7	310.87	730.00	11346.8	717.50	94.54	3391.6
1405.45	49923.3	310.67	729.60	11333.2	717.10	94.54	3389.7
1405.40	50471.3	310.47	729.20	11319.7	716.70	94.54	3387.8
1405.35	51018.8	310.27	728.80	11306.2	716.30	94.54	3386.0
1405.30	51565.7	310.07	728.40	11292.7	715.90	94.54	3384.1
1405.25	52112.0	309.87	728.00	11279.3	715.50	94.54	3382.2
1405.20	52657.7	309.67	727.60	11265.8	715.10	94.54	3380.3
1405.15	53202.9	309.47	727.20	11252.3	714.70	94.54	3378.4
1405.10	53747.5	309.27	726.80	11238.9	714.30	94.54	3376.5
1405.05	54291.5	309.07	726.40	11225.4	713.90	94.54	3374.6
1405.00	54834.9	308.87	726.00	11212.0	713.50	94.54	3372.7
1404.95	55377.8	308.67	725.60	11198.5	713.10	94.54	3370.8
1404.90	55920.1	308.47	725.20	11185.1	712.70	94.54	3368.9
1404.85	56461.8	308.27	724.80	11171.7	712.30	94.54	3367.0
1404.80	57002.9	308.07	724.40	11158.3	711.90	94.54	3365.2
1404.75	57543.5	307.87	724.00	11144.9	711.50	94.54	3363.3
1404.70	58083.4	307.67	723.60	11131.5	711.10	94.54	3361.4
1404.65	58622.9	307.47	723.20	11118.1	710.70	94.54	3359.5
1404.60	59161.7	307.27	722.80	11104.7	710.30	94.54	3357.6
1404.55	59700.0	307.07	722.40	11091.4	709.90	94.54	3355.7
1404.50	60237.7	306.87	722.00	11078.0	709.50	94.54	3353.8
1404.45	60774.8	306.67	721.60	11064.7	709.10	94.54	3351.9
1404.40	61311.3	306.47	721.20	11051.3	708.70	94.54	3350.0
1404.35	61847.3	306.27	720.80	11038.0	708.30	94.54	3348.1
1404.30	62382.7	306.07	720.40	11024.6	707.90	94.54	3346.2
1404.25	62917.6	305.87	720.00	11011.3	707.50	94.54	3344.4
1404.20	63451.8	305.67	719.60	10998.0	707.10	94.54	3342.5
1404.15	63985.5	305.47	719.20	10984.7	706.70	94.54	3340.6
1404.10	64518.6	305.27	718.80	10971.4	706.30	94.54	3338.7
1404.05	65051.2	305.07	718.40	10958.1	705.90	94.54	3336.8
1404.00	65583.2	304.87	718.00	10944.8	705.50	94.54	3334.9
1403.95	66114.6	304.67	717.60	10931.6	705.10	94.54	3333.0
1403.90	66645.5	304.47	717.20	10918.3	704.70	94.54	3331.1
1403.85	67175.7	304.27	716.80	10905.0	704.30	94.54	3329.2
1403.80	67705.5	304.07	716.40	10891.8	703.90	94.54	3327.3
1403.75	68234.6	303.87	716.00	10878.5	703.50	94.54	3325.4
1403.70	68763.2	303.67	715.60	10865.3	703.10	94.54	3323.6
1403.65	69291.2	303.47	715.20	10852.1	702.70	94.54	3321.7
1403.60	69818.6	303.27	714.80	10838.9	702.30	94.54	3319.8
1403.55	70345.5	303.07	714.40	10825.7	701.90	94.54	3317.9
1403.50	70871.8	302.87	714.00	10812.5	701.50	94.54	3316.0

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES          *
*                                        *
*  Version   4.6.2;  May 1991            *
*                                        *
*  RUN DATE    06FEB93    TIME   14:21:04 *
*****************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
*************************************
```

```
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
```

THIS RUN EXECUTED 06FEB93 14:21:04

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

 Version   4.6.2;  May 1991
************************************
```

SPLIT FLOW BEING PERFORMED

```
SF       SPLIT FLOW AT BASIN


TW       BANK TRANSITION FOR ACCESS ROAD SECTION 52.90 TO 53.25
WS     2   52.90   53.25      -1       3
WC     0 1409.30      35    1413


TW       OVERFLOW WEIR FOR BASIN SECTION 52.00 TO 52.90
WS     2   52.00   52.90      -1       3
WC     0 1409.25      90 1409.30


TW       OVERFLOW WEIR FOR BASIN SECTION 51.10 TO 52.00
WS     2   51.10   52.00      -1       3
WC     0 1409.20      90 1409.25


TW       OVERFLOW WEIR FOR BASIN SECTION 49.40 TO 51.10
WS     2   49.40   51.10      -1       3
WC     0  1409.1     170 1409.20


TW       BANK TRANSITION FOR ACCESS ROAD SECTION 48.95 TO 49.40
WS     2   48.95   49.40      -1       3
WC     0    1413      45  1409.1
```

```
T1      SOSSAMAN CHANNEL & BASIN PROJECT FCD NO. 91-07  APA NO. P31D01
T2      FROM DROP STRUCTURES SOUTH OF BASELINE RD. TO HAWES & SOUTHERN
T3     FILE SCDENW1: IM GR W/ REDUCED FLOWS AND BASIN
T4      100 YR, 24 HOUR DISCHARGES FROM FCD
T5      SECTIONS 1 THRU 5 FROM ADOT PRJ. NO. SBM 028-1-311PE,511C
T6      PROFILE ONE:  EARTH CHANNEL, 4:1 SIDESLOPSE, CONTINUOUS GRADE, DROPS
T7                    SOUTH HALF 15'BW - NORTH HALF 10'BW
T8                    SHIFTED SOUTH HALF ALIGNMENT 5' TO WEST

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              2        0        0        -1       0        0        0        1385.0   0

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    1         0        -1       2        5                 -1       6

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    100       150
    38        8        26       1        23       21       24       22       3        5
    42                 38       26       25       4        68       43                38
    30        64       65       33

J5  LPRNT     NUMSEC                 ********REQUESTED SECTION NUMBERS********

    -10       -10

        Mannings 'n' = .04 earth overbanks & .035 earth channel
        Contraction Coef. = .3 & Expansion Coef. = .5

NC     .04       .04      .035       .3        .5
QT       1      2229

        SECTION 1 IS APA SURVEY STA. 0+49 = ADOT STA. 40+59
        DOWNSTREAM SECTION AT DROP STRUCTURE
X1       1        8       220      315
GR  1387.2      199    1380.2      200    1379.5      220    1368.4      248    1368.4      288
GR  1379.7      315    1383.1      324    1383.1      400

        SECTION 2 IS APA SURVEY STA. 1+29 = ADOT STA. 39+79
        SECTION AT DROP STRUCTURE
```

```
X1        2        8      230      322       80     80.1       80
GR   1389.7      199   1382.7      200   1381.6      230   1368.8      255   1368.8      294
GR   1381.6      322   1382.7      327   1382.7      400

        SECTION 3 IS APA SURVEY STA. 1+41 = ADOT STA. 39+67
        UPSTREAM SECTION AT DROP STRUCTURE

X1        3       15      230      319       12       12       12
GR   1388.1      199   1381.1      200   1382.7      230   1381.8      239   1381.8      242
GR   1374.3      256   1374.3      272   1372.4    272.1   1372.4    278.1   1374.3    278.2
GR   1374.3      294   1381.8      306   1381.8      309   1382.7      319   1382.7      400

        SECTION 4 IS APA SURVEY STA. 6+01 = ADOT STA. 35+17
        DOWNSTREAM SECTION AT DROP STRUCTURE

X1        4        9      223      310      460      459      460
GR   1392.1      199   1385.1      200   1384.7      216   1383.4      223   1373.3      248
GR   1373.4      285   1383.3      310   1386.8      319   1386.8      400

        SECTION 5 IS APA SURVEY STA. 6+92 = ADOT STA. 34+26
        SECTION AT DROP STRUCTURE

X1        5        8      222      298       93       92       91
GR   1393.3      199   1386.3      200   1386.3      222   1374.3      247   1374.3      287
GR   1387.1      298   1387.1      310   1387.1      400

        SECTION 6 IS APA SURVEY STA. 7+03 = ADOT STA. 34+15
        UPSTREAM SECTION AT DROP STRUCTURE

X1        6       15      222      310       11       11       11
GR   1393.5      199   1386.5      200   1386.5      222   1383.3      231   1383.3      234
GR   1378.7      248   1378.7      263   1377.1    263.1   1377.1    269.1   1378.7    269.2
GR   1378.7      285   1383.3      289   1383.3      291   1387.2      310   1387.2      400

        THE FOLLOWING SECTION NOS. USE APA SURVEY STATIONS: IE 9+06 = 9.06
        DOWNSTREAM TRANSITION FROM CBC UNDER BASELINE RD.

X1     9.06        6       71      141      222      193      204
GR   1387.2        0   1387.5       71   1377.7       90   1376.6      121   1388.4      141
GR   1388.0      196

        Mannings 'n' = .04 earth overbanks & .020 shotcrete/concrete channel
        Contraction Coef. = .1 & Expansion Coef. = .3

NC      .04      .04      .02       .1       .3

        DOWNSTREAM END OF CBC UNDER BASELINE RD.
X1     9.50       10     79.7    122.4       45       42       43
X3       10                                                      1389     1388.8
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR   1387.7       28   1388.6       59   1385.2       72   1385.4       76   1384.2     79.7
GR   1377.7     79.8   1377.3    122.3   1381.9    122.4   1388.7      139   1387.7      188
```

```
SB    1.25      1.64      2.6                42.49     2.49      320                1378.6    1377.5

      UPSTREAM END OF CBC UNDER BASELINE RD.
X1   10.50         8     79.7     122.4      100      100      100
X2    2259                 1    1386.6    1388.8
X3      10                                                                 1389     1388.8
      AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
BT      -3        36    1389.2                95     1389                159     1388.8
GR  1388.6         0    1387.6      79.7   1378.6     79.8   1378.6    122.3     1386.6     122.4
GR  1386.4       129    1387.8       133   1388.3      200

      UPSTREAM TRANSITION TO CBC UNDER BASELINE RD. BY BEND ONE

X1   11.00         7     73.4       149      41       62       50
X2    2028
GR  1388.6         0    1388.6        14   1387.3     73.4     1380      73.5     1379.5       125
GR  1388.2       149    1388.7       200

      END SHOTCRETE/CONCRETE LINED CHANNEL

X1   11.31         7     63.5     139.6      14       36       21
GR  1388.6         0    1387.1      63.5   1380.3       76   1379.8       97    1379.75      113.6
GR  1387.3     139.6    1388.7       200

      Mannings 'n' = .04 earth overbanks & .035 earth channel
      Contraction Coef. = .3 & Expansion Coef. = .5

NC    .04       .04      .035        .3       .5

      SECTION 98' UPSTREAM OF CBC UNDER BASELINE RD.
X1   11.63         8       61       144       25       36       29
CI     105      1381      0.0         4        4      -15
GR  1388.2         0    1387.8        24   1388.4       61   1379.1       81      1379       107
GR  1388.2       144     1389       171   1388.9      181

      SECTION 426' UPSTREAM OF CBC UNDER BASELINE RD.

X1   14.90        10       63       145      323      330      326
CI              0.001
GR  1389.4         0     1390        48   1389.9       63   1382.9     87.7    1381.4      91.2
GR  1380.7     109.2    1384.9       121     1390      145   1390.9      161    1390.7       173

      ADDED SECTION

X1   17.00        10     65.5     146.9      210      210      210
CI
GR  1391.5         0    1391.9        51   1391.8     65.5   1387.5       85    1383.7      90.9
GR  1380.6     118.4    1386.5     126.4   1391.9    146.9   1392.8    157.9    1393.2       164

      ADDED SECTION FOR UPSTREAM END OF DROP
```

```
X1    17.15                                  15        15        15                  0
CI              1385

        SECTION 884' UPSTREAM OF CBC UNDER BASELINE RD.

X1    19.50        8        69       149       235       235       235
CI              0.0002
GR   1393.4        6    1394.2        69      1392        78      1385        88    1385.4       119
GR   1389.4      127    1394.1       149    1394.2       200

        ADDED SECTION

X1    21.00       12        70       148       150       150       150
CI
GR   1394.6      1.7      1395      46.5    1395.7      58.9    1395.6        70      1393      89.5
GR    1389     97.3    1385.1     105.3    1385.6     119.3    1388.7     121.2    1394.2       130
GR   1395.7      148    1396.0     163.8

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    21.15                                  15        15        15                  0
CI              1388.5

        SECTION 20' DOWNSTREAM OF BEND TWO

X1    22.42        9        73       150       127       127       127
CI              0.001
GR   1395.6       11    1396.7        73    1392.7       103    1389.4       112    1388.7       128
GR   1394.2      134      1397       150    1397.4       165    1397.1       200

        SECTION BY BEND TWO

X1    22.92        8        91       167        49        34        40
CI     115
GR   1397.2       31    1397.4        91    1388.7       134    1388.8       146    1394.9       154
GR   1397.6      167    1397.8       182    1397.1       226

        SECTION 20' UPSTREAM INSIDE BEND TWO

X1    23.40       10        64       144        51        26        37
CI     105
X3      10
GR    1398       29    1398.4        33    1397.2        64    1392.9        92    1389.3       104
GR   1388.7      113    1394.4       125    1397.7       144    1397.7       160      1397       200

        SECTION 165' UPSTREAM OF BEND TWO

X1    25.05        8      59.4     137.7       165       165       165
CI
GR   1398.9       21    1397.8      59.4    1393.2      89.6    1389.2      94.2    1389.2     100.8
GR   1392.8    105.3    1397.7     137.7    1397.5       200

        SECTION WITH LOW FLOW CHANNEL 397' UPSTREAM OF BEND TWO
```

```
X1    27.00       10       58      140      195      195      195
CI
GR     1400       12   1399.5     42.6   1399.1     43.4   1398.6       58   1394.2       89
GR   1393.1     91.2   1392.9     97.6   1394.3      103   1398.6      140   1398.5      200

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    27.15                                15       15       15                    0
CI            1391.6

        SECTION NEAR BEGINNING OF LOW FLOW CHANNEL

X1    29.50       10       61      134      235      235      235
CI            0.0002
X3       10
GR   1401.4        0   1401.1        8   1401.3       39   1400.3       61   1396.4       88
GR   1395.1       93   1394.9       97   1395.4      108   1399.9      134   1400.4      154

        SECTION 877' DOWNSTREAM OF CBC UNDER US 60

X1    32.00       11       63      138      250      250      250
CI
GR   1402.7        0   1402.2       44   1402.6       51   1402.3       63   1397.9     87.4
GR   1396.5     99.6   1396.4    110.5   1399.4    120.8   1402.2      138   1402.4      150
GR   1402.9      154

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    32.15                                15       15       15                    0
CI             1395

        SECTION 677' DOWNSTREAM OF CBC UNDER US 60

X1    34.00       10       60      138      185      185      185
CI            0.0002
X3       10
GR   1403.4       47   1403.6       60   1397.4       93   1397.1       99   1398.1      113
GR   1403.5      138     1404      153   1402.8      162   1403.5      164   1403.9      200

        SECTION 427' DOWNSTREAM OF CBC UNDER US 60

X1    36.50        9     60.2    140.4      250      250      250
CI
X3       10
GR   1405.6        0   1405.5        7   1405.7       15   1404.8       37     1406       48
GR   1405.2     60.2   1398.3     98.8     1405    140.4   1404.5      157

        ADDED SECTION FOR UPSTREAM END OF DROP
```

```
X1    36.65                                   15        15        15                  0
CI              1398

        ADDED SECTION 177' DOWNSTREAM OF CBC UNDER US 60

X1    39.00        10      56.9     138.8       235       235       235
CI            0.0002
X3      10
GR   1406.8      41.1      1406      56.9    1403.1      79.2    1399.7      93.6    1398.9      99.4
GR   1400.2       105    1402.3     108.5    1403.5     121.1    1407.2     138.8    1408.5     149.3

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    39.15                                   15        15        15
CI            1400.83
X3      10

        Mannings 'n' = .016 concrete overbanks & .016 concrete channel
        Contraction Coef. = .1 & Expansion Coef. = .3

NC    .016      .016      .016        .1        .3

        DOWNSTREAM TRANSITION FROM CBC UNDER US 60
        BEGIN CONCRETE LINED CHANNEL
X1    39.92         9        65       126        77        77        77
X2     2067
CI      100   1400.85                                     0.01
X3      10
GR   1402.8        29    1408.7        65    1400.9        82    1400.8      97.3    1400.9       112
GR   1408.8       126      1408       148    1406.3       184      1406       200

        DOWNSTREAM END OF CBC UNDER US 60

X1    40.77         7      48.3     125.5        87        87        85
        6" USED FOR SEDIMENT DEPOSITION
X3      10     1401.5                                                        1410.1      1410.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR   1409.4         0    1408.7      48.3      1401      48.4      1401     125.4    1408.8     125.5
GR   1408.9       160    1408.4       200


SB    1.25      1.56       2.6                   77         5       432                1401.6      1401

        UPSTREAM END OF CBC UNDER US 60
X1    43.00         9      48.3     125.5       223       223       223
X2     2072                   1    1407.7    1410.1
        6" USED FOR SEDIMENT DEPOSITION
X3      10     1402.2                                                        1410.1      1410.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
BT      -4         0    1410.1                 48.3    1410.1                 125.5      1410.1
BT               200    1410.1
GR   1410.4         0    1409.5         8    1409.5      48.3    1401.7      48.4    1401.6     125.4
GR   1409.6     125.5    1409.8       138    1409.1       196    1409.3       200
```

```
        UPSTREAM CONFLUENCE WITH ADOT CHANNEL ALONG US 60

X1    43.14       13      48.4     125.5       14       14       14
X3       10                                                   1409.7    1409.7
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW
X4        1   1401.8      48.4
GR   1408.6        0    1408.6         2   1408.1        8     1408       11    1409.7     24.5
GR   1409.7     39.6    1404.8      39.7   1401.8       47   1401.7     89.8    1401.7    125.4
GR   1409.8    125.5    1409.2       190   1409.7      200

        UPSTREAM TRANSITION TO CONFLUENCE WITH ADOT CHANNEL ALONG US 60

X1    43.58       10       0.9      52.3       44       44       44
X2     1309
GR   1409.9        0    1409.9       0.9   1409.5        1   1401.9       17    1401.9       36
GR    1409       52      1410      52.3   1409.4      103   1410.2      118    1410.1      127

        SECTION 107' UPSTREAM OF CONFLUENCE

X1    44.65        7      73.4     124.4      107      107      107
GR   1409.9        0    1410.4      73.4   1402.4     89.4   1402.4     108.6    1410.5    124.4
GR   1410.1      154    1408.6       200

        SECTION 142' UPSTREAM OF CONFLUENCE

X1    45.00                                   35       35       35                .16

        SECTION 167' UPSTREAM OF CONFLUENCE

X1    45.25                                   25       25       25                .11

        UPSTREAM END OF CONCRETE LINED CHANNEL

X1    45.69       14      73.2     124.2       44       44       44
X2     1312
X3       10
GR    1410        0    1410.2         9   1408.4       24   1410.4     68.5    1410.9     71.4
GR   1410.7     73.2   1402.75      89.8   1402.8    108.2   1411.4    124.2    1411.4    126.6
GR   1409.8      156     1409       159     1409      196   1408.8      200

        Mannings 'n' = .04 earth overbanks & .035 earth channel
        Contraction Coef. = .3 & Expansion Coef. = .5

NC     .04      .04     .035       .3       .5

        UPSTREAM TRANSITION TO CONCRETE LINED CHANNEL
X1    45.99       15       48      136       31       31       30
CI      100   1402.8    0.017        4        4      -10
X3       10                         65
GR   1409.7        3    1406.7       29   1406.9       34   1406.6       44     1408       48
GR   1407.1       69    1403.4       96   1402.8     98.3   1402.8    104.2    1404.7      108
GR   1406.6      115    1410.3      136   1409.8      181   1409.2      189    1408.8      200
```

ADDED SECTION FOR UPSTREAM END OF DROP

```
X1    46.15                                16        16        16                  0
CI            1404.02
X3      10                        75      1410
```

SECTION 280' UPSTREAM OF ADOT RIGHT-OF-WAY
N VALUE FOR CHIMP CHANGED TO REFLECT CONCRETE FOR WEIR SIDE OF CHANNEL

```
X1    48.50       10        68       130       235       235       235
CI            0.0004     0.024
X3      10
GR   1411.2        0    1412.2        68    1409.5        80    1403.4        96    1402.9        98
GR   1403.2      100    1410.8       130    1410.7       157    1410.3       158      1409       195
```

ADDED SECTION - BEGIN BANK TRANSITION

```
X1    48.95       12      66.6       130        45        45        45
CI
X3      10                          56      1413
GR   1410.8        0    1411.4        50    1412.6        64    1412.5      66.6    1409.5      80.8
GR   1403.1     96.7    1404.1     103.2    1411.4       130    1411.4     133.1    1410.7     158.2
GR   1409.1      189    1409.3       200
```

ADDED SECTION - END BANK TRANSITION - SOUTH END OF WEIR

```
X1    49.40       11      67.4      134.7        45        45        45
CI
X3       0                          70
GR   1411.0        0    1412.0        58    1412.7        63    1412.6      67.4    1409.4      82.8
GR   1402.6     97.6    1402.5      99.2    1411.7     134.7    1411.8       146    1409.9       176
GR   1409.4      200
```

SECTION 540' UPSTREAM OF ADOT RIGHT-OF-WAY

```
X1    51.10       13        70       127       170       170       170
CI
X3       0                          70
GR    1413        0    1413.4        32    1412.4        58    1412.8        70    1407.9        88
GR   1403.3       96      1403       100      1403       101    1405.7       105    1411.2       127
GR   1412.2      149    1410.6       160    1409.7       174
```

ADDED SECTION 630' UPSTREAM OF ADOT RIGHT-OF-WAY

```
X1    52.00       13      67.8      129.6        90        90        90
CI
X3       0                          70
GR   1411.4     38.2    1413.8      54.9    1413.4      67.8    1410.7      80.6    1405.9      90.8
GR   1402.8     97.3    1403.0      99.7    1405.8     104.7    1408.9     113.3    1412.0     129.6
GR   1412.5    150.5    1410.2     158.3    1410.0     163.7
```

ADDED SECTION - NORTH END OF WEIR - BEGIN BANK TRANSITION

```
X1    52.90      17      71     128      90      90      90
CI
X3        0                     70
GR   1412.2       0  1412.8      44  1412.8      55    1414      60  1413.2      71
GR   1410.8      82  1405.7    92.6  1403.4    98.4  1404.2    99.7  1404.6   102.7
GR   1408.1   108.5  1412.3     128  1412.4     143  1411.9     153  1410.6     158
GR   1410.2     164  1410.1     200
```

ADDED SECTION - END BANK TRANSITION

```
X1    53.25      15    71.6   125.7      35      35      35
CI                   0.035
X3       10                     58    1413
GR   1412.3       0  1412.4      43    1413      58    1414      62  1413.3    71.6
GR   1412.4      76  1405.1      93  1403.4    99.1  1403.7   101.5  1407.9     108
GR   1412.1   125.7  1412.5     131  1412.3     152  1410.8     158  1410.2     200
```

SECTION NEAR NORTH END OF DRAINAGE BASIN

```
X1    53.45      11      73     134      20      20      20
CI
X3       10
GR    1412       0  1412.2      41  1413.3      73  1406.6      89  1403.5     101
GR   1408.2     109  1411.9     124  1412.7     134  1411.9     155  1410.8     158
GR   1410.4     165
```

SECTION 255' UPSTREAM OF DRAINAGE BASIN

```
X1    56.00      14    74.4   128.5     255     255     255
CI
X3       10
GR   1413.2    41.8  1414.6    47.2  1413.8    74.4  1411.7    83.2  1406.7    91.1
GR   1405.5    95.5  1403.8      99  1405.1   101.8  1408.6   109.2  1411.2   118.2
GR   1412.8   128.5  1413.8   149.6  1411.6   157.7  1411.3   160.1
```

SECTION 455' UPSTREAM OF DRAINAGE BASIN

```
X1    58.00      13    73.6   128.5     200     200     200
CI            0.00161
X3       10
GR   1413.3    42.1  1414.2    47.7  1414.3    73.6  1412.7    82.6  1406.8      91
GR   1406.6    93.8  1405.3    96.8  1405.2   102.1  1411.3   114.5  1413.2   128.5
GR   1413.8     151  1411.7   157.5  1411.3   159.8
```

SECTION 655' UPSTREAM OF DRAINAGE BASIN

```
X1    60.00      13    69.1   128.3     200     200     200
CI
X3       10
GR   1414.1    42.7    1415    47.4    1415    69.1  1413.3    80.8  1407.2    90.8
GR   1406.9    93.1  1405.1    98.1  1406.6   103.2  1411.2   112.9  1413.9   128.3
GR    1414   149.1  1412.7   157.2  1412.5   158.7
```

```
        SECTION 855' UPSTREAM OF DRAINAGE BASIN

X1    62.00       13       72    126.7      200      200      200
CI
X3       10
GR   1414.2     37.6   1415.4     43.4     1415       72   1413.3     80.5     1406     94.3
GR   1405.2     98.6   1405.9    100.9   1411.6    111.7   1413.4    117.9   1414.3    126.7
GR   1414.4    151.2   1413.2      158   1412.5    174.7

        SECTION 1055' UPSTREAM OF DRAINAGE BASIN

X1    64.00       10     69.1      134      200      200      200
CI
X3       10
GR   1414.8       36   1415.8       50   1415.8     69.1   1414.6     79.2   1405.2     96.1
GR   1405.4    104.1   1412.2    118.2   1414.5      134   1415.2    150.7   1412.8    157.5

        DOWNSTREAM TRANSITION FROM CBC UNDER SOUTHERN AVE.

X1    65.22       12       67      134      122      122      122
CI            1405.89
X3       10
GR    1415       35   1415.3       46   1415.8       50     1416       67   1413.8       81
GR  1407.2       91   1406.7      106   1407.6      111     1413      122   1415.4      134
GR    1414      158   1413.6      162

        Mannings 'n' = .04 earth overbanks & .016 concrete channel
        Contraction Coef. = .1 & Expansion Coef. = .3

NC     .04      .04     .016       .1       .3

        DOWNSTREAM END OF CBC UNDER SOUTHERN AVE.
X1    65.85       14     84.9    116.8       64       64       63
CI                -1                              0.01
        12" USED FOR SEDIMENT DEPOSITION
X3       10   1407.1                                                1414.6   1414.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR    1415        0   1414.4       38   1415.6       41   1415.2       72   1414.3     79.4
GR  1414.3     82.7   1414.5     84.9   1406.1       85   1406.1    116.7   1414.5    116.8
GR  1413.7    124.1   1414.8    129.4     1415      153   1413.7      200

        COFQ DECREASED DUE TO TRAFFIC BARRIER AT TOP OF BOX

SB     1.25     1.56     2.56            31.67     1.67      180            1406.6   1406.1

        UPSTREAM END OF CBC UNDER SOUTHERN AVE.
X1    66.66       12     84.9    116.8       80       80       80
X2     1325                 1   1412.7   1414.6
        12" USED FOR SEDIMENT DEPOSITION
X3       10   1407.6                                                1414.6   1414.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
        INCLUDES TRAFFIC BARRIER
BT       -8       12   1414.6            58   1414.7                 83.4   1414.8
BT                86   1417.2        114.4   1417.2                116.9     1415
```

```
BT                154     1414.8                  200     1414.1
GR   1411.3         0     1412.2        13        1414        14     1413.9        47     1413.9      84.9
GR   1406.6        85     1406.7     116.7      1413.4     116.8     1414.3     117.9     1413.9     121.3
GR   1414.6       169     1413.8       200
```

UPSTREAM TRANSITION TO CBC UNDER SOUTHERN AVE.
FOLLOWING SECTIONS ARE ALONG SOUTHERN AVE.

```
X1    67.20        10       25.4        59        25        66        46
X3       10    1407.6
GR   1414.7         0     1414.6         8      1414      25.4    1407.1      31.5     1406.8      42.4
GR   1407.7      57.3     1411.6        59    1413.4        59    1412.7        69     1412.6      76.5
```

CONTINUE TRANSITION - CONCRETE TO SHOTCRETE CHANNEL
Mannings 'n' = .02 left overbank mainly paved road, .021 shotcrete channel & right overbank
Contraction Coef. = .1 & Expansion Coef. = .3

```
NC     .02      .021      .021        .1        .3

X1    67.44         8        29      50.4        25        26        25
X2     1123
X3       10    1407.6
GR   1414.6         0     1414.6        10    1414.1        26    1413.8        29     1407.3        35
GR   1407.4      45.6     1415.5      50.4    1415.4        67
```

SECTION 80.72 TRANSFERRED DOWNSTREAM & LOWERED 6.87 FEET
SECTION 200' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

```
X1    68.87         8       31.5      48.9       143       143       143                -6.87
GR   1421.5      13.8     1420.7      23.4    1420.4      31.5    1415.3      35.6     1415.4      44.2
GR   1421.5      48.9     1421.5        51      1428      51.1
```

SECTION 300' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

```
X1    69.87                                     100       100       100                 0.58
```

SECTION 400' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

```
X1    70.87                                     100       100       100                 0.58
```

THIS RUN EXECUTED 06FEB93 14:23:08

****
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

FILE SCDENW1: IM GR W/ R

SUMMARY PRINTOUT

	SECNO	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
*	1.000	3.61	9.96	1372.01	1379.50	220.00	1379.70	315.00	1373.55	128.14	1368.40
*	2.000	4.66	7.76	1373.46	1381.60	230.00	1381.60	322.00	1374.39	57.43	1368.80
*	3.000	5.43	10.49	1377.83	1382.70	230.00	1382.70	319.00	1379.54	140.87	1372.40
*	4.000	7.57	4.19	1380.87	1383.40	223.00	1383.30	310.00	1381.14	10.24	1373.30
	5.000	6.60	5.34	1380.90	1386.30	222.00	1387.10	298.00	1381.35	17.88	1374.30
*	6.000	5.23	10.33	1382.33	1386.50	222.00	1387.20	310.00	1383.99	136.19	1377.10
*	9.060	8.06	5.25	1384.66	1387.50	71.00	1388.40	141.00	1385.09	16.13	1376.60
*	9.500	7.34	5.77	1384.64	1384.20	79.70	1381.90	122.40	1385.16	5.95	1377.30
	10.500	6.14	6.83	1384.74	1387.60	79.70	1386.60	122.40	1385.47	10.52	1378.60
	11.000	5.69	4.79	1385.19	1387.30	73.40	1388.20	149.00	1385.54	5.70	1379.50
	11.310	5.32	5.91	1385.07	1387.10	63.50	1387.30	139.60	1385.61	10.12	1379.75
*	11.630	4.67	9.88	1385.67	1388.40	61.00	1388.20	144.00	1387.19	128.65	1381.00
*	14.900	7.17	4.98	1388.49	1389.90	63.00	1390.16	147.83	1388.88	20.12	1381.33
	17.000	7.40	4.71	1388.94	1391.86	56.19	1392.76	157.39	1389.28	17.39	1381.54
*	17.150	4.66	9.92	1389.66	1391.80	65.50	1391.90	146.90	1391.19	129.78	1385.00
*	19.500	7.09	5.06	1392.14	1394.10	61.28	1394.10	149.00	1392.53	21.06	1385.05
	21.000	7.42	4.69	1392.49	1395.52	55.73	1395.84	155.57	1392.84	17.20	1385.08

	SECNO	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
*	21.150	4.66	9.92	1393.16	1395.61	69.07	1395.70	148.00	1394.69	129.78	1388.50
*	22.420	6.54	5.78	1395.17	1396.57	65.72	1397.00	150.00	1395.69	30.07	1388.63
	22.920	6.66	5.61	1395.32	1397.34	72.81	1397.60	167.00	1395.81	27.87	1388.67
	23.400	6.75	5.49	1395.45	1397.22	63.43	1397.70	148.48	1395.92	26.26	1388.70
	25.050	7.06	5.10	1395.93	1397.80	59.40	1397.67	147.70	1396.33	21.47	1388.87
	27.000	7.31	4.81	1396.37	1398.60	58.00	1398.58	150.57	1396.73	18.42	1389.06
*	27.150	4.66	9.91	1396.26	1398.60	58.00	1398.60	140.50	1397.79	129.70	1391.60
*	29.500	7.09	5.06	1398.74	1400.30	61.00	1400.22	146.79	1399.13	21.06	1391.65
	32.000	7.59	4.51	1399.29	1402.52	54.21	1402.07	154.00	1399.61	15.46	1391.70
*	32.150	4.66	9.92	1399.66	1402.30	63.00	1402.26	141.54	1401.19	129.79	1395.00
*	34.000	6.91	5.28	1401.94	1403.60	60.00	1403.82	147.64	1402.38	23.66	1395.04
	36.500	7.48	4.62	1402.57	1405.48	55.93	1404.68	150.89	1402.90	16.53	1395.09
*	36.650	4.66	9.92	1402.66	1405.20	60.20	1405.00	140.49	1404.19	129.76	1398.00
*	39.000	7.09	5.06	1405.14	1406.00	56.90	1407.25	149.30	1405.53	21.06	1398.05
*	39.150	4.67	9.90	1405.50	1406.00	56.90	1407.20	138.80	1407.02	129.38	1400.83
*	39.920	5.72	6.85	1406.52	1408.70	65.00	1408.80	126.00	1407.25	7.94	1400.80
*	40.770	5.62	3.68	1407.12	1408.70	48.30	1408.80	125.50	1407.33	1.88	1401.50
	43.000	4.96	4.19	1407.16	1409.50	48.30	1409.60	125.50	1407.43	2.82	1402.20
	43.140	5.52	3.78	1407.22	1401.80	48.40	1409.80	125.50	1407.44	1.87	1401.70
*	43.580	5.17	5.34	1407.07	1409.90	.90	1410.00	52.30	1407.52	6.04	1401.90
	44.650	4.62	6.39	1407.02	1410.40	73.40	1410.50	124.40	1407.65	9.65	1402.40
	45.000	4.45	6.71	1407.01	1410.56	73.40	1410.66	124.40	1407.71	11.07	1402.56
	45.250	4.33	6.95	1407.00	1410.67	73.40	1410.77	124.40	1407.75	12.22	1402.67
	45.690	4.23	7.47	1406.98	1410.70	73.20	1411.40	124.20	1407.85	14.74	1402.75
	45.990	4.37	7.01	1407.17	100000.00	48.00	1410.30	136.00	1407.93	17.93	1402.80
*	46.150	3.75	8.96	1407.77	1410.00	48.00	1410.30	136.00	1409.02	34.80	1404.02

	SECNO	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
*	48.500	5.27	5.13	1409.38	1412.13	62.95	1410.79	131.72	1409.79	15.47	1404.11
	48.950	5.34	5.01	1409.47	1412.42	61.86	1411.38	133.97	1409.86	14.49	1404.13
	49.400	5.40	4.93	1409.55	100000.00	61.59	1411.70	135.22	1409.93	13.83	1404.15
	51.100	5.54	5.76	1409.76	100000.00	61.77	1411.53	134.25	1410.27	18.35	1404.22
	52.000	5.63	6.28	1409.89	100000.00	57.09	1412.17	136.66	1410.50	21.42	1404.25
	52.900	5.75	6.89	1410.04	100000.00	58.04	1412.36	137.29	1410.77	25.18	1404.29
	53.250	5.94	6.56	1410.24	1413.28	59.11	1412.44	137.54	1410.91	46.73	1404.30
	53.450	6.10	6.25	1410.41	1412.88	60.73	1412.55	137.95	1411.02	41.04	1404.31
	56.000	7.04	4.89	1411.45	1414.36	55.20	1413.39	140.89	1411.82	21.26	1404.41
	58.000	7.15	4.75	1411.89	1414.24	57.00	1413.51	140.09	1412.24	19.72	1404.74
	60.000	7.23	4.66	1412.29	1415.00	55.23	1413.96	140.60	1412.63	18.73	1405.06
	62.000	7.29	4.60	1412.67	1415.23	55.60	1414.36	140.91	1413.00	18.05	1405.38
	64.000	7.33	4.55	1413.03	1415.80	54.61	1414.81	141.44	1413.35	17.56	1405.70
	65.220	7.36	4.52	1413.25	1415.86	55.12	1414.97	141.33	1413.57	17.23	1405.89
*	65.850	5.91	6.98	1413.01	1414.50	84.90	1414.50	116.80	1413.77	8.02	1407.10
	66.660	5.97	6.96	1413.57	1413.90	84.90	1413.40	116.80	1414.33	7.85	1407.60
	67.200	5.95	7.37	1413.55	1414.00	25.40	1413.40	59.00	1414.39	8.64	1407.60
*	67.440	5.91	12.27	1413.51	1413.80	29.00	1415.50	50.40	1415.85	55.96	1407.60
*	68.870	6.88	10.59	1415.31	1413.53	31.50	1414.63	48.90	1416.90	33.95	1408.43
*	69.870	6.85	10.66	1415.86	1414.11	31.50	1415.21	48.90	1417.48	34.64	1409.01
*	70.870	6.86	10.63	1416.45	1414.69	31.50	1415.79	48.90	1418.06	34.37	1409.59

FILE SCDENW1: IM GR W/ R

SUMMARY PRINTOUT

	SECNO	VCH	AREA	TOPWID	FRCH	Q
*	1.000	9.96	176.41	57.73	1.00	1756.77
*	2.000	7.76	226.32	58.27	.69	1756.77
*	3.000	10.49	167.46	50.25	1.01	1756.77
*	4.000	4.19	419.37	74.58	.31	1756.77
	5.000	5.34	328.69	59.45	.40	1756.77
*	6.000	10.33	170.02	51.22	1.00	1756.77
*	9.060	5.25	334.93	58.16	.39	1756.77
*	9.500	5.77	304.41	42.70	.38	1756.77
	10.500	6.83	261.51	42.65	.49	1786.77
	11.000	4.79	325.13	67.27	.38	1555.77
	11.310	5.91	263.41	64.73	.52	1555.77
*	11.630	9.88	157.40	52.38	1.00	1555.77
*	14.900	4.98	312.70	72.31	.42	1555.77
	17.000	4.71	330.11	74.21	.39	1555.77
*	17.150	9.92	156.89	52.30	1.01	1555.77
*	19.500	5.06	307.46	71.72	.43	1555.77
	21.000	4.69	331.47	74.35	.39	1555.77
*	21.150	9.92	156.89	52.30	1.01	1555.77
*	22.420	5.78	269.39	67.34	.51	1555.77
	22.920	5.61	277.09	68.25	.49	1555.77
	23.400	5.49	283.26	68.97	.48	1555.77
	25.050	5.10	305.29	71.48	.43	1555.77
	27.000	4.81	323.13	73.45	.40	1555.77
*	27.150	9.91	156.92	52.30	1.01	1555.77

	SECNO	VCH	AREA	TOPWID	FRCH	Q
*	29.500	5.06	307.46	71.72	.43	1555.77
	32.000	4.51	344.93	75.79	.37	1555.77
*	32.150	9.92	156.89	52.30	1.01	1555.77
*	34.000	5.28	294.46	70.26	.45	1555.77
	36.500	4.62	336.46	74.89	.38	1555.77
*	36.650	9.92	156.90	52.30	1.01	1555.77
*	39.000	5.06	307.48	71.73	.43	1555.77
*	39.150	9.90	157.07	52.33	1.01	1555.77
*	39.920	6.85	232.70	52.22	.57	1594.77
*	40.770	3.68	433.57	77.16	.27	1594.77
	43.000	4.19	382.18	77.14	.33	1599.77
	43.140	3.78	423.19	77.07	.28	1599.77
*	43.580	5.34	156.77	41.57	.48	836.77
	44.650	6.39	130.87	37.45	.60	836.77
	45.000	6.71	124.62	36.79	.64	836.77
	45.250	6.95	120.34	36.32	.67	836.77
	45.690	7.47	112.36	35.02	.74	839.77
	45.990	7.01	119.82	44.91	.76	839.77
*	46.150	8.96	93.72	39.99	1.03	839.77
*	48.500	5.13	163.55	52.12	.51	839.77
	48.950	5.01	167.58	52.74	.50	839.77
	49.400	4.93	171.33	60.54	.52	841.67
	51.100	5.76	178.26	55.25	.60	1026.68
	52.000	6.28	183.35	55.08	.61	1152.05
	52.900	6.89	189.55	55.97	.66	1306.37
	53.250	6.56	200.07	57.46	.62	1312.00

	SECND	VCH	AREA	TOPWID	FRCH	Q
	53.450	6.25	210.00	58.82	.58	1312.00
	56.000	4.89	268.39	66.29	.43	1312.00
	58.000	4.75	276.02	67.20	.41	1312.00
	60.000	4.66	281.38	67.84	.40	1312.00
	62.000	4.60	285.31	68.30	.40	1312.00
	64.000	4.55	288.22	68.64	.39	1312.00
	65.220	4.52	290.29	68.88	.39	1312.00
*	65.850	6.98	188.08	31.86	.51	1312.00
	66.660	6.96	190.33	31.90	.50	1325.00
	67.200	7.37	190.26	50.71	.56	1325.00
*	67.440	12.27	91.49	19.96	1.01	1123.00
*	68.870	10.59	118.98	37.21	.80	1123.00
*	69.870	10.66	118.08	37.21	.81	1123.00
*	70.870	10.63	118.43	37.21	.81	1123.00

FILE SCDENW1: IM GR W/ R

SUMMARY PRINTOUT

	SECNO	BW	VEXR	VEXT	K*CHSL
*	1.000	.01	.00	.00	.00
*	2.000	.01	.00	.00	5.00
*	3.000	.01	.00	.00	300.00
*	4.000	.01	.00	.00	1.96
	5.000	.01	.00	.00	10.99
*	6.000	.01	.00	.00	254.54
*	9.060	.01	.00	.00	-2.45
*	9.500	.01	.00	.00	16.28
	10.500	.01	.00	.00	13.00
	11.000	.01	.00	.00	18.00
	11.310	.01	.00	.00	11.90
*	11.630	15.00	.00	.00	43.10
*	14.900	15.00	-1.06	-1.06	1.00
	17.000	15.00	.48	-.58	1.00
*	17.150	15.00	-.02	-.59	230.93
*	19.500	15.00	-.69	-1.29	.20
	21.000	15.00	.79	-.50	.20
*	21.150	15.00	.07	-.43	228.20
*	22.420	15.00	.16	-.28	1.00
	22.920	15.00	.13	-.14	1.00
	23.400	15.00	.14	.00	1.00
	25.050	15.00	.93	.93	1.00
	27.000	15.00	1.69	2.61	1.00
*	27.150	15.00	.10	2.71	169.07

	SECNO	BW	VEXR	VEXT	K*CHSL
*	29.500	15.00	1.23	3.95	.20
	32.000	15.00	2.61	6.56	.20
*	32.150	15.00	.12	6.68	220.20
*	34.000	15.00	.68	7.36	.20
	36.500	15.00	1.87	9.23	.20
*	36.650	15.00	.09	9.32	194.20
*	39.000	15.00	.79	10.12	.20
*	39.150	15.00	.02	10.14	185.53
*	39.920	.01	.00	10.14	-.39
*	40.770	.01	.00	10.14	8.23
	43.000	.01	.00	10.14	3.14
	43.140	.01	.00	10.14	-35.71
*	43.580	.01	.00	10.14	4.55
	44.650	.01	.00	10.14	4.67
	45.000	.01	.00	10.14	4.57
	45.250	.01	.00	10.14	4.40
	45.690	.01	.00	10.14	1.82
	45.990	10.00	-.03	10.11	1.67
*	46.150	10.00	-.02	10.09	76.25
*	48.500	10.00	-.14	9.95	.40
	48.950	10.00	.07	10.02	.40
	49.400	10.00	.07	10.09	.40
	51.100	10.00	.38	10.47	.40
	52.000	10.00	.34	10.81	.40
	52.900	10.00	.44	11.26	.40
	53.250	10.00	.19	11.44	.40

	SECNO	BW	VEXR	VEXT	K*CHSL
	53.450	10.00	.10	11.55	.40
	56.000	10.00	1.58	13.13	.40
	58.000	10.00	1.50	14.62	1.61
	60.000	10.00	1.56	16.18	1.61
	62.000	10.00	1.62	17.80	1.61
	64.000	10.00	1.45	19.25	1.61
	65.220	10.00	.76	20.02	1.54
*	65.850	.01	.00	20.02	19.21
	66.660	.01	.00	20.02	6.25
	67.200	.01	.00	20.02	.00
*	67.440	.01	.00	20.02	.00
*	68.870	.01	.00	20.02	5.80
*	69.870	.01	.00	20.02	5.80
*	70.870	.01	.00	20.02	5.80

FILE SCDENW1: IM GR W/ R

SUMMARY PRINTOUT TABLE 100

SECNO	EGLWC	ELLC	EGPRS	ELTRD	QPR	QWEIR	CLASS	H3	DEPTH	CWSEL	VCH	EG
10.500	1385.47	1386.60	.00	1388.80	1756.77	.00	1.00	.10	6.14	1384.74	6.83	1385.47
43.000	1407.43	1407.70	.00	1410.10	1594.77	.00	1.00	.03	4.96	1407.16	4.19	1407.43
66.660	1414.05	1412.70	1414.33	1414.60	1325.00	.00	10.00	.17	5.97	1413.57	6.96	1414.33

FILE SCDENW1: IM GR W/ R

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	1.000	.00	.00	.00	1368.40	1756.77	1372.01	1372.01	1373.55	128.14	9.96	176.41	155.19
*	2.000	80.00	.00	.00	1368.80	1756.77	1373.46	1372.50	1374.39	57.43	7.76	226.32	231.81
*	3.000	12.00	.00	.00	1372.40	1756.77	1377.83	1377.83	1379.54	140.87	10.49	167.46	148.02
*	4.000	460.00	.00	.00	1373.30	1756.77	1380.87	1377.10	1381.14	10.24	4.19	419.37	548.92
	5.000	91.00	.00	.00	1374.30	1756.77	1380.90	1378.00	1381.35	17.88	5.34	328.69	415.48
*	6.000	11.00	.00	.00	1377.10	1756.77	1382.33	1382.33	1383.99	136.19	10.33	170.02	150.53
*	9.060	204.00	.00	.00	1376.60	1756.77	1384.66	1381.37	1385.09	16.13	5.25	334.93	437.48
*	9.500	43.00	.00	.00	1377.30	1756.77	1384.64	1381.25	1385.16	5.95	5.77	304.41	719.96
	10.500	100.00	1388.80	1386.60	1378.60	1786.77	1384.74	.00	1385.47	10.52	6.83	261.51	550.85
	11.000	50.00	.00	.00	1379.50	1555.77	1385.19	1382.68	1385.54	5.70	4.79	325.13	651.61
	11.310	21.00	.00	.00	1379.75	1555.77	1385.07	1383.37	1385.61	10.12	5.91	263.41	488.97
*	11.630	29.00	.00	.00	1381.00	1555.77	1385.67	1385.67	1387.19	128.65	9.88	157.40	137.16
*	14.900	326.00	.00	.00	1381.33	1555.77	1388.49	1385.99	1388.88	20.12	4.98	312.70	346.81
	17.000	210.00	.00	.00	1381.54	1555.77	1388.94	1386.20	1389.28	17.39	4.71	330.11	373.04
*	17.150	15.00	.00	.00	1385.00	1555.77	1389.66	1389.66	1391.19	129.78	9.92	156.89	136.57
*	19.500	235.00	.00	.00	1385.05	1555.77	1392.14	1389.72	1392.53	21.06	5.06	307.46	339.02
	21.000	150.00	.00	.00	1385.08	1555.77	1392.49	1389.74	1392.84	17.20	4.69	331.47	375.11
*	21.150	15.00	.00	.00	1388.50	1555.77	1393.16	1393.16	1394.69	129.78	9.92	156.89	136.57
*	22.420	127.00	.00	.00	1388.63	1555.77	1395.17	1393.30	1395.69	30.07	5.78	269.39	283.72
	22.920	40.00	.00	.00	1388.67	1555.77	1395.32	1393.33	1395.81	27.87	5.61	277.09	294.71
	23.400	37.00	.00	.00	1388.70	1555.77	1395.45	1393.37	1395.92	26.26	5.49	283.26	303.57
	25.050	165.00	.00	.00	1388.87	1555.77	1395.93	1393.53	1396.33	21.47	5.10	305.29	335.79
	27.000	195.00	.00	.00	1389.06	1555.77	1396.37	1393.73	1396.73	18.42	4.81	323.13	362.46
*	27.150	15.00	.00	.00	1391.60	1555.77	1396.26	1396.26	1397.79	129.70	9.91	156.92	136.61

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	29.500	235.00	.00	.00	1391.65	1555.77	1398.74	1396.32	1399.13	21.06	5.06	307.46	339.02
	32.000	250.00	.00	.00	1391.70	1555.77	1399.29	1396.36	1399.61	15.46	4.51	344.93	395.72
*	32.150	15.00	.00	.00	1395.00	1555.77	1399.66	1399.66	1401.19	129.79	9.92	156.89	136.56
*	34.000	185.00	.00	.00	1395.04	1555.77	1401.94	1399.71	1402.38	23.66	5.28	294.46	319.85
	36.500	250.00	.00	.00	1395.09	1555.77	1402.57	1399.76	1402.90	16.53	4.62	336.46	382.71
*	36.650	15.00	.00	.00	1398.00	1555.77	1402.66	1402.66	1404.19	129.76	9.92	156.90	136.58
*	39.000	235.00	.00	.00	1398.05	1555.77	1405.14	1402.72	1405.53	21.06	5.06	307.48	339.04
*	39.150	15.00	.00	.00	1400.83	1555.77	1405.50	1405.50	1407.02	129.38	9.90	157.07	136.78
*	39.920	77.00	.00	.00	1400.80	1594.77	1406.52	1404.90	1407.25	7.94	6.85	232.70	565.87
*	40.770	85.00	.00	.00	1401.50	1594.77	1407.12	1403.86	1407.33	1.88	3.68	433.57	1163.68
	43.000	223.00	1410.10	1407.70	1402.20	1599.77	1407.16	.00	1407.43	2.82	4.19	382.18	952.59
	43.140	14.00	.00	.00	1401.70	1599.77	1407.22	1404.10	1407.44	1.87	3.78	423.19	1168.87
*	43.580	44.00	.00	.00	1401.90	836.77	1407.07	1405.30	1407.52	6.04	5.34	156.77	340.56
	44.650	107.00	.00	.00	1402.40	836.77	1407.02	1405.82	1407.65	9.65	6.39	130.87	269.42
	45.000	35.00	.00	.00	1402.56	836.77	1407.01	1405.99	1407.71	11.07	6.71	124.62	251.48
	45.250	25.00	.00	.00	1402.67	836.77	1407.00	1406.09	1407.75	12.22	6.95	120.34	239.37
	45.690	44.00	.00	.00	1402.75	839.77	1406.98	1406.28	1407.85	14.74	7.47	112.36	218.73
	45.990	30.00	.00	.00	1402.80	839.77	1407.17	1406.59	1407.93	17.93	7.01	119.82	198.32
*	46.150	16.00	.00	.00	1404.02	839.77	1407.77	1407.77	1409.02	34.80	8.96	93.72	142.35
*	48.500	235.00	.00	.00	1404.11	839.77	1409.38	1407.92	1409.79	15.47	5.13	163.55	213.52
	48.950	45.00	.00	.00	1404.13	839.77	1409.47	1407.92	1409.86	14.49	5.01	167.58	220.63
	49.400	45.00	.00	.00	1404.15	841.67	1409.55	1407.94	1409.93	13.83	4.93	171.33	226.33
	51.100	170.00	.00	.00	1404.22	1026.68	1409.76	1408.40	1410.27	18.35	5.76	178.26	239.65
	52.000	90.00	.00	.00	1404.25	1152.05	1409.89	1408.67	1410.50	21.42	6.28	183.35	248.95
	52.900	90.00	.00	.00	1404.29	1306.37	1410.04	1408.97	1410.77	25.18	6.89	189.55	260.31
	53.250	35.00	.00	.00	1404.30	1312.00	1410.24	1409.01	1410.91	46.73	6.56	200.07	191.92

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	53.450	20.00	.00	.00	1404.31	1312.00	1410.41	1409.02	1411.02	41.04	6.25	210.00	204.80
	56.000	255.00	.00	.00	1404.41	1312.00	1411.45	1409.12	1411.82	21.26	4.89	268.39	284.54
	58.000	200.00	.00	.00	1404.74	1312.00	1411.89	1409.45	1412.24	19.72	4.75	276.02	295.42
	60.000	200.00	.00	.00	1405.06	1312.00	1412.29	1409.77	1412.63	18.73	4.66	281.38	303.15
	62.000	200.00	.00	.00	1405.38	1312.00	1412.67	1410.09	1413.00	18.05	4.60	285.31	308.83
	64.000	200.00	.00	.00	1405.70	1312.00	1413.03	1410.41	1413.35	17.56	4.55	288.22	313.05
	65.220	122.00	.00	.00	1405.89	1312.00	1413.25	1410.60	1413.57	17.23	4.52	290.29	316.06
*	65.850	63.00	.00	.00	1407.10	1312.00	1413.01	1410.86	1413.77	8.02	6.98	188.08	463.23
	66.660	80.00	1414.60	1412.70	1407.60	1325.00	1413.57	.00	1414.33	7.85	6.96	190.33	472.83
	67.200	46.00	.00	.00	1407.60	1325.00	1413.55	1411.73	1414.39	8.64	7.37	190.26	450.70
*	67.440	25.00	.00	.00	1407.60	1123.00	1413.51	1413.51	1415.85	55.96	12.27	91.49	150.12
*	68.870	143.00	.00	.00	1408.43	1123.00	1415.31	1415.31	1416.90	33.95	10.59	118.98	192.74
*	69.870	100.00	.00	.00	1409.01	1123.00	1415.86	1415.86	1417.48	34.64	10.66	118.08	190.82
*	70.870	100.00	.00	.00	1409.59	1123.00	1416.45	1416.45	1418.06	34.37	10.63	118.43	191.56

A MAXIMUM OF 5 TABLES MAY BE GENERATED

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     1.000  PROFILE=  1  CRITICAL DEPTH ASSUMED

WARNING SECNO=     2.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     3.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     3.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     6.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     6.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     9.060  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     9.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    11.630  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    11.630  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    14.900  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    17.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    17.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    19.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    21.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    21.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    22.420  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    27.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    27.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    29.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    32.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    32.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    34.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    36.650  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    36.650  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    39.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    39.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    39.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    39.920  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

```
WARNING SECNO=     40.770  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     43.580  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     46.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     46.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     48.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     65.850  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     67.440  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     67.440  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     68.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     68.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     69.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     69.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     70.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     70.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY
```

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDENW1.SMP 06-Feb-93

QP FILE: SCDENW1F.SOS

DETERMINE REQUIRED AND AVAILABLE FREEBOARD

ALTERNATIVE I: EARTH CHANNEL WITH 4:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	DEPTH	VCH	FREEBD	CWSEL	FREEBD ELEV	XLBEL	STCHL	RBEL	STCHR	*MINIMUM ADDT'L FREEBD LT	*MINIMUM ADDT'L FREEBD RT	EG	ELMIN
1.00	3.61	9.96	1.29	1372.01	1373.30	1379.50	220.00	1379.70	315.00	6.20	6.40	1373.55	1368.40
2.00	4.66	7.76	1.40	1373.46	1374.86	1381.60	230.00	1381.60	322.00	6.74	6.74	1374.39	1368.80
3.00	5.43	10.49	1.78	1377.83	1379.61	1382.70	230.00	1382.70	319.00	3.09	3.09	1379.54	1372.40
4.00	7.57	4.19	1.96	1380.87	1382.83	1383.40	223.00	1383.30	310.00	0.57	0.47	1381.14	1373.30
5.00	6.60	5.34	1.76	1380.90	1382.66	1386.30	222.00	1387.10	298.00	3.64	4.44	1381.35	1374.30
6.00	5.23	10.33	1.72	1382.33	1384.05	1386.50	222.00	1387.20	310.00	2.45	3.15	1383.99	1377.10
9.06	8.06	5.25	2.12	1384.66	1386.78	1387.50	71.00	1388.40	141.00	0.72	1.62	1385.09	1376.60
9.50	7.34	5.77	1.96	1384.64	1386.60	1384.20	79.70	1381.90	122.40	-2.40	-4.70	1385.16	1377.30
10.50	6.14	6.83	1.72	1384.74	1386.46	1387.60	79.70	1386.60	122.40	1.14	0.14	1385.47	1378.60
11.00	5.69	4.79	1.51	1385.19	1386.70	1387.30	73.40	1388.20	149.00	0.60	1.50	1385.54	1379.50
11.31	5.32	5.91	1.47	1385.07	1386.54	1387.10	63.50	1387.30	139.60	0.56	0.76	1385.61	1379.75
11.63	4.67	9.88	1.55	1385.67	1387.22	1388.40	61.00	1388.20	144.00	1.18	0.98	1387.19	1381.00
14.90	7.17	4.98	1.89	1388.49	1390.38	1389.90	63.00	1390.16	147.83	-0.48	-0.22	1388.88	1381.33
17.00	7.40	4.71	1.94	1388.94	1390.88	1391.86	56.19	1392.76	157.39	0.98	1.88	1389.28	1381.54
17.15	4.66	9.92	1.55	1389.66	1391.21	1391.80	65.50	1391.90	146.90	0.59	0.69	1391.19	1385.00
19.50	7.09	5.06	1.87	1392.14	1394.01	1394.10	61.28	1394.10	149.00	0.09	0.09	1392.53	1385.05
21.00	7.42	4.69	1.94	1392.49	1394.43	1395.52	55.73	1395.84	155.57	1.09	1.41	1392.84	1385.08
21.15	4.66	9.92	1.55	1393.16	1394.71	1395.61	69.07	1395.70	148.00	0.90	0.99	1394.69	1388.50
22.42	6.54	5.78	1.76	1395.17	1396.93	1396.57	65.72	1397.00	150.00	-0.36	0.07	1395.69	1388.63
22.92	6.66	5.61	1.79	1395.32	1397.11	1397.34	72.81	1397.60	167.00	0.23	0.49	1395.81	1388.67
23.40	6.75	5.49	1.80	1395.45	1397.25	1397.22	63.43	1397.70	148.48	-0.03	0.45	1395.92	1388.70
25.05	7.06	5.10	1.87	1395.93	1397.80	1397.80	59.40	1397.67	147.70	0.00	-0.13	1396.33	1388.87
27.00	7.31	4.81	1.92	1396.37	1398.29	1398.60	58.00	1398.58	150.57	0.31	0.29	1396.73	1389.06
27.15	4.66	9.91	1.55	1396.26	1397.81	1398.60	58.00	1398.60	140.50	0.79	0.79	1397.79	1391.60
29.50	7.09	5.06	1.87	1398.74	1400.61	1400.30	61.00	1400.22	146.79	-0.31	-0.39	1399.13	1391.65
32.00	7.59	4.51	1.98	1399.29	1401.27	1402.52	54.21	1402.07	154.00	1.25	0.80	1399.61	1391.70
32.15	4.66	9.92	1.55	1399.66	1401.21	1402.30	63.00	1402.26	141.54	1.09	1.05	1401.19	1395.00
34.00	6.91	5.28	1.84	1401.94	1403.78	1403.60	60.00	1403.82	147.64	-0.18	0.04	1402.38	1395.04
36.50	7.48	4.62	1.95	1402.57	1404.52	1405.48	55.93	1404.68	150.89	0.96	0.16	1402.90	1395.09
36.65	4.66	9.92	1.55	1402.66	1404.21	1405.20	60.20	1405.00	140.49	0.99	0.79	1404.19	1398.00
39.00	7.09	5.06	1.87	1405.14	1407.01	1406.00	56.90	1407.25	149.30	-1.01	0.24	1405.53	1398.05
39.15	4.67	9.90	1.55	1405.50	1407.05	1406.00	56.90	1407.20	138.80	-1.05	0.15	1407.02	1400.83
39.92	5.72	6.85	1.61	1406.52	1408.13	1408.70	65.00	1408.80	126.00	0.57	0.67	1407.25	1400.80
40.77	5.62	3.68	1.46	1407.12	1408.58	1408.70	48.30	1408.80	125.50	0.12	0.22	1407.33	1401.50
43.00	4.96	4.19	1.31	1407.16	1408.47	1409.50	48.30	1409.60	125.50	1.03	1.13	1407.43	1402.20
43.14	5.52	3.78	1.44	1407.22	1408.66	1401.80	48.40	1409.80	125.50	-6.86	1.14	1407.44	1401.70
43.58	5.17	5.34	1.40	1407.07	1408.47	1409.90	0.90	1410.00	52.30	1.43	1.53	1407.52	1401.90
44.65	4.62	6.39	1.31	1407.02	1408.33	1410.40	73.40	1410.50	124.40	2.07	2.17	1407.65	1402.40
45.00	4.45	6.71	1.29	1407.01	1408.30	1410.56	73.40	1410.66	124.40	2.26	2.36	1407.71	1402.56
45.25	4.33	6.95	1.27	1407.00	1408.27	1410.67	73.40	1410.77	124.40	2.40	2.50	1407.75	1402.67
45.69	4.23	7.47	1.27	1406.98	1408.25	1410.70	73.20	1411.40	124.20	2.45	3.15	1407.85	1402.75

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDENW1.SMP 06-Feb-93

QP FILE: SCDENW1F.SOS

DETERMINE REQUIRED AND AVAILABLE FREEBOARD

ALTERNATIVE I: EARTH CHANNEL WITH 4:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	DEPTH	VCH	FREEBD	CWSEL	FREEBD ELEV	XLBEL	STCHL	RBEL	STCHR	*MINIMUM ADDT'L FREEBD LT	*MINIMUM ADDT'L FREEBD RT	EG	ELMIN
45.99	4.37	7.01	1.28	1407.17	1408.45	100000.00	48.00	1410.30	136.00	98591.55	1.85	1407.93	1402.80
46.15	3.75	8.96	1.25	1407.77	1409.02	1410.00	48.00	1410.30	136.00	0.98	1.28	1409.02	1404.02
48.50	5.27	5.13	1.42	1409.38	1410.80	1412.13	62.95	1410.79	131.72	1.33	-0.01	1409.79	1404.11
48.95	5.34	5.01	1.43	1409.47	1410.90	1412.42	61.86	1411.38	133.97	1.52	0.48	1409.86	1404.13
49.40	5.40	4.93	1.44	1409.55	1410.99	100000.00	61.59	1411.70	135.22	98589.01	0.71	1409.93	1404.15
51.10	5.54	5.76	1.51	1409.76	1411.27	100000.00	61.77	1411.53	134.25	98588.73	0.26	1410.27	1404.22
52.00	5.63	6.28	1.56	1409.89	1411.45	100000.00	57.09	1412.17	136.66	98588.55	0.72	1410.50	1404.25
52.90	5.75	6.89	1.62	1410.04	1411.66	100000.00	58.04	1412.36	137.29	98588.34	0.70	1410.77	1404.29
53.25	5.94	6.56	1.65	1410.24	1411.89	1413.28	59.11	1412.44	137.54	1.39	0.55	1410.91	1404.30
53.45	6.10	6.25	1.68	1410.41	1412.09	1412.88	60.73	1412.55	137.95	0.79	0.46	1411.02	1404.31
56.00	7.04	4.89	1.85	1411.45	1413.30	1414.36	55.20	1413.39	140.89	1.06	0.09	1411.82	1404.41
58.00	7.15	4.75	1.88	1411.89	1413.77	1414.24	57.00	1413.51	140.09	0.47	-0.26	1412.24	1404.74
60.00	7.23	4.66	1.89	1412.29	1414.18	1415.00	55.23	1413.96	140.60	0.82	-0.22	1412.63	1405.06
62.00	7.29	4.60	1.90	1412.67	1414.57	1415.23	55.60	1414.36	140.91	0.66	-0.21	1413.00	1405.38
64.00	7.33	4.55	1.91	1413.03	1414.94	1415.80	54.61	1414.81	141.44	0.86	-0.13	1413.35	1405.70
65.22	7.36	4.52	1.92	1413.25	1415.17	1415.86	55.12	1414.97	141.33	0.69	-0.20	1413.57	1405.89
65.85	5.91	6.98	1.67	1413.01	1414.68	1414.50	84.90	1414.50	116.80	-0.18	-0.18	1413.77	1407.10
66.66	5.97	6.96	1.68	1413.57	1415.25	1413.90	84.90	1413.40	116.80	-1.35	-1.85	1414.33	1407.60
67.20	5.95	7.37	1.70	1413.55	1415.25	1414.00	25.40	1413.40	59.00	-1.25	-1.85	1414.39	1407.60
67.44	5.91	12.27	2.06	1413.51	1415.57	1413.80	29.00	1415.50	50.40	-1.77	-0.07	1415.85	1407.60
68.87	6.88	10.59	2.16	1415.31	1417.47	1413.53	31.50	1414.63	48.90	-3.94	-2.84	1416.90	1408.43
69.87	6.85	10.66	2.15	1415.86	1418.01	1414.11	31.50	1415.21	48.90	-3.90	-2.80	1417.48	1409.01
70.87	6.86	10.63	2.15	1416.45	1418.60	1414.69	31.50	1415.79	48.90	-3.91	-2.81	1418.06	1409.59

*NOTE: NEGATIVE NUMBERS INDICATE THE FREEBOARD ELEVATION IS ABOVE THE LEFT (EAST BANK) OR RIGHT (WEST BANK) CHANNEL BANK ELEV.

SECTION = SURVEY BASELINE STATION USED FOR CROSS SECTION IDENTIFICATION NUMBER
DEPTH = WATER DEPTH CALCULATED BY HEC-2
VCH = WATER VELOCITY IN THE MAIN CHANNEL
FREEBD = REQUIRED FREEBOARD COMPUTED ACCORDING TO FORMULA 5.10 FCD MANUAL VOL. 2
CWSEL = COMPUTED WATER SURFACE ELEVATION
FREEBD ELEV = CWSEL + FREEBD
XLBEL = LEFT BANK ELEVATION (EAST BANK)
STCHL = STATION OF THE LEFT BANK (EAST BANK)
RBEL = RIGHT BANK ELEVATION (WEST BANK)
STCHR = STATION OF THE RIGHT BANK (WEST BANK)
ADDT'L FREEBD = RIGHT OR LEFT BANK ELEVATION MINUS FREEBD ELEV
EG = ENERGY GRADIENT ELEVATION FOR THE CROSS SECTION
ELMIN = MINIMUM ELEVATION IN CURRENT CROSS SECTION

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDENW1.SMP 06-Feb-93

QP FILE: SCDENW1D.SOS

DETERMINE AVAILABLE DISTANCE FROM RIGHT OF WAY TO TOP OF CHANNEL

ALTERNATIVE I: EARTH CHANNEL WITH 4:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	STCHL	STCHR	MAXIMUM AVAILABLE DISTANCE LT	MAXIMUM AVAILABLE DISTANCE RT	
11.00	73.40	149.00	30.90	8.50	
11.31	63.50	139.60	21.00	17.90	
11.63	61.00	144.00	18.50	13.50	
14.90	63.00	147.83	20.50	9.67	
17.00	56.19	157.39	13.69	0.11	
17.15	65.50	146.90	23.00	10.60	
19.50	61.28	149.00	18.78	8.50	
21.00	55.73	155.57	13.23	1.93	
21.15	69.07	148.00	26.57	9.50	
22.42	65.72	150.00	23.22	7.50	
22.92	72.81	167.00	20.31	0.50	*
23.40	63.43	148.48	20.93	9.02	
25.05	59.40	147.70	16.90	9.80	
27.00	58.00	150.57	15.50	6.93	
27.15	58.00	140.50	15.50	17.00	
29.50	61.00	146.79	18.50	10.71	
32.00	54.21	154.00	11.71	3.50	
32.15	63.00	141.54	20.50	15.96	
34.00	60.00	147.64	17.50	9.86	
36.50	55.93	150.89	13.43	6.61	
36.65	60.20	140.49	17.70	17.01	
39.00	56.90	149.30	14.40	8.20	
39.15	56.90	138.80	14.40	18.70	
39.92	65.00	126.00	22.50	31.50	
40.77	48.30	125.50	5.80	32.00	
43.00	48.30	125.50	5.80	32.00	
43.14	48.40	125.50	5.90	32.00	
43.58	0.90	52.30	-41.60	105.20	
44.65	73.40	124.40	30.90	33.10	
45.00	73.40	124.40	30.90	33.10	
45.25	73.40	124.40	30.90	33.10	
45.69	73.20	124.20	30.70	33.30	
45.99	48.00	136.00	5.50	21.50	
46.15	48.00	136.00	5.50	21.50	
48.50	62.95	131.72	20.45	25.78	
48.95	61.86	133.97	19.36	23.53	
49.40	61.59	135.22	19.09	22.28	
51.10	61.77	134.25	19.27	23.25	
52.00	57.09	136.66	14.59	20.84	
52.90	58.04	137.29	15.54	20.21	
53.25	59.11	137.54	16.61	19.96	

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDENW1.SMP 06-Feb-93

QP FILE: SCDENW1D.SOS

DETERMINE AVAILABLE DISTANCE FROM RIGHT OF WAY TO TOP OF CHANNEL

ALTERNATIVE I: EARTH CHANNEL WITH 4:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	STCHL	STCHR	MAXIMUM AVAILABLE DISTANCE LT	MAXIMUM AVAILABLE DISTANCE RT
53.45	60.73	137.95	18.23	19.55
56.00	55.20	140.89	12.70	16.61
58.00	57.00	140.09	14.50	17.41
60.00	55.23	140.60	12.73	16.90
62.00	55.60	140.91	13.10	16.59
64.00	54.61	141.44	12.11	16.06
65.22	55.12	141.33	12.62	16.17
65.85	84.90	116.80	42.40	40.70
66.66	84.90	116.80	42.40	40.70

SECTION = SURVEY BASELINE STATION USED FOR CROSS SECTION IDENTIFICATION NUMBER
STCHL = STATION OF THE LEFT BANK (EAST BANK)
STCHR = STATION OF THE RIGHT BANK (WEST BANK)

```
*******************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
*  Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    06FEB93    TIME   10:36:32 *
*******************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*         (916) 756-1104            *
*************************************
```

```
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
```

THIS RUN EXECUTED 06FEB93 10:36:32

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

 Version   4.6.2;  May 1991
************************************



SPLIT FLOW BEING PERFORMED


SF       SPLIT FLOW AT BASIN


TW       BANK TRANSITION FOR ACCESS ROAD SECTION 52.90 TO 53.25
WS     2   52.90   53.25      -1       3
WC     0  1409.4      35    1413


TW       OVERFLOW WEIR FOR BASIN SECTION 52.00 TO 52.90
WS     2   52.00   52.90      -1       3
WC     0 1409.32      90  1409.4


TW       OVERFLOW WEIR FOR BASIN SECTION 51.10 TO 52.00
WS     2   51.10   52.00      -1       3
WC     0 1409.24      90 1409.32


TW       OVERFLOW WEIR FOR BASIN SECTION 48.95 TO 51.10
WS     2   48.95   51.10      -1       3
WC     0 1409.05     215 1409.24


TW       BANK TRANSITION FOR ACCESS ROAD SECTION 48.50 TO 48.95
WS     2   48.50   48.95      -1       3
WC     0    1413      45 1409.05
```

```
T1       SOSSAMAN CHANNEL & BASIN PROJECT FCD NO. 91-07  APA NO. P31D01
T2       FROM DROP STRUCTURES SOUTH OF BASELINE RD. TO HAWES & SOUTHERN
T3      FILE SCDCNW: IM GR W/ REDUCED FLOWS AND BASIN
T4       100 YR, 24 HOUR DISCHARGES FROM FCD
T5       SECTIONS 1 THRU 5 FROM ADOT PRJ. NO. SBM 028-1-311PE,511C
T6       PROFILE ONE:  CONCRETE CHANNEL, 3:1 SIDESLOPES, CONTINUOUS GRADE, DROPS
T7                     SOUTH HALF 15'BW - NORTH HALF 10'BW

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              2        0        0        -1       0        0        0        1385.0   0

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     1        0        -1       2        5                 -1       6

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    100      150
     38        8       26        1       23       21       24       22        3        5
     42                38       26       25        4       68       43                 38
     30       64       65       33

J5  LPRNT    NUMSEC                 *********REQUESTED SECTION NUMBERS********

    -10      -10

        Mannings 'n' = .04 earth overbanks & .035 earth channel
        Contraction Coef. = .3 & Expansion Coef. = .5

NC     .04      .04      .035      .3       .5
QT       1     2275

        SECTION 1 IS APA SURVEY STA. 0+49 = ADOT STA. 40+59
        DOWNSTREAM SECTION AT DROP STRUCTURE
X1       1        8      220      315
GR  1387.2      199   1380.2      200   1379.5      220   1368.4      248   1368.4      288
GR  1379.7      315   1383.1      324   1383.1      400

        SECTION 2 IS APA SURVEY STA. 1+29 = ADOT STA. 39+79
        SECTION AT DROP STRUCTURE
```

```
X1        2        8      230      322       80     80.1       80
GR   1389.7      199   1382.7      200   1381.6      230   1368.8      255   1368.8      294
GR   1381.6      322   1382.7      327   1382.7      400

        SECTION 3 IS APA SURVEY STA. 1+41 = ADOT STA. 39+67
        UPSTREAM SECTION AT DROP STRUCTURE

X1        3       15      230      319       12       12       12
GR   1388.1      199   1381.1      200   1382.7      230   1381.8      239   1381.8      242
GR   1374.3      256   1374.3      272   1372.4    272.1   1372.4    278.1   1374.3    278.2
GR   1374.3      294   1381.8      306   1381.8      309   1382.7      319   1382.7      400

        SECTION 4 IS APA SURVEY STA. 6+01 = ADOT STA. 35+17
        DOWNSTREAM SECTION AT DROP STRUCTURE

X1        4        9      223      310      460      459      460
GR   1392.1      199   1385.1      200   1384.7      216   1383.4      223   1373.3      248
GR   1373.4      285   1383.3      310   1386.8      319   1386.8      400

        SECTION 5 IS APA SURVEY STA. 6+92 = ADOT STA. 34+26
        SECTION AT DROP STRUCTURE

X1        5        8      222      298       93       92       91
GR   1393.3      199   1386.3      200   1386.3      222   1374.3      247   1374.3      287
GR   1387.1      298   1387.1      310   1387.1      400

        SECTION 6 IS APA SURVEY STA. 7+03 = ADOT STA. 34+15
        UPSTREAM SECTION AT DROP STRUCTURE

X1        6       15      222      310       11       11       11
GR   1393.5      199   1386.5      200   1386.5      222   1383.3      231   1383.3      234
GR   1378.7      248   1378.7      263   1377.1    263.1   1377.1    269.1   1378.7    269.2
GR   1378.7      285   1383.3      289   1383.3      291   1387.2      310   1387.2      400

        THE FOLLOWING SECTION NOS. USE APA SURVEY STATIONS: IE 9+06 = 9.06
        DOWNSTREAM TRANSITION FROM CBC UNDER BASELINE RD.

X1     9.06        6       71      141      222      193      204
GR   1387.2        0   1387.5       71   1377.7       90   1376.6      121   1388.4      141
GR   1388.0      196

        Mannings 'n' = .04 earth overbanks & .020 shotcrete/concrete channel
        Contraction Coef. = .1 & Expansion Coef. = .3

NC      .04      .04      .02       .1       .3

        DOWNSTREAM END OF CBC UNDER BASELINE RD.
X1     9.50       10     79.7    122.4       45       42       43
X3       10                                                      1389   1388.8
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR   1387.7       28   1388.6       59   1385.2       72   1385.4       76   1384.2     79.7
GR   1377.7     79.8   1377.3    122.3   1381.9    122.4   1388.7      139   1387.7      188
```

```
SB     1.25      1.64      2.6                42.49      2.49      320                1378.6     1377.5

       UPSTREAM END OF CBC UNDER BASELINE RD.
X1    10.50         8     79.7     122.4      100       100       100
X2     2291                 1    1386.6    1388.8
X3       10                                                                   1389     1388.8
       AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
BT       -3        36    1389.2                95      1389                  159     1388.8
GR   1388.6         0    1387.6      79.7   1378.6      79.8    1378.6     122.3     1386.6      122.4
GR   1386.4       129    1387.8       133   1388.3       200

       UPSTREAM TRANSITION TO CBC UNDER BASELINE RD. BY BEND ONE

X1    11.00         7     73.4       149        41        62        50
X2     2060
GR   1388.6         0    1388.6        14   1387.3      73.4      1380      73.5     1379.5       125
GR   1388.2       149    1388.7       200

       END SHOTCRETE/CONCRETE LINED CHANNEL

X1    11.31         7     63.5     139.6        14        36        21
GR   1388.6         0    1387.1      63.5   1380.3        76    1379.8        97    1379.75      113.6
GR   1387.3     139.6    1388.7       200

       Mannings 'n' = .04 earth overbanks & .035 earth channel
       Contraction Coef. = .3 & Expansion Coef. = .5

NC      .04       .04      .035        .3        .5

       SECTION 98' UPSTREAM OF CBC UNDER BASELINE RD.
X1    11.63         8       61       144        25        36        29
CI      100    1381.5    0.017         3         3       -15
GR   1388.2         0    1387.8        24   1388.4        61    1379.1        81      1379       107
GR   1388.2       144     1389       171   1388.9       181

       SECTION 426' UPSTREAM OF CBC UNDER BASELINE RD.

X1    14.90        10       63       145       323       330       326
CI             0.0022
GR   1389.4         0     1390        48   1389.9        63    1382.9      87.7     1381.4      91.2
GR   1380.7     109.2    1384.9       121      1390       145    1390.9       161     1390.7       173

       ADDED SECTION

X1    17.00        10     65.5     146.9       210       210       210
CI
GR   1391.5         0    1391.9        51   1391.8      65.5    1387.5        85     1383.7      90.9
GR   1380.6     118.4    1386.5     126.4   1391.9     146.9    1392.8     157.9     1393.2       164

       ADDED SECTION FOR UPSTREAM END OF DROP
```

```
X1    17.15                                  15        15        15                  0
CI              1384.7

        SECTION 884' UPSTREAM OF CBC UNDER BASELINE RD.

X1    19.50         8        69       149       235       235       235
CI              0.0022
GR   1393.4         6    1394.2        69      1392        78      1385        88    1385.4       119
GR   1389.4       127    1394.1       149    1394.2       200

        ADDED SECTION

X1    21.00        12        70       148       150       150       150
CI
GR   1394.6       1.7      1395      46.5    1395.7      58.9    1395.6        70      1393      89.5
GR    1389      97.3    1385.1     105.3    1385.6     119.3    1388.7     121.2    1394.2       130
GR   1395.7       148      1396     163.8

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    21.15                                  15        15        15
CI              1388.5

        SECTION 20' DOWNSTREAM OF BEND TWO

X1    22.42         9        73       150       127       127       127
CI              0.0022
GR   1395.6        11    1396.7        73    1392.7       103    1389.4       112    1388.7       128
GR   1394.2       134      1397       150    1397.4       165    1397.1       200

        SECTION BY BEND TWO

X1    22.92         8        91       167        49        34        40
CI      110
GR   1397.2        31    1397.4        91    1388.7       134    1388.8       146    1394.9       154
GR   1397.6       167    1397.8       182    1397.1       226

        SECTION 20' UPSTREAM INSIDE BEND TWO

X1    23.40        10        64       144        51        26        37
CI      100
X3       10
GR    1398        29    1398.4        33    1397.2        64    1392.9        92    1389.3       104
GR   1388.7       113    1394.4       125    1397.7       144    1397.7       160      1397       200

        SECTION 165' UPSTREAM OF BEND TWO

X1    25.05         8      59.4     137.7       165       165       165
CI
GR   1398.9        21    1397.8      59.4    1393.2      89.6    1389.2      94.2    1389.2     100.8
GR   1392.8     105.3    1397.7     137.7    1397.5       200

        SECTION WITH LOW FLOW CHANNEL 397' UPSTREAM OF BEND TWO
```

```
X1    27.00       10       58      140      195      195      195
CI
GR     1400       12   1399.5     42.6   1399.1     43.4   1398.6       58   1394.2       89
GR   1393.1     91.2   1392.9     97.6   1394.3      103   1398.6      140   1398.5      200

        SECTION NEAR BEGINNING OF LOW FLOW CHANNEL

X1    29.50       10       61      134      250      250      250
CI
X3       10
GR   1401.4        0   1401.1        8   1401.3       39   1400.3       61   1396.4       88
GR   1395.1       93   1394.9       97   1395.4      108   1399.9      134   1400.4      154

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    29.65                                15       15       15                0
CI            1393.2

        SECTION 877' DOWNSTREAM OF CBC UNDER US 60

X1    32.00       11       63      138      235      235      235
CI            0.0022
GR   1402.7        0   1402.2       44   1402.6       51   1402.3       63   1397.9     87.4
GR   1396.5     99.6   1396.4    110.5   1399.4    120.8   1402.2      138   1402.4      150
GR   1402.9      154

        SECTION 677' DOWNSTREAM OF CBC UNDER US 60

X1    34.00       10       60      138      200      200      200
CI
X3       10
GR   1403.4       47   1403.6       60   1397.4       93   1397.1       99   1398.1      113
GR   1403.5      138     1404      153   1402.8      162   1403.5      164   1403.9      200

        ADDED SECTION FOR UPSTREAM END OF DROP

X1    34.15                                15       15       15                0
CI            1396.5

        SECTION 427' DOWNSTREAM OF CBC UNDER US 60

X1    36.50        9     60.2    140.4      235      235      235
CI            0.0022
X3       10
GR   1405.6        0   1405.5        7   1405.7       15   1404.8       37     1406       48
GR   1405.2     60.2   1398.3     98.8     1405    140.4   1404.5      157

        ADDED SECTION 177' DOWNSTREAM OF CBC UNDER US 60
```

```
X1    39.00       10      56.9     138.8       250       250       250
CI
X3       10
GR   1406.8     41.1    1406.0      56.9    1403.1      79.2    1399.7      93.6    1398.9      99.4
GR   1400.2      105    1402.3     108.5    1403.5     121.1    1407.2     138.8    1408.5     149.3

         ADDED SECTION FOR UPSTREAM END OF DROP

X1    39.15                                     15        15        15
CI            1400.68
X3       10

         Mannings 'n' = .016 concrete overbanks & .016 concrete channel
         Contraction Coef. = .1 & Expansion Coef. = .3

NC     .016      .016      .016       .1        .3

         DOWNSTREAM TRANSITION FROM CBC UNDER US 60
         BEGIN CONCRETE LINED CHANNEL
X1    39.92        9        65      126        77        77        77
X2     2068
CI            1400.85                                   0.01
X3       10
GR   1402.8       29    1408.7       65    1400.9        82    1400.8      97.3    1400.9       112
GR   1408.8      126      1408      148    1406.3       184      1406       200

         DOWNSTREAM END OF CBC UNDER US 60

X1    40.77        7      48.3     125.5        87        87        85
         6" USED FOR SEDIMENT DEPOSITION
X3       10    1401.5                                                        1410.1    1410.1
         AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR   1409.4        0    1408.7      48.3      1401      48.4      1401     125.4    1408.8     125.5
GR   1408.9      160    1408.4       200


SB    1.25     1.56       2.6                   77         5       432                1401.6      1401

         UPSTREAM END OF CBC UNDER US 60
X1    43.00        9      48.3     125.5       223       223       223
X2     2070                  1    1407.7    1410.1
         6" USED FOR SEDIMENT DEPOSITION
X3       10    1402.2                                                        1410.1    1410.1
         AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
BT       -4        0    1410.1                48.3    1410.1                 125.5    1410.1
BT               200    1410.1
GR   1410.4        0    1409.5        8    1409.5      48.3    1401.7      48.4    1401.6     125.4
GR   1409.6    125.5    1409.8      138    1409.1       196    1409.3       200

         UPSTREAM CONFLUENCE WITH ADOT CHANNEL ALONG US 60
```

```
X1    43.14      13      48.4     125.5      14      14      14
X3       10                                                   1409.7   1409.7
         AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW
X4        1    1401.8    48.4
GR   1408.6       0    1408.6       2    1408.1       8    1408      11   1409.7    24.5
GR   1409.7    39.6    1404.8    39.7    1401.8      47    1401.7    89.8   1401.7   125.4
GR   1409.8   125.5    1409.2     190    1409.7     200

         UPSTREAM TRANSITION TO CONFLUENCE WITH ADOT CHANNEL ALONG US 60

X1    43.58      10       0.9    52.3      44      44      44
X2     1307
GR   1409.9       0    1409.9     0.9    1409.5       1    1401.9    17   1401.9      36
GR    1409      52      1410    52.3    1409.4     103    1410.2   118   1410.1     127

         SECTION 107' UPSTREAM OF CONFLUENCE

X1    44.65       7      73.4   124.4     107     107     107
GR   1409.9       0    1410.4    73.4    1402.4    89.4    1402.4   108.6   1410.5   124.4
GR   1410.1     154    1408.6     200

         SECTION 142' UPSTREAM OF CONFLUENCE

X1    45.00                              35      35      35              .16

         SECTION 167' UPSTREAM OF CONFLUENCE

X1    45.25                              25      25      25              .11

         UPSTREAM END OF CONCRETE LINED CHANNEL

X1    45.69      14      73.2   124.2      44      44      44
X2     1309
X3       10
GR    1410       0    1410.2       9    1408.4      24    1410.4    68.5   1410.9    71.4
GR   1410.7    73.2   1402.75    89.8    1402.8   108.2    1411.4   124.2   1411.4   126.6
GR   1409.8     156     1409     159      1409     196    1408.8     200

         Mannings 'n' = .04 earth overbanks & .035 earth channel
         Contraction Coef. = .3 & Expansion Coef. = .5

NC     .04     .04     .035      .3       .5

         UPSTREAM TRANSITION TO CONCRETE LINED CHANNEL
X1    45.99      15      48     136      31      31      30
CI     100    1402.8   0.017       3       3     -10
X3       10                      65
GR   1409.7       3    1406.7      29    1406.9      34    1406.6    44    1408      48
GR   1407.1      69    1403.4      96    1402.8    98.3    1402.8   104.2   1404.7   108
GR   1406.6     115    1410.3     136    1409.8     181    1409.2   189   1408.8   200

         ADDED SECTION FOR UPSTREAM END OF DROP
```

```
X1    46.15                                16        16        16                  0
CI            1404.27
X3       10                        75      1410
```

SECTION 280' UPSTREAM OF ADOT RIGHT-OF-WAY - BEGIN BANK TRANSITION

```
X1    48.50        10        68       130       235       235       235
CI            0.0004
X3       10                        65      1413
GR   1411.2         0    1412.2        68    1409.5        80    1403.4        96    1402.9        98
GR   1403.2       100    1410.8       130    1410.7       157    1410.3       158      1409       195
```

ADDED SECTION - END BANK TRANSITION - SOUTH END OF WEIR

```
X1    48.95        12      66.6       130        45        45        45
CI
X3       10                        80
GR   1410.8         0    1411.4        50    1412.6        64    1412.5      66.6    1409.5      80.8
GR   1403.1      96.7    1404.1     103.2    1411.4       130    1411.4     133.1    1410.7     158.2
GR   1409.1       189    1409.3       200
```

SECTION 540' UPSTREAM OF ADOT RIGHT-OF-WAY

```
X1    51.10        13        70       127       215       215       215
CI
X3        0                        80
GR     1413         0    1413.4        32    1412.4        58    1412.8        70    1407.9        88
GR   1403.3        96      1403       100      1403       101    1405.7       105    1411.2       127
GR   1412.2       149    1410.6       160    1409.7       174
```

ADDED SECTION 630' UPSTREAM OF ADOT RIGHT-OF-WAY

```
X1    52.00        13      67.8     129.6        90        90        90
CI
X3        0                        80
GR   1411.4      38.2    1413.8      54.9    1413.4      67.8    1410.7      80.6    1405.9      90.8
GR   1402.8      97.3      1403      99.7    1405.8     104.7    1408.9     113.3    1412.0     129.6
GR   1412.5     150.5    1410.2     158.3    1410.0     163.7
```

ADDED SECTION - NORTH END OF WEIR - BEGIN BANK TRANSITION

```
X1    52.90        17        71       128        90        90        90
CI
X3        0                        80
GR   1412.2         0    1412.8        44    1412.8        55      1414        60    1413.2        71
GR   1410.8        82    1405.7      92.6    1403.4      98.4    1404.2      99.7    1404.6     102.7
GR   1408.1     108.5    1412.3       128    1412.4       143    1411.9       153    1410.6       158
GR   1410.2       164    1410.1       200
```

ADDED SECTION - END BANK TRANSITION

```
X1    53.25       15      71.6     125.7       35       35       35
CI
X3       10                          67     1413
GR    1412.3        0    1412.4       43     1413       58     1414       62   1413.3     71.6
GR    1412.4       76    1405.1       93   1403.4     99.1   1403.7    101.5   1407.9      108
GR    1412.1    125.7    1412.5      131   1412.3      152   1410.8      158   1410.2      200
```

SECTION NEAR NORTH END OF DRAINAGE BASIN

```
X1    53.45       11       73      134       20       20       20
CI
X3       10
GR     1412        0    1412.2       41   1413.3       73   1406.6       89   1403.5      101
GR    1408.2      109    1411.9      124   1412.7      134   1411.9      155   1410.8      158
GR    1410.4      165
```

SECTION 255' UPSTREAM OF DRAINAGE BASIN

```
X1    56.00       14     74.4     128.5      255      255      255
CI
X3       10
GR    1413.2     41.8    1414.6     47.2   1413.8     74.4   1411.7     83.2   1406.7     91.1
GR    1405.5     95.5    1403.8       99   1405.1    101.8   1408.6    109.2   1411.2    118.2
GR    1412.8    128.5    1413.8    149.6   1411.6    157.7   1411.3    160.1
```

SECTION 455' UPSTREAM OF DRAINAGE BASIN

```
X1    58.00       13     73.6     128.5      200      200      200
CI
X3       10
GR    1413.3     42.1    1414.2     47.7   1414.3     73.6   1412.7     82.6   1406.8       91
GR    1406.6     93.8    1405.3     96.8   1405.2    102.1   1411.3    114.5   1413.2    128.5
GR    1413.8      151    1411.7    157.5   1411.3    159.8
```

SECTION 655' UPSTREAM OF DRAINAGE BASIN

```
X1    60.00       13     69.1     128.3      200      200      200
CI            0.00161
X3       10
GR    1414.1     42.7     1415     47.4     1415     69.1   1413.3     80.8   1407.2     90.8
GR    1406.9     93.1    1405.1     98.1   1406.6    103.2   1411.2    112.9   1413.9    128.3
GR     1414    149.1    1412.7    157.2   1412.5    158.7
```

SECTION 855' UPSTREAM OF DRAINAGE BASIN

```
X1    62.00       13       72     126.7      200      200      200
CI
X3       10
GR    1414.2     37.6    1415.4     43.4     1415       72   1413.3     80.5     1406     94.3
GR    1405.2     98.6    1405.9    100.9   1411.6    111.7   1413.4    117.9   1414.3    126.7
GR    1414.4    151.2    1413.2      158   1412.5    174.7
```

SECTION 1055' UPSTREAM OF DRAINAGE BASIN

```
X1    64.00       10      69.1      134      200      200      200
CI
X3       10
GR   1414.8       36    1415.8       50   1415.8     69.1   1414.6     79.2   1405.2     96.1
GR   1405.4    104.1    1412.2    118.2   1414.5      134   1415.2    150.7   1412.8    157.5

        DOWNSTREAM TRANSITION FROM CBC UNDER SOUTHERN AVE.

X1    65.22       12       67      134      122      122      122
CI             1405.9
X3       10
GR    1415       35    1415.3       46   1415.8       50     1416       67   1413.8       81
GR   1407.2       91    1406.7      106   1407.6      111     1413      122   1415.4      134
GR    1414      158    1413.6      162

        Mannings 'n' = .04 earth overbanks & .016 concrete channel
        Contraction Coef. = .1 & Expansion Coef. = .3

NC     .04      .04      .016       .1       .3

        DOWNSTREAM END OF CBC UNDER SOUTHERN AVE.
X1    65.85       14      84.9    116.8       64       64       63
CI                -1                          0.01
        12" USED FOR SEDIMENT DEPOSITION
X3       10   1407.1                                                1414.6    1414.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
GR    1415        0    1414.4       38   1415.6       41   1415.2       72   1414.3     79.4
GR   1414.3     82.7    1414.5     84.9   1406.1       85   1406.1    116.7   1414.5    116.8
GR   1413.7    124.1    1414.8    129.4     1415      153   1413.7      200

        COFQ DECREASED DUE TO TRAFFIC BARRIER AT TOP OF BOX

SB    1.25     1.56      2.56                31.67     1.67      180             1406.6    1406.1

        UPSTREAM END OF CBC UNDER SOUTHERN AVE.
X1    66.66       12      84.9    116.8       80       80       80
X2    1325                   1   1412.7   1414.6
        12" USED FOR SEDIMENT DEPOSITION
X3       10   1407.6                                                1414.6    1414.1
        AREAS OUTSIDE OF CBC DO NOT EFFECTIVELY CARRY FLOW UNTIL RDWY OVERTOPS
        INCLUDES TRAFFIC BARRIER
BT       -8       12    1414.6                  58   1414.7                  83.4   1414.8
BT                86    1417.2               114.4   1417.2                 116.9     1415
BT               154    1414.8                 200   1414.1
GR   1411.3        0    1412.2       13     1414       14   1413.9       47   1413.9     84.9
GR   1406.6       85    1406.7    116.7   1413.4    116.8   1414.3    117.9   1413.9    121.3
GR   1414.6      169    1413.8      200

        UPSTREAM TRANSITION TO CBC UNDER SOUTHERN AVE.
        FOLLOWING SECTIONS ARE ALONG SOUTHERN AVE.
```

```
X1    67.20      10      25.4      59      25      66      46
X3       10  1407.6
GR   1414.7       0    1414.6       8    1414    25.4  1407.1    31.5  1406.8    42.4
GR   1407.7    57.3    1411.6      59  1413.4      59  1412.7      69  1412.6    76.5

        CONTINUE TRANSITION - CONCRETE TO SHOTCRETE CHANNEL
        Mannings 'n' = .02 left overbank mainly paved road, .021  shotcrete
        channel & right overbank
        Contraction Coef. = .1 & Expansion Coef. = .3

NC     .02    .021    .021      .1      .3

X1    67.44       8      29    50.4      25      26      25
X2     1123
X3       10  1407.6
GR   1414.6       0    1414.6      10  1414.1      26  1413.8      29  1407.3      35
GR   1407.4    45.6    1415.5    50.4  1415.4      67

        SECTION 80.72 TRANSFERRED DOWNSTREAM & LOWERED 6.87 FEET
        SECTION 200' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

X1    68.87       8      31.5    48.9     143     143     143              -6.87
GR   1421.5    13.8    1420.7    23.4  1420.4    31.5  1415.3    35.6  1415.4    44.2
GR   1421.5    48.9    1421.5      51    1428    51.1

        SECTION 300' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

X1    69.87                            100     100     100               0.58

        SECTION 400' EAST OF SOSSAMAN CHANNEL ALONG SOUTHERN AVE.

X1    70.87                            100     100     100               0.58
```

THIS RUN EXECUTED 06FEB93 10:38:54

****
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

FILE SCDCNW: IM GR W/ RE

SUMMARY PRINTOUT

	SECNO	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
*	1.000	3.67	10.05	1372.07	1379.50	220.00	1379.70	315.00	1373.64	128.15	1368.40
*	2.000	4.73	7.84	1373.53	1381.60	230.00	1381.60	322.00	1374.48	57.59	1368.80
*	3.000	5.50	10.57	1377.90	1382.70	230.00	1382.70	319.00	1379.64	140.02	1372.40
*	4.000	7.67	4.23	1380.97	1383.40	223.00	1383.30	310.00	1381.25	10.31	1373.30
	5.000	6.70	5.40	1381.00	1386.30	222.00	1387.10	298.00	1381.45	17.96	1374.30
*	6.000	5.30	10.43	1382.40	1386.50	222.00	1387.20	310.00	1384.08	136.26	1377.10
*	9.060	8.16	5.31	1384.76	1387.50	71.00	1388.40	141.00	1385.19	16.28	1376.60
*	9.500	7.43	5.86	1384.73	1384.20	79.70	1381.90	122.40	1385.26	6.03	1377.30
	10.500	6.24	6.86	1384.84	1387.60	79.70	1386.60	122.40	1385.57	10.44	1378.60
	11.000	5.79	4.80	1385.29	1387.30	73.40	1388.20	149.00	1385.64	5.61	1379.50
	11.310	5.43	5.89	1385.18	1387.10	63.50	1387.30	139.60	1385.71	9.86	1379.75
*	11.630	5.04	10.48	1386.54	1388.40	61.00	1388.20	144.00	1388.25	30.02	1381.50
	14.900	5.82	8.42	1388.04	1389.90	63.00	1390.00	145.00	1389.14	16.53	1382.22
	17.000	5.68	8.74	1388.36	1391.80	65.13	1391.90	146.90	1389.55	18.29	1382.68
*	17.150	5.05	10.47	1389.75	1391.80	65.50	1391.90	146.90	1391.45	29.88	1384.70
	19.500	5.82	8.44	1391.03	1394.16	65.68	1394.10	149.00	1392.14	16.61	1385.22
	21.000	5.71	8.67	1391.26	1395.67	62.13	1395.70	148.00	1392.43	17.88	1385.55

	SECND	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
*	21.150	5.05	10.46	1393.55	1395.60	70.00	1395.70	148.00	1395.25	29.80	1388.50
	22.420	5.81	8.44	1394.59	1396.63	68.95	1397.00	150.00	1395.70	16.65	1388.78
	22.920	5.78	8.51	1394.65	1397.35	77.04	1397.60	167.00	1395.78	17.02	1388.87
	23.400	5.76	8.57	1394.71	1397.20	64.00	1397.70	144.00	1395.85	17.35	1388.95
	25.050	5.66	8.79	1394.97	1397.80	59.40	1397.70	137.70	1396.17	18.60	1389.31
	27.000	5.58	8.99	1395.32	1398.60	58.00	1398.60	140.00	1396.58	19.75	1389.74
	29.500	5.51	9.16	1395.80	1400.30	61.00	1399.96	136.52	1397.11	20.76	1390.29
*	29.650	5.04	10.48	1398.24	1400.30	61.00	1399.90	134.00	1399.95	30.00	1393.20
	32.000	5.82	8.42	1399.54	1402.30	63.00	1402.20	138.00	1400.64	16.55	1393.72
	34.000	5.69	8.73	1399.84	1403.60	60.00	1403.50	138.00	1401.03	18.21	1394.16
*	34.150	5.04	10.47	1401.54	1403.60	60.00	1403.50	138.00	1403.25	29.90	1396.50
	36.500	5.82	8.44	1402.83	1405.20	60.20	1405.00	140.40	1403.94	16.61	1397.02
	39.000	5.66	8.80	1403.22	1406.00	56.90	1407.20	138.80	1404.43	18.63	1397.57
*	39.150	5.42	9.29	1406.10	1406.00	56.90	1407.20	138.80	1407.44	33.39	1400.68
*	39.920	6.21	6.19	1407.01	1408.70	65.00	1408.80	126.00	1407.60	5.93	1400.80
*	40.770	5.98	3.47	1407.48	1408.70	48.30	1408.80	125.50	1407.67	1.56	1401.50
	43.000	5.38	3.86	1407.58	1409.50	48.30	1409.60	125.50	1407.81	2.18	1402.20
	43.140	5.93	3.52	1407.63	1401.80	48.40	1409.80	125.50	1407.82	1.49	1401.70
*	43.580	5.62	4.77	1407.52	1409.90	.90	1410.00	52.30	1407.88	4.40	1401.90
	44.650	5.09	5.63	1407.49	1410.40	73.40	1410.50	124.40	1407.98	6.73	1402.40
	45.000	4.92	5.90	1407.48	1410.56	73.40	1410.66	124.40	1408.02	7.67	1402.56
	45.250	4.80	6.09	1407.47	1410.67	73.40	1410.77	124.40	1408.05	8.38	1402.67
	45.690	4.71	6.49	1407.46	1410.70	73.20	1411.40	124.20	1408.11	9.91	1402.75
*	45.990	4.55	7.80	1407.35	100000.00	48.00	1410.30	136.00	1408.30	20.38	1402.80
*	46.150	4.18	8.57	1408.45	1410.00	48.00	1410.30	136.00	1409.59	34.83	1404.27
*	48.500	5.20	6.33	1409.56	1412.20	68.00	1410.80	130.00	1410.18	11.59	1404.36

	SECNO	DEPTH	VCH	CWSEL	XLBEL	STCHL	RBEL	STCHR	EG	10*KS	ELMIN
	48.950	5.25	6.26	1409.63	100000.00	66.60	1411.40	130.00	1410.24	11.04	1404.38
	51.100	5.27	8.09	1409.74	100000.00	70.00	1411.20	127.00	1410.75	18.33	1404.47
	52.000	5.34	8.65	1409.84	100000.00	67.80	1412.00	129.60	1411.00	20.55	1404.50
	52.900	5.42	9.19	1409.96	100000.00	68.47	1412.30	128.29	1411.27	22.72	1404.54
	53.250	5.85	8.10	1410.41	1413.56	67.97	1412.29	128.20	1411.43	16.58	1404.55
	53.450	5.91	8.00	1410.47	1413.17	69.18	1412.70	134.00	1411.47	16.05	1404.56
	56.000	6.48	6.88	1411.14	1414.02	66.93	1412.85	129.56	1411.88	10.68	1404.66
	58.000	6.70	6.48	1411.44	1414.27	66.42	1413.25	130.53	1412.10	9.10	1404.74
	60.000	6.54	6.75	1411.61	1415.00	65.20	1413.92	131.55	1412.32	10.16	1405.07
	62.000	6.41	6.99	1411.80	1415.09	65.91	1414.32	131.80	1412.55	11.14	1405.39
	64.000	6.29	7.20	1412.00	1415.80	64.73	1414.50	134.00	1412.81	12.07	1405.71
	65.220	6.24	7.30	1412.14	1415.97	64.78	1415.40	134.00	1412.97	12.51	1405.90
	65.850	4.95	8.32	1412.05	1414.50	84.90	1414.50	116.80	1413.13	13.61	1407.10
	66.660	4.80	8.68	1412.40	1413.90	84.90	1413.40	116.80	1413.57	15.30	1407.60
	67.200	4.68	9.67	1412.28	1414.00	25.40	1413.40	59.00	1413.73	19.24	1407.60
*	67.440	5.91	12.28	1413.51	1413.80	29.00	1415.50	50.40	1415.85	56.03	1407.60
*	68.870	6.88	10.59	1415.31	1413.53	31.50	1414.63	48.90	1416.90	33.94	1408.43
*	69.870	6.85	10.66	1415.86	1414.11	31.50	1415.21	48.90	1417.48	34.62	1409.01
*	70.870	6.86	10.63	1416.45	1414.69	31.50	1415.79	48.90	1418.06	34.37	1409.59

FILE SCDCNW: IM GR W/ RE

SUMMARY PRINTOUT

	SECNO	VCH	AREA	TOPWID	FRCH	Q
*	1.000	10.05	179.75	58.02	1.01	1806.39
*	2.000	7.84	230.44	58.56	.70	1806.39
*	3.000	10.57	170.93	50.48	1.01	1806.39
*	4.000	4.23	426.76	75.08	.31	1806.39
	5.000	5.40	334.51	59.74	.40	1806.39
*	6.000	10.43	173.20	51.46	1.00	1806.39
*	9.060	5.31	340.47	58.51	.39	1806.39
*	9.500	5.86	308.32	42.70	.38	1806.39
	10.500	6.86	265.57	42.65	.48	1822.39
	11.000	4.80	331.86	67.55	.38	1591.39
	11.310	5.89	270.05	65.26	.51	1591.39
*	11.630	10.48	151.79	45.24	1.01	1591.39
	14.900	8.42	188.99	49.93	.76	1591.39
	17.000	8.74	182.06	49.09	.80	1591.39
*	17.150	10.47	152.06	45.27	1.01	1591.39
	19.500	8.44	188.64	49.89	.76	1591.39
	21.000	8.67	183.60	49.28	.79	1591.39
*	21.150	10.46	152.20	45.29	1.01	1591.39
	22.420	8.44	188.47	49.87	.77	1591.39
	22.920	8.51	186.97	49.69	.77	1591.39
	23.400	8.57	185.63	49.52	.78	1591.39
	25.050	8.79	180.95	48.95	.81	1591.39
	27.000	8.99	176.99	48.47	.83	1591.39
	29.500	9.16	173.78	48.07	.85	1591.39

	SECNO	VCH	AREA	TOPWID	FRCH	Q
*	29.650	10.48	151.83	45.24	1.01	1591.39
	32.000	8.42	188.91	49.92	.76	1591.39
	34.000	8.73	182.38	49.13	.80	1591.39
*	34.150	10.47	152.03	45.27	1.01	1591.39
	36.500	8.44	188.67	49.89	.76	1591.39
	39.000	8.80	180.86	48.94	.81	1591.39
*	39.150	9.29	171.30	68.78	1.02	1591.39
*	39.920	6.19	258.37	54.13	.50	1599.39
*	40.770	3.47	461.10	77.17	.25	1599.39
	43.000	3.86	414.97	77.15	.29	1601.39
	43.140	3.52	454.77	77.07	.26	1601.39
*	43.580	4.77	175.89	43.52	.42	838.39
	44.650	5.63	149.00	39.32	.51	838.39
	45.000	5.90	142.17	38.63	.54	838.39
	45.250	6.09	137.76	38.17	.56	838.39
	45.690	6.49	129.46	36.89	.61	840.39
*	45.990	7.80	107.78	37.33	.81	840.39
*	46.150	8.57	98.07	44.11	1.01	840.39
*	48.500	6.33	132.81	41.15	.62	840.39
	48.950	6.26	134.84	40.73	.61	843.88
	51.100	8.09	135.90	41.39	.84	1099.66
	52.000	8.65	138.65	41.01	.83	1198.63
	52.900	9.19	142.08	41.26	.87	1305.86
	53.250	8.10	161.57	45.15	.75	1309.00
	53.450	8.00	163.54	45.41	.74	1309.00
	56.000	6.88	190.28	48.82	.61	1309.00

	SECNO	VCH	AREA	TOPWID	FRCH	Q
	58.000	6.48	201.93	50.23	.57	1309.00
	60.000	6.75	193.86	49.26	.60	1309.00
	62.000	6.99	187.30	48.45	.63	1309.00
	64.000	7.20	181.83	47.77	.65	1309.00
	65.220	7.30	179.39	47.46	.66	1309.00
	65.850	8.32	157.40	31.84	.66	1309.00
	66.660	8.68	152.66	31.86	.70	1325.00
	67.200	9.67	136.98	32.08	.82	1325.00
*	67.440	12.28	91.45	19.95	1.01	1123.00
*	68.870	10.59	118.99	37.21	.80	1123.00
*	69.870	10.66	118.10	37.21	.81	1123.00
*	70.870	10.63	118.42	37.21	.81	1123.00

FILE SCDCNW: IM GR W/ RE

SUMMARY PRINTOUT

	SECND	BW	VEXR	VEXT	K*CHSL
*	1.000	.01	.00	.00	.00
*	2.000	.01	.00	.00	5.00
*	3.000	.01	.00	.00	300.00
*	4.000	.01	.00	.00	1.96
	5.000	.01	.00	.00	10.99
*	6.000	.01	.00	.00	254.54
*	9.060	.01	.00	.00	-2.45
*	9.500	.01	.00	.00	16.28
	10.500	.01	.00	.00	13.00
	11.000	.01	.00	.00	18.00
	11.310	.01	.00	.00	11.90
*	11.630	15.00	.00	.00	60.34
	14.900	15.00	-2.34	-2.34	2.20
	17.000	15.00	-.78	-3.13	2.20
*	17.150	15.00	-.08	-3.20	134.72
	19.500	15.00	-1.23	-4.43	2.20
	21.000	15.00	.11	-4.32	2.20
*	21.150	15.00	.01	-4.31	196.88
	22.420	15.00	-.14	-4.45	2.20
	22.920	15.00	.01	-4.44	2.20
	23.400	15.00	.01	-4.42	2.20
	25.050	15.00	.31	-4.11	2.20
	27.000	15.00	.80	-3.31	2.20
	29.500	15.00	1.73	-1.58	2.20

	SECND	BW	VEXR	VEXT	K*CHSL
*	29.650	15.00	.07	-1.51	193.94
	32.000	15.00	.60	-.91	2.20
	34.000	15.00	.79	-.11	2.20
*	34.150	15.00	.02	-.09	156.21
	36.500	15.00	.04	-.05	2.20
	39.000	15.00	.64	.59	2.20
*	39.150	15.00	.00	.60	207.54
*	39.920	.01	.00	.60	1.56
*	40.770	.01	.00	.60	8.23
	43.000	.01	.00	.60	3.14
	43.140	.01	.00	.60	-35.71
*	43.580	.01	.00	.60	4.55
	44.650	.01	.00	.60	4.67
	45.000	.01	.00	.60	4.57
	45.250	.01	.00	.60	4.40
	45.690	.01	.00	.60	1.82
*	45.990	10.00	-.07	.53	1.67
*	46.150	10.00	-.04	.49	91.87
*	48.500	10.00	-.55	-.06	.40
	48.950	10.00	-.05	-.10	.40
	51.100	10.00	-.05	-.15	.40
	52.000	10.00	.07	-.09	.40
	52.900	10.00	.14	.06	.40
	53.250	10.00	.07	.13	.40
	53.450	10.00	.04	.16	.40
	56.000	10.00	.68	.84	.40

	SECND	BW	VEXR	VEXT	K*CHSL
	58.000	10.00	.81	1.66	.40
	60.000	10.00	.92	2.58	1.61
	62.000	10.00	.96	3.53	1.61
	64.000	10.00	.79	4.32	1.61
	65.220	10.00	.34	4.67	1.56
	65.850	.01	.00	4.67	19.05
	66.660	.01	.00	4.67	6.25
	67.200	.01	.00	4.67	.00
*	67.440	.01	.00	4.67	.00
*	68.870	.01	.00	4.67	5.80
*	69.870	.01	.00	4.67	5.80
*	70.870	.01	.00	4.67	5.80

FILE SCDCNW: IM GR W/ RE

SUMMARY PRINTOUT TABLE 100

SECND	EGLWC	ELLC	EGPRS	ELTRD	QPR	QWEIR	CLASS	H3	DEPTH	CWSEL	VCH	EG
10.500	1385.57	1386.60	.00	1388.80	1806.39	.00	1.00	.11	6.24	1384.84	6.86	1385.57
43.000	1407.75	1407.70	1407.81	1410.10	1601.39	.00	10.00	.03	5.38	1407.58	3.86	1407.81
66.660	1413.57	1412.70	1413.37	1414.60	1309.00	.00	1.00	.35	4.80	1412.40	8.68	1413.57

FILE SCDCNW: IM GR W/ RE

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	1.000	.00	.00	.00	1368.40	1806.39	1372.07	1372.07	1373.64	128.15	10.05	179.75	159.57
*	2.000	80.00	.00	.00	1368.80	1806.39	1373.53	1372.57	1374.48	57.59	7.84	230.44	238.04
*	3.000	12.00	.00	.00	1372.40	1806.39	1377.90	1377.90	1379.64	140.02	10.57	170.93	152.66
*	4.000	460.00	.00	.00	1373.30	1806.39	1380.97	1377.17	1381.25	10.31	4.23	426.76	562.56
	5.000	91.00	.00	.00	1374.30	1806.39	1381.00	1378.07	1381.45	17.96	5.40	334.51	426.24
*	6.000	11.00	.00	.00	1377.10	1806.39	1382.40	1382.40	1384.08	136.26	10.43	173.20	154.75
*	9.060	204.00	.00	.00	1376.60	1806.39	1384.76	1381.45	1385.19	16.28	5.31	340.47	447.72
*	9.500	43.00	.00	.00	1377.30	1806.39	1384.73	1381.30	1385.26	6.03	5.86	308.32	735.46
	10.500	100.00	1388.80	1386.60	1378.60	1822.39	1384.84	.00	1385.57	10.44	6.86	265.57	563.89
	11.000	50.00	.00	.00	1379.50	1591.39	1385.29	1382.72	1385.64	5.61	4.80	331.86	671.85
	11.310	21.00	.00	.00	1379.75	1591.39	1385.18	1383.41	1385.71	9.86	5.89	270.05	506.76
*	11.630	29.00	.00	.00	1381.50	1591.39	1386.54	1386.54	1388.25	30.02	10.48	151.79	290.43
	14.900	326.00	.00	.00	1382.22	1591.39	1388.04	1387.26	1389.14	16.53	8.42	188.99	391.45
	17.000	210.00	.00	.00	1382.68	1591.39	1388.36	1387.73	1389.55	18.29	8.74	182.06	372.06
*	17.150	15.00	.00	.00	1384.70	1591.39	1389.75	1389.75	1391.45	29.88	10.47	152.06	291.13
	19.500	235.00	.00	.00	1385.22	1591.39	1391.03	1390.26	1392.14	16.61	8.44	188.64	390.46
	21.000	150.00	.00	.00	1385.55	1591.39	1391.26	1390.60	1392.43	17.88	8.67	183.60	376.36
*	21.150	15.00	.00	.00	1388.50	1591.39	1393.55	1393.55	1395.25	29.80	10.46	152.20	291.51
	22.420	127.00	.00	.00	1388.78	1591.39	1394.59	1393.82	1395.70	16.65	8.44	188.47	389.98
	22.920	40.00	.00	.00	1388.87	1591.39	1394.65	1393.92	1395.78	17.02	8.51	186.97	385.76
	23.400	37.00	.00	.00	1388.95	1591.39	1394.71	1394.00	1395.85	17.35	8.57	185.63	382.02
	25.050	165.00	.00	.00	1389.31	1591.39	1394.97	1394.36	1396.17	18.60	8.79	180.95	368.98
	27.000	195.00	.00	.00	1389.74	1591.39	1395.32	1394.79	1396.58	19.75	8.99	176.99	358.05
	29.500	250.00	.00	.00	1390.29	1591.39	1395.80	1395.33	1397.11	20.76	9.16	173.78	349.25

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	29.650	15.00	.00	.00	1393.20	1591.39	1398.24	1398.24	1399.95	30.00	10.48	151.83	290.53
	32.000	235.00	.00	.00	1393.72	1591.39	1399.54	1398.76	1400.64	16.55	8.42	188.91	391.23
	34.000	200.00	.00	.00	1394.16	1591.39	1399.84	1399.21	1401.03	18.21	8.73	182.38	372.95
*	34.150	15.00	.00	.00	1396.50	1591.39	1401.54	1401.54	1403.25	29.90	10.47	152.03	291.05
	36.500	235.00	.00	.00	1397.02	1591.39	1402.83	1402.06	1403.94	16.61	8.44	188.67	390.53
	39.000	250.00	.00	.00	1397.57	1591.39	1403.22	1402.62	1404.43	18.63	8.80	180.86	368.74
*	39.150	15.00	.00	.00	1400.68	1591.39	1406.10	1406.10	1407.44	33.39	9.29	171.30	275.38
*	39.920	77.00	.00	.00	1400.80	1599.39	1407.01	1404.90	1407.60	5.93	6.19	258.37	656.73
*	40.770	85.00	.00	.00	1401.50	1599.39	1407.48	1403.87	1407.67	1.56	3.47	461.10	1282.52
	43.000	223.00	1410.10	1407.70	1402.20	1601.39	1407.58	.00	1407.81	2.18	3.86	414.97	1085.61
	43.140	14.00	.00	.00	1401.70	1601.39	1407.63	1404.10	1407.82	1.49	3.52	454.77	1313.50
*	43.580	44.00	.00	.00	1401.90	838.39	1407.52	1405.32	1407.88	4.40	4.77	175.89	399.54
	44.650	107.00	.00	.00	1402.40	838.39	1407.49	1405.83	1407.98	6.73	5.63	149.00	323.20
	45.000	35.00	.00	.00	1402.56	838.39	1407.48	1405.99	1408.02	7.67	5.90	142.17	302.65
	45.250	25.00	.00	.00	1402.67	838.39	1407.47	1406.10	1408.05	8.38	6.09	137.76	289.56
	45.690	44.00	.00	.00	1402.75	840.39	1407.46	1406.28	1408.11	9.91	6.49	129.46	266.94
*	45.990	30.00	.00	.00	1402.80	840.39	1407.35	1406.87	1408.30	20.38	7.80	107.78	186.17
*	46.150	16.00	.00	.00	1404.27	840.39	1408.45	1408.45	1409.59	34.83	8.57	98.07	142.39
*	48.500	235.00	.00	.00	1404.36	840.39	1409.56	1408.45	1410.18	11.59	6.33	132.81	246.82
	48.950	45.00	.00	.00	1404.38	843.88	1409.63	1408.46	1410.24	11.04	6.26	134.84	253.96
	51.100	215.00	.00	.00	1404.47	1099.66	1409.74	1409.14	1410.75	18.33	8.09	135.90	256.83
	52.000	90.00	.00	.00	1404.50	1198.63	1409.84	1409.38	1411.00	20.55	8.65	138.65	264.42
	52.900	90.00	.00	.00	1404.54	1305.86	1409.96	1409.59	1411.27	22.72	9.19	142.08	273.95
	53.250	35.00	.00	.00	1404.55	1309.00	1410.41	1409.64	1411.43	16.58	8.10	161.57	321.47
	53.450	20.00	.00	.00	1404.56	1309.00	1410.47	1409.65	1411.47	16.05	8.00	163.54	326.74
	56.000	255.00	.00	.00	1404.66	1309.00	1411.14	1409.75	1411.88	10.68	6.88	190.28	400.55

	SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	58.000	200.00	.00	.00	1404.74	1309.00	1411.44	1409.83	1412.10	9.10	6.48	201.93	433.84
	60.000	200.00	.00	.00	1405.07	1309.00	1411.61	1410.15	1412.32	10.16	6.75	193.86	410.72
	62.000	200.00	.00	.00	1405.39	1309.00	1411.80	1410.47	1412.55	11.14	6.99	187.30	392.14
	64.000	200.00	.00	.00	1405.71	1309.00	1412.00	1410.79	1412.81	12.07	7.20	181.83	376.83
	65.220	122.00	.00	.00	1405.90	1309.00	1412.14	1410.98	1412.97	12.51	7.30	179.39	370.03
	65.850	63.00	.00	.00	1407.10	1309.00	1412.05	1410.84	1413.13	13.61	8.32	157.40	354.81
	66.660	80.00	1414.60	1412.70	1407.60	1325.00	1412.40	.00	1413.57	15.30	8.68	152.66	338.79
	67.200	46.00	.00	.00	1407.60	1325.00	1412.28	1411.74	1413.73	19.24	9.67	136.98	302.11
*	67.440	25.00	.00	.00	1407.60	1123.00	1413.51	1413.51	1415.85	56.03	12.28	91.45	150.02
*	68.870	143.00	.00	.00	1408.43	1123.00	1415.31	1415.31	1416.90	33.94	10.59	118.99	192.75
*	69.870	100.00	.00	.00	1409.01	1123.00	1415.86	1415.86	1417.48	34.62	10.66	118.10	190.85
*	70.870	100.00	.00	.00	1409.59	1123.00	1416.45	1416.45	1418.06	34.37	10.63	118.42	191.55

A MAXIMUM OF 5 TABLES MAY BE GENERATED

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     1.000  PROFILE=  1  CRITICAL DEPTH ASSUMED

WARNING SECNO=     2.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     3.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     3.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     6.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     6.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     9.060  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     9.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    11.630  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    11.630  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    17.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    17.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    21.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    21.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    29.650  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    29.650  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    34.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    34.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    39.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    39.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    39.920  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    40.770  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    43.580  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    45.990  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    46.150  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    46.150  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    48.500  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    67.440  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    67.440  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    68.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
```

```
CAUTION SECNO=     68.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     69.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     69.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     70.870  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     70.870  PROFILE=  1  MINIMUM SPECIFIC ENERGY
```

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDCNW.SMP 06-Feb-93

QP FILE: SCDCNWF.SOS

DETERMINE REQUIRED AND AVAILABLE FREEBOARD

ALTERNATIVE II: CONCRETE CHANNEL WITH 3:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	DEPTH	VCH	FREEBD	CWSEL	FREEBD ELEV	XLBEL	STCHL	RBEL	STCHR	*MINIMUM ADDT'L FREEBD LT	*MINIMUM ADDT'L FREEBD RT	EG	ELMIN
1.00	3.67	10.05	1.31	1372.07	1373.38	1379.50	220.00	1379.70	315.00	6.12	6.32	1373.64	1368.40
2.00	4.73	7.84	1.42	1373.53	1374.95	1381.60	230.00	1381.60	322.00	6.65	6.65	1374.48	1368.80
3.00	5.50	10.57	1.81	1377.90	1379.71	1382.70	230.00	1382.70	319.00	2.99	2.99	1379.64	1372.40
4.00	7.67	4.23	1.99	1380.97	1382.96	1383.40	223.00	1383.30	310.00	0.44	0.34	1381.25	1373.30
5.00	6.70	5.40	1.79	1381.00	1382.79	1386.30	222.00	1387.10	298.00	3.51	4.31	1381.45	1374.30
6.00	5.30	10.43	1.75	1382.40	1384.15	1386.50	222.00	1387.20	310.00	2.35	3.05	1384.08	1377.10
9.06	8.16	5.31	2.15	1384.76	1386.91	1387.50	71.00	1388.40	141.00	0.59	1.49	1385.19	1376.60
9.50	7.43	5.86	1.99	1384.73	1386.72	1384.20	79.70	1381.90	122.40	-2.52	-4.82	1385.26	1377.30
10.50	6.24	6.86	1.74	1384.84	1386.58	1387.60	79.70	1386.60	122.40	1.02	0.02	1385.57	1378.60
11.00	5.79	4.80	1.54	1385.29	1386.83	1387.30	73.40	1388.20	149.00	0.47	1.37	1385.64	1379.50
11.31	5.43	5.89	1.49	1385.18	1386.67	1387.10	63.50	1387.30	139.60	0.43	0.63	1385.71	1379.75
11.63	5.04	10.48	1.69	1386.54	1388.23	1388.40	61.00	1388.20	144.00	0.17	-0.03	1388.25	1381.50
14.90	5.82	8.42	1.73	1388.04	1389.77	1389.90	63.00	1390.00	145.00	0.13	0.23	1389.14	1382.22
17.00	5.68	8.74	1.72	1388.36	1390.08	1391.80	65.13	1391.90	146.90	1.72	1.82	1389.55	1382.68
17.15	5.05	10.47	1.69	1389.75	1391.44	1391.80	65.50	1391.90	146.90	0.36	0.46	1391.45	1384.70
19.50	5.82	8.44	1.73	1391.03	1392.76	1394.16	65.68	1394.10	149.00	1.40	1.34	1392.14	1385.22
21.00	5.71	8.67	1.72	1391.26	1392.98	1395.67	62.13	1395.70	148.00	2.69	2.72	1392.43	1385.55
21.15	5.05	10.46	1.69	1393.55	1395.24	1395.60	70.00	1395.70	148.00	0.36	0.46	1395.25	1388.50
22.42	5.81	8.44	1.73	1394.59	1396.32	1396.63	68.95	1397.00	150.00	0.31	0.68	1395.70	1388.78
22.92	5.78	8.51	1.73	1394.65	1396.38	1397.35	77.04	1397.60	167.00	0.97	1.22	1395.78	1388.87
23.40	5.76	8.57	1.73	1394.71	1396.44	1397.20	64.00	1397.70	144.00	0.76	1.26	1395.85	1388.95
25.05	5.66	8.79	1.71	1394.97	1396.68	1397.80	59.40	1397.70	137.70	1.12	1.02	1396.17	1389.31
27.00	5.58	8.99	1.71	1395.32	1397.03	1398.60	58.00	1398.60	140.00	1.57	1.57	1396.58	1389.74
29.50	5.51	9.16	1.70	1395.80	1397.50	1400.30	61.00	1399.96	136.52	2.80	2.46	1397.11	1390.29
29.65	5.04	10.48	1.69	1398.24	1399.93	1400.30	61.00	1399.90	134.00	0.37	-0.03	1399.95	1393.20
32.00	5.82	8.42	1.73	1399.54	1401.27	1402.30	63.00	1402.20	138.00	1.03	0.93	1400.64	1393.72
34.00	5.69	8.73	1.72	1399.84	1401.56	1403.60	60.00	1403.50	138.00	2.04	1.94	1401.03	1394.16
34.15	5.04	10.47	1.69	1401.54	1403.23	1403.60	60.00	1403.50	138.00	0.37	0.27	1403.25	1396.50
36.50	5.82	8.44	1.73	1402.83	1404.56	1405.20	60.20	1405.00	140.40	0.64	0.44	1403.94	1397.02
39.00	5.66	8.80	1.72	1403.22	1404.94	1406.00	56.90	1407.20	138.80	1.06	2.26	1404.43	1397.57
39.15	5.42	9.29	1.69	1406.10	1407.79	1406.00	56.90	1407.20	138.80	-1.79	-0.59	1407.44	1400.68
39.92	6.21	6.19	1.70	1407.01	1408.71	1408.70	65.00	1408.80	126.00	-0.01	0.09	1407.60	1400.80
40.77	5.98	3.47	1.54	1407.48	1409.02	1408.70	48.30	1408.80	125.50	-0.32	-0.22	1407.67	1401.50
43.00	5.38	3.86	1.40	1407.58	1408.98	1409.50	48.30	1409.60	125.50	0.52	0.62	1407.81	1402.20
43.14	5.93	3.52	1.53	1407.63	1409.16	1401.80	48.40	1409.80	125.50	-7.36	0.64	1407.82	1401.70
43.58	5.62	4.77	1.49	1407.52	1409.01	1409.90	0.90	1410.00	52.30	0.89	0.99	1407.88	1401.90
44.65	5.09	5.63	1.40	1407.49	1408.89	1410.40	73.40	1410.50	124.40	1.51	1.61	1407.98	1402.40
45.00	4.92	5.90	1.37	1407.48	1408.85	1410.56	73.40	1410.66	124.40	1.71	1.81	1408.02	1402.56
45.25	4.80	6.09	1.34	1407.47	1408.81	1410.67	73.40	1410.77	124.40	1.86	1.96	1408.05	1402.67
45.69	4.71	6.49	1.34	1407.46	1408.80	1410.70	73.20	1411.40	124.20	1.90	2.60	1408.11	1402.75
45.99	4.55	7.80	1.37	1407.35	1408.72	100000.00	48.00	1410.30	136.00	98591.28	1.58	1408.30	1402.80

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDCNW.SMP 06-Feb-93

QP FILE: SCDCNWF.SOS

DETERMINE REQUIRED AND AVAILABLE FREEBOARD

ALTERNATIVE II: CONCRETE CHANNEL WITH 3:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	DEPTH	VCH	FREEBD	CWSEL	FREEBD ELEV	XLBEL	STCHL	RBEL	STCHR	*MINIMUM ADDT'L FREEBD LT	*MINIMUM ADDT'L FREEBD RT	EG	ELMIN
46.15	4.18	8.57	1.33	1408.45	1409.78	1410.00	48.00	1410.30	136.00	0.22	0.52	1409.59	1404.27
48.50	5.20	6.33	1.46	1409.56	1411.02	1412.20	68.00	1410.80	130.00	1.18	-0.22	1410.18	1404.36
48.95	5.25	6.26	1.46	1409.63	1411.09	100000.00	66.60	1411.40	130.00	98588.91	0.31	1410.24	1404.38
51.10	5.27	8.09	1.57	1409.74	1411.31	100000.00	70.00	1411.20	127.00	98588.69	-0.11	1410.75	1404.47
52.00	5.34	8.65	1.63	1409.84	1411.47	100000.00	67.80	1412.00	129.60	98588.53	0.53	1411.00	1404.50
52.90	5.42	9.19	1.68	1409.96	1411.64	100000.00	68.47	1412.30	128.29	98588.36	0.66	1411.27	1404.54
53.25	5.85	8.10	1.72	1410.41	1412.13	1413.56	67.97	1412.29	128.20	1.43	0.16	1411.43	1404.55
53.45	5.91	8.00	1.73	1410.47	1412.20	1413.17	69.18	1412.70	134.00	0.97	0.50	1411.47	1404.56
56.00	6.48	6.88	1.80	1411.14	1412.94	1414.02	66.93	1412.85	129.56	1.08	-0.09	1411.88	1404.66
58.00	6.70	6.48	1.84	1411.44	1413.28	1414.27	66.42	1413.25	130.53	0.99	-0.03	1412.10	1404.74
60.00	6.54	6.75	1.81	1411.61	1413.42	1415.00	65.20	1413.92	131.55	1.58	0.50	1412.32	1405.07
62.00	6.41	6.99	1.79	1411.80	1413.59	1415.09	65.91	1414.32	131.80	1.50	0.73	1412.55	1405.39
64.00	6.29	7.20	1.77	1412.00	1413.77	1415.80	64.73	1414.50	134.00	2.03	0.73	1412.81	1405.71
65.22	6.24	7.30	1.77	1412.14	1413.91	1415.97	64.78	1415.40	134.00	2.06	1.49	1412.97	1405.90
65.85	4.95	8.32	1.51	1412.05	1413.56	1414.50	84.90	1414.50	116.80	0.94	0.94	1413.13	1407.10
66.66	4.80	8.68	1.49	1412.40	1413.89	1413.90	84.90	1413.40	116.80	0.01	-0.49	1413.57	1407.60
67.20	4.68	9.67	1.53	1412.28	1413.81	1414.00	25.40	1413.40	59.00	0.19	-0.41	1413.73	1407.60
67.44	5.91	12.28	2.06	1413.51	1415.57	1413.80	29.00	1415.50	50.40	-1.77	-0.07	1415.85	1407.60
68.87	6.88	10.59	2.16	1415.31	1417.47	1413.53	31.50	1414.63	48.90	-3.94	-2.84	1416.90	1408.43
69.87	6.85	10.66	2.15	1415.86	1418.01	1414.11	31.50	1415.21	48.90	-3.90	-2.80	1417.48	1409.01
70.87	6.86	10.63	2.15	1416.45	1418.60	1414.69	31.50	1415.79	48.90	-3.91	-2.81	1418.06	1409.59

*NOTE: NEGATIVE NUMBERS INDICATE THE FREEBOARD ELEVATION IS ABOVE THE LEFT (EAST BANK) OR RIGHT (WEST BANK) CHANNEL BANK ELEV.

SECTION = SURVEY BASELINE STATION USED FOR CROSS SECTION IDENTIFICATION NUMBER
DEPTH = WATER DEPTH CALCULATED BY HEC-2
VCH = WATER VELOCITY IN THE MAIN CHANNEL
FREEBD = REQUIRED FREEBOARD COMPUTED ACCORDING TO FORMULA 5.10 FCD MANUAL VOL. 2
CWSEL = COMPUTED WATER SURFACE ELEVATION
FREEBD ELEV = CWSEL + FREEBD
XLBEL = LEFT BANK ELEVATION (EAST BANK)
STCHL = STATION OF THE LEFT BANK (EAST BANK)
RBEL = RIGHT BANK ELEVATION (WEST BANK)
STCHR = STATION OF THE RIGHT BANK (WEST BANK)
ADDT'L FREEBD = RIGHT OR LEFT BANK ELEVATION MINUS FREEBD ELEV
EG = ENERGY GRADIENT ELEVATION FOR THE CROSS SECTION
ELMIN = MINIMUM ELEVATION IN CURRENT CROSS SECTION

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDCNW.SMP 06-Feb-93

QP FILE: SCDCNWD.SOS

DETERMINE AVAILABLE DISTANCE FROM RIGHT OF WAY TO TOP OF CHANNEL

ALTERNATIVE II: CONCRETE CHANNEL WITH 3:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	STCHL	STCHR	MAXIMUM AVAILABLE DISTANCE LT	MAXIMUM AVAILABLE DISTANCE RT	
11.00	73.40	149.00	30.90	8.50	
11.31	63.50	139.60	21.00	17.90	
11.63	61.00	144.00	18.50	13.50	
14.90	63.00	145.00	20.50	12.50	
17.00	65.13	146.90	22.63	10.60	
17.15	65.50	146.90	23.00	10.60	
19.50	65.68	149.00	23.18	8.50	
21.00	62.13	148.00	19.63	9.50	
21.15	70.00	148.00	27.50	9.50	
22.42	68.95	150.00	26.45	7.50	
22.92	77.04	167.00	24.54	0.50	*
23.40	64.00	144.00	21.50	13.50	
25.05	59.40	137.70	16.90	19.80	
27.00	58.00	140.00	15.50	17.50	
29.50	61.00	136.52	18.50	20.98	
29.65	61.00	134.00	18.50	23.50	
32.00	63.00	138.00	20.50	19.50	
34.00	60.00	138.00	17.50	19.50	
34.15	60.00	138.00	17.50	19.50	
36.50	60.20	140.40	17.70	17.10	
39.00	56.90	138.80	14.40	18.70	
39.15	56.90	138.80	14.40	18.70	
39.92	65.00	126.00	22.50	31.50	
40.77	48.30	125.50	5.80	32.00	
43.00	48.30	125.50	5.80	32.00	
43.14	48.40	125.50	5.90	32.00	
43.58	0.90	52.30	-41.60	105.20	
44.65	73.40	124.40	30.90	33.10	
45.00	73.40	124.40	30.90	33.10	
45.25	73.40	124.40	30.90	33.10	
45.69	73.20	124.20	30.70	33.30	
45.99	48.00	136.00	5.50	21.50	
46.15	48.00	136.00	5.50	21.50	
48.50	68.00	130.00	25.50	27.50	
48.95	66.60	130.00	24.10	27.50	
51.10	70.00	127.00	27.50	30.50	
52.00	67.80	129.60	25.30	27.90	
52.90	68.47	128.29	25.97	29.21	
53.25	67.97	128.20	25.47	29.30	
53.45	69.18	134.00	26.68	23.50	
56.00	66.93	129.56	24.43	27.94	

PROJECT: SOSSAMAN CHANNEL AND BASIN

FCD CONTRACT NO: 91-07
APA PROJECT NO: P31D01

HEC 2 FILE: HECEXE\SCDCNW.SMP 06-Feb-93

QP FILE: SCDCNWD.SOS

DETERMINE AVAILABLE DISTANCE FROM RIGHT OF WAY TO TOP OF CHANNEL

ALTERNATIVE II: CONCRETE CHANNEL WITH 3:1 SIDESLOPES AND CONTINUOUS GRADE
SOUTH HALF = 15' & NORTH HALF = 10' BOTTOM WIDTH

SECTION	STCHL	STCHR	MAXIMUM AVAILABLE DISTANCE LT	MAXIMUM AVAILABLE DISTANCE RT
58.00	66.42	130.53	23.92	26.97
60.00	65.20	131.55	22.70	25.95
62.00	65.91	131.80	23.41	25.70
64.00	64.73	134.00	22.23	23.50
65.22	64.78	134.00	22.28	23.50
65.85	84.90	116.80	42.40	40.70
66.66	84.90	116.80	42.40	40.70

SECTION = SURVEY BASELINE STATION USED FOR CROSS SECTION IDENTIFICATION NUMBER
STCHL = STATION OF THE LEFT BANK (EAST BANK)
STCHR = STATION OF THE RIGHT BANK (WEST BANK)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

by E.O. 1/21/93

Worksheet Name: SOS CHK SECT 1

Comment: ~~SITE 1; AVERAGE SECTION FOR SEC 1 TO SEC 2~~ EXIST CHANNEL: ALONG EASTSIDE OF ELLSWORTH, NORTH OF SOUTHERN

Solve For Discharge

Given Input Data:

Bottom Width.....	7.30 ft
Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.75:1 (H:V)
Manning's n.....	0.023
Channel Slope....	0.0113 ft/ft
Depth.....	2.36 ft

Computed Results:

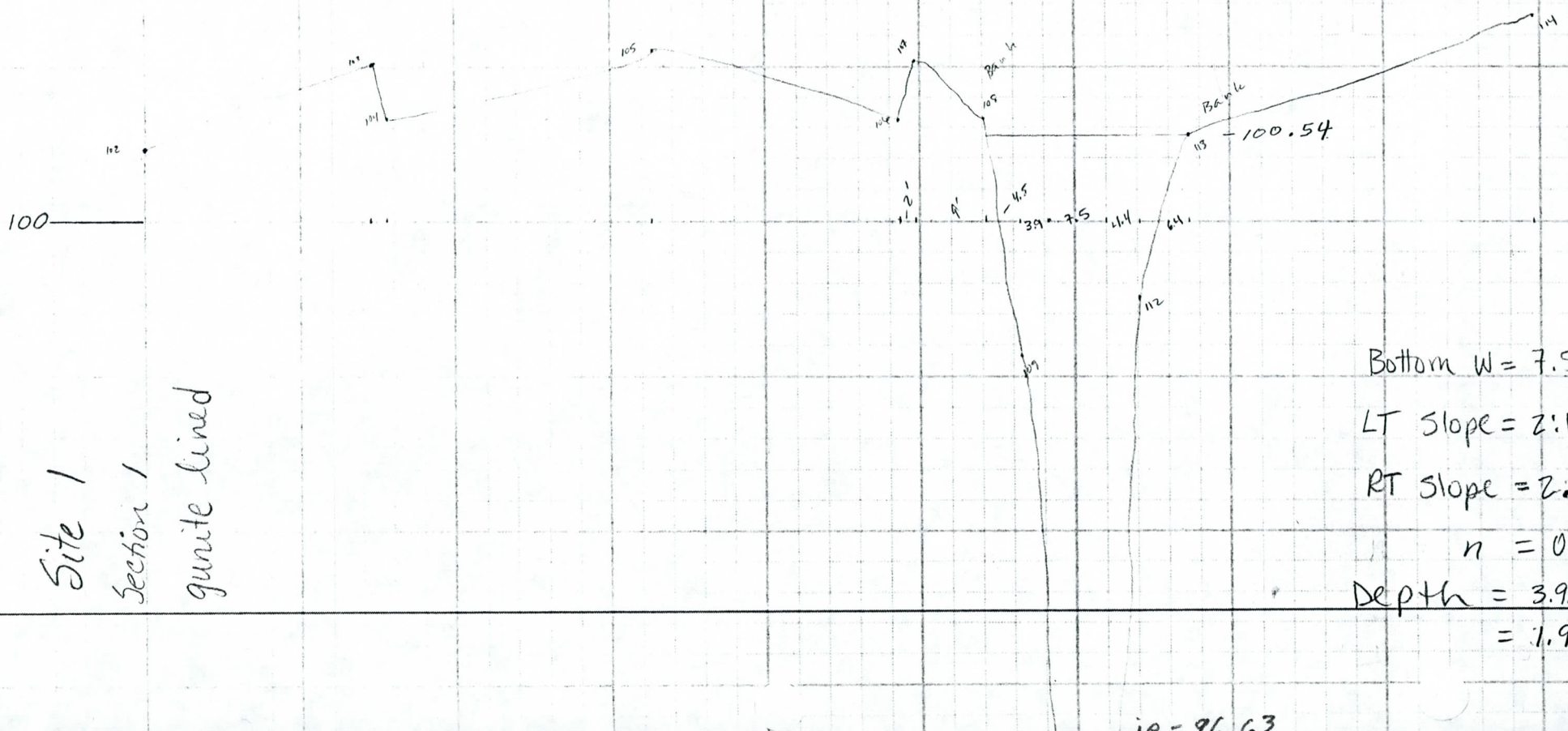
Discharge.....	281.74 cfs ≈ 282 cfs
Velocity.....	9.25 fps
Flow Area.....	30.46 sf
Flow Top Width...	18.51 ft
Wetted Perimeter.	19.48 ft
Critical Depth...	2.68 ft
Critical Slope...	0.0068 ft/ft
Froude Number....	1.27 (flow is Supercritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Sassaman Channel | P31D01 | MR 1/19/93

Site 1
Section 1
gunite lined

H 1" = 20'
V 1" = 1'

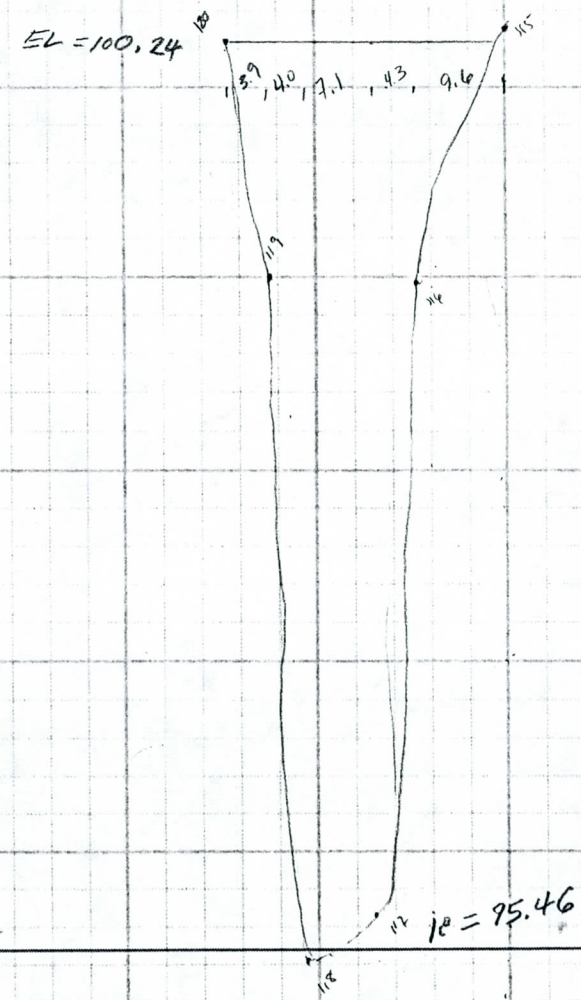


Bottom W = 7.5'
LT Slope = 2:1
RT Slope = 2.5:1
n = 0.023
Depth = 3.95' - 2
= 1.95 ft

Sossaman Channel | P31D01 | MR 1/19/93

Site 1
Section 2
gunite lined

100



Bottom W = 7.1'
LT Slope = 2:1
RT Slope = 3:1
n = 0.023
Depth = 4.8' - 2' = 2.8'
minimum freeboard = 2 ft

Distance from 1&2 = 104'

Pressure Pipe Analysis & Design
Circular Pipe

EXIST CULVERT: ALONG EASTSIDE OF ELLSWORTH ACROSS

Worksheet Name: SOUTHERN BOX CULVERT

Comment: EQUIVELENT SECTION LOWER LIMIT

Solve For Discharge

Given Input Data:

Elevation @ 1.....	1.00	ft
Pressure @ 1.....	0.86	psi
Elevation @ 2.....	0.70	ft
Pressure @ 2.....	0.43	psi
Diameter.....	64.00	in = equivalent surface area to single barrel 10' x 3' box culvert
Length.....	125.00	ft
Hazen-Williams C..	100.00	

Computed Results:

Discharge.....	134136.88	gpm ≈ 299 CFS
Velocity.....	13.38	fps
Headloss.....	1.29	ft
Energy Grade @ 1..	5.77	ft
Energy Grade @ 2..	4.47	ft
Friction Slope....	10.336	ft/1000 ft

Actual area = 30 SF
Reduced area = 22.3 SF
Used worst case "C" value to include entrance & Exit values

Capacity req = 295 CFS (100yr - 24hr)
" " prov = 299 CFS OK

Actual capacity > 299 CFS, @ 0.5 of headwater

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

By EB 1/21/93

Worksheet Name: SOSSAMAN EXISTING 2

Comment: EXIST CHANNEL: ALONG THE EASTSIDE OF ELLSWORTH, SOUTH OF SOUTHERN ~~SITE 1; AVERAGE SECTION FOR SEC 5 TO SEC 6~~

Solve For Discharge

Given Input Data:

Bottom Width.....	7.85 ft
Left Side Slope..	3.50:1 (H:V)
Right Side Slope.	1.65:1 (H:V)
Manning's n.....	0.023
Channel Slope....	0.0037 ft/ft
Depth.....	3.60 ft

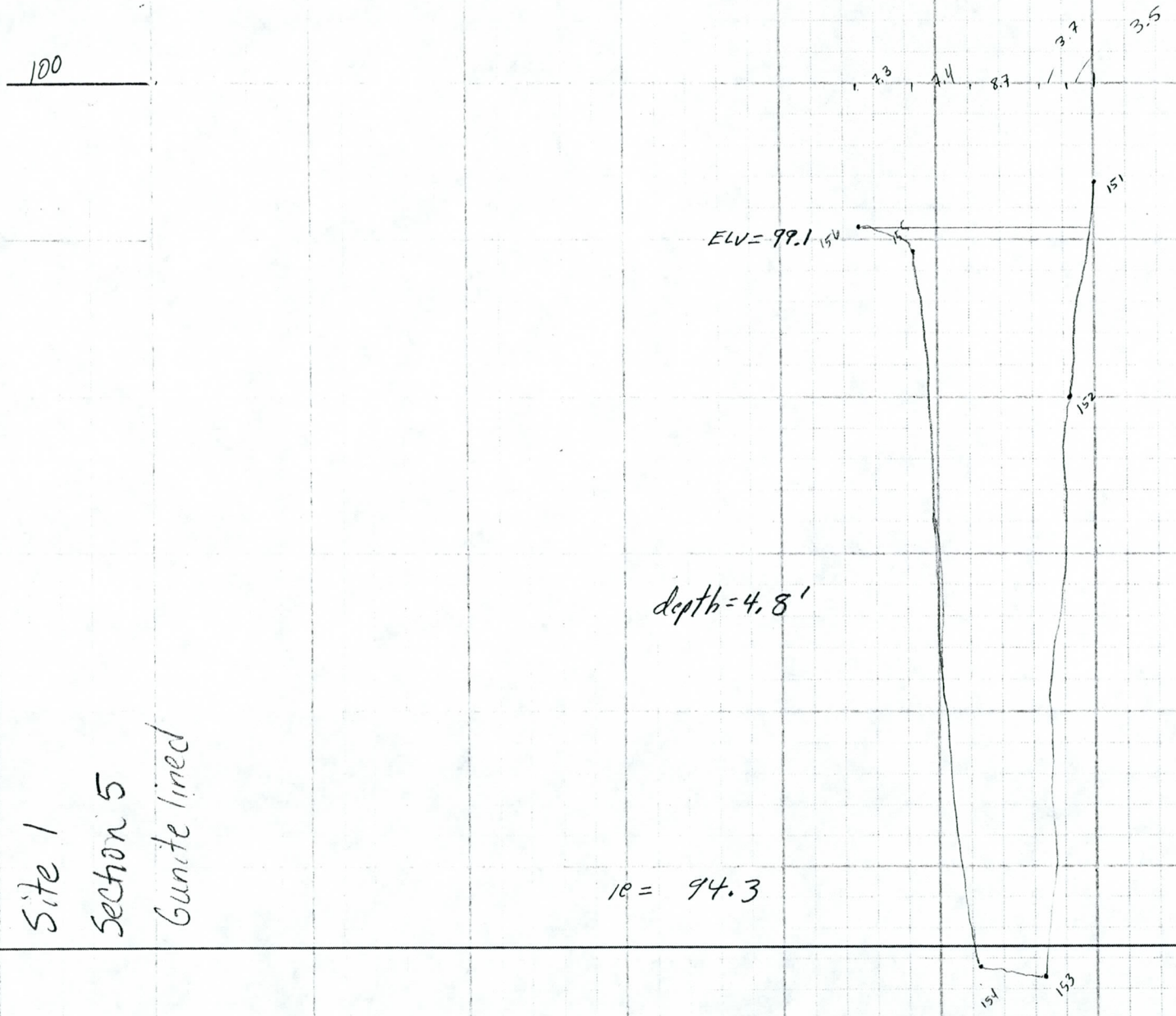
Computed Results:

Discharge.....	410.83 cfs ≈ 411 cfs
Velocity.....	6.67 fps
Flow Area.....	61.63 sf
Flow Top Width...	26.39 ft
Wetted Perimeter.	27.90 ft
Critical Depth...	3.14 ft
Critical Slope...	0.0065 ft/ft
Froude Number....	0.77 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Sossaman Channel | P31001 | 1/20/93

Site 1
Section 5
Gunite lined

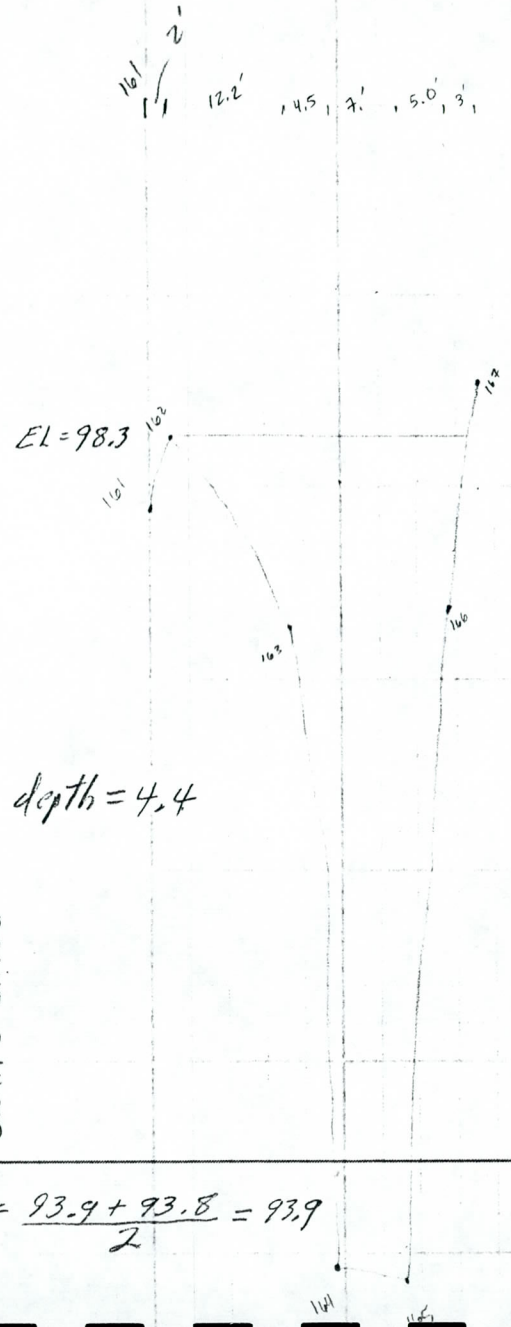


Bottom W = 8.7'
Lt Side Slope = 3:1
Rt side Slope = 1.5:1
n = 0.023
depth = 4.7' - 2'
= 2.7'

FB = 2' min

Sossaman Channel | P31D01 | 1/20/93

Site 1
Section 6
Gunite Lined



$10 = \frac{93.9 + 93.8}{2} = 93.9$

Distance from sect 5 to 6
= 107.4

Bottom W = 7.0'

Lt side slope = 4:1

Rt side Slope = 1.8:1

n = 0.023

depth = 4.35' − 2'

= 2.35 ft

FB = 2' min

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOSSAMAN EXISTING 4

Comment: EXIST CHANNEL: NORTH/SOUTH 2600' EAST OF ~~CRIMSON~~ ELLSWORTH, SOUTH OF SOUTHERN ~~SITE 2; AVERAGE SECTION FOR~~ SEC 2 TO SEC 3

Solve For Discharge

Given Input Data:

Bottom Width.....	4.50 ft
Left Side Slope..	2.67:1 (H:V)
Right Side Slope.	3.13:1 (H:V)
Manning's n.....	0.040
Channel Slope....	0.0068 ft/ft
Depth.....	2.60 ft

Computed Results:

Discharge.....	127.35 cfs : CONSERVATIVE USE ≈127 cfs
Velocity.....	4.07 fps
Flow Area.....	31.30 sf
Flow Top Width...	19.58 ft
Wetted Perimeter.	20.46 ft
Critical Depth...	1.96 ft
Critical Slope...	0.0228 ft/ft
Froude Number....	0.57 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

By C.A 1/21/93

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOSSAMAN EXISTING

Comment: ~~SITE 2; AVERAGE SECTION FOR~~ EXIST CHANNEL: NORTH/SOUTH 2600' EAST OF ~~CRIMSON~~ ELLSWORTH, SOUTH OF SOUTHERN SEC 1 TO SEC 2

Solve For Discharge

Given Input Data:

Bottom Width.....	4.30 ft
Left Side Slope..	2.46:1 (H:V)
Right Side Slope.	2.75:1 (H:V)
Manning's n.....	0.040
Channel Slope....	0.0047 ft/ft
Depth.....	3.30 ft

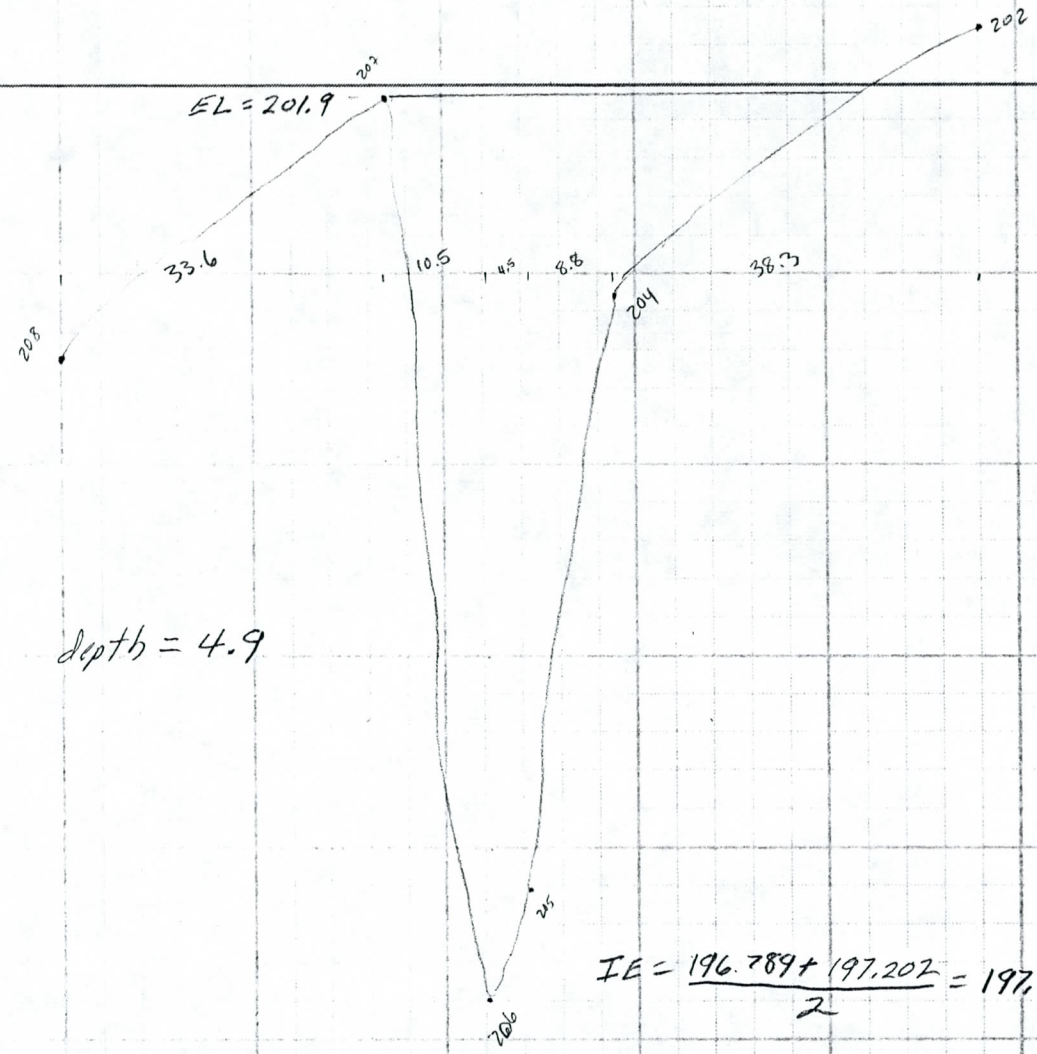
Computed Results:

Discharge.....	164.71 cfs ! SEE ~~FOLLOWING~~ PREVIOUS SHEET
Velocity.....	3.87 fps
Flow Area.....	42.56 sf
Flow Top Width...	21.49 ft
Wetted Perimeter.	22.72 ft
Critical Depth...	2.32 ft
Critical Slope...	0.0220 ft/ft
Froude Number....	0.48 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Sossaman Channel P31D01 MAR 1/20/93

Site 2
Section 1



depth = 4.9

L to (2) = 105.6

$IE = \frac{196.789 + 197.202}{2} = 197.0'$

Bottom W = 4.5 ✓

Lt Slope = 2.25 : 1 ✓

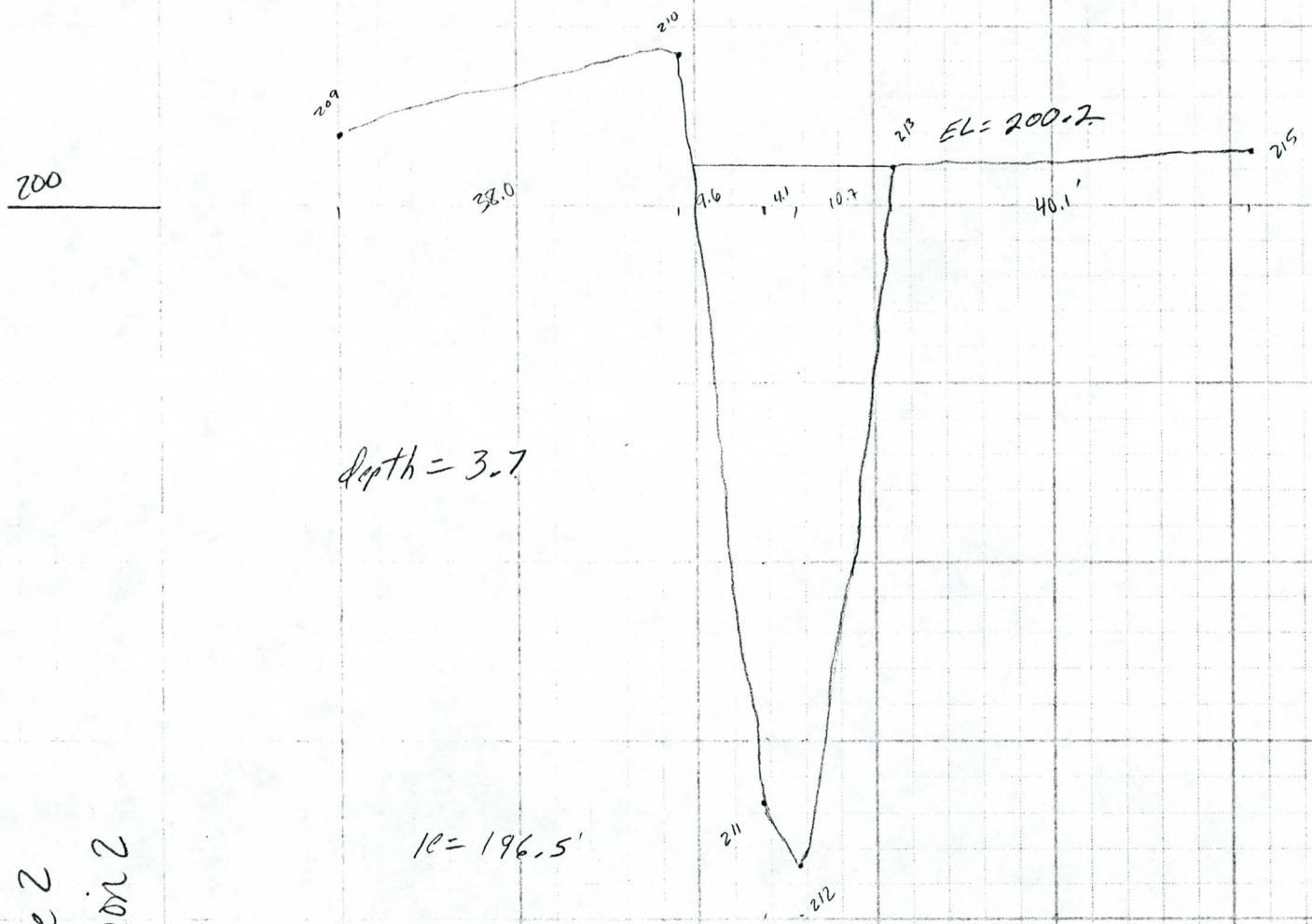
Rt Slope = 2.75 : 1 ✓

n = 0.04 ✓

depth = 4.5' - 1' = 3.5'

Sossaman Channel P31D01 1/20/93

Site 2
Section 2

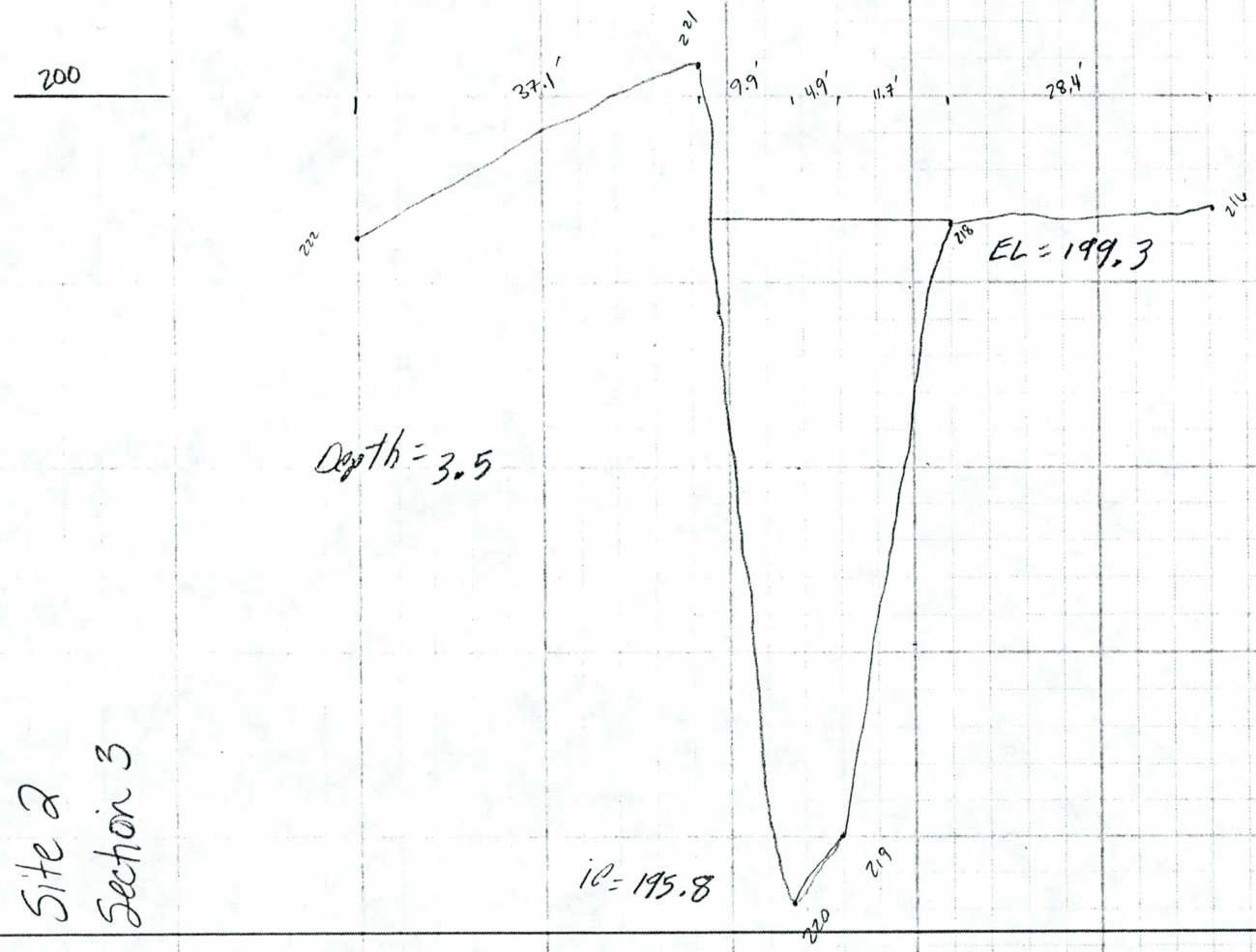


L to (3) = 102.7

Bottom W = 4.1 ft ✓
LT slope = 2.67:1 ✓
Rt slope = 2.75:1 ✓
n = 0.04 ✓
depth = 3.7 - 1 ✓
= 2.7 ft

Sassaman Channel | P31D01 | 1/20/93

Site 2
Section 3



Bottom w = 4.9'
Lt slope = 2.67 : 1
Rt slope = 3.5 : 1
n = 0.04
depth = 3.5 - 1 = 2.5'

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

OK ED
1/21/93

Worksheet Name: SOSSAMAN

Comment: ~~SITE 3 - COMBINED SECTIONS 1 & 2~~ EXIST CHANNEL: ALONG THE EASTSIDE OF CRIMSON ROAD, NORTH OF SOUTHERN

Solve For Discharge

Given Input Data:

Bottom Width.....	7.20 ft
Left Side Slope..	3.70:1 (H:V)
Right Side Slope.	1.40:1 (H:V)
Manning's n.....	0.023
Channel Slope....	0.0093 ft/ft
Depth.....	1.35 ft

Computed Results:

Discharge.....	88.17 cfs ≈88 cfs
Velocity.....	6.14 fps
Flow Area.....	14.37 sf
Flow Top Width...	14.09 ft
Wetted Perimeter.	14.70 ft
Critical Depth...	1.40 ft
Critical Slope...	0.0080 ft/ft
Froude Number....	1.07 (flow is Supercritical)

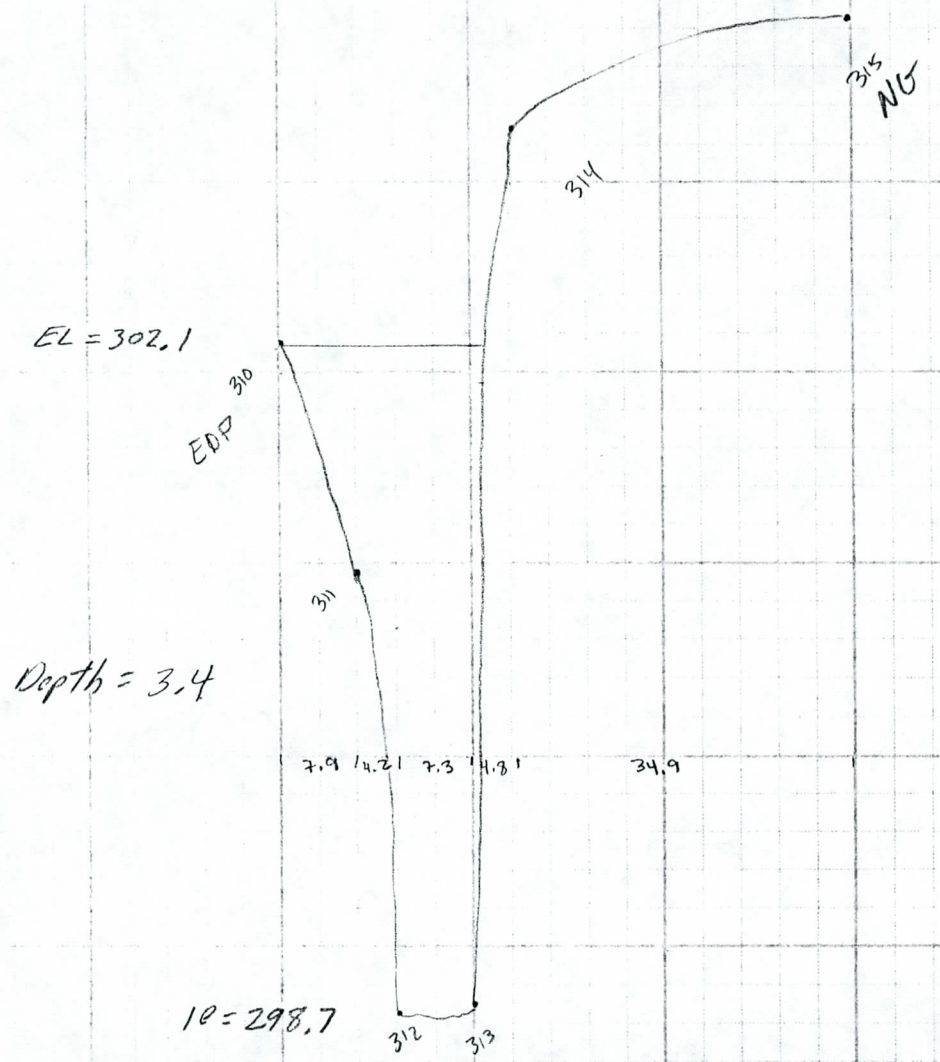
$$\text{Slope} = \frac{1}{106.1} = 0.0094$$

Depth = 3.3

w/2' FB = 1.3

Sossaman Channel P31D01 1/20/93

Site 3
Section 1
Gunite Lined



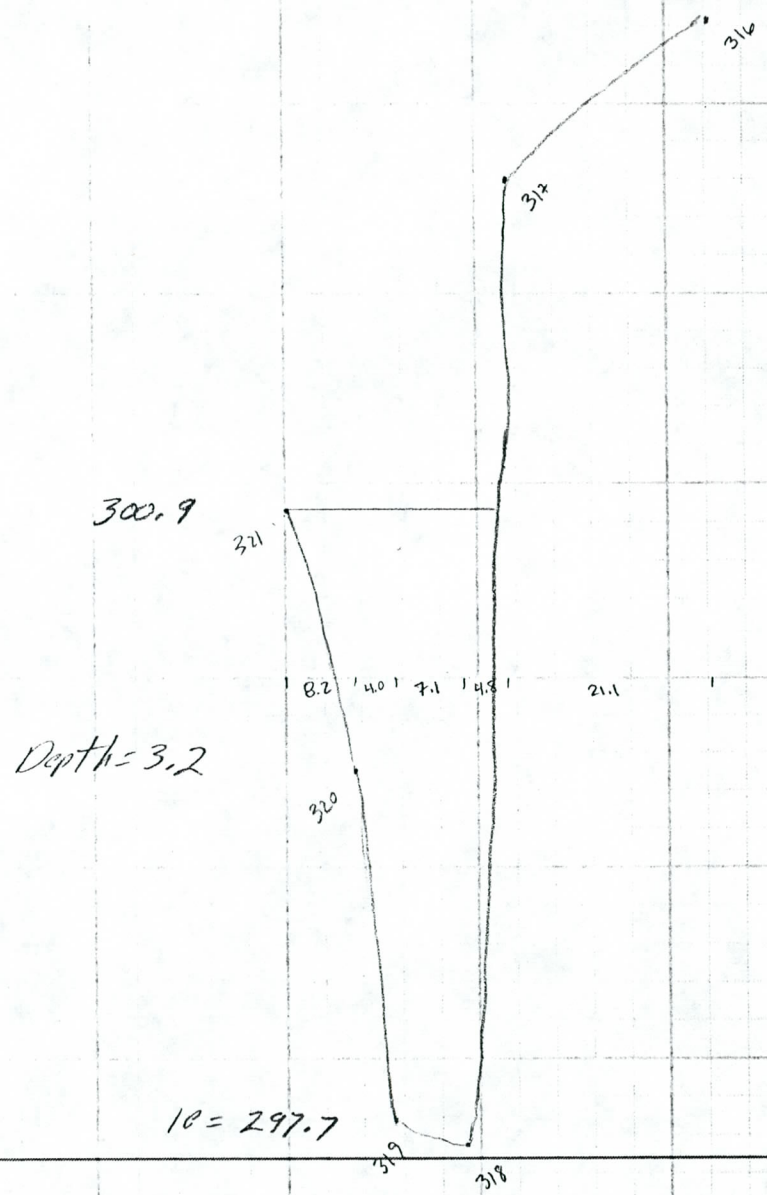
L to (2) = 106.1

Bottom w = 7.3 ft
Lt slope = 3.46 : 1
Rt slope = 1.37 : 1
n = 0.023
depth = 3.5' - 2'
= 1.5'

Sossaman Channel

Site 3
Section 2

P31D01 MAR 1/20/93



Bottom w = 7.1 ft
Lt slope = 3.93 : 1
Rt slope = 1.45 : 1
n = 0.023
depth = 3.2' - 2'
= 1.2'

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: EX CULVERT

Comment: ~~EXISTING AT SOUTHERN & CRIMSON~~ EXIST CULVERT: ALONG EASTSIDE OF CRIMSON ACROSS SOUTHERN 12 REQ

Solve For Discharge

Given Input Data:

Bottom Width.....	6.00 ft
Manning's n.....	0.016
Channel Slope....	0.0050 ft/ft
Depth.....	2.00 ft

Computed Results:

Discharge.....	88.99 cfs	≈ 89 cfs per barrel
Velocity.....	7.42 fps	
Flow Area.....	12.00 sf	
Flow Top Width...	6.00 ft	
Wetted Perimeter.	10.00 ft	
Critical Depth...	1.90 ft	
Critical Slope...	0.0058 ft/ft	
Froude Number....	0.92 (flow is Subcritical)	

Capacity = 89 CFS/per barrel

Total of 2 barrels = 2 × 89 = 178 CFS

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOSSAMAN EXISTING 5

Comment: EXIST CHANNEL: ALONG THE EASTSIDE OF CRIMSON, SOUTH OF SOUTHERN ~~SITE 3; AVERAGE SECTION FOR SEC 7 TO SEC 8~~

Solve For Discharge

Given Input Data:

Bottom Width.....	6.85 ft
Left Side Slope..	10.75:1 (H:V)
Right Side Slope.	1.13:1 (H:V)
Manning's n.....	0.023
Channel Slope....	0.0055 ft/ft
Depth.....	1.90 ft

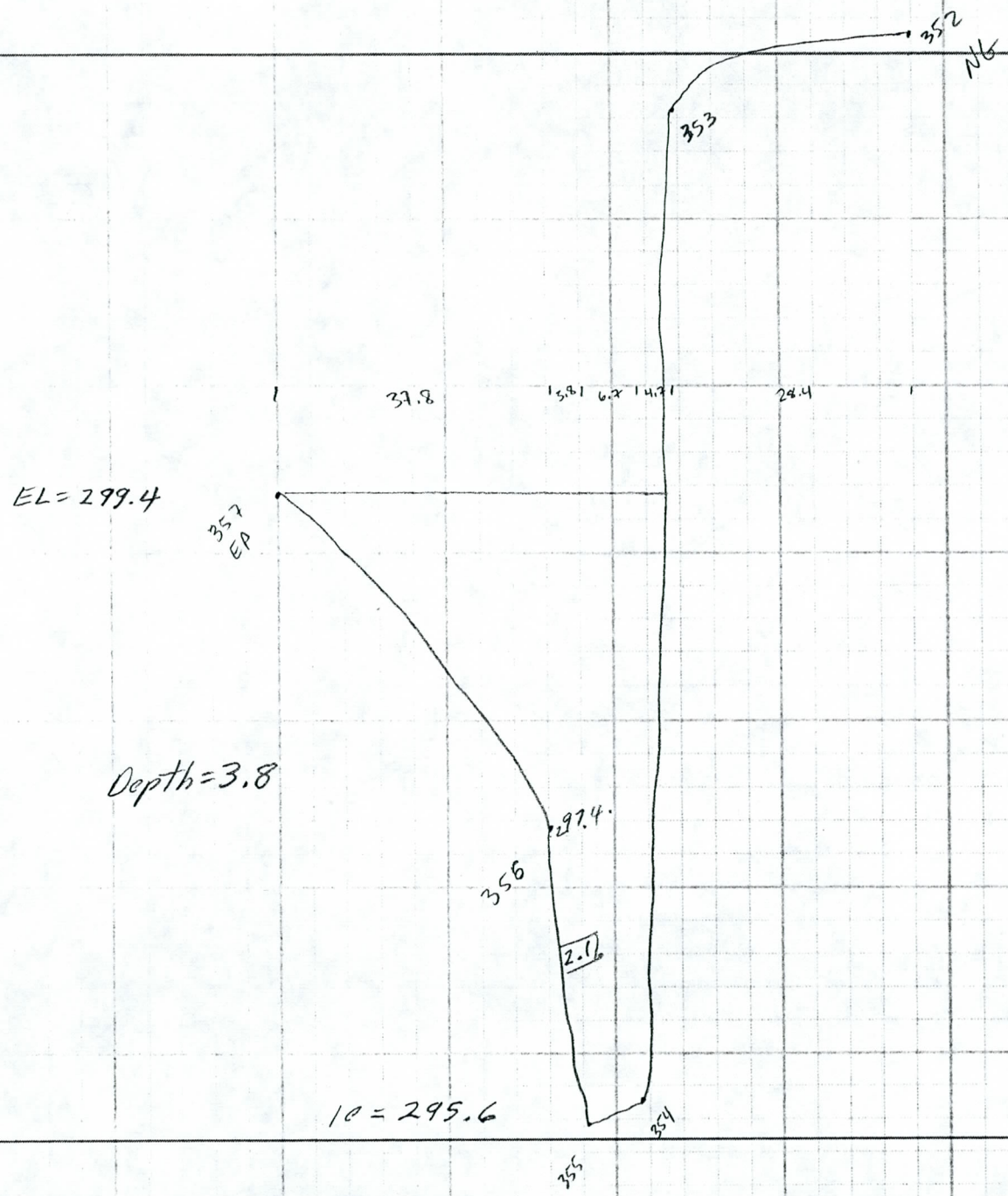
Computed Results:

Discharge.....	180.17 cfs ≈180 cfs
Velocity.....	5.23 fps
Flow Area.....	34.46 sf
Flow Top Width...	29.42 ft
Wetted Perimeter.	30.23 ft
Critical Depth...	1.76 ft
Critical Slope...	0.0078 ft/ft
Froude Number....	0.85 (flow is Subcritical)

Sossaman Channel | P31D01 | 1/20/93

Site 3
Section 7
Gunite lined

300



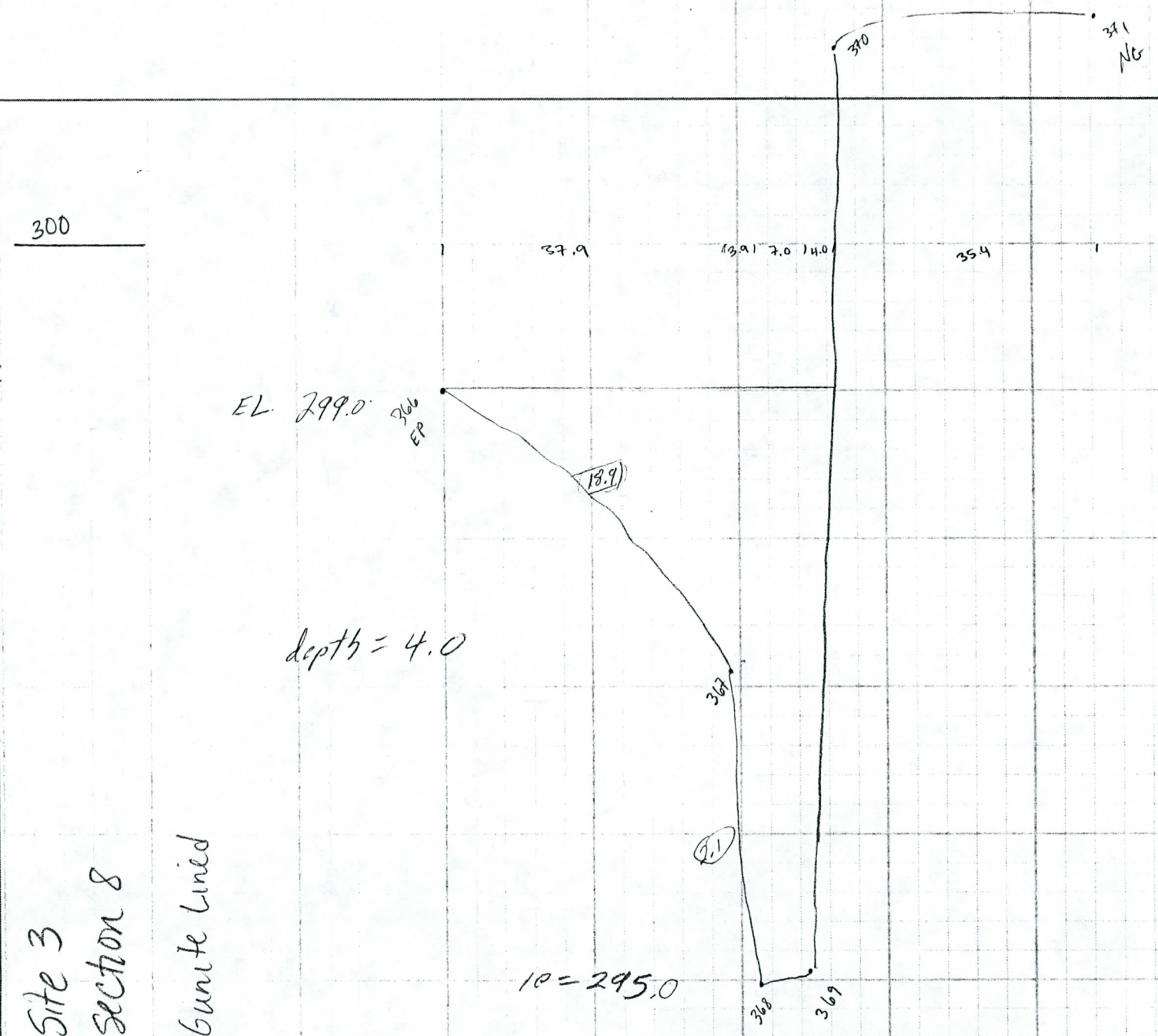
L To(8) = 109.4

Bottom w = 6.7 ft
Lt slope = 1 : 1
Rt slope = 1.25 : 1
n = 0.023
depth = 3.75' - 1'
= 2.75'

Sossaman Channel P31D01 MR 1/20/93

Site 3
Section 8

Gunite Lined



Bottom w = 7.0 ft
Lt slope = 10.5 : 1
Rt slope = 1 : 1
n = 0.023
depth = 4' − 1'
= 3.0'

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOSSAMAN EXISTING 6

EXIST CHANNEL: NE/SW 1200' EAST OF CRIMSON AT SOUTHERN

Comment: ~~SITE 4; AVERAGE SECTION FOR SEC 1 TO SEC 2~~

Solve For Discharge

Given Input Data:

Bottom Width.....	2.40 ft
Left Side Slope..	5.50:1 (H:V)
Right Side Slope.	5.70:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0120 ft/ft
Depth.....	0.95 ft

Computed Results:

Discharge.....	26.88 cfs
Velocity.....	3.67 fps
Flow Area.....	7.33 sf
Flow Top Width...	13.04 ft
Wetted Perimeter.	13.21 ft
Critical Depth...	0.89 ft
Critical Slope...	0.0165 ft/ft
Froude Number....	0.86 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

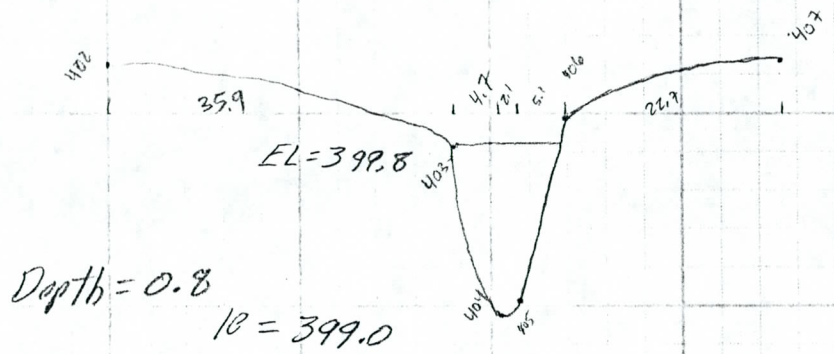
Sossaman Channel

Site 4
Section 1

P31001

MB 1/20/93

400



Depth = 0.8

IE = 399.0

Roadside ditch = FB N/A

L to (2) = 116.2

Bottom W = 2.1 ft

LT Slope = 5:1

Rt Slope = 6.4:1

n = 0.03

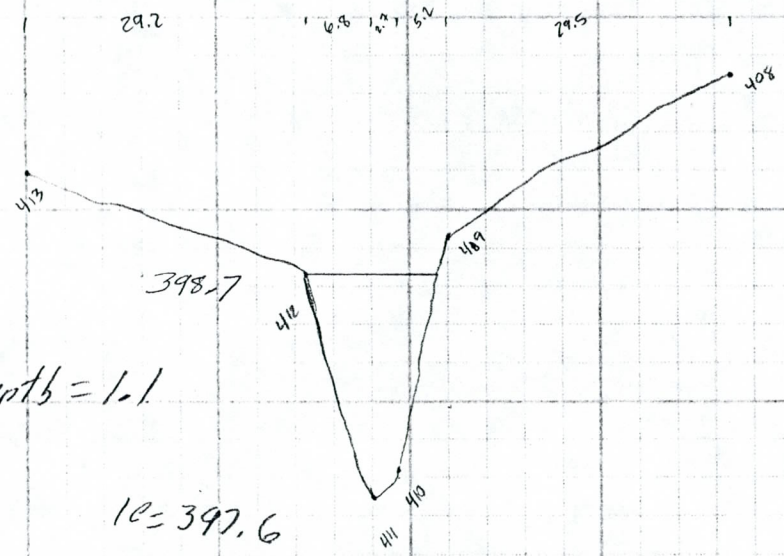
depth = 0.9 ft

no allowance for FB

Sossaman Channel | P31D01 | MB 1/20/93

Site 4
Section 2

400



Depth = 1.1

IE = 397.6

Bottom w = 2.7 ft

Lt slope = 6:1

Rt slope = 5:1

n = 0.03

depth = 1.1 ft

no allowance for FB

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOSSAMAN

Comment: EXIST CHANNEL: NE/SW 900' WEST OF SIGNAL BUTTE, SOUTH OF SOUTHERN ~~SITE 5 -- COMBINED SECTIONS 2 & 3~~

Solve For Discharge

Given Input Data:

Bottom Width.....	1.75 ft
Left Side Slope..	2.25:1 (H:V)
Right Side Slope.	3.10:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0063 ft/ft
Depth.....	1.43 ft

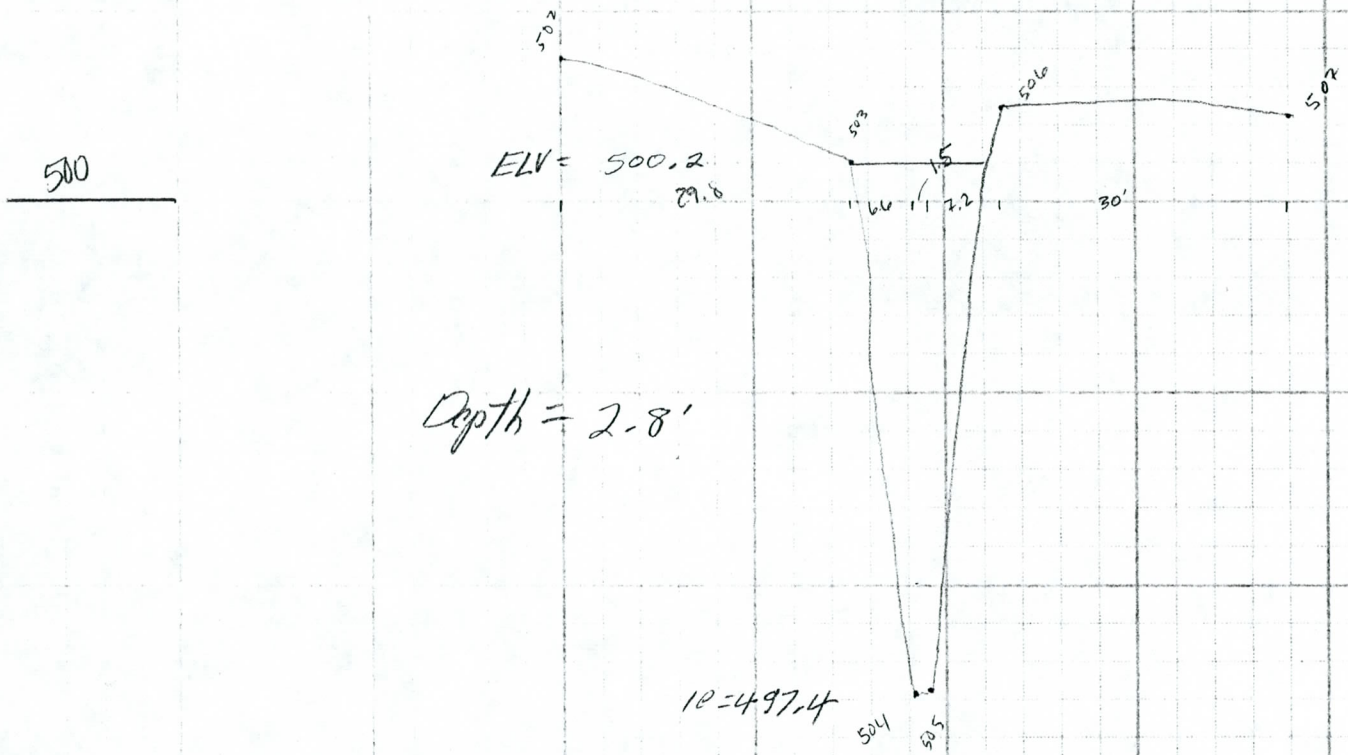
Computed Results:

Discharge.....	26.87 cfs ≈ 27 cfs
Velocity.....	3.39 fps
Flow Area.....	7.93 sf
Flow Top Width...	9.37 ft
Wetted Perimeter.	9.90 ft
Critical Depth...	1.16 ft
Critical Slope...	0.0158 ft/ft
Froude Number....	0.65 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Sossaman Channel P31D01 GMB 1/20/93

Site 5
section 1



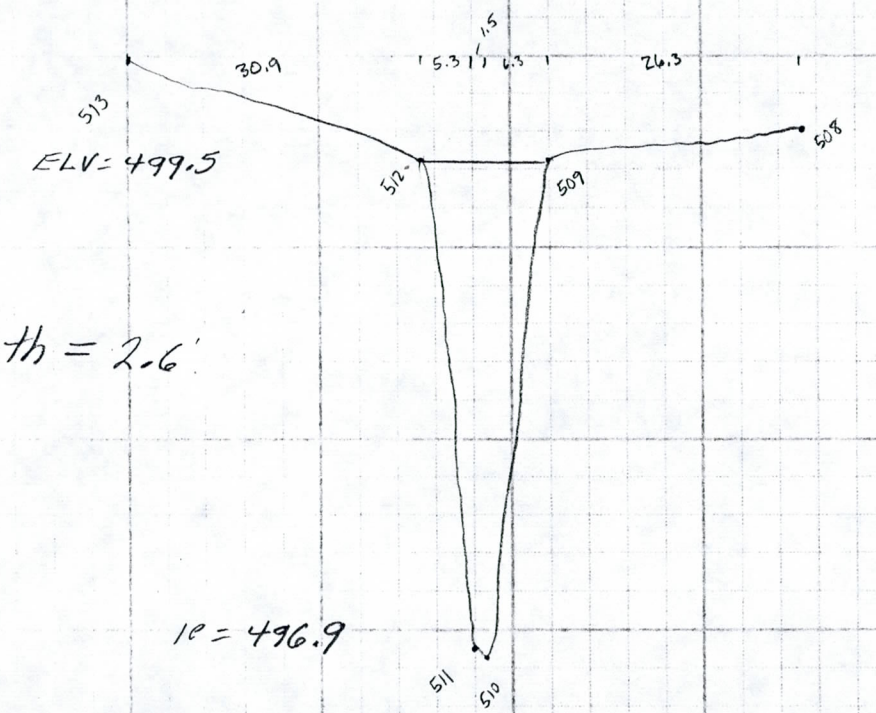
L to (2) = 90.8'

Bottom w = 1.5 ft
Lt slope = 2.4 : 1
Rt slope = 2.6 : 1
n = 0.03
depth = 2.78' - 1' = 1.78'

Sossaman Channel P31D01 MR 1/20/93

Site 5
Section 2

500



Depth = 2.6'

ie = 496.9

L to (3) = 99.2

Bottom w = 1.5

Lt slope = 2:1

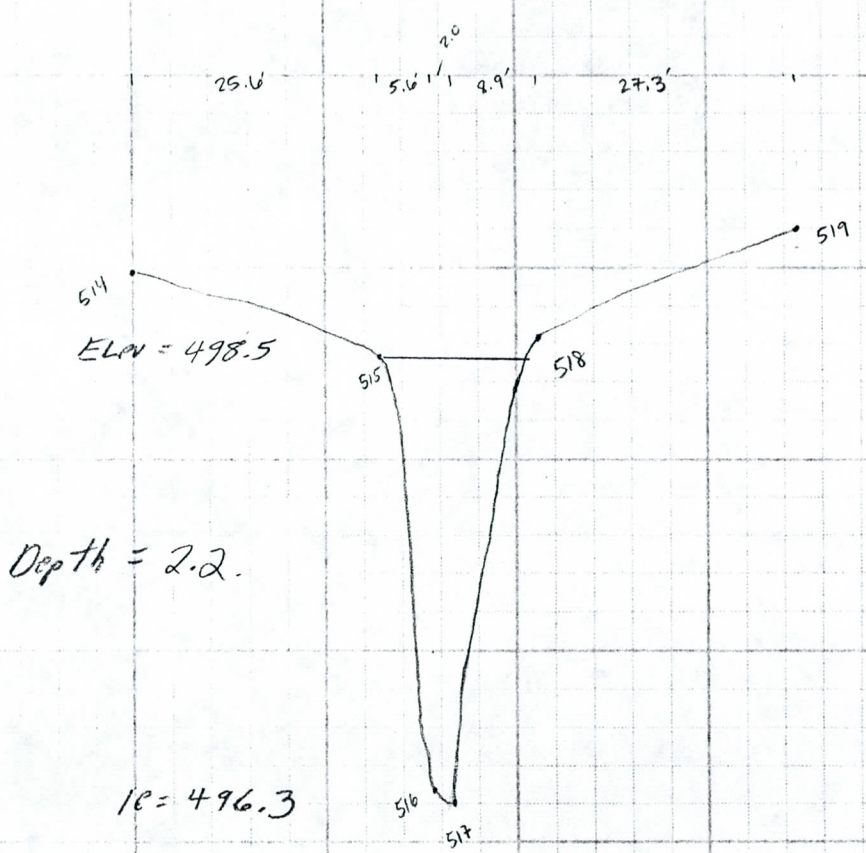
Rt slope = 2.4:1

n = 0.03

depth = 2.55 - 1 = 1.55

Sossaman Channel P31D01 MR 1/20/93

Site 5
section 3



Bottom w = 2.0 ft
Lt slope = 2.5 : 1
Rt slope = 3.8 : 1
n = 0.03
depth = 2.3' - 1' = 1.3'

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

OK ED 1/21/93

Worksheet Name: SOSSAMAN

Comment: ~~SITE 6 - COMBINED SECTIONS 1 & 2~~ EXIST CHANNEL: ALONG EASTSIDE OF SIGNAL BUTTE, SOUTH OF SOUTHERN

Solve For Discharge

Given Input Data:

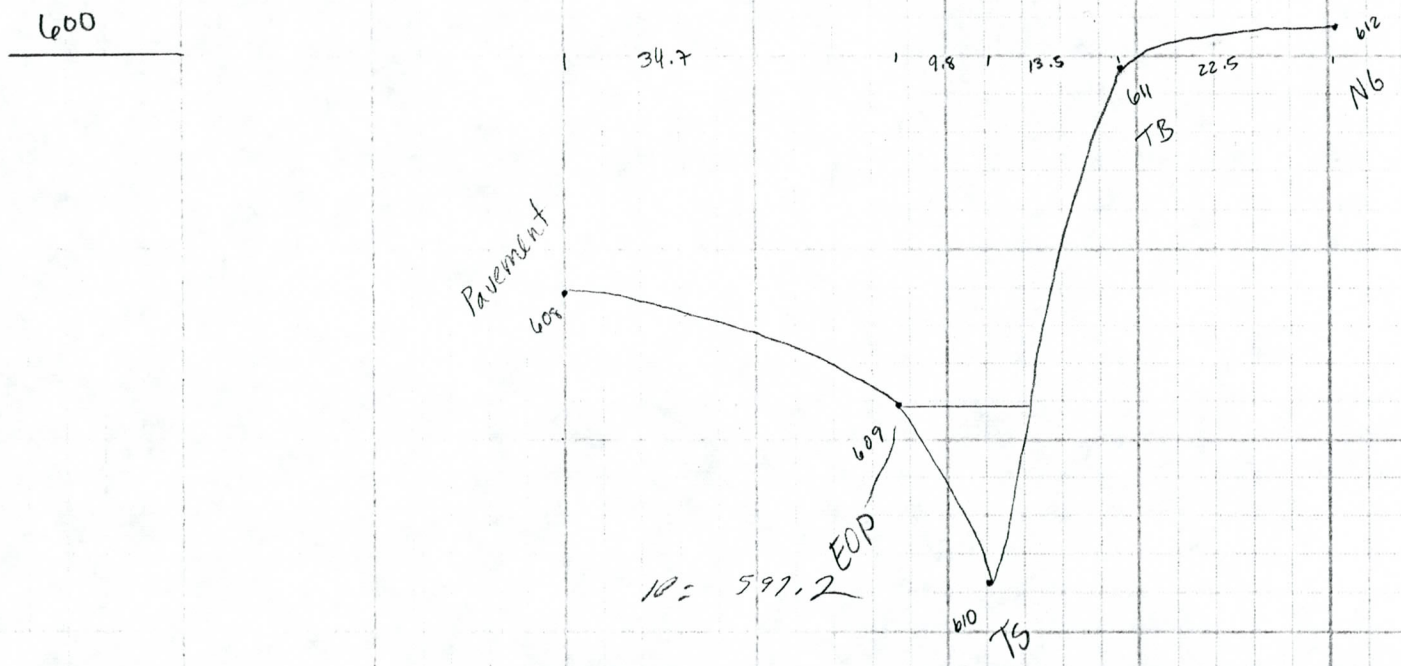
Bottom Width.....	3.15 ft
Left Side Slope..	7.35:1 (H:V)
Right Side Slope.	8.00:1 (H:V)
Manning's n.....	0.025
Channel Slope....	0.0207 ft/ft
Depth.....	1.63 ft

Computed Results:

Discharge.....	201.90 cfs ≈ 202 cfs
Velocity.....	7.95 fps
Flow Area.....	25.39 sf
Flow Top Width...	28.09 ft
Wetted Perimeter.	28.30 ft
Critical Depth...	1.93 ft
Critical Slope...	0.0090 ft/ft
Froude Number....	1.47 (flow is Supercritical)

Sossaman Channel | P31D01 | 1/20/93

Site 6
Section 1



L to (1) = 102.7

Bottom w = 0 ft

LT slope = 10:1

Rt slope = 14:1

n = 0.025

depth = 0.95

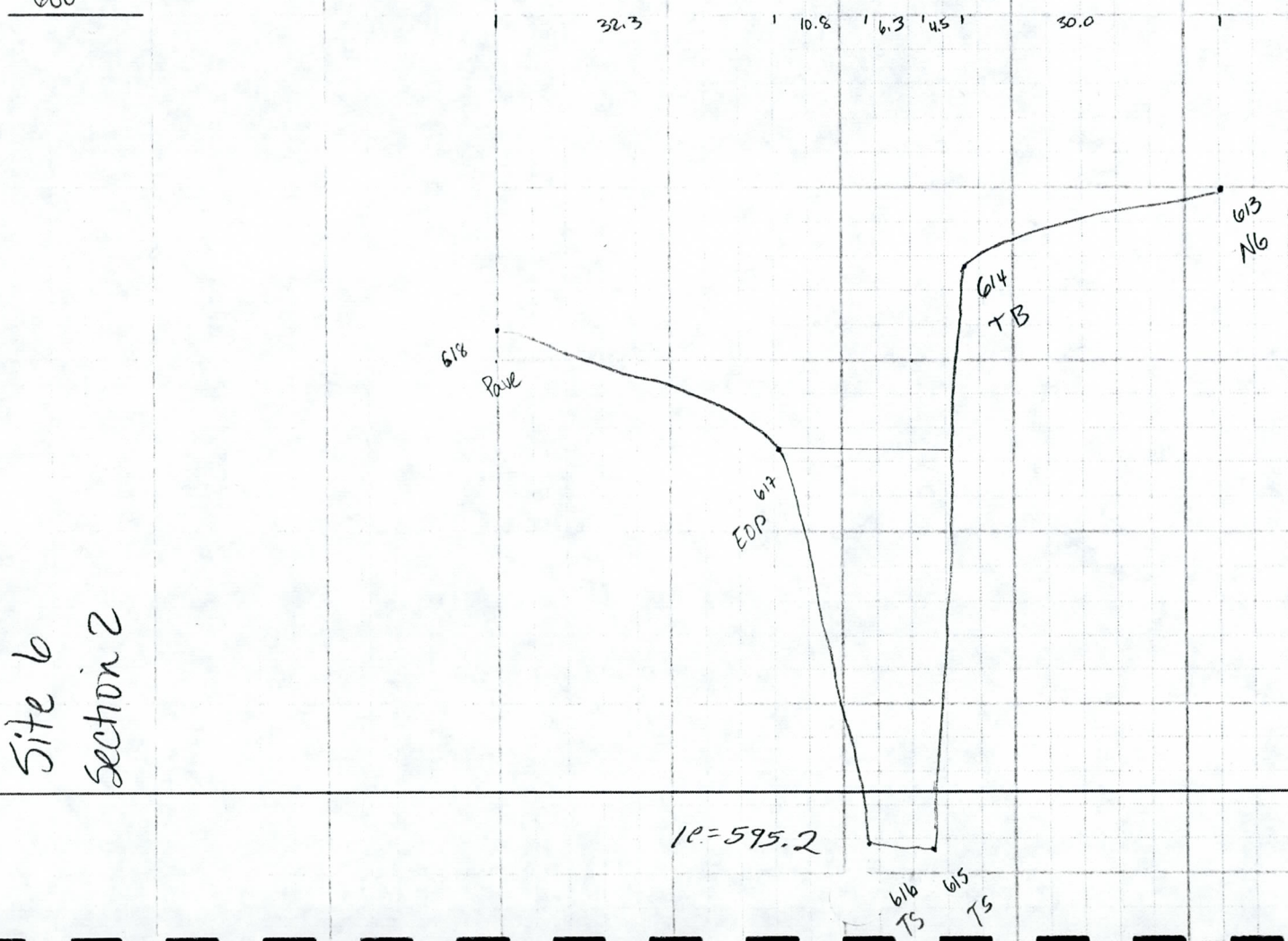
no allowance for FB

Sossaman Channel

Site 6
Section 2

P31D01

1/20/93



Bottom w = 6.3 ft
Lt slope = 4.7 : 1
Rt slope = 1.95 : 1
n = 0.025
depth = 2.3 ft
no allowance for FB

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: RECOMMENDATIONS: 10' BOTTOM WIDTH GUNITE LINED CHANNEL FROM SOUTHERN TO US60

Comment: SITE 2

Solve For Discharge

Given Input Data:

Bottom Width.....	4.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.022
Channel Slope....	0.0047 ft/ft
Depth.....	4.00 ft

Computed Results:

Discharge.....	498.94 cfs
Velocity.....	7.80 fps
Flow Area.....	64.00 sf
Flow Top Width...	28.00 ft
Wetted Perimeter.	29.30 ft
Critical Depth...	3.83 ft
Critical Slope...	0.0058 ft/ft
Froude Number....	0.91 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: RECOMMENDATIONS: SINGLE BARREL 10'x4' BOX CULVERT UNDERNEATH SOUTHERN

Comment: SITE 2

Solve For Bottom Width

Given Input Data:

Manning's n.....	0.016
Channel Slope....	0.0049 ft/ft
Depth.....	4.00 ft
Discharge.....	445.00 cfs

Computed Results:

Bottom Width.....	10.04 ft
Velocity.....	11.08 fps
Flow Area.....	40.15 sf
Flow Top Width...	10.04 ft
Wetted Perimeter.	18.04 ft
Critical Depth...	3.94 ft
Critical Slope...	0.0051 ft/ft
Froude Number....	FULL

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: SOUTHERN DITCH PCC

Comment: GUNNITE CHANNEL ALONG SOUTHERN TO CRIMSON

Solve For Depth

Given Input Data:

Bottom Width.....	5.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.019
Channel Slope....	0.0066 ft/ft
Discharge.....	270.00 cfs

Computed Results:

Depth.....	2.54 ft
Velocity.....	8.41 fps
Flow Area.....	32.10 sf
Flow Top Width...	20.25 ft
Wetted Perimeter.	21.08 ft
Critical Depth...	2.75 ft
Critical Slope...	0.0047 ft/ft
Froude Number....	1.18 (flow is Supercritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CULVERT - RECOMMENDATIONS; ~~SITE 3~~ 4 BARREL 6' x 5' BOX CULVERT UNDERNEAT SOUTHERN
SITE 3

Comment: ~~IMPROVEMENTS AT SOUTHERN & CRIMSON 4 REQ~~

Solve For Discharge — Single Barrel

Given Input Data:

Bottom Width.....	6.00 ft
Manning's n.....	0.016
Channel Slope....	0.0050 ft/ft
Depth.....	5.00 ft

Computed Results:

Discharge.....	299.58 cfs
Velocity.....	9.99 fps
Flow Area.....	30.00 sf
Flow Top Width...	6.00 ft
Wetted Perimeter.	16.00 ft
Critical Depth...	4.26 ft
Critical Slope...	0.0075 ft/ft
Froude Number....	0.79 (flow is Subcritical)

300 CFS per barrel

4 barrel's (300) = 1200 CFS

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: RECOMMENDATIONS: 10' BOTTOM WIDTH GUNITE CHANNEL SOUTHERN TO US 60

Comment: SITE 3

Solve For Discharge

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.022
Channel Slope....	0.0040 ft/ft
Depth.....	5.50 ft

Computed Results:

Discharge.....	1367.37 cfs
Velocity.....	9.38 fps
Flow Area.....	145.75 sf
Flow Top Width...	43.00 ft
Wetted Perimeter.	44.79 ft
Critical Depth...	5.22 ft
Critical Slope...	0.0050 ft/ft
Froude Number....	0.90 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: 2 BARREL 8'x4' BOX CULVERT

Comment: HAWES ROAD AT SOUTHERN AVE

Solve For Discharge

Given Input Data:

Bottom Width.....	8.00 ft
Manning's n.....	0.016
Channel Slope....	0.0009 ft/ft
Depth.....	4.00 ft

Computed Results:

Discharge.....	141.53 cfs x 2 ≈ 280 cfs
Velocity.....	4.42 fps
Flow Area.....	32.00 sf
Flow Top Width...	8.00 ft
Wetted Perimeter.	16.00 ft
Critical Depth...	2.13 ft
Critical Slope...	0.0051 ft/ft
Froude Number....	FULL

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Pressure Pipe Analysis & Design
Circular Pipe

Worksheet Name: BASIN OUTLET

Comment: 24" DIA CONCRETE PIPE - FLOWING FULL

Solve For Discharge

Given Input Data:

Elevation @ 1.....	1403.00	ft
Pressure @ 1.....	1.08	psi
Elevation @ 2.....	1402.80	ft
Pressure @ 2.....	0.87	psi
Diameter.....	24.00	in
Length.....	110.00	ft
Hazen-Williams C..	120.00	

Computed Results:

Discharge.....	9277.24	gpm
Velocity.....	6.58	fps
Headloss.....	0.68	ft
Energy Grade @ 1..	1406.16	ft
Energy Grade @ 2..	1405.48	ft
Friction Slope....	6.222	ft/1000 ft

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

XIV. APPENDIX

B. PLAN OF RECOMMENDED ALTERNATIVE - SEE FOLLOWING FOLDERS

RUPP PHOTOGRAPHY, INC.
4811 NORTH 7TH STREET,
SUITE B
PHOENIX, ARIZONA 85014
(602) 277-0439

LEGEND

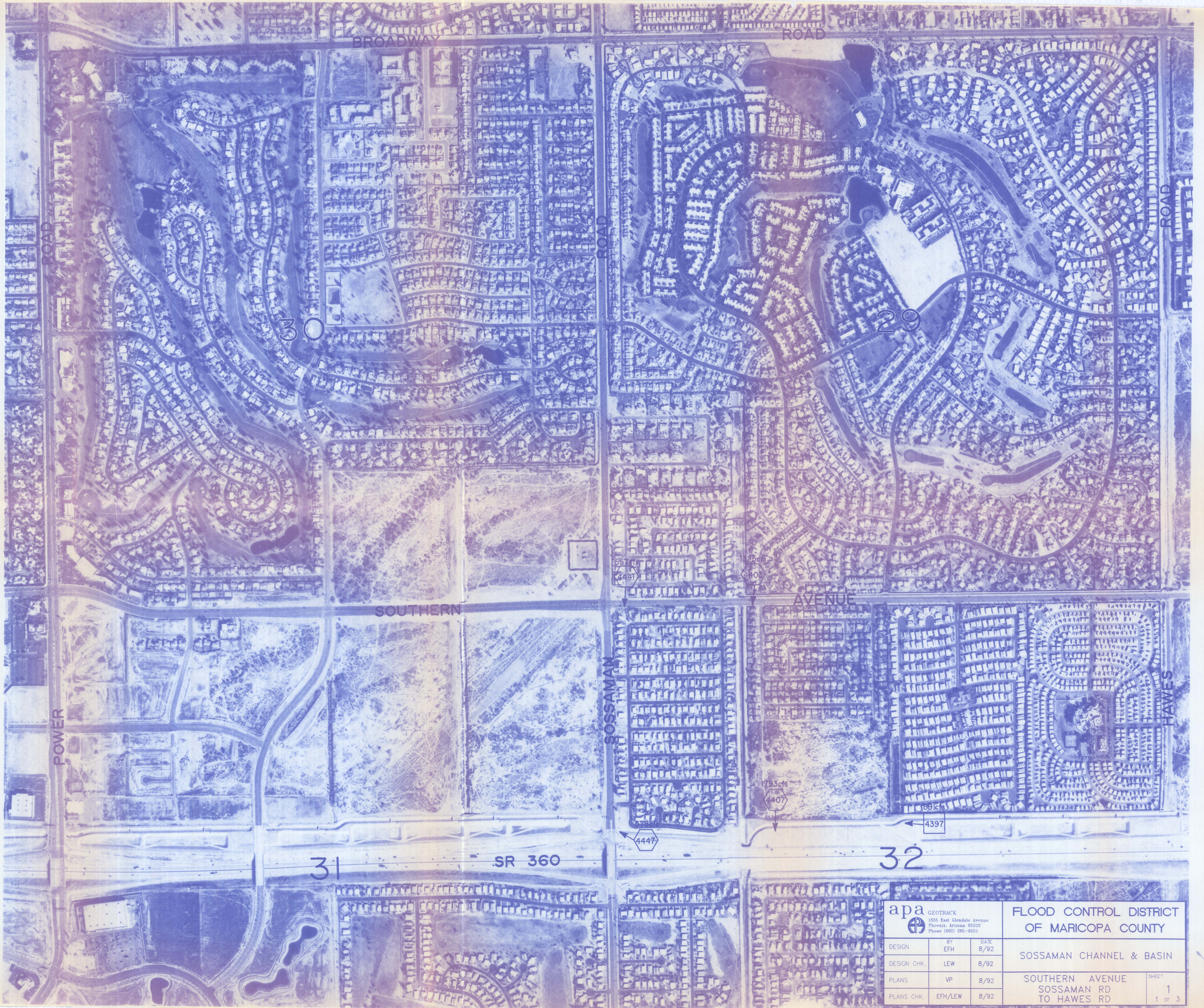
- SUBASIN RUNOFF
- COMBINE HYDROGRAPHS
- ROUTE HYDROGRAPH
- DIVERT HYDROGRAPH
- ROUTE HYDROGRAPH THRU BASIN

NOTE: Discharges shown are the 100 year, 24 hour design storm supplied by FCD. Node numbers shown within symbols are from the schematic routing for the East Maricopa County Area Drainage Master Study (EADMS 14)

N

TIN R7E

SCALE 1"= 400'



apa GEOTRACK
1555 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 265-9550

	BY	DATE
DESIGN	EFH	8/92
DESIGN CHK.	LEW	8/92
PLANS	VP	8/92
PLANS CHK.	EFH/LEW	8/92

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

SOUTHERN AVENUE
SOSSAMAN RD
TO HAWES RD

SHEET 1 OF 3

RUPP PHOTOGRAPHY, INC.
4811 NORTH 7TH STREET,
SUITE B
PHOENIX, ARIZONA 85014
(602) 277-0439

LEGEND

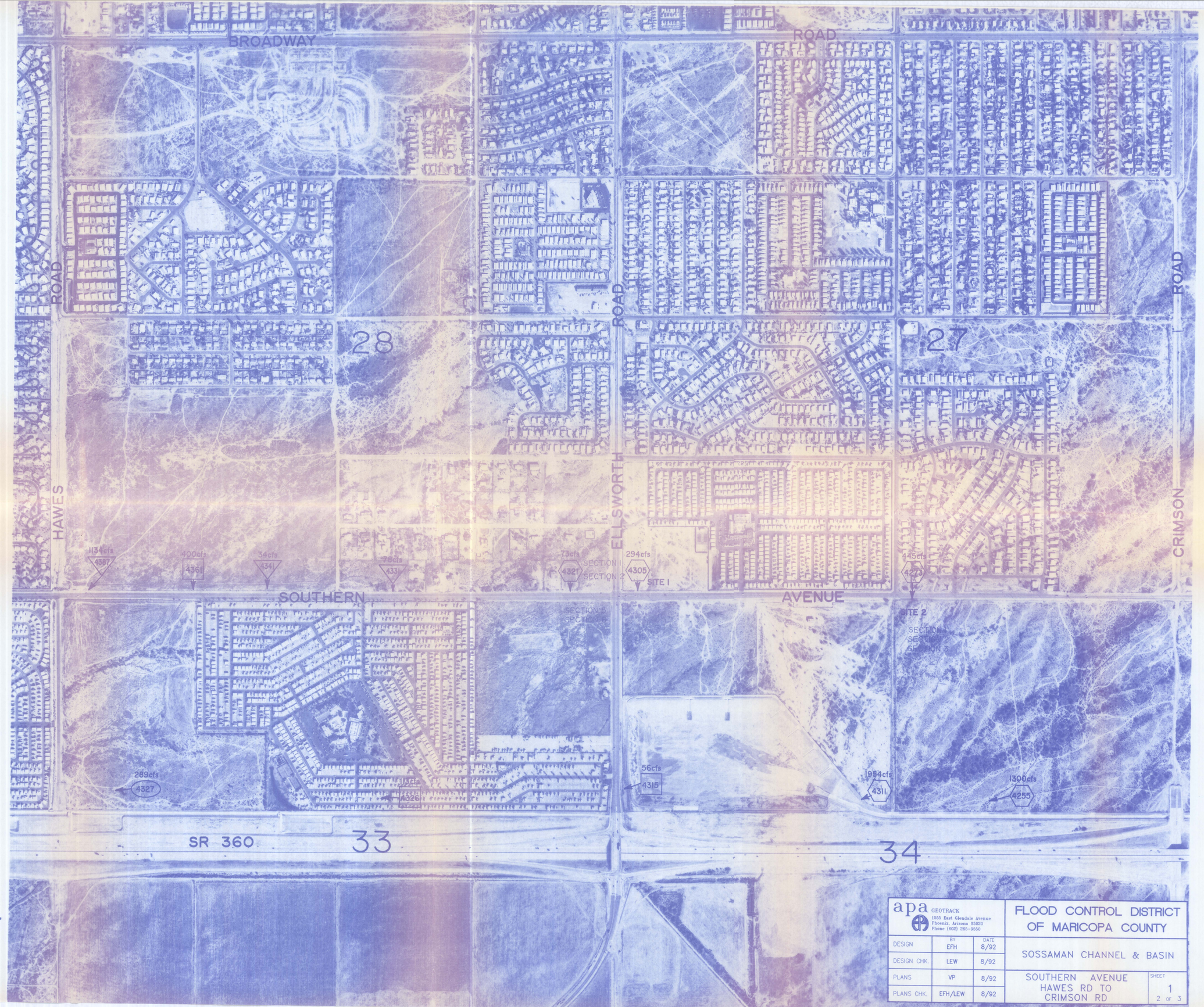
- SUBASIN RUNOFF
- COMBINE HYDROGRAPHS
- ROUTE HYDROGRAPH
- DIVERT HYDROGRAPH
- ROUTE HYDROGRAPH THRU BASIN

NOTE: Discharges shown are the 100 year, 24 hour design storm supplied by FCD. Node numbers shown within symbols are from the schematic routing for the East Maricopa County Area Drainage Master Study (EADMS 14)

N

TIN — R7E

SCALE 1"= 400'



apa GEOTRACK 1555 East Glendale Avenue Phoenix, Arizona 85020 Phone (602) 265-9550			FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	BY EFH	DATE 8/92	SOSSAMAN CHANNEL & BASIN
DESIGN CHK.	LEW	8/92	
PLANS	VP	8/92	SOUTHERN AVENUE HAWES RD TO CRIMSON RD
PLANS CHK.	EFH/LEW	8/92	SHEET 1 OF 3

RUPP PHOTOGRAPHY, INC.
4811 NORTH 7TH STREET,
SUITE B
PHOENIX, ARIZONA 85014
(602) 277-0439

LEGEND

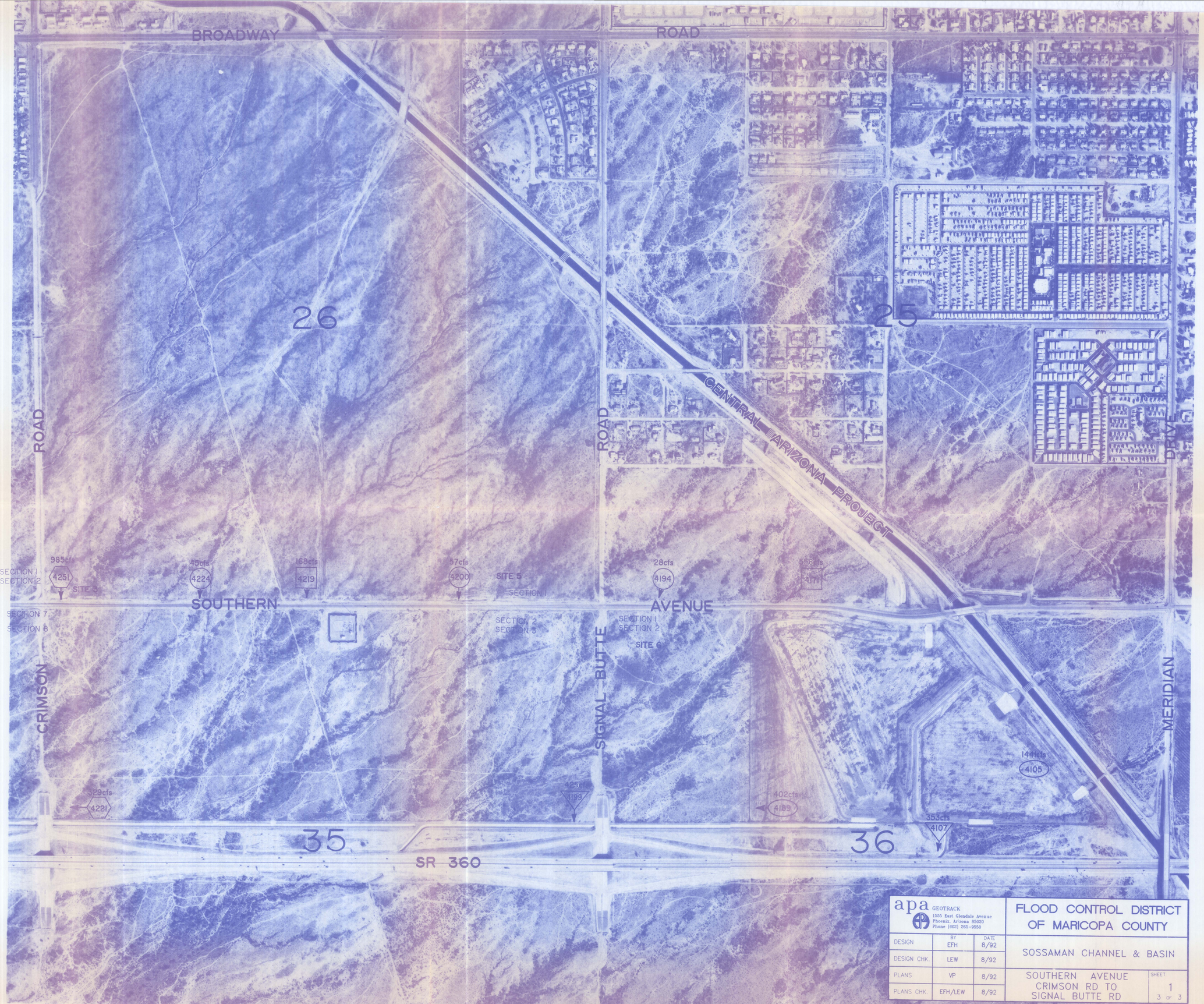
- SUBASIN RUNOFF
- COMBINE HYDROGRAPHS
- ROUTE HYDROGRAPH
- DIVERT HYDROGRAPH
- ROUTE HYDROGRAPH THRU BASIN

NOTE: Discharges shown are the 100 year, 24 hour design storm supplied by FCD. Node numbers shown within symbols are from the schematic routing for the East Maricopa County Area Drainage Master Study (EADMS 14)

N

TIN R7E

SCALE 1"= 400'



apa GEOTRACK
1555 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 265-9550

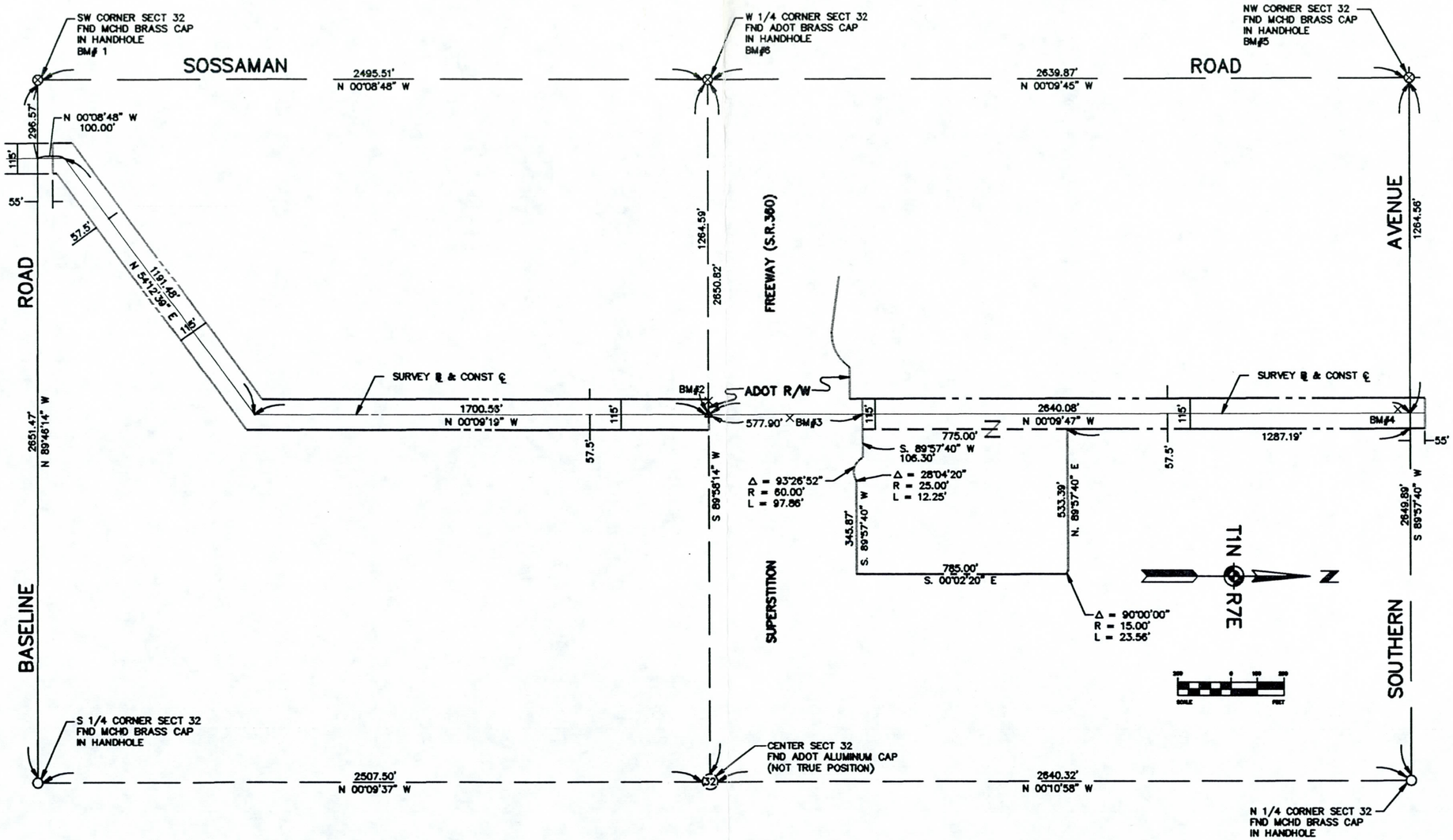
	BY	DATE
DESIGN	EFH	8/92
DESIGN CHK.	LEW	8/92
PLANS	VP	8/92
PLANS CHK.	EFH/LEW	8/92

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

SOUTHERN AVENUE
CRIMSON RD TO
SIGNAL BUTTE RD

SHEET 1 3 OF 3



BASIS OF BEARINGS

ARIZONA STATE PLANE COORDINATE SYSTEM
N.A.D. 1983, CENTRAL ZONE

ALL BEARINGS ARE GRID
ALL DISTANCES ARE GROUND

BASIS OF BENCH MARKS

N.G.V.D. 1929

NUMBER	ELEVATION	DESCRIPTION
1	1385.98	MCHD BRASS CAP IN HANDHOLE SW CORNER SECT 32 T1N, R7E.
2	1408.14	ADOT ALUMINUM R/W CAP, S SIDE OF SR 360 STA 929+99.4, W OF SOSSAMAN CHANNEL.
3	1409.70	ADOT ALUMINUM CAP, N SIDE OF SR 360 AT CENTERLINE CBC.
4	1417.21	MCHD BRASS CAP IN W END OF HDWL, S SIDE OF SOUTHERN AVE AT SOSSAMAN CHANNEL. STAMPED "1419.41", 1980 *
5	1405.76	MCHD BRASS CAP IN HANDHOLE NW CORNER SECT 32, T1N, R7E.
6	1403.77	ADOT BRASS CAP IN HANDHOLE W 1/4 CORNER SECT 32, T1N, R7E.

* EQUATION TO MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION DATUM = N.G.V.D. +2.20'

EQUATION TO CITY OF MESA DATUM = N.G.V.D.

GEOMETRIC DATA

CURVE NUMBER	PI STATION	CURVE LENGTH	TANGENT LENGTH	DELTA

TWO WORKING DAYS BEFORE YOU DIG CALL BLUE STAKE 1-800-782-5348

apa GEOTRACK
1566 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 256-9658

SYMBOL	REVISION DESCRIPTION	DATE	BY

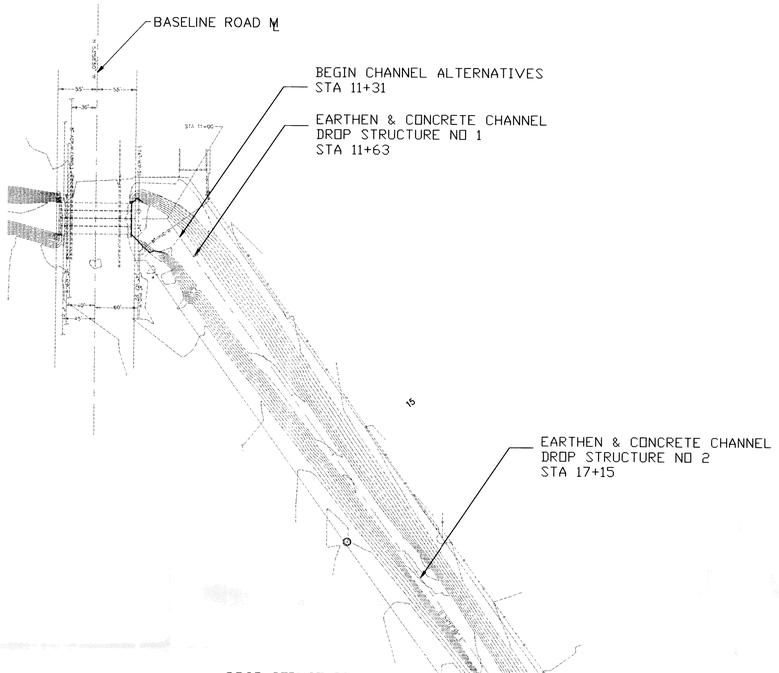
	BY	DATE
DESIGN	LEW	8/3/92
DESIGN CHK.	DSH	8/10/92
PLANS	EJB/LEW	8/3/92
PLANS CHK.	DSH	8/10/92

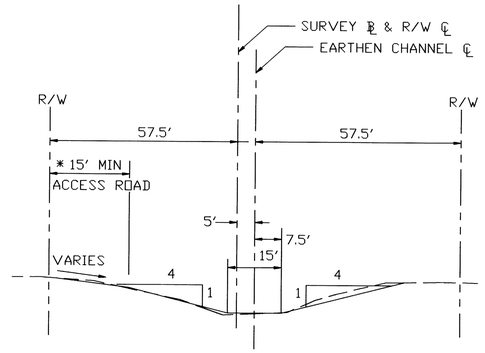
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

PROJECT CONTROL

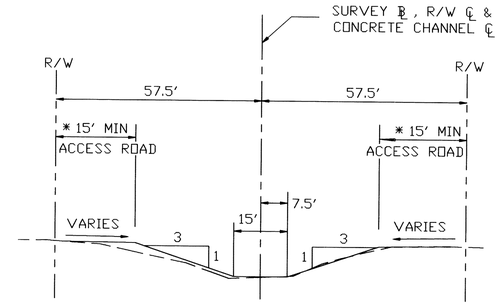
SHEET 0 OF 0





EARTHEN CHANNEL
TYPICAL SECTION

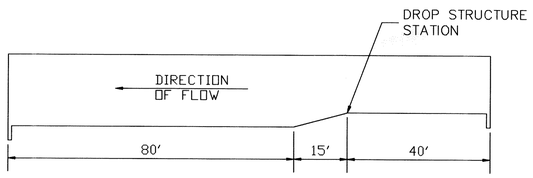
STA 11+31 TO STA 39+92
NTS LOOKING DOWNSTREAM



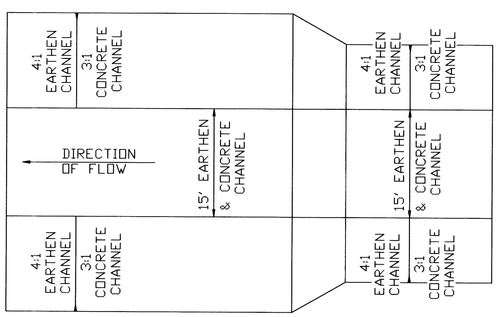
CONCRETE CHANNEL
TYPICAL SECTION

STA 11+31 TO STA 39+92
NTS LOOKING DOWNSTREAM

*NOTE: REQUIRED CHANNEL FREEBOARD MAY INCLUDE ACCESS ROAD

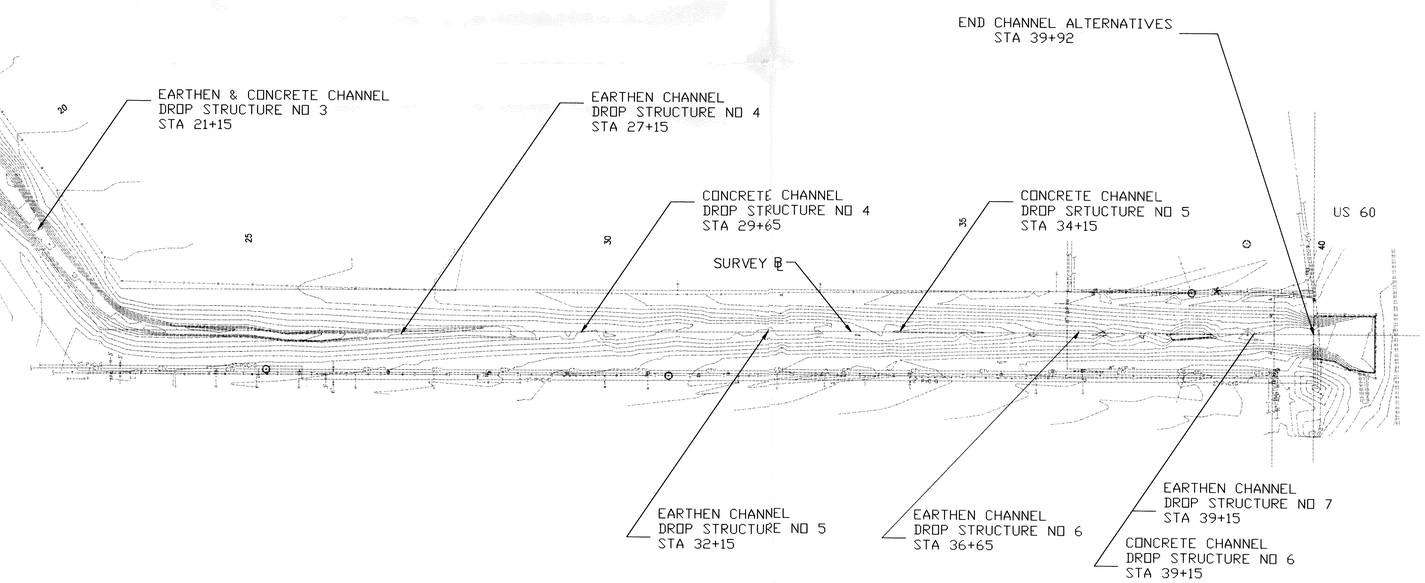


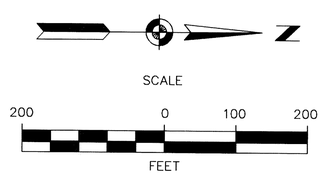
LONGITUNINAL SECTION
NTS



PLAN
NTS

EARTHEN & CONCRETE CHANNEL
TYPICAL DROP STRUCTURE





FILENAME: P31D01-1

TWO WORKING DAYS BEFORE YOU DIG CALL BLUE STAKE 1-800-782-5348

SYMBOL	REVISION DESCRIPTION	DATE	BY

apa GEOTRACK
1555 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 285-9550

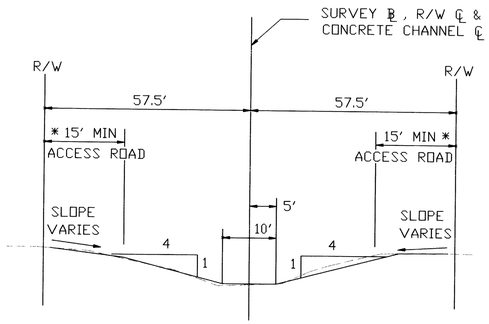
	BY	DATE
DESIGN	LEW	2/93
DESIGN CHK.		
PLANS	WTF	2/93
PLANS CHK.	MAR	2/93

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

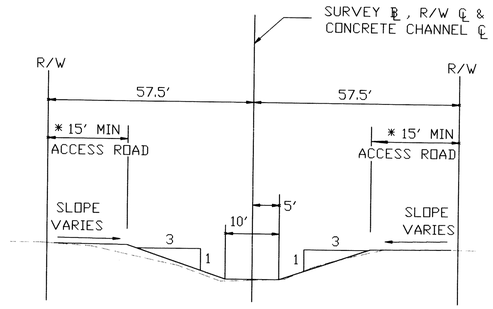
CHANNEL ALTERNATIVES
STA 11+31 TO 39+92

SHEET 1
1 OF 3



EARTHEN CHANNEL
TYPICAL SECTION

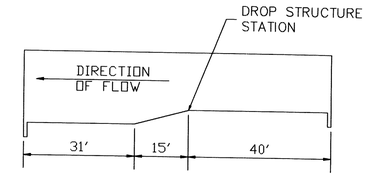
STA 45+69 TO 65+65
NTS LOOKING DOWNSTREAM



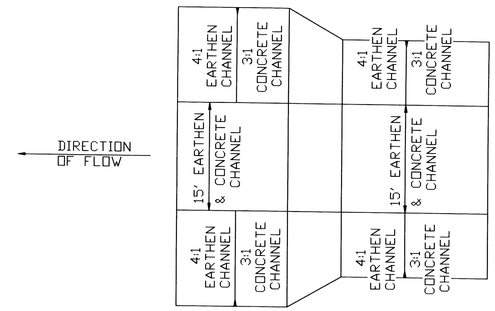
CONCRETE CHANNEL
TYPICAL SECTION

STA 45+69 TO 65+65
NTS LOOKING DOWNSTREAM

*NOTE: REQUIRED CHANNEL FREEBOARD MAY INCLUDE ACCESS ROAD

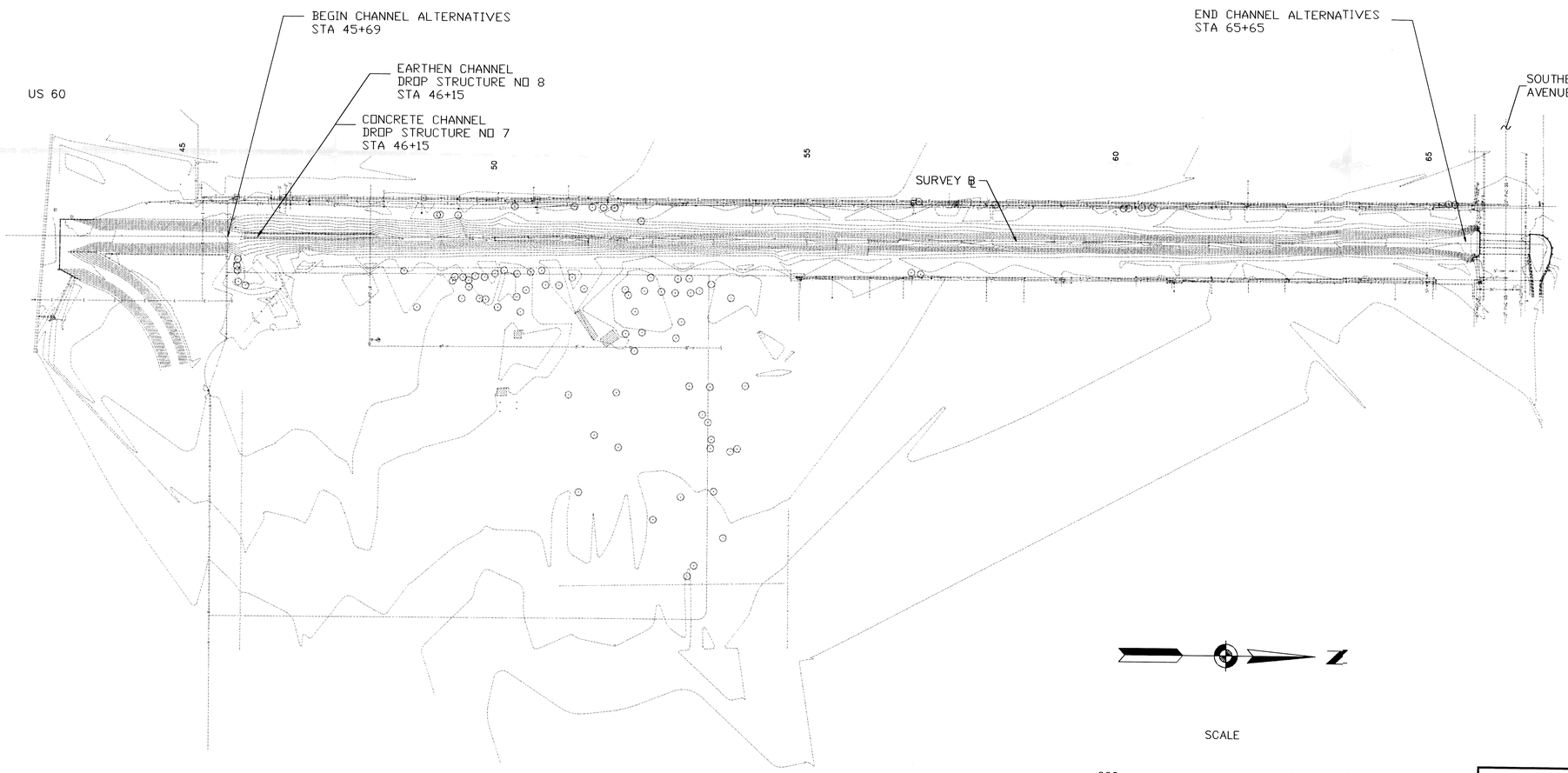


LONGITUNINAL SECTION
NTS



PLAN
NTS

EARTHEN & CONCRETE CHANNEL
TYPICAL DROP STRUCTURE



FILENAME: P31D01-2

TWO WORKING DAYS BEFORE YOU DIG CALL BLUE STAKE 1-800-782-5348

apa GEOTRACK
1555 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 285-9550

	BY	DATE
DESIGN	LEW	2/93
DESIGN CHK.		
PLANS	WTF	2/93
PLANS CHK.	MAR	2/93

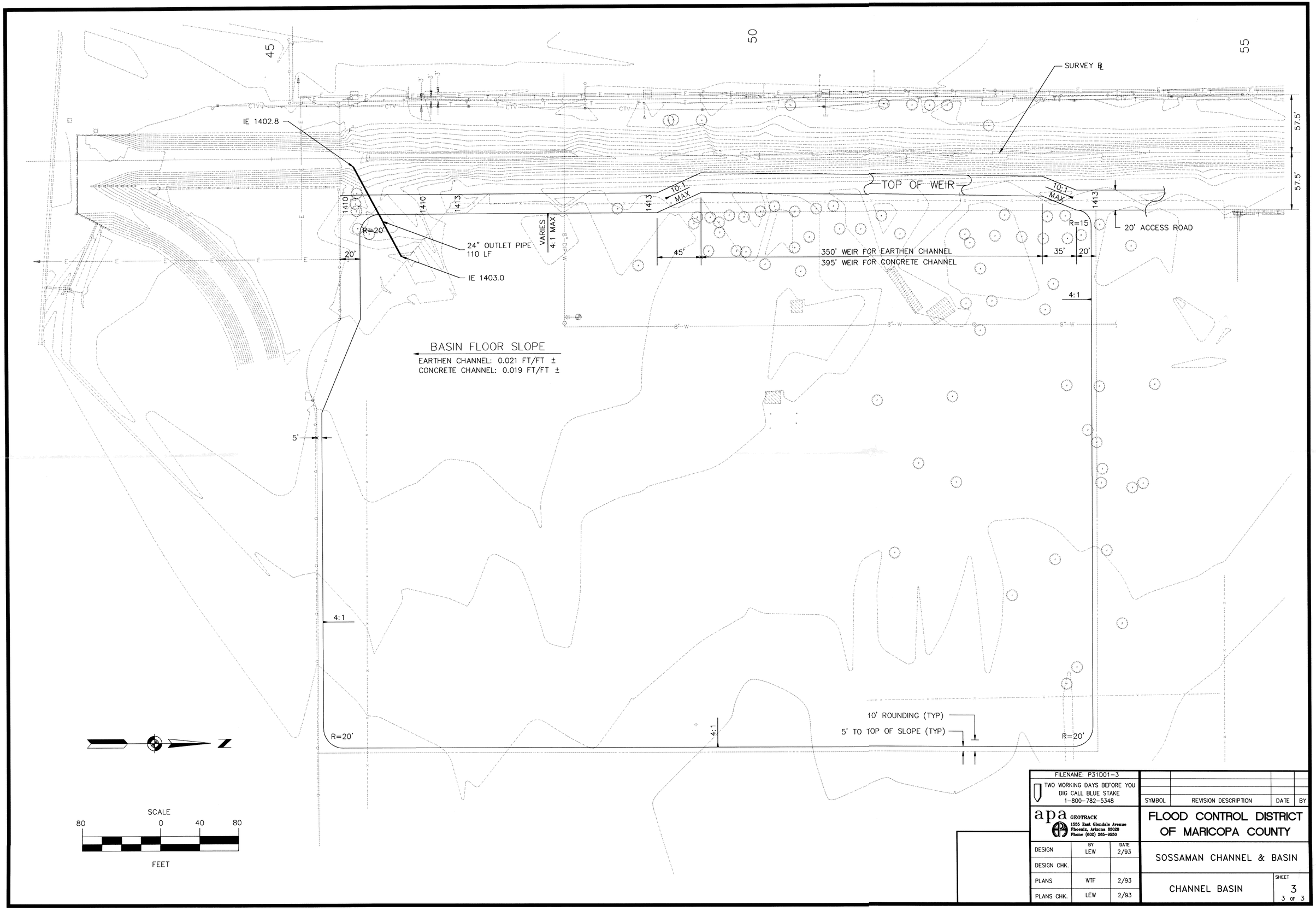
SYMBOL	REVISION DESCRIPTION	DATE	BY

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

CHANNEL ALTERNATIVES
STA 45+69 TO 65+56

SHEET 2
2 OF 3



FILENAME: P31D01-3

TWO WORKING DAYS BEFORE YOU DIG CALL BLUE STAKE 1-800-782-5348

apa GEOTRACK
1555 East Glendale Avenue
Phoenix, Arizona 85020
Phone (602) 285-9550

	BY	DATE
DESIGN	LEW	2/93
DESIGN CHK.		
PLANS	WTF	2/93
PLANS CHK.	LEW	2/93

SYMBOL	REVISION DESCRIPTION	DATE	BY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOSSAMAN CHANNEL & BASIN

CHANNEL BASIN

SHEET 3 OF 3