January 1991

Section 4 Drainage Study

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Contract No. 87-40

Squaw Peak Highway

Submitted to the

Arizona Department of Transportation

Prepared By

Baker Engineers 50 YEARS OF SERVICE
Michael Baker, Jr., Inc.
Phoenix, Arizona

DN 71
FN 5.2.3

SQUAW PEAK HIGHWAY
Section 4 Drainage Study

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1.0 GENERAL

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These features are the subject of this study.

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This study covers review of offsite hydrology and the channel system in Section 4 to determine whether modifications in the design and analysis can significantly reduce construction costs of the drainage facilities and associated structures.

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The study consists of a review of the following components of the General Plan: hydrology, increased in-channel storage, substitution of trapezoidal channel for rectangular channel, use of existing storm drain capacity and discharge locations to reduce Sweetwater Channel capacity and reconfiguration of the Squaw Peak Highway channel crossing. Study activities are as follows:

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3.5 Squaw Peak Highway Channel Crossing

In the General Plan the main channel crosses under two-span grade separation structure for Sweetwater Avenue. This study proposes to utilize a box culvert for the channel crossing and a single span bridge for the grade separation.

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The modified drainage configuration, which incorporates the various cost reduction/flow reduction concepts, is shown in plan view in Plate 2. The modified profile is shown in Plate 3. The storm operation of the study configuration was modeled by revising the calibrated HEC-1 Model. The study model is shown schematically in Figure C-1 and HEC-1 output is presented in Appendix C.

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4.0 BENEFITS

4.1 Costs

The estimated cost savings are based on the Section 4 Estimate Summary dated November 15, 1990. The net change in costs evaluated for or this study is a reduction of $260,200. Table 1 is the summary of changes in estimated costs resulting from the modifications proposed in this study. As discussed in the previous paragraph, this savings does not reflect potential savings in the area east of 34th Street attributable to the reduction in peak flows.

4.2 Flow Rates

The reduced flow rates determined in this study allow lower velocity channel flows within the same right-of-way. Design is simplified because supercritical flows are avoided. Special transition sections may be replaced by standard ADOT headwalls at culverts. The benefits include reduced construction time, simpler design process and reduced possibility of operational problems. These factors may result in significant unidentified cost savings.

TABLE 1

ITEM	DESCRIPTION	QUANTITY GENL. PLAN	QUANTITY STUDY	QUANTITY NET	UNIT	COST ($)	NET COST CHANGE ($)
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	• Structural Excavation	76,000	110,900	+ 34,900	C.Y.	3.80	+ 132,600
5	DRAINAGE						
	• 66" RCP	700	700	0			0
	Concrete Channel:						
	• Shea - Cholla 16' Lined	2,500	0	-2,500	L.FT.	144.	-360,000
	Shea - Cholla Trap, Concrete Slopes	0	2,338	+ 2,338	L.FT.	180.	+ 420,800
	Drop Structure Desert Cove	0	1	+ 1	L.S.	37,000.	+ 37,000
	Drop Structure Cholla	0	1	+ 1	L.S.	23,700.	+ 23,700
	• Cholla - Cactus 36' RC	2,700	0	-2,700	L.FT.	378.	-1,020,600
	Cholla - Cactus 35' RC	0	2,100	+ 2,100	L.FT.	432.	+ 907,200
	Cholla - Cactus Trap, Concrete Slopes	0	600	+ 600	L.FT.	252.	+ 151,200
	• Cactus - Sweetwater 45' RC	2,500	1,500	-1,000	L.FT.	450.	-450,000
	Cactus - Sweetwater Trap, Concrete Slopes	0	1,000	+ 1,000	L.FT.	351.	+ 351,000
	• Sweetwater - IBW 55' RC	1,500	0	-1,500	L.FT.	529.	-793,500
	Sweetwater - IBW 40' RC	0	1,070	+ 1070	L.FT.	432.	+ 462,200
6	STRUCTURES						
	• Retaining Walls	53,740	55,040	+ 1,300	S.F.	20.	+ 26,000
	Bridges:						
	• Cholla Drainage Crossing	2,240	1,400	-840	S.F.	40.	-33,600
	• Cactus Drainage Crossing	5,500	5,400	-100	S.F.	40.	-4,000
	• Sweetwater Drainage (33rd)	4,480	22,080	+ 17,600	S.F.	40.	+ 704,000
	• 34th Street Drainage Crossing	3,360	0	-3,360	S.F.	40.	-134,400
	• Sweetwater Overpass	27,972	11,100	-16,872	S.F.	50.	-843,600
	• **General Plan Estimate Items**	**Net**	**(Decrease)**				**(260,200)**

5.0 RECOMMENDATIONS

Generally, the modifications described in this study are recommended for adoption in the General Plan. Other specific recommendations follow:

5.1 Hydrology

It is recommended that the section design consultant be required to perform a hydrology study for the section to better define the various points of interception and peak inflows for the 50 and 100-year events. Additional detail is needed to locate specific concentration points and to define size and type of channel inlets.

5.2 Channel Concepts

The substitution of trapezoidal channels for rectangular concrete channels is a very sound economic move where right-of-way is available. It is recommended that rectangular concrete channel sections be replaced by trapezoidal sections wherever right-of-way permits.

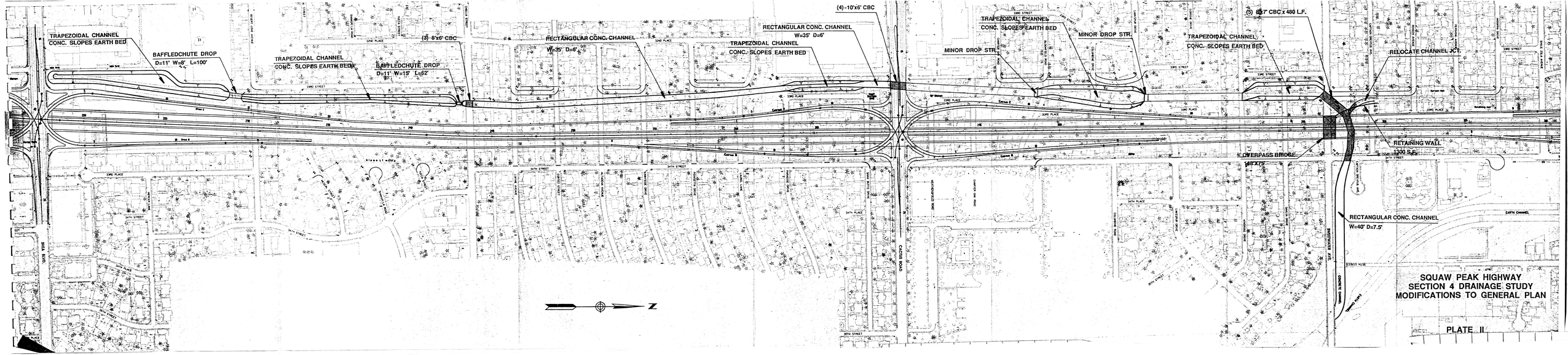
5.3 In-Channel Storage

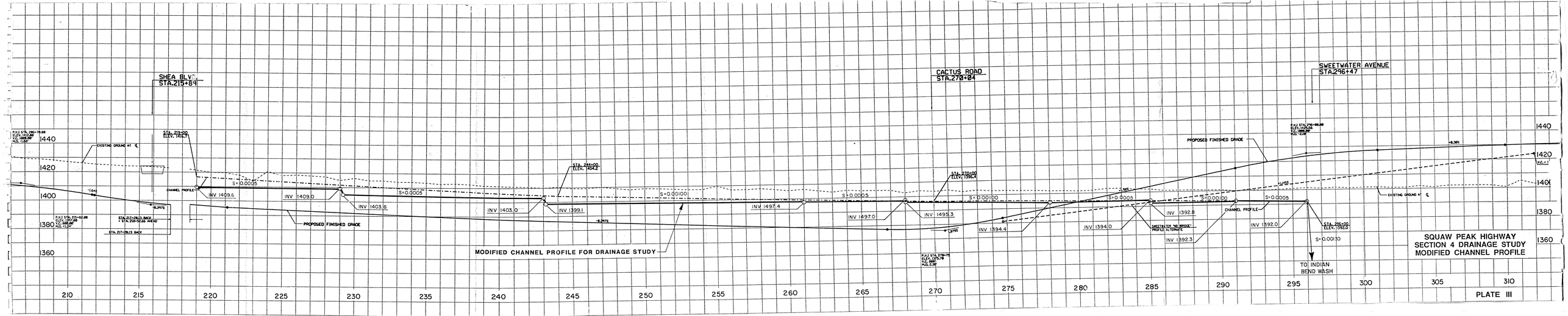
The enlarged channel between Shea Boulevard and Desert Cove Avenue is very effective in reducing the flood peak. It is recommended that this basin be made part of the General Plan regardless of whether other features of this study are retained.

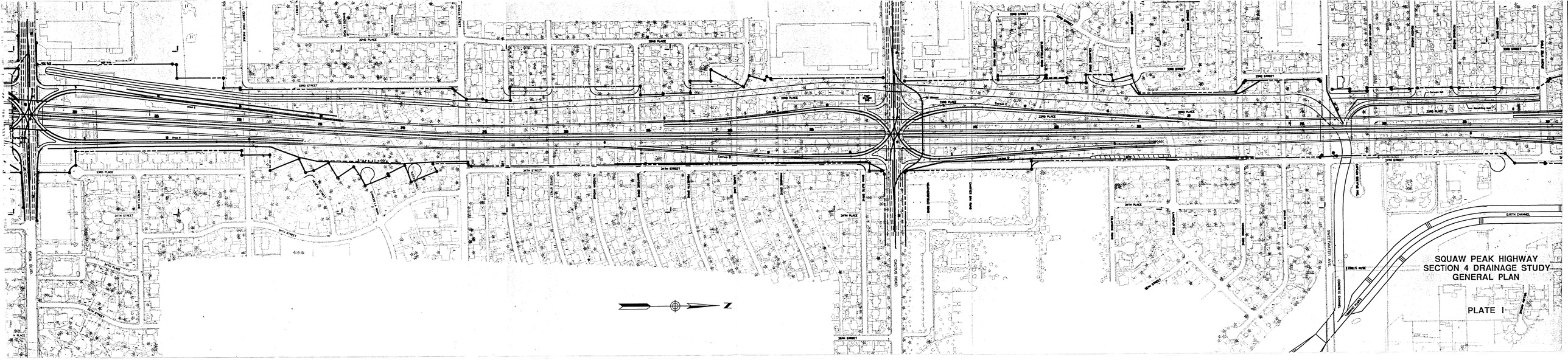
In all areas additional right-of-way may become available as "mitigation acquisition" or by inverse condemnation. If and when these become available for Squaw Peak Highway purposes, increase in in-channel storage should be considered in the design phase.

APPENDIX A

Calculations


TRAPEZOIDAL CHANNEL
CONC. SLOPES EARTH BED
BAFFLEDCHUTE DROP
D=11' W=8' L=100'
TRAPEZOIDAL CHANNEL
CONC. SLOPES EARTH BED
BAFFLEDCHUTE DROP
D=11' W=15' L=52'
(3) 6'x6' CBC
RECTANGULAR CONC. CHANNEL
W=35' D=6'
RECTANGULAR CONC. CHANNEL
W=35' D=6'
TRAPEZOIDAL CHANNEL
CONC. SLOPES EARTH BED
(4)-10'x6' CBC
MINOR DROP STR.
TRAPEZOIDAL CHANNEL
CONC. SLOPES EARTH BED
MINOR DROP STR.
TRAPEZOIDAL CHANNEL
CONC. SLOPES EARTH BED
(5) 8'x7' CBC x 480 L.F.
RELOCATE CHANNEL JCT.
RETAINING WALL
1300 S.F.
OVERPASS BRIDGE
RECTANGULAR CONC. CHANNEL
W=40' D=7.5'
SQUAW PEAK HIGHWAY
SECTION 4 DRAINAGE STUDY
MODIFICATIONS TO GENERAL PLAN
PLATE II


SHEA BLVD
STA.215+89
CACTUS ROAD
STA.270+04
SWEETWATER AVENUE
STA.296+47
P.V.I. STA. 280+78.88
ELEV. 1402.88
V.C. 1809.88'
PCL 1.6%
STA. 213+00
ELEV. 1416.7
EXISTING GROUND AT ℄
CHANNEL PROFILE
S=0.0005
INV 1409.6
INV 1409.0
INV 1403.6
INV 1403.0
INV 1399.1
STA. 264+00
ELEV. 1404.2
S=0.00100
INV 1497.4
INV 1497.0
INV 1495.3
STA. 270+00
ELEV. 1396.4
S=0.00100
INV 1394.4
INV 1394.0
INV 1392.8
INV 1392.3
INV 1392.0
STA. 295+00
ELEV. 1392.0
S=0.00130
TO INDIAN BEND WASH
PROPOSED FINISHED GRADE
MODIFIED CHANNEL PROFILE FOR DRAINAGE STUDY
P.V.I. STA. 279+75
ELEV. 1375.78
V.C. 1500'
PCL 2.0%
P.V.I. STA. 295+98.88
ELEV. 1392.88
V.C. 1800.88'
PCL 2.0%
P.V.I. STA. 215+52.88
ELEV. 1377.88
V.C. 1600.88'
PCL 1.5%
STA. 217+28.13 BACK
= STA. 215+52.88 AHEAD
STA. 217+28.13 BACK
SWEETWATER "NO BRIDGE" PROFILE ALTERNATE
1440
1420
1400
1380
1360
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
SQUAW PEAK HIGHWAY
SECTION 4 DRAINAGE STUDY
MODIFIED CHANNEL PROFILE
PLATE III


SQUAW PEAK HIGHWAY
SECTION 4 DRAINAGE STUDY
GENERAL PLAN
PLATE I
SHEA BLVD.
32ND PLACE
32ND STREET
34TH STREET
34TH PLACE
CACTUS ROAD
DEVONSHIRE AVE.
EARTH CHANNEL
N

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It is recommended that the section design consultant be required to perform a hydrology study for the section to better define the various points of interception and peak inflows for the 50 and 100-year events. Additional detail is needed to locate specific concentration points and to define size and type of channel inlets.

5.2 Channel Concepts

The substitution of trapezoidal channels for rectangular concrete channels is a very sound economic move where right-of-way is available. It is recommended that rectangular concrete channel sections be replaced by trapezoidal sections wherever right-of-way permits.

5.3 In-Channel Storage

The enlarged channel between Shea Boulevard and Desert Cove Avenue is very effective in reducing the flood peak. It is recommended that this basin be made part of the General Plan regardless of whether other features of this study are retained.

In all areas additional right-of-way may become available as "mitigation acquisition" or by inverse condemnation. If and when these become available for Squaw Peak Highway purposes, increase in in-channel storage should be considered in the design phase.

APPENDIX A

Calculations

S.O. No. _____

Subject: Squaw Peak Section 4-5

Sheet No. ____ of ____

Drawing No. _____

Computed by GWG Checked By [illegible] 12-28-90 Date 11-14-90

DROP STRUCTURES

"Design of Small Canal Structures"

Use $q = 40$ cfs/ft.

$$U_c = (gq)^{1/3} = 10.88 \text{ fps}$$

$$U_{l_{max}} = \frac{U_c}{2} = 5.44 \text{ fps}$$

$$d_1 = \text{inlet depth} = \frac{q}{U_1} = 7.35 \text{ ft.}$$

$$E_1 = 7.35 + \frac{5.44^2}{2g} = 7.81$$

$$d_c = \left(\frac{q^2}{g}\right)^{1/3} = 3.68 \text{ ft.}$$

$$E_c = 1.5 d_c = 5.52$$

$$h_l = \frac{0.5}{2g}(U_c - U_l)^2 = 0.[illegible]$$

$$h_s = 7.81 - 5.52 - 0.[illegible] = 1.[illegible]$$

q	0	5	10	20	30	40	50
d_c	0	.92	1.[illegible]	2.[illegible]	3.03	3.68	4.27
E_c	0	1.38	2.19	3.43	4.55	5.52	6.41
y_1	1.60	2.[illegible]	3.[illegible]	5.[illegible]	6.15	7.21	8.01
E_{100}	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

$S_1 = 1.60$

Assume that $d_1 = 7.35$ [illegible] can be expected for time period [illegible] to 100 [illegible] or [illegible].

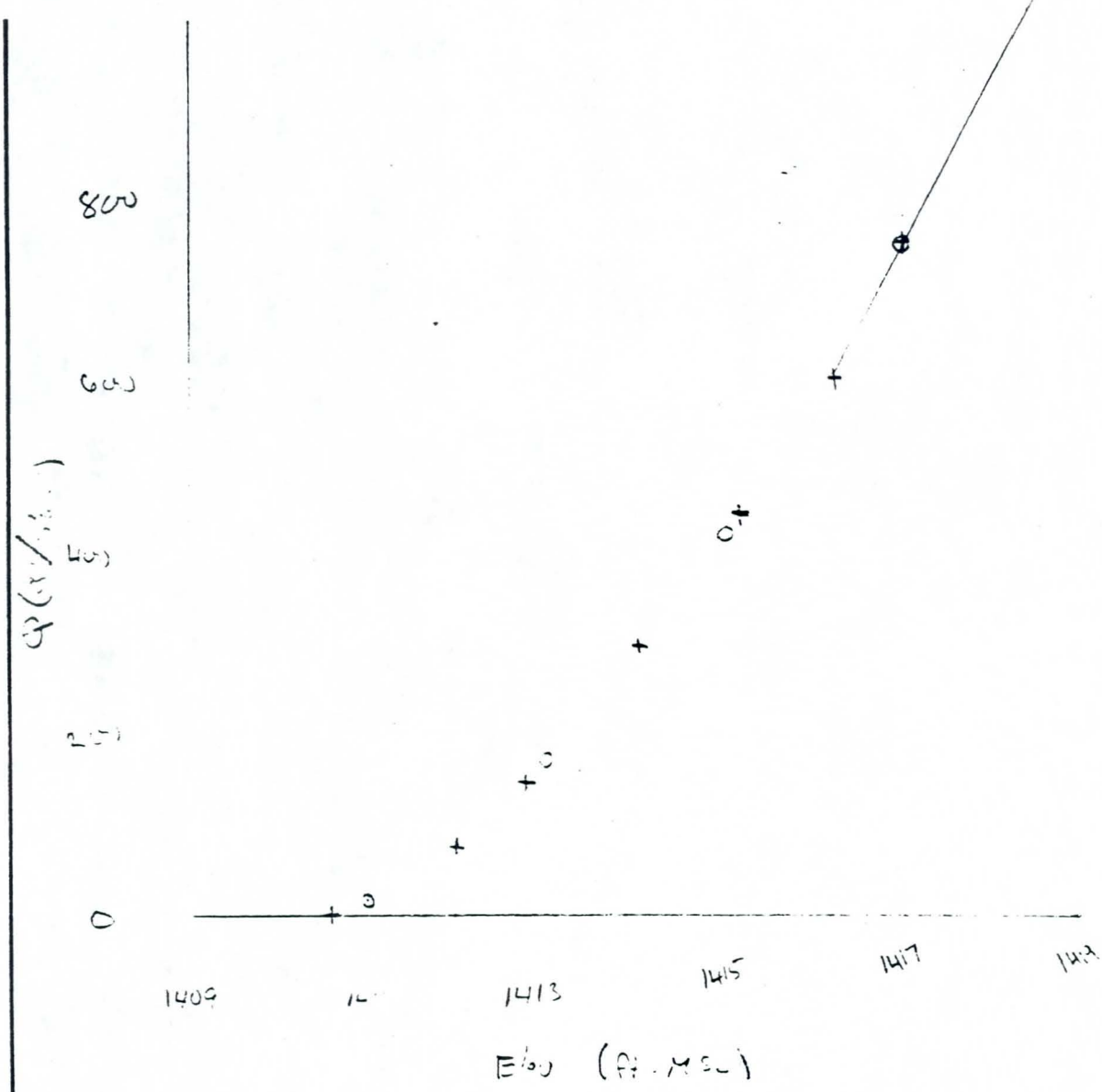
S.O. No. _____

Subject: Spring Pond Section 4-5

Sheet No. ____ of ____

Drawing No. _____

Computed by CWG Checked By RAG 12-28-90 Date 11-14-90



	SE	1409	1411	1413	1415	1417	1419	
(15')	SQ	0	20	175	425	750	1130	for STO 2 ✓
(8')	SQ	0	11	93	227	400	603	for STO 1 ✓
(30')	SQ	0	40	350	850	1500	2260	for STO 3 + STO 4 ✓
(45')	SQ	0	60	525	1275	2250	3390	for STO 5

S.O. No. _____

Subject: Spring Park Section 4.5

Sheet No. ____ of ____

Drawing No. _____

Computed by GWB Checked By [illegible] 12-26-90 Date 11-15-90

Use $q = 20$ cfs/ft.

$U_c = (gq)^{1/3} = 8.64$ fps

$U_1 = \frac{U_c}{2} = 4.32$ fps

$d_1 = \frac{q}{U_1} = 4.63$ ft.

This is too low. Using the available storage volume to [illegible] excess flows for too long of a time period.

Use $q = 50$ cfs/ft

$U_c = (gq)^{1/3} = 11.72$ fps

$U_1 = \qquad = 5.86$ fps

$d_1 = \frac{q}{U} = 8.53$ ft

$E_1 = 8.53 + \frac{5.86^2}{2g} = 9.06$

$E_c = 1.5\, d_c = 1.5\left(\frac{50^2}{32.2}\right)^{1/3} = 6.40$

$h_1 = \frac{0.5}{2g}\left(U_c^2 - U_1^2\right) = 0.80$

$h_s = 9.06 - 6.40 - 0.80 = 1.86'$ sill height

At this height there should be no flows exceeding d_1 or d_c.

Baker Engineers

S.O. No. _____

Subject: SQUAW PEAK HWY
SECTION 4 DRAINAGE STUDY

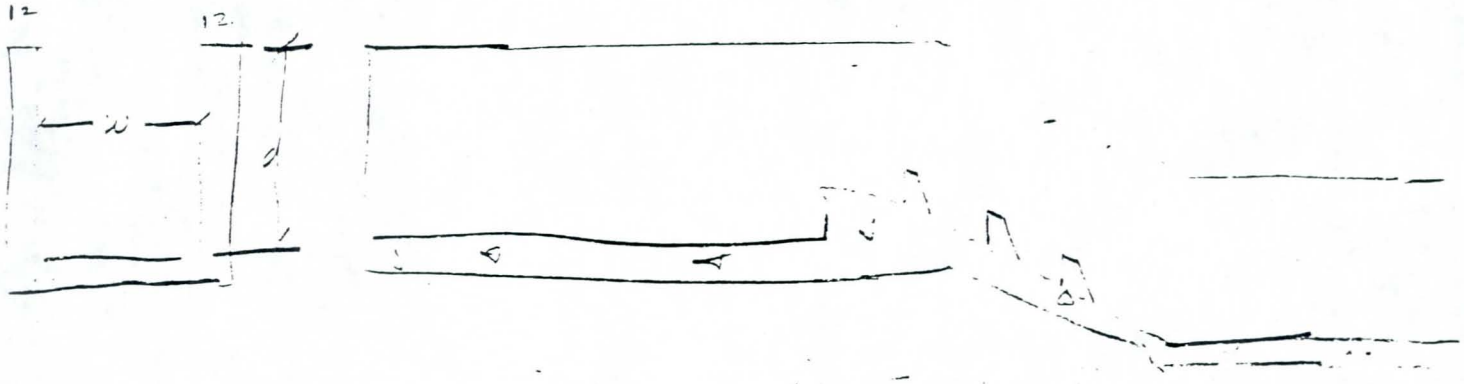
Sheet No. ____ of ____

Drawing No. _____

Computed by BRJ 12-13-90 Checked By _____ Date _____

Structure Estimates
CHANNEL DROP STR

STA 228+50 to 229+50 (DESERT COVE) W=3' D=11' L=100'



[illegible] = 110.5 cu.yd.

[illegible] = $37,000

STA 242+50 to 243+12 (CHOLLA) W=15' D=11' L=62'

(CHOLLA CBC DOWNSTREAM OF DROP TERMINATE STR CALCS AT 243+12)

VOL CONC $\frac{[12' \times 11' \times 62']}{27} - \frac{[11' \times 9' \times 62']}{27} = 75.8$ cu.yd.

COST = 75.8 × (250 × 1.25) = $23,700

STA 268+00 & 285+00 - Drop Strs. ΔH = 1.7' & 1.3'

MINOR DROP EST COST EACH STR - $5,000

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

50 yr

Worksheet Name: CHOLLA CBC

Comment:

Solve For Depth

(3) 8' x 6'

Given Input Data:

$Q_{50} = 287 \times 3 = 861$ cfs

Bottom Width.....	8.00 ft
Manning's n.....	0.013
Channel Slope....	0.0015 ft/ft
Discharge.....	287.00 cfs

Computed Results:

Depth.....	4.81 ft
Velocity.....	7.45 fps
Flow Area.....	38.51 sf
Flow Top Width...	8.00 ft
Wetted Perimeter.	17.63 ft
Critical Depth...	3.42 ft
Critical Slope...	0.0037 ft/ft
Froude Number....	0.60 (flow is Subcritical)

Quantity
[illegible] x 50' = 1400 sq. ft.

Open Channel Flow Module, Version 3.09 (c) 1990
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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: 100-yr

Comment: CHULLA CBC

Solve For Depth

Given Input Data: (3) 8' x 6'

Bottom Width.....	8.00 ft
Manning's n.....	0.013
Channel Slope....	0.0015 ft/ft
Discharge.....	366.00 cfs

$Q_{100} = 3 \times 366 = 1098$ cfs

Computed Results:

Depth.....	5.81 ft
Velocity.....	7.87 fps
Flow Area.....	46.51 sf
Flow Top Width...	8.00 ft
Wetted Perimeter.	19.63 ft
Critical Depth...	4.02 ft
Critical Slope...	0.0039 ft/ft
Froude Number....	0.58 (flow is Subcritical)

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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment:

CHOLLA TO CACTUS
APPX Sta
244+00 to 261+00
Q_{50} = 1594.00 cfs

Solve For Depth

Given Input Data:

Bottom Width.....	35.00 ft
Manning's n.....	0.013
Channel Slope....	0.0010 ft/ft
Discharge.....	1594.00 cfs

Computed Results:

Depth.....	5.06 ft
Velocity.....	9.00 fps
Flow Area.....	177.18 sf
Flow Top Width...	35.00 ft
Wetted Perimeter.	45.12 ft
Critical Depth...	4.01 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.70 (flow is Subcritical)

Quantity 2100 LF

Total Trapezoidal [illegible] 1500 LF
600 LF
2100 LF

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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment:

CHOLLA TO CACTUS

244+00 to 261+00

Q_{100} = 1972 cfs

Solve For Depth

Given Input Data:

Bottom Width.....	35.00 ft
Manning's n.....	0.013
Channel Slope....	0.0010 ft/ft
Discharge.....	1972.00 cfs

Computed Results:

Depth.....	5.83 ft
Velocity.....	9.67 fps
Flow Area.....	204.02 sf
Flow Top Width...	35.00 ft
Wetted Perimeter.	46.66 ft
Critical Depth...	4.62 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.71 (flow is Subcritical)

CULVERT # 1 PERFORMANCE CURVE
FOR 4 BARREL(S)

CMCTB - Box
(4) 10 x 6

	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	100.18	100.00	0.00	-0.18	1.00	100.18	0.00	0.00
197	101.73	101.35	1.37	1.55	0.00	0.00	0.00	3.67
394	102.63	102.07	2.13	2.45	0.00	0.00	0.00	4.76
592	103.39	102.67	2.82	3.21	0.00	0.00	0.00	5.54
789	104.06	103.21	3.45	3.88	0.00	0.00	0.00	6.15
986	104.69	103.70	4.04	4.51	0.00	0.00	0.00	6.66
183	105.27	104.16	4.61	5.09	0.00	0.00	0.00	7.10
1380	105.82	104.60	5.15	5.64	0.00	0.00	0.00	7.50
1578	106.34	105.03	5.68	6.16	0.00	0.00	0.00	7.85
596	106.39	105.07	5.73	6.21	0.00	0.00	0.00	7.88
972	107.34	105.83	6.75	7.16	0.00	0.00	0.00	8.46

El. inlet face invert 100.18 ft El. outlet invert 100.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 1.00 ft

PRESS <P> TO PLOT PRESS <ENTER> TO CONTINUE

2 3 4 5END 6 7 8 9 10

Quantity
45' x 120' = 5400 sq. ft.

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment:

Solve For Channel Slope

Given Input Data:

Bottom Width.....	10.00 ft
Manning's n.....	0.013
Depth.....	5.07 ft
Discharge.....	399.00 cfs

Computed Results:

Channel Slope....	0.0014 ft/ft
Velocity.....	7.87 fps
Flow Area.....	50.70 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	20.14 ft
Critical Depth...	3.67 ft
Critical Slope...	0.0033 ft/ft
Froude Number....	0.62 (flow is Subcritical)

Check outlet conds

CACTUS Box

$Q_{50} = \frac{1596}{4} = 399$ cfs

ok

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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Check outlet conds

CACTUS BOX

$Q_{100} = \frac{1972}{4} = 493$

ok

Worksheet Name:

Comment:

Solve For Channel Slope

Given Input Data:

Bottom Width.....	10.00 ft
Manning's n.....	0.013
Depth.....	5.83 ft
Discharge.....	493.00 cfs

Computed Results:

Channel Slope....	0.0015 ft/ft
Velocity.....	8.46 fps
Flow Area.....	58.30 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	21.66 ft
Critical Depth...	4.23 ft
Critical Slope...	0.0034 ft/ft
Froude Number....	0.62 (flow is Subcritical)

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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

CACTUS TO SWEETWATER
270+00 to 278+00

Q_{50} = 1678 cfs

Worksheet Name:

Comment:

Solve For Depth

Given Input Data:

Bottom Width.....	35.00 ft
Manning's n.....	0.013
Channel Slope....	0.0010 ft/ft
Discharge.....	1678.00 cfs

Computed Results:

Depth.....	5.24 ft
Velocity.....	9.16 fps
Flow Area.....	183.29 sf
Flow Top Width...	35.00 ft
Wetted Perimeter.	45.47 ft
Critical Depth...	4.15 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.71 (flow is Subcritical)

Quantity 1500 LF

Total Issue of
Compensation 1000 LF
1500 LF

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Rectangular Channel Analysis & Design
Open Channel - Uniform flow

CACTUS TO SWEETWATER
270+00 to 278+00
Q_{100} = 2136 cfs

Worksheet Name:

Comment:

Solve For Depth

Given Input Data:

Bottom Width.....	35.00 ft
Manning's n.....	0.013
Channel Slope....	0.0010 ft/ft
Discharge.....	2136.00 cfs

Computed Results:

Depth.....	6.15 ft
Velocity.....	9.93 fps
Flow Area.....	215.20 sf
Flow Top Width...	35.00 ft
Wetted Perimeter.	47.30 ft
Critical Depth...	4.87 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.71 (flow is Subcritical)

Open Channel Flow Module, Version 3.09 (c) 1990
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H4-8 OUTPUT

SPH (5) 8x7 CBC

DIA CBC

MAIN CHANNEL CROSSING

(INCLUDES SWEETWATER CROSSING WEST OF SPH and 34TH ST. CROSSING EAST OF SPH.)

ULVERTNALYSISERSION

URRENT DATEURRENT TIMEILE NAMEILE DATE
12-26-19 11:19:44 SW87 12/20/90

FLOW IS SUBMERGED - REQUIRES 3' HIGH SILL 10' DOWNSTREAM OF OUTLET - NOT SHOWN IN H4-8 ANALYSIS

ERFORMANCEURVEISCHARGEANGE
FLOWSNALYZED

MINUMUM DISCHARGE (CFS)	0
DESIGN DISCHARGE (CFS)	3003
MAXIMUM DISCHARGE (CFS)	3793

CJLV#	A - SITE DATA			B - CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANN. N	INLET TYPE
1	1388.80	1388.30	480.00	5 - RCB	8.00	7.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

QUANTITY 46' x 480' = 22,080 sq. ft.

CBC

T DATEURRENT TIMEILE NAMEILE DATE
-26-19 11:19:44 SW87 12/20/90

ULVERT NUMBER: 1

ULVERTNVERTATA

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	1390.50
OUTLET STATION (FT)	480.00
OUTLET ELEVATION (FT)	1388.30
NUMBER OF BARRELS	5.00
SLOPE (V-FT/H-FT)	0.0010
CULVERT LENGTH ALONG SLOPE (FT)	480.00

ARREL SHAPE: 8.00 FT X 7.00 FT BOX
ARREL MATERIAL: CONCRETE
WITH A MANNING'S N OF 0.013
NLET TYPE: CONVENTIONAL
NLET EDGE AND WALL: 1:1 BEVEL (45 DEG. FLARE)
NLET DEPRESSION: YES

INLET DEPRESSION (FALL) DATA

MAXIMUM ALLOWABLE FALL-	0.00 FT
INLET DEPRESSION	1.70 FT
FALL SLOPE (:1)	0.50
CREST WIDTH	0.00 FT

OWNSTREAM CHANNEL CROSS-SECTION

BOTTOM WIDTH (FT)	40.00
SIDE SLOPE H/V :1	0.0
CHANNEL SLOPE V/H (FT/FT)	0.001
MANNING'S N (.01-0.1)	0.013
CHANNEL INVERT ELEVATION (FT)	1388.30

CULVERT %13881 OUTLET INVERT ELEVATION AT

SPM
CBC

F T DATEURRENT TIMEILE NAMEILE DATE
..-26-19 11:19:44 SW87 12/20/90

NIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NO.	VEL. (FPS)	SHEAR (PSF)
0.00	1388.30	0.000	0.00	0.00
379.30	1390.00	0.000	5.57	0.14
758.60	1390.92	0.000	7.23	0.21
1137.90	1391.69	0.000	8.39	0.28
1517.20	1392.38	0.000	9.30	0.33
1896.50	1393.01	0.000	10.06	0.38
2275.80	1393.61	0.000	10.72	0.43
2655.10	1394.17	0.000	11.30	0.48
3003.00	1394.67	0.000	11.78	0.52
3413.70	1395.24	0.000	12.30	0.56
3793.00	1395.75	0.000	12.73	0.60

SELECTED OVERTOPPING CREST

ROADWAY SURFACE: PAVED

EMBANKMENT TOP WIDTH (FT): 180.00

'ANT ROADWAY ELEVATION PROFILE

CREST LENGTH (FT) 54.00
VERTOPPING CREST ELEVATION (FT) 1425.00

SPH
CBC

T DATEURRENT TIMEILE NAMEILE DATE
-26-19 11:19:44 SW87 12/20/90

SUMMARY OF CULVERT FLOWS (CFS) FILE: SW87 DATE: 12/20/90

ELEV (FT)	TOTAL	1	2	3	4	5	6	OVERTOP	ITER
1388.80	0	0	0	0	0	0	0	0	0
1391.17	379	379	0	0	0	0	0	0	2
1392.57	759	759	0	0	0	0	0	0	2
1393.71	1138	1138	0	0	0	0	0	0	2
1394.79	1517	1517	0	0	0	0	0	0	2
1394.90	1897	1897	0	0	0	0	0	0	2
1395.75	2276	2276	0	0	0	0	0	0	2
1396.55	2655	2655	0	0	0	0	0	0	2
1397.26	3003	3003	0	0	0	0	0	0	2
1398.06	3414	3414	0	0	0	0	0	0	2
1402.08	3793	3793	0	0	0	0	0	0	2

SPM
CBC

T DATEURRENT TIMEILE NAMEILE DATE
..-26-19 11:19:44 SW87 12/20/90

CULVERT # 1 PERFORMANCE CURVE
FOR 5 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	1390.53	1388.30	0.00	-0.50	-0.50	1388.80	0.00	0.00
379	1391.17	1390.00	2.36	2.37	2.37	1388.80	0.00	5.57
759	1392.57	1390.92	2.73	3.77	3.77	1388.80	0.00	7.23
1138	1393.71	1391.69	3.04	4.91	4.91	1388.80	0.00	8.39
1517	1394.79	1392.38	3.31	5.99	5.99	1388.80	0.00	9.30
1897	1395.75	1393.01	3.57	6.95	6.95	1388.80	0.00	10.06
2276	1396.60	1393.61	3.80	7.80	7.80	1388.80	0.00	10.72
2655	1397.05	1394.17	4.03	8.25	8.25	1388.80	0.00	11.30
3003	1397.76	1394.67	4.22	8.96	8.96	1388.80	0.00	11.79
3414	1863.26	1395.24	4.45	474.46	474.46	1388.80	0.00	12.30
3793	1402.08	1395.75	4.64	13.28	13.28	1388.80	0.00	13.55

JMMARY OF ITERATIVE SOLUTION ERRORS FILE: SW87 DATE: 12/20/90

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
1388.80	0.00	0	0	0.00
1391.17	0.00	379	0	0.00
1392.57	0.00	759	0	0.00
1393.71	0.00	1138	0	0.00
1394.79	0.00	1517	0	0.00
1394.90	0.00	1897	0	0.00
1395.75	0.00	2276	0	0.00
1396.55	0.00	2655	0	0.00
1397.26	0.00	3003	0	0.00
1398.06	0.00	3414	0	0.00
1402.08	0.00	3793	0	0.00

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Sweetwater Channel
[illegible] - Flow
Q_{50}=3005 cfs

Worksheet Name:

Comment:

Solve For Depth

Given Input Data:

Bottom Width.....	40.00 ft
Manning's n.....	0.013
Channel Slope....	0.0013 ft/ft
Discharge.....	3005.00 cfs

Computed Results:

Depth.....	6.38 ft
Velocity.....	11.78 fps
Flow Area.....	255.02 sf
Flow Top Width...	40.00 ft
Wetted Perimeter.	52.75 ft
Critical Depth...	5.60 ft
Critical Slope...	0.0019 ft/ft
Froude Number....	0.82 (flow is Subcritical)

Quantity 1070 LF

Total 1500
430+
1070 LF

[illegible] channel alignment
[illegible]

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Sweetwater Channel
34th St to I-5N
Q_{100} = 3795 cfs

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment:

Solve For Depth

Given Input Data:

Bottom Width.....	40.00 ft
Manning's n.....	0.013
Channel Slope....	0.0013 ft/ft
Discharge.....	3795.00 cfs

Computed Results:

Depth.....	7.45 ft
Velocity.....	12.73 fps
Flow Area.....	298.09 sf
Flow Top Width...	40.00 ft
Wetted Perimeter.	54.90 ft
Critical Depth...	6.54 ft
Critical Slope...	0.0019 ft/ft
Froude Number....	0.82 (flow is Subcritical)

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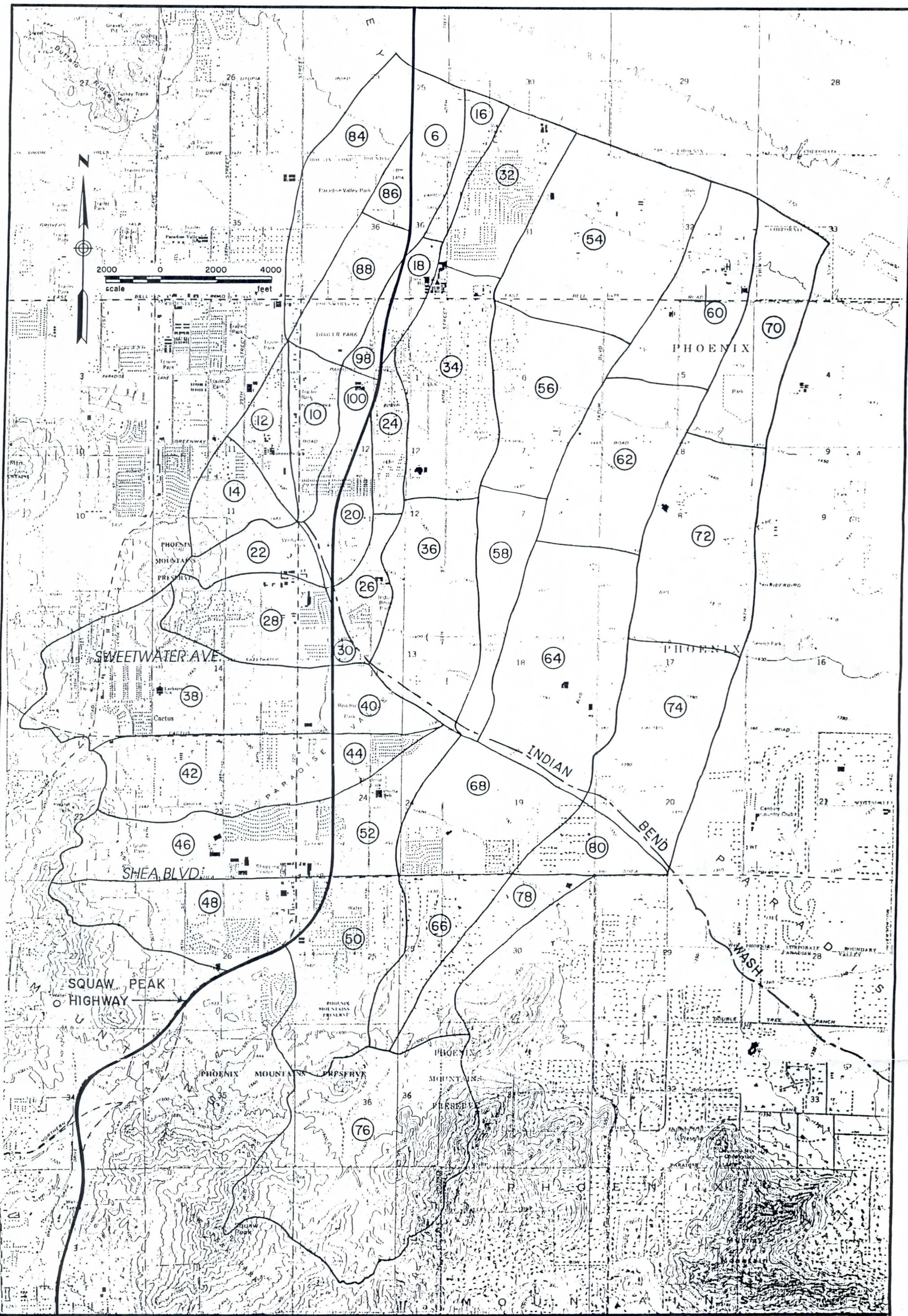
APPENDIX B

General Plan Model HEC-1 Calibrated to TR-20 Output



BAKER ENGINEERS

MICHAEL BAKER JR., INC.

INDIAN BEND WASH WATERSHED
DRAINAGE AREA MAP

FIGURE B-1

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

  1           ID   SQUAW PEAK HIGHWAY       SECTIONS 4 & 5      DRAINAGE TO SWEETWATER
  2           ID   50-YR STORM
  3           ID   MODEL BASED ON HEC-1 PARAMETERS IN FINAL HYDROLOGY MANUAL, NOV88
  4           ID   **********************LAG TIMES PER TR-20 TCONCS*****************************
  5           ID   **********************PRECIP PER TR-20 9-HR EVENT****************************
  6           IT       6 01JAN90       0     300
  7           IO       4
              *

  8           KK     S48
  9           KM   SUBAREA 48 HYDROGRAPH
 10           BA    0.80
              *
 11           IN       6
 12           PB    3.12
 13           PC    0.00    0.00    0.00    0.01    0.02    0.03    0.04    0.05    0.06    0.07
 14           PC    0.08    0.09    0.10    0.11    0.12    0.13    0.14    0.15    0.16    0.17
 15           PC    0.18    0.19    0.20    0.21    0.22    0.23    0.24    0.25    0.26    0.27
 16           PC    0.28    0.29    0.30    0.31    0.33    0.35    0.37    0.39    0.41    0.44
 17           PC    0.47    0.56    0.67    0.80    1.02    1.47    2.29    2.58    2.77    2.89
 18           PC    2.99    3.03    3.05    3.07    3.09    3.11    3.13    3.15    3.17    3.18
 19           PC    3.19    3.20    3.21    3.22    3.23    3.24    3.25    3.26    3.27    3.28
 20           PC    3.29    3.30    3.31    3.32    3.33    3.34    3.35    3.36    3.37    3.38
              *
 21           LS    0.37    87.1
 22           UD    0.34
              *

 23           KK     RS48
 24           KM   ROUTE S48 TO CP46                    SHEA TO CHOLLA
 25           RM       1    0.07     0.3
              *

 26           KK     S46
 27           KM   SUBAREA 46 HYDROGRAPH
 28           BA    0.82
 29           LS    0.41    85.8
 30           UD    0.50
              *

 31           KK     C46
 32           KM   COMBINE RS48 & S46
 33           HC       2    1.62
              *

 34           KK     S42
 35           KM   SUBAREA 42 HYDROGRAPH
 36           BA    0.90
 37           LS    0.47    83.9
 38           UD    0.55
              *
```

CALIBRATE

DT SHEAST

KK DCCT

KM CACTUS TO I 15

DT CCEAST ____ 300

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

  39          KK     C42
  40          KM   COMBINE RC46 & S42          AT        CACTUS
  41          HC       2    2.52
              *

  42          KK     RC42
  43          KM   ROUTE C42 TO CP38                CHOLLA TO SWEETWATER
  44          RM       1    0.11     0.3
              *

  45          KK     S38
  46          KM   SUBAREA 38 HYDROGRAPH
  47          BA    1.34
  48          LS    0.50    83.0
  49          UD    0.55
              *

  50          KK     C38
  51          KM   COMBINE RC42 & S38
  52          HC       2
  53          KO       1
  54          ZZ
```

```
                                    ****
                 FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
         U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                    ****


                 SQUAW PEAK HIGHWAY        SECTIONS 4 & 5      DRAINAGE TO SWEETWATER
                 50-YR STORM
                 MODEL BASED ON HEC-1 PARAMETERS IN FINAL HYDROLOGY MANUAL, NOV88
                 **********************LAG TIMES PER TR-20 TCONCS*****************************
                 **********************PRECIP PER TR-20 9-HR EVENT****************************

 7 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          4  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

 IT          HYDROGRAPH TIME DATA
                  NMIN          6  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1JAN90  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     2JAN90  ENDING DATE
                NDTIME       0554  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE   29.90 HOURS

       ENGLISH UNITS


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


          **************
          *            *
 8 KK     *      S48   *
          *            *
          **************
                     SUBAREA 48 HYDROGRAPH

11 IN        TIME DATA FOR INPUT TIME SERIES
                 JXMIN          6  TIME INTERVAL IN MINUTES
                JXDATE     1JAN90  STARTING DATE
                JXTIME          0  STARTING TIME

           SUBBASIN RUNOFF DATA

10 BA        SUBBASIN CHARACTERISTICS
                 TAREA        .80  SUBBASIN AREA

             PRECIPITATION DATA

12 PB            STORM       3.12  BASIN TOTAL PRECIPITATION

13 PI          INCREMENTAL PRECIPITATION PATTERN
                 .00      .00      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .02      .02      .02      .02      .02      .03      .03
                 .09      .11      .13      .22      .45      .82      .29      .19      .12      .10
                 .04      .02      .02      .02      .02      .02      .02      .02      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
```

```
                .01       .01       .01       .01       .01       .01       .01       .01       .01

21 LS        SCS LOSS RATE
                STRTL        .37  INITIAL ABSTRACTION
               CRVNBR      87.10  CURVE NUMBER
                RTIMP        .00  PERCENT IMPERVIOUS AREA

2 UD         SCS DIMENSIONLESS UNITGRAPH
                TLAG        .34  LAG

                                                    ***

NING *** TIME INTERVAL IS GREATER THAN .29*LAG

                                              UNIT HYDROGRAPH
                                          19 END-OF-PERIOD ORDINATES
          150.     491.     889.     990.     866.     629.     391.     259.     173.     113.
           74.      49.      32.      21.      14.      10.       7.       4.       1.

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

          **************
          *            *
23 KK     *     RS48   *
          *            *
          **************
                   ROUTE S48 TO CP46                    SHEA TO CHOLLA

        HYDROGRAPH ROUTING DATA

2:        MUSKINGUM ROUTING
              NSTPS         1 NUMBER OF SUBREACHES
              AMSKK       .07 MUSKINGUM K
                  X       .30 MUSKINGUM X

                                                    ***

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

          **************
          *            *
26 KK     *     S46    *
          *            *
          **************
                   SUBAREA 46 HYDROGRAPH

        SUBBASIN RUNOFF DATA

28 BA       SUBBASIN CHARACTERISTICS
                TAREA        .82  SUBBASIN AREA

            PRECIPITATION DATA

12 PB           STORM       3.12  BASIN TOTAL PRECIPITATION

13            INCREMENTAL PRECIPITATION PATTERN
                .00       .00       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .02       .02       .02       .02       .02       .03       .03
```

```
.09   .11   .13   .22   .45   .82   .29   .19   .12   .10
.04   .02   .02   .02   .02   .02   .02   .02   .01   .01
.01   .01   .01   .01   .01   .01   .01   .01   .01   .01
.01   .01   .01   .01   .01   .01   .01   .01   .01
```

```
2.      SCS LOSS RATE
            STRTL      .41  INITIAL ABSTRACTION
            CRVNBR   85.80  CURVE NUMBER
            RTIMP      .00  PERCENT IMPERVIOUS AREA

30 UD   SCS DIMENSIONLESS UNITGRAPH
            TLAG       .50  LAG

                                  ***

                                UNIT HYDROGRAPH
                            27 END-OF-PERIOD ORDINATES
   63.   192.   400.   612.   713.   713.   633.   522.   377.   273.
  202.   154.   114.    85.    63.    47.    35.    26.    19.    14.
   11.     8.     6.     5.     3.     2.     1.
```

*** ***

```
          **************
          *            *
31 KK     *     C46    *
          *            *
          **************
                  COMBINE RS48 & S46

3.      HYDROGRAPH COMBINATION
            ICOMP        2  NUMBER OF HYDROGRAPHS TO COMBINE

                                  ***
```

*** ***

```
          **************
          *            *
34 KK     *     S42    *
          *            *
          **************
                  SUBAREA 42 HYDROGRAPH

        SUBBASIN RUNOFF DATA

36 BA     SUBBASIN CHARACTERISTICS
              TAREA      .90  SUBBASIN AREA

          PRECIPITATION DATA

12 PB         STORM     3.12  BASIN TOTAL PRECIPITATION

13 PI     INCREMENTAL PRECIPITATION PATTERN
   .00   .00   .01   .01   .01   .01   .01   .01   .01
   .01   .01   .01   .01   .01   .01   .01   .01   .01
   .01   .01   .01   .01   .01   .01   .01   .01   .01
   .01   .01   .01   .02   .02   .02   .02   .02   .03   .03
   .09   .11   .13   .22   .45   .82   .29   .19   .12   .10
   .04   .02   .02   .02   .02   .02   .02   .02   .01   .01
```

```
          .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
          .01       .01       .01       .01       .01       .01       .01       .01       .01

7 LS        SCS LOSS RATE
                 STRTL        .47  INITIAL ABSTRACTION
                CRVNBR      83.90  CURVE NUMBER
                 RTIMP        .00  PERCENT IMPERVIOUS AREA

8 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG        .55  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          30 END-OF-PERIOD ORDINATES
      56.      167.      341.      556.      689.      725.      689.      604.      493.      358.
     268.      203.      159.      121.       92.       70.       53.       40.       31.       24.
      18.       14.       10.        8.        7.        5.        4.        2.        1.        0.

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

          **************
          *            *
39 KK     *       C42  *
          *            *
          **************
                     COMBINE RC46 & S42

41 HC       HYDROGRAPH COMBINATION
                 ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

          **************
          *            *
42 KK     *       RC4  *     2
          *            *
          **************
                     ROUTE C42 TO CP38              CHOLLA TO SWEETWATER

            HYDROGRAPH ROUTING DATA

44 RM       MUSKINGUM ROUTING
                 NSTPS          1 NUMBER OF SUBREACHES
                 AMSKK        .11 MUSKINGUM K
                     X        .30 MUSKINGUM X

                                                  ***

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

          **************
          *            *
45 KK     *       S38  *
          *            *
```

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**************
              SUBAREA 38 HYDROGRAPH

        SUBBASIN RUNOFF DATA

41        SUBBASIN CHARACTERISTICS
             TAREA        1.34  SUBBASIN AREA

          PRECIPITATION DATA

42 PB        STORM        3.12  BASIN TOTAL PRECIPITATION

43 PI       INCREMENTAL PRECIPITATION PATTERN
             .00    .00    .01    .01    .01    .01    .01    .01    .01    .01
             .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
             .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
             .01    .01    .01    .02    .02    .02    .02    .02    .03    .03
             .09    .11    .13    .22    .45    .82    .29    .19    .12    .10
             .04    .02    .02    .02    .02    .02    .02    .02    .01    .01
             .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
             .01    .01    .01    .01    .01    .01    .01    .01    .01

48 LS       SCS LOSS RATE
             STRTL         .50  INITIAL ABSTRACTION
            CRVNBR       83.00  CURVE NUMBER
             RTIMP         .00  PERCENT IMPERVIOUS AREA

49 UD       SCS DIMENSIONLESS UNITGRAPH
             TLAG         .55  LAG

                                   ***

                                UNIT HYDROGRAPH
                            30 END-OF-PERIOD ORDINATES
      83.     248.     507.     828.    1026.    1080.    1026.     900.     734.     533.
     399.     302.     237.     180.     137.     105.      79.      59.      46.      35.
      27.      21.      15.      12.      10.       8.       5.       4.       2.       0.

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

**************
*            *
50 KK   *   C38  *
*            *
**************
              COMBINE RC42 & S38

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

52 HC       HYDROGRAPH COMBINATION
             ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                   ***

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

                         HYDROGRAPH AT STATION      C38
                            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	JAN	0000	1	0.	1	JAN	0730	76	200.	1	JAN	1500	151	0.	1	JAN	2230	226	0.
		0006	2	0.	1	JAN	0736	77	197.	1	JAN	1506	152	0.	1	JAN	2236	227	0.
		0012	3	0.	1	JAN	0742	78	195.	1	JAN	1512	153	0.	1	JAN	2242	228	0.
1	JAN	0018	4	0.	1	JAN	0748	79	193.	1	JAN	1518	154	0.	1	JAN	2248	229	0.
1	JAN	0024	5	0.	1	JAN	0754	80	193.	1	JAN	1524	155	0.	1	JAN	2254	230	0.
1	JAN	0030	6	0.	1	JAN	0800	81	191.	1	JAN	1530	156	0.	1	JAN	2300	231	0.
1	JAN	0036	7	0.	1	JAN	0806	82	188.	1	JAN	1536	157	0.	1	JAN	2306	232	0.
1	JAN	0042	8	0.	1	JAN	0812	83	179.	1	JAN	1542	158	0.	1	JAN	2312	233	0.
1	JAN	0048	9	0.	1	JAN	0818	84	163.	1	JAN	1548	159	0.	1	JAN	2318	234	0.
1	JAN	0054	10	0.	1	JAN	0824	85	140.	1	JAN	1554	160	0.	1	JAN	2324	235	0.
1	JAN	0100	11	0.	1	JAN	0830	86	114.	1	JAN	1600	161	0.	1	JAN	2330	236	0.
1	JAN	0106	12	0.	1	JAN	0836	87	89.	1	JAN	1606	162	0.	1	JAN	2336	237	0.
1	JAN	0112	13	0.	1	JAN	0842	88	67.	1	JAN	1612	163	0.	1	JAN	2342	238	0.
1	JAN	0118	14	0.	1	JAN	0848	89	50.	1	JAN	1618	164	0.	1	JAN	2348	239	0.
1	JAN	0124	15	0.	1	JAN	0854	90	37.	1	JAN	1624	165	0.	1	JAN	2354	240	0.
1	JAN	0130	16	0.	1	JAN	0900	91	28.	1	JAN	1630	166	0.	2	JAN	0000	241	0.
1	JAN	0136	17	0.	1	JAN	0906	92	21.	1	JAN	1636	167	0.	2	JAN	0006	242	0.
1	JAN	0142	18	0.	1	JAN	0912	93	16.	1	JAN	1642	168	0.	2	JAN	0012	243	0.
1	JAN	0148	19	0.	1	JAN	0918	94	12.	1	JAN	1648	169	0.	2	JAN	0018	244	0.
1	JAN	0154	20	0.	1	JAN	0924	95	9.	1	JAN	1654	170	0.	2	JAN	0024	245	0.
1	JAN	0200	21	0.	1	JAN	0930	96	6.	1	JAN	1700	171	0.	2	JAN	0030	246	0.
1	JAN	0206	22	0.	1	JAN	0936	97	5.	1	JAN	1706	172	0.	2	JAN	0036	247	0.
1	JAN	0212	23	0.	1	JAN	0942	98	4.	1	JAN	1712	173	0.	2	JAN	0042	248	0.
1	JAN	0218	24	0.	1	JAN	0948	99	3.	1	JAN	1718	174	0.	2	JAN	0048	249	0.
1	JAN	0224	25	0.	1	JAN	0954	100	2.	1	JAN	1724	175	0.	2	JAN	0054	250	0.
1	JAN	0230	26	0.	1	JAN	1000	101	1.	1	JAN	1730	176	0.	2	JAN	0100	251	0.
1	JAN	0236	27	0.	1	JAN	1006	102	1.	1	JAN	1736	177	0.	2	JAN	0106	252	0.
1	JAN	0242	28	0.	1	JAN	1012	103	1.	1	JAN	1742	178	0.	2	JAN	0112	253	0.
1	JAN	0248	29	0.	1	JAN	1018	104	1.	1	JAN	1748	179	0.	2	JAN	0118	254	0.
		0254	30	0.	1	JAN	1024	105	0.	1	JAN	1754	180	0.	2	JAN	0124	255	0.
		0300	31	0.	1	JAN	1030	106	0.	1	JAN	1800	181	0.	2	JAN	0130	256	0.
1	JAN	0306	32	0.	1	JAN	1036	107	0.	1	JAN	1806	182	0.	2	JAN	0136	257	0.
1	JAN	0312	33	0.	1	JAN	1042	108	0.	1	JAN	1812	183	0.	2	JAN	0142	258	0.
1	JAN	0318	34	0.	1	JAN	1048	109	0.	1	JAN	1818	184	0.	2	JAN	0148	259	0.
1	JAN	0324	35	0.	1	JAN	1054	110	0.	1	JAN	1824	185	0.	2	JAN	0154	260	0.
1	JAN	0330	36	0.	1	JAN	1100	111	0.	1	JAN	1830	186	0.	2	JAN	0200	261	0.
1	JAN	0336	37	0.	1	JAN	1106	112	0.	1	JAN	1836	187	0.	2	JAN	0206	262	0.
1	JAN	0342	38	0.	1	JAN	1112	113	0.	1	JAN	1842	188	0.	2	JAN	0212	263	0.
1	JAN	0348	39	0.	1	JAN	1118	114	0.	1	JAN	1848	189	0.	2	JAN	0218	264	0.
1	JAN	0354	40	0.	1	JAN	1124	115	0.	1	JAN	1854	190	0.	2	JAN	0224	265	0.
1	JAN	0400	41	0.	1	JAN	1130	116	0.	1	JAN	1900	191	0.	2	JAN	0230	266	0.
1	JAN	0406	42	1.	1	JAN	1136	117	0.	1	JAN	1906	192	0.	2	JAN	0236	267	0.
1	JAN	0412	43	3.	1	JAN	1142	118	0.	1	JAN	1912	193	0.	2	JAN	0242	268	0.
1	JAN	0418	44	13.	1	JAN	1148	119	0.	1	JAN	1918	194	0.	2	JAN	0248	269	0.
1	JAN	0424	45	42.	1	JAN	1154	120	0.	1	JAN	1924	195	0.	2	JAN	0254	270	0.
1	JAN	0430	46	119.	1	JAN	1200	121	0.	1	JAN	1930	196	0.	2	JAN	0300	271	0.
1	JAN	0436	47	321.	1	JAN	1206	122	0.	1	JAN	1936	197	0.	2	JAN	0306	272	0.
1	JAN	0442	48	739.	1	JAN	1212	123	0.	1	JAN	1942	198	0.	2	JAN	0312	273	0.
1	JAN	0448	49	1429.	1	JAN	1218	124	0.	1	JAN	1948	199	0.	2	JAN	0318	274	0.
1	JAN	0454	50	2308.	1	JAN	1224	125	0.	1	JAN	1954	200	0.	2	JAN	0324	275	0.
1	JAN	0500	51	3112.	1	JAN	1230	126	0.	1	JAN	2000	201	0.	2	JAN	0330	276	0.
1	JAN	0506	52	3606.	1	JAN	1236	127	0.	1	JAN	2006	202	0.	2	JAN	0336	277	0.
1	JAN	0512	53	3732.	1	JAN	1242	128	0.	1	JAN	2012	203	0.	2	JAN	0342	278	0.
1	JAN	0518	54	3548.	1	JAN	1248	129	0.	1	JAN	2018	204	0.	2	JAN	0348	279	0.
1	JAN	0524	55	3157.	1	JAN	1254	130	0.	1	JAN	2024	205	0.	2	JAN	0354	280	0.
1	JAN	0530	56	2660.	1	JAN	1300	131	0.	1	JAN	2030	206	0.	2	JAN	0400	281	0.
1	JAN	0536	57	2172.	1	JAN	1306	132	0.	1	JAN	2036	207	0.	2	JAN	0406	282	0.
		0542	58	1751.	1	JAN	1312	133	0.	1	JAN	2042	208	0.	2	JAN	0412	283	0.
		0548	59	1414.	1	JAN	1318	134	0.	1	JAN	2048	209	0.	2	JAN	0418	284	0.
1	JAN	0554	60	1150.	1	JAN	1324	135	0.	1	JAN	2054	210	0.	2	JAN	0424	285	0.
1	JAN	0600	61	949.	1	JAN	1330	136	0.	1	JAN	2100	211	0.	2	JAN	0430	286	0.
1	JAN	0606	62	795.	1	JAN	1336	137	0.	1	JAN	2106	212	0.	2	JAN	0436	287	0.
1	JAN	0612	63	670.	1	JAN	1342	138	0.	1	JAN	2112	213	0.	2	JAN	0442	288	0.

1 JAN 0618	64	566.	*	1 JAN 1348	139	0.	*	1 JAN 2118	214	0.	*	2 JAN 0448	289	0.
1 JAN 0624	65	481.	*	1 JAN 1354	140	0.	*	1 JAN 2124	215	0.	*	2 JAN 0454	290	0.
1 JAN 0630	66	411.	*	1 JAN 1400	141	0.	*	1 JAN 2130	216	0.	*	2 JAN 0500	291	0.
1 JAN 0636	67	356.	*	1 JAN 1406	142	0.	*	1 JAN 2136	217	0.	*	2 JAN 0506	292	0.
N 0642	68	314.	*	1 JAN 1412	143	0.	*	1 JAN 2142	218	0.	*	2 JAN 0512	293	0.
N 0648	69	283.	*	1 JAN 1418	144	0.	*	1 JAN 2148	219	0.	*	2 JAN 0518	294	0.
1 JAN 0654	70	260.	*	1 JAN 1424	145	0.	*	1 JAN 2154	220	0.	*	2 JAN 0524	295	0.
1 JAN 0700	71	243.	*	1 JAN 1430	146	0.	*	1 JAN 2200	221	0.	*	2 JAN 0530	296	0.
1 JAN 0706	72	230.	*	1 JAN 1436	147	0.	*	1 JAN 2206	222	0.	*	2 JAN 0536	297	0.
1 JAN 0712	73	220.	*	1 JAN 1442	148	0.	*	1 JAN 2212	223	0.	*	2 JAN 0542	298	0.
1 JAN 0718	74	211.	*	1 JAN 1448	149	0.	*	1 JAN 2218	224	0.	*	2 JAN 0548	299	0.
1 JAN 0724	75	205.	*	1 JAN 1454	150	0.	*	1 JAN 2224	225	0.	*	2 JAN 0554	300	0.
			*				*				*			

****

EAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	29.90-HR
3732.	5.20	(CFS)	663.	166.	133.	133.
		(INCHES)	1.597	1.597	1.597	1.597
		(AC-FT)	329.	329.	329.	329.

CUMULATIVE AREA = 3.86 SQ MI

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	S48	1100.	4.90	154.	38.	31.	.80		
ROUTED TO	RS48	1093.	5.00	154.	38.	31.	.80		
HYDROGRAPH AT	S46	850.	5.10	148.	37.	30.	.82		
2 COMBINED AT	C46	1894.	5.00	302.	76.	61.	1.62		
HYDROGRAPH AT	S42	795.	5.20	149.	37.	30.	.90		
2 COMBINED AT	C42	2658.	5.10	451.	113.	90.	2.52		
ROUTED TO	RC42	2602.	5.20	451.	113.	90.	2.52		
HYDROGRAPH AT	S38	1131.	5.20	212.	53.	43.	1.34		
2 COMBINED AT	C38	3732.	5.20	663.	166.	133.	3.86		

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

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

  1           ID   SQUAW PEAK HIGHWAY       SECTIONS 4 & 5      DRAINAGE TO SWEETWATER
  2           ID   100-YR STORM
  3           ID   MODEL BASED ON TR-20 RUN  IN FINAL HYDROLOGY MANUAL, NOV88
  4           ID   ******************************LAG TIMES FROM TR-20 INPUT TCONCS**************
  5           ID   ******************************PRECIP. IS TR-20 9-HR EVENT********************
  6           IT       6 01JAN90       0     300
  7           IO       5
              *

  8           KK     S48
  9           KM   SUBAREA 48 HYDROGRAPH
 10           BA    0.80
              *
 11           IN       6
 12           PB    3.48
 13           PC    0.00    0.00    0.00    0.01    0.02    0.03    0.04    0.05    0.06    0.07
 14           PC    0.08    0.09    0.10    0.11   0.012    0.13    0.14    0.15    0.16    0.17
 15           PC    0.18    0.19    0.20    0.21    0.22    0.23    0.24    0.25    0.26    0.27
 16           PC    0.28    0.29    0.30    0.31    0.33    0.35    0.37    0.39    0.41    0.44
 17           PC    0.47    0.56    0.67    0.80    1.02    1.47    2.29    2.58    2.77    2.89
 18           PC    2.99    3.03    3.05    3.07    3.09    3.11    3.13    3.15    3.17    3.18
 19           PC    3.19    3.20    3.21    3.22    3.23    3.24    3.25    3.26    3.27    3.28
 20           PC    3.29    3.30    3.31    3.32    3.33    3.34    3.35    3.36    3.37    3.38
 21           PC    3.39    3.40    3.41    3.42    3.43    3.44    3.45    3.46    3.47    3.48
              *
 22           LS    0.37    87.1
 23           UD    0.34
              *

 24           KK    RS48
 25           KM   ROUTE S48 TO CP46                    SHEA TO CHOLLA
 26           RM       1    0.07     0.3
              *

 27           KK     S46
 28           KM   SUBAREA 46 HYDROGRAPH
 29           BA    0.82
 30           LS    0.41    85.8
 31           UD    0.50
              *

 32           KK     C46
 33           KM   COMBINE RS48 & S46
 34           HC       2    1.62
              *

 35           KK     S42
 36           KM   SUBAREA 42 HYDROGRAPH
 37           BA    0.90
 38           LS    0.47    83.9
 39           UD    0.47
              *
```

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

  40          KK     C42
  41          KM   COMBINE RC46 & S42
  42          HC       2    2.52
              *

  43          KK     RC42
  44          KM   ROUTE C42 TO CP38              CHOLLA TO SWEETWATER
  45          RM       1    0.11      0.3
              *

  46          KK     S38
  47          KM   SUBAREA 38 HYDROGRAPH
  48          BA    1.34
  49          LS    0.50    83.0
  50          UD    0.55
              *

  51          KK     C38
  52          KM   COMBINE RC42 & S38
  53          HC       2
  54          KO       1
  55          ZZ
```

```
                                                  ****
                    FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
          U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                                  ****



                    SQUAW PEAK HIGHWAY       SECTIONS 4 & 5       DRAINAGE TO SWEETWATER
                    100-YR STORM
                    MODEL BASED ON TR-20 RUN  IN FINAL HYDROLOGY MANUAL, NOV88
                    ******************************LAG TIMES FROM TR-20 INPUT TCONCS***************
                    ******************************PRECIP. IS TR-20 9-HR EVENT********************

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

   IT          HYDROGRAPH TIME DATA
                      NMIN           6  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1JAN90  STARTING DATE
                     ITIME        0000  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2JAN90  ENDING DATE
                    NDTIME        0554  ENDING TIME

                COMPUTATION INTERVAL     .10 HOURS
                     TOTAL TIME BASE   29.90 HOURS

        ENGLISH UNITS

WARN     *** TIME INTERVAL IS GREATER THAN .29*LAG


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


          **************
          *            *
 51 KK    *       C38  *
          *            *
          **************


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

 53 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

                                        HYDROGRAPH AT STATION      C38
                                           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 JAN 0000   1      0. *   1 JAN 0730  76     219. *   1 JAN 1500 151      0. *   1 JAN 2230 226      0.
   1 JAN 0006   2      0. *   1 JAN 0736  77     217. *   1 JAN 1506 152      0. *   1 JAN 2236 227      0.
```

1 JAN 0012	3	0.	*	1 JAN 0742	78	216.	*	1 JAN 1512	153	0.	*	1 JAN 2242	228	0.
1 JAN 0018	4	0.	*	1 JAN 0748	79	215.	*	1 JAN 1518	154	0.	*	1 JAN 2248	229	0.
1 JAN 0024	5	0.	*	1 JAN 0754	80	214.	*	1 JAN 1524	155	0.	*	1 JAN 2254	230	0.
1 JAN 0030	6	0.	*	1 JAN 0800	81	214.	*	1 JAN 1530	156	0.	*	1 JAN 2300	231	0.
1 0036	7	0.	*	1 JAN 0806	82	214.	*	1 JAN 1536	157	0.	*	1 JAN 2306	232	0.
N 0042	8	0.	*	1 JAN 0812	83	214.	*	1 JAN 1542	158	0.	*	1 JAN 2312	233	0.
1 JAN 0048	9	0.	*	1 JAN 0818	84	214.	*	1 JAN 1548	159	0.	*	1 JAN 2318	234	0.
1 JAN 0054	10	0.	*	1 JAN 0824	85	214.	*	1 JAN 1554	160	0.	*	1 JAN 2324	235	0.
1 JAN 0100	11	0.	*	1 JAN 0830	86	214.	*	1 JAN 1600	161	0.	*	1 JAN 2330	236	0.
1 JAN 0106	12	0.	*	1 JAN 0836	87	214.	*	1 JAN 1606	162	0.	*	1 JAN 2336	237	0.
1 JAN 0112	13	0.	*	1 JAN 0842	88	214.	*	1 JAN 1612	163	0.	*	1 JAN 2342	238	0.
1 JAN 0118	14	0.	*	1 JAN 0848	89	214.	*	1 JAN 1618	164	0.	*	1 JAN 2348	239	0.
1 JAN 0124	15	0.	*	1 JAN 0854	90	214.	*	1 JAN 1624	165	0.	*	1 JAN 2354	240	0.
1 JAN 0130	16	0.	*	1 JAN 0900	91	214.	*	1 JAN 1630	166	0.	*	2 JAN 0000	241	0.
1 JAN 0136	17	0.	*	1 JAN 0906	92	210.	*	1 JAN 1636	167	0.	*	2 JAN 0006	242	0.
1 JAN 0142	18	0.	*	1 JAN 0912	93	200.	*	1 JAN 1642	168	0.	*	2 JAN 0012	243	0.
1 JAN 0148	19	0.	*	1 JAN 0918	94	180.	*	1 JAN 1648	169	0.	*	2 JAN 0018	244	0.
1 JAN 0154	20	0.	*	1 JAN 0924	95	153.	*	1 JAN 1654	170	0.	*	2 JAN 0024	245	0.
1 JAN 0200	21	0.	*	1 JAN 0930	96	123.	*	1 JAN 1700	171	0.	*	2 JAN 0030	246	0.
1 JAN 0206	22	0.	*	1 JAN 0936	97	94.	*	1 JAN 1706	172	0.	*	2 JAN 0036	247	0.
1 JAN 0212	23	0.	*	1 JAN 0942	98	70.	*	1 JAN 1712	173	0.	*	2 JAN 0042	248	0.
1 JAN 0218	24	0.	*	1 JAN 0948	99	51.	*	1 JAN 1718	174	0.	*	2 JAN 0048	249	0.
1 JAN 0224	25	0.	*	1 JAN 0954	100	37.	*	1 JAN 1724	175	0.	*	2 JAN 0054	250	0.
1 JAN 0230	26	0.	*	1 JAN 1000	101	28.	*	1 JAN 1730	176	0.	*	2 JAN 0100	251	0.
1 JAN 0236	27	0.	*	1 JAN 1006	102	20.	*	1 JAN 1736	177	0.	*	2 JAN 0106	252	0.
1 JAN 0242	28	0.	*	1 JAN 1012	103	15.	*	1 JAN 1742	178	0.	*	2 JAN 0112	253	0.
1 JAN 0248	29	0.	*	1 JAN 1018	104	11.	*	1 JAN 1748	179	0.	*	2 JAN 0118	254	0.
1 JAN 0254	30	0.	*	1 JAN 1024	105	8.	*	1 JAN 1754	180	0.	*	2 JAN 0124	255	0.
1 JAN 0300	31	0.	*	1 JAN 1030	106	6.	*	1 JAN 1800	181	0.	*	2 JAN 0130	256	0.
1 JAN 0306	32	0.	*	1 JAN 1036	107	4.	*	1 JAN 1806	182	0.	*	2 JAN 0136	257	0.
1 JAN 0312	33	0.	*	1 JAN 1042	108	3.	*	1 JAN 1812	183	0.	*	2 JAN 0142	258	0.
1 JAN 0318	34	0.	*	1 JAN 1048	109	2.	*	1 JAN 1818	184	0.	*	2 JAN 0148	259	0.
1 0324	35	0.	*	1 JAN 1054	110	2.	*	1 JAN 1824	185	0.	*	2 JAN 0154	260	0.
0330	36	1.	*	1 JAN 1100	111	1.	*	1 JAN 1830	186	0.	*	2 JAN 0200	261	0.
1 JAN 0336	37	1.	*	1 JAN 1106	112	1.	*	1 JAN 1836	187	0.	*	2 JAN 0206	262	0.
1 JAN 0342	38	2.	*	1 JAN 1112	113	1.	*	1 JAN 1842	188	0.	*	2 JAN 0212	263	0.
1 JAN 0348	39	4.	*	1 JAN 1118	114	0.	*	1 JAN 1848	189	0.	*	2 JAN 0218	264	0.
1 JAN 0354	40	7.	*	1 JAN 1124	115	0.	*	1 JAN 1854	190	0.	*	2 JAN 0224	265	0.
1 JAN 0400	41	11.	*	1 JAN 1130	116	0.	*	1 JAN 1900	191	0.	*	2 JAN 0230	266	0.
1 JAN 0406	42	17.	*	1 JAN 1136	117	0.	*	1 JAN 1906	192	0.	*	2 JAN 0236	267	0.
1 JAN 0412	43	31.	*	1 JAN 1142	118	0.	*	1 JAN 1912	193	0.	*	2 JAN 0242	268	0.
1 JAN 0418	44	60.	*	1 JAN 1148	119	0.	*	1 JAN 1918	194	0.	*	2 JAN 0248	269	0.
1 JAN 0424	45	123.	*	1 JAN 1154	120	0.	*	1 JAN 1924	195	0.	*	2 JAN 0254	270	0.
1 JAN 0430	46	254.	*	1 JAN 1200	121	0.	*	1 JAN 1930	196	0.	*	2 JAN 0300	271	0.
1 JAN 0436	47	541.	*	1 JAN 1206	122	0.	*	1 JAN 1936	197	0.	*	2 JAN 0306	272	0.
1 JAN 0442	48	1093.	*	1 JAN 1212	123	0.	*	1 JAN 1942	198	0.	*	2 JAN 0312	273	0.
1 JAN 0448	49	1966.	*	1 JAN 1218	124	0.	*	1 JAN 1948	199	0.	*	2 JAN 0318	274	0.
1 JAN 0454	50	3040.	*	1 JAN 1224	125	0.	*	1 JAN 1954	200	0.	*	2 JAN 0324	275	0.
1 JAN 0500	51	3969.	*	1 JAN 1230	126	0.	*	1 JAN 2000	201	0.	*	2 JAN 0330	276	0.
1 JAN 0506	52	4481.	*	1 JAN 1236	127	0.	*	1 JAN 2006	202	0.	*	2 JAN 0336	277	0.
1 JAN 0512	53	4534.	*	1 JAN 1242	128	0.	*	1 JAN 2012	203	0.	*	2 JAN 0342	278	0.
1 JAN 0518	54	4215.	*	1 JAN 1248	129	0.	*	1 JAN 2018	204	0.	*	2 JAN 0348	279	0.
1 JAN 0524	55	3663.	*	1 JAN 1254	130	0.	*	1 JAN 2024	205	0.	*	2 JAN 0354	280	0.
1 JAN 0530	56	3017.	*	1 JAN 1300	131	0.	*	1 JAN 2030	206	0.	*	2 JAN 0400	281	0.
1 JAN 0536	57	2427.	*	1 JAN 1306	132	0.	*	1 JAN 2036	207	0.	*	2 JAN 0406	282	0.
1 JAN 0542	58	1933.	*	1 JAN 1312	133	0.	*	1 JAN 2042	208	0.	*	2 JAN 0412	283	0.
1 JAN 0548	59	1545.	*	1 JAN 1318	134	0.	*	1 JAN 2048	209	0.	*	2 JAN 0418	284	0.
1 JAN 0554	60	1247.	*	1 JAN 1324	135	0.	*	1 JAN 2054	210	0.	*	2 JAN 0424	285	0.
1 JAN 0600	61	1024.	*	1 JAN 1330	136	0.	*	1 JAN 2100	211	0.	*	2 JAN 0430	286	0.
1 JAN 0606	62	854.	*	1 JAN 1336	137	0.	*	1 JAN 2106	212	0.	*	2 JAN 0436	287	0.
0612	63	718.	*	1 JAN 1342	138	0.	*	1 JAN 2112	213	0.	*	2 JAN 0442	288	0.
0618	64	605.	*	1 JAN 1348	139	0.	*	1 JAN 2118	214	0.	*	2 JAN 0448	289	0.
1 JAN 0624	65	512.	*	1 JAN 1354	140	0.	*	1 JAN 2124	215	0.	*	2 JAN 0454	290	0.
1 JAN 0630	66	437.	*	1 JAN 1400	141	0.	*	1 JAN 2130	216	0.	*	2 JAN 0500	291	0.
1 JAN 0636	67	378.	*	1 JAN 1406	142	0.	*	1 JAN 2136	217	0.	*	2 JAN 0506	292	0.
1 JAN 0642	68	334.	*	1 JAN 1412	143	0.	*	1 JAN 2142	218	0.	*	2 JAN 0512	293	0.

1 JAN 0648	69	303.	*	1 JAN 1418	144	0.	*	1 JAN 2148	219	0.	*	2 JAN 0518	294	0.
1 JAN 0654	70	279.	*	1 JAN 1424	145	0.	*	1 JAN 2154	220	0.	*	2 JAN 0524	295	0.
1 JAN 0700	71	262.	*	1 JAN 1430	146	0.	*	1 JAN 2200	221	0.	*	2 JAN 0530	296	0.
1 JAN 0706	72	248.	*	1 JAN 1436	147	0.	*	1 JAN 2206	222	0.	*	2 JAN 0536	297	0.
1 JAN 0712	73	238.	*	1 JAN 1442	148	0.	*	1 JAN 2212	223	0.	*	2 JAN 0542	298	0.
1 JAN 0718	74	230.	*	1 JAN 1448	149	0.	*	1 JAN 2218	224	0.	*	2 JAN 0548	299	0.
1 JAN 0724	75	224.	*	1 JAN 1454	150	0.	*	1 JAN 2224	225	0.	*	2 JAN 0554	300	0.
			*				*				*			

****

AK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	29.90-HR
4534.	5.20	(CFS)	823.	206.	166.	166.
		(INCHES)	1.983	1.987	1.987	1.987
		(AC-FT)	408.	409.	409.	409.

CUMULATIVE AREA = 3.86 SQ MI

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	S48	1286.	4.90	189.	47.	38.	.80		
ROUTED TO	RS48	1273.	5.00	189.	47.	38.	.80		
HYDROGRAPH AT	S46	1002.	5.10	183.	46.	37.	.82		
2 COMBINED AT	C46	2229.	5.00	372.	93.	75.	1.62		
HYDROGRAPH AT	S42	1050.	5.10	186.	47.	37.	.90		
2 COMBINED AT	C42	3250.	5.00	557.	140.	112.	2.52		
ROUTED TO	RC4	3180.	5.20	557.	140.	112.	2.52		
HYDROGRAPH AT	S38	1354.	5.20	266.	67.	53.	1.34		
2 COMBINED AT	C38	4534.	5.20	823.	206.	166.	3.86		

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

APPENDIX C

Revised HEC-1 Study Model

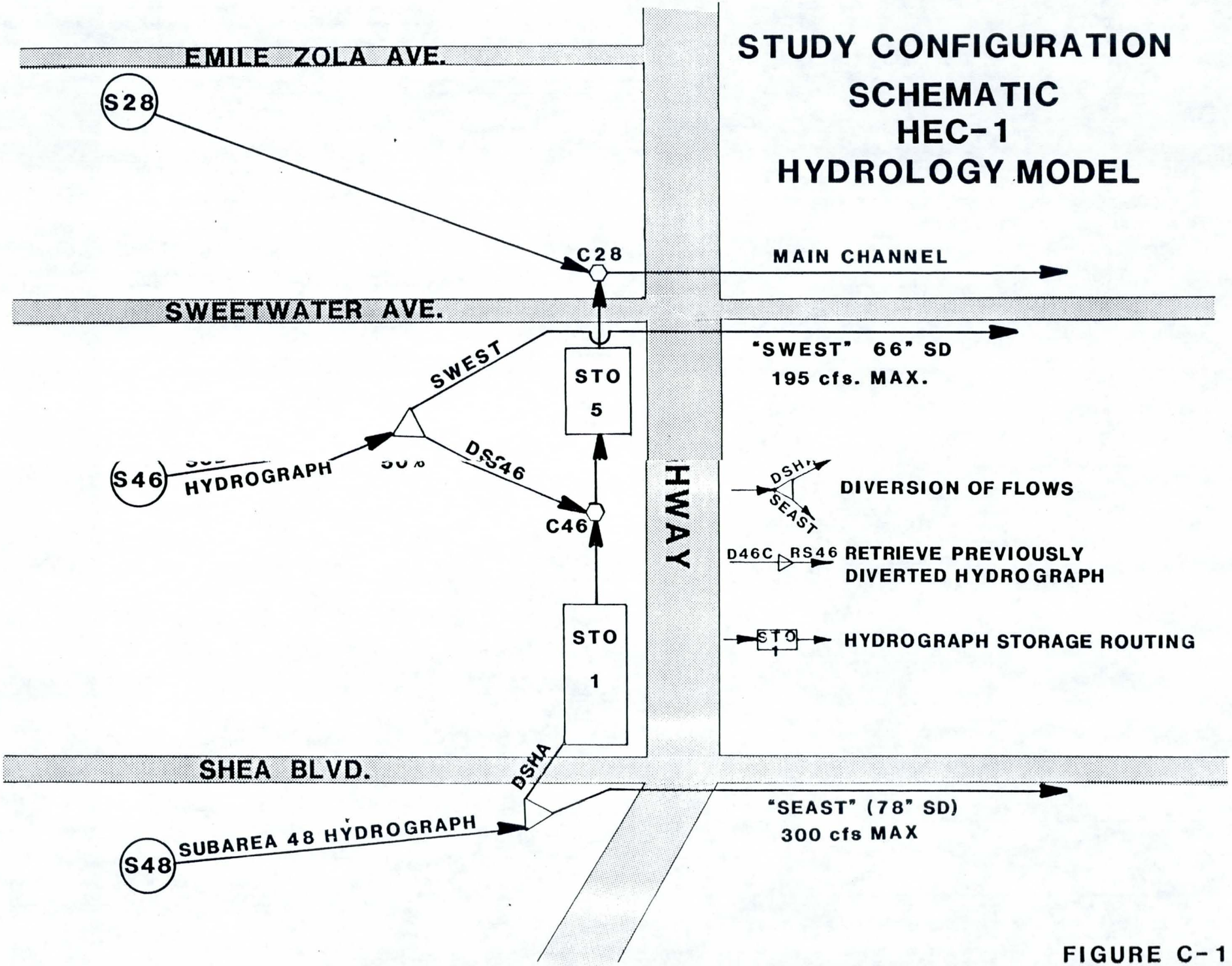
STUDY CONFIGURATION
SCHEMATIC
HEC-1
HYDROLOGY MODEL
EMILE ZOLA AVE.
S28
C28
MAIN CHANNEL
SWEETWATER AVE.
"SWEST" 66" SD
195 cfs. MAX.
SWEST
STO
5
S46
HYDROGRAPH
DS46
C46
HWAY
DSHA
SEAST
DIVERSION OF FLOWS
D46C
RS46
RETRIEVE PREVIOUSLY
DIVERTED HYDROGRAPH
STO
1
STO
HYDROGRAPH STORAGE ROUTING
SHEA BLVD.
DSHA
"SEAST" (78" SD)
300 cfs MAX
S48
SUBAREA 48 HYDROGRAPH

FIGURE C-1

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

  1           ID   SQUAW PEAK HIGHWAY        SECTIONS 4 & 5      DRAINAGE TO SWEETWATER
  2           ID
  3           ID                             FILE:  SP5R4
  4           ID                             DATE:  11/15/90
  5           ID
  6           ID   50-YR STORM
  7           ID   MODEL BASED ON HEC-1 PARAMETERS IN FINAL HYDROLOGY MANUAL, NOV88
  8           ID   **********************LAG TIMES PER TR-20 TCONCS*****************************
  9           ID   **********************PRECIP PER TR-20 9-HR EVENT****************************
 10           IT       6 01JAN90       0     300
 11           IO       5
              *DIAGRAM

 12           KK     S48
 13           KM   SUBAREA 48 HYDROGRAPH
 14           BA    0.80
              *
 15           IN       6
 16           PB    3.12
 17           PC    0.00    0.00    0.00    0.01    0.02    0.03    0.04    0.05    0.06    0.07
 18           PC    0.08    0.09    0.10    0.11    0.12    0.13    0.14    0.15    0.16    0.17
 19           PC    0.18    0.19    0.20    0.21    0.22    0.23    0.24    0.25    0.26    0.27
 20           PC    0.28    0.29    0.30    0.31    0.33    0.35    0.37    0.39    0.41    0.44
 21           PC    0.47    0.56    0.67    0.80    1.02    1.47    2.29    2.58    2.77    2.89
 22           PC    2.99    3.03    3.05    3.07    3.09    3.11    3.13    3.15    3.17    3.18
 23           PC    3.19    3.20    3.21    3.22    3.23    3.24    3.25    3.26    3.27    3.28
 24           PC    3.29    3.30    3.31    3.32    3.33    3.34    3.35    3.36    3.37    3.38
 25           PC    3.39    3.40    3.41    3.42    3.43    3.44    3.45    3.46    3.47    3.48
              *
 26           LS    0.37    87.1
 27           UD    0.34
              *

 28           KK    DSHA
 29           KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG  SHEA  TO IBW
 30           DT   SEAST            300
 31           DI       0     100     200     300     400    5000
 32           DQ       0     100     200     300     300     300
              *

 33           KK    STO1
 34           KM   STORAGE ROUTING          RETARD BETWEEN SHEA & DESERT COVE (9', 2.11' SILL)
 35           RS       1    ELEV       0       0
 36           SV       0    3.03    6.46   10.29   14.53   19.17
 37           SE    1409    1411    1413    1415    1417    1419
 38           SQ       0       0     69.    210.    399.    621.
              *

 39           KK     S46
 40           KM   SUBAREA 46 HYDROGRAPH
 41           BA    0.82
 42           LS    0.41    85.8
 43           UD    0.50
              *
```

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

  44          KK    DS46
  45          KM   DIVERT HALF OF S46 HYDROGRAPH TO CHANNEL NORTH OF CHOLLA (SPLIT SUBAREA RO)
  46          DT    D46C            1500
  47          DI       0     500    1000    1500
  48          DQ       0     250     500     750
              *

  49          KK     C46
  50          KM   COMBINE STO1 & DS46              AT CHOLLA
  51          HC       2    1.21
              *

  52          KK    STO2
  53          KM   STORAGE ROUTING            RETARD BETWEEN DESERT COVE &"CHOLLA (15', 2.11')
  54          RS       1    ELEV       0       0
  55          SV       0    1.43    3.27    5.54    8.24   11.35
  56          SE    1403    1405    1407    1409    1411    1413
  57          SQ       0      0.     115.    350.    665.   1035.
              *

  58          KK    RS46
  59          KM   RETRIEVE DIVERTED HALF OF S46 INTO CHANNEL NORTH OF CHOLLA
  60          DR    D46C
              *

  61          KK    C46N
  62          KM   COMBINE STO2 & D46C NORTH OF CHOLLA
  63          HC       2    1.62
              *

  64          KK     S42
  65          KM   SUBAREA 42 HYDROGRAPH
  66          BA    0.90
  67          LS    0.47    83.9
  68          UD    0.47
              *

  69          KK    DS42
  70          KM   DIVERT HALF OF S42 HYDROGRAPH TO CHANNEL NORTH OF CACTUS (SPLIT SUBAREA RO)
  71          DT    D42C            1500
  72          DI       0     500    1000    1500
  73          DQ       0     250     500     750
              *

  74          KK    C42S
  75          KM   COMBINE STO2 & D46C NORTH OF CHOLLA
  76          HC       2    2.07
              *
```

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

  77          KK    STO3
  78          KM   STORAGE ROUTING           RETARD SOUTH OF CACTUS (30' WIDTH, 2.11' SILL)
  79          RS       1    ELEV       0       0
  80          SV       0    1.29    2.75    4.41    6.24    8.26
  81          SE    1397    1399    1401    1403    1405    1407
  82          SQ       0       0    230.    700.   1330.   2070.
              *

  83          KK    RS42
  84          KM   RETRIEVE DIVERTED HALF OF S42 IN CACTUS ROAD
  85          DR    D42C
              *

  86          KK    DCCT
  87          KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG CACTUS TO IBW
  88          DT   CEAST             300
  89          DI       0     100     200     300     400    5000
  90          DQ       0     100     200     300     300     300
              *

  91          KK    C42N
  92          KM   COMBINE STO3 & DCCT          IN CHANNEL NORTH OF CACTUS
  93          HC       2    2.52
              *

  94          KK    STO4
  95          KM   STORAGE ROUTING           RETARD NORTH OF CACTUS (30' WIDTH, 2.11' SILL)
  96          RS       1    ELEV       0       0
  97          SV       0    2.02    4.29    6.79    9.53   12.51
  98          SE    1394    1396    1398    1400    1402    1404
  99          SQ       0       0    230.    700.   1330.   2070.
              *

 100          KK     S38
 101          KM   SUBAREA 38 HYDROGRAPH
 102          BA    1.34
 103          LS    0.50    83.0
 104          UD    0.55
              *

 105          KK    DSWW
 106          KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG  SWEETWATER TO IBW
 107          DT   SWEST             195
 108          DI       0      10     100     195     500    1500
 109          DQ       0      10     100     195     195     195
              *

 110          KK     C38
 111          KM   COMBINE STO4 & DSWW             AT SWEETWATER
 112          HC       2
              *
```

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

 113          KK   STO5
 114          KM   STORAGE ROUTING            RETARD SOUTH OF SWEETWATER (45' WIDTH, 2.11' SILL)
 115          RS      1   ELEV       0      0
 116          SV      0   1.63    3.43   5.39    7.52    9.81
 117          SE   1392   1394    1396   1398    1400    1402
 118          SQ      0      0    345.   1050.   1995.   3105.
              *

 119          KK    S28
 120          KM   SUBAREA 28 HYDROGRAPH          NORTH OF SWEETWATER
 121          BA   0.65
 122          LS   0.50    83.0
 123          UD   0.42
              *

 124          KK    C28
 125          KM   COMBINE C38 & S28             NORTH CHANNEL JOINS SOUTH CHANNEL AT SWEETWATER
 126          HC      2
 127          KO      1
 128          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

(V) ROUTING (--->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

```
 2        S48
           .
           .
;0         .-------->  SEAST
:8       DSHA
           V
           V
33       STO1
           .
           .
39         .        S46
           .          .
           .          .
46         .          .-------->   D46C
44         .       DS46
           .          .
           .          .
49       C46............
           V
           V
52       STO2
           .
           .
60         .          .<--------   D46C
58         .        RS46
           .          .
           .          .
61       C46N...........
           .
           .
64         .        S42
           .          .
           .          .
71         .          .-------->   D42C
69         .       DS42
           .          .
           .          .
74       C42S...........
           V
           V
77       STO3
           .
           .
85         .          .<--------   D42C
83         .       RS42
           .          .
           .          .
88         .          .-------->   CEAST
86         .       DCCT
           .          .
           .          .
91       C42N...........
           V
           V
94       STO4
           .
           .
100        .        S38
           .          .
```

```
                .            .
107             .            .-------->   SWEST
05              .        DSWW
                .            .
                .            .
11            C38............
               V
               V
113           STO5
                .
                .
119             .        S28
                .            .
                .            .
124           C28............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
                                        ****
                    FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
          U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                        ****



                    SQUAW PEAK HIGHWAY       SECTIONS 4 & 5      DRAINAGE TO SWEETWATER

                                             FILE:  SP5R4
                                             DATE:  11/15/90

                    50-YR STORM
                    MODEL BASED ON HEC-1 PARAMETERS IN FINAL HYDROLOGY MANUAL, NOV88
                    **********************LAG TIMES PER TR-20 TCONCS*****************************
                    **********************PRECIP PER TR-20 9-HR EVENT****************************

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

   IT          HYDROGRAPH TIME DATA
                      NMIN          6  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN90  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     2JAN90  ENDING DATE
                    NDTIME       0554  ENDING TIME

                 COMPUTATION INTERVAL     .10 HOURS
                      TOTAL TIME BASE   29.90 HOURS

        ENGLISH UNITS

ARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      230. TO     2070.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     1330. TO     2070.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      345. TO     3105.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


            **************
            *            *
 124 KK     *       C28  *
            *            *
            **************

 127        OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
```

1 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

HYDROGRAPH AT STATION C28
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 JAN 0000	1	0.	1 JAN 0730	76	110.	1 JAN 1500	151	0.	1 JAN 2230	226	0.
1 JAN 0006	2	0.	1 JAN 0736	77	106.	1 JAN 1506	152	0.	1 JAN 2236	227	0.
1 JAN 0012	3	0.	1 JAN 0742	78	103.	1 JAN 1512	153	0.	1 JAN 2242	228	0.
1 JAN 0018	4	0.	1 JAN 0748	79	101.	1 JAN 1518	154	0.	1 JAN 2248	229	0.
1 JAN 0024	5	0.	1 JAN 0754	80	99.	1 JAN 1524	155	0.	1 JAN 2254	230	0.
1 JAN 0030	6	0.	1 JAN 0800	81	97.	1 JAN 1530	156	0.	1 JAN 2300	231	0.
1 JAN 0036	7	0.	1 JAN 0806	82	96.	1 JAN 1536	157	0.	1 JAN 2306	232	0.
1 JAN 0042	8	0.	1 JAN 0812	83	95.	1 JAN 1542	158	0.	1 JAN 2312	233	0.
1 JAN 0048	9	0.	1 JAN 0818	84	95.	1 JAN 1548	159	0.	1 JAN 2318	234	0.
1 JAN 0054	10	0.	1 JAN 0824	85	94.	1 JAN 1554	160	0.	1 JAN 2324	235	0.
1 JAN 0100	11	0.	1 JAN 0830	86	94.	1 JAN 1600	161	0.	1 JAN 2330	236	0.
1 JAN 0106	12	0.	1 JAN 0836	87	94.	1 JAN 1606	162	0.	1 JAN 2336	237	0.
1 JAN 0112	13	0.	1 JAN 0842	88	93.	1 JAN 1612	163	0.	1 JAN 2342	238	0.
1 JAN 0118	14	0.	1 JAN 0848	89	93.	1 JAN 1618	164	0.	1 JAN 2348	239	0.
1 JAN 0124	15	0.	1 JAN 0854	90	93.	1 JAN 1624	165	0.	1 JAN 2354	240	0.
1 JAN 0130	16	0.	1 JAN 0900	91	92.	1 JAN 1630	166	0.	2 JAN 0000	241	0.
1 JAN 0136	17	0.	1 JAN 0906	92	90.	1 JAN 1636	167	0.	2 JAN 0006	242	0.
1 JAN 0142	18	0.	1 JAN 0912	93	86.	1 JAN 1642	168	0.	2 JAN 0012	243	0.
0148	19	0.	1 JAN 0918	94	80.	1 JAN 1648	169	0.	2 JAN 0018	244	0.
0154	20	0.	1 JAN 0924	95	71.	1 JAN 1654	170	0.	2 JAN 0024	245	0.
1 JAN 0200	21	0.	1 JAN 0930	96	62.	1 JAN 1700	171	0.	2 JAN 0030	246	0.
1 JAN 0206	22	0.	1 JAN 0936	97	53.	1 JAN 1706	172	0.	2 JAN 0036	247	0.
1 JAN 0212	23	0.	1 JAN 0942	98	44.	1 JAN 1712	173	0.	2 JAN 0042	248	0.
1 JAN 0218	24	0.	1 JAN 0948	99	35.	1 JAN 1718	174	0.	2 JAN 0048	249	0.
1 JAN 0224	25	0.	1 JAN 0954	100	28.	1 JAN 1724	175	0.	2 JAN 0054	250	0.
1 JAN 0230	26	0.	1 JAN 1000	101	22.	1 JAN 1730	176	0.	2 JAN 0100	251	0.
1 JAN 0236	27	0.	1 JAN 1006	102	17.	1 JAN 1736	177	0.	2 JAN 0106	252	0.
1 JAN 0242	28	0.	1 JAN 1012	103	13.	1 JAN 1742	178	0.	2 JAN 0112	253	0.
1 JAN 0248	29	0.	1 JAN 1018	104	9.	1 JAN 1748	179	0.	2 JAN 0118	254	0.
1 JAN 0254	30	0.	1 JAN 1024	105	7.	1 JAN 1754	180	0.	2 JAN 0124	255	0.
1 JAN 0300	31	0.	1 JAN 1030	106	5.	1 JAN 1800	181	0.	2 JAN 0130	256	0.
1 JAN 0306	32	0.	1 JAN 1036	107	4.	1 JAN 1806	182	0.	2 JAN 0136	257	0.
1 JAN 0312	33	0.	1 JAN 1042	108	3.	1 JAN 1812	183	0.	2 JAN 0142	258	0.
1 JAN 0318	34	0.	1 JAN 1048	109	2.	1 JAN 1818	184	0.	2 JAN 0148	259	0.
1 JAN 0324	35	0.	1 JAN 1054	110	2.	1 JAN 1824	185	0.	2 JAN 0154	260	0.
1 JAN 0330	36	0.	1 JAN 1100	111	1.	1 JAN 1830	186	0.	2 JAN 0200	261	0.
1 JAN 0336	37	0.	1 JAN 1106	112	1.	1 JAN 1836	187	0.	2 JAN 0206	262	0.
1 JAN 0342	38	0.	1 JAN 1112	113	1.	1 JAN 1842	188	0.	2 JAN 0212	263	0.
1 JAN 0348	39	0.	1 JAN 1118	114	0.	1 JAN 1848	189	0.	2 JAN 0218	264	0.
1 JAN 0354	40	0.	1 JAN 1124	115	0.	1 JAN 1854	190	0.	2 JAN 0224	265	0.
1 JAN 0400	41	0.	1 JAN 1130	116	0.	1 JAN 1900	191	0.	2 JAN 0230	266	0.
1 JAN 0406	42	0.	1 JAN 1136	117	0.	1 JAN 1906	192	0.	2 JAN 0236	267	0.
1 JAN 0412	43	0.	1 JAN 1142	118	0.	1 JAN 1912	193	0.	2 JAN 0242	268	0.
1 JAN 0418	44	2.	1 JAN 1148	119	0.	1 JAN 1918	194	0.	2 JAN 0248	269	0.
1 JAN 0424	45	10.	1 JAN 1154	120	0.	1 JAN 1924	195	0.	2 JAN 0254	270	0.
1 JAN 0430	46	34.	1 JAN 1200	121	0.	1 JAN 1930	196	0.	2 JAN 0300	271	0.
0436	47	108.	1 JAN 1206	122	0.	1 JAN 1936	197	0.	2 JAN 0306	272	0.
0442	48	240.	1 JAN 1212	123	0.	1 JAN 1942	198	0.	2 JAN 0312	273	0.
1 JAN 0448	49	456.	1 JAN 1218	124	0.	1 JAN 1948	199	0.	2 JAN 0318	274	0.
1 JAN 0454	50	1235.	1 JAN 1224	125	0.	1 JAN 1954	200	0.	2 JAN 0324	275	0.
1 JAN 0500	51	2138.	1 JAN 1230	126	0.	1 JAN 2000	201	0.	2 JAN 0330	276	0.
1 JAN 0506	52	2732.	1 JAN 1236	127	0.	1 JAN 2006	202	0.	2 JAN 0336	277	0.

1 JAN 0512	53	3003.	*	1 JAN 1242	128	0.	*	1 JAN 2012	203	0.	*	2 JAN 0342	278	0.
1 JAN 0518	54	2944.	*	1 JAN 1248	129	0.	*	1 JAN 2018	204	0.	*	2 JAN 0348	279	0.
1 JAN 0524	55	2654.	*	1 JAN 1254	130	0.	*	1 JAN 2024	205	0.	*	2 JAN 0354	280	0.
1 JAN 0530	56	2241.	*	1 JAN 1300	131	0.	*	1 JAN 2030	206	0.	*	2 JAN 0400	281	0.
1 JAN 0536	57	1834.	*	1 JAN 1306	132	0.	*	1 JAN 2036	207	0.	*	2 JAN 0406	282	0.
1 JAN 0542	58	1454.	*	1 JAN 1312	133	0.	*	1 JAN 2042	208	0.	*	2 JAN 0412	283	0.
1 JAN 0548	59	1139.	*	1 JAN 1318	134	0.	*	1 JAN 2048	209	0.	*	2 JAN 0418	284	0.
1 JAN 0554	60	910.	*	1 JAN 1324	135	0.	*	1 JAN 2054	210	0.	*	2 JAN 0424	285	0.
1 JAN 0600	61	714.	*	1 JAN 1330	136	0.	*	1 JAN 2100	211	0.	*	2 JAN 0430	286	0.
1 JAN 0606	62	555.	*	1 JAN 1336	137	0.	*	1 JAN 2106	212	0.	*	2 JAN 0436	287	0.
1 JAN 0612	63	430.	*	1 JAN 1342	138	0.	*	1 JAN 2112	213	0.	*	2 JAN 0442	288	0.
1 JAN 0618	64	355.	*	1 JAN 1348	139	0.	*	1 JAN 2118	214	0.	*	2 JAN 0448	289	0.
1 JAN 0624	65	298.	*	1 JAN 1354	140	0.	*	1 JAN 2124	215	0.	*	2 JAN 0454	290	0.
1 JAN 0630	66	264.	*	1 JAN 1400	141	0.	*	1 JAN 2130	216	0.	*	2 JAN 0500	291	0.
1 JAN 0636	67	238.	*	1 JAN 1406	142	0.	*	1 JAN 2136	217	0.	*	2 JAN 0506	292	0.
1 JAN 0642	68	213.	*	1 JAN 1412	143	0.	*	1 JAN 2142	218	0.	*	2 JAN 0512	293	0.
1 JAN 0648	69	190.	*	1 JAN 1418	144	0.	*	1 JAN 2148	219	0.	*	2 JAN 0518	294	0.
1 JAN 0654	70	171.	*	1 JAN 1424	145	0.	*	1 JAN 2154	220	0.	*	2 JAN 0524	295	0.
1 JAN 0700	71	155.	*	1 JAN 1430	146	0.	*	1 JAN 2200	221	0.	*	2 JAN 0530	296	0.
1 JAN 0706	72	142.	*	1 JAN 1436	147	0.	*	1 JAN 2206	222	0.	*	2 JAN 0536	297	0.
1 JAN 0712	73	131.	*	1 JAN 1442	148	0.	*	1 JAN 2212	223	0.	*	2 JAN 0542	298	0.
1 JAN 0718	74	122.	*	1 JAN 1448	149	0.	*	1 JAN 2218	224	0.	*	2 JAN 0548	299	0.
1 JAN 0724	75	116.	*	1 JAN 1454	150	0.	*	1 JAN 2224	225	0.	*	2 JAN 0554	300	0.
			*				*				*			

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	29.90-HR
3003.	5.20	(CFS)	490.	123.	98.	98.
		(INCHES)	1.010	1.011	1.011	1.011
		(AC-FT)	243.	243.	243.	243.

CUMULATIVE AREA = 4.51 SQ MI

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	S48	1051.	4.90	154.	38.	31.	.80		
DIVERSION TO	SEAST	300.	4.90	91.	23.	18.	.80		
HYDROGRAPH AT	DSHA	751.	4.90	63.	16.	13.	.80		
ROUTED TO	STO1	469.	5.20	57.	14.	11.	.80	1417.63	5.20
HYDROGRAPH AT	S46	811.	5.10	148.	37.	30.	.82		
DIVERSION TO	D46C	406.	5.10	74.	19.	15.	.82		
HYDROGRAPH AT	DS46	406.	5.10	74.	19.	15.	.82		
2 COMBINED AT	C46	862.	5.20	131.	33.	26.	1.62		
ROUTED TO	STO2	814.	5.30	128.	32.	26.	1.62	1411.80	5.30
HYDROGRAPH AT	RS46	406.	5.10	74.	19.	15.	.00		
2 COMBINED AT	C46N	1196.	5.20	202.	51.	41.	1.62		
HYDROGRAPH AT	S42	839.	5.10	149.	37.	30.	.90		
DIVERSION TO	D42C	420.	5.10	74.	19.	15.	.90		
HYDROGRAPH AT	DS42	420.	5.10	74.	19.	15.	.90		
2 COMBINED AT	C42S	1594.	5.20	276.	69.	56.	2.52		
ROUTED TO	STO3	1579.	5.20	274.	69.	55.	2.52	1405.67	5.20
HYDROGRAPH AT	RS42	420.	5.10	74.	19.	15.	.00		
DIVERSION TO	CEAST	300.	5.10	67.	17.	14.	.00		
HYDROGRAPH AT	DCCT	120.	5.10	7.	2.	1.	.00		
2 COMBINED AT	C42N	1678.	5.20	281.	70.	56.	2.52		
ROUTED TO	STO4	1639.	5.30	277.	69.	56.	2.52	1402.84	5.30
HYDROGRAPH AT	S38	1074.	5.20	212.	53.	43.	1.34		
DIVERSION TO	SWEST	195.	5.20	98.	25.	20.	1.34		
HYDROGRAPH AT	DSWW	879.	5.20	114.	28.	23.	1.34		
2 COMBINED AT	C38	2500.	5.20	391.	98.	78.	3.86		
ROUTED TO	STO5	2493.	5.30	387.	97.	78.	3.86	1400.90	5.30
HYDROGRAPH AT	S28	615.	5.00	103.	26.	21.	.65		
2 COMBINED AT	C28	3003.	5.20	490.	123.	98.	4.51		

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

  1           ID   SQUAW PEAK HIGHWAY       SECTIONS 4 & 5      DRAINAGE TO SWEETWATER
  2           ID
  3           ID                            FILE:  SP10R4
  4           ID                            DATE:  11/15/90
  5           ID   100-YR STORM
  6           ID   MODEL BASED ON TR-20 RUN  IN FINAL HYDROLOGY MANUAL, NOV88
  7           ID   ******************************LAG TIMES FROM TR-20 INPUT TCONCS**************
  8           ID   ******************************PRECIP. IS TR-20 9-HR EVENT********************
  9           IT       6 01JAN90       0     180
 10           IO       5
              *DIAGRAM

 11           KK     S48
 12           KM   SUBAREA 48 HYDROGRAPH
 13           BA    0.80
              *
 14           IN       6
 15           PB    3.48
 16           PC    0.00    0.00    0.00    0.01    0.02    0.03    0.04    0.05    0.06    0.07
 17           PC    0.08    0.09    0.10    0.11    0.12    0.13    0.14    0.15    0.16    0.17
 18           PC    0.18    0.19    0.20    0.21    0.22    0.23    0.24    0.25    0.26    0.27
 19           PC    0.28    0.29    0.30    0.31    0.33    0.35    0.37    0.39    0.41    0.44
 20           PC    0.47    0.56    0.67    0.80    1.02    1.47    2.29    2.58    2.77    2.89
 21           PC    2.99    3.03    3.05    3.07    3.09    3.11    3.13    3.15    3.17    3.18
 22           PC    3.19    3.20    3.21    3.22    3.23    3.24    3.25    3.26    3.27    3.28
 23           PC    3.29    3.30    3.31    3.32    3.33    3.34    3.35    3.36    3.37    3.38
 24           PC    3.39    3.40    3.41    3.42    3.43    3.44    3.45    3.46    3.47    3.48
              *
 25           LS    0.37    87.1
 26           UD    0.34
              *

 27           KK    DSHA
 28           KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG  SHEA  TO IBW
 29           DT   SEAST            300
 30           DI       0     100     200     300     400    5000
 31           DQ       0     100     200     300     300     300
              *

 32           KK    STO1
 33           KM   STORAGE ROUTING          RETARD BETWEEN SHEA & DESERT COVE (9', 2.11' SILL)
 34           RS       1    ELEV       0       0
 35           SV       0    3.03    6.46   10.29   14.53   19.17
 36           SE    1409    1411    1413    1415    1417    1419
 37           SQ       0       0     69.    210.    399.    621.
              *

 38           KK     S46
 39           KM   SUBAREA 46 HYDROGRAPH
 40           BA    0.82
 41           LS    0.41    85.8
 42           UD    0.50
              *
```

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

  43          KK   DS46
  44          KM   DIVERT HALF OF S46 HYDROGRAPH TO CHANNEL NORTH OF CHOLLA (SPLIT SUBAREA RO)
  45          DT   D46C            1500
  46          DI     0     500    1000    1500
  47          DQ     0     250     500     750
              *

  48          KK   C46
  49          KM   COMBINE STO1 & DS46                AT CHOLLA
  50          HC     2    1.21
              *

  51          KK   STO2
  52          KM   STORAGE ROUTING          RETARD BETWEEN DESERT COVE & CHOLLA (15', 2.11')
  53          RS     1    ELEV      0       0
  54          SV     0    1.43    3.27    5.54    8.24   11.35
  55          SE  1403    1405    1407    1409    1411    1413
  56          SQ     0       0     115.    350.    665.   1035.
              *

  57          KK   RS46
  58          KM   RETRIEVE DIVERTED HALF OF S46 INTO CHANNEL NORTH OF CHOLLA
  59          DR   D46C
              *

  60          KK   C46N
  61          KM   COMBINE STO2 & D46C NORTH OF CHOLLA
  62          HC     2    1.62
              *

  63          KK   S42
  64          KM   SUBAREA 42 HYDROGRAPH
  65          BA   0.90
  66          LS   0.47    83.9
  67          UD   0.47
              *

  68          KK   DS42
  69          KM   DIVERT HALF OF S42 HYDROGRAPH TO CHANNEL NORTH OF CACTUS (SPLIT SUBAREA RO)
  70          DT   D42C            1500
  71          DI     0     500    1000    1500
  72          DQ     0     250     500     750
              *

  73          KK   C42S
  74          KM   COMBINE STO2 & D46C NORTH OF CHOLLA
  75          HC     2    2.07
              *
```

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

 76           KK   STO3
 77           KM   STORAGE ROUTING            RETARD SOUTH OF CACTUS (30' WIDTH, 2.11' SILL)
 78           RS     1   ELEV      0      0
 79           SV     0   1.29    2.75   4.41   6.24   8.26
 80           SE  1397   1399    1401   1403   1405   1407
 81           SQ     0      0    230.   700.  1330.  2070.
              *

 82           KK   RS42
 83           KM   RETRIEVE DIVERTED HALF OF S42 IN CACTUS ROAD
 84           DR   D42C
              *

 85           KK   DCCT
 86           KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG CACTUS TO IBW
 87           DT   CEAST            300
 88           DI     0    100    200    300    400   5000
 89           DQ     0    100    200    300    300    300
              *

 90           KK   C42N
 91           KM   COMBINE STO3 & DCCT          IN CHANNEL NORTH OF CACTUS
 92           HC     2   2.52
              *

 93           KK   STO4
 94           KM   STORAGE ROUTING            RETARD NORTH OF CACTUS (30' WIDTH, 2.11' SILL)
 95           RS     1   ELEV      0      0
 96           SV     0   2.02    4.29   6.79   9.53  12.51
 97           SE  1394   1396    1398   1400   1402   1404
 98           SQ     0      0    230.   700.  1330.  2070.
              *

 99           KK   S38
100           KM   SUBAREA 38 HYDROGRAPH
101           BA   1.34
102           LS   0.50   83.0
103           UD   0.55
              *

104           KK   DSWW
105           KM   DIVERT STORM DRAIN & GUTTER FLOWS EAST ALONG  SWEETWATER TO IBW
106           DT   SWEST            195
107           DI     0     10    100    195    500   1500
108           DQ     0     10    100    195    195    195
              *

109           KK   C38
110           KM   COMBINE STO4 & DSWW            AT SWEETWATER
111           HC     2
              *
```

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

 112          KK   STO5
 113          KM   STORAGE ROUTING          RETARD SOUTH OF SWEETWATER (45' WIDTH, 2.11' SILL)
 114          RS     1   ELEV      0      0
 115          SV     0   1.63    3.43   5.39    7.52    9.81
 116          SE  1392   1394    1396   1398    1400    1402
 117          SQ     0      0     345.  1050.   1995.   3105.
              *

 118          KK   S28
 119          KM   SUBAREA 28 HYDROGRAPH        NORTH OF SWEETWATER
 120          BA   0.65
 121          LS   0.50    83.0
 122          UD   0.42
              *

 123          KK   C28
 124          KM   COMBINE C38 & S28            NORTH CHANNEL JOINS SOUTH CHANNEL AT SWEETWATER
 125          HC     2
 126          KO     1
 127          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

NPUT
L E

NC

(V) ROUTING (--->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

```
 1      S48
         .
         .
29       .-------->  SEAST
27     DSHA
         V
         V
32     STO1
         .
         .
38       .        S46
         .         .
         .         .
45       .         .-------->   D46C
43       .       DS46
         .         .
         .         .
48     C46............
         V
         V
51     STO2
         .
         .
59       .         .<--------   D46C
57       .       RS46
         .         .
         .         .
60     C46N...........
         .
         .
63       .        S42
         .         .
         .         .
70       .         .-------->   D42C
68       .       DS42
         .         .
         .         .
73     C42S...........
         V
         V
76     STO3
         .
         .
84       .         .<--------   D42C
82       .       RS42
         .         .
         .         .
87       .         .-------->   CEAST
85       .       DCCT
         .         .
         .         .
90     C42N...........
         V
         V
9_     STO4
         .
         .
99       .        S38
         .         .
```

```
            .          .
106         .          .-------->  SWEST
104         .       DSWW
            .          .
            .          .
1ι        C38............
            V
            V
112       STO5
            .
            .
118         .        S28
            .          .
            .          .
123       C28............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
                                        ****
                    FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
          U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                        ****


                 SQUAW PEAK HIGHWAY       SECTIONS 4 & 5      DRAINAGE TO SWEETWATER

                                          FILE:  SP10R4
                                          DATE:  11/15/90
                 100-YR STORM
                 MODEL BASED ON TR-20 RUN  IN FINAL HYDROLOGY MANUAL, NOV88
                 ******************************LAG TIMES FROM TR-20 INPUT TCONCS**************
                 ******************************PRECIP. IS TR-20 9-HR EVENT********************

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

  IT           HYDROGRAPH TIME DATA
                      NMIN          6  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN90  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        180  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     1JAN90  ENDING DATE
                    NDTIME       1754  ENDING TIME

               COMPUTATION INTERVAL     .10 HOURS
                    TOTAL TIME BASE   17.90 HOURS

        ENGLISH UNITS

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

* WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      230. TO     2070.
             THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
             THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

* WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     1330. TO     2070.
             THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
             THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      345. TO     3105.
             THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
             THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


            **************
            *            *
 123 KK     *       C28  *
            *            *
            **************

 126        OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

125 HC      HYDROGRAPH COMBINATION
```

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

HYDROGRAPH AT STATION C28
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 JAN 0000	1	0.	1 JAN 0430	46	52.	1 JAN 0900	91	106.	1 JAN 1330	136	0.
1 JAN 0006	2	0.	1 JAN 0436	47	145.	1 JAN 0906	92	104.	1 JAN 1336	137	0.
1 JAN 0012	3	0.	1 JAN 0442	48	305.	1 JAN 0912	93	99.	1 JAN 1342	138	0.
1 JAN 0018	4	0.	1 JAN 0448	49	730.	1 JAN 0918	94	91.	1 JAN 1348	139	0.
1 JAN 0024	5	0.	1 JAN 0454	50	1804.	1 JAN 0924	95	82.	1 JAN 1354	140	0.
1 JAN 0030	6	0.	1 JAN 0500	51	2851.	1 JAN 0930	96	71.	1 JAN 1400	141	0.
1 JAN 0036	7	0.	1 JAN 0506	52	3525.	1 JAN 0936	97	61.	1 JAN 1406	142	0.
1 JAN 0042	8	0.	1 JAN 0512	53	3793.	1 JAN 0942	98	50.	1 JAN 1412	143	0.
1 JAN 0048	9	0.	1 JAN 0518	54	3689.	1 JAN 0948	99	40.	1 JAN 1418	144	0.
1 JAN 0054	10	0.	1 JAN 0524	55	3312.	1 JAN 0954	100	32.	1 JAN 1424	145	0.
1 JAN 0100	11	0.	1 JAN 0530	56	2777.	1 JAN 1000	101	25.	1 JAN 1430	146	0.
1 JAN 0106	12	0.	1 JAN 0536	57	2239.	1 JAN 1006	102	19.	1 JAN 1436	147	0.
1 JAN 0112	13	0.	1 JAN 0542	58	1792.	1 JAN 1012	103	14.	1 JAN 1442	148	0.
1 JAN 0118	14	0.	1 JAN 0548	59	1403.	1 JAN 1018	104	11.	1 JAN 1448	149	0.
1 JAN 0124	15	0.	1 JAN 0554	60	1101.	1 JAN 1024	105	8.	1 JAN 1454	150	0.
1 JAN 0130	16	0.	1 JAN 0600	61	880.	1 JAN 1030	106	6.	1 JAN 1500	151	0.
1 JAN 0136	17	0.	1 JAN 0606	62	695.	1 JAN 1036	107	5.	1 JAN 1506	152	0.
1 JAN 0142	18	0.	1 JAN 0612	63	542.	1 JAN 1042	108	3.	1 JAN 1512	153	0.
1 JAN 0148	19	0.	1 JAN 0618	64	421.	1 JAN 1048	109	2.	1 JAN 1518	154	0.
0154	20	0.	1 JAN 0624	65	351.	1 JAN 1054	110	2.	1 JAN 1524	155	0.
0200	21	0.	1 JAN 0630	66	296.	1 JAN 1100	111	1.	1 JAN 1530	156	0.
1 JAN 0206	22	0.	1 JAN 0636	67	264.	1 JAN 1106	112	1.	1 JAN 1536	157	0.
1 JAN 0212	23	0.	1 JAN 0642	68	240.	1 JAN 1112	113	1.	1 JAN 1542	158	0.
1 JAN 0218	24	0.	1 JAN 0648	69	216.	1 JAN 1118	114	0.	1 JAN 1548	159	0.
1 JAN 0224	25	0.	1 JAN 0654	70	195.	1 JAN 1124	115	0.	1 JAN 1554	160	0.
1 JAN 0230	26	0.	1 JAN 0700	71	178.	1 JAN 1130	116	0.	1 JAN 1600	161	0.
1 JAN 0236	27	0.	1 JAN 0706	72	163.	1 JAN 1136	117	0.	1 JAN 1606	162	0.
1 JAN 0242	28	0.	1 JAN 0712	73	151.	1 JAN 1142	118	0.	1 JAN 1612	163	0.
1 JAN 0248	29	0.	1 JAN 0718	74	141.	1 JAN 1148	119	0.	1 JAN 1618	164	0.
1 JAN 0254	30	0.	1 JAN 0724	75	133.	1 JAN 1154	120	0.	1 JAN 1624	165	0.
1 JAN 0300	31	0.	1 JAN 0730	76	127.	1 JAN 1200	121	0.	1 JAN 1630	166	0.
1 JAN 0306	32	0.	1 JAN 0736	77	122.	1 JAN 1206	122	0.	1 JAN 1636	167	0.
1 JAN 0312	33	0.	1 JAN 0742	78	119.	1 JAN 1212	123	0.	1 JAN 1642	168	0.
1 JAN 0318	34	0.	1 JAN 0748	79	116.	1 JAN 1218	124	0.	1 JAN 1648	169	0.
1 JAN 0324	35	0.	1 JAN 0754	80	114.	1 JAN 1224	125	0.	1 JAN 1654	170	0.
1 JAN 0330	36	0.	1 JAN 0800	81	112.	1 JAN 1230	126	0.	1 JAN 1700	171	0.
1 JAN 0336	37	0.	1 JAN 0806	82	111.	1 JAN 1236	127	0.	1 JAN 1706	172	0.
1 JAN 0342	38	0.	1 JAN 0812	83	110.	1 JAN 1242	128	0.	1 JAN 1712	173	0.
1 JAN 0348	39	0.	1 JAN 0818	84	109.	1 JAN 1248	129	0.	1 JAN 1718	174	0.
1 JAN 0354	40	0.	1 JAN 0824	85	108.	1 JAN 1254	130	0.	1 JAN 1724	175	0.
1 JAN 0400	41	0.	1 JAN 0830	86	108.	1 JAN 1300	131	0.	1 JAN 1730	176	0.
1 JAN 0406	42	0.	1 JAN 0836	87	107.	1 JAN 1306	132	0.	1 JAN 1736	177	0.
1 JAN 0412	43	1.	1 JAN 0842	88	107.	1 JAN 1312	133	0.	1 JAN 1742	178	0.
1 JAN 0418	44	5.	1 JAN 0848	89	107.	1 JAN 1318	134	0.	1 JAN 1748	179	0.
1 JAN 0424	45	17.	1 JAN 0854	90	107.	1 JAN 1324	135	0.	1 JAN 1754	180	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	17.90-HR
3793.	5.20	(CFS)	615.	206.	206.	206.
		(INCHES)	1.267	1.269	1.269	1.269
		(AC-FT)	305.	305.	305.	305.

CUMULATIVE AREA = 4.51 SQ MI

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	S48	1243.	4.90	181.	61.	61.	.80		
DIVERSION TO	SEAST	300.	4.90	98.	33.	33.	.80		
HYDROGRAPH AT	DSHA	943.	4.90	83.	28.	28.	.80		
ROUTED TO	STO1	621.	5.20	77.	26.	26.	.80	1419.00	5.20
HYDROGRAPH AT	S46	965.	5.10	176.	59.	59.	.82 .93	1551	
DIVERSION TO	D46C	483.	5.10	88.	29.	29.	.82		
HYDROGRAPH AT	DS46	483.	5.10	88.	29.	29.	.82		
2 COMBINED AT	C46	1098.	5.10	165.	55.	55.	1.62		
ROUTED TO	STO2	1031.	5.20	162.	54.	54.	1.62	1412.98	5.20
HYDROGRAPH AT	RS46	483.	5.10	88.	29.	29.	.00		
2 COMBINED AT	C46N	1496.	5.20	250.	84.	84.	1.62		
HYDROGRAPH AT	S42	1008.	5.10	178.	60.	60.	.90 .8	1073	
DIVERSION TO	D42C	504.	5.10	89.	30.	30.	.90		
HYDROGRAPH AT	DS42	504.	5.10	89.	30.	30.	.90		
2 COMBINED AT	C42S	1972.	5.20	339.	114.	114.	2.52		
ROUTED TO	STO3	1960.	5.20	336.	113.	113.	2.52	1406.70	5.20
HYDROGRAPH AT	RS42	504.	5.10	89.	30.	30.	.00		
DIVERSION TO	CEAST	300.	5.10	75.	25.	25.	.00		
HYDROGRAPH AT	DCCT	204.	5.10	14.	5.	5.	.00		
2 COMBINED AT	C42N	2136.	5.20	351.	118.	118.	2.52		
ROUTED TO	STO4	2082.	5.20	346.	116.	116.	2.52	1404.03	5.20
HYDROGRAPH AT	S38	1296.	5.20	254.	85.	85.	1.34 1.02	1229	
DIVERSION TO	SWEST	195.	5.20	106.	35.	35.	1.34		
HYDROGRAPH AT	DSWW	1101.	5.20	149.	50.	50.	1.34		
2 COMBINED AT	C38	3183.	5.20	495.	166.	166.	3.86		
ROUTED TO	STO5	3153.	5.30	492.	165.	165.	3.86	1402.09	5.30
HYDROGRAPH AT	S28	745.	5.00	123.	41.	41.	.65	584	
2 COMBINED AT	C28	3793.	5.20	615.	206.	206.	4.51		