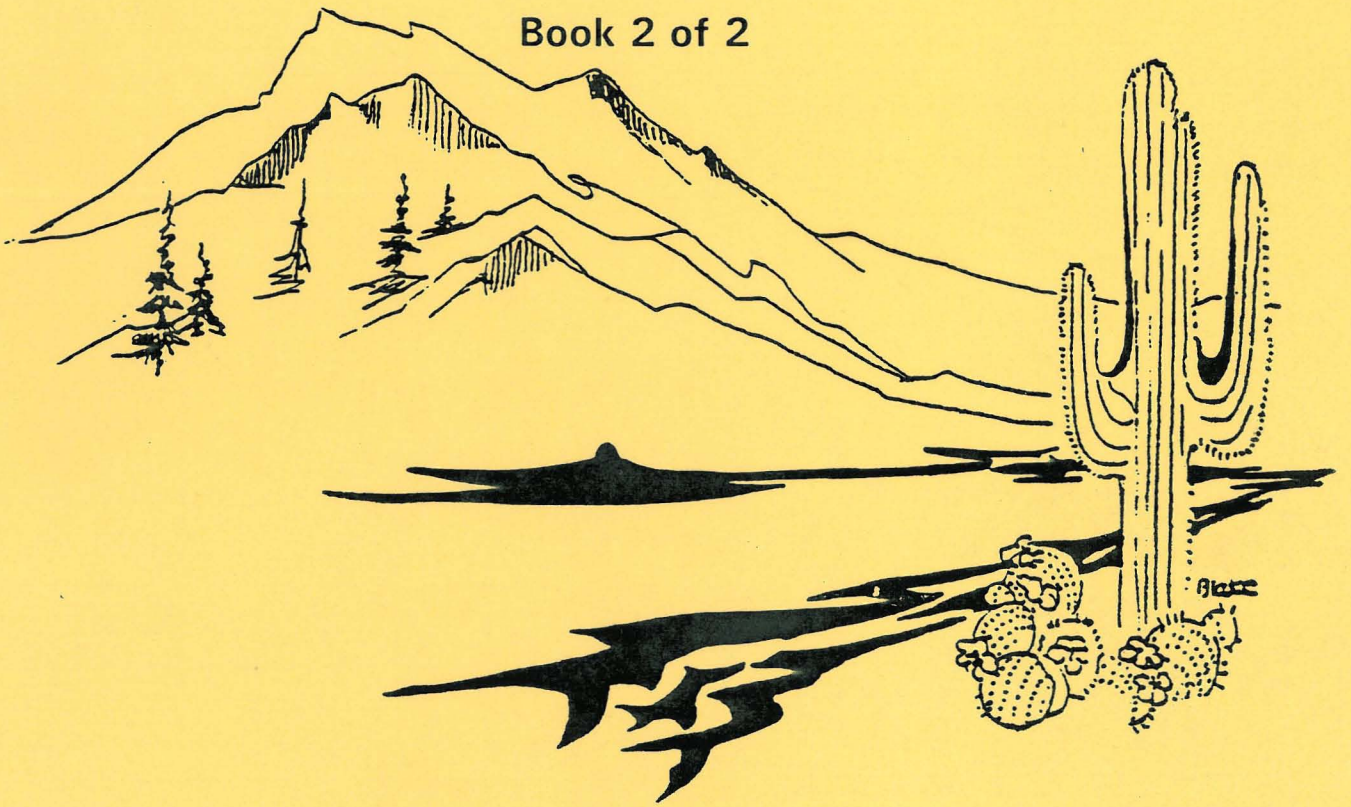
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PHOENIX, ARIZONA

CAVE CREEK
ABOVE CAREFREE HIGHWAY
FLOODPLAIN DELINEATION STUDY
FCD 95-28

TECHNICAL DATA NOTEBOOK
HYDROLOGY
Existing Condition

Book 2 of 2



George V. Sabol Consulting Engineers, Inc.
Scottsdale, Arizona

in association with
McLaughlin Kmetty Engineers, Ltd.

JULY 1997

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PHOENIX, ARIZONA

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APPENDIX A

Rainfall Loss Parameter Calculations

Table A-1
DTHETA & PSIF Lookup Table
Using XKSAT

Note:
The values in this table are taken from Figure 4.3 of the FCDMC Drainage Design Manual.

XKSAT in/hr (1)	DTHETA Dry (2)	DTHETA Normal (3)	PSIF inches (4)
0.01	0.150	0.050	12.400
0.02	0.193	0.100	11.200
0.03	0.223	0.127	10.100
0.04	0.248	0.150	9.700
0.05	0.269	0.150	8.800
0.06	0.287	0.150	8.400
0.07	0.304	0.150	8.000
0.08	0.319	0.150	7.600
0.09	0.332	0.150	7.300
0.10	0.345	0.150	7.000
0.11	0.357	0.169	6.800
0.12	0.369	0.189	6.600
0.13	0.380	0.209	6.400
0.14	0.390	0.229	6.200
0.15	0.400	0.250	6.000
0.16	0.393	0.250	5.800
0.17	0.387	0.250	5.700
0.18	0.381	0.250	5.600
0.19	0.376	0.250	5.400
0.20	0.371	0.250	5.300
0.21	0.366	0.250	5.200
0.22	0.362	0.250	5.100
0.23	0.358	0.250	5.000
0.24	0.354	0.250	4.900
0.25	0.350	0.250	4.800
0.26	0.350	0.250	4.700
0.27	0.350	0.250	4.650
0.28	0.350	0.250	4.600
0.29	0.350	0.250	4.550
0.30	0.350	0.250	4.500
0.31	0.350	0.250	4.450
0.32	0.350	0.250	4.400
0.33	0.350	0.250	4.350
0.34	0.350	0.250	4.300
0.35	0.350	0.250	4.250
0.36	0.350	0.250	4.200
0.37	0.350	0.250	4.150
0.38	0.350	0.250	4.100
0.39	0.350	0.250	4.000
0.40	0.350	0.250	3.950
0.41	0.350	0.251	3.915

Table A-1
DTHETA & PSIF Lookup Table
Using XKSAT

XKSAT in/hr (1)	DTHETA Dry (2)	DTHETA Normal (3)	PSIF inches (4)
0.42	0.350	0.252	3.880
0.43	0.350	0.253	3.845
0.44	0.350	0.254	3.810
0.45	0.350	0.255	3.775
0.46	0.350	0.256	3.740
0.47	0.350	0.257	3.705
0.48	0.350	0.258	3.670
0.49	0.350	0.259	3.635
0.50	0.350	0.259	3.600
0.51	0.350	0.260	3.575
0.52	0.350	0.261	3.550
0.53	0.350	0.262	3.525
0.54	0.350	0.263	3.500
0.55	0.350	0.264	3.475
0.56	0.350	0.264	3.450
0.57	0.350	0.265	3.425
0.58	0.350	0.266	3.400
0.59	0.350	0.267	3.375
0.60	0.350	0.267	3.350
0.61	0.350	0.268	3.330
0.62	0.350	0.269	3.310
0.63	0.350	0.270	3.290
0.64	0.350	0.270	3.270
0.65	0.350	0.271	3.250
0.66	0.350	0.272	3.230
0.67	0.350	0.272	3.210
0.68	0.350	0.273	3.190
0.69	0.350	0.274	3.170
0.70	0.350	0.274	3.150
0.71	0.350	0.275	3.130
0.72	0.350	0.276	3.110
0.73	0.350	0.276	3.090
0.74	0.350	0.277	3.070
0.75	0.350	0.277	3.050
0.76	0.350	0.278	3.030
0.77	0.350	0.279	3.010
0.78	0.350	0.279	2.990
0.79	0.350	0.280	2.970
0.80	0.350	0.280	2.950
0.81	0.350	0.281	2.935
0.82	0.350	0.282	2.920

Table A-1
DTHETA & PSIF Lookup Table
Using XKSAT

XKSAT in/hr (1)	DTHETA Dry (2)	DTHETA Normal (3)	PSIF inches (4)
0.83	0.350	0.282	2.905
0.84	0.350	0.283	2.890
0.85	0.350	0.283	2.875
0.86	0.350	0.284	2.860
0.87	0.350	0.284	2.845
0.88	0.350	0.285	2.830
0.89	0.350	0.285	2.815
0.90	0.350	0.286	2.800
0.91	0.350	0.287	2.785
0.92	0.350	0.287	2.770
0.93	0.350	0.288	2.755
0.94	0.350	0.288	2.740
0.95	0.350	0.289	2.725
0.96	0.350	0.289	2.710
0.97	0.350	0.290	2.695
0.98	0.350	0.290	2.680
0.99	0.350	0.291	2.665
1.00	0.350	0.291	2.650
1.01	0.350	0.292	2.640
1.02	0.350	0.292	2.630
1.03	0.350	0.292	2.620
1.04	0.350	0.293	2.610
1.05	0.350	0.293	2.600
1.06	0.350	0.294	2.590
1.07	0.350	0.294	2.580
1.08	0.350	0.295	2.570
1.09	0.350	0.295	2.560
1.10	0.350	0.296	2.550
1.11	0.350	0.296	2.540
1.12	0.350	0.297	2.530
1.13	0.350	0.297	2.520
1.14	0.350	0.297	2.510
1.15	0.350	0.298	2.500
1.16	0.350	0.298	2.490
1.17	0.350	0.299	2.480
1.18	0.350	0.299	2.470
1.19	0.350	0.300	2.460
1.20	0.350	0.300	2.450

Table A-2

Tonto National Forest General TES
Rainfall loss characteristics for each
soil map unit in its natural condition

Soil Map Unit (1)	Bare Ground XKSAT in/hr (2)	Natural Rock Outcrop % (3)	Assinged RTIMP % (4)
103	0.12	0	0
TES121	0.12	0	0
126	0.40	30	15
TES301	0.40	0	0
303	0.40	30	15

Table A-3

Tonto National Forest Cartwright Allotment TES
Rainfall loss characteristics for each
soil map unit in its natural condition

Soil Map Unit (1)	Bare Ground XKSAT in/hr (2)	Natural Rock Outcrop % (3)	Assigned RTIMP % (4)
CA12	0.40	0	0
73	0.40	0	0
239	0.40	30	15
292	0.40	30	15
300	0.06	0	0
301	0.06	0	0
352	0.40	10	5
381	0.40	0	0
382	0.40	15	5
390	0.06	0	0
391	0.06	0	0
400	0.06	0	0
401	0.06	0	0
402	0.40	10	5
415	0.40	0	0
416	0.06	0	0
417	0.25	20	10
418	0.40	0	0
451	0.25	0	0
452	0.25	20	10

Table A-4

NRCS Aguila-Carefree Soil Survey
Rainfall loss characteristics for each
soil map unit in its natural condition

Soil Map Unit (1)	Bare Ground XKSAT in/hr (2)	Natural Rock Outcrop % (3)	Assinged RTIMP % (4)
3	0.58	0	0
6	0.62	0	0
8	0.96	0	0
12	0.01	0	0
24	0.02	0	0
26	0.01	0	0
28	0.02	0	0
31	0.33	35	15
33	0.23	0	0
34	0.23	0	0
40	0.17	0	0
41	0.17	0	0
44	0.03	0	0
61	0.15	0	0
63	0.14	25	10
66	0.23	0	0
72	0.09	30	15
93	0.33	0	0
95	0.04	0	0
96	0.07	0	0
98	0.37	0	0
104	0.14	60	30
110	0.13	0	0
112	0.39	0	0
121	0.12	0	0

Table A-5

Surface retention loss and vegetation cover for each subbasin in its natural condition

Subbasin ID (1)	HEC-1 ID (2)	IA in (3)	Vegetation Cover % (4)
SSW1	S110L	0.20	35
CC1	S110R	0.20	40
BC1	S120	0.25	40
CC2	S130	0.25	40
BMM1	S140	0.20	25
CC3	S150	0.20	35
UNT1	S150R	0.20	25
STC1	S160	0.25	40
CC4	S170	0.20	35
GG1	S170R	0.20	25
MF1	S180	0.25	35
CC6	S190L	0.20	30
CC5	S190R	0.25	30
CC7	S200	0.20	35
CWC1	S210	0.20	35
CC8	S220	0.20	30
CC9	S230	0.20	30
CC10	S240	0.20	35
WSW1	S250	0.20	35
UNT2	S260L	0.20	35
CC11	S260R	0.20	30
GVW1	S270	0.25	35
GVW2	S280	0.20	30
GWW1	S290	0.15	30
GVW3	S310	0.15	35
AHW1	S320	0.15	30
AHW4	S330	0.15	30
AHW3	S340L	0.20	35
AHW2	S340R	0.15	30
AHW5	S350	0.15	35
AHW6	S360	0.20	35
AHW7	S370	0.15	30
AHW8	S380	0.20	30
AHW9	S390	0.15	30
UNT3	S400L	0.20	25
CC12	S400	0.20	30
CC13	S410	0.15	25

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S110L	Soil Map Unit No.	..	73	352	390	391	400	401	402	415	417	418	452	0	0	0	0	0	0
	Sub-Area (acres)	..	24.7	572.4	464.8	249.4	1253.7	1268.0	1642.3	313.2	272.0	11.8	709.5	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.40	0.40	0.06	0.06	0.06	0.06	0.40	0.40	0.25	0.40	0.25	---	---	---	---	---	---
	RTIMP (rock)	..	0%	5%	0%	0%	0%	0%	5%	0%	10%	0%	10%	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.15**
PSIF	**6.00**
DTHETA (Dry)	**0.40**
DTHETA (Normal)	**0.25**
RTIMP avg.	**3.08 %**

Total Subbasin Area in sq. miles = 10.60

S110R	Soil Map Unit No.	..	73	126	303	381	382	400	401	402	417	451	452	TES121	0	0	0	0	0
	Sub-Area (acres)	..	47.4	3130.5	22.5	158.6	53.4	1741.4	1123.5	2939.3	254.0	263.3	613.8	1130.5	---	---	---	---	---
	XKSAT (bare ground)	..	0.40	0.40	0.40	0.40	0.40	0.06	0.06	0.40	0.25	0.25	0.25	0.12	---	---	---	---	---
	RTIMP (rock)	..	0%	15%	15%	0%	5%	0%	0%	5%	10%	0%	10%	0%	---	---	---	---	---

XKSAT log avg (bare ground)	**0.21**
PSIF	**5.20**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.25**
RTIMP avg.	**6.18 %**

Total Subbasin Area in sq. miles = 17.93

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S120	Soil Map Unit No.	..	73	126	303	352	390	391	400	401	402	416	451	452	0	0	0	0	0
	Sub-Area (acres)	..	16.0	3.8	337.1	1137.8	189.2	88.6	9.1	14.7	548.1	33.4	336.0	341.4	---	---	---	---	---
	XKSAT (bare ground)	..	0.40	0.40	0.40	0.40	0.06	0.06	0.06	0.06	0.40	0.06	0.25	0.25	---	---	---	---	---
	RTIMP (rock)	..	0%	15%	15%	5%	0%	0%	0%	0%	5%	0%	0%	10%	---	---	---	---	---

XKSAT log avg (bare ground)	**0.29**
PSIF	**4.55**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**5.55 %**

Total Subbasin Area in sq. miles = 4.77

S130	Soil Map Unit No.	..	73	239	352	381	382	390	391	400	401	402	416	417	451	452	0	0	0
	Sub-Area (acres)	..	47.4	70.4	66.7	0.6	3.2	16.1	38.5	17.1	177.9	190.6	149.9	255.2	233.3	575.1	---	---	---
	XKSAT (bare ground)	..	0.40	0.40	0.40	0.40	0.40	0.06	0.06	0.06	0.06	0.40	0.06	0.25	0.25	0.25	---	---	---
	RTIMP (rock)	..	0%	15%	5%	0%	5%	0%	0%	0%	0%	5%	0%	10%	0%	10%	---	---	---

XKSAT log avg (bare ground)	**0.20**
PSIF	**5.30**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.25**
RTIMP avg.	**5.79 %**

Total Subbasin Area in sq. miles = 2.88

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S140	Soil Map Unit No. ..	73	239	381	382	401	402	451	452	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	6.9	33.1	284.4	515.1	116.6	15.2	28.7	175.5	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.40	0.40	0.40	0.06	0.40	0.25	0.25	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	0%	5%	0%	5%	0%	10%	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.31**
PSIF	**4.45**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**4.17 %**

Total Subbasin Area in sq. miles = 1.84

S150	Soil Map Unit No. ..	73	239	381	382	451	452	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	24.0	374.1	3.4	16.8	6.7	256.5	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.40	0.40	0.40	0.25	0.25	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	0%	5%	0%	10%	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.33**
PSIF	**4.35**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**12.12 %**

Total Subbasin Area in sq. miles = 1.06

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S150R	Soil Map Unit No. ..	73	239	381	382	390	452	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	0.7	445.3	182.9	305.1	33.8	308.7	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.40	0.40	0.40	0.06	0.25	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	0%	5%	0%	10%	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.34**
PSIF	**4.30**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**8.85 %**

Total Subbasin Area in sq. miles = 1.99

S160	Soil Map Unit No. ..	73	239	292	352	381	390	391	417	451	452	0	0	0	0	0	0	0
	Sub-Area (acres) ..	2.7	62.5	1.0	227.5	100.6	112.1	22.1	19.2	103.6	176.8	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.40	0.40	0.40	0.40	0.06	0.06	0.25	0.25	0.25	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	15%	5%	0%	0%	0%	10%	0%	10%	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.25**
PSIF	**4.80**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**4.89 %**

Total Subbasin Area in sq. miles = 1.29

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S170	Soil Map Unit No. ..	73	239	301	390	417	452	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	31.8	155.5	16.5	221.8	103.1	55.8	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.40	0.06	0.06	0.25	0.25	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	0%	0%	10%	10%	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.16**
PSIF	**5.80**
DTHETA (Dry)	**0.39**
DTHETA (Normal)	**0.25**
RTIMP avg.	**6.71 %**

Total Subbasin Area in sq. miles = 0.91

S170R	Soil Map Unit No. ..	103	126	239	300	381	382	390	391	400	401	402	451	452	0	0	0	0
	Sub-Area (acres) ..	43.7	1.7	565.2	27.3	147.0	291.9	2.7	101.9	5.5	31.4	71.7	43.0	853.8	---	---	---	---
	XKSAT (bare ground) ..	0.12	0.40	0.40	0.06	0.40	0.40	0.06	0.06	0.06	0.06	0.40	0.25	0.25	---	---	---	---
	RTIMP (rock) ..	0%	15%	15%	0%	0%	5%	0%	0%	0%	0%	5%	0%	10%	---	---	---	---

XKSAT log avg (bare ground)	**0.28**
PSIF	**4.60**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**8.62 %**

Total Subbasin Area in sq. miles = 3.42

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S180	Soil Map Unit No.	..	73	103	126	239	292	300	301	352	381	390	391	401	402	416	417	452	0
	Sub-Area (acres)	..	21.0	9.2	0.6	2.2	250.0	467.3	338.2	332.5	9.3	72.3	41.3	84.8	331.3	83.1	76.1	314.7	---
	XKSAT (bare ground)	..	0.40	0.12	0.40	0.40	0.40	0.06	0.06	0.40	0.40	0.06	0.06	0.06	0.40	0.06	0.25	0.25	---
	RTIMP (rock)	..	0%	0%	15%	15%	15%	0%	0%	5%	0%	0%	0%	0%	5%	0%	10%	10%	---

XKSAT log avg (bare ground)	**0.16**
PSIF	**5.80**
DTHETA (Dry)	**0.39**
DTHETA (Normal)	**0.25**
RTIMP avg.	**4.53 %**

Total Subbasin Area in sq. miles = 3.80

S190L	Soil Map Unit No.	..	103	239	292	300	301	352	416	CA12	0	0	0	0	0	0	0	0	0
	Sub-Area (acres)	..	0.1	5.4	10.7	522.6	509.0	648.2	2.9	102.2	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.12	0.40	0.40	0.06	0.06	0.40	0.06	0.40	---	---	---	---	---	---	---	---	---
	RTIMP (rock)	..	0%	15%	15%	0%	0%	5%	0%	0%	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.13**
PSIF	**6.40**
DTHETA (Dry)	**0.38**
DTHETA (Normal)	**0.21**
RTIMP avg.	**1.93 %**

Total Subbasin Area in sq. miles = 2.81

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S190R	Soil Map Unit No. ..	73	103	126	239	292	300	301	352	391	CA12	0	0	0	0	0	0	0
	Sub-Area (acres) ..	5.3	295.7	304.6	284.4	475.0	311.1	543.7	462.3	90.9	23.5	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.40	0.12	0.40	0.40	0.40	0.06	0.06	0.40	0.06	0.40	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	15%	15%	15%	0%	0%	5%	0%	0%	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.19**
PSIF	**5.40**
DTHETA (Dry)	**0.38**
DTHETA (Normal)	**0.25**
RTIMP avg.	**6.53 %**

Total Subbasin Area in sq. miles = 4.37

S200	Soil Map Unit No. ..	8	12	34	61	63	103	126	292	300	301	303	352	CA12	0	0	0	0
	Sub-Area (acres) ..	3.4	1.5	0.5	20.0	0.6	157.6	578.5	274.4	112.6	469.6	541.2	343.0	24.2	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.23	0.15	0.14	0.12	0.40	0.40	0.06	0.06	0.40	0.40	0.40	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	10%	0%	15%	15%	0%	0%	15%	5%	0%	---	---	---	---

XKSAT log avg (bare ground)	**0.24**
PSIF	**4.90**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**8.96 %**

Total Subbasin Area in sq. miles = 3.95

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S210	Soil Map Unit No. ..	8	31	33	34	61	63	72	103	104	126	300	301	303	352	401	402	452
	Sub-Area (acres) ..	32.2	918.4	11.3	62.4	59.8	95.0	1267.1	303.7	17.9	937.8	3.6	1.3	2840.8	11.3	43.4	14.5	0.2
	XKSAT (bare ground) ..	0.96	0.33	0.23	0.23	0.15	0.14	0.09	0.12	0.14	0.40	0.06	0.06	0.40	0.40	0.06	0.40	0.25
	RTIMP (rock) ..	0%	15%	0%	0%	0%	10%	15%	0%	30%	15%	0%	0%	15%	5%	0%	5%	10%

XKSAT log avg (bare ground)	**0.27**
PSIF	**4.65**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**13.76 %**

Total Subbasin Area in sq. miles = 10.34

S220	Soil Map Unit No. ..	8	12	26	31	33	34	61	63	72	103	126	303	0	0	0	0	0
	Sub-Area (acres) ..	76.2	2.9	13.9	17.5	2.8	56.5	0.3	34.5	1033.8	1.1	240.6	846.2	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.01	0.33	0.23	0.23	0.15	0.14	0.09	0.12	0.40	0.40	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	15%	0%	0%	0%	10%	15%	0%	15%	15%	---	---	---	---	---

XKSAT log avg (bare ground)	**0.20**
PSIF	**5.30**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.25**
RTIMP avg.	**13.93 %**

Total Subbasin Area in sq. miles = 3.63

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S230	Soil Map Unit No. ..	8	26	31	34	66	72	96	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	78.6	37.2	13.3	80.4	55.5	885.9	26.0	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.33	0.23	0.23	0.09	0.07	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	15%	0%	0%	15%	0%	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground) 0.11
PSIF 6.80
DTHETA (Dry) 0.36
DTHETA (Normal) 0.17
RTIMP avg. 11.46 %

Total Subbasin Area in sq. miles = 1.84

S240	Soil Map Unit No. ..	8	26	33	34	66	72	93	95	96	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	37.5	165.1	56.8	110.7	495.3	655.3	24.7	126.4	9.3	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.23	0.23	0.23	0.09	0.33	0.04	0.07	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	15%	0%	0%	0%	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground) 0.11
PSIF 6.80
DTHETA (Dry) 0.36
DTHETA (Normal) 0.17
RTIMP avg. 5.85 %

Total Subbasin Area in sq. miles = 2.63

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S250	Soil Map Unit No. ..	8	26	31	33	34	63	66	72	93	95	96	104	121	0	0	0	0
	Sub-Area (acres) ..	66.0	467.0	781.9	307.4	249.5	295.1	375.0	1011.1	52.7	22.0	86.1	33.9	19.8	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.33	0.23	0.23	0.14	0.23	0.09	0.33	0.04	0.07	0.14	0.12	---	---	---	---
	RTIMP (rock) ..	0%	0%	15%	0%	0%	10%	0%	15%	0%	0%	0%	30%	0%	---	---	---	---

XKSAT log avg (bare ground)	**0.12**
PSIF	**6.60**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.19**
RTIMP avg.	**8.19 %**

Total Subbasin Area in sq. miles = 5.89

S260L	Soil Map Unit No. ..	8	12	26	33	34	63	66	72	93	96	104	0	0	0	0	0	0
	Sub-Area (acres) ..	150.6	4.4	2.9	646.2	141.9	160.1	0.0	476.8	51.3	102.1	683.7	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.01	0.23	0.23	0.14	0.23	0.09	0.33	0.07	0.14	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	10%	0%	15%	0%	0%	30%	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.17**
PSIF	**5.70**
DTHETA (Dry)	**0.39**
DTHETA (Normal)	**0.25**
RTIMP avg.	**12.09 %**

Total Subbasin Area in sq. miles = 3.78

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S260R	Soil Map Unit No. ..	8	26	33	34	72	93	96	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	65.4	50.9	30.9	84.7	814.5	5.3	3.0	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.23	0.23	0.09	0.33	0.07	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	15%	0%	0%	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.10**
PSIF	**7.00**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.15**
RTIMP avg.	**11.58 %**

Total Subbasin Area in sq. miles = 1.65

S270	Soil Map Unit No. ..	6	8	26	34	41	72	93	104	303	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	41.1	72.4	31.4	157.6	69.8	1378.3	3.6	613.2	744.9	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.62	0.96	0.01	0.23	0.17	0.09	0.33	0.14	0.40	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	15%	0%	30%	15%	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.16**
PSIF	**5.80**
DTHETA (Dry)	**0.39**
DTHETA (Normal)	**0.25**
RTIMP avg.	**16.14 %**

Total Subbasin Area in sq. miles = 4.86

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S280	Soil Map Unit No. ..	8	34	41	63	72	93	104	303	TES301	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	115.6	6.0	232.2	307.6	638.1	98.3	51.4	699.8	1647.9	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.23	0.17	0.14	0.09	0.33	0.14	0.40	0.40	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	10%	15%	0%	30%	15%	0%	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.27**
PSIF	**4.65**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.25**
RTIMP avg.	**6.50 %**

Total Subbasin Area in sq. miles = 5.93

S290	Soil Map Unit No. ..	6	24	28	33	34	40	41	63	72	93	96	121	TES301	0	0	0	0
	Sub-Area (acres) ..	291.9	15.7	6.9	383.7	293.9	465.9	742.7	51.9	74.2	286.1	590.7	6.4	1678.9	---	---	---	---
	XKSAT (bare ground) ..	0.62	0.02	0.02	0.23	0.23	0.17	0.17	0.14	0.09	0.33	0.07	0.12	0.40	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	0%	0%	10%	15%	0%	0%	0%	0%	---	---	---	---

XKSAT log avg (bare ground)	**0.23**
PSIF	**5.00**
DTHETA (Dry)	**0.36**
DTHETA (Normal)	**0.25**
RTIMP avg.	**0.33 %**

Total Subbasin Area in sq. miles = 7.64

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S310	Soil Map Unit No.	..	6	8	12	26	33	34	41	72	93	96	121	0	0	0	0	0	0
	Sub-Area (acres)	..	101.2	194.5	13.8	172.4	155.6	654.2	77.1	10.1	97.7	39.9	11.2	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.62	0.96	0.01	0.01	0.23	0.23	0.17	0.09	0.33	0.07	0.12	---	---	---	---	---	---
	RTIMP (rock)	..	0%	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.19**
PSIF	**5.40**
DTHETA (Dry)	**0.38**
DTHETA (Normal)	**0.25**
RTIMP avg.	**0.10 %**

Total Subbasin Area in sq. miles = 2.39

S320	Soil Map Unit No.	..	12	61	63	72	93	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres)	..	3.8	171.6	57.5	19.5	38.4	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.01	0.15	0.14	0.09	0.33	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock)	..	0%	0%	10%	15%	0%	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.15**
PSIF	**6.00**
DTHETA (Dry)	**0.40**
DTHETA (Normal)	**0.25**
RTIMP avg.	**2.98 %**

Total Subbasin Area in sq. miles = 0.45

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S330	Soil Map Unit No. ..	12	33	61	72	93	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	35.3	2.0	14.5	17.6	35.2	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.01	0.23	0.15	0.09	0.33	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	15%	0%	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.07**
PSIF	**8.00**
DTHETA (Dry)	**0.30**
DTHETA (Normal)	**0.15**
RTIMP avg.	**2.53 %**

Total Subbasin Area in sq. miles = 0.16

S340L	Soil Map Unit No. ..	33	61	63	72	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	6.9	47.8	84.0	15.0	---	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.23	0.15	0.14	0.09	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	10%	15%	---	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.14**
PSIF	**6.20**
DTHETA (Dry)	**0.39**
DTHETA (Normal)	**0.23**
RTIMP avg.	**6.92 %**

Total Subbasin Area in sq. miles = 0.24

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S340R	Soil Map Unit No.	..	12	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres)	..	3.6	37.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.01	0.15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock)	..	0%	0%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.12**
PSIF	**6.60**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.19**
RTIMP avg.	**0.00 %**

Total Subbasin Area in sq. miles = 0.06

S350	Soil Map Unit No.	..	28	33	61	63	72	93	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres)	..	3.9	21.5	38.3	8.8	18.6	11.7	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground)	..	0.02	0.23	0.15	0.14	0.09	0.33	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock)	..	0%	0%	0%	10%	15%	0%	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.15**
PSIF	**6.00**
DTHETA (Dry)	**0.40**
DTHETA (Normal)	**0.25**
RTIMP avg.	**3.57 %**

Total Subbasin Area in sq. miles = 0.16

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S360	Soil Map Unit No. ..	28	33	61	63	72	93	96	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	9.8	18.6	113.4	140.8	84.1	2.5	0.9	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.02	0.23	0.15	0.14	0.09	0.33	0.07	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	10%	15%	0%	0%	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.13**
PSIF	**6.40**
DTHETA (Dry)	**0.38**
DTHETA (Normal)	**0.21**
RTIMP avg.	**7.21 %**

Total Subbasin Area in sq. miles = 0.58

S370	Soil Map Unit No. ..	26	28	33	34	61	72	93	96	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	3.2	4.2	15.0	11.2	8.9	20.5	30.8	124.4	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.01	0.02	0.23	0.23	0.15	0.09	0.33	0.07	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	15%	0%	0%	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.10**
PSIF	**7.00**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.15**
RTIMP avg.	**1.41 %**

Total Subbasin Area in sq. miles = 0.34

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S380	Soil Map Unit No. ..	33	72	93	96	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	23.4	218.7	9.7	13.9	---	---	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.23	0.09	0.33	0.07	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	15%	0%	0%	---	---	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.10**
PSIF	**7.00**
DTHETA (Dry)	**0.35**
DTHETA (Normal)	**0.15**
RTIMP avg.	**12.35 %**

Total Subbasin Area in sq. miles = 0.42

S390	Soil Map Unit No. ..	8	26	33	34	72	93	96	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	14.2	37.7	14.7	7.9	31.9	74.3	41.5	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.96	0.01	0.23	0.23	0.09	0.33	0.07	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	15%	0%	0%	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.12**
PSIF	**6.60**
DTHETA (Dry)	**0.37**
DTHETA (Normal)	**0.19**
RTIMP avg.	**2.15 %**

Total Subbasin Area in sq. miles = 0.35

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S400L	Soil Map Unit No. ..	3	6	12	33	34	44	61	63	72	93	96	110	0	0	0	0	0
	Sub-Area (acres) ..	24.8	175.1	28.7	1012.6	1.1	8.3	739.1	166.7	624.7	43.1	386.6	5.6	---	---	---	---	---
	XKSAT (bare ground) ..	0.58	0.62	0.01	0.23	0.23	0.03	0.15	0.14	0.09	0.33	0.07	0.13	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	0%	0%	10%	15%	0%	0%	0%	---	---	---	---	---

XKSAT log avg (bare ground)	**0.15**
PSIF	**6.00**
DTHETA (Dry)	**0.40**
DTHETA (Normal)	**0.25**
RTIMP avg.	**3.43 %**

Total Subbasin Area in sq. miles = 5.03

S400	Soil Map Unit No. ..	3	8	12	33	34	72	93	96	121	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	90.2	73.4	55.3	174.7	23.9	1459.4	7.5	53.3	19.8	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.58	0.96	0.01	0.23	0.23	0.09	0.33	0.07	0.12	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	15%	0%	0%	0%	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.11**
PSIF	**6.80**
DTHETA (Dry)	**0.36**
DTHETA (Normal)	**0.17**
RTIMP avg.	**11.18 %**

Total Subbasin Area in sq. miles = 3.06

Table A-6
Worksheet
Soils, Vegetation Cover, and RTIMP for rainfall losses by Green & Ampt method for each subbasin

S410	Soil Map Unit No. ..	3	12	33	44	96	98	110	0	0	0	0	0	0	0	0	0	0	0
	Sub-Area (acres) ..	140.2	113.8	28.7	105.4	388.4	29.2	31.4	---	---	---	---	---	---	---	---	---	---	---
	XKSAT (bare ground) ..	0.58	0.01	0.23	0.03	0.07	0.37	0.13	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (rock) ..	0%	0%	0%	0%	0%	0%	0%	---	---	---	---	---	---	---	---	---	---	---

XKSAT log avg (bare ground)	**0.08**
PSIF	**7.60**
DTHETA (Dry)	**0.32**
DTHETA (Normal)	**0.15**
RTIMP avg.	**0.00 %**

Total Subbasin Area in sq. miles = 1.31

Table A-7

Rainfall loss characteristics and corresponding composite values for each land use classification

Land use Class (1)	Base RTIMP % (2)	Pervious Area Open Space Values Veg. Cover % (3)	Pervious Area Open Space Values IA in (4)	Composite Values Veg. Cover % (5)	Composite Values IA in (6)
LDR-15	15	40	0.20	34	0.18
LDR-25	25	40	0.20	30	0.16
MDR	30	40	0.20	28	0.16
HDR	45	40	0.20	22	0.13
C	80	50	0.15		0.07
RSRT	60	80	0.20	32	0.11
AP	85	50	0.15	8	0.07
* GC	10	90	0.20	81	0.19
EF	50	40	0.15	20	0.10
N	**	**	**	**	**
F	**	**	**	**	**
L	100	0	0.00	0	0.00
PARK	**	**	**	**	**
P	100	---	---	0	0.05

Land use Class	Description
LDR	Light Density Residential
MDR	Medium Density Residential
HDR	High Density Residential
C	Commercial, incl. Light and Medium Intensity
RSRT	Hotel or Resort
AP	Airport
GC	Golf Course
EF	Equestrian Facility
N	Natural, includes vacant landuse
F	Forest
L	Lake
PARK	Park
P	Pavement

* The golf course vegetation cover accounts for natural desert out-of-bounds areas included in the land use polygons.

** Land use class is considered as natural condition and does not contribute to the developed area composite values.

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S110L	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	6781.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 10.60

S110R	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	11478.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 17.93

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S120	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	3055.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 4.77

S130	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	1842.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 2.88

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S140	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	1175.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 1.84

S150	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	681.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 1.06

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S150R	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	1276.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 1.99

S160	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	828.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 1.29

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S170	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	584.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 0.91

S170R	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	2186.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 3.42

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S180	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	2433.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 3.80

S190L	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	1801.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 100.0 %
Developed Area 0.0 %

RTIMP (Dev.) avg. 0.00 %
Veg Cover (Dev.) avg. 0.00 %
IA (Dev.) avg. 0.00

Total Subbasin Area in sq. miles = 2.81

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S190R	Land Use ID	..	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	2796.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 4.37

S200	Land Use ID	..	F	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	2505.8	21.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 3.95

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S210	Land Use ID	..	F	N	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	Natural or Developed	..	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	4171.5	2449.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 10.34

S220	Land Use ID	..	F	N	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	Natural or Developed	..	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	1113.3	1213.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 3.63

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S230	Land Use ID ..	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed ..	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres) ..	12.8	1164.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed) ..	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed) ..	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed) ..	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 98.9 %
Developed Area 1.1 %

RTIMP (Dev.) avg. 15.00 %
Veg Cover (Dev.) avg. 34.00 %
IA (Dev.) avg. 0.18

Total Subbasin Area in sq. miles = 1.84

S240	Land Use ID ..	LDR-15	N	PARK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed ..	D	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres) ..	47.8	1521.7	111.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed) ..	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed) ..	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed) ..	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 97.2 %
Developed Area 2.8 %

RTIMP (Dev.) avg. 15.00 %
Veg Cover (Dev.) avg. 34.00 %
IA (Dev.) avg. 0.18

Total Subbasin Area in sq. miles = 2.63

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S250	Land Use ID	..	EF	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	39.7	1015.4	2712.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	50%	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	20%	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	0.10	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**72.0**	**%**
Developed Area	**28.0**	**%**
RTIMP (Dev.) avg.	**16.32**	**%**
Veg Cover (Dev.) avg.	**33.47**	**%**
IA (Dev.) avg.	**0.17**	

Total Subbasin Area in sq. miles = 5.89

S260L	Land Use ID	..	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	657.6	1762.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**72.8**	**%**
Developed Area	**27.2**	**%**
RTIMP (Dev.) avg.	**15.00**	**%**
Veg Cover (Dev.) avg.	**34.00**	**%**
IA (Dev.) avg.	**0.18**	

Total Subbasin Area in sq. miles = 3.78

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S260R	Land Use ID	..	LDR-15	N	PARK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	D	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	30.1	651.5	373.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**97.1**	**%**
Developed Area	**2.9**	**%**
RTIMP (Dev.) avg.	**15.00**	**%**
Veg Cover (Dev.) avg.	**34.00**	**%**
IA (Dev.) avg.	**0.18**	

Total Subbasin Area in sq. miles = 1.65

S270	Land Use ID	..	F	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	747.4	2365.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**100.0**	**%**
Developed Area	**0.0**	**%**
RTIMP (Dev.) avg.	**0.00**	**%**
Veg Cover (Dev.) avg.	**0.00**	**%**
IA (Dev.) avg.	**0.00**	

Total Subbasin Area in sq. miles = 4.86

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S280																		
Land Use ID	..	F	GC	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	N	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	1266.4	175.8	1106.8	1247.9	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	---	10%	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	---	81%	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	---	0.19	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**66.2**	**%**
Developed Area	**33.8**	**%**
RTIMP (Dev.) avg.	**14.31**	**%**
Veg Cover (Dev.) avg.	**40.44**	**%**
IA (Dev.) avg.	**0.18**	

Total Subbasin Area in sq. miles = 5.93

S290																		
Land Use ID	..	AP	C	GC	HDR	LDR-15	LDR-25	N	RSRT	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	D	D	D	D	D	N	D	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	50.0	56.6	370.5	103.3	2590.8	53.5	1646.3	17.9	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	85%	80%	10%	45%	15%	25%	---	60%	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	8%	10%	81%	22%	34%	30%	---	32%	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.07	0.07	0.19	0.13	0.18	0.16	---	0.11	---	---	---	---	---	---	---	---	---

Natural Area	**33.7**	**%**
Developed Area	**66.3**	**%**
RTIMP (Dev.) avg.	**18.01**	**%**
Veg Cover (Dev.) avg.	**38.08**	**%**
IA (Dev.) avg.	**0.17**	

Total Subbasin Area in sq. miles = 7.64

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S310																		
Land Use ID	..	C	GC	L	LDR-15	N	RSRT	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	D	N	D	N	D	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	4.8	13.9	3.7	373.0	1130.5	1.7	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	80%	10%	---	15%	---	60%	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	10%	81%	---	34%	---	32%	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.07	0.19	---	0.18	---	0.11	---	---	---	---	---	---	---	---	---	---	---

Natural Area 74.2 %
Developed Area 25.8 %

RTIMP (Dev.) avg. 15.82 %
Veg Cover (Dev.) avg. 35.36 %
IA (Dev.) avg. 0.18

Total Subbasin Area in sq. miles = 2.39

S320																		
Land Use ID	..	GC	LDR-25	MDR	N	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	17.1	229.4	10.0	34.2	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	10%	25%	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	81%	30%	28%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.19	0.16	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 11.8 %
Developed Area 88.2 %

RTIMP (Dev.) avg. 24.20 %
Veg Cover (Dev.) avg. 33.32 %
IA (Dev.) avg. 0.16

Total Subbasin Area in sq. miles = 0.45

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S330																		
Land Use ID	..	C	LDR-25	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	22.0	79.0	3.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	80%	25%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	10%	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.07	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**3.5**	**%**
Developed Area	**96.5**	**%**
RTIMP (Dev.) avg.	**37.00**	**%**
Veg Cover (Dev.) avg.	**25.64**	**%**
IA (Dev.) avg.	**0.14**	

Total Subbasin Area in sq. miles = 0.16

S340L																		
Land Use ID	..	LDR-25	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	70.3	83.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	25%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**54.2**	**%**
Developed Area	**45.8**	**%**
RTIMP (Dev.) avg.	**25.00**	**%**
Veg Cover (Dev.) avg.	**30.00**	**%**
IA (Dev.) avg.	**0.16**	

Total Subbasin Area in sq. miles = 0.24

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S340R	Land Use ID	..	C	LDR-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	D	D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	13.9	27.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	80%	25%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	10%	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	0.07	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**0.0**	**%**
Developed Area	**100.0**	**%**
RTIMP (Dev.) avg.	**43.39**	**%**
Veg Cover (Dev.) avg.	**23.31**	**%**
IA (Dev.) avg.	**0.13**	

Total Subbasin Area in sq. miles = 0.06

S350	Land Use ID	..	C	HDR	LDR-25	N	0	0	0	0	0	0	0	0	0	0	0	0	0
	Natural or Developed	..	D	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---
	Sub-Area (acres)	..	3.1	5.5	71.3	22.9	---	---	---	---	---	---	---	---	---	---	---	---	---
	RTIMP (Developed)	..	80%	45%	25%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Veg. Cover (Developed)	..	10%	22%	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	IA (Developed)	..	0.07	0.13	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**22.3**	**%**
Developed Area	**77.7**	**%**
RTIMP (Dev.) avg.	**28.50**	**%**
Veg Cover (Dev.) avg.	**28.68**	**%**
IA (Dev.) avg.	**0.16**	

Total Subbasin Area in sq. miles = 0.16

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S360																		
Land Use ID ..	C	HDR	LDR-25	N	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	11.4	0.6	115.8	242.2	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	80%	45%	25%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	10%	22%	30%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.07	0.13	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 65.4 %
Developed Area 34.6 %

RTIMP (Dev.) avg. 30.01 %
Veg Cover (Dev.) avg. 28.17 %
IA (Dev.) avg. 0.15

Total Subbasin Area in sq. miles = 0.58

S370																		
Land Use ID ..	C	HDR	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	123.5	12.5	18.2	64.2	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	80%	45%	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	10%	22%	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.07	0.13	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 29.4 %
Developed Area 70.6 %

RTIMP (Dev.) avg. 69.50 %
Veg Cover (Dev.) avg. 13.80 %
IA (Dev.) avg. 0.09

Total Subbasin Area in sq. miles = 0.34

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S380																		
Land Use ID ..	C	LDR-15	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	D	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	4.7	175.0	86.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	80%	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	10%	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.07	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**32.4**	**%**
Developed Area	**67.6**	**%**
RTIMP (Dev.) avg.	**16.69**	**%**
Veg Cover (Dev.) avg.	**33.38**	**%**
IA (Dev.) avg.	**0.17**	

Total Subbasin Area in sq. miles = 0.42

S390																		
Land Use ID ..	C	GC	HDR	LDR-15	N	RSRT	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	D	D	D	N	D	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	11.4	23.5	15.4	47.2	115.8	8.9	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	80%	10%	45%	15%	---	60%	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	10%	81%	22%	34%	---	32%	---	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.07	0.19	0.13	0.18	---	0.11	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**52.1**	**%**
Developed Area	**47.9**	**%**
RTIMP (Dev.) avg.	**28.95**	**%**
Veg Cover (Dev.) avg.	**39.92**	**%**
IA (Dev.) avg.	**0.16**	

Total Subbasin Area in sq. miles = 0.35

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S400L																		
Land Use ID ..	C	GC	LDR-15	LDR-25	MDR	N	RSRT	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	D	D	D	D	N	D	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	13.4	205.1	763.7	734.8	71.9	1405.9	21.6	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	80%	10%	15%	25%	30%	---	60%	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	10%	81%	34%	30%	28%	---	32%	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.07	0.19	0.18	0.16	0.16	---	0.11	---	---	---	---	---	---	---	---	---	---

Natural Area 43.7 %
Developed Area 56.3 %

RTIMP (Dev.) avg. 20.10 %
Veg Cover (Dev.) avg. 37.26 %
IA (Dev.) avg. 0.17

Total Subbasin Area in sq. miles = 5.03

S400																		
Land Use ID ..	LDR-15	N	PARK	RSRT	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed ..	D	N	N	D	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres) ..	103.7	1172.9	680.9	0.0	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed) ..	15%	---	---	60%	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed) ..	34%	---	---	32%	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed) ..	0.18	---	---	0.11	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area 94.7 %
Developed Area 5.3 %

RTIMP (Dev.) avg. 15.01 %
Veg Cover (Dev.) avg. 34.00 %
IA (Dev.) avg. 0.18

Total Subbasin Area in sq. miles = 3.06

Table A-8
Worksheet
Land use characteristics for rainfall losses for each subbasin
Existing Conditions

S410																		
Land Use ID	..	LDR-15	N	PARK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural or Developed	..	D	N	N	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sub-Area (acres)	..	195.6	638.8	2.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RTIMP (Developed)	..	15%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Veg. Cover (Developed)	..	34%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
IA (Developed)	..	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Natural Area	**76.6**	**%**
Developed Area	**23.4**	**%**
RTIMP (Dev.) avg.	**15.00**	**%**
Veg Cover (Dev.) avg.	**34.00**	**%**
IA (Dev.) avg.	**0.18**	

Total Subbasin Area in sq. miles = 1.31

Table A-9
Rainfall loss parameters for Green & Ampt method for each subbasin
Existing Conditions

Sub-basin ID (1)	HEC-1 ID (2)	Total sq. mi. (3)	Area Nat. % (4)	Area Dev. % (5)	IA, in inches Nat. (6)	IA, in inches Dev. (7)	IA, in inches Wghtd. (8)	RTIMP, in % Nat. (9)	RTIMP, in % Dev. (10)	RTIMP, in % Wghtd. (11)	Veg. Cover, in % Nat. (12)	Veg. Cover, in % Dev. (13)	Veg. Cover, in % Wghtd. (14)	XKSAT Bare Ground in/hr (15)	PSIF inches (16)	DTHETA Nat. dry (17)	DTHETA Dev. normal (18)	DTHETA Wghtd. (19)	XKSAT Corrected for Veg. in/hr (20)
AHW5	S350	0.1607	22.3	77.7	0.15	0.16	0.16	4	29	23	35	29	30	0.15	6.00	0.40	0.25	0.28	0.18
AHW6	S360	0.5782	65.4	34.6	0.20	0.15	0.18	7	30	15	35	28	33	0.13	6.40	0.38	0.21	0.32	0.16
AHW7	S370	0.3411	29.4	70.6	0.15	0.09	0.11	1	69	49	30	14	19	0.10	7.00	0.35	0.15	0.21	0.11
AHW8	S380	0.4153	32.4	67.6	0.20	0.17	0.18	12	17	15	30	33	32	0.10	7.00	0.35	0.15	0.21	0.12
AHW9	S390	0.3472	52.1	47.9	0.15	0.16	0.15	2	29	15	30	40	35	0.12	6.60	0.37	0.19	0.28	0.15
UNT3	S400L	5.0257	43.7	56.3	0.20	0.17	0.18	3	20	13	25	37	32	0.15	6.00	0.40	0.25	0.32	0.19
CC12	S400	3.0586	94.7	5.3	0.20	0.18	0.20	11	15	11	30	34	30	0.11	6.80	0.36	0.17	0.35	0.13
CC13	S410	1.3078	76.6	23.4	0.15	0.18	0.16	0	15	4	25	34	27	0.08	7.60	0.32	0.15	0.28	0.10

IA composite (8) = [(6)*(4)+(7)*(5)]/100

RTIMP total (11) = [(9)*(4) + (10)*(5)]/100

Vegetation Cover composi (14) = [(12)*(4)+(13)*(5)]/100

DTHETA composit (19) = [(17)*(4) + (18)*(5)]/100

XKSAT Correcte (20) = (15)*[(14)/100 * 1.111 + 0.889] where (14) > 10 and (15) < 1.2

Table A-9
Rainfall loss parameters for Green & Ampt method for each subbasin
Existing Conditions

Sub-basin ID (1)	HEC-1 ID (2)	Total sq. mi. (3)	Area Nat. % (4)	Area Dev. % (5)	IA, in inches Nat. (6)	IA, in inches Dev. (7)	IA, in inches Wghtd. (8)	RTIMP, in % Nat. (9)	RTIMP, in % Dev. (10)	RTIMP, in % Wghtd. (11)	Veg. Cover, in % Nat. (12)	Veg. Cover, in % Dev. (13)	Veg. Cover, in % Wghtd. (14)	XKSAT Bare Ground in/hr (15)	PSIF inches (16)	DTHETA Nat. dry (17)	DTHETA Dev. normal (18)	DTHETA Wghtd. (19)	XKSAT Corrected for Veg. in/hr (20)
SSW1	S110L	10.5965	100.0	0.0	0.20	0.00	0.20	3	0	3	35	0	35	0.15	6.00	0.40	0.25	0.40	0.19
CC1	S110R	17.9347	100.0	0.0	0.20	0.00	0.20	6	0	6	40	0	40	0.21	5.20	0.37	0.25	0.37	0.28
BC1	S120	4.7739	100.0	0.0	0.25	0.00	0.25	6	0	6	40	0	40	0.29	4.55	0.35	0.25	0.35	0.39
CC2	S130	2.8783	100.0	0.0	0.25	0.00	0.25	6	0	6	40	0	40	0.20	5.30	0.37	0.25	0.37	0.27
BMM1	S140	1.8367	100.0	0.0	0.20	0.00	0.20	4	0	4	25	0	25	0.31	4.45	0.35	0.25	0.35	0.36
CC3	S150	1.0648	100.0	0.0	0.20	0.00	0.20	12	0	12	35	0	35	0.33	4.35	0.35	0.25	0.35	0.42
UNT1	S150R	1.9946	100.0	0.0	0.20	0.00	0.20	9	0	9	25	0	25	0.34	4.30	0.35	0.25	0.35	0.40
STC1	S160	1.2938	100.0	0.0	0.25	0.00	0.25	5	0	5	40	0	40	0.25	4.80	0.35	0.25	0.35	0.33
CC4	S170	0.9134	100.0	0.0	0.20	0.00	0.20	7	0	7	35	0	35	0.16	5.80	0.39	0.25	0.39	0.20
GG1	S170R	3.4168	100.0	0.0	0.20	0.00	0.20	9	0	9	25	0	25	0.28	4.60	0.35	0.25	0.35	0.33
MF1	S180	3.8030	100.0	0.0	0.25	0.00	0.25	5	0	5	35	0	35	0.16	5.80	0.39	0.25	0.39	0.20
CC6	S190L	2.8141	100.0	0.0	0.20	0.00	0.20	2	0	2	30	0	30	0.13	6.40	0.38	0.21	0.38	0.16
CC5	S190R	4.3697	100.0	0.0	0.25	0.00	0.25	7	0	7	30	0	30	0.19	5.40	0.38	0.25	0.38	0.23
CC7	S200	3.9485	100.0	0.0	0.20	0.00	0.20	9	0	9	35	0	35	0.24	4.90	0.35	0.25	0.35	0.31
CWC1	S210	10.3448	100.0	0.0	0.20	0.00	0.20	14	0	14	35	0	35	0.27	4.65	0.35	0.25	0.35	0.35
CC8	S220	3.6349	100.0	0.0	0.20	0.00	0.20	14	0	14	30	0	30	0.20	5.30	0.37	0.25	0.37	0.24
CC9	S230	1.8388	98.9	1.1	0.20	0.18	0.20	11	15	11	30	34	30	0.11	6.80	0.36	0.17	0.36	0.13
CC10	S240	2.6267	97.2	2.8	0.20	0.18	0.20	6	15	6	35	34	35	0.11	6.80	0.36	0.17	0.35	0.14
WSW1	S250	5.8865	72.0	28.0	0.20	0.17	0.19	8	16	10	35	33	35	0.12	6.60	0.37	0.19	0.32	0.15
UNT2	S260L	3.7813	72.8	27.2	0.20	0.18	0.19	12	15	13	35	34	35	0.17	5.70	0.39	0.25	0.35	0.22
CC11	S260R	1.6479	97.1	2.9	0.20	0.18	0.20	12	15	12	30	34	30	0.10	7.00	0.35	0.15	0.34	0.12
GVW1	S270	4.8632	100.0	0.0	0.25	0.00	0.25	16	0	16	35	0	35	0.16	5.80	0.39	0.25	0.39	0.20
GVW2	S280	5.9326	66.2	33.8	0.20	0.18	0.19	7	14	9	30	40	34	0.27	4.65	0.35	0.25	0.32	0.34
GWW1	S290	7.6391	33.7	66.3	0.15	0.17	0.17	0	18	12	30	38	35	0.23	5.00	0.36	0.25	0.29	0.29
GVW3	S310	2.3871	74.0	26.0	0.15	0.17	0.16	0	17	4	35	35	35	0.19	5.40	0.38	0.25	0.34	0.24
AHW1	S320	0.4542	11.8	88.2	0.15	0.16	0.16	3	24	22	30	33	33	0.15	6.00	0.40	0.25	0.27	0.19
AHW4	S330	0.1635	3.5	96.5	0.15	0.14	0.14	3	37	36	30	26	26	0.07	8.00	0.30	0.15	0.16	0.08
AHW3	S340L	0.2401	54.2	45.8	0.20	0.16	0.18	7	25	15	35	30	33	0.14	6.20	0.39	0.23	0.32	0.18
AHW2	S340R	0.0648	0.0	100.0	0.15	0.13	0.13	0	43	43	30	23	23	0.12	6.60	0.37	0.19	0.19	0.14

Table A-10

Description of Subbasin Identifiers

Subbasin* ID	Description
(1)	(2)
AHW1	Andora Hills Wash
AHW2	Andora Hills Wash
AHW3	Andora Hills Wash
AHW4	Andora Hills Wash
AHW5	Andora Hills Wash
AHW6	Andora Hills Wash
AHW7	Andora Hills Wash
AHW8	Andora Hills Wash
AHW9	Andora Hills Wash
BC1	Bronco Creek
BMM1	Big Maggie May
CC1	Cave Creek
CC2	Cave Creek
CC3	Cave Creek
CC4	Cave Creek
CC5	Cave Creek
CC6	Cave Creek
CC7	Cave Creek
CC8	Cave Creek
CC9	Cave Creek
CC10	Cave Creek
CC11	Cave Creek
CC12	Cave Creek
CC13	Cave Creek
CWC1	Cottonwook Creek
GG1	Gray's Gulch
GVW1	Grapevine Wash
GVW2	Grapevine Wash
GVW3	Grapevine Wash
GWW1	Galloway Wash
MF1	Matty's Fork
SSW1	Seven Springs Wash
STC1	Skunk Tank Canyon
UNT1	Unnamed Tributary
UNT2	Unnamed Tributary
UNT3	Unnamed Tributary
WSW1	Willow Springs Wash

* note: Numeric portion of identifiers indicates multiple subbasin delineations for that wash or catagory.

Table 6: Soil Descriptions

The following are brief descriptions of the major soil components of the map units found on the Cartwright Allotment. Since the map units are fairly broad, these descriptions are not site specific but represent typical profiles.

MU 12 - The soils in this map unit occur along stream channels at the lowest elevations within the allotment. The soils are derived from recent alluvium and tend to be highly variable. The soils are normally coarse textured and contain varying amounts of rock fragments but typically contain more than 35% rock fragments. The soil moisture also varies widely. Only those soils within a few feet of perennial water are wet enough to produce anaerobic conditions. The soils further removed from the active channel are drier. The soils on higher benches may be somewhat droughty.

MU 73 - The soils in this map unit occur along stream channels at higher elevations than those in MU 12. The soils are derived from recent alluvium and tend to be highly variable. The soils are normally coarse textured and contain varying amounts of rock fragments but typically contain more than 35% rock fragments. These soils are normally moister than those in MU 12 but the soil moisture also varies widely. Only those soils within a few feet of perennial water are wet enough to produce anaerobic conditions. The soils further removed from the active channel are drier. The soils on higher benches may be somewhat droughty.

MU 239 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The parent material is variable but the dominant material is derived from granite or schist. This map unit is an association of two soils plus rock outcrop. The drier soils on south facing slopes have a Aridic soil moisture regime (desert soils) while those on north aspects have an Ustic moisture regime (semi-arid). The rock outcrop occurs randomly throughout the unit. Because of steep slopes, dry conditions, and the type of parent material, most soils have poor profile development. The soils typically have an extremely cobble sandy loam surface horizon. The subsoil shows little development and is typically a sandy loam containing large amounts of rock fragments.

MU 291 - This map unit occurs on moderately steep hill slopes. The soils are formed from basalt or colluvium derived from basalt and granite. Component .1 has a very stony clay loam surface grading to a clay loam or clay subsoil containing more than 35% rock fragments. Component .2 has a very cobbley clay loam surface over a clay or clay loam subsoil containing fewer than 35% rock fragments.

MU 292 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The soils are variable but typically contain an extremely cobbley sandy loam surface over a finer textured subsoil. Soils typically contain more than 35% rock fragments in the subsoil.

MU 300 - This map unit occurs on nearly level to strongly sloping elevated plains. The soils are derived from basalt. Component .1 has a cobbley loam surface over a clay loam or clay subsoil. Component .2 has a cobbley clay loam surface over a clay subsoil. Because of the large amount of expanding clay in component .2, deep, wide cracks extending from the surface to a depth of 20 inches or more form when the soil is dry. Both components have fewer than 35% rock fragments in the subsoil.

MU 301 - This map unit occurs on moderately steep hill slopes. The soils are formed from basalt, Quaternary/Tertiary sediments, or colluvium derived from basalt and granite. Component .1 has a very cobbley clay loam surface grading to a clay loam or clay subsoil containing fewer than 35% rock fragments. Component .2 has a very stony clay loam surface over a clay or clay loam subsoil containing more than 35% rock fragments.

MU 304 - This map unit occurs on moderately steep to steep hill and mountain slopes. The soils are derived from Quaternary/Tertiary limestone deposits. This map unit is an association of two soils. Component .1 occurs on north facing slopes and has an Ustic moisture regime (semi-arid). Component .2 occurs on south facing slopes and has an Aridic moisture regime (desert soils). Both components have weakly developed soils less than 20 inches deep to limestone bedrock. The surface is an extremely cobbley loam over a loamy subsoil. The soils are calcareous throughout the profile.

MU 352 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The soils are variable but typically contain an extremely cobbley sandy loam surface over a finer textured subsoil. Soils typically contain more than 35% rock fragments in the subsoil.

MU 381 - This map unit occurs on moderately steep hill slopes. The soils are derived form schist. Because of the resistant nature of the schist, the soils tend to be shallow and poorly developed. The soils have an extremely gravelly sandy loam surface over a sandy loam subsoil which contains more than 35% rock fragments. The soils are less than 20 inches deep to bedrock.

MU 382- This map unit occurs on steep to very steep mountains. The soils are derived from schist. Because of the steep slopes and the resistant nature of the schist, the soils tend to be shallow and poorly developed. The soils are somewhat variable but typically have an extremely gravelly sandy loam surface over a sandy loam subsoil. The subsoil typically has greater than 35% rock fragments. The soils are less than 20 inches deep to bedrock.

MU 390 - This map unit occurs on nearly level to strongly sloping elevated plains. The soils are derived from basalt. Component .1 has a very gravelly loam surface over a clay loam or clay subsoil. Component .2 has a cobbley clay loam surface over a clay subsoil. Because of the large amount of expanding clay in component .2, deep, wide cracks extending from the surface to a depth of 20 inches or more form when the soil is dry. Both components have fewer than 35% rock fragments in the subsoil.

MU 391 - This map unit occurs on moderately steep hill slopes. The soils are formed from basalt, Quaternary/Tertiary sediments, or colluvium derived from basalt and granite. Component .1 has a very cobbley clay loam surface grading to a clay loam or clay subsoil containing fewer than 35% rock fragments. Component .2 has a very stony clay loam surface over a clay or clay loam subsoil containing more than 35% rock fragments.

MU 400 - This map unit occurs on nearly level to strongly sloping elevated plains. The soils are derived from basalt. Component .1 has a very cobbley loam surface over a clay loam or clay subsoil. Component .2 has a cobbley clay loam surface over a clay subsoil. Because of the large amount of expanding clay in component .2, deep, wide cracks extending from the surface to a depth of 20 or more inches form when the soil is dry. Both components have less than 35% rock fragments in the subsoil.

MU 401 - This map unit occurs on moderately steep hill slopes. The soils are formed from basalt, Quaternary/Tertiary sediments, or colluvium derived from basalt and granite. Component .1 has a very cobbley loam surface grading to a clay loam or clay subsoil containing fewer than 35% rock fragments. Component .2 has a very stony clay loam surface over a clay or clay loam subsoil containing more than 35% rock fragments.

MU 402 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The soils are variable but typically has an extremely cobbley sandy loam surface over a finer textured subsoil. Soils typically contain more than 35% rock fragments in the subsoil.

MU 415 - This map units occurs on nearly level to moderately sloping valley plains. The soils are derived from recent alluvium, are poorly developed, and highly variable. Component .1 occurs near the active stream channel. It is a deep soil with an extremely gravelly sandy loam surface over a sandy loam or loamy sand subsoil. Component .2 occurs on a higher terrace and is more stable. It is a deep soil with a very cobbley loam surface over a medium textured subsoil.

MU 416 - This map unit occurs on moderately steep hill slopes. The soils are derived from basalt or Quaternary/Tertiary sediments. They have a very stony sandy loam surface over a clay loam or clay subsoil. The subsoil normally has greater than 35% rock fragments.

MU 417 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The soils are derived from basalt, Quaternary/Tertiary sediments or colluvium derived from mixed sources. The soil surface is a very stony sandy loam over a loamy or clayey subsoil. The subsoil normally contains more than 35% rock fragments.

MU 418 - This map unit occurs on nearly level to moderately steep plains and hills. The soils are derived from Quaternary/Tertiary sediments and have little profile development. Component .1 has a extremely gravelly sandy loam surface over a sandy loam subsoil. The subsoil has more than 35% rock fragments and the soil is less than 20 inches deep to bed rock. Component .2 is similar to .1 except that component .2 is greater than 20 inches deep.

MU 451 - This map unit occurs on moderately steep hill slopes. The soils are derived from basalt, Quaternary/Tertiary sediments, schist, or mixed colluvium. They have a very stony sandy loam surface over a loam or clay loam subsoil. The subsoil normally has greater than 35% rock fragments.

MU 452 - This map unit occurs on steep to very steep mountain slopes, scarps, and canyons. The soils are derived from basalt, Quaternary/Tertiary sediments, colluvium derived from mixed sources, or schist. The soil surface is a very stony sandy loam over a loamy or clay loam subsoil. The subsoil normally contains more than 35% rock fragments.

The following is an example of the calculation procedures used in preparing the data in Tables A-6 through A-9. Sample calculations are performed for Subbasin S290. It should be noted that some disparity between sample calculations and values in the tables can exist due to greater precision of spreadsheet numerics.

Step 1: *Calculate the log-average value of XKSAT.* Refer to Table A-6, page 12, Appendix A.

Log-Avg XKSAT = 10^a, where

$$a = \left[\frac{\begin{array}{c}(291.9)\log(0.62) + (15.7)\log(0.02) + (6.9)\log(0.02) + \\ (383.7)\log(0.23) + (293.9)\log(0.23) + (465.9)\log(0.17) + \\ (742.7)\log(0.17) + (51.9)\log(0.14) + (74.2)\log(0.09) + \\ (286.1)\log(0.33) + (590.7)\log(0.07) + (6.4)\log(0.12) + \\ (1678.9)\log(0.40)\end{array}}{\begin{array}{c}291.9 + 15.7 + 6.9 + 383.7 + 293.9 + 465.9 + \\ 742.7 + 51.9 + 74.2 + 286.1 + 590.7 + 6.4 + 1678.9\end{array}} \right]$$

$$= -0.6294$$

$$\text{Log-Avg XKSAT} = 10^{-0.6294}$$

$$= 0.23 \text{ inches per hour}$$

This value is placed in Table A-6, page 12, row 5 of the calculation set for Subbasin S290, and in Table A-9, column 15.

Step 2: *Determine the DTHETA and PSIF parameters corresponding to Log-Avg XKSAT.* Use the log-averaged XKSAT value of 0.23 to look up the values for PSIF, DTHETA (dry) and DTHETA (normal), in Table A-1.

PSIF	=	5.0 inches
DTHETA (dry)	=	0.36
DTHETA (normal)	=	0.25

These values are placed in Table A-6, page 12, rows 6, 7 and 8 respectively, and in Table A-9, columns 16, 17 and 18 respectively.

Step 3: *Calculate the weighted value of natural area RTIMP (rock) for the subbasin.* Refer to Table A-6, page 12.

$$\text{RTIMP (weighted)} = \left[\frac{(0)(291.9) + (0)(15.7) + (0)(6.9) + (0)(383.7) + (0)(293.9) + (0)(465.9) + (0)(742.7) + (10)(51.9) + (15)(74.2) + (0)(286.1) + (0)(590.7) + (0)(6.4) + (0)(1678.9)}{291.9 + 15.7 + 6.9 + 383.7 + 293.9 + 465.9 + 742.7 + 51.9 + 74.2 + 286.1 + 590.7 + 6.4 + 1678.9}\right]$$

$$= 0.33\%$$

This value is placed in Table A-6, page 12, row 9 of the calculation set for Subbasin S290, and in Table A-9, column 9.

Step 4: *Calculate the percentage of natural area in the subbasin.* Refer to Table A-8, page 12. A land use is considered "natural" if the identifier in row 2 is "N".

$$\text{Natural Area} = \left[\frac{1646.3}{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 1646.3 + 17.9}\right] 100$$

$$= 33.7\%$$

This value is placed in Table A-8, page 12, row 7 of the calculation set for Subbasin S290, and in Table A-9, column 4.

Step 5: *Calculate the percentage of developed area in the subbasin.* Refer to Table A-8, page 12. A land use is considered developed if the identifier in row 2 is "D".

$$\text{Developed Area} = \left[\frac{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 17.9}{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 1646.3 + 17.9}\right] 100$$

$$= 66.3\%$$

This value is placed in Table A-8, page 12, row 8 of the calculation set for Subbasin S290, and in Table A-9, column 5.

Step 6: *Calculate the average developed area RTIMP for the subbasin.* Refer to Table A-8, page 12. The percent impervious for each land use shown in row 4 of the calculation set for Subbasin S290 in Table A-8 is taken from Table A-7, column 2. It should be noted that the average value calculated here is an average for the developed area only and does not include natural areas in the calculations.

$$\text{RTIMP (Dev) avg.} = \left[\frac{(85)(50.0) + (80)(56.6) + (10)(370.5) + (45)(103.3) + (15)(2590.8) + (25)(53.5) + (60)(17.9)}{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 17.9}\right]$$

$$= 18.01\%$$

This value is placed in Table A-8, page 12, row 9 of the calculation set for Subbasin S290, and in Table A-9, column 10.

Step 7: *Calculate the composite vegetative cover density (VCD) for each land use in the subbasin, adjusted to reflect impervious area.* Refer to Table A-7, page 1.

Pervious VCD for land use AP = 50% (column 3)
Pervious RTIMP for land use AP = 85% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 85}{100}\right](50) = 8\% \text{ (column 5)}$$

Pervious VCD for land use C = 50% (column 3)
Pervious RTIMP for land use C = 80% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 80}{100}\right](50) = 10\% \text{ (column 5)}$$

Pervious VCD for land use GC = 90% (column 3)
Pervious RTIMP for land use GC = 10% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 10}{100}\right](90) = 81\% \text{ (column 5)}$$

Pervious VCD for land use HDR = 40% (column 3)
Pervious RTIMP for land use HDR = 45% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 45}{100}\right](40) = 22\% \text{ (column 5)}$$

Pervious VCD for land use LDR-15 = 40% (column 3)
Pervious RTIMP for land use LDR-15 = 15% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 15}{100}\right](40) = 34\% \text{ (column 5)}$$

Pervious VCD for land use LDR-25 = 40% (column 3)
Pervious VCD for land use LDR-25 = 25% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 25}{100}\right](40) = 30\% \text{ (column 5)}$$

Pervious VCD for land use RSRT = 80% (column 3)
Pervious RTIP for land use RSRT = 60% (column 2)

$$\text{Composite VCD (Dev)} = \left[\frac{100 - 60}{100}\right](80) = 32\% \text{ (column 5)}$$

These values are placed in Table A-8, page 12, row 5 of the calculation set for Subbasin S290.

Step 8: *Calculate the weighted developed area vegetation cover density for the subbasin.* Refer to Table A-8, page 12.

$$\text{Veg Cover (Dev) avg.} = \left[\frac{(8)(50.0) + (10)(56.6) + (81)(370.5) + (22)(103.3) + (34)(2590.8) + (30)(53.5) + (32)(17.9)}{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 17.9}\right]$$

$$= 38.08\%$$

This value is placed in Table A-8, page 12, row 10 of the calculation set for Subbasin S290, and in Table A-9, column 13.

Step 9: *Calculate the composite IA for each land use in the subbasin.* Refer to Table A-7, page 1.

Pervious IA for land use AP = 0.15 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use AP = 85% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-85)(0.15) + (0.05)(85)}{100}\right] = 0.07 \text{ inches (column 6)}$$

Pervious IA for land use C = 0.15 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use C = 80% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-80)(0.15) + (0.05)(80)}{100}\right] = 0.07 \text{ inches (column 6)}$$

Pervious IA for land use GC = 0.20 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use GC = 10% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-10)(0.20) + (0.05)(10)}{100}\right] = 0.19 \text{ inches (column 6)}$$

Pervious IA for land use HDR = 0.20 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use HDR = 45% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-45)(0.20) + (0.05)(45)}{100}\right] = 0.13 \text{ inches (column 6)}$$

Pervious IA for land use LDR-15 = 0.20 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use LDR-15 = 15% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-15)(0.20) + (0.05)(15)}{100}\right] = 0.18 \text{ inches (column 6)}$$

Pervious IA for land use LDR-25 = 0.20 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use LDR-25 = 25% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-25)(0.20) + (0.05)(25)}{100}\right] = 0.16 \text{ inches (column 6)}$$

Pervious IA for land use RSRT = 0.20 inches (column 4)
Impervious IA for Pavement = 0.05 inches
Impervious RTIMP for land use RSRT = 60% (column 2)

$$\text{Composite IA (Dev)} = \left[\frac{(100-60)(0.20) + (0.05)(60)}{100}\right] = 0.11 \text{ inches (column 6)}$$

These values are placed in Table A-8, page 12, row 6 of the calculation set for Subbasin S290.

Step 10: *Calculate the weighted developed area IA for the subbasin.* Refer to Table A-8, page 12.

$$\text{IA (Dev) avg.} = \left[\frac{(0.07)(50.0) + (0.07)(56.6) + (0.19)(370.5) + (0.13)(103.3) + (0.18)(2590.8) + (0.16)(53.5) + (0.11)(17.9)}{50.0 + 56.6 + 370.5 + 103.3 + 2590.8 + 53.5 + 17.9}\right]$$

$$= 0.17 \text{ inches}$$

This value is placed in Table A-8, page 12, row 11 of the calculation set for Subbasin S290, and in Table A-9, column 7.

Step 11: *Calculate the weighted IA for the subbasin.* Refer to Table A-9, page 1.

Percentage of natural area	=	33.7%	(column 4)
Assigned natural IA for the subbasin	=	0.15 inches	(column 6)
Percentage of developed area	=	66.3%	(column 5)
Weighted developed IA for the subbasin	=	0.17 inches	(column 7)

$$\text{Weighted IA} = \left[\frac{(0.15)(33.7) + (0.17)(66.3)}{100}\right] = 0.16 \text{ inches}$$

This value is placed in Table A-9, page 1, column 8.

Step 12: *Calculate the weighted percent impervious for the subbasin.* Refer to Table A-9, page 1.

Percentage of natural area	=	33.7%	(column 4)
Weighted natural RTIMP (rock)	=	0.33%	(column 9)
Percentage of developed area	=	66.3%	(column 5)
Weighted developed RTIMP	=	18.01%	(column 10)

$$\text{Weighted RTIMP} = \left[\frac{0.33)(33.7) + (18.01)(66.3)}{100}\right] = 12\%$$

This value is placed in Table A-9, page 1, column 11.

Step 13: *Calculate the weighted value of vegetation cover density for the subbasin.* Refer to Table A-9, page 1.

Percentage of natural area	=	33.7%	(column 4)
Assigned natural VCD for the subbasin	=	30%	(column 12)
Percentage of developed area	=	66.3%	(column 5)
Weighted developed VCD	=	38.08%	(column 13)

$$\text{Weighted VCD} = \left[\frac{(30)(33.7) + (38.08)(66.3)}{100}\right] = 35\%$$

This value is placed in Table A-9, page 1, column 14.

Step 14: *Calculate the weighted value of DTHETA for the subbasin.* Refer to Table A-9, page 1.

Percentage of natural area	=	33.7%	(column 4)
DTHETA (dry) - natural	=	0.36	(column 17)
Percentage of developed area	=	66.3%	(column 5)
DTHETA (normal) - developed	=	0.25	(column 18)

$$\text{Weighted DTHETA} = \left[\frac{(0.36)(33.7) + (0.25)(66.3)}{100}\right] = 0.29$$

This value is placed in Table A-9, page 1, column 19.

Step 15: *Adjust XKSAT to reflect effects of vegetation cover.* Refer to Table A-9, page 1.

Weighted VCD for the subbasin	=	35%
Log-Avg XKSAT for the subbasin	=	0.23 inches per hour

$$C_k = \frac{(35 - 10)}{90} + 1.0 = 1.28$$

$$\text{XKSAT (adjusted)} = (1.28)(0.23) = 0.29 \text{ inches per hour}$$

This value is placed in Table A-9, page 1, column 20.

APPENDIX B

Vegetation Transects

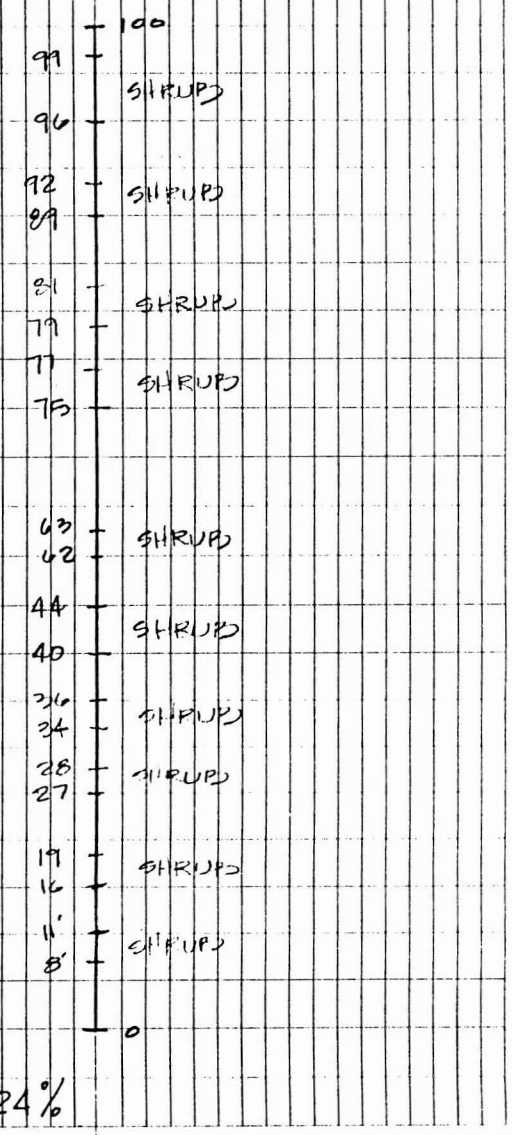
UPPER COVE CREEK FPD STUDY
VEGETATION TRANSECTS
1/15/96

PV1 GENERAL SHOT, TRANSECT #1
PV2 TYPICAL SHRUBS

LOCATION: NEAR DIRT ROAD IN N½ OF SEC 4
T5N R4E.

ASPECT: WEST

ELEVATION: 2100' FEET



VEG = 24%

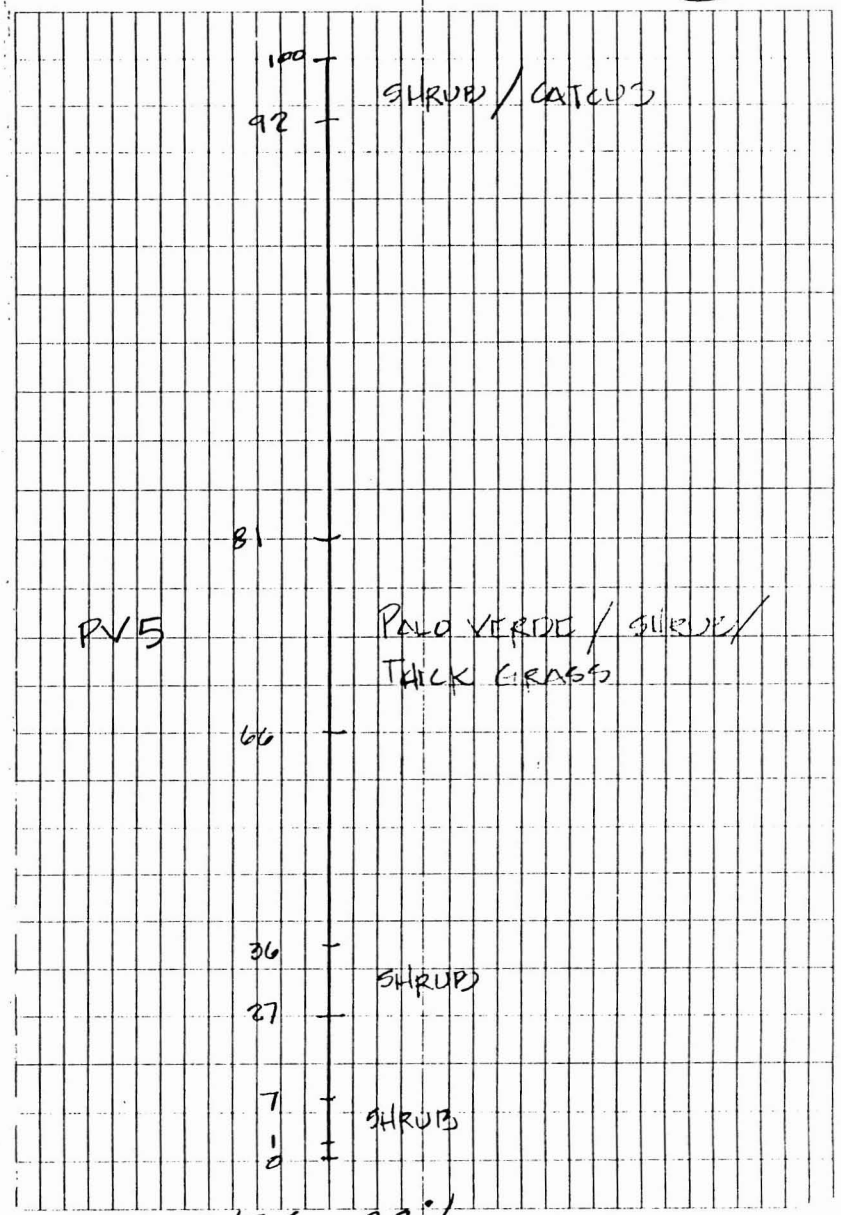
PV 3 GENERAL SHOT, TRANSECT # 2
PV 4 TYPICAL SHRUB
PV 5 GRASS UNDER POLO VERDE TREE

LOCATION: NEAR DIRT ROAD IN NW 1/4 OF SECT 18 T6N R4E.

ASPECT: SOUTH

ELEVATION: 2400 FEET

(2)



VEG = 39%

PV6	GENERAL SHOT, TRANSECT 3
PV7	TYPICAL VEGITATION
PV8	" "
PV9	PIEDRA MINE CAVE SHAFT
PV10	" "
PV11	CAVE CREEK CAGE, ABANDONED
PV12	" "

LOCATION: NEAR DIRT ROAD IN SE 1/4 OF SECT 4 T6N R4E.

ASPECT: WEST

ELEVATION: 2400 FEET

100	
99	SHRUB (SPARSE)
97	
88	
84	BUSH
79	SHRUB & BUSH W/ GRASS
70	
50	BUSH
46	
42	SHRUB W/ GRASS
34	
30	SHRUB W/ GRASS
28	SHRUB
25	
20	SMALL SHRUB
19	
15	CACTUS
14	
0	CHOLLA CACTUS

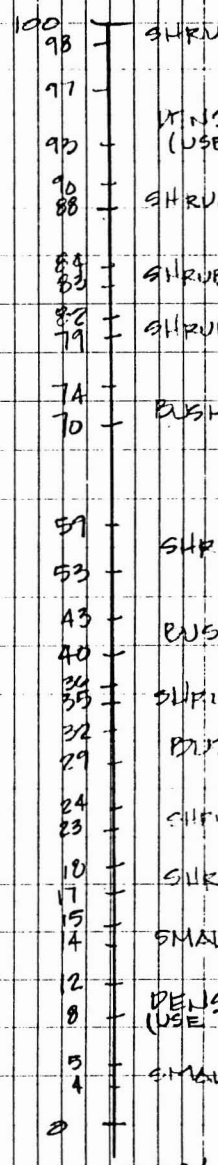
VEG = 35%

PV13 GENERAL SHOT, TRANSECT # 4
PV14 TYPICAL SHRUBS

LOCATION NW OF CAVE CREEK RD & HORSESHOE DAM RD INTERSECTION IN NW 1/4 OF SECT 22 T6N R5E

ASPECT: SOUTH

ELEVATION: 3300 FEET



VEG = 31%

PV15 LOOKING N. ACROSS CAVE CREEK WASH. ESTIMATE 20% VEG. COVER

PV16 GENERAL SHOT, TRANSECT # 5

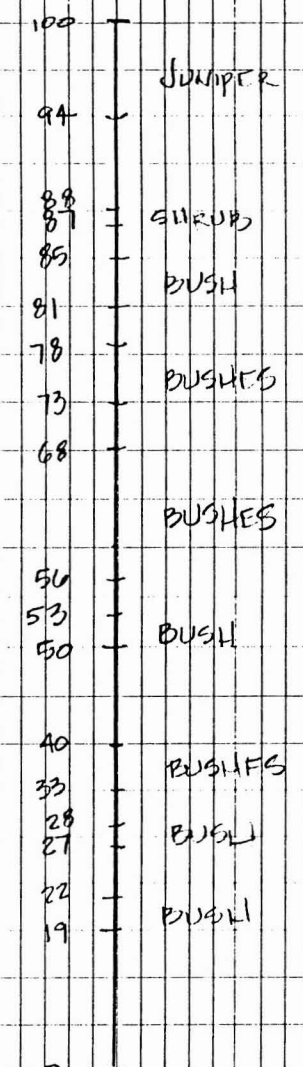
PV17 JUNIPER TREE

LOCATION: APPROX. 2 mi DOWNSTREAM OF SEVEN SPRINGS CAMPGROUND ON SOUTH SIDE OF CAVE CREEK WASH.

ASPECT: NORTH

ELEVATION: 3400 FEET

5



(North slope aspect)

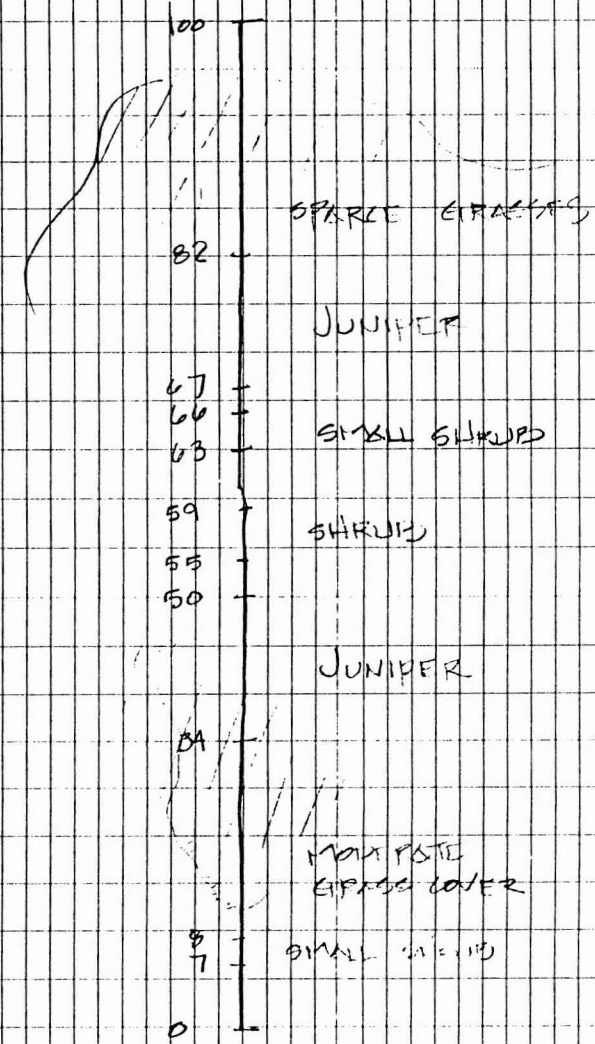
VEG = 42%

PV18	GENERAL SHOT, TRANSECT # 6
PV19	MODERATE GRASS
PV20	SPARCE GRASS
PV21	MAGAZINE MESA
PV22	" "
PV23	JUST OUTSIDE MAGAZINE MESA
PV24	LOOKING S. FROM MAGAZINE MESA
PV25	LOOKING W. @ NEW RIVER MESA
PV26	CAVE CREEK WASH LOOKING D/S
PV27	SEVEN SPRINGS WASH LOOKING D/S

LOCATION: MAGAZINE MESA NEAR POWER LINES

ASPECT: EAST

ELEVATION: 4000 FEET



VEG = 39%

APPENDIX C

Unit Hydrograph Parameter Calculations

TABLE C-1

Time of Concentration or Lag Parameters for Each Subbasin

Sub-basin ID (1)	HEC-1 ID (2)	Hydrograph Type (3)	Elevation, in feet Top (4)	Elevation, in feet Bottom (5)	Lag or Tc Flow Path miles (6)	Slope ft/mile (7)	Adjusted Slope ft/mile (8)	Lca miles (9)	Surface Roughness Type (10)*	Kb (11)	Kn (12)	Time-Area Relation (13)**
SSW1	S110L	Mountain	4400	3310	5.6818	192	---	2.519	---	---	0.045	---
CC1	S110R	Mountain	4660	3310	7.0644	191	---	3.504	---	---	0.05	---
BC1	S120	Mountain	4450	3300	5.0000	230	---	2.367	---	---	0.05	---
CC2	S130	Mountain	4610	3230	2.5379	544	---	1.136	---	---	0.05	---
BMM1	S140	Mountain	4580	3220	3.2197	422	---	1.657	---	---	0.045	---
CC3	S150	Mountain	3940	2950	2.0833	475	---	1.061	---	---	0.045	---
UNT1	S150R	Mountain	4744	2950	2.6326	681	---	1.326	---	---	0.045	---
STC1	S160	Mountain	4820	2930	3.0303	624	---	1.610	---	---	0.05	---
CC4	S170	Mountain	3520	2840	1.9129	355	---	0.720	---	---	0.045	---
GG1	S170R	Mountain	4740	2840	4.9621	383	---	2.538	---	---	0.045	---
MF1	S180	Mountain	4360	2760	4.5455	352	---	2.367	---	---	0.045	---
CC6	S190L	Mountain	3073	2500	3.2197	178	---	0.663	---	---	0.045	---
CC5	S190R	Mountain	3890	2500	4.8295	288	---	2.140	---	---	0.045	---
CC7	S200	Mountain	4680	2350	3.5038	665	---	0.871	---	---	0.045	---
CWC1	S210	Mountain	4060	2290	7.3864	240	---	4.091	---	---	0.045	---
CC8	S220	Mountain	4300	2220	3.5985	578	---	1.439	---	---	0.045	---
CC9	S230	Mountain	3780	2132	2.7273	604	---	1.515	---	---	0.045	---
CC10	S240	Mountain	2620	2105	3.2765	157	---	1.042	---	---	0.045	---
WSW1	S250	Mountain	4340	2040	6.0795	378	---	2.557	---	---	0.04	---
UNT2	S260L	Mountain	4230	2030	5.9280	371	---	2.992	---	---	0.04	---
CC11	S260R	Mountain	2390	2030	2.1591	167	---	0.909	---	---	0.04	---
GVW1	S270	Mountain	4300	2460	6.1553	299	---	3.712	---	---	0.045	---
GVW2	S280	Mountain	4560	2515	6.1742	331	---	3.409	---	---	0.04	---
GWW1	S290	Desert/Rangeland	3460	2230	7.9924	154	---	3.561	---	---	0.03	---
GVW3	S310	Desert/Rangeland	2780	2025	4.6212	163	---	2.235	---	---	0.03	---
AHW1	S320	Clark	2515	2325	0.9470	201	201	---	B	0.05	---	B
AHW4	S330	Clark	2480	2345	1.2121	111	111	---	A/B	0.04	---	A
AHW3	S340L	Clark	3265	2300	0.9659	999	350	---	C	0.10	---	B
AHW2	S340R	Clark	2440	2300	0.6439	217	217	---	B	0.06	---	A

TABLE C-1

Time of Concentration or Lag Parameters for Each Subbasin

Sub-basin ID (1)	HEC-1 ID (2)	Hydrograph Type (3)	Elevation, in feet Top (4)	Elevation, in feet Bottom (5)	Lag or Tc Flow Path miles (6)	Slope ft/mile (7)	Adjusted Slope ft/mile (8)	Lca miles (9)	Surface Roughness Type (10)*	Kb (11)	Kn (12)	Time-Area Relation (13)**
AHW5	S350	Clark	2420	2275	0.6629	219	219	---	B/C	0.08	---	B
AHW6	S360	Clark	2400	2175	1.5909	141	141	---	C	0.09	---	B
AHW7	S370	Clark	2300	2095	1.4962	137	137	---	A/B	0.04	---	A
AHW8	S380	Clark	2665	2090	0.9848	584	317	---	A/B	0.04	---	A
AHW9	S390	Clark	2240	2000	1.5152	158	158	---	A/B	0.04	---	A
UNT3	S400L	Desert/Rangeland	2740	1910	7.5189	110	---	3.267	---	---	0.03	---
CC12	S400	Mountain	2540	1910	2.8220	223	---	1.383	---	---	0.045	---
CC13	S410	Desert/Rangeland	2135	1860	3.0492	90	---	1.515	---	---	0.025	---

* Note: Refer to revised table 5.1 of the design manual

** Note: Time-Area Relations
A = Urban
B = HEC1 Default (partially urbanized)
C = Desert/Rangeland (natural)

TABLE C-2

Time of Concentration and Duration of Rainfall Excess for Subbasins Modeled Using the Clark Unit Hydrograph Andora Hills Wash, Existing Condition, 100-year, 6-hour Storm

Subbasin ID	HEC-1 ID	Excess Rainfall Values (inches) By Decreasing Rank (time interval in minutes) 5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	Total Excess (inches)	Time at 90% Excess (minutes)	Tc (min.)	Tc (hours)	R (hours)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
AHW1	320	0.51	0.50	0.50	0.17	0.14	0.13	0.06	0.06	0.05	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.406	50	14	0.229	0.109
AHW4	330	0.53	0.53	0.53	0.20	0.17	0.16	0.08	0.08	0.08	0.08	0.07	0.07	0.01	0.01	0.01	0.01	0.01	0.01	2.883	70	17	0.275	0.288
AHW3	340	0.50	0.50	0.50	0.17	0.13	0.12	0.05	0.05	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	2.264	45	17	0.288	0.204
AHW2	340	0.53	0.52	0.52	0.19	0.16	0.16	0.08	0.08	0.07	0.07	0.07	0.06	0.01	0.01	0.01	0.01	0.01	0.01	2.858	90	12	0.196	0.201
AHW5	350	0.51	0.51	0.51	0.17	0.14	0.13	0.06	0.06	0.06	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.443	55	14	0.238	0.152
AHW6	360	0.48	0.48	0.48	0.17	0.14	0.13	0.06	0.06	0.06	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	2.267	45	33	0.550	0.377
AHW7	370	0.53	0.53	0.53	0.20	0.16	0.16	0.08	0.08	0.07	0.07	0.07	0.07	0.01	0.01	0.01	0.01	0.01	0.01	2.950	90	18	0.292	0.241
AHW8	380	0.52	0.51	0.51	0.18	0.15	0.14	0.07	0.07	0.06	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	2.484	50	11	0.179	0.089
AHW9	390	0.51	0.50	0.50	0.17	0.14	0.13	0.06	0.06	0.05	0.04	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	2.368	45	17	0.283	0.233

TABLE C-3

Time of Concentration and Duration of Rainfall Excess for Subbasins Modeled Using the Clark Unit Hydrograph Andora Hill Wash, Existing Condition, 100-year, 24-hour Storm

Subbasin ID (1)	HEC-1 ID (2)	Excess Rainfall Values (inches) By Decreasing Rank (time interval in minutes) 5 (3)	10 (4)	15 (5)	20 (6)	25 (7)	30 (8)	35 (9)	40 (10)	45 (11)	50 (12)	55 (13)	60 (14)	65 (15)	70 (16)	75 (17)	80 (18)	85 (19)	90 (20)	Total Excess (inches) (21)	Time at 90% Excess (minutes) (22)	Tc (min.) (23)	Tc (hours) (24)	R (hours) (25)
AHW1	S320	0.32	0.32	0.32	0.32	0.32	0.32	0.04	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.545	90	16	0.271	0.131
AHW4	S330	0.34	0.34	0.33	0.33	0.33	0.33	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	3.456	90	19	0.321	0.342
AHW3	S340	0.32	0.32	0.31	0.31	0.31	0.31	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.298	65	20	0.333	0.241
AHW2	S340	0.34	0.34	0.33	0.33	0.33	0.33	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	3.369	90	14	0.233	0.244
AHW5	S350	0.32	0.32	0.32	0.32	0.32	0.32	0.04	0.04	0.04	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.592	90	17	0.279	0.182
AHW6	S360	0.32	0.32	0.32	0.32	0.31	0.31	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	2.343	70	33	0.550	0.377
AHW7	S370	0.34	0.34	0.33	0.33	0.33	0.33	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	3.603	90	20	0.333	0.279
AHW8	S380	0.33	0.33	0.33	0.32	0.32	0.32	0.04	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	2.613	90	13	0.213	0.108
AHW9	S390	0.32	0.32	0.32	0.32	0.32	0.32	0.04	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	2.421	80	20	0.329	0.275

APPENDIX D

Reach Route Parameters and Summary Data

Table D-1
Reach route physical data, existing condition

Reach Route Concentration Points		In		Length		Elevation (feet)		Slope
Top	Bottom	Subbasin	Cross Section Source	Feet	Miles	Top	Bottom	(ft/ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
110	120	BC1	Hydrology Field Reconnaissance	1500	0.2841	3310	3300	0.0067
120	130	CC2	Hydrology Field Reconnaissance	5800	1.0985	3300	3230	0.0121
130	140	BMM1	Hydrology Field Reconnaissance	1800	0.3409	3230	3220	0.0056
140	150	CC3	Hydrology Field Reconnaissance	10000	1.8939	3220	2950	0.0270
150	160	MF4	Hydrology Field Reconnaissance	1000	0.1894	2950	2930	0.0200
160	170	CC4	Hydrology Field Reconnaissance	4600	0.8712	2930	2840	0.0196
170	180	MF1	Hydrology Field Reconnaissance	4000	0.7576	2840	2760	0.0200
180	190	CC5/CC6	Hydrology Field Reconnaissance	16600	3.1439	2760	2500	0.0157
190	200	CC7	Hydrology Field Reconnaissance	11000	2.0833	2500	2350	0.0136
200	210	CWC1	200 Scale 2' CI Mapping, sheet 5	4800	0.9091	2350	2290	0.0125
210	220	CC8	200 Scale 2' CI Mapping, sheet 5	5800	1.0985	2290	2220	0.0121
220	230	CC9	200 Scale 2' CI Mapping, sheet 5	6900	1.3068	2220	2132	0.0128
230	240	CC10	200 Scale 2' CI Mapping, sheet 5	2300	0.4356	2132	2105	0.0117
240	250	CC11	200 Scale 2' CI Mapping, sheet 4	6200	1.1742	2105	2040	0.0105
250	260	CC11	200 Scale 2' CI Mapping, sheet 4	1500	0.2841	2040	2030	0.0067
260	310	CC12	200 Scale 2' CI Mapping, sheet 4	900	0.1705	2030	2025	0.0056
270	300	GVW3	Hydrology Field Reconnaissance	12500	2.3674	2460	2100	0.0288
280	295	GVW3	Hydrology Field Reconnaissance	13800	2.6136	2515	2172	0.0249
290	295	GVW3	Hydrology Field Reconnaissance	2400	0.4545	2230	2172	0.0242
295	300	GVW3	Hydrology Field Reconnaissance	3000	0.5682	2172	2100	0.0240
300	310	GVW3	Hydrology Field Reconnaissance	4000	0.7576	2100	2025	0.0188
310	390	CC12	200 Scale 2' CI Mapping, sheet 4	2000	0.3788	2025	2000	0.0125
320	340	AHW2/AHW3	Hydrology Field Reconnaissance	1800	0.3409	2325	2300	0.0139
330	340	AHW5	Hydrology Field Reconnaissance	1400	0.2652	2345	2300	0.0321
340	350	AHW5	Hydrology Field Reconnaissance	2100	0.3977	2300	2275	0.0119
350	360	AHW6	Hydrology Field Reconnaissance	4700	0.8902	2275	2175	0.0213
360	370	AHW7	Hydrology Field Reconnaissance	3600	0.6818	2175	2095	0.0222
370	385	AHW9	Hydrology Field Reconnaissance	2800	0.5303	2095	2058	0.0132
380	385	AHW9	Hydrology Field Reconnaissance	2900	0.5492	2090	2058	0.0110
385	390	AHW9	Hydrology Field Reconnaissance	2600	0.4924	2058	2000	0.0223
390	400	CC12	200 Scale 2' CI Mapping, sheets 2&3	*	*	*	*	*
400	410	CC13	200 Scale 2' CI Mapping, sheets 1&2	*	*	*	*	*

*NOTE: HEC-RAS rating relations used for this routing reach

Table D-2
Reach 390400 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
8	2000	1996.95	121.72	4.95	1995.71	1997.31	0.00703	4.98	0.56
8	4000	1998.22	221.76	6.22	1997.04	1998.85	0.00727	6.71	0.62
8	6000	1999.12	308.16	7.12		2000.05	0.00795	8.11	0.67
8	8000	2000.92	316.47	8.92	1998.62	2001.8	0.00497	7.99	0.56
8	10000	2000.39	376.07	8.39		2001.97	0.00993	10.67	0.78
8	12000	2001.31	419.96	9.31		2003.03	0.00898	11.19	0.76
8	14000	2001.91	467.71	9.91		2003.83	0.00902	11.86	0.77
8	16000	2002.48	514.49	10.48		2004.66	0.00929	12.65	0.79
8	18000	2002.99	558.4	10.99		2005.41	0.00957	13.38	0.81
8	20000	2003.42	601.09	11.42		2006.09	0.0099	14.07	0.83
8	22000	2003.85	641.56	11.85		2006.73	0.01013	14.68	0.85
8	24000	2004.22	681.25	12.22		2007.31	0.01041	15.27	0.86
8	26000	2004.55	719.94	12.55		2007.86	0.01071	15.85	0.88
8	28000	2004.89	757.5	12.89		2008.39	0.01092	16.36	0.9
8	30000	2005.22	794.22	13.22		2008.89	0.01109	16.83	0.91
8	32000	2005.53	830.22	13.53		2009.37	0.01125	17.28	0.92
8	34000	2005.82	865.39	13.82		2009.83	0.01145	17.74	0.93
8	36000	2006.57	904.63	14.57	2006.57	2010.23	0.00977	17.11	0.94
8	38000	2006.89	938.96	14.89	2006.89	2010.63	0.00974	17.39	0.95
8	40000	2007.19	972.59	15.19	2007.19	2011.01	0.00974	17.67	0.96
8	42000	2007.49	1005.41	15.49	2007.49	2011.39	0.00974	17.94	0.97
8	44000	2007.78	1037.89	15.78	2007.78	2011.76	0.0097	18.17	0.98
7	2000	1980.84	103.56	2.84	1980.22	1981.33	0.00918	5.62	0.64
7	4000	1982.14	193.69	4.14	1981.29	1982.93	0.00872	7.17	0.67
7	6000	1983.23	271.5	5.23	1982.18	1984.24	0.00788	8.14	0.67
7	8000	1982.99	272.5	4.99	1982.99	1985.01	0.01682	11.49	0.97
7	10000	1985.14	321.01	7.14		1986.34	0.00623	9.11	0.63
7	12000	1985.53	356.58	7.53		1986.99	0.00715	10.14	0.68
7	14000	1986.07	395.61	8.07		1987.67	0.0072	10.71	0.69
7	16000	1986.58	433.18	8.58		1988.27	0.00717	11.16	0.7
7	18000	1987	468.68	9		1988.76	0.00716	11.54	0.7
7	20000	1987.41	503.2	9.41		1989.22	0.00707	11.84	0.7
7	22000	1987.79	535.87	9.79		1989.65	0.00706	12.17	0.71
7	24000	1988.16	567.95	10.16		1990.06	0.00699	12.43	0.71
7	26000	1988.53	599.22	10.53		1990.46	0.0069	12.66	0.71
7	28000	1988.86	629.6	10.86		1990.85	0.00687	12.92	0.71
7	30000	1989.18	659.32	11.18		1991.22	0.00685	13.17	0.71
7	32000	1989.5	688.38	11.5		1991.58	0.00682	13.39	0.71
7	34000	1989.81	716.83	11.81		1991.93	0.00678	13.61	0.72
7	36000	1990.11	744.67	12.11		1992.28	0.00674	13.82	0.72
7	38000	1990.4	771.97	12.4		1992.61	0.00672	14.02	0.72
7	40000	1990.69	798.76	12.69		1992.94	0.00669	14.22	0.72
7	42000	1990.97	824.85	12.97		1993.26	0.00667	14.41	0.72
7	44000	1991.24	850.53	13.24		1993.58	0.00664	14.59	0.72

Table D-2
Reach 390400 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
6	2000	1959.85	81.28	3.85		1960.28	0.00718	5.39	0.58
6	4000	1961.27	157.19	5.27		1961.89	0.00744	6.44	0.61
6	6000	1962.69	218.59	6.69		1963.29	0.00815	6.41	0.63
6	8000	1964.18	204.22	8.18		1964.63	0.00418	5.53	0.48
6	10000	1963.49	242.82	7.49		1964.5	0.01185	8.26	0.78
6	12000	1964.12	266.5	8.12		1965.16	0.00986	8.41	0.73
6	14000	1964.51	293.72	8.51	1963.64	1965.68	0.00996	8.97	0.74
6	16000	1964.85	319.26	8.85	1964	1966.18	0.01013	9.51	0.76
6	18000	1965.19	343.71	9.19	1964.31	1966.65	0.0102	9.99	0.77
6	20000	1965.5	367.61	9.5	1964.64	1967.09	0.01037	10.46	0.79
6	22000	1965.81	390.16	9.81	1964.97	1967.52	0.01041	10.87	0.79
6	24000	1966.09	412.46	10.09	1965.27	1967.93	0.01056	11.29	0.81
6	26000	1966.35	434.21	10.35	1965.57	1968.33	0.01074	11.71	0.82
6	28000	1966.62	455.31	10.62	1965.85	1968.72	0.01077	12.06	0.83
6	30000	1966.88	476.13	10.88	1966.12	1969.09	0.01084	12.41	0.83
6	32000	1967.13	496.41	11.13	1966.39	1969.46	0.0109	12.74	0.84
6	34000	1967.37	516.26	11.37	1966.66	1969.81	0.01096	13.06	0.85
6	36000	1967.6	535.68	11.6	1966.91	1970.16	0.01102	13.37	0.85
6	38000	1967.83	554.72	11.83	1967.19	1970.5	0.01107	13.67	0.86
6	40000	1968.05	573.43	12.05	1967.4	1970.83	0.01112	13.96	0.87
6	42000	1968.26	591.67	12.26	1967.64	1971.14	0.01117	14.23	0.87
6	44000	1968.47	609.64	12.47	1967.89	1971.45	0.01123	14.51	0.88
5	2000	1937.75	43.9	3.75	1936.87	1938.1	0.00877	4.75	0.56
5	4000	1939.24	85.35	5.24	1937.93	1939.62	0.00846	4.8	0.55
5	6000	1939.96	119.88	5.96	1938.92	1940.45	0.00814	5.57	0.57
5	8000	1939.44	99.14	5.44	1939.44	1940.71	0.02613	8.88	0.99
5	10000	1940	133.76	6	1940	1940.35	0.00648	4.72	0.5
5	12000	1940.16	145.83	6.16	1940.01	1940.61	0.00779	5.37	0.55
5	14000	1940.45	160.99	6.45	1940.01	1940.96	0.00776	5.71	0.56
5	16000	1940.73	175.3	6.73	1940.01	1941.29	0.00774	6.02	0.57
5	18000	1940.98	189.05	6.98	1940.01	1941.6	0.00777	6.33	0.58
5	20000	1941.24	202.62	7.24	1940.01	1941.91	0.00773	6.59	0.58
5	22000	1941.47	215.3	7.47	1940.2	1942.2	0.00778	6.86	0.59
5	24000	1941.7	227.98	7.7	1940.37	1942.48	0.00775	7.1	0.59
5	26000	1941.93	240.43	7.93	1940.55	1942.76	0.0077	7.32	0.59
5	28000	1942.15	252.34	8.15	1940.71	1943.03	0.00774	7.56	0.6
5	30000	1942.36	264.13	8.36	1940.87	1943.29	0.00776	7.79	0.61
5	32000	1942.57	275.62	8.57		1943.55	0.00777	8	0.61
5	34000	1942.77	286.89	8.77		1943.8	0.00778	8.21	0.61
5	36000	1942.96	297.92	8.96		1944.04	0.00779	8.4	0.62
5	38000	1943.15	308.73	9.15		1944.28	0.00781	8.59	0.62
5	40000	1943.33	319.36	9.33		1944.51	0.00782	8.78	0.63
5	42000	1943.51	329.75	9.51		1944.73	0.00783	8.95	0.63

Table D-2
Reach 390400 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
5	44000	1943.69	339.99	9.69		1944.95	0.00784	9.12	0.63
4	2000	1911.04	0	3.04	1910.19	1911.52	0.00901	5.61	0.59
4	4000	1912.67	0	4.67	1911.38	1913.39	0.00901	6.9	0.62
4	6000	1913.98	0	5.98	1912.47	1914.82	0.00902	7.42	0.63
4	8000	1913.41	0	5.41	1913.41	1915.38	0.02267	11.39	0.99
4	10000	1914.66	0	6.66	1914.51	1915.14	0.009	5.62	0.59
4	12000	1915.02	0	7.02	1914.51	1915.57	0.00901	6	0.6
4	14000	1915.35	0	7.35	1914.51	1915.97	0.00901	6.41	0.61
4	16000	1915.63	0	7.63	1914.52	1916.33	0.00902	6.76	0.62
4	18000	1915.9	0	7.9	1914.75	1916.66	0.00901	7.08	0.62
4	20000	1916.15	0	8.15	1915	1916.97	0.009	7.36	0.63
4	22000	1916.38	0	8.38	1915	1917.25	0.00902	7.64	0.64
4	24000	1916.6	0	8.6	1915.45	1917.53	0.00901	7.89	0.64
4	26000	1916.82	0	8.82	1915.68	1917.8	0.00901	8.12	0.65
4	28000	1917.02	0	9.02	1915.91	1918.05	0.009	8.35	0.65
4	30000	1917.22	0	9.22	1916.17	1918.3	0.009	8.56	0.65
4	32000	1917.41	0	9.41	1916.34	1918.54	0.009	8.77	0.66
4	34000	1917.6	0	9.6	1916.51	1918.77	0.009	8.96	0.66
4	36000	1917.78	0	9.78	1916.68	1918.99	0.009	9.15	0.67
4	38000	1917.96	0	9.96	1916.85	1919.21	0.009	9.33	0.67
4	40000	1918.13	0	10.13	1917.01	1919.42	0.009	9.5	0.67
4	42000	1918.29	0	10.29	1917.18	1919.63	0.009	9.67	0.67
4	44000	1918.45	0	10.45	1917.32	1919.83	0.00901	9.84	0.68

Table D-3

Reach 400410 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
4	2000	1910.86	56.03	2.86	1909.88	1911.15	0.00675	4.39	0.5
4	4000	1912.41	96.19	4.41		1912.78	0.00741	4.95	0.53
4	6000	1913.33	131.11	5.33		1913.77	0.00769	5.32	0.55
4	8000	1914.08	183.03	6.08		1914.55	0.00836	5.52	0.57
4	10000	1914.75	219.52	6.75		1915.2	0.00821	5.46	0.56
4	12000	1915.18	249.74	7.18		1915.69	0.00775	5.75	0.56
4	14000	1915.56	280.52	7.56		1916.11	0.0074	6.04	0.56
4	16000	1915.88	318.69	7.88		1916.49	0.00722	6.32	0.56
4	18000	1916.21	346.03	8.21		1916.85	0.00693	6.52	0.55
4	20000	1916.54	375.45	8.54		1917.21	0.00654	6.66	0.55
4	22000	1916.83	400.23	8.83		1917.53	0.00638	6.85	0.54
4	24000	1917.11	424.42	9.11		1917.84	0.00622	7.02	0.54
4	26000	1917.38	447.89	9.38		1918.13	0.00608	7.17	0.54
4	28000	1917.64	471.77	9.64		1918.42	0.00597	7.33	0.54
4	30000	1917.85	495.58	9.85		1918.67	0.00599	7.52	0.54
4	32000	1918.07	519.73	10.07		1918.92	0.00597	7.69	0.55
4	34000	1918.23	544.81	10.23		1919.13	0.0061	7.91	0.55
4	36000	1918.28	578.73	10.28		1919.27	0.00666	8.31	0.58
4	38000	1918.46	601.91	10.46		1919.48	0.00669	8.48	0.58
4	40000	1918.66	624.05	10.66		1919.72	0.00661	8.6	0.58
4	42000	1918.83	646.61	10.83		1919.92	0.00665	8.78	0.59
4	44000	1919	668.61	11		1920.13	0.00667	8.93	0.59
3	2000	1898.43	41.98	4.43		1898.82	0.01199	5.54	0.65
3	4000	1899.7	70.93	5.7		1900.14	0.01128	5.77	0.65
3	6000	1900.45	96.41	6.45		1901.01	0.01094	6.49	0.66
3	8000	1901.09	138.99	7.09	1900.01	1901.74	0.01003	7.06	0.65
3	10000	1901.53	166.01	7.53		1902.31	0.01043	7.76	0.67
3	12000	1901.89	188.83	7.89		1902.8	0.01104	8.45	0.7
3	14000	1902.24	211.91	8.24	1901.41	1903.27	0.01163	9.12	0.73
3	16000	1902.55	242.58	8.55	1901.77	1903.65	0.01191	9.62	0.75
3	18000	1902.8	262.75	8.8	1902.36	1904	0.0125	10.17	0.77
3	20000	1903.08	284.17	9.08	1902.66	1904.38	0.01347	10.92	0.81
3	22000	1903.25	302.75	9.25	1902.59	1904.66	0.01412	11.41	0.83
3	24000	1903.41	320.89	9.41	1903.3	1904.93	0.0148	11.89	0.86
3	26000	1903.55	338.57	9.55	1903.52	1905.19	0.01555	12.38	0.88
3	28000	1903.71	356.52	9.71	1903.71	1905.45	0.01599	12.76	0.9
3	30000	1903.9	374.53	9.9	1903.9	1905.69	0.01597	13.01	0.9
3	32000	1904.08	392.76	10.08	1904.08	1905.93	0.01601	13.27	0.91
3	34000	1904.29	411.72	10.29	1904.29	1906.16	0.01554	13.36	0.9
3	36000	1904.75	437.17	10.75	1904.75	1906.44	0.0132	12.85	0.84
3	38000	1904.9	454.86	10.9	1904.9	1906.63	0.0132	13.02	0.84
3	40000	1905.01	471.79	11.01	1905.01	1906.81	0.01357	13.33	0.85
3	42000	1905.16	489.02	11.16	1905.16	1906.98	0.01351	13.48	0.85

Table D-3

Reach 400410 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
3	44000	1905.29	505.93	11.29	1905.29	1907.16	0.01361	13.67	0.86
2	2000	1878.86	22.6	4.86	1877.91	1879.19	0.00813	4.66	0.54
2	4000	1880.31	36.6	6.31	1878.99	1880.77	0.00844	5.48	0.57
2	6000	1881.28	49.14	7.28	1879.77	1881.81	0.00848	5.9	0.58
2	8000	1882.63	70.38	8.63	1880.66	1882.97	0.00871	4.68	0.56
2	10000	1883.09	84.05	9.09	1882.01	1883.45	0.00843	4.78	0.55
2	12000	1883.43	95.68	9.43	1882.2	1883.82	0.00812	5	0.55
2	14000	1883.75	106.9	9.75	1882.58	1884.17	0.00784	5.18	0.55
2	16000	1884.2	122	10.2	1882.86	1884.59	0.00764	5.03	0.54
2	18000	1884.43	131.95	10.43	1883.09	1884.86	0.0074	5.23	0.54
2	20000	1884.67	142.1	10.67	1883.24	1885.12	0.00706	5.38	0.53
2	22000	1884.89	151.63	10.89	1883.46	1885.37	0.00683	5.54	0.53
2	24000	1885.11	161	11.11	1883.62	1885.62	0.00662	5.69	0.53
2	26000	1885.33	170.23	11.33	1883.78	1885.86	0.0064	5.82	0.52
2	28000	1885.55	179.37	11.55		1886.1	0.00619	5.94	0.52
2	30000	1885.76	188.2	11.76		1886.33	0.00602	6.06	0.52
2	32000	1885.98	197.09	11.98		1886.56	0.00583	6.16	0.51
2	34000	1886.18	205.63	12.18		1886.79	0.00568	6.26	0.51
2	36000	1886.39	214.35	12.39		1887.02	0.0055	6.35	0.51
2	38000	1886.6	222.83	12.6		1887.24	0.00536	6.44	0.5
2	40000	1886.81	231.45	12.81		1887.46	0.00519	6.51	0.5
2	42000	1887.01	239.67	13.01		1887.68	0.00507	6.59	0.49
2	44000	1887.21	248.02	13.21		1887.89	0.00494	6.67	0.49
1	2000	1860.08	0	2.08	1859.46	1860.38	0.009	4.51	0.56
1	4000	1861.07	0	3.07	1860.25	1861.59	0.009	5.89	0.6
1	6000	1861.87	0	3.87	1860.9	1862.57	0.009	6.89	0.62
1	8000	1862.57	0	4.57	1861.45	1863.44	0.00901	7.7	0.64
1	10000	1863.19	0	5.19	1861.99	1864.23	0.009	8.39	0.65
1	12000	1863.77	0	5.77	1862.47	1864.95	0.009	9.01	0.66
1	14000	1864.3	0	6.3	1862.92	1865.64	0.009	9.56	0.67
1	16000	1864.8	0	6.8	1863.37	1866.28	0.009	10.07	0.68
1	18000	1865.28	0	7.28	1863.77	1866.89	0.00902	10.54	0.69
1	20000	1865.73	0	7.73	1864.18	1867.48	0.00901	10.98	0.7
1	22000	1866.17	0	8.17	1864.56	1868.05	0.00901	11.39	0.7
1	24000	1866.59	0	8.59	1864.93	1868.6	0.009	11.78	0.71
1	26000	1866.99	0	8.99	1865.3	1869.13	0.009	12.15	0.72
1	28000	1867.39	0	9.39	1865.64	1869.64	0.009	12.5	0.72
1	30000	1867.77	0	9.77	1865.99	1870.14	0.009	12.83	0.73
1	32000	1868.13	0	10.13	1866.26	1870.62	0.009	13.16	0.73
1	34000	1868.49	0	10.49	1866.65	1871.09	0.00901	13.47	0.73
1	36000	1868.84	0	10.84	1866.98	1871.56	0.00901	13.77	0.74
1	38000	1869.18	0	11.18	1867.28	1872.01	0.009	14.05	0.74

Table D-3

Reach 400410 HEC-RAS hydraulic data for hydrologic routing

Cross-Section (1)	Q Total cfs (2)	W.S. Elev feet (3)	Accumulated Volume acre-ft (4)	Maximum Channel Depth feet (5)	Critical W.S. Elev feet (6)	E.G. Elev feet (7)	E.G. Slope ft/ft (8)	Channel Velocity fps (9)	Froude # (10)
1	40000	1869.52	0	11.52	1867.61	1872.45	0.009	14.33	0.75
1	42000	1869.84	0	11.84	1867.91	1872.89	0.009	14.6	0.75
1	44000	1870.18	0	12.18	1868.13	1873.33	0.00902	14.89	0.75

Table D-4
Summary of assigned reach route steady state loss rates

Routing Reach (1)	Dominant Soil Map Unit (2)	Steady State Loss Rate (XKSAT) in/hr (3)
110120	Cartwright Allotment TES 73	0.40
120130	Cartwright Allotment TES 73	0.40
130140	Cartwright Allotment TES 73	0.40
140150	Cartwright Allotment TES 73	0.35
150160	Cartwright Allotment TES 73	0.40
160170	Cartwright Allotment TES 73	0.40
170180	Cartwright Allotment TES 73	0.40
180190	Cartwright Allotment TES CA12	0.40
190200	Cartwright Allotment TES CA12	0.40
200210	SCS 8	0.96
210220	SCS 8	0.96
220230	SCS 8	0.96
230240	SCS 8	0.96
240250	SCS 8	0.96
250260	SCS 8	0.96
270300	SCS 8	0.96
280295	SCS 8	0.79
295300	SCS 6	0.62
300310	SCS 8	0.96
310390	SCS 8	0.96
320340	SCS 61	0.15
330340	SCS 61	0.15
340350	SCS 61	0.15
350360	SCS 61	0.15
360370	SCS 33	0.28
370385	SCS 93	0.33
380385	SCS 96	0.10
385390	SCS 93	0.07
390400	SCS 3	0.77
400410	SCS 3	0.58

Table D-5

Summary of the normal depth reach route hydraulic data for the 100-year, 24-hour storm

Routing Reach	Reach				Manning's Equation						Computed Using HEC-1 Summary Data					NSTEPS from HEC-1 Input File
	Slope in ft/ft	Length in feet	Average n value	Average Q in cfs	Channel Base Width in feet	Flow Area in sf	Flow Top Width in feet	Flow Depth in feet	Froude Number	Average Velocity in fps	Wave Celerity in fps	Velocity Range in fps Min.	Velocity Range in fps Max.	Travel Time in hours	Travel NSTEPS Computed	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
110120	0.007	1500	0.083	15558	42.0	1902.6	223.0	13.1	0.50	8.2	5.0	1.5	7.5	0.0833	1	1
120130	0.012	5800	0.083	17631	42.0	1687.8	220.0	12.2	0.67	10.5	19.3	5.8	29.1	0.0833	1	1
130140	0.006	1800	0.083	18057	42.0	2245.1	227.7	14.7	0.45	8.1	0.0	0.0	0.0	0.0000	1	1
140150	0.027	10000	0.091	18352	44.0	1517.2	176.0	12.3	0.73	12.2	16.7	6.7	25.1	0.1667	2	2
150160	0.020	1000	0.092	18527	44.0	1685.3	177.9	13.2	0.63	11.1	0.0	0.0	0.0	0.0000	1	1
160170	0.020	4600	0.074	18724	47.0	1229.8	179.5	11.7	1.03	15.3	15.3	4.6	23.1	0.0833	1	1
170180	0.017	4000	0.075	19757	47.0	1348.4	187.2	12.4	0.97	14.8	13.3	4.0	20.1	0.0833	1	1
180190	0.016	16600	0.094	20616	34.0	1583.4	237.3	11.8	0.90	13.1	18.4	8.3	20.8	0.2500	3	3
190200	0.014	11000	0.073	21381	22.0	1654.4	153.2	14.3	0.70	13.0	18.3	7.3	27.6	0.1667	2	2
200210	0.013	4800	0.064	21288	40.0	2522.2	485.1	10.8	0.66	8.5	16.0	4.8	24.1	0.0833	1	1
210220	0.013	4800	0.064	23822	40.0	2727.8	493.7	11.2	0.66	8.8	8.0	3.2	12.0	0.1667	2	2
220230	0.013	4800	0.064	23967	40.0	2742.6	494.3	11.3	0.66	8.8	16.0	4.8	24.1	0.0833	1	1
230240	0.012	2300	0.065	23976	24.0	3047.8	641.0	12.8	0.64	8.0	7.7	2.3	11.5	0.0833	1	1
240250	0.011	6200	0.068	24057	40.0	2696.7	427.5	13.2	0.63	9.0	20.7	6.2	31.1	0.0833	1	1
250260	0.007	1500	0.068	24795	15.0	2639.7	258.9	20.4	0.52	9.4	0.0	0.0	0.0	0.0000	1	1
270300	0.029	12500	0.086	3445	33.0	309.9	195.5	4.5	1.59	11.4	8.3	4.2	7.8	0.4167	5	5
280295	0.025	13800	0.052	4289	162.8	479.1	174.4	2.8	0.98	9.2	15.3	6.9	17.3	0.2500	3	3
295300	0.024	3000	0.037	9747	107.6	586.9	146.8	4.9	1.49	16.9	0.0	0.0	0.0	0.0000	1	1
300310	0.019	4000	0.044	12161	46.5	590.3	89.0	7.8	1.42	20.8	0.0	0.0	0.0	0.0000	1	1
310390	0.013	2000	0.065	31703	72.0	3284.6	522.7	10.0	0.69	9.8	0.0	0.0	0.0	0.0000	1	1
320340	0.014	1800	0.052	938	22.3	120.9	55.8	3.6	0.96	8.0	6.0	1.8	9.0	0.0833	1	1
330340	0.032	1400	0.062	280	2.8	44.6	32.3	2.9	0.98	6.6	4.7	1.4	7.0	0.0833	1	1
340350	0.012	2100	0.060	1715	17.7	196.7	68.3	4.8	0.92	8.9	7.0	2.1	10.5	0.0833	1	1
350360	0.021	4700	0.062	1926	14.8	234.9	111.9	4.7	1.02	8.4	7.8	3.1	11.8	0.1667	2	2
360370	0.022	3600	0.042	2611	13.6	167.1	45.3	5.2	1.46	15.9	12.0	3.6	18.0	0.0833	1	1
370385	0.013	2800	0.025	3028	12.3	207.6	76.2	6.3	1.59	14.9	9.3	2.8	14.0	0.0833	1	1
380385	0.011	2900	0.049	908	9.7	122.1	52.1	3.7	0.88	7.6	0.0	0.0	0.0	0.0000	1	1
385390	0.022	2600	0.054	3442	7.5	251.1	64.0	6.8	1.24	13.9	8.7	2.6	13.0	0.0833	1	1
390400*	0.008	10400	0.047	31896	---	3408.8	627.0	10.8	0.75	9.7	17.3	6.9	26.0	0.1667	2	2
400410+	0.009	5600	0.050	34376	---	4108.7	861.4	10.8	0.67	8.9	9.3	3.7	14.0	0.1667	2	2

Note: * - The Manning's equation hydraulic data were calculated using HEC-RAS and are taken from profile with Q = 32,000 cfs

Note: + - The Manning's equation hydraulic data were calculated using HEC-RAS and are taken from profile with Q = 34,000 cfs

Table D-7

Summary of the normal depth reach route hydraulic data for the 100-year, 24-hour storm for Andora Hills Wash

Routing Reach	Reach: Slope in ft/ft	Reach: Length in feet	Reach: Average n value	Reach: Average Q in cfs	Manning's Equation: Channel Base Width in feet	Manning's Equation: Flow Area in sf	Manning's Equation: Flow Top Width in feet	Manning's Equation: Flow Depth in feet	Manning's Equation: Froude Number	Manning's Equation: Average Velocity in fps	Computed Using HEC-1 Summary Data: Wave Celerity in fps	Computed Using HEC-1 Summary Data: Velocity Range in fps: Min.	Computed Using HEC-1 Summary Data: Velocity Range in fps: Max.	Computed Using HEC-1 Summary Data: Travel Time in hours	Computed Using HEC-1 Summary Data: Travel NSTEPS Computed	NSTEPS from HEC-1 Input File
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
320340	0.014	1800	0.051	859	22.3	113.2	53.5	3.5	0.95	7.8	15.0	4.5	22.6	0.0333	1	1
330340	0.032	1400	0.061	260	2.8	42.0	31.3	2.8	0.98	6.5	11.7	3.5	17.5	0.0333	1	1
340350	0.012	2100	0.060	1575	17.7	183.9	66.3	4.6	0.93	8.7	17.5	5.2	26.3	0.0333	1	1
350360	0.021	4700	0.062	1791	14.8	220.5	110.4	4.6	1.04	8.3	9.8	4.7	9.8	0.1333	4	4
360370	0.022	3600	0.042	2432	13.6	159.0	44.7	5.0	1.45	15.6	30.0	9.0	45.1	0.0333	1	1
370385	0.013	2800	0.025	2804	12.3	194.9	73.3	6.2	1.59	14.7	11.7	4.7	17.5	0.0667	2	2
380385	0.011	2900	0.049	842	9.7	115.4	51.0	3.6	0.88	7.5	12.1	4.8	18.2	0.0667	2	2
385390	0.022	2600	0.054	3199	7.5	237.2	62.5	6.6	1.24	13.7	10.8	4.3	16.3	0.0667	2	2

Table D-6

Summary of the normal depth reach route hydraulic data for the 100-year, 6-hour storm for Andora Hills Wash

	Reach				Manning's Equation						Computed Using HEC-1 Summary Data					NSTEPS
Routing			Average		Channel	Flow	Flow Top	Flow	Froude	Average	Wave	Velocity Range		Travel		from HEC-1
Reach	Slope	Length	n	Q	Base Width	Area	Width	Depth	Number	Velocity	Celerity	in fps		Time	NSTEPS	Input
	in ft/ft	in feet	value	in cfs	in feet	in sf	in feet	in feet		in fps	in fps	Min.	Max.	in hours	Computed	File
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
320340	0.014	1800	0.057	1355	22.3	160.9	67.4	4.3	0.98	8.6	15.0	4.5	22.6	0.0333	1	1
330340	0.032	1400	0.062	382	2.8	56.6	36.6	3.3	0.99	7.0	11.7	3.5	17.5	0.0333	1	1
340350	0.012	2100	0.061	2048	17.7	227.8	73.1	5.3	0.91	9.1	8.7	3.5	13.2	0.0667	2	2
350360	0.021	4700	0.062	2203	14.8	262.1	114.9	4.9	1.00	8.6	9.8	4.7	9.8	0.1333	4	4
360370	0.022	3600	0.042	2594	13.6	166.2	45.3	5.2	1.46	15.9	30.0	9.0	45.1	0.0333	1	1
370385	0.013	2800	0.025	2886	12.3	199.3	74.3	6.2	1.59	14.8	23.4	7.0	35.1	0.0333	1	1
380385	0.011	2900	0.050	1346	9.7	164.0	58.3	4.5	0.88	8.4	24.2	7.2	36.3	0.0333	1	1
385390	0.022	2600	0.054	3179	7.5	236.0	62.3	6.6	1.24	13.7	21.7	6.5	32.6	0.0333	1	1

Data Summary Descriptions for Tables D-5, D-6 and D-7

Column 1: Reach name consisting of top and bottom concentration point numbers.

Column 2: Average slope of reach, in ft/ft.

Column 3: Length of the reach, in feet.

Column 4: Average Manning's n value for the reach cross section. Weighting for averaging calculations are based on the horizontal width of the left and right overbanks and channel.

Column 5: Average discharge for the reach, in cfs. Value is a numeric average of the peak discharge entering(pre-route) and exiting(post-route) discharges reported by HEC-1.

Column 6: Channel base width, in feet.

Column 7: Average cross sectional flow area for the reach, in square feet. Flow area is calculated using Manning's equation, the channel slope in column 2, the average discharge from column 5, and the average n value for the left and right overbanks and channel.

Column 8: Flow top width, in feet. Calculated using the cross section geometry and flow depth from column 9.

Column 9: Flow depth, in feet. Calculated using Manning's equation, the channel slope in column 2, the average discharge from column 5, and the average n value for the left and right overbanks and channel.

Column 10: Froude number, calculated as follows:

$$[10] = [11] / (32.2 * [7] / [8])^{0.5}$$

Column 11: Average velocity, in fps. Calculated by dividing column 5 by column 7. This value is compared to the velocity ranges calculated in columns 13 and 14, to check reasonableness of routing operational timing.

Column 12: Wave celerity, in fps. Calculated by dividing the column 3 by column 15 and converting the units appropriately. This wave celerity is considered to be accurate within plus or minus one HEC-1 computational time step.

Column 13: Minimum check velocity, in fps. This value is calculated using the reach length, HEC-1 calculated travel time, HEC-1 computational time step and a factor relating maximum wave celerity to average velocity. The formula is as follows:

$$[13] = [3] / (([15] + NMIN)(3600)(1.67))$$

where: NMIN is the HEC-1 computational time step;

3600 is the conversion factor from hours to seconds; and

1.67 is the factor relating maximum wave celerity to average velocity.

NOTE: If the HEC-1 travel time from column 15 is zero, the minimum average velocity is set to zero.

Column 14: Maximum check velocity, in fps. This value is calculated using the reach length, HEC-1 calculated travel time, HEC-1 computational time step and a factor relating minimum wave celerity to average velocity.

$$[14] = [3] / (([15] - NMIN)(3600)(1.33))$$

where: NMIN is the HEC-1 computational time step;

3600 is the conversion factor from hours to seconds; and

1.33 is the factor relating minimum wave celerity to average velocity.

NOTE: If the HEC-1 travel time from column 15 is zero, the maximum average velocity is set to zero. If the HEC-1 travel time is equal to the HEC-1 computational time step, one-half NMIN is used.

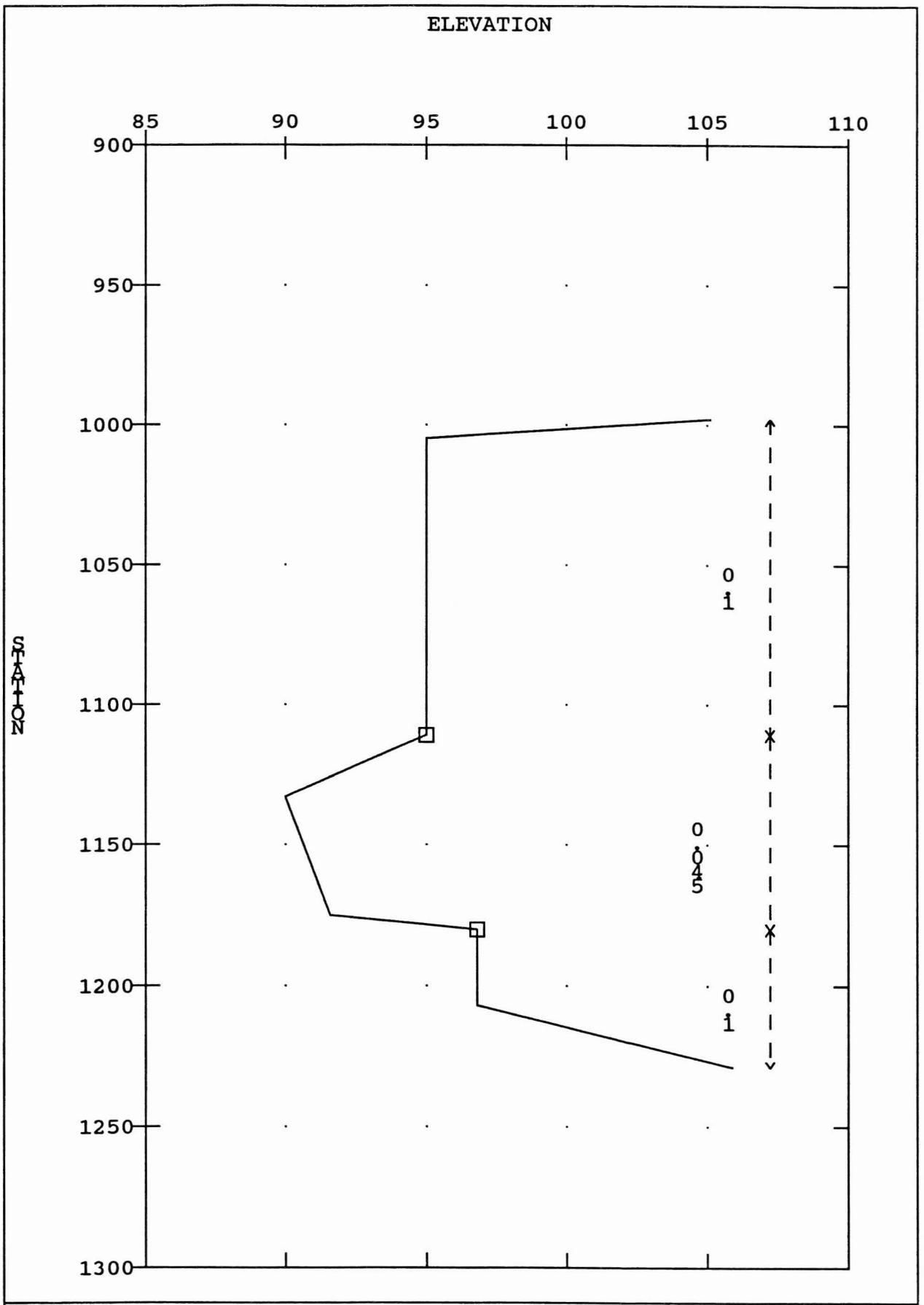
Column 15: Travel time through the reach, in hours. Calculated by subtracting the time to peak reported by HEC-1 at the end of the routing from the time to peak reported by HEC-1 at the beginning of the routing.

Column 16: Value of NSTEPS from the HEC-1 output file is calculated as follows:

$$[16] = [15] / NMIN$$

If the HEC-1 travel time from column 15 is zero, NSTEPS is set to one.

Column 17: NSTEPS value coded in RS record of the HEC-1 input model.



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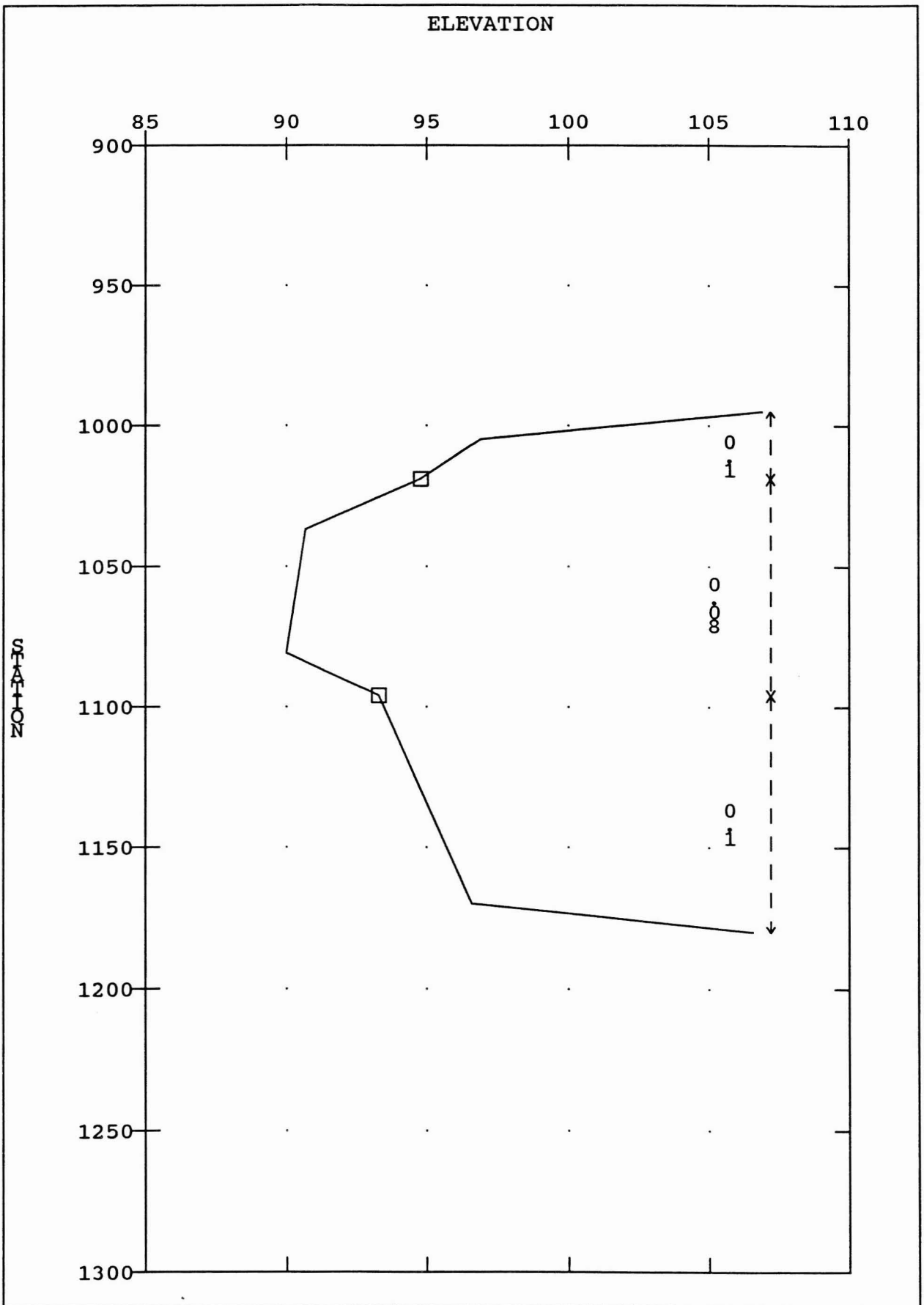

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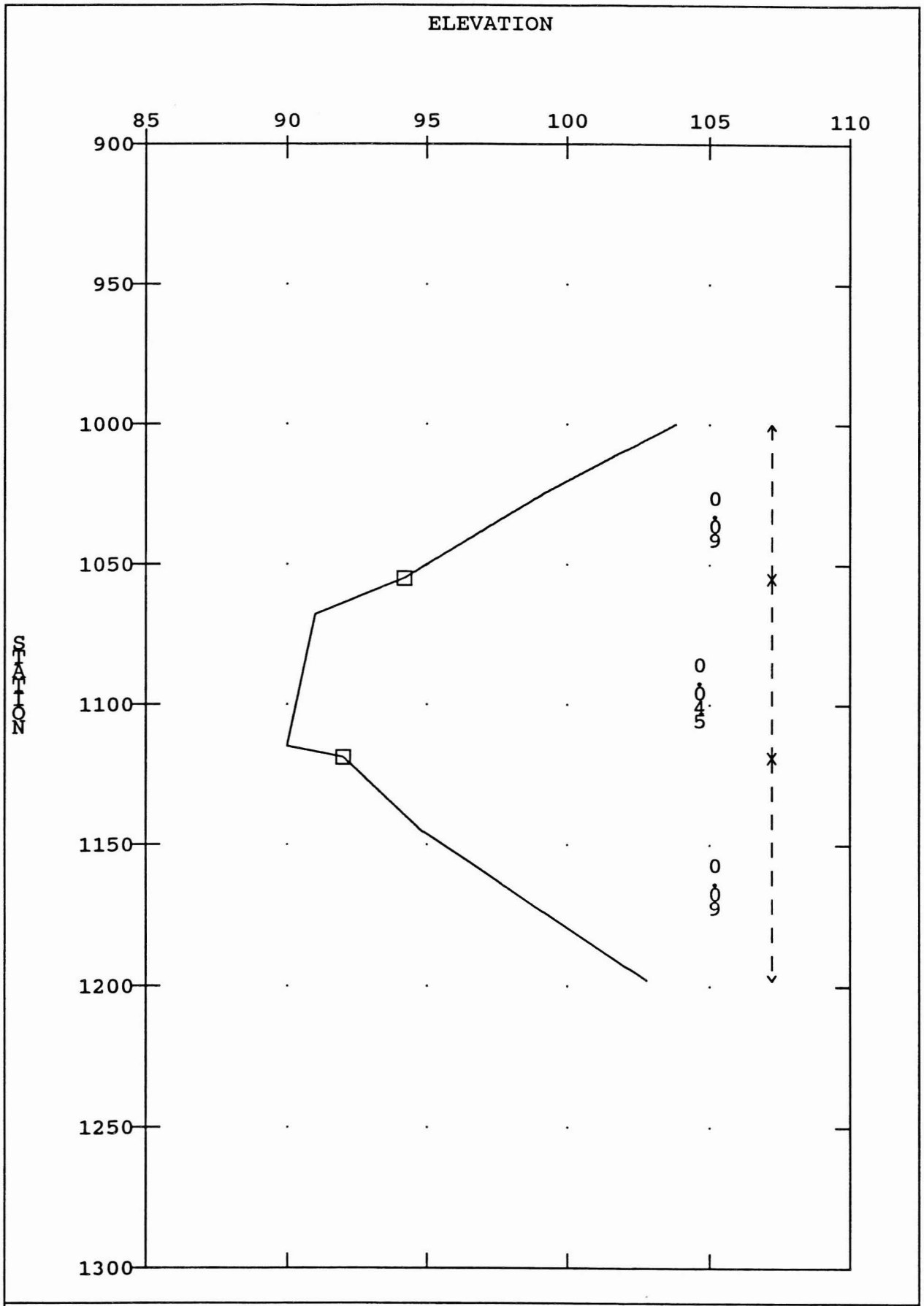

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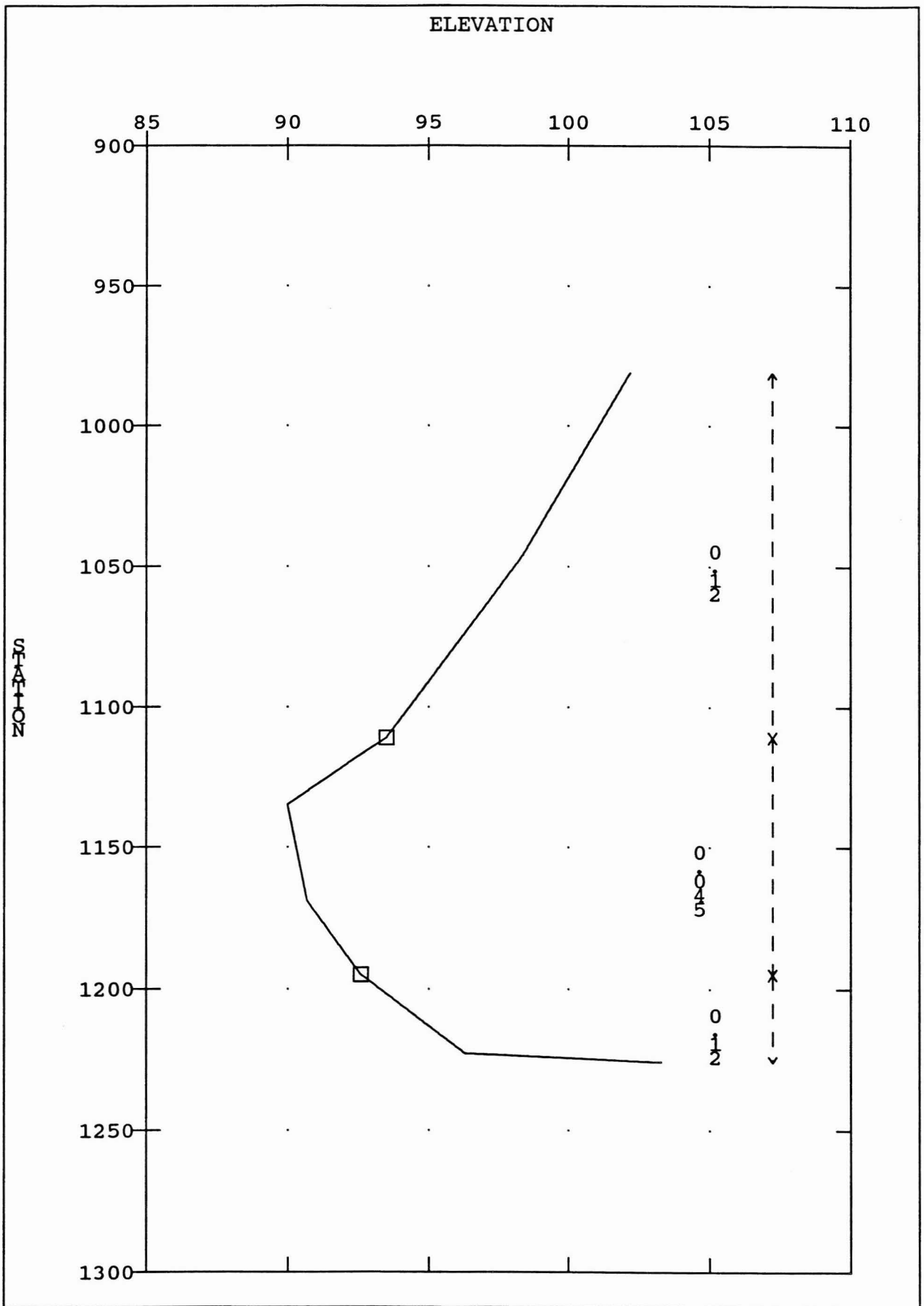

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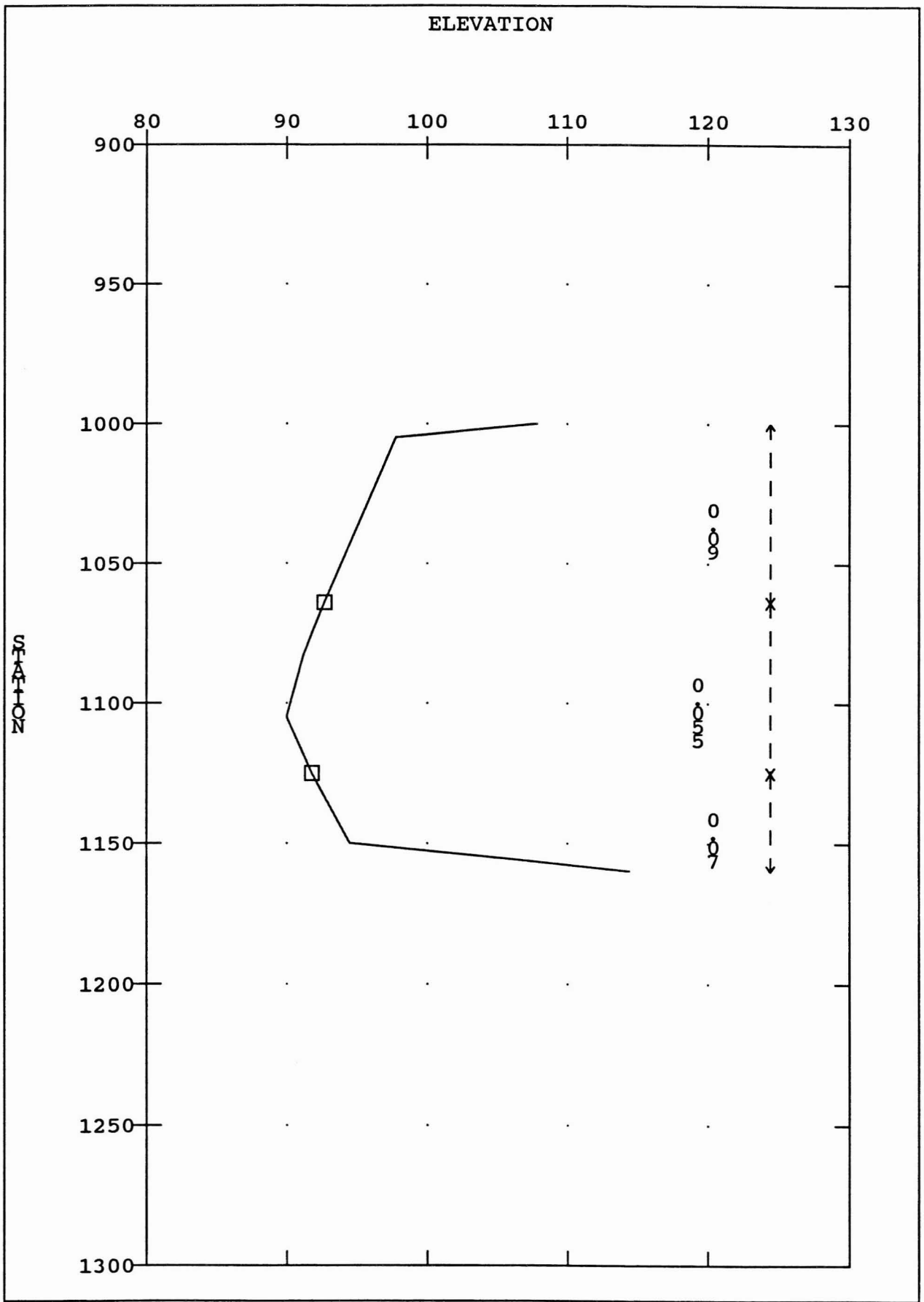

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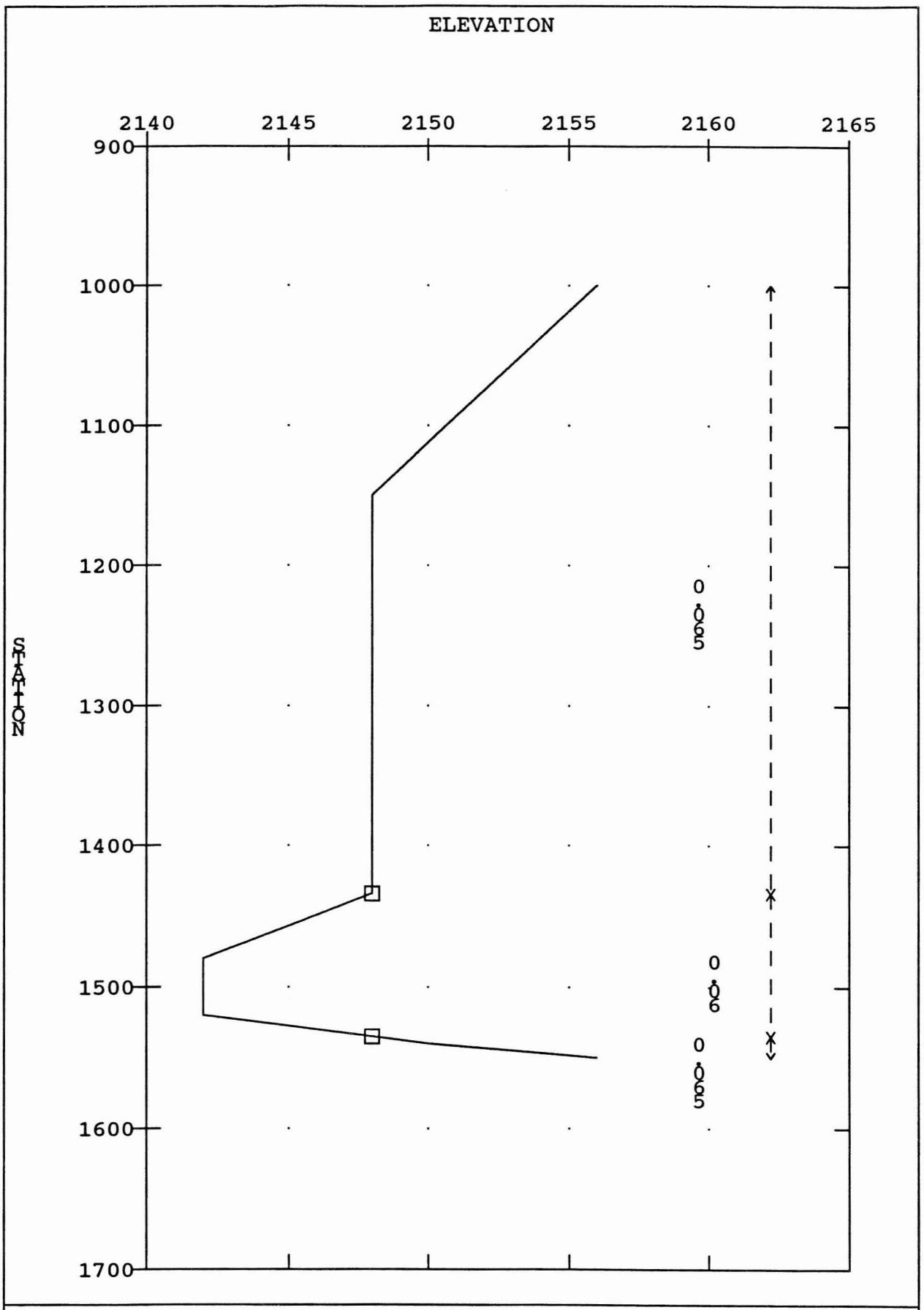

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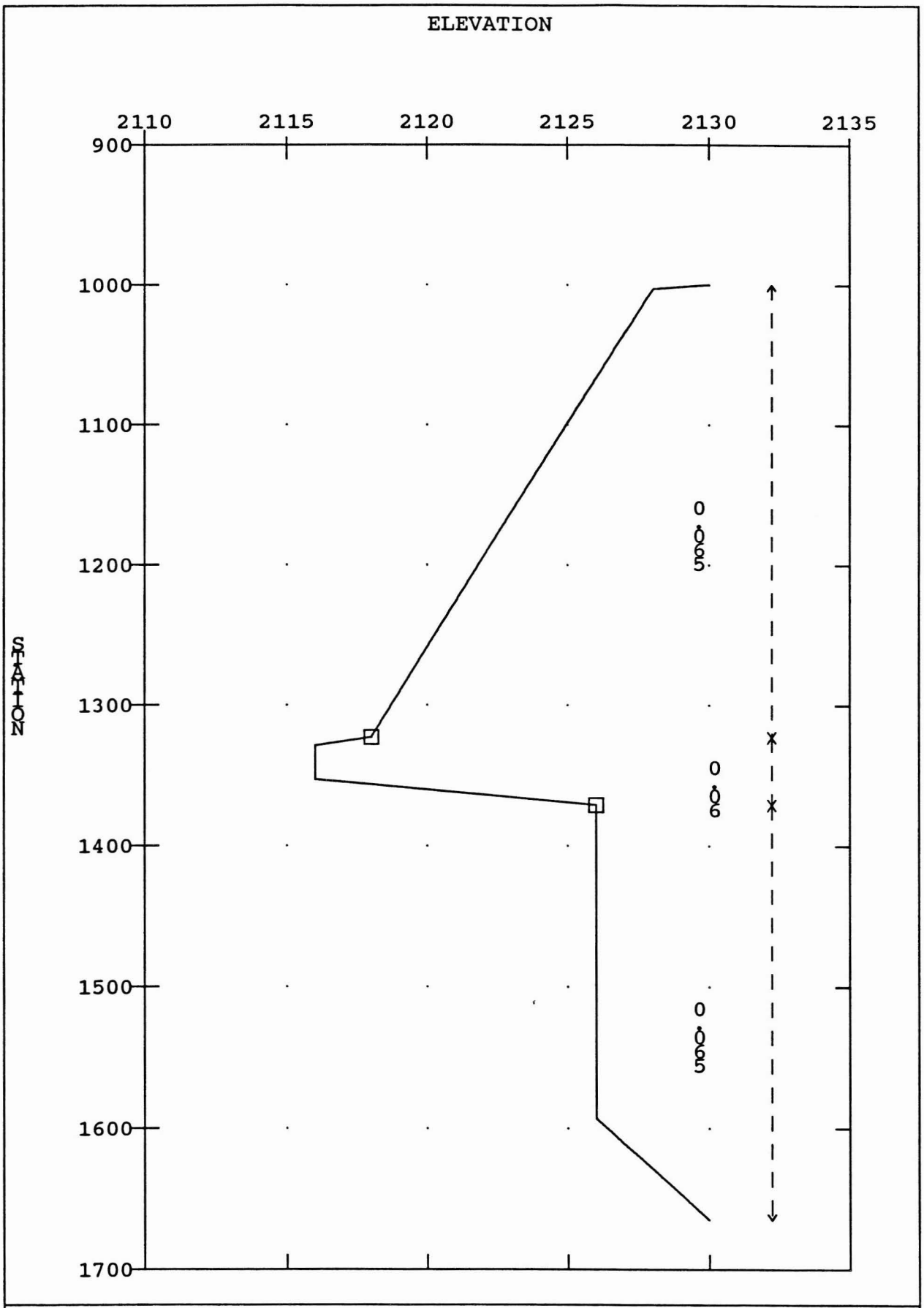

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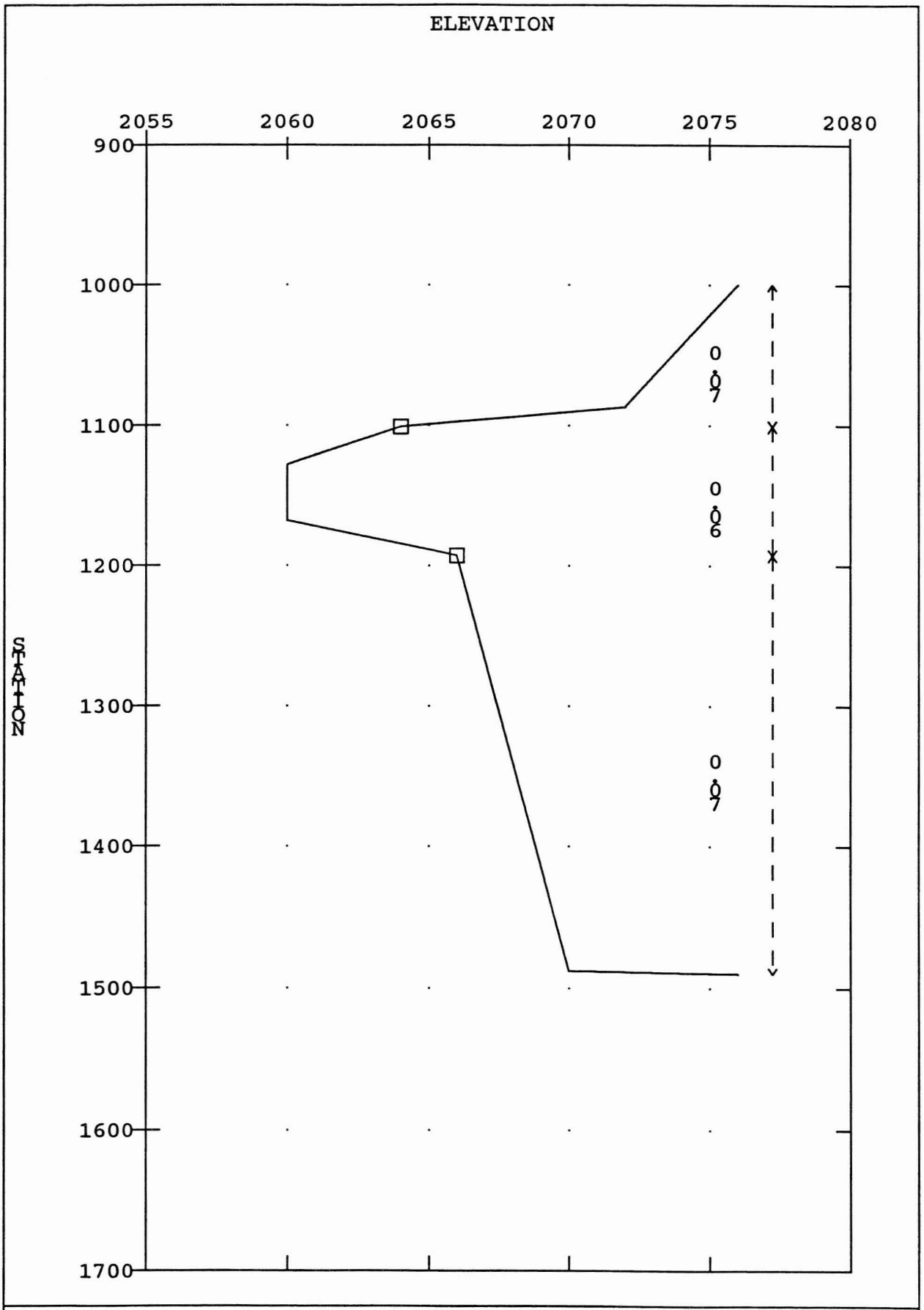

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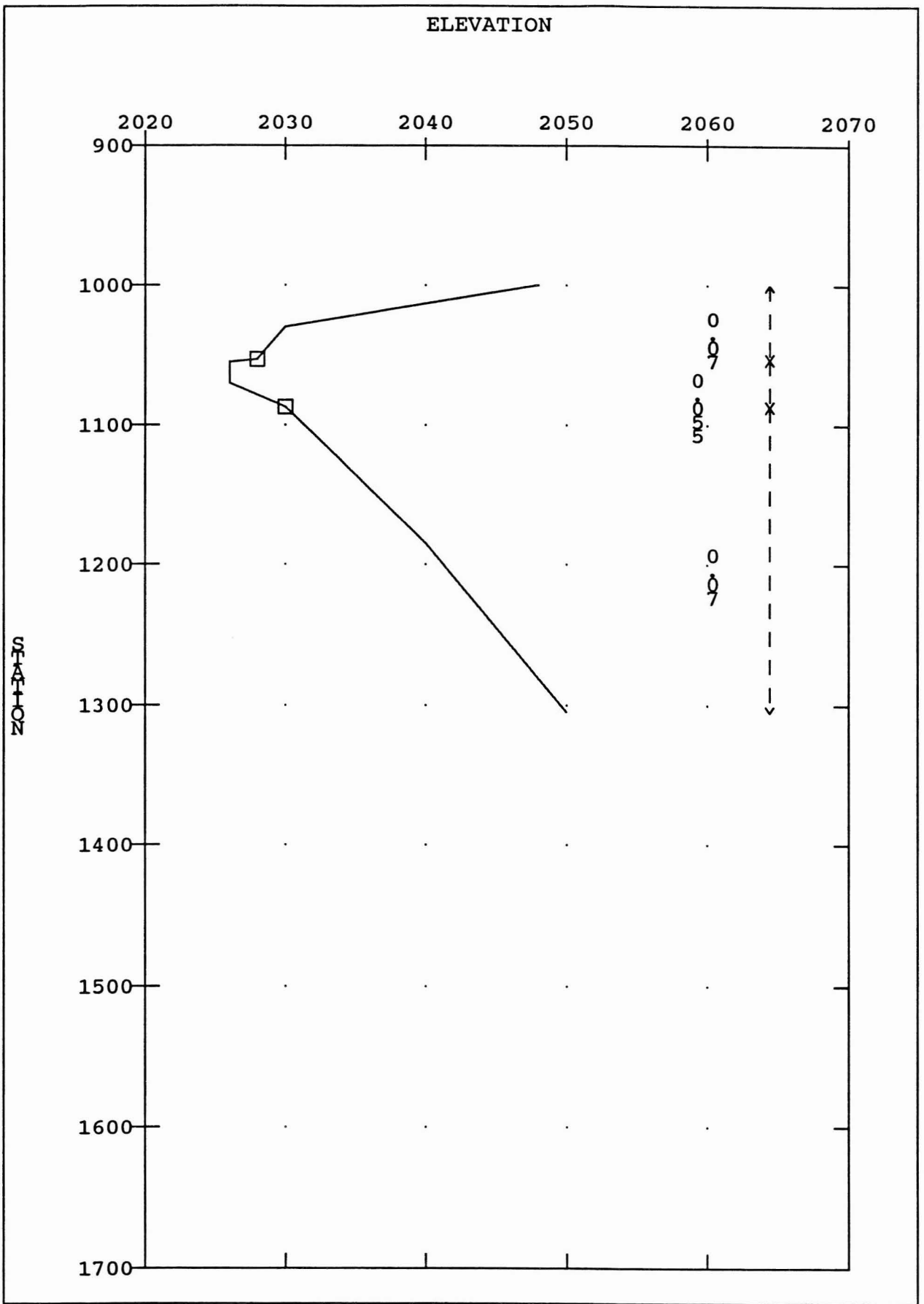

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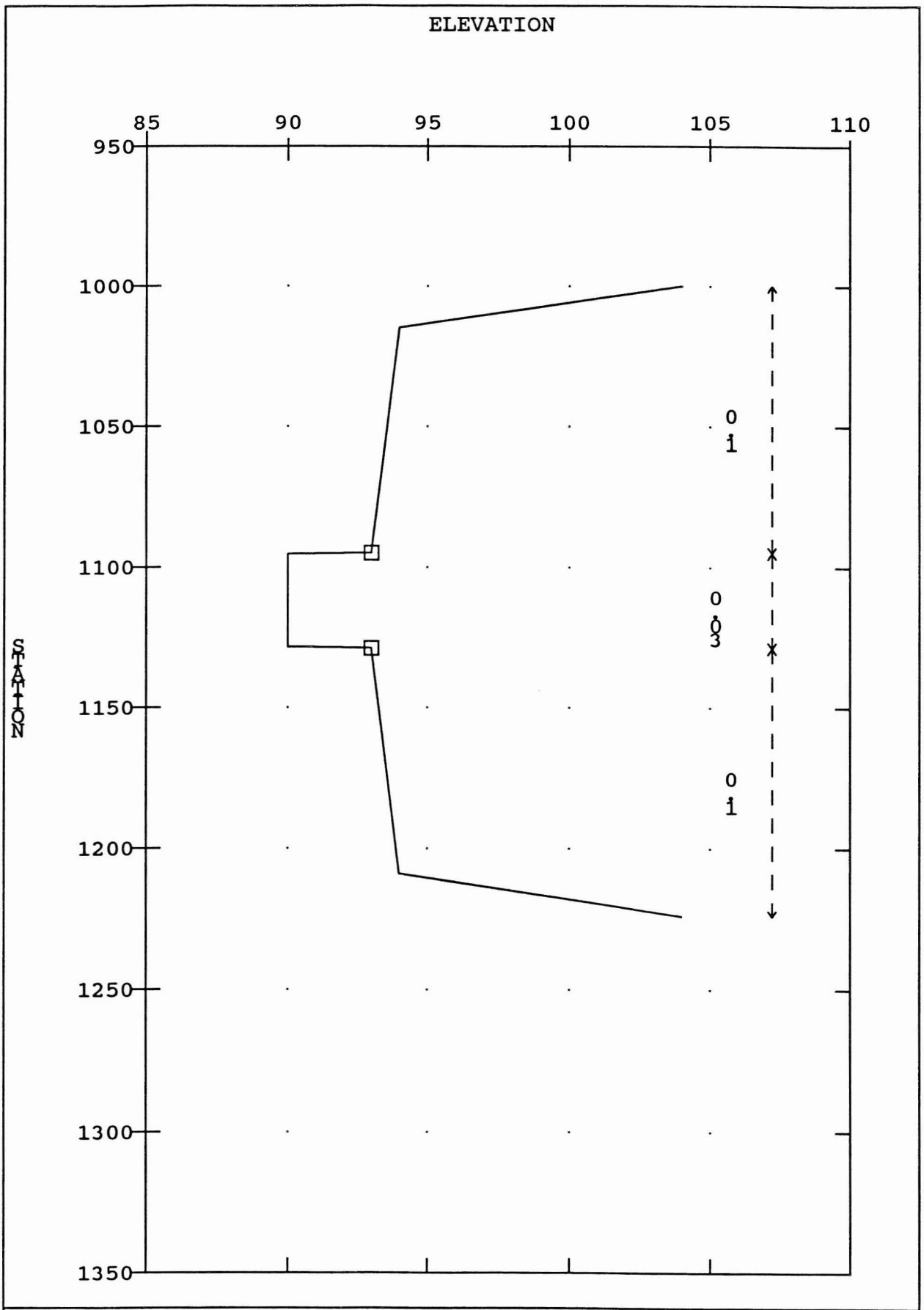

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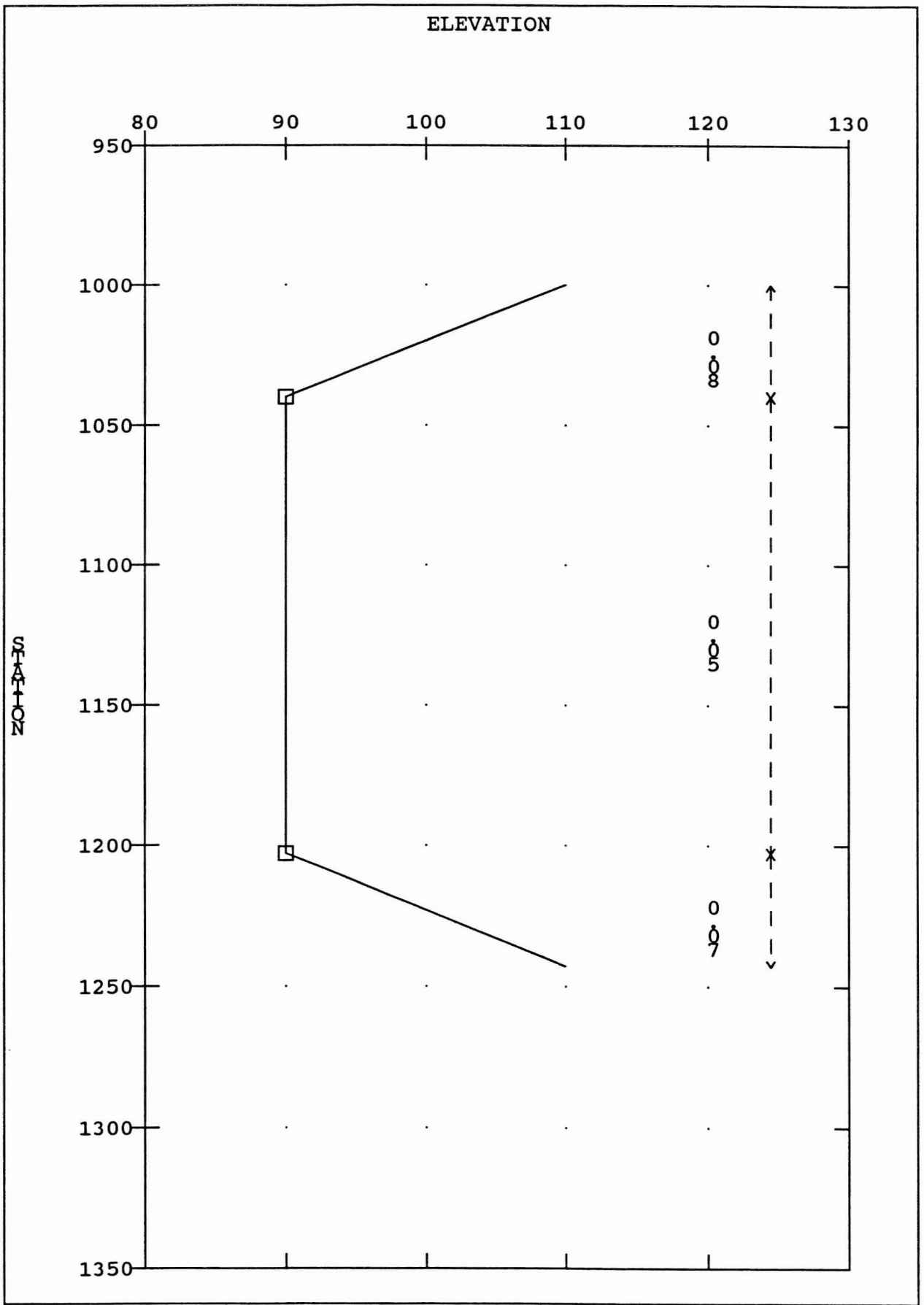

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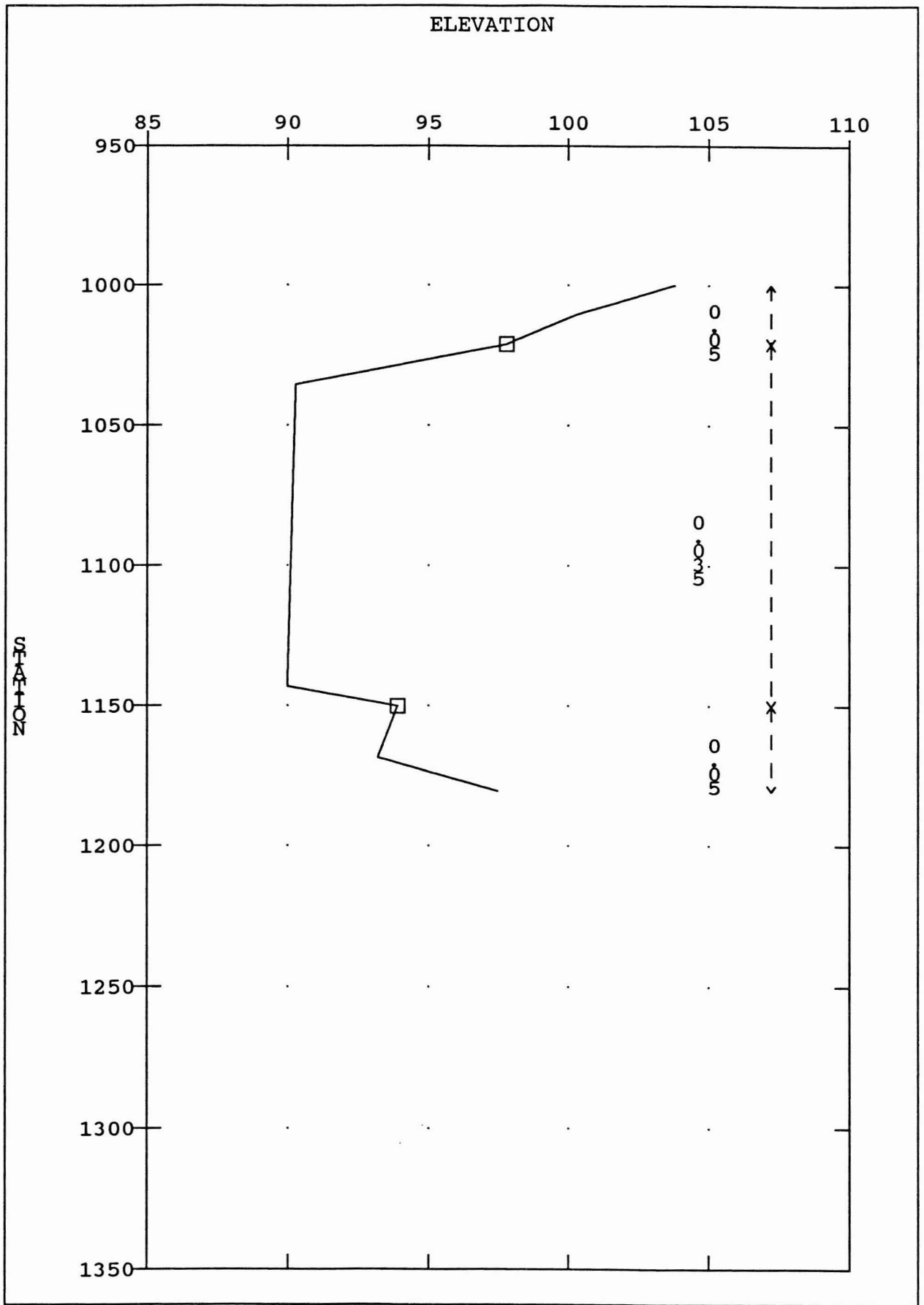

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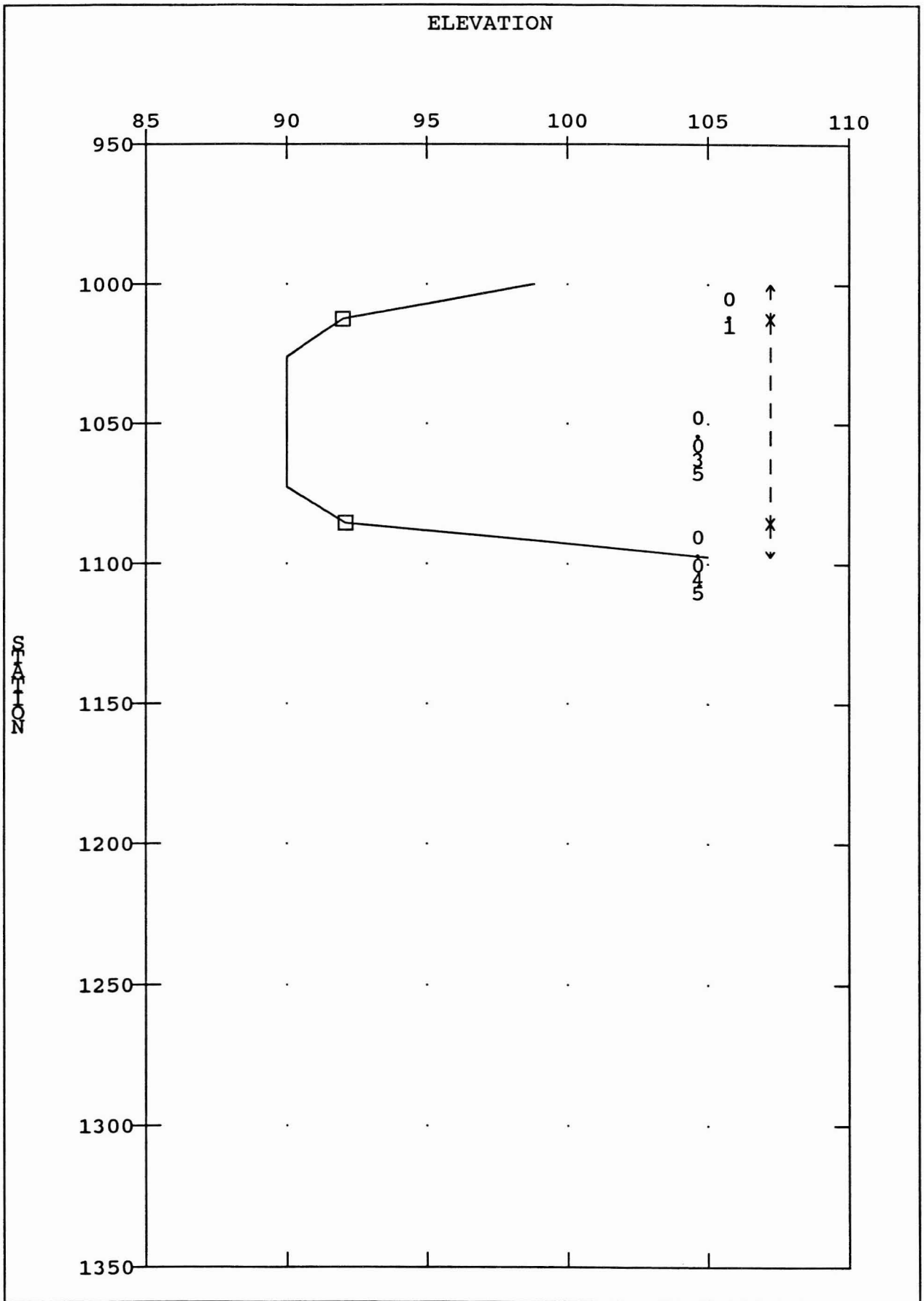

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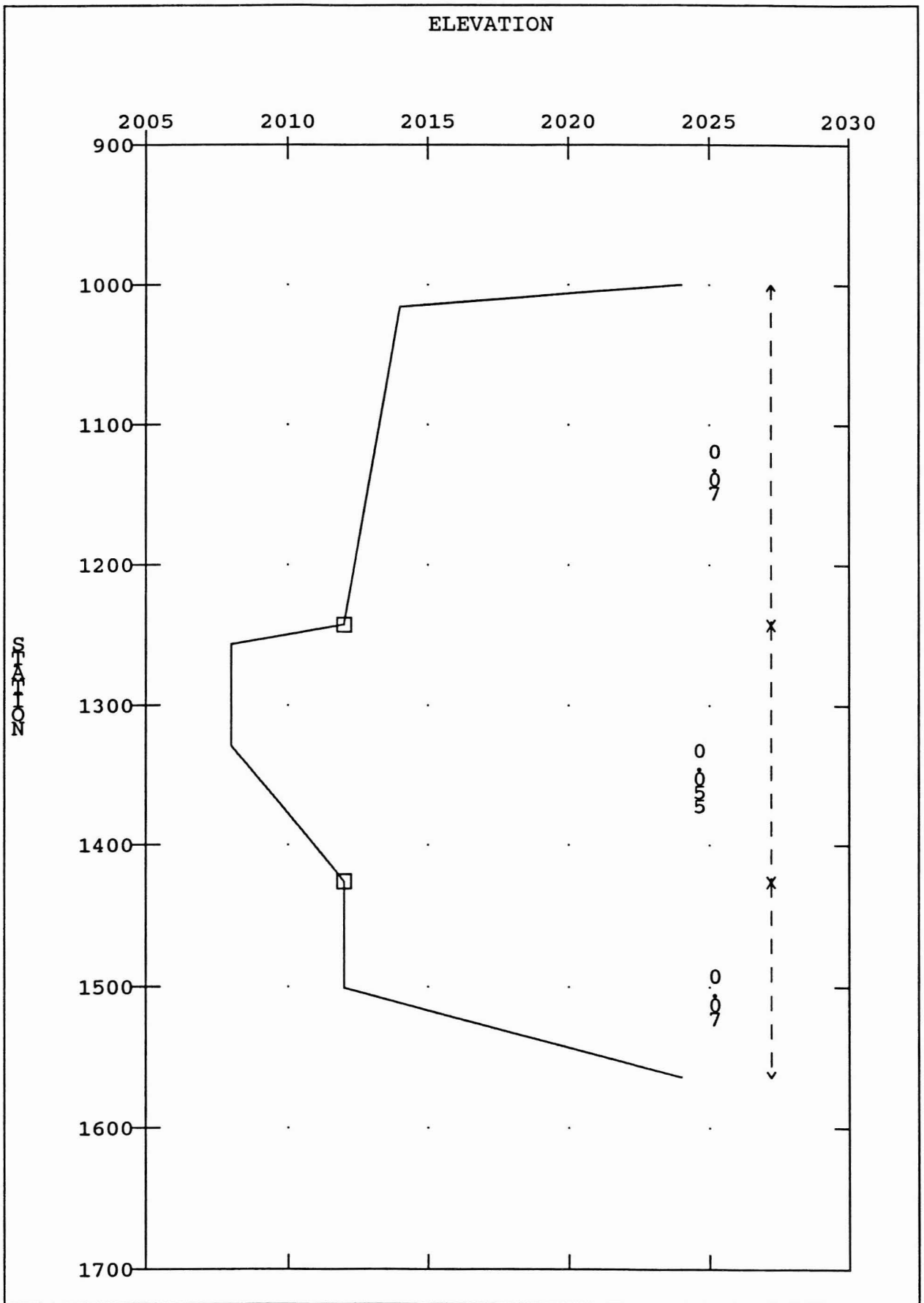

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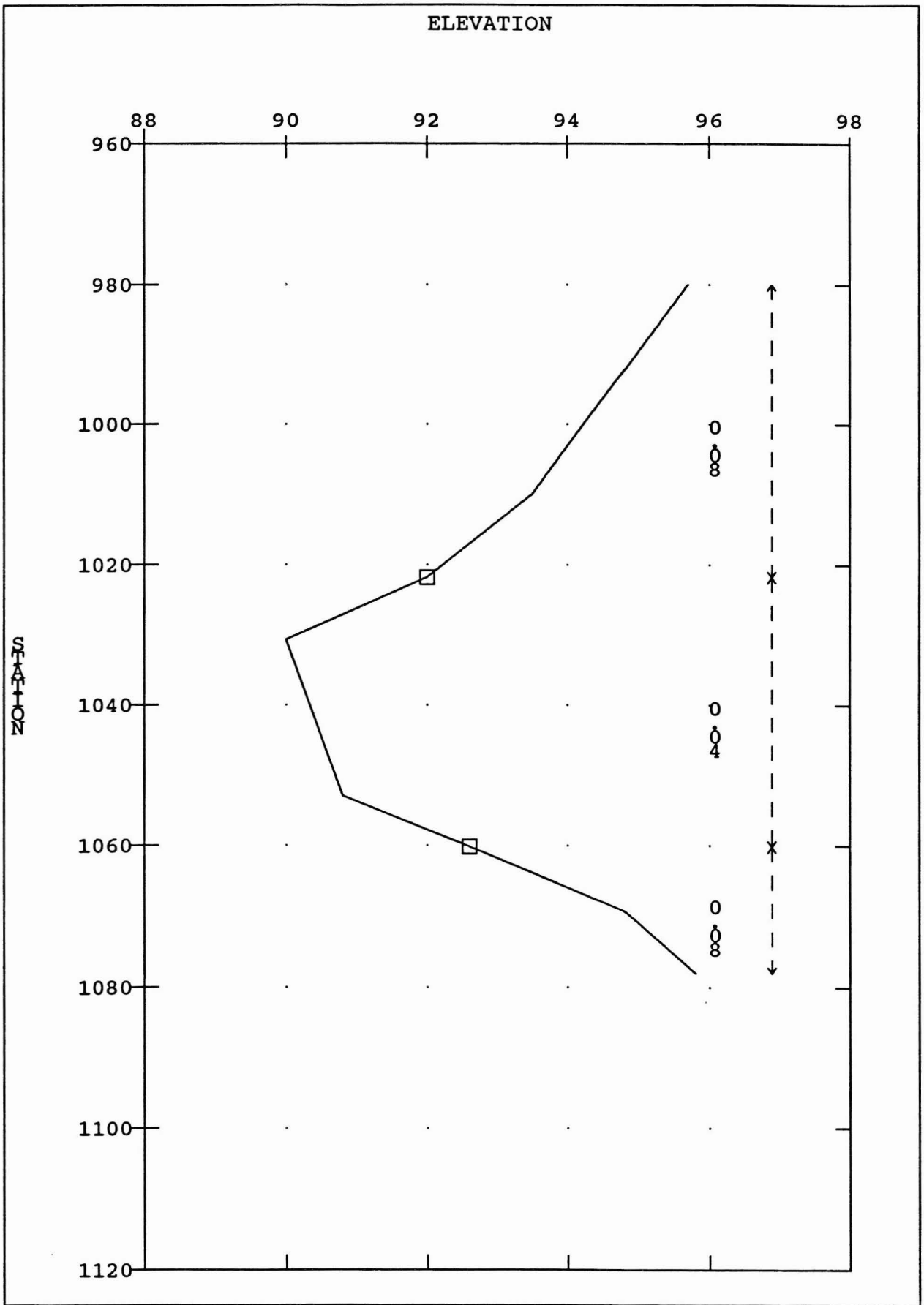

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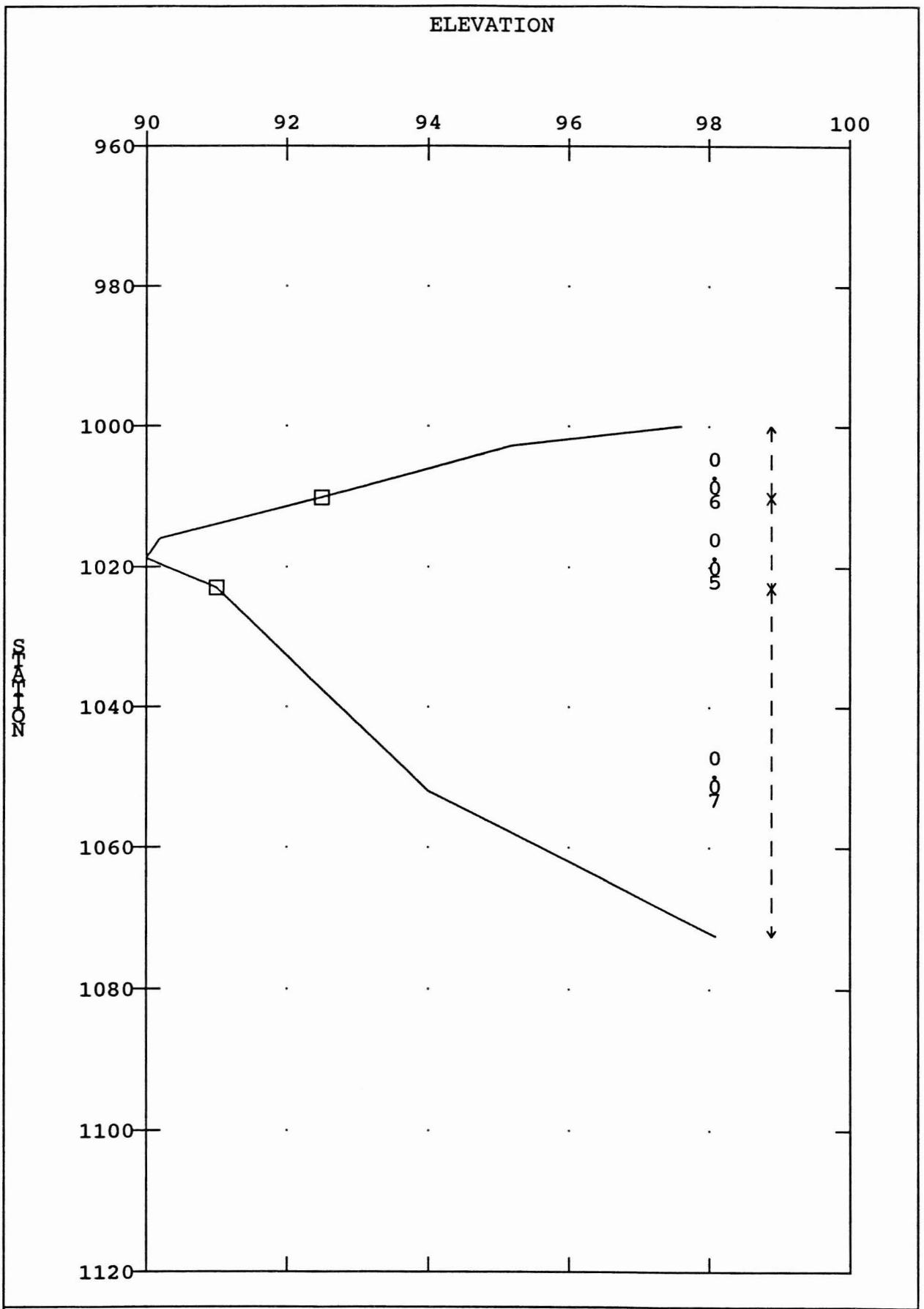

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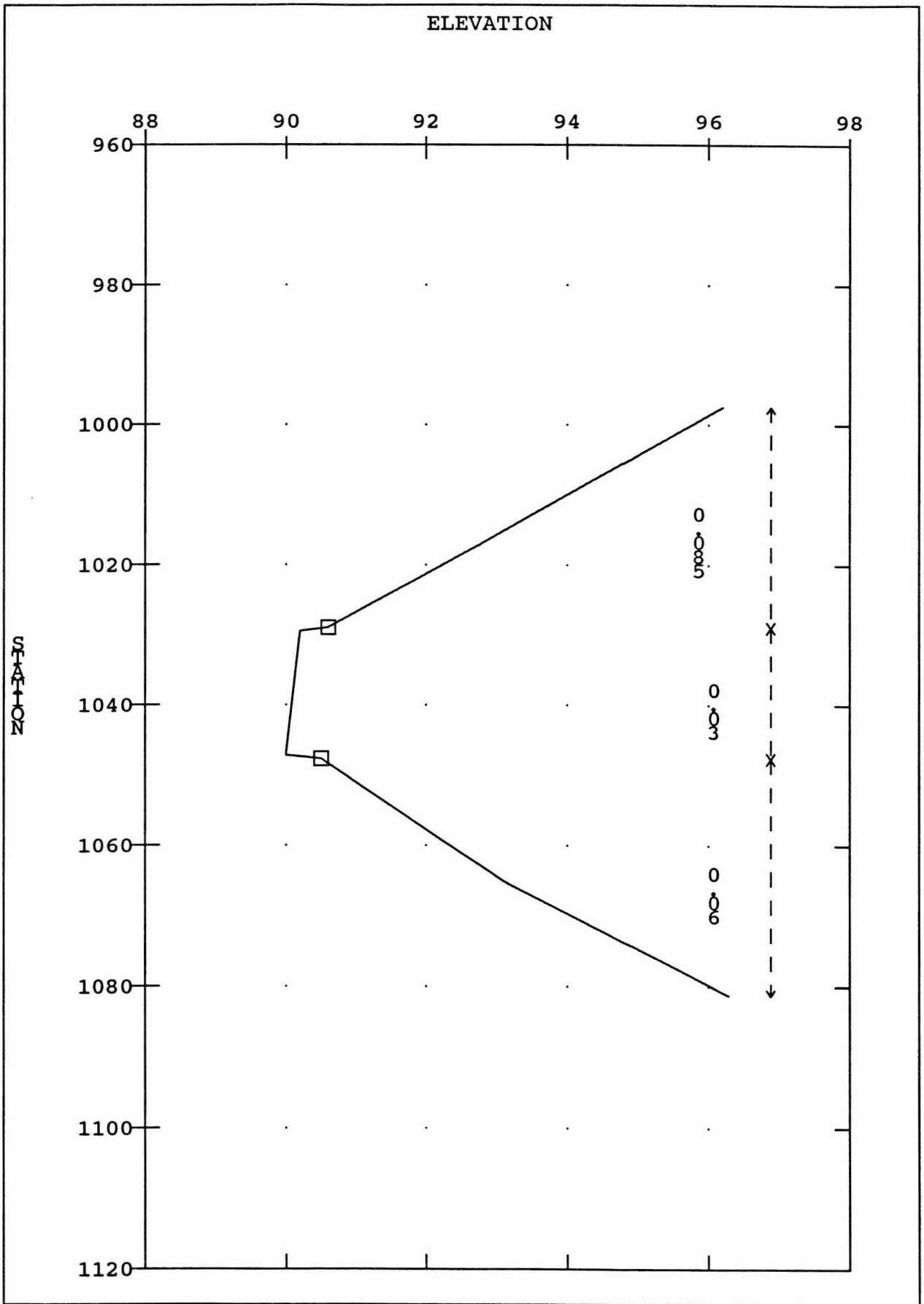

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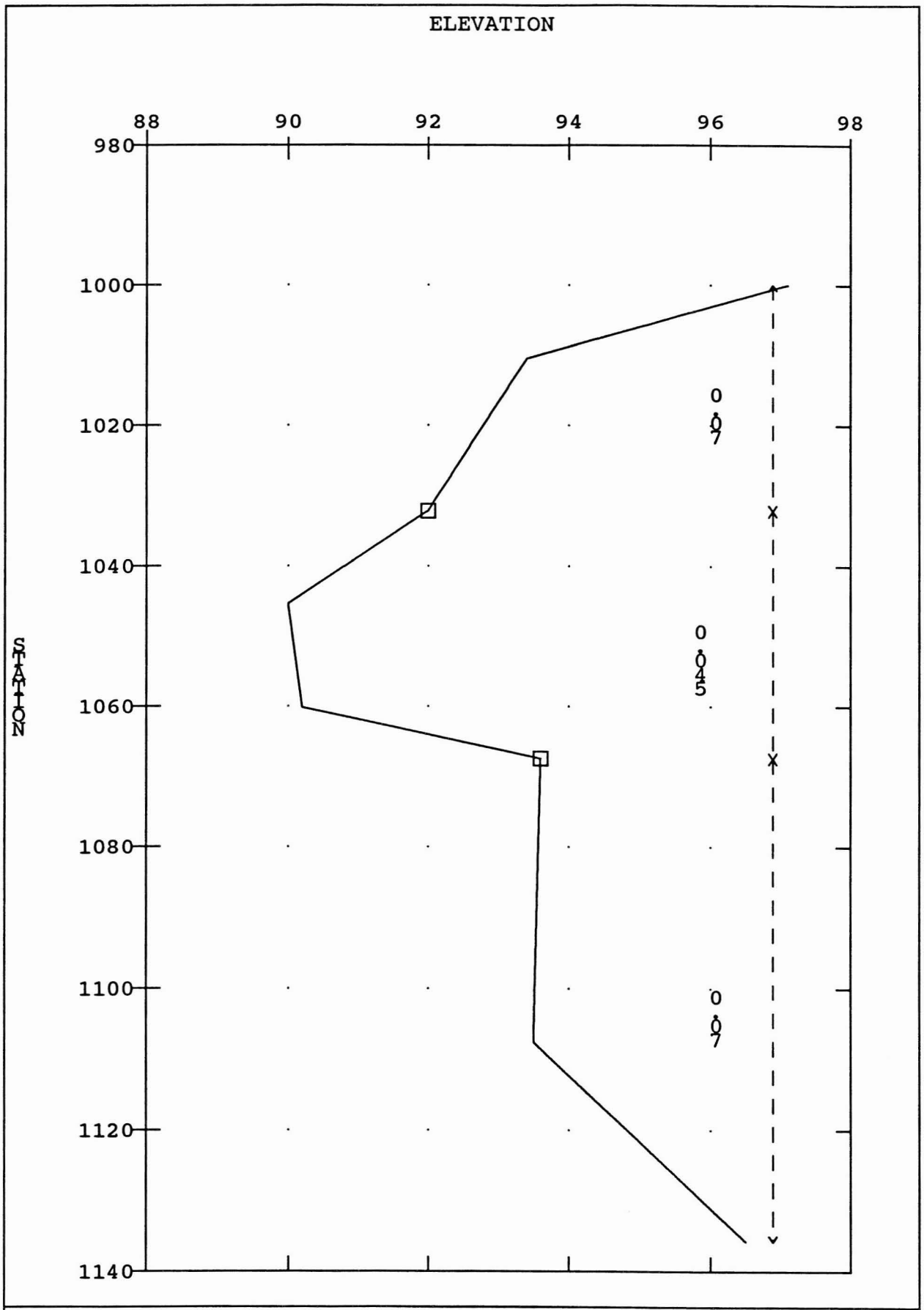

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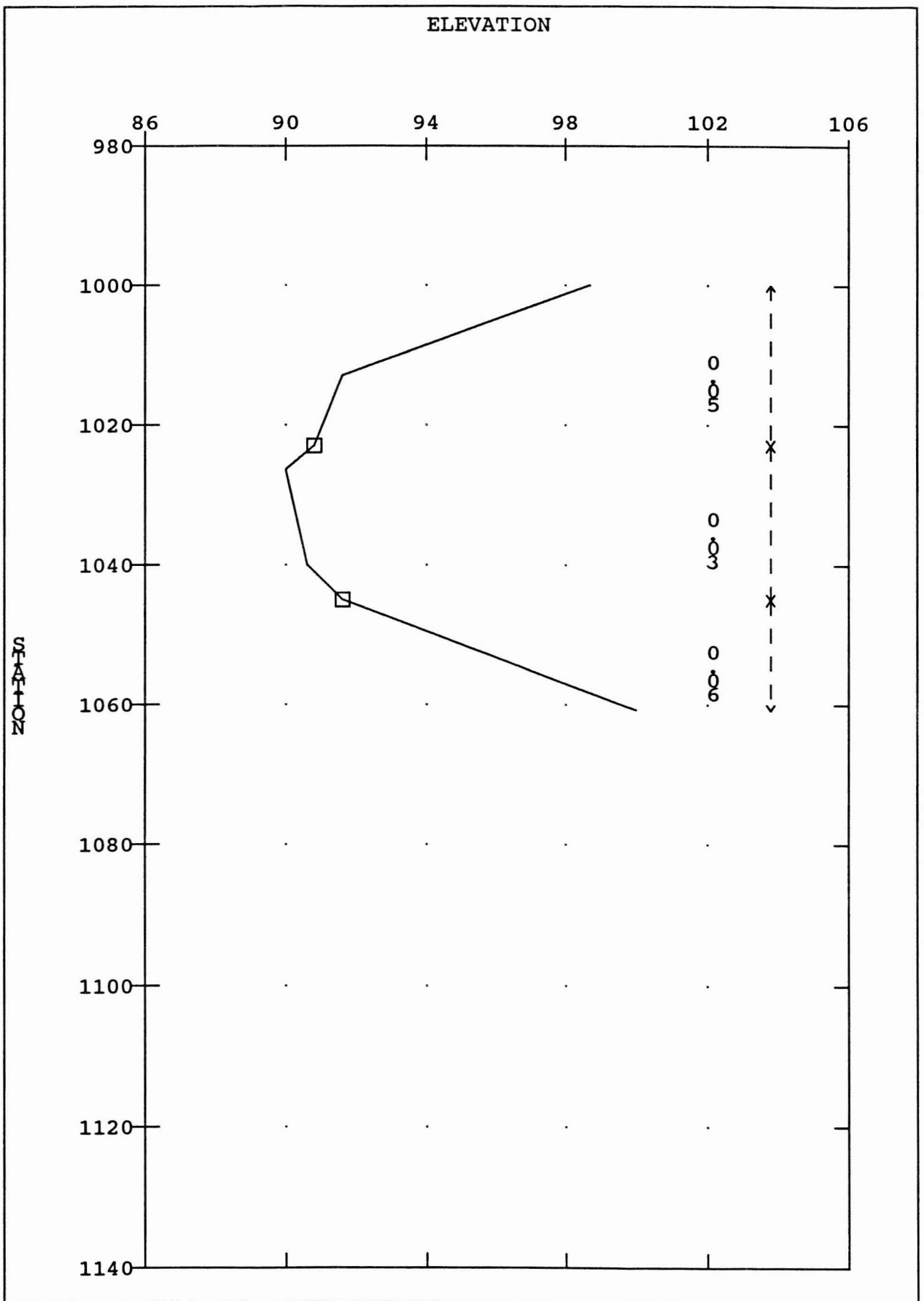

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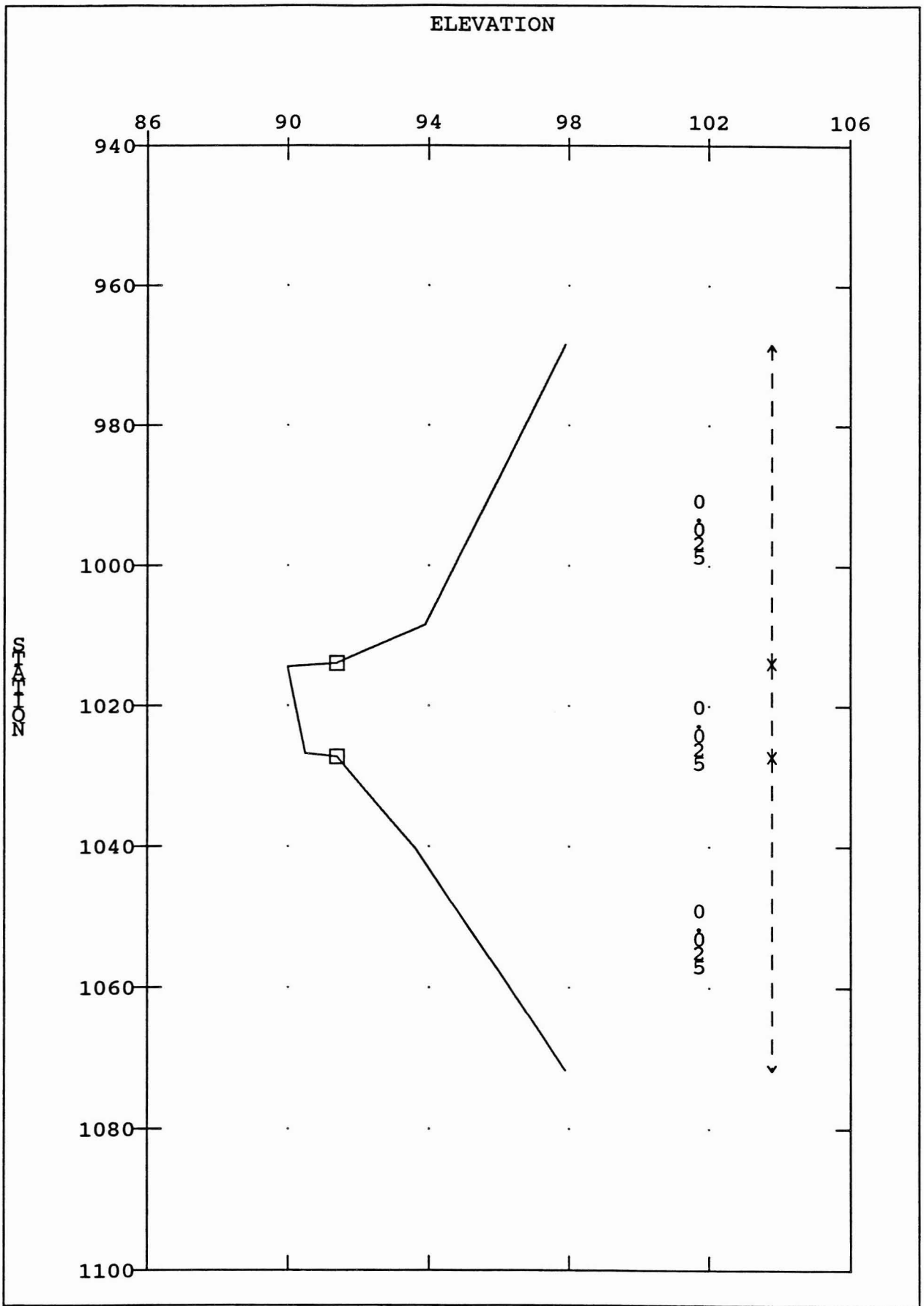

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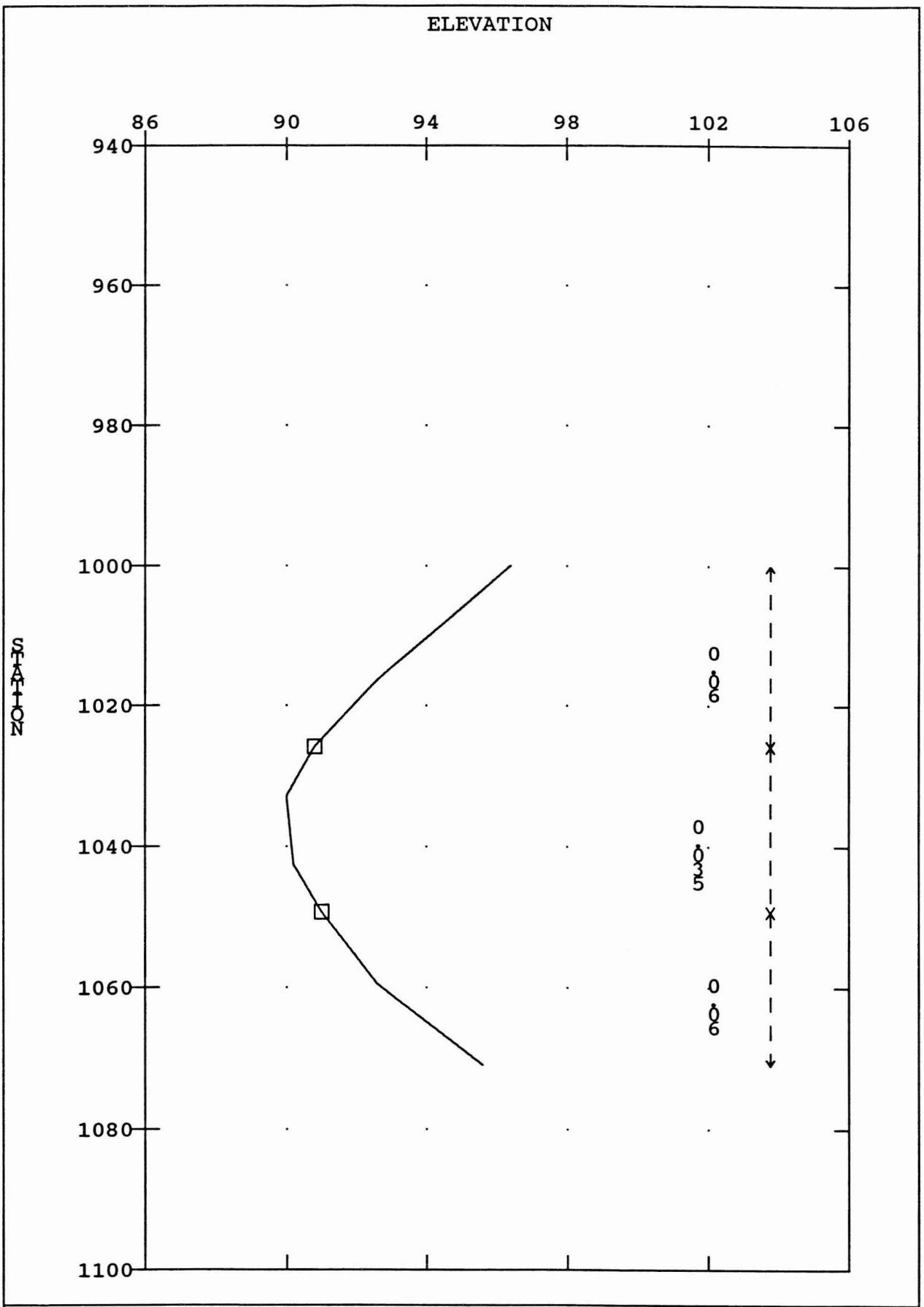

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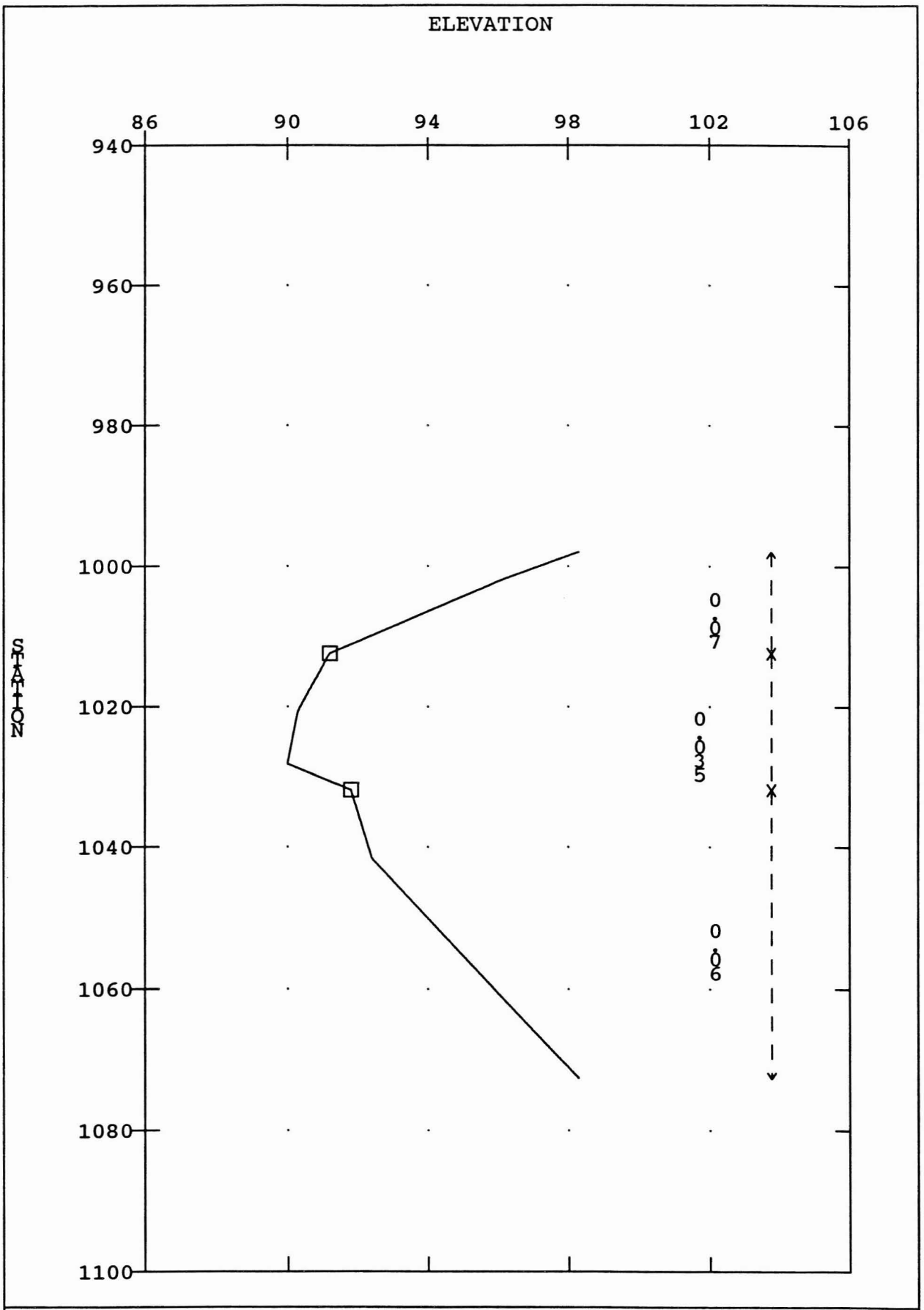

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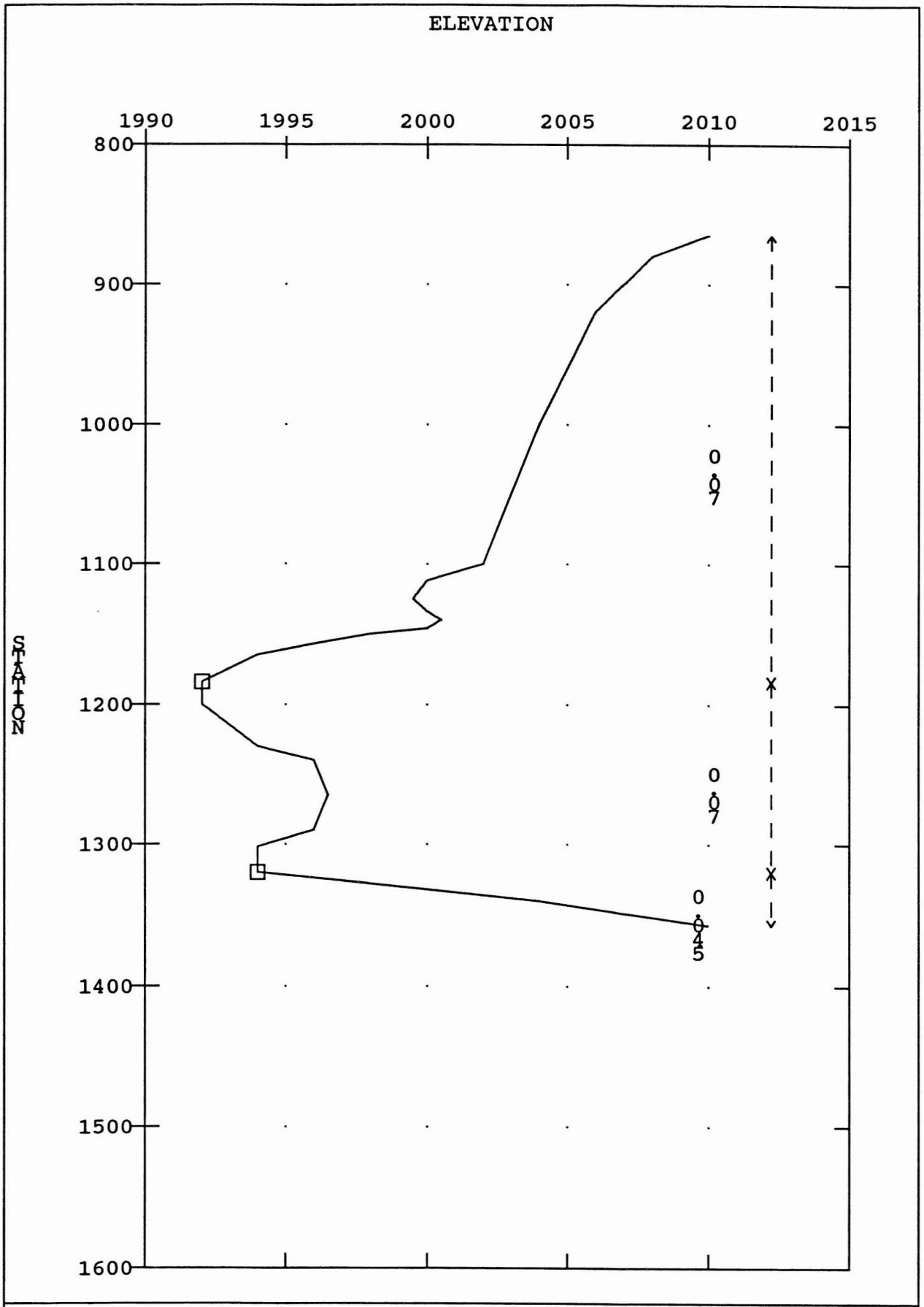
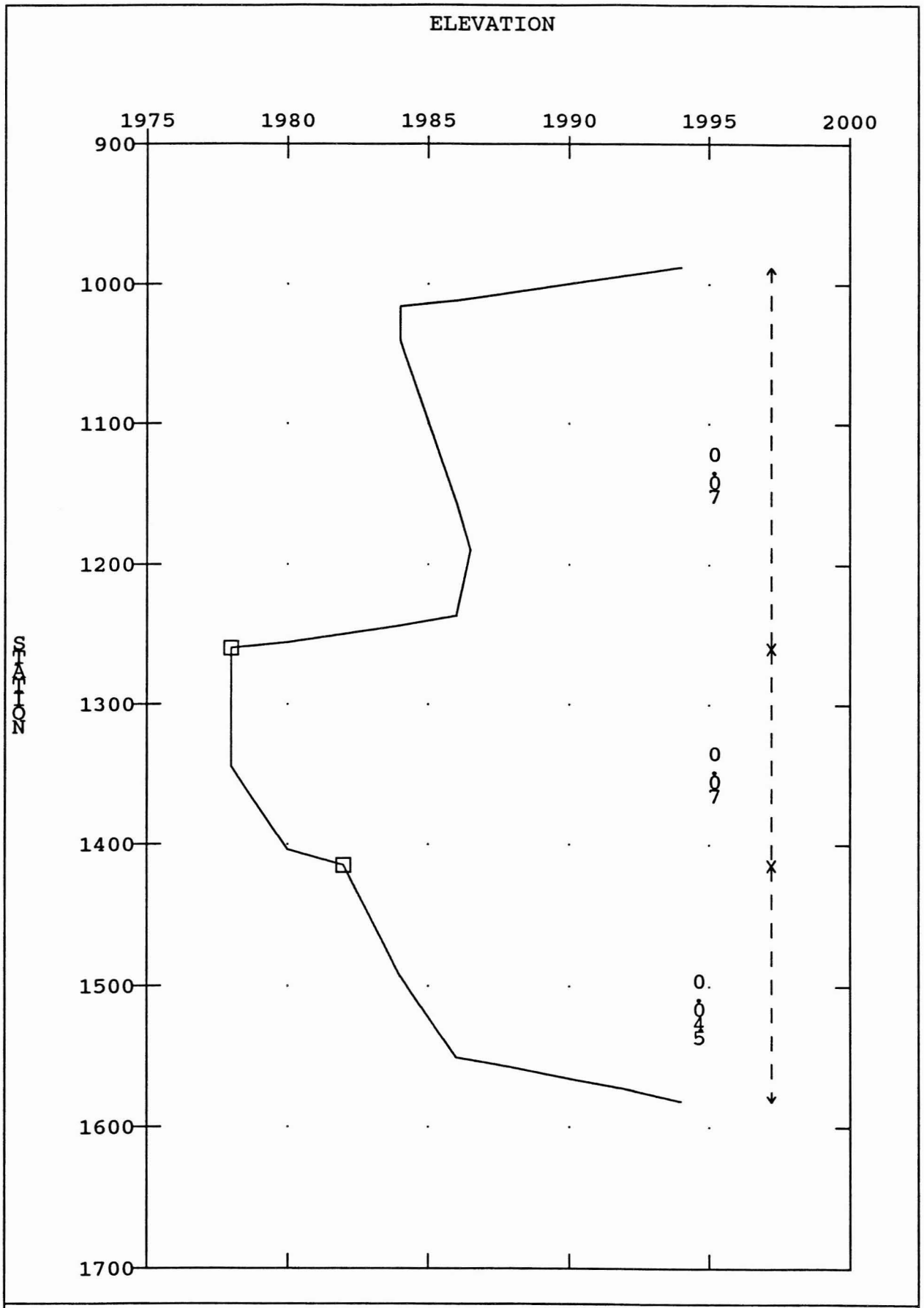
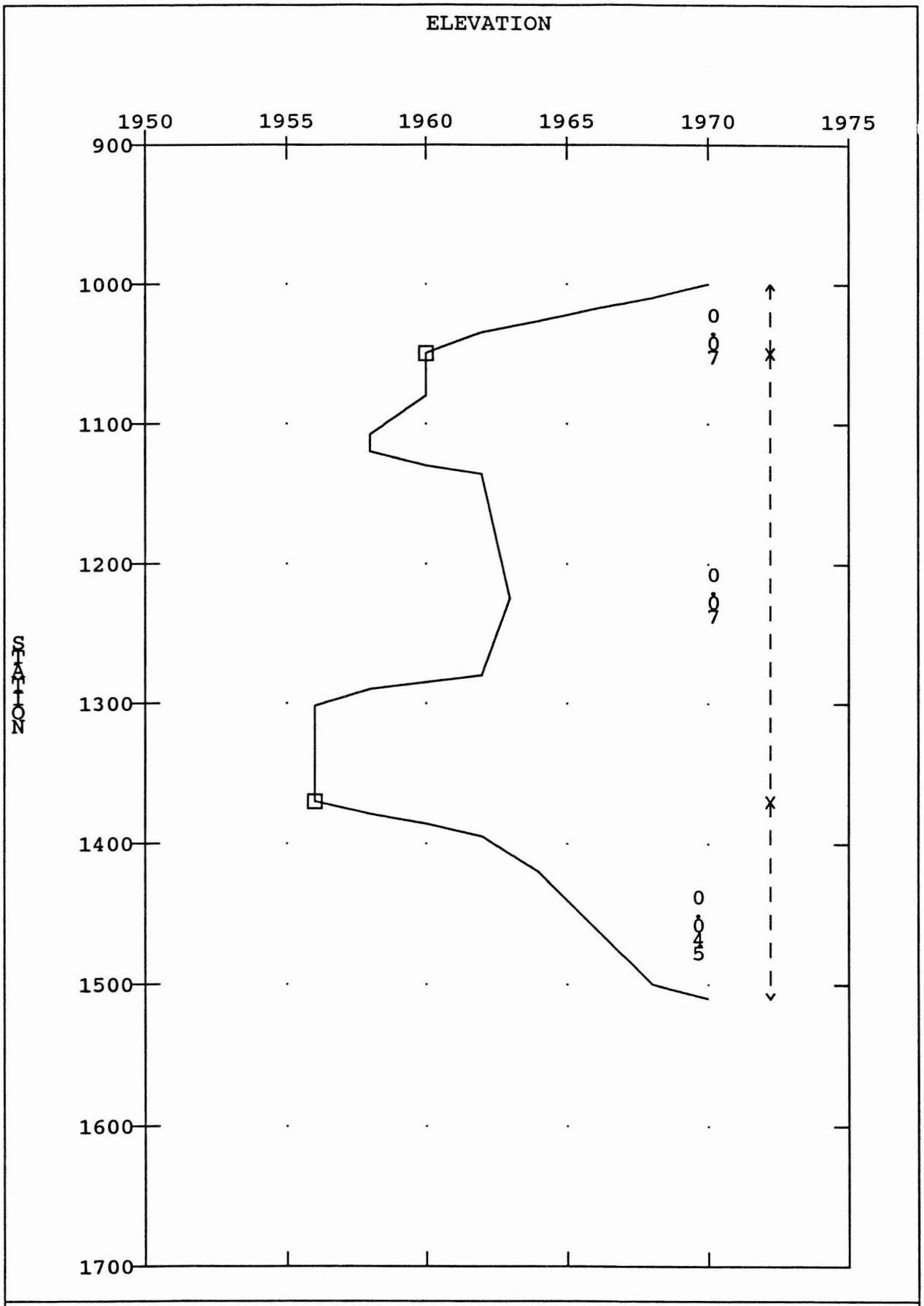


HEC-RAS SECTION : 8

REACH 390400



HEC-RAS SECTION : 7
REACH 390400



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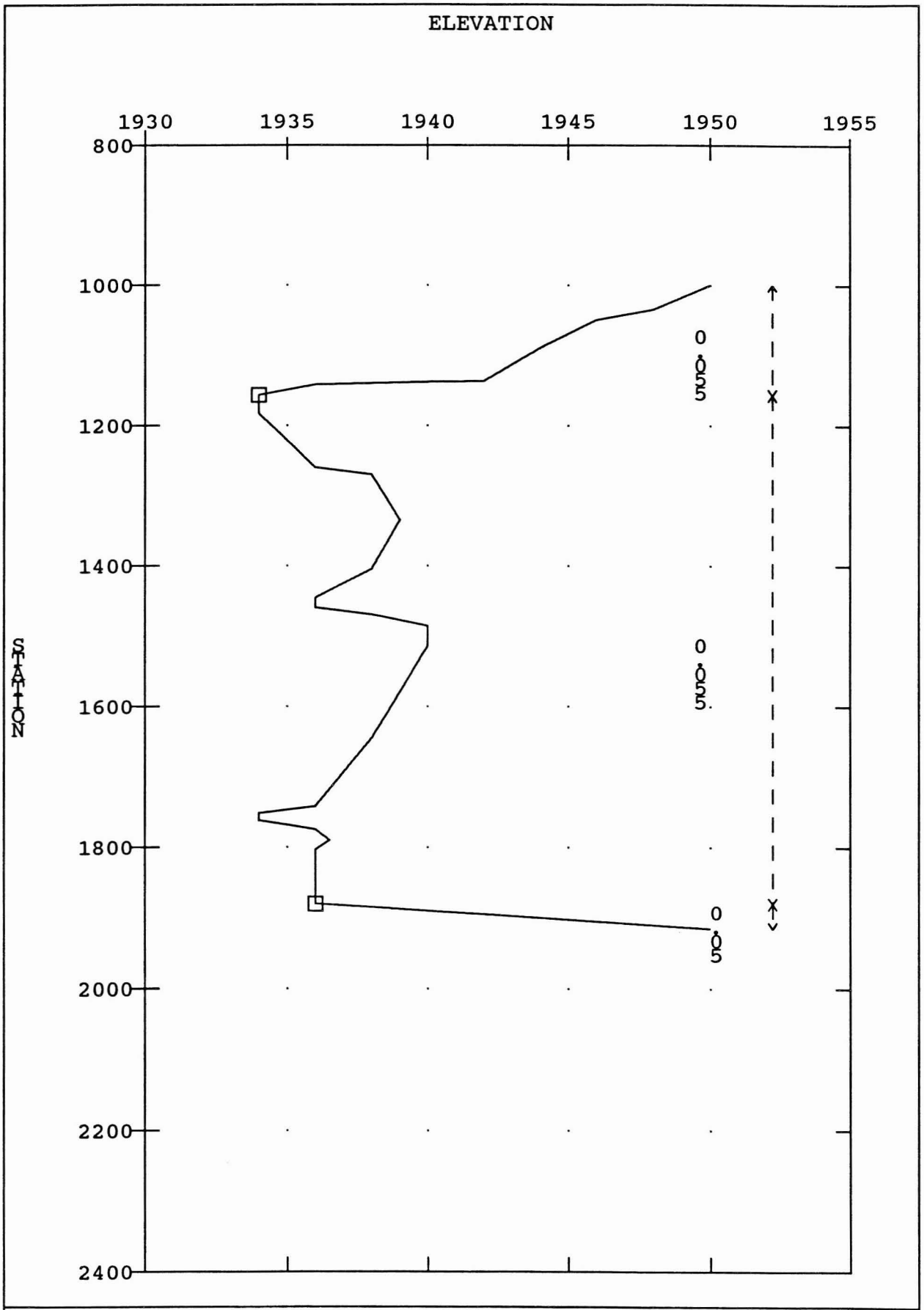

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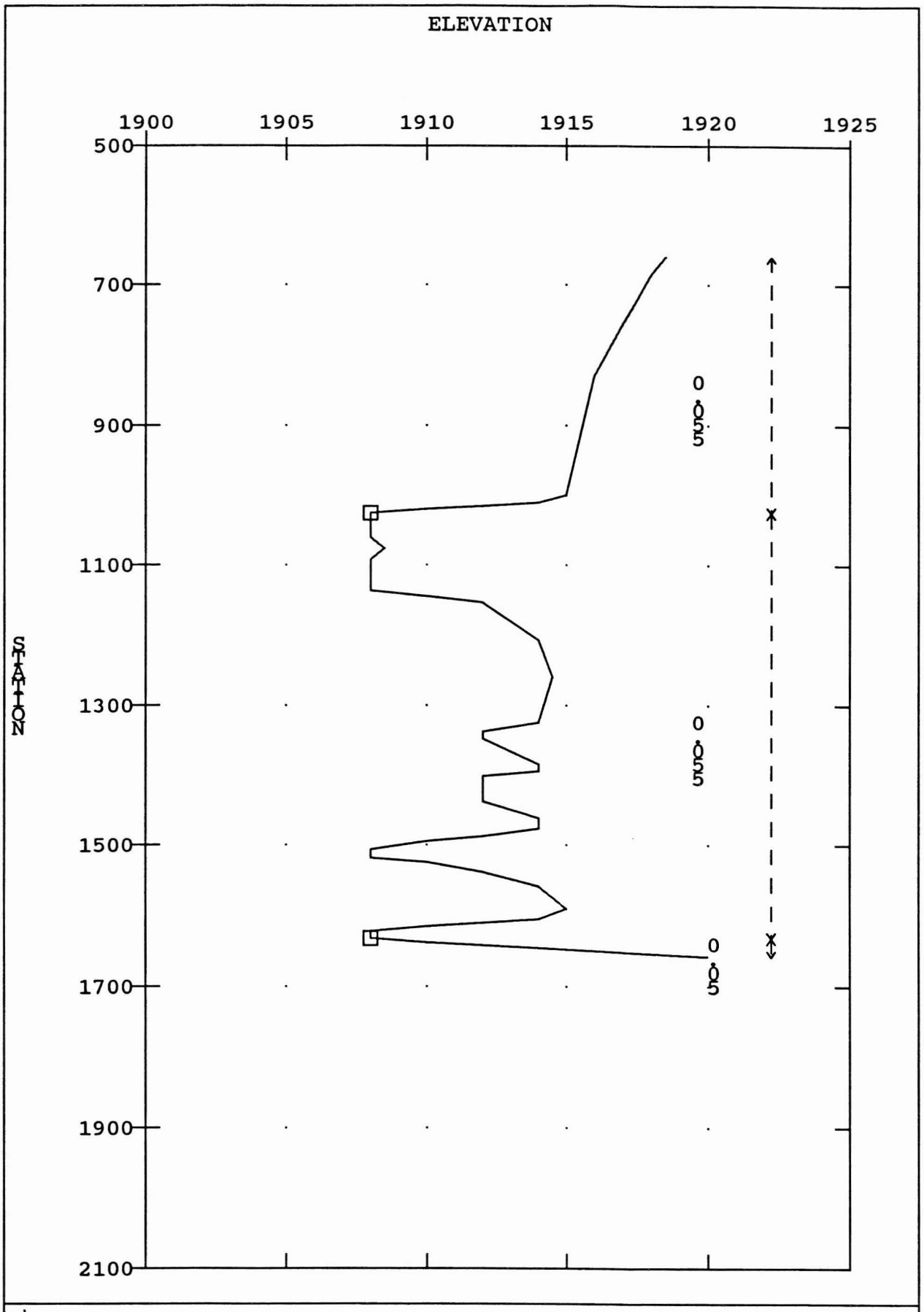
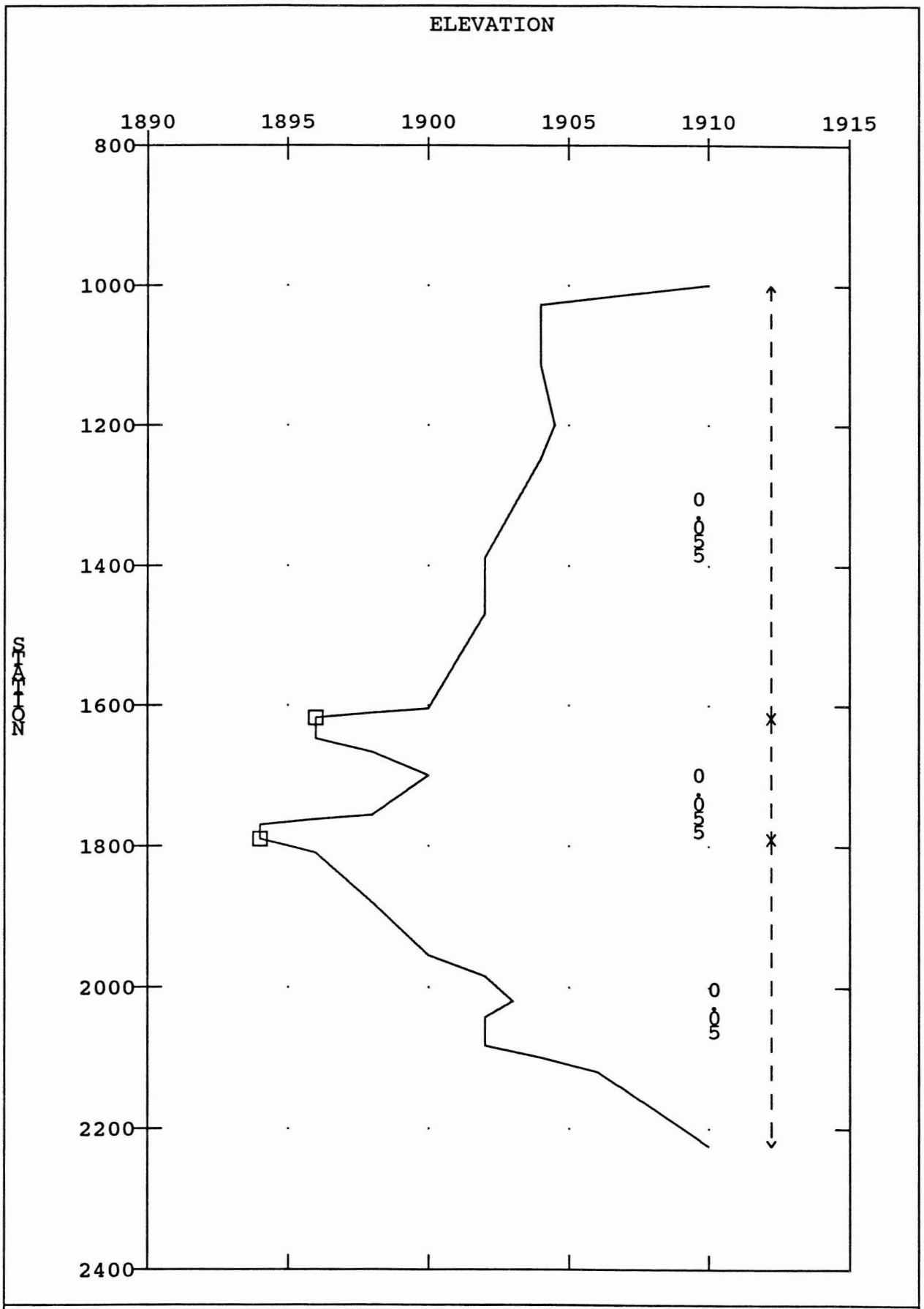


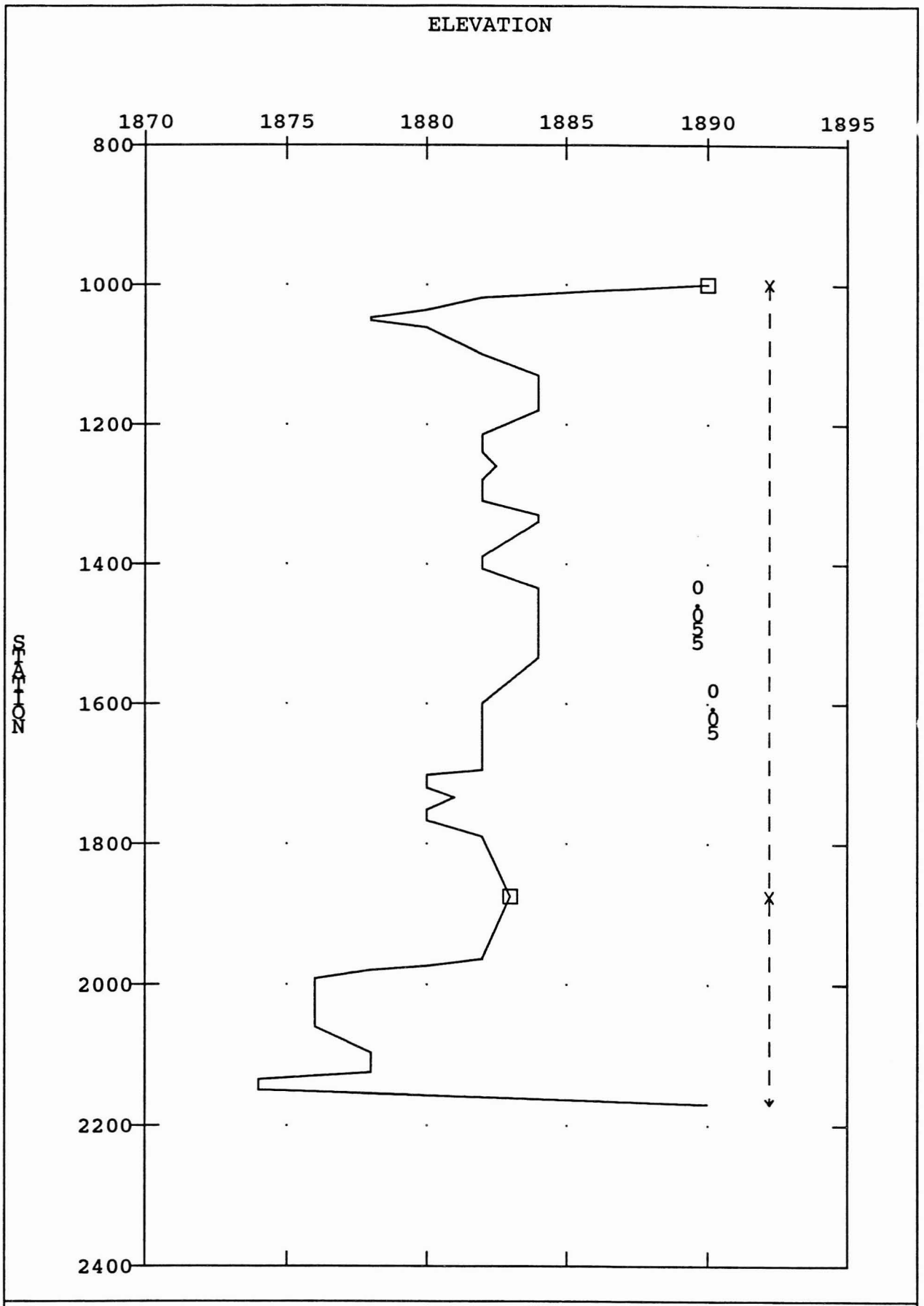
HEC-RAS SECTION : 4

REACH 390400 & 400410



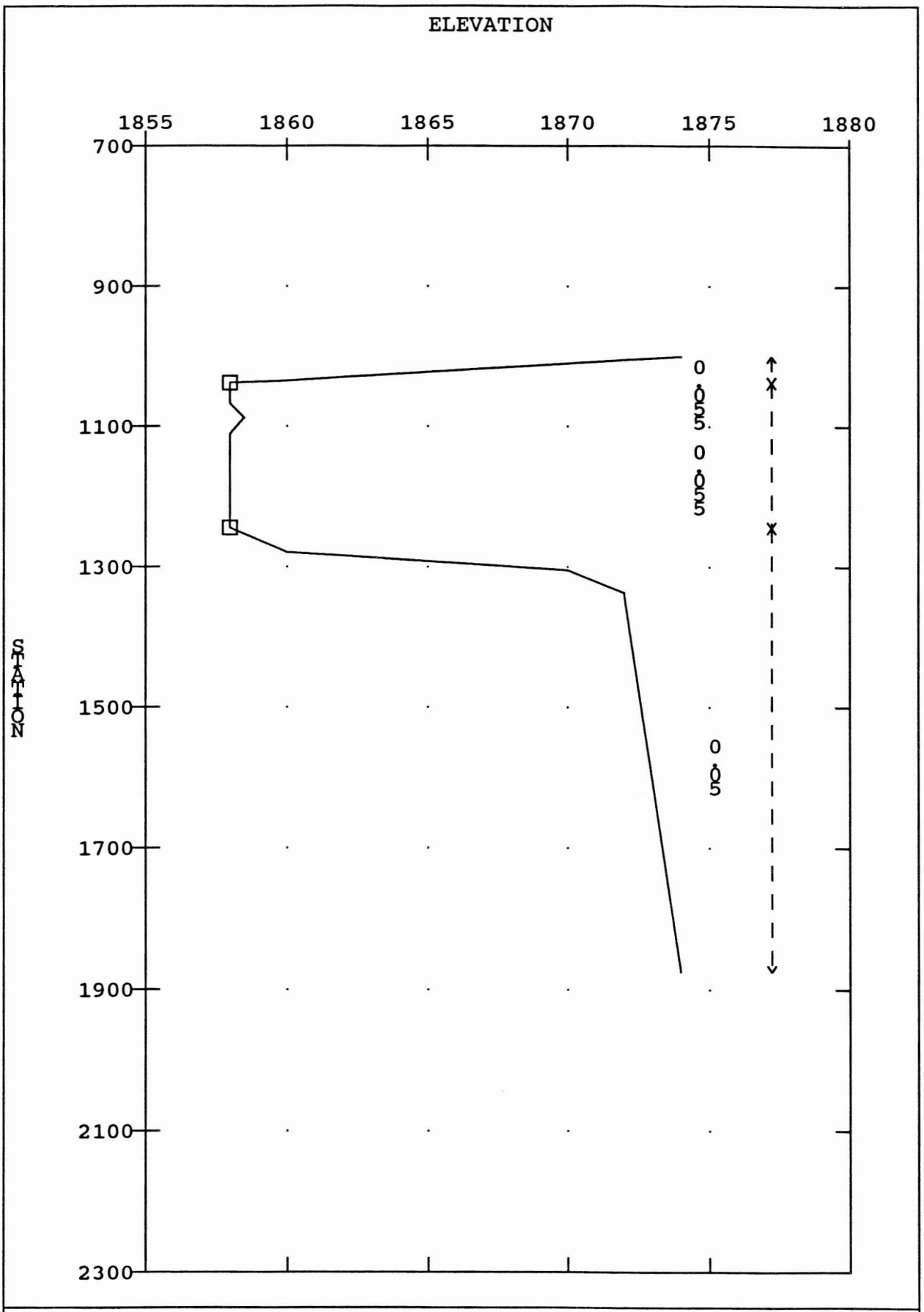
HEC-RAS SECTION : 3

REACH 400410



HEC-RAS SECTION : 2

REACH 400410



HEC-RAS SECTION : 1
REACH 400410

APPENDIX E

Indirect Method Calculations and Figures

TABLE E-1

USGS Gage Data for Representative Watersheds

Station No.	Station Name	Drainage Area	Mean Elevation	Main Channel Slope	Record Length	Q Max	Log Pearson Type III 100-year Discharge	
							Peak	Unit Peak
		sm	ft	ft/mi	years	cfs	cfs	cfs/sm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
09478500	Queen Creek at Whitlow Damsite near Superior	144.0	3,180	137.0	15	42,900	46,100	320
09480000	Santa Cruz River near Lochiel	82.2	5,150	42.2	40	12,000	11,200	136
09498870	Rye Creek near Gisela	122.0	4,390	91.4	20	44,400	35,400	290
09510150*	Sycamore Creek near Sunflower	52.3	4,260	58.6	13	16,100	42,700	816
09512300*	Cave Creek near Cave Creek	121.0	3,470	123.0	31	12,400	20,000	165
09513780*	New River near Rock Springs	67.3	3,970	140.0	27	18,600	34,600	514
09513800*	New River at New River	83.3	3,600	105.0	21	19,500	37,500	450
09513860*	Skunk Creek near Phoenix	64.6	2,180	49.2	29	11,500	31,000	480
09516800	Jackrabbit Wash near Tonopah	137.0	2,260	34.4	15	6,840	32,900	240
09510180	Rock Creek near Sunflower	15.2	3,680	412.0	9	1,900	5,790	381
09512200	Salt River Tributary in South Mtn. Park	1.8	1,730	244.0	28	670	3,220	1,789
09513820	Deadman Wash near New River	11.1	1,980	124.0	19	1,630	6,070	547
09516600	Ox Wash near Morristown	6.3	2,290	101.0	16	2,900	5,330	846

* - Denotes hydrologically similar watersheds.

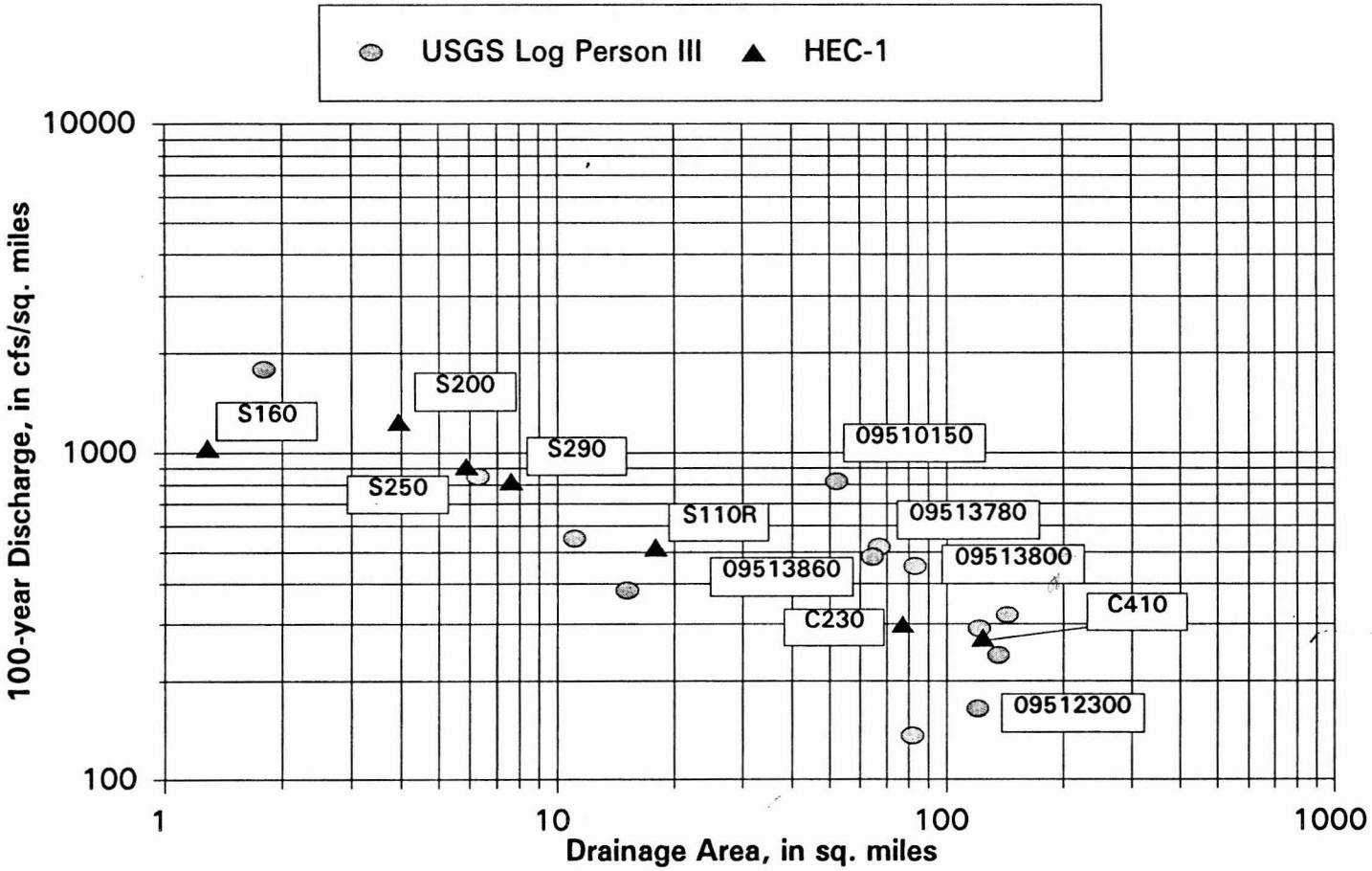
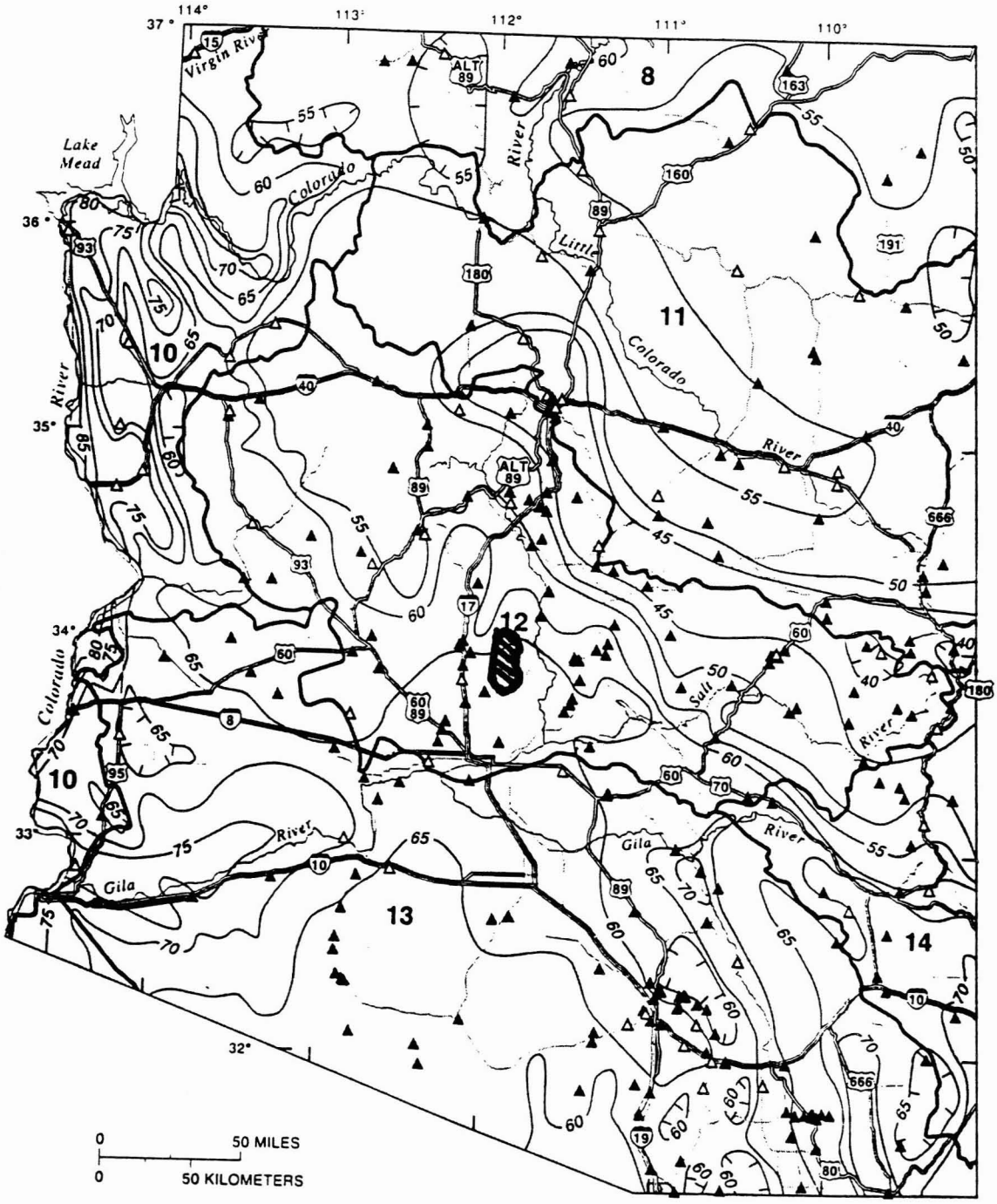


FIGURE E-1
HEC-1 model results comparison with USGS gage Data



EXPLANATION

BOUNDARY OF FLOOD REGIONS

11 FLOOD-REGION NUMBER

10 INTERSTATE HIGHWAY

89 U.S. HIGHWAY

STATE HIGHWAY

60 LINE OF EQUAL FREE WATER-SURFACE EVAPORATION—Interval 5 inches (Farnsworth and others, 1982)

STREAMFLOW-GAGING STATION

▲ Station relation defined

△ Station relation undefined

FIGURE E-2

Map of USGS Flood Regions for Arizona

TABLE E-2

Selected HEC-1 Model Results for Indirect Method Verifications

HEC-1 ID	Drainage Area sm	Mean Elevation feet	100-year HEC-1 Model Results: Peak Discharge cfs	100-year HEC-1 Model Results: Unit Peak Discharge cfs/sm
(1)	(2)	(3)	(4)	(5)
S110R	17.93	3,600	9,212	514
S160	1.29	4,100	1,334	1,034
S200	3.95	3,000	4,911	1,243
C230	77.46	3,000	23,235	300
S250	5.89	2,400	5,379	913
S290	7.64	2,700	6,269	820
C410	124.38	2,800	33,771	272

TABLE E-3

Comparison of modeled results with USGS regional regression equation

HEC-1 ID	Drainage Area sq. mile	Mean Elevation feet	100-year Discharge: USGS cfs	100-year Discharge: HEC-1 model cfs	USGS Standard Error Range: Low cfs	USGS Standard Error Range: High cfs
(1)	(2)	(3)	(4)	(5)	(6)	(7)
S110R	17.93	3,600	9,768	9,212	5,958	13,578
S160	1.29	4,100	1,546	1,334	943	2,149
S200	3.95	3,000	4,054	4,911	2,473	5,635
C230	77.46	3,000	23,380	23,235	14,262	32,498
S250	5.89	2,400	5,877	5,379	3,585	8,169
S290	7.64	2,700	6,599	6,269	4,025	9,173
C410	124.38	2,800	30,351	33,771	18,514	42,188

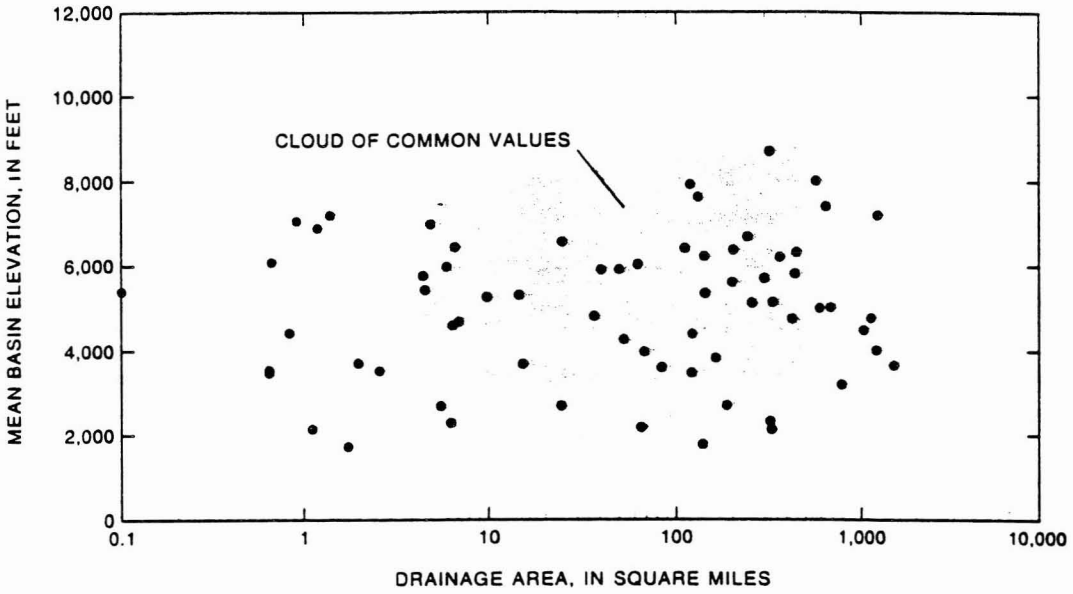


Figure 40. Joint distribution of mean basin elevation and drainage area for gaged sites in the Central Arizona Region 12.

FIGURE E-3

Region 12 scatter diagram of USGS gaged sites

TABLE E-4

Region 12 regression equations for estimation of peak discharge

Table 16. Generalized least-squares regression equations for estimating regional flood-frequency relations for the Central Arizona Region 12

Equation: Q, peak discharge, in cubic feet per second; AREA, drainage area, in square miles; and ELEV, mean basin elevation, in feet. Data were based on 68 stations. Average number of years of systematic record is 21.

Recurrence interval, in years	Equation	Average standard error of prediction, in percent	Equivalent years of record
2	$Q=41.1\text{AREA}^{0.629}$	105	0.23
5	$Q=238\text{AREA}^{0.687}(\text{ELEV}/1{,}000)^{-0.358}$	68	1.90
10	$Q=479\text{AREA}^{0.661}(\text{ELEV}/1{,}000)^{-0.398}$	52	6.24
25	$Q=942\text{AREA}^{0.630}(\text{ELEV}/1{,}000)^{-0.383}$	40	17.8
50	$Q=10^{(7.36-4.17\text{AREA}^{-0.08})}(\text{ELEV}/1000)^{-0.440}$	37	27.5
100	$Q=10^{(6.55-3.17\text{AREA}^{-0.11})}(\text{ELEV}/1{,}000)^{-0.454}$	39	32.1

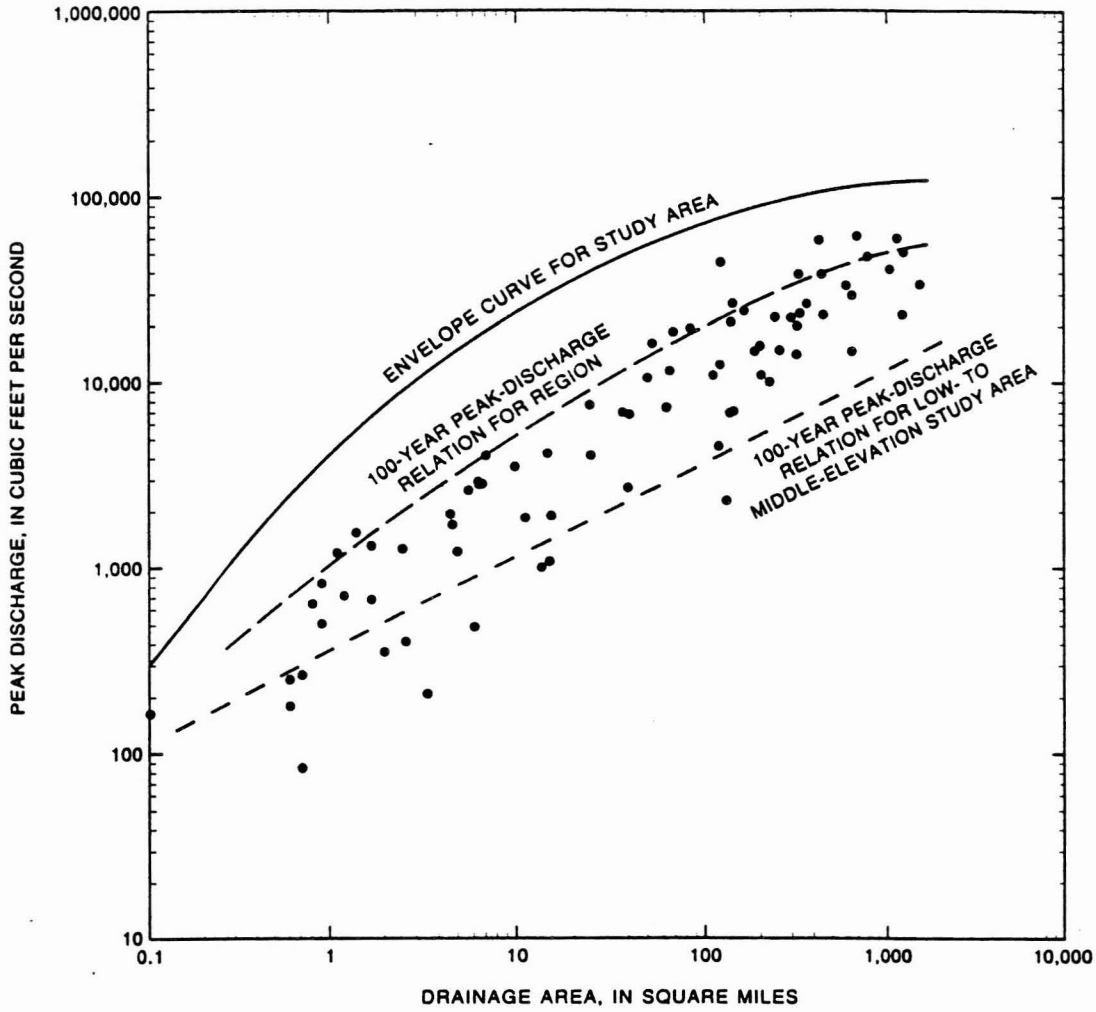
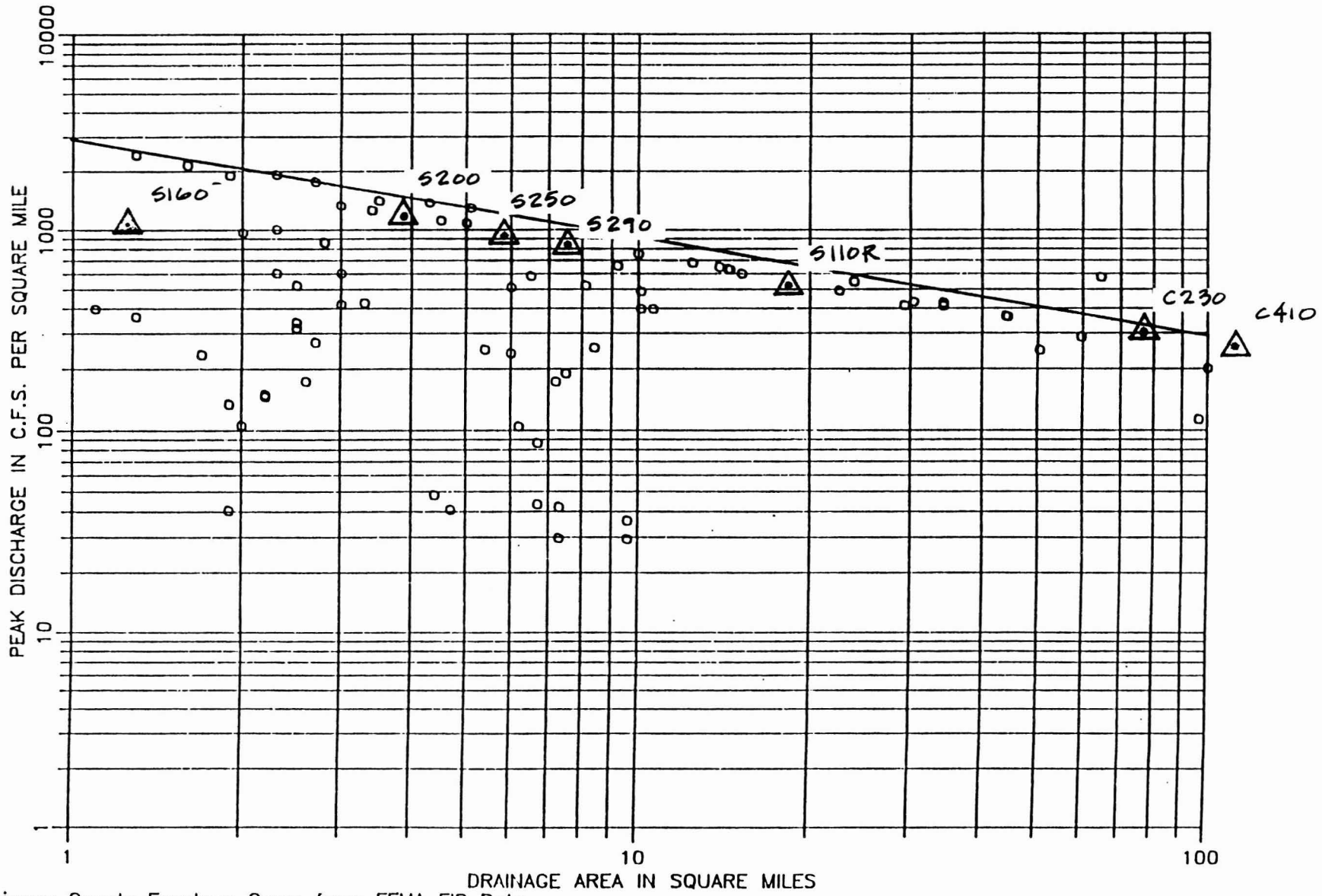


FIGURE E-4

Region 12 regression equation envelope curve and data plot



Maricopa County Envelope Curve from FEMA FIS Data
SSA 2-91 ADWR

FIGURE E-5
Envelope Curve of Maricopa County FEMA FIS Data

APPENDIX F

Reach Route Hydrograph Plots

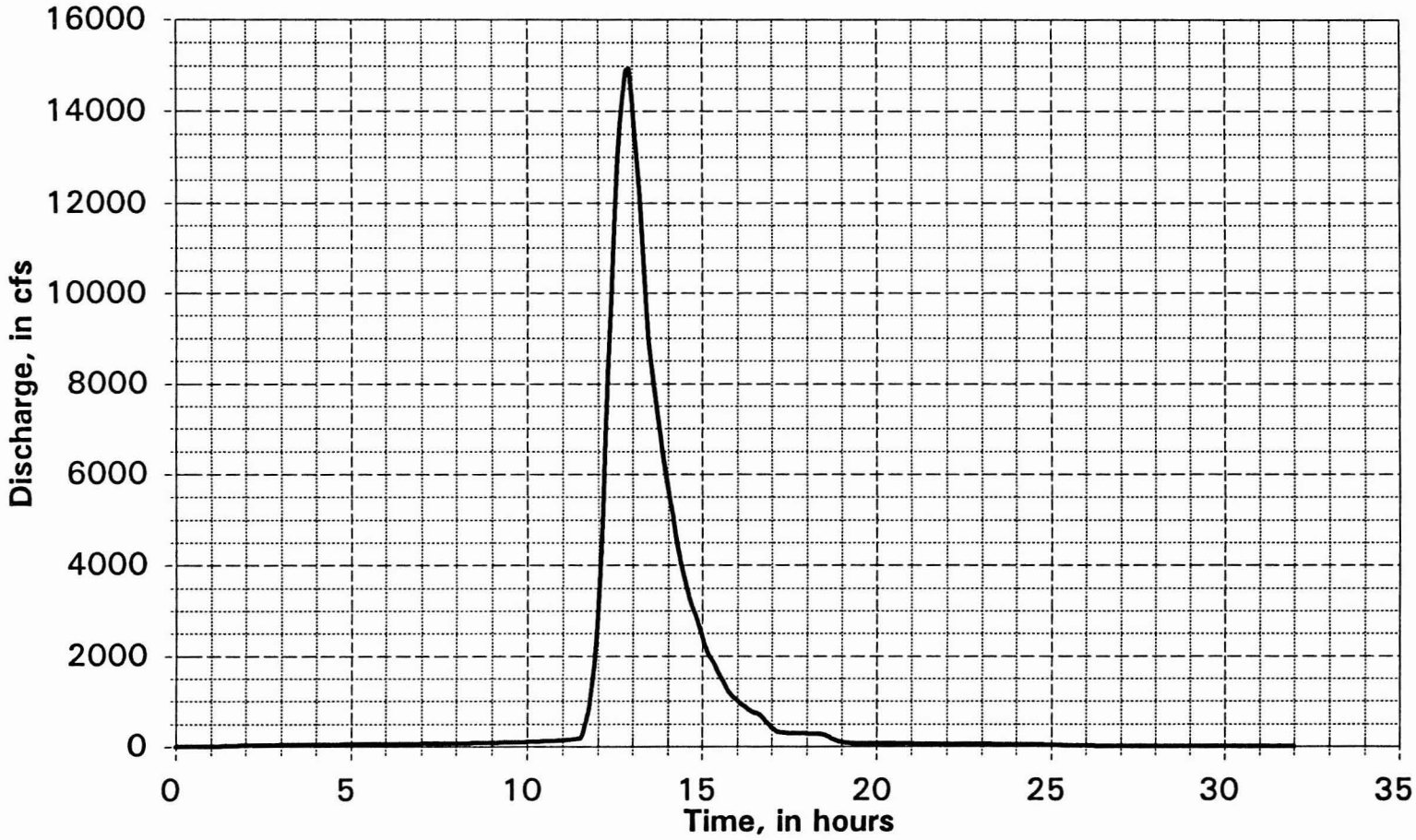


Figure 1
Hydrograph at HEC-1 ID 110120

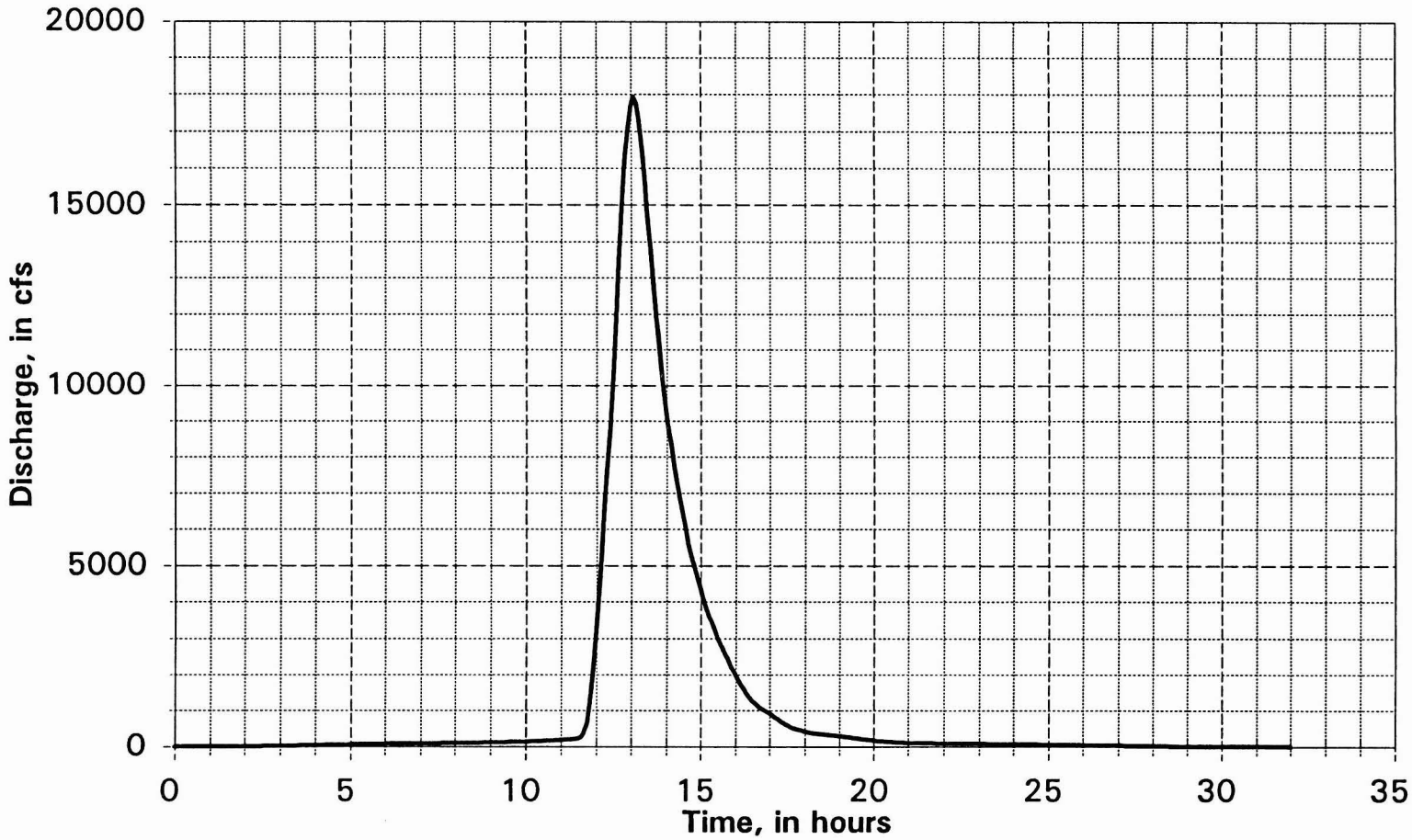


Figure 2
Hydrograph at HEC-1 ID 150160

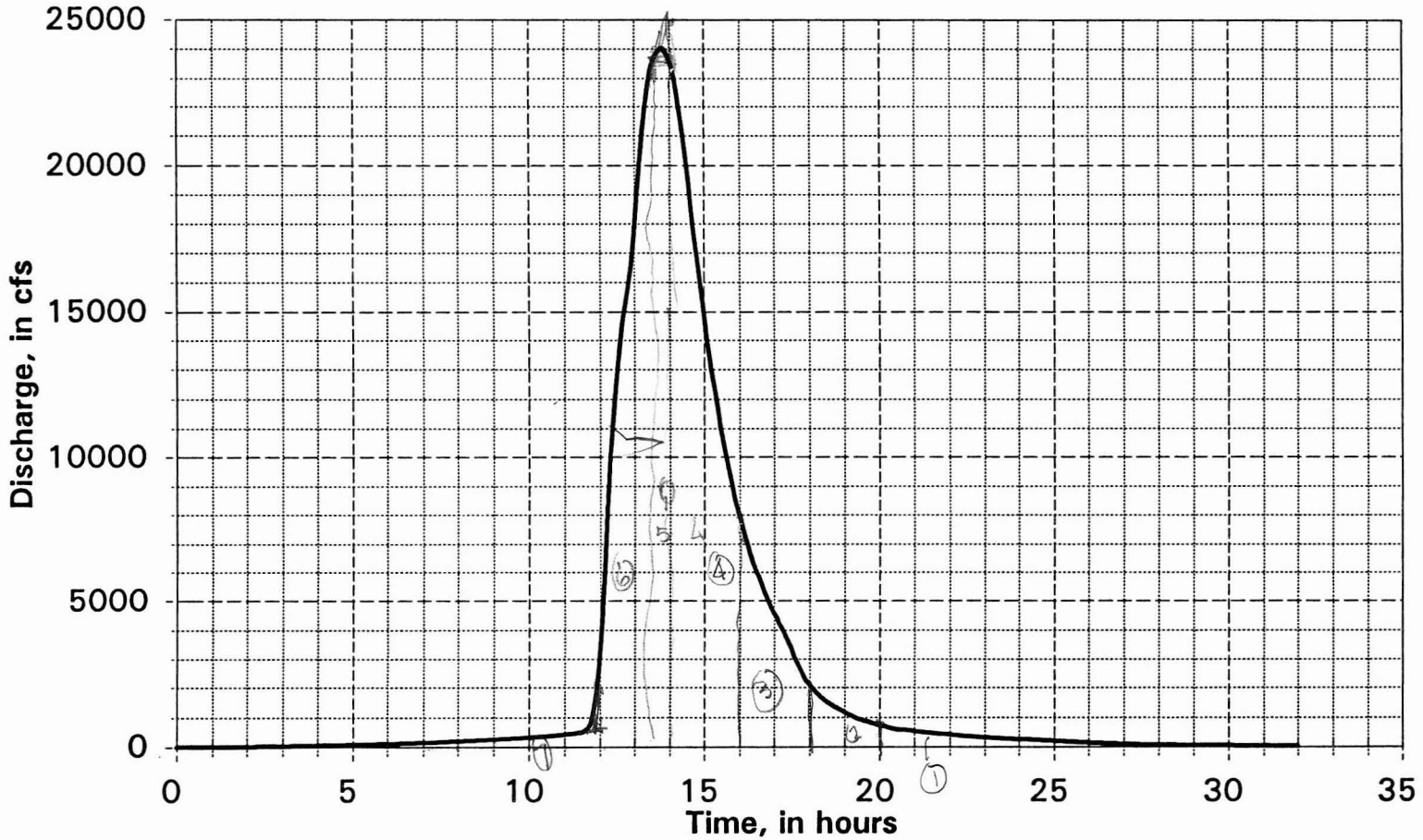


Figure 3
Hydrograph at HEC-1 ID 250260

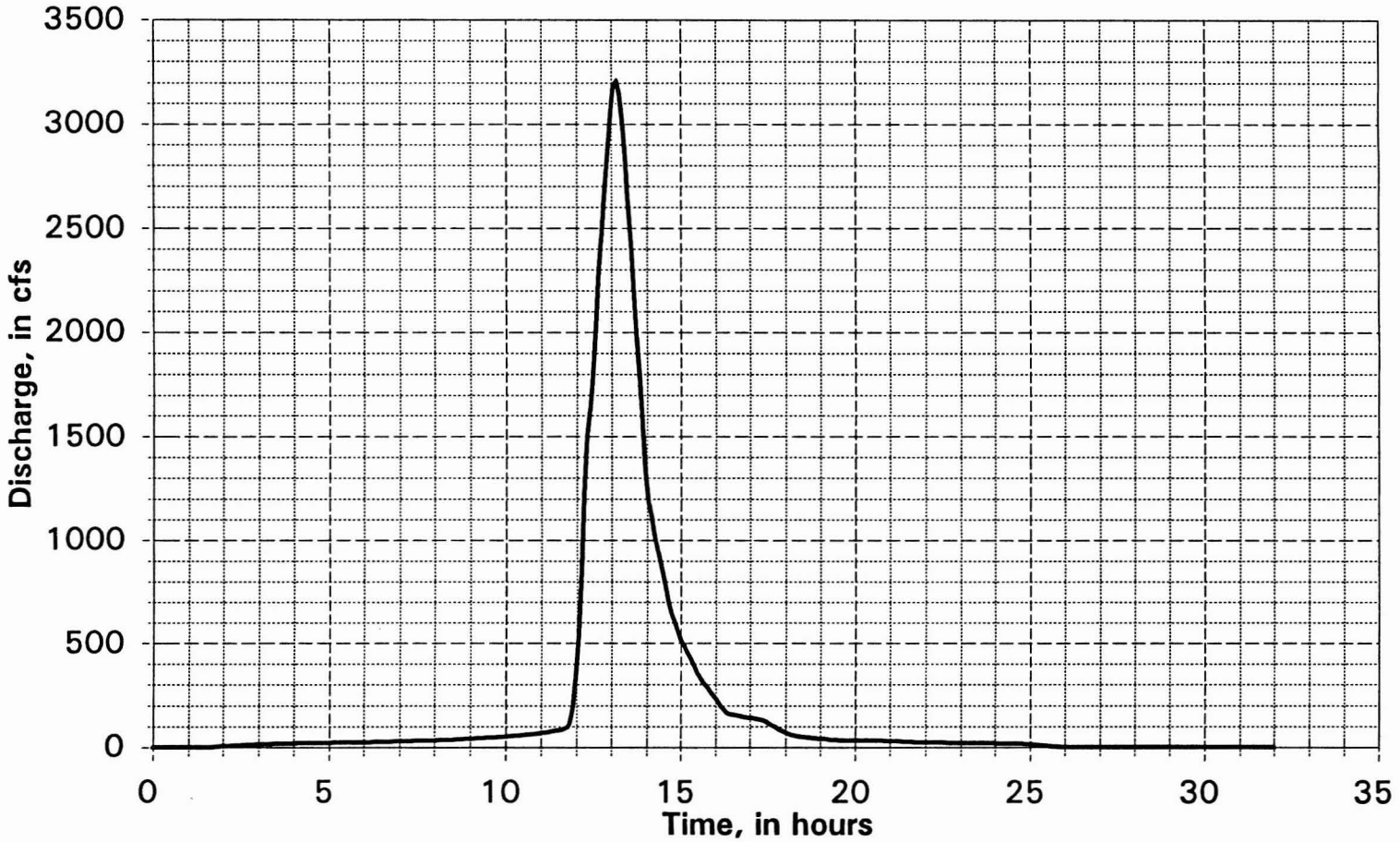


Figure 4
Hydrograph at HEC-1 ID 270300

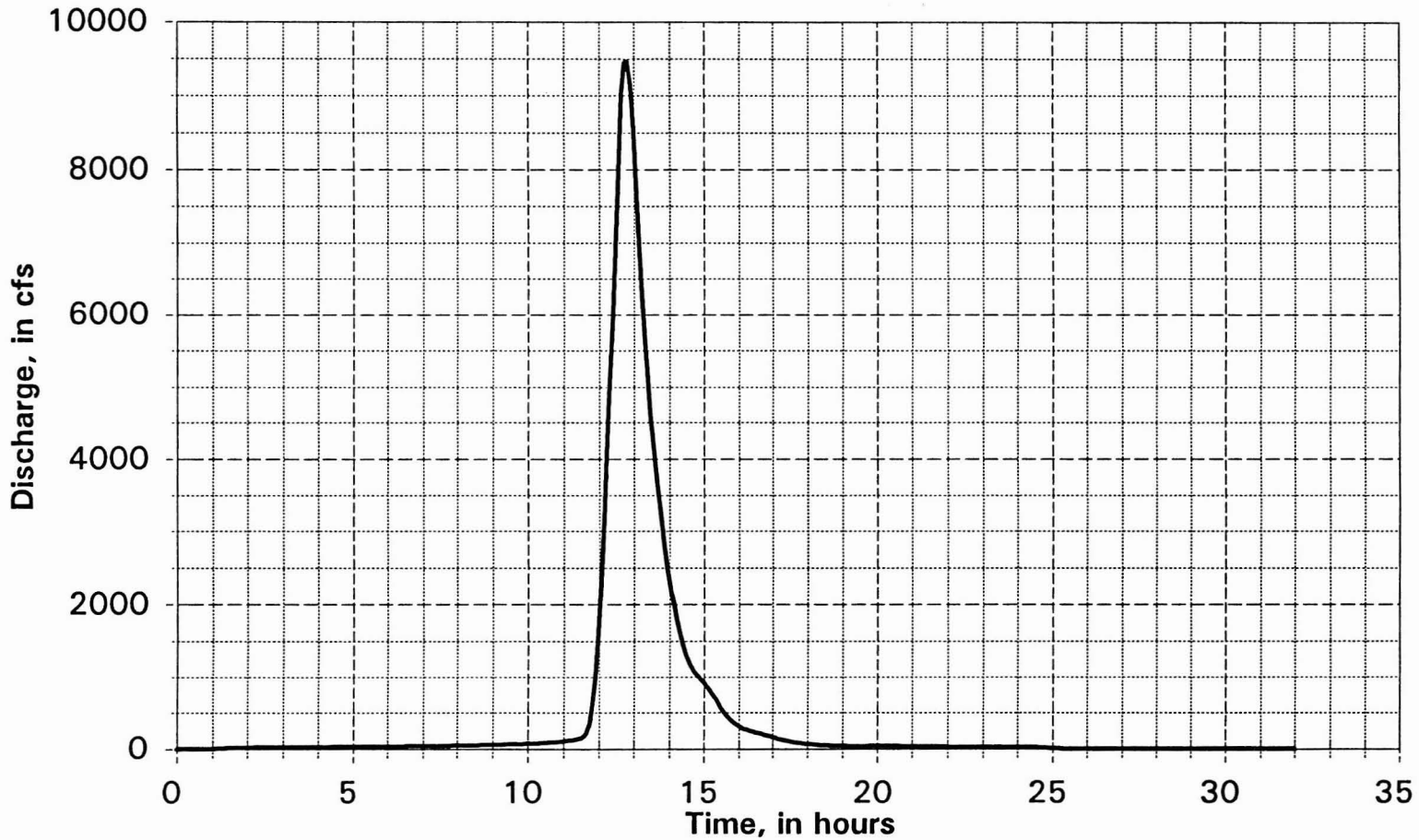


Figure 5
Hydrograph at HEC-1 ID 295300

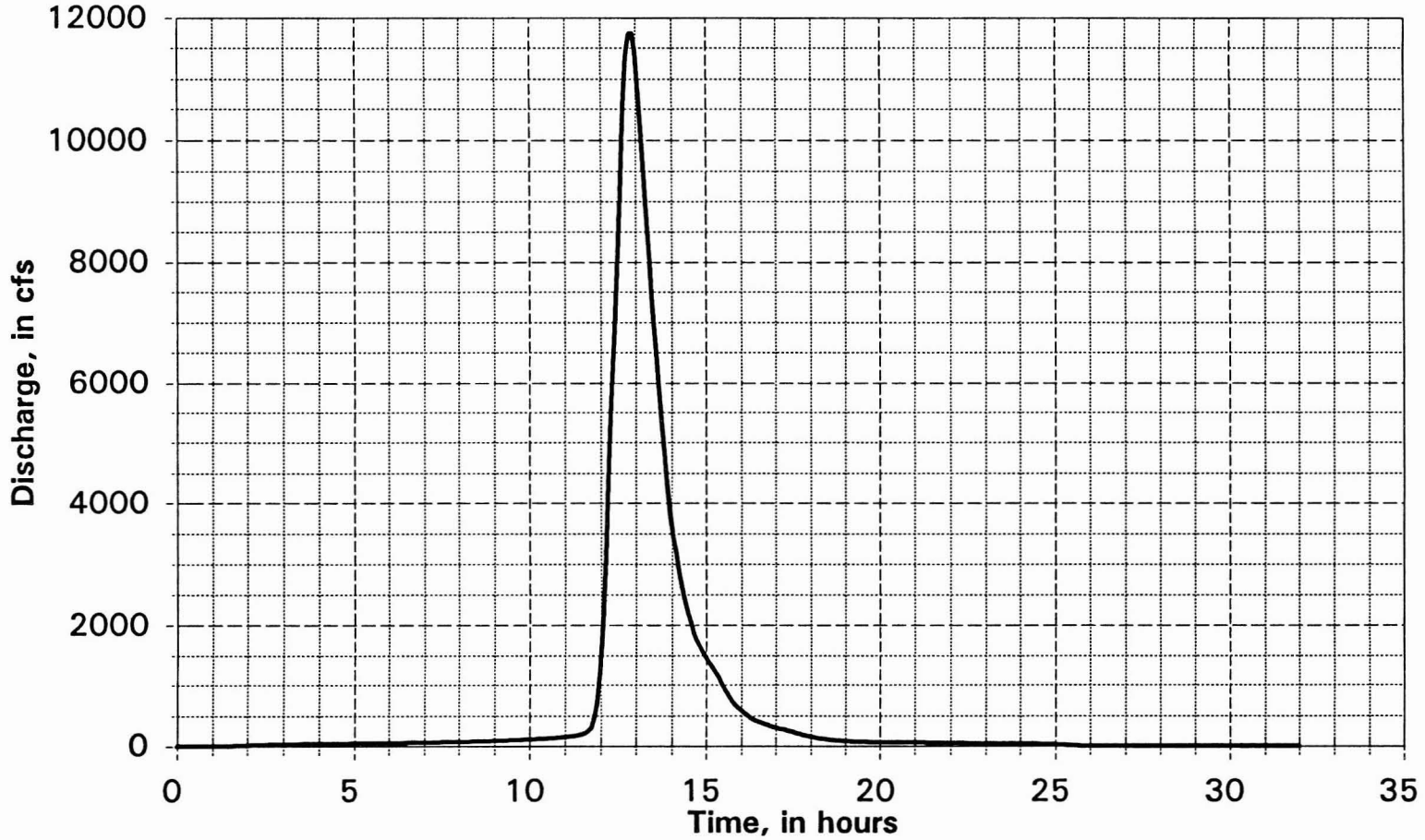


Figure 6
Hydrograph at HEC-1 ID 300310

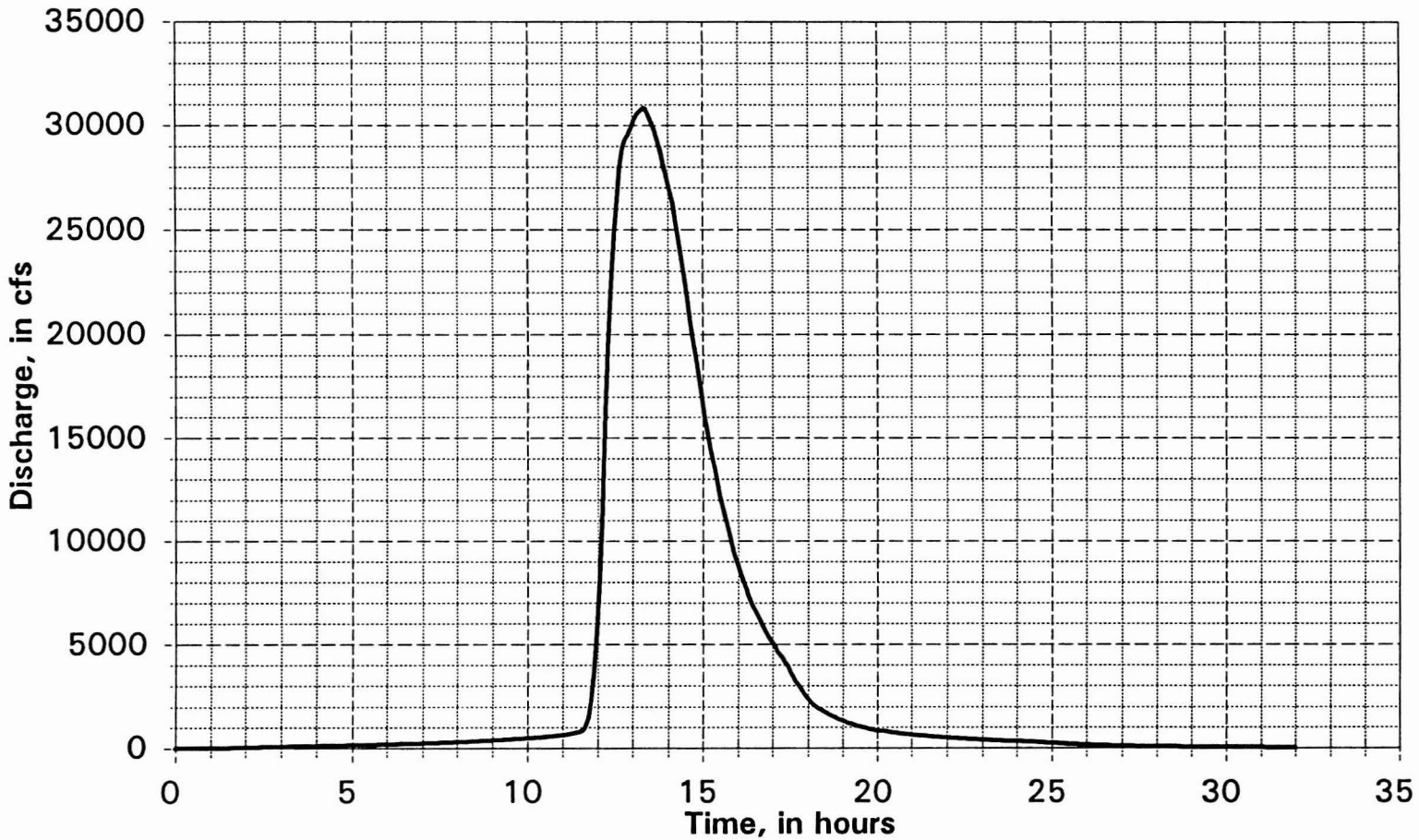


Figure 7
Hydrograph at HEC-1 ID 310390

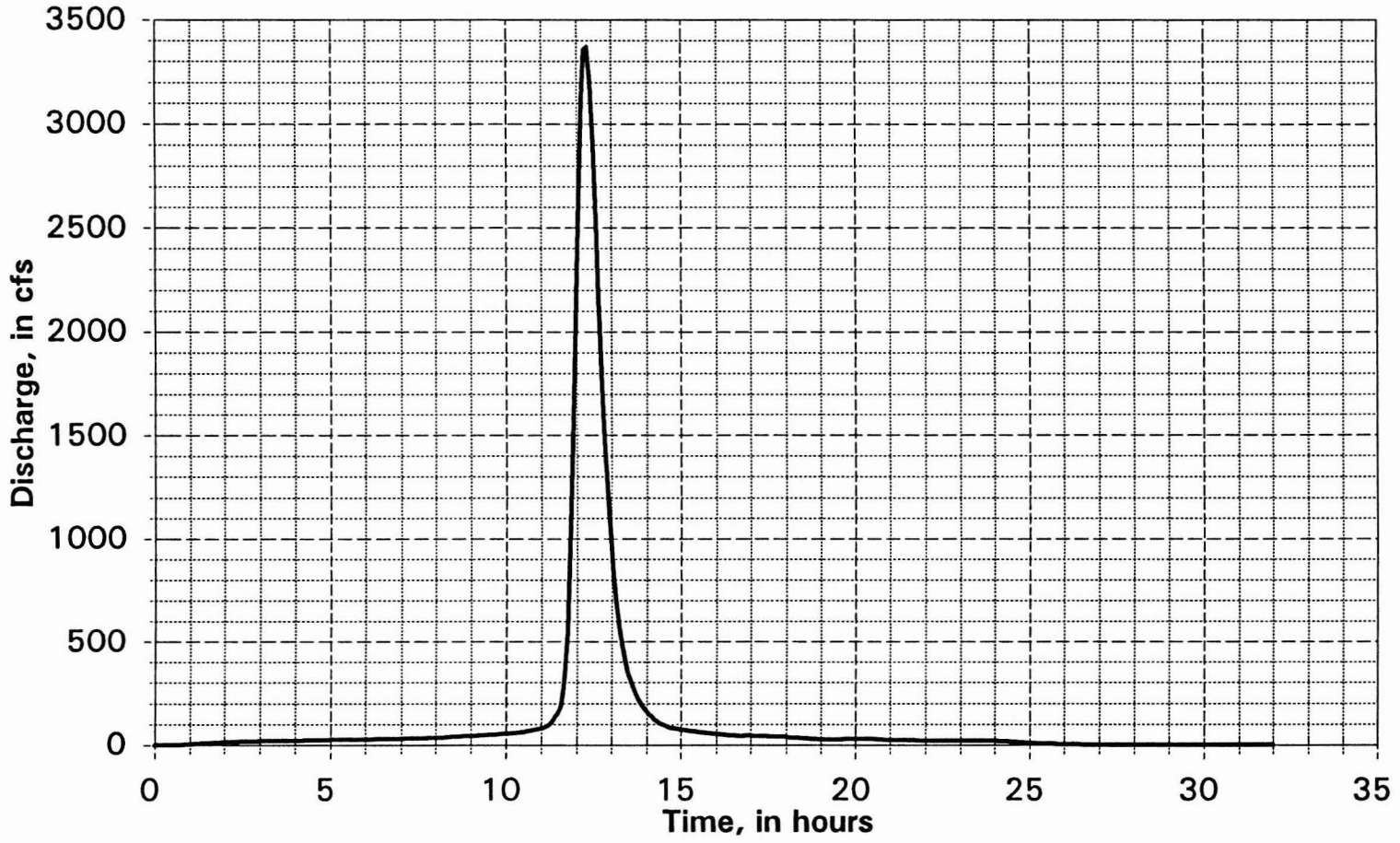


Figure 8
Hydrograph at HEC-1 ID 385390

APPENDIX G

Cave Creek 100-Year, 24-Hour HEC-1 Output

```
1*****************************************                                    *****************************************
 *                                       *                                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *              MAY  1991                *                                    *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.0.1E              *                                    *         609 SECOND STREET             *
 *                                       *                                    *      DAVIS, CALIFORNIA 95616          *
 *  RUN DATE  06/26/96  TIME  09:33:53   *                                    *          (916) 551-1748               *
 *                                       *                                    *                                       *
 *****************************************                                    *****************************************

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


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

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

1                                                   HEC-1 INPUT                                                    PAGE  1

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

            1           ID        Cave Creek Above Carefree Highway FPD Study       File: CC100-24.IH1
            2           ID           by  GVSCE for Maricopa County FCD 95-28    Original: 06-25-96     mcg
            3           ID           Project:           84                        Revised:
            4           ID
            5           ID        Cave Creek Watershed (just below Carefree Higway bridge)
            6           ID           100-year, 24-hr rainfall with SCS Type II distribution
            7           ID           Green & Ampt Loss Rate Method
            8           ID           NMIN = 5
            9           ID           Phoenix Mountain and Desert/Rangeland S-Graph
           10           ID           Clark Unit Hydrograph
           11           ID           Modified Puls channel storage routing
           12           ID
           13           ID           200 Scale 2' CI mapping of study reach by Aerial Mapping Company
           14           ID
                        *
                        *
           15           IT       5                     900
           16           IO       5
           17           IN      15
                        *
                        *DIAGRAM
                        *
                        *  Depth-Area reduction factors taken from Table 2.1a of FCDMC Design Manual
                        *
                        *  PC records are a 24-hour SCS Type II rainfall distribution
                        *
           18           JD    4.98    0.01
           19           PC   0.000   0.002   0.005   0.008   0.011   0.013   0.016   0.019   0.022   0.025
           20           PC   0.028   0.032   0.035   0.038   0.041   0.044   0.048   0.053   0.056   0.060
           21           PC   0.063   0.067   0.071   0.075   0.080   0.084   0.089   0.093   0.098   0.103
           22           PC   0.109   0.114   0.120   0.127   0.133   0.140   0.147   0.155   0.163   0.172
           23           PC   0.181   0.192   0.204   0.220   0.235   0.259   0.283   0.473   0.663   0.699
           24           PC   0.735   0.754   0.772   0.785   0.799   0.810   0.820   0.829   0.838   0.846
           25           PC   0.854   0.861   0.868   0.874   0.880   0.885   0.891   0.900   0.902   0.910
           26           PC   0.912   0.920   0.921   0.926   0.929   0.930   0.937   0.941   0.945   0.950
           27           PC   0.952   0.957   0.959   0.962   0.965   0.970   0.972   0.973   0.978   0.981
           28           PC   0.984   0.987   0.989   0.992   0.995   0.998   1.000
           29           JD    4.97    1.00
           30           JD    4.68   10.00
           31           JD    4.53   20.00
           32           JD    4.26   70.00
           33           JD    4.15  130.00
                        *

           34           KK   S110L
           35           KM   Subbasin  SSW1
           36           KM
           37           KM      The Phoenix Mountain S-Graph is used for this basin.
           38           KM          Lag Used =  65.6 minutes
           39           KM
           40           BA  10.597
           41           LG    0.20    0.40    6.00    0.19    3.00
           42           UI     544     544     544    1545    2110    2807    3371    3819    4178    4753
           43           UI    5872    6285    4183    3619    3260    3068    2823    2634    2426    2231
           44           UI    2055    1817    1611    1419    1331    1256    1180    1093     893     825
1                                                   HEC-1 INPUT                                                    PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 45          UI     695     695     597     596     555     417     417     417     373     266
 46          UI     266     266     266     266     246     104     104     104     104     104
 47          UI     104     104     104     104     104     104     104     104     104     104
 48          UI       0       0       0       0       0       0       0       0       0       0
 49          UI       0       0       0       0       0       0       0       0       0       0
             *

 50          KK   S110R
 51          KM   Subbasin  CC1
 52          KM
 53          KM      The Phoenix Mountain S-Graph is used for this basin.
 54          KM          Lag Used =  89.8 minutes
 55          KM
 56          BA  17.935
 57          LG    0.20    0.37    5.20    0.28    6.00
 58          UI     672     672     672     672    1765    2209    2758    3442    4026    4397
 59          UI    4807    5119    5488    6315    7397    8233    5996    4949    4441    4110
 60          UI    3925    3741    3508    3319    3164    2968    2777    2638    2451    2250
 61          UI    2089    1798    1728    1645    1577    1546    1422    1405    1132    1104
 62          UI    1008     859     859     839     736     736     736     651     515     515
 63          UI     515     515     515     330     329     329     329     329     329     329
 64          UI     329     219     129     129     129     129     129     129     129     129
 65          UI     129     129     129     129     129     129     129     129     129     129
 66          UI     129     129     129       0       0       0       0       0       0       0
 67          UI       0       0       0       0       0       0       0       0       0       0
             *

 68          KK    C110
 69          KM      Combine runoff from Subbasins S110L and S110R at C110.
 70          HC       2
             *

 71          KK  110120
 72          KM   Normal depth channel route from C110 to C120.
 73          KM       Source:  Hydrology Field Reconnaissance, page 14
 74          KM       End points were extended
 75          RS       1    FLOW      -1
 76          RC   0.100   0.045   0.100    1500  0.0067
 77          RX   998.0  1005.0  1111.0  1133.0  1175.0  1180.0  1207.0    1229
 78          RY   105.1    95.0    95.0    90.0    91.6    96.8    96.8   105.9
 79          RL                   0.40    90.0
             *

 80          KK    S120
 81          KM   Subbasin   BC1
 82          KM
 83          KM      The Phoenix Mountain S-Graph is used for this basin.
 84          KM          Lag Used =  65.5 minutes
 85          KM
 86          BA   4.774
 87          LG    0.25    0.35    4.55    0.39    6.00
 88          UI     245     245     245     699     954    1268    1522    1725    1886    2148
 89          UI    2656    2821    1883    1629    1468    1382    1271    1186    1092    1005
 90          UI     923     817     724     639     600     565     530     489     403     369
 91          UI     313     312     269     269     247     188     188     188     165     120
```



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

 92          UI     120     120     120     120     107      47      47      47      47      47
 93          UI      47      47      47      47      47      47      47      47      47      47
 94          UI       0       0       0       0       0       0       0       0       0       0
 95          UI       0       0       0       0       0       0       0       0       0       0
             *

 96          KK    C120
 97          KM      Combine routed hydrograph from C110 w/runoff from S120 at C120.
 98          HC       2
             *

 99          KK  120130
100          KM   Normal depth channel route from C120 to C130.
101          KM       Source:  Hydrology Field Reconnaissance, page 14
102          KM       End points were extended
103          RS       1    FLOW      -1
104          RC   0.100   0.045   0.100    5800  0.0121
105          RX   998.0  1005.0  1111.0  1133.0  1175.0  1180.0  1207.0    1229
106          RY   105.1    95.0    95.0    90.0    91.6    96.8    96.8   105.9
107          RL                   0.40    90.0
             *

108          KK    S130
109          KM   Subbasin   CC2
110          KM
111          KM      The Phoenix Mountain S-Graph is used for this basin.
112          KM          Lag Used =  32.5 minutes
113          KM
114          BA   2.878
115          LG    0.25    0.37    5.30    0.27    6.00
116          UI     298     579    1364    1982    2470    3305    2104    1720    1476    1259
117          UI    1040     812     704     601     457     374     326     252     228     162
118          UI     146     146      80      57      57      57      57      57      57      57
119          UI       0       0       0       0       0       0       0       0       0       0
120          UI       0       0       0       0       0       0       0       0       0       0
             *

121          KK    C130
```

```
 122          KM      Combine routed hydrograph from C120 w/runoff from S130 at C130.
 123          HC       2
              *

 124          KK  130140
 125          KM  Normal depth channel route from C130 to C140.
 126          KM      Source:  Hydrology Field Reconnaissance, page 14
 127          KM      End points were extended
 128          RS       1    FLOW      -1
 129          RC  0.100   0.045   0.100    1800  0.0056
 130          RX  998.0  1005.0  1111.0  1133.0  1175.0  1180.0  1207.0    1229
 131          RY  105.1    95.0    95.0    90.0    91.6    96.8    96.8   105.9
 132          RL                   0.40    90.0
              *
1                                          HEC-1 INPUT                                                    PAGE  4

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

 133          KK   S140
 134          KM  Subbasin   BMM1
 135          KM
 136          KM     The Phoenix Mountain S-Graph is used for this basin.
 137          KM         Lag Used =  38.8 minutes
 138          KM
 139          BA  1.837
 140          LG   0.20    0.35    4.45    0.36    4.00
 141          UI    159     223     564     896    1125    1359    1824    1217     970     860
 142          UI    760     654     560     453     389     353     295     235     202     175
 143          UI    152     122     118      78      78      78      57      31      31      31
 144          UI     31      31      31      31      31       0       0       0       0       0
 145          UI      0       0       0       0       0       0       0       0       0       0
              *

 146          KK   C140
 147          KM     Combine routed hydrograph from C130 w/runoff from S140 at C140.
 148          HC       2
              *

 149          KK  140150
 150          KM  Normal depth channel route from C140 to C150.
 151          KM      Source:  Hydrology Field Reconnaissance, page 15
 152          KM      End points were extended
 153          RS       2    FLOW      -1
 154          RC  0.100   0.080   0.100   10000   0.027
 155          RX  995.0  1005.0  1019.0  1037.0  1081.0  1096.0  1170.0  1180.0
 156          RY  106.9    96.9    94.8    90.7    90.0    93.3    96.6   106.6
 157          RL                   0.35    90.0
              *

 158          KK   S150
 159          KM  Subbasin   CC3
 160          KM
 161          KM     The Phoenix Mountain S-Graph is used for this basin.
 162          KM         Lag Used =  27.1 minutes
 163          KM
 164          BA  1.065
 165          LG   0.20    0.35    4.35    0.42   12.00
 166          UI    132     358     754    1018    1430     913     731     609     494     369
 167          UI    309     247     182     151     118     101      65      65      48      25
 168          UI     25      25      25      25      25       0       0       0       0       0
 169          UI      0       0       0       0       0       0       0       0       0       0
              *

 170          KK  S150R
 171          KM  Subbasin  UNT1
 172          KM
 173          KM     The Phoenix Mountain S-Graph is used for this basin.
 174          KM         Lag Used =  30.2 minutes
 175          KM
 176          BA  1.995
 177          LG   0.20    0.35    4.30    0.40    9.00
 178          UI    223     506    1120    1573    2092    2159    1391    1179     994     825
1                                          HEC-1 INPUT                                                    PAGE  5

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

 179          UI    631     529     450     336     273     243     171     158     109     109
 180          UI     84      43      43      43      43      43      43       0       0       0
 181          UI      0       0       0       0       0       0       0       0       0       0
              *

 182          KK   C150
 183          KM     Combine routed hydrograph from C140 w/runoff from S150 and S150R at C120.
 184          HC       3
              *

 185          KK  150160
 186          KM  Normal depth channel route from C150 to C160.
 187          KM      Source:  Hydrology Field Reconnaissance, page 15
 188          KM      End points were extended
 189          RS       1    FLOW      -1
 190          RC  0.100   0.080   0.100    1000    0.02
 191          RX  995.0  1005.0  1019.0  1037.0  1081.0  1096.0  1170.0  1180.0
 192          RY  106.9    96.9    94.8    90.7    90.0    93.3    96.6   106.6
 193          RL                   0.40    90.0
              *
```

```
 194          KK    S160
 195          KM   Subbasin   STC1
 196          KM
 197          KM      The Phoenix Mountain S-Graph is used for this basin.
 198          KM          Lag Used =  38.7 minutes
 199          KM
 200          BA   1.294
 201          LG    0.25    0.35    4.80    0.33    5.00
 202          UI     113     159     400     635     797     964    1289     851     683     605
 203          UI     534     460     393     318     273     249     206     164     142     123
 204          UI     105      86      81      55      55      55      38      22      22      22
 205          UI      22      22      22      22      22       0       0       0       0       0
 206          UI       0       0       0       0       0       0       0       0       0       0
              *

 207          KK    C160
 208          KM      Combine routed hydrograph from C150 w/runoff from S160 at C160.
 209          HC       2
              *

 210          KK  160170
 211          KM   Normal depth channel route from C160 to C170.
 212          KM       Source:  Hydrology Field Reconnaissance, page 16
 213          RS       1    FLOW      -1
 214          RC   0.090   0.045   0.090    4600  0.0196
 215          RX  1000.0  1024.0  1055.0  1068.0  1115.0  1119.0  1145.0  1198.0
 216          RY   103.8    99.3    94.2    91.0    90.0    92.0    94.8   102.8
 217          RL                   0.40    90.0
              *
1                                          HEC-1 INPUT                                          PAGE  6

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

 218          KK    S170
 219          KM   Subbasin   CC4
 220          KM
 221          KM      The Phoenix Mountain S-Graph is used for this basin.
 222          KM          Lag Used =  24.0 minutes
 223          KM
 224          BA   0.913
 225          LG    0.20    0.39    5.80    0.20    7.00
 226          UI     128     429     833    1173    1149     744     606     479     349     288
 227          UI     212     157     128      98      68      63      40      25      25      25
 228          UI      25      25       0       0       0       0       0       0       0       0
 229          UI       0       0       0       0       0       0       0       0       0       0
              *

 230          KK   S170R
 231          KM   Subbasin  GG1
 232          KM
 233          KM      The Phoenix Mountain S-Graph is used for this basin.
 234          KM          Lag Used =  54.8 minutes
 235          KM
 236          BA   3.417
 237          LG    0.20    0.35    4.60    0.33    9.00
 238          UI     210     210     398     725    1052    1317    1513    1694    2115    2450
 239          UI    1599    1348    1229    1120    1025     932     842     755     658     551
 240          UI     512     483     440     367     328     268     259     230     230     164
 241          UI     161     161     122     103     103     103     103      71      40      40
 242          UI      40      40      40      40      40      40      40      40      40      40
 243          UI       0       0       0       0       0       0       0       0       0       0
 244          UI       0       0       0       0       0       0       0       0       0       0
              *

 245          KK    C170
 246          KM      Combine routed hydrograph from C160 w/runoff from S170 and S170R at C170.
 247          HC       3
              *

 248          KK  170180
 249          KM   Normal depth channel route from C170 to C180.
 250          KM       Source:  Hydrology Field Reconnaissance, page 16
 251          KM       End points were extended
 252          RS       1    FLOW      -1
 253          RC   0.090   0.045   0.090    4000  0.0174
 254          RX     994  1024.0  1055.0  1068.0  1115.0  1119.0  1145.0    1211
 255          RY   104.9    99.3    94.2    91.0    90.0    92.0    94.8   104.8
 256          RL                   0.40    90.0
              *

 257          KK    S180
 258          KM   Subbasin   MF1
 259          KM
 260          KM      The Phoenix Mountain S-Graph is used for this basin.
 261          KM          Lag Used =  52.5 minutes
 262          KM
 263          BA   3.803
1                                          HEC-1 INPUT                                          PAGE  7

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

 264          LG    0.25    0.39    5.80    0.20    5.00
 265          UI     244     244     513     899    1302    1582    1821    2095    2727    2417
 266          UI    1706    1482    1362    1232    1128    1009     904     787     661     600
 267          UI     563     515     428     375     312     294     267     252     187     187
```

```
268          UI     184     119     119     119     119     111      47      47      47      47
269          UI      47      47      47      47      47      47      47      47       0       0
270          UI       0       0       0       0       0       0       0       0       0       0
             *

271          KK    C180
272          KM      Combine routed hydrograph from C170 w/runoff from S180 at C180.
273          HC       2
             *

274          KK  180190
275          KM   Normal depth channel route from C180 to C190.
276          KM       Source:  Hydrology Field Reconnaissance, page 17
277          KM       End points were extended
278          RS       3    FLOW      -1
279          RC   0.120   0.045   0.120   16600  0.0157
280          RX     981  1046.0  1111.0  1135.0  1169.0  1195.0  1223.0    1226
281          RY   102.2    98.4    93.5    90.0    90.7    92.6    96.3   103.3
282          RL                   0.40    90.0
             *

283          KK   S190L
284          KM   Subbasin  CC6
285          KM
286          KM      The Phoenix Mountain S-Graph is used for this basin.
287          KM          Lag Used =  32.3 minutes
288          KM
289          BA   2.814
290          LG    0.20    0.38    6.40    0.16    2.00
291          UI     293     577    1361    1964    2461    3230    2042    1680    1443    1224
292          UI    1008     783     688     573     439     362     321     236     225     148
293          UI     144     144      64      56      56      56      56      56      56       0
294          UI       0       0       0       0       0       0       0       0       0       0
295          UI       0       0       0       0       0       0       0       0       0       0
             *

296          KK   S190R
297          KM   Subbasin  CC5
298          KM
299          KM      The Phoenix Mountain S-Graph is used for this basin.
300          KM          Lag Used =  53.7 minutes
301          KM
302          BA   4.370
303          LG    0.25    0.38    5.40    0.23    7.00
304          UI     274     274     547     970    1421    1747    2009    2266    2899    3001
305          UI    2002    1710    1570    1425    1306    1175    1073     926     796     697
306          UI     651     606     544     450     377     350     310     300     251     210
307          UI     210     185     134     134     134     134     111      53      53      53
308          UI      53      53      53      53      53      53      53      53      53       0
309          UI       0       0       0       0       0       0       0       0       0       0
310          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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

311          KK    C190
312          KM      Combine routed hydrograph from C180 w/runoff from S190L and S190R at C190.
313          HC       3
             *

314          KK  190200
315          KM   Normal depth channel route from C190 to C200.
316          KM       Source:  Hydrology Field Reconnaissance, page 18
317          KM       End points were extended
318          RS       2    FLOW      -1
319          RC   0.090   0.055   0.070   11000  0.0136
320          RX  1000.0  1005.0  1064.0  1083.0  1105.0  1125.0  1150.0  1160.0
321          RY   107.8    97.8    92.7    91.2    90.0    91.8    94.5   114.5
322          RL                   0.40    90.0
             *

323          KK    S200
324          KM   Subbasin   CC7
325          KM
326          KM      The Phoenix Mountain S-Graph is used for this basin.
327          KM          Lag Used =  28.8 minutes
328          KM
329          BA   3.949
330          LG    0.20    0.35    4.90    0.31    9.00
331          UI     462    1141    2455    3379    4798    3798    2728    2302    1919    1533
332          UI    1171    1021     802     593     510     394     353     226     226     185
333          UI      88      88      88      88      88      88       0       0       0       0
334          UI       0       0       0       0       0       0       0       0       0       0
             *

335          KK    C200
336          KM      Combine routed hydrograph from C190 w/runoff from S200 at C200.
337          HC       2
             *

338          KK  200210
339          KM   Normal depth channel route from C200 to C210.
340          KM       Source:  200 Scale 2' CI Mapping, sheet 5
341          RS       1    FLOW      -1
342          RC   0.065   0.060   0.065    4800  0.0125
```

```
 343          RX  1000.0  1150.0  1434.0  1480.0  1520.0  1535.0  1540.0  1550.0
 344          RY  2156.0  2148.0  2148.0  2142.0  2142.0  2148.0  2150.0  2156.0
 345          RL                    0.95  2142.0
              *

 346          KK    S210
 347          KM   Subbasin   CWC1
 348          KM
 349          KM      The Phoenix Mountain S-Graph is used for this basin.
 350          KM          Lag Used =  83.6 minutes
 351          KM
 352          BA  10.345
 353          LG   0.20    0.35    4.65    0.35   14.00
 354          UI    417     417     417     539    1199    1526    1859    2428    2630    2910
1                                          HEC-1 INPUT                                          PAGE  9

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

 355          UI   3138    3357    3891    4603    5020    3542    2980    2690    2492    2388
 356          UI   2235    2110    1989    1872    1736    1643    1521    1384    1275    1102
 357          UI   1048    1015     959     923     872     764     685     649     533     533
 358          UI    515     457     457     457     358     320     320     320     320     238
 359          UI    204     204     204     204     204     204     204      98      80      80
 360          UI     80      80      80      80      80      80      80      80      80      80
 361          UI     80      80      80      80      80      80      80       0       0       0
 362          UI      0       0       0       0       0       0       0       0       0       0
              *

 363          KK    C210
 364          KM      Combine routed hydrograph from C200 w/runoff from S210 at C210.
 365          HC       2
              *

 366          KK  210220
 367          KM   Normal depth channel route from C210 to C220.
 368          KM       Source:  200 Scale 2' CI Mapping, sheet 5
 369          RS       1    FLOW      -1
 370          RC   0.065   0.060   0.065    4800  0.0125
 371          RX  1000.0  1150.0  1434.0  1480.0  1520.0  1535.0  1540.0  1550.0
 372          RY  2156.0  2148.0  2148.0  2142.0  2142.0  2148.0  2150.0  2156.0
 373          RL                    0.95  2142.0
              *

 374          KK    S220
 375          KM   Subbasin   CC8
 376          KM
 377          KM      The Phoenix Mountain S-Graph is used for this basin.
 378          KM          Lag Used =  36.2 minutes
 379          KM
 380          BA   3.635
 381          LG   0.20    0.37    5.30    0.24   14.00
 382          UI    338     552    1303    2063    2526    3284    3443    2227    1914    1668
 383          UI   1443    1228     974     828     746     606     475     411     371     278
 384          UI    259     197     166     166     139      65      65      65      65      65
 385          UI     65      65      65       0       0       0       0       0       0       0
 386          UI      0       0       0       0       0       0       0       0       0       0
              *

 387          KK    C220
 388          KM      Combine routed hydrograph from C210 w/runoff from S220 at C220.
 389          HC       2
              *

 390          KK  220230
 391          KM   Normal depth channel route from C220 to C230.
 392          KM       Source:  200 Scale 2' CI Mapping, sheet 5
 393          RS       1    FLOW      -1
 394          RC   0.065   0.060   0.065    4800  0.0125
 395          RX  1000.0  1150.0  1434.0  1480.0  1520.0  1535.0  1540.0  1550.0
 396          RY  2156.0  2148.0  2148.0  2142.0  2142.0  2148.0  2150.0  2156.0
 397          RL                    0.95  2142.0
              *
1                                          HEC-1 INPUT                                          PAGE 10

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

 398          KK    S230
 399          KM   Subbasin   CC9
 400          KM
 401          KM      The Phoenix Mountain S-Graph is used for this basin.
 402          KM          Lag Used =  32.9 minutes
 403          KM
 404          BA   1.839
 405          LG   0.20    0.36    6.80    0.13   11.00
 406          UI    188     360     846    1240    1539    2109    1357    1099     949     809
 407          UI    676     529     449     399     301     240     208     172     144     114
 408          UI     92      92      65      36      36      36      36      36      36      36
 409          UI      0       0       0       0       0       0       0       0       0       0
 410          UI      0       0       0       0       0       0       0       0       0       0
              *

 411          KK    C230
 412          KM      Combine routed hydrograph from C220 w/runoff from S230 at C230.
 413          HC       2
              *
```

```
414          KK  230240
415          KM   Normal depth channel route from C230 to C240.
416          KM       Source:  200 Scale 2' CI Mapping, sheet 5
417          RS       1    FLOW      -1
418          RC   0.065   0.060   0.065    2300  0.0117
419          RX  1000.0  1003.0  1323.0  1329.0  1353.0  1371.0  1593.0  1665.0
420          RY  2130.0  2128.0  2118.0  2116.0  2116.0  2126.0  2126.0  2130.0
421          RL                     0.95  2116.0
             *

422          KK    S240
423          KM   Subbasin   CC10
424          KM
425          KM      The Phoenix Mountain S-Graph is used for this basin.
426          KM          Lag Used =  39.5 minutes
427          KM
428          BA   2.627
429          LG    0.20    0.35    6.80    0.14    6.00
430          UI     224     300     774    1234    1558    1862    2544    1821    1395    1235
431          UI    1087     950     821     667     563     513     444     356     286     257
432          UI     241     172     172     129     110     110     110      45      43      43
433          UI      43      43      43      43      43      43       0       0       0       0
434          UI       0       0       0       0       0       0       0       0       0       0
             *

435          KK    C240
436          KM      Combine routed hydrograph from C230 w/runoff from S240 at C240.
437          HC       2
             *
```

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

438          KK  240250
439          KM   Normal depth channel route from C240 to C250.
440          KM       Source:  200 Scale 2' CI Mapping, sheet 4
441          RS       1    FLOW      -1
442          RC   0.070   0.060   0.070    6200  0.0105
443          RX  1000.0  1087.0  1101.0  1128.0  1168.0  1193.0  1488.0  1490.0
444          RY  2076.0  2072.0  2064.0  2060.0  2060.0  2066.0  2070.0  2076.0
445          RL                     0.95  2060.0
             *

446          KK    S250
447          KM   Subbasin   WSW1
448          KM
449          KM      The Phoenix Mountain S-Graph is used for this basin.
450          KM          Lag Used =  52.9 minutes
451          KM
452          BA   5.887
453          LG    0.19    0.32    6.60    0.15   10.00
454          UI     375     375     773    1360    1978    2409    2779    3177    4081    3882
455          UI    2661    2292    2117    1910    1756    1559    1419    1227    1042     933
456          UI     873     804     688     603     479     466     410     410     292     287
457          UI     287     205     183     183     183     183      92      72      72      72
458          UI      72      72      72      72      72      72      72      72       0       0
459          UI       0       0       0       0       0       0       0       0       0       0
             *

460          KK    C250
461          KM      Combine routed hydrograph from C240 w/runoff from S250 at C250.
462          HC       2
             *

463          KK  250260
464          KM   Normal depth channel route from C250 to C260.
465          KM       Source:  200 Scale 2' CI Mapping, sheet 4
466          RS       1    FLOW      -1
467          RC   0.070   0.055   0.070    1500  0.0067
468          RX  1000.0  1030.0  1053.0  1055.0  1070.0  1087.0  1185.0  1305.0
469          RY  2048.0  2030.0  2028.0  2026.0  2026.0  2030.0  2040.0  2050.0
470          RL                     0.95  2026.0
             *

471          KK   S260L
472          KM   Subbasin  UNT2
473          KM
474          KM      The Phoenix Mountain S-Graph is used for this basin.
475          KM          Lag Used =  55.8 minutes
476          KM
477          BA   3.781
478          LG    0.19    0.35    5.70    0.22   13.00
479          UI     228     228     413     774    1108    1408    1622    1803    2209    2711
480          UI    1868    1515    1352    1249    1138    1046     942     852     744     635
481          UI     570     535     498     443     375     311     291     260     250     219
482          UI     175     175     171     112     112     112     112     112      56      44
483          UI      44      44      44      44      44      44      44      44      44      44
```

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

484          UI      44       0       0       0       0       0       0       0       0       0
485          UI       0       0       0       0       0       0       0       0       0       0
             *

486          KK   S260R
```

```
487          KM   Subbasin  CC11
488          KM
489          KM      The Phoenix Mountain S-Graph is used for this basin.
490          KM          Lag Used =  28.1 minutes
491          KM
492          BA   1.648
493          LG    0.20    0.34    7.00    0.12   12.00
494          UI     197     506    1076    1471    2112    1500    1134     956     787     609
495          UI     484     419     304     242     211     151     130      96      96      53
496          UI      38      38      38      38      38      38       0       0       0       0
497          UI       0       0       0       0       0       0       0       0       0       0
             *

498          KK    C260
499          KM      Combine routed hydrograph from C250 w/runoff from S260L and S260R at C210.
500          HC       3
             *
             *
             * **  260310 too short to route, L=900'
             *
             *

501          KK    S270
502          KM   Subbasin   GVW1
503          KM
504          KM      The Phoenix Mountain S-Graph is used for this basin.
505          KM          Lag Used =  72.0 minutes
506          KM
507          BA   4.863
508          LG    0.25    0.39    5.80    0.20   16.00
509          UI     227     227     227     520     770     988    1319    1465    1635    1770
510          UI    2008    2436    2714    1857    1568    1406    1325    1234    1154    1076
511          UI    1000     927     861     769     697     601     563     540     521     475
512          UI     429     373     337     290     290     255     249     249     188     174
513          UI     174     174     143     111     111     111     111     111     111      62
514          UI      44      44      44      44      44      44      44      44      44      44
515          UI      44      44      44      44      44      44       0       0       0       0
516          UI       0       0       0       0       0       0       0       0       0       0
             *

517          KK  270300
518          KM   Normal depth channel route from C270 to C300.
519          KM       Source:  Hydrology Field Reconnaissance, page 13
520          RS       5    FLOW      -1
521          RC   0.100   0.030   0.100   12500  0.0288
522          RX  1000.0  1015.0  1095.0  1095.5  1128.5  1129.0  1209.0  1224.0
523          RY   104.0    94.0    93.0    90.0    90.0    93.0    94.0   104.0
524          RL                   0.95    90.0
             *
```



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

525          KK    S280
526          KM   Subbasin   GVW2
527          KM
528          KM      The Phoenix Mountain S-Graph is used for this basin.
529          KM          Lag Used =  60.9 minutes
530          KM
531          BA   5.933
532          LG    0.19    0.32    4.65    0.34    9.00
533          UI     328     328     451    1015    1383    1884    2163    2438    2708    3356
534          UI    3893    2615    2193    1961    1835    1678    1554    1419    1298    1170
535          UI    1036     875     810     767     718     658     539     481     419     402
536          UI     359     359     280     252     252     244     161     161     161     161
537          UI     161     125      63      63      63      63      63      63      63      63
538          UI      63      63      63      63      63      63       0       0       0       0
539          UI       0       0       0       0       0       0       0       0       0       0
             *

540          KK  280295
541          KM   Normal depth channel route from C280 to C295.
542          KM       Source:  Hydrology Field Reconnaissance, page 12
543          RS       3    FLOW      -1
544          RC   0.080   0.050   0.070   13800  0.0249
545          RX  1000.0  1020.0  1040.0  1040.1  1202.9  1203.0  1223.0  1243.0
546          RY   110.0   100.0    90.0    90.0    90.0    90.0   100.0   110.0
547          RL                   0.80    90.0
             *

548          KK    S290
549          KM   Subbasin    GWW1
550          KM
551          KM    The Phoenix Desert/Rangeland S-Graph is used for this basin.
552          KM          Lag Used =  59.2 minutes
553          KM
554          BA   7.639
555          LG     .17     .29    5.00     .29   12.00
556          UI    434.    434.    658.   1394.   1955.   2544.   3010.   3563.   3879.   4073.
557          UI   4161.   4087.   3873.   3482.   3006.   2564.   2229.   1944.   1652.   1431.
558          UI   1243.   1051.    908.    819.    671.    627.    460.    460.    360.    297.
559          UI    297.    297.    175.    106.    106.    106.    106.    106.    106.    106.
560          UI    106.    106.    106.      0.      0.      0.      0.      0.      0.      0.
561          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             *
```

```
                    * **  290295 too short to route, L=2400'  S=0.0242
                    *
                    *

 562                KK    C295
 563                KM      Combine routed hydrographs from and C280 w/runoff from S290 at C295.
 564                HC       2
                    *
1                                          HEC-1 INPUT                                          PAGE 14

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

 565                KK  295300
 566                KM   Normal depth channel route from C295 to C300.
 567                KM       Source:  Hydrology Field Reconnaissance, page 10
 568                KM       Elevations were adjusted up 0.3' from field book
 569                RS       1    FLOW      -1
 570                RC   0.050   0.035   0.050    3000  0.0240
 571                RX  1000.0  1010.6  1021.1  1035.6  1143.2  1150.2  1168.6  1180.6
 572                RY   103.8   100.3    97.8    90.3    90.0    93.9    93.2    97.5
 573                RL                    0.60    90.0
                    *

 574                KK    C300
 575                KM      Combine routed hydrographs from C270 and C295 at C300.
 576                HC       2
                    *

 577                KK  300310
 578                KM   Normal depth channel route from C300 to C310.
 579                KM       Source:  Hydrology Field Reconnaissance, page 9
 580                RS       1    FLOW      -1
 581                RC   0.100   0.035   0.045    4000  0.0188
 582                RX  1000.0  1006.0  1012.5  1026.2  1072.7  1085.6  1091.6  1097.6
 583                RY    98.8    95.6    92.0    90.0    90.0    92.1    98.6   105.0
 584                RL                    0.95    90.0
                    *

 585                KK    S310
 586                KM   Subbasin    GVW3
 587                KM
 588                KM    The Phoenix Desert/Rangeland S-Graph is used for this basin.
 589                KM          Lag Used =  39.8 minutes
 590                KM
 591                BA   2.387
 592                LG     .16     .34    5.40     .24    4.00
 593                UI    202.    265.    700.   1104.   1459.   1756.   1900.   1915.   1782.   1474.
 594                UI   1174.    951.    767.    609.    489.    394.    321.    248.    214.    145.
 595                UI    138.    117.     49.     49.     49.     49.     49.     49.     49.      0.
 596                UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 597                UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *

 598                KK   C310L
 599                KM      Combine routed hydrograph from C300 w/runoff from S310 at C310L.
 600                HC       2
                    *

 601                KK    C310
 602                KM      Combine hydrograph from C260 with hydrograph from C310L at C310.
 603                HC       2
                    *
1                                          HEC-1 INPUT                                          PAGE 15

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

 604                KK  310390
 605                KM   Normal depth channel route from C310 to C390.
 606                KM       Source:  Hydrology Field Reconnaissance, page 24
 607                RS       1    FLOW      -1
 608                RC   0.070   0.055   0.070    2000  0.0125
 609                RX  1000.0  1016.0  1243.0  1257.0  1329.0  1426.0  1501.0  1564.0
 610                RY  2024.0  2014.0  2012.0  2008.0  2008.0  2012.0  2012.0  2024.0
 611                RL                    0.95  2008.0
                    *
                    *
                    * ****************** START ANDORA HILLS WASH MAJOR BASIN **********************
                    *
                    *

 612                KK    S320
 613                KM   Subbasin   AHW1
 614                KM
 615                KM      The Clark Unit Hydrograph is used for this basin.
 616                KM          The HEC-1 time-area relation is used for this basin.
 617                KM
 618                KM      Time of Concentration for this subbasin is based on the following:
 619                KM          An rainfall areal reduction factor of 1.000
 620                KM
 621                KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 622                KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 623                KM   .32 .32 .32 .32 .32 .32 .04 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
 624                KM
 625                KM          L=   0.950 miles, S=  201 feet/mile, Kb= .05
 626                KM
```

```
 627          BA   0.454
 628          LG    0.16    0.27    6.00    0.19   22.00
 629          UC   0.271   0.131
              *

 630          KK  320340
 631          KM   Normal depth channel route from C320 to C340.
 632          KM       Source:  Hydrology Field Reconnaissance, page 1
 633          RS       1    FLOW      -1
 634          RC   0.080   0.040   0.080    1800  0.0139
 635          RX   980.0  1010.0  1021.8  1030.7  1053.0  1060.2  1069.2  1078.0
 636          RY    95.7    93.5    92.0    90.0    90.8    92.6    94.8    95.8
 637          RL                    0.15    90.0
              *

 638          KK    S330
 639          KM   Subbasin   AHW4
 640          KM
 641          KM      The Clark Unit Hydrograph is used for this basin.
 642          KM          The Urban time-area relation is used for this basin.
 643          KM
 644          KM      Time of Concentration for this subbasin is based on the following:
 645          KM          An rainfall areal reduction factor of 1.000
 646          KM
 647          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
1                                        HEC-1 INPUT                                          PAGE 16

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

 648          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 649          KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
 650          KM
 651          KM          L=   1.210 miles, S=  111 feet/mile, Kb= .04
 652          KM
 653          BA   0.164
 654          LG    0.14    0.16    8.00    0.08   36.00
 655          UC   0.321   0.342
 656          UA       0       5      16      30      65      77      84      90      94      97
 657          UA     100
              *

 658          KK  330340
 659          KM   Normal depth channel route from C330 to C340.
 660          KM       Source:  Hydrology Field Reconnaissance, page 2
 661          RS       1    FLOW      -1
 662          RC   0.060   0.050   0.070    1400  0.0321
 663          RX  1000.0  1002.8  1010.2  1016.0  1018.8  1023.0  1052.0  1072.5
 664          RY    97.6    95.2    92.5    90.2    90.0    91.0    94.0    98.1
 665          RL                    0.15    90.0
              *

 666          KK   S340L
 667          KM   Subbasin  AHW3
 668          KM
 669          KM      The Clark Unit Hydrograph is used for this basin.
 670          KM          The HEC-1 time-area relation is used for this basin.
 671          KM
 672          KM      Time of Concentration for this subbasin is based on the following:
 673          KM          An rainfall areal reduction factor of 1.000
 674          KM
 675          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 676          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 677          KM   .32 .32 .31 .31 .31 .31 .03 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
 678          KM
 679          KM          L=   0.970 miles, S=  350 feet/mile, Kb= .10
 680          KM
 681          BA   0.240
 682          LG    0.18    0.32    6.20    0.18   15.00
 683          UC   0.333   0.241
              *

 684          KK   S340R
 685          KM   Subbasin  AHW2
 686          KM
 687          KM      The Clark Unit Hydrograph is used for this basin.
 688          KM          The Urban time-area relation is used for this basin.
 689          KM
 690          KM      Time of Concentration for this subbasin is based on the following:
 691          KM          An rainfall areal reduction factor of 1.000
 692          KM
 693          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 694          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 695          KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
 696          KM
1                                        HEC-1 INPUT                                          PAGE 17

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

 697          KM          L=   0.640 miles, S=  217 feet/mile, Kb= .06
 698          KM
 699          BA   0.065
 700          LG    0.13    0.19    6.60    0.14   43.00
 701          UC   0.233   0.244
 702          UA       0       5      16      30      65      77      84      90      94      97
 703          UA     100
              *
```

```
 704          KK    C340
 705          KM      Combine routed hydrographs from C320 and C340 w/runoff from S340L & S340R.
 706          HC       4
              *

 707          KK  340350
 708          KM   Normal depth channel route from C340 to C350.
 709          KM       Source:  Hydrology Field Reconnaissance, page 3
 710          RS       1    FLOW      -1
 711          RC   0.085   0.030   0.060    2100  0.0119
 712          RX   997.5  1017.5  1029.0  1029.5  1047.2  1047.7  1065.1  1081.3
 713          RY    96.2    92.7    90.6    90.2    90.0    90.5    93.1    96.3
 714          RL                   0.15    90.0
              *

 715          KK    S350
 716          KM   Subbasin   AHW5
 717          KM
 718          KM      The Clark Unit Hydrograph is used for this basin.
 719          KM          The HEC-1 time-area relation is used for this basin.
 720          KM
 721          KM      Time of Concentration for this subbasin is based on the following:
 722          KM          An rainfall areal reduction factor of 1.000
 723          KM
 724          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 725          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 726          KM   .32 .32 .32 .32 .32 .32 .04 .04 .04 .04 .04 .03 .01 .01 .01 .01 .01 .01
 727          KM
 728          KM          L=   0.660 miles, S=  219 feet/mile, Kb= .08
 729          KM
 730          BA   0.161
 731          LG    0.16    0.28    6.00    0.18   23.00
 732          UC   0.279   0.182
              *

 733          KK    C350
 734          KM      Combine routed hydrograph from C340 w/runoff from S350 at C350.
 735          HC       2
              *

 736          KK  350360
 737          KM   Normal depth channel route from C350 to C360.
 738          KM       Source:  Hydrology Field Reconnaissance, page 4
 739          RS       2    FLOW      -1
 740          RC   0.070   0.045   0.070    4700  0.0213
 741          RX  1000.0  1010.5  1032.2  1045.4  1060.2  1067.5  1107.6  1135.8
```



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

 742          RY    97.1    93.4    92.0    90.0    90.2    93.6    93.5    96.5
 743          RL                   0.15    90.0
              *

 744          KK    S360
 745          KM   Subbasin   AHW6
 746          KM
 747          KM      The Clark Unit Hydrograph is used for this basin.
 748          KM          The HEC-1 time-area relation is used for this basin.
 749          KM
 750          KM      Time of Concentration for this subbasin is based on the following:
 751          KM          An rainfall areal reduction factor of 1.000
 752          KM
 753          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 754          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 755          KM   .32 .32 .32 .32 .31 .31 .03 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
 756          KM
 757          KM          L=   1.590 miles, S=  141 feet/mile, Kb= .09
 758          KM
 759          BA   0.578
 760          LG    0.18    0.32    6.40    0.16   15.00
 761          UC   0.550   0.377
              *

 762          KK    C360
 763          KM      Combine routed hydrograph from C350 w/runoff from S360 at C360.
 764          HC       2
              *

 765          KK  360370
 766          KM   Normal depth channel route from C360 to C370.
 767          KM       Source:  Hydrology Field Reconnaissance, page 5
 768          RS       1    FLOW      -1
 769          RC   0.050   0.030   0.060    3600  0.0222
 770          RX  1000.0  1013.0  1023.0  1026.4  1040.0  1045.0  1052.9  1060.8
 771          RY    98.7    91.6    90.8    90.0    90.6    91.6    95.8   100.0
 772          RL                   0.30    90.0
              *

 773          KK    S370
 774          KM   Subbasin   AHW7
 775          KM
 776          KM      The Clark Unit Hydrograph is used for this basin.
 777          KM          The Urban time-area relation is used for this basin.
 778          KM
 779          KM      Time of Concentration for this subbasin is based on the following:
 780          KM          An rainfall areal reduction factor of 1.000
```

```
 781          KM
 782          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 783          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 784          KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
 785          KM
 786          KM          L=   1.500 miles, S=  137 feet/mile, Kb= .04
 787          KM
 788          BA   0.341
1                                          HEC-1 INPUT                                                    PAGE 19

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

 789          LG    0.11    0.21    7.00    0.11   49.00
 790          UC   0.333   0.279
 791          UA       0       5      16      30      65      77      84      90      94      97
 792          UA     100
              *

 793          KK    C370
 794          KM      Combine routed hydrograph from C360 w/runoff from S370 at C370.
 795          HC       2
              *

 796          KK  370385
 797          KM   Normal depth channel route from C370 to C385.
 798          KM       Source:  Hydrology Field Reconnaissance, page 6
 799          KM       End points were extended at a slope of 1:10 due to golf course
 800          RS       1    FLOW      -1
 801          RC   0.025   0.025   0.025    2800  0.0132
 802          RX   968.5  1008.5  1014.0  1014.5  1026.8  1027.3  1040.2  1071.8
 803          RY    97.9    93.9    91.4    90.0    90.5    91.4    93.6    97.9
 804          RL                    0.35    90.0
              *

 805          KK    S380
 806          KM   Subbasin   AHW8
 807          KM
 808          KM      The Clark Unit Hydrograph is used for this basin.
 809          KM          The Urban time-area relation is used for this basin.
 810          KM
 811          KM      Time of Concentration for this subbasin is based on the following:
 812          KM          An rainfall areal reduction factor of 1.000
 813          KM
 814          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 815          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 816          KM   .33 .33 .33 .32 .32 .32 .04 .04 .04 .04 .04 .04 .02 .02 .02 .02 .02 .02
 817          KM
 818          KM          L=   0.980 miles, S=  317 feet/mile, Kb= .04
 819          KM
 820          BA   0.415
 821          LG    0.18    0.21    7.00    0.12   15.00
 822          UC   0.213   0.108
 823          UA       0       5      16      30      65      77      84      90      94      97
 824          UA     100
              *

 825          KK  380385
 826          KM   Normal depth channel route from C380 to C385.
 827          KM       Source:  Hydrology Field Reconnaissance, page 8
 828          KM       End points were extended
 829          RS       1    FLOW      -1
 830          RC   0.060   0.035   0.060    2900  0.0110
 831          RX  1000.0  1016.4  1025.9  1032.9  1042.6  1049.3  1059.5  1071.0
 832          RY    96.4    92.6    90.8    90.0    90.2    91.0    92.6    95.6
 833          RL                    0.10    90.0
              *
1                                          HEC-1 INPUT                                                    PAGE 20

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

 834          KK    C385
 835          KM      Combine routed hydrographs from C370 and C380 at C385.
 836          HC       2
              *

 837          KK  385390
 838          KM   Normal depth channel route from C385 to C390.
 839          KM       Source:  Hydrology Field Reconnaissance, page 7
 840          RS       1    FLOW      -1
 841          RC   0.070   0.035   0.060    2600  0.0223
 842          RX   998.0  1002.0  1012.5  1020.7  1028.2  1031.9  1041.7  1072.7
 843          RY    98.3    96.1    91.2    90.3    90.0    91.8    92.4    98.3
 844          RL                    0.05    90.0
              *

 845          KK    S390
 846          KM   Subbasin   AHW9
 847          KM
 848          KM      The Clark Unit Hydrograph is used for this basin.
 849          KM          The Urban time-area relation is used for this basin.
 850          KM
 851          KM      Time of Concentration for this subbasin is based on the following:
 852          KM          An rainfall areal reduction factor of 1.000
 853          KM
 854          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 855          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
```

```
856          KM   .32 .32 .32 .32 .32 .32 .04 .04 .04 .04 .04 .04 .01 .01 .01 .01 .01 .01
857          KM
858          KM         L=   1.520 miles, S=  158 feet/mile, Kb= .04
859          KM
860          BA   0.347
861          LG    0.15    0.28    6.60    0.15   15.00
862          UC   0.329   0.275
863          UA       0       5      16      30      65      77      84      90      94      97
864          UA     100
             *

865          KK   C390L
866          KM      Combine routed hydrograph from C385 w/runoff from S390 at C390L.
867          HC       2
             *
             *
             * ******************* END ANDORA HILLS WASH MAJOR BASIN **********************
             *
             *

868          KK    C390
869          KM      Combine routed hydrograph from C310 with hydrograph from C390L at C390.
870          HC       2
             *
1                                          HEC-1 INPUT                                          PAGE 21

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

871          KK  390400
872          KM   Modified pulse channel route from C390 to C400.
873          KM       Source:  Rating curve generated using HEC-RAS v1.1
874          RS       2    FLOW      -1
875          SV       0     222     316     420     468     514     558     601     642     681
876          SV     720     758     794     830     865     905     938     973    1005    1038
877          SQ       0    4000    8000   12000   14000   16000   18000   20000   22000   24000
878          SQ   26000   28000   30000   32000   34000   36000   38000   40000   42000   44000
879          SE    90.0    95.1    96.6    97.6    98.1    98.4    98.8    99.1    99.5    99.8
880          SE   100.0   100.3   100.6   100.8   101.1   101.4   101.6   101.9   102.1   102.3
881          RL                    0.75    90.0
             *

882          KK    S400
883          KM   Subbasin   CC12
884          KM
885          KM      The Phoenix Mountain S-Graph is used for this basin.
886          KM          Lag Used =  59.7 minutes
887          KM
888          BA   3.059
889          LG     .20     .35    6.80     .13   11.00
890          UI     265     369     935    1486    1867    2251    3029    2036    1617    1432
891          UI    1265    1091     936     755     649     589     494     395     338     290
892          UI     257     203     199     130     130     130      99      51      51      51
893          UI      51      51      51      51      51       0       0       0       0       0
894          UI       0       0       0       0       0       0       0       0       0       0
             *

895          KK   C400R
896          KM      Combine routed hydrograph from C390 w/runoff from S400 at C400R.
897          HC       2
             *

898          KK   S400L
899          KM   Subbasin  UNT3
900          KM
901          KM      The Phoenix Desert/Rangeland S-Graph is used for this basin.
902          KM          Lag Used =  79.5 minutes
903          KM
904          BA   5.026
905          LG     .18     .32    6.00     .19   13.00
906          UI    213.    213.    213.    350.    627.    855.   1074.   1263.   1468.   1618.
907          UI   1802.   1910.   1972.   2040.   2040.   1999.   1927.   1825.   1618.   1479.
908          UI   1293.   1170.   1049.    949.    847.    763.    668.    607.    549.    475.
909          UI    425.    401.    346.    326.    291.    226.    226.    226.    153.    146.
910          UI    146.    146.    146.     93.     52.     52.     52.     52.     52.     52.
911          UI     52.     52.     52.     52.     52.     52.     52.     52.      0.      0.
912          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
1                                          HEC-1 INPUT                                          PAGE 22

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

913          KK    C400
914          KM      Combine hydrograph C400R w/runoff from S400L at C400.
915          HC       2
             *

916          KK  400410
917          KM   Modified pulse channel route from C400 to C410.
918          KM       Source:  Rating curve generated using HEC-RAS v1.1
919          RS       2    FLOW      -1
920          SV       0      96     183     250     281     319     346     375     400     424
921          SV     448     472     496     520     545     579     602     624     647     669
922          SQ       0    4000    8000   12000   14000   16000   18000   20000   22000   24000
923          SQ   26000   28000   30000   32000   34000   36000   38000   40000   42000   44000
924          SE    90.0    94.9    96.2    97.6    98.0    98.4    98.7    99.0    99.3    99.6
```

```
925          SE    99.8   100.1   100.3   100.6   100.8   101.1   101.3   101.5   101.7   101.9
926          RL                    0.60    90.0
             *

927          KK    S410
928          KM   Subbasin CC13
929          KM
930          KM      The Phoenix Desert/Rangeland S-Graph is used for this basin.
931          KM          Lag Used =  27.4 minutes
932          KM
933          BA   1.308
934          LG     .16     .28    7.60     .10    4.00
935          UI    161.    434.    924.   1306.   1515.   1481.   1190.    862.    632.    453.
936          UI    328.    248.    170.    117.    107.     39.     39.     39.     39.     39.
937          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
938          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

939          KK    C410
940          KM      Combine routed hydrograph from C400 w/runoff from S410 at C410.
941          HC       2
             *
942          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   34       S110L
                .
                .
   50           .       S110R
                .          .
                .          .
   68        C110............
                V
                V
   71      110120
                .
                .
   80           .        S120
                .          .
                .          .
   96        C120............
                V
                V
   99      120130
                .
                .
  108           .        S130
                .          .
                .          .
  121        C130............
                V
                V
  124      130140
                .
                .
  133           .        S140
                .          .
                .          .
  146        C140............
                V
                V
  149      140150
                .
                .
  158           .        S150
                .          .
                .          .
  170           .          .       S150R
                .          .          .
                .          .          .
  182        C150........................
                V
                V
  185      150160
                .
                .
  194           .        S160
                .          .
                .          .
  207        C160............
                V
                V
  210      160170
                .
                .
  218           .        S170
                .          .
                .          .
  230           .          .       S170R
                .          .          .
                .          .          .
  245        C170........................
```

```
                V
                V
248       170180
                .
                .
257             .        S180
                .           .
                .           .
271         C180............
                V
                V
274       180190
                .
                .
283             .       S190L
                .           .
                .           .
296             .           .       S190R
                .           .           .
                .           .           .
311         C190........................
                V
                V
314       190200
                .
                .
323             .        S200
                .           .
                .           .
335         C200............
                V
                V
338       200210
                .
                .
346             .        S210
                .           .
                .           .
363         C210............
                V
                V
366       210220
                .
                .
374             .        S220
                .           .
                .           .
387         C220............
                V
                V
390       220230
                .
                .
398             .        S230
                .           .
                .           .
411         C230............
                V
                V
414       230240
                .
                .
422             .        S240
                .           .
                .           .
435         C240............
                V
                V
438       240250
                .
                .
446             .        S250
                .           .
                .           .
460         C250............
                V
                V
463       250260
                .
                .
471             .       S260L
                .           .
                .           .
486             .           .       S260R
                .           .           .
                .           .           .
498         C260........................
                .
                .
501             .        S270
                .           V
                .           V
517             .      270300
                .           .
                .           .
525             .           .        S280
                .           .           V
```

```
                .          .          V
540             .          .     280295
                .          .          .
                .          .          .
548             .          .          .       S290
                .          .          .          .
                .          .          .          .
562             .          .       C295............
                .          .          V
                .          .          V
565             .          .     295300
                .          .          .
                .          .          .
574             .       C300............
                .          V
                .          V
577             .     300310
                .          .
                .          .
585             .          .       S310
                .          .          .
                .          .          .
598             .      C310L............
                .          .
                .          .
601          C310............
                V
                V
604        310390
                .
                .
612             .       S320
                .          V
                .          V
630             .     320340
                .          .
                .          .
638             .          .       S330
                .          .          V
                .          .          V
658             .          .     330340
                .          .          .
                .          .          .
666             .          .          .      S340L
                .          .          .          .
                .          .          .          .
684             .          .          .          .      S340R
                .          .          .          .          .
                .          .          .          .          .
704             .       C340..................................
                .          V
                .          V
707             .     340350
                .          .
                .          .
715             .          .       S350
                .          .          .
                .          .          .
733             .       C350............
                .          V
                .          V
736             .     350360
                .          .
                .          .
744             .          .       S360
                .          .          .
                .          .          .
762             .       C360............
                .          V
                .          V
765             .     360370
                .          .
                .          .
773             .          .       S370
                .          .          .
                .          .          .
793             .       C370............
                .          V
                .          V
796             .     370385
                .          .
                .          .
805             .          .       S380
                .          .          V
                .          .          V
825             .          .     380385
                .          .          .
                .          .          .
834             .       C385............
                .          V
                .          V
837             .     385390
                .          .
                .          .
845             .          .       S390
                .          .          .
                .          .          .
```

```
865          .       C390L............
             .          .
             .          .
868       C390............
             V
             V
871     390400
             .
             .
882          .        S400
             .          .
             .          .
895      C400R............
             .
             .
898          .       S400L
             .          .
             .          .
913       C400............
             V
             V
916     400410
             .
             .
927          .        S410
             .          .
             .          .
939       C410............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              MAY  1991               *
 *           VERSION 4.0.1E             *
 *                                      *
 *  RUN DATE  06/26/96  TIME  09:33:53  *
 *                                      *
 ****************************************

                                        ****************************************
                                        *                                      *
                                        *   U.S. ARMY CORPS OF ENGINEERS       *
                                        *   HYDROLOGIC ENGINEERING CENTER      *
                                        *          609 SECOND STREET           *
                                        *       DAVIS, CALIFORNIA 95616        *
                                        *          (916) 551-1748              *
                                        *                                      *
                                        ****************************************

                        Cave Creek Above Carefree Highway FPD Study       File: CC100-24.IH1
                           by  GVSCE for Maricopa County FCD 95-28    Original: 06-25-96     mcg
                           Project:          84                        Revised:

                        Cave Creek Watershed (just below Carefree Higway bridge)
                           100-year, 24-hr rainfall with SCS Type II distribution
                           Green & Ampt Loss Rate Method
                           NMIN = 5
                           Phoenix Mountain and Desert/Rangeland S-Graph
                           Clark Unit Hydrograph
                           Modified Puls channel storage routing

                           200 Scale 2' CI mapping of study reach by Aerial Mapping Company

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

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         900  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      4    0  ENDING DATE
                     NDTIME        0255  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL    0.08 HOURS
                       TOTAL TIME BASE   74.92 HOURS

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

 18 JD          INDEX STORM NO. 1
                       STRM        4.98  PRECIPITATION DEPTH
                       TRDA        0.01  TRANSPOSITION DRAINAGE AREA

 19 PI            PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

```
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
29 JD         INDEX STORM NO. 2
                STRM        4.97  PRECIPITATION DEPTH
                TRDA        1.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
30 JD         INDEX STORM NO. 3
                STRM        4.68  PRECIPITATION DEPTH
                TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
31 JD         INDEX STORM NO. 4
                STRM        4.53  PRECIPITATION DEPTH
                TRDA       20.00  TRANSPOSITION DRAINAGE AREA
```

```
 0 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                 0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                 0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

32 JD         INDEX STORM NO. 5
                STRM        4.26  PRECIPITATION DEPTH
                TRDA       70.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                 0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                 0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

33 JD         INDEX STORM NO. 6
                STRM        4.15  PRECIPITATION DEPTH
                TRDA      130.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.00
                 0.01      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.06      0.06
                 0.06      0.06      0.06      0.06      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 WARNING --- ROUTED OUTFLOW (  44962.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45717.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46225.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46495.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46538.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46364.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45989.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45445.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44757.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44998.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45734.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46203.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46431.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46433.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46222.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45820.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45253.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44544.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44810.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45556.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46065.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46334.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46375.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46200.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45826.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45285.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44598.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44845.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45575.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46043.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46269.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46270.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  46059.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45658.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  45093.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (  44386.) IS GREATER THAN MAXIMUM OUTFLOW (  44000.) IN STORAGE-OUTFLOW TABLE
1
                                        RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                TIME IN HOURS,  AREA IN SQUARE MILES

                                                PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
          OPERATION        STATION              FLOW    PEAK                                          AREA     STAGE    MAX STAGE
+                                                                  6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                           S110L               7509.   12.67       1865.       478.        159.      10.60
          HYDROGRAPH AT
+                           S110R               9212.   12.92       2860.       763.        255.      17.93
          2 COMBINED AT
+                             C110             15136.   12.83       4499.      1184.        395.      28.53
          ROUTED TO
+                          110120              14944.   12.92       4498.      1183.        395.      28.53
          HYDROGRAPH AT
```

+		S120	3123.	12.58	769.	203.	68.	4.77
+	2 COMBINED AT	C120	17293.	12.83	5132.	1352.	451.	33.31
+	ROUTED TO	120130	16828.	12.92	5124.	1350.	451.	33.31
+	HYDROGRAPH AT	S130	3342.	12.25	513.	135.	45.	2.88
+	2 COMBINED AT	C130	17526.	12.92	5530.	1458.	487.	36.18
+	ROUTED TO	130140	17396.	12.92	5528.	1457.	486.	36.18
+	HYDROGRAPH AT	S140	1846.	12.25	309.	80.	27.	1.84
+	2 COMBINED AT	C140	17929.	12.92	5768.	1520.	507.	38.02
+	ROUTED TO	140150	17572.	13.08	5750.	1516.	506.	38.02
+	HYDROGRAPH AT	S150	1381.	12.17	194.	54.	18.	1.07
+	HYDROGRAPH AT	S150R	2361.	12.17	347.	94.	31.	2.00
+	3 COMBINED AT	C150	17932.	13.08	6160.	1632.	545.	41.08
+	ROUTED TO	150160	17925.	13.08	6158.	1631.	545.	41.08
+	HYDROGRAPH AT	S160	1334.	12.25	226.	59.	20.	1.29
+	2 COMBINED AT	C160	18188.	13.08	6330.	1677.	560.	42.38
+	ROUTED TO	160170	18051.	13.17	6322.	1675.	559.	42.38
+	HYDROGRAPH AT	S170	1378.	12.17	183.	48.	16.	0.91
+	HYDROGRAPH AT	S170R	2742.	12.50	610.	164.	55.	3.42
+	3 COMBINED AT	C170	19152.	13.08	6941.	1843.	616.	46.71
+	ROUTED TO	170180	19074.	13.17	6934.	1842.	615.	46.71
+	HYDROGRAPH AT	S180	3283.	12.50	706.	184.	61.	3.80
+	2 COMBINED AT	C180	20249.	13.17	7491.	1988.	664.	50.51
+	ROUTED TO	180190	19633.	13.42	7450.	1981.	662.	50.51
+	HYDROGRAPH AT	S190L	3503.	12.25	538.	137.	46.	2.81
+	HYDROGRAPH AT	S190R	3666.	12.50	805.	213.	71.	4.37
+	3 COMBINED AT	C190	20761.	13.33	8471.	2256.	754.	57.69
+	ROUTED TO	190200	20566.	13.50	8432.	2252.	752.	57.69
+	HYDROGRAPH AT	S200	4911.	12.17	707.	190.	63.	3.95
+	2 COMBINED AT	C200	20679.	13.50	8941.	2400.	803.	61.64
+	ROUTED TO	200210	20482.	13.58	8910.	2392.	799.	61.64
+	HYDROGRAPH AT	S210	5895.	12.83	1814.	512.	171.	10.35
+	2 COMBINED AT	C210	23119.	13.58	10396.	2813.	942.	71.99
+	ROUTED TO	210220	22987.	13.67	10365.	2805.	938.	71.99

	HYDROGRAPH AT							
+		S220	4131.	12.25	725.	200.	67.	3.63
	2 COMBINED AT							
+		C220	23260.	13.58	10903.	2963.	992.	75.62
	ROUTED TO							
+		220230	23134.	13.67	10871.	2955.	988.	75.62
	HYDROGRAPH AT							
+		S230	2408.	12.25	406.	109.	36.	1.84
	2 COMBINED AT							
+		C230	23235.	13.67	11164.	3040.	1017.	77.46
	ROUTED TO							
+		230240	23199.	13.75	11148.	3037.	1016.	77.46
	HYDROGRAPH AT							
+		S240	2964.	12.33	541.	141.	47.	2.63
	2 COMBINED AT							
+		C240	23394.	13.75	11551.	3147.	1053.	80.09
	ROUTED TO							
+		240250	23213.	13.83	11504.	3137.	1049.	80.09
	HYDROGRAPH AT							
+		S250	5379.	12.50	1217.	326.	109.	5.89
	2 COMBINED AT							
+		C250	24045.	13.75	12448.	3400.	1137.	85.97
	ROUTED TO							
+		250260	24030.	13.83	12441.	3399.	1137.	85.97
	HYDROGRAPH AT							
+		S260L	3232.	12.50	759.	208.	70.	3.78
	HYDROGRAPH AT							
+		S260R	2410.	12.17	378.	102.	34.	1.65
	3 COMBINED AT							
+		C260	24661.	13.75	13281.	3640.	1218.	91.40
	HYDROGRAPH AT							
+		S270	3471.	12.75	989.	277.	93.	4.86
	ROUTED TO							
+		270300	3213.	13.17	977.	268.	89.	4.86
	HYDROGRAPH AT							
+		S280	4340.	12.58	1040.	280.	94.	5.93
	ROUTED TO							
+		280295	3983.	12.83	996.	250.	83.	5.93
	HYDROGRAPH AT							
+		S290	6269.	12.67	1446.	395.	132.	7.64
	2 COMBINED AT							
+		C295	9547.	12.75	2349.	623.	208.	13.57
	ROUTED TO							
+		295300	9465.	12.83	2345.	619.	206.	13.57
	2 COMBINED AT							
+		C300	11828.	12.83	3207.	856.	286.	18.44
	ROUTED TO							
+		300310	11751.	12.83	3201.	852.	284.	18.44
	HYDROGRAPH AT							
+		S310	2747.	12.33	444.	115.	38.	2.39
	2 COMBINED AT							
+		C310L	12838.	12.83	3571.	947.	316.	20.82
	2 COMBINED AT							
+		C310	30867.	13.33	16273.	4435.	1484.	112.23
	ROUTED TO							
+		310390	30821.	13.33	16256.	4430.	1481.	112.23
	HYDROGRAPH AT							
+		S320	945.	12.00	108.	31.	10.	0.45
	ROUTED TO							
+		320340	933.	12.08	108.	31.	10.	0.45
	HYDROGRAPH AT							
+		S330	284.	12.08	50.	15.	5.	0.16
	ROUTED TO							
+		330340	277.	12.17	50.	15.	5.	0.16
	HYDROGRAPH AT							

+		S340L	418.	12.08	53.	15.	5.	0.24
	HYDROGRAPH AT							
+		S340R	125.	12.00	19.	6.	2.	0.06
	4 COMBINED AT							
+		C340	1747.	12.08	230.	66.	22.	0.92
	ROUTED TO							
+		340350	1690.	12.17	230.	66.	22.	0.92
	HYDROGRAPH AT							
+		S350	315.	12.08	39.	11.	4.	0.16
	2 COMBINED AT							
+		C350	1987.	12.08	268.	77.	26.	1.08
	ROUTED TO							
+		350360	1868.	12.25	268.	77.	26.	1.08
	HYDROGRAPH AT							
+		S360	791.	12.25	131.	36.	12.	0.58
	2 COMBINED AT							
+		C360	2620.	12.25	393.	111.	37.	1.66
	ROUTED TO							
+		360370	2564.	12.33	392.	111.	37.	1.66
	HYDROGRAPH AT							
+		S370	634.	12.08	105.	33.	11.	0.34
	2 COMBINED AT							
+		C370	3011.	12.25	492.	142.	47.	2.00
	ROUTED TO							
+		370385	2979.	12.33	492.	142.	47.	2.00
	HYDROGRAPH AT							
+		S380	933.	12.00	105.	29.	10.	0.41
	ROUTED TO							
+		380385	886.	12.00	105.	29.	10.	0.41
	2 COMBINED AT							
+		C385	3416.	12.25	590.	169.	56.	2.42
	ROUTED TO							
+		385390	3370.	12.33	590.	169.	56.	2.42
	HYDROGRAPH AT							
+		S390	607.	12.08	82.	22.	7.	0.35
	2 COMBINED AT							
+		C390L	3798.	12.25	666.	189.	63.	2.76
	2 COMBINED AT							
+		C390	31176.	13.33	16751.	4579.	1532.	114.99
	ROUTED TO							
+		390400	30982.	13.50	16534.	4543.	1516.	114.99
	HYDROGRAPH AT							
+		S400	3541.	12.33	665.	179.	60.	3.06
	2 COMBINED AT							
+		C400R	31437.	13.42	16954.	4681.	1563.	118.05
	HYDROGRAPH AT							
+		S400L	3461.	13.00	1034.	283.	95.	5.03
	2 COMBINED AT							
+		C400	33856.	13.17	17746.	4904.	1638.	123.08
	ROUTED TO							
+		400410	33698.	13.33	17681.	4889.	1632.	123.08
	HYDROGRAPH AT							
+		S410	2169.	12.17	307.	79.	26.	1.31
	2 COMBINED AT							
+		C410	33771.	13.33	17817.	4947.	1651.	124.38

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

APPENDIX H

Andora Hills Wash 100-Year, 6-Hour HEC-1 Output

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              MAY   1991               *
 *           VERSION 4.0.1E              *
 *                                       *
 *  RUN DATE  06/27/96  TIME  10:16:19   *
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*          (916) 551-1748           *
*                                   *
*************************************
```

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

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

        1           ID        Cave Creek Above Carefree Highway FPD Study       File: AW100-6.IH1
        2           ID           by  GVSCE for Maricopa County FCD 95-28    Original: 06-17-96     mcg
        3           ID           Project:           84                        Revised:
        4           ID
        5           ID         Andora Hills Wash sub-watershed model
        6           ID           100-year, 6-hr rainfall with FCDMC Design Manual distribution
        7           ID           Green & Ampt Loss Rate Method
        8           ID           NMIN = 2
        9           ID           Clark Unit Hydrograph
       10           ID           Modified Puls, normal depth channel routing
                    *
                    *
                    *
       11           IT       2                     900
       12           IO       5
       13           IN      15
                    *
                    *DIAGRAM
                    *
                    *  Depth-Area reduction factors taken from Table 2.2 of FCDMC Design Manual
                    *
                    *  6-hr rainfall distributions per Table 2.4 and Figure 2.17 of Design Manual
                    *
       14           JD    3.40    0.01
       15           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       16           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       17           PC   0.962   0.972   0.983   0.991   1.000
       18           JD    3.38    0.50
       19           JD    3.30    2.80
       20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
       21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
       22           PC   0.950   0.963   0.975   0.988   1.000
                    *

       23           KK    S320
       24           KM   Subbasin   AHW1
       25           KM
       26           KM      The Clark Unit Hydrograph is used for this basin.
       27           KM          The HEC-1 time-area relation is used for this basin.
       28           KM
       29           KM      Time of Concentration for this subbasin is based on the following:
       30           KM          6-Hour Rainfall, Pattern No.  1.00
       31           KM          An rainfall areal reduction factor of 0.994
       32           KM
       33           KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
       34           KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
       35           KM   .51 .50 .50 .17 .14 .13 .06 .06 .05 .04 .04 .03 .01 .01 .01 .01 .01 .01
       36           KM
       37           KM          L=   0.950 miles, S=  201 feet/mile, Kb= .05
       38           KM
       39           BA   0.454
```

```
 40          LG    0.16    0.27    6.00    0.19   22.00
 41          UC   0.229   0.109
             *
1                                        HEC-1 INPUT                                                    PAGE  2

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


 42          KK  320340
 43          KM   Normal depth channel route from C320 to C340.
 44          KM       Source:  Hydrology Field Reconnaissance, page 1
 45          RS       1    FLOW      -1
 46          RC   0.080   0.040   0.080    1800  0.0139
 47          RX   980.0  1010.0  1021.8  1030.7  1053.0  1060.2  1069.2  1078.0
 48          RY    95.7    93.5    92.0    90.0    90.8    92.6    94.8    95.8
 49          RL                    0.15    90.0
             *

 50          KK    S330
 51          KM   Subbasin   AHW4
 52          KM
 53          KM      The Clark Unit Hydrograph is used for this basin.
 54          KM          The Urban time-area relation is used for this basin.
 55          KM
 56          KM      Time of Concentration for this subbasin is based on the following:
 57          KM          6-Hour Rainfall, Pattern No.  1.00
 58          KM          An rainfall areal reduction factor of 0.998
 59          KM
 60          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 61          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 62          KM   .53 .53 .53 .20 .17 .16 .08 .08 .08 .08 .07 .07 .01 .01 .01 .01 .01 .01
 63          KM
 64          KM          L=   1.210 miles, S=  111 feet/mile, Kb= .04
 65          KM
 66          BA   0.164
 67          LG    0.14    0.16    8.00    0.08   36.00
 68          UC   0.275   0.288
 69          UA       0       5      16      30      65      77      84      90      94      97
 70          UA     100
             *

 71          KK  330340
 72          KM   Normal depth channel route from C330 to C340.
 73          KM       Source:  Hydrology Field Reconnaissance, page 2
 74          RS       1    FLOW      -1
 75          RC   0.060   0.050   0.070    1400  0.0321
 76          RX  1000.0  1002.8  1010.2  1016.0  1018.8  1023.0  1052.0  1072.5
 77          RY    97.6    95.2    92.5    90.2    90.0    91.0    94.0    98.1
 78          RL                    0.15    90.0
             *

 79          KK   S340L
 80          KM   Subbasin  AHW3
 81          KM
 82          KM      The Clark Unit Hydrograph is used for this basin.
 83          KM          The HEC-1 time-area relation is used for this basin.
 84          KM
 85          KM      Time of Concentration for this subbasin is based on the following:
 86          KM          6-Hour Rainfall, Pattern No.  1.00
 87          KM          An rainfall areal reduction factor of 0.997
 88          KM
 89          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
1                                        HEC-1 INPUT                                                    PAGE  3

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

 90          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 91          KM   .50 .50 .50 .17 .13 .12 .05 .05 .05 .03 .02 .01 .00 .00 .00 .00 .00 .00
 92          KM
 93          KM          L=   0.970 miles, S=  350 feet/mile, Kb= .10
 94          KM
 95          BA   0.240
 96          LG    0.18    0.32    6.20    0.18   15.00
 97          UC   0.288   0.204
             *

 98          KK   S340R
 99          KM   Subbasin  AHW2
100          KM
101          KM      The Clark Unit Hydrograph is used for this basin.
102          KM          The Urban time-area relation is used for this basin.
103          KM
104          KM      Time of Concentration for this subbasin is based on the following:
105          KM          6-Hour Rainfall, Pattern No.  1.00
106          KM          An rainfall areal reduction factor of 0.999
107          KM
108          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
109          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
110          KM   .53 .52 .52 .19 .16 .16 .08 .08 .07 .07 .07 .06 .01 .01 .01 .01 .01 .01
```

```
 111          KM
 112          KM          L=   0.640 miles, S=  217 feet/mile, Kb= .06
 113          KM
 114          BA   0.065
 115          LG    0.13    0.19    6.60    0.14   43.00
 116          UC   0.196   0.201
 117          UA       0       5      16      30      65      77      84      90      94      97
 118          UA     100
              *

 119          KK    C340
 120          KM      Combine routed hydrographs from C320 and C340 w/runoff from S340L & S340R.
 121          HC       4
              *

 122          KK  340350
 123          KM   Normal depth channel route from C340 to C350.
 124          KM       Source:  Hydrology Field Reconnaissance, page 3
 125          RS       2    FLOW      -1
 126          RC   0.085   0.030   0.060    2100  0.0119
 127          RX   997.5  1017.5  1029.0  1029.5  1047.2  1047.7  1065.1  1081.3
 128          RY    96.2    92.7    90.6    90.2    90.0    90.5    93.1    96.3
 129          RL                    0.15    90.0
              *

 130          KK    S350
 131          KM   Subbasin   AHW5
 132          KM
 133          KM      The Clark Unit Hydrograph is used for this basin.
 134          KM          The HEC-1 time-area relation is used for this basin.
 135          KM
 136          KM      Time of Concentration for this subbasin is based on the following:
1                                        HEC-1 INPUT                                          PAGE  4

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

 137          KM          6-Hour Rainfall, Pattern No.  1.00
 138          KM          An rainfall areal reduction factor of 0.998
 139          KM
 140          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 141          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 142          KM   .51 .51 .51 .17 .14 .13 .06 .06 .06 .04 .04 .03 .01 .01 .01 .01 .01 .01
 143          KM
 144          KM          L=   0.660 miles, S=  219 feet/mile, Kb= .08
 145          KM
 146          BA   0.161
 147          LG    0.16    0.28    6.00    0.18   23.00
 148          UC   0.238   0.152
              *

 149          KK    C350
 150          KM      Combine routed hydrograph from C340 w/runoff from S350 at C350.
 151          HC       2
              *

 152          KK  350360
 153          KM   Normal depth channel route from C350 to C360.
 154          KM       Source:  Hydrology Field Reconnaissance, page 4
 155          RS       4    FLOW      -1
 156          RC   0.070   0.045   0.070    4700  0.0213
 157          RX  1000.0  1010.5  1032.2  1045.4  1060.2  1067.5  1107.6  1135.8
 158          RY    97.1    93.4    92.0    90.0    90.2    93.6    93.5    96.5
 159          RL                    0.15    90.0
              *

 160          KK    S360
 161          KM   Subbasin   AHW6
 162          KM
 163          KM      The Clark Unit Hydrograph is used for this basin.
 164          KM          The HEC-1 time-area relation is used for this basin.
 165          KM
 166          KM      Time of Concentration for this subbasin is based on the following:
 167          KM          6-Hour Rainfall, Pattern No.  1.08
 168          KM          An rainfall areal reduction factor of 0.992
 169          KM
 170          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 171          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 172          KM   .48 .48 .48 .17 .14 .13 .06 .06 .06 .04 .03 .02 .00 .00 .00 .00 .00 .00
 173          KM
 174          KM          L=   1.590 miles, S=  141 feet/mile, Kb= .09
 175          KM
 176          BA   0.578
 177          LG    0.18    0.32    6.40    0.16   15.00
 178          UC   0.550   0.377
              *
1                                        HEC-1 INPUT                                          PAGE  5

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

```
179          KK    C360
180          KM      Combine routed hydrograph from C350 w/runoff from S360 at C360.
181          HC       2
             *

182          KK  360370
183          KM   Normal depth channel route from C360 to C370.
184          KM       Source:  Hydrology Field Reconnaissance, page 5
185          RS       1    FLOW      -1
186          RC   0.050   0.030   0.060    3600  0.0222
187          RX  1000.0  1013.0  1023.0  1026.4  1040.0  1045.0  1052.9  1060.8
188          RY    98.7    91.6    90.8    90.0    90.6    91.6    95.8   100.0
189          RL                   0.30    90.0
             *

190          KK    S370
191          KM   Subbasin   AHW7
192          KM
193          KM      The Clark Unit Hydrograph is used for this basin.
194          KM          The Urban time-area relation is used for this basin.
195          KM
196          KM      Time of Concentration for this subbasin is based on the following:
197          KM          6-Hour Rainfall, Pattern No.  1.00
198          KM          An rainfall areal reduction factor of 0.996
199          KM
200          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
201          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
202          KM   .53 .53 .53 .20 .16 .16 .08 .08 .07 .07 .07 .07 .01 .01 .01 .01 .01 .01
203          KM
204          KM          L=   1.500 miles, S=  137 feet/mile, Kb= .04
205          KM
206          BA   0.341
207          LG    0.11    0.21    7.00    0.11   49.00
208          UC   0.292   0.241
209          UA       0       5      16      30      65      77      84      90      94      97
210          UA     100
             *

211          KK    C370
212          KM      Combine routed hydrograph from C360 w/runoff from S370 at C370.
213          HC       2
             *

214          KK  370385
215          KM   Normal depth channel route from C370 to C385.
216          KM       Source:  Hydrology Field Reconnaissance, page 6
217          KM       End points were extended at a slope of 1:10 due to golf course
218          RS       1    FLOW      -1
219          RC   0.025   0.025   0.025    2800  0.0132
220          RX   968.5  1008.5  1014.0  1014.5  1026.8  1027.3  1040.2  1071.8
221          RY    97.9    93.9    91.4    90.0    90.5    91.4    93.6    97.9
222          RL                   0.35    90.0
             *
```



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

223          KK    S380
224          KM   Subbasin   AHW8
225          KM
226          KM      The Clark Unit Hydrograph is used for this basin.
227          KM          The Urban time-area relation is used for this basin.
228          KM
229          KM      Time of Concentration for this subbasin is based on the following:
230          KM          6-Hour Rainfall, Pattern No.  1.00
231          KM          An rainfall areal reduction factor of 0.995
232          KM
233          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
234          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
235          KM   .52 .51 .51 .18 .15 .14 .07 .07 .06 .05 .05 .05 .00 .00 .00 .00 .00 .00
236          KM
237          KM          L=   0.980 miles, S=  317 feet/mile, Kb= .04
238          KM
239          BA   0.415
240          LG    0.18    0.21    7.00    0.12   15.00
241          UC   0.179   0.089
242          UA       0       5      16      30      65      77      84      90      94      97
243          UA     100
             *

244          KK  380385
245          KM   Normal depth channel route from C380 to C385.
246          KM       Source:  Hydrology Field Reconnaissance, page 8
247          KM       End points were extended
248          RS       1    FLOW      -1
249          RC   0.060   0.035   0.060    2900  0.0110
250          RX  1000.0  1016.4  1025.9  1032.9  1042.6  1049.3  1059.5  1071.0
```

```
 251          RY    96.4    92.6    90.8    90.0    90.2    91.0    92.6    95.6
 252          RL                    0.10    90.0
              *

 253          KK    C385
 254          KM      Combine routed hydrographs from C370 and C380 at C385.
 255          HC       2
              *

 256          KK  385390
 257          KM   Normal depth channel route from C385 to C390.
 258          KM       Source:  Hydrology Field Reconnaissance, page 7
 259          RS       1    FLOW      -1
 260          RC   0.070   0.035   0.060    2600  0.0223
 261          RX   998.0  1002.0  1012.5  1020.7  1028.2  1031.9  1041.7  1072.7
 262          RY    98.3    96.1    91.2    90.3    90.0    91.8    92.4    98.3
 263          RL                    0.05    90.0
              *
1                                          HEC-1 INPUT                                          PAGE  7

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


 264          KK    S390
 265          KM   Subbasin   AHW9
 266          KM
 267          KM      The Clark Unit Hydrograph is used for this basin.
 268          KM          The Urban time-area relation is used for this basin.
 269          KM
 270          KM      Time of Concentration for this subbasin is based on the following:
 271          KM          6-Hour Rainfall, Pattern No.  1.00
 272          KM          An rainfall areal reduction factor of 0.995
 273          KM
 274          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 275          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 276          KM   .51 .50 .50 .17 .14 .13 .06 .06 .05 .04 .04 .03 .00 .00 .00 .00 .00 .00
 277          KM
 278          KM          L=   1.520 miles, S=  158 feet/mile, Kb= .04
 279          KM
 280          BA   0.347
 281          LG    0.15    0.28    6.60    0.15   15.00
 282          UC   0.283   0.233
 283          UA       0       5      16      30      65      77      84      90      94      97
 284          UA     100
              *

 285          KK   C390L
 286          KM      Combine routed hydrograph from C385 w/runoff from S390 at C390L.
 287          HC       2
              *
 288          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23        S320
                 V
                 V
    42      320340
                 .
                 .
    50           .        S330
                 .           V
                 .           V
    71           .      330340
                 .           .
                 .           .
    79           .           .       S340L
                 .           .           .
                 .           .           .
    98           .           .           .       S340R
                 .           .           .           .
                 .           .           .           .
   119        C340.................................
                 V
                 V
   122      340350
                 .
                 .
   130           .        S350
                 .           .
                 .           .
   149        C350............
                 V
                 V
   152      350360
```

```
                .
                .
  160           .        S360
                .           .
                .           .
  179        C360............
                V
                V
  182      360370
                .
                .
  190           .        S370
                .           .
                .           .
  211        C370............
                V
                V
  214      370385
                .
                .
  223           .        S380
                .           V
                .           V
  244           .      380385
                .           .
                .           .
  253        C385............
                V
                V
  256      385390
                .
                .
  264           .        S390
                .           .
                .           .
  285       C390L............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY   1991              *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E             *                                    *         609 SECOND STREET            *
 *                                      *                                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE  06/27/96  TIME  10:16:19  *                                    *          (916) 551-1748              *
 *                                      *                                    *                                      *
 ****************************************                                    ****************************************


                                Cave Creek Above Carefree Highway FPD Study       File: AW100-6.IH1
                                   by  GVSCE for Maricopa County FCD 95-28    Original: 06-17-96     mcg
                                   Project:          84                        Revised:

                                 Andora Hills Wash sub-watershed model
                                   100-year, 6-hr rainfall with FCDMC Design Manual distribution
                                   Green & Ampt Loss Rate Method
                                   NMIN = 2
                                   Clark Unit Hydrograph
                                   Modified Puls, normal depth channel routing

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

     IT          HYDROGRAPH TIME DATA
                        NMIN           2  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         900  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME        0558  ENDING TIME
                       ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL    0.03 HOURS
                        TOTAL TIME BASE   29.97 HOURS

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

```
14 JD          INDEX STORM NO. 1
                     STRM        3.40  PRECIPITATION DEPTH
                     TRDA        0.01  TRANSPOSITION DRAINAGE AREA

15 PI            PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                   0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

18 JD          INDEX STORM NO. 2
                     STRM        3.38  PRECIPITATION DEPTH
                     TRDA        0.50  TRANSPOSITION DRAINAGE AREA

 0 PI            PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                   0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

19 JD          INDEX STORM NO. 3
                     STRM        3.30  PRECIPITATION DEPTH
                     TRDA        2.80  TRANSPOSITION DRAINAGE AREA

20 PI            PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.03      0.03      0.03      0.03      0.03
                   0.03      0.03      0.03      0.03      0.03      0.03      0.03      0.03      0.03      0.03
                   0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
1
                                                  RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES

                                     PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
        OPERATION        STATION     FLOW    PEAK                                           AREA      STAGE     MAX STAGE
+                                                        6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                          S320     1385.    4.07         109.         27.         22.      0.45

        ROUTED TO
+                        320340     1325.    4.10         109.         27.         22.      0.45

        HYDROGRAPH AT
+                          S330      388.    4.10          47.         12.         10.      0.16
```

+	ROUTED TO	330340	376.	4.13	47.	12.	10.	0.16
+	HYDROGRAPH AT	S340L	568.	4.13	54.	14.	11.	0.24
+	HYDROGRAPH AT	S340R	181.	4.07	19.	5.	4.	0.06
+	4 COMBINED AT	C340	2070.	4.10	222.	56.	45.	0.92
+	ROUTED TO	340350	2025.	4.17	222.	56.	45.	0.92
+	HYDROGRAPH AT	S350	447.	4.07	39.	10.	8.	0.16
+	2 COMBINED AT	C350	2260.	4.13	258.	65.	52.	1.08
+	ROUTED TO	350360	2146.	4.27	257.	64.	52.	1.08
+	HYDROGRAPH AT	S360	895.	4.33	131.	33.	26.	0.58
+	2 COMBINED AT	C360	2615.	4.30	374.	94.	75.	1.66
+	ROUTED TO	360370	2572.	4.33	373.	94.	75.	1.66
+	HYDROGRAPH AT	S370	862.	4.10	101.	25.	20.	0.34
+	2 COMBINED AT	C370	2902.	4.33	466.	117.	94.	2.00
+	ROUTED TO	370385	2870.	4.37	465.	117.	94.	2.00
+	HYDROGRAPH AT	S380	1419.	4.03	103.	26.	21.	0.41
+	ROUTED TO	380385	1273.	4.07	103.	26.	21.	0.41
+	2 COMBINED AT	C385	3192.	4.33	557.	140.	112.	2.42
+	ROUTED TO	385390	3166.	4.37	557.	140.	112.	2.42
+	HYDROGRAPH AT	S390	829.	4.10	82.	21.	16.	0.35
+	2 COMBINED AT	C390L	3456.	4.33	627.	158.	126.	2.76

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

APPENDIX I

Andora Hills Wash 100-Year, 24-Hour HEC-1 Output

```
1*************************************                                    *************************************
 *                                   *                                    *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*                                    *   U.S. ARMY CORPS OF ENGINEERS    *
 *             MAY   1991            *                                    *   HYDROLOGIC ENGINEERING CENTER   *
 *           VERSION 4.0.1E          *                                    *         609 SECOND STREET         *
 *                                   *                                    *      DAVIS, CALIFORNIA 95616      *
 *  RUN DATE  06/27/96  TIME  10:15:54*                                    *          (916) 551-1748           *
 *                                   *                                    *                                   *
 *************************************                                    *************************************

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

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

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

```
1                                                HEC-1 INPUT                                                    PAGE  1

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

        1           ID        Cave Creek Above Carefree Highway FPD Study       File: AW100-24.IH1
        2           ID           by  GVSCE for Maricopa County FCD 95-28    Original: 06-17-96     mcg
        3           ID           Project:           84                        Revised:
        4           ID
        5           ID         Andora Hills Wash sub-watershed model
        6           ID           100-year, 24-hr rainfall with SCS Type II distribution
        7           ID           Green & Ampt Loss Rate Method
        8           ID           NMIN = 2
        9           ID           Clark Unit Hydrograph
       10           ID           Modified Puls, normal depth channel routing
                    *
                    *
                    *
       11           IT       2                     900
       12           IO       5
       13           IN      15
                    *
                    *DIAGRAM
                    *
                    *  Depth-Area reduction factors based on Table 2.1a of FCDMC Design Manual.
                    *
                    *  PC records are a 24-hour SCS Type II rainfall distribution.
                    *
       14           JD    4.60    0.01
       15           PC   0.000   0.002   0.005   0.008   0.011   0.013   0.016   0.019   0.022   0.025
       16           PC   0.028   0.032   0.035   0.038   0.041   0.044   0.048   0.053   0.056   0.060
       17           PC   0.063   0.067   0.071   0.075   0.080   0.084   0.089   0.093   0.098   0.103
       18           PC   0.109   0.114   0.120   0.127   0.133   0.140   0.147   0.155   0.163   0.172
       19           PC   0.181   0.192   0.204   0.220   0.235   0.259   0.283   0.473   0.663   0.699
       20           PC   0.735   0.754   0.772   0.785   0.799   0.810   0.820   0.829   0.838   0.846
       21           PC   0.854   0.861   0.868   0.874   0.880   0.885   0.891   0.900   0.902   0.910
       22           PC   0.912   0.920   0.921   0.926   0.929   0.930   0.937   0.941   0.945   0.950
       23           PC   0.952   0.957   0.959   0.962   0.965   0.970   0.972   0.973   0.978   0.981
       24           PC   0.984   0.987   0.989   0.992   0.995   0.998   1.000
       25           JD    4.57    1.00
       26           JD    4.46    5.00
                    *

       27           KK    S320
       28           KM   Subbasin   AHW1
       29           KM
       30           KM      The Clark Unit Hydrograph is used for this basin.
       31           KM          The HEC-1 time-area relation is used for this basin.
       32           KM
       33           KM      Time of Concentration for this subbasin is based on the following:
       34           KM          An rainfall areal reduction factor of 1.000
       35           KM
       36           KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
       37           KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
       38           KM   .32 .32 .32 .32 .32 .32 .04 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
       39           KM
```

```
  40        KM          L=   0.950 miles, S=  201 feet/mile, Kb= .05
  41        KM
  42        BA   0.454
  43        LG    0.16    0.27    6.00    0.19   22.00
1                                   HEC-1 INPUT                                                    PAGE  2

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

  44        UC   0.271   0.131
            *

  45        KK  320340
  46        KM   Normal depth channel route from C320 to C340.
  47        KM       Source:  Hydrology Field Reconnaissance, page 1
  48        RS       1    FLOW      -1
  49        RC   0.080   0.040   0.080    1800  0.0139
  50        RX   980.0  1010.0  1021.8  1030.7  1053.0  1060.2  1069.2  1078.0
  51        RY    95.7    93.5    92.0    90.0    90.8    92.6    94.8    95.8
  52        RL                    0.15    90.0
            *

  53        KK    S330
  54        KM   Subbasin   AHW4
  55        KM
  56        KM      The Clark Unit Hydrograph is used for this basin.
  57        KM          The Urban time-area relation is used for this basin.
  58        KM
  59        KM      Time of Concentration for this subbasin is based on the following:
  60        KM          An rainfall areal reduction factor of 1.000
  61        KM
  62        KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
  63        KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
  64        KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
  65        KM
  66        KM          L=   1.210 miles, S=  111 feet/mile, Kb= .04
  67        KM
  68        BA   0.164
  69        LG    0.14    0.16    8.00    0.08   36.00
  70        UC   0.321   0.342
  71        UA       0       5      16      30      65      77      84      90      94      97
  72        UA     100
            *

  73        KK  330340
  74        KM   Normal depth channel route from C330 to C340.
  75        KM       Source:  Hydrology Field Reconnaissance, page 2
  76        RS       1    FLOW      -1
  77        RC   0.060   0.050   0.070    1400  0.0321
  78        RX  1000.0  1002.8  1010.2  1016.0  1018.8  1023.0  1052.0  1072.5
  79        RY    97.6    95.2    92.5    90.2    90.0    91.0    94.0    98.1
  80        RL                    0.15    90.0
            *

  81        KK   S340L
  82        KM   Subbasin  AHW3
  83        KM
  84        KM      The Clark Unit Hydrograph is used for this basin.
  85        KM          The HEC-1 time-area relation is used for this basin.
  86        KM
  87        KM      Time of Concentration for this subbasin is based on the following:
  88        KM          An rainfall areal reduction factor of 1.000
  89        KM
  90        KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
1                                   HEC-1 INPUT                                                    PAGE  3

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

  91        KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
  92        KM   .32 .32 .31 .31 .31 .31 .03 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
  93        KM
  94        KM          L=   0.970 miles, S=  350 feet/mile, Kb= .10
  95        KM
  96        BA   0.240
  97        LG    0.18    0.32    6.20    0.18   15.00
  98        UC   0.333   0.241
            *

  99        KK   S340R
 100        KM   Subbasin  AHW2
 101        KM
 102        KM      The Clark Unit Hydrograph is used for this basin.
 103        KM          The Urban time-area relation is used for this basin.
 104        KM
 105        KM      Time of Concentration for this subbasin is based on the following:
 106        KM          An rainfall areal reduction factor of 1.000
 107        KM
 108        KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 109        KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 110        KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
```

```
 111          KM
 112          KM          L=   0.640 miles, S=  217 feet/mile, Kb= .06
 113          KM
 114          BA   0.065
 115          LG    0.13    0.19    6.60    0.14   43.00
 116          UC   0.233   0.244
 117          UA      0       5      16      30      65      77      84      90      94      97
 118          UA    100
              *

 119          KK    C340
 120          KM      Combine routed hydrographs from C320 and C340 w/runoff from S340L & S340R.
 121          HC       4
              *

 122          KK  340350
 123          KM   Normal depth channel route from C340 to C350.
 124          KM       Source:  Hydrology Field Reconnaissance, page 3
 125          RS       1    FLOW      -1
 126          RC   0.085   0.030   0.060    2100  0.0119
 127          RX   997.5  1017.5  1029.0  1029.5  1047.2  1047.7  1065.1  1081.3
 128          RY    96.2    92.7    90.6    90.2    90.0    90.5    93.1    96.3
 129          RL                    0.15    90.0
              *

 130          KK    S350
 131          KM   Subbasin   AHW5
 132          KM
 133          KM      The Clark Unit Hydrograph is used for this basin.
 134          KM          The HEC-1 time-area relation is used for this basin.
 135          KM
 136          KM      Time of Concentration for this subbasin is based on the following:
 137          KM          An rainfall areal reduction factor of 1.000
```



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

 138          KM
 139          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 140          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 141          KM   .32 .32 .32 .32 .32 .32 .04 .04 .04 .04 .04 .03 .01 .01 .01 .01 .01 .01
 142          KM
 143          KM          L=   0.660 miles, S=  219 feet/mile, Kb= .08
 144          KM
 145          BA   0.161
 146          LG    0.16    0.28    6.00    0.18   23.00
 147          UC   0.279   0.182
              *

 148          KK    C350
 149          KM      Combine routed hydrograph from C340 w/runoff from S350 at C350.
 150          HC       2
              *

 151          KK  350360
 152          KM   Normal depth channel route from C350 to C360.
 153          KM       Source:  Hydrology Field Reconnaissance, page 4
 154          RS       4    FLOW      -1
 155          RC   0.070   0.045   0.070    4700  0.0213
 156          RX  1000.0  1010.5  1032.2  1045.4  1060.2  1067.5  1107.6  1135.8
 157          RY    97.1    93.4    92.0    90.0    90.2    93.6    93.5    96.5
 158          RL                    0.15    90.0
              *

 159          KK    S360
 160          KM   Subbasin   AHW6
 161          KM
 162          KM      The Clark Unit Hydrograph is used for this basin.
 163          KM          The HEC-1 time-area relation is used for this basin.
 164          KM
 165          KM      Time of Concentration for this subbasin is based on the following:
 166          KM          An rainfall areal reduction factor of 1.000
 167          KM
 168          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 169          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 170          KM   .32 .32 .32 .32 .31 .31 .03 .03 .03 .03 .03 .03 .01 .01 .01 .01 .01 .01
 171          KM
 172          KM          L=   1.590 miles, S=  141 feet/mile, Kb= .09
 173          KM
 174          BA   0.578
 175          LG    0.18    0.32    6.40    0.16   15.00
 176          UC   0.550   0.377
              *

 177          KK    C360
 178          KM      Combine routed hydrograph from C350 w/runoff from S360 at C360.
 179          HC       2
              *
```

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

 180          KK  360370
 181          KM   Normal depth channel route from C360 to C370.
 182          KM       Source:  Hydrology Field Reconnaissance, page 5
 183          RS       1    FLOW      -1
 184          RC   0.050   0.030   0.060    3600  0.0222
 185          RX  1000.0  1013.0  1023.0  1026.4  1040.0  1045.0  1052.9  1060.8
 186          RY    98.7    91.6    90.8    90.0    90.6    91.6    95.8   100.0
 187          RL                    0.30    90.0
              *

 188          KK    S370
 189          KM   Subbasin   AHW7
 190          KM
 191          KM      The Clark Unit Hydrograph is used for this basin.
 192          KM          The Urban time-area relation is used for this basin.
 193          KM
 194          KM      Time of Concentration for this subbasin is based on the following:
 195          KM          An rainfall areal reduction factor of 1.000
 196          KM
 197          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 198          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 199          KM   .34 .34 .33 .33 .33 .33 .05 .05 .05 .05 .05 .05 .03 .03 .03 .03 .03 .03
 200          KM
 201          KM          L=   1.500 miles, S=  137 feet/mile, Kb= .04
 202          KM
 203          BA   0.341
 204          LG    0.11    0.21    7.00    0.11   49.00
 205          UC   0.333   0.279
 206          UA       0       5      16      30      65      77      84      90      94      97
 207          UA     100
              *

 208          KK    C370
 209          KM      Combine routed hydrograph from C360 w/runoff from S370 at C370.
 210          HC       2
              *

 211          KK  370385
 212          KM   Normal depth channel route from C370 to C385.
 213          KM       Source:  Hydrology Field Reconnaissance, page 6
 214          KM       End points were extended at a slope of 1:10 due to golf course
 215          RS       2    FLOW      -1
 216          RC   0.025   0.025   0.025    2800  0.0132
 217          RX   968.5  1008.5  1014.0  1014.5  1026.8  1027.3  1040.2  1071.8
 218          RY    97.9    93.9    91.4    90.0    90.5    91.4    93.6    97.9
 219          RL                    0.35    90.0
              *

 220          KK    S380
 221          KM   Subbasin   AHW8
 222          KM
 223          KM      The Clark Unit Hydrograph is used for this basin.
 224          KM          The Urban time-area relation is used for this basin.
 225          KM
```



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

 226          KM      Time of Concentration for this subbasin is based on the following:
 227          KM          An rainfall areal reduction factor of 1.000
 228          KM
 229          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 230          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 231          KM   .33 .33 .33 .32 .32 .32 .04 .04 .04 .04 .04 .04 .02 .02 .02 .02 .02 .02
 232          KM
 233          KM          L=   0.980 miles, S=  317 feet/mile, Kb= .04
 234          KM
 235          BA   0.415
 236          LG    0.18    0.21    7.00    0.12   15.00
 237          UC   0.213   0.108
 238          UA       0       5      16      30      65      77      84      90      94      97
 239          UA     100
              *

 240          KK  380385
 241          KM   Normal depth channel route from C380 to C385.
 242          KM       Source:  Hydrology Field Reconnaissance, page 8
 243          KM       End points were extended
 244          RS       2    FLOW      -1
 245          RC   0.060   0.035   0.060    2900  0.0110
 246          RX  1000.0  1016.4  1025.9  1032.9  1042.6  1049.3  1059.5  1071.0
 247          RY    96.4    92.6    90.8    90.0    90.2    91.0    92.6    95.6
 248          RL                    0.10    90.0
              *

 249          KK    C385
```

```
 250          KM      Combine routed hydrographs from C370 and C380 at C385.
 251          HC       2
              *

 252          KK  385390
 253          KM   Normal depth channel route from C385 to C390.
 254          KM       Source:  Hydrology Field Reconnaissance, page 7
 255          RS       2    FLOW     -1
 256          RC   0.070   0.035   0.060    2600  0.0223
 257          RX   998.0  1002.0  1012.5  1020.7  1028.2  1031.9  1041.7  1072.7
 258          RY    98.3    96.1    91.2    90.3    90.0    91.8    92.4    98.3
 259          RL                    0.05    90.0
              *

 260          KK    S390
 261          KM   Subbasin   AHW9
 262          KM
 263          KM      The Clark Unit Hydrograph is used for this basin.
 264          KM          The Urban time-area relation is used for this basin.
 265          KM
 266          KM      Time of Concentration for this subbasin is based on the following:
 267          KM          An rainfall areal reduction factor of 1.000
 268          KM
 269          KM       EXCESS RAINFALL VALUES EXCEEDED IN 5-MINUTE INTERVALS
 270          KM     5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
 271          KM   .32 .32 .32 .32 .32 .32 .04 .04 .04 .04 .04 .04 .01 .01 .01 .01 .01 .01
 272          KM
1                                                HEC-1 INPUT                                                    PAGE  7

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

 273          KM          L=   1.520 miles, S=  158 feet/mile, Kb= .04
 274          KM
 275          BA   0.347
 276          LG    0.15    0.28    6.60    0.15   15.00
 277          UC   0.329   0.275
 278          UA       0       5      16      30      65      77      84      90      94      97
 279          UA     100
              *

 280          KK   C390L
 281          KM      Combine routed hydrograph from C385 w/runoff from S390 at C390L.
 282          HC       2
              *
 283          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    27        S320
                V
                V
    45      320340
                .
                .
    53          .        S330
                .           V
                .           V
    73          .      330340
                .           .
                .           .
    81          .           .       S340L
                .           .           .
                .           .           .
    99          .           .           .       S340R
                .           .           .           .
                .           .           .           .
   119        C340.................................
                V
                V
   122      340350
                .
                .
   130          .        S350
                .           .
                .           .
   148        C350............
                V
                V
   151      350360
                .
                .
   159          .        S360
                .           .
                .           .
   177        C360............
```

```
                V
                V
  180       360370
                .
                .
  188           .        S370
                .           .
                .           .
  208         C370............
                V
                V
  211       370385
                .
                .
  220           .        S380
                .           V
                .           V
  240           .      380385
                .           .
                .           .
  249         C385............
                V
                V
  252       385390
                .
                .
  260           .        S390
                .           .
                .           .
  280         C390L...........

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ****************************************
*                                        *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              MAY   1991                *                                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.0.1E               *                                    *          609 SECOND STREET           *
*                                        *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE  06/27/96  TIME  10:15:54    *                                    *           (916) 551-1748             *
*                                        *                                    *                                      *
****************************************                                    ****************************************


                                Cave Creek Above Carefree Highway FPD Study       File: AW100-24.IH1
                                   by  GVSCE for Maricopa County FCD 95-28    Original: 06-17-96     mcg
                                   Project:          84                        Revised:

                                 Andora Hills Wash sub-watershed model
                                   100-year, 24-hr rainfall with SCS Type II distribution
                                   Green & Ampt Loss Rate Method
                                   NMIN = 2
                                   Clark Unit Hydrograph
                                   Modified Puls, normal depth channel routing

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

     IT          HYDROGRAPH TIME DATA
                        NMIN           2  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         900  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME        0558  ENDING TIME
                       ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL    0.03 HOURS
                        TOTAL TIME BASE   29.97 HOURS

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

  14 JD          INDEX STORM NO. 1
                        STRM        4.60  PRECIPITATION DEPTH
                        TRDA        0.01  TRANSPOSITION DRAINAGE AREA

  15 PI            PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
25 JD          INDEX STORM NO. 2
                  STRM        4.57  PRECIPITATION DEPTH
                  TRDA        1.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
                  0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00        0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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26 JD INDEX STORM NO. 3

STRM 4.46 PRECIPITATION DEPTH

TRDA 5.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S320	866.	12.03	97.	28.	22.	0.45		
+	ROUTED TO	320340	852.	12.07	97.	28.	22.	0.45		
+	HYDROGRAPH AT	S330	262.	12.10	45.	13.	11.	0.16		
+	ROUTED TO	330340	257.	12.13	45.	13.	11.	0.16		
+	HYDROGRAPH AT	S340L	381.	12.10	48.	13.	11.	0.24		
+	HYDROGRAPH AT	S340R	117.	12.07	17.	5.	4.	0.06		
+	4 COMBINED AT	C340	1591.	12.10	207.	60.	48.	0.92		
+	ROUTED TO	340350	1558.	12.13	207.	60.	48.	0.92		
+	HYDROGRAPH AT	S350	289.	12.07	35.	10.	8.	0.16		
+	2 COMBINED AT	C350	1827.	12.13	241.	69.	56.	1.08		

	ROUTED TO							
+		350360	1754.	12.27	241.	69.	56.	1.08
	HYDROGRAPH AT							
+		S360	716.	12.23	117.	32.	26.	0.58
	2 COMBINED AT							
+		C360	2450.	12.27	355.	101.	81.	1.66
	ROUTED TO							
+		360370	2414.	12.30	354.	100.	81.	1.66
	HYDROGRAPH AT							
+		S370	584.	12.10	95.	30.	24.	0.34
	2 COMBINED AT							
+		C370	2814.	12.27	446.	129.	104.	2.00
	ROUTED TO							
+		370385	2794.	12.33	446.	129.	104.	2.00
	HYDROGRAPH AT							
+		S380	849.	12.00	94.	26.	21.	0.41
	ROUTED TO							
+		380385	834.	12.07	94.	26.	21.	0.41
	2 COMBINED AT							
+		C385	3204.	12.23	536.	154.	123.	2.42
	ROUTED TO							
+		385390	3194.	12.30	536.	154.	123.	2.42
	HYDROGRAPH AT							
+		S390	554.	12.10	72.	20.	16.	0.35
	2 COMBINED AT							
+		C390L	3568.	12.27	606.	173.	139.	2.76

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF

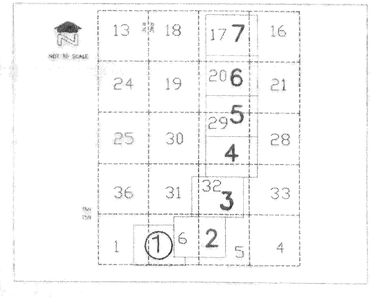
CAVE CREEK

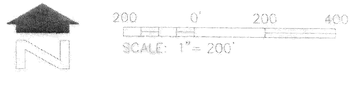
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP





GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK	FEDMC	12/96
PLATS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 7

Dwg. Name: P:\9240\4003\ACAD\CCSHEET.dwg
Date: REV. DEC. 17, 1996 04:44 pm

AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 1-8-97

AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

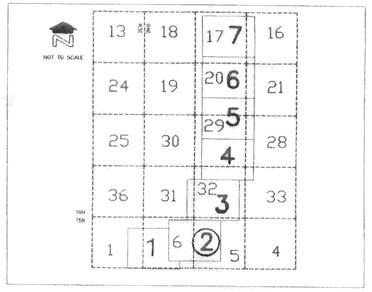
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 7

Dwg. Name: \P:\92404003\ACAD\CCSHEETX.dwg
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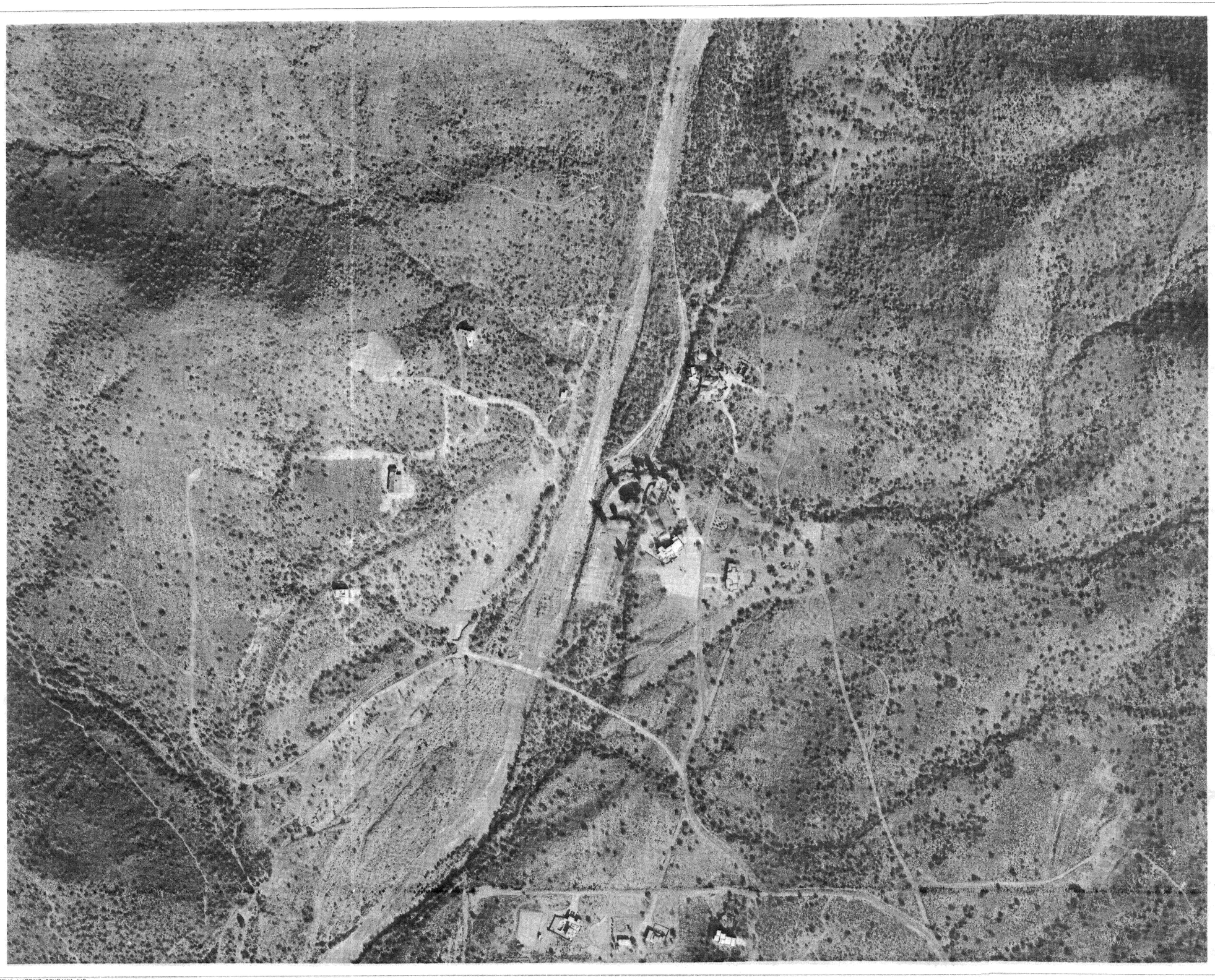


AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

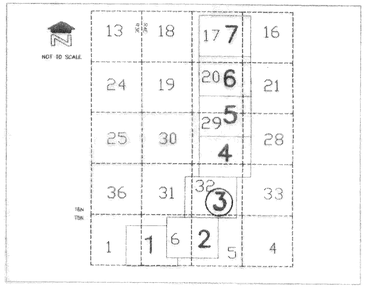
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

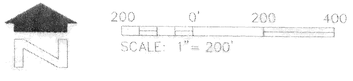
FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP





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DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RCS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 3 OF 7

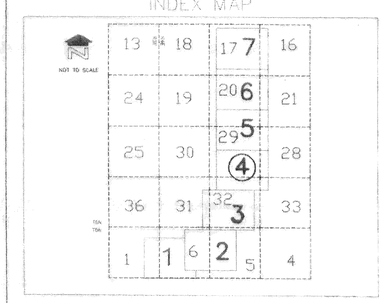
Dwg. Name: LP1,9240A003,ACAD (CCSHEET).dwg
Date: REV. DEC. 17, 1996 04:44 pm

AERIAL MAPPING COMPANY, INC.
SCUM-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY
F.C.D. CONTRACT NO. 95-28
LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

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DESIGN	FEB	12/96
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PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 7

Dwg. Name: \P:\9240\00\ACAD\COSHEETA.dwg
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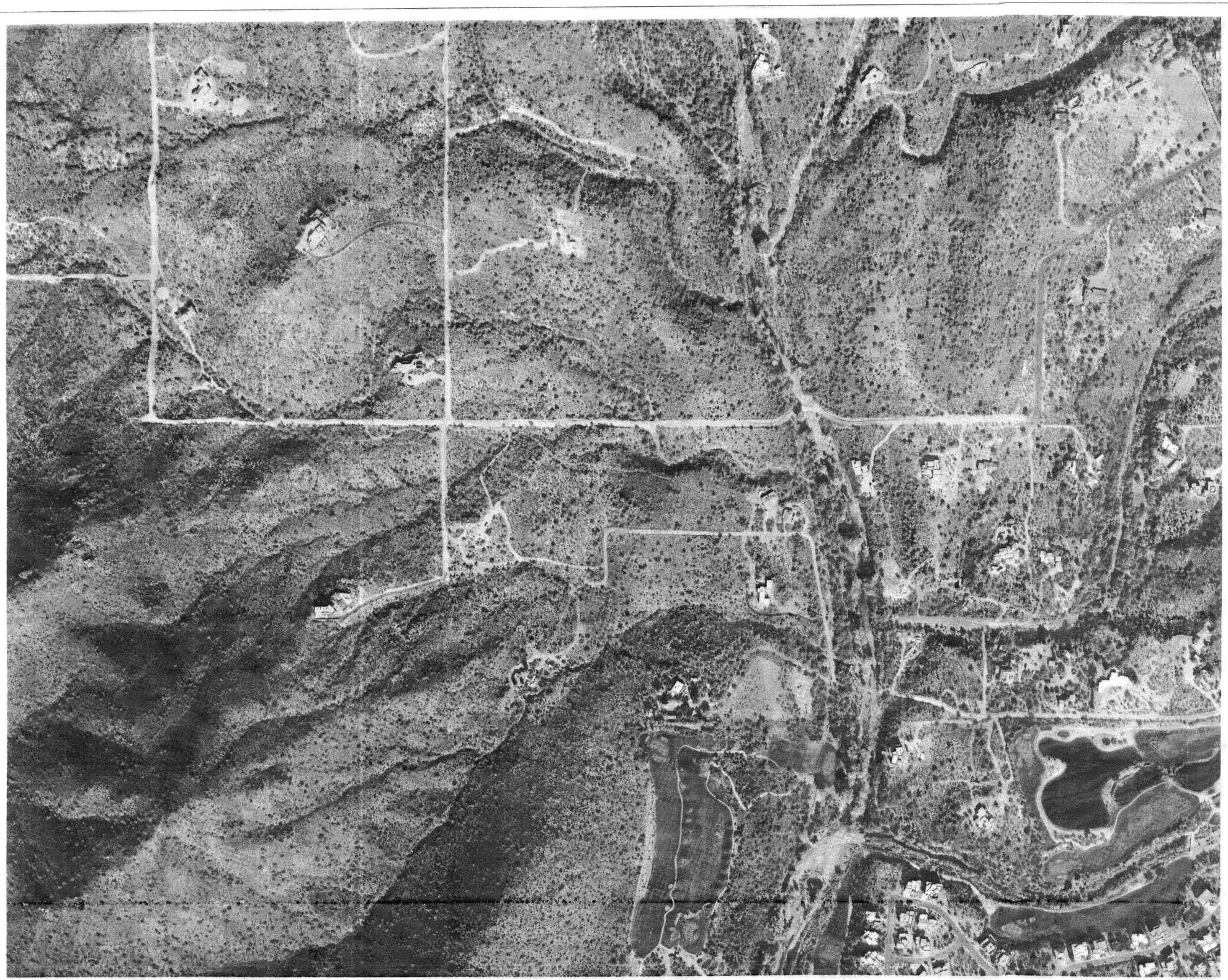


AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

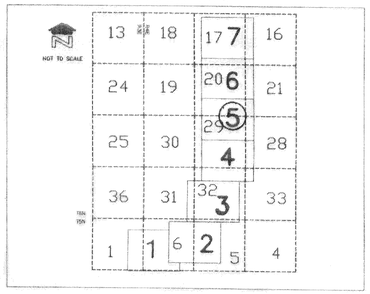
FLOOD DELINEATION STUDY OF

CAVE CREEK
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 5 OF 7

Dwg. Name: \P:\92404003\ACAD\CCSHEETX.dwg
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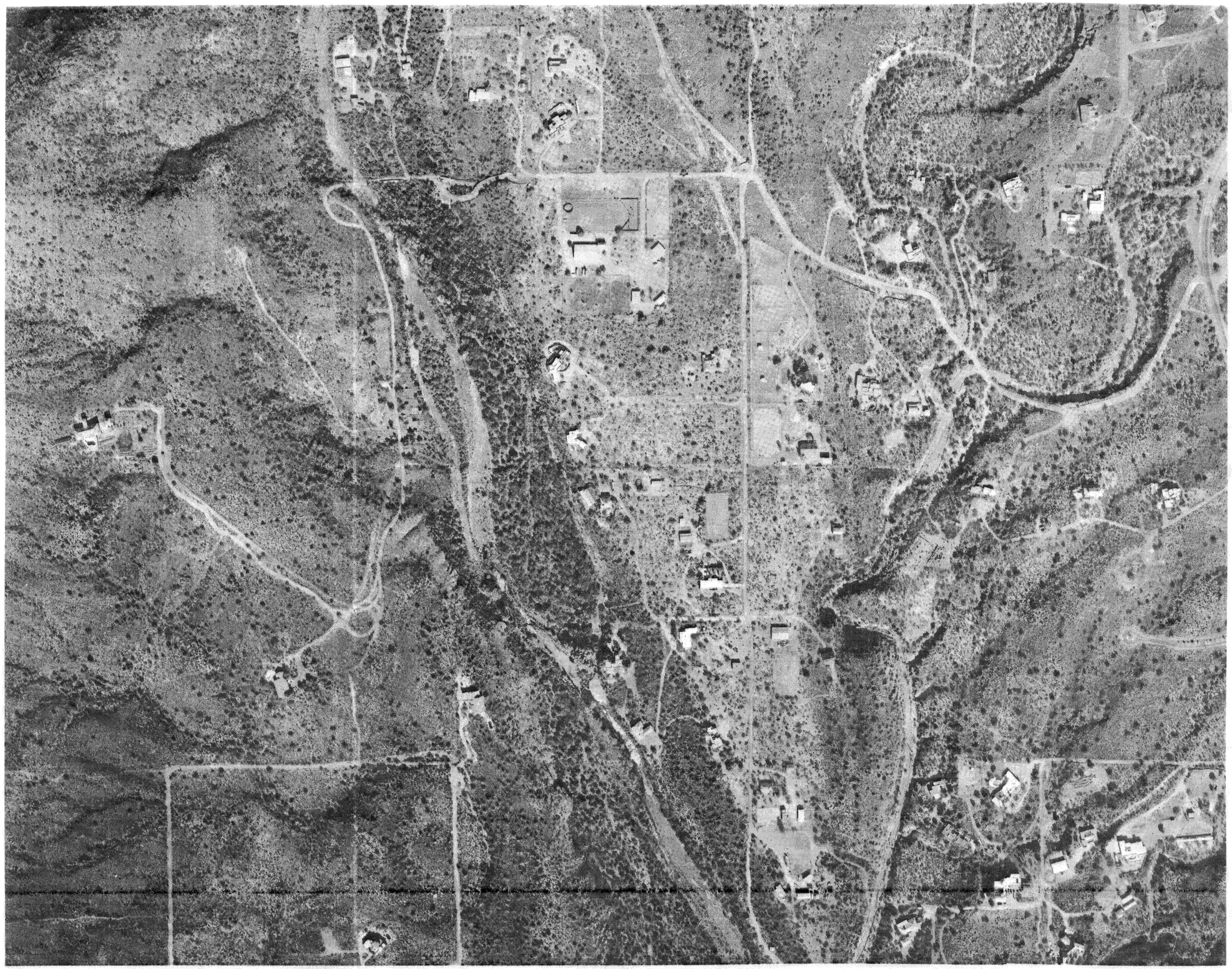


AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPO7 PHOTO DATE: 12-05-96

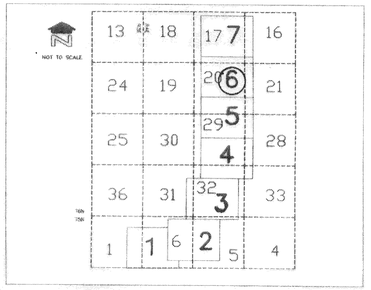
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 6 OF 7

Dwg. Name: \P\92404003.ACAD\OCSHEET7.dwg
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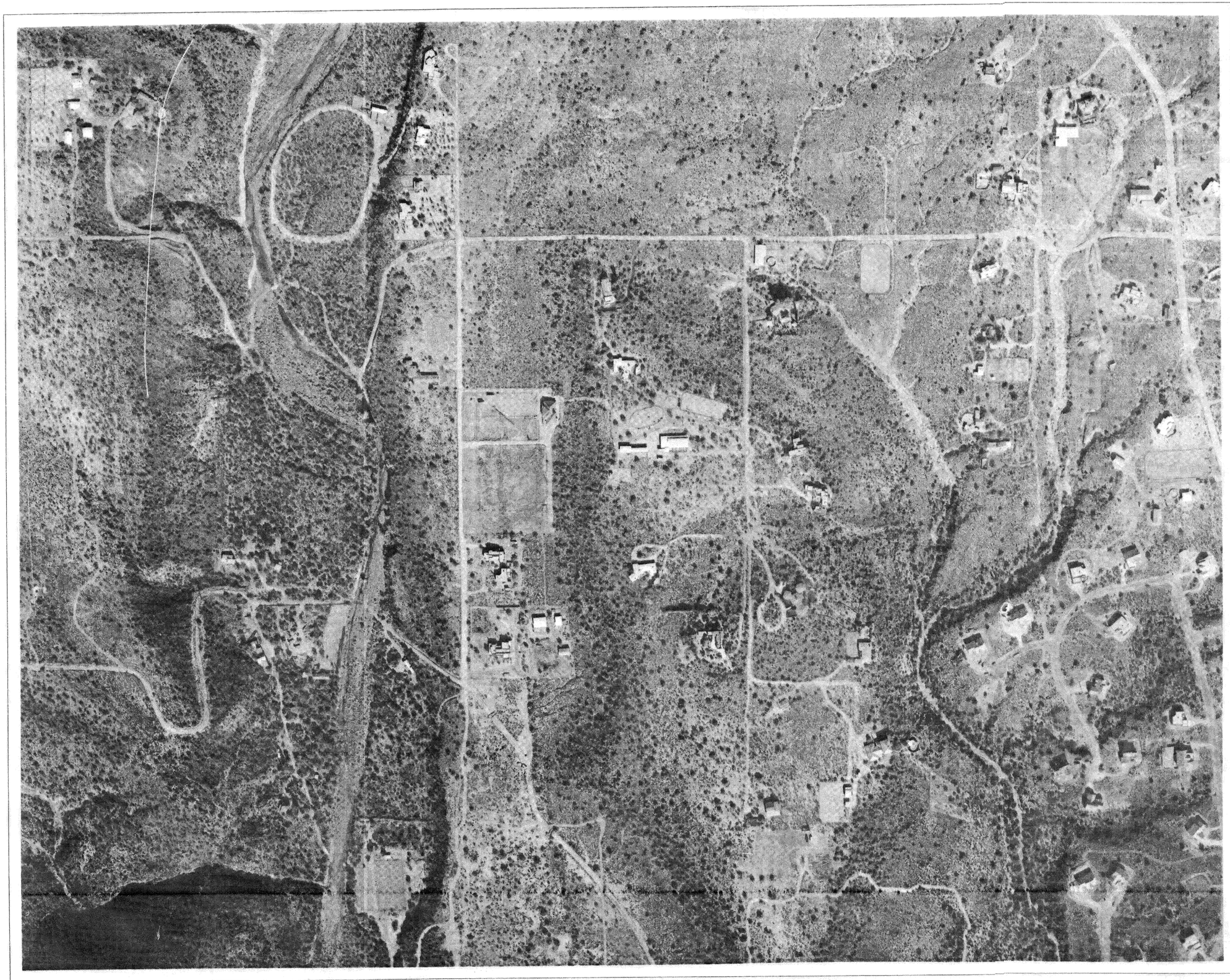
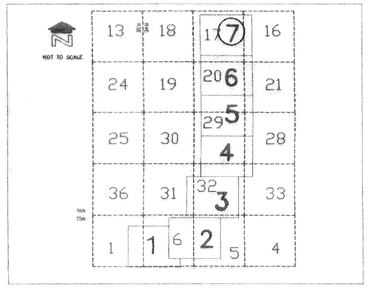


AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY
F.C.D. CONTRACT NO. 95-28
LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 7 OF 7

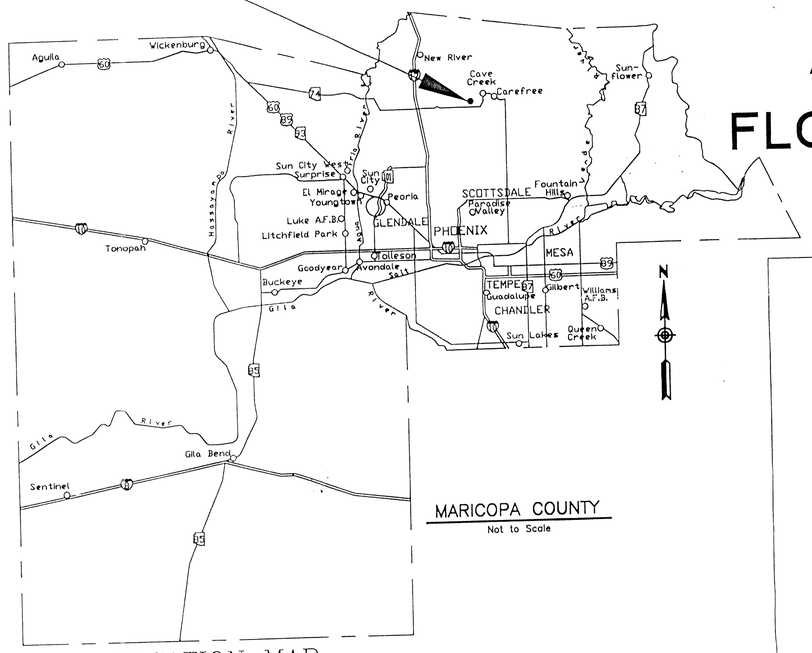
Dwg. Name: P:\92404003\ACAD\CCSHEET7.dwg
Date: REV. DEC. 17, 1996 04:44 pm

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAVE CREEK
ABOVE CAREFREE HIGHWAY
FLOODPLAIN DELINEATION STUDY

FCD 95-28

STUDY AREA



MARICOPA COUNTY
Not to Scale

LOCATION MAP

DATUM

HORIZONTAL: North American Datum of 1927
VERTICAL: National Geodetic Vertical Datum of 1929

STATEMENTS BY PROFESSIONAL REGISTRANTS

The ground control survey was prepared under my direct supervision:

REGISTERED LAND SURVEYOR 13168 RICHARD ALCOCER ARIZONA, U.S.A.

The following statements apply to the individual seals affixed to each of the maps following this cover sheet.

The photogrammetry and topographic mapping were prepared under my direct supervision:

REGISTERED LAND SURVEYOR CERTIFICATE NO. 11890 RICHARD D. COOK ARIZONA, U.S.A.

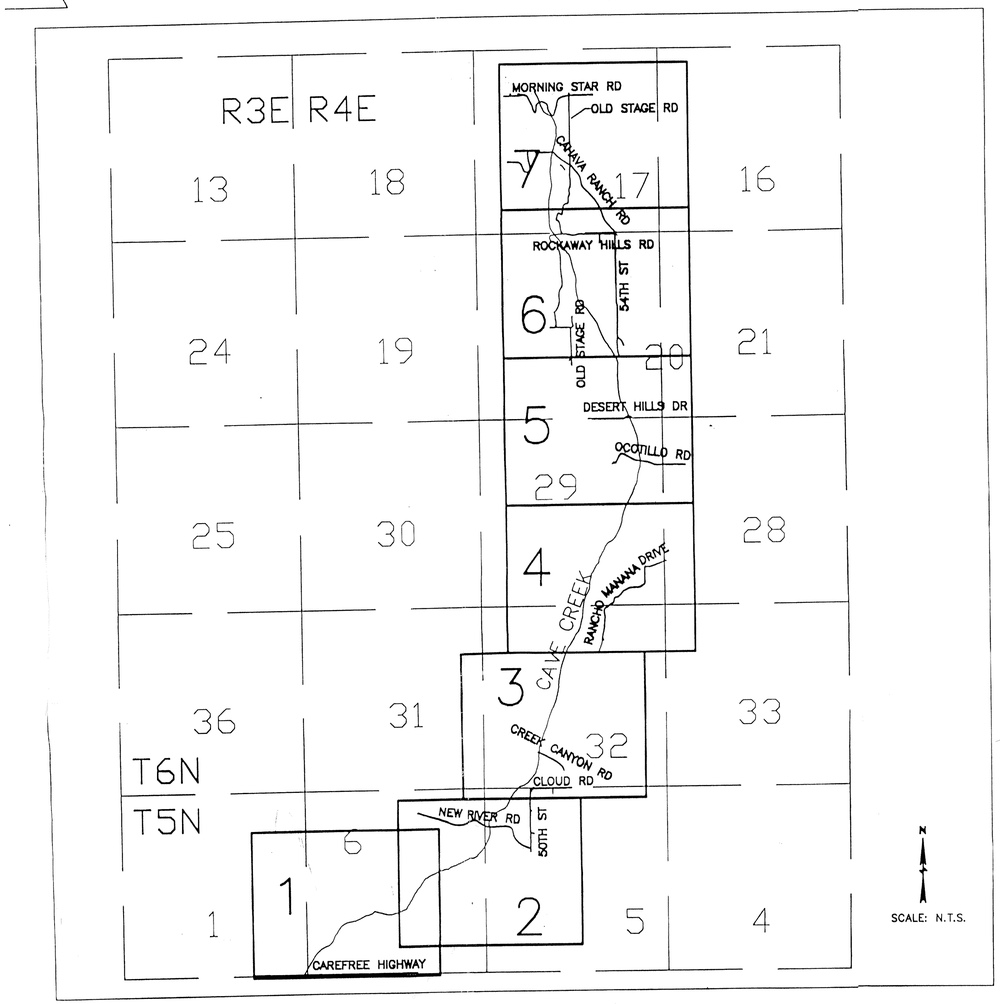
The hydrologic values used for the floodplain and floodway delineation were prepared under my direct supervision:

Registered Professional Engineer (Civil) CERTIFICATE NO. 17928 GEORGE V. SABOL ARIZONA, U.S.A.

The floodplain and floodway delineation were prepared under my direct supervision:

Registered Professional Engineer (Civil) CERTIFICATE NO. 23969 FRANK EDWARD BROWN ARIZONA, U.S.A.

CENTRAL FILES
FILE NO. 318



STUDY AREA MAP
AND SHEET INDEX

SHEET INDEX

Sheet 1-7 Floodplain Delineation Study

NOTE

Floodplain Limits in this Study are Plotted at each HEC-2 Cross Section on the Basis of Starting (SSTA) and Ending (ENDST) Stations Unless there is Ineffective Flow Area or a Conflict with Topographic Contours, in which case, the Contours take Precedence.

AERIAL MAPPING

Aerial Mapping Company, Inc.
3141 W. Clarendon Avenue
Phoenix, Arizona 85017 (602) 263-5728
Flight Date: January 12, 1996
Contour Interval: 2 Feet

GROUND CONTROL

Alcocer Land Surveyors
3501 N. 16th Street, Suite C
Phoenix, Arizona 85016 (602) 263-7846

HYDROLOGY

George V. Sabol Consuting Engineers, Inc.
40 SFC Engineering Company
7776 Pointe Parkway West, Suite 290
Phoenix, Arizona 85044 (602) 438-2200

HYDRAULICS

McLaughlin Kmetty Engieers, Ltd.
3501 N. 16th Street
Phoenix, Arizona 85016 (602) 248-7702

LEGEND

Section Label 31
Sheet Limits
Sheet Number 7
Study Wash
Section Line

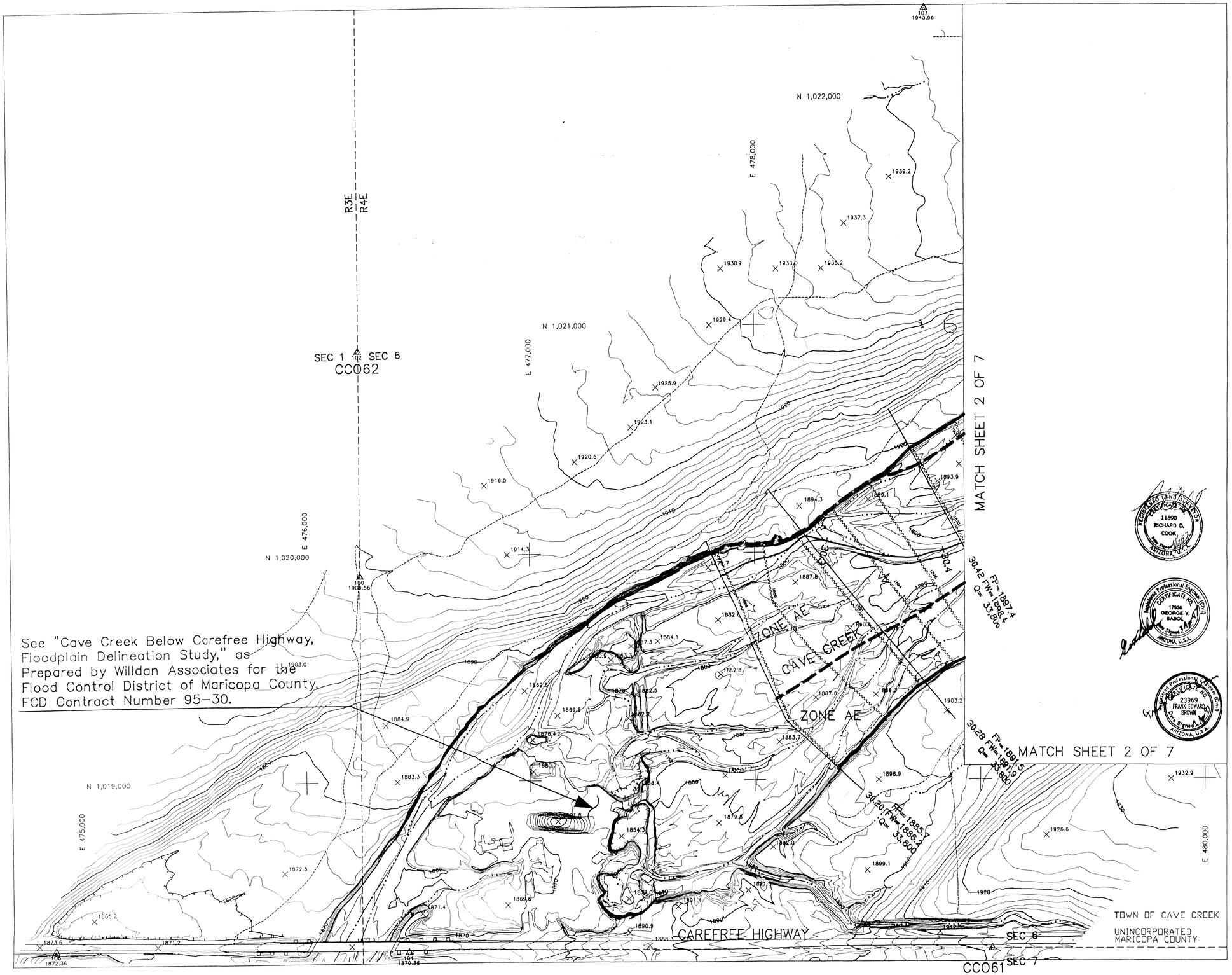
GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	9/96
DESIGN C	CLJ	9/96
PLANS	KLH,RGS	3/97
PLANS CI	FEB	3/97
SUBMITTEY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER
COVER SHEET

Dwg. Name: \P92404003\ACAD\CCCOVER.dwg
Date: REV. March 31, 1997 2:17pm

CAVE CREEK ABOVE CAREFREE HIGHWAY
FLOODPLAIN DELINEATION STUDY
GEORGE V. SABOL/MCLAUGHLIN KMETTY
STUDY 1996 FCD 95-28



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	2.0
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	○ OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

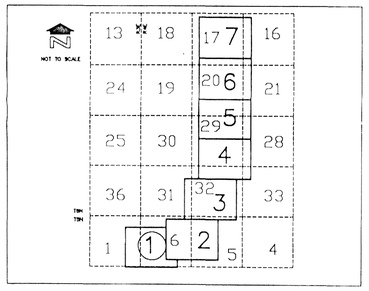
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC061	1908.08	LOCATED AT TOP OF BRASS CAP IN HANDHOLE AT S 1/4 CORNER SEC 6, T5N, R4E.
CC062	1914.48	LOCATED AT TOP OF BRASS CAP IN HANDHOLE AT W 1/4 CORNER SEC 6, T5N, R4E.

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88 THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.

INDEX MAP



200 0' 200 400

SCALE: 1"= 200'

CONTOUR INTERVAL = 2' FEET

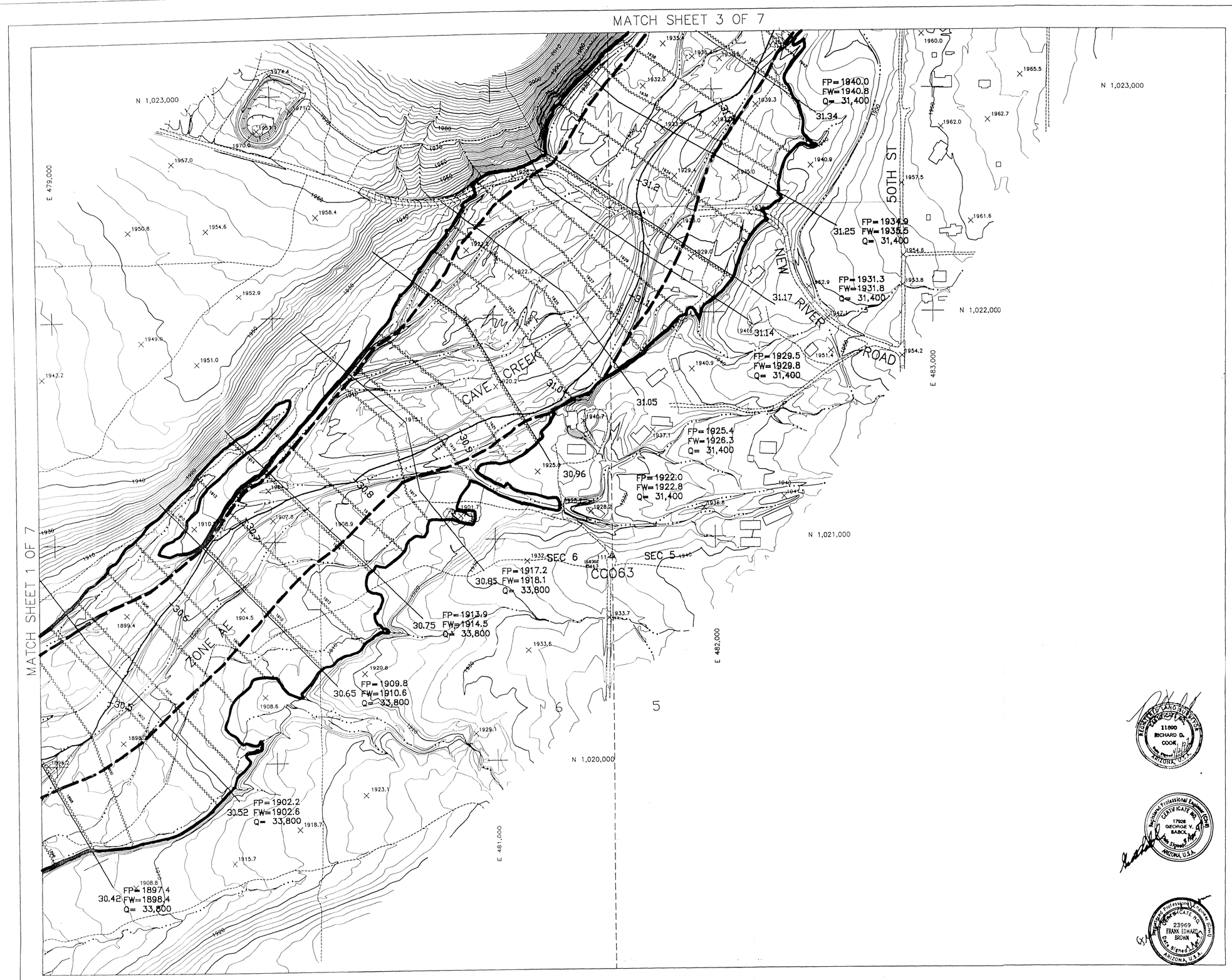
GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESGN	FEB	9/96	
DESGN CHK.	FCDMC	9/96	
PLANS	KLH,RGS	3/97	RECOMMENDED BY: DATE
PLANS CHK.	FEB	3/97	APPROVED BY: DATE
SUBMITTED BY: DATE:			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 1 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET1.dwg
Date: REV. MARCH 31, 1997 11:00 am

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY ALCOCER LAND SURVEYORS



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	2.0
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	○ OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

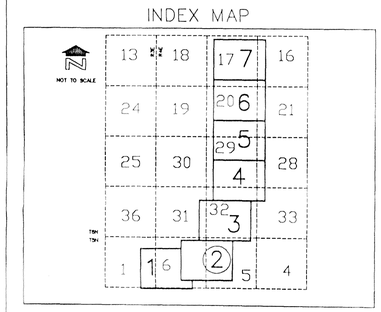
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC063	1938.37	LOCATED AT TOP OF USGLO BRASS CAP AT EAST 1/4 CORNER SEC 6 T5N R4E

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88 THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.

INDEX MAP



200 0' 200 400

SCALE: 1"= 200'

CONTOUR INTERVAL = 2' FEET

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	9/96
DESIGN CHK.	FCDMC	9/96
PLANS	KLH,RGS	3/97
PLANS CHK.	FEB	3/97
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

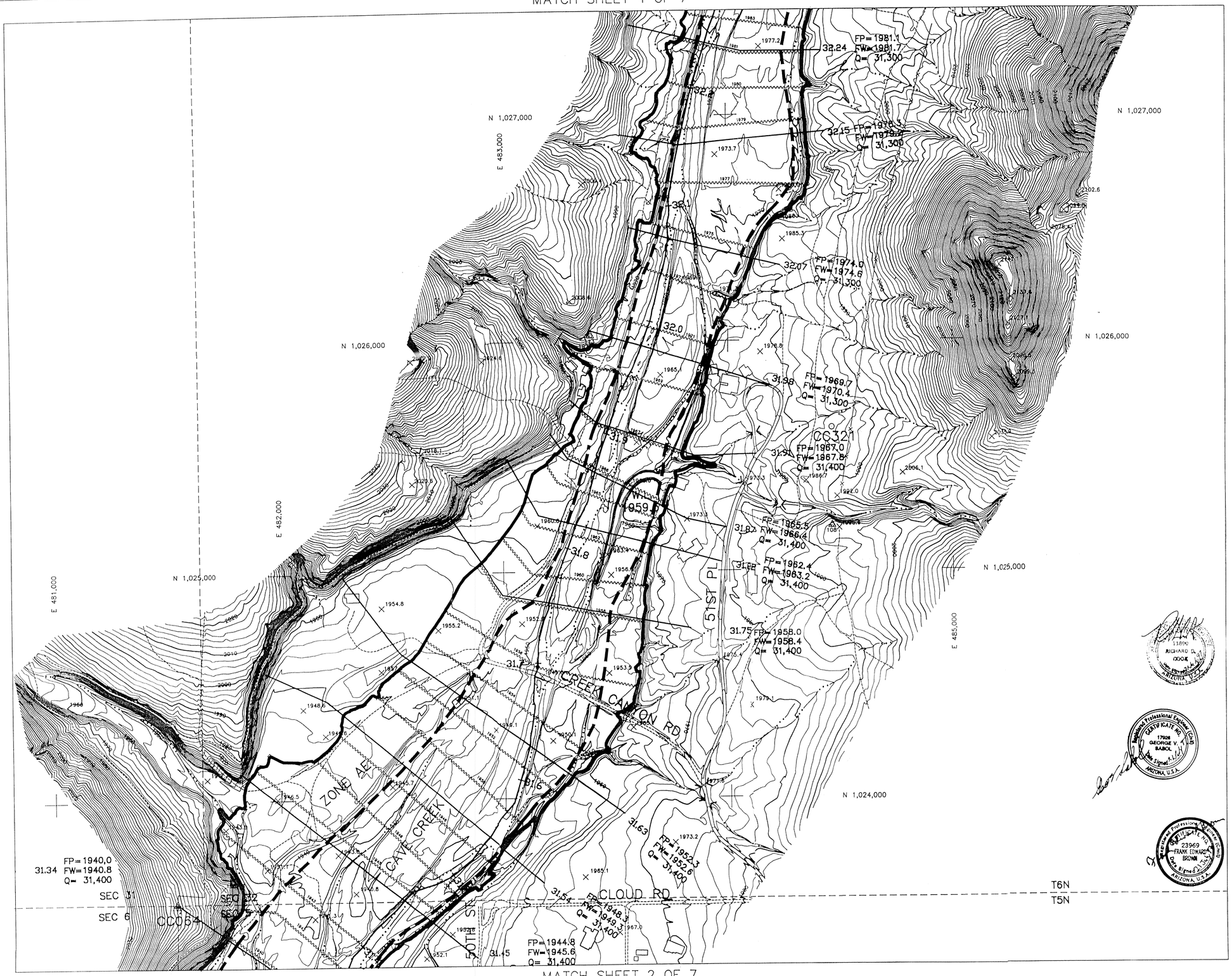
SHEET 2 OF 7

Dwg. Name: V:\9240403\ACAD\CCSHEET2.dwg
Date: REV. MARCH 31, 1997 10:15 am

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDAR 1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURV DATA PROVIDED BY ALCOCER LAND SURVEYORS

MATCH SHEET 4 OF 7



MATCH SHEET 2 OF 7

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	2.0
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	○ OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

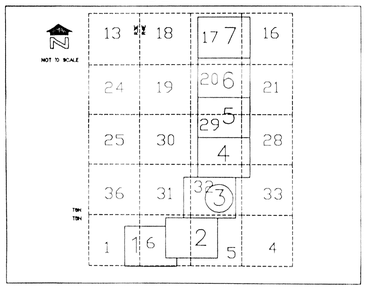
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC064	1993.22	LOCATED AT TOP OF USGLO BRASS CAP AT NE CORNER SEC 6 T5N R4E
CC321	1985.02	LOCATED AT TOP OF BRASS CAP IN CONCRETE 7' WEST OF POWER LINE AND 7' WEST OF POWER & TELEPHONE POLE # PS1007660, BEING IN THE SE 1/4 OF SEC 32, T6N R4E. APPROXIMATE COORDINATES N1025619.4 E484463.9

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88 THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'

CONTOUR INTERVAL = 2' FEET

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

DESIGN	BY FEB	DATE 9/96
DESIGN CHK.	FCDMC	9/96
PLANS	KLH,RGS	3/97
PLANS CHK.	FEB	3/97
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

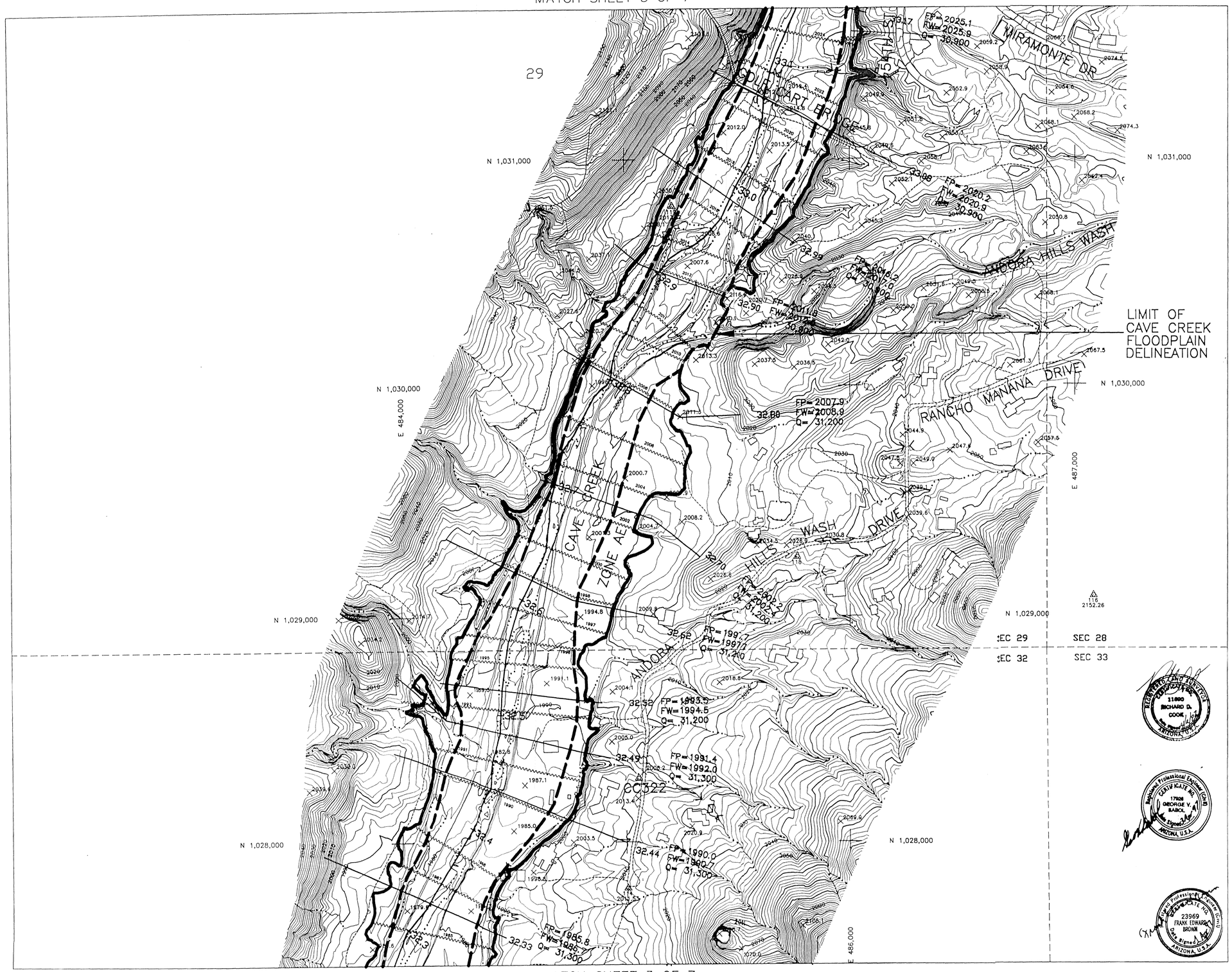
SHEET 3 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET3.dwg
Date: REV MARCH 31, 1997 01:56Pm

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY MCCOCER LAND SURVEYORS

MATCH SHEET 5 OF 7



MATCH SHEET 3 OF 7

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	2.0
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	○ OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

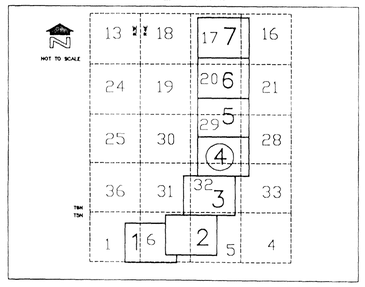
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC322	2005.81	LOCATED AT TOP OF BRASS CAP IN CONCRETE 10' NORTH & 6' WEST OF ELECTRIC TRANSFORMER # M66450, BEING ON THE WEST SIDE OF ANDORA HILLS WASH DRIVE, BEING IN THE NE 1/4 OF SEC 32 T6N R4E, APPROXIMATE COORDINATES N1028278.3 E485054.4

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88 THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.
4. THE GOLF CART BRIDGE AT RM 33.08 IS ABOUT 1.0 FEET ABOVE THE CHANNEL BOTTOM. THE CROSS SECTION IS TAKEN ALONG THE TOP OF DECK AND A BRIDGE ANALYSIS IS NOT NEEDED.

INDEX MAP



SCALE: 1" = 200'
CONTOUR INTERVAL = 2' FEET

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	FEB	9/96	
DESIGN CHK.	FCDMC	9/96	
PLANS	KLH,RGS	3/97	RECOMMENDED BY: DATE
PLANS CHK.	FEB	3/97	APPROVED BY: DATE
SUBMITTED BY: DATE:			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 4 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET4.dwg
Date: REV. MARCH 31, 1997 03:07 pm

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY ALCOCER LAND SURVEYORS

MATCH SHEET 6 OF 7

MATCH SHEET 4 OF 7

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY ALCOCER LAND SURVEYORS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	20
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	O OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

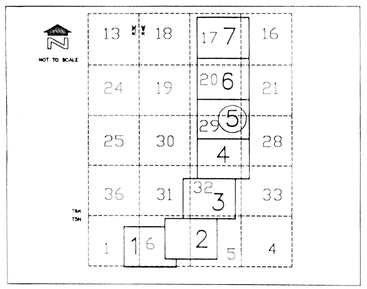
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC291	2057.34	LOCATED AT TOP OF BRASS CAP IN CONCRETE 10' SOUTH OF OCOTILLO ROAD & 55TH STREET, BEING IN THE NE 1/4 SEC 29 T6N R4E. APPROXIMATE COORDINATES N1032723.2 E486628.2
CC201	2090.39	LOCATED AT TOP OF BRASS CAP IN CONCRETE BEING IN THE SE 1/4 SEC 20 T6N R4E. COORDINATES N1025191.926820 E484461.678362

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88 THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.

INDEX MAP

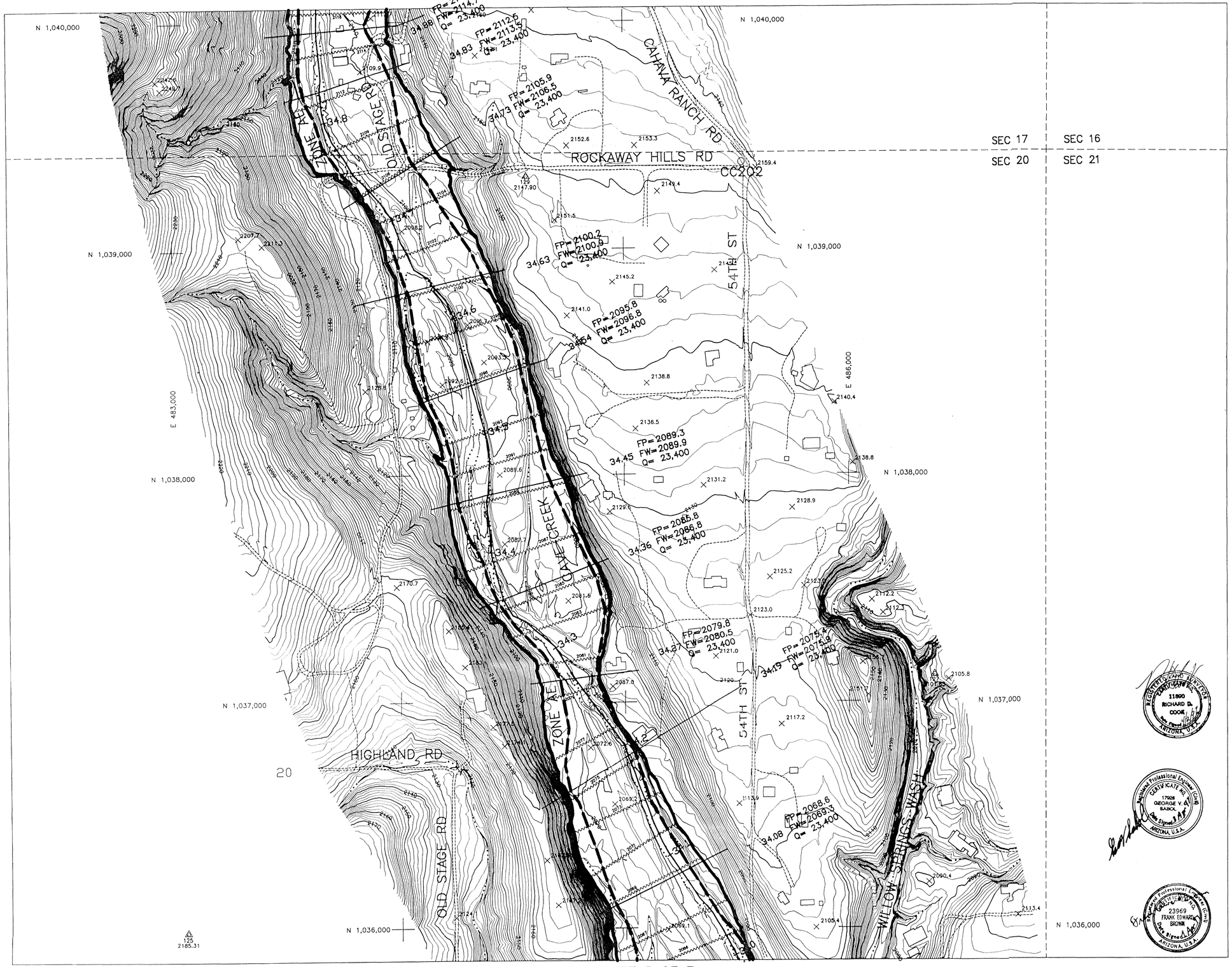


200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2' FEET

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	FEB	9/96	
DESIGN CHK.	FCDMC	9/96	
PLANS	KLH,RGS	3/97	RECOMMENDED BY: DATE
PLANS CHK.	FEB	3/97	APPROVED BY: DATE
SUBMITTED BY: DATE:			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 5 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET5.dwg
Date: REV. MARCH 31, 1997 04:35 pm



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY

FLOODWAY BOUNDARY

HYDRAULIC BASE LINE & RIVER MILE — 2.0

CROSS SECTION — FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519

ELEVATION REFERENCE MARK — ○ OR △ CC061

BASE FLOOD ELEVATIONS — 1221

ZONE DESIGNATIONS — ZONE AE

CORPORATE LIMITS

SECTION LINE

ELEVATION REFERENCE MARKS

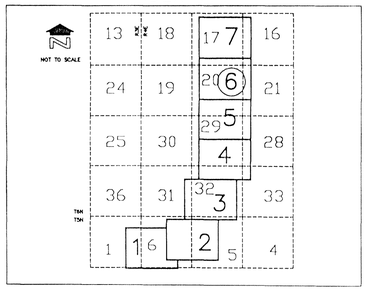
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
ERM# CC202	2154.03	LOCATED AT TOP OF BRASS CAP IN CONCRETE IN THE NW CORNER OF CAHAVA RANCH ROAD AND ROCKAWAY HILLS ROAD AND 15' WEST OF POWER POLE # MTP 107.64, BEING IN THE NE 1/4 SEC 20 T6N R4E, APPROXIMATE COORDINATES N1039368.8 E485527.7

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION: NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88. THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
2. ALL SECTION CORNERS ARE APPROXIMATE.
3. ERM LABELS "CC061": WHERE CC MEANS CAVE CREEK, THE NEXT TWO DIGITS REFER TO THE SECTION NUMBER THE ERM IS IN, AND THE LAST DIGIT IS THE ACTUAL ERM NUMBER.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'

CONTOUR INTERVAL = 2' FEET

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	9/96
DESIGN CHK.	FCDMC	9/96
PLANS	KLH,RGS	3/97
PLANS CHK.	FEB	3/97
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

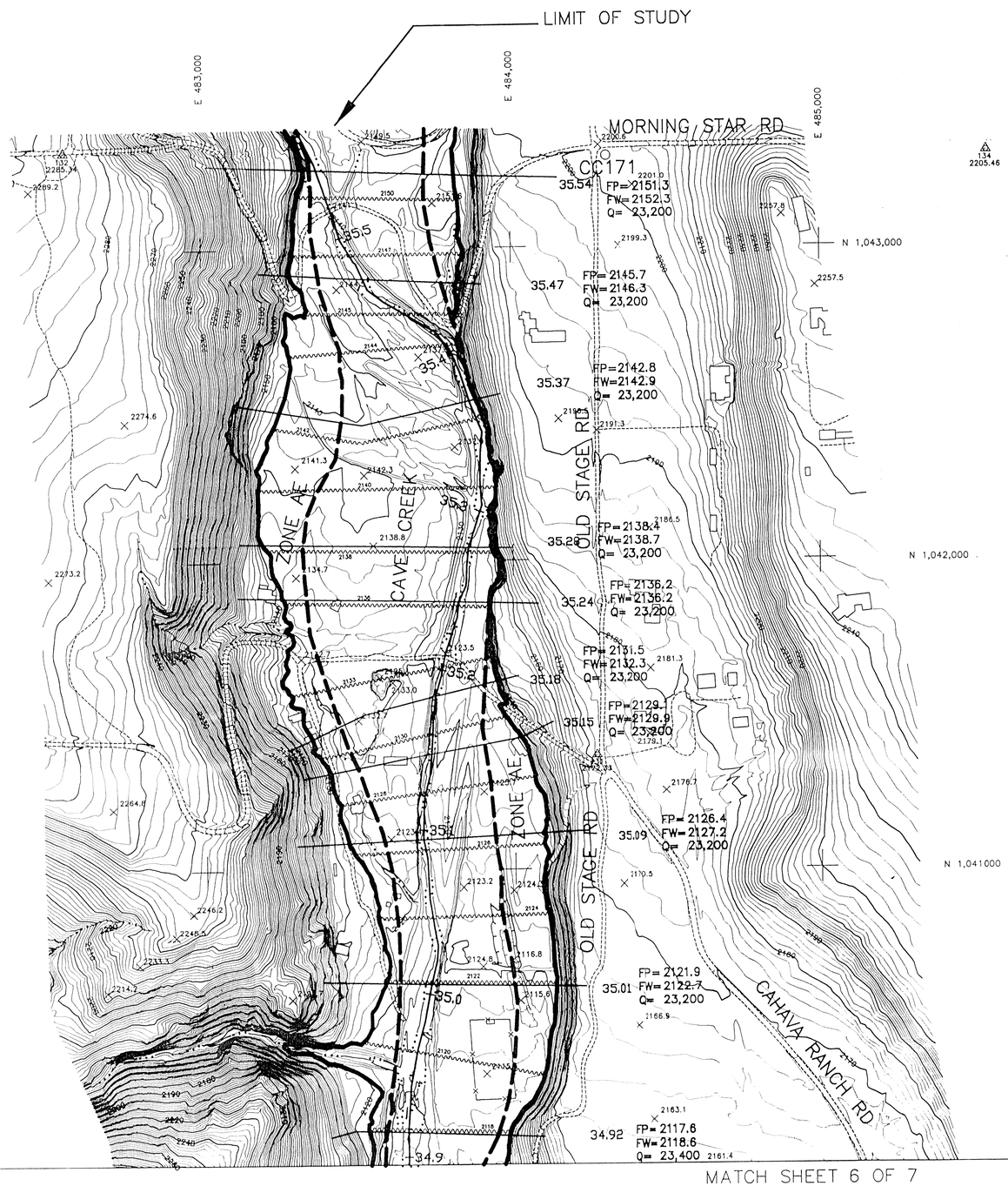
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 6 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET6.dwg
Date: REV. MARCH 31, 1997 03:45 pm

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY ALCOCER LAND SURVEYORS



UNINCORPORATED MARICOPA COUNTY
TOWN OF CAVE CREEK

SEC 17
SEC 16

MATCH SHEET 6 OF 7

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE & RIVER MILE	2.0
CROSS SECTION	FP=100 Yr WSEL / FW=Floodway WSEL / Q=100 Yr Flow — 5.519
ELEVATION REFERENCE MARK	○ OR △ CC061
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	
SECTION LINE	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUM.	ELEV. (FT)	DESCRIPTION/LOCATION
CC171	2201.93	LOCATED AT TOP OF BRASS CAP IN CONCRETE AT THE SOUTHEAST CORNER OF MORNING STAR ROAD AND OLD STAGE ROAD. ALSO 3' WEST OF POWER AND TELEPHONE POLE, BEING IN THE NE 1/4 SEC 17 T6N R4E. APPROXIMATE COORDINATES N1043306.6 E484315.0

NOTES

1. NGVD 29 TO NAVD 88 ELEVATION CONVERSION:
   NGVD 1929 + 1.87 FEET (OR + 0.57 METERS) = NAVD 88
   THIS CONVERSION WAS DERIVED BY THE NATIONAL GEODETIC SURVEY, RETRIEVAL DATE JULY 21, 1992, AT BELL 2, USING DIFFERENTIAL LEVELING. BELL 2 IS LOCATED ABOUT 0.05 MILES WEST OF INTERSTATE 17 AT THE BELL ROAD INTERCHANGE.
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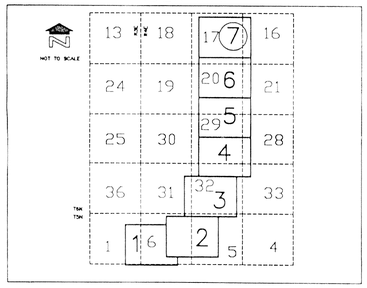
INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2' FEET

REGISTERED LAND SURVEYOR
CERTIFICATE NO. 11800
RICHARD D. COOK
Date Signed 3-31-97
ARIZONA, U.S.A.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 17928
GEORGE V. SABOL
Date Signed 3-31-97
ARIZONA, U.S.A.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 23969
FRANK EDWARD BROWN
Date Signed 3-31-97
ARIZONA, U.S.A.

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	9/96
DESIGN CHK.	FCDMC	9/96
PLANS	KLH,RGS	3/97
PLANS CHK.	FEB	3/97
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

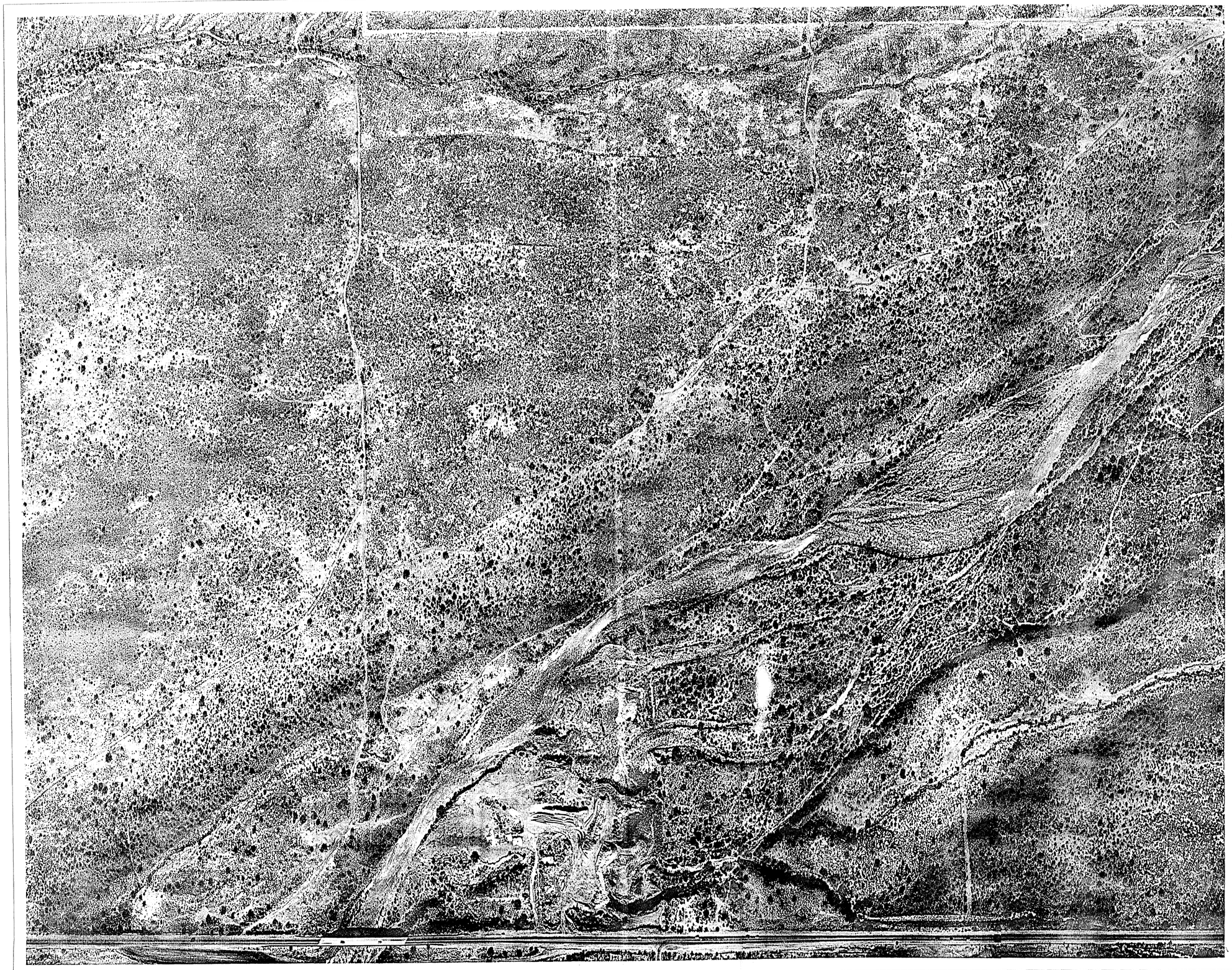
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 7 OF 7

Dwg. Name: \P\92404003\ACAD\CCSHEET7.dwg
Date: REV. MARCH 31, 1997 03:25 pm

AERIAL MAPPING COMPANY, INC.
PHOTOGRAMMETRY
FLIGHT DATE: 1-12-96

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY ALCOCER LAND SURVEYORS



AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 1-8-97

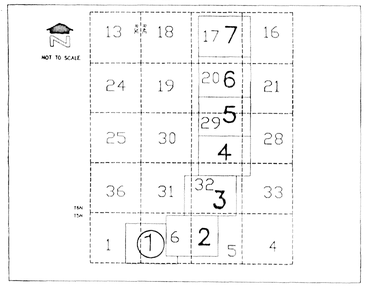
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

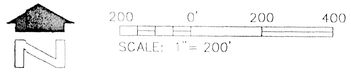
FLOOD DELINEATION STUDY OF CAVE CREEK ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP





GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

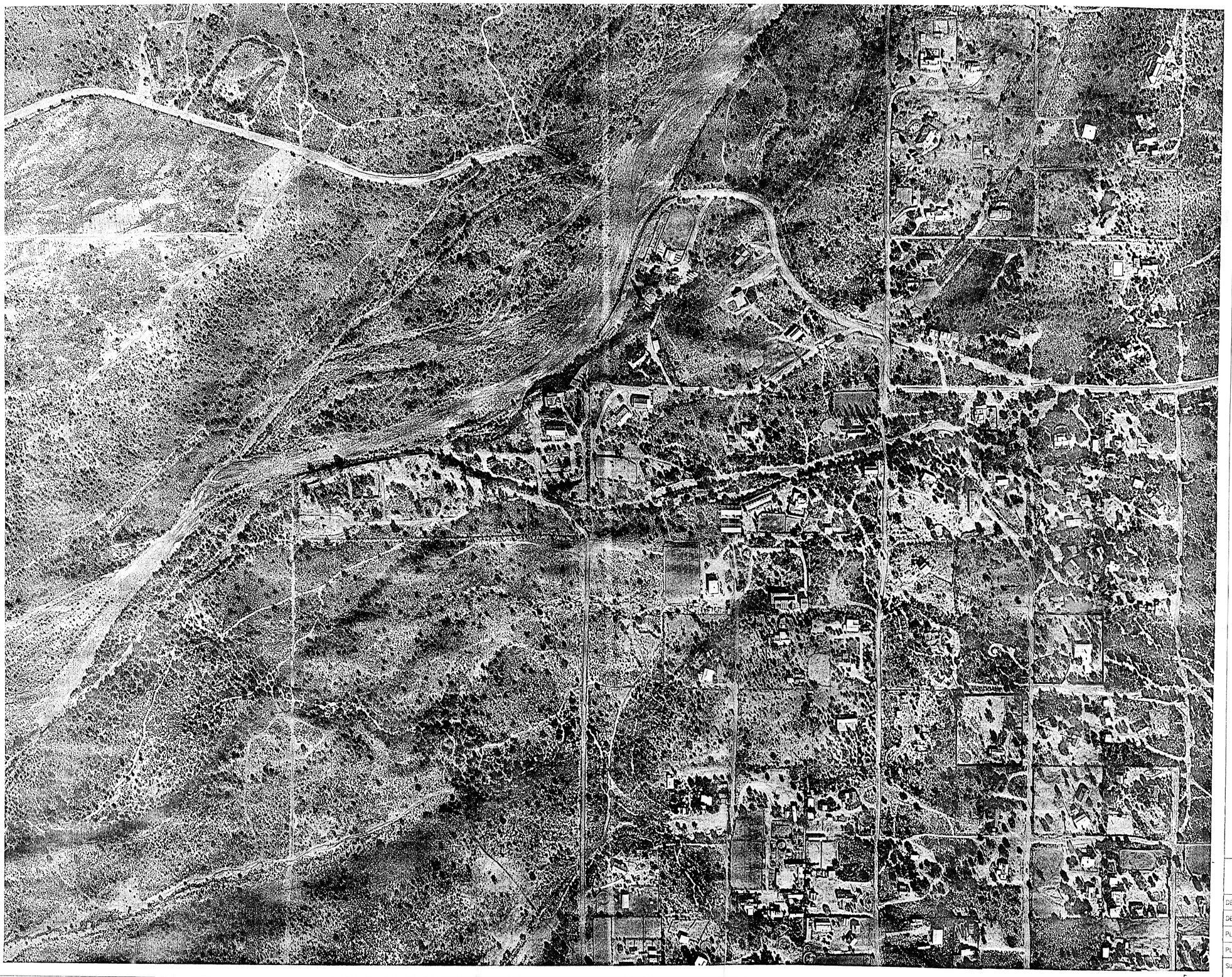
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 7

Dwg. Name: V:\9240\0031\ACAD\COSHEETX.dwg
Date: REV. DEC. 17, 1996 04:44 pm



AERIAL MAPPING COMPANY, INC.
SEMI-RECTIFIED PHOTOGRAPHY
SPOT PHOTO DATE: 12-05-96

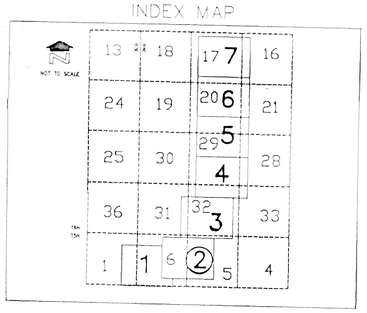
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
CAVE CREEK
ABOVE CAREFREE HIGHWAY

F.C.D. CONTRACT NO. 95-28

LEGEND

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'

GEORGE V. SABOL CONSULTING ENGINEERS, INC.
in association with
McLAUGHLIN KMETTY ENGINEERS, LTD.

	BY	DATE
DESIGN	FEB	12/96
DESIGN CHK.	FCDMC	12/96
PLANS	KLH,RGS	12/96
PLANS CHK.	FEB	12/96

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 7

Dwg. Name: V:\92404003\ACAD\CCSHEET7.dwg
Date: REV. DEC. 17, 1996 04:44 pm