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Hydrology Report

Cline Creek
Floodplain Delineation Study
for the
Flood Control District of Maricopa County

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HYDROLOGY REPORT
Cline Creek
TABLE OF CONTENTS

			Page
1.0	Introduction		1
	1.1	Purpose of the Study	1
	1.2	Authority for Study	1
	1.3	Watershed Description	1
	1.4	Previous Studies	2
2.0	Engineering Methodology		5
	2.1	Rainfall	6
	2.2	Soil Losses	11
	2.3	Sub-basin Lag Time Determinations	18
	2.4	Stream Routing	21
	2.5	HEC-1 Model Sequence	22
3.0	Summary and Conclusions		
	3.1	Summary	23
	3.2	Results of the HEC-1 Model	24
	3.3	Conclusions	24
	3.4	100-year Floodplain Delineation Flows	26
4.0	References		27

Appendix A: Cline Creek HEC-1 100-Year 2 Hour Storm
Appendix B: Cline Creek HEC-1 100-Year 6 Hour Storm
Appendix C: Cline Creek HEC-1 100-Year 24 Hour Storm
Appendix D: Cline Creek Data Supplied By Flood Control District of Maricopa County
Appendix E: Cline Creek Calculations: Precipitation Data
Appendix F: Cline Creek Calculations: Loss Rates & Percent Impervious
Appendix G: Cline Creek Calculations: Sub-basin Lag Times, Routing Travel Times
Appendix H: Cline Creek Calculations: Muskingum Routing Parameters

——— : Flood Plain Delineation study Survey Notes.

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List of Figures

1. Watershed Vicinity Map ..... Page 3
2. Floodplain Delineation Study Stream Reach Map ..... Page 4
3. Cline Creek Watershed Boundary Map ..... Pocket 1
4. Basin X Watershed Boundary Map ..... Pocket 2
5. SCS Type II 100-Year 2, 6 and 24 Hr Rainfall Distribution ..... Page 8
6. Basin X Soils Map ..... Pocket 3
7. Cline Creek Watershed Soils Map ..... Pocket 4
8. Basin X HEC-1 Model Schematic ..... Pocket 5
9. Cline Creek Watershed HEC-1 Model Schematic ..... Pocket 6

List of Tables

Page

1. Cline Creek 100-year Storm Total Point Precipitation 6
2. Precipitation Distribution for Cline Creek 2, 6 and 24 Hour Storms 9
3. Areal Reduction of Precipitation for Cline Creek 100-Year Storms 10
4. Cline Creek Watershed Basin-X (Sub-Basin C-6) Soil Groups 12
5. Cline Creek Watershed Soil Groups 14
6. Model XB-02, XB-06, and XB-24 Secondary Sub-basin Hydrologic Input Parameters 20
7. Model CC-02, CC-06, and CC-24 Sub-basin Hydrologic Input Parameters 20
8. Model CC-02, CC-06, and CC-24 Muskingum Channel Input Parameters 21
9. Cline Creek Watershed 100-Year Runoff Summary 25
10. Cline Creek 100-Year Floodplain Delineation Discharges 26

1.0 Introduction

This report presents the results of a hydrologic analysis of the Cline Creek watershed in northern Maricopa County, Arizona. The hydrologic analysis is part of a floodplain delineation study of Cline Creek and its tributaries being conducted by Baker Engineers for the Flood Control District of Maricopa County. The watershed location is shown in Figure 1.

The limits of delineation for Cline Creek are Skunk Creek at the downstream end and the Tonto National Forest Boundary at the upstream end. The tributaries being delineated are all within developing or potentially developing lands south of the Tonto National Forest. The delineation reaches are shown in Figure 2.

1.1 Purpose of the Study

A hydrologic and hydraulic analysis of the Cline Creek watershed is being completed to determine 100-year peak discharges and associated floodplain and floodway limits. Water-surface profiles will be computed for Cline Creek and its tributaries to established base flood elevations. This information will be combined into a floodway and floodplain map which will be submitted by the Flood Control District to the Federal Emergency Management Agency (FEMA) for approval. Upon approval by FEMA, the maps will be used in establishing flood insurance rates and flood plain management requirements.

1.2 Authority for Study

This study was authorized by a contract for floodplain delineation services (FCD 89-15) with the Flood Control District of Maricopa County dated June 5, 1989.

1.3 Watershed Description

The Cline Creek watershed is comprised of approximately 16.0 square miles of land within the unincorporated area of northern Maricopa County and is tributary to Skunk Creek.

Approximately 2/3 of the watershed lies within the Tonto National Forest. The probabilities of land development or significant change in watershed conditions inside the National Forest are remote. However, these lands comprise the headwaters of the Cline Creek Watershed along the steep New River Mesa escarpment and its foothills. The tributaries draining National Forest lands are arranged in a fan-shaped pattern and have confluence in Cline Creek near the boundary between Forest and private land. The steep watershed and fan shape produce a high runoff potential for Cline Creek.

The southerly 1/3 of the watershed is principally valley floor and the majority of this area is undergoing large acreage residential development. There are two major tributaries in the southerly third which both join Cline Creek just upstream of New River Road. These sub-basins are comprised of mostly valley floor with headwaters in the lower foothills of New River Mesa.

The vegetation in the watershed is typical of the high desert with mountain brush types of growth in the higher elevations. Most of the washes have reaches of dense riparian vegetation in overbank areas. Elevation ranges from 2000 feet at the Skunk Creek confluence to 4600 feet along the rim of New River Mesa. Stream slopes range from approximately 1% on lower Cline Creek to over 20% on upper tributaries. Ground slopes exceed 50% along the face of New River Mesa. Generally streams flow in a west-to-southwesterly direction. No major drainage structures exist in the watershed. Cline Creek crosses New River Road and Circle Mountain Road via dip crossings.

1.4 Previous Studies

A review of existing data for the Cline Creek watershed found no detailed hydrologic studies. The Cline Creek area is mapped as Zone B on the effective Flood Insurance Rate Map (FIRM) for Maricopa County [1].

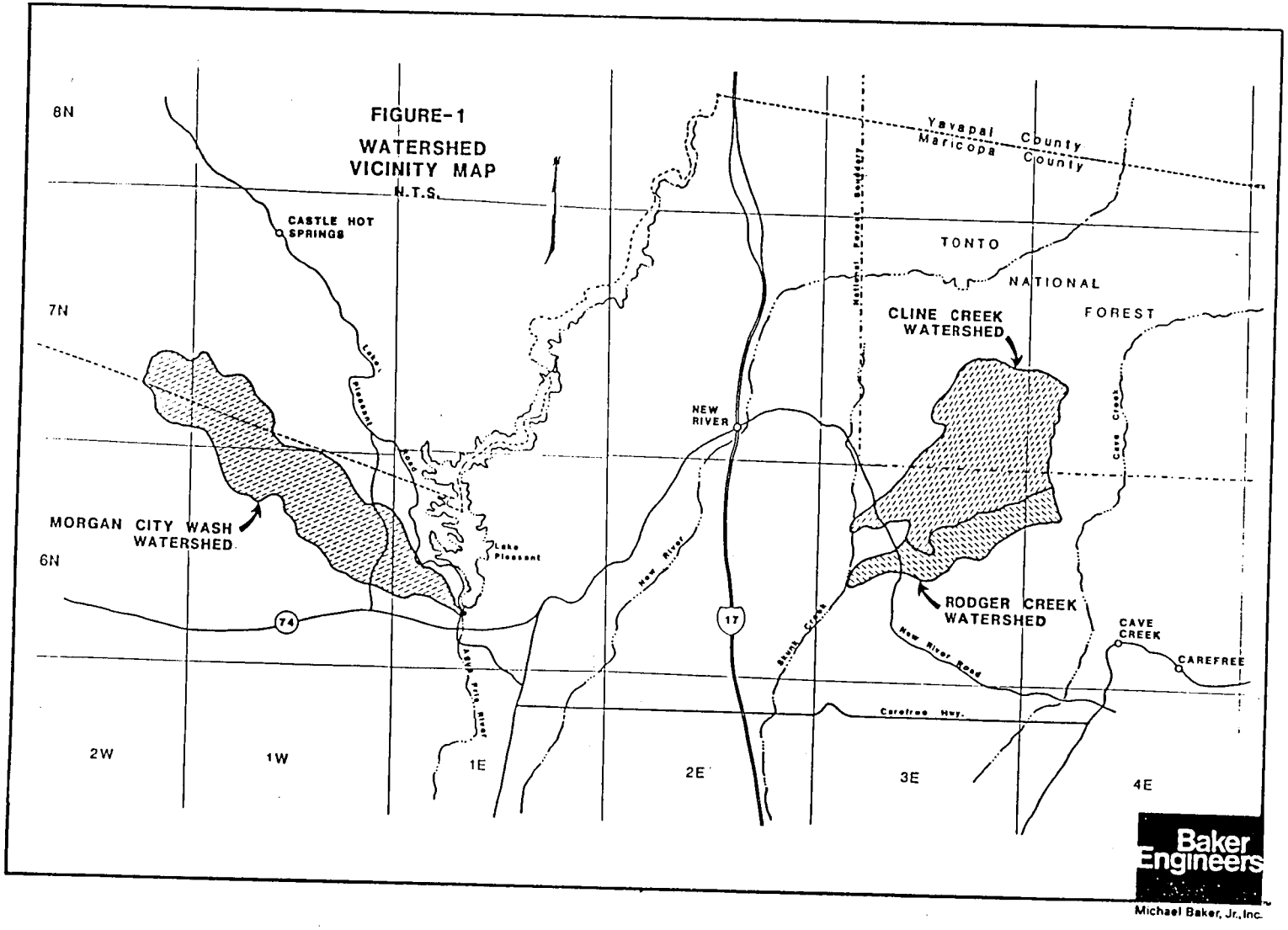
FIGURE-1
WATERSHED
VICINITY MAP
N.T.S.
8N
7N
6N
2W
1W
1E
2E
3E
4E
CASTLE HOT SPRINGS
Lake Pleasant
Lake Pleasant
Arizona River
New River
NEW RIVER
17
74
Yavapai County
Maricopa County
TONTO
NATIONAL
FOREST
CLINE CREEK WATERSHED
RODGER CREEK WATERSHED
MORGAN CITY WASH WATERSHED
Rodger Creek
New River Road
Carefree Hwy.
Cave Creek
CAVE CREEK
CAREFREE
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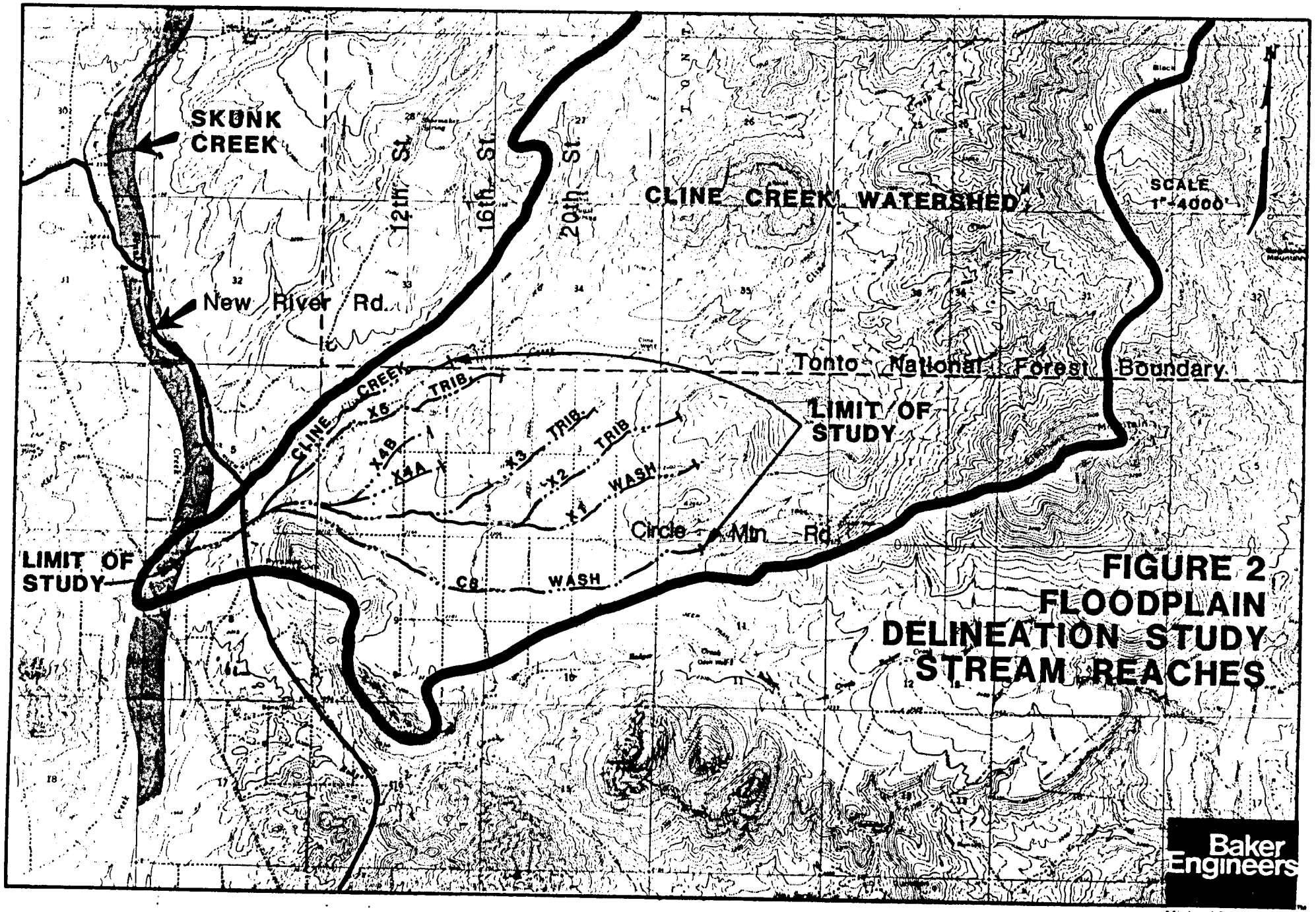

FIGURE 2
FLOODPLAIN DELINEATION STUDY
STREAM REACHES

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2.0 Engineering Methodology

General

The HEC-1 computer program of the U.S. Army Corps of Engineers [2] was used in the hydrologic analysis of the Cline Creek watershed. The program produces an incremental time-based record of storm runoff from a watershed. The watershed is modeled as a series of sub-basins connected by the watershed stream system. Hydrographs are computed for precipitation runoff from the sub-basins, as additions of several hydrographs at stream junctions and as hydrographs routed along stream reaches or through reservoirs.

The HEC-1 option utilizing the Soil Conservation Service (SCS) dimensionless hydrograph in combination with initial and uniform loss rate methodology was selected for computing sub-basin runoff. The Muskingum routing option was used for routing of flood hydrographs downstream through the various channel reaches of the watershed.

Levels of Detail

Because of the wide range of drainage area of streams to be delineated, the watershed was modeled at two separate levels of detail (see Figures 3 and 4). The Cline Creek Watershed, shown in Figure 3, represents the large scale level. Sub-basin C-6 was considered as an internal watershed, designated Basin X, and is shown in Figure 4. Each of the steps of development described in the following paragraphs were performed for the Basin X model just as they were for the model of Cline Creek Watershed. Mapping and calculations for the two models will be presented in parallel beginning with Basin X.

In dividing Basin X into sub-basins to produce flows for the delineation reaches, it was discovered that normal routing and combination procedures would have required a hydrograph calculation interval of 1 minute. In order to avoid potential mathematical instability, the model was divided one step further. Secondary sub-basins were defined for six of the tributaries above their confluence with the main Basin X wash, Tributary C-6. Sub-basin hydrographs were calculated to provide

delineation flows, but were not routed downstream. These secondary tributaries and sub-basins are shown in Figure 8.

A separate HEC-1 file designated XB was created to calculate an outflow hydrograph from each of these (secondary) sub-basins. These are shown in Figure 4. Secondary sub-basins are those designated X-1A, X-2A, etc. The sub-basins for the routed Basin X model are designated X-1, X-2, etc. This model is incorporated into the Cline Creek Watershed HEC-1 model designated CC.

The development of the various input parameters for the HEC-1 watershed model is presented in the following paragraphs.

2.1 Rainfall

Floodplains in Maricopa County are delineated for a peak 100-year flow. Runoff is simulated for storm durations of 2, 6 and 24 hours. The maximum peak flow from among the three storms is used for floodplain delineation of a stream segment. Precipitation data is identical for Basin X and the Cline Creek Watershed models. The source of precipitation depths is NOAA Atlas 2 [3]. The storm total precipitation values for this study are given in Table 1.

TABLE 1
Cline Creek
100-Year Storm Total Point Precipitation

Duration (hours)	Precipitation (inches)
2	2.79
6	3.50
24	4.80

The SCS 100-year Type II Rainfall Distributions included in Appendix D were used to define temporal distribution for the three precipitation events (see Figure 5). Cumulative point precipitation at 15 minute intervals is presented in Table 2. Because of the input requirements of

the 'JD' option, discussed below, the precipitation distribution was input as the cumulative percent of storm total precipitation for the 2, 6, and 24 hour events (see Appendix D).

The Cline Creek watershed area of approximately 16 square miles exceeds the maximum watershed area, 10 square miles, for which point precipitation may be considered average precipitation for the entire watershed under Flood Control District criteria. Since Basin X is a sub-basin of Cline Creek, areal reduction was applied to Basin X precipitation. Areal reduction of precipitation was applied to the 2, 6, and 24 hour 100-year storms in accordance with the National Weather Service's HYDRO-40 [4]. The HEC-1 "JD" option was used to perform the areal reduction automatically. The "JD" option accounts for accumulated drainage area for each sub-basin and combination hydrograph computation and adjusts the hydrograph flows to compensate for areal reduction of precipitation. The input requirement is a minimum of five data pairs defining the relationship between average basin-wide precipitation and basin area. The areal reduction values also depend on storm duration, so each of the three storms in the study has separate "JD" input data pairs. The areal reduction values are given in Table 3.

Development of precipitation input data for the HEC-1 hydrology model is presented in Appendix E.

CLINE CREEK, 100 YEAR STORM

SCS TYPE II PRECIPITATION DISTRIBUTION

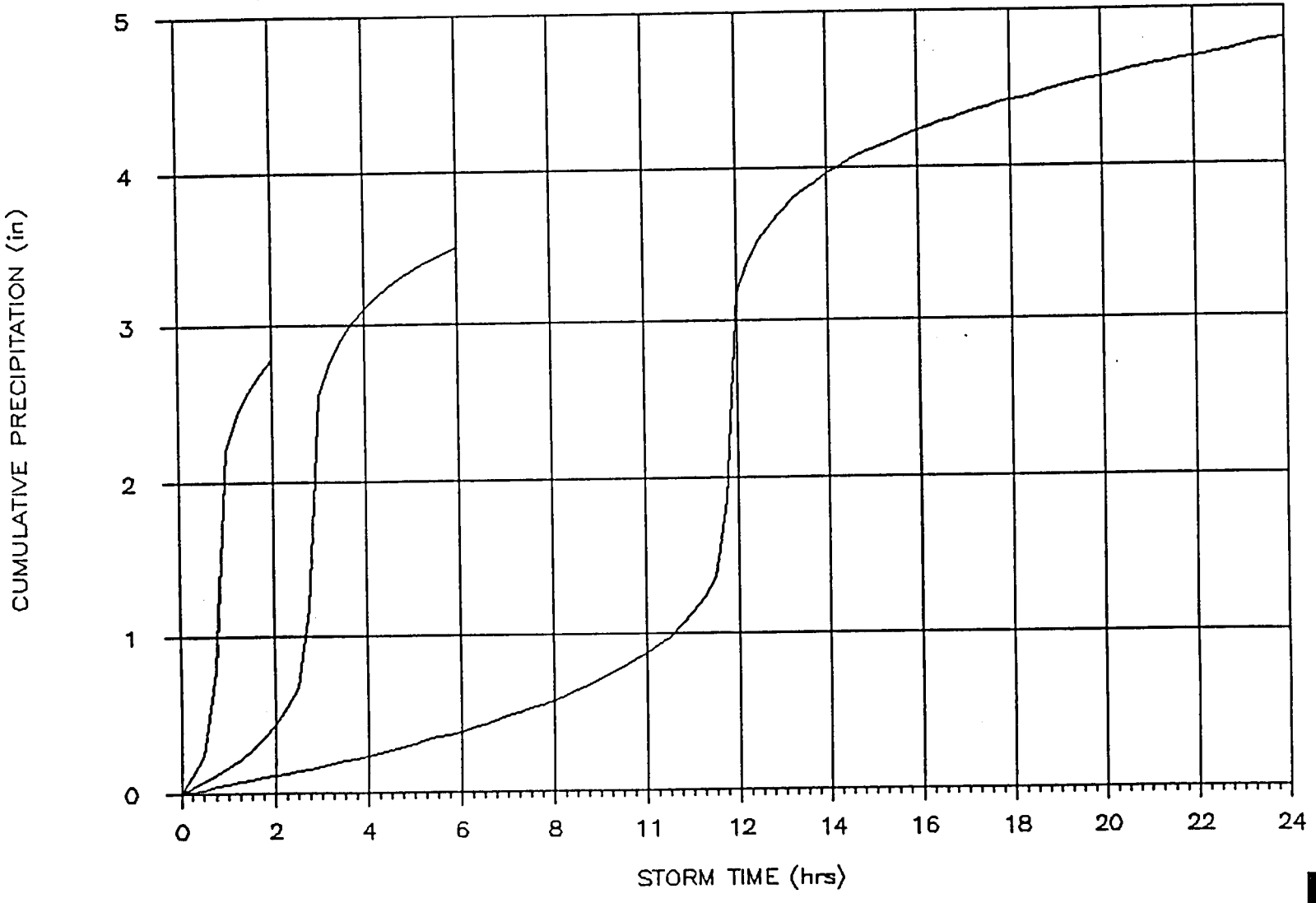

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TABLE - 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY - FLOOD PLAIN DELINATION STUDY

RODGER CREEK AND CLINE CREEK BAKER ENGINEERS PROJECT NUMBER 16923-HPH

100-YEAR POINT RAINFALL: 2 HR., 6 HR., & 24 HR.

SCS TYPE II PRECIPITATION DISTRIBUTION

STORM TIME (hrs.)	STORM-PRECIPITATION 2 HR. (in.)	6 HR. (in.)	24 HR. (in.)	STORM TIME (cont.)	24 HR. (cont.)
0.00	0.00	0.00	0.00	12.25	3.39
0.25	0.11	0.04	0.01	12.50	3.53
0.50	0.24	0.08	0.02	12.75	3.64
0.75	0.78	0.12	0.04	13.00	3.72
1.00	2.21	0.17	0.05	13.25	3.80
1.25	2.43	0.22	0.07	13.50	3.86
1.50	2.58	0.28	0.08	13.75	3.91
1.75	2.70	0.35	0.10	14.00	3.96
2.00	2.79	0.44	0.11	14.25	4.00
2.25		0.54	0.12	14.50	4.04
2.50		0.67	0.14	14.75	4.08
2.75		1.19	0.15	15.00	4.11
3.00		2.55	0.17	15.25	4.14
3.25		2.77	0.18	15.50	4.17
3.50		2.91	0.20	15.75	4.20
3.75		3.02	0.21	16.00	4.23
4.00		3.11	0.23	16.25	4.26
4.25		3.18	0.25	16.50	4.29
4.50		3.24	0.27	16.75	4.31
4.75		3.30	0.29	17.00	4.33
5.00		3.35	0.31	17.25	4.36
5.25		3.39	0.33	17.50	4.38
5.50		3.43	0.35	17.75	4.41
5.75		3.47	0.36	18.00	4.43
6.00		3.50	0.38	18.25	4.44
6.25			0.41	18.50	4.46
6.50			0.43	18.75	4.48
6.75			0.46	19.00	4.50
7.00			0.48	19.25	4.52
7.25			0.50	19.50	4.54
7.50			0.53	19.75	4.56
7.75			0.55	20.00	4.57
8.00			0.58	20.25	4.59
8.25			0.60	20.50	4.60
8.50			0.64	20.75	4.62
8.75			0.67	21.00	4.63
9.00			0.71	21.25	4.65
9.25			0.74	21.50	4.66
9.50			0.78	21.75	4.68
9.75			0.83	22.00	4.69
11.00			0.87	22.25	4.70
10.25			0.92	22.50	4.72
10.50			0.97	22.75	4.73
10.75			1.05	23.00	4.75
11.00			1.13	23.25	4.76
11.25			1.23	23.50	4.78
11.50			1.36	23.75	4.79
11.75			1.86	24.00	4.80
12.00			3.18		

TABLE 3
Areal Reduction of Precipitation for Cline Creek 100-Year Storms

2 HOUR EVENT

(P_{100} = 2.79 inches)

Area (Miles 2)	Areal Reduction Factor	Total Storm Precipitation (inches)
0	1.00	2.79
10	0.79	2.20
20	0.73	2.04
30	0.69	1.93
40	0.66	1.84

6 HOUR EVENT

(P_{100} = 3.50 inches)

Area (Miles 2)	Areal Reduction Factor	Total Storm Precipitation (inches)
0	1.00	3.50
10	0.85	2.98
20	0.79	2.77
30	0.75	2.63
40	0.72	2.52

24 HOUR EVENT

(P_{100} = 4.80 inches)

Area (Miles 2)	Areal Reduction Factor	Total Storm Precipitation (inches)
0	1.00	4.80
10	0.95	4.56
20	0.92	4.42
30	0.90	4.32
40	0.89	4.27

2.2 Soil Losses

The SCS Aguila-Carefree Soil Survey [5] was used to determine soil characteristics and infiltration properties within the portions of the Cline Creek Watershed outside the Tonto National Forest. No detailed soil survey has been published for Tonto National Forest. Soil characteristics were discussed with the soil scientist for the Tonto National Forest. It was determined that a classification of soils inside the National Forest as clay would best describe the hydrologic properties of these soils.

The hydrologic unit boundaries were superimposed on soils mapping for Basin X and for the Cline Creek Watershed in order that the soil composition of each hydrologic unit could be measured, (see Figures 6 and 7). The soil types for secondary sub-basins in Basin X are presented in Table 4. Soil types for the Cline Creek Watershed are presented in Table 5 in the sequence of the combined BasinX/Cline Creek Watershed HEC-1 computations.

Soils were classified by their texture using data from the Aguila - Carefree Soil Survey [5] and loss rate correlations provided by the Flood Control District contained in Appendix D. The Initial and Uniform Loss Rate option of the HEC-1 computer program was selected to determine rainfall excess. Values of initial losses, uniform loss rates and percent impervious were calculated for each secondary sub-basin and sub-basin using the soil texture classifications and ground cover. Loss rate and impervious area calculations are presented in Appendix F. Input parameters are included in Tables 6 and 7.

TABLE 4
Cline Creek Watershed Basin-X (Sub-Basin C-6) Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Secondary Sub-Basin X-1A			
26	Continental Cobbly Clay Loam	40	14.7
66	Greyeagle-Suncity Variant Complex	46	16.9
72	Lehmans-Rock Outcrop Complex	186	68.4
		272	100.0
Secondary Sub-Basin X-2A			
26	Continental Cobbly Clay Loam	22	12.4
66	Greyeagle-Suncity Variant Complex	102	57.3
72	Lehmans-Rock Outcrop Complex	54	30.3
		178	100.0
Secondary Sub-Basin X-3A			
26	Continental Cobbly Clay Loam	11	4.0
66	Greyeagle-Suncity Variant Complex	121	43.5
72	Lehmans-Rock Outcrop Complex	9	3.2
93	Nickel-Cave Complex	10	3.6
95	Ohaco Gravelly Loam	127	45.7
		278	100.0
Secondary Sub-Basin X-4A			
28	Continental-Ohaco Complex	36	35.0
66	Greyeagle-Suncity Variant Complex	43	41.7
95	Ohaco Gravelly Loam	24	23.3
		103	100.0

TABLE 4 (Cont'd)
Cline Creek Watershed Basin-X (Sub-Basin C-6) Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Secondary Sub-Basin X-4B			
28	Continental-Ohaco Complex	36	63.2
66	Greyeagle-Suncity Variant Complex	5	8.7
95	Ohaco Gravelly Loam	16	28.1
		57	100.0
Secondary Sub-Basin X-5A			
6	Anthony-Arizo Complex	28	19.2
26	Continental Cobbly Clay Loam	12	8.2
28	Continental-Ohaco Complex	3	2.1
66	Greyeagle-Suncity Variant Complex	44	30.1
95	Ohaco Gravelly Loam	59	40.4
		146	100.0

TABLE 5
Cline Creek Watershed Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Basin-X (Sub-Basin C-6)			
Sub-Basin X-1			
26	Continental Cobbly Clay Loam	81	20.9
66	Greyeagle-Suncity Variant Complex	74	19.1
72	Lehmans-Rock Outcrop Complex	202	52.2
93	Nickel-Cave Complex	20	5.2
95	Ohaco Gravelly Loam	10	2.6
		387	100.0
Sub-Basin X-2			
26	Continental Cobbly Clay Loam	53	19.2
66	Greyeagle-Suncity Variant Complex	135	48.7
95	Ohaco Gravelly Loam	89	32.1
		277	100.0
Sub-Basin X-3			
6	Anthony-Arizo Complex	9	2.6
26	Continental Cobbly Clay Loam	26	7.4
28	Continental-Ohaco Complex	11	3.1
66	Greyeagle-Suncity Variant Complex	148	41.6
72	Lehmans-Rock Outcrop Complex	9	2.5
93	Nickel-Cave Complex	9	2.5
95	Ohaco Gravelly Loam	143	40.3
		355	100.0

TABLE 5 (Cont'd)
Cline Creek Watershed Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Sub-Basin X-4			
28	Continental-Ohaco Complex	76	42.0
66	Greyeagle-Suncity Variant Complex	48	26.5
95	Ohaco Gravelly Loam	57	31.5
		181	100.0
Sub-Basin X-5			
6	Anthony-Arizo Complex	80	33.1
26	Continental Cobbly Clay Loam	12	5.0
28	Continental-Ohaco Complex	13	5.4
66	Greyeagle-Suncity Variant Complex	44	18.3
95	Ohaco Gravelly Loam	92	38.2
		241	100.0
Sub-Basin C-1			
*	Clay	808	100.0
Sub-Basin C-2			
*	Clay	1378	100.0
Sub-Basin C-3			
66	Greyeagle-Suncity Variant Complex	92	11.5
72	Lehmans-Rock Outcrop Complex	11	1.4
95	Ohaco Gravelly Loam	9	1.1
*	Clay	686	86.0
		798	100.0

*Clay (based on information from Soil Scientist at Tonto National Forest)

TABLE 5 (Cont'd)
Cline Creek Watershed Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Sub-Basin C-4			
*	Clay	1629	100.0
Sub-Basin C-5			
66	Greyeagle-Suncity Variant Complex	72	3.3
*	Clay	2092	96.7
		2164	100.0
Sub-Basin C-6	(See Basin X)		
Sub-Basin C-7			
26	Continental Cobbly Clay Loam	204	27.0
66	Greyeagle-Suncity Variant Complex	77	10.2
72	Lehmans-Rock Outcrop Complex	448	59.3
95	Ohaco Gravelly Loam	26	3.5
		755	100.0
Sub-Basin C-8			
6	Anthony-Arizo Complex	7	0.8
26	Continental Cobbly Clay Loam	440	48.3
66	Greyeagle-Suncity Variant Complex	49	5.4
72	Lehmans-Rock Outcrop Complex	266	29.2
95	Ohaco Gravelly Loam	149	16.3
		911	100.0

*Clay (based on information from Soil Scientist at Tonto National Forest)

TABLE 5 (Cont'd)
Cline Creek Watershed Soil Groups

SCS Group Number	SCS Group Name	Area (acres)	Percent of Sub-Basin
Sub-Basin C-9			
3	Antho-Carrizo-Maripo Complex	8	2.4
6	Anthony-Arizo Complex	59	17.5
13	Carefree-Beardsley Complex	6	1.8
26	Continental Cobbly Clay Loam	98	29.0
44	Ebon Very Gravelly Loam	15	4.4
66	Greyeagle-Suncity Variant Complex	21	6.2
72	Lehmans-Rock Outcrop Complex	31	9.2
93	Nickel-Cave Complex	9	2.7
96	Pinaleno-Tres Hermano Complex	33	9.8
110	Suncity-Cipriano Complex	7	2.0
*	Clay	51	15.0
		338	100.0

*Clay (based on information from Soil Scientist at Tonto National Forest)

2.3 Sub-basin Lag Time Determinations

For the dimensionless unit hydrograph option HEC-1 requires the input of the lag time for each sub-basin. Lag time for each secondary sub-basin and sub-basin was computed using the length, slope and roughness of the longest watercourse within the sub-basin. Procedures used were adapted from Chapter 3 of SCS's TR-55 [6]. A copy of the chapter is included in Appendix G to provide detailed theory. The adaptations used for this study were as follows:

Sheet Flow - The upstream reach of each water course was designated Range (natural), Manning's n = 0.13. The TR-55 procedure was followed.

Shallow Concentrated Flow - TR-55 contains a graphical method to solve for velocity of shallow concentrated flow in the urban setting. The method was adapted for variable Manning's "n" values found in the high desert. Appendix G contains a series of graphs solving Manning's equation for "n" factors from 0.050 to 0.100.

The two designations CS-1 and CS-2 were used for shallow concentrated flow reaches representing average estimated depth of flow of 3" and 6", respectively. In each case the engineer considered the topography of the drainage area along the stream, topographic evidence of the stream cross-section shape and engineering judgment to estimate the upstream and downstream limits of CS-1 and/or CS-2 reaches. The wide rectangular channel approximation, "hydraulic radius equals depth", and Manning's equation graphs were used to determine velocity based on values of Manning's "n", depth and stream slope.

Channel Flow - Channel velocities were calculated for one of two channel reaches designated CH-1 or CH-2 using a graphical algorithm for an approximate solution of Manning's equation. Preliminary HEC-1 runs for Cline Creek and tributaries were used to estimate average reach flows, or to estimate "per square mile" flows for sub-areas

draining to a reach. This flow was used as a basis to check the velocity estimation. The average bed width for the reach was estimated from topography or aerial photographs for channels which appeared to approximate a wide rectangular channel. For channels which appeared best represented by a triangular channel a side slope ratio relating average top width to depth for the reach was estimated.

A value was assumed for hydraulic radius (and top width determined for the triangular approximation) equal to depth for the rectangular approximation or one-half of depth for the triangular approximation. A velocity was read from the graph using reach slope, hydraulic radius and Manning's "n". A value for flow was calculated, equal to velocity times hydraulic radius times top width. The calculated flow was compared to the estimated average reach flow. The hydraulic radius was adjusted, and the calculation was repeated until the calculated flow agreed with estimated average flow for the reach. Once the HEC-1 model had been finalized, the estimates of average reach flow were reviewed to be sure that no "order of magnitude" errors had been introduced.

Manning's "n" - The most subjective variable in computing lag times has always been the "n" factor. These values were estimated based on engineering judgment, experience, field review and two reports previously submitted for this study: Summary of Field Inspection, Cline Creek and Rodger Creek; Summary of Field Inspection, Cline Creek. These reports were used to estimate composite values of "n" for channel velocities. Shallow concentrated flow roughness values were estimated using topographic mapping and aerial photography where coverage was available.

Unit hydrograph parameters for the Model XB secondary sub-basins are listed in Table 6, and those for Basin X and Cline Creek Watershed sub-basins, Model CC, are listed in Table 7. Computations of sub-basins lag time are presented in Appendix G.

TABLE 6
Model XB-02, XB-06, and XB-24
Secondary Sub-basin Hydrologic Input Parameters

Secondary Sub-Basin	Area (miles 2)	Uniform Loss Rate CNSTL (in./hr.)	Initial Loss STRTL (inches)	Percent Impervious	Lag Time (Hours)
X1-A	0.43	0.20	0.88	20.51	0.41
X2-A	0.28	0.29	0.91	9.10	0.50
X3-A	0.43	0.36	0.94	0.97	0.58
X4-A	0.16	0.30	0.90	-0-	0.40
X4-B	0.09	0.23	0.86	-0-	0.45
X5-A	0.23	0.35	0.93	-0-	0.52

TABLE 7
Model CC-02, CC-06, and CC-24
Sub-basin Hydrologic Input Parameters

Sub-Basin	Area (miles 2)	Uniform Loss Rate CNSTL (in./hr.)	Initial Loss STRTL (inches)	Percent Impervious	Lag Time (Hours)
Basin X					
X1	0.60	0.21	0.88	15.95	0.44
X2	0.43	0.29	0.90	5.78	0.59
X3	0.56	0.35	0.93	0.76	0.69
X4	0.28	0.28	0.89	-0-	0.48
X5	0.38	0.35	0.93	-0-	0.66
Cline Creek Watershed					
C-1	1.26	0.01	0.55	-0-	0.36
C-2	2.15	0.09	0.63	-0-	0.76
C-3	1.25	0.06	0.61	-0-	0.50
C-4	2.55	0.01	0.55	-0-	0.50
C-5	3.38	0.02	0.56	-0-	0.57
C-6*	2.25	0.29	0.90	5.5	0.72
C-7	1.18	0.18	0.87	17.7	0.54
C-8	1.42	0.18	0.85	8.8	0.64
C-9	0.53	0.24	0.83	3.9	0.48

* Basin X

2.4 Streamflow Routing

Hydrographs from upper watershed sub-basins were routed through the watershed stream system using the Muskingum Routing option of HEC-1. Muskingum routing is a stream storage method which calculates reach outflow based on inflow and a previous value of outflow. A stream reach is divided into a number sub-reaches calculated to avoid negative routing coefficients, which are internally generated. Input parameters are: travel time through a channel reach, (AMSKK); a weighting factor to account for the relative effect of inflow and outflow on stream storage, (X); and the number of sub-reaches, (NSTPS).

The travel time (AMSKK) determination followed the same TR55 procedures [6] as were used to determine sub-basin lag times. The value of the Muskingum "X" has a theoretical mathematical range of 0.0 to 0.5. For the relatively steep channel reaches of Cline Creek, a value of X = 0.3 was estimated to give significant weight to reach inflows in determining stream storage. This reflects a judgment that: 1. backwater curves probably do not extend very far upstream and 2. rapid changes in flow can create significant wedge storage before outflow responds. Muskingum channel routing parameters are listed in Table 8. Travel time calculations are included in Appendix G following sub-basin lag time calculations. Calculations to determine the number of sub-reaches are presented in Appendix H.

TABLE 8
Model CC-02, CC-06, and CC-24
Muskingum Channel Routing Input Parameters

Routing Reach	NSTPS*	AMSKK (hours)	X
RO-X2	2	0.15	0.3
RO-X5	2	0.23	0.3
RO-1	6	0.58	0.3
RO-2	3	0.27	0.3
RO-3	3	0.24	0.3
RO-4	3	0.25	0.3
RO-5	8	0.77	0.3
RO-6	2	0.21	0.3

* NSTPS based on computation interval of 6 minutes

2.5 HEC-1 Model Sequence

The purpose of the hydrology study for the Cline Creek watershed is to determine 100-year flood flows for delineation of Cline Creek and a number of its tributaries. The model has been subdivided into two HEC-1 files to provide the necessary level of detail while maintaining a consistent output of hydrograph data based on a 6 minute computation interval.

The initial sequence is contained in the XB file. The model produces a series of sub-basin hydrographs for the secondary sub-basins with no combinations or routings. The order is X1-A; X2-A; X3-A; X4-A; X4-B; X5-A.

The Basin X model with routings and combinations is included as the first series of computations in the Cline Creek watershed model, file CC. Basin X has five sub-basins, four combination points and two routing reaches. The final hydrograph, designated XCO-4, represents Cline Creek sub-basin C-6 hydrograph. The Cline Creek model sequence combines C-6 into Cline Creek flow at the appropriate point in the computation. The Basin X schematic is shown in Figure 8.

The Cline Creek model consists of nine sub-basins, including Basin X. Sub-basins C-1 through C-5 are combined and routed to a major confluence point, CO-2, on Cline Creek just upstream of the Tonto National Forest boundary. Upstream of CO-2 the Cline Creek floodplain will not be delineated. The combinations and routings downstream of CO-2 are designed to produce 100-year flood flows specifically for delineation of two Cline Creek outside the National Forest. The Cline Creek watershed model contains six routing reaches and five combination points which are exclusive of any in the Basin X model. The HEC-1 Model Schematic for Cline Creek Watershed is shown in Figure 9.

3.0 Summary and Conclusions

3.1 Summary

Using the HEC-1 SCS dimensionless hydrograph option, hydrology was simulated for the 2, 6 and 24 hour storms on the Cline Creek watershed. Two HEC-1 models were developed. The first, XB, was used to produce 100-year flows for the smallest tributaries to be delineated. The output of this model is a series of six sub-basin hydrographs for the six drainage areas. These were termed "secondary" sub-basins to indicate that they were fractional parts of sub-basins used in the second HEC-1 model, CC.

The CC model simulates the entire Cline Creek Watershed with the series of sub-basin hydrographs, routings and combinations for the detailed analysis of Sub-basin C-6 (Basin X) computed first, followed by the balance of the computations for the Cline Creek Watershed. The Basin X computation contains five sub-basins, four combinations and two routing reaches. The remaining Cline Creek model simulates the other eight sub-basins with five combinations and six routing reaches.

The computation interval of 6 minutes was chosen as the smallest interval which could accommodate the 28 hour hydrograph resulting from a 24 hour storm. The 6 minute interval was used for 2 and 6 hour storm hydrographs to maintain consistency for comparing all three storm durations. Areal reduction of precipitation was applied because of the 16 square mile watershed area.

Watershed conditions were modeled which reflect the near-natural conditions of the watershed. Precipitation losses were simulated by initial and uniform loss rates and percent impervious areas. Likewise, routing parameters were computed based on generally prevailing wash conditions, a naturally occurring combination of gravel/cobble-bed channel and desert riparian overbanks.

3.2 Results of the HEC-1 Model

Peak discharges for the 2, 6 and 24 hour 100 year events are listed in Table 9. Flows are tabulated for the six secondary sub-basins, 13 sub-basins and 9 combination points in the XB and CC models, shown schematically in Figures 8 and 9. Copies of the HEC-1 output for the XB and CC models are presented as follows: 2 hour storm, XB-02 and CC-02 in Appendix A; 6 hour storm, XB-06 and CC-06 in Appendix B; and 24 hour storm, XB-24 and CC-24 in Appendix C.

3.3 Conclusions

By comparison of peak flows for the 2, 6 and 24 hour events (Table 9), it is seen that the 24 hour event produces the maximum peak runoff from each sub-basin and at each combination point in the watershed.

Two factors favor maximum peak runoff from the 24 hour storm on Cline Creek. The first is an average initial loss of nearly 0.7 inch for the watershed. In the 24 hour storm early precipitation can completely satisfy the initial loss prior to the most intense precipitation, which results in a high percentage of runoff during the heaviest rainfall.

The second factor is that the peak 15 minute rainfall intensity for the SCS Type II 24 hour storm is only slightly less than the 15 minute peak intensities of the 2 and 6 hour storm distributions. Comparison of the graphs of the three precipitation distributions (Figure 3) shows the similarity of peak intensity. Since the 24 hour storm simulation produced the largest peaks throughout the watershed, all of the floodplain delineation flows were selected from the 24 hour flow values. The flow for each reach was selected such that 100-year floodplain delineation flows do not increase in an upstream direction.

TABLE 9
Cline Creek Watershed 100-Year Runoff Summary

Location	Peak Discharge (cfs) Event		
	2 Hour	6 Hour	24 Hour
Model XB			
Secondary Sub-basin X-1A	536	640	708
Secondary Sub-basin X-2A	280	346	390
Secondary Sub-basin X-3A	337	435	518
Secondary Sub-basin X-4A	187	231	254
Secondary Sub-basin X-4B	104	126	139
Secondary Sub-basin X-5A	203	262	301
Model CC			
Sub-basin X-1	674	830	943
Sub-basin X-2	364	458	531
Combination Point XCO-1	990	1238	1430
Sub-basin X-3	377	493	592
Combination Point XCO-2	1248	1615	1924
Sub-basin X-4	279	350	399
Combination Point XCO-3	1405	1808	2206
Sub-basin X-5	271	349	418
Combination Point XCO-4	1620	2114	2604
Sub-basin C-1	1908	2211	2345
Sub-basin C-2	1731	2137	2435
Sub-basin C-3	1454	1738	1882
Sub-basin C-4	3024	3597	3900
Sub-basin C-5	3553	4311	4775
Combination Point CO-1	5988	7274	8137
Combination Point CO-2	9341	11638	13283
Sub-basin C-7	1136	1403	1642
Sub-basin C-8	1156	1458	1746
Combination Point CO-3	1496	1863	2281
Combination Point CO-4	10665	13772	16691
Sub-basin C-9	551	677	768
Combination Point CO-5 (Discharge to Skunk Creek)	10476	13551	16527

3.4 100-Year Floodplain Delineation Flows

The flows used to delineate the 100-year floodplain of the various reaches Cline Creek are presented in Table 10.

TABLE 10
Cline Creek Watershed 100-Year Flows

		Reach	Discharge (cfs)
Cline Creek	:	Skunk Creek to Confluence Trib. C-8	16,700
Cline Creek	:	Confluence Trib. C-8 to Tonto National Forest	13,300
Tributary C-8	:	Confluence Cline Creek to 2200' East of 24th Street Alignment	2,280
Tributary C-6	:	Confluence Cline Creek to Confluence Trib. X-4	2,210
Tributary C-6	:	Confluence Trib. X-4 to Confluence Trib. X-3A	1,920
Tributary C-6	:	Confluence Trib. X-3A to Confluence Trib. X-2A	1,430
Tributary C-6	:	Confluence Trib. X-2A to 600' West of 20th Street	943
Tributary X-5	:	Confluence Cline Creek* to 500' West of 10th Street	418
Tributary X-5A	:	500' West of 10th Street to 16th Street Alignment	301
Tributary X-4	:	Confluence Trib. C-6 to Confluence Trib. X-4B	399
Tributary X-4B	:	Confluence Trib. X-4A to 600' West of 14th Street	139
Tributary X-4A	:	Confluence Trib. X-4B to 200' West of 14th Street	254
Tributary X-3A	:	Confluence Trib. C-6 to 500' East of 20th Street	518
Tributary X-2A	:	Confluence Trib. C-6 to 24th Street Alignment	390
Tributary X-1A	:	600' West of 20th Street to 1400' East of 24th Street Alignment	708

* The channel occupied by X-5 Tributary is also a side channel of Cline Creek. The downstream limit of delineation will be determined once the Cline Creek Floodway width has been determined.

4.0 References

1. Flood Insurance Study, Flood Insurance Rate Maps; Flood Boundary and Floodway Maps, Federal Emergency Management Agency, Effective date - April 15, 1988.

2. United States Army Corps of Engineers, Hydrologic Engineering Center, "HEC-1 Flood Hydrograph Package Users Manual," March, 1987 and "Flood Hydrograph Package HEC-1 (IBM XT 512k Version) February 1, 1985.

3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NOAA Atlas 2, "Precipitation Frequency Atlas of the Western United States, Volume 8, Arizona," 1973.

4. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NOAA Technical Memorandum NWS HYDRO-40, "Depth-Area Ratios in the Semi-Arid Southwest United States," August 1984.

5. U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of Aguila - Carefree Area, Parts of Maricopa and Pinal Counties, Arizona," April 1986.

6. U.S. Department of Agriculture, Soil Conservation Service, "Urban Hydrology for Small Watersheds, " Technical Release 55, June 1986.

APPENDIX A

CLINE CREEK

HEC-1

100-YEAR 2 HOUR STORM

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                                FILE:    XB-02
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 2 HOUR EVENT (SECONDARY SUB-BASINS ONLY)
  6           ID                          COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
  7           ID                          DRAINAGE AREAS
  8           ID
  9           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
 10           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
 11           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 12           ID
 13           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 14           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 15           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 16           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 17           ID                                                AND PERCENT IMPERVIOUS
 18           ID                          STREAM ROUTING - NONE
 19           ID                          HYDROGRAPH COMBINATIONS - NONE
 20           ID
 21           ID        WATERSHED NAME:   CLINE CREEK   (BASIN X IS SUB-BASIN C-6)
 22           ID
 23           ID        CONTRACT NUMBER:  FCD 89-15
 24           ID
 25           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/06/89
 26           ID                          COMP: EO 12/18/89        CKD: BAB 12-18-89
 27           IT      6 01AUG89    1100      70
             *DIAGRAM
 28           IN      15
 29           IO       5
 30           JD    2.79     .01
 31           PC      .0    .039    .087    .280    .791    .872    .924    .967   1.000
 32           JD    2.20     10.
 33           JD    2.04     20.
 34           JD    1.93     30.
 35           JD    1.84     40.

 36           KK  SSBX1A
 37           KM        RUNOFF FROM SEC.SUBBASIN X1-A
 38           BA    0.43
 39           LU    0.88    0.20   20.51
 40           UD    0.41

 41           KK  SSBX2A
 42           KM         RUNOFF FROM SEC.SUBBASIN X2-A
 43           BA    0.28
 44           LU    0.91    0.29    9.10
 45           UD    0.50

 46           KK  SSBX3A
 47           KM        RUNOFF FROM SEC.SUBBASIN X3-A
 48           BA    0.43
 49           LU    0.94    0.36    0.97
 50           UD    0.58
```

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

  51          KK  SSBX4A
  52          KM        RUNOFF FROM SEC.SUBBASIN X4-A
  53          BA    0.16
  54          LU    0.90    0.30    0.00
  55          UD    0.40

  56          KK  SSBX4B
  57          KM        RUNOFF FROM SEC.SUBBASIN X4-B
  58          BA    0.09
  59          LU    0.86    0.23    0.00
  60          UD    0.45

  61          KK  SSBX5A
  62          KM        RUNOFF FROM SEC.SUBBASIN X5-A
  63          BA    0.23
  64          LU    0.93    0.35    0.00
  65          UD    0.52
  66          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   36      SSBX1A
                .
                .
   41           .      SSBX2A
                .           .
                .           .
   46           .           .     SSBX3A
                .           .          .
                .           .          .
   51           .           .          .     SSBX4A
                .           .          .          .
                .           .          .          .
   56           .           .          .          .     SSBX4B
                .           .          .          .          .
                .           .          .          .          .
   61           .           .          .          .          .     SSBX5A
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: XB-02

HYDROLOGY FOR: 100-YEAR 2 HOUR EVENT (SECONDARY SUB-BASINS ONLY)
COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
DRAINAGE AREAS

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
AND PERCENT IMPERVIOUS
STREAM ROUTING - NONE
HYDROGRAPH COMBINATIONS - NONE

WATERSHED NAME: CLINE CREEK (BASIN X IS SUB-BASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/06/89
COMP: _____ CKD: _____

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

   IT        HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1AUG89  STARTING DATE
                  ITIME       1100  STARTING TIME
                     NQ         70  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1AUG89  ENDING DATE
                 NDTIME       1754  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE    6.90 HOURS

      ENGLISH UNITS

30 JD        INDEX STORM NO. 1
                  STRM       2.79  PRECIPITATION DEPTH
                  TRDA        .01  TRANSPOSITION DRAINAGE AREA

31 PI          PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

32 JD        INDEX STORM NO. 2
                  STRM       2.20  PRECIPITATION DEPTH
                  TRDA      10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

[illegible]  INDEX STORM NO. 3
                  STRM       2.04  PRECIPITATION DEPTH
                  TRDA      20.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01
```

```
34 JD        INDEX STORM NO. 4
                  STRM        1.93  PRECIPITATION DEPTH
                  TRDA       30.00  TRANSPOSITION DRAINAGE AREA

               PRECIPITATION PATTERN
                  .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                  .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

35 JD        INDEX STORM NO. 5
                  STRM        1.84  PRECIPITATION DEPTH
                  TRDA       40.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                  .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                  .03       .03       .03       .02       .02       .02       .02       .02       .01       .01
```

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	SSBX1A	536.	1.30	73.	63.	63.	.43		
HYDROGRAPH AT	SSBX2A	280.	1.40	41.	36.	36.	.28		
HYDROGRAPH AT	SSBX3A	337.	1.50	52.	45.	45.	.43		
HYDROGRAPH AT	SSBX4A	187.	1.30	22.	19.	19.	.16		
HYDROGRAPH AT	SSBX4B	104.	1.40	14.	12.	12.	.09		
HYDROGRAPH AT	SSBX5A	203.	1.40	29.	25.	25.	.23		

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

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                              FILE: CC-02
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 2 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
  9           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                      &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: 1/5/90             CKD: 1-5-90
 24           IT      6 01AUG89    1100      70
             *DIAGRAM
 25           IN     15
 26           IO      5
 27           JD   2.79     .01
 28           PC     .0    .039    .087    .280    .791    .872    .924    .967   1.000
 29           JD   2.20     10.
 30           JD   2.04     20.
 31           JD   1.93     30.
 32           JD   1.84     40.

 33           KK   X1SUB
 34           KM        RUNOFF FROM SUBBASIN X1
 35           BA   0.60
 36           LU   0.88    0.21   15.95
 37           UD   0.44

 38           KK   XROX2
 39           KM        ROUTE X1 THROUGH SUBBASIN X2
 40           RM      2    0.15    0.30

 41           KK   X2SUB
 42           KM        RUNOFF FROM SUBBASIN X2
 43           BA   0.43
 44           LU   0.90    0.29    5.78
 45           UD   0.59
```

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

  46          KK   XCO-1
  47          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  48          HC       2

  49          KK   XROX3
  50          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  51          RM       2    0.23    0.30

  52          KK   X3SUB
  53          KM        RUNOFF FROM SUBBASIN X3
  54          BA    0.56
  55          LU    0.93    0.35    0.76
  56          UD    0.69

  57          KK   XCO-2
  58          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  59          HC       2

  60          KK   X4SUB
  61          KM        RUNOFF FROM SUBBASIN X4
  62          BA    0.28
  63          LU    0.89    0.28    0.00
  64          UD    0.48

  65          KK   XCO-3
  66          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  67          HC       2

  68          KK   X5SUB
  69          KM        RUNOFF FROM SUBBASIN X5
  70          BA    0.38
  71          LU    0.93    0.35    0.00
  72          UD    0.66

  73          KK   XCO-4
  74          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  75          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  76          HC       2

  77          KK   SUBC1
  78          KM        RUNOFF FROM SUBBASIN C-1
  79          BA    1.26
  80          LU     .55     .01      0.
  81          UD     .36

  82          KK   RO-1
  83          KM        ROUTE C-1       THROUGH      C-2
  84          RM       6     .58      .3
```

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

  85          KK   SUBC2
  86          KM        RUNOFF FROM SUBBASIN    C-2
  87          BA    2.15
  88          LU     .63     .09      0.
  89          UD     .76

  90          KK   SUBC3
  91          KM        RUNOFF FROM SUBBASIN    C-3
  92          BA    1.25
  93          LU     .61     .06      0.
  94          UD     .50

  95          KK   SUBC4
  96          KM        RUNOFF FROM SUBBASIN    C-4
  97          BA    2.55
  98          LU     .55     .01      0.
  99          UD     .50

 100          KK   RO-2
 101          KM        ROUTE C-4       THROUGH      C-5
 102          RM       3     .27      .3

 103          KK   SUBC5
 104          KM        RUNOFF FROM SUBBASIN    C-5
 105          BA    3.38
 106          LU     .56     .02      0.
 107          UD     .57

 108          KK   CO-1
 109          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 110          HC       2

 111          KK   RO-3
 112          KM        ROUTE C-4&5     THROUGH      C-3
 113          RM       3     .24      .3

 114          KK   CO-2
 115          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 116          HC       4

 117          KK   RO-4
 118          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 119          RM       3     .25      .3

 120          KK   SUBC7
 121          KM        RUNOFF FROM SUBBASIN    C-7
 122          BA    1.18
 123          LU     .87     .18    17.7
 124          UD     .54
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  125         KK   RO-5
  126         KM        ROUTE C-7       THROUGH      C-8
  127         RM       8     .77      .3

  128         KK   SUBC8
  129         KM        RUNOFF FROM SUBBASIN    C-8
  130         BA    1.42
  131         LU     .85     .18     8.8
  132         UD     .64

  133         KK   CO-3
  134         KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
  135         HC       2

  136         KK   CO-4
  137         KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
  138         HC       3

  139         KK   RO-6
  140         KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
  141         RM       2     .21      .3

  142         KK   SUBC9
  143         KM        RUNOFF FROM SUBBASIN    C-9
  144         BA     .53
  145         LU     .83     .24     3.9
  146         UD     .48

  147         KK   CO-5
  148         KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
  149         KO       1
  150         HC       2
  151         ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  33       X1SUB
               V
               V
  38       XROX2
               .
               .
  41           .       X2SUB
               .           .
               .           .
  46       XCO-1............
               V
               V
  49       XROX3
               .
               .
  52           .       X3SUB
               .           .
               .           .
  57       XCO-2............
               .
               .
  60           .       X4SUB
               .           .
               .           .
  65       XCO-3............
               .
               .
  68           .       X5SUB
               .           .
               .           .
  73       XCO-4............
               .
               .
  77           .       SUBC1
               .           V
               .           V
  82           .       RO-1
               .           .
               .           .
  85           .           .       SUBC2
               .           .           .
               .           .           .
  90           .           .           .       SUBC3
               .           .           .           .
               .           .           .           .
  95           .           .           .           .       SUBC4
               .           .           .           .           V
               .           .           .           .           V
 100           .           .           .           .       RO-2
               .           .           .           .           .
               .           .           .           .           .
 103           .           .           .           .           .       SUBC5
               .           .           .           .           .           .
               .           .           .           .           .           .
               .           .           .           .       CO-1 ............
               .           .           .           .           V
               .           .           .           .           V
 111           .           .           .           .       RO-3
               .           .           .           .           .
```

```
            .         .         .         .         .
114         .     CO-2 ..................................
            .         V
            .         V
1           .     RO-4
            .         .
            .         .
120         .         .     SUBC7
            .         .         V
            .         .         V
125         .         .     RO-5
            .         .         .
            .         .         .
128         .         .         .     SUBC8
            .         .         .         .
            .         .         .         .
133         .         .     CO-3 ............
            .         .         .
            .         .         .
136     CO-4 ......................
            V
            V
139     RO-6
            .
            .
142         .     SUBC9
            .         .
            .         .
147     CO-5 ............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

****

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: CC-02

HYDROLOGY FOR: 100-YEAR 2 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	6	MINUTES IN COMPUTATION INTERVAL
IDATE	1AUG89	STARTING DATE
ITIME	1100	STARTING TIME
NQ	70	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1AUG89	ENDING DATE
NDTIME	1754	ENDING TIME

COMPUTATION INTERVAL .10 HOURS
TOTAL TIME BASE 6.90 HOURS

ENGLISH UNITS

27 JD INDEX STORM NO. 1

STRM	2.79	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

28 PI PRECIPITATION PATTERN

.02	.02	.02	.02	.02	.08	.08	.14	.20	.20
.03	.03	.03	.02	.02	.02	.02	.02	.01	.01

29 JD INDEX STORM NO. 2

STRM	2.20	PRECIPITATION DEPTH
TRDA	10.00	TRANSPOSITION DRAINAGE AREA

U PI PRECIPITATION PATTERN

.02	.02	.02	.02	.02	.08	.08	.14	.20	.20
.03	.03	.03	.02	.02	.02	.02	.02	.01	.01

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 30 JD          INDEX STORM NO. 3
                      STRM        2.04  PRECIPITATION DEPTH
                      TRDA       20.00  TRANSPOSITION DRAINAGE AREA

                  PRECIPITATION PATTERN
                     .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                     .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

 31 JD          INDEX STORM NO. 4
                      STRM        1.93  PRECIPITATION DEPTH
                      TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                     .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                     .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

 32 JD          INDEX STORM NO. 5
                      STRM        1.84  PRECIPITATION DEPTH
                      TRDA       40.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                     .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                     .03       .03       .03       .02       .02       .02       .02       .02       .01       .01


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


          **************
          *            *
147 KK    *    CO-5    *
          *            *
          **************

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

150 HC          HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

                                                HYDROGRAPH AT    CO-5
                                            TRANSPOSITION AREA      .0 SQ MI

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

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	10294.	1 AUG 1436	37	1722.	1 AUG 1624	55	8.
1 AUG 1106	2	0.	1 AUG 1254	20	12280.	1 AUG 1442	38	1332.	1 AUG 1630	56	5.
1 AUG 1112	3	0.	1 AUG 1300	21	13999.	1 AUG 1448	39	1023.	1 AUG 1636	57	3.
1 AUG 1118	4	1.	1 AUG 1306	22	15232.	1 AUG 1454	40	784.	1 AUG 1642	58	2.
1 AUG 1124	5	3.	1 AUG 1312	23	15807.	1 AUG 1500	41	601.	1 AUG 1648	59	1.
1 AUG 1130	6	5.	1 AUG 1318	24	15663.	1 AUG 1506	42	460.	1 AUG 1654	60	1.
UG 1136	7	10.	1 AUG 1324	25	14854.	1 AUG 1512	43	352.	1 AUG 1700	61	1.
UG 1142	8	16.	1 AUG 1330	26	13541.	1 AUG 1518	44	267.	1 AUG 1706	62	0.
1 AUG 1148	9	37.	1 AUG 1336	27	11951.	1 AUG 1524	45	201.	1 AUG 1712	63	0.
1 AUG 1154	10	103.	1 AUG 1342	28	10307.	1 AUG 1530	46	149.	1 AUG 1718	64	0.
1 AUG 1200	11	274.	1 AUG 1348	29	8762.	1 AUG 1536	47	110.	1 AUG 1724	65	0.
1 AUG 1206	12	613.	1 AUG 1354	30	7387.	1 AUG 1542	48	81.	1 AUG 1730	66	0.

1 AUG	1212	13	1173.	*	1 AUG	1400	31	6189.	*	1 AUG	1548	49	60.	*	1 AUG	1736	67	0.
1 AUG	1218	14	1987.	*	1 AUG	1406	32	5151.	*	1 AUG	1554	50	45.	*	1 AUG	1742	68	0.
1 AUG	1224	15	3112.	*	1 AUG	1412	33	4247.	*	1 AUG	1600	51	33.	*	1 AUG	1748	69	0.
1 AUG	1230	16	4569.	*	1 AUG	1418	34	3461.	*	1 AUG	1606	52	24.	*	1 AUG	1754	70	0.
1	1236	17	6309.	*	1 AUG	1424	35	2782.	*	1 AUG	1612	53	17.	*				
	1242	18	8253.	*	1 AUG	1430	36	2203.	*	1 AUG	1618	54	11.	*				
				*					*					*				

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
15807.	2.20	(CFS)	3464.	3013.	3013.	3013.
		(INCHES)	2.017	2.017	2.017	2.017
		(AC-FT)	1718.	1718.	1718.	1718.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	AUG	1100	1	0.	*	1	AUG	1248	19	6928.	*	1	AUG	1436	37	1285.	*	1	AUG	1624	55	6.
1	AUG	1106	2	0.	*	1	AUG	1254	20	8403.	*	1	AUG	1442	38	993.	*	1	AUG	1630	56	4.
1	AUG	1112	3	0.	*	1	AUG	1300	21	9731.	*	1	AUG	1448	39	762.	*	1	AUG	1636	57	2.
1	AUG	1118	4	1.	*	1	AUG	1306	22	10739.	*	1	AUG	1454	40	583.	*	1	AUG	1642	58	2.
1	AUG	1124	5	2.	*	1	AUG	1312	23	11283.	*	1	AUG	1500	41	446.	*	1	AUG	1648	59	1.
	G	1130	6	4.	*	1	AUG	1318	24	11297.	*	1	AUG	1506	42	342.	*	1	AUG	1654	60	1.
		1136	7	8.	*	1	AUG	1324	25	10806.	*	1	AUG	1512	43	261.	*	1	AUG	1700	61	0.
1	AUG	1142	8	13.	*	1	AUG	1330	26	9916.	*	1	AUG	1518	44	199.	*	1	AUG	1706	62	0.
1	AUG	1148	9	22.	*	1	AUG	1336	27	8795.	*	1	AUG	1524	45	149.	*	1	AUG	1712	63	0.
1	AUG	1154	10	55.	*	1	AUG	1342	28	7613.	*	1	AUG	1530	46	111.	*	1	AUG	1718	64	0.
1	AUG	1200	11	145.	*	1	AUG	1348	29	6489.	*	1	AUG	1536	47	82.	*	1	AUG	1724	65	0.
1	AUG	1206	12	344.	*	1	AUG	1354	30	5483.	*	1	AUG	1542	48	61.	*	1	AUG	1730	66	0.
1	AUG	1212	13	690.	*	1	AUG	1400	31	4603.	*	1	AUG	1548	49	45.	*	1	AUG	1736	67	0.
1	AUG	1218	14	1203.	*	1	AUG	1406	32	3837.	*	1	AUG	1554	50	33.	*	1	AUG	1742	68	0.
1	AUG	1224	15	1930.	*	1	AUG	1412	33	3168.	*	1	AUG	1600	51	24.	*	1	AUG	1748	69	0.
1	AUG	1230	16	2902.	*	1	AUG	1418	34	2583.	*	1	AUG	1606	52	18.	*	1	AUG	1754	70	0.
1	AUG	1236	17	4095.	*	1	AUG	1424	35	2077.	*	1	AUG	1612	53	13.	*					
1	AUG	1242	18	5458.	*	1	AUG	1430	36	1645.	*	1	AUG	1618	54	9.	*					

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
11297.	2.30	(CFS)	2462.	2141.	2141.	2141.
		(INCHES)	1.433	1.433	1.433	1.433
		(AC-FT)	1221.	1221.	1221.	1221.

CUMULATIVE AREA = 15.97 SQ MI

****

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	6043.	1 AUG 1436	37	1165.	1 AUG 1624	55	5.
1 AUG 1106	2	0.	1 AUG 1254	20	7370.	1 AUG 1442	38	900.	1 AUG 1630	56	3.
1 AUG 1112	3	0.	1 AUG 1300	21	8577.	1 AUG 1448	39	690.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	9510.	1 AUG 1454	40	528.	1 AUG 1642	58	1.
1 AUG 1124	5	2.	1 AUG 1312	23	10033.	1 AUG 1500	41	404.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	10082.	1 AUG 1506	42	309.	1 AUG 1654	60	1.
1 AUG 1136	7	7.	1 AUG 1324	25	9673.	1 AUG 1512	43	236.	1 AUG 1700	61	0.
1 AUG 1142	8	12.	1 AUG 1330	26	8901.	1 AUG 1518	44	180.	1 AUG 1706	62	0.
1 AUG 1148	9	20.	1 AUG 1336	27	7912.	1 AUG 1524	45	135.	1 AUG 1712	63	0.
1 AUG 1154	10	47.	1 AUG 1342	28	6860.	1 AUG 1530	46	101.	1 AUG 1718	64	0.
1 AUG 1200	11	123.	1 AUG 1348	29	5856.	1 AUG 1536	47	74.	1 AUG 1724	65	0.
1 AUG 1206	12	290.	1 AUG 1354	30	4954.	1 AUG 1542	48	55.	1 AUG 1730	66	0.
1 AUG 1212	13	584.	1 AUG 1400	31	4164.	1 AUG 1548	49	41.	1 AUG 1736	67	0.
1 AUG 1218	14	1021.	1 AUG 1406	32	3474.	1 AUG 1554	50	30.	1 AUG 1742	68	0.
1 AUG 1224	15	1644.	1 AUG 1412	33	2870.	1 AUG 1600	51	22.	1 AUG 1748	69	0.
1 AUG 1230	16	2485.	1 AUG 1418	34	2342.	1 AUG 1606	52	16.	1 AUG 1754	70	0.
1 AUG 1236	17	3530.	1 AUG 1424	35	1883.	1 AUG 1612	53	11.			
1 AUG 1242	18	4734.	1 AUG 1430	36	1491.	1 AUG 1618	54	8.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
10082.	2.30	(CFS)	2190.	1905.	1905.	1905.
		(INCHES)	1.275	1.275	1.275	1.275
		(AC-FT)	1086.	1086.	1086.	1086.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	5436.	1 AUG 1436	37	1082.	1 AUG 1624	55	5.
1 AUG 1106	2	0.	1 AUG 1254	20	6662.	1 AUG 1442	38	836.	1 AUG 1630	56	3.
1 AUG 1112	3	0.	1 AUG 1300	21	7786.	1 AUG 1448	39	641.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	8666.	1 AUG 1454	40	491.	1 AUG 1642	58	1.
1 AUG 1124	5	2.	1 AUG 1312	23	9175.	1 AUG 1500	41	375.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	9249.	1 AUG 1506	42	287.	1 AUG 1654	60	1.
1 AUG 1136	7	7.	1 AUG 1324	25	8898.	1 AUG 1512	43	219.	1 AUG 1700	61	0.
1 AUG 1142	8	11.	1 AUG 1330	26	8205.	1 AUG 1518	44	167.	1 AUG 1706	62	0.
1 AUG 1148	9	19.	1 AUG 1336	27	7307.	1 AUG 1524	45	126.	1 AUG 1712	63	0.
1 AUG 1154	10	43.	1 AUG 1342	28	6345.	1 AUG 1530	46	93.	1 AUG 1718	64	0.
1 AUG 1200	11	109.	1 AUG 1348	29	5423.	1 AUG 1536	47	69.	1 AUG 1724	65	0.
1 AUG 1206	12	254.	1 AUG 1354	30	4593.	1 AUG 1542	48	51.	1 AUG 1730	66	0.
1 AUG 1212	13	511.	1 AUG 1400	31	3863.	1 AUG 1548	49	38.	1 AUG 1736	67	0.
1 AUG 1218	14	896.	1 AUG 1406	32	3225.	1 AUG 1554	50	28.	1 AUG 1742	68	0.
1 AUG 1224	15	1447.	1 AUG 1412	33	2666.	1 AUG 1600	51	21.	1 AUG 1748	69	0.
1 AUG 1230	16	2199.	1 AUG 1418	34	2176.	1 AUG 1606	52	15.	1 AUG 1754	70	0.
1 AUG 1236	17	3141.	1 AUG 1424	35	1750.	1 AUG 1612	53	11.			
1 AUG 1242	18	4237.	1 AUG 1430	36	1386.	1 AUG 1618	54	7.			

F LOW (.)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
9249.	2.30	(CFS)	2004.	1743.	1743.	1743.
		(INCHES)	1.167	1.167	1.167	1.167
		(AC-FT)	994.	994.	994.	994.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	AUG	1100	1	0.	1	AUG	1248	19	4941.	1	AUG	1436	37	1015.	1	AUG	1624	55	4.
1	AUG	1106	2	0.	1	AUG	1254	20	6082.	1	AUG	1442	38	784.	1	AUG	1630	56	3.
1	AUG	1112	3	0.	1	AUG	1300	21	7139.	1	AUG	1448	39	601.	1	AUG	1636	57	2.
1	AUG	1118	4	1.	1	AUG	1306	22	7977.	1	AUG	1454	40	460.	1	AUG	1642	58	1.
1	AUG	1124	5	2.	1	AUG	1312	23	8475.	1	AUG	1500	41	351.	1	AUG	1648	59	1.
1	AUG	1130	6	4.	1	AUG	1318	24	8568.	1	AUG	1506	42	269.	1	AUG	1654	60	1.
1	AUG	1136	7	6.	1	AUG	1324	25	8264.	1	AUG	1512	43	205.	1	AUG	1700	61	0.
1	AUG	1142	8	11.	1	AUG	1330	26	7637.	1	AUG	1518	44	156.	1	AUG	1706	62	0.
1	AUG	1148	9	18.	1	AUG	1336	27	6813.	1	AUG	1524	45	118.	1	AUG	1712	63	0.
1	AUG	1154	10	39.	1	AUG	1342	28	5924.	1	AUG	1530	46	88.	1	AUG	1718	64	0.
1	AUG	1200	11	98.	1	AUG	1348	29	5070.	1	AUG	1536	47	65.	1	AUG	1724	65	0.
1	AUG	1206	12	224.	1	AUG	1354	30	4297.	1	AUG	1542	48	48.	1	AUG	1730	66	0.
1	AUG	1212	13	452.	1	AUG	1400	31	3618.	1	AUG	1548	49	35.	1	AUG	1736	67	0.
1	AUG	1218	14	794.	1	AUG	1406	32	3022.	1	AUG	1554	50	26.	1	AUG	1742	68	0.
1	AUG	1224	15	1287.	1	AUG	1412	33	2500.	1	AUG	1600	51	19.	1	AUG	1748	69	0.
1	AUG	1230	16	1966.	1	AUG	1418	34	2041.	1	AUG	1606	52	14.	1	AUG	1754	70	0.
1	AUG	1236	17	2824.	1	AUG	1424	35	1642.	1	AUG	1612	53	10.					
1	AUG	1242	18	3831.	1	AUG	1430	36	1300.	1	AUG	1618	54	7.					

F .OW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
8568.	2.30	(CFS)	1852.	1611.	1611.	1611.
		(INCHES)	1.078	1.078	1.078	1.078
		(AC-FT)	919.	919.	919.	919.

CUMULATIVE AREA = 15.97 SQ MI

INTERPOLATED HYDROGRAPH AT CO-5

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	AUG	1100	1	0.	1	AUG	1248	19	6330.	1	AUG	1436	37	1204.	1	AUG	1624	55	5.
1	AUG	1106	2	0.	1	AUG	1254	20	7706.	1	AUG	1442	38	930.	1	AUG	1630	56	3.
1	AUG	1112	3	0.	1	AUG	1300	21	8952.	1	AUG	1448	39	714.	1	AUG	1636	57	2.
1	AUG	1118	4	1.	1	AUG	1306	22	9909.	1	AUG	1454	40	546.	1	AUG	1642	58	1.
1	AUG	1124	5	2.	1	AUG	1312	23	10439.	1	AUG	1500	41	418.	1	AUG	1648	59	1.
1	AUG	1130	6	4.	1	AUG	1318	24	10476.	1	AUG	1506	42	320.	1	AUG	1654	60	1.
1	AUG	1136	7	7.	1	AUG	1324	25	10041.	1	AUG	1512	43	244.	1	AUG	1700	61	0.
1	AUG	1142	8	12.	1	AUG	1330	26	9230.	1	AUG	1518	44	186.	1	AUG	1706	62	0.
1	AUG	1148	9	20.	1	AUG	1336	27	8199.	1	AUG	1524	45	140.	1	AUG	1712	63	0.
1	AUG	1154	10	50.	1	AUG	1342	28	7104.	1	AUG	1530	46	104.	1	AUG	1718	64	0.
	AUG	1200	11	130.	1	AUG	1348	29	6062.	1	AUG	1536	47	77.	1	AUG	1724	65	0.
	JG	1206	12	307.	1	AUG	1354	30	5126.	1	AUG	1542	48	57.	1	AUG	1730	66	0.
1	AUG	1212	13	618.	1	AUG	1400	31	4306.	1	AUG	1548	49	42.	1	AUG	1736	67	0.
1	AUG	1218	14	1080.	1	AUG	1406	32	3592.	1	AUG	1554	50	31.	1	AUG	1742	68	0.
1	AUG	1224	15	1737.	1	AUG	1412	33	2967.	1	AUG	1600	51	23.	1	AUG	1748	69	0.
1	AUG	1230	16	2621.	1	AUG	1418	34	2420.	1	AUG	1606	52	17.	1	AUG	1754	70	0.

1 AUG 1236	17	3713.	*	1 AUG 1424	35	1946.	*	1 AUG 1612	53	12.	*
1 AUG 1242	18	4969.	*	1 AUG 1430	36	1541.	*	1 AUG 1618	54	8.	*
			*				*				*

****

FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
10476.	2.30	(CFS)	2278.	1981.	1981.	1981.
		(INCHES)	1.326	1.326	1.326	1.326
		(AC-FT)	1130.	1130.	1130.	1130.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	674.	1.40	96.	83.	83.	.60		
ROUTED TO	XROX2	665.	1.50	96.	83.	83.	.60		
HYDROGRAPH AT	X2SUB	364.	1.50	60.	52.	52.	.43		
2 COMBINED AT	XCO-1	990.	1.50	149.	130.	130.	1.03		
ROUTED TO	XROX3	932.	1.80	149.	130.	130.	1.03		
HYDROGRAPH AT	X3SUB	377.	1.60	67.	58.	58.	.56		
2 COMBINED AT	XCO-2	1248.	1.70	207.	180.	180.	1.59		
HYDROGRAPH AT	X4SUB	279.	1.40	38.	33.	33.	.28		
2 COMBINED AT	XCO-3	1405.	1.70	239.	207.	207.	1.87		
HYDROGRAPH AT	X5SUB	271.	1.60	46.	40.	40.	.38		
2 COMBINED AT	XCO-4	1620.	1.70	276.	240.	240.	2.25		
HYDROGRAPH AT	SUBC1	1908.	1.30	246.	214.	214.	1.26		
ROUTED TO	RO-1	1641.	1.90	246.	214.	214.	1.26		
HYDROGRAPH AT	SUBC2	1731.	1.70	367.	319.	319.	2.15		
HYDROGRAPH AT	SUBC3	1454.	1.40	227.	198.	198.	1.25		
HYDROGRAPH AT	SUBC4	3024.	1.40	481.	418.	418.	2.55		
ROUTED TO	RO-2	2893.	1.70	481.	418.	418.	2.55		
HYDROGRAPH AT	SUBC5	3553.	1.50	620.	540.	540.	3.38		
2 COMBINED AT	CO-1	5988.	1.60	1064.	925.	925.	5.93		
ROUTED TO	RO-3	5775.	1.90	1064.	925.	925.	5.93		
4 COMBINED AT	CO-2	9341.	1.80	1783.	1550.	1550.	10.59		
ROUTED TO	RO-4	9101.	2.10	1783.	1550.	1550.	10.59		
HYDROGRAPH AT	SUBC7	1136.	1.50	189.	164.	164.	1.18		
ROUTED TO	RO-5	1016.	2.30	189.	164.	164.	1.18		
HYDROGRAPH AT	SUBC8	1156.	1.60	213.	185.	185.	1.42		
2 COMBINED AT	CO-3	1496.	2.10	385.	335.	335.	2.60		
3 COMBINED AT	CO-4	10665.	2.10	2233.	1942.	1942.	15.44		
ROUTED TO	RO-6	10465.	2.30	2233.	1942.	1942.	15.44		
HYDROGRAPH AT	SUBC9	551.	1.40	78.	68.	68.	.53		

2 COMBINED AT	CO-5	10476.	2.30	2278.	1981.	1981.	15.97

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

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                                FILE: CC-02
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 2 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
  9           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                     -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                     &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: SSO/12/18/89       CKD: 12-18-89
 24           IT      6 01AUG89    1100      70
             *DIAGRAM
 25           IN     15
 26           IO      5
 27           JD   2.79     .01
 28           PC     .0    .039    .087    .280    .791    .872    .924    .967   1.000
 29           JD   2.20     10.
 30           JD   2.04     20.
 31           JD   1.93     30.
 32           JD   1.84     40.

 33           KK   X1SUB
 34           KM        RUNOFF FROM SUBBASIN X1
 35           BA   0.60
 36           LU   0.88    0.21   15.95
 37           UD   0.44

 38           KK   XROX2
 39           KM        ROUTE X1 THROUGH SUBBASIN X2
 40           RM      2    0.15    0.30

 41           KK   X2SUB
 42           KM        RUNOFF FROM SUBBASIN X2
 43           BA   0.43
 44           LU   0.90    0.29    5.78
 45           UD   0.73
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  46          KK   XCO-1
  47          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  48          HC       2

  49          KK   XROX3
  50          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  51          RM       2    0.23    0.30

  52          KK   X3SUB
  53          KM        RUNOFF FROM SUBBASIN X3
  54          BA    0.56
  55          LU    0.93    0.35    0.76
  56          UD    0.69

  57          KK   XCO-2
  58          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  59          HC       2

  60          KK   X4SUB
  61          KM        RUNOFF FROM SUBBASIN X4
  62          BA    0.28
  63          LU    0.89    0.28    0.00
  64          UD    0.47

  65          KK   XCO-3
  66          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  67          HC       2

  68          KK   X5SUB
  69          KM        RUNOFF FROM SUBBASIN X5
  70          BA    0.38
  71          LU    0.93    0.35    0.00
  72          UD    0.47

  73          KK   XCO-4
  74          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  75          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  76          HC       2

  77          KK   SUBC1
  78          KM        RUNOFF FROM SUBBASIN C-1
  79          BA    1.26
  80          LU     .55     .01      0.
  81          UD     .36

  82          KK   RO-1
  83          KM        ROUTE C-1       THROUGH      C-2
  84          RM       6     .58      .3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  85          KK   SUBC2
  86          KM        RUNOFF FROM SUBBASIN    C-2
  87          BA    2.15
  88          LU     .63      .09      0.
  89          UD     .76

  90          KK   SUBC3
  91          KM        RUNOFF FROM SUBBASIN    C-3
  92          BA    1.25
  93          LU     .61      .06      0.
  94          UD     .50

  95          KK   SUBC4
  96          KM        RUNOFF FROM SUBBASIN    C-4
  97          BA    2.55
  98          LU     .55      .01      0.
  99          UD     .50

 100          KK   RO-2
 101          KM        ROUTE C-4       THROUGH      C-5
 102          RM       3      .27      .3

 103          KK   SUBC5
 104          KM        RUNOFF FROM SUBBASIN    C-5
 105          BA    3.38
 106          LU     .56      .02      0.
 107          UD     .57

 108          KK   CO-1
 109          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 110          HC       2

 111          KK   RO-3
 112          KM        ROUTE C-4&5     THROUGH      C-3
 113          RM       3      .24      .3

 114          KK   CO-2
 115          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 116          HC       4

 117          KK   RO-4
 118          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 119          RM       3      .25      .3

 120          KK   SUBC7
 121          KM        RUNOFF FROM SUBBASIN    C-7
 122          BA    1.18
 123          LU     .87      .18     17.7
 124          UD     .54
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 125          KK   RO-5
 126          KM        ROUTE C-7       THROUGH      C-8
 127          RM       8     .77      .3

 128          KK   SUBC8
 129          KM        RUNOFF FROM SUBBASIN    C-8
 130          BA    1.42
 131          LU     .85     .18     8.8
 132          UD     .64

 133          KK   CO-3
 134          KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
 135          HC       2

 136          KK   CO-4
 137          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
 138          HC       3

 139          KK   RO-6
 140          KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
 141          RM       2     .21      .3

 142          KK   SUBC9
 143          KM        RUNOFF FROM SUBBASIN    C-9
 144          BA     .53
 145          LU     .83     .24     3.9
 146          UD     .48

 147          KK   CO-5
 148          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
 149          KO       1
 150          HC       2
 151          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  33       X1SUB
               V
               V
  38       XROX2
               .
               .
  41           .       X2SUB
               .           .
               .           .
  46       XCO-1............
               V
               V
  49       XROX3
               .
               .
  52           .       X3SUB
               .           .
               .           .
  57       XCO-2............
               .
               .
  60           .       X4SUB
               .           .
               .           .
  65       XCO-3............
               .
               .
  68           .       X5SUB
               .           .
               .           .
           XCO-4............
               .
               .
  77           .       SUBC1
               .           V
               .           V
  82           .       RO-1
               .           .
               .           .
  85           .           .       SUBC2
               .           .           .
               .           .           .
  90           .           .           .       SUBC3
               .           .           .           .
               .           .           .           .
  95           .           .           .           .       SUBC4
               .           .           .           .           V
               .           .           .           .           V
 100           .           .           .           .       RO-2
               .           .           .           .           .
               .           .           .           .           .
 103           .           .           .           .           .       SUBC5
               .           .           .           .           .           .
               .           .           .           .           .           .
 108           .           .           .           .       CO-1 ............
               .           .           .           .           V
               .           .           .           .           V
 111           .           .           .           .       RO-3
               .           .           .           .           .
               .           .           .           .           .
 114           .       CO-2 ................................
               .           V
               .           V
               .       RO-4
               .           .
               .           .
 120           .           .       SUBC7
               .           .           V
               .           .           V
```

```
125          .          .       RO-5
             .          .          .
             .          .          .
128          .          .          .       SUBC8
             .          .          .          .
             .          .          .          .
             .          .       CO-3 ............
             .          .          .
             .          .          .
136       CO-4 ......................
             V
             V
139       RO-6
             .
             .
142          .       SUBC9
             .          .
             .          .
147       CO-5 ............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: CC-02

HYDROLOGY FOR: 100-YEAR 2 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

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

  'T         HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1AUG89  STARTING DATE
                  ITIME       1100  STARTING TIME
                     NQ         70  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1AUG89  ENDING DATE
                 NDTIME       1754  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE    6.90 HOURS

       ENGLISH UNITS

27 JD        INDEX STORM NO. 1
                   STRM       2.79  PRECIPITATION DEPTH
                   TRDA        .01  TRANSPOSITION DRAINAGE AREA

28 PI          PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

29 JD        INDEX STORM NO. 2
                   STRM       2.20  PRECIPITATION DEPTH
                   TRDA      10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

30 JD        INDEX STORM NO. 3
                   STRM       2.04  PRECIPITATION DEPTH
                   TRDA      20.00  TRANSPOSITION DRAINAGE AREA

            PRECIPITATION PATTERN
                 .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                 .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

31 JD        INDEX STORM NO. 4
                   STRM       1.93  PRECIPITATION DEPTH
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                    TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                     .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                     .03       .03       .03       .02       .02       .02       .02       .02       .01       .01

                INDEX STORM NO. 5
                    STRM        1.84  PRECIPITATION DEPTH
                    TRDA       40.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                     .02       .02       .02       .02       .02       .08       .08       .14       .20       .20
                     .03       .03       .03       .02       .02       .02       .02       .02       .01       .01


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


          **************
          *            *
147 KK    *    CO-5    *
          *            *
          **************

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

150 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

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

                                          HYDROGRAPH AT    CO-5
                                     TRANSPOSITION AREA      .0 SQ MI

*****************************************************************************************************************************
                                 *                                 *                                 *
  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW
                                 *                                 *                                 *
   1 AUG 1100   1        0.      *   1 AUG 1248  19     10209.     *   1 AUG 1436  37      1731.     *   1 AUG 1624  55         8.
   1 AUG 1106   2        0.      *   1 AUG 1254  20     12151.     *   1 AUG 1442  38      1339.     *   1 AUG 1630  56         5.
   1 AUG 1112   3        0.      *   1 AUG 1300  21     13859.     *   1 AUG 1448  39      1030.     *   1 AUG 1636  57         3.
   1 AUG 1118   4        1.      *   1 AUG 1306  22     15111.     *   1 AUG 1454  40       790.     *   1 AUG 1642  58         2.
   1 AUG 1124   5        3.      *   1 AUG 1312  23     15723.     *   1 AUG 1500  41       605.     *   1 AUG 1648  59         1.
   1 AUG 1130   6        5.      *   1 AUG 1318  24     15615.     *   1 AUG 1506  42       464.     *   1 AUG 1654  60         1.
   1 AUG 1136   7       10.      *   1 AUG 1324  25     14831.     *   1 AUG 1512  43       355.     *   1 AUG 1700  61         1.
   1 AUG 1142   8       16.      *   1 AUG 1330  26     13532.     *   1 AUG 1518  44       271.     *   1 AUG 1706  62         0.
   1 AUG 1148   9       37.      *   1 AUG 1336  27     11949.     *   1 AUG 1524  45       204.     *   1 AUG 1712  63         0.
   1 AUG 1154  10      103.      *   1 AUG 1342  28     10309.     *   1 AUG 1530  46       153.     *   1 AUG 1718  64         0.
   1 AUG 1200  11      279.      *   1 AUG 1348  29      8768.     *   1 AUG 1536  47       114.     *   1 AUG 1724  65         0.
   1 AUG 1206  12      635.      *   1 AUG 1354  30      7396.     *   1 AUG 1542  48        84.     *   1 AUG 1730  66         0.
   1 AUG 1212  13     1232.      *   1 AUG 1400  31      6201.     *   1 AUG 1548  49        63.     *   1 AUG 1736  67         0.
   1 AUG 1218  14     2094.      *   1 AUG 1406  32      5164.     *   1 AUG 1554  50        47.     *   1 AUG 1742  68         0.
   1 AUG 1224  15     3246.      *   1 AUG 1412  33      4260.     *   1 AUG 1600  51        34.     *   1 AUG 1748  69         0.
   1 AUG 1230  16     4686.      *   1 AUG 1418  34      3474.     *   1 AUG 1606  52        25.     *   1 AUG 1754  70         0.
   1 AUG 1236  17     6367.      *   1 AUG 1424  35      2793.     *   1 AUG 1612  53        17.     *
   1 AUG 1242  18     8236.      *   1 AUG 1430  36      2213.     *   1 AUG 1618  54        12.     *
                                 *                                 *                                 *
*****************************************************************************************************************************

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR      6.90-HR
   15723.      2.20        (CFS)     3464.      3013.       3013.       3013.
                          (INCHES)   2.017      2.017       2.017       2.017
                           (AC-FT)   1718.      1718.       1718.       1718.

                       CUMULATIVE AREA =   15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	6877.	1 AUG 1436	37	1290.	1 AUG 1624	55	6.
1 AUG 1106	2	0.	1 AUG 1254	20	8320.	1 AUG 1442	38	998.	1 AUG 1630	56	4.
1 AUG 1112	3	0.	1 AUG 1300	21	9636.	1 AUG 1448	39	766.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	10655.	1 AUG 1454	40	587.	1 AUG 1642	58	2.
1 AUG 1124	5	2.	1 AUG 1312	23	11223.	1 AUG 1500	41	449.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	11263.	1 AUG 1506	42	344.	1 AUG 1654	60	1.
1 AUG 1136	7	8.	1 AUG 1324	25	10791.	1 AUG 1512	43	264.	1 AUG 1700	61	0.
1 AUG 1142	8	13.	1 AUG 1330	26	9912.	1 AUG 1518	44	201.	1 AUG 1706	62	0.
1 AUG 1148	9	21.	1 AUG 1336	27	8797.	1 AUG 1524	45	152.	1 AUG 1712	63	0.
1 AUG 1154	10	54.	1 AUG 1342	28	7618.	1 AUG 1530	46	113.	1 AUG 1718	64	0.
1 AUG 1200	11	146.	1 AUG 1348	29	6497.	1 AUG 1536	47	84.	1 AUG 1724	65	0.
1 AUG 1206	12	353.	1 AUG 1354	30	5492.	1 AUG 1542	48	62.	1 AUG 1730	66	0.
1 AUG 1212	13	721.	1 AUG 1400	31	4613.	1 AUG 1548	49	46.	1 AUG 1736	67	0.
1 AUG 1218	14	1265.	1 AUG 1406	32	3847.	1 AUG 1554	50	34.	1 AUG 1742	68	0.
1 AUG 1224	15	2016.	1 AUG 1412	33	3177.	1 AUG 1600	51	25.	1 AUG 1748	69	0.
1 AUG 1230	16	2982.	1 AUG 1418	34	2592.	1 AUG 1606	52	18.	1 AUG 1754	70	0.
1 AUG 1236	17	4140.	1 AUG 1424	35	2085.	1 AUG 1612	53	13.			
1 AUG 1242	18	5454.	1 AUG 1430	36	1651.	1 AUG 1618	54	9.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
11263.	2.30	(CFS)	2462.	2141.	2141.	2141.
		(INCHES)	1.433	1.433	1.433	1.433
		(AC-FT)	1221.	1221.	1221.	1221.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	6001.	1 AUG 1436	37	1170.	1 AUG 1624	55	5.
1 AUG 1106	2	0.	1 AUG 1254	20	7300.	1 AUG 1442	38	904.	1 AUG 1630	56	3.
1 AUG 1112	3	0.	1 AUG 1300	21	8496.	1 AUG 1448	39	694.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	9437.	1 AUG 1454	40	531.	1 AUG 1642	58	1.
1 AUG 1124	5	2.	1 AUG 1312	23	9980.	1 AUG 1500	41	407.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	10052.	1 AUG 1506	42	312.	1 AUG 1654	60	1.
1 AUG 1136	7	7.	1 AUG 1324	25	9661.	1 AUG 1512	43	238.	1 AUG 1700	61	0.
1 AUG 1142	8	12.	1 AUG 1330	26	8898.	1 AUG 1518	44	182.	1 AUG 1706	62	0.
1 AUG 1148	9	19.	1 AUG 1336	27	7914.	1 AUG 1524	45	137.	1 AUG 1712	63	0.
1 AUG 1154	10	47.	1 AUG 1342	28	6865.	1 AUG 1530	46	103.	1 AUG 1718	64	0.
1 AUG 1200	11	124.	1 AUG 1348	29	5864.	1 AUG 1536	47	76.	1 AUG 1724	65	0.
1 AUG 1206	12	297.	1 AUG 1354	30	4963.	1 AUG 1542	48	56.	1 AUG 1730	66	0.
1 AUG 1212	13	608.	1 AUG 1400	31	4173.	1 AUG 1548	49	42.	1 AUG 1736	67	0.
1 AUG 1218	14	1070.	1 AUG 1406	32	3483.	1 AUG 1554	50	31.	1 AUG 1742	68	0.
1 AUG 1224	15	1715.	1 AUG 1412	33	2879.	1 AUG 1600	51	23.	1 AUG 1748	69	0.
1 AUG 1230	16	2553.	1 AUG 1418	34	2350.	1 AUG 1606	52	17.	1 AUG 1754	70	0.
1 AUG 1236	17	3569.	1 AUG 1424	35	1890.	1 AUG 1612	53	12.			
1 AUG 1242	18	4732.	1 AUG 1430	36	1497.	1 AUG 1618	54	8.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
[illegible]52.	2.30	(CFS)	2190.	1905.	1905.	1905.
		(INCHES)	1.275	1.275	1.275	1.275
		(AC-FT)	1086.	1086.	1086.	1086.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	5400.	1 AUG 1436	37	1087.	1 AUG 1624	55	5.
1 AUG 1106	2	0.	1 AUG 1254	20	6600.	1 AUG 1442	38	840.	1 AUG 1630	56	3.
1 AUG 1112	3	0.	1 AUG 1300	21	7714.	1 AUG 1448	39	645.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	8601.	1 AUG 1454	40	493.	1 AUG 1642	58	1.
1 AUG 1124	5	2.	1 AUG 1312	23	9128.	1 AUG 1500	41	377.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	9222.	1 AUG 1506	42	289.	1 AUG 1654	60	1.
1 AUG 1136	7	7.	1 AUG 1324	25	8887.	1 AUG 1512	43	221.	1 AUG 1700	61	0.
1 AUG 1142	8	11.	1 AUG 1330	26	8204.	1 AUG 1518	44	168.	1 AUG 1706	62	0.
1 AUG 1148	9	18.	1 AUG 1336	27	7310.	1 AUG 1524	45	127.	1 AUG 1712	63	0.
1 AUG 1154	10	42.	1 AUG 1342	28	6351.	1 AUG 1530	46	95.	1 AUG 1718	64	0.
1 AUG 1200	11	109.	1 AUG 1348	29	5430.	1 AUG 1536	47	71.	1 AUG 1724	65	0.
1 AUG 1206	12	259.	1 AUG 1354	30	4600.	1 AUG 1542	48	52.	1 AUG 1730	66	0.
1 AUG 1212	13	531.	1 AUG 1400	31	3871.	1 AUG 1548	49	39.	1 AUG 1736	67	0.
1 AUG 1218	14	937.	1 AUG 1406	32	3234.	1 AUG 1554	50	29.	1 AUG 1742	68	0.
1 AUG 1224	15	1508.	1 AUG 1412	33	2674.	1 AUG 1600	51	21.	1 AUG 1748	69	0.
1 AUG 1230	16	2259.	1 AUG 1418	34	2183.	1 AUG 1606	52	15.	1 AUG 1754	70	0.
1 AUG 1236	17	3176.	1 AUG 1424	35	1757.	1 AUG 1612	53	11.			
1 AUG 1242	18	4236.	1 AUG 1430	36	1391.	1 AUG 1618	54	7.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
9222.	2.30	(CFS)	2004.	1743.	1743.	1743.
		(INCHES)	1.167	1.167	1.167	1.167
		(AC-FT)	994.	994.	994.	994.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 AUG 1100	1	0.	1 AUG 1248	19	4909.	1 AUG 1436	37	1019.	1 AUG 1624	55	5.
1 AUG 1106	2	0.	1 AUG 1254	20	6028.	1 AUG 1442	38	788.	1 AUG 1630	56	3.
1 AUG 1112	3	0.	1 AUG 1300	21	7075.	1 AUG 1448	39	604.	1 AUG 1636	57	2.
1 AUG 1118	4	1.	1 AUG 1306	22	7919.	1 AUG 1454	40	462.	1 AUG 1642	58	1.
1 AUG 1124	5	2.	1 AUG 1312	23	8432.	1 AUG 1500	41	354.	1 AUG 1648	59	1.
1 AUG 1130	6	4.	1 AUG 1318	24	8544.	1 AUG 1506	42	271.	1 AUG 1654	60	1.
1 AUG 1136	7	6.	1 AUG 1324	25	8255.	1 AUG 1512	43	207.	1 AUG 1700	61	0.
1 AUG 1142	8	11.	1 AUG 1330	26	7637.	1 AUG 1518	44	158.	1 AUG 1706	62	0.
1 AUG 1148	9	17.	1 AUG 1336	27	6817.	1 AUG 1524	45	119.	1 AUG 1712	63	0.
1 AUG 1154	10	38.	1 AUG 1342	28	5930.	1 AUG 1530	46	89.	1 AUG 1718	64	0.
1 AUG 1200	11	98.	1 AUG 1348	29	5076.	1 AUG 1536	47	66.	1 AUG 1724	65	0.
1 AUG 1206	12	229.	1 AUG 1354	30	4305.	1 AUG 1542	48	49.	1 AUG 1730	66	0.
1 AUG 1212	13	468.	1 AUG 1400	31	3625.	1 AUG 1548	49	36.	1 AUG 1736	67	0.
1 AUG 1218	14	829.	1 AUG 1406	32	3030.	1 AUG 1554	50	27.	1 AUG 1742	68	0.
1 AUG 1224	15	1339.	1 AUG 1412	33	2507.	1 AUG 1600	51	20.	1 AUG 1748	69	0.
1 AUG 1230	16	2018.	1 AUG 1418	34	2048.	1 AUG 1606	52	14.	1 AUG 1754	70	0.
1 AUG 1236	17	2856.	1 AUG 1424	35	1648.	1 AUG 1612	53	10.			
1 AUG 1242	18	3831.	1 AUG 1430	36	1305.	1 AUG 1618	54	7.			

PEAK FLOW)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
.4.	2.30	(CFS)	1852.	1611.	1611.	1611.
		(INCHES)	1.078	1.078	1.078	1.078
		(AC-FT)	919.	919.	919.	919.

CUMULATIVE AREA = 15.97 SQ MI

INTERPOLATED HYDROGRAPH AT CO-5

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	AUG	1100	1	0.	1	AUG	1248	19	6286.	1	AUG	1436	37	1209.	1	AUG	1624	55	5.
1	AUG	1106	2	0.	1	AUG	1254	20	7631.	1	AUG	1442	38	935.	1	AUG	1630	56	4.
1	AUG	1112	3	0.	1	AUG	1300	21	8866.	1	AUG	1448	39	718.	1	AUG	1636	57	2.
1	AUG	1118	4	1.	1	AUG	1306	22	9832.	1	AUG	1454	40	549.	1	AUG	1642	58	2.
1	AUG	1124	5	2.	1	AUG	1312	23	10383.	1	AUG	1500	41	421.	1	AUG	1648	59	1.
1	AUG	1130	6	4.	1	AUG	1318	24	10445.	1	AUG	1506	42	322.	1	AUG	1654	60	1.
1	AUG	1136	7	7.	1	AUG	1324	25	10028.	1	AUG	1512	43	247.	1	AUG	1700	61	0.
1	AUG	1142	8	12.	1	AUG	1330	26	9227.	1	AUG	1518	44	188.	1	AUG	1706	62	0.
1	AUG	1148	9	20.	1	AUG	1336	27	8201.	1	AUG	1524	45	142.	1	AUG	1712	63	0.
1	AUG	1154	10	49.	1	AUG	1342	28	7110.	1	AUG	1530	46	106.	1	AUG	1718	64	0.
1	AUG	1200	11	131.	1	AUG	1348	29	6069.	1	AUG	1536	47	79.	1	AUG	1724	65	0.
1	AUG	1206	12	315.	1	AUG	1354	30	5135.	1	AUG	1542	48	58.	1	AUG	1730	66	0.
1	AUG	1212	13	644.	1	AUG	1400	31	4316.	1	AUG	1548	49	43.	1	AUG	1736	67	0.
1	AUG	1218	14	1133.	1	AUG	1406	32	3601.	1	AUG	1554	50	32.	1	AUG	1742	68	0.
1	AUG	1224	15	1812.	1	AUG	1412	33	2976.	1	AUG	1600	51	24.	1	AUG	1748	69	0.
1	AUG	1230	16	2693.	1	AUG	1418	34	2428.	1	AUG	1606	52	17.	1	AUG	1754	70	0.
1	AUG	1236	17	3754.	1	AUG	1424	35	1953.	1	AUG	1612	53	12.					
1	AUG	1242	18	4966.	1	AUG	1430	36	1547.	1	AUG	1618	54	8.					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	6.90-HR
10445.	2.30	(CFS)	2278.	1981.	1981.	1981.
		(INCHES)	1.326	1.326	1.326	1.326
		(AC-FT)	1130.	1130.	1130.	1130.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	674.	1.40	96.	83.	83.	.60		
ROUTED TO	XROX2	665.	1.50	96.	83.	83.	.60		
HYDROGRAPH AT	X2SUB	306.	1.70	60.	52.	52.	.43		
2 COMBINED AT	XCO-1	913.	1.50	149.	130.	130.	1.03		
ROUTED TO	XROX3	876.	1.80	149.	130.	130.	1.03		
HYDROGRAPH AT	X3SUB	377.	1.60	67.	58.	58.	.56		
2 COMBINED AT	XCO-2	1177.	1.80	207.	180.	180.	1.59		
HYDROGRAPH AT	X4SUB	283.	1.40	38.	33.	33.	.28		
2 COMBINED AT	XCO-3	1326.	1.70	239.	207.	207.	1.87		
HYDROGRAPH AT	X5SUB	356.	1.40	46.	40.	40.	.38		
2 COMBINED AT	XCO-4	1513.	1.70	276.	240.	240.	2.25		
HYDROGRAPH AT	SUBC1	1908.	1.30	246.	214.	214.	1.26		
ROUTED TO	RO-1	1641.	1.90	246.	214.	214.	1.26		
HYDROGRAPH AT	SUBC2	1731.	1.70	367.	319.	319.	2.15		
HYDROGRAPH AT	SUBC3	1454.	1.40	227.	198.	198.	1.25		
HYDROGRAPH AT	SUBC4	3024.	1.40	481.	418.	418.	2.55		
ROUTED TO	RO-2	2893.	1.70	481.	418.	418.	2.55		
HYDROGRAPH AT	SUBC5	3553.	1.50	620.	540.	540.	3.38		
2 COMBINED AT	CO-1	5988.	1.60	1064.	925.	925.	5.93		
ROUTED TO	RO-3	5775.	1.90	1064.	925.	925.	5.93		
4 COMBINED AT	CO-2	9341.	1.80	1783.	1550.	1550.	10.59		
ROUTED TO	RO-4	9101.	2.10	1783.	1550.	1550.	10.59		
HYDROGRAPH AT	SUBC7	1136.	1.50	189.	164.	164.	1.18		
ROUTED TO	RO-5	1016.	2.30	189.	164.	164.	1.18		
HYDROGRAPH AT	SUBC8	1156.	1.60	213.	185.	185.	1.42		
2 COMBINED AT	CO-3	1496.	2.10	385.	335.	335.	2.60		
3 COMBINED AT	CO-4	10638.	2.10	2233.	1942.	1942.	15.44		
ROUTED TO	RO-6	10433.	2.30	2233.	1942.	1942.	15.44		
HYDROGRAPH AT	SUBC9	551.	1.40	78.	68.	68.	.53		
2 COMBINED AT	CO-5	10445.	2.30	2278.	1981.	1981.	15.97		

* MAL END OF HEC-1 ***

APPENDIX B

CLINE CREEK

HEC-1

100-YEAR 6 HOUR STORM

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                              FILE:    XB-06
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 6 HOUR EVENT (SECONDARY SUB-BASINS ONLY)
  6           ID                          COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
  7           ID                          DRAINAGE AREAS
  8           ID
  9           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
 10           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
 11           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 12           ID
 13           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 14           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 15           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 16           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 17           ID                                    &  PERCENT IMPERVIOUS
 18           ID                          STREAM ROUTING - NONE
 19           ID                          HYDROGRAPH COMBINATIONS - NONE
 20           ID
 21           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUB-BASIN C-6 )
 22           ID
 23           ID        CONTRACT NUMBER:  FCD 89-15
 24           ID
 25           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/06/89
 26           ID                          COMP: SSO 12/08/89 CKD: BMG 12-18-89
 27           IT      6 01OCT89    0900     100
             *DIAGRAM
 28           IN      15
 29           IO       5
 30           JD    3.50     .01
 31           PC      .0    .011    .022    .035    .048    .062    .079    .100    .125    .155
 32           PC    .192    .339    .729    .791    .830    .862    .887    .908    .926    .942
 33           PC    .956    .969    .980    .990   1.000
 34           JD    2.98     10.
 35           JD    2.77     20.
 36           JD    2.63     30.
 37           JD    2.52     40.

 38           KK  SSBX1A
 39           KM        RUNOFF FROM SEC.SUBBASIN X1-A
 40           BA    0.43
 41           LU    0.88    0.20   20.51
 42           UD    0.41

 43           KK  SSBX2A
 44           KM        RUNOFF FROM SEC.SUBBASIN X2-A
 45           BA    0.28
 46           LU    0.91    0.29    9.10
 47           UD    0.50
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  48          KK  SSBX3A
  49          KM        RUNOFF FROM SEC.SUBBASIN X3-A
  50          BA    0.43
  51          LU    0.94    0.36    0.97
  52          UD    0.58

  53          KK  SSBX4A
  54          KM        RUNOFF FROM SEC.SUBBASIN X4-A
  55          BA    0.16
  56          LU    0.90    0.30    0.00
  57          UD    0.40

  58          KK  SSBX4B
  59          KM        RUNOFF FROM SEC.SUBBASIN X4-B
  60          BA    0.09
  61          LU    0.86    0.23    0.00
  62          UD    0.45

  63          KK  SSBX5A
  64          KM        RUNOFF FROM SEC.SUBBASIN X5-A
  65          BA    0.23
  66          LU    0.93    0.35    0.00
  67          UD    0.52
  68          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

 [illegible]  SSBX1A
              .
              .
 43           .      SSBX2A
              .          .
              .          .
 48           .          .     SSBX3A
              .          .         .
              .          .         .
 53           .          .         .     SSBX4A
              .          .         .         .
              .          .         .         .
 58           .          .         .         .     SSBX4B
              .          .         .         .         .
              .          .         .         .         .
 63           .          .         .         .         .     SSBX5A
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: XB-06

HYDROLOGY FOR: 100-YEAR 6 HOUR EVENT (SECONDARY SUB-BASINS ONLY)
COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
DRAINAGE AREAS

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING - NONE
HYDROGRAPH COMBINATIONS - NONE

WATERSHED NAME: CLINE CREEK (BASIN X IS SUB-BASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/06/89
COMP: _____ CKD: _____

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

   IT        HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE      10CT89  STARTING DATE
                  ITIME        0900  STARTING TIME
                     NQ         100  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      10CT89  ENDING DATE
                 NDTIME        1854  ENDING TIME

             COMPUTATION INTERVAL     .10 HOURS
                  TOTAL TIME BASE    9.90 HOURS

        ENGLISH UNITS

30 JD        INDEX STORM NO. 1
                   STRM       3.50  PRECIPITATION DEPTH
                   TRDA        .01  TRANSPOSITION DRAINAGE AREA

31 PI          PRECIPITATION PATTERN
                 .00    .00    .00    .00    .00    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .06    .06    .11    .16    .16
                 .02    .02    .02    .02    .02    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                 .01    .01    .00    .00    .00    .00    .00    .00    .00    .00

34 JD        INDEX STORM NO. 2
                   STRM       2.98  PRECIPITATION DEPTH
                   TRDA      10.00  TRANSPOSITION DRAINAGE AREA

[illegible] PI   PRECIPITATION PATTERN
                 .00    .00    .00    .00    .00    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .06    .06    .11    .16    .16
                 .02    .02    .02    .02    .02    .01    .01    .01    .01    .01
                 .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                 .01    .01    .00    .00    .00    .00    .00    .00    .00    .00
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35 JD        INDEX STORM NO. 3
                 STRM        2.77  PRECIPITATION DEPTH
                 TRDA       20.00  TRANSPOSITION DRAINAGE AREA

           PRECIPITATION PATTERN
               .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
               .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

36 JD        INDEX STORM NO. 4
                 STRM        2.63  PRECIPITATION DEPTH
                 TRDA       30.00  TRANSPOSITION DRAINAGE AREA

 0 PI        PRECIPITATION PATTERN
               .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
               .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

37 JD        INDEX STORM NO. 5
                 STRM        2.52  PRECIPITATION DEPTH
                 TRDA       40.00  TRANSPOSITION DRAINAGE AREA

 0 PI        PRECIPITATION PATTERN
               .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
               .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
               .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
```

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	SSBX1A	640.	3.30	94.	57.	57.	.43		
HYDROGRAPH AT	SSBX2A	346.	3.40	52.	32.	32.	.28		
HYDROGRAPH AT	SSBX3A	435.	3.50	68.	41.	41.	.43		
HYDROGRAPH AT	SSBX4A	231.	3.30	28.	17.	17.	.16		
HYDROGRAPH AT	SSBX4B	126.	3.30	17.	11.	11.	.09		
HYDROGRAPH AT	SSBX5A	262.	3.40	37.	23.	23.	.23		

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

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                              FILE: CC-06
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 6 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
  9           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                      &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: SSO 1/5/90         CKD: [illegible] 1-5-90
 24           IT      6 01OCT89    0900     100
             *DIAGRAM
 25           IN     15
 26           IO      5
 27           JD   3.50     .01
 28           PC     .0    .011    .022    .035    .048    .062    .079    .100    .125    .155
 29           PC    .192   .339    .729    .791    .830    .862    .887    .908    .926    .942
 30           PC    .956   .969    .980    .990   1.000
 31           JD   2.98     10.
 32           JD   2.77     20.
 33           JD   2.63     30.
 34           JD   2.52     40.

 35           KK   X1SUB
 36           KM        RUNOFF FROM SUBBASIN X1
 37           BA    0.60
 38           LU    0.88    0.21   15.95
 39           UD    0.44

 40           KK   XROX2
 41           KM        ROUTE X1 THROUGH SUBBASIN X2
 42           RM      2    0.15    0.30

 43           KK   X2SUB
 44           KM        RUNOFF FROM SUBBASIN X2
 45           BA    0.43
 46           LU    0.90    0.29    5.78
 47           UD    0.59
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  48          KK   XCO-1
  49          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  50          HC       2

  51          KK   XROX3
  52          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  53          RM       2    0.23    0.30

  54          KK   X3SUB
  55          KM        RUNOFF FROM SUBBASIN X3
  56          BA    0.56
  57          LU    0.93    0.35    0.76
  58          UD    0.69

  59          KK   XCO-2
  60          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  61          HC       2

  62          KK   X4SUB
  63          KM        RUNOFF FROM SUBBASIN X4
  64          BA    0.28
  65          LU    0.89    0.28    0.00
  66          UD    0.48

  67          KK   XCO-3
  68          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  69          HC       2

  70          KK   X5SUB
  71          KM        RUNOFF FROM SUBBASIN X5
  72          BA    0.38
  73          LU    0.93    0.35    0.00
  74          UD    0.66

  75          KK   XCO-4
  76          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  77          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  78          HC       2

  79          KK   SUBC1
  80          KM        RUNOFF FROM SUBBASIN C-1
  81          BA    1.26
  82          LU     .55     .01      0.
  83          UD     .36

  84          KK   RO-1
  85          KM        ROUTE C-1       THROUGH      C-2
  86          RM       6     .58      .3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  87          KK   SUBC2
  88          KM        RUNOFF FROM SUBBASIN    C-2
  89          BA    2.15
  90          LU     .63     .09      0.
  91          UD     .76

  92          KK   SUBC3
  93          KM        RUNOFF FROM SUBBASIN    C-3
  94          BA    1.25
  95          LU     .61     .06      0.
  96          UD     .50

  97          KK   SUBC4
  98          KM        RUNOFF FROM SUBBASIN    C-4
  99          BA    2.55
 100          LU     .55     .01      0.
 101          UD     .50

 102          KK   RO-2
 103          KM        ROUTE C-4       THROUGH      C-5
 104          RM       3     .27      .3

 105          KK   SUBC5
 106          KM        RUNOFF FROM SUBBASIN    C-5
 107          BA    3.38
 108          LU     .56     .02      0.
 109          UD     .57

 110          KK   CO-1
 111          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 112          HC       2

 113          KK   RO-3
 114          KM        ROUTE C-4&5     THROUGH      C-3
 115          RM       3     .24      .3

 116          KK   CO-2
 117          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 118          HC       4

 119          KK   RO-4
 120          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 121          RM       3     .25      .3

 122          KK   SUBC7
 123          KM        RUNOFF FROM SUBBASIN    C-7
 124          BA    1.18
 125          LU     .87     .18    17.7
 126          UD     .54
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  127         KK   RO-5
  128         KM        ROUTE C-7       THROUGH      C-8
  129         RM       8     .77      .3

  130         KK   SUBC8
  131         KM        RUNOFF FROM SUBBASIN    C-8
  132         BA    1.42
  133         LU     .85     .18     8.8
  134         UD     .64

  135         KK   CO-3
  136         KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
  137         HC       2

  138         KK   CO-4
  139         KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
  140         HC       3

  141         KK   RO-6
  142         KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
  143         RM       2     .21      .3

  144         KK   SUBC9
  145         KM        RUNOFF FROM SUBBASIN    C-9
  146         BA     .53
  147         LU     .83     .24     3.9
  148         UD     .48

  149         KK   CO-5
  150         KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
  151         KO       1
  152         HC       2
  153         ZZ
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SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  35      X1SUB
              V
              V
  40      XROX2
              .
              .
  43          .       X2SUB
              .           .
              .           .
  48      XCO-1............
              V
              V
  51      XROX3
              .
              .
  54          .       X3SUB
              .           .
              .           .
  59      XCO-2............
              .
              .
  62          .       X4SUB
              .           .
              .           .
  67      XCO-3............
              .
              .
          .       X5SUB
              .           .
              .           .
  75      XCO-4............
              .
              .
  79          .       SUBC1
              .           V
              .           V
  84          .       RO-1
              .           .
              .           .
  87          .           .       SUBC2
              .           .           .
              .           .           .
  92          .           .           .       SUBC3
              .           .           .           .
              .           .           .           .
  97          .           .           .           .       SUBC4
              .           .           .           .           V
              .           .           .           .           V
 102          .           .           .           .       RO-2
              .           .           .           .           .
              .           .           .           .           .
 105          .           .           .           .           .       SUBC5
              .           .           .           .           .           .
              .           .           .           .           .           .
              .           .           .           .       CO-1 ............
              .           .           .           .           V
              .           .           .           .           V
 113          .           .           .           .       RO-3
              .           .           .           .           .
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                .         .         .         .         .
116             .      CO-2 ..................................
                .         V
                .         V
11[illegible]   .      RO-4
                .         .
                .         .
122             .         .      SUBC7
                .         .         V
                .         .         V
127             .         .      RO-5
                .         .         .
                .         .         .
130             .         .         .      SUBC8
                .         .         .         .
                .         .         .         .
135             .         .      CO-3 ............
                .         .         .
                .         .         .
138          CO-4 ......................
                V
                V
141          RO-6
                .
                .
144             .      SUBC9
                .         .
                .         .
149          CO-5 ............
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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

FILE: CC-06

HYDROLOGY FOR: 100-YEAR 6 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

24 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	6	MINUTES IN COMPUTATION INTERVAL
IDATE	1OCT89	STARTING DATE
ITIME	0900	STARTING TIME
NQ	100	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1OCT89	ENDING DATE
NDTIME	1854	ENDING TIME

COMPUTATION INTERVAL .10 HOURS
TOTAL TIME BASE 9.90 HOURS

ENGLISH UNITS

27 JD INDEX STORM NO. 1

STRM	3.50	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

28 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.06	.06	.11	.16	.16
.02	.02	.02	.02	.02	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.00	.00

JD INDEX STORM NO. 2

STRM	2.98	PRECIPITATION DEPTH
TRDA	10.00	TRANSPOSITION DRAINAGE AREA

```
  0 PI          PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                    .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

 32 JD        INDEX STORM NO. 3
                     STRM       2.77  PRECIPITATION DEPTH
                     TRDA      20.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                    .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

 33 JD        INDEX STORM NO. 4
                     STRM       2.63  PRECIPITATION DEPTH
                     TRDA      30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                    .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

 3[illegible]         INDEX STORM NO. 5
                     STRM       2.52  PRECIPITATION DEPTH
                     TRDA      40.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                    .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

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

            **************
            *            *
 149 KK     *    CO-5    *
            *            *
            **************

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

 1[illegible]         HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA .0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	71.	1 OCT 1400	51	6511.	1 OCT 1630	76	365.
1 OCT 0906	2	0.	1 OCT 1136	27	78.	1 OCT 1406	52	5561.	1 OCT 1636	77	287.
1 OCT 0912	3	0.	1 OCT 1142	28	97.	1 OCT 1412	53	4782.	1 OCT 1642	78	222.
1 OCT 0918	4	0.	1 OCT 1148	29	156.	1 OCT 1418	54	4141.	1 OCT 1648	79	169.
1 OCT 0924	5	1.	1 OCT 1154	30	307.	1 OCT 1424	55	3612.	1 OCT 1654	80	128.
1 OCT 0930	6	2.	1 OCT 1200	31	630.	1 OCT 1430	56	3174.	1 OCT 1700	81	96.
1 OCT 0936	7	3.	1 OCT 1206	32	1202.	1 OCT 1436	57	2810.	1 OCT 1706	82	72.
1 OCT 0942	8	5.	1 OCT 1212	33	2088.	1 OCT 1442	58	2505.	1 OCT 1712	83	54.
1 OCT 0948	9	7.	1 OCT 1218	34	3316.	1 OCT 1448	59	2248.	1 OCT 1718	84	41.
1 OCT 0954	10	10.	1 OCT 1224	35	4900.	1 OCT 1454	60	2031.	1 OCT 1724	85	31.
1 OCT 1000	11	13.	1 OCT 1230	36	6809.	1 OCT 1500	61	1846.	1 OCT 1730	86	23.
1 OCT 1006	12	17.	1 OCT 1236	37	8941.	1 OCT 1506	62	1685.	1 OCT 1736	87	17.
1 OCT 1012	13	21.	1 OCT 1242	38	11162.	1 OCT 1512	63	1545.	1 OCT 1742	88	13.
1 OCT 1018	14	25.	1 OCT 1248	39	13313.	1 OCT 1518	64	1421.	1 OCT 1748	89	10.
1 OCT 1024	15	29.	1 OCT 1254	40	15219.	1 OCT 1524	65	1311.	1 OCT 1754	90	7.
1 OCT 1030	16	33.	1 OCT 1300	41	16681.	1 OCT 1530	66	1212.	1 OCT 1800	91	5.
1 OCT 1036	17	37.	1 OCT 1306	42	17528.	1 OCT 1536	67	1123.	1 OCT 1806	92	4.
1 OCT 1042	18	41.	1 OCT 1312	43	17656.	1 OCT 1542	68	1042.	1 OCT 1812	93	3.
1 OCT 1048	19	45.	1 OCT 1318	44	17069.	1 OCT 1548	69	964.	1 OCT 1818	94	2.
1 OCT 1054	20	48.	1 OCT 1324	45	15872.	1 OCT 1554	70	888.	1 OCT 1824	95	1.
1 OCT 1100	21	52.	1 OCT 1330	46	14254.	1 OCT 1600	71	809.	1 OCT 1830	96	1.
1 OCT 1106	22	55.	1 OCT 1336	47	12446.	1 OCT 1606	72	725.	1 OCT 1836	97	1.
1 OCT 1112	23	59.	1 OCT 1342	48	10663.	1 OCT 1612	73	636.	1 OCT 1842	98	0.
1 OCT 1118	24	62.	1 OCT 1348	49	9050.	1 OCT 1618	74	544.	1 OCT 1848	99	0.
1 OCT 1124	25	66.	1 OCT 1354	50	7665.	1 OCT 1624	75	452.	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
17656.	4.20	(CFS)	4371.	2656.	2656.	2656.
		(INCHES)	2.545	2.551	2.551	2.551
		(AC-FT)	2168.	2173.	2173.	2173.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	60.	1 OCT 1400	51	5374.	1 OCT 1630	76	297.
1 OCT 0906	2	0.	1 OCT 1136	27	65.	1 OCT 1406	52	4584.	1 OCT 1636	77	234.
1 OCT 0912	3	0.	1 OCT 1142	28	74.	1 OCT 1412	53	3936.	1 OCT 1642	78	180.
1 OCT 0918	4	0.	1 OCT 1148	29	104.	1 OCT 1418	54	3403.	1 OCT 1648	79	137.
1 OCT 0924	5	1.	1 OCT 1154	30	192.	1 OCT 1424	55	2964.	1 OCT 1654	80	103.
1 OCT 0930	6	2.	1 OCT 1200	31	402.	1 OCT 1430	56	2600.	1 OCT 1700	81	78.
1 OCT 0936	7	3.	1 OCT 1206	32	794.	1 OCT 1436	57	2298.	1 OCT 1706	82	58.
1 OCT 0942	8	4.	1 OCT 1212	33	1424.	1 OCT 1442	58	2045.	1 OCT 1712	83	44.
1 OCT 0948	9	6.	1 OCT 1218	34	2324.	1 OCT 1448	59	1834.	1 OCT 1718	84	33.
1 OCT 0954	10	9.	1 OCT 1224	35	3527.	1 OCT 1454	60	1655.	1 OCT 1724	85	25.
1 OCT 1000	11	11.	1 OCT 1230	36	5026.	1 OCT 1500	61	1502.	1 OCT 1730	86	18.
1 OCT 1006	12	15.	1 OCT 1236	37	6750.	1 OCT 1506	62	1371.	1 OCT 1736	87	14.

1 OCT 1012	13	18.	*	1 OCT 1242	38	8599.	*	1 OCT 1512	63	1256.	*	1 OCT 1742	88	10.
1 OCT 1018	14	21.	*	1 OCT 1248	39	10440.	*	1 OCT 1518	64	1154.	*	1 OCT 1748	89	8.
1 OCT 1024	15	25.	*	1 OCT 1254	40	12116.	*	1 OCT 1524	65	1063.	*	1 OCT 1754	90	6.
1 OCT 1030	16	28.	*	1 OCT 1300	41	13442.	*	1 OCT 1530	66	982.	*	1 OCT 1800	91	4.
[illegible] OCT 1036	17	31.	*	1 OCT 1306	42	14256.	*	1 OCT 1536	67	910.	*	1 OCT 1806	92	3.
[illegible] 1042	18	35.	*	1 OCT 1312	43	14457.	*	1 OCT 1542	68	844.	*	1 OCT 1812	93	2.
1 OCT 1048	19	38.	*	1 OCT 1318	44	14042.	*	1 OCT 1548	69	781.	*	1 OCT 1818	94	1.
1 OCT 1054	20	41.	*	1 OCT 1324	45	13097.	*	1 OCT 1554	70	720.	*	1 OCT 1824	95	1.
1 OCT 1100	21	44.	*	1 OCT 1330	46	11782.	*	1 OCT 1600	71	656.	*	1 OCT 1830	96	1.
1 OCT 1106	22	47.	*	1 OCT 1336	47	10295.	*	1 OCT 1606	72	589.	*	1 OCT 1836	97	0.
1 OCT 1112	23	50.	*	1 OCT 1342	48	8821.	*	1 OCT 1612	73	517.	*	1 OCT 1842	98	0.
1 OCT 1118	24	53.	*	1 OCT 1348	49	7483.	*	1 OCT 1618	74	443.	*	1 OCT 1848	99	0.
1 OCT 1124	25	56.	*	1 OCT 1354	50	6334.	*	1 OCT 1624	75	368.	*	1 OCT 1854	100	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
14457.	4.20	(CFS)	3517.	2137.	2137.	2137.
		(INCHES)	2.047	2.053	2.053	2.053
		(AC-FT)	1744.	1748.	1748.	1748.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	*	1 OCT 1130	26	56.	*	1 OCT 1400	51	4912.	*	1 OCT 1630	76	270.
1 OCT 0906	2	0.	*	1 OCT 1136	27	60.	*	1 OCT 1406	52	4188.	*	1 OCT 1636	77	212.
1 OCT 0912	3	0.	*	1 OCT 1142	28	66.	*	1 OCT 1412	53	3594.	*	1 OCT 1642	78	163.
1 OCT 0918	4	0.	*	1 OCT 1148	29	88.	*	1 OCT 1418	54	3106.	*	1 OCT 1648	79	124.
1 OCT 0924	5	1.	*	1 OCT 1154	30	157.	*	1 OCT 1424	55	2703.	*	1 OCT 1654	80	94.
1 OCT 0930	6	1.	*	1 OCT 1200	31	329.	*	1 OCT 1430	56	2371.	*	1 OCT 1700	81	70.
1 OCT 0936	7	2.	*	1 OCT 1206	32	660.	*	1 OCT 1436	57	2094.	*	1 OCT 1706	82	53.
1 OCT 0942	8	4.	*	1 OCT 1212	33	1198.	*	1 OCT 1442	58	1863.	*	1 OCT 1712	83	39.
1 OCT 0948	9	6.	*	1 OCT 1218	34	1977.	*	1 OCT 1448	59	1670.	*	1 OCT 1718	84	30.
1 OCT 0954	10	8.	*	1 OCT 1224	35	3031.	*	1 OCT 1454	60	1506.	*	1 OCT 1724	85	22.
1 OCT 1000	11	11.	*	1 OCT 1230	36	4360.	*	1 OCT 1500	61	1367.	*	1 OCT 1730	86	16.
1 OCT 1006	12	14.	*	1 OCT 1236	37	5906.	*	1 OCT 1506	62	1247.	*	1 OCT 1736	87	12.
1 OCT 1012	13	17.	*	1 OCT 1242	38	7582.	*	1 OCT 1512	63	1142.	*	1 OCT 1742	88	9.
1 OCT 1018	14	20.	*	1 OCT 1248	39	9273.	*	1 OCT 1518	64	1049.	*	1 OCT 1748	89	7.
1 OCT 1024	15	23.	*	1 OCT 1254	40	10833.	*	1 OCT 1524	65	966.	*	1 OCT 1754	90	5.
1 OCT 1030	16	26.	*	1 OCT 1300	41	12088.	*	1 OCT 1530	66	892.	*	1 OCT 1800	91	4.
1 OCT 1036	17	29.	*	1 OCT 1306	42	12882.	*	1 OCT 1536	67	826.	*	1 OCT 1806	92	3.
1 OCT 1042	18	32.	*	1 OCT 1312	43	13115.	*	1 OCT 1542	68	766.	*	1 OCT 1812	93	2.
1 OCT 1048	19	35.	*	1 OCT 1318	44	12775.	*	1 OCT 1548	69	709.	*	1 OCT 1818	94	1.
1 OCT 1054	20	38.	*	1 OCT 1324	45	11941.	*	1 OCT 1554	70	653.	*	1 OCT 1824	95	1.
1 OCT 1100	21	41.	*	1 OCT 1330	46	10757.	*	1 OCT 1600	71	596.	*	1 OCT 1830	96	1.
1 OCT 1106	22	44.	*	1 OCT 1336	47	9408.	*	1 OCT 1606	72	535.	*	1 OCT 1836	97	0.
1 OCT 1112	23	46.	*	1 OCT 1342	48	8064.	*	1 OCT 1612	73	470.	*	1 OCT 1842	98	0.
1 OCT 1118	24	49.	*	1 OCT 1348	49	6841.	*	1 OCT 1618	74	402.	*	1 OCT 1848	99	0.
1 OCT 1124	25	53.	*	1 OCT 1354	50	5790.	*	1 OCT 1624	75	334.	*	1 OCT 1854	100	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
13115.	4.20	(CFS)	3172.	1928.	1928.	1928.
		(INCHES)	1.847	1.852	1.852	1.852

(AC-FT) 1573. 1577. 1577. 1577.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	53.	1 OCT 1400	51	4601.	1 OCT 1630	76	252.
1 OCT 0906	2	0.	1 OCT 1136	27	57.	1 OCT 1406	52	3923.	1 OCT 1636	77	198.
1 OCT 0912	3	0.	1 OCT 1142	28	62.	1 OCT 1412	53	3366.	1 OCT 1642	78	152.
1 OCT 0918	4	0.	1 OCT 1148	29	80.	1 OCT 1418	54	2908.	1 OCT 1648	79	116.
1 OCT 0924	5	1.	1 OCT 1154	30	137.	1 OCT 1424	55	2531.	1 OCT 1654	80	87.
1 OCT 0930	6	1.	1 OCT 1200	31	287.	1 OCT 1430	56	2219.	1 OCT 1700	81	65.
1 OCT 0936	7	2.	1 OCT 1206	32	579.	1 OCT 1436	57	1960.	1 OCT 1706	82	49.
1 OCT 0942	8	4.	1 OCT 1212	33	1059.	1 OCT 1442	58	1743.	1 OCT 1712	83	37.
1 OCT 0948	9	6.	1 OCT 1218	34	1758.	1 OCT 1448	59	1562.	1 OCT 1718	84	27.
1 OCT 0954	10	8.	1 OCT 1224	35	2712.	1 OCT 1454	60	1409.	1 OCT 1724	85	20.
1 OCT 1000	11	10.	1 OCT 1230	36	3929.	1 OCT 1500	61	1278.	1 OCT 1730	86	15.
1 OCT 1006	12	13.	1 OCT 1236	37	5355.	1 OCT 1506	62	1166.	1 OCT 1736	87	11.
1 OCT 1012	13	16.	1 OCT 1242	38	6913.	1 OCT 1512	63	1067.	1 OCT 1742	88	8.
1 OCT 1018	14	19.	1 OCT 1248	39	8498.	1 OCT 1518	64	980.	1 OCT 1748	89	6.
1 OCT 1024	15	22.	1 OCT 1254	40	9974.	1 OCT 1524	65	903.	1 OCT 1754	90	5.
1 OCT 1030	16	25.	1 OCT 1300	41	11176.	1 OCT 1530	66	833.	1 OCT 1800	91	3.
1 OCT 1036	17	28.	1 OCT 1306	42	11954.	1 OCT 1536	67	771.	1 OCT 1806	92	2.
1 OCT 1042	18	31.	1 OCT 1312	43	12206.	1 OCT 1542	68	714.	1 OCT 1812	93	2.
1 OCT 1048	19	33.	1 OCT 1318	44	11919.	1 OCT 1548	69	661.	1 OCT 1818	94	1.
1 OCT 1054	20	36.	1 OCT 1324	45	11160.	1 OCT 1554	70	609.	1 OCT 1824	95	1.
1 OCT 1100	21	39.	1 OCT 1330	46	10065.	1 OCT 1600	71	556.	1 OCT 1830	96	0.
1 OCT 1106	22	41.	1 OCT 1336	47	8809.	1 OCT 1606	72	499.	1 OCT 1836	97	0.
1 OCT 1112	23	44.	1 OCT 1342	48	7554.	1 OCT 1612	73	438.	1 OCT 1842	98	0.
1 OCT 1118	24	47.	1 OCT 1348	49	6410.	1 OCT 1618	74	375.	1 OCT 1848	99	0.
1 OCT 1124	25	50.	1 OCT 1354	50	5425.	1 OCT 1624	75	312.	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
12206.	4.20	(CFS)	2943.	1788.	1788.	1788.
		(INCHES)	1.713	1.718	1.718	1.718
		(AC-FT)	1459.	1463.	1463.	1463.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	51.	1 OCT 1400	51	4358.	1 OCT 1630	76	238.
1 OCT 0906	2	0.	1 OCT 1136	27	55.	1 OCT 1406	52	3715.	1 OCT 1636	77	187.
1 OCT 0912	3	0.	1 OCT 1142	28	59.	1 OCT 1412	53	3187.	1 OCT 1642	78	144.
1 OCT 0918	4	0.	1 OCT 1148	29	75.	1 OCT 1418	54	2753.	1 OCT 1648	79	109.
1 OCT 0924	5	1.	1 OCT 1154	30	125.	1 OCT 1424	55	2396.	1 OCT 1654	80	82.
1 OCT 0930	6	1.	1 OCT 1200	31	256.	1 OCT 1430	56	2100.	1 OCT 1700	81	61.

1	OCT	0936	7	2.	*	1 OCT	1206	32	517.	*	1 OCT	1436	57	1855.	*	1 OCT	1706	82	46.
1	OCT	0942	8	4.	*	1 OCT	1212	33	950.	*	1 OCT	1442	58	1649.	*	1 OCT	1712	83	34.
1	OCT	0948	9	5.	*	1 OCT	1218	34	1585.	*	1 OCT	1448	59	1477.	*	1 OCT	1718	84	26.
1	OCT	0954	10	7.	*	1 OCT	1224	35	2461.	*	1 OCT	1454	60	1332.	*	1 OCT	1724	85	19.
1	OCT	1000	11	10.	*	1 OCT	1230	36	3589.	*	1 OCT	1500	61	1208.	*	1 OCT	1730	86	14.
1	OCT	1006	12	12.	*	1 OCT	1236	37	4921.	*	1 OCT	1506	62	1102.	*	1 OCT	1736	87	11.
1	OCT	1012	13	15.	*	1 OCT	1242	38	6387.	*	1 OCT	1512	63	1009.	*	1 OCT	1742	88	8.
1	OCT	1018	14	18.	*	1 OCT	1248	39	7888.	*	1 OCT	1518	64	926.	*	1 OCT	1748	89	6.
1	OCT	1024	15	21.	*	1 OCT	1254	40	9299.	*	1 OCT	1524	65	853.	*	1 OCT	1754	90	4.
1	OCT	1030	16	24.	*	1 OCT	1300	41	10460.	*	1 OCT	1530	66	787.	*	1 OCT	1800	91	3.
1	OCT	1036	17	27.	*	1 OCT	1306	42	11225.	*	1 OCT	1536	67	727.	*	1 OCT	1806	92	2.
1	OCT	1042	18	29.	*	1 OCT	1312	43	11493.	*	1 OCT	1542	68	674.	*	1 OCT	1812	93	2.
1	OCT	1048	19	32.	*	1 OCT	1318	44	11246.	*	1 OCT	1548	69	623.	*	1 OCT	1818	94	1.
1	OCT	1054	20	35.	*	1 OCT	1324	45	10546.	*	1 OCT	1554	70	574.	*	1 OCT	1824	95	1.
1	OCT	1100	21	37.	*	1 OCT	1330	46	9522.	*	1 OCT	1600	71	524.	*	1 OCT	1830	96	0.
1	OCT	1106	22	40.	*	1 OCT	1336	47	8340.	*	1 OCT	1606	72	471.	*	1 OCT	1836	97	0.
1	OCT	1112	23	42.	*	1 OCT	1342	48	7154.	*	1 OCT	1612	73	414.	*	1 OCT	1842	98	0.
1	OCT	1118	24	45.	*	1 OCT	1348	49	6072.	*	1 OCT	1618	74	354.	*	1 OCT	1848	99	0.
1	OCT	1124	25	48.	*	1 OCT	1354	50	5138.	*	1 OCT	1624	75	294.	*	1 OCT	1854	100	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
11493.	4.20	(CFS)	2763.	1679.	1679.	1679.
		(INCHES)	1.609	1.613	1.613	1.613
		(AC-FT)	1370.	1374.	1374.	1374.

CUMULATIVE AREA = 15.97 SQ MI

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INTERPOLATED HYDROGRAPH AT CO-5

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	OCT	0900	1	0.	*	1	OCT	1130	26	57.	*	1	OCT	1400	51	5062.	*	1	OCT	1630	76	279.
1	OCT	0906	2	0.	*	1	OCT	1136	27	61.	*	1	OCT	1406	52	4317.	*	1	OCT	1636	77	219.
1	OCT	0912	3	0.	*	1	OCT	1142	28	68.	*	1	OCT	1412	53	3705.	*	1	OCT	1642	78	169.
1	OCT	0918	4	0.	*	1	OCT	1148	29	93.	*	1	OCT	1418	54	3202.	*	1	OCT	1648	79	128.
1	OCT	0924	5	1.	*	1	OCT	1154	30	168.	*	1	OCT	1424	55	2788.	*	1	OCT	1654	80	97.
1	OCT	0930	6	1.	*	1	OCT	1200	31	353.	*	1	OCT	1430	56	2445.	*	1	OCT	1700	81	73.
1	OCT	0936	7	3.	*	1	OCT	1206	32	704.	*	1	OCT	1436	57	2160.	*	1	OCT	1706	82	54.
1	OCT	0942	8	4.	*	1	OCT	1212	33	1271.	*	1	OCT	1442	58	1922.	*	1	OCT	1712	83	41.
1	OCT	0948	9	6.	*	1	OCT	1218	34	2090.	*	1	OCT	1448	59	1723.	*	1	OCT	1718	84	31.
1	OCT	0954	10	8.	*	1	OCT	1224	35	3192.	*	1	OCT	1454	60	1554.	*	1	OCT	1724	85	23.
1	OCT	1000	11	11.	*	1	OCT	1230	36	4576.	*	1	OCT	1500	61	1411.	*	1	OCT	1730	86	17.
1	OCT	1006	12	14.	*	1	OCT	1236	37	6180.	*	1	OCT	1506	62	1287.	*	1	OCT	1736	87	13.
1	OCT	1012	13	17.	*	1	OCT	1242	38	7912.	*	1	OCT	1512	63	1179.	*	1	OCT	1742	88	9.
1	OCT	1018	14	20.	*	1	OCT	1248	39	9651.	*	1	OCT	1518	64	1083.	*	1	OCT	1748	89	7.
1	OCT	1024	15	23.	*	1	OCT	1254	40	11250.	*	1	OCT	1524	65	998.	*	1	OCT	1754	90	5.
1	OCT	1030	16	27.	*	1	OCT	1300	41	12527.	*	1	OCT	1530	66	922.	*	1	OCT	1800	91	4.
1	OCT	1036	17	30.	*	1	OCT	1306	42	13328.	*	1	OCT	1536	67	853.	*	1	OCT	1806	92	3.
1	OCT	1042	18	33.	*	1	OCT	1312	43	13551.	*	1	OCT	1542	68	791.	*	1	OCT	1812	93	2.
1	OCT	1048	19	36.	*	1	OCT	1318	44	13187.	*	1	OCT	1548	69	732.	*	1	OCT	1818	94	1.
1	OCT	1054	20	39.	*	1	OCT	1324	45	12316.	*	1	OCT	1554	70	675.	*	1	OCT	1824	95	1.
1	OCT	1100	21	42.	*	1	OCT	1330	46	11090.	*	1	OCT	1600	71	615.	*	1	OCT	1830	96	1.
1	OCT	1106	22	45.	*	1	OCT	1336	47	9696.	*	1	OCT	1606	72	552.	*	1	OCT	1836	97	0.
1	OCT	1112	23	47.	*	1	OCT	1342	48	8310.	*	1	OCT	1612	73	485.	*	1	OCT	1842	98	0.
1	OCT	1118	24	51.	*	1	OCT	1348	49	7050.	*	1	OCT	1618	74	415.	*	1	OCT	1848	99	0.
1	OCT	1124	25	54.	*	1	OCT	1354	50	5966.	*	1	OCT	1624	75	345.	*	1	OCT	1854	100	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
13551.	4.20	(CFS)	3284.	1996.	1996.	1996.
		(INCHES)	1.912	1.917	1.917	1.917
		(AC-FT)	1628.	1633.	1633.	1633.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	830.	3.30	124.	75.	75.	.60		
ROUTED TO	XROX2	808.	3.50	124.	75.	75.	.60		
HYDROGRAPH AT	X2SUB	458.	3.50	77.	46.	46.	.43		
2 COMBINED AT	XCO-1	1238.	3.50	196.	119.	119.	1.03		
ROUTED TO	XROX3	1176.	3.70	196.	119.	119.	1.03		
HYDROGRAPH AT	X3SUB	493.	3.60	88.	53.	53.	.56		
2 COMBINED AT	XCO-2	1615.	3.70	276.	168.	168.	1.59		
HYDROGRAPH AT	X4SUB	350.	3.40	49.	29.	29.	.28		
2 COMBINED AT	XCO-3	1808.	3.70	320.	194.	194.	1.87		
HYDROGRAPH AT	X5SUB	349.	3.60	60.	36.	36.	.38		
2 COMBINED AT	XCO-4	2114.	3.60	373.	226.	226.	2.25		
HYDROGRAPH AT	SUBC1	2211.	3.20	346.	209.	209.	1.26		
ROUTED TO	RO-1	1930.	3.80	346.	209.	209.	1.26		
HYDROGRAPH AT	SUBC2	2137.	3.60	497.	302.	302.	2.15		
HYDROGRAPH AT	SUBC3	1738.	3.40	311.	189.	189.	1.25		
HYDROGRAPH AT	SUBC4	3597.	3.40	685.	415.	415.	2.55		
ROUTED TO	RO-2	3438.	3.60	685.	415.	415.	2.55		
HYDROGRAPH AT	SUBC5	4311.	3.40	884.	536.	536.	3.38		
2 COMBINED AT	CO-1	7274.	3.60	1536.	931.	931.	5.93		
ROUTED TO	RO-3	7147.	3.80	1536.	931.	931.	5.93		
4 COMBINED AT	CO-2	11638.	3.80	2577.	1562.	1562.	10.59		
ROUTED TO	RO-4	11412.	4.00	2577.	1562.	1562.	10.59		
HYDROGRAPH AT	SUBC7	1403.	3.40	248.	151.	151.	1.18		
ROUTED TO	RO-5	1253.	4.20	248.	151.	151.	1.18		
HYDROGRAPH AT	SUBC8	1458.	3.50	280.	170.	170.	1.42		
2 COMBINED AT	CO-3	1863.	4.10	515.	313.	313.	2.60		
3 COMBINED AT	CO-4	13772.	4.00	3220.	1956.	1956.	15.44		
ROUTED TO	RO-6	13508.	4.20	3219.	1956.	1956.	15.44		
HYDROGRAPH AT	SUBC9	677.	3.40	99.	60.	60.	.53		

2 COMBINED AT	CO-5	13551.	4.20	3284.	1996.	1996.	15.97

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

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

  1           ID                    FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                                 FILE: CC-06
  4           ID
  5           ID        HYDROLOGY FOR:    100-YEAR 6 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
  9           ID                          TO THE TONTO NATIONAL FOREST BOUNDARY
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                    &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: ESO 12/18/89       CKD: 12-18-89
 24           IT      6 01OCT89    0900     100
             *DIAGRAM
 25           IN     15
 26           IO      5
 27           JD   3.50     .01
 28           PC     .0    .011    .022    .035    .048    .062    .079    .100    .125    .155
 29           PC    .192   .339    .729    .791    .830    .862    .887    .908    .926    .942
 30           PC    .956   .969    .980    .990   1.000
 31           JD   2.98     10.
 32           JD   2.77     20.
 33           JD   2.63     30.
 34           JD   2.52     40.

 35           KK   X1SUB
 36           KM        RUNOFF FROM SUBBASIN X1
 37           BA    0.60
 38           LU    0.88    0.21   15.95
 39           UD    0.44

 40           KK   XROX2
 41           KM        ROUTE X1 THROUGH SUBBASIN X2
 42           RM       2    0.15    0.30

 43           KK   X2SUB
 44           KM        RUNOFF FROM SUBBASIN X2
 45           BA    0.43
 46           LU    0.90    0.29    5.78
 47           UD    0.73
```

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

  48          KK   XCO-1
  49          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  50          HC       2

  51          KK   XROX3
  52          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  53          RM       2    0.23    0.30

  54          KK   X3SUB
  55          KM        RUNOFF FROM SUBBASIN X3
  56          BA    0.56
  57          LU    0.93    0.35    0.76
  58          UD    0.69

  59          KK   XCO-2
  60          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  61          HC       2

  62          KK   X4SUB
  63          KM        RUNOFF FROM SUBBASIN X4
  64          BA    0.28
  65          LU    0.89    0.28    0.00
  66          UD    0.47

  67          KK   XCO-3
  68          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  69          HC       2

  70          KK   X5SUB
  71          KM        RUNOFF FROM SUBBASIN X5
  72          BA    0.38
  73          LU    0.93    0.35    0.00
  74          UD    0.47

  75          KK   XCO-4
  76          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  77          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  78          HC       2

  79          KK   SUBC1
  80          KM        RUNOFF FROM SUBBASIN C-1
  81          BA    1.26
  82          LU     .55     .01      0.
  83          UD     .36

  84          KK   RO-1
  85          KM        ROUTE C-1       THROUGH      C-2
  86          RM       6     .58      .3
```

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

  87          KK   SUBC2
  88          KM        RUNOFF FROM SUBBASIN    C-2
  89          BA    2.15
  90          LU     .63     .09      0.
  91          UD     .76

  92          KK   SUBC3
  93          KM        RUNOFF FROM SUBBASIN    C-3
  94          BA    1.25
  95          LU     .61     .06      0.
  96          UD     .50

  97          KK   SUBC4
  98          KM        RUNOFF FROM SUBBASIN    C-4
  99          BA    2.55
 100          LU     .55     .01      0.
 101          UD     .50

 102          KK   RO-2
 103          KM        ROUTE C-4       THROUGH      C-5
 104          RM       3     .27      .3

 105          KK   SUBC5
 106          KM        RUNOFF FROM SUBBASIN    C-5
 107          BA    3.38
 108          LU     .56     .02      0.
 109          UD     .57

 110          KK   CO-1
 111          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 112          HC       2

 113          KK   RO-3
 114          KM        ROUTE C-4&5     THROUGH      C-3
 115          RM       3     .24      .3

 116          KK   CO-2
 117          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 118          HC       4

 119          KK   RO-4
 120          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 121          RM       3     .25      .3

 122          KK   SUBC7
 123          KM        RUNOFF FROM SUBBASIN    C-7
 124          BA    1.18
 125          LU     .87     .18    17.7
 126          UD     .54
```

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

 127          KK   RO-5
 128          KM        ROUTE C-7       THROUGH      C-8
 129          RM       8     .77      .3

 130          KK   SUBC8
 131          KM        RUNOFF FROM SUBBASIN    C-8
 132          BA    1.42
 133          LU     .85     .18     8.8
 134          UD     .64

 135          KK   CO-3
 136          KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
 137          HC       2

 138          KK   CO-4
 139          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
 140          HC       3

 141          KK   RO-6
 142          KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
 143          RM       2     .21      .3

 144          KK   SUBC9
 145          KM        RUNOFF FROM SUBBASIN    C-9
 146          BA     .53
 147          LU     .83     .24     3.9
 148          UD     .48

 149          KK   CO-5
 150          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
 151          KO       1
 152          HC       2
 153          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

 -        X1SUB
              V
              V
 40       XROX2
              .
              .
 43           .       X2SUB
              .           .
              .           .
 48       XCO-1............
              V
              V
 51       XROX3
              .
              .
 54           .       X3SUB
              .           .
              .           .
 59       XCO-2............
              .
              .
 62           .       X4SUB
              .           .
              .           .
 67       XCO-3............
              .
              .
 70           .       X5SUB
              .           .
              .           .
 75       XCO-4............
              .
              .
 79           .       SUBC1
              .           V
              .           V
 84           .       RO-1
              .           .
              .           .
 87           .           .       SUBC2
              .           .           .
              .           .           .
 92           .           .           .       SUBC3
              .           .           .           .
              .           .           .           .
 97           .           .           .           .       SUBC4
              .           .           .           .           V
              .           .           .           .           V
102           .           .           .           .       RO-2
              .           .           .           .           .
              .           .           .           .           .
105           .           .           .           .           .       SUBC5
              .           .           .           .           .           .
              .           .           .           .           .           .
110           .           .           .           .       CO-1 ............
              .           .           .           .           V
              .           .           .           .           V
113           .           .           .           .       RO-3
              .           .           .           .           .
              .           .           .           .           .
116           .       CO-2 ...................................
              .           V
              .           V
              .       RO-4
              .           .
              .           .
122           .           .       SUBC7
              .           .           V
              .           .           V
```

```
127          .          .      RO-5
             .          .          .
             .          .          .
130          .          .          .      SUBC8
             .          .          .          .
             .          .          .          .
             .          .      CO-3 ............
             .          .          .
             .          .          .
138      CO-4 ......................
             V
             V
141      RO-6
             .
             .
144          .      SUBC9
             .          .
             .          .
149      CO-5 ............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

****

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: CC-06

HYDROLOGY FOR: 100-YEAR 6 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST BOUNDARY

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

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

 T           HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE     10CT89  STARTING DATE
                  ITIME       0900  STARTING TIME
                     NQ        100  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     10CT89  ENDING DATE
                 NDTIME       1854  ENDING TIME

          COMPUTATION INTERVAL     .10 HOURS
               TOTAL TIME BASE    9.90 HOURS

     ENGLISH UNITS

27 JD        INDEX STORM NO. 1
                   STRM       3.50  PRECIPITATION DEPTH
                   TRDA        .01  TRANSPOSITION DRAINAGE AREA

28 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                 .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

31 JD        INDEX STORM NO. 2
                   STRM       2.98  PRECIPITATION DEPTH
                   TRDA      10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                 .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

32 JD        INDEX STORM NO. 3
                   STRM       2.77  PRECIPITATION DEPTH
```

```
                    TRDA       20.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                      .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

 33 JD          INDEX STORM NO. 4
                    STRM        2.63  PRECIPITATION DEPTH
                    TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                      .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .00       .00       .00       .00       .00       .00       .00       .00

 34 JD          INDEX STORM NO. 5
                    STRM        2.52  PRECIPITATION DEPTH
                    TRDA       40.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .06       .06       .11       .16       .16
                      .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                      .01       .01       .00       .00       .00       .00       .00       .00       .00       .00


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


            **************
            *            *
 149 KK     *    CO-5    *
            *            *
            **************

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

 152 HC          HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

                                          HYDROGRAPH AT    CO-5
                                     TRANSPOSITION AREA      .0 SQ MI

*****************************************************************************************************************************
                                 *                                 *                                 *
  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW     *  DA MON HRMN  ORD      FLOW
                                 *                                 *                                 *
   1 OCT 0900    1        0.     *   1 OCT 1130   26       70.     *   1 OCT 1400   51     6524.     *   1 OCT 1630   76      366.
   1 OCT 0906    2        0.     *   1 OCT 1136   27       77.     *   1 OCT 1406   52     5575.     *   1 OCT 1636   77      288.
   1 OCT 0912    3        0.     *   1 OCT 1142   28       97.     *   1 OCT 1412   53     4796.     *   1 OCT 1642   78      222.
   1 OCT 0918    4        0.     *   1 OCT 1148   29      156.     *   1 OCT 1418   54     4154.     *   1 OCT 1648   79      169.
   1 OCT 0924    5        1.     *   1 OCT 1154   30      312.     *   1 OCT 1424   55     3624.     *   1 OCT 1654   80      128.
   1 OCT 0930    6        2.     *   1 OCT 1200   31      649.     *   1 OCT 1430   56     3185.     *   1 OCT 1700   81       96.
   1 OCT 0936    7        3.     *   1 OCT 1206   32     1252.     *   1 OCT 1436   57     2819.     *   1 OCT 1706   82       73.
   1 OCT 0942    8        5.     *   1 OCT 1212   33     2185.     *   1 OCT 1442   58     2512.     *   1 OCT 1712   83       55.
   1 OCT 0948    9        7.     *   1 OCT 1218   34     3456.     *   1 OCT 1448   59     2255.     *   1 OCT 1718   84       41.
   1 OCT 0954   10       10.     *   1 OCT 1224   35     5050.     *   1 OCT 1454   60     2037.     *   1 OCT 1724   85       31.
   1 OCT 1000   11       13.     *   1 OCT 1230   36     6920.     *   1 OCT 1500   61     1851.     *   1 OCT 1730   86       23.
   1 OCT 1006   12       17.     *   1 OCT 1236   37     8974.     *   1 OCT 1506   62     1690.     *   1 OCT 1736   87       17.
```

1 OCT 1012	13	21.	*	1 OCT 1242	38	11109.	*	1 OCT 1512	63	1550.	*	1 OCT 1742	88	13.
1 OCT 1018	14	24.	*	1 OCT 1248	39	13191.	*	1 OCT 1518	64	1425.	*	1 OCT 1748	89	10.
1 OCT 1024	15	29.	*	1 OCT 1254	40	15060.	*	1 OCT 1524	65	1315.	*	1 OCT 1754	90	7.
1 OCT 1030	16	33.	*	1 OCT 1300	41	16523.	*	1 OCT 1530	66	1216.	*	1 OCT 1800	91	5.
1 OCT 1036	17	37.	*	1 OCT 1306	42	17401.	*	1 OCT 1536	67	1127.	*	1 OCT 1806	92	4.
1 OCT 1042	18	41.	*	1 OCT 1312	43	17572.	*	1 OCT 1542	68	1045.	*	1 OCT 1812	93	3.
1 OCT 1048	19	44.	*	1 OCT 1318	44	17023.	*	1 OCT 1548	69	967.	*	1 OCT 1818	94	2.
1 OCT 1054	20	48.	*	1 OCT 1324	45	15852.	*	1 OCT 1554	70	890.	*	1 OCT 1824	95	1.
1 OCT 1100	21	51.	*	1 OCT 1330	46	14248.	*	1 OCT 1600	71	810.	*	1 OCT 1830	96	1.
1 OCT 1106	22	55.	*	1 OCT 1336	47	12447.	*	1 OCT 1606	72	726.	*	1 OCT 1836	97	1.
1 OCT 1112	23	58.	*	1 OCT 1342	48	10669.	*	1 OCT 1612	73	637.	*	1 OCT 1842	98	0.
1 OCT 1118	24	62.	*	1 OCT 1348	49	9059.	*	1 OCT 1618	74	545.	*	1 OCT 1848	99	0.
1 OCT 1124	25	66.	*	1 OCT 1354	50	7677.	*	1 OCT 1624	75	453.	*	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
17572.	4.20	(CFS)	4371.	2656.	2656.	2656.
		(INCHES)	2.545	2.551	2.551	2.551
		(AC-FT)	2168.	2173.	2173.	2173.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	*	1 OCT 1130	26	60.	*	1 OCT 1400	51	5386.	*	1 OCT 1630	76	297.
1 OCT 0906	2	0.	*	1 OCT 1136	27	64.	*	1 OCT 1406	52	4597.	*	1 OCT 1636	77	234.
1 OCT 0912	3	0.	*	1 OCT 1142	28	73.	*	1 OCT 1412	53	3947.	*	1 OCT 1642	78	180.
1 OCT 0918	4	0.	*	1 OCT 1148	29	103.	*	1 OCT 1418	54	3414.	*	1 OCT 1648	79	137.
1 OCT 0924	5	1.	*	1 OCT 1154	30	193.	*	1 OCT 1424	55	2973.	*	1 OCT 1654	80	104.
1 OCT 0930	6	2.	*	1 OCT 1200	31	411.	*	1 OCT 1430	56	2608.	*	1 OCT 1700	81	78.
1 OCT 0936	7	3.	*	1 OCT 1206	32	824.	*	1 OCT 1436	57	2304.	*	1 OCT 1706	82	58.
1 OCT 0942	8	4.	*	1 OCT 1212	33	1491.	*	1 OCT 1442	58	2051.	*	1 OCT 1712	83	44.
1 OCT 0948	9	6.	*	1 OCT 1218	34	2432.	*	1 OCT 1448	59	1839.	*	1 OCT 1718	84	33.
1 OCT 0954	10	9.	*	1 OCT 1224	35	3650.	*	1 OCT 1454	60	1659.	*	1 OCT 1724	85	25.
1 OCT 1000	11	11.	*	1 OCT 1230	36	5122.	*	1 OCT 1500	61	1506.	*	1 OCT 1730	86	18.
1 OCT 1006	12	14.	*	1 OCT 1236	37	6786.	*	1 OCT 1506	62	1374.	*	1 OCT 1736	87	14.
1 OCT 1012	13	17.	*	1 OCT 1242	38	8565.	*	1 OCT 1512	63	1259.	*	1 OCT 1742	88	10.
1 OCT 1018	14	21.	*	1 OCT 1248	39	10347.	*	1 OCT 1518	64	1157.	*	1 OCT 1748	89	8.
1 OCT 1024	15	24.	*	1 OCT 1254	40	11990.	*	1 OCT 1524	65	1066.	*	1 OCT 1754	90	6.
1 OCT 1030	16	28.	*	1 OCT 1300	41	13313.	*	1 OCT 1530	66	985.	*	1 OCT 1800	91	4.
1 OCT 1036	17	31.	*	1 OCT 1306	42	14150.	*	1 OCT 1536	67	913.	*	1 OCT 1806	92	3.
1 OCT 1042	18	35.	*	1 OCT 1312	43	14387.	*	1 OCT 1542	68	846.	*	1 OCT 1812	93	2.
1 OCT 1048	19	38.	*	1 OCT 1318	44	14004.	*	1 OCT 1548	69	783.	*	1 OCT 1818	94	1.
1 OCT 1054	20	41.	*	1 OCT 1324	45	13081.	*	1 OCT 1554	70	721.	*	1 OCT 1824	95	1.
1 OCT 1100	21	44.	*	1 OCT 1330	46	11779.	*	1 OCT 1600	71	658.	*	1 OCT 1830	96	1.
1 OCT 1106	22	47.	*	1 OCT 1336	47	10299.	*	1 OCT 1606	72	590.	*	1 OCT 1836	97	0.
1 OCT 1112	23	50.	*	1 OCT 1342	48	8828.	*	1 OCT 1612	73	518.	*	1 OCT 1842	98	0.
1 OCT 1118	24	53.	*	1 OCT 1348	49	7493.	*	1 OCT 1618	74	443.	*	1 OCT 1848	99	0.
1 OCT 1124	25	56.	*	1 OCT 1354	50	6345.	*	1 OCT 1624	75	368.	*	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
14387.	4.20	(CFS)	3517.	2137.	2137.	2137.
		(INCHES)	2.047	2.053	2.053	2.053
		(AC-FT)	1744.	1748.	1748.	1748.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	56.	1 OCT 1400	51	4923.	1 OCT 1630	76	270.
1 OCT 0906	2	0.	1 OCT 1136	27	60.	1 OCT 1406	52	4199.	1 OCT 1636	77	213.
1 OCT 0912	3	0.	1 OCT 1142	28	66.	1 OCT 1412	53	3604.	1 OCT 1642	78	164.
1 OCT 0918	4	0.	1 OCT 1148	29	88.	1 OCT 1418	54	3115.	1 OCT 1648	79	124.
1 OCT 0924	5	1.	1 OCT 1154	30	157.	1 OCT 1424	55	2712.	1 OCT 1654	80	94.
1 OCT 0930	6	1.	1 OCT 1200	31	336.	1 OCT 1430	56	2378.	1 OCT 1700	81	70.
1 OCT 0936	7	2.	1 OCT 1206	32	684.	1 OCT 1436	57	2100.	1 OCT 1706	82	53.
1 OCT 0942	8	4.	1 OCT 1212	33	1254.	1 OCT 1442	58	1868.	1 OCT 1712	83	40.
1 OCT 0948	9	6.	1 OCT 1218	34	2069.	1 OCT 1448	59	1674.	1 OCT 1718	84	30.
1 OCT 0954	10	8.	1 OCT 1224	35	3139.	1 OCT 1454	60	1510.	1 OCT 1724	85	22.
1 OCT 1000	11	10.	1 OCT 1230	36	4447.	1 OCT 1500	61	1370.	1 OCT 1730	86	17.
1 OCT 1006	12	13.	1 OCT 1236	37	5941.	1 OCT 1506	62	1250.	1 OCT 1736	87	12.
1 OCT 1012	13	16.	1 OCT 1242	38	7556.	1 OCT 1512	63	1145.	1 OCT 1742	88	9.
1 OCT 1018	14	19.	1 OCT 1248	39	9192.	1 OCT 1518	64	1052.	1 OCT 1748	89	7.
1 OCT 1024	15	23.	1 OCT 1254	40	10721.	1 OCT 1524	65	969.	1 OCT 1754	90	5.
1 OCT 1030	16	26.	1 OCT 1300	41	11971.	1 OCT 1530	66	895.	1 OCT 1800	91	4.
1 OCT 1036	17	29.	1 OCT 1306	42	12786.	1 OCT 1536	67	829.	1 OCT 1806	92	3.
1 OCT 1042	18	32.	1 OCT 1312	43	13050.	1 OCT 1542	68	768.	1 OCT 1812	93	2.
1 OCT 1048	19	35.	1 OCT 1318	44	12741.	1 OCT 1548	69	711.	1 OCT 1818	94	1.
1 OCT 1054	20	38.	1 OCT 1324	45	11928.	1 OCT 1554	70	655.	1 OCT 1824	95	1.
1 OCT 1100	21	41.	1 OCT 1330	46	10756.	1 OCT 1600	71	597.	1 OCT 1830	96	1.
1 OCT 1106	22	43.	1 OCT 1336	47	9412.	1 OCT 1606	72	536.	1 OCT 1836	97	0.
1 OCT 1112	23	46.	1 OCT 1342	48	8072.	1 OCT 1612	73	471.	1 OCT 1842	98	0.
1 OCT 1118	24	49.	1 OCT 1348	49	6851.	1 OCT 1618	74	403.	1 OCT 1848	99	0.
1 OCT 1124	25	52.	1 OCT 1354	50	5800.	1 OCT 1624	75	335.	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
13050.	4.20	(CFS)	3172.	1928.	1928.	1928.
		(INCHES)	1.847	1.852	1.852	1.852
		(AC-FT)	1573.	1577.	1577.	1577.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	53.	1 OCT 1400	51	4612.	1 OCT 1630	76	252.
1 OCT 0906	2	0.	1 OCT 1136	27	57.	1 OCT 1406	52	3933.	1 OCT 1636	77	198.
1 OCT 0912	3	0.	1 OCT 1142	28	61.	1 OCT 1412	53	3375.	1 OCT 1642	78	153.
1 OCT 0918	4	0.	1 OCT 1148	29	79.	1 OCT 1418	54	2917.	1 OCT 1648	79	116.
1 OCT 0924	5	1.	1 OCT 1154	30	138.	1 OCT 1424	55	2539.	1 OCT 1654	80	87.
1 OCT 0930	6	1.	1 OCT 1200	31	292.	1 OCT 1430	56	2225.	1 OCT 1700	81	65.
1 OCT 0936	7	2.	1 OCT 1206	32	599.	1 OCT 1436	57	1965.	1 OCT 1706	82	49.
1 OCT 0942	8	4.	1 OCT 1212	33	1107.	1 OCT 1442	58	1748.	1 OCT 1712	83	37.
1 OCT 0948	9	5.	1 OCT 1218	34	1840.	1 OCT 1448	59	1566.	1 OCT 1718	84	27.
1 OCT 0954	10	8.	1 OCT 1224	35	2811.	1 OCT 1454	60	1412.	1 OCT 1724	85	20.
1 OCT 1000	11	10.	1 OCT 1230	36	4010.	1 OCT 1500	61	1281.	1 OCT 1730	86	15.
1 OCT 1006	12	13.	1 OCT 1236	37	5389.	1 OCT 1506	62	1168.	1 OCT 1736	87	11.
1 OCT 1012	13	15.	1 OCT 1242	38	6891.	1 OCT 1512	63	1070.	1 OCT 1742	88	8.
1 OCT 1018	14	18.	1 OCT 1248	39	8426.	1 OCT 1518	64	983.	1 OCT 1748	89	6.
1 OCT 1024	15	21.	1 OCT 1254	40	9872.	1 OCT 1524	65	905.	1 OCT 1754	90	5.
1 OCT 1030	16	24.	1 OCT 1300	41	11069.	1 OCT 1530	66	836.	1 OCT 1800	91	3.
1 OCT 1036	17	28.	1 OCT 1306	42	11865.	1 OCT 1536	67	773.	1 OCT 1806	92	2.
1 OCT 1042	18	30.	1 OCT 1312	43	12147.	1 OCT 1542	68	716.	1 OCT 1812	93	2.
1 OCT 1048	19	33.	1 OCT 1318	44	11887.	1 OCT 1548	69	663.	1 OCT 1818	94	1.
1 OCT 1054	20	36.	1 OCT 1324	45	11148.	1 OCT 1554	70	610.	1 OCT 1824	95	1.
1 OCT 1100	21	39.	1 OCT 1330	46	10065.	1 OCT 1600	71	557.	1 OCT 1830	96	0.
1 OCT 1106	22	41.	1 OCT 1336	47	8814.	1 OCT 1606	72	500.	1 OCT 1836	97	0.
1 OCT 1112	23	44.	1 OCT 1342	48	7562.	1 OCT 1612	73	439.	1 OCT 1842	98	0.
1 OCT 1118	24	47.	1 OCT 1348	49	6419.	1 OCT 1618	74	376.	1 OCT 1848	99	0.
1 OCT 1124	25	50.	1 OCT 1354	50	5435.	1 OCT 1624	75	312.	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
12147.	4.20	(CFS)	2943.	1788.	1788.	1788.
		(INCHES)	1.713	1.718	1.718	1.718
		(AC-FT)	1459.	1463.	1463.	1463.

CUMULATIVE AREA = 15.97 SQ MI

HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	51.	1 OCT 1400	51	4368.	1 OCT 1630	76	238.
1 OCT 0906	2	0.	1 OCT 1136	27	54.	1 OCT 1406	52	3725.	1 OCT 1636	77	187.
1 OCT 0912	3	0.	1 OCT 1142	28	59.	1 OCT 1412	53	3196.	1 OCT 1642	78	144.
1 OCT 0918	4	0.	1 OCT 1148	29	74.	1 OCT 1418	54	2761.	1 OCT 1648	79	109.
1 OCT 0924	5	1.	1 OCT 1154	30	125.	1 OCT 1424	55	2403.	1 OCT 1654	80	82.
1 OCT 0930	6	1.	1 OCT 1200	31	260.	1 OCT 1430	56	2106.	1 OCT 1700	81	62.
1 OCT 0936	7	2.	1 OCT 1206	32	534.	1 OCT 1436	57	1860.	1 OCT 1706	82	46.
1 OCT 0942	8	4.	1 OCT 1212	33	992.	1 OCT 1442	58	1654.	1 OCT 1712	83	34.
1 OCT 0948	9	5.	1 OCT 1218	34	1659.	1 OCT 1448	59	1481.	1 OCT 1718	84	26.
1 OCT 0954	10	7.	1 OCT 1224	35	2552.	1 OCT 1454	60	1335.	1 OCT 1724	85	19.
1 OCT 1000	11	10.	1 OCT 1230	36	3665.	1 OCT 1500	61	1211.	1 OCT 1730	86	14.
1 OCT 1006	12	12.	1 OCT 1236	37	4955.	1 OCT 1506	62	1104.	1 OCT 1736	87	11.
1 OCT 1012	13	15.	1 OCT 1242	38	6369.	1 OCT 1512	63	1011.	1 OCT 1742	88	8.
1 OCT 1018	14	18.	1 OCT 1248	39	7823.	1 OCT 1518	64	929.	1 OCT 1748	89	6.
1 OCT 1024	15	21.	1 OCT 1254	40	9205.	1 OCT 1524	65	855.	1 OCT 1754	90	4.
1 OCT 1030	16	23.	1 OCT 1300	41	10360.	1 OCT 1530	66	789.	1 OCT 1800	91	3.
1 OCT 1036	17	26.	1 OCT 1306	42	11142.	1 OCT 1536	67	730.	1 OCT 1806	92	2.
1 OCT 1042	18	29.	1 OCT 1312	43	11437.	1 OCT 1542	68	676.	1 OCT 1812	93	2.
CT 1048	19	32.	1 OCT 1318	44	11217.	1 OCT 1548	69	625.	1 OCT 1818	94	1.
CT 1054	20	34.	1 OCT 1324	45	10536.	1 OCT 1554	70	576.	1 OCT 1824	95	1.
OCT 1100	21	37.	1 OCT 1330	46	9522.	1 OCT 1600	71	525.	1 OCT 1830	96	0.
1 OCT 1106	22	39.	1 OCT 1336	47	8344.	1 OCT 1606	72	471.	1 OCT 1836	97	0.
1 OCT 1112	23	42.	1 OCT 1342	48	7161.	1 OCT 1612	73	414.	1 OCT 1842	98	0.
1 OCT 1118	24	45.	1 OCT 1348	49	6080.	1 OCT 1618	74	354.	1 OCT 1848	99	0.
1 OCT 1124	25	48.	1 OCT 1354	50	5148.	1 OCT 1624	75	295.	1 OCT 1854	100	0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
11437.	4.20	(CFS)	2763.	1679.	1679.	1679.
		(INCHES)	1.609	1.613	1.613	1.613
		(AC-FT)	1370.	1374.	1374.	1374.

CUMULATIVE AREA = 15.97 SQ MI

INTERPOLATED HYDROGRAPH AT CO-5

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 OCT 0900	1	0.	1 OCT 1130	26	57.	1 OCT 1400	51	5073.	1 OCT 1630	76	279.
1 OCT 0906	2	0.	1 OCT 1136	27	61.	1 OCT 1406	52	4328.	1 OCT 1636	77	220.
1 OCT 0912	3	0.	1 OCT 1142	28	68.	1 OCT 1412	53	3716.	1 OCT 1642	78	169.
1 OCT 0918	4	0.	1 OCT 1148	29	93.	1 OCT 1418	54	3212.	1 OCT 1648	79	129.
1 OCT 0924	5	1.	1 OCT 1154	30	169.	1 OCT 1424	55	2796.	1 OCT 1654	80	97.
CT 0930	6	1.	1 OCT 1200	31	360.	1 OCT 1430	56	2452.	1 OCT 1700	81	73.
CT 0936	7	3.	1 OCT 1206	32	730.	1 OCT 1436	57	2166.	1 OCT 1706	82	55.
OCT 0942	8	4.	1 OCT 1212	33	1331.	1 OCT 1442	58	1928.	1 OCT 1712	83	41.
1 OCT 0948	9	6.	1 OCT 1218	34	2187.	1 OCT 1448	59	1728.	1 OCT 1718	84	31.
1 OCT 0954	10	8.	1 OCT 1224	35	3305.	1 OCT 1454	60	1558.	1 OCT 1724	85	23.
1 OCT 1000	11	11.	1 OCT 1230	36	4666.	1 OCT 1500	61	1414.	1 OCT 1730	86	17.

1 OCT 1006	12	14.	*	1 OCT 1236	37	6215.	*	1 OCT 1506	62	1290.	*	1 OCT 1736	87	13.
1 OCT 1012	13	17.	*	1 OCT 1242	38	7884.	*	1 OCT 1512	63	1182.	*	1 OCT 1742	88	10.
1 OCT 1018	14	20.	*	1 OCT 1248	39	9567.	*	1 OCT 1518	64	1086.	*	1 OCT 1748	89	7.
1 OCT 1024	15	23.	*	1 OCT 1254	40	11133.	*	1 OCT 1524	65	1001.	*	1 OCT 1754	90	5.
1 OCT 1030	16	26.	*	1 OCT 1300	41	12407.	*	1 OCT 1530	66	924.	*	1 OCT 1800	91	4.
1 OCT 1036	17	30.	*	1 OCT 1306	42	13229.	*	1 OCT 1536	67	856.	*	1 OCT 1806	92	3.
1 OCT 1042	18	33.	*	1 OCT 1312	43	13484.	*	1 OCT 1542	68	793.	*	1 OCT 1812	93	2.
1 OCT 1048	19	36.	*	1 OCT 1318	44	13151.	*	1 OCT 1548	69	734.	*	1 OCT 1818	94	1.
1 OCT 1054	20	39.	*	1 OCT 1324	45	12302.	*	1 OCT 1554	70	676.	*	1 OCT 1824	95	1.
1 OCT 1100	21	42.	*	1 OCT 1330	46	11088.	*	1 OCT 1600	71	617.	*	1 OCT 1830	96	1.
1 OCT 1106	22	44.	*	1 OCT 1336	47	9700.	*	1 OCT 1606	72	553.	*	1 OCT 1836	97	0.
1 OCT 1112	23	47.	*	1 OCT 1342	48	8317.	*	1 OCT 1612	73	486.	*	1 OCT 1842	98	0.
1 OCT 1118	24	50.	*	1 OCT 1348	49	7059.	*	1 OCT 1618	74	416.	*	1 OCT 1848	99	0.
1 OCT 1124	25	54.	*	1 OCT 1354	50	5977.	*	1 OCT 1624	75	346.	*	1 OCT 1854	100	0.
			*				*				*			

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.90-HR
13484.	4.20	(CFS)	3284.	1996.	1996.	1996.
		(INCHES)	1.912	1.917	1.917	1.917
		(AC-FT)	1628.	1633.	1633.	1633.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	830.	3.30	124.	75.	75.	.60		
ROUTED TO	XROX2	808.	3.50	124.	75.	75.	.60		
HYDROGRAPH AT	X2SUB	387.	3.60	77.	46.	46.	.43		
2 COMBINED AT	XCO-1	1153.	3.50	196.	119.	119.	1.03		
ROUTED TO	XROX3	1088.	3.70	196.	119.	119.	1.03		
HYDROGRAPH AT	X3SUB	493.	3.60	88.	53.	53.	.56		
2 COMBINED AT	XCO-2	1528.	3.70	276.	168.	168.	1.59		
HYDROGRAPH AT	X4SUB	353.	3.40	49.	29.	29.	.28		
2 COMBINED AT	XCO-3	1716.	3.70	319.	194.	194.	1.87		
HYDROGRAPH AT	X5SUB	454.	3.40	60.	36.	36.	.38		
2 COMBINED AT	XCO-4	1999.	3.60	373.	226.	226.	2.25		
HYDROGRAPH AT	SUBC1	2211.	3.20	346.	209.	209.	1.26		
ROUTED TO	RO-1	1930.	3.80	346.	209.	209.	1.26		
HYDROGRAPH AT	SUBC2	2137.	3.60	497.	302.	302.	2.15		
HYDROGRAPH AT	SUBC3	1738.	3.40	311.	189.	189.	1.25		
HYDROGRAPH AT	SUBC4	3597.	3.40	685.	415.	415.	2.55		
ROUTED TO	RO-2	3438.	3.60	685.	415.	415.	2.55		
HYDROGRAPH AT	SUBC5	4311.	3.40	884.	536.	536.	3.38		
2 COMBINED AT	CO-1	7274.	3.60	1536.	931.	931.	5.93		
ROUTED TO	RO-3	7147.	3.80	1536.	931.	931.	5.93		
4 COMBINED AT	CO-2	11638.	3.80	2577.	1562.	1562.	10.59		
ROUTED TO	RO-4	11412.	4.00	2577.	1562.	1562.	10.59		
HYDROGRAPH AT	SUBC7	1403.	3.40	248.	151.	151.	1.18		
ROUTED TO	RO-5	1253.	4.20	248.	151.	151.	1.18		
HYDROGRAPH AT	SUBC8	1458.	3.50	280.	170.	170.	1.42		
2 COMBINED AT	CO-3	1863.	4.10	515.	313.	313.	2.60		
3 COMBINED AT	CO-4	13709.	4.00	3220.	1956.	1956.	15.44		
ROUTED TO	RO-6	13441.	4.20	3220.	1956.	1956.	15.44		
HYDROGRAPH AT	SUBC9	677.	3.40	99.	60.	60.	.53		
2 COMBINED AT	CO-5	13484.	4.20	3284.	1996.	1996.	15.97		

*' MAL END OF HEC-1 ***

APPENDIX E

CLINE CREEK

CALCULATIONS:

PRECIPITATION DATA

E

Baker Engineers

S.O. No. 16923

Subject: FCD- FLOODPLAIN DELINEATION
CLINE CREEK HYDROLOGY — Sheet No. 1 of 1
BASIN X Imput Data Summary — Drawing No.

Computed by SBO — Checked By RBJ 11/29/89 — Date 11/14/89

PRECIP. 100 YR. (IN.)	2 HR.	6 HR.	24 HR.
	2.79	3.50	4.80

SUB-BASIN	AREA (MI.²)	LOSS RATES UNIFORM (IN./HR.)	LOSS RATES INITIAL (IN.)	% IMPERVIOUS	LAG TIME (HR.)
X 1	0.60	0.21	0.88	15.95	0.44
X 2	0.43	0.29	0.90	5.78	0.59
X 3	0.56	0.35	0.93	0.76	0.69
X 4	0.28	0.28	0.89	—	0.48
X 5	0.38	0.35	0.93	—	0.66

SECONDARY SUB-BASIN	AREA (MI²)	LOSS RATES UNIFORM (IN/HR)	LOSS RATES INITIAL (IN.)	% IMPERVIOUS	LAG TIME (HR.)
X 1-A	0.43	0.20	0.88	20.51	0.41
X 2-A	0.28	0.29	0.91	9.10	0.50
X 3-A	0.43	0.36	0.94	0.97	0.58
X4-A	0.16	0.30	0.90	—	0.40
X4-B	0.09	0.23	0.86	—	0.45
X5-A	0.23	0.35	0.93	—	0.52

REACH DESIGNATION	TRAVEL TIME K (HRS)	VALUE K 0.167	VALUE K 0.0114	RANGE OF n	"RM" INPUT FOR HEC-1 n	K	X
RX-2	0.15	0.90	2.10	$1 \le n \le 2$	2	0.15	0.30
RX-3	0.23	1.39	3.22	$1 \le n \le 3$	2	0.23	0.30

Baker Engineers

S.O. No.

Subject: FCD Floodplain Delineation
Cline Creek Hydrology
Input Data Summary

Sheet No. ____ of ____
Drawing No.
Computed by BRJ 11/04/69 Checked By 11/19/69 Date

Precipitation 100-year (inches	2 hr	6 hr	24 hr
	2.79	3.50	4.80

Sub-basin Data	Area (Mi^2)	Loss Rates Uniform (in./hr.)	Loss Rates Initial (inches)	Percent Impervious	Lag Time (hours)
C-1	1.26	0.01	0.55	0	0.36
C-2	2.15	0.09	0.63	0	0.76
C-3	1.25	0.06	0.61	0	0.50
C-4	2.55	0.01	0.55	0	0.50
C-5	3.38	0.02	0.56	0	0.57
C-6*	2.25	0.29	0.90	5.5	0.73
C-7	1.18	0.18	0.87	17.7	0.54
C-8	1.42	0.18	0.85	8.8	0.64
C-9	0.53	0.24	0.83	3.9	0.48

Routing Reach	no. Sub reaches	Reach Travel Time (hrs.)	Muskingum X
R-1	6	0.58	0.3
R-2	3	0.27	0.3
R-3	3	0.24	0.3
R-4	3	0.25	0.3
R-5	8	0.77	0.3
R-6	2	0.21	0.3

* BASIN X TOTALS

Baker Engineers

S.O. No. E 2

Subject: FCD Flood Delin. Study
Precipitation - 2 Hour Storm
Point Precip. Values

Sheet No. ___ of ___

Drawing No. ___

Computed by BRJ 10-12-89 Checked By DRD Date 18 Oct 89

Rodger Creek - Cline Creek

NOAA Atlas 100-year Precipitation

* P-24 hr = 4.8"

** P-6hr = 3.5"

$$P\text{-}1hr = 0.494 + 0.755 \frac{(P\text{-}6hr)^2}{P\text{-}24hr}$$

$$= 2.42''$$

$$P\text{-}2\,hr = 0.341 * P\text{-}6hr + 0.659 * P\text{-}1hr$$

$$= \underline{\underline{2.79''}}$$

Morgan City Wash

* P-24hr = 4.5"

** P-6hr = 3.4"

$$P\text{-}1hr = 0.494 + 0.755 \frac{(3.4'')^2}{4.5''}$$

$$= 2.43''$$

$$P\text{-}2hr = 0.341 * 3.4'' + 0.659 * 2.43''$$

$$= 2.76''$$

*NOAA Atlas 2 Vol. VIII fig. 29

** " " " " " fig. 23

Table 11. *Equations for estimating 1-hr values in Arizona with statistical parameters for each equation*

Equation	Corr. coeff.	No. of stations	Mean of computed stn. values (inches)	Standard error of estimate (inches)
$Y_2 = -0.011 + 0.942[(X_1)(X_1/X_2)]$	0.95	86	0.72	0.085
$Y_{100} = 0.494 + 0.755[(X_3)(X_3/X_4)]$	.90	85	1.96	.290

List of variables

Y_2 = 2-yr 1-hr estimated value
Y_{100} = 100-yr 1-hr estimated value
X_1 = 2-yr 6-hr value from precipitation-frequency maps
X_2 = 2-yr 24-hr value from precipitation-frequency maps
X_3 = 100-yr 6-hr value from precipitation-frequency maps
X_4 = 100-yr 24-hr value from precipitation-frequency maps

Procedures for estimating 1-hr (60-min) precipitation-frequency values. Multiple-regression screening techniques were used to develop equations for estimating 1-hr values. Factors considered in the screening process were restricted to those that could be determined easily from the maps of this Atlas or from generally available topographic maps.

The 11 western states were separated into several geographic regions. The regions were chosen on the basis of meteorological and climatological homogeneity and are generally combinations of river basins separated by prominent divides. Arizona is located wholly within a region that extends from the crest of the Continental Divide, the Sangre de Cristo Range, and the Sacramento Mountains in Colorado and New Mexico westward to southwestern California, the Virgin River Basin in Nevada, and the Wasatch divide in Utah. Equations to provide estimates for the 1-hr duration for 2- and 100-yr return periods are shown in table 11. Also listed are the statistical parameters associated with each equation. In these equations, the variable $[(X_1)(X_1/X_2)]$ or $[(X_3)(X_3/X_4)]$ can be regarded as the 6-hr value times the slope of the line connecting the 6- and 24-hr values for the appropriate return period.

Estimates of 1-hr precipitation-frequency values for return periods between 2 and 100 yrs. The 1-hr values for the 2- and 100-yr return periods can be plotted on the nomogram of figure 6 to obtain values for return periods greater than 2 yrs or less than 100 yrs. Draw a straight line connecting the 2- and 100-yr values and read the desired return-period value from the nomogram.

Estimates for 2- and 3-hr (120- and 180-min) precipitation-frequency values. To obtain estimates of precipitation-frequency values for 2 or 3 hrs, plot the 1- and 6-hr values from the Atlas on the appropriate nomogram of figure 15. Draw a straight line connecting the 1- and 6-hr values, and read the 2- and 3-hr values from the nomogram. This nomogram is independent of return period. It was developed using data from the same regions used to develop the 1-hr equations.

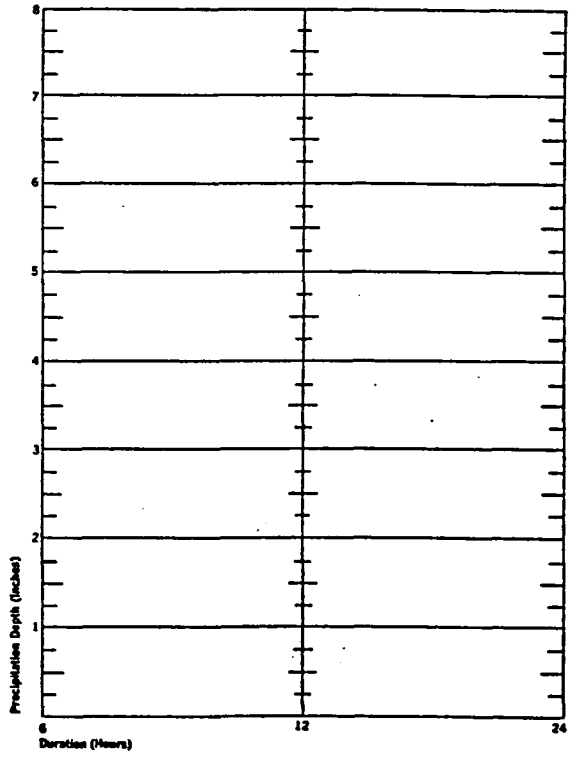


Figure 16. *Precipitation depth-duration diagram (6- to 24-hr).*

E-4

Table 12. *Adjustment fro*

Duration (min)	
Ratio to 1-hr	C

(Adopted from *U.S. W* 1961.)

The mathematical solution from the data used to develop figure 15 gives the following equations for estimating the 2- and 3-hr values in Arizona;

$$2\text{-hr} = 0.341\ (6\text{-hr}) + 0.659\ (1\text{-hr}) \quad (3)$$

$$3\text{-hr} = 0.569\ (6\text{-hr}) + 0.431\ (1\text{-hr}) \quad (4)$$

Estimates for 12-hr (720-min) precipitation-frequency values. To obtain estimates for the 12-hr duration, plot values from the 6- and 24-hr maps in figure 16. Read the 12-hr estimates at the intersection of the line connecting these points with the 12-hr duration line of the nomogram.

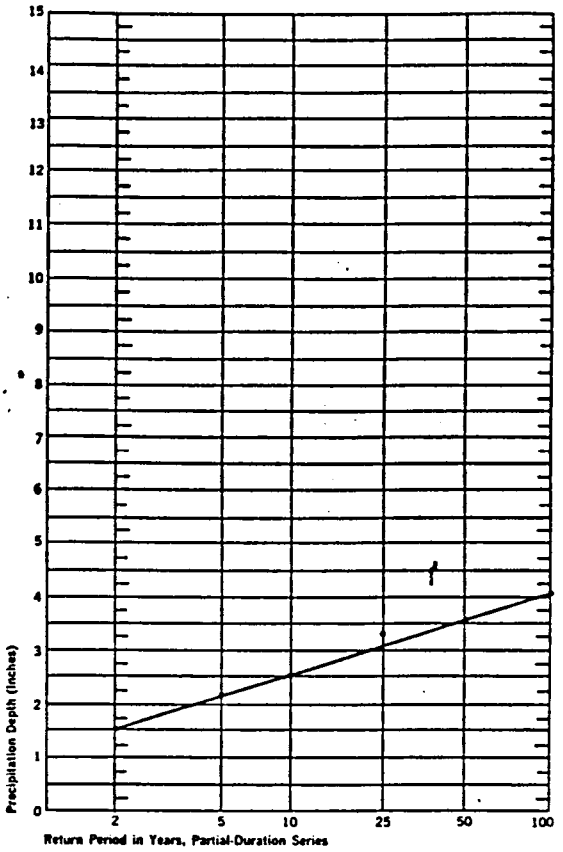
Estimates for less than 1 hr. To obtain estimates for durations of less than 1 hr, apply the values in table 12 to the 1-hr value for the return period of interest.

Illustration of Use of Precipitation-Frequency Maps, Diagrams, and Equations

To illustrate the use of these maps, values were read from figures 18 to 29 for the point at 34°00′ N. and 113°00′ W. These values are shown in boldface type in table 13. The values read from the maps should be plotted on the return-period diagram of figure 6 because (1) not all points are as easy to locate on a series of maps as are latitude-longitude intersections, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. This has been done for the 24-hr values in table 13 (fig. 17a) and a line of best fit has been drawn subjectively. On this nomogram, the 25-yr return-period value appears somewhat off the line, so the value read from the maps is corrected (as shown by the strikeout in table 13); such corrected values are adopted in preference to the original readings.

The 2- and 100-yr 1-hr values for the point were computed from the equations in table 11. The 2-yr 1-hr value is estimated at 1.08 in. (2-yr 6- and 24-hr values from table 13); the estimated 100-yr 1-hr value is 2.52 in. (100-yr 6- and 24-hr values from table 13). By plotting these 1-hr values on figure 6 and connecting them with a straight line, one can obtain estimates for return periods of 5, 10, 25, and 50 yrs.

The 2- and 3-hr values can be estimated by using the nomogram of figure 15 or equations (3) and (4). The 1- and 6-hr values for the desired return period are obtained as above. Plot these points on the nomogram of figure 15 and connect them with a straight line. Read the estimates for 2 and 3 hrs at the intersections of the connecting line and the 2- and 3-hr vertical lines. An example is shown in figure 17b for the 2-yr return period. The 2-yr 2-hr (1.17 in.) and 2-yr 3-hr (1.23 in.) values are in italics in table 13.



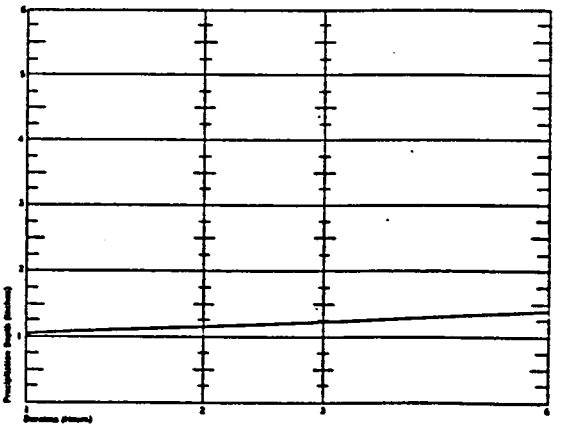


Figure 17. *Illustration of use of precipitation-frequency diagrams using values from precipitation-frequency maps and relations.*

Baker Engineers

S.O. No.

Subject: Project # 16923

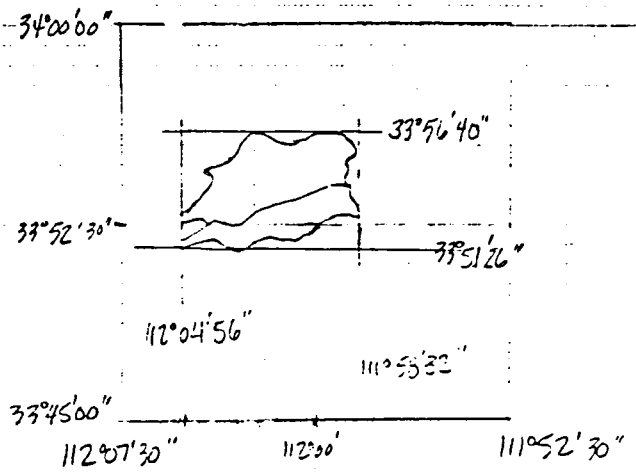
Sheet No. ____ of ____

Drawing No.

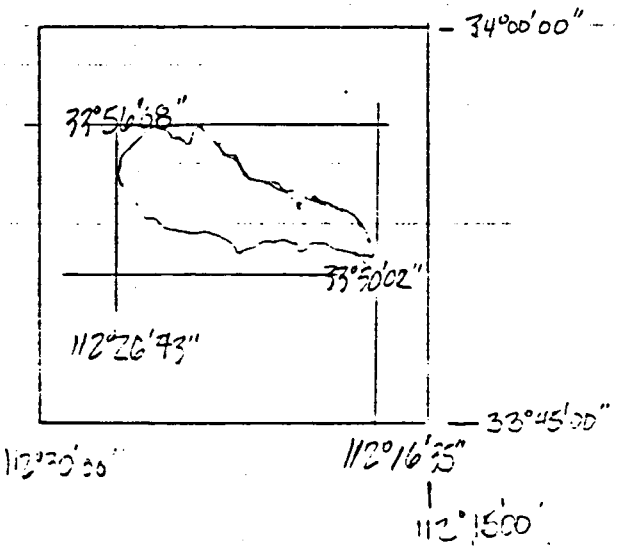
Computed by SAR Checked By 10-12-89 Date 6/16/89

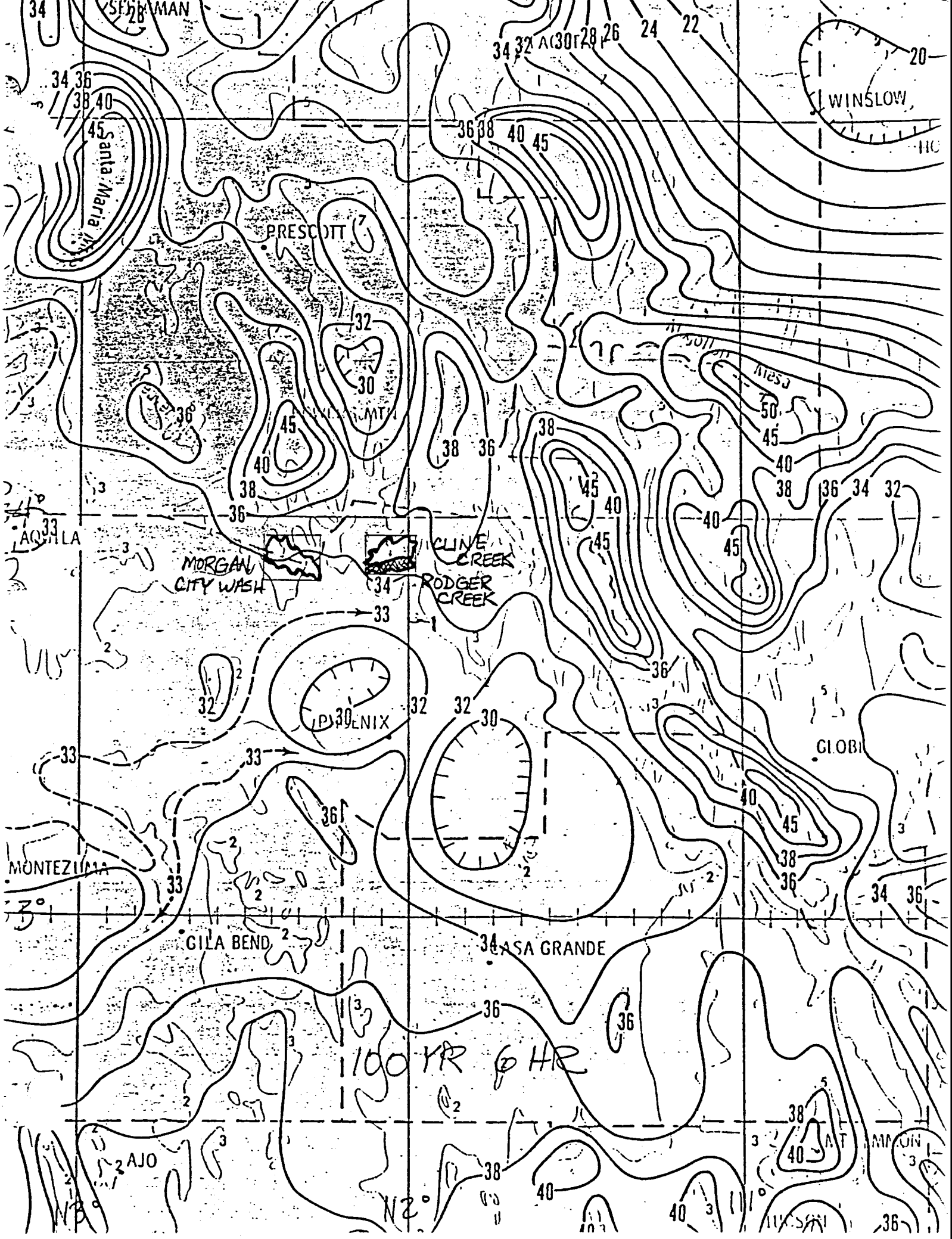
Cline Creek / Rodger Creek

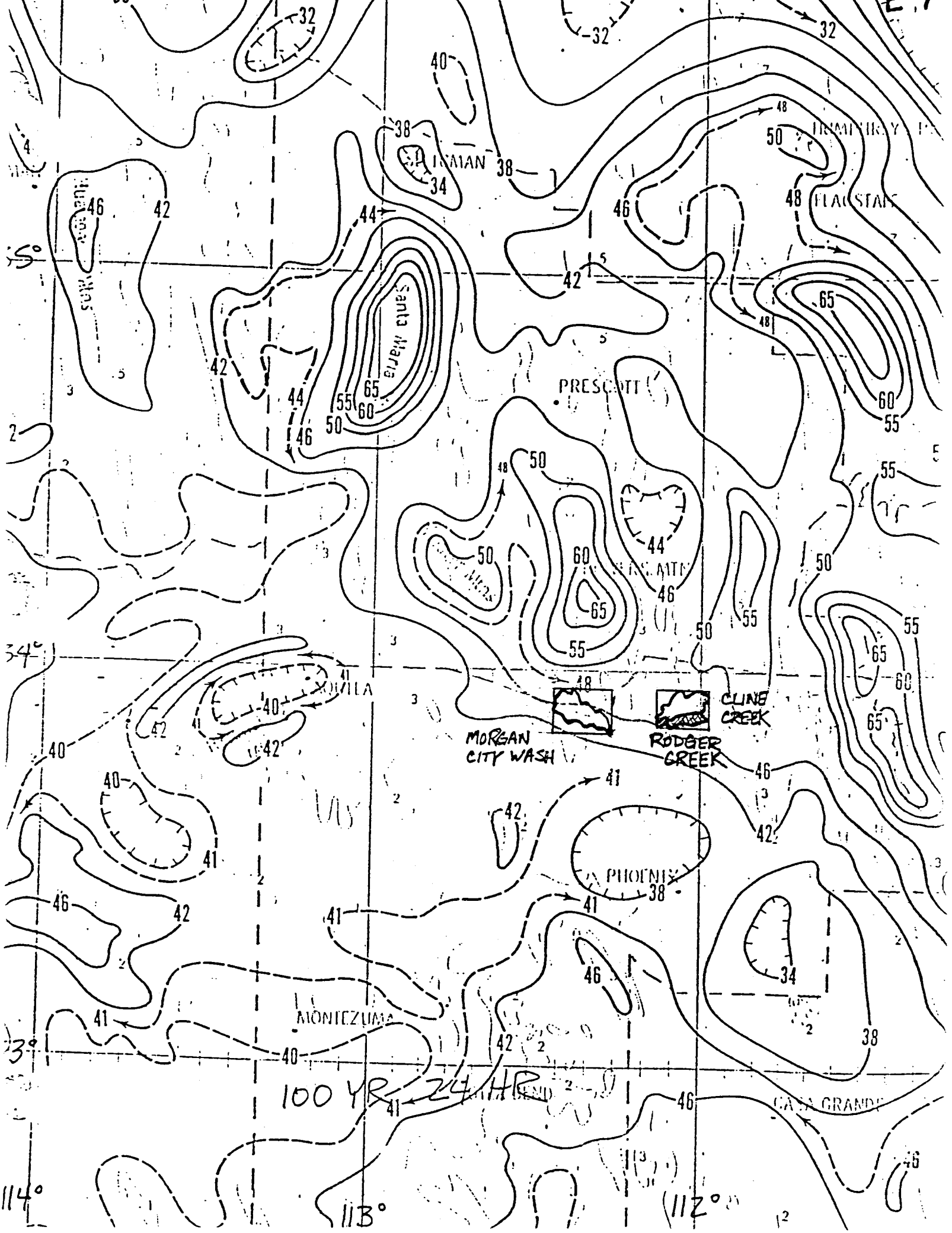
Exact Locations



Morgan City Wash




WINSLOW
PRESCOTT
Santa Maria
Mesa
MORGAN CITY WASH
CLINE CREEK
RODGER CREEK
PHOENIX
GLOBE
MONTEZUMA
GILA BEND
CASA GRANDE
AJO
100 YR 6 HR


PRESCOTT
PHOENIX
MONTEZUMA
CASA GRANDE
Sierra Ancha
MORGAN CITY WASH
RODGER CREEK
CLINE CREEK
100 YR 24 HR
35°
34°
33°
114°
113°
112°

Baker Engineers

S.O. No. 16723-HPH-04

Subject: Cline Creek & Morgan City Wash
Precipitation Areal Reduction
FCDMC · FDS Hydrology

Sheet No. ____ of ____
Drawing No. ____
Computed by BRD 10/24/89 Checked By SSO 10/26/89 Date ____

Precipitation Areal Reductions

After NOAA Technical Memorandum NWS HYDRO-40
Figure 15. Areal Reductions for Central Arizona

Reduction Factor

Watershed Area (Mi^2)	2 Hour	6 Hour	24 Hour
0	1.00 ①	1.00 ②	1.00 ③
10	0.79	0.85	0.95
20	0.73	0.79	0.92
30	0.69	0.75	0.90
40	0.66	0.72	0.89
50	0.64	0.70	0.88
70	0.62	0.68	0.86
100	0.58	0.65	0.85
200	0.53	0.60	0.82 ④
400	0.49	0.56	0.79

① Values for 3 hour storm read from Fig. 15 graph
② Values for 6 hour storm read from Fig. 15 graph
③ Values from FCD Memo in Data package
④ Values for 24 hour storm read from Fig 15 graph

E 9

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: Areal Reduction	☒ FILE ☐ DESTROY

TO: DJP FROM: VAR JAR DATE: 4/11/89

A question had come up regarding which areal reduction curve should be used. NOAA in their Technical Memorandum NWS HYDRO-40 entitled "Depth-Area Ratios in the Semi-Arid Southwest United States" has utilized the data from the Walnut Gulch Experimental watershed to develop the curves to be used for the Southwest region of the United States. The memo does not provide a regression equation for the curves, but only a graph. Because of the shape and the scale for the curves, it is difficult to achieve accurate values for the smaller watersheds. Therefore, Tom Hieb and I conducted independent determinations of the values for less than 100 square miles for a uniform set of ratios for a storm with a duration of 24 hours.

The ratios should be used for any watershed greater than 10 square miles. The following are the values to be used for a storm with a duration of 24 hours.

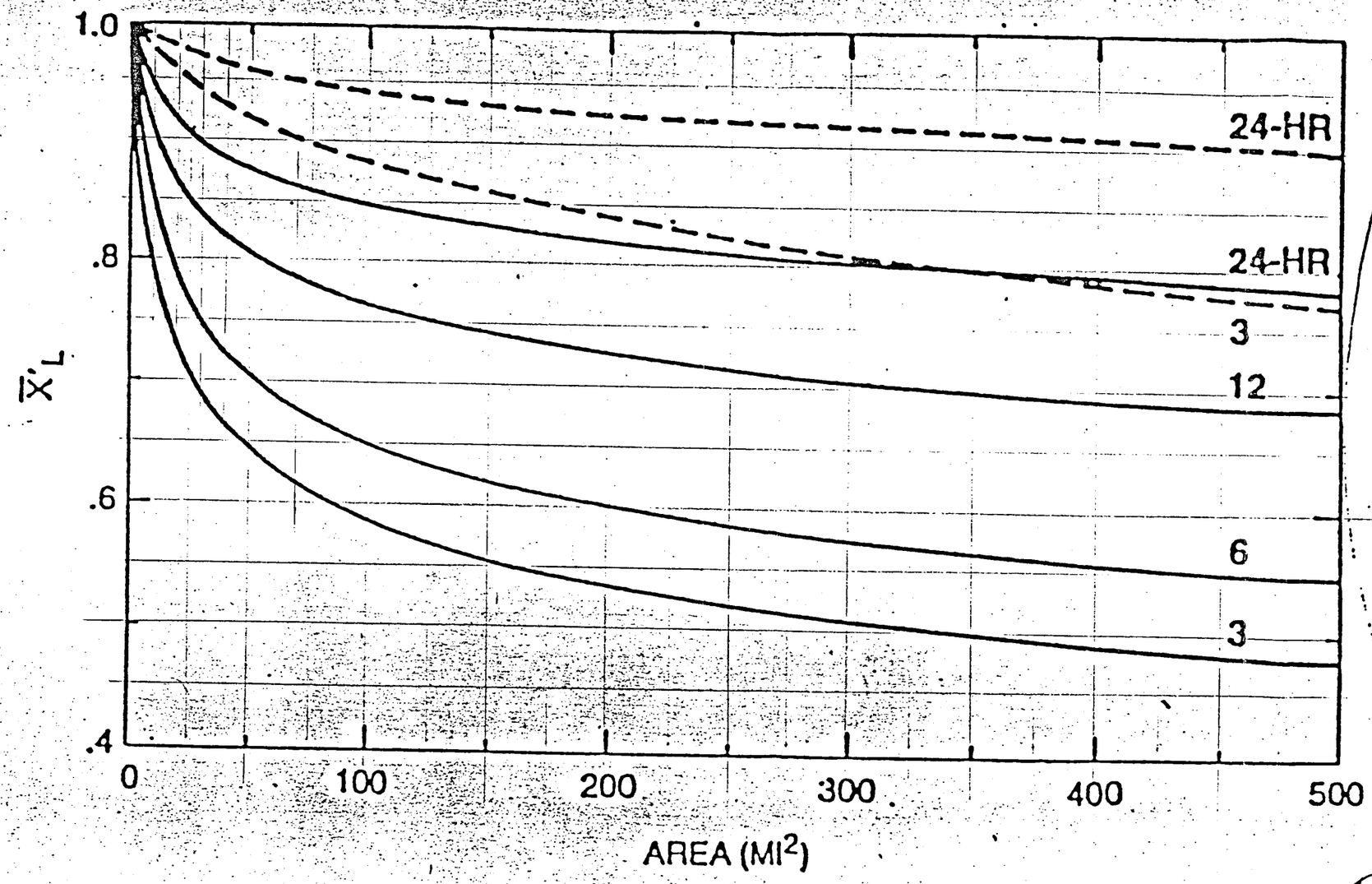
Square Mile	Ratio
10	.95
20	.92
30	.90
40	.89
50	.88
60	.87
70	.86
80	.86
90	.85
100	.85

I have not looked at values for other durations, ~~if~~ if there is a need to have these values, then we should determine a set of uniform ratios for that specific duration that can be used.

6900-003
11/78

AREA (MI^2)

Figure 14.--$\bar{X}'_L$ (2.54-yr depth-area ratio, see sec. 4.3) for 3-, 6-, 12-, and 24-hr in southeast Arizona. Dashed lines are 3-hr and 24-hr Chicago $\bar{X}'_L$ (from TR 24)



Recommended for use in Central A Z

Figure 15.--Same as figure 14, but for central Arizona.

PRECIPITATION Areal Reductions for Central AZ By Duration.

Baker Engineers

S.O. No. 16923-HPH

Subject: Cline Creek Precipitation Input, HEC-1 "JD" Routine for Areal Reduction

Sheet No. ____ of ____

FCDMC FDS

Drawing No. ____

Computed by BKJ 10/26/89 Checked By SKO/10/26/89 Date ____

Data Pairs for JD Option

100-YEAR 2 HOUR STORM - Total Point Precip. = 2.79"

Reduction Factor for Point Precip. to Area	DATA ID	PRECIP. (in.)	AREA (MI²)
1.00	JD	2.79	0.01
0.79	JD	2.20	10.
0.73	JD	2.04	20.
0.69	JD	1.93	30.
0.66	JD	1.84	40.

100-YEAR 6 HOUR STORM - Total Point. Precip. = 3.50"

Reduction Factor	DATA ID	PRECIP (IN.)	AREA (MI²)
1.00	JD	3.50	0.01
0.85	JD	2.98	10.
0.79	JD	2.77	20.
0.75	JD	2.63	30.
0.72	JD	2.52	40.

100-YEAR 24 HOUR STORM - Total Point Precip = 4.80"

Reduction Factor	DATA ID	PRECIP (IN.)	AREA (MI²)
1.00	JD	4.80	0.01
0.95	JD	4.56	10.
0.92	JD	4.42	20.
0.90	JD	4.32	30
0.89	JD	4.27	40

APPENDIX F

CLINE CREEK

CALCULATIONS:

LOSS RATES AND

PERCENT IMPERVIOUS

Baker Engineers

S.O. No. [illegible] F1

Subject: [illegible]

Sheet No. 1 of

Drawing No.

Computed by [illegible] Checked By [illegible] 11/06/89 Date [illegible] 04 89

* ALL AREAS ARE IN ACRES

BASIN X1 = ~~385~~ 387

X1-A	X1-B	X-1
264.73	112.44	379.67
266.51	114.22	380.03
267.59	112.09	
266.52	113.87	
266.50	113.15	
~~267~~	~~115~~	~~385~~ 387
272	115	

BASIN X2 = ~~276~~ 277

X2-A	X2-B	X-2
175.07	96.07	271.36
174.71	96.43	273.99
172.35	97.10	269.35
174.00	96.79	
[illegible]	96.79	
~~175~~	~~97~~	~~276~~
178	99	

BASIN X3 = ~~347~~ 355

X3-A	X3-B	X3
272.21	75.44	350.14
273.28	76.86	35[illegible]
274.00	76.14	347.22
272.92	77.22	343.26
274.85	78.35	
~~275~~	~~76~~	~~347~~
278	77	

Baker Engineers

S.O. No. [illegible] F-2

Subject: [illegible]

Sheet No. [illegible] of [illegible]

Drawing No. [illegible]

Computed by [illegible] Checked By [illegible] 11/06/99 Date [illegible]

* ALL AREAS ARE IN ACRES

BASIN X4 = ~~175~~ 181

X4-A	X4-B	X4-C	X4
100.70	57.[illegible]	20.[illegible]	178.26
102.83	54.80	[illegible]	[illegible]
[illegible]	54.[illegible]	[illegible]	177.43
[illegible]	56.58	20.[illegible]	
[illegible]	56.[illegible]	20.[illegible]	
~~[illegible]~~	~~[illegible]~~	21	178
103	57		

BASIN X5 = ~~[illegible]~~ 241

X5-A	X5-B	X5
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	235.[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	237.[illegible]
[illegible]	[illegible]	
~~[illegible]~~	~~[illegible]~~	[illegible]
95	146	

	CALC.		ADJ.	
X1 =	380 +7	[illegible]	387	0.60 m²
X2 =	[illegible] +5	1417.56	277	0.43
X3 =	349 +6		355	0.56
X4 =	178 +3		181	0.28
X5 =	[illegible] +4		241	0.38
	[illegible] ✓	[illegible] ✓	1441 ✓	2.25

2000 SCALE = 1441 ✓

1000 SCALE = 1416

(-25)

Baker Engineers

S.O. No.

Subject: CLINE CREEK BASIN - X (SUB BASIN C-6)
UNIFORM & INITIAL LOSS RATES
By SCS Soil Class.

Sheet No. 3 of

Drawing No.

Computed by SCO Checked By 11/06/89 Date 11/06/89

BASIN X1-A AREA = 272 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA (ACRES)	ADJ.
26	.09	.53	38 + 1 = 39	40
66	.40	.70	45	46
72	.18	.64	183	186

$$CNSTL = \frac{(.09)(40)+(.40)(46)+(.18)(186)}{272} = 0.20 \checkmark$$

$$STRTL = \frac{(.53)(40)+(.70)(46)+(.64)(186)}{272} = 0.63 \checkmark$$

STRTL = 0.63 + .25 = 0.88 ✓

BASIN X1-B AREA = 115 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA (ACRES)	ADJ.
26	.09	.53	41	
66	.40	.70	28	
72	.18	.64	16	
93	.40	.70	20	
95	.35	.69	10	

$$CNSTL = \frac{(.09)(41)+(.40)(28)+(.18)(16)+(.40)(20)+(.35)(10)}{115} = 0.25 \checkmark$$

$$STRTL = \frac{(.53)(41)+(.70)(28)+(.64)(16)+(.70)(20)+(.69)(10)}{115} = 0.63 \checkmark$$

STRTL = .63 + .25 = 0.88 ✓

BASIN X1 AREA = 387 ACRES

$$CNSTL \quad \frac{(.2)(272)+(.25)(115)}{387} = 0.21 \checkmark$$

$$STRTL \quad \frac{(.63)(115)+(.63)(272)}{387} = 0.63 \checkmark + .25 = 0.88 \checkmark$$

F-4

Baker Engineers

S.O. No.

Subject:

Sheet No. 4 of

Drawing No.

Computed by SSO Checked By BJG 11/06/89 Date 11/06/89

BASIN X2-A AREA = 178 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES	ADJ.
26	.09	.53	22	22
66	.40	.70	100	102
72	.18	.64	54	54

CNSTL $\frac{(.09)(22)+(.40)(102)+(.18)(54)}{178} = 0.29$ ✓

STRTL $\frac{(.53)(22)+(.7)(102)+(.64)(54)}{178} = 0.66$ ✓

STRTL 0.66 + 0.25 = 0.91 ✓

BASIN X2-B AREA = 99 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES	ADJ.
26	.09	.53	31	31
66	.40	.70	32	33
95	.35	.69	34	35

CNSTL $\frac{(.09)(31)+(.40)(33)+(.35)(35)}{99} = 0.29$ ✓

STRTL $\frac{(.53)(31)+(.70)(33)+(.69)(35)}{99} = 0.64$ ✓

STRTL 0.64 + 0.25 = 0.89 ✓

BASIN X2 AREA = 277 ACRES

CNSTL $\frac{(.29)(178)+(.29)(99)}{277} = 0.29$ ✓

STRTL $\frac{(.66)(178)+(.64)(99)}{277} = 0.65 + 0.25 = 0.90$ ✓

F-3

Baker Engineers

S.O. No. _____

Subject: _____

Sheet No. 5 of _____

Drawing No. _____

Computed by SSO Checked By PAJ 11/06/89 Date 11/06/89

BASIN X3-A AREA = 278 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES	ADJ.
26	.09	.53	11	12
64	.40	.70	119	121
72	.18	.64	9	9
93	.40	.70	9	10
95	.35	.69	41+38+46 = 125	127

CNSTL $\frac{(.09)(11)+(.4)(121)+(.18)(9)+(.4)(10)+(.35)(127)}{278} = 0.36$ ✓

STRTL $\frac{(.53)(11)+(.7)(121)+(.64)(9)+(.7)(10)+(.69)(127)}{278} = 0.69$ ✓

STRTL 0.69+0.25 = 0.94 ✓

BASIN X3-B AREA = 77 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES	ADJ.
9	.40	.70	9	
26	.09	.53	14	
23	.15	.56	11	
64	.40	.70	27	
95	.35	.69	16	

CNSTL $\frac{(.4)(9)+(.09)(14)+(.15)(11)+(.4)(27)+(.35)(16)}{77} = \cancel{0.46}$ 0.30 BTO. ✓SSO

STRTL $\frac{(.7)(9)+(.53)(14)+(.56)(11)+(.7)(27)+(.69)(16)}{77} = 0.65$ ✓

STRTL 0.65 + 0.25 = 0.90 ✓

BASIN X3 AREA = 355 ACRES

CNSTL $\frac{(.36)(278)+(.3)(77)}{355} = 0.35$ ✓

STRTL $\frac{(.69)(278)+(.65)(77)}{355} = 0.68 + .25 = 0.93$ ✓

Baker Engineers

S.O. No.

Subject:

Sheet No. 6 of

Drawing No.

Computed by SSO Checked By PDG 11/06/89 Date 11 06 89

BASIN X4-A AREA = 103 ACRES

SCS UNIT	UNIF. CNSTL	INTL. STRTL	AREA AC.
28	.15	.56	36
66	.40	.70	43
95	.35	.69	24

CNSTL $\frac{(.15)(36)+(.4)(43)+(.35)(24)}{103} = 0.30$

STRTL $\frac{(.56)(36)+(.7)(43)+(.69)(24)}{103} = 0.65 + 0.25 = 0.90$

BASIN X4-B AREA = 57 ACRES

SCS UNIT	UNIF. CNSTL	INTL. STRTL	AREA AC
28	.15	.56	36
66	.40	.70	5
95	.35	.69	16

CNSTL $\frac{(.15)(36)+(.4)(5)+(.35)(16)}{57} = 0.23$

STRTL $\frac{(.56)(36)+(.7)(5)+(.69)(16)}{57} = 0.61 + 0.25 = 0.86$

BASIN X4-C AREA = 21 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES
28	.15	.56	4
95	.35	.69	17

CNSTL $\frac{(.15)(4)+(.35)(17)}{21} = 0.31$

STRTL $\frac{(.56)(4)+(.69)(17)}{21} = 0.67 + 0.25 = 0.92$

BASIN X-4 AREA = 181 ACRES

CNSTL $\frac{(.3)(103)+(.23)(57)+(.31)(21)}{181} = 0.28$

STRTL $\frac{(.65)(103)+(.61)(57)+(.67)(21)}{181} = 0.64 + 0.25 = 0.89$

F-1

Baker Engineers

S.O. No. _____

Subject: _____

Sheet No. 7 of _____

Drawing No. _____

Computed by [illegible] Checked By [illegible] 11/06/89 Date 11/06/89

BASIN X5-B ✓ [illegible] (X5-B) AREA = 95 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES
6	.40	.70	52
28	.15	.56	10
95	.35	.69	33

CNSTL $\frac{(.4)(52)+(.15)(10)+(.35)(33)}{95} = 0.36$ ✓

STRTL $\frac{(.7)(52)+(.56)(10)+(.69)(33)}{95} = 0.68 + 0.25 = 0.93$ ✓

BASIN X-5A ✓ [illegible] (X5-B) AREA = 146 ACRES

SCS UNIT	UNIFORM CNSTL	INITIAL STRTL	AREA ACRES
5	.40	.70	28
26	.09	.53	12
28	.15	.56	3
66	.40	.70	44
95	.35	.69	59

CNSTL $\frac{(.4)(28)+(.09)(12)+(.15)(3)+(.4)(44)+(.35)(59)}{146} = 0.35$ ✓

STRTL $\frac{(.7)(28)+(.53)(12)+(.56)(3)+(.7)(44)+(.69)(59)}{146} = 0.68 + 0.25 = 0.93$ ✓

BASIN X5 AREA = 241 ACRES

CNSTL $\frac{(.36)(95)+(.35)(146)}{241} = 0.35$ ✓

STRTL $\frac{(.68)(95)+(.68)(146)}{241} = 0.68 + 0.25 = 0.93$ ✓

F-8

Baker Engineers

S.O. No. 16923-10

Subject: Percent Impervious in each Basin

Sheet No. 5 of

Drawing No.

Computed by SBD Checked By 11/08/89 Date 11/06/89

BASIN X1-A AREA = 272 ACRES

SCS # 72, 30% Imp. AREA = 186 ACRES

$RTIMP = \frac{(.3)(186)}{272} = 20.51\%$ ✓

BASIN X1-B AREA = 115 ACRES

SCS # 72, 30% Imp. AREA = 16 ACRES

$RTIMP = \frac{(.3)(16)}{115} = 4.17\%$ ✓

BASIN X1 AREA = 387 ACRES

$RTIMP = \frac{(.21)(272)+(.04)(115)}{387} = 15.95\%$ ✓

BASIN X2-A AREA = 175 ACRES

SCS # 72, 30% IMP. AREA = 54 ACRES

$RTIMP = \frac{(.3)(54)}{175} = 9.10\%$ ✓

BASIN X2-B AREA = 92 ACRES

SCS # 72, 30% Imp AREA = NONE ✓

BASIN X2 AREA 277 ACRES

$RTIMP = \frac{(.09)(178)}{277} = 5.78\%$ ✓

BASIN X3-A AREA = 278 ACRES

SCS # 72, 30% IMP. AREA = 9 ACRES

$RTIMP = \frac{(.3)(9)}{278} = 0.97\%$ ✓

BASIN X3-B AREA = 77 ACRES

SCS # 72, 30% Imp AREA = NONE ✓

BASIN X3 AREA = 355 ACRES

$RTIMP = \frac{(.0097)(278)}{355} = 0.76\%$ ✓

BASIN X4 & X5 NONE ✓

F-9

Baker Engineers

S.O. No. 16923-04

Subject: Flood Plain Delineation
Cline Creek.

Sheet No. 2 of 13

Drawing No.

Computed by SAR Checked By [illegible] Date 07/13/89

((CORRECTED AREAS 11/03/89 SKO)) CKD [illegible] 11/4/8

Cline Creek - Determination of Sub Basin Areas.

Sub C-1

810
806
807
~~801~~
808

$\boxed{808 \text{ Ac}}$ 1.26 mi²

Sub C-2

1382
1381
1372
1371
1382
1388
1376
1375

$\boxed{1378 \text{ Ac}}$ 2.15

Sub C-3

458
450
454
454

$\boxed{\cancel{454} \text{ Ac}}$ ~~.71~~

((798 Ac))
1.25

Sub C-4

1633
1623
1633
1627
1624
1635
1628

$\boxed{1629 \text{ Ac}}$ 2.55

Sub C-5

2162
~~2171~~
2163
2166
2163

$\boxed{2164 \text{ Ac}}$ 3.38

Sub C-6

1076
1065
1070
1076

$\boxed{\cancel{1072} \text{ Ac}}$ ~~1.68~~

((1441 Ac))
2.25

Sub C-7

756
~~763~~
752
757
756

$\boxed{755 \text{ Ac}}$ 1.18

Sub C-8

995
996
1002
1001
999

$\boxed{\cancel{999} \text{ Ac}}$ ~~1.56~~

((911 Ac))
1.42

Sub C-9

958
958
968
961
~~948~~
~~976~~
~~948~~
965
966

$\boxed{\cancel{963} \text{ Ac}}$ ~~1.50~~

((338 Ac))
0.53

Total = 10,222 Ac = 15.973 mi²

Baker Engineers

S.O. No. 16923-04 F-16

Subject: Cline Creek

Sheet No. 2 of 16

~~Drawing No.~~ (1 of 5)

Computed by SAR Checked By [illegible] Date 08/07/89

Determination of Composite Initial and Uniform Loss Rates for each Sub-Basin, based on SCS Soil Texture Classification and Flood Control District Guidelines.

Surface Retention Loss High Desert Slopes & Mountain Brush similar Use 0.25

Sub C-1 (Area = 808 Acres)

100% "Clay". (Assumed)

CNSTL = .01

STRTL' = .30

STRTL = .30 + .25 = .55

Sub C-2 (Area = 1378 Acres).

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
"Clay" (Assumed)	.01	.30	1087
66	.40	.70	291

$$CNSTL = \frac{(1087)(.01) + (291)(.40)}{1378} = .09$$

$$STRTL' = \frac{(1087)(.30) + (291)(.70)}{1378} = .38$$

STRTL = .38 + .25 = .63

Baker Engineers

S.O. No. 16923-04 F-11

Subject: CLINE CREEK
UNIFORM & INITIAL LOSS RATES BY SCS SOIL TEXTURE CLASSIFICATION

Sheet No. 3 of 16A
Drawing No. (2 OF 5)

Computed by SRO Checked By 11/4/89 Date 11/03/89

SUB C-3 ((AREA = 798))

SOIL MAP SYMBOL	UNIFORM (CNSTL)	INITIAL (STRTL)	AREA (ACRES)
* "CLAY ASSUMED"	.01	.30	686
66	.40	.70	92
95	.35	.69	9
72	.18	.64	11
			798 (1.25 mi²)

$$CNSTL = \frac{(686)(.01)+(92)(.40)+(9)(.35)+(11)(.18)}{798} = 0.06$$

$$STRTL = \frac{(.30)(686)+(.70)(92)+(.69)(9)+(.64)(11)}{798} = 0.36$$

$$STRTL = 0.36 + .25 = .61$$

S.O. No. 16923-04 F-12

Baker Engineers

Subject: Cline Creek
Uniform and Initial Loss Rates by SCS Soil Texture Classification

Sheet No. 3 of 16

Drawing No. (2 of 5)

Computed by SAR Checked By [illegible] Date 08/07/89

Sub C-3 (Area = 454 Acres).

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
"Clay" (Assumed)	.01	.30	260
66	.40	.70	194

$$CNSTL = \frac{(260)(.01) + (194)(.40)}{454} = .18$$

((REVISED SOILS AREAS 11/03/89, SEE 3 OF 16A SSO))

$$STRTL' = \frac{(260)(.30) + (194)(.70)}{454} = .47$$

$$STRTL = .47 + .25 = .72$$

Sub C-4 (Area = 1629)

100% "Clay" (Assumed)

$CNSTL = .01$

$STRTL' = .30$

$STRTL = .30 + .25 = .55$

Baker Engineers

S.O. No. 16923-04 F-13

Subject: Cline Creek
Uniform & Initial Loss Rates by SCS Soil Texture Classification

Sheet No. 4 of 16
~~Drawing No.~~ (3 of 5)

Computed by SAR Checked By MAA Date 08/07/89

((CORRECTED AREAS 11/04/89 SSO)) and PAR 11/04/89

Sub C-5 (Area = 2164 Acres)

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
"Clay" (Assumed)	.01	.30	2092
66	.40	.70	72

$$CNSTL = \frac{(2092)(.01) + (72)(.40)}{2164} = .02 \checkmark$$

$$STRTL' = \frac{(2092)(\overset{0.30}{\cancel{.40}}) + (72)(.70)}{2164} = \cancel{.41}\ 0.31$$

$$STRTL = \overset{.31}{\cancel{.41}} + .25 = \cancel{.66}\ .56$$

Sub C-6 (Area = ~~1072~~ ((1441)))

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
6	.40 ✓	.70 ✓	1+10+5 = ~~16~~ ((111))
26	.09 ✓	.53 ✓	107+12+24 = ~~143~~ ((188))
28	.15 ✓	.56 ✓	~~67~~ ((104))
66	.40 ✓	.70 ✓	30+61+4+209+5+45 = ~~354~~ ((404))
72	.18 ✓	.64 ✓	~~272~~ ((263))
93	.40 ✓	.70 ✓	8+15 = ~~23~~ ((33))
95	.35 ✓	.69 ✓	32+53+74+37+1 = ~~197~~ ((338))

$$CNSTL = \frac{(\overset{((111))}{\cancel{16}})(.40) + (\overset{((188))}{\cancel{143}})(.09) + (\overset{((104))}{\cancel{67}})(.15) + (\overset{((404))}{\cancel{354}})(.40) + (\overset{((263))}{\cancel{272}})(.18) + (\overset{((33))}{\cancel{23}})(.40) + (\overset{((338))}{\cancel{197}})(.35)}{\cancel{1072}\ ((1441))}$$

$$= \cancel{.26}\ ((.29)) \checkmark$$

$$STRTL' = \frac{(\overset{((111))}{\cancel{16}})(.70) + (\overset{((188))}{\cancel{143}})(.53) + (\overset{((104))}{\cancel{67}})(.56) + (\overset{((404))}{\cancel{354}})(.70) + (\overset{((263))}{\cancel{272}})(.64) + (\overset{((33))}{\cancel{23}})(.70) + (\overset{((338))}{\cancel{197}})(.69)}{\cancel{1072}\ ((1441))}$$

$$= .65\ ((.65)) \checkmark$$

$$STRTL = .65 + .25 = .90 \checkmark$$

S.O. No. 16923-04 F-14

Baker Engineers

Subject: Cline Creek
Uniform & Initial Loss Rates by SCS Soil Texture Classification

Sheet No. 5 of 16
~~Drawing No.~~ (4 of 5)

Computed by SAR Checked By [illegible] Date 08/07/89

((CORRECTED AREAS 11/04/89 SSO)) [illegible] 11/04/89

Sub C-7 (Area = 755 Acres)

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
26	.09	.53	204
66	.40	.70	14+57+6 = 77
72	.18	.64	448
95	.35	.69	26

$$CNSTL = \frac{(204)(.09)+(77)(.40)+(448)(.18)+(26)(.35)}{\cancel{775}\ \cancel{752}\ 755} = .18 \checkmark \text{ ok.}$$

$$STRTL' = \frac{(204)(.53)+(77)(.70)+(445)(.64)+(26)(.69)}{\cancel{775}\ \cancel{752}\ 755} = \cancel{.60}\ 0.62 \text{ ok}$$

$$STRTL = \cancel{.60}\ .62 + .25 = \cancel{.85}\ 0.87$$

Sub C-8 (Area = ~~999~~ ((911)) Acres)

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
6	.40 ✓	.70 ✓	4+3=7 ✓
26	.09 ✓	.53 ✓	464 +6+2+5 = ~~477~~ ((440))
66	.40 ✓	.70 ✓	30+30+3+4 = ~~67~~ ((49))
72	.18 ✓	.64 ✓	~~263~~ ((266))
93	.40	.70	~~3~~ ((0))
95	.35 ✓	.69 ✓	10+90+82 = ~~182~~ ((149))

$$CNSTL = \frac{(7)(.40)+(\cancel{477}\ 440)(.09)+(\cancel{67}\ 49)(.40)+(\cancel{263}\ 266)(.18)+(\cancel{3}\ 0)(.40)+(\cancel{182}\ 149)(.35)}{\cancel{999}\ (911)} = .18 \checkmark$$

$$STRTL' = \frac{(7)(.70)+(\cancel{477}\ 440)(.53)+(\cancel{67}\ 49)(.70)+(\cancel{263}\ 266)(.64)+(\cancel{3}\ 0)(.70)+(\cancel{182}\ 149)(.69)}{\cancel{999}\ (911)} = .60 \checkmark$$

$$STRTL = .60 + .25 = .85 \checkmark$$

S.O. No. 16923-04 F-15

Baker Engineers

Subject: Cline Creek
Uniform & Initial Loss Rates by SCS Soil Texture Classification

Sheet No. 6 of 16
~~Drawing No.~~ (5 of 5)

Computed by SAC Checked By [illegible] Date 08/07/89

((CORRECTED AEROS 11/04/89 SAC))
Chkd BRG 11/04/89

SubC-9 (Area = ~~963~~ ((338)))

Soil Map Symbol	Uniform (CNSTL)	Initial (STRTL)	Area
3	1.78 ✓	.90 ✓	8 ✓
6	.40 ✓	.70 ✓	~~164~~ ((59))
13	.06 ✓	.42 ✓	6 ✓
26	.09 ✓	.53 ✓	90+13+12 = ~~115~~ ((98))
~~38~~	~~.15~~	~~.56~~	~~32~~ ((0))
44	.33 ✓	.66 ✓	15 ✓
66	.40 ✓	.70 ✓	3+396 = ~~399~~ ((21))
~~72~~	.18 ✓	.64 ✓	13+31 = ~~44~~ ((31))
93	.40	.70	9 ✓
~~95~~	~~.35~~	~~.69~~	95+3+5 = ~~103~~ ((0))
96	.25 ✓	.66 ✓	33 ✓
110	.40 ✓	.70 ✓	7 ✓
"Clay" Assumed	.01 ✓	.30 ✓	~~28~~ ((51))

$$CNSTL = \frac{1}{\cancel{963}\ ((338))}\Big[(8)(1.78)+(\cancel{164}\ ((59)))(.40)+(6)(.06)+(\cancel{115}\ ((98)))(.09)+(\cancel{32}\ ((0)))(.15)+(15)(.33)$$
$$+(\cancel{399}\ ((21)))(.40)+(\cancel{44}\ ((31)))(.18)+(9)(.40)+(\cancel{103}\ ((0)))(.35)+(33)(.25)+(7)(.40)+(\cancel{28}\ ((51)))(.01)\Big]$$

$$= \cancel{.33} \checkmark \left(\left(= \frac{81.11}{338} = 0.24\right)\right) \checkmark$$

$$STRTL' = \frac{1}{\cancel{963}\ ((338))}\Big[(8)(.90)+(\cancel{164}\ ((59)))(.70)+(6)(.42)+(\cancel{115}\ ((98)))(.53)+(\cancel{32}\ ((0)))(.56)+(15)(.66)$$
$$+(\cancel{399}\ ((21)))(.70)+(\cancel{44}\ ((31)))(.64)+(9)(.70)+(\cancel{103}\ ((0)))(.69)+(33)(.66)+(7)(.70)+(\cancel{28}\ ((51)))(.30)\Big]$$

$$= \cancel{.66} \checkmark \left(\left(= \frac{195.68}{338} = 0.58\right)\right) \checkmark$$

$$STRTL = \cancel{.66}\ .58 + .25 = \cancel{.91}\ ((.83)) \checkmark$$

Baker Engineers

S.O. No. 16923-04 F-16

Subject: Cline Creek

Sheet No. 10 of 16

~~Drawing No.~~ (1 of 1)

Computed by SAR Checked By [illegible] Date 08/09/89

((CORRECTED AREAS 11/04/89 SSO)) CK [illegible] 11/04/89

Percent Impervious in each SubBasin:

SubBasins C-1 — C-5, 0% Impervious

Sub C-6

Soil #72, 30% Impervious

Area of #72 = ~~272~~ ((263)) Acres

RTIMP = $\frac{(.30)(\cancel{272})}{\cancel{1092}\ 1441}$ ((263)) = ~~7.6%~~ ✓ ((5.48%)) ✓

Sub C-7 ((No CHANGE)) ✓

Soil #72, 30% Impervious

Area of #72 = 445 Acres

RTIMP = $\frac{(.30)(445)}{755}$ = 17.7% ✓

Sub C-8

Soil #72, 30% Impervious

Area of #72 = ~~265~~ ((266)) Acres

RTIMP = $\frac{(.30)(\cancel{265})}{\cancel{999}\ ((911))}$ ((266)) = ~~7.9%~~ ✓ ((8.76%)) ✓

Sub C-9

Soil #72, 30% Impervious

Area of #72 = ~~44~~ ((31)) Acres

RTIMP = $\frac{(.30)(\cancel{44})}{\cancel{963}\ ((338))}$ ((31)) = ~~1.4%~~ ✓ =((3.91%)) ✓

SCS SOIL MAP UNIT	SCS SOIL GROUP
3	Antho-Carrizo-Maripo Complex
6	Anthony-Arizo Complex
13	Carefree-Beardsley Complex
26	Continental Cobbly Clay Loam
28	Continental-Ohaco Complex
44	Ebon Very Gravelly Loam
66	Greyeagle-Suncity Variant Complex
72	Lehmans-Rock Outcrop Complex
93	Nickel-Cave Complex
95	Ohaco Gravelly Loam
96	Pinaleno-Tres Hermano Complex
110	Suncity-Cipriano Complex
*	Clay (Based on information from Soil Scientist at Tonto National Forest)

LEGEND

———	WATERSHED BOUNDARY
— — —	SUB-BASIN BOUNDARY
(C-6)	SUB-BASIN IDENTIFICATION
———	S.C.S. SOIL GROUP BOUNDARY
72	S.C.S SOIL MAP UNIT

Baker Engineers

S.O. No. 16923-04

Subject: SCS Soil Texture Classification

Sheet No. 1 of 3

Drawing No.

Computed by SAC Checked By CMH Date 08/04/89

From Flood Control District: Initial and Uniform Loss Rates

Soil Texture Classification	Uniform (CNSTL)	Initial (Dry, Bare Ground) (STRTL)
Sand	4.6	1.3
Loamy Sand	1.2	0.8
Sandy Loam	0.4	0.7
Sandy Clay Loam	0.06	0.6
Clay Loam	0.04	0.5
Sandy Clay	0.02	0.4
Clay	0.01	0.3

Unadjusted for ground cover.

Soil Map Symbol	Percent Area	Soil Classification	Composite CNSTL	Composite STRTL
3	(35+20)=55	Sandy Loam	1.78	.90
	15	Loamy Sand		
	30	Sand		
6	100	Sandy Loam	.40	.70
8	100	Sandy Loam	.40	.70
10	20	Sandy Loam	2.40	.98
	40	Loamy Sand		
	40	Sand		
12	100	Clay Loam	.04	.50
13	50	Clay	.06	.40
	40	Clay Loam		
	10	Sandy Loam		
*16	65 → 76	Sandy Loam		
	15 → 0	Impervious (Ignore)	.40	.70
	20 → 24	Sandy Loam		

Baker Engineers

S.O. No. 16923-04 F-20

Subject:

Sheet No. 2 of 3

Drawing No.

Computed by SAR Checked By [illegible] Date 08/04/89

Soil Map Symbol	Percent Area	Soil Classification	Composite CNSTL	Composite STRTL
21	100	Sandy Loam	.40	.70
26	85	Clay Loam	.09	.53
	15	Sandy Loam		
28	70	Clay Loam	.15	.56
	(20+10)=30	Sandy Loam		
*31	55 → 85	Sandy Loam	.40	.70
	35 → 0	Impervious		
	10 → 15	Sandy Loam		
33	80	Sandy Loam	.33	.66
	20	Clay Loam		
41	(45+20)=65	Sandy Loam	.28	.67
	35	Sandy Clay Loam		
44	80	Sandy Loam		
	20	Clay Loam	.33	.66
48	(45+35)=80	Sandy Loam	.33	.68
	20	Sandy Clay Loam		
51	100	Sandy Loam	.40	.70
*52	45	Sandy Loam	.40	.70
	20	Sandy Loam		
	20	Impervious		
	15	Sandy Loam		
66	100	Sandy Loam	.40	.70
68	100	Sandy Loam	.40	.70
70	100	Sandy Loam	.40	.70

Baker Engineers

S.O. No. 16923-04 F-21

Subject:

Sheet No. 3 of 3

Drawing No.

Computed by SAR Checked By MPR Date 08/04/89

Soil Map Symbol	Percent Area	Soil Classification	Composite CN STC	Composite STCTC
*72	45→64	Sandy Clay Loam	.18	.64
	30→0	Impervious		
	25→36	Sandy Loam		
93	100	Sandy Loam	.40	.70
95	85	Sandy Loam	.35	.69
	15	Sandy Clay Loam		
96	45	Sandy Clay Loam	.25	.66
	(40+15)=55	Sandy Loam		
98	100	Sandy Loam	.40	.70
*103	65→0	Impervious	.40	.70
	25→71	Sandy Loam		
	10→29	Sandy Loam		
*104	60→0	Impervious	.23	.65
	20→50	Sandy Clay Loam		
	20→50	Sandy Loam		
*108	50→71	Sandy Loam	.40	.70
	30→0	Impervious		
	20→29	Sandy Loam		
*109	55→85	Sandy Loam	.40	.70
	35→0	Impervious		
	10→15	Sandy Loam		
110	100	Sandy Loam	.40	.70

APPENDIX G

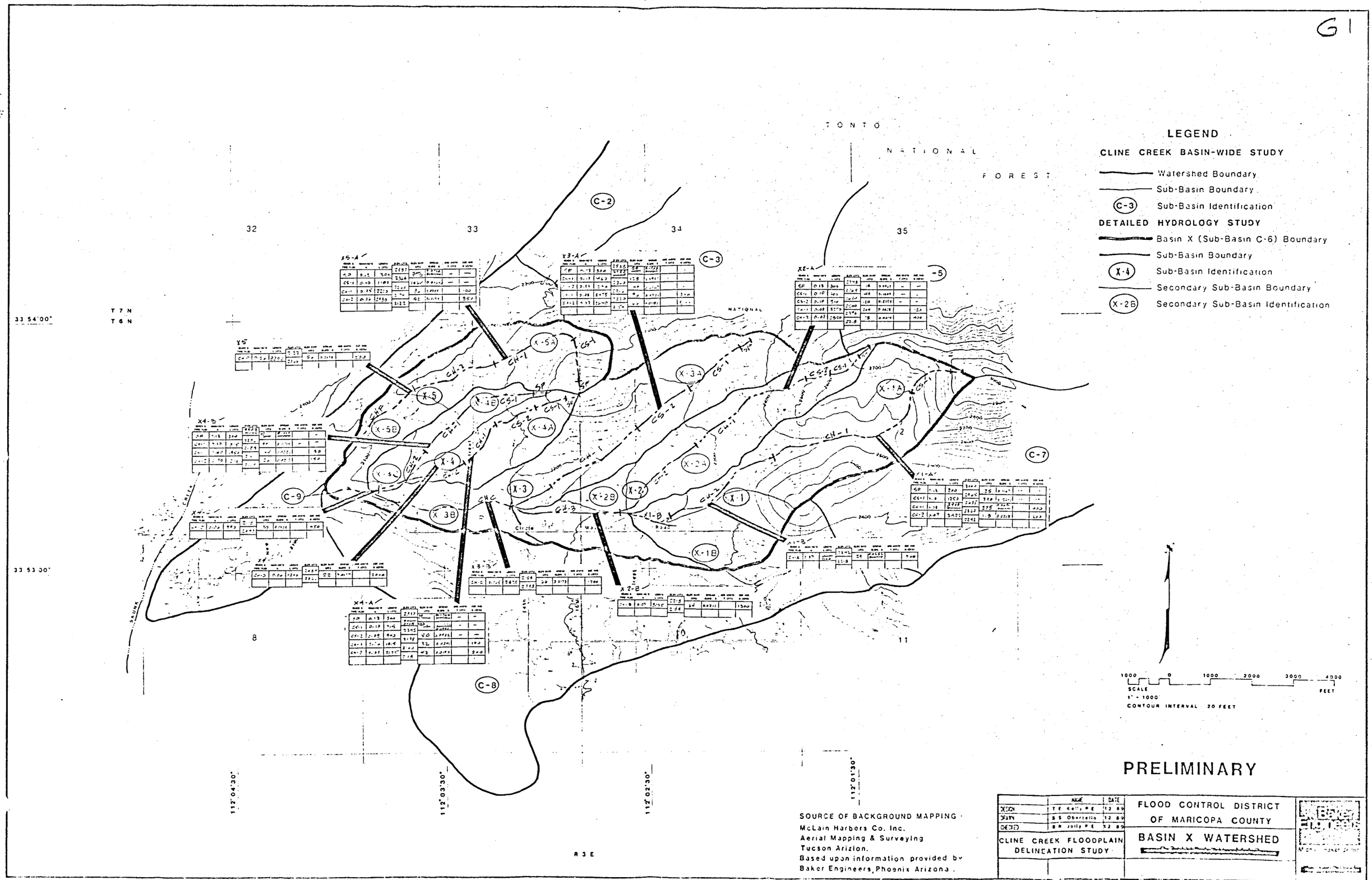
CLINE CREEK

CALCULATIONS:

SUB-BASIN LAG TIMES,

ROUTING TRAVEL TIMES

G1



SOURCE OF BACKGROUND MAPPING:
McLain Harbers Co. Inc.
Aerial Mapping & Surveying
Tucson Arizion.
Based upon information provided by
Baker Engineers, Phoenix Arizona.

PRELIMINARY

	NAME	DATE
DESIGN	T E Kelly P E	12 89
DRAWN	S S Oberteilo	12 89
CHECKED	B R Jolly P E	12 89

CLINE CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BASIN X WATERSHED

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By SRD Date 11/10/89

Location CLINE CREEK BASIN X1-1 Checked PRD Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	SF			
1. Surface description (table 3-1, TR-55)		9-N RANGE			
2. Manning's roughness coeff., n (table 3-1, TR-55)		0.13			
3. Flow length, L (total L ≤ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P2	in	2.0			
5. Land slope, s	ft/ft	0.11667			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	0.22	+	=	0.22

Shallow concentrated flow	Segment ID	CS-1			
7. Manning's roughness coeff., n		0.10			
8. Hydraulic radius r (appx - avg. depth) Est.		.25			
9. Flow Length, L	ft	1350			
10. Watercourse slope, s	ft/ft	[illegible]			
11. Average velocity, V (Figure 5)	ft/s	3.1			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.11	+	=	0.11

Channel flow	Segment ID	CH-1	CH-2		
13. Approximate flow rate, Q	ft^3/sec	400	600		
14. Top width, T	ft	28	60		
15. Hydraulic radius, r = d = A/T	Estimate ft	2	1.75		
16. Channel slope, s	ft/ft	~~0.689~~ 0.0689	0.0308		
17. Manning's roughness coeff., n		0.08	0.07		
18. Average velocity, V (Figure 4/3)	ft/s	7.5	5.25		
19 Flow length, L	ft	3990	3325		
20. Check r estimate: Q = V x T x r = →	compare to line 13	420	551		
21. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.15	+ 0.20	=	0.35
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr				0.68

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) T_c = 0.41

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By [illegible] Date 11/13/89

Location CLINE CREEK BASIN X1-B Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach RX 1

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	
1. Surface description (table 3-1, TR-55)		
2. Manning's roughness coeff., n (table 3-1, TR-55)		
3. Flow length, L (total L ≤ 300 ft) ft		
4. Two-yr 24-hr rainfall, P2 in		
5. Land slope, s ft/ft		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+	=

Shallow concentrated flow	Segment ID	
7. Manning's roughness coeff., n		
8. Hydraulic radius r (appx - avg. depth) Est.		
9. Flow Length, L ft		
10. Watercourse slope, s ft/ft		
11. Average velocity, V (Figure _____) ft/s		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+	=

Channel flow	Segment ID	
	CH-A	
13. Approximate flow rate, Q ft^3/sec	300	
14. Top width, T ft	68	
15. Hydraulic radius, r = d = A/T Estimate ft	2.125	
16. Channel slope, s ft/ft	0.0218	
17. Manning's roughness coeff., n	0.07	
18. Average velocity, V (Figure 3) ft/s	5.5	
19 Flow length, L ft	1100	
20. Check r estimate: Q = V x T x r = _____ compare to line 13	795	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.056 +	=
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr		0.056

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By [illegible] Date 11/13/89

Location CLINE CREEK BASIN X2-A Checked [illegible] Date 11/14/89

T_c for Subarea X2-A

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
	SF		
1. Surface description (table 3-1, TR-55)	[illegible]		
2. Manning's roughness coeff., n (table 3-1, TR-55)	[illegible]		
3. Flow length, L (total L ≤ 300 ft) ft	[illegible]		
4. Two-yr 24-hr rainfall, P2 in	2.0		
5. Land slope, s ft/ft	[illegible]		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.32	+	= 0.32

Shallow concentrated flow	Segment ID		
	SS-1	SS-2	
7. Manning's roughness coeff., n	0.10	0.10	
8. Hydraulic radius r (appx - avg. depth) Est.	.25	.50	
9. Flow Length, L ft	[illegible]	510	
10. Watercourse slope, s ft/ft	[illegible]	0.2353	
11. Average velocity, V (Figure 5) ft/s	2.4	4.5	
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.10	+ 0.03	= 0.13

Channel flow	Segment ID		
	CH-1	CH-2	
13. Approximate flow rate, Q ft³/sec	120	400	
14. Top width, T ft	36	45.5	
15. Hydraulic radius, r = d = A/T Estimate ft	0.79	1.75	
16. Channel slope, s ft/ft	0.0623	0.0274	
17. Manning's roughness coeff., n	0.09	0.07	
18. Average velocity, V (Figure ____) 4.&3 ft/s	3.9	5.1	
19 Flow length, L ft	3250	2350	
20. Check r estimate: Q = V x T x r = _____ compare to line 13	110	406	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.23	+ 0.16	= 0.39
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			0.84

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

TL = 0.50

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By ESO Date 11/13/89

Location CLINE CREEK BASIN X2-B Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach RX2

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)			
2.	Manning's roughness coeff., n (table 3-1, TR-55)			
3.	Flow length, L (total L ≤ 300 ft)	ft		
4.	Two-yr 24-hr rainfall, P2	in		
5.	Land slope, s	ft/ft		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+	=

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n			
8.	Hydraulic radius r (appx - avg. depth) Est.			
9.	Flow Length, L	ft		
10.	Watercourse slope, s	ft/ft		
11.	Average velocity, V (Figure _____)	ft/s		
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+	=

Channel flow		Segment ID	CH-B
13.	Approximate flow rate, Q	ft^3/sec	1300
14.	Top width, T	ft	100
15.	Hydraulic radius, r = d = A/T	Estimate ft	2.3
16.	Channel slope, s	ft/ft	0.0211
17.	Manning's roughness coeff., n		0.07
18.	Average velocity, V (Figure 3)	ft/s	5.6
19	Flow length, L	ft	3035
20.	Check r estimate: Q = V x T x r = _____ compare to line 13		1288
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.15 + =
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr	0.15

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By [illegible] Date 11/13/84

Location CLINE CREEK [illegible] X3-L Checked [illegible] Date 11/14/89

T_c for Subarea [illegible]

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID			
1. Surface description (table 3-1, TR-55)	[illegible]			
2. Manning's roughness coeff., n (table 3-1, TR-55)	0.13			
3. Flow length, L (total L ≤ 300 ft) ft	300			
4. Two-yr 24-hr rainfall, P2 in	2.0			
5. Land slope, s ft/ft	[illegible]			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.18	+	=	0.18

Shallow concentrated flow	Segment ID			
	[illegible]	CS-2		
7. Manning's roughness coeff., n	0.10	0.09		
8. Hydraulic radius r (appx - avg. depth) Est.	.25	.50		
9. Flow Length, L ft	1400	1200		
10. Watercourse slope, s ft/ft	[illegible]	[illegible]		
11. Average velocity, V (Figure 5) ft/s	1.79	2.2		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.23	+ .15	=	.38

Channel flow	Segment ID			
	CH-1	CH-2		
13. Approximate flow rate, Q ft³/sec	500	500		
14. Top width, T ft	52	80		
15. Hydraulic radius, r = d = A/T Estimate ft	1.3	1.0		
16. Channel slope, s ft/ft	0.0088	0.0181		
17. Manning's roughness coeff., n	0.03	0.07		
18. Average velocity, V (Figure ____) 4/& 3 ft/s	4.5	3.9		
19 Flow length, L ft	2475	5640		
20. Check r estimate: Q = V x T x r = _____ compare to line 13	304	499		
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.15	+ .26	=	.41
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr				.97

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) T_c = 0.58

Time of concentration (T_c) or travel time (T_t)

G-7

Project **FCD-Flood Plain Delineation** By SSO Date 11/13/89

Location CLINE CREEK BASIN X3-B Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach RX3

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+		=

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		=

Channel flow	Segment ID		
	CH-C		(L/G)
13. Approximate flow rate, Q ft³/sec	1700		
14. Top width, T ft	101	101	
15. Hydraulic radius, r = d = A/T Estimate ft	2.8	2.8	
16. Channel slope, s ft/ft	0.0173		
17. Manning's roughness coeff., n	0.06	0.07	0.065
18. Average velocity, V (Figure ____) (2F3 L/G) ft/s	6.5	5.6	6.0
19 Flow length, L ft	3825		
20. Check r estimate: Q = V x T x r = _____ compare to line 13	1838	1583	1710
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		= 0.18
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			0.18

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

COMBINE RX5 INTO RX-3 0.05

RX3 T_t = 0.23 hr

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By [illegible] Date 11/13/89

Location CLINE CREEK BASIN X4-A Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)	SF		
2. Manning's roughness coeff., n (table 3-1, TR-55)	SPARSE		
3. Flow length, L (total L ≤ 300 ft) ft	0.13		
4. Two-yr 24-hr rainfall, P2 in	500		
5. Land slope, s ft/ft	2.0		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.17		
	0.21	+	= 0.21

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n	SH-1	SH-2	
8. Hydraulic radius r (appx - avg. depth) Est.	0.10	0.05	
9. Flow Length, L ft	.25	.50	
10. Watercourse slope, s ft/ft	715	940	
11. Average velocity, V (Figure _____) ft/s	[illegible]	[illegible]	
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	2.3	2.7	
	0.09	+ 0.10	= 0.19

Channel flow	Segment ID		
13. Approximate flow rate, Q ft^3/sec	CH-1	CH-2	
14. Top width, T ft	100	200	
15. Hydraulic radius, r = d = A/T Estimate ft	42	49	
16. Channel slope, s ft/ft	.675	1.1	
17. Manning's roughness coeff., n	0.0245	0.0193	
18. Average velocity, V (Figure _____) ft/s	0.06	0.07	
19 Flow length, L ft	3.5	3.1	
20. Check r estimate: Q = V x T x r = _____ compare to line 13	1015	2125	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	99	207	
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr	0.08	+ 0.18	= 0.26
			0.66

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) T_c = 0.40

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Flood Plain Delineation** By SSO Date 11/13/89

Location CLINE CREEK BASIN X4-B Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID			
1. Surface description (table 3-1, TR-55)	SF			
	OPEN LAND			
2. Manning's roughness coeff., n (table 3-1, TR-55)	0.13			
3. Flow length, L (total L ≤ 300 ft) ft	300			
4. Two-yr 24-hr rainfall, P2 in	3.0			
5. Land slope, s ft/ft	0.400			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.20	+	=	0.20

Shallow concentrated flow	Segment ID			
7. Manning's roughness coeff., n	SS-1			
	0.10			
8. Hydraulic radius r (appx - avg. depth) Est.	.25			
9. Flow Length, L ft	1315			
10. Watercourse slope, s ft/ft	0.0745			
11. Average velocity, V (Figure _____) ft/s	1.65			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.22	+	=	0.22

Channel flow	Segment ID			
13. Approximate flow rate, Q ft^3/sec	CH-1	CH-2		
	90	150		
14. Top width, T ft	[illegible]	34		
15. Hydraulic radius, r = d = A/T Estimate ft	0.5	0.9		
16. Channel slope, s ft/ft	0.0226	0.0217		
17. Manning's roughness coeff., n	0.06	0.07		
18. Average velocity, V (Figure ____) 2.5 ft/s	2.5	3.0		
19 Flow length, L ft	1950	1200		
20. Check r estimate: Q = V x T x r = _____ compare to line 13	73	146		
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.22	+ 0.11	=	0.33
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr				0.75

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

TL = 0.45

Time of concentration (T_c) or travel time (T_t)

G-10

Project FCD - Flood Plain Delineation By SKO Date 11/13/89

Location [illegible] Checked [illegible] Date 11/14/89

T_c for Subarea X-1C

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr		+	=

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+	=

Channel flow	Segment ID		
	CH-E		
13. Approximate flow rate, Q ft^3/sec	450		
14. Top width, T ft	52		
15. Hydraulic radius, r = d = A/T Estimate ft	1.6		
16. Channel slope, s ft/ft	0.0303		
17. Manning's roughness coeff., n	0.06		
18. Average velocity, V (Figure 2) ft/s	5.6		
19 Flow length, L ft	990		
20. Check r estimate: Q = V x T x r = _____ compare to line 13	466		
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.05	+	= 0.05
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

10 of 12

G-11

Project FEMA - Flood Plain Delineation By [illegible] Date 11/13/89

Location [illegible] Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach [illegible]

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	
1. Surface description (table 3-1, TR-55)		
2. Manning's roughness coeff., n (table 3-1, TR-55)		
3. Flow length, L (total L ≤ 300 ft) ft		
4. Two-yr 24-hr rainfall, P2 in		
5. Land slope, s ft/ft		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+	=

Shallow concentrated flow	Segment ID	
7. Manning's roughness coeff., n		
8. Hydraulic radius r (appx - avg. depth) Est.		
9. Flow Length, L ft		
10. Watercourse slope, s ft/ft		
11. Average velocity, V (Figure _____) ft/s		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+	=

Channel flow	Segment ID	
13. Approximate flow rate, Q ft³/sec	[illegible]	
14. Top width, T ft	200	
15. Hydraulic radius, r = d = A/T Estimate ft	103	
16. Channel slope, s ft/ft	3	
17. Manning's roughness coeff., n	0.077	
18. Average velocity, V (Figure 2) ft/s	0.06	
19 Flow length, L ft	6.5	
20. Check r estimate: Q = V x T x r = _____ compare to line 13	1240	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	1989	
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr	0.05 +	= 0.05
		0.05

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Cannot route at DL=6 Min.
COMBINE WITH RX-3.

Time of concentration (T_c) or travel time (T_t)

11 of 12

G-12

Project FCD - Flood Plain Delineation By [illegible] Date 11/13/89

Location [illegible] Creek Basin X5-A Checked [illegible] Date 11/14/89

T_c for Subarea X5-A

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)		SF	
2.	Manning's roughness coeff., n (table 3-1, TR-55)		Smooth Paved	
3.	Flow length, L (total L ≤ 300 ft)	ft	0.13	
4.	Two-yr 24-hr rainfall, P2	in	300	
5.	Land slope, s	ft/ft	2.0	
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.0700	
			0.27 +	= 0.27

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n		SS-1	
8.	Hydraulic radius r (appx - avg. depth) Est.		0.10	
9.	Flow Length, L	ft	.35	
10.	Watercourse slope, s	ft/ft	1100	
11.	Average velocity, V (Figure 5)	ft/s	0.0164	
12.	$T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.55	
			0.17 +	= 0.17

Channel flow		Segment ID		
13.	Approximate flow rate, Q	ft³/sec	CH-1	CH-2
14.	Top width, T	ft	100	350
15.	Hydraulic radius, r = d = A/T	Estimate ft	[illegible]	188
16.	Channel slope, s	ft/ft	0.35	0.75
17.	Manning's roughness coeff., n		0.0359	0.0177
18.	Average velocity, V (Figure ____) 1 & 2	ft/s	0.05	0.06
19	Flow length, L	ft	2.3	2.6
20.	Check r estimate: Q = V x T x r = _____ compare to line 13		2210	2930
21.	$T_t = \frac{L}{3600\ V}$ Compute T_t	hr	101	365
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr	0.12 +	0.31 = 0.43
				0.87

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

0.52

Time of concentration (T_c) or travel time (T_t)

G-13

Project FCD- Flood Plain Delineation By SEO Date 11/13/89

Location Clear Creek Basin X5 Checked PRL Date 11/14/89

T_c for Subarea X C B

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	
1.	Surface description (table 3-1, TR-55)		
2.	Manning's roughness coeff., n (table 3-1, TR-55)		
3.	Flow length, L (total L ≤ 300 ft)	ft	
4.	Two-yr 24-hr rainfall, P2	in	
5.	Land slope, s	ft/ft	
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+ =

Shallow concentrated flow		Segment ID	
7.	Manning's roughness coeff., n		
8.	Hydraulic radius r (appx - avg. depth) Est.		
9.	Flow Length, L	ft	
10.	Watercourse slope, s	ft/ft	
11.	Average velocity, V (Figure _____)	ft/s	
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+ =

Channel flow		Segment ID	CH-F
13.	Approximate flow rate, Q	ft^3/sec	2000
14.	Top width, T	ft	36.6
15.	Hydraulic radius, r = d = A/T	Estimate ft	1.4
16.	Channel slope, s	ft/ft	0.0170
17.	Manning's roughness coeff., n		0.06
18.	Average velocity, V (Figure 2)	ft/s	4.0
19	Flow length, L	ft	3300
20.	Check r estimate: Q = V x T x r = _____ compare to line 13		1998
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+ 0.23 =
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr	0.23

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

Project [illegible] By [illegible] Date 11/14/89

Location Clear Creek Checked [illegible] Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)			
2.	Manning's roughness coeff., n (table 3-1, TR-55)			
3.	Flow length, L (total L ≤ 300 ft)	ft		
4.	Two-yr 24-hr rainfall, P2	in		
5.	Land slope, s	ft/ft		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+	=

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n			
8.	Hydraulic radius r (appx - avg. depth) Est.			
9.	Flow Length, L	ft		
10.	Watercourse slope, s	ft/ft		
11.	Average velocity, V (Figure _____)	ft/s		
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+	=

Channel flow		Segment ID		
13.	Approximate flow rate, Q	ft^3/sec		
14.	Top width, T	ft		
15.	Hydraulic radius, r = d = A/T	Estimate ft		
16.	Channel slope, s	ft/ft		
17.	Manning's roughness coeff., n			
18.	Average velocity, V (Figure _____)	ft/s		
19	Flow length, L	ft		
20.	Check r estimate: Q = V x T x r = _____ compare to line 13			
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	[illegible] + [illegible]	=
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr		3.77

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

G-15

Project [illegible] By [illegible] Date [illegible]

Location [illegible] Checked [illegible] Date 11/14/89

T_c for Subarea X2

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	
1.	Surface description (table 3-1, TR-55)		
2.	Manning's roughness coeff., n (table 3-1, TR-55)		
3.	Flow length, L (total L ≤ 300 ft)	ft	
4.	Two-yr 24-hr rainfall, P2	in	
5.	Land slope, s	ft/ft	
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+ =

Shallow concentrated flow		Segment ID	
7.	Manning's roughness coeff., n		
8.	Hydraulic radius r (appx - avg. depth) Est.		
9.	Flow Length, L	ft	
10.	Watercourse slope, s	ft/ft	
11.	Average velocity, V (Figure _____)	ft/s	
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+ =

Channel flow		Segment ID	
13.	Approximate flow rate, Q	ft^3/sec	
14.	Top width, T	ft	
15.	Hydraulic radius, r = d = A/T	Estimate ft	
16.	Channel slope, s	ft/ft	
17.	Manning's roughness coeff., n		
18.	Average velocity, V (Figure _____)	ft/s	
19	Flow length, L	ft	
20.	Check r estimate: Q = V x T x r = _____ compare to line 13		
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.34 + 0.15 =
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr	0.99

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Tc = 0.59

Time of concentration (T_c) or travel time (T_t)

5
G-16

Project _____ By _____ Date _____

Location _____ Checked BRG Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

_____

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+		=

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		=

Channel flow	Segment ID		
13. Approximate flow rate, Q ft^3/sec			
14. Top width, T ft			
15. Hydraulic radius, r = d = A/T Estimate ft			
16. Channel slope, s ft/ft			
17. Manning's roughness coeff., n			
18. Average velocity, V (Figure _____) ft/s			
19 Flow length, L ft			
20. Check r estimate: Q = V x T x r = _____ compare to line 13			
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.07 +	0.8	=
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			1.15

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

0.69

Time of concentration (T_c) or travel time (T_t)

5
G-17

Project _____ By _____ Date _____

Location _____ Checked BBG - Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
1.	Surface description (table 3-1, TR-55)					
2.	Manning's roughness coeff., n (table 3-1, TR-55)					
3.	Flow length, L (total L ≤ 300 ft)	ft				
4.	Two-yr 24-hr rainfall, P2	in				
5.	Land slope, s	ft/ft				
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr		+		=

~~Shallow concentrated flow~~ T_c tributaries		Segment ID				
7.	Manning's roughness coeff., n					
8.	Hydraulic radius r (appx - avg. depth) Est.					
9.	Flow Length, L	ft				
10.	Watercourse slope, s	ft/ft				
11.	Average velocity, V (Figure _____)	ft/s				
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	.36	+	[illegible]	= .75

Larger Value

Channel flow		Segment ID				
13.	Approximate flow rate, Q	ft^3/sec				
14.	Top width, T	ft				
15.	Hydraulic radius, r = d = A/T	Estimate ft				
16.	Channel slope, s	ft/ft				
17.	Manning's roughness coeff., n					
18.	Average velocity, V (Figure _____)	ft/s				
19	Flow length, L	ft				
20.	Check r estimate: Q = V x T x r = _____ compare to line 13					
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr		+	.05	= .05
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr				0.80

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

T_c = 0.48

Time of concentration (T_c) or travel time (T_t)

G-19

Project _____ By _____ Date _____

Location _____ Checked _____ Date 11/14/89

T_c for Subarea

T_t for Routing Reach

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)			
2.	Manning's roughness coeff., n (table 3-1, TR-55)			
3.	Flow length, L (total L ≤ 300 ft)	ft		
4.	Two-yr 24-hr rainfall, P2	in		
5.	Land slope, s	ft/ft		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+	=

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n			
8.	Hydraulic radius r (appx - avg. depth) Est.			
9.	Flow Length, L	ft		
10.	Watercourse slope, s	ft/ft		
11.	Average velocity, V (Figure _____)	ft/s		
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+	=

Channel flow		Segment ID		
13.	Approximate flow rate, Q	ft^3/sec		
14.	Top width, T	ft		
15.	Hydraulic radius, r = d = A/T	Estimate ft		
16.	Channel slope, s	ft/ft		
17.	Manning's roughness coeff., n			
18.	Average velocity, V (Figure _____)	ft/s		
19	Flow length, L	ft		
20.	Check r estimate: Q = V x T x r = _____ compare to line 13			
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	.87 +	.23 =
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr		1.10

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Tc = 0.66

APPENDIX C

CLINE CREEK

HEC-1

100-YEAR 24 HOUR STORM

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

  1           ID                  FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                              FILE:    XB-24
  4           ID
  5           ID        HYDROLOGY FOR:    100 YEAR 24 HOUR EVENT (SECONDARY SUB- BASINS ONLY)
  6           ID                          COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
  7           ID                          DRAINAGE AREAS
  8           ID
  9           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
 10           ID                          CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
 11           ID                          TO THE TONTO NATIONAL FOREST
 12           ID
 13           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 14           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 15           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 16           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 17           ID                                    &  PERCENT IMPERVIOUS
 18           ID                          STREAM ROUTING - NONE
 19           ID                          HYDROGRAPH COMBINATIONS - NONE
 20           ID
 21           ID        WATERSHED NAME:   CLINE CREEK    (BASIN X IS SUB-BASIN C-6)
 22           ID
 23           ID        CONTRACT NUMBER:  FCD 89-15
 24           ID
 25           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/06/89
 26           ID                          COMP: SSO 12/18/89       CKD: 12-18-89
 27           IT      6 01JAN89       0     280
              *DIAGRAM
 28           IO      5
 29           IN     15
 30           JD   4.80     .01
 31           PC     .0     .01     .02     .04     .05     .07     .08     .10     .11     .12
 32           PC    .14     .15     .17     .18     .20     .21     .23     .25     .27     .29
 33           PC    .31     .33     .35     .36     .38     .41     .43     .46     .48     .50
 34           PC    .53     .55     .58     .60     .64     .67     .71     .74     .78     .83
 35           PC    .87     .92     .97    1.05    1.13    1.23    1.36    1.86    3.18    3.39
 36           PC   3.53    3.64    3.72    3.80    3.86    3.91    3.96    4.00    4.04    4.08
 37           PC   4.11    4.14    4.17    4.20    4.23    4.26    4.29    4.31    4.33    4.36
 38           PC   4.38    4.41    4.43    4.44    4.46    4.48    4.50    4.52    4.54    4.56
 39           PC   4.57    4.59    4.60    4.62    4.63    4.65    4.66    4.68    4.69    4.70
 40           PC   4.72    4.73    4.75    4.76    4.78    4.79    4.80
 41           JD   4.56      10
 42           JD   4.42      20
 43           JD   4.32      30
 44           JD   4.27      40

 45           KK  SSBX1A
 46           KM        RUNOFF FROM SEC.SUBBASIN X1-A
 47           BA   0.43
 48           LU   0.88    0.20   20.51
 49           UD   0.41
```

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

  50          KK  SSBX2A
  51          KM        RUNOFF FROM SEC.SUBBASIN X2-A
  52          BA    0.28
  53          LU    0.91    0.29    9.10
  54          UD    0.50

  55          KK  SSBX3A
  56          KM        RUNOFF FROM SEC.SUBBASIN X3-A
  57          BA    0.43
  58          LU    0.94    0.36    0.97
  59          UD    0.58

  60          KK  SSBX4A
  61          KM        RUNOFF FROM SEC.SUBBASIN X4-A
  62          BA    0.16
  63          LU    0.90    0.30    0.00
  64          UD    0.40

  65          KK  SSBX4B
  66          KM        RUNOFF FROM SEC.SUBBASIN X4-B
  67          BA    0.09
  68          LU    0.86    0.23    0.00
  69          UD    0.45

  70          KK  SSBX5A
  71          KM        RUNOFF FROM SEC.SUBBASIN X5-A
  72          BA    0.23
  73          LU    0.93    0.35    0.00
  74          UD    0.52
  75          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

           SSBX1A
                .
                .
   50           .      SSBX2A
                .           .
                .           .
   55           .           .     SSBX3A
                .           .          .
                .           .          .
   60           .           .          .     SSBX4A
                .           .          .          .
                .           .          .          .
   65           .           .          .          .     SSBX4B
                .           .          .          .          .
                .           .          .          .          .
   70           .           .          .          .          .     SSBX5A
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

****

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: XB-24

HYDROLOGY FOR: 100 YEAR 24 HOUR EVENT (SECONDARY SUB- BASINS ONLY)
COMPUTES OUTFLOW HYDROGRAPHS FOR SIX MINOR TRIBUTARY
DRAINAGE AREAS

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
CLINE CREEK AND TRIBUTARIES - SKUNK CREEK
TO THE TONTO NATIONAL FOREST

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING - NONE
HYDROGRAPH COMBINATIONS - NONE

WATERSHED NAME: CLINE CREEK (BASIN X IS SUB-BASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/06/89
COMP: _____ CKD: _____

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

   IT        HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1JAN89  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        280  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     2JAN89  ENDING DATE
                 NDTIME       0354  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE   27.90 HOURS

      ENGLISH UNITS

30 JD       INDEX STORM NO. 1
                  STRM       4.80  PRECIPITATION DEPTH
                  TRDA        .01  TRANSPOSITION DRAINAGE AREA

31 PI         PRECIPITATION PATTERN
                .00    .00    .00    .00    .00    .01    .01    .01    .00    .00
                .01    .01    .01    .00    .00    .01    .01    .01    .00    .00
                .00    .00    .01    .01    .01    .00    .00    .01    .01    .01
                .00    .00    .01    .01    .01    .00    .00    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                .01    .01    .01    .01    .01    .00    .00    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                .01    .01    .01    .02    .02    .01    .01    .01    .02    .02
                .01    .01    .01    .02    .02    .02    .02    .02    .02    .02
                .02    .02    .02    .02    .02    .03    .03    .03    .03    .03
                .04    .04    .05    .05    .05    .20    .20    .36    .53    .53
                .08    .08    .07    .06    .06    .04    .04    .04    .03    .03
                .03    .03    .03    .02    .02    .02    .02    .02    .02    .02
                .02    .02    .02    .02    .02    .02    .02    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
                .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
```

.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

INDEX STORM NO. 2
STRM 4.56 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

42 JD INDEX STORM NO. 3
STRM 4.42 PRECIPITATION DEPTH
TRDA 20.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

43 JD INDEX STORM NO. 4
STRM 4.32 PRECIPITATION DEPTH
TRDA 30.00 TRANSPOSITION DRAINAGE AREA

PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

44 JD INDEX STORM NO. 5

STRM 4.27 PRECIPITATION DEPTH

TRDA 40.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

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	SSBX1A	708.	12.30	113.	31.	27.	.43		
HYDROGRAPH AT	SSBX2A	390.	12.40	63.	17.	14.	.28		
HYDROGRAPH AT	SSBX3A	518.	12.40	84.	21.	18.	.43		
HYDROGRAPH AT	SSBX4A	254.	12.30	34.	8.	7.	.16		
HYDROGRAPH AT	SSBX4B	139.	12.30	21.	5.	4.	.09		
HYDROGRAPH AT	SSBX5A	301.	12.40	45.	11.	10.	.23		

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

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

  1           ID                    FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                                 FILE: CC-24
  4           ID
  5           ID        HYDROLOGY FOR:    100 YEAR 24 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK
  9           ID
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                     -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                     &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: SSD 1-5-90         CKD: BRY 1-5-90
 24           IT      6 01JAN89       0     280
              *DIAGRAM
 25           IO      5
 26           IN     15
 27           JD   4.80     .01
 28           PC     .0     .01     .02     .04     .05     .07     .08     .10     .11     .12
 29           PC    .14     .15     .17     .18     .20     .21     .23     .25     .27     .29
 30           PC    .31     .33     .35     .36     .38     .41     .43     .46     .48     .50
 31           PC    .53     .55     .58     .60     .64     .67     .71     .74     .78     .83
 32           PC    .87     .92     .97    1.05    1.13    1.23    1.36    1.86    3.18    3.39
 33           PC   3.53    3.64    3.72    3.80    3.86    3.91    3.96    4.00    4.04    4.08
 34           PC   4.11    4.14    4.17    4.20    4.23    4.26    4.29    4.31    4.33    4.36
 35           PC   4.38    4.41    4.43    4.44    4.46    4.48    4.50    4.52    4.54    4.56
 36           PC   4.57    4.59    4.60    4.62    4.63    4.65    4.66    4.68    4.69    4.70
 37           PC   4.72    4.73    4.75    4.76    4.78    4.79    4.80
 38           JD   4.56      10
 39           JD   4.42      20
 40           JD   4.32      30
 41           JD   4.27      40

 42           KK   X1SUB
 43           KM        RUNOFF FROM SUBBASIN X1
 44           BA   0.60
 45           LU   0.88    0.21   15.95
 46           UD   0.44

 47           KK   XROX2
 48           KM        ROUTE X1 THRUOGH SUBBASIN X2
 49           RM      2    0.15    0.30
```

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

  50          KK   X2SUB
  51          KM        RUNOFF FROM SUBBASIN X2
  52          BA    0.43
  53          LU    0.90    0.29    5.78
  54          UD    0.59

  55          KK   XCO-1
  56          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  57          HC       2

  58          KK   XROX3
  59          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  60          RM       2    0.23    0.30

  61          KK   X3SUB
  62          KM        RUNOFF FROM SUBBASIN X3
  63          BA    0.56
  64          LU    0.93    0.35    0.76
  65          UD    0.69

  66          KK   XCO-2
  67          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  68          HC       2

  69          KK   X4SUB
  70          KM        RUNOFF FROM SUBBASIN X4
  71          BA    0.28
  72          LU    0.89    0.28    0.00
  73          UD    0.48

  74          KK   XCO-3
  75          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  76          HC       2

  77          KK   X5SUB
  78          KM        RUNOFF FROM SUBBASIN X5
  79          BA    0.38
  80          LU    0.93    0.35    0.00
  81          UD    0.66

  82          KK   XCO-4
  83          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  84          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  85          HC       2

  86          KK   SUBC1
  87          KM        RUNOFF FROM SUBBASIN C-1
  88          BA    1.26
  89          LU     .55     .01      0.
  90          UD     .36
```

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

  91          KK   RO-1
  92          KM        ROUTE C-1       THROUGH      C-2
  93          RM       6     .58      .3

  94          KK   SUBC2
  95          KM        RUNOFF FROM SUBBASIN    C-2
  96          BA    2.15
  97          LU     .63     .09      0.
  98          UD     .76

  99          KK   SUBC3
 100          KM        RUNOFF FROM SUBBASIN    C-3
 101          BA    1.25
 102          LU     .61     .06      0.
 103          UD     .50

 104          KK   SUBC4
 105          KM        RUNOFF FROM SUBBASIN    C-4
 106          BA    2.55
 107          LU     .55     .01      0.
 108          UD     .50

 109          KK   RO-2
 110          KM        ROUTE C-4       THROUGH      C-5
 111          RM       3     .27      .3

 112          KK   SUBC5
 113          KM        RUNOFF FROM SUBBASIN    C-5
 114          BA    3.38
 115          LU     .56     .02      0.
 116          UD     .57

 117          KK   CO-1
 118          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 119          HC       2

 120          KK   RO-3
 121          KM        ROUTE C-4&5     THROUGH      C-3
 122          RM       3     .24      .3

 123          KK   CO-2
 124          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 125          HC       4

 126          KK   RO-4
 127          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 128          RM       3     .25      .3

 129          KK   SUBC7
 130          KM        RUNOFF FROM SUBBASIN    C-7
 131          BA    1.18
 132          LU     .87     .18    17.7
 133          UD     .54
```

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

 134          KK   RO-5
 135          KM        ROUTE C-7       THROUGH      C-8
 136          RM       8     .77      .3

 137          KK   SUBC8
 138          KM        RUNOFF FROM SUBBASIN    C-8
 139          BA    1.42
 140          LU     .85     .18     8.8
 141          UD     .64

 142          KK   CO-3
 143          KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
 144          HC       2

 145          KK   CO-4
 146          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
 147          HC       3

 148          KK   RO-6
 149          KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
 150          RM       2     .21      .3

 151          KK   SUBC9
 152          KM        RUNOFF FROM SUBBASIN    C-9
 153          BA     .53
 154          LU     .83     .24     3.9
 155          UD     .48

 156          KK   CO-5
 157          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
 158          KO       1
 159          HC       2
 160          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  42      X1SUB
              V
              V
  47      XROX2
              .
              .
  50          .       X2SUB
              .           .
              .           .
  55      XCO-1............
              V
              V
  58      XROX3
              .
              .
  61          .       X3SUB
              .           .
              .           .
  66      XCO-2............
              .
              .
  69          .       X4SUB
              .           .
              .           .
  74      XCO-3............
              .
              .
              .       X5SUB
              .           .
              .           .
  82      XCO-4............
              .
              .
  86          .       SUBC1
              .           V
              .           V
  91          .       RO-1
              .           .
              .           .
  94          .           .       SUBC2
              .           .           .
              .           .           .
  99          .           .           .       SUBC3
              .           .           .           .
              .           .           .           .
 104          .           .           .           .       SUBC4
              .           .           .           .           V
              .           .           .           .           V
 109          .           .           .           .       RO-2
              .           .           .           .           .
              .           .           .           .           .
 112          .           .           .           .           .       SUBC5
              .           .           .           .           .           .
              .           .           .           .           .           .
              .           .           .           .       CO-1 ............
              .           .           .           .           V
              .           .           .           .           V
 120          .           .           .           .       RO-3
              .           .           .           .           .
```

```
                .          .          .          .          .
123             .       CO-2 ..................................
                .          V
                .          V
126             .       RO-4
                .          .
                .          .
129             .          .       SUBC7
                .          .          V
                .          .          V
134             .          .       RO-5
                .          .          .
                .          .          .
137             .          .          .       SUBC8
                .          .          .          .
                .          .          .          .
142             .          .       CO-3 .............
                .          .          .
                .          .          .
145          CO-4 ........................
                V
                V
148          RO-6
                .
                .
151             .       SUBC9
                .          .
                .          .
156          CO-5 .............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: CC-24

HYDROLOGY FOR: 100 YEAR 24 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF CLINE CREEK

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	6	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN89	STARTING DATE
ITIME	0000	STARTING TIME
NQ	280	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2JAN89	ENDING DATE
NDTIME	0354	ENDING TIME

COMPUTATION INTERVAL .10 HOURS
TOTAL TIME BASE 27.90 HOURS

ENGLISH UNITS

27 JD INDEX STORM NO. 1

STRM	4.80	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

28 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03

.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

38 JD INDEX STORM NO. 2

STRM 4.56 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

39 JD INDEX STORM NO. 3

STRM 4.42 PRECIPITATION DEPTH

TRDA 20.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

40 JD INDEX STORM NO. 4

STRM 4.32 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

41 JD INDEX STORM NO. 5

STRM 4.27 PRECIPITATION DEPTH

TRDA 40.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01

```
                  .00       .00       .01       .01       .01       .00       .00       .00       .00       .00

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

              ***************
              *             *
156 KK        *    CO-5     *
              *             *
              ***************

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

159 HC            HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                            ***

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

                                                 HYDROGRAPH AT     CO-5
                                            TRANSPOSITION AREA        .0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	25.	*	1 JAN 1400	141	6437.	*	1 JAN 2100	211	295.
'AN 0006	2	0.	*	1 JAN 0706	72	25.	*	1 JAN 1406	142	5493.	*	1 JAN 2106	212	283.
JAN 0012	3	0.	*	1 JAN 0712	73	26.	*	1 JAN 1412	143	4719.	*	1 JAN 2112	213	273.
1 JAN 0018	4	0.	*	1 JAN 0718	74	26.	*	1 JAN 1418	144	4082.	*	1 JAN 2118	214	264.
1 JAN 0024	5	0.	*	1 JAN 0724	75	27.	*	1 JAN 1424	145	3557.	*	1 JAN 2124	215	257.
1 JAN 0030	6	0.	*	1 JAN 0730	76	28.	*	1 JAN 1430	146	3121.	*	1 JAN 2130	216	251.
1 JAN 0036	7	1.	*	1 JAN 0736	77	28.	*	1 JAN 1436	147	2756.	*	1 JAN 2136	217	247.
1 JAN 0042	8	1.	*	1 JAN 0742	78	28.	*	1 JAN 1442	148	2448.	*	1 JAN 2142	218	244.
1 JAN 0048	9	2.	*	1 JAN 0748	79	29.	*	1 JAN 1448	149	2186.	*	1 JAN 2148	219	242.
1 JAN 0054	10	3.	*	1 JAN 0754	80	29.	*	1 JAN 1454	150	1965.	*	1 JAN 2154	220	240.
1 JAN 0100	11	4.	*	1 JAN 0800	81	29.	*	1 JAN 1500	151	1777.	*	1 JAN 2200	221	239.
1 JAN 0106	12	5.	*	1 JAN 0806	82	29.	*	1 JAN 1506	152	1617.	*	1 JAN 2206	222	238.
1 JAN 0112	13	6.	*	1 JAN 0812	83	29.	*	1 JAN 1512	153	1481.	*	1 JAN 2212	223	237.
1 JAN 0118	14	7.	*	1 JAN 0818	84	30.	*	1 JAN 1518	154	1363.	*	1 JAN 2218	224	237.
1 JAN 0124	15	9.	*	1 JAN 0824	85	30.	*	1 JAN 1524	155	1262.	*	1 JAN 2224	225	236.
1 JAN 0130	16	10.	*	1 JAN 0830	86	32.	*	1 JAN 1530	156	1174.	*	1 JAN 2230	226	235.
1 JAN 0136	17	11.	*	1 JAN 0836	87	37.	*	1 JAN 1536	157	1098.	*	1 JAN 2236	227	234.
1 JAN 0142	18	13.	*	1 JAN 0842	88	47.	*	1 JAN 1542	158	1033.	*	1 JAN 2242	228	233.
1 JAN 0148	19	14.	*	1 JAN 0848	89	66.	*	1 JAN 1548	159	975.	*	1 JAN 2248	229	230.
1 JAN 0154	20	15.	*	1 JAN 0854	90	95.	*	1 JAN 1554	160	922.	*	1 JAN 2254	230	226.
1 JAN 0200	21	15.	*	1 JAN 0900	91	137.	*	1 JAN 1600	161	873.	*	1 JAN 2300	231	222.
1 JAN 0206	22	16.	*	1 JAN 0906	92	189.	*	1 JAN 1606	162	828.	*	1 JAN 2306	232	217.
1 JAN 0212	23	17.	*	1 JAN 0912	93	248.	*	1 JAN 1612	163	787.	*	1 JAN 2312	233	212.
1 JAN 0218	24	17.	*	1 JAN 0918	94	311.	*	1 JAN 1618	164	751.	*	1 JAN 2318	234	208.
1 JAN 0224	25	17.	*	1 JAN 0924	95	374.	*	1 JAN 1624	165	721.	*	1 JAN 2324	235	207.
1 JAN 0230	26	17.	*	1 JAN 0930	96	435.	*	1 JAN 1630	166	696.	*	1 JAN 2330	236	209.
1 JAN 0236	27	17.	*	1 JAN 0936	97	491.	*	1 JAN 1636	167	677.	*	1 JAN 2336	237	212.
1 JAN 0242	28	17.	*	1 JAN 0942	98	542.	*	1 JAN 1642	168	662.	*	1 JAN 2342	238	217.
1 JAN 0248	29	17.	*	1 JAN 0948	99	587.	*	1 JAN 1648	169	651.	*	1 JAN 2348	239	221.
JAN 0254	30	17.	*	1 JAN 0954	100	625.	*	1 JAN 1654	170	642.	*	1 JAN 2354	240	224.
JAN 0300	31	17.	*	1 JAN 1000	101	657.	*	1 JAN 1700	171	635.	*	2 JAN 0000	241	227.
1 JAN 0306	32	17.	*	1 JAN 1006	102	685.	*	1 JAN 1706	172	628.	*	2 JAN 0006	242	229.
1 JAN 0312	33	17.	*	1 JAN 1012	103	711.	*	1 JAN 1712	173	620.	*	2 JAN 0012	243	230.
1 JAN 0318	34	17.	*	1 JAN 1018	104	737.	*	1 JAN 1718	174	611.	*	2 JAN 0018	244	231.

1 JAN 0324	35	17.	*	1 JAN 1024	105	765.	*	1 JAN 1724	175	598.	*	2 JAN 0024	245	230.
1 JAN 0330	36	17.	*	1 JAN 1030	106	795.	*	1 JAN 1730	176	583.	*	2 JAN 0030	246	228.
1 JAN 0336	37	18.	*	1 JAN 1036	107	829.	*	1 JAN 1736	177	565.	*	2 JAN 0036	247	224.
1 JAN 0342	38	18.	*	1 JAN 1042	108	866.	*	1 JAN 1742	178	544.	*	2 JAN 0042	248	218.
1 JAN 0348	39	18.	*	1 JAN 1048	109	906.	*	1 JAN 1748	179	524.	*	2 JAN 0048	249	208.
N 0354	40	18.	*	1 JAN 1054	110	948.	*	1 JAN 1754	180	504.	*	2 JAN 0054	250	195.
AN 0400	41	18.	*	1 JAN 1100	111	993.	*	1 JAN 1800	181	488.	*	2 JAN 0100	251	179.
1 JAN 0406	42	18.	*	1 JAN 1106	112	1043.	*	1 JAN 1806	182	476.	*	2 JAN 0106	252	160.
1 JAN 0412	43	18.	*	1 JAN 1112	113	1100.	*	1 JAN 1812	183	469.	*	2 JAN 0112	253	139.
1 JAN 0418	44	18.	*	1 JAN 1118	114	1169.	*	1 JAN 1818	184	466.	*	2 JAN 0118	254	118.
1 JAN 0424	45	19.	*	1 JAN 1124	115	1253.	*	1 JAN 1824	185	466.	*	2 JAN 0124	255	97.
1 JAN 0430	46	19.	*	1 JAN 1130	116	1357.	*	1 JAN 1830	186	467.	*	2 JAN 0130	256	78.
1 JAN 0436	47	19.	*	1 JAN 1136	117	1489.	*	1 JAN 1836	187	466.	*	2 JAN 0136	257	61.
1 JAN 0442	48	19.	*	1 JAN 1142	118	1660.	*	1 JAN 1842	188	463.	*	2 JAN 0142	258	47.
1 JAN 0448	49	20.	*	1 JAN 1148	119	1900.	*	1 JAN 1848	189	455.	*	2 JAN 0148	259	35.
1 JAN 0454	50	20.	*	1 JAN 1154	120	2248.	*	1 JAN 1854	190	444.	*	2 JAN 0154	260	26.
1 JAN 0500	51	21.	*	1 JAN 1200	121	2759.	*	1 JAN 1900	191	428.	*	2 JAN 0200	261	20.
1 JAN 0506	52	21.	*	1 JAN 1206	122	3487.	*	1 JAN 1906	192	408.	*	2 JAN 0206	262	15.
1 JAN 0512	53	22.	*	1 JAN 1212	123	4464.	*	1 JAN 1912	193	385.	*	2 JAN 0212	263	11.
1 JAN 0518	54	22.	*	1 JAN 1218	124	5690.	*	1 JAN 1918	194	363.	*	2 JAN 0218	264	8.
1 JAN 0524	55	23.	*	1 JAN 1224	125	7168.	*	1 JAN 1924	195	343.	*	2 JAN 0224	265	6.
1 JAN 0530	56	23.	*	1 JAN 1230	126	8876.	*	1 JAN 1930	196	329.	*	2 JAN 0230	266	4.
1 JAN 0536	57	23.	*	1 JAN 1236	127	10731.	*	1 JAN 1936	197	321.	*	2 JAN 0236	267	3.
1 JAN 0542	58	24.	*	1 JAN 1242	128	12629.	*	1 JAN 1942	198	319.	*	2 JAN 0242	268	2.
1 JAN 0548	59	24.	*	1 JAN 1248	129	14444.	*	1 JAN 1948	199	320.	*	2 JAN 0248	269	2.
1 JAN 0554	60	24.	*	1 JAN 1254	130	16032.	*	1 JAN 1954	200	324.	*	2 JAN 0254	270	1.
1 JAN 0600	61	24.	*	1 JAN 1300	131	17216.	*	1 JAN 2000	201	328.	*	2 JAN 0300	271	1.
1 JAN 0606	62	24.	*	1 JAN 1306	132	17838.	*	1 JAN 2006	202	331.	*	2 JAN 0306	272	1.
1 JAN 0612	63	24.	*	1 JAN 1312	133	17796.	*	1 JAN 2012	203	334.	*	2 JAN 0312	273	0.
1 JAN 0618	64	23.	*	1 JAN 1318	134	17091.	*	1 JAN 2018	204	336.	*	2 JAN 0318	274	0.
1 JAN 0624	65	23.	*	1 JAN 1324	135	15823.	*	1 JAN 2024	205	336.	*	2 JAN 0324	275	0.
1 JAN 0630	66	23.	*	1 JAN 1330	136	14168.	*	1 JAN 2030	206	334.	*	2 JAN 0330	276	0.
1 JAN 0636	67	23.	*	1 JAN 1336	137	12348.	*	1 JAN 2036	207	331.	*	2 JAN 0336	277	0.
AN 0642	68	23.	*	1 JAN 1342	138	10567.	*	1 JAN 2042	208	325.	*	2 JAN 0342	278	0.
JAN 0648	69	24.	*	1 JAN 1348	139	8961.	*	1 JAN 2048	209	317.	*	2 JAN 0348	279	0.
1 JAN 0654	70	24.	*	1 JAN 1354	140	7584.	*	1 JAN 2054	210	307.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
17838.	13.10	(CFS)	4962.	1407.	1211.	1211.
		(INCHES)	2.889	3.277	3.279	3.279
		(AC-FT)	2460.	2791.	2792.	2792.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	23.	*	1 JAN 1400	141	6077.	*	1 JAN 2100	211	276.
1 JAN 0006	2	0.	*	1 JAN 0706	72	24.	*	1 JAN 1406	142	5182.	*	1 JAN 2106	212	265.
1 JAN 0012	3	0.	*	1 JAN 0712	73	25.	*	1 JAN 1412	143	4448.	*	1 JAN 2112	213	255.
1 JAN 0018	4	0.	*	1 JAN 0718	74	25.	*	1 JAN 1418	144	3845.	*	1 JAN 2118	214	246.
JAN 0024	5	0.	*	1 JAN 0724	75	26.	*	1 JAN 1424	145	3348.	*	1 JAN 2124	215	240.
JAN 0030	6	0.	*	1 JAN 0730	76	26.	*	1 JAN 1430	146	2935.	*	1 JAN 2130	216	234.
1 JAN 0036	7	1.	*	1 JAN 0736	77	27.	*	1 JAN 1436	147	2590.	*	1 JAN 2136	217	230.
1 JAN 0042	8	1.	*	1 JAN 0742	78	27.	*	1 JAN 1442	148	2299.	*	1 JAN 2142	218	227.
1 JAN 0048	9	2.	*	1 JAN 0748	79	27.	*	1 JAN 1448	149	2052.	*	1 JAN 2148	219	225.

1	JAN	0054	10	3.	*	1	JAN	0754	80	27.	*	1	JAN	1454	150	1843.	*	1	JAN	2154	220	224.
1	JAN	0100	11	4.	*	1	JAN	0800	81	28.	*	1	JAN	1500	151	1666.	*	1	JAN	2200	221	223.
1	JAN	0106	12	5.	*	1	JAN	0806	82	28.	*	1	JAN	1506	152	1515.	*	1	JAN	2206	222	222.
1	JAN	0112	13	6.	*	1	JAN	0812	83	28.	*	1	JAN	1512	153	1387.	*	1	JAN	2212	223	221.
1	JAN	0118	14	7.	*	1	JAN	0818	84	28.	*	1	JAN	1518	154	1276.	*	1	JAN	2218	224	220.
		0124	15	8.	*	1	JAN	0824	85	28.	*	1	JAN	1524	155	1181.	*	1	JAN	2224	225	220.
	JAN	0130	16	10.	*	1	JAN	0830	86	28.	*	1	JAN	1530	156	1098.	*	1	JAN	2230	226	219.
1	JAN	0136	17	11.	*	1	JAN	0836	87	29.	*	1	JAN	1536	157	1027.	*	1	JAN	2236	227	218.
1	JAN	0142	18	12.	*	1	JAN	0842	88	29.	*	1	JAN	1542	158	966.	*	1	JAN	2242	228	217.
1	JAN	0148	19	13.	*	1	JAN	0848	89	32.	*	1	JAN	1548	159	911.	*	1	JAN	2248	229	214.
1	JAN	0154	20	14.	*	1	JAN	0854	90	37.	*	1	JAN	1554	160	862.	*	1	JAN	2254	230	211.
1	JAN	0200	21	15.	*	1	JAN	0900	91	48.	*	1	JAN	1600	161	816.	*	1	JAN	2300	231	207.
1	JAN	0206	22	15.	*	1	JAN	0906	92	69.	*	1	JAN	1606	162	774.	*	1	JAN	2306	232	202.
1	JAN	0212	23	16.	*	1	JAN	0912	93	102.	*	1	JAN	1612	163	735.	*	1	JAN	2312	233	197.
1	JAN	0218	24	16.	*	1	JAN	0918	94	150.	*	1	JAN	1618	164	701.	*	1	JAN	2318	234	194.
1	JAN	0224	25	16.	*	1	JAN	0924	95	210.	*	1	JAN	1624	165	672.	*	1	JAN	2324	235	193.
1	JAN	0230	26	17.	*	1	JAN	0930	96	278.	*	1	JAN	1630	166	649.	*	1	JAN	2330	236	194.
1	JAN	0236	27	17.	*	1	JAN	0936	97	349.	*	1	JAN	1636	167	631.	*	1	JAN	2336	237	197.
1	JAN	0242	28	17.	*	1	JAN	0942	98	417.	*	1	JAN	1642	168	617.	*	1	JAN	2342	238	202.
1	JAN	0248	29	17.	*	1	JAN	0948	99	477.	*	1	JAN	1648	169	606.	*	1	JAN	2348	239	205.
1	JAN	0254	30	16.	*	1	JAN	0954	100	528.	*	1	JAN	1654	170	598.	*	1	JAN	2354	240	209.
1	JAN	0300	31	16.	*	1	JAN	1000	101	570.	*	1	JAN	1700	171	591.	*	2	JAN	0000	241	211.
1	JAN	0306	32	16.	*	1	JAN	1006	102	606.	*	1	JAN	1706	172	584.	*	2	JAN	0006	242	213.
1	JAN	0312	33	16.	*	1	JAN	1012	103	639.	*	1	JAN	1712	173	577.	*	2	JAN	0012	243	214.
1	JAN	0318	34	17.	*	1	JAN	1018	104	669.	*	1	JAN	1718	174	568.	*	2	JAN	0018	244	215.
1	JAN	0324	35	17.	*	1	JAN	1024	105	700.	*	1	JAN	1724	175	557.	*	2	JAN	0024	245	214.
1	JAN	0330	36	17.	*	1	JAN	1030	106	732.	*	1	JAN	1730	176	543.	*	2	JAN	0030	246	213.
1	JAN	0336	37	17.	*	1	JAN	1036	107	765.	*	1	JAN	1736	177	526.	*	2	JAN	0036	247	209.
1	JAN	0342	38	17.	*	1	JAN	1042	108	801.	*	1	JAN	1742	178	507.	*	2	JAN	0042	248	203.
1	JAN	0348	39	17.	*	1	JAN	1048	109	840.	*	1	JAN	1748	179	488.	*	2	JAN	0048	249	194.
1	JAN	0354	40	17.	*	1	JAN	1054	110	879.	*	1	JAN	1754	180	469.	*	2	JAN	0054	250	182.
1	JAN	0400	41	17.	*	1	JAN	1100	111	921.	*	1	JAN	1800	181	454.	*	2	JAN	0100	251	166.
	JAN	0406	42	17.	*	1	JAN	1106	112	967.	*	1	JAN	1806	182	443.	*	2	JAN	0106	252	149.
		0412	43	17.	*	1	JAN	1112	113	1019.	*	1	JAN	1812	183	436.	*	2	JAN	0112	253	130.
	JAN	0418	44	18.	*	1	JAN	1118	114	1083.	*	1	JAN	1818	184	434.	*	2	JAN	0118	254	110.
1	JAN	0424	45	18.	*	1	JAN	1124	115	1162.	*	1	JAN	1824	185	434.	*	2	JAN	0124	255	91.
1	JAN	0430	46	18.	*	1	JAN	1130	116	1258.	*	1	JAN	1830	186	434.	*	2	JAN	0130	256	73.
1	JAN	0436	47	18.	*	1	JAN	1136	117	1380.	*	1	JAN	1836	187	434.	*	2	JAN	0136	257	57.
1	JAN	0442	48	18.	*	1	JAN	1142	118	1540.	*	1	JAN	1842	188	430.	*	2	JAN	0142	258	44.
1	JAN	0448	49	19.	*	1	JAN	1148	119	1767.	*	1	JAN	1848	189	424.	*	2	JAN	0148	259	33.
1	JAN	0454	50	19.	*	1	JAN	1154	120	2095.	*	1	JAN	1854	190	413.	*	2	JAN	0154	260	25.
1	JAN	0500	51	20.	*	1	JAN	1200	121	2579.	*	1	JAN	1900	191	399.	*	2	JAN	0200	261	18.
1	JAN	0506	52	20.	*	1	JAN	1206	122	3269.	*	1	JAN	1906	192	380.	*	2	JAN	0206	262	14.
1	JAN	0512	53	21.	*	1	JAN	1212	123	4196.	*	1	JAN	1912	193	359.	*	2	JAN	0212	263	10.
1	JAN	0518	54	21.	*	1	JAN	1218	124	5360.	*	1	JAN	1918	194	338.	*	2	JAN	0218	264	7.
1	JAN	0524	55	21.	*	1	JAN	1224	125	6763.	*	1	JAN	1924	195	320.	*	2	JAN	0224	265	6.
1	JAN	0530	56	22.	*	1	JAN	1230	126	8385.	*	1	JAN	1930	196	306.	*	2	JAN	0230	266	4.
1	JAN	0536	57	22.	*	1	JAN	1236	127	10147.	*	1	JAN	1936	197	299.	*	2	JAN	0236	267	3.
1	JAN	0542	58	22.	*	1	JAN	1242	128	11950.	*	1	JAN	1942	198	296.	*	2	JAN	0242	268	2.
1	JAN	0548	59	23.	*	1	JAN	1248	129	13674.	*	1	JAN	1948	199	298.	*	2	JAN	0248	269	2.
1	JAN	0554	60	23.	*	1	JAN	1254	130	15182.	*	1	JAN	1954	200	301.	*	2	JAN	0254	270	1.
1	JAN	0600	61	23.	*	1	JAN	1300	131	16306.	*	1	JAN	2000	201	305.	*	2	JAN	0300	271	1.
1	JAN	0606	62	23.	*	1	JAN	1306	132	16897.	*	1	JAN	2006	202	309.	*	2	JAN	0306	272	1.
1	JAN	0612	63	22.	*	1	JAN	1312	133	16858.	*	1	JAN	2012	203	311.	*	2	JAN	0312	273	0.
1	JAN	0618	64	22.	*	1	JAN	1318	134	16188.	*	1	JAN	2018	204	313.	*	2	JAN	0318	274	0.
1	JAN	0624	65	22.	*	1	JAN	1324	135	14983.	*	1	JAN	2024	205	313.	*	2	JAN	0324	275	0.
1	JAN	0630	66	22.	*	1	JAN	1330	136	13412.	*	1	JAN	2030	206	312.	*	2	JAN	0330	276	0.
1	JAN	0636	67	22.	*	1	JAN	1336	137	11685.	*	1	JAN	2036	207	309.	*	2	JAN	0336	277	0.
1	JAN	0642	68	22.	*	1	JAN	1342	138	9995.	*	1	JAN	2042	208	304.	*	2	JAN	0342	278	0.
1	JAN	0648	69	23.	*	1	JAN	1348	139	8471.	*	1	JAN	2048	209	296.	*	2	JAN	0348	279	0.
	JAN	0654	70	23.	*	1	JAN	1354	140	7165.	*	1	JAN	2054	210	287.	*	2	JAN	0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR

16897.	13.10	(CFS)	4682.	1321.	1137.	1137.
		(INCHES)	2.726	3.075	3.077	3.077
		(AC-FT)	2321.	2619.	2621.	2621.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	JAN	0000	1	0.	1	JAN	0700	71	23.	1	JAN	1400	141	5868.	1	JAN	2100	211	264.
1	JAN	0006	2	0.	1	JAN	0706	72	23.	1	JAN	1406	142	5001.	1	JAN	2106	212	254.
1	JAN	0012	3	0.	1	JAN	0712	73	24.	1	JAN	1412	143	4290.	1	JAN	2112	213	244.
1	JAN	0018	4	0.	1	JAN	0718	74	24.	1	JAN	1418	144	3707.	1	JAN	2118	214	236.
1	JAN	0024	5	0.	1	JAN	0724	75	25.	1	JAN	1424	145	3226.	1	JAN	2124	215	229.
1	JAN	0030	6	0.	1	JAN	0730	76	25.	1	JAN	1430	146	2827.	1	JAN	2130	216	224.
1	JAN	0036	7	1.	1	JAN	0736	77	26.	1	JAN	1436	147	2493.	1	JAN	2136	217	221.
1	JAN	0042	8	1.	1	JAN	0742	78	26.	1	JAN	1442	148	2211.	1	JAN	2142	218	218.
1	JAN	0048	9	2.	1	JAN	0748	79	26.	1	JAN	1448	149	1973.	1	JAN	2148	219	216.
1	JAN	0054	10	3.	1	JAN	0754	80	27.	1	JAN	1454	150	1772.	1	JAN	2154	220	214.
1	JAN	0100	11	4.	1	JAN	0800	81	27.	1	JAN	1500	151	1601.	1	JAN	2200	221	213.
1	JAN	0106	12	5.	1	JAN	0806	82	27.	1	JAN	1506	152	1455.	1	JAN	2206	222	212.
1	JAN	0112	13	6.	1	JAN	0812	83	27.	1	JAN	1512	153	1332.	1	JAN	2212	223	211.
1	JAN	0118	14	7.	1	JAN	0818	84	27.	1	JAN	1518	154	1225.	1	JAN	2218	224	211.
1	JAN	0124	15	8.	1	JAN	0824	85	27.	1	JAN	1524	155	1133.	1	JAN	2224	225	210.
1	JAN	0130	16	9.	1	JAN	0830	86	27.	1	JAN	1530	156	1054.	1	JAN	2230	226	210.
1	JAN	0136	17	10.	1	JAN	0836	87	28.	1	JAN	1536	157	986.	1	JAN	2236	227	209.
	AN	0142	18	12.	1	JAN	0842	88	28.	1	JAN	1542	158	927.	1	JAN	2242	228	208.
	JAN	0148	19	13.	1	JAN	0848	89	29.	1	JAN	1548	159	874.	1	JAN	2248	229	205.
1	JAN	0154	20	13.	1	JAN	0854	90	30.	1	JAN	1554	160	827.	1	JAN	2254	230	202.
1	JAN	0200	21	14.	1	JAN	0900	91	34.	1	JAN	1600	161	783.	1	JAN	2300	231	198.
1	JAN	0206	22	15.	1	JAN	0906	92	42.	1	JAN	1606	162	742.	1	JAN	2306	232	193.
1	JAN	0212	23	15.	1	JAN	0912	93	58.	1	JAN	1612	163	704.	1	JAN	2312	233	188.
1	JAN	0218	24	16.	1	JAN	0918	94	86.	1	JAN	1618	164	671.	1	JAN	2318	234	185.
1	JAN	0224	25	16.	1	JAN	0924	95	129.	1	JAN	1624	165	644.	1	JAN	2324	235	184.
1	JAN	0230	26	16.	1	JAN	0930	96	185.	1	JAN	1630	166	621.	1	JAN	2330	236	186.
1	JAN	0236	27	16.	1	JAN	0936	97	251.	1	JAN	1636	167	604.	1	JAN	2336	237	189.
1	JAN	0242	28	16.	1	JAN	0942	98	321.	1	JAN	1642	168	590.	1	JAN	2342	238	193.
1	JAN	0248	29	16.	1	JAN	0948	99	388.	1	JAN	1648	169	580.	1	JAN	2348	239	196.
1	JAN	0254	30	16.	1	JAN	0954	100	448.	1	JAN	1654	170	572.	1	JAN	2354	240	200.
1	JAN	0300	31	16.	1	JAN	1000	101	500.	1	JAN	1700	171	565.	2	JAN	0000	241	202.
1	JAN	0306	32	16.	1	JAN	1006	102	545.	1	JAN	1706	172	559.	2	JAN	0006	242	204.
1	JAN	0312	33	16.	1	JAN	1012	103	584.	1	JAN	1712	173	552.	2	JAN	0012	243	205.
1	JAN	0318	34	16.	1	JAN	1018	104	620.	1	JAN	1718	174	544.	2	JAN	0018	244	206.
1	JAN	0324	35	16.	1	JAN	1024	105	654.	1	JAN	1724	175	533.	2	JAN	0024	245	205.
1	JAN	0330	36	16.	1	JAN	1030	106	688.	1	JAN	1730	176	520.	2	JAN	0030	246	204.
1	JAN	0336	37	16.	1	JAN	1036	107	724.	1	JAN	1736	177	503.	2	JAN	0036	247	200.
1	JAN	0342	38	16.	1	JAN	1042	108	761.	1	JAN	1742	178	485.	2	JAN	0042	248	194.
1	JAN	0348	39	16.	1	JAN	1048	109	799.	1	JAN	1748	179	467.	2	JAN	0048	249	186.
1	JAN	0354	40	17.	1	JAN	1054	110	838.	1	JAN	1754	180	449.	2	JAN	0054	250	174.
1	JAN	0400	41	17.	1	JAN	1100	111	878.	1	JAN	1800	181	434.	2	JAN	0100	251	159.
1	JAN	0406	42	17.	1	JAN	1106	112	922.	1	JAN	1806	182	423.	2	JAN	0106	252	142.
1	JAN	0412	43	17.	1	JAN	1112	113	973.	1	JAN	1812	183	417.	2	JAN	0112	253	124.
1	JAN	0418	44	17.	1	JAN	1118	114	1034.	1	JAN	1818	184	415.	2	JAN	0118	254	105.
1	JAN	0424	45	17.	1	JAN	1124	115	1109.	1	JAN	1824	185	415.	2	JAN	0124	255	87.
	AN	0430	46	17.	1	JAN	1130	116	1201.	1	JAN	1830	186	415.	2	JAN	0130	256	70.
	JAN	0436	47	18.	1	JAN	1136	117	1318.	1	JAN	1836	187	415.	2	JAN	0136	257	54.
1	JAN	0442	48	18.	1	JAN	1142	118	1472.	1	JAN	1842	188	412.	2	JAN	0142	258	42.
1	JAN	0448	49	18.	1	JAN	1148	119	1690.	1	JAN	1848	189	406.	2	JAN	0148	259	31.
1	JAN	0454	50	19.	1	JAN	1154	120	2007.	1	JAN	1854	190	396.	2	JAN	0154	260	23.

1 JAN 0500	51	19.	*	1 JAN 1200	121	2475.	*	1 JAN 1900	191	382.	*	2 JAN 0200	261	17.
1 JAN 0506	52	20.	*	1 JAN 1206	122	3142.	*	1 JAN 1906	192	364.	*	2 JAN 0206	262	13.
1 JAN 0512	53	20.	*	1 JAN 1212	123	4040.	*	1 JAN 1912	193	344.	*	2 JAN 0212	263	10.
1 JAN 0518	54	20.	*	1 JAN 1218	124	5168.	*	1 JAN 1918	194	323.	*	2 JAN 0218	264	7.
1 JAN 0524	55	21.	*	1 JAN 1224	125	6527.	*	1 JAN 1924	195	306.	*	2 JAN 0224	265	5.
N 0530	56	21.	*	1 JAN 1230	126	8099.	*	1 JAN 1930	196	293.	*	2 JAN 0230	266	4.
N 0536	57	22.	*	1 JAN 1236	127	9806.	*	1 JAN 1936	197	286.	*	2 JAN 0236	267	3.
1 JAN 0542	58	22.	*	1 JAN 1242	128	11553.	*	1 JAN 1942	198	283.	*	2 JAN 0242	268	2.
1 JAN 0548	59	22.	*	1 JAN 1248	129	13224.	*	1 JAN 1948	199	285.	*	2 JAN 0248	269	2.
1 JAN 0554	60	22.	*	1 JAN 1254	130	14686.	*	1 JAN 1954	200	288.	*	2 JAN 0254	270	1.
1 JAN 0600	61	22.	*	1 JAN 1300	131	15776.	*	1 JAN 2000	201	292.	*	2 JAN 0300	271	1.
1 JAN 0606	62	22.	*	1 JAN 1306	132	16349.	*	1 JAN 2006	202	295.	*	2 JAN 0306	272	1.
1 JAN 0612	63	22.	*	1 JAN 1312	133	16310.	*	1 JAN 2012	203	298.	*	2 JAN 0312	273	0.
1 JAN 0618	64	22.	*	1 JAN 1318	134	15662.	*	1 JAN 2018	204	300.	*	2 JAN 0318	274	0.
1 JAN 0624	65	21.	*	1 JAN 1324	135	14494.	*	1 JAN 2024	205	300.	*	2 JAN 0324	275	0.
1 JAN 0630	66	21.	*	1 JAN 1330	136	12972.	*	1 JAN 2030	206	299.	*	2 JAN 0330	276	0.
1 JAN 0636	67	21.	*	1 JAN 1336	137	11298.	*	1 JAN 2036	207	296.	*	2 JAN 0336	277	0.
1 JAN 0642	68	22.	*	1 JAN 1342	138	9661.	*	1 JAN 2042	208	291.	*	2 JAN 0342	278	0.
1 JAN 0648	69	22.	*	1 JAN 1348	139	8185.	*	1 JAN 2048	209	284.	*	2 JAN 0348	279	0.
1 JAN 0654	70	22.	*	1 JAN 1354	140	6921.	*	1 JAN 2054	210	275.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
16349.	13.10	(CFS)	4518.	1270.	1093.	1093.
		(INCHES)	2.630	2.958	2.960	2.960
		(AC-FT)	2240.	2520.	2521.	2521.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	22.	*	1 JAN 1400	141	5718.	*	1 JAN 2100	211	256.
1 JAN 0006	2	0.	*	1 JAN 0706	72	23.	*	1 JAN 1406	142	4872.	*	1 JAN 2106	212	246.
1 JAN 0012	3	0.	*	1 JAN 0712	73	23.	*	1 JAN 1412	143	4178.	*	1 JAN 2112	213	236.
1 JAN 0018	4	0.	*	1 JAN 0718	74	24.	*	1 JAN 1418	144	3608.	*	1 JAN 2118	214	228.
1 JAN 0024	5	0.	*	1 JAN 0724	75	24.	*	1 JAN 1424	145	3139.	*	1 JAN 2124	215	222.
1 JAN 0030	6	0.	*	1 JAN 0730	76	25.	*	1 JAN 1430	146	2749.	*	1 JAN 2130	216	217.
1 JAN 0036	7	1.	*	1 JAN 0736	77	25.	*	1 JAN 1436	147	2424.	*	1 JAN 2136	217	214.
1 JAN 0042	8	1.	*	1 JAN 0742	78	26.	*	1 JAN 1442	148	2149.	*	1 JAN 2142	218	211.
1 JAN 0048	9	2.	*	1 JAN 0748	79	26.	*	1 JAN 1448	149	1917.	*	1 JAN 2148	219	209.
1 JAN 0054	10	3.	*	1 JAN 0754	80	26.	*	1 JAN 1454	150	1721.	*	1 JAN 2154	220	207.
1 JAN 0100	11	3.	*	1 JAN 0800	81	26.	*	1 JAN 1500	151	1554.	*	1 JAN 2200	221	206.
1 JAN 0106	12	4.	*	1 JAN 0806	82	26.	*	1 JAN 1506	152	1413.	*	1 JAN 2206	222	205.
1 JAN 0112	13	6.	*	1 JAN 0812	83	26.	*	1 JAN 1512	153	1292.	*	1 JAN 2212	223	205.
1 JAN 0118	14	7.	*	1 JAN 0818	84	27.	*	1 JAN 1518	154	1189.	*	1 JAN 2218	224	204.
1 JAN 0124	15	8.	*	1 JAN 0824	85	27.	*	1 JAN 1524	155	1099.	*	1 JAN 2224	225	204.
1 JAN 0130	16	9.	*	1 JAN 0830	86	27.	*	1 JAN 1530	156	1022.	*	1 JAN 2230	226	203.
1 JAN 0136	17	10.	*	1 JAN 0836	87	27.	*	1 JAN 1536	157	956.	*	1 JAN 2236	227	202.
1 JAN 0142	18	11.	*	1 JAN 0842	88	27.	*	1 JAN 1542	158	899.	*	1 JAN 2242	228	201.
1 JAN 0148	19	12.	*	1 JAN 0848	89	28.	*	1 JAN 1548	159	848.	*	1 JAN 2248	229	199.
1 JAN 0154	20	13.	*	1 JAN 0854	90	29.	*	1 JAN 1554	160	802.	*	1 JAN 2254	230	196.
JAN 0200	21	14.	*	1 JAN 0900	91	30.	*	1 JAN 1600	161	759.	*	1 JAN 2300	231	192.
JAN 0206	22	15.	*	1 JAN 0906	92	34.	*	1 JAN 1606	162	719.	*	1 JAN 2306	232	187.
1 JAN 0212	23	15.	*	1 JAN 0912	93	42.	*	1 JAN 1612	163	683.	*	1 JAN 2312	233	182.
1 JAN 0218	24	15.	*	1 JAN 0918	94	58.	*	1 JAN 1618	164	650.	*	1 JAN 2318	234	179.
1 JAN 0224	25	16.	*	1 JAN 0924	95	86.	*	1 JAN 1624	165	623.	*	1 JAN 2324	235	178.

1 JAN 0230	26	16.	*	1 JAN 0930	96	127.	*	1 JAN 1630	166	602.	*	1 JAN 2330	236	179.
1 JAN 0236	27	16.	*	1 JAN 0936	97	181.	*	1 JAN 1636	167	585.	*	1 JAN 2336	237	183.
1 JAN 0242	28	16.	*	1 JAN 0942	98	244.	*	1 JAN 1642	168	571.	*	1 JAN 2342	238	186.
1 JAN 0248	29	16.	*	1 JAN 0948	99	310.	*	1 JAN 1648	169	561.	*	1 JAN 2348	239	190.
1 JAN 0254	30	16.	*	1 JAN 0954	100	375.	*	1 JAN 1654	170	553.	*	1 JAN 2354	240	193.
1 JAN 0300	31	16.	*	1 JAN 1000	101	434.	*	1 JAN 1700	171	547.	*	2 JAN 0000	241	195.
1 JAN 0306	32	16.	*	1 JAN 1006	102	487.	*	1 JAN 1706	172	541.	*	2 JAN 0006	242	197.
1 JAN 0312	33	16.	*	1 JAN 1012	103	533.	*	1 JAN 1712	173	534.	*	2 JAN 0012	243	198.
1 JAN 0318	34	16.	*	1 JAN 1018	104	575.	*	1 JAN 1718	174	526.	*	2 JAN 0018	244	199.
1 JAN 0324	35	16.	*	1 JAN 1024	105	614.	*	1 JAN 1724	175	516.	*	2 JAN 0024	245	199.
1 JAN 0330	36	16.	*	1 JAN 1030	106	652.	*	1 JAN 1730	176	503.	*	2 JAN 0030	246	197.
1 JAN 0336	37	16.	*	1 JAN 1036	107	690.	*	1 JAN 1736	177	487.	*	2 JAN 0036	247	194.
1 JAN 0342	38	16.	*	1 JAN 1042	108	729.	*	1 JAN 1742	178	470.	*	2 JAN 0042	248	188.
1 JAN 0348	39	16.	*	1 JAN 1048	109	768.	*	1 JAN 1748	179	452.	*	2 JAN 0048	249	180.
1 JAN 0354	40	16.	*	1 JAN 1054	110	807.	*	1 JAN 1754	180	435.	*	2 JAN 0054	250	168.
1 JAN 0400	41	16.	*	1 JAN 1100	111	847.	*	1 JAN 1800	181	420.	*	2 JAN 0100	251	154.
1 JAN 0406	42	16.	*	1 JAN 1106	112	890.	*	1 JAN 1806	182	410.	*	2 JAN 0106	252	138.
1 JAN 0412	43	17.	*	1 JAN 1112	113	939.	*	1 JAN 1812	183	404.	*	2 JAN 0112	253	120.
1 JAN 0418	44	17.	*	1 JAN 1118	114	998.	*	1 JAN 1818	184	401.	*	2 JAN 0118	254	102.
1 JAN 0424	45	17.	*	1 JAN 1124	115	1071.	*	1 JAN 1824	185	401.	*	2 JAN 0124	255	84.
1 JAN 0430	46	17.	*	1 JAN 1130	116	1160.	*	1 JAN 1830	186	402.	*	2 JAN 0130	256	67.
1 JAN 0436	47	17.	*	1 JAN 1136	117	1274.	*	1 JAN 1836	187	401.	*	2 JAN 0136	257	53.
1 JAN 0442	48	18.	*	1 JAN 1142	118	1423.	*	1 JAN 1842	188	398.	*	2 JAN 0142	258	40.
1 JAN 0448	49	18.	*	1 JAN 1148	119	1635.	*	1 JAN 1848	189	393.	*	2 JAN 0148	259	30.
1 JAN 0454	50	18.	*	1 JAN 1154	120	1944.	*	1 JAN 1854	190	383.	*	2 JAN 0154	260	23.
1 JAN 0500	51	19.	*	1 JAN 1200	121	2401.	*	1 JAN 1900	191	370.	*	2 JAN 0200	261	17.
1 JAN 0506	52	19.	*	1 JAN 1206	122	3052.	*	1 JAN 1906	192	352.	*	2 JAN 0206	262	13.
1 JAN 0512	53	20.	*	1 JAN 1212	123	3929.	*	1 JAN 1912	193	333.	*	2 JAN 0212	263	9.
1 JAN 0518	54	20.	*	1 JAN 1218	124	5031.	*	1 JAN 1918	194	313.	*	2 JAN 0218	264	7.
1 JAN 0524	55	20.	*	1 JAN 1224	125	6358.	*	1 JAN 1924	195	296.	*	2 JAN 0224	265	5.
1 JAN 0530	56	21.	*	1 JAN 1230	126	7895.	*	1 JAN 1930	196	283.	*	2 JAN 0230	266	4.
1 JAN 0536	57	21.	*	1 JAN 1236	127	9563.	*	1 JAN 1936	197	276.	*	2 JAN 0236	267	3.
1 JAN 0542	58	21.	*	1 JAN 1242	128	11270.	*	1 JAN 1942	198	274.	*	2 JAN 0242	268	2.
1 JAN 0548	59	21.	*	1 JAN 1248	129	12903.	*	1 JAN 1948	199	276.	*	2 JAN 0248	269	1.
1 JAN 0554	60	22.	*	1 JAN 1254	130	14332.	*	1 JAN 1954	200	279.	*	2 JAN 0254	270	1.
1 JAN 0600	61	21.	*	1 JAN 1300	131	15397.	*	1 JAN 2000	201	283.	*	2 JAN 0300	271	1.
1 JAN 0606	62	21.	*	1 JAN 1306	132	15957.	*	1 JAN 2006	202	286.	*	2 JAN 0306	272	0.
1 JAN 0612	63	21.	*	1 JAN 1312	133	15919.	*	1 JAN 2012	203	289.	*	2 JAN 0312	273	0.
1 JAN 0618	64	21.	*	1 JAN 1318	134	15286.	*	1 JAN 2018	204	290.	*	2 JAN 0318	274	0.
1 JAN 0624	65	21.	*	1 JAN 1324	135	14145.	*	1 JAN 2024	205	291.	*	2 JAN 0324	275	0.
1 JAN 0630	66	21.	*	1 JAN 1330	136	12658.	*	1 JAN 2030	206	290.	*	2 JAN 0330	276	0.
1 JAN 0636	67	21.	*	1 JAN 1336	137	11023.	*	1 JAN 2036	207	287.	*	2 JAN 0336	277	0.
1 JAN 0642	68	21.	*	1 JAN 1342	138	9424.	*	1 JAN 2042	208	282.	*	2 JAN 0342	278	0.
1 JAN 0648	69	21.	*	1 JAN 1348	139	7982.	*	1 JAN 2048	209	275.	*	2 JAN 0348	279	0.
1 JAN 0654	70	22.	*	1 JAN 1354	140	6747.	*	1 JAN 2054	210	266.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
15957.	13.10	(CFS)	4401.	1234.	1062.	1062.
		(INCHES)	2.562	2.875	2.876	2.876
		(AC-FT)	2182.	2448.	2450.	2450.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
			*				*				*			

1	JAN 0000	1	0.	*	1	JAN 0700	71	22.	*	1	JAN 1400	141	5644.	*	1	JAN 2100	211	252.
1	JAN 0006	2	0.	*	1	JAN 0706	72	22.	*	1	JAN 1406	142	4808.	*	1	JAN 2106	212	242.
1	JAN 0012	3	0.	*	1	JAN 0712	73	23.	*	1	JAN 1412	143	4122.	*	1	JAN 2112	213	233.
1	JAN 0018	4	0.	*	1	JAN 0718	74	24.	*	1	JAN 1418	144	3560.	*	1	JAN 2118	214	225.
1	JAN 0024	5	0.	*	1	JAN 0724	75	24.	*	1	JAN 1424	145	3096.	*	1	JAN 2124	215	219.
	JAN 0030	6	0.	*	1	JAN 0730	76	25.	*	1	JAN 1430	146	2712.	*	1	JAN 2130	216	214.
	JAN 0036	7	1.	*	1	JAN 0736	77	25.	*	1	JAN 1436	147	2390.	*	1	JAN 2136	217	210.
1	JAN 0042	8	1.	*	1	JAN 0742	78	25.	*	1	JAN 1442	148	2120.	*	1	JAN 2142	218	207.
1	JAN 0048	9	2.	*	1	JAN 0748	79	26.	*	1	JAN 1448	149	1890.	*	1	JAN 2148	219	205.
1	JAN 0054	10	3.	*	1	JAN 0754	80	26.	*	1	JAN 1454	150	1696.	*	1	JAN 2154	220	204.
1	JAN 0100	11	3.	*	1	JAN 0800	81	26.	*	1	JAN 1500	151	1532.	*	1	JAN 2200	221	203.
1	JAN 0106	12	4.	*	1	JAN 0806	82	26.	*	1	JAN 1506	152	1393.	*	1	JAN 2206	222	202.
1	JAN 0112	13	5.	*	1	JAN 0812	83	26.	*	1	JAN 1512	153	1274.	*	1	JAN 2212	223	201.
1	JAN 0118	14	7.	*	1	JAN 0818	84	26.	*	1	JAN 1518	154	1172.	*	1	JAN 2218	224	201.
1	JAN 0124	15	8.	*	1	JAN 0824	85	26.	*	1	JAN 1524	155	1083.	*	1	JAN 2224	225	200.
1	JAN 0130	16	9.	*	1	JAN 0830	86	26.	*	1	JAN 1530	156	1007.	*	1	JAN 2230	226	200.
1	JAN 0136	17	10.	*	1	JAN 0836	87	27.	*	1	JAN 1536	157	942.	*	1	JAN 2236	227	199.
1	JAN 0142	18	11.	*	1	JAN 0842	88	27.	*	1	JAN 1542	158	885.	*	1	JAN 2242	228	198.
1	JAN 0148	19	12.	*	1	JAN 0848	89	27.	*	1	JAN 1548	159	835.	*	1	JAN 2248	229	196.
1	JAN 0154	20	13.	*	1	JAN 0854	90	28.	*	1	JAN 1554	160	790.	*	1	JAN 2254	230	193.
1	JAN 0200	21	14.	*	1	JAN 0900	91	29.	*	1	JAN 1600	161	747.	*	1	JAN 2300	231	188.
1	JAN 0206	22	14.	*	1	JAN 0906	92	32.	*	1	JAN 1606	162	708.	*	1	JAN 2306	232	184.
1	JAN 0212	23	15.	*	1	JAN 0912	93	38.	*	1	JAN 1612	163	672.	*	1	JAN 2312	233	179.
1	JAN 0218	24	15.	*	1	JAN 0918	94	49.	*	1	JAN 1618	164	640.	*	1	JAN 2318	234	176.
1	JAN 0224	25	15.	*	1	JAN 0924	95	70.	*	1	JAN 1624	165	613.	*	1	JAN 2324	235	175.
1	JAN 0230	26	15.	*	1	JAN 0930	96	104.	*	1	JAN 1630	166	592.	*	1	JAN 2330	236	176.
1	JAN 0236	27	16.	*	1	JAN 0936	97	150.	*	1	JAN 1636	167	575.	*	1	JAN 2336	237	179.
1	JAN 0242	28	16.	*	1	JAN 0942	98	207.	*	1	JAN 1642	168	562.	*	1	JAN 2342	238	183.
1	JAN 0248	29	15.	*	1	JAN 0948	99	270.	*	1	JAN 1648	169	552.	*	1	JAN 2348	239	187.
1	JAN 0254	30	15.	*	1	JAN 0954	100	335.	*	1	JAN 1654	170	544.	*	1	JAN 2354	240	190.
1	JAN 0300	31	15.	*	1	JAN 1000	101	397.	*	1	JAN 1700	171	538.	*	2	JAN 0000	241	192.
1	JAN 0306	32	15.	*	1	JAN 1006	102	453.	*	1	JAN 1706	172	532.	*	2	JAN 0006	242	194.
1	JAN 0312	33	15.	*	1	JAN 1012	103	504.	*	1	JAN 1712	173	525.	*	2	JAN 0012	243	195.
	JAN 0318	34	15.	*	1	JAN 1018	104	550.	*	1	JAN 1718	174	517.	*	2	JAN 0018	244	196.
	JAN 0324	35	15.	*	1	JAN 1024	105	592.	*	1	JAN 1724	175	507.	*	2	JAN 0024	245	195.
1	JAN 0330	36	16.	*	1	JAN 1030	106	632.	*	1	JAN 1730	176	494.	*	2	JAN 0030	246	194.
1	JAN 0336	37	16.	*	1	JAN 1036	107	672.	*	1	JAN 1736	177	479.	*	2	JAN 0036	247	191.
1	JAN 0342	38	16.	*	1	JAN 1042	108	712.	*	1	JAN 1742	178	462.	*	2	JAN 0042	248	185.
1	JAN 0348	39	16.	*	1	JAN 1048	109	752.	*	1	JAN 1748	179	444.	*	2	JAN 0048	249	177.
1	JAN 0354	40	16.	*	1	JAN 1054	110	791.	*	1	JAN 1754	180	428.	*	2	JAN 0054	250	166.
1	JAN 0400	41	16.	*	1	JAN 1100	111	831.	*	1	JAN 1800	181	413.	*	2	JAN 0100	251	152.
1	JAN 0406	42	16.	*	1	JAN 1106	112	874.	*	1	JAN 1806	182	403.	*	2	JAN 0106	252	135.
1	JAN 0412	43	16.	*	1	JAN 1112	113	922.	*	1	JAN 1812	183	397.	*	2	JAN 0112	253	118.
1	JAN 0418	44	16.	*	1	JAN 1118	114	980.	*	1	JAN 1818	184	395.	*	2	JAN 0118	254	100.
1	JAN 0424	45	17.	*	1	JAN 1124	115	1052.	*	1	JAN 1824	185	395.	*	2	JAN 0124	255	82.
1	JAN 0430	46	17.	*	1	JAN 1130	116	1139.	*	1	JAN 1830	186	395.	*	2	JAN 0130	256	66.
1	JAN 0436	47	17.	*	1	JAN 1136	117	1251.	*	1	JAN 1836	187	395.	*	2	JAN 0136	257	52.
1	JAN 0442	48	17.	*	1	JAN 1142	118	1398.	*	1	JAN 1842	188	392.	*	2	JAN 0142	258	40.
1	JAN 0448	49	18.	*	1	JAN 1148	119	1607.	*	1	JAN 1848	189	386.	*	2	JAN 0148	259	30.
1	JAN 0454	50	18.	*	1	JAN 1154	120	1912.	*	1	JAN 1854	190	377.	*	2	JAN 0154	260	22.
1	JAN 0500	51	18.	*	1	JAN 1200	121	2362.	*	1	JAN 1900	191	364.	*	2	JAN 0200	261	17.
1	JAN 0506	52	19.	*	1	JAN 1206	122	3006.	*	1	JAN 1906	192	347.	*	2	JAN 0206	262	12.
1	JAN 0512	53	19.	*	1	JAN 1212	123	3872.	*	1	JAN 1912	193	328.	*	2	JAN 0212	263	9.
1	JAN 0518	54	20.	*	1	JAN 1218	124	4961.	*	1	JAN 1918	194	308.	*	2	JAN 0218	264	7.
1	JAN 0524	55	20.	*	1	JAN 1224	125	6273.	*	1	JAN 1924	195	291.	*	2	JAN 0224	265	5.
1	JAN 0530	56	20.	*	1	JAN 1230	126	7792.	*	1	JAN 1930	196	279.	*	2	JAN 0230	266	4.
1	JAN 0536	57	21.	*	1	JAN 1236	127	9440.	*	1	JAN 1936	197	272.	*	2	JAN 0236	267	3.
1	JAN 0542	58	21.	*	1	JAN 1242	128	11128.	*	1	JAN 1942	198	270.	*	2	JAN 0242	268	2.
1	JAN 0548	59	21.	*	1	JAN 1248	129	12742.	*	1	JAN 1948	199	271.	*	2	JAN 0248	269	1.
1	JAN 0554	60	21.	*	1	JAN 1254	130	14154.	*	1	JAN 1954	200	274.	*	2	JAN 0254	270	1.
1	JAN 0600	61	21.	*	1	JAN 1300	131	15207.	*	1	JAN 2000	201	278.	*	2	JAN 0300	271	1.
	JAN 0606	62	21.	*	1	JAN 1306	132	15761.	*	1	JAN 2006	202	281.	*	2	JAN 0306	272	0.
	JAN 0612	63	21.	*	1	JAN 1312	133	15724.	*	1	JAN 2012	203	284.	*	2	JAN 0312	273	0.
1	JAN 0618	64	21.	*	1	JAN 1318	134	15098.	*	1	JAN 2018	204	285.	*	2	JAN 0318	274	0.
1	JAN 0624	65	21.	*	1	JAN 1324	135	13970.	*	1	JAN 2024	205	286.	*	2	JAN 0324	275	0.
1	JAN 0630	66	21.	*	1	JAN 1330	136	12500.	*	1	JAN 2030	206	285.	*	2	JAN 0330	276	0.

1	JAN	0636	67	21.	*	1	JAN	1336	137	10885.	*	1	JAN	2036	207	282.	*	2	JAN	0336	277	0.
1	JAN	0642	68	21.	*	1	JAN	1342	138	9305.	*	1	JAN	2042	208	278.	*	2	JAN	0342	278	0.
1	JAN	0648	69	21.	*	1	JAN	1348	139	7880.	*	1	JAN	2048	209	271.	*	2	JAN	0348	279	0.
1	JAN	0654	70	22.	*	1	JAN	1354	140	6660.	*	1	JAN	2054	210	262.	*	2	JAN	0354	280	0.
					*						*						*					

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
15761.	13.10	(CFS)	4343.	1216.	1047.	1047.
		(INCHES)	2.528	2.833	2.834	2.834
		(AC-FT)	2153.	2413.	2414.	2414.

CUMULATIVE AREA = 15.97 SQ MI

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INTERPOLATED HYDROGRAPH AT CO-5

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	JAN	0000	1	0.	*	1	JAN	0700	71	23.	*	1	JAN	1400	141	5936.	*	1	JAN	2100	211	268.
1	JAN	0006	2	0.	*	1	JAN	0706	72	23.	*	1	JAN	1406	142	5060.	*	1	JAN	2106	212	257.
1	JAN	0012	3	0.	*	1	JAN	0712	73	24.	*	1	JAN	1412	143	4341.	*	1	JAN	2112	213	247.
1	JAN	0018	4	0.	*	1	JAN	0718	74	25.	*	1	JAN	1418	144	3752.	*	1	JAN	2118	214	239.
1	JAN	0024	5	0.	*	1	JAN	0724	75	25.	*	1	JAN	1424	145	3265.	*	1	JAN	2124	215	233.
1	JAN	0030	6	0.	*	1	JAN	0730	76	26.	*	1	JAN	1430	146	2862.	*	1	JAN	2130	216	228.
1	JAN	0036	7	1.	*	1	JAN	0736	77	26.	*	1	JAN	1436	147	2524.	*	1	JAN	2136	217	224.
1	JAN	0042	8	1.	*	1	JAN	0742	78	26.	*	1	JAN	1442	148	2240.	*	1	JAN	2142	218	221.
1	JAN	0048	9	2.	*	1	JAN	0748	79	27.	*	1	JAN	1448	149	1999.	*	1	JAN	2148	219	219.
	JAN	0054	10	3.	*	1	JAN	0754	80	27.	*	1	JAN	1454	150	1795.	*	1	JAN	2154	220	217.
	JAN	0100	11	4.	*	1	JAN	0800	81	27.	*	1	JAN	1500	151	1622.	*	1	JAN	2200	221	216.
1	JAN	0106	12	5.	*	1	JAN	0806	82	27.	*	1	JAN	1506	152	1475.	*	1	JAN	2206	222	215.
1	JAN	0112	13	6.	*	1	JAN	0812	83	27.	*	1	JAN	1512	153	1349.	*	1	JAN	2212	223	215.
1	JAN	0118	14	7.	*	1	JAN	0818	84	27.	*	1	JAN	1518	154	1242.	*	1	JAN	2218	224	214.
1	JAN	0124	15	8.	*	1	JAN	0824	85	28.	*	1	JAN	1524	155	1149.	*	1	JAN	2224	225	214.
1	JAN	0130	16	9.	*	1	JAN	0830	86	28.	*	1	JAN	1530	156	1068.	*	1	JAN	2230	226	213.
1	JAN	0136	17	11.	*	1	JAN	0836	87	28.	*	1	JAN	1536	157	999.	*	1	JAN	2236	227	212.
1	JAN	0142	18	12.	*	1	JAN	0842	88	28.	*	1	JAN	1542	158	939.	*	1	JAN	2242	228	211.
1	JAN	0148	19	13.	*	1	JAN	0848	89	30.	*	1	JAN	1548	159	886.	*	1	JAN	2248	229	208.
1	JAN	0154	20	14.	*	1	JAN	0854	90	32.	*	1	JAN	1554	160	838.	*	1	JAN	2254	230	205.
1	JAN	0200	21	14.	*	1	JAN	0900	91	38.	*	1	JAN	1600	161	794.	*	1	JAN	2300	231	201.
1	JAN	0206	22	15.	*	1	JAN	0906	92	50.	*	1	JAN	1606	162	752.	*	1	JAN	2306	232	196.
1	JAN	0212	23	16.	*	1	JAN	0912	93	72.	*	1	JAN	1612	163	714.	*	1	JAN	2312	233	191.
1	JAN	0218	24	16.	*	1	JAN	0918	94	107.	*	1	JAN	1618	164	681.	*	1	JAN	2318	234	188.
1	JAN	0224	25	16.	*	1	JAN	0924	95	155.	*	1	JAN	1624	165	653.	*	1	JAN	2324	235	187.
1	JAN	0230	26	16.	*	1	JAN	0930	96	215.	*	1	JAN	1630	166	630.	*	1	JAN	2330	236	188.
1	JAN	0236	27	16.	*	1	JAN	0936	97	283.	*	1	JAN	1636	167	613.	*	1	JAN	2336	237	192.
1	JAN	0242	28	16.	*	1	JAN	0942	98	352.	*	1	JAN	1642	168	599.	*	1	JAN	2342	238	196.
1	JAN	0248	29	16.	*	1	JAN	0948	99	417.	*	1	JAN	1648	169	588.	*	1	JAN	2348	239	199.
1	JAN	0254	30	16.	*	1	JAN	0954	100	474.	*	1	JAN	1654	170	580.	*	1	JAN	2354	240	202.
1	JAN	0300	31	16.	*	1	JAN	1000	101	523.	*	1	JAN	1700	171	574.	*	2	JAN	0000	241	205.
1	JAN	0306	32	16.	*	1	JAN	1006	102	565.	*	1	JAN	1706	172	567.	*	2	JAN	0006	242	207.
1	JAN	0312	33	16.	*	1	JAN	1012	103	602.	*	1	JAN	1712	173	560.	*	2	JAN	0012	243	208.
1	JAN	0318	34	16.	*	1	JAN	1018	104	636.	*	1	JAN	1718	174	552.	*	2	JAN	0018	244	209.
1	JAN	0324	35	16.	*	1	JAN	1024	105	669.	*	1	JAN	1724	175	541.	*	2	JAN	0024	245	208.
1	JAN	0330	36	16.	*	1	JAN	1030	106	702.	*	1	JAN	1730	176	527.	*	2	JAN	0030	246	206.
1	JAN	0336	37	16.	*	1	JAN	1036	107	737.	*	1	JAN	1736	177	511.	*	2	JAN	0036	247	203.
	JAN	0342	38	16.	*	1	JAN	1042	108	774.	*	1	JAN	1742	178	492.	*	2	JAN	0042	248	197.
	JAN	0348	39	17.	*	1	JAN	1048	109	812.	*	1	JAN	1748	179	474.	*	2	JAN	0048	249	188.
1	JAN	0354	40	17.	*	1	JAN	1054	110	851.	*	1	JAN	1754	180	456.	*	2	JAN	0054	250	176.
1	JAN	0400	41	17.	*	1	JAN	1100	111	892.	*	1	JAN	1800	181	441.	*	2	JAN	0100	251	161.
1	JAN	0406	42	17.	*	1	JAN	1106	112	937.	*	1	JAN	1806	182	430.	*	2	JAN	0106	252	144.

1	JAN	0412	43	17.	*	1	JAN	1112	113	988.	*	1	JAN	1812	183	423.	*	2	JAN	0112	253	126.
1	JAN	0418	44	17.	*	1	JAN	1118	114	1050.	*	1	JAN	1818	184	421.	*	2	JAN	0118	254	107.
1	JAN	0424	45	17.	*	1	JAN	1124	115	1126.	*	1	JAN	1824	185	421.	*	2	JAN	0124	255	88.
1	JAN	0430	46	18.	*	1	JAN	1130	116	1219.	*	1	JAN	1830	186	422.	*	2	JAN	0130	256	71.
1	JAN	0436	47	18.	*	1	JAN	1136	117	1338.	*	1	JAN	1836	187	421.	*	2	JAN	0136	257	55.
1	JAN	0442	48	18.	*	1	JAN	1142	118	1494.	*	1	JAN	1842	188	418.	*	2	JAN	0142	258	42.
1	JAN	0448	49	18.	*	1	JAN	1148	119	1715.	*	1	JAN	1848	189	412.	*	2	JAN	0148	259	32.
1	JAN	0454	50	19.	*	1	JAN	1154	120	2036.	*	1	JAN	1854	190	402.	*	2	JAN	0154	260	24.
1	JAN	0500	51	19.	*	1	JAN	1200	121	2509.	*	1	JAN	1900	191	387.	*	2	JAN	0200	261	18.
1	JAN	0506	52	20.	*	1	JAN	1206	122	3183.	*	1	JAN	1906	192	369.	*	2	JAN	0206	262	13.
1	JAN	0512	53	20.	*	1	JAN	1212	123	4090.	*	1	JAN	1912	193	349.	*	2	JAN	0212	263	10.
1	JAN	0518	54	21.	*	1	JAN	1218	124	5230.	*	1	JAN	1918	194	328.	*	2	JAN	0218	264	7.
1	JAN	0524	55	21.	*	1	JAN	1224	125	6603.	*	1	JAN	1924	195	310.	*	2	JAN	0224	265	5.
1	JAN	0530	56	21.	*	1	JAN	1230	126	8192.	*	1	JAN	1930	196	297.	*	2	JAN	0230	266	4.
1	JAN	0536	57	22.	*	1	JAN	1236	127	9917.	*	1	JAN	1936	197	290.	*	2	JAN	0236	267	3.
1	JAN	0542	58	22.	*	1	JAN	1242	128	11682.	*	1	JAN	1942	198	288.	*	2	JAN	0242	268	2.
1	JAN	0548	59	22.	*	1	JAN	1248	129	13370.	*	1	JAN	1948	199	289.	*	2	JAN	0248	269	2.
1	JAN	0554	60	22.	*	1	JAN	1254	130	14847.	*	1	JAN	1954	200	292.	*	2	JAN	0254	270	1.
1	JAN	0600	61	22.	*	1	JAN	1300	131	15948.	*	1	JAN	2000	201	296.	*	2	JAN	0300	271	1.
1	JAN	0606	62	22.	*	1	JAN	1306	132	16527.	*	1	JAN	2006	202	300.	*	2	JAN	0306	272	1.
1	JAN	0612	63	22.	*	1	JAN	1312	133	16488.	*	1	JAN	2012	203	302.	*	2	JAN	0312	273	0.
1	JAN	0618	64	22.	*	1	JAN	1318	134	15833.	*	1	JAN	2018	204	304.	*	2	JAN	0318	274	0.
1	JAN	0624	65	22.	*	1	JAN	1324	135	14653.	*	1	JAN	2024	205	304.	*	2	JAN	0324	275	0.
1	JAN	0630	66	22.	*	1	JAN	1330	136	13115.	*	1	JAN	2030	206	303.	*	2	JAN	0330	276	0.
1	JAN	0636	67	22.	*	1	JAN	1336	137	11424.	*	1	JAN	2036	207	300.	*	2	JAN	0336	277	0.
1	JAN	0642	68	22.	*	1	JAN	1342	138	9770.	*	1	JAN	2042	208	295.	*	2	JAN	0342	278	0.
1	JAN	0648	69	22.	*	1	JAN	1348	139	8278.	*	1	JAN	2048	209	288.	*	2	JAN	0348	279	0.
1	JAN	0654	70	23.	*	1	JAN	1354	140	7000.	*	1	JAN	2054	210	279.	*	2	JAN	0354	280	0.
					*						*						*					

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
[illegible]	13.10	(CFS)	4571.	1287.	1107.	1107.
		(INCHES)	2.661	2.996	2.998	2.998
		(AC-FT)	2267.	2552.	2553.	2553.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	943.	12.30	152.	41.	36.	.60		
ROUTED TO	XROX2	909.	12.50	152.	41.	36.	.60		
HYDROGRAPH AT	X2SUB	531.	12.40	94.	24.	21.	.43		
2 COMBINED AT	XCO-1	1430.	12.50	244.	65.	56.	1.03		
ROUTED TO	XROX3	1378.	12.70	244.	65.	56.	1.03		
HYDROGRAPH AT	X3SUB	592.	12.50	110.	28.	24.	.56		
2 COMBINED AT	XCO-2	1924.	12.70	353.	93.	80.	1.59		
HYDROGRAPH AT	X4SUB	399.	12.30	60.	15.	13.	.28		
2 COMBINED AT	XCO-3	2206.	12.60	411.	107.	92.	1.87		
HYDROGRAPH AT	X5SUB	418.	12.50	75.	19.	16.	.38		
2 COMBINED AT	XCO-4	2604.	12.60	483.	125.	108.	2.25		
HYDROGRAPH AT	SUBC1	2345.	12.20	437.	133.	114.	1.26		
ROUTED TO	RO-1	2058.	12.80	437.	133.	114.	1.26		
HYDROGRAPH AT	SUBC2	2435.	12.60	629.	162.	139.	2.15		
HYDROGRAPH AT	SUBC3	1882.	12.40	392.	106.	91.	1.25		
HYDROGRAPH AT	SUBC4	3900.	12.40	878.	267.	230.	2.55		
ROUTED TO	RO-2	3762.	12.60	878.	267.	230.	2.55		
HYDROGRAPH AT	SUBC5	4775.	12.40	1139.	338.	291.	3.38		
2 COMBINED AT	CO-1	8137.	12.50	2007.	601.	517.	5.93		
ROUTED TO	RO-3	7967.	12.80	2007.	601.	517.	5.93		
4 COMBINED AT	CO-2	13283.	12.70	3423.	989.	850.	10.59		
ROUTED TO	RO-4	13041.	13.00	3423.	989.	850.	10.59		
HYDROGRAPH AT	SUBC7	1642.	12.40	310.	85.	73.	1.18		
ROUTED TO	RO-5	1474.	13.20	310.	85.	73.	1.18		
HYDROGRAPH AT	SUBC8	1746.	12.50	358.	94.	81.	1.42		
2 COMBINED AT	CO-3	2281.	13.00	664.	178.	153.	2.60		
3 COMBINED AT	CO-4	16691.	12.90	4464.	1260.	1084.	15.44		
ROUTED TO	RO-6	16381.	13.10	4464.	1260.	1084.	15.44		
HYDROGRAPH AT	SUBC9	768.	12.30	122.	31.	27.	.53		

2 COMBINED AT	CO-5	16527.	13.10	4571.	1287.	1107.	15.97

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

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

  1           ID                    FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID
  3           ID                                 FILE: CC-24
  4           ID
  5           ID        HYDROLOGY FOR:    100 YEAR 24 HOUR EVENT
  6           ID
  7           ID        PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF
  8           ID                          CLINE CREEK
  9           ID
 10           ID
 11           ID        METHODS OF STUDY: HEC-1   DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
 12           ID                          PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
 13           ID                                      -AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
 14           ID                          EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
 15           ID                                      &  PERCENT IMPERVIOUS
 16           ID                          STREAM ROUTING- MUSKINGUM METHOD
 17           ID
 18           ID        WATERSHED NAME:   CLINE CREEK   ( BASIN X IS SUBBASIN C-6 )
 19           ID
 20           ID        CONTRACT NUMBER:  FCD 89-15
 21           ID
 22           ID        COMPUTED BY:      BAKER ENGINEERS          DATE:12/11/89
 23           ID                          COMP: HD 12/12/89        CKD: [illegible] 12-18-89
 24           IT      6 01JAN89       0     280
              *DIAGRAM
 25           IO      5
 26           IN     15
 27           JD   4.80     .01
 28           PC     .0     .01     .02     .04     .05     .07     .08     .10     .11     .12
 29           PC    .14     .15     .17     .18     .20     .21     .23     .25     .27     .29
 30           PC    .31     .33     .35     .36     .38     .41     .43     .46     .48     .50
 31           PC    .53     .55     .58     .60     .64     .67     .71     .74     .78     .83
 32           PC    .87     .92     .97    1.05    1.13    1.23    1.36    1.86    3.18    3.39
 33           PC   3.53    3.64    3.72    3.80    3.86    3.91    3.96    4.00    4.04    4.08
 34           PC   4.11    4.14    4.17    4.20    4.23    4.26    4.29    4.31    4.33    4.36
 35           PC   4.38    4.41    4.43    4.44    4.46    4.48    4.50    4.52    4.54    4.56
 36           PC   4.57    4.59    4.60    4.62    4.63    4.65    4.66    4.68    4.69    4.70
 37           PC   4.72    4.73    4.75    4.76    4.78    4.79    4.80
 38           JD   4.56      10
 39           JD   4.42      20
 40           JD   4.32      30
 41           JD   4.27      40

 42           KK   X1SUB
 43           KM        RUNOFF FROM SUBBASIN X1
 44           BA   0.60
 45           LU   0.88    0.21   15.95
 46           UD   0.44

 47           KK   XROX2
 48           KM        ROUTE X1 THRUOGH SUBBASIN X2
 49           RM      2   0.15    0.30
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  50          KK   X2SUB
  51          KM        RUNOFF FROM SUBBASIN X2
  52          BA    0.43
  53          LU    0.90    0.29    5.78
  54          UD    0.73

  55          KK   XCO-1
  56          KM        COMBINE RUNOFF FROM SUBBASINS X1 AND X2
  57          HC       2

  58          KK   XROX3
  59          KM        ROUTE X1 & X2 THROUGH SUBBASINS X3 & X5
  60          RM       2    0.23    0.30

  61          KK   X3SUB
  62          KM        RUNOFF FROM SUBBASIN X3
  63          BA    0.56
  64          LU    0.93    0.35    0.76
  65          UD    0.69

  66          KK   XCO-2
  67          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,AND X3
  68          HC       2

  69          KK   X4SUB
  70          KM        RUNOFF FROM SUBBASIN X4
  71          BA    0.28
  72          LU    0.89    0.28    0.00
  73          UD    0.47

  74          KK   XCO-3
  75          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,AND X4
  76          HC       2

  77          KK   X5SUB
  78          KM        RUNOFF FROM SUBBASIN X5
  79          BA    0.38
  80          LU    0.93    0.35    0.00
  81          UD    0.47

  82          KK   XCO-4
  83          KM        COMBINE RUNOFF FROM SUBBASINS X1,X2,X3,X4,AND X5
  84          KM        BASIN X OUTFLOW HYDROGRAPH = SUB C-6 RUNOFF HYDROGRAPH
  85          HC       2

  86          KK   SUBC1
  87          KM        RUNOFF FROM SUBBASIN C-1
  88          BA    1.26
  89          LU     .55     .01      0.
  90          UD     .36
```

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

  91          KK   RO-1
  92          KM        ROUTE C-1       THROUGH      C-2
  93          RM       6     .58      .3

  94          KK   SUBC2
  95          KM        RUNOFF FROM SUBBASIN    C-2
  96          BA    2.15
  97          LU     .63     .09      0.
  98          UD     .76

  99          KK   SUBC3
 100          KM        RUNOFF FROM SUBBASIN    C-3
 101          BA    1.25
 102          LU     .61     .06      0.
 103          UD     .50

 104          KK   SUBC4
 105          KM        RUNOFF FROM SUBBASIN    C-4
 106          BA    2.55
 107          LU     .55     .01      0.
 108          UD     .50

 109          KK   RO-2
 110          KM        ROUTE C-4       THROUGH      C-5
 111          RM       3     .27      .3

 112          KK   SUBC5
 113          KM        RUNOFF FROM SUBBASIN    C-5
 114          BA    3.38
 115          LU     .56     .02      0.
 116          UD     .57

 117          KK   CO-1
 118          KM        COMBINE RUNOFF FROM SUBBASINS C-4       AND   C-5
 119          HC       2

 120          KK   RO-3
 121          KM        ROUTE C-4&5     THROUGH      C-3
 122          RM       3     .24      .3

 123          KK   CO-2
 124          KM        COMBINE RUNOFF FROM SUBBASINS C-4&5 WITH C-1,2&3
 125          HC       4

 126          KK   RO-4
 127          KM        ROUTE C-1,2,3,4,5  THRU C-9 UPST
 128          RM       3     .25      .3

 129          KK   SUBC7
 130          KM        RUNOFF FROM SUBBASIN    C-7
 131          BA    1.18
 132          LU     .87     .18    17.7
 133          UD     .54
```

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

 134          KK   RO-5
 135          KM        ROUTE C-7       THROUGH      C-8
 136          RM       8     .77      .3

 137          KK   SUBC8
 138          KM        RUNOFF FROM SUBBASIN    C-8
 139          BA    1.42
 140          LU     .85     .18     8.8
 141          UD     .64

 142          KK   CO-3
 143          KM        COMBINE RUNOFF FROM SUBBASINS C-7  AND   C-8
 144          HC       2

 145          KK   CO-4
 146          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 5 ; C-6     AND     C-7&8
 147          HC       3

 148          KK   RO-6
 149          KM        ROUTE C-1 THRU 8 THRUOGH C-9 DWN
 150          RM       2     .21      .3

 151          KK   SUBC9
 152          KM        RUNOFF FROM SUBBASIN    C-9
 153          BA     .53
 154          LU     .83     .24     3.9
 155          UD     .48

 156          KK   CO-5
 157          KM        COMBINE RUNOFF FROM SUBBASINS C-1 THRU 8   AND    C-9
 158          KO       1
 159          HC       2
 160          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

           X1SUB
              V
              V
  47      XROX2
              .
              .
  50          .       X2SUB
              .           .
              .           .
  55      XCO-1............
              V
              V
  58      XROX3
              .
              .
  61          .       X3SUB
              .           .
              .           .
  66      XCO-2............
              .
              .
  69          .       X4SUB
              .           .
              .           .
  74      XCO-3............
              .
              .
  77          .       X5SUB
              .           .
              .           .
  82      XCO-4............
              .
              .
  86          .       SUBC1
              .           V
              .           V
  91          .       RO-1
              .           .
              .           .
  94          .           .       SUBC2
              .           .           .
              .           .           .
  99          .           .           .       SUBC3
              .           .           .           .
              .           .           .           .
 104          .           .           .           .       SUBC4
              .           .           .           .           V
              .           .           .           .           V
 109          .           .           .           .       RO-2
              .           .           .           .           .
              .           .           .           .           .
 112          .           .           .           .           .       SUBC5
              .           .           .           .           .           .
              .           .           .           .           .           .
 117          .           .           .           .       CO-1 ............
              .           .           .           .           V
              .           .           .           .           V
 120          .           .           .           .       RO-3
              .           .           .           .           .
              .           .           .           .           .
 123          .       CO-2 ...................................
              .           V
              .           V
              .       RO-4
              .           .
              .           .
 129          .           .       SUBC7
              .           .           V
              .           .           V
```

```
134          .          .       RO-5
             .          .          .
             .          .          .
137          .          .          .       SUBC8
             .          .          .          .
             .          .          .          .
             .          .       CO-3 ............
             .          .          .
             .          .          .
145       CO-4 ........................
             V
             V
148       RO-6
             .
             .
151          .       SUBC9
             .          .
             .          .
156       CO-5 ............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****

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

****

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE: CC-24

HYDROLOGY FOR: 100 YEAR 24 HOUR EVENT

PURPOSE OF STUDY: DELINEATION OF THE 100-YEAR FLOODPLAIN OF CLINE CREEK

METHODS OF STUDY: HEC-1 DIMENSIONLESS SCS HYDROGRAPH 6 MIN. INTERVALS
PRECIPITATION- SCS TYPE II STORM BY 15 MIN. INCREMENTS
-AREAL REDUCTION BY "JD" DEPTH-AREA OPTION
EXCESS PRECIPITATION- INITIAL AND UNIFORM LOSS RATES
& PERCENT IMPERVIOUS
STREAM ROUTING- MUSKINGUM METHOD

WATERSHED NAME: CLINE CREEK (BASIN X IS SUBBASIN C-6)

CONTRACT NUMBER: FCD 89-15

COMPUTED BY: BAKER ENGINEERS DATE:12/11/89
COMP: _____ CKD: _____

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

   IT        HYDROGRAPH TIME DATA
                   NMIN          6  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1JAN89  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        280  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     2JAN89  ENDING DATE
                 NDTIME       0354  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE   27.90 HOURS

      ENGLISH UNITS

27 JD        INDEX STORM NO. 1
                   STRM       4.80  PRECIPITATION DEPTH
                   TRDA        .01  TRANSPOSITION DRAINAGE AREA

28 PI          PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .01     .01     .01     .00     .00
                 .01     .01     .01     .00     .00     .01     .01     .01     .00     .00
                 .00     .00     .01     .01     .01     .00     .00     .01     .01     .01
                 .00     .00     .01     .01     .01     .00     .00     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .00     .00     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .02     .02     .01     .01     .01     .02     .02
                 .01     .01     .01     .02     .02     .02     .02     .02     .02     .02
                 .02     .02     .02     .02     .02     .03     .03     .03     .03     .03
                 .04     .04     .05     .05     .05     .20     .20     .36     .53     .53
                 .08     .08     .07     .06     .06     .04     .04     .04     .03     .03
                 .03     .03     .03     .02     .02     .02     .02     .02     .02     .02
                 .02     .02     .02     .02     .02     .02     .02     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .00     .00     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .00     .00
                 .01     .01     .01     .00     .00     .01     .01     .01     .00     .00
```

.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

38 JD INDEX STORM NO. 2

STRM 4.56 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

39 JD INDEX STORM NO. 3

STRM 4.42 PRECIPITATION DEPTH

TRDA 20.00 TRANSPOSITION DRAINAGE AREA

PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.02	.02	.01	.01	.01	.02	.02
.01	.01	.01	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.03	.03	.03	.03	.03
.04	.04	.05	.05	.05	.20	.20	.36	.53	.53
.08	.08	.07	.06	.06	.04	.04	.04	.03	.03
.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.00	.00	.00

40 JD INDEX STORM NO. 4

STRM 4.32 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
.01	.01	.01	.00	.00	.01	.01	.01	.00	.00
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.00	.00	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

```
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .02      .02      .01      .01      .01      .02      .02
                .01      .01      .01      .02      .02      .02      .02      .02      .02      .02
                .02      .02      .02      .02      .02      .03      .03      .03      .03      .03
                .04      .04      .05      .05      .05      .20      .20      .36      .53      .53
                .08      .08      .07      .06      .06      .04      .04      .04      .03      .03
                .03      .03      .03      .02      .02      .02      .02      .02      .02      .02
                .02      .02      .02      .02      .02      .02      .02      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .00      .00      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .00      .00
                .01      .01      .01      .00      .00      .01      .01      .01      .00      .00
                .01      .01      .01      .00      .00      .01      .01      .01      .00      .00
                .00      .00      .01      .01      .01      .00      .00      .01      .01      .01
                .00      .00      .01      .01      .01      .00      .00      .00      .00      .00

 41 JD        INDEX STORM NO. 5
                    STRM        4.27  PRECIPITATION DEPTH
                    TRDA       40.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .01      .01      .01      .00      .00
                .01      .01      .01      .00      .00      .01      .01      .01      .00      .00
                .00      .00      .01      .01      .01      .00      .00      .01      .01      .01
                .00      .00      .01      .01      .01      .00      .00      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .00      .00      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .02      .02      .01      .01      .01      .02      .02
                .01      .01      .01      .02      .02      .02      .02      .02      .02      .02
                .02      .02      .02      .02      .02      .03      .03      .03      .03      .03
                .04      .04      .05      .05      .05      .20      .20      .36      .53      .53
                .08      .08      .07      .06      .06      .04      .04      .04      .03      .03
                .03      .03      .03      .02      .02      .02      .02      .02      .02      .02
                .02      .02      .02      .02      .02      .02      .02      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                .00      .00      .01      .01      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .00      .00
                .01      .01      .01      .00      .00      .01      .01      .01      .00      .00
                .01      .01      .01      .00      .00      .01      .01      .01      .00      .00
                .00      .00      .01      .01      .01      .00      .00      .01      .01      .01
                .00      .00      .01      .01      .01      .00      .00      .00      .00      .00


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


            **************
            *            *
 156 KK     *    CO-5    *
            *            *
            **************

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

 159 HC        HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

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

                                          HYDROGRAPH AT    CO-5
                                     TRANSPOSITION AREA      .0 SQ MI

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
					*						*						*					
1	JAN	0000	1	0.	*	1	JAN	0700	71	25.	*	1	JAN	1400	141	6452.	*	1	JAN	2100	211	295.
1	JAN	0006	2	0.	*	1	JAN	0706	72	25.	*	1	JAN	1406	142	5508.	*	1	JAN	2106	212	283.
1	JAN	0012	3	0.	*	1	JAN	0712	73	26.	*	1	JAN	1412	143	4733.	*	1	JAN	2112	213	273.
1	JAN	0018	4	0.	*	1	JAN	0718	74	26.	*	1	JAN	1418	144	4096.	*	1	JAN	2118	214	264.
	JAN	0024	5	0.	*	1	JAN	0724	75	27.	*	1	JAN	1424	145	3569.	*	1	JAN	2124	215	257.
	JAN	0030	6	0.	*	1	JAN	0730	76	28.	*	1	JAN	1430	146	3132.	*	1	JAN	2130	216	251.
1	JAN	0036	7	1.	*	1	JAN	0736	77	28.	*	1	JAN	1436	147	2765.	*	1	JAN	2136	217	247.
1	JAN	0042	8	1.	*	1	JAN	0742	78	28.	*	1	JAN	1442	148	2456.	*	1	JAN	2142	218	244.
1	JAN	0048	9	2.	*	1	JAN	0748	79	29.	*	1	JAN	1448	149	2193.	*	1	JAN	2148	219	242.
1	JAN	0054	10	3.	*	1	JAN	0754	80	29.	*	1	JAN	1454	150	1971.	*	1	JAN	2154	220	240.
1	JAN	0100	11	4.	*	1	JAN	0800	81	29.	*	1	JAN	1500	151	1782.	*	1	JAN	2200	221	239.
1	JAN	0106	12	5.	*	1	JAN	0806	82	29.	*	1	JAN	1506	152	1622.	*	1	JAN	2206	222	238.
1	JAN	0112	13	6.	*	1	JAN	0812	83	29.	*	1	JAN	1512	153	1485.	*	1	JAN	2212	223	237.
1	JAN	0118	14	7.	*	1	JAN	0818	84	30.	*	1	JAN	1518	154	1368.	*	1	JAN	2218	224	237.
1	JAN	0124	15	9.	*	1	JAN	0824	85	30.	*	1	JAN	1524	155	1266.	*	1	JAN	2224	225	236.
1	JAN	0130	16	10.	*	1	JAN	0830	86	32.	*	1	JAN	1530	156	1178.	*	1	JAN	2230	226	235.
1	JAN	0136	17	11.	*	1	JAN	0836	87	37.	*	1	JAN	1536	157	1102.	*	1	JAN	2236	227	234.
1	JAN	0142	18	12.	*	1	JAN	0842	88	47.	*	1	JAN	1542	158	1036.	*	1	JAN	2242	228	233.
1	JAN	0148	19	14.	*	1	JAN	0848	89	66.	*	1	JAN	1548	159	977.	*	1	JAN	2248	229	230.
1	JAN	0154	20	15.	*	1	JAN	0854	90	95.	*	1	JAN	1554	160	924.	*	1	JAN	2254	230	226.
1	JAN	0200	21	15.	*	1	JAN	0900	91	137.	*	1	JAN	1600	161	875.	*	1	JAN	2300	231	222.
1	JAN	0206	22	16.	*	1	JAN	0906	92	189.	*	1	JAN	1606	162	829.	*	1	JAN	2306	232	217.
1	JAN	0212	23	17.	*	1	JAN	0912	93	248.	*	1	JAN	1612	163	788.	*	1	JAN	2312	233	212.
1	JAN	0218	24	17.	*	1	JAN	0918	94	311.	*	1	JAN	1618	164	752.	*	1	JAN	2318	234	208.
1	JAN	0224	25	17.	*	1	JAN	0924	95	374.	*	1	JAN	1624	165	721.	*	1	JAN	2324	235	207.
1	JAN	0230	26	17.	*	1	JAN	0930	96	435.	*	1	JAN	1630	166	696.	*	1	JAN	2330	236	209.
1	JAN	0236	27	17.	*	1	JAN	0936	97	491.	*	1	JAN	1636	167	677.	*	1	JAN	2336	237	212.
1	JAN	0242	28	17.	*	1	JAN	0942	98	542.	*	1	JAN	1642	168	662.	*	1	JAN	2342	238	217.
1	JAN	0248	29	17.	*	1	JAN	0948	99	587.	*	1	JAN	1648	169	651.	*	1	JAN	2348	239	221.
1	JAN	0254	30	17.	*	1	JAN	0954	100	625.	*	1	JAN	1654	170	642.	*	1	JAN	2354	240	224.
1	JAN	0300	31	17.	*	1	JAN	1000	101	657.	*	1	JAN	1700	171	635.	*	2	JAN	0000	241	227.
1	JAN	0306	32	17.	*	1	JAN	1006	102	685.	*	1	JAN	1706	172	628.	*	2	JAN	0006	242	229.
1	JAN	0312	33	17.	*	1	JAN	1012	103	711.	*	1	JAN	1712	173	620.	*	2	JAN	0012	243	230.
1	JAN	0318	34	17.	*	1	JAN	1018	104	737.	*	1	JAN	1718	174	611.	*	2	JAN	0018	244	231.
1	JAN	0324	35	17.	*	1	JAN	1024	105	765.	*	1	JAN	1724	175	598.	*	2	JAN	0024	245	230.
1	JAN	0330	36	17.	*	1	JAN	1030	106	795.	*	1	JAN	1730	176	583.	*	2	JAN	0030	246	228.
	AN	0336	37	18.	*	1	JAN	1036	107	829.	*	1	JAN	1736	177	565.	*	2	JAN	0036	247	224.
	AN	0342	38	18.	*	1	JAN	1042	108	866.	*	1	JAN	1742	178	545.	*	2	JAN	0042	248	218.
1	JAN	0348	39	18.	*	1	JAN	1048	109	906.	*	1	JAN	1748	179	524.	*	2	JAN	0048	249	208.
1	JAN	0354	40	18.	*	1	JAN	1054	110	948.	*	1	JAN	1754	180	504.	*	2	JAN	0054	250	195.
1	JAN	0400	41	18.	*	1	JAN	1100	111	993.	*	1	JAN	1800	181	488.	*	2	JAN	0100	251	179.
1	JAN	0406	42	18.	*	1	JAN	1106	112	1042.	*	1	JAN	1806	182	476.	*	2	JAN	0106	252	160.
1	JAN	0412	43	18.	*	1	JAN	1112	113	1099.	*	1	JAN	1812	183	469.	*	2	JAN	0112	253	139.
1	JAN	0418	44	18.	*	1	JAN	1118	114	1168.	*	1	JAN	1818	184	466.	*	2	JAN	0118	254	118.
1	JAN	0424	45	19.	*	1	JAN	1124	115	1253.	*	1	JAN	1824	185	466.	*	2	JAN	0124	255	98.
1	JAN	0430	46	19.	*	1	JAN	1130	116	1357.	*	1	JAN	1830	186	467.	*	2	JAN	0130	256	78.
1	JAN	0436	47	19.	*	1	JAN	1136	117	1490.	*	1	JAN	1836	187	466.	*	2	JAN	0136	257	61.
1	JAN	0442	48	19.	*	1	JAN	1142	118	1663.	*	1	JAN	1842	188	463.	*	2	JAN	0142	258	47.
1	JAN	0448	49	20.	*	1	JAN	1148	119	1908.	*	1	JAN	1848	189	455.	*	2	JAN	0148	259	35.
1	JAN	0454	50	20.	*	1	JAN	1154	120	2267.	*	1	JAN	1854	190	444.	*	2	JAN	0154	260	26.
1	JAN	0500	51	21.	*	1	JAN	1200	121	2800.	*	1	JAN	1900	191	428.	*	2	JAN	0200	261	20.
1	JAN	0506	52	21.	*	1	JAN	1206	122	3559.	*	1	JAN	1906	192	408.	*	2	JAN	0206	262	15.
1	JAN	0512	53	22.	*	1	JAN	1212	123	4573.	*	1	JAN	1912	193	385.	*	2	JAN	0212	263	11.
1	JAN	0518	54	22.	*	1	JAN	1218	124	5827.	*	1	JAN	1918	194	363.	*	2	JAN	0218	264	8.
1	JAN	0524	55	23.	*	1	JAN	1224	125	7301.	*	1	JAN	1924	195	343.	*	2	JAN	0224	265	6.
1	JAN	0530	56	23.	*	1	JAN	1230	126	8961.	*	1	JAN	1930	196	329.	*	2	JAN	0230	266	4.
1	JAN	0536	57	23.	*	1	JAN	1236	127	10737.	*	1	JAN	1936	197	321.	*	2	JAN	0236	267	3.
1	JAN	0542	58	24.	*	1	JAN	1242	128	12555.	*	1	JAN	1942	198	319.	*	2	JAN	0242	268	2.
1	JAN	0548	59	24.	*	1	JAN	1248	129	14309.	*	1	JAN	1948	199	320.	*	2	JAN	0248	269	2.
1	JAN	0554	60	24.	*	1	JAN	1254	130	15869.	*	1	JAN	1954	200	324.	*	2	JAN	0254	270	1.
1	JAN	0600	61	24.	*	1	JAN	1300	131	17060.	*	1	JAN	2000	201	328.	*	2	JAN	0300	271	1.
1	JAN	0606	62	24.	*	1	JAN	1306	132	17715.	*	1	JAN	2006	202	331.	*	2	JAN	0306	272	1.
1	JAN	0612	63	24.	*	1	JAN	1312	133	17716.	*	1	JAN	2012	203	334.	*	2	JAN	0312	273	0.
1	JAN	0618	64	23.	*	1	JAN	1318	134	17048.	*	1	JAN	2018	204	336.	*	2	JAN	0318	274	0.
1	JAN	0624	65	23.	*	1	JAN	1324	135	15804.	*	1	JAN	2024	205	336.	*	2	JAN	0324	275	0.
1	JAN	0630	66	23.	*	1	JAN	1330	136	14163.	*	1	JAN	2030	206	334.	*	2	JAN	0330	276	0.
1	JAN	0636	67	23.	*	1	JAN	1336	137	12351.	*	1	JAN	2036	207	331.	*	2	JAN	0336	277	0.
1	JAN	0642	68	23.	*	1	JAN	1342	138	10575.	*	1	JAN	2042	208	325.	*	2	JAN	0342	278	0.
	AN	0648	69	24.	*	1	JAN	1348	139	8972.	*	1	JAN	2048	209	317.	*	2	JAN	0348	279	0.
	AN	0654	70	24.	*	1	JAN	1354	140	7597.	*	1	JAN	2054	210	307.	*	2	JAN	0354	280	0.
					*						*						*					

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PEAK FLOW TIME MAXIMUM AVERAGE FLOW

(CFS)	(HR)		6-HR	24-HR	72-HR	27.90-HR
17716.	13.20	(CFS)	4962.	1407.	1211.	1211.
		(INCHES)	2.889	3.277	3.279	3.279
		(AC-FT)	2460.	2791.	2792.	2792.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 10.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	JAN	0000	1	0.	1	JAN	0700	71	23.	1	JAN	1400	141	6092.	1	JAN	2100	211	276.
1	JAN	0006	2	0.	1	JAN	0706	72	24.	1	JAN	1406	142	5197.	1	JAN	2106	212	265.
1	JAN	0012	3	0.	1	JAN	0712	73	24.	1	JAN	1412	143	4462.	1	JAN	2112	213	255.
1	JAN	0018	4	0.	1	JAN	0718	74	25.	1	JAN	1418	144	3858.	1	JAN	2118	214	246.
1	JAN	0024	5	0.	1	JAN	0724	75	26.	1	JAN	1424	145	3359.	1	JAN	2124	215	240.
1	JAN	0030	6	0.	1	JAN	0730	76	26.	1	JAN	1430	146	2945.	1	JAN	2130	216	234.
1	JAN	0036	7	1.	1	JAN	0736	77	27.	1	JAN	1436	147	2598.	1	JAN	2136	217	230.
1	JAN	0042	8	1.	1	JAN	0742	78	27.	1	JAN	1442	148	2306.	1	JAN	2142	218	228.
1	JAN	0048	9	2.	1	JAN	0748	79	27.	1	JAN	1448	149	2058.	1	JAN	2148	219	225.
1	JAN	0054	10	3.	1	JAN	0754	80	27.	1	JAN	1454	150	1848.	1	JAN	2154	220	224.
1	JAN	0100	11	4.	1	JAN	0800	81	28.	1	JAN	1500	151	1670.	1	JAN	2200	221	223.
1	JAN	0106	12	5.	1	JAN	0806	82	28.	1	JAN	1506	152	1519.	1	JAN	2206	222	222.
1	JAN	0112	13	6.	1	JAN	0812	83	28.	1	JAN	1512	153	1391.	1	JAN	2212	223	221.
1	JAN	0118	14	7.	1	JAN	0818	84	28.	1	JAN	1518	154	1280.	1	JAN	2218	224	220.
1	JAN	0124	15	8.	1	JAN	0824	85	28.	1	JAN	1524	155	1185.	1	JAN	2224	225	220.
1	JAN	0130	16	9.	1	JAN	0830	86	28.	1	JAN	1530	156	1102.	1	JAN	2230	226	219.
1	JAN	0136	17	11.	1	JAN	0836	87	29.	1	JAN	1536	157	1031.	1	JAN	2236	227	218.
1	JAN	0142	18	12.	1	JAN	0842	88	29.	1	JAN	1542	158	969.	1	JAN	2242	228	217.
1	JAN	0148	19	13.	1	JAN	0848	89	32.	1	JAN	1548	159	914.	1	JAN	2248	229	214.
1	JAN	0154	20	14.	1	JAN	0854	90	37.	1	JAN	1554	160	864.	1	JAN	2254	230	211.
1	JAN	0200	21	15.	1	JAN	0900	91	48.	1	JAN	1600	161	817.	1	JAN	2300	231	207.
	N	0206	22	15.	1	JAN	0906	92	69.	1	JAN	1606	162	775.	1	JAN	2306	232	202.
	AN	0212	23	16.	1	JAN	0912	93	102.	1	JAN	1612	163	735.	1	JAN	2312	233	197.
1	JAN	0218	24	16.	1	JAN	0918	94	150.	1	JAN	1618	164	701.	1	JAN	2318	234	194.
1	JAN	0224	25	16.	1	JAN	0924	95	210.	1	JAN	1624	165	672.	1	JAN	2324	235	193.
1	JAN	0230	26	17.	1	JAN	0930	96	278.	1	JAN	1630	166	649.	1	JAN	2330	236	194.
1	JAN	0236	27	17.	1	JAN	0936	97	349.	1	JAN	1636	167	631.	1	JAN	2336	237	197.
1	JAN	0242	28	17.	1	JAN	0942	98	417.	1	JAN	1642	168	617.	1	JAN	2342	238	202.
1	JAN	0248	29	17.	1	JAN	0948	99	477.	1	JAN	1648	169	606.	1	JAN	2348	239	205.
1	JAN	0254	30	16.	1	JAN	0954	100	528.	1	JAN	1654	170	598.	1	JAN	2354	240	209.
1	JAN	0300	31	16.	1	JAN	1000	101	570.	1	JAN	1700	171	591.	2	JAN	0000	241	211.
1	JAN	0306	32	16.	1	JAN	1006	102	606.	1	JAN	1706	172	584.	2	JAN	0006	242	213.
1	JAN	0312	33	16.	1	JAN	1012	103	639.	1	JAN	1712	173	577.	2	JAN	0012	243	214.
1	JAN	0318	34	17.	1	JAN	1018	104	669.	1	JAN	1718	174	568.	2	JAN	0018	244	215.
1	JAN	0324	35	17.	1	JAN	1024	105	700.	1	JAN	1724	175	557.	2	JAN	0024	245	214.
1	JAN	0330	36	17.	1	JAN	1030	106	731.	1	JAN	1730	176	543.	2	JAN	0030	246	213.
1	JAN	0336	37	17.	1	JAN	1036	107	765.	1	JAN	1736	177	526.	2	JAN	0036	247	209.
1	JAN	0342	38	17.	1	JAN	1042	108	801.	1	JAN	1742	178	507.	2	JAN	0042	248	203.
1	JAN	0348	39	17.	1	JAN	1048	109	839.	1	JAN	1748	179	488.	2	JAN	0048	249	194.
1	JAN	0354	40	17.	1	JAN	1054	110	879.	1	JAN	1754	180	470.	2	JAN	0054	250	182.
1	JAN	0400	41	17.	1	JAN	1100	111	921.	1	JAN	1800	181	454.	2	JAN	0100	251	166.
1	JAN	0406	42	17.	1	JAN	1106	112	967.	1	JAN	1806	182	443.	2	JAN	0106	252	149.
1	JAN	0412	43	17.	1	JAN	1112	113	1019.	1	JAN	1812	183	436.	2	JAN	0112	253	130.
1	JAN	0418	44	18.	1	JAN	1118	114	1083.	1	JAN	1818	184	434.	2	JAN	0118	254	110.
1	JAN	0424	45	18.	1	JAN	1124	115	1161.	1	JAN	1824	185	434.	2	JAN	0124	255	91.
1	JAN	0430	46	18.	1	JAN	1130	116	1258.	1	JAN	1830	186	434.	2	JAN	0130	256	73.
1	JAN	0436	47	18.	1	JAN	1136	117	1381.	1	JAN	1836	187	434.	2	JAN	0136	257	57.
1	JAN	0442	48	18.	1	JAN	1142	118	1543.	1	JAN	1842	188	431.	2	JAN	0142	258	44.
1	JAN	0448	49	19.	1	JAN	1148	119	1774.	1	JAN	1848	189	424.	2	JAN	0148	259	33.
1	JAN	0454	50	19.	1	JAN	1154	120	2113.	1	JAN	1854	190	414.	2	JAN	0154	260	25.
1	JAN	0500	51	20.	1	JAN	1200	121	2617.	1	JAN	1900	191	399.	2	JAN	0200	261	18.
1	JAN	0506	52	20.	1	JAN	1206	122	3337.	1	JAN	1906	192	380.	2	JAN	0206	262	14.
1	JAN	0512	53	21.	1	JAN	1212	123	4299.	1	JAN	1912	193	359.	2	JAN	0212	263	10.
	AN	0518	54	21.	1	JAN	1218	124	5490.	1	JAN	1918	194	338.	2	JAN	0218	264	7.
	AN	0524	55	21.	1	JAN	1224	125	6889.	1	JAN	1924	195	320.	2	JAN	0224	265	6.
1	JAN	0530	56	22.	1	JAN	1230	126	8466.	1	JAN	1930	196	306.	2	JAN	0230	266	4.
1	JAN	0536	57	22.	1	JAN	1236	127	10152.	1	JAN	1936	197	299.	2	JAN	0236	267	3.
1	JAN	0542	58	22.	1	JAN	1242	128	11879.	1	JAN	1942	198	296.	2	JAN	0242	268	2.
1	JAN	0548	59	23.	1	JAN	1248	129	13545.	1	JAN	1948	199	298.	2	JAN	0248	269	2.

1 JAN 0554	60	23.	*	1 JAN 1254	130	15027.	*	1 JAN 1954	200	301.	*	2 JAN 0254	270	1.
1 JAN 0600	61	23.	*	1 JAN 1300	131	16158.	*	1 JAN 2000	201	305.	*	2 JAN 0300	271	1.
1 JAN 0606	62	23.	*	1 JAN 1306	132	16780.	*	1 JAN 2006	202	309.	*	2 JAN 0306	272	1.
1 JAN 0612	63	22.	*	1 JAN 1312	133	16781.	*	1 JAN 2012	203	311.	*	2 JAN 0312	273	0.
1 JAN 0618	64	22.	*	1 JAN 1318	134	16147.	*	1 JAN 2018	204	313.	*	2 JAN 0318	274	0.
1 JAN 0624	65	22.	*	1 JAN 1324	135	14967.	*	1 JAN 2024	205	313.	*	2 JAN 0324	275	0.
N 0630	66	22.	*	1 JAN 1330	136	13409.	*	1 JAN 2030	206	312.	*	2 JAN 0330	276	0.
AN 0636	67	22.	*	1 JAN 1336	137	11689.	*	1 JAN 2036	207	309.	*	2 JAN 0336	277	0.
1 JAN 0642	68	22.	*	1 JAN 1342	138	10003.	*	1 JAN 2042	208	304.	*	2 JAN 0342	278	0.
1 JAN 0648	69	23.	*	1 JAN 1348	139	8482.	*	1 JAN 2048	209	296.	*	2 JAN 0348	279	0.
1 JAN 0654	70	23.	*	1 JAN 1354	140	7178.	*	1 JAN 2054	210	287.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
16781.	13.20	(CFS)	4682.	1321.	1137.	1137.
		(INCHES)	2.726	3.075	3.077	3.077
		(AC-FT)	2321.	2619.	2621.	2621.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 20.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	23.	*	1 JAN 1400	141	5882.	*	1 JAN 2100	211	264.
1 JAN 0006	2	0.	*	1 JAN 0706	72	23.	*	1 JAN 1406	142	5015.	*	1 JAN 2106	212	254.
1 JAN 0012	3	0.	*	1 JAN 0712	73	24.	*	1 JAN 1412	143	4304.	*	1 JAN 2112	213	244.
1 JAN 0018	4	0.	*	1 JAN 0718	74	24.	*	1 JAN 1418	144	3719.	*	1 JAN 2118	214	236.
1 JAN 0024	5	0.	*	1 JAN 0724	75	25.	*	1 JAN 1424	145	3237.	*	1 JAN 2124	215	229.
1 JAN 0030	6	0.	*	1 JAN 0730	76	25.	*	1 JAN 1430	146	2836.	*	1 JAN 2130	216	224.
AN 0036	7	1.	*	1 JAN 0736	77	26.	*	1 JAN 1436	147	2501.	*	1 JAN 2136	217	221.
AN 0042	8	1.	*	1 JAN 0742	78	26.	*	1 JAN 1442	148	2218.	*	1 JAN 2142	218	218.
1 JAN 0048	9	2.	*	1 JAN 0748	79	26.	*	1 JAN 1448	149	1979.	*	1 JAN 2148	219	216.
1 JAN 0054	10	3.	*	1 JAN 0754	80	27.	*	1 JAN 1454	150	1777.	*	1 JAN 2154	220	214.
1 JAN 0100	11	3.	*	1 JAN 0800	81	27.	*	1 JAN 1500	151	1605.	*	1 JAN 2200	221	213.
1 JAN 0106	12	4.	*	1 JAN 0806	82	27.	*	1 JAN 1506	152	1460.	*	1 JAN 2206	222	212.
1 JAN 0112	13	6.	*	1 JAN 0812	83	27.	*	1 JAN 1512	153	1336.	*	1 JAN 2212	223	211.
1 JAN 0118	14	7.	*	1 JAN 0818	84	27.	*	1 JAN 1518	154	1229.	*	1 JAN 2218	224	211.
1 JAN 0124	15	8.	*	1 JAN 0824	85	27.	*	1 JAN 1524	155	1137.	*	1 JAN 2224	225	210.
1 JAN 0130	16	9.	*	1 JAN 0830	86	27.	*	1 JAN 1530	156	1058.	*	1 JAN 2230	226	210.
1 JAN 0136	17	10.	*	1 JAN 0836	87	28.	*	1 JAN 1536	157	989.	*	1 JAN 2236	227	209.
1 JAN 0142	18	11.	*	1 JAN 0842	88	28.	*	1 JAN 1542	158	929.	*	1 JAN 2242	228	208.
1 JAN 0148	19	12.	*	1 JAN 0848	89	29.	*	1 JAN 1548	159	877.	*	1 JAN 2248	229	205.
1 JAN 0154	20	13.	*	1 JAN 0854	90	30.	*	1 JAN 1554	160	829.	*	1 JAN 2254	230	202.
1 JAN 0200	21	14.	*	1 JAN 0900	91	34.	*	1 JAN 1600	161	784.	*	1 JAN 2300	231	198.
1 JAN 0206	22	15.	*	1 JAN 0906	92	42.	*	1 JAN 1606	162	743.	*	1 JAN 2306	232	193.
1 JAN 0212	23	15.	*	1 JAN 0912	93	58.	*	1 JAN 1612	163	705.	*	1 JAN 2312	233	188.
1 JAN 0218	24	16.	*	1 JAN 0918	94	86.	*	1 JAN 1618	164	672.	*	1 JAN 2318	234	185.
1 JAN 0224	25	16.	*	1 JAN 0924	95	128.	*	1 JAN 1624	165	644.	*	1 JAN 2324	235	184.
1 JAN 0230	26	16.	*	1 JAN 0930	96	185.	*	1 JAN 1630	166	622.	*	1 JAN 2330	236	185.
1 JAN 0236	27	16.	*	1 JAN 0936	97	251.	*	1 JAN 1636	167	604.	*	1 JAN 2336	237	189.
1 JAN 0242	28	16.	*	1 JAN 0942	98	321.	*	1 JAN 1642	168	590.	*	1 JAN 2342	238	193.
1 JAN 0248	29	16.	*	1 JAN 0948	99	388.	*	1 JAN 1648	169	580.	*	1 JAN 2348	239	196.
1 JAN 0254	30	16.	*	1 JAN 0954	100	448.	*	1 JAN 1654	170	572.	*	1 JAN 2354	240	200.
1 JAN 0300	31	16.	*	1 JAN 1000	101	500.	*	1 JAN 1700	171	565.	*	2 JAN 0000	241	202.
1 JAN 0306	32	16.	*	1 JAN 1006	102	545.	*	1 JAN 1706	172	559.	*	2 JAN 0006	242	204.
1 JAN 0312	33	16.	*	1 JAN 1012	103	584.	*	1 JAN 1712	173	552.	*	2 JAN 0012	243	205.
1 JAN 0318	34	16.	*	1 JAN 1018	104	620.	*	1 JAN 1718	174	544.	*	2 JAN 0018	244	206.
1 JAN 0324	35	16.	*	1 JAN 1024	105	654.	*	1 JAN 1724	175	533.	*	2 JAN 0024	245	205.
1 JAN 0330	36	16.	*	1 JAN 1030	106	688.	*	1 JAN 1730	176	520.	*	2 JAN 0030	246	204.
1 JAN 0336	37	16.	*	1 JAN 1036	107	724.	*	1 JAN 1736	177	503.	*	2 JAN 0036	247	200.
1 JAN 0342	38	16.	*	1 JAN 1042	108	760.	*	1 JAN 1742	178	485.	*	2 JAN 0042	248	194.
JAN 0348	39	16.	*	1 JAN 1048	109	799.	*	1 JAN 1748	179	467.	*	2 JAN 0048	249	186.
JAN 0354	40	17.	*	1 JAN 1054	110	838.	*	1 JAN 1754	180	449.	*	2 JAN 0054	250	174.
1 JAN 0400	41	17.	*	1 JAN 1100	111	878.	*	1 JAN 1800	181	434.	*	2 JAN 0100	251	159.
1 JAN 0406	42	17.	*	1 JAN 1106	112	922.	*	1 JAN 1806	182	424.	*	2 JAN 0106	252	142.
1 JAN 0412	43	17.	*	1 JAN 1112	113	973.	*	1 JAN 1812	183	417.	*	2 JAN 0112	253	124.
1 JAN 0418	44	17.	*	1 JAN 1118	114	1034.	*	1 JAN 1818	184	415.	*	2 JAN 0118	254	105.

1 JAN 0424	45	17.	*	1 JAN 1124	115	1109.	*	1 JAN 1824	185	415.	*	2 JAN 0124	255	87.
1 JAN 0430	46	17.	*	1 JAN 1130	116	1201.	*	1 JAN 1830	186	415.	*	2 JAN 0130	256	70.
1 JAN 0436	47	18.	*	1 JAN 1136	117	1319.	*	1 JAN 1836	187	415.	*	2 JAN 0136	257	54.
1 JAN 0442	48	18.	*	1 JAN 1142	118	1474.	*	1 JAN 1842	188	412.	*	2 JAN 0142	258	42.
1 JAN 0448	49	18.	*	1 JAN 1148	119	1696.	*	1 JAN 1848	189	406.	*	2 JAN 0148	259	31.
1 JAN 0454	50	19.	*	1 JAN 1154	120	2024.	*	1 JAN 1854	190	396.	*	2 JAN 0154	260	24.
1 JAN 0500	51	19.	*	1 JAN 1200	121	2511.	*	1 JAN 1900	191	382.	*	2 JAN 0200	261	18.
1 JAN 0506	52	19.	*	1 JAN 1206	122	3208.	*	1 JAN 1906	192	364.	*	2 JAN 0206	262	13.
1 JAN 0512	53	20.	*	1 JAN 1212	123	4140.	*	1 JAN 1912	193	344.	*	2 JAN 0212	263	10.
1 JAN 0518	54	20.	*	1 JAN 1218	124	5293.	*	1 JAN 1918	194	323.	*	2 JAN 0218	264	7.
1 JAN 0524	55	21.	*	1 JAN 1224	125	6649.	*	1 JAN 1924	195	306.	*	2 JAN 0224	265	5.
1 JAN 0530	56	21.	*	1 JAN 1230	126	8177.	*	1 JAN 1930	196	293.	*	2 JAN 0230	266	4.
1 JAN 0536	57	21.	*	1 JAN 1236	127	9811.	*	1 JAN 1936	197	286.	*	2 JAN 0236	267	3.
1 JAN 0542	58	22.	*	1 JAN 1242	128	11484.	*	1 JAN 1942	198	283.	*	2 JAN 0242	268	2.
1 JAN 0548	59	22.	*	1 JAN 1248	129	13100.	*	1 JAN 1948	199	285.	*	2 JAN 0248	269	2.
1 JAN 0554	60	22.	*	1 JAN 1254	130	14536.	*	1 JAN 1954	200	288.	*	2 JAN 0254	270	1.
1 JAN 0600	61	22.	*	1 JAN 1300	131	15632.	*	1 JAN 2000	201	292.	*	2 JAN 0300	271	1.
1 JAN 0606	62	22.	*	1 JAN 1306	132	16235.	*	1 JAN 2006	202	295.	*	2 JAN 0306	272	1.
1 JAN 0612	63	22.	*	1 JAN 1312	133	16236.	*	1 JAN 2012	203	298.	*	2 JAN 0312	273	0.
1 JAN 0618	64	22.	*	1 JAN 1318	134	15622.	*	1 JAN 2018	204	300.	*	2 JAN 0318	274	0.
1 JAN 0624	65	21.	*	1 JAN 1324	135	14478.	*	1 JAN 2024	205	300.	*	2 JAN 0324	275	0.
1 JAN 0630	66	21.	*	1 JAN 1330	136	12969.	*	1 JAN 2030	206	299.	*	2 JAN 0330	276	0.
1 JAN 0636	67	21.	*	1 JAN 1336	137	11302.	*	1 JAN 2036	207	296.	*	2 JAN 0336	277	0.
1 JAN 0642	68	22.	*	1 JAN 1342	138	9670.	*	1 JAN 2042	208	291.	*	2 JAN 0342	278	0.
1 JAN 0648	69	22.	*	1 JAN 1348	139	8197.	*	1 JAN 2048	209	284.	*	2 JAN 0348	279	0.
1 JAN 0654	70	22.	*	1 JAN 1354	140	6934.	*	1 JAN 2054	210	275.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
16236.	13.20	(CFS)	4518.	1270.	1093.	1093.
		(INCHES)	2.630	2.958	2.960	2.960
		(AC-FT)	2240.	2520.	2521.	2521.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 30.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	22.	*	1 JAN 1400	141	5732.	*	1 JAN 2100	211	256.
1 JAN 0006	2	0.	*	1 JAN 0706	72	23.	*	1 JAN 1406	142	4886.	*	1 JAN 2106	212	246.
1 JAN 0012	3	0.	*	1 JAN 0712	73	23.	*	1 JAN 1412	143	4191.	*	1 JAN 2112	213	236.
1 JAN 0018	4	0.	*	1 JAN 0718	74	24.	*	1 JAN 1418	144	3620.	*	1 JAN 2118	214	228.
1 JAN 0024	5	0.	*	1 JAN 0724	75	24.	*	1 JAN 1424	145	3149.	*	1 JAN 2124	215	222.
1 JAN 0030	6	0.	*	1 JAN 0730	76	25.	*	1 JAN 1430	146	2758.	*	1 JAN 2130	216	217.
1 JAN 0036	7	1.	*	1 JAN 0736	77	25.	*	1 JAN 1436	147	2431.	*	1 JAN 2136	217	214.
1 JAN 0042	8	1.	*	1 JAN 0742	78	26.	*	1 JAN 1442	148	2156.	*	1 JAN 2142	218	211.
1 JAN 0048	9	2.	*	1 JAN 0748	79	26.	*	1 JAN 1448	149	1923.	*	1 JAN 2148	219	209.
1 JAN 0054	10	2.	*	1 JAN 0754	80	26.	*	1 JAN 1454	150	1726.	*	1 JAN 2154	220	207.
1 JAN 0100	11	3.	*	1 JAN 0800	81	26.	*	1 JAN 1500	151	1559.	*	1 JAN 2200	221	206.
1 JAN 0106	12	4.	*	1 JAN 0806	82	26.	*	1 JAN 1506	152	1417.	*	1 JAN 2206	222	205.
1 JAN 0112	13	5.	*	1 JAN 0812	83	26.	*	1 JAN 1512	153	1296.	*	1 JAN 2212	223	205.
1 JAN 0118	14	7.	*	1 JAN 0818	84	27.	*	1 JAN 1518	154	1192.	*	1 JAN 2218	224	204.
1 JAN 0124	15	8.	*	1 JAN 0824	85	27.	*	1 JAN 1524	155	1103.	*	1 JAN 2224	225	204.
1 JAN 0130	16	9.	*	1 JAN 0830	86	27.	*	1 JAN 1530	156	1026.	*	1 JAN 2230	226	203.
1 JAN 0136	17	10.	*	1 JAN 0836	87	27.	*	1 JAN 1536	157	959.	*	1 JAN 2236	227	202.
1 JAN 0142	18	11.	*	1 JAN 0842	88	27.	*	1 JAN 1542	158	901.	*	1 JAN 2242	228	201.
1 JAN 0148	19	12.	*	1 JAN 0848	89	28.	*	1 JAN 1548	159	850.	*	1 JAN 2248	229	199.
1 JAN 0154	20	13.	*	1 JAN 0854	90	29.	*	1 JAN 1554	160	803.	*	1 JAN 2254	230	196.
1 JAN 0200	21	14.	*	1 JAN 0900	91	30.	*	1 JAN 1600	161	760.	*	1 JAN 2300	231	192.
1 JAN 0206	22	14.	*	1 JAN 0906	92	34.	*	1 JAN 1606	162	720.	*	1 JAN 2306	232	187.
1 JAN 0212	23	15.	*	1 JAN 0912	93	42.	*	1 JAN 1612	163	683.	*	1 JAN 2312	233	182.
1 JAN 0218	24	15.	*	1 JAN 0918	94	58.	*	1 JAN 1618	164	651.	*	1 JAN 2318	234	179.
1 JAN 0224	25	16.	*	1 JAN 0924	95	86.	*	1 JAN 1624	165	624.	*	1 JAN 2324	235	178.
1 JAN 0230	26	16.	*	1 JAN 0930	96	127.	*	1 JAN 1630	166	602.	*	1 JAN 2330	236	179.
1 JAN 0236	27	16.	*	1 JAN 0936	97	181.	*	1 JAN 1636	167	585.	*	1 JAN 2336	237	183.
1 JAN 0242	28	16.	*	1 JAN 0942	98	244.	*	1 JAN 1642	168	572.	*	1 JAN 2342	238	186.
1 JAN 0248	29	16.	*	1 JAN 0948	99	310.	*	1 JAN 1648	169	561.	*	1 JAN 2348	239	190.

1 JAN 0254	30	16.	*	1 JAN 0954	100	375.	*	1 JAN 1654	170	553.	*	1 JAN 2354	240	193.
1 JAN 0300	31	16.	*	1 JAN 1000	101	434.	*	1 JAN 1700	171	547.	*	2 JAN 0000	241	195.
1 JAN 0306	32	16.	*	1 JAN 1006	102	487.	*	1 JAN 1706	172	541.	*	2 JAN 0006	242	197.
1 JAN 0312	33	16.	*	1 JAN 1012	103	533.	*	1 JAN 1712	173	534.	*	2 JAN 0012	243	198.
1 JAN 0318	34	16.	*	1 JAN 1018	104	575.	*	1 JAN 1718	174	526.	*	2 JAN 0018	244	199.
1 JAN 0324	35	16.	*	1 JAN 1024	105	614.	*	1 JAN 1724	175	516.	*	2 JAN 0024	245	199.
JAN 0330	36	16.	*	1 JAN 1030	106	652.	*	1 JAN 1730	176	503.	*	2 JAN 0030	246	197.
JAN 0336	37	16.	*	1 JAN 1036	107	690.	*	1 JAN 1736	177	487.	*	2 JAN 0036	247	194.
1 JAN 0342	38	16.	*	1 JAN 1042	108	729.	*	1 JAN 1742	178	470.	*	2 JAN 0042	248	188.
1 JAN 0348	39	16.	*	1 JAN 1048	109	768.	*	1 JAN 1748	179	452.	*	2 JAN 0048	249	180.
1 JAN 0354	40	16.	*	1 JAN 1054	110	807.	*	1 JAN 1754	180	435.	*	2 JAN 0054	250	168.
1 JAN 0400	41	16.	*	1 JAN 1100	111	847.	*	1 JAN 1800	181	420.	*	2 JAN 0100	251	154.
1 JAN 0406	42	16.	*	1 JAN 1106	112	890.	*	1 JAN 1806	182	410.	*	2 JAN 0106	252	138.
1 JAN 0412	43	17.	*	1 JAN 1112	113	939.	*	1 JAN 1812	183	404.	*	2 JAN 0112	253	120.
1 JAN 0418	44	17.	*	1 JAN 1118	114	998.	*	1 JAN 1818	184	401.	*	2 JAN 0118	254	102.
1 JAN 0424	45	17.	*	1 JAN 1124	115	1071.	*	1 JAN 1824	185	401.	*	2 JAN 0124	255	84.
1 JAN 0430	46	17.	*	1 JAN 1130	116	1160.	*	1 JAN 1830	186	402.	*	2 JAN 0130	256	67.
1 JAN 0436	47	17.	*	1 JAN 1136	117	1274.	*	1 JAN 1836	187	401.	*	2 JAN 0136	257	53.
1 JAN 0442	48	17.	*	1 JAN 1142	118	1425.	*	1 JAN 1842	188	398.	*	2 JAN 0142	258	40.
1 JAN 0448	49	18.	*	1 JAN 1148	119	1642.	*	1 JAN 1848	189	393.	*	2 JAN 0148	259	30.
1 JAN 0454	50	18.	*	1 JAN 1154	120	1960.	*	1 JAN 1854	190	383.	*	2 JAN 0154	260	23.
1 JAN 0500	51	19.	*	1 JAN 1200	121	2436.	*	1 JAN 1900	191	370.	*	2 JAN 0200	261	17.
1 JAN 0506	52	19.	*	1 JAN 1206	122	3116.	*	1 JAN 1906	192	353.	*	2 JAN 0206	262	13.
1 JAN 0512	53	19.	*	1 JAN 1212	123	4026.	*	1 JAN 1912	193	333.	*	2 JAN 0212	263	9.
1 JAN 0518	54	20.	*	1 JAN 1218	124	5153.	*	1 JAN 1918	194	313.	*	2 JAN 0218	264	7.
1 JAN 0524	55	20.	*	1 JAN 1224	125	6478.	*	1 JAN 1924	195	296.	*	2 JAN 0224	265	5.
1 JAN 0530	56	21.	*	1 JAN 1230	126	7971.	*	1 JAN 1930	196	283.	*	2 JAN 0230	266	4.
1 JAN 0536	57	21.	*	1 JAN 1236	127	9568.	*	1 JAN 1936	197	276.	*	2 JAN 0236	267	3.
1 JAN 0542	58	21.	*	1 JAN 1242	128	11203.	*	1 JAN 1942	198	274.	*	2 JAN 0242	268	2.
1 JAN 0548	59	21.	*	1 JAN 1248	129	12782.	*	1 JAN 1948	199	276.	*	2 JAN 0248	269	1.
1 JAN 0554	60	21.	*	1 JAN 1254	130	14185.	*	1 JAN 1954	200	279.	*	2 JAN 0254	270	1.
1 JAN 0600	61	21.	*	1 JAN 1300	131	15257.	*	1 JAN 2000	201	283.	*	2 JAN 0300	271	1.
1 JAN 0606	62	21.	*	1 JAN 1306	132	15846.	*	1 JAN 2006	202	286.	*	2 JAN 0306	272	1.
1 JAN 0612	63	21.	*	1 JAN 1312	133	15847.	*	1 JAN 2012	203	289.	*	2 JAN 0312	273	0.
1 JAN 0618	64	21.	*	1 JAN 1318	134	15247.	*	1 JAN 2018	204	290.	*	2 JAN 0318	274	0.
1 JAN 0624	65	21.	*	1 JAN 1324	135	14130.	*	1 JAN 2024	205	291.	*	2 JAN 0324	275	0.
1 JAN 0630	66	21.	*	1 JAN 1330	136	12655.	*	1 JAN 2030	206	290.	*	2 JAN 0330	276	0.
1 JAN 0636	67	21.	*	1 JAN 1336	137	11027.	*	1 JAN 2036	207	287.	*	2 JAN 0336	277	0.
AN 0642	68	21.	*	1 JAN 1342	138	9432.	*	1 JAN 2042	208	282.	*	2 JAN 0342	278	0.
AN 0648	69	21.	*	1 JAN 1348	139	7993.	*	1 JAN 2048	209	275.	*	2 JAN 0348	279	0.
1 JAN 0654	70	22.	*	1 JAN 1354	140	6760.	*	1 JAN 2054	210	266.	*	2 JAN 0354	280	0.
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
15847.	13.20	(CFS)	4401.	1234.	1062.	1062.
		(INCHES)	2.562	2.875	2.876	2.876
		(AC-FT)	2182.	2448.	2450.	2450.

CUMULATIVE AREA = 15.97 SQ MI

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HYDROGRAPH AT CO-5
TRANSPOSITION AREA 40.0 SQ MI

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 0000	1	0.	*	1 JAN 0700	71	22.	*	1 JAN 1400	141	5658.	*	1 JAN 2100	211	252.
1 JAN 0006	2	0.	*	1 JAN 0706	72	22.	*	1 JAN 1406	142	4822.	*	1 JAN 2106	212	242.
1 JAN 0012	3	0.	*	1 JAN 0712	73	23.	*	1 JAN 1412	143	4135.	*	1 JAN 2112	213	233.
1 JAN 0018	4	0.	*	1 JAN 0718	74	23.	*	1 JAN 1418	144	3572.	*	1 JAN 2118	214	225.
1 JAN 0024	5	0.	*	1 JAN 0724	75	24.	*	1 JAN 1424	145	3106.	*	1 JAN 2124	215	219.
1 JAN 0030	6	0.	*	1 JAN 0730	76	25.	*	1 JAN 1430	146	2720.	*	1 JAN 2130	216	214.
1 JAN 0036	7	1.	*	1 JAN 0736	77	25.	*	1 JAN 1436	147	2398.	*	1 JAN 2136	217	210.
1 JAN 0042	8	1.	*	1 JAN 0742	78	25.	*	1 JAN 1442	148	2126.	*	1 JAN 2142	218	207.
JAN 0048	9	2.	*	1 JAN 0748	79	26.	*	1 JAN 1448	149	1896.	*	1 JAN 2148	219	205.
JAN 0054	10	2.	*	1 JAN 0754	80	26.	*	1 JAN 1454	150	1701.	*	1 JAN 2154	220	204.
JAN 0100	11	3.	*	1 JAN 0800	81	26.	*	1 JAN 1500	151	1536.	*	1 JAN 2200	221	203.
1 JAN 0106	12	4.	*	1 JAN 0806	82	26.	*	1 JAN 1506	152	1397.	*	1 JAN 2206	222	202.
1 JAN 0112	13	5.	*	1 JAN 0812	83	26.	*	1 JAN 1512	153	1277.	*	1 JAN 2212	223	201.
1 JAN 0118	14	7.	*	1 JAN 0818	84	26.	*	1 JAN 1518	154	1175.	*	1 JAN 2218	224	201.

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 JAN 0124	15	8.	1 JAN 0824	85	26.	1 JAN 1524	155	1087.	1 JAN 2224	225	200.
1 JAN 0130	16	9.	1 JAN 0830	86	26.	1 JAN 1530	156	1011.	1 JAN 2230	226	200.
1 JAN 0136	17	10.	1 JAN 0836	87	27.	1 JAN 1536	157	945.	1 JAN 2236	227	199.
1 JAN 0142	18	11.	1 JAN 0842	88	27.	1 JAN 1542	158	888.	1 JAN 2242	228	198.
1 JAN 0148	19	12.	1 JAN 0848	89	27.	1 JAN 1548	159	837.	1 JAN 2248	229	196.
1 JAN 0154	20	13.	1 JAN 0854	90	28.	1 JAN 1554	160	791.	1 JAN 2254	230	193.
[illegible] 0200	21	14.	1 JAN 0900	91	29.	1 JAN 1600	161	748.	1 JAN 2300	231	188.
[illegible] 0206	22	14.	1 JAN 0906	92	32.	1 JAN 1606	162	709.	1 JAN 2306	232	184.
[illegible] JAN 0212	23	15.	1 JAN 0912	93	38.	1 JAN 1612	163	672.	1 JAN 2312	233	179.
1 JAN 0218	24	15.	1 JAN 0918	94	49.	1 JAN 1618	164	640.	1 JAN 2318	234	176.
1 JAN 0224	25	15.	1 JAN 0924	95	70.	1 JAN 1624	165	614.	1 JAN 2324	235	175.
1 JAN 0230	26	15.	1 JAN 0930	96	104.	1 JAN 1630	166	592.	1 JAN 2330	236	176.
1 JAN 0236	27	16.	1 JAN 0936	97	150.	1 JAN 1636	167	575.	1 JAN 2336	237	179.
1 JAN 0242	28	16.	1 JAN 0942	98	207.	1 JAN 1642	168	562.	1 JAN 2342	238	183.
1 JAN 0248	29	15.	1 JAN 0948	99	270.	1 JAN 1648	169	552.	1 JAN 2348	239	187.
1 JAN 0254	30	15.	1 JAN 0954	100	335.	1 JAN 1654	170	544.	1 JAN 2354	240	190.
1 JAN 0300	31	15.	1 JAN 1000	101	397.	1 JAN 1700	171	538.	2 JAN 0000	241	192.
1 JAN 0306	32	15.	1 JAN 1006	102	453.	1 JAN 1706	172	532.	2 JAN 0006	242	194.
1 JAN 0312	33	15.	1 JAN 1012	103	504.	1 JAN 1712	173	525.	2 JAN 0012	243	195.
1 JAN 0318	34	15.	1 JAN 1018	104	549.	1 JAN 1718	174	517.	2 JAN 0018	244	196.
1 JAN 0324	35	15.	1 JAN 1024	105	592.	1 JAN 1724	175	507.	2 JAN 0024	245	195.
1 JAN 0330	36	16.	1 JAN 1030	106	632.	1 JAN 1730	176	495.	2 JAN 0030	246	194.
1 JAN 0336	37	16.	1 JAN 1036	107	672.	1 JAN 1736	177	479.	2 JAN 0036	247	191.
1 JAN 0342	38	16.	1 JAN 1042	108	712.	1 JAN 1742	178	462.	2 JAN 0042	248	185.
1 JAN 0348	39	16.	1 JAN 1048	109	751.	1 JAN 1748	179	444.	2 JAN 0048	249	177.
1 JAN 0354	40	16.	1 JAN 1054	110	791.	1 JAN 1754	180	428.	2 JAN 0054	250	166.
1 JAN 0400	41	16.	1 JAN 1100	111	831.	1 JAN 1800	181	413.	2 JAN 0100	251	152.
1 JAN 0406	42	16.	1 JAN 1106	112	874.	1 JAN 1806	182	403.	2 JAN 0106	252	135.
1 JAN 0412	43	16.	1 JAN 1112	113	922.	1 JAN 1812	183	397.	2 JAN 0112	253	118.
1 JAN 0418	44	16.	1 JAN 1118	114	980.	1 JAN 1818	184	395.	2 JAN 0118	254	100.
1 JAN 0424	45	17.	1 JAN 1124	115	1051.	1 JAN 1824	185	395.	2 JAN 0124	255	83.
1 JAN 0430	46	17.	1 JAN 1130	116	1139.	1 JAN 1830	186	395.	2 JAN 0130	256	66.
1 JAN 0436	47	17.	1 JAN 1136	117	1252.	1 JAN 1836	187	395.	2 JAN 0136	257	52.
1 JAN 0442	48	17.	1 JAN 1142	118	1400.	1 JAN 1842	188	392.	2 JAN 0142	258	40.
1 JAN 0448	49	18.	1 JAN 1148	119	1613.	1 JAN 1848	189	386.	2 JAN 0148	259	30.
1 JAN 0454	50	18.	1 JAN 1154	120	1927.	1 JAN 1854	190	377.	2 JAN 0154	260	22.
1 JAN 0500	51	18.	1 JAN 1200	121	2397.	1 JAN 1900	191	364.	2 JAN 0200	261	17.
1 JAN 0506	52	19.	1 JAN 1206	122	3069.	1 JAN 1906	192	347.	2 JAN 0206	262	12.
[illegible] JAN 0512	53	19.	1 JAN 1212	123	3968.	1 JAN 1912	193	328.	2 JAN 0212	263	9.
[illegible] N 0518	54	20.	1 JAN 1218	124	5082.	1 JAN 1918	194	308.	2 JAN 0218	264	7.
[illegible] JAN 0524	55	20.	1 JAN 1224	125	6391.	1 JAN 1924	195	291.	2 JAN 0224	265	5.
1 JAN 0530	56	20.	1 JAN 1230	126	7867.	1 JAN 1930	196	279.	2 JAN 0230	266	4.
1 JAN 0536	57	21.	1 JAN 1236	127	9446.	1 JAN 1936	197	272.	2 JAN 0236	267	3.
1 JAN 0542	58	21.	1 JAN 1242	128	11062.	1 JAN 1942	198	270.	2 JAN 0242	268	2.
1 JAN 0548	59	21.	1 JAN 1248	129	12622.	1 JAN 1948	199	271.	2 JAN 0248	269	1.
1 JAN 0554	60	21.	1 JAN 1254	130	14010.	1 JAN 1954	200	274.	2 JAN 0254	270	1.
1 JAN 0600	61	21.	1 JAN 1300	131	15069.	1 JAN 2000	201	278.	2 JAN 0300	271	1.
1 JAN 0606	62	21.	1 JAN 1306	132	15651.	1 JAN 2006	202	281.	2 JAN 0306	272	0.
1 JAN 0612	63	21.	1 JAN 1312	133	15652.	1 JAN 2012	203	284.	2 JAN 0312	273	0.
1 JAN 0618	64	21.	1 JAN 1318	134	15060.	1 JAN 2018	204	285.	2 JAN 0318	274	0.
1 JAN 0624	65	21.	1 JAN 1324	135	13955.	1 JAN 2024	205	286.	2 JAN 0324	275	0.
1 JAN 0630	66	21.	1 JAN 1330	136	12498.	1 JAN 2030	206	285.	2 JAN 0330	276	0.
1 JAN 0636	67	21.	1 JAN 1336	137	10889.	1 JAN 2036	207	282.	2 JAN 0336	277	0.
1 JAN 0642	68	21.	1 JAN 1342	138	9313.	1 JAN 2042	208	278.	2 JAN 0342	278	0.
1 JAN 0648	69	21.	1 JAN 1348	139	7892.	1 JAN 2048	209	271.	2 JAN 0348	279	0.
1 JAN 0654	70	22.	1 JAN 1354	140	6673.	1 JAN 2054	210	262.	2 JAN 0354	280	0.

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
15652.	13.20	(CFS)	4343.	1216.	1047.	1047.
		(INCHES)	2.528	2.833	2.834	2.834
		(AC-FT)	2153.	2413.	2414.	2414.

CUMULATIVE AREA = 15.97 SQ MI

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INTERPOLATED HYDROGRAPH AT CO-5

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DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW

1 JAN 0000	1	0.	*	1 JAN 0700	71	23.	*	1 JAN 1400	141	5950.	*	1 JAN 2100	211	268.
1 JAN 0006	2	0.	*	1 JAN 0706	72	23.	*	1 JAN 1406	142	5074.	*	1 JAN 2106	212	257.
1 JAN 0012	3	0.	*	1 JAN 0712	73	24.	*	1 JAN 1412	143	4355.	*	1 JAN 2112	213	247.
1 JAN 0018	4	0.	*	1 JAN 0718	74	25.	*	1 JAN 1418	144	3764.	*	1 JAN 2118	214	239.
1 JAN 0024	5	0.	*	1 JAN 0724	75	25.	*	1 JAN 1424	145	3276.	*	1 JAN 2124	215	233.
1 JAN 0030	6	0.	*	1 JAN 0730	76	26.	*	1 JAN 1430	146	2871.	*	1 JAN 2130	216	228.
N 0036	7	1.	*	1 JAN 0736	77	26.	*	1 JAN 1436	147	2532.	*	1 JAN 2136	217	224.
N 0042	8	1.	*	1 JAN 0742	78	26.	*	1 JAN 1442	148	2247.	*	1 JAN 2142	218	221.
JAN 0048	9	2.	*	1 JAN 0748	79	27.	*	1 JAN 1448	149	2005.	*	1 JAN 2148	219	219.
1 JAN 0054	10	3.	*	1 JAN 0754	80	27.	*	1 JAN 1454	150	1800.	*	1 JAN 2154	220	217.
1 JAN 0100	11	3.	*	1 JAN 0800	81	27.	*	1 JAN 1500	151	1626.	*	1 JAN 2200	221	216.
1 JAN 0106	12	4.	*	1 JAN 0806	82	27.	*	1 JAN 1506	152	1479.	*	1 JAN 2206	222	215.
1 JAN 0112	13	6.	*	1 JAN 0812	83	27.	*	1 JAN 1512	153	1353.	*	1 JAN 2212	223	215.
1 JAN 0118	14	7.	*	1 JAN 0818	84	27.	*	1 JAN 1518	154	1246.	*	1 JAN 2218	224	214.
1 JAN 0124	15	8.	*	1 JAN 0824	85	28.	*	1 JAN 1524	155	1152.	*	1 JAN 2224	225	214.
1 JAN 0130	16	9.	*	1 JAN 0830	86	28.	*	1 JAN 1530	156	1072.	*	1 JAN 2230	226	213.
1 JAN 0136	17	10.	*	1 JAN 0836	87	28.	*	1 JAN 1536	157	1003.	*	1 JAN 2236	227	212.
1 JAN 0142	18	12.	*	1 JAN 0842	88	28.	*	1 JAN 1542	158	942.	*	1 JAN 2242	228	211.
1 JAN 0148	19	13.	*	1 JAN 0848	89	30.	*	1 JAN 1548	159	889.	*	1 JAN 2248	229	208.
1 JAN 0154	20	14.	*	1 JAN 0854	90	32.	*	1 JAN 1554	160	840.	*	1 JAN 2254	230	205.
1 JAN 0200	21	14.	*	1 JAN 0900	91	38.	*	1 JAN 1600	161	795.	*	1 JAN 2300	231	201.
1 JAN 0206	22	15.	*	1 JAN 0906	92	50.	*	1 JAN 1606	162	753.	*	1 JAN 2306	232	196.
1 JAN 0212	23	15.	*	1 JAN 0912	93	72.	*	1 JAN 1612	163	715.	*	1 JAN 2312	233	191.
1 JAN 0218	24	16.	*	1 JAN 0918	94	106.	*	1 JAN 1618	164	681.	*	1 JAN 2318	234	188.
1 JAN 0224	25	16.	*	1 JAN 0924	95	155.	*	1 JAN 1624	165	653.	*	1 JAN 2324	235	187.
1 JAN 0230	26	16.	*	1 JAN 0930	96	215.	*	1 JAN 1630	166	631.	*	1 JAN 2330	236	188.
1 JAN 0236	27	16.	*	1 JAN 0936	97	283.	*	1 JAN 1636	167	613.	*	1 JAN 2336	237	192.
1 JAN 0242	28	16.	*	1 JAN 0942	98	352.	*	1 JAN 1642	168	599.	*	1 JAN 2342	238	196.
1 JAN 0248	29	16.	*	1 JAN 0948	99	417.	*	1 JAN 1648	169	589.	*	1 JAN 2348	239	199.
1 JAN 0254	30	16.	*	1 JAN 0954	100	474.	*	1 JAN 1654	170	580.	*	1 JAN 2354	240	202.
1 JAN 0300	31	16.	*	1 JAN 1000	101	523.	*	1 JAN 1700	171	574.	*	2 JAN 0000	241	205.
1 JAN 0306	32	16.	*	1 JAN 1006	102	565.	*	1 JAN 1706	172	567.	*	2 JAN 0006	242	207.
1 JAN 0312	33	16.	*	1 JAN 1012	103	602.	*	1 JAN 1712	173	560.	*	2 JAN 0012	243	208.
1 JAN 0318	34	16.	*	1 JAN 1018	104	636.	*	1 JAN 1718	174	552.	*	2 JAN 0018	244	209.
1 JAN 0324	35	16.	*	1 JAN 1024	105	669.	*	1 JAN 1724	175	541.	*	2 JAN 0024	245	208.
1 JAN 0330	36	16.	*	1 JAN 1030	106	702.	*	1 JAN 1730	176	527.	*	2 JAN 0030	246	206.
1 JAN 0336	37	16.	*	1 JAN 1036	107	737.	*	1 JAN 1736	177	511.	*	2 JAN 0036	247	203.
1 JAN 0342	38	16.	*	1 JAN 1042	108	774.	*	1 JAN 1742	178	493.	*	2 JAN 0042	248	197.
IAN 0348	39	17.	*	1 JAN 1048	109	812.	*	1 JAN 1748	179	474.	*	2 JAN 0048	249	188.
AN 0354	40	17.	*	1 JAN 1054	110	851.	*	1 JAN 1754	180	456.	*	2 JAN 0054	250	176.
JAN 0400	41	17.	*	1 JAN 1100	111	892.	*	1 JAN 1800	181	441.	*	2 JAN 0100	251	162.
1 JAN 0406	42	17.	*	1 JAN 1106	112	937.	*	1 JAN 1806	182	430.	*	2 JAN 0106	252	144.
1 JAN 0412	43	17.	*	1 JAN 1112	113	988.	*	1 JAN 1812	183	423.	*	2 JAN 0112	253	126.
1 JAN 0418	44	17.	*	1 JAN 1118	114	1050.	*	1 JAN 1818	184	421.	*	2 JAN 0118	254	107.
1 JAN 0424	45	17.	*	1 JAN 1124	115	1126.	*	1 JAN 1824	185	421.	*	2 JAN 0124	255	88.
1 JAN 0430	46	18.	*	1 JAN 1130	116	1219.	*	1 JAN 1830	186	422.	*	2 JAN 0130	256	71.
1 JAN 0436	47	18.	*	1 JAN 1136	117	1339.	*	1 JAN 1836	187	421.	*	2 JAN 0136	257	55.
1 JAN 0442	48	18.	*	1 JAN 1142	118	1497.	*	1 JAN 1842	188	418.	*	2 JAN 0142	258	42.
1 JAN 0448	49	18.	*	1 JAN 1148	119	1722.	*	1 JAN 1848	189	412.	*	2 JAN 0148	259	32.
1 JAN 0454	50	19.	*	1 JAN 1154	120	2053.	*	1 JAN 1854	190	402.	*	2 JAN 0154	260	24.
1 JAN 0500	51	19.	*	1 JAN 1200	121	2546.	*	1 JAN 1900	191	387.	*	2 JAN 0200	261	18.
1 JAN 0506	52	20.	*	1 JAN 1206	122	3250.	*	1 JAN 1906	192	369.	*	2 JAN 0206	262	13.
1 JAN 0512	53	20.	*	1 JAN 1212	123	4191.	*	1 JAN 1912	193	349.	*	2 JAN 0212	263	10.
1 JAN 0518	54	21.	*	1 JAN 1218	124	5357.	*	1 JAN 1918	194	328.	*	2 JAN 0218	264	7.
1 JAN 0524	55	21.	*	1 JAN 1224	125	6727.	*	1 JAN 1924	195	310.	*	2 JAN 0224	265	5.
1 JAN 0530	56	21.	*	1 JAN 1230	126	8271.	*	1 JAN 1930	196	297.	*	2 JAN 0230	266	4.
1 JAN 0536	57	22.	*	1 JAN 1236	127	9922.	*	1 JAN 1936	197	290.	*	2 JAN 0236	267	3.
1 JAN 0542	58	22.	*	1 JAN 1242	128	11612.	*	1 JAN 1942	198	288.	*	2 JAN 0242	268	2.
1 JAN 0548	59	22.	*	1 JAN 1248	129	13244.	*	1 JAN 1948	199	289.	*	2 JAN 0248	269	2.
1 JAN 0554	60	22.	*	1 JAN 1254	130	14695.	*	1 JAN 1954	200	292.	*	2 JAN 0254	270	1.
1 JAN 0600	61	22.	*	1 JAN 1300	131	15803.	*	1 JAN 2000	201	296.	*	2 JAN 0300	271	1.
1 JAN 0606	62	22.	*	1 JAN 1306	132	16412.	*	1 JAN 2006	202	300.	*	2 JAN 0306	272	1.
1 JAN 0612	63	22.	*	1 JAN 1312	133	16413.	*	1 JAN 2012	203	302.	*	2 JAN 0312	273	0.
1 JAN 0618	64	22.	*	1 JAN 1318	134	15793.	*	1 JAN 2018	204	304.	*	2 JAN 0318	274	0.
1 JAN 0624	65	22.	*	1 JAN 1324	135	14637.	*	1 JAN 2024	205	304.	*	2 JAN 0324	275	0.
1 JAN 0630	66	22.	*	1 JAN 1330	136	13112.	*	1 JAN 2030	206	303.	*	2 JAN 0330	276	0.
1 JAN 0636	67	22.	*	1 JAN 1336	137	11428.	*	1 JAN 2036	207	300.	*	2 JAN 0336	277	0.
1 JAN 0642	68	22.	*	1 JAN 1342	138	9778.	*	1 JAN 2042	208	295.	*	2 JAN 0342	278	0.
1 JAN 0648	69	22.	*	1 JAN 1348	139	8289.	*	1 JAN 2048	209	288.	*	2 JAN 0348	279	0.
1 JAN 0654	70	22.	*	1 JAN 1354	140	7013.	*	1 JAN 2054	210	279.	*	2 JAN 0354	280	0.
			*				*				*			

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	27.90-HR
16413.	13.20	(CFS)	4571.	1287.	1107.	1107.

(INCHES)	2.661	2.996	2.998	2.998
(AC-FT)	2267.	2552.	2553.	2553.

CUMULATIVE AREA = 15.97 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	X1SUB	943.	12.30	152.	41.	36.	.60		
ROUTED TO	XROX2	909.	12.50	152.	41.	36.	.60		
HYDROGRAPH AT	X2SUB	458.	12.60	94.	24.	21.	.43		
2 COMBINED AT	XCO-1	1351.	12.50	244.	65.	56.	1.03		
ROUTED TO	XROX3	1293.	12.70	244.	65.	56.	1.03		
HYDROGRAPH AT	X3SUB	592.	12.50	110.	28.	24.	.56		
2 COMBINED AT	XCO-2	1839.	12.70	353.	93.	80.	1.59		
HYDROGRAPH AT	X4SUB	405.	12.30	60.	15.	13.	.28		
2 COMBINED AT	XCO-3	2087.	12.60	411.	107.	92.	1.87		
HYDROGRAPH AT	X5SUB	532.	12.30	75.	19.	16.	.38		
2 COMBINED AT	XCO-4	2456.	12.60	483.	125.	108.	2.25		
HYDROGRAPH AT	SUBC1	2345.	12.20	437.	133.	114.	1.26		
ROUTED TO	RO-1	2058.	12.80	437.	133.	114.	1.26		
HYDROGRAPH AT	SUBC2	2435.	12.60	629.	162.	139.	2.15		
HYDROGRAPH AT	SUBC3	1882.	12.40	392.	106.	91.	1.25		
HYDROGRAPH AT	SUBC4	3900.	12.40	878.	267.	230.	2.55		
ROUTED TO	RO-2	3762.	12.60	878.	267.	230.	2.55		
HYDROGRAPH AT	SUBC5	4775.	12.40	1139.	338.	291.	3.38		
2 COMBINED AT	CO-1	8137.	12.50	2007.	601.	517.	5.93		
ROUTED TO	RO-3	7967.	12.80	2007.	601.	517.	5.93		
4 COMBINED AT	CO-2	13283.	12.70	3423.	989.	850.	10.59		
ROUTED TO	RO-4	13041.	13.00	3423.	989.	850.	10.59		
HYDROGRAPH AT	SUBC7	1642.	12.40	310.	85.	73.	1.18		
ROUTED TO	RO-5	1474.	13.20	310.	85.	73.	1.18		
HYDROGRAPH AT	SUBC8	1746.	12.50	358.	94.	81.	1.42		
2 COMBINED AT	CO-3	2281.	13.00	664.	178.	153.	2.60		
3 COMBINED AT	CO-4	16575.	12.90	4464.	1260.	1084.	15.44		
ROUTED TO	RO-6	16304.	13.20	4464.	1260.	1084.	15.44		
HYDROGRAPH AT	SUBC9	768.	12.30	122.	31.	27.	.53		
2 COMBINED AT	CO-5	16413.	13.20	4571.	1287.	1107.	15.97		

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

APPENDIX D

CLINE CREEK

DATA SUPPLIED

BY

FLOOD CONTROL DISTRICT OF

MARICOPA COUNTY

SCS TYPE II DISTRIBUTION

2-HOUR DISTRIBUTION

Time Inc.(Hr)	Cumulative ppt
0.00	0.000
0.25	0.039
0.50	0.087
0.75	0.280
1.00	0.791
1.25	0.872
1.50	0.924
1.75	0.967
2.00	1.000

6-HOUR DISTRIBUTION

Time Inc.(Hr)	Cumulative ppt
0.00	0.000
0.25	0.011
0.50	0.022
0.75	0.035
1.00	0.048
1.25	0.062
1.50	0.079
1.75	0.100
2.00	0.125
2.25	0.155
2.50	0.192
2.75	0.339
3.00	0.729
3.25	0.791
3.50	0.830
3.75	0.862
4.00	0.887
4.25	0.908
4.50	0.926
4.75	0.942
5.00	0.956
5.25	0.969
5.50	0.980
5.75	0.990
6.00	1.000

D 2

24-HOUR DISTRIBUTION

Time Inc.(Hr)	Cumulative ppt	Time Inc.(Hr)	Cumulative ppt
0.00	0.000	12.00	0.663
0.25	0.002	12.25	0.707
0.50	0.005	12.50	0.735
0.75	0.008	12.75	0.758
1.00	0.011	13.00	0.776
1.25	0.014	13.25	0.791
1.50	0.017	13.50	0.804
1.75	0.020	13.75	0.815
2.00	0.023	14.00	0.825
2.25	0.026	14.25	0.834
2.50	0.029	14.50	0.842
2.75	0.032	14.75	0.849
3.00	0.035	15.00	0.856
3.25	0.038	15.25	0.863
3.50	0.041	15.50	0.869
3.75	0.044	15.75	0.875
4.00	0.048	16.00	0.881
4.25	0.052	16.25	0.887
4.50	0.056	16.50	0.893
4.75	0.060	16.75	0.898
5.00	0.064	17.00	0.903
5.25	0.068	17.25	0.908
5.50	0.072	17.50	0.913
5.75	0.076	17.75	0.918
6.00	0.080	18.00	0.922
6.25	0.085	18.25	0.926
6.50	0.090	18.50	0.930
6.75	0.095	18.75	0.934
7.00	0.100	19.00	0.938
7.25	0.105	19.25	0.942
7.50	0.110	19.50	0.946
7.75	0.115	19.75	0.950
8.00	0.120	20.00	0.953
8.25	0.126	20.25	0.956
8.50	0.133	20.50	0.959
8.75	0.140	20.75	0.962
9.00	0.147	21.00	0.965
9.25	0.155	21.25	0.968
9.50	0.163	21.50	0.971
9.75	0.172	21.75	0.974
10.00	0.181	22.00	0.977
10.20	0.191	22.25	0.980
10.50	0.203	22.50	0.983
10.75	0.218	22.75	0.986
11.00	0.236	23.00	0.989
11.25	0.257	23.25	0.992
11.50	0.283	23.50	0.995
11.75	0.387	23.75	0.998
		24.00	1.000

D 3

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: Areal ~~Aerial~~ Reduction	☒ FILE ☐ DESTROY

TO: DJP ~~MV~~ FROM: ~~VAR~~ JAR DATE: 4/11/89

A question had come up regarding which areal reduction curve should be used. NOAA in their Technical Memorandum NWS HYDRO-40 entitled "Depth-Area Ratios in the Semi-Arid Southwest United States" has utilized the data from the Walnut Gulch Experimental watershed to develop the curves to be used for the Southwest region of the United States. The memo does not provide a regression equation for the curves, but only a graph. Because of the shape and the scale for the curves, it is difficult to achieve accurate values for the smaller watersheds. Therefore, Tom Hieb and I conducted independent determinations of the values for less than 100 square miles for a uniform set of ratios for a storm with a duration of 24 hours.

The ratios should be used for any watershed greater than 10 square miles. The following are the values to be used for a storm with a duration of 24 hours.

Square Mile	Ratio
10	.95
20	.92
30	.90
40	.89
50	.88
60	.87
70	.86
80	.86
90	.85
100	.85

I have not looked at values for other durations, ~~if~~ if there is a need to have these values, then we should determine a set of uniform ratios for that specific duration that can be used.

6900-003
11/78

D 4

TABLE 1

Surface retention loss for various land surfaces in Maricopa County (addition to STRTL for IL+ULR method and IA for Green and Ampt method)

Land-Use and/or Surface Cover	Surface Retention Loss inches
(1)	(2)
Natural	
Desert and rangeland, flat slope	.35
Hillslopes, Sonoran desert	.15
Mountain, brush	.25
Developed (Residential and Commercial)	
Lawn and turf	.20
Desert landscape	.10
Pavement	.05
Agricultural	
Tilled	1.00
Irrigated pasture	.50

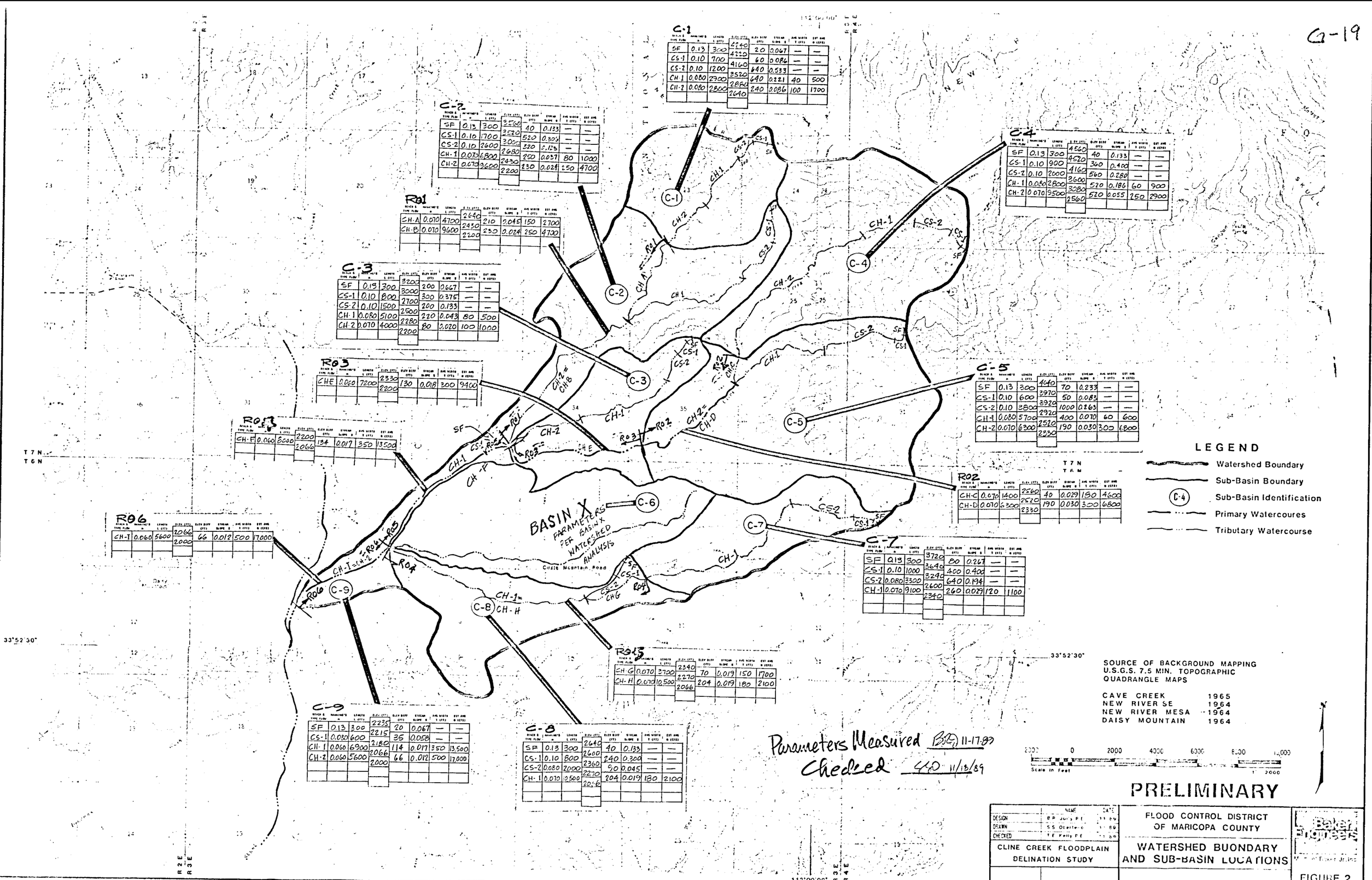
TABLE 4

Initial Loss plus Uniform Loss Rate parameter values
for bare ground according to soil texture classification

Soil texture Classification	Uniform Loss Rate CNSTL	Initial Loss, In inches STRTL[1]		
		Dry	Normal	Saturated
(1)	(2)	(3)	(4)	(5)
sand	4.6	1.3	1.3	0
loamy sand	1.2	.8	.8	0
sandy loam	.4	.7	.6	0
loam	.15	.6	.5	0
silty loam	.25	.8	.7	0
sandy clay loam	.06	.6	.5	0
clay loam	.04	.5	.4	0
silty clay loam	.04	.6	.5	0
sandy clay	.02	.4	.3	0
silty clay	.02	.4	.3	0
clay	.01	.3	.2	0

[1] Selection of STRTL:
Dry - for [illegible] lands such as desert and rangeland
Normal - for [illegible] lawn, turf, and permanent pasture
Saturated - for [illegible] agricultural land

G-19


C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
R01
R02
R03
R04
R05
R06
BASIN X
PARAMETERS PER BASIN X WATERSHED ANALYSIS
Cline Mountain Road
T7N
T6N
R2E
R3E
R4E
33°52'30"
112°00'00"
LEGEND
Watershed Boundary
Sub-Basin Boundary
Sub-Basin Identification
Primary Watercoures
Tributary Watercourse
SOURCE OF BACKGROUND MAPPING
U.S.G.S. 7.5 MIN. TOPOGRAPHIC
QUADRANGLE MAPS
CAVE CREEK 1965
NEW RIVER SE 1964
NEW RIVER MESA 1964
DAISY MOUNTAIN 1964
Scale in Feet
PRELIMINARY
Parameters Measured 11-17-89
Checked 11/13/89
DESIGN
DRAWN
CHECKED
CLINE CREEK FLOODPLAIN DELINATION STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
WATERSHED BUONDARY AND SUB-BASIN LOCATIONS
Baker Engineers
FIGURE 2

G-20

Time of concentration (T_c) or travel time (T_t)

Project **FCD-Floodplain Delineation** By BRJ Date 11-18-89

Location CLINE CREEK WATERSHED Checked [illegible] Date 11-18-89

T_c for Subarea C-1

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)	SF		
2. Manning's roughness coeff., n (table 3-1, TR-55)	OPEN RANGE		
3. Flow length, L (total L ≤ 300 ft) ft	0.13		
4. Two-yr 24-hr rainfall, P2 in	300		
5. Land slope, s ft/ft	2.0		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.067		
	0.27 +		= 0.27

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n	CS-1	CS-2	
8. Hydraulic radius r (appx - avg. depth) Est.	0.10	0.10	
9. Flow Length, L ft	0.25	0.50	
10. Watercourse slope, s ft/ft	700	1200	
11. Average velocity, V (Figure 5) ft/s	0.086	0.533	
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	1.7	6.7	
	0.11 +	0.05	= 0.16

Channel flow	Segment ID		
13. Approximate flow rate, Q ft^3/sec	CH-1	CH-2	
14. Top width, T ft	500	1700	
15. Hydraulic radius, r = d = A/T Estimate ft	40	100	
16. Channel slope, s ft/ft	1.2	2.0	
17. Manning's roughness coeff., n	0.221	0.086	
18. Average velocity, V (Figure 4) ft/s	0.080	0.080	
19 Flow length, L ft	10.0	8.6	
20. Check r estimate: Q = V x T x r = 480 compare to line 13	2900	2800	
	✓	✓	1720
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.08 +	0.09	= 0.17
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			0.60

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6T_c = 0.36$ hr

Time of concentration (T_c) or travel time (T_t)

G-21

Project FCD - Floodplain Delin. By BB Date 11-18-89

Location CLINE CREEK WATERSHED Checked SBD Date 11-18-89

T_c for Subarea C-2

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID			
	SF			
1. Surface description (table 3-1, TR-55)	OPEN RANGE			
2. Manning's roughness coeff., n (table 3-1, TR-55)	0.13			
3. Flow length, L (total L ≤ 300 ft) ft	300			
4. Two-yr 24-hr rainfall, P2 in	2.0			
5. Land slope, s ft/ft	0.133			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.21	+	=	0.21

Shallow concentrated flow	Segment ID			
	CS-1	CS-2		
7. Manning's roughness coeff., n	0.10	0.10		
8. Hydraulic radius r (appx - avg. depth) Est.	0.25	0.50		
9. Flow Length, L ft	1700	2600		
10. Watercourse slope, s ft/ft	0.306	0.123		
11. Average velocity, V (Figure 5) ft/s	3.3	3.3		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.14	+ 0.22	=	0.36

Channel flow	Segment ID			
	CH-1	CH-2		
13. Approximate flow rate, Q ft^3/sec	1000	4700		
14. Top width, T ft	80	250		
15. Hydraulic radius, r = d = $A/_T$ Estimate ft	1.9	2.8		
16. Channel slope, s ft/ft	0.037	0.024		
17. Manning's roughness coeff., n	0.070	0.070		
18. Average velocity, V (Figure 3) ft/s	6.4	6.7		
19 Flow length, L ft	6800	9600		
20. Check r estimate: Q = V x T x r = 972 compare to line 13	✓	✓	4690	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.30	+ 0.40	=	0.70
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr				1.27

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6T_c = 0.76$ hr.

Time of concentration (T_c) or travel time (T_t)

G22

Project FCD - Floodplain Delin. By BRG Date 11-18-89

Location CLINE CREEK WATERSHED Checked SSO Date 11-18-89

T_c for Subarea C-3

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	SF		
1. Surface description (table 3-1, TR-55)		OPEN RANGE		
2. Manning's roughness coeff., n (table 3-1, TR-55)		0.13		
3. Flow length, L (total L ≤ 300 ft)	ft	300		
4. Two-yr 24-hr rainfall, P2	in	2.0		
5. Land slope, s	ft/ft	0.667		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	0.11	+	= 0.11

Shallow concentrated flow	Segment ID	CS-1	CS-2	
7. Manning's roughness coeff., n		0.10	0.10	
8. Hydraulic radius r (appx - avg. depth) Est.		0.25	0.50	
9. Flow Length, L	ft	800	1500	
10. Watercourse slope, s	ft/ft	0.375	0.133	
11. Average velocity, V (Figure 5)	ft/s	3.6	3.4	
12. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.06	+ 0.12	= 0.18

Channel flow	Segment ID	CH-1	CH-2	
13. Approximate flow rate, Q	ft^3/sec	500	1000	
14. Top width, T	ft	80	100	
15. Hydraulic radius, r = d = A/T	Estimate ft	1.3	2.1	
16. Channel slope, s	ft/ft	0.043	0.020	
17. Manning's roughness coeff., n		0.080	0.070	
18. Average velocity, V (Figure 4)	ft/s	4.6	4.9	FIG 3
19 Flow length, L	ft	5100	4000	
20. Check r estimate: Q = V x T x r = 478 compare to line 13		✓	✓	1029
21. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.31	+ 0.23	= 0.54
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr			0.83

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6\,T_c = 0.50$ hr.

Time of concentration (T_c) or travel time (T_t)

G-23

Project FCD Floodplain Delin. By BRJ. Date 11-18-89

Location CLINE CREEK WATERSHED Checked [illegible] Date 11-18-89

T_c for Subarea C-4

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	SF		
1. Surface description (table 3-1, TR-55)		OPEN RANGE		
2. Manning's roughness coeff., n (table 3-1, TR-55)		0.13		
3. Flow length, L (total L ≤ 300 ft) ft		300		
4. Two-yr 24-hr rainfall, P2 in		2.0		
5. Land slope, s ft/ft		0.133		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr		0.21	+	= 0.21

Shallow concentrated flow	Segment ID	CS-1	CS-2	
7. Manning's roughness coeff., n		0.10	0.10	
8. Hydraulic radius r (appx - avg. depth) Est.		0.25	0.50	
9. Flow Length, L ft		900	2000	
10. Watercourse slope, s ft/ft		0.400	0.280	
11. Average velocity, V (Figure 5) ft/s		3.8	4.9	
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		0.07	+ 0.11	= 0.18

Channel flow	Segment ID	CH-1	CH-2	
13. Approximate flow rate, Q ft^3/sec		900	2900	
14. Top width, T ft		60	250	
15. Hydraulic radius, r = d = A/T Estimate ft		1.5	1.65	
16. Channel slope, s ft/ft		0.186	0.055	
17. Manning's roughness coeff., n		0.080	0.070	
18. Average velocity, V (Figure 4) ft/s		10.3	7.1	FIG3
19 Flow length, L ft		2800	9500	
20. Check r estimate: Q = V x T x r = 927 compare to line 13		✓	✓	2929
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		0.08	+ 0.37	= 0.45
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr				0.84

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

$T_L = .6T_c = 0.50$ hr

Time of concentration (T_c) or travel time (T_t)

G-24

Project FCD · Floodplain Delin. By BRS Date 11-18-89

Location CLINE CREEK WATERSHED Checked SSO Date 11-18-89

T_c for Subarea C-5

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
	SF				
1. Surface description (table 3-1, TR-55)	OPEN RANGE				
2. Manning's roughness coeff., n (table 3-1, TR-55)	0.13				
3. Flow length, L (total L ≤ 300 ft) ft	300				
4. Two-yr 24-hr rainfall, P2 in	2.0				
5. Land slope, s ft/ft	0.233				
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.17	+		=	0.17

Shallow concentrated flow	Segment ID				
	CS-1	CS-2			
7. Manning's roughness coeff., n	0.10	0.10			
8. Hydraulic radius r (appx - avg. depth) Est.	0.25	0.50			
9. Flow Length, L ft	600	3800			
10. Watercourse slope, s ft/ft	0.083	0.263			
11. Average velocity, V (Figure 5) ft/s	1.7	4.8			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.10	+	0.22	=	0.32

Channel flow	Segment ID				
	CH-1	CH-2			
13. Approximate flow rate, Q ft^3/sec	600	6800			
14. Top width, T ft	60	300			
15. Hydraulic radius, r = d = A/T Estimate ft	1.5	2.9			
16. Channel slope, s ft/ft	0.070	0.030			
17. Manning's roughness coeff., n	0.080	0.070			
18. Average velocity, V (Figure 4) ft/s	6.5	7.8	FIG 3		
19 Flow length, L ft	5700	6300			
20. Check r estimate: Q = V x T x r = 585 compare to line 13	✓	✓	6786		
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.24	+	0.22	=	0.46
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr					0.95

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6T_c = 0.57$ hr

Time of concentration (T_c) or travel time (T_t)

G-23

Project FCD. Floodplain Delin. By BRG Date 11-18-89

Location CLINE CREEK WATERSHED Checked SBO Date 11-18-89

T_c for Subarea C-7

T_t for Routing Reach

Assumed Watershed Conditions: UNDEVELOPED

NOTES: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	SF		
1. Surface description (table 3-1, TR-55)		OPEN RANGE		
2. Manning's roughness coeff., n (table 3-1, TR-55)		0.13		
3. Flow length, L (total L ≤ 300 ft)	ft	300		
4. Two-yr 24-hr rainfall, P2	in	2.0		
5. Land slope, s	ft/ft	0.267		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	0.16	+	= 0.16

Shallow concentrated flow	Segment ID	CS-1	CS-2	
7. Manning's roughness coeff., n		0.10	0.080	
8. Hydraulic radius r (appx - avg. depth) Est.		0.25	0.050	
9. Flow Length, L	ft	1000	3300	
10. Watercourse slope, s	ft/ft	0.400	0.194	
11. Average velocity, V (Figure 5)	ft/s	3.8	5.1	FIG 4
12. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.07	+ 0.18	= 0.25

Channel flow	Segment ID	CH-1	
13. Approximate flow rate, Q	ft^3/sec	1100	
14. Top width, T	ft	120	
15. Hydraulic radius, r = d = A/T	Estimate ft	1.7	
16. Channel slope, s	ft/ft	0.029	
17. Manning's roughness coeff., n		0.070	
18. Average velocity, V (Figure 3)	ft/s	5.2	
19 Flow length, L	ft	9100	
20. Check r estimate: Q = V x T x r = 1061 compare to line 13		✓	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.49	+ = 0.49
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr		0.90

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6T_c = 0.54$ hr

Time of concentration (T_c) or travel time (T_t)

G-26

Project FCD - Floodplain Delin. By BPJ Date 11-18-89

Location CLINE CREEK WATERSHED Checked [illegible] Date 11-18-89

T_c for Subarea C-8

T_t for Routing Reach

Assumed Watershed Conditions

MINI-RANCH SUBDIVISION

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
	SF				
1. Surface description (table 3-1, TR-55)	OPEN RANGE				
2. Manning's roughness coeff., n (table 3-1, TR-55)	0.13				
3. Flow length, L (total L ≤ 300 ft) ft	300				
4. Two-yr 24-hr rainfall, P2 in	2.0				
5. Land slope, s ft/ft	0.133				
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.21	+		=	0.21

Shallow concentrated flow	Segment ID				
	CS-1	CS-2			
7. Manning's roughness coeff., n	0.10	0.080			
8. Hydraulic radius r (appx - avg. depth) Est.	0.25	0.50			
9. Flow Length, L ft	800	2000			
10. Watercourse slope, s ft/ft	0.300	0.045			
11. Average velocity, V (Figure 5) ft/s	3.3	2.5	FIG.4		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.07	+	0.22	=	0.29

Channel flow	Segment ID				
	CH-1				
13. Approximate flow rate, Q ft^3/sec	2100				
14. Top width, T ft	180				
15. Hydraulic radius, r = d = A/T Estimate ft	2.3				
16. Channel slope, s ft/ft	0.019				
17. Manning's roughness coeff., n	0.070				
18. Average velocity, V (Figure 3) ft/s	5.2				
19 Flow length, L ft	10,500				
20. Check r estimate: Q = V x T x r = 2153 compare to line 13	✓				
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.56	+		=	0.56
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr					1.06

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

$T_L = .6T_C = 0.64$

Time of concentration (T_c) or travel time (T_t)

G-27

Project FCD-Floodplain Delin. By RPJ. Date 11-18-89

Location CLINE CREEK WATERSHED Checked SJC Date 11-18-89

T_c for Subarea C-9

T_t for Routing Reach

Assumed Watershed Conditions

MINI-RANCH & MAJOR WASH BED

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	SF		
1. Surface description (table 3-1, TR-55)			OPEN RANGE		
2. Manning's roughness coeff., n (table 3-1, TR-55)			0.13		
3. Flow length, L (total L ≤ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P2	in		2.0		
5. Land slope, s	ft/ft		0.067		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr		0.27	+	= 0.27

Shallow concentrated flow		Segment ID	CS-1		
7. Manning's roughness coeff., n			0.080		
8. Hydraulic radius r (appx - avg. depth) Est.			0.25		
9. Flow Length, L	ft		600		
10. Watercourse slope, s	ft/ft		0.058		
11. Average velocity, V (Figure 4)	ft/s		1.7		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		0.10	+	= 0.10

Channel flow		Segment ID	CH-1	CH-2	
13. Approximate flow rate, Q	ft^3/sec		13,500	17,000	
14. Top width, T	ft		350	500	
15. Hydraulic radius, r = d = A/T	Estimate ft		4.4	4.5	
16. Channel slope, s	ft/ft		0.017	0.012	
17. Manning's roughness coeff., n			0.060	0.060	
18. Average velocity, V (Figure 2)	ft/s		8.8	7.5	
19 Flow length, L	ft		6900	5600	
20. Check r estimate: Q = V x T x r = 13,552 compare to line 13			✓	✓	16875
21. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		0.22	+ 0.21	= 0.43
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr				0.80

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds) $T_L = .6T_c = 0.48$ hr.

Time of concentration (T_c) or travel time (T_t)

G-23

Project FCD · Floodplain Delin. By BRG Date 11-18-89

Location CLINE CREEK WATERSHED Checked [illegible] Date 11-18-89

T_c for Subarea

T_t for Routing Reach R-1

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+	=	

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+	=	

Channel flow	Segment ID		
	CH-A	CH-B	
13. Approximate flow rate, Q ft³/sec	2700	4700	
14. Top width, T ft	150	250	
15. Hydraulic radius, r = d = A/T Estimate ft	2.4	2.8	
16. Channel slope, s ft/ft	0.045	0.024	
17. Manning's roughness coeff., n	0.070	0.070	
18. Average velocity, V (Figure 3) ft/s	7.4	6.7	
19 Flow length, L ft	4700	9600	
20. Check r estimate: Q = V x T x r = 2664 compare to line 13	✓	✓	4690
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.18 +	0.40 =	0.58
22. Watershed or subarea ~~T_c~~ or T_t (add T_t in steps 6, 12 and 21) hr			0.58

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

6-29

Project FCD - Floodplain Delin. By B.R.J. Date 11-18-89

Location CLINE CREEK WATERSHED Checked SSO Date 11-18-89

T_c for Subarea — Assumed Watershed Conditions

T_t for Routing Reach R-2

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+		=

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		=

Channel flow	Segment ID		
	CH-C	CH-D	
13. Approximate flow rate, Q ft³/sec	4600	6800	
14. Top width, T ft	180	300	
15. Hydraulic radius, r = d = A/T Estimate ft	3.2	2.9	
16. Channel slope, s ft/ft	0.029	0.030	
17. Manning's roughness coeff., n	0.070	0.070	
18. Average velocity, V (Figure 3) ft/s	8.1	7.8	
19 Flow length, L ft	1400	6300	
20. Check r estimate: Q = V x T x r = 4666 compare to line 13	✓	✓	6786
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.05 +	0.22	= 0.27
22. Watershed or subarea ~~T_c~~ or T_t (add T_t in steps 6, 12 and 21) hr			0.27

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

G-30

Project FCD - Floodplain Delin By [illegible] Date 11-18-89

Location CLINE CREEK WATERSHED Checked [illegible] Date 11-18-89

T_c for Subarea

T_t for Routing Reach R-3

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)			
2.	Manning's roughness coeff., n (table 3-1, TR-55)			
3.	Flow length, L (total L ≤ 300 ft) ft			
4.	Two-yr 24-hr rainfall, P2 in			
5.	Land slope, s ft/ft			
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+		=

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n			
8.	Hydraulic radius r (appx - avg. depth) Est.			
9.	Flow Length, L ft			
10.	Watercourse slope, s ft/ft			
11.	Average velocity, V (Figure _____) ft/s			
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		=

Channel flow		Segment ID		
13.	Approximate flow rate, Q ft^3/sec	CH-E		
14.	Top width, T ft	9400		
15.	Hydraulic radius, r = d = A/T Estimate ft	300		
16.	Channel slope, s ft/ft	3.8		
17.	Manning's roughness coeff., n	0.018		
18.	Average velocity, V (Figure 2) ft/s	0.060		
19	Flow length, L ft	8.2		
20.	Check r estimate: Q = V x T x r = 9348 compare to line 13	7200		
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t hr	✓		
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr	0.24 +		= 0.24
				0.24

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

G-31

Project FCD - Floodplain Delin By BRG Date 11-18-89

Location CLINE CREEK WATERSHED Checked SSO Date 11-18-89

T_c for Subarea

T_t for Routing Reach R-4

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft)	ft		
4. Two-yr 24-hr rainfall, P2	in		
5. Land slope, s	ft/ft		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+	=

Shallow concentrated flow		Segment ID	
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L	ft		
10. Watercourse slope, s	ft/ft		
11. Average velocity, V (Figure _____)	ft/s		
12. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+	=

Channel flow		Segment ID	
		CH-F	
13. Approximate flow rate, Q	ft³/sec	13,500	
14. Top width, T	ft	350	
15. Hydraulic radius, r = d = A/T	Estimate ft	4.4	
16. Channel slope, s	ft/ft	0.017	
17. Manning's roughness coeff., n		0.060	
18. Average velocity, V (Figure 2)	ft/s	8.8	
19 Flow length, L	ft	8000	
20. Check r estimate: Q = V x T x r = 13,552 compare to line 13		✓	
21. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.25 +	= 0.25
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr		0.25

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

G-32

Project FCD - Floodplain Delin. By BRJ. Date 11-18-89

Location CLINE CREEK WATERSHED Checked SBO Date 11-18-89

T_c for Subarea

T_t for Routing Reach R-5

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1, TR-55)			
2. Manning's roughness coeff., n (table 3-1, TR-55)			
3. Flow length, L (total L ≤ 300 ft) ft			
4. Two-yr 24-hr rainfall, P2 in			
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	+		=

Shallow concentrated flow	Segment ID		
7. Manning's roughness coeff., n			
8. Hydraulic radius r (appx - avg. depth) Est.			
9. Flow Length, L ft			
10. Watercourse slope, s ft/ft			
11. Average velocity, V (Figure _____) ft/s			
12. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	+		=

Channel flow	Segment ID		
	CH-G	CH-H	
13. Approximate flow rate, Q ft³/sec	1700	2100	
14. Top width, T ft	150	180	
15. Hydraulic radius, r = d = A/T Estimate ft	2.25	2.3	
16. Channel slope, s ft/ft	0.019	0.019	
17. Manning's roughness coeff., n	0.070	0.070	
18. Average velocity, V (Figure 3) ft/s	5.0	5.2	FIG. 3
19 Flow length, L ft	3700	10,500	
20. Check r estimate: Q = V x T x r = 1688 compare to line 13	✓	✓	2153
21. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.21 +	0.56 =	0.77
22. Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21) hr			0.77

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Time of concentration (T_c) or travel time (T_t)

G-59

Project FCD-Floodplain Delin. By BCG Date 11-18-89

Location CLINE CREEK WATERSHED Checked SCO Date 11-18-89

T_c for Subarea

T_t for Routing Reach R-6

Assumed Watershed Conditions

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1.	Surface description (table 3-1, TR-55)			
2.	Manning's roughness coeff., n (table 3-1, TR-55)			
3.	Flow length, L (total L ≤ 300 ft)	ft		
4.	Two-yr 24-hr rainfall, P2	in		
5.	Land slope, s	ft/ft		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	+	=

Shallow concentrated flow		Segment ID		
7.	Manning's roughness coeff., n			
8.	Hydraulic radius r (appx - avg. depth) Est.			
9.	Flow Length, L	ft		
10.	Watercourse slope, s	ft/ft		
11.	Average velocity, V (Figure _____)	ft/s		
12.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	+	=

Channel flow		Segment ID		
		CH-I		
13.	Approximate flow rate, Q	ft^3/sec	17,000	
14.	Top width, T	ft	500	
15.	Hydraulic radius, r = d = A/T	Estimate ft	4.5	
16.	Channel slope, s	ft/ft	0.012	
17.	Manning's roughness coeff., n		0.060	
18.	Average velocity, V (Figure 2)	ft/s	7.5	
19	Flow length, L	ft	5600	
20.	Check r estimate: Q = V x T x r = 13,552 compare to line 13		✓	
21.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.21 +	= 0.21
22.	Watershed or subarea T_c or T_t (add T_t in steps 6, 12 and 21)	hr		0.21

(Adapted from Worksheet 3, SCS TR-55, Urban Hydrology for Small Watersheds)

Average Velocities for Upland Channels & Shallow Concentrated Flow

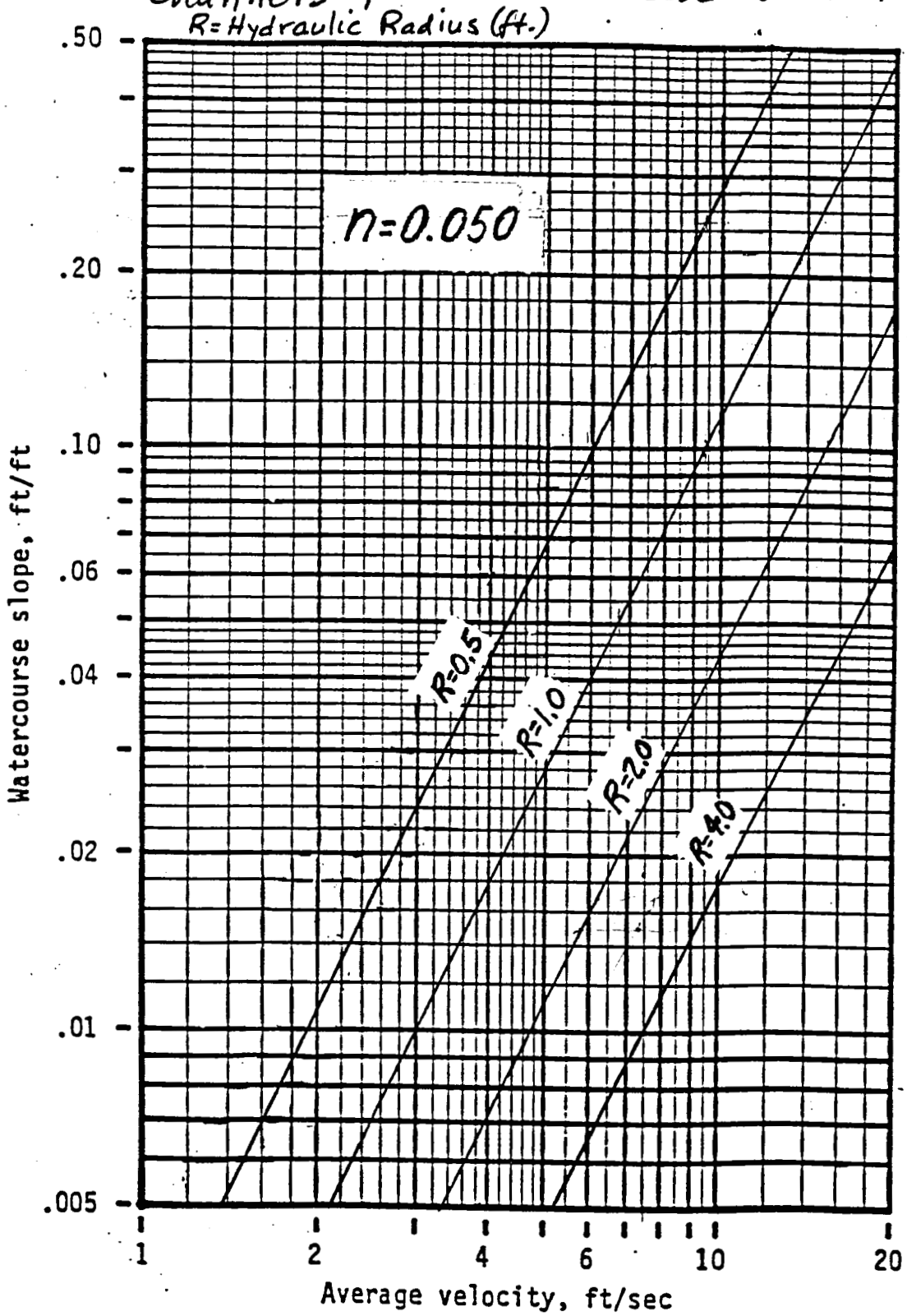


Chart 1

Average Velocities for Upland Channels & Shallow Concentrated Flow

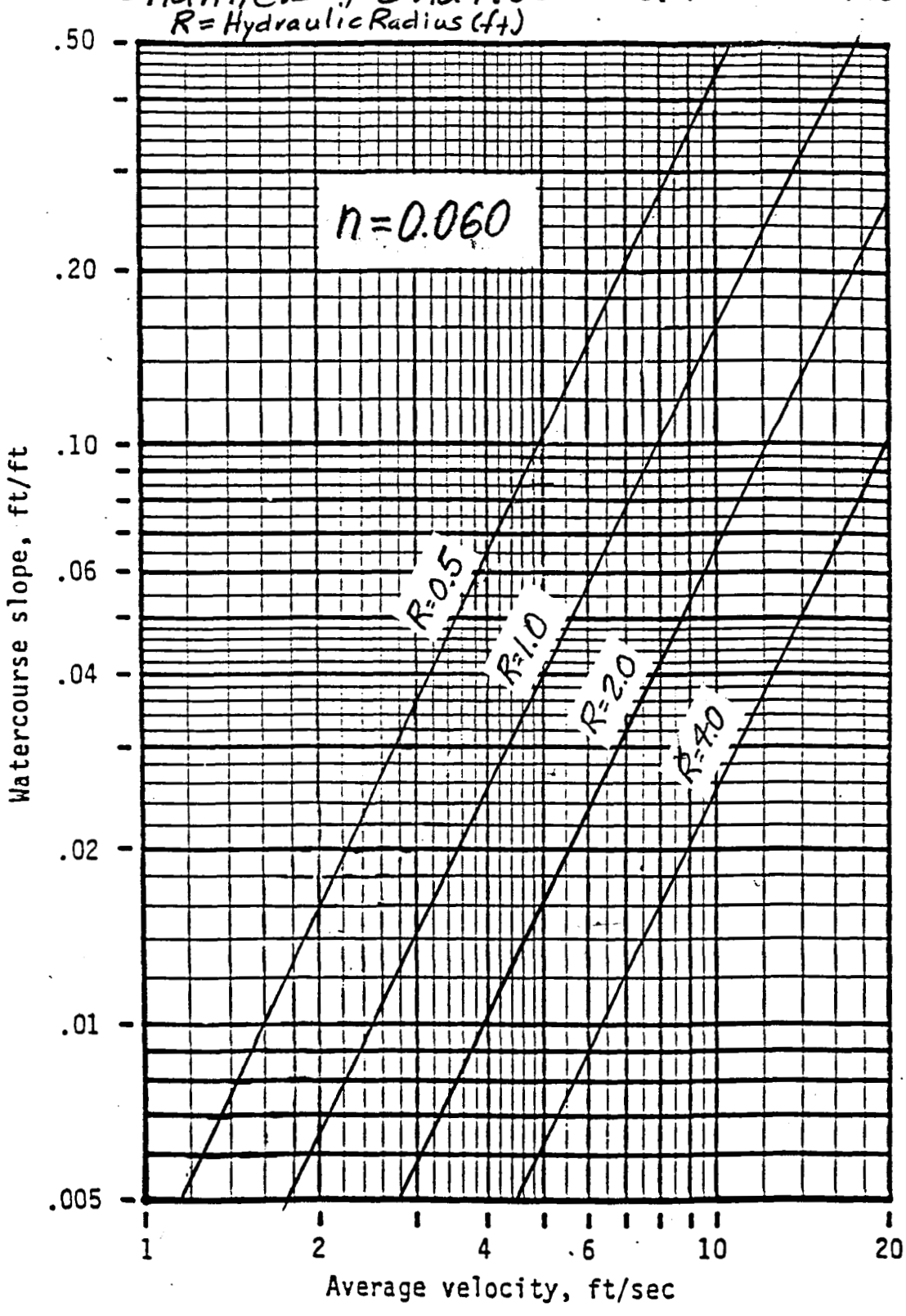


Chart 2

Average Velocities for Upland Channels & Shallow Concentrated Flow

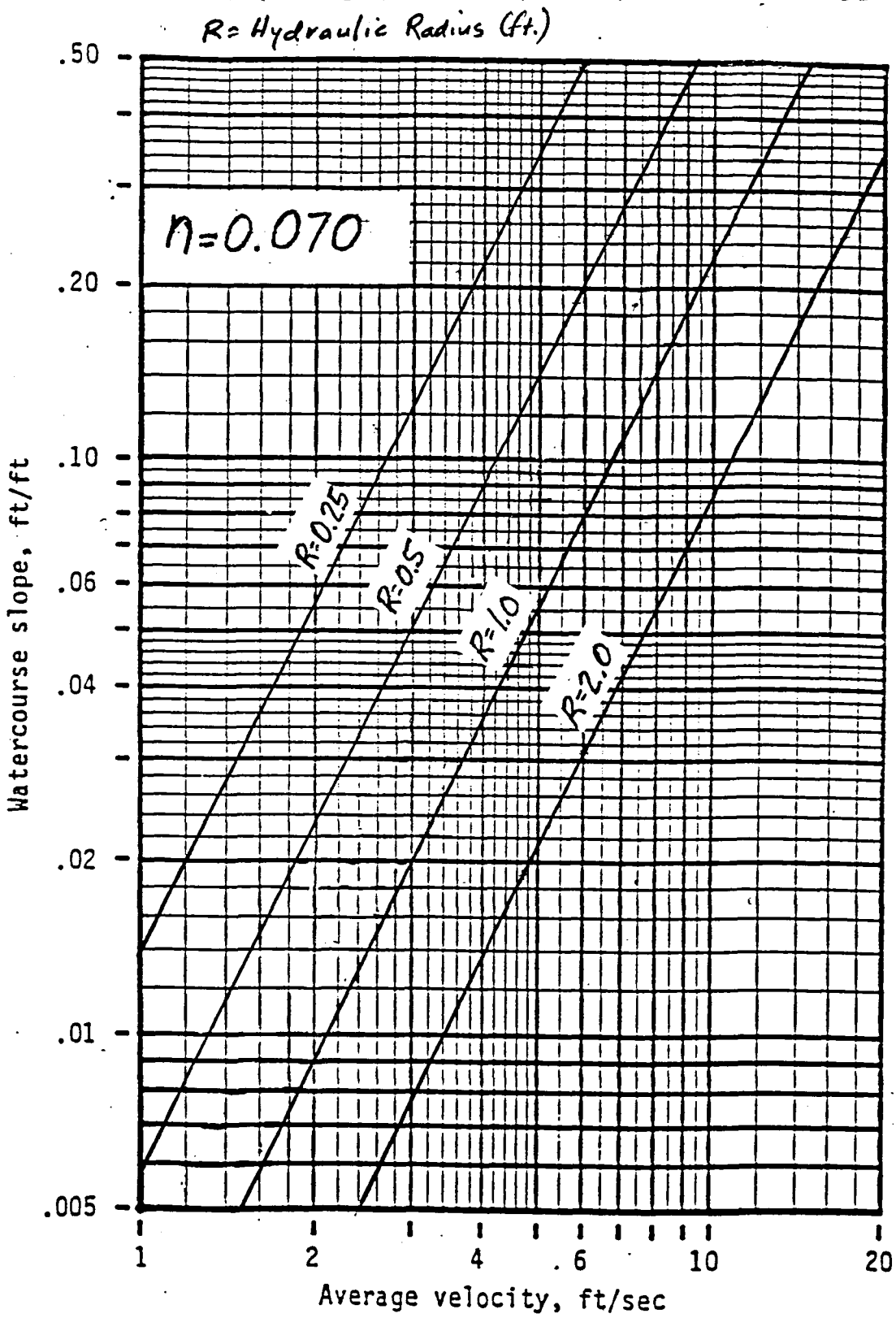


Chart 3

Average Velocities for Upland Channels & Shallow Concentrated Flow

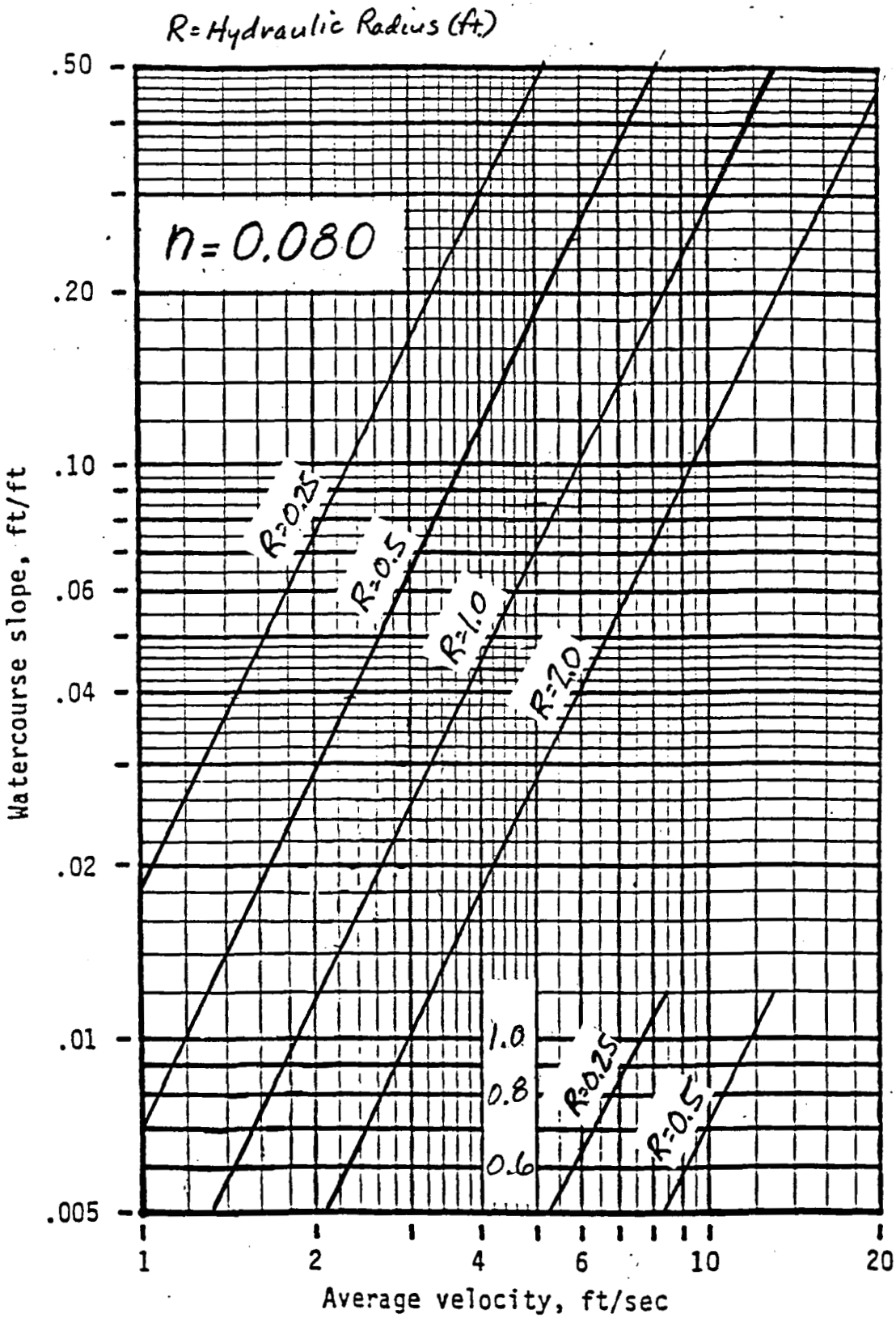


Chart 4

Average Velocities for Upland Channels & Shallow Concentrated Flow

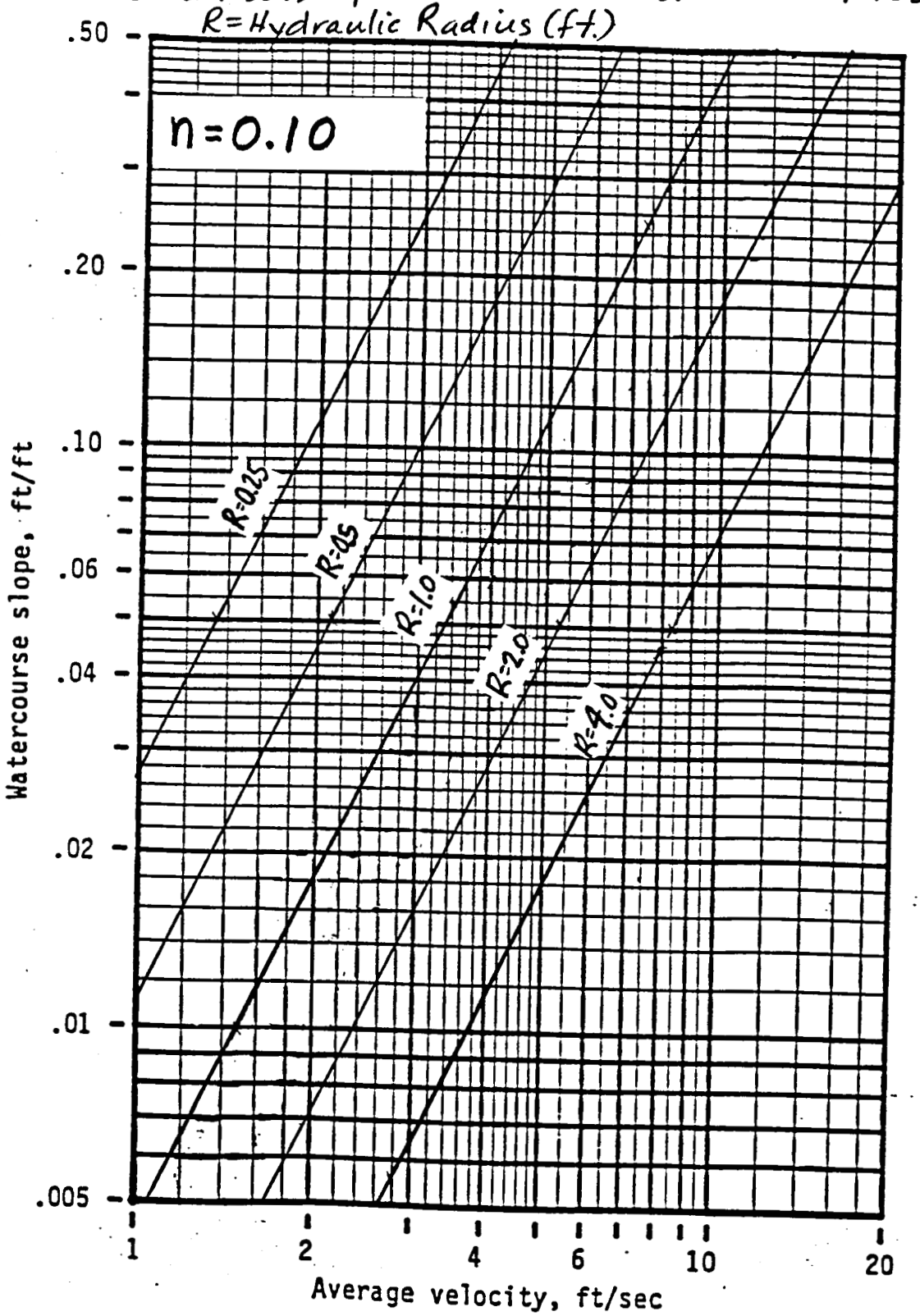


Chart 5

Chapter 3: Time of concentration and travel time

Travel time (T_t) is the time it takes water to travel from one location to another in a watershed. T_t is a component of time of concentration (T_c), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. T_c is computed by summing all the travel times for consecutive components of the drainage conveyance system.

T_c influences the shape and peak of the runoff hydrograph. Urbanization usually decreases T_c, thereby increasing the peak discharge. But T_c can be increased as a result of (a) ponding behind small or inadequate drainage systems, including storm drain inlets and road culverts, or (b) reduction of land slope through grading.

Factors affecting time of concentration and travel time

Surface roughness

One of the most significant effects of urban development on flow velocity is less retardance to flow. That is, undeveloped areas with very slow and shallow overland flow through vegetation become modified by urban development: the flow is then delivered to streets, gutters, and storm sewers that transport runoff downstream more rapidly. Travel time through the watershed is generally decreased.

Channel shape and flow patterns

In small non-urban watersheds, much of the travel time results from overland flow in upstream areas. Typically, urbanization reduces overland flow lengths by conveying storm runoff into a channel as soon as possible. Since channel designs have efficient hydraulic characteristics, runoff flow velocity increases and travel time decreases.

Slope

Slopes may be increased or decreased by urbanization, depending on the extent of site grading or the extent to which storm sewers and street ditches are used in the design of the water management system. Slope will tend to increase when channels are straightened and decrease when overland flow is directed through storm sewers, street gutters, and diversions.

Computation of travel time and time of concentration

Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. The type that occurs is a function of the conveyance system and is best determined by field inspection.

Travel time (T_t) is the ratio of flow length to flow velocity:

$$T_t = \frac{L}{3600\ V} \qquad \text{[Eq. 3-1]}$$

where

T_t = travel time (hr),
L = flow length (ft),
V = average velocity (ft/s), and
3600 = conversion factor from seconds to hours.

Time of concentration (T_c) is the sum of T_t values for the various consecutive flow segments:

$$T_c = T_{t_1} + T_{t_2} + \ldots T_{t_m} \qquad \text{[Eq. 3-2]}$$

where

T_c = time of concentration (hr) and
m = number of flow segments.

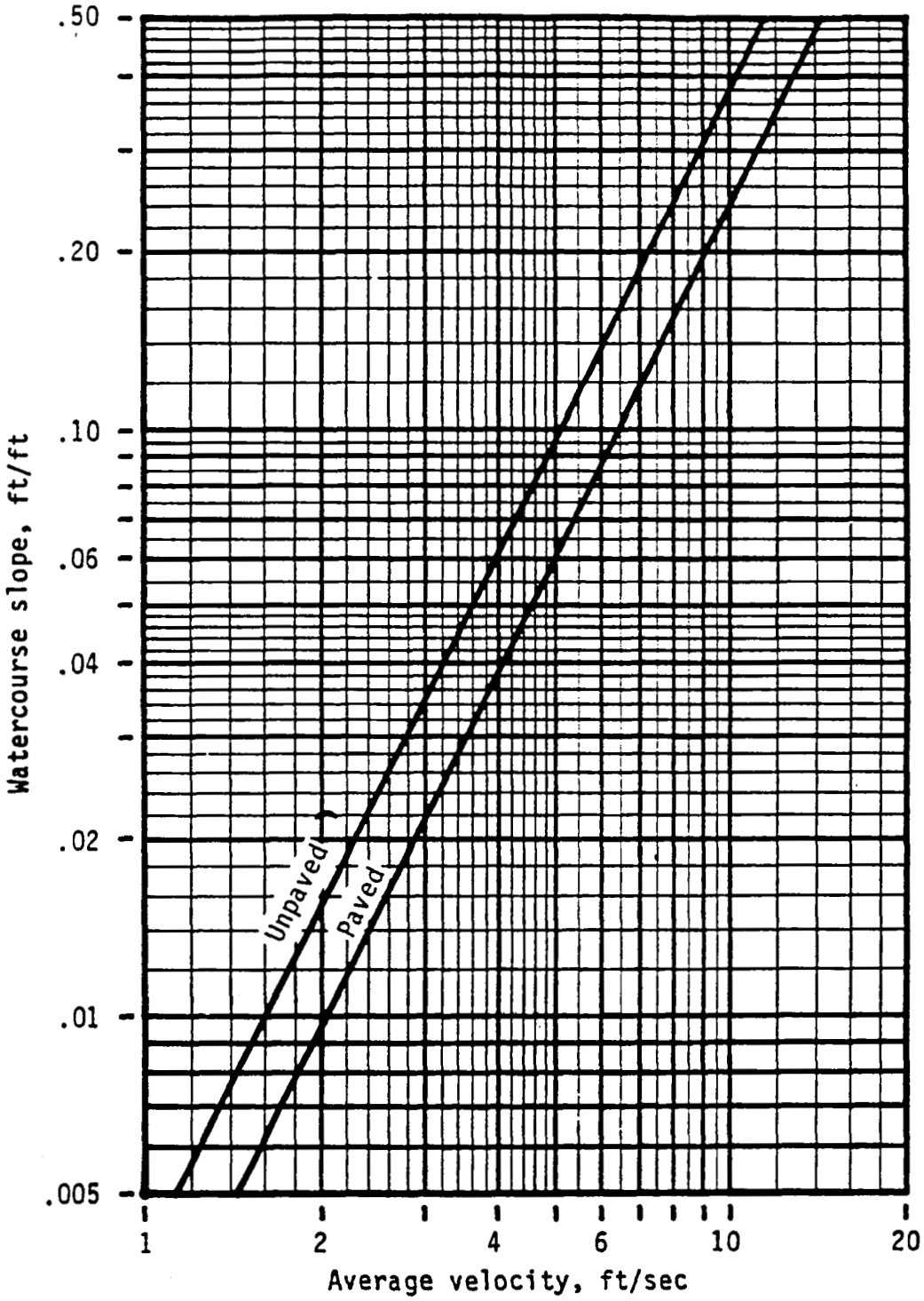


Figure 3-1.—Average velocities for estimating travel time for shallow concentrated flow.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overton and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007\,(nL)^{0.8}}{(P_2)^{0.5}\,s^{0.4}} \qquad \text{[Eq. 3-3]}$$

Table 3-1.—Roughness coefficients (Manning's n) for sheet flow

Surface description	n[1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses[2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:[3]	
Light underbrush	0.40
Dense underbrush	0.80

[1]The n values are a composite of information compiled by Engman (1986).
[2]Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.
[3]When selecting n, consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

where

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1),
L = flow length (ft),
P_2 = 2-year, 24-hour rainfall (in), and
s = slope of hydraulic grade line (land slope, ft/ft).

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevation.

G-42

anning's equation is

$$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n} \qquad \text{[Eq. 3-4]}$$

where

- V = average velocity (ft/s),
- r = hydraulic radius (ft) and is equal to a/p_w,
- a = cross sectional flow area (ft^2),
- p_w = wetted perimeter (ft),
- s = slope of the hydraulic grade line (channel slope, ft/ft), and
- n = Manning's roughness coefficient for open channel flow.

Manning's n values for open channel flow can be obtained from standard textbooks such as Chow (1959) or Linsley et al. (1982). After average velocity is computed using equation 3-4, T_t for the channel segment can be estimated using equation 3-1.

Reservoirs or lakes

Sometimes it is necessary to estimate the velocity of w through a reservoir or lake at the outlet of a atershed. This travel time is normally very small and can be assumed as zero.

Limitations

- Manning's kinematic solution should not be used for sheet flow longer than 300 feet. Equation 3-3 was developed for use with the four standard rainfall intensity-duration relationships.

- In watersheds with storm sewers, carefully identify the appropriate hydraulic flow path to estimate T_c. Storm sewers generally handle only a small portion of a large event. The rest of the peak flow travels by streets, lawns, and so on, to the outlet. Consult a standard hydraulics textbook to determine average velocity in pipes for either pressure or nonpressure flow.

- The minimum T_c used in TR-55 is 0.1 hour.

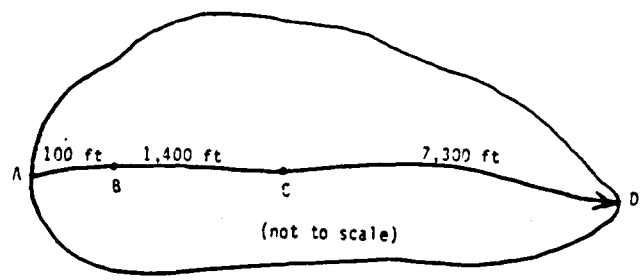
- A culvert or bridge can act as a reservoir outlet if there is significant storage behind it. The procedures in TR-55 can be used to determine the peak flow upstream of the culvert. Detailed storage routing procedures should be used to determine the outflow through the culvert.

Example 3-1

The sketch below shows a watershed in Dyer County, northwestern Tennessee. The problem is to compute T_c at the outlet of the watershed (point D). The 2-year 24-hour rainfall depth is 3.6 inches. All three types of flow occur from the hydraulically most distant point (A) to the point of interest (D). To compute T_c, first determine T_t for each segment from the following information:

Segment AB:	Sheet flow; dense grass; slope (s) = 0.01 ft/ft; and length (L) = 100 ft.
Segment BC:	Shallow concentrated flow; unpaved; s = 0.01 ft/ft; and L = 1400 ft.
Segment CD:	Channel flow; Manning's n = .05; flow area (a) = 27 ft^2; wetted perimeter (p_w) = 28.2 ft; s = 0.005 ft/ft; and L = 7300 ft.

See figure 3-2 for the computations made on worksheet 3.



Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Heavenly Acres By DW Date 10/6/85

Location Dyer County, Tennessee Checked XXX Date 10/8/85

Circle one: Present (Developed)

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB		
1. Surface description (table 3-1)			DENSE GRASS		
2. Manning's roughness coeff., n (table 3-1) ..			0.24		
3. Flow length, L (total L ≤ 300 ft)	ft		100		
4. Two-yr 24-hr rainfall, P_2	in		3.6		
5. Land slope, s	ft/ft		0.01		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.30	+	= 0.30
Shallow concentrated flow		Segment ID	BC		
7. Surface description (paved or unpaved)			Unpaved		
8. Flow length, L	ft		1400		
9. Watercourse slope, s	ft/ft		0.01		
10. Average velocity, V (figure 3-1)	ft/s		1.6		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.24	+	= 0.24
Channel flow		Segment ID	CD		
12. Cross sectional flow area, a	ft^2		27		
13. Wetted perimeter, p_w	ft		28.2		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		0.957		
15. Channel slope, s	ft/ft		0.005		
16. Manning's roughness coeff., n			0.05		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		2.05		
18. Flow length, L	ft		7300		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.99	+	= 0.99
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				1.53

Figure 3-2.—Worksheet 3 for example 3-1.

APPENDIX H

CLINE CREEK

CALCULATIONS:

MUSKINGUM ROUTING

PARAMETERS

Baker Engineers

S.O. No.

Subject: FCD Floodplain Delineation

CLINE CREEK HYDROLOGY Sheet No. ___ of ___

Muskingum Routing Parameters Drawing No.

Computed by BRD 11/29/89 Checked By 11/29/89 Date

Calculate number of routing subreaches, n, such that the following inequalities are satisfied:

$$\frac{1}{2(1-x)} \leq \frac{K \times 60}{n\,\Delta t} \leq \frac{1}{2x} \qquad n \text{ is an integer}$$

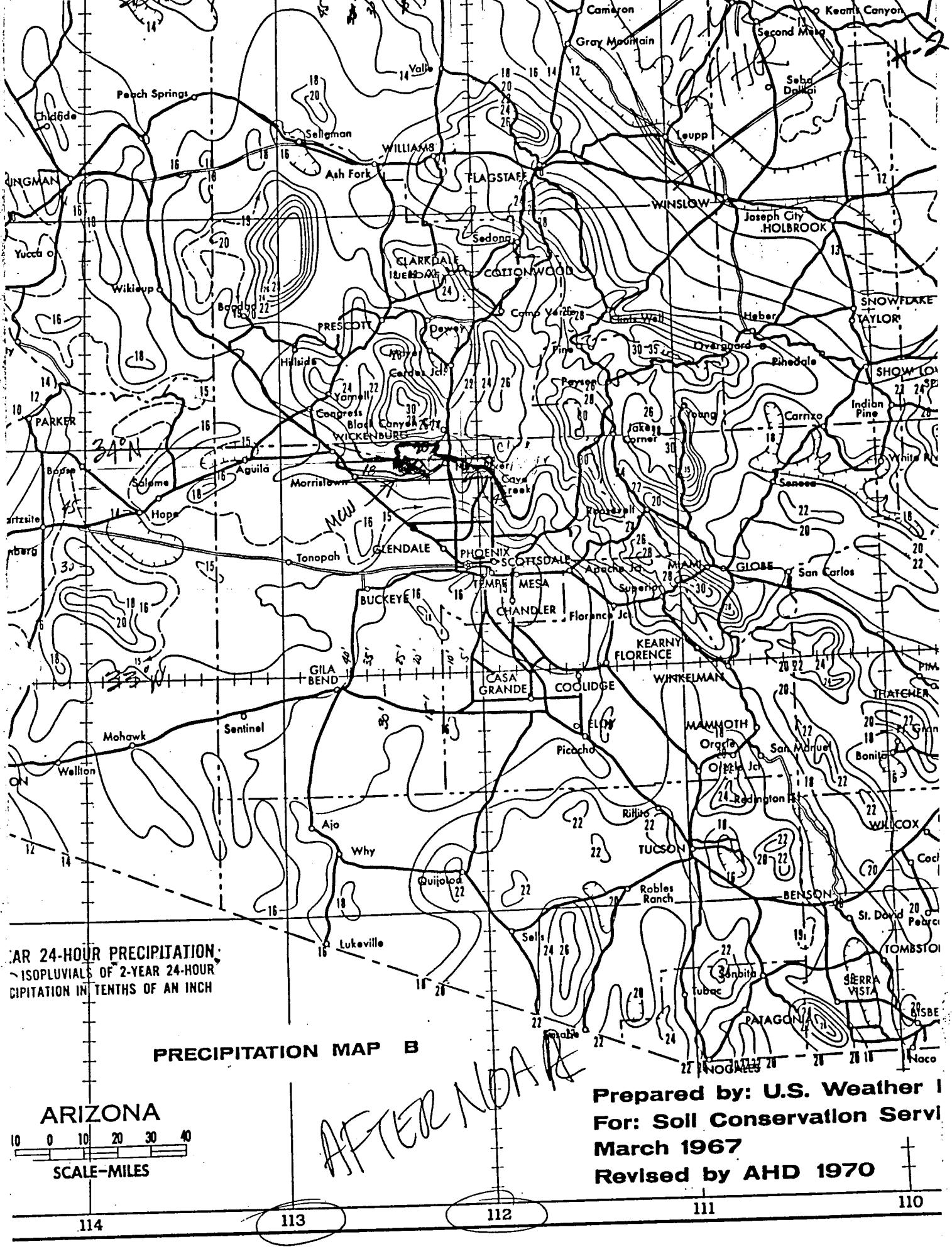
where K is travel time for the reach in hours

Δt is the hydrograph computation interval in minutes (in this case $\Delta t = 6$ minutes), and

x is the Muskingum weighting factor which relates the ratio of inflow to outflow in determining reach storage. ($x = .3$ for all Cline Creek routing reaches.)

So the inequality becomes $\frac{K}{0.167} \leq n \leq \frac{K}{0.0714}$

Reach Designation	Travel Time K (hrs.)	Value $\frac{K}{0.167}$	Value $\frac{K}{0.0714}$	Range of n	"RM" INPUT for HEC 1		
					n	K	X
RX-2	0.15	0.90	2.10	$1 \leq n \leq 2$	2	0.15	0.30
RX-3	0.23	1.38	3.22	$1 \leq n \leq 3$	2	0.23	0.30


Cameron
Keams Canyon
Second Mesa
Gray Mountain
Seba Dalkai
Peach Springs
Seligman
WILLIAMS
Ash Fork
FLAGSTAFF
Leupp
WINSLOW
Joseph City
HOLBROOK
Sedona
CLARKDALE
COTTONWOOD
Camp Verde
Clints Well
Heber
SNOWFLAKE
TAYLOR
PRESCOTT
Dewey
Hillside
Cordes Jct
Pine
Overgaard
Pinedale
Payson
Yarnell
Congress
Black Canyon
WICKENBURG
Young
Carrizo
Indian Pine
PARKER
Aguila
Morristown
Cave Creek
Roosevelt
Salome
Hope
Tonopah
GLENDALE
PHOENIX
SCOTTSDALE
Apache Jct
MIAMI
GLOBE
San Carlos
TEMPE
MESA
Superior
BUCKEYE
CHANDLER
Florence Jct
KEARNY
FLORENCE
GILA BEND
CASA GRANDE
COOLIDGE
WINKELMAN
THATCHER
Mohawk
Sentinel
ELOY
Picacho
MAMMOTH
Oracle
San Manuel
Bonita
Wellton
Redington
Rillito
WILCOX
Ajo
Why
TUCSON
Quijotoa
Robles Ranch
BENSON
St. David
Lukeville
Sells
TOMBSTONE
Sonoita
Tubac
SIERRA VISTA
PATAGONIA
Nogales
Naco
AR 24-HOUR PRECIPITATION
ISOPLUVIALS OF 2-YEAR 24-HOUR
CIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP B
ARIZONA
10 0 10 20 30 40
SCALE-MILES
AFTER NOAA
Prepared by: U.S. Weather
For: Soil Conservation Servi
March 1967
Revised by AHD 1970
114
113
112
111
110

Baker Engineers

S.O. No.

Subject: FCD Floodplain Delineation

CLINE CREEK HYDROLOGY Sheet No. ___ of ___

Muskingum Routing Parameters Drawing No.

Computed by BLG 11/18/89 Checked By SSD Date

Calculate number of routing subreaches, n, such that the following inequalities are satisfied:

$$\frac{1}{2(1-x)} \leq \frac{K \cdot 60}{n\,\Delta t} \leq \frac{1}{2x} \qquad n \text{ is an integer}$$

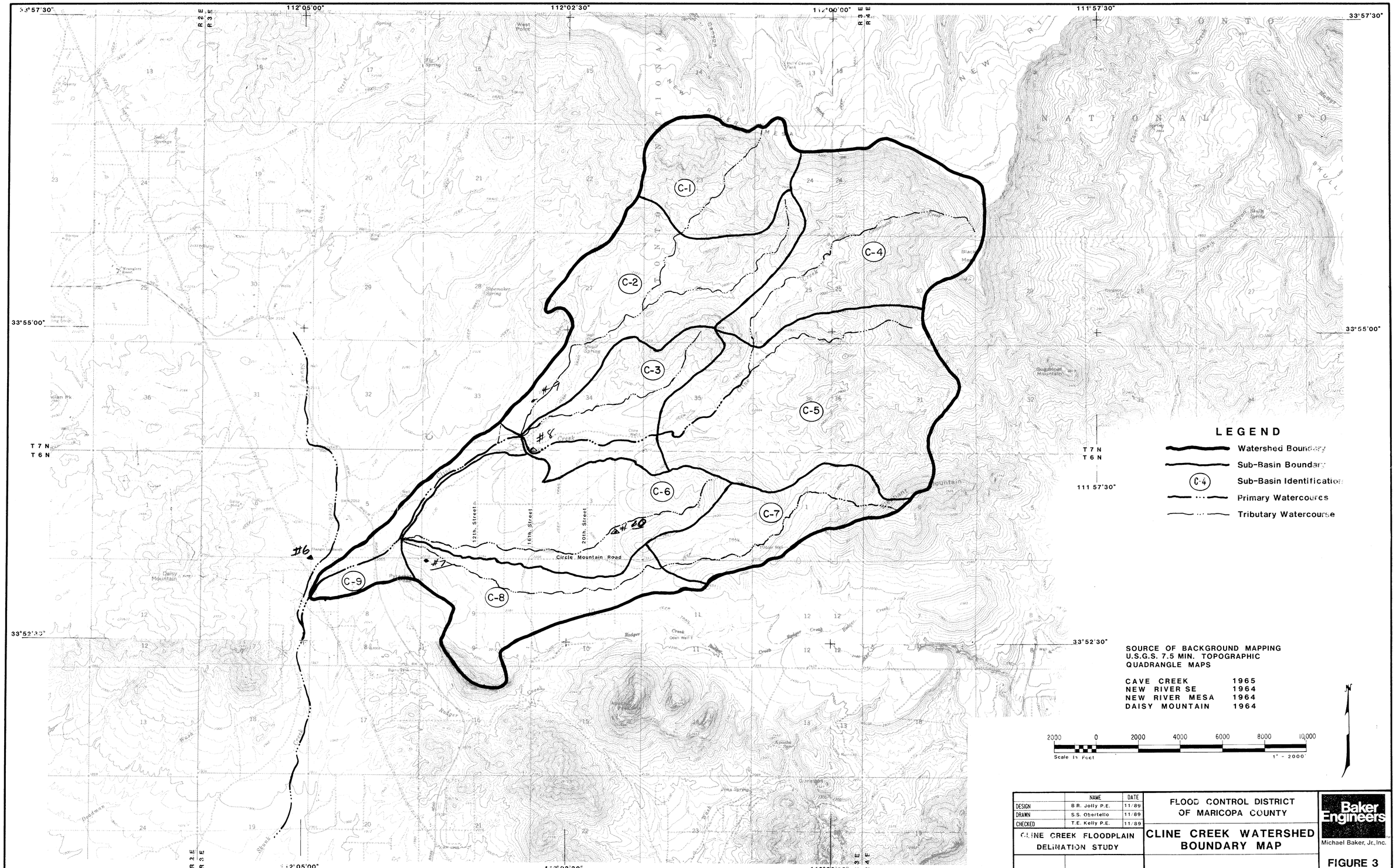
where K is travel time for the reach in hours

Δt is the hydrograph computation interval in minutes (in this case $\Delta t = 6$ minutes), and

x is the Muskingum weighting factor which relates the ratio of inflow to outflow in determining reach storage. ($x = .3$ for all Cline Creek routing reaches.)

So the inequality becomes $\frac{K}{0.167} \leq n \leq \frac{K}{0.0714}$

Reach Designation	Travel Time K (hrs.)	Value $\frac{K}{0.167}$	Value $\frac{K}{0.0714}$	Range of n	"RM" INPUT for HEC 1		
					n	K	X
R-1	0.58	3.47	8.12	$4 \leq n \leq 8$	RM 6	0.58	0.3
R-2	0.27	1.62	3.78	$2 \leq n \leq 3$	RM 3	0.27	0.3
R-3	0.24	1.44	3.36	$2 \leq n \leq 3$	RM 3	0.24	0.3
R-4	0.25	1.50	3.50	$2 \leq n \leq 3$	RM 3	0.25	0.3
R-5	0.77	4.61	10.78	$5 \leq n \leq 10$	RM 8	0.77	0.3
R-6	0.21	1.26	2.94	$2 \leq n \leq 2$	RM 2	0.21	0.3



	NAME	DATE
DESIGN	B.R. Jolly P.E.	11/89
DRAWN	S.S. Obertello	11/89
CHECKED	T.E. Kelly P.E.	11/89

CLINE CREEK FLOODPLAIN DELINATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CLINE CREEK WATERSHED BOUNDARY MAP

Baker Engineers

Michael Baker, Jr., Inc.

FIGURE 3

SOURCE OF BACKGROUND MAPPING :
McLain Harbers Co. Inc.
Aerial Mapping & Surveying
Tucson Arizion.
Based upon information provided by
Baker Engineers, Phoenix Arizona .

	NAME	DATE
DESIGN	T.E. Kelly P.E.	12/89
DRAWN	S.S. Obertello	12/89
CHECKED	B.R. Jolly P.E.	12/89

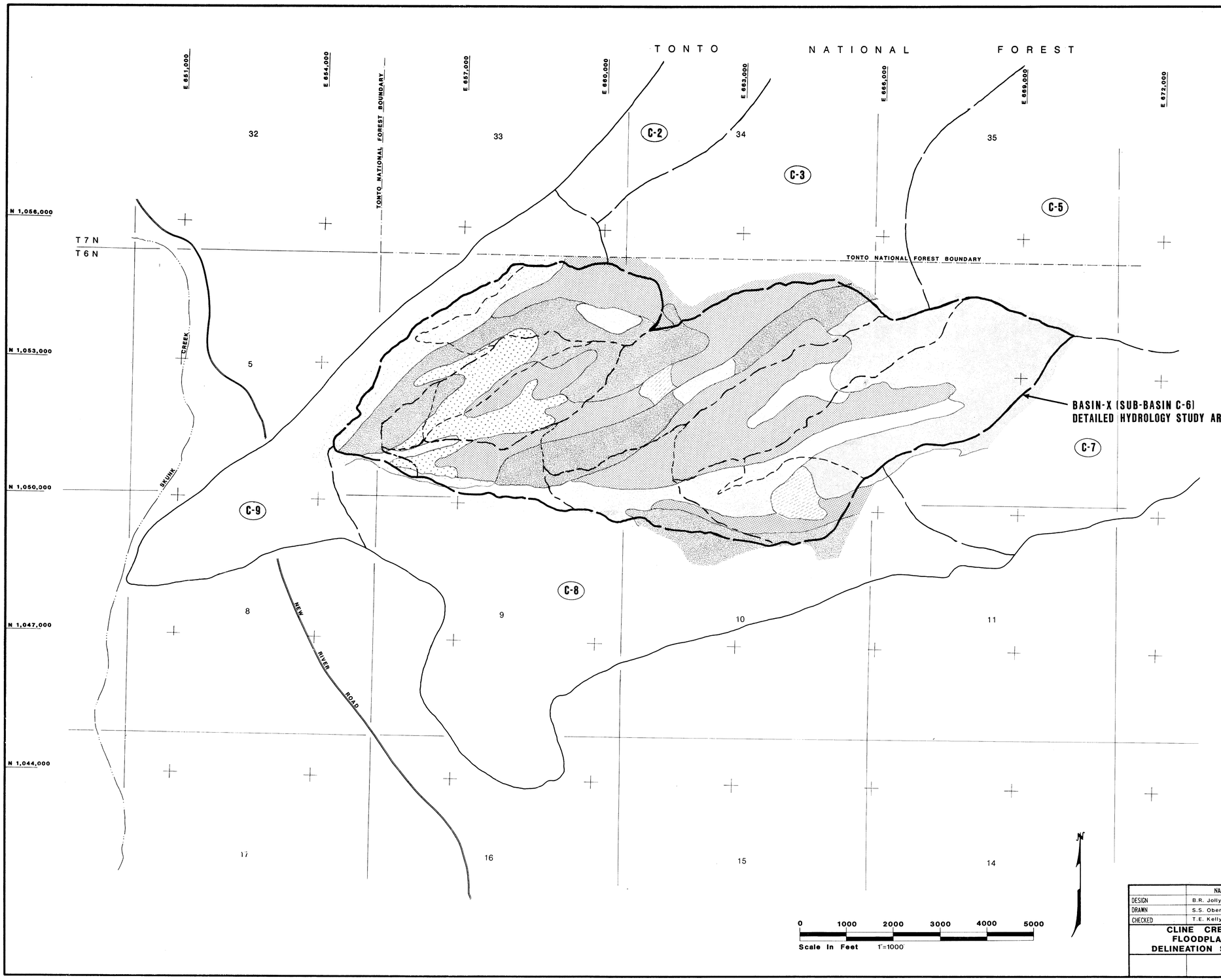
CLINE CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BASIN X WATERSHED BOUNDARY MAP

Baker Engineers
Michael Baker, Jr., Inc.

FIGURE 4



LEGEND

CILNE CREEK BASIN-WIDE STUDY

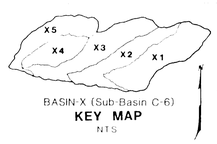
- Watershed Boundary
- Sub-Basin Boundary
- (C-5) Sub-Basin Identification

DETAILED HYDROLOGY STUDY

- Basin X (Sub-Basin 6) Boundary
- Sub-Basin Boundary
- Secondary Sub-Basin Boundary

SOIL CLASSIFICATION

SOIL UNIT SYMBOL	SOIL UNIT	S.C.S. SOIL GROUP
	6	Anthony-Arizo Complex
	26	Continental Cobby Clay Loam
	28	Continental-Ohaco Complex
	66	Greyeagle-Suncity Variant Complex
	72	Lehmans-Rock Outcrop Complex
	93	Nickel-Cave Complex
	95	Ohaco Gravelly Loam



BASIS OF SOIL CLASSIFICATION:
Soil Survey of Aguila - Carefree Area,
Parts of Maricopa and Pinal County,
U.S. Department of Agriculture,
Soil Conservation Service, April 1986.

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1			
2			
3			
4			

	NAME	DATE
DESIGN	B.R. Jolly P.E.	11/89
DRAWN	S.S. Obertello	11/89
CHECKED	T.E. Kelly P.E.	11/89

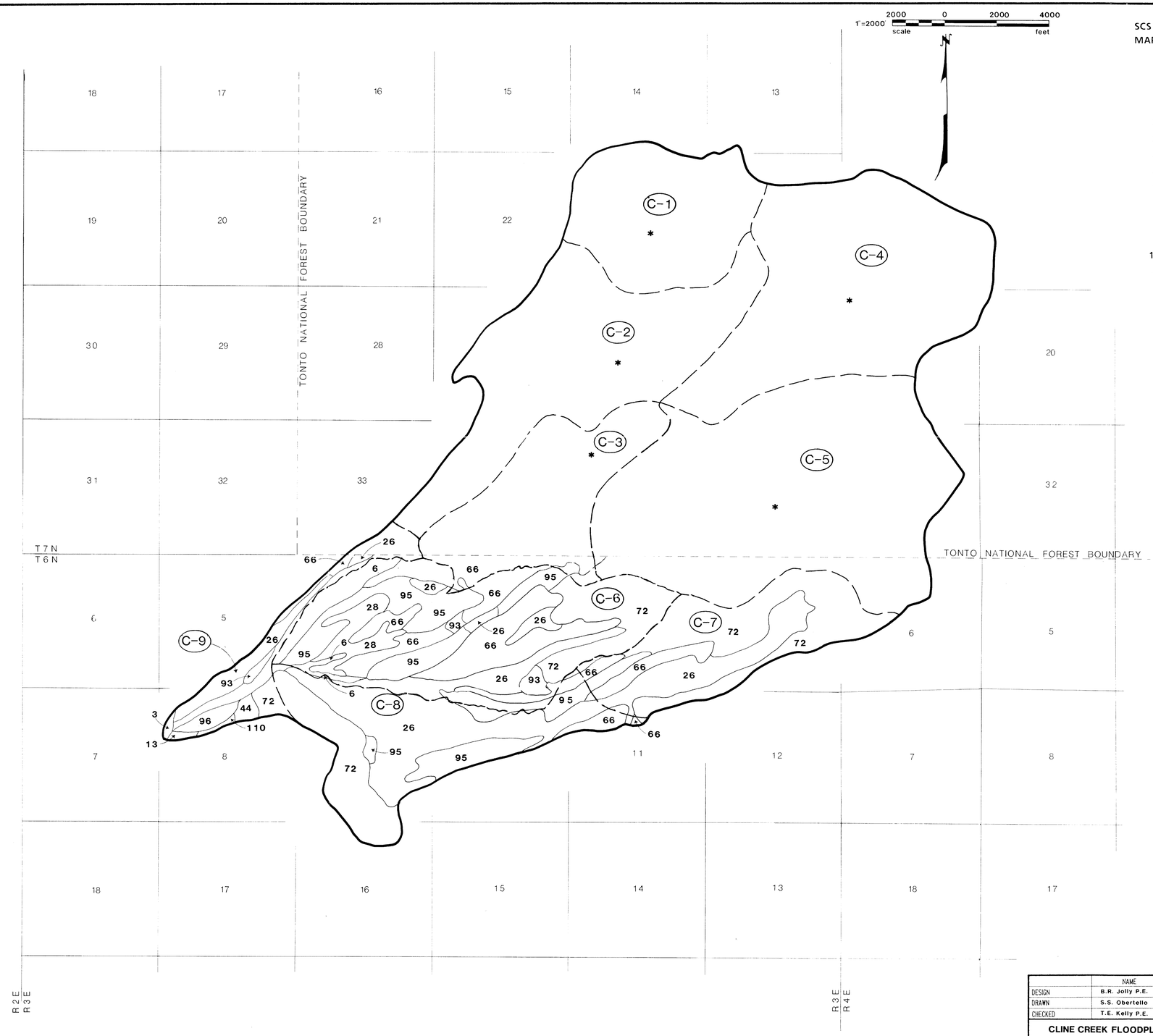
CLINE CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BASIN X SOILS MAP

Baker Engineers
Michael Baker, Jr., Inc.

FIGURE 6



SCS SOIL MAP UNIT	SCS SOIL GROUP
3	Antho-Carrizo-Maripo Complex
6	Anthony-Arizo Complex
13	Carefree-Beardsley Complex
26	Continental Cobbly Clay Loam
28	Continental-Ohaco Complex
44	Ebon Very Gravelly Loam
66	Greyeagle-Suncity Variant Complex
72	Lehmans-Rock Outcrop Complex
93	Nickel-Cave Complex
95	Ohaco Gravelly Loam
96	Pinaleno-Tres Hermano Complex
110	Suncity-Cipriano Complex
*	Clay (Based on information from Soil Scientist at Tonto National Forest)

LEGEND

- WATERSHED BOUNDARY
- SUB-BASIN BOUNDARY
- (C-6) SUB-BASIN IDENTIFICATION
- S.C.S. SOIL GROUP BOUNDARY
- 72 S.C.S SOIL MAP UNIT

BASIS OF SOIL CLASSIFICATION:
Soil Survey of Aguila - Carefree Area, Parts of Maricopa and Pinal County, U.S. Department of Agriculture, Soil Conservation Service, April 1986.

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1			
2			
3			
4			

	NAME	DATE
DESIGN	B.R. Jolly P.E.	11/89
DRAWN	S.S. Obertello	11/89
CHECKED	T.E. Kelly P.E.	11/89

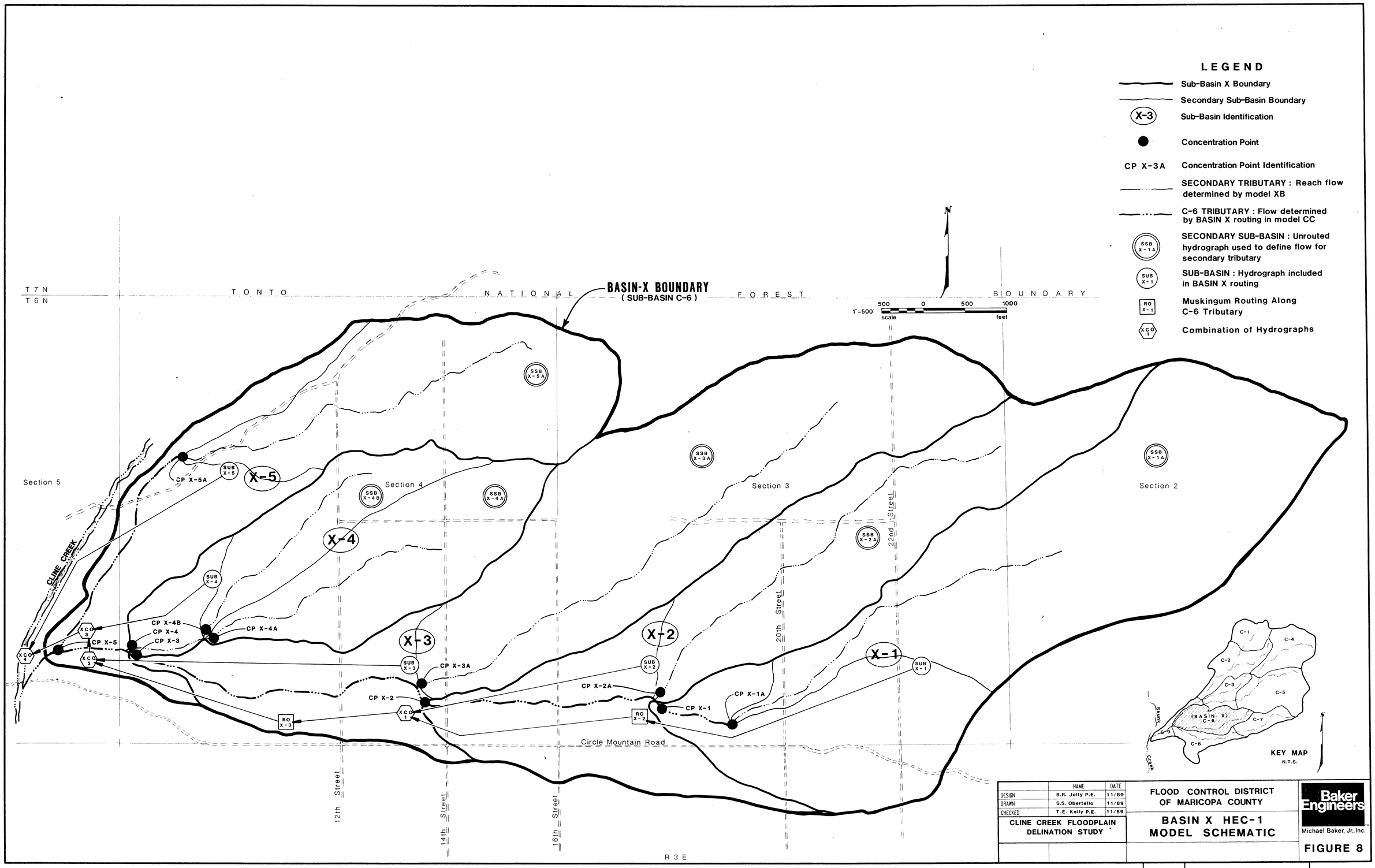
CLINE CREEK FLOODPLAIN DELINATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CLINE CREEK WATERSHED SOILS MAP

Baker Engineers
Michael Baker, Jr., Inc.

FIGURE 7



	NAME	DATE
DESIGN	B.R. Jolly P.E.	11/89
DRAWN	S.S. Obertello	11/89
CHECKED	T.E. Kelly P.E.	11/89

CLINE CREEK FLOODPLAIN DELINATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

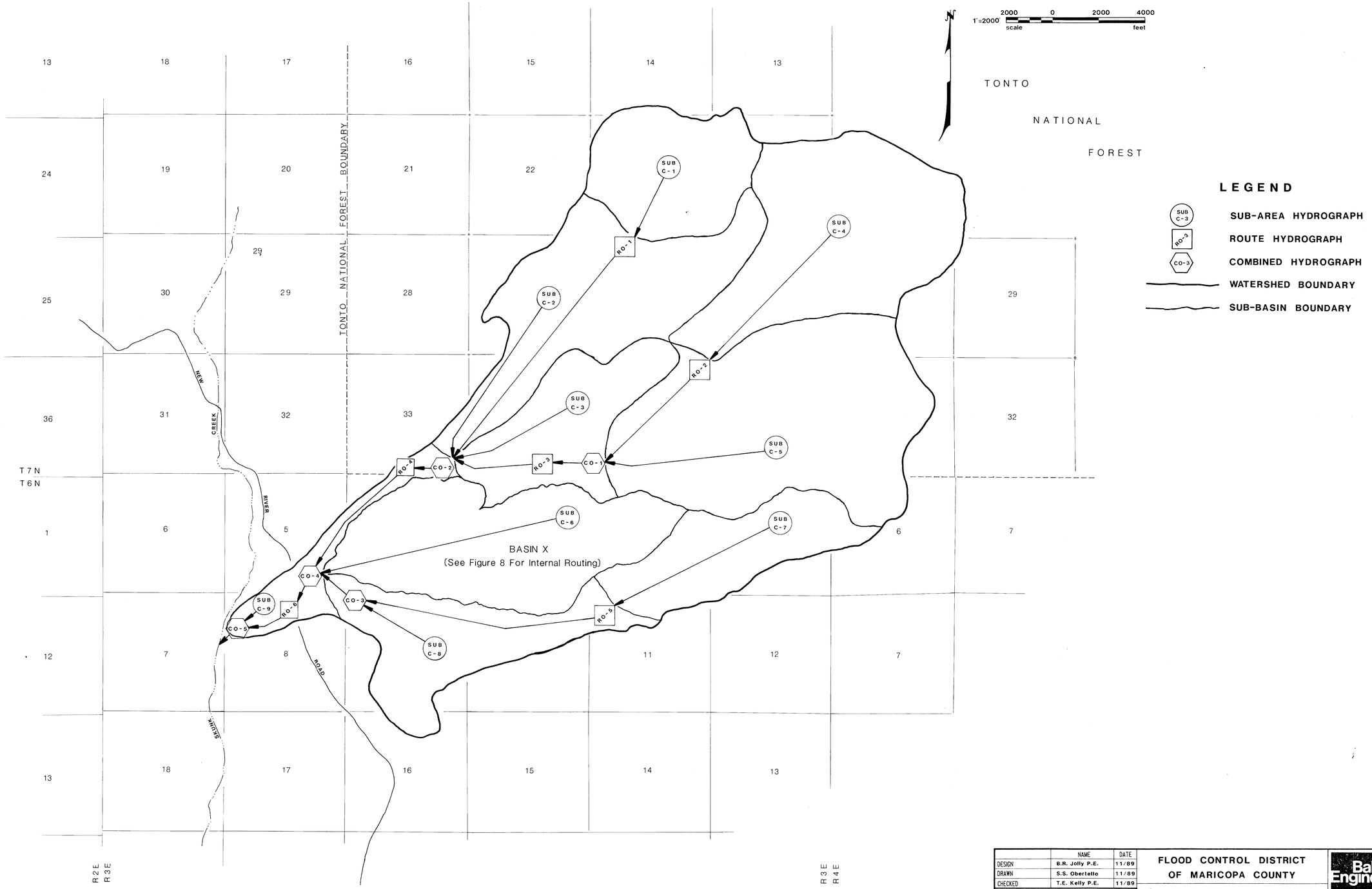
BASIN X HEC-1 MODEL SCHEMATIC

Baker Engineers

Michael Baker, Jr., Inc.

FIGURE 8

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1			
2			
3			
4			



NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1			
2			
3			
4			

	NAME	DATE
DESIGN	B.R. Jolly P.E.	11/89
DRAWN	S.S. Obertello	11/89
CHECKED	T.E. Kelly P.E.	11/89

CLINE CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CLINE CREEK WATERSHED HEC-1 MODEL SCHEMATIC

Baker Engineers
Michael Baker, Jr., Inc.

FIGURE 9

FLOODPLAIN

DELINEATION

STUDY

SURVEY

NOTES

Baker Engineers

S.O. No. 16723-02

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL POINTS
RODGER & CLINE CREEK'S

Sheet No. 1 of 1

Drawing No.

Computed by SSO Checked By Date 24 July 89

SURVEY ID	POINT #	NORTH	EAST	ELEV	REMARKS
HV 1	1	1,039,523.610	449,945.118	[illegible].807	SHEET # 6 (SEC. COR.)
HV 2	2	~~1,040,886.309~~ KZ	~~449,693.500~~ 8/12/89	1925.217	SHEET # 6
HV 3	3	1,047,780.739	467,614.487	2[illegible].335	SHEET # 7
HV 4	4	1,045,436.281	469,018.318	2[illegible].005	LOOP - 2 PART B
HV 5	5	1,043,548.677	470,871.557	2353.240	SHEET # 8
HV 6	6	1,047,806.502	477,961.901	2591.245	SHEET # 8
HV 7	7	1,049,741.756	477,946.394	2732.865	SHEET # 12
HV 8	8	1,048,110.307	450,509.230	2014.142	LOOP 2 PART C
HV 9	9	1,050,087.152	449,903.834	2038.379	LOOP 2 PART C
HV 10	10	1,056,536.575	459,176.838	2229.581	SHEET # 10
HV 11	11	1,055,413.301	460,320.299	2215.656	SHEET # 10
HV 12	12	1,052,297.959	455,230.231	2102.436	SHEET # 10
HV 13	13	1,050,755.656	456,556.280	2114.836	SHEET # 10
HV-14	14	1,051450.049	464,421.022	2325.851	SHEET # 10
HV-15	15	1,053,611.177	464,451.199	2365.554	SHEET # 10
MESA	MESA	1,063,594.070	481,299.460	4700.0	LOOP - 1, REF BC, FIRST ORD
US BOULDER	17	1,056,156,904	466,209.601		LOOP - 1
KNOLL	18	1,058,923,075 ✓	469,602.329 ✓		LOOP - 1
PYP. PEAK	19	1,049,083.243	454,819.282		LOOP - 2 PART B
SHAN.-LA	20	1,049,269.163	449,384.230		LOOP - 2 PART C
G.U.Q.T.M	21	1,049,675.517	463,140.880		LOOP - 2 PART B
CREEK 1	22	1,056,719.588	460,543.826		SHEET # 10
CREEK 2	23	1,057,391.159 ✓	459,884.110 ✓		LOOP - 2 PART - A
HILL	24	1,053,444.132 ✓	460,477.376 ✓		LOOP - 2 PART A
ML	25	1,050,139.711	465,560.609		LOOP - 2 PART B

Baker Engineers

S.O. No. 16425-02

Subject: FLOOD PLAIN DELINEATION

HORIZ. CONTROL LOOP-1

Sheet No. 1 of 12

Drawing No.

Computed by SSO Checked By Date 20 July 90

LONGITUDE CENTRAL MERIDIAN = 111° 55' 00"

LONGITUDE STATION "MESA" = 111° 58' 41.931"

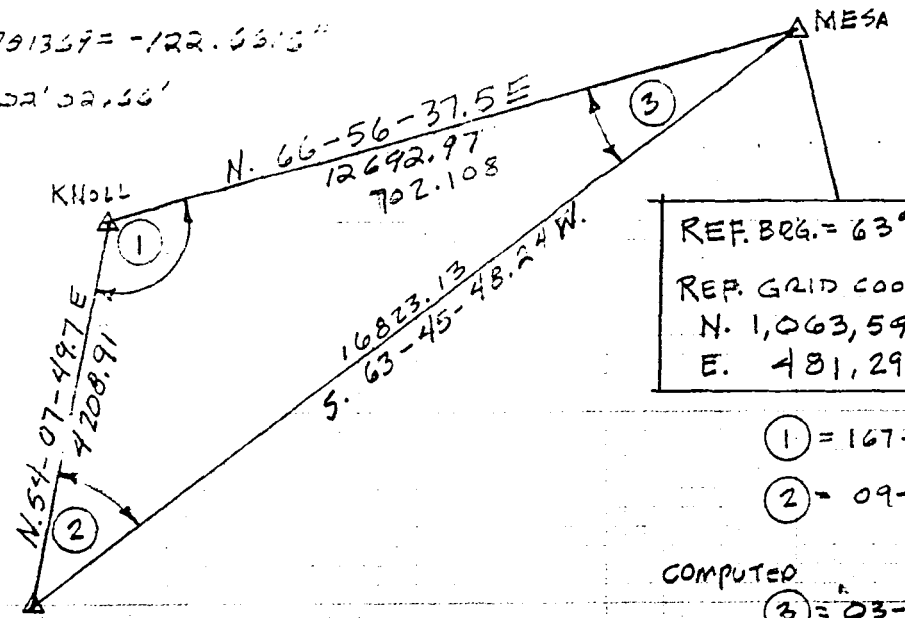
DIFFERENCE = 00° 03' 41.931" = -221.931"

LATITUDE STATION "MESA" = 33° 55' 25.363" = 0.552701369

-221.931" X 0.552701369 = -122.6612"

(-122.6612) - 120" = -02' 02.66'

63° 47' 50.9"
(-) 00° 02' 02.66"
63° 45' 48.24"



REF. BRG. = 63°45'48.24'

REF. GRID COORD.
N. 1,063,594.07
E. 481,299.46

(1) = 167-11-12.2

(2) = 09-37-58.5

COMPUTED
(3) = 03-01-00.3

REF. AZIMUTH MARK
USC&GS BC STA. 1924

GRID COORD.

MESA:
N. 1,063,594.07
E. 481,299.46

REF. AZ. (U.S. BOULDER)
N. 1056156.904
E. 466209.601

KNOLL:
N. 1058923.075
E. 469620.329

Baker Engineers

S.O. No. 16923-02

Subject: FLOOD PLAN DELINEATION

HORIZ. CONTROL LOOP-1

COLCS.

Sheet No. 2 of 12

Drawing No.

Computed by SSO Checked By Date 20 July

TRAVERSE - BRG./DIST.

LOOP 1

N1063594.0[illegible] MESA (REF)
E481299.4600

63.454624 BRG. (REF.)
3.000000 Q
243.454624 AZ
16823.19000 DIST. TO
0.000000 AZ MARK
90.000000 STD. 1924
16823.19000

-15089.944649
-7437.151183
N1056156.919 AZ MARK
E466209.5135 STA. 1924
16823.19000

54.074970 BRG.
1.000000 Q
54.074970 AZ.
4208.910000 DIST. TO
0.000000 KNOLL
90.000000
4208.910000

3410.704455
2466.174874
N1058923.094 KNOLL
E469620.2180
21032.04000

66.563750 BRG
1.000000 Q
66.563750 AZ
12692.97000 DIST. TO
0.000000 MESA
90.000000
12692.97000

11679.06594
4971.006782
N1063594.100 MESA (REF)
E481299.2838
TOTAL

LOOP-1

CLOSE:

N[illegible] MESA.
E[illegible]

[illegible] = DIST
[illegible] BRG
[illegible] = Q
592487.[illegible] = [illegible]
0.000305 = EC

BALANCE:

N[illegible]
E481299.4600 MESA.
N1063594.100
E481299.2838
1063594.100
481299.2838
0.000000

1056156.919
466209.5135
N1056156.904 REF AZ.
E466209.6014 ADJ.
0.000000

1058923.094
469620.2180
N1058923.075 KNOLL
E469620.2288 ADJ.
0.000000

1063594.100
481299.2838
N1063594.069 MESA
E481299.4604
0.000000

Baker Engineers

S.O. No. 3453-32

Subject: Flood Plain Delineation
Horiz. Control
& Number I.D.

Sheet No. 1 of 1

Drawing No.

Computed by SSO Checked By Date 21 July 89

#			
1	=	90 - 23 - 37.5	
2	=	167 - 11 - 12.2	
3	=	09 - 37 - 58.5	
4	=	21 - 59 - 26	
5	=	39 - 54 - 43.5	
6	=	65 - 57 - 26	
7	=	67 - 36 - 56.5	
8	=	08 - 20 - 43.8	
9	=	187 - 28 - 43	
10	=	05 - 20 - 04.8	
11	=	165 - 53 - 07.7	
12	=	138 - 39 - 04.8	
13	=	84 - 44 - 07	
14	=	29 - 18 - 27	
15	=	119 - 04 - 32.5	
16	=	21 - 00 - 44	
17	=	25 - 19 - 02.5	
18	=	58 - 48 - 57.5	MEA.
19	=	121 - 04 - 39	
20	=	146 - 23 - 41.5	
21	=	173 - 12 - 11	MEA.
22	=	120 - 11 - 00	
23	=	117 - 59 - 48	
24	=	115 - 27 - 27	
25	=	39 - 36 - 30.5	MEA.
26	=	18 - 28 - 14.75	
27	=	09 - 35 - 49.5	
28	=	14 - 58 - 21	
29	=	59 - 17 - 02	

#			
30	=	14 - 27 - 11.5	
31	=	57 - 09 - 21.5	
32	=	22 - 46 - 09.5	
33	=	130 - 13 - 21	
34		04 - 34 - 15	
35	=	73 - 02 - 29	
36	=	102 - 36 - 36.5	
37	=	49 - 58 - 54.5	
38		24 - 34 - 10.5	
39	=	109 - 47 - 49.5	
40	=	100 - 44 - 13.5	
41	=	123 - 34 - 27.5	
42	=	111 - 07 - 08.5	
43	=	245 - 36 - 46	
44	=	98 - 44 - 21.3	
45	=	87 - 37 - 30.75	
46	=	33 - 33 - 31.75	CAL
47	=	60 - 57 - 17.5	MEA.
48	=	84 - 44 - 07	MEA.
49	=	03 - 11 - 11.25	MEA.
50	=	189 - 28 - 54	MEA.
51	=	27 - 55 - 32.5	MEA.
52	=	57 - 09 - 21.5	MEA.
53	=	40 - 40 - 02	MEA.
54	=	22 - 46 - 09.5	MEA.
55	=	93 - 46 - 26.5	MEA.
56	=	109 - 35 - 25.5	MEA.
57	=	87 - 37 - 42.3	CAL.
58	=	143 - 35 - 12	MEA.

S.O. No. 1223-02

Subject: Flood Plain Delineation

Hart Creek Loop 2

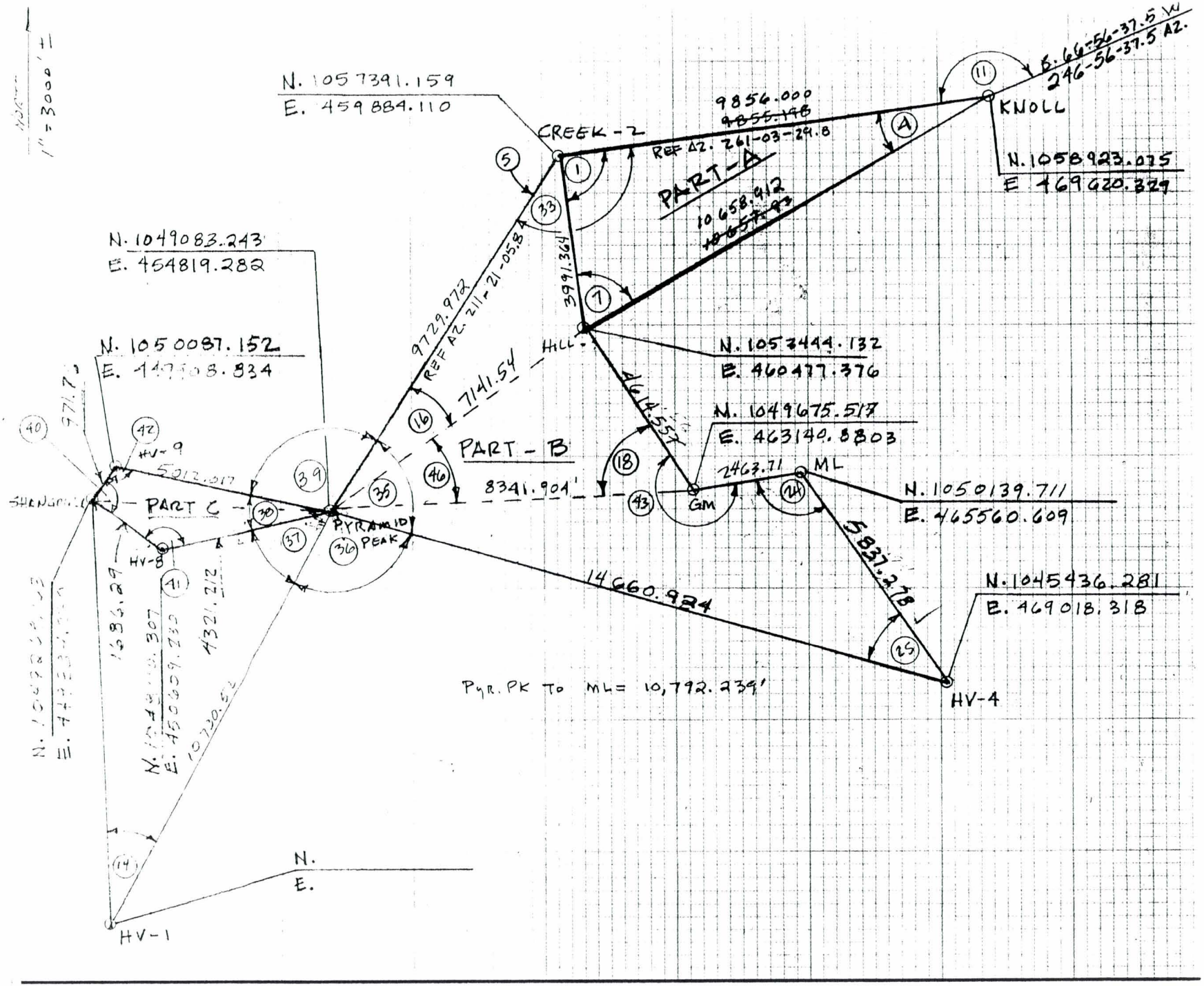
Sheet No. 3 of 12

Drawing No.

Computed by SSD Checked By

Date 7-20-93

1" = 3000'



Baker Engineers

Baker Engineers

S.O. No. 1 6 9 23 - 0 2

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL LOOP-2

Sheet No. 4 of 12

Drawing No.

Computed by SSO Checked By Date 21 July 89

ADJ. TRIANGLE

3991.364 = a
90.399875° = ∡B = (1)
67.6156944° = ∡C = (7)

21.99058556° = ∡A = (4)
10658.91238 = b
9856.000112 = c

TRAVERSE
LOOP-2 PART A

N1058923.075
E469620.3290 KNOLL
246.563750 REF. AZ.

-165.530770 ∡L (11)
-345.530770
261.032980 AZ
81.032980 BRG.
3.000000 Q
9856.000000 DIST.
0.000000
90.000000
9856.000000

9736.219493 DEP.
-1531.915792 LAT.
N1057391.159
E459884.1095 CREEK-2
9856.000000

90.233750 ∡R (1)
-89.362250
171.270730 AZ.
8.325270 BRG.
2.000000 Q
3991.364000 DIST.
0.000000
90.000000
3991.364000

593.266110 DEP.
-3947.026970 LAT.
N1053444.132
E460477.3756 HILL
13847.36400

67.365650 ∡R (7)
-112.230350
59.040380 AZ
59.040380 BRG.
1.000000 Q.
10658.91200 DIST.
0.000000
90.000000
10658.91200

9142.958190 LAT.
5478.948598 DEP.
N1058923.075
E469620.3288 KNOLL
24506.27600

CLOSED

LOOP-2 PART B
TRAVERSE

N1057391.159 CREEK-2
E459884.1100
261.032980 REF AZ.
130.182100 ∡(35) R
-49.413900
211.215080 AZ
31.215080 BRG.
3.000000 Q
9729.972000 DIST TO
0.000000 PYR. PK
90.000000
9729.972000

-5064.206040 DEP.
-8308.199101 LAT.
N1049082.960 PYRAMID
E454619.[illegible] PEAK
9729.972000

∡(35) R
-1[illegible]
104.241980 AZ
75.354020 BRG.
2.000000 Q
14660.92400 DIST TO
0.000000 HV-4
90.000000
14660.92400

14199.97405 DEP.
-3647.386652 LAT.
N1045435.573
E469019.8780 HV-4
24390.89600

39.163050 ∡(25) R
-140.432950
323.405030 AZ.
36.190970 BRG.
4.000000 Q
5837.278000 DIST TO
0.000000 MIL
90.000000
5837.278000

-3457.[illegible] DEP
4703.[illegible] LAT
N1050[illegible] MIL
E465[illegible]
3022[illegible]

115.27270[illegible] ∡(24) R
-64.32330[illegible]
259.08170[illegible] AZ
79.08170[illegible] BRG.
3.000000 Q
2463.710000 DIST TO
0.000000 GUOTM
90.000000
2463.710000

-2419.571074 DEP
-464.26585[illegible] LAT
N1049[illegible] TOM
E[illegible]

Baker Engineers

S.O. No. [illegible]

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL
LOOP - 2

Sheet No. 5 of 12

Drawing No.

Computed by [illegible] Checked By Date 21 July 89

2 ∡ (43) R
[illegible]
324.450330 AZ.
35.145670 BRG.
4.000000 Q
4614.557000 DIST. TO
0.000000 HILL
90.000000
4614.557000

-2663.209086 DEP.
3768.481614 LAT.
N1053443.048
E460479.7629 HILL
37306.44100 TOTAL DIST.

CLOSURE
N1053444.132
E460477.3760 HILL

2.621296 DIST
65.345891 BRG.
4.000000 Q.
1166435502. TOT. AREA
0.000070 EC

BALLANCE (COMPASS RULE)

N1057391.159 CREEK-2
E459884.1100
1057391.159
459884.1100
1057391.159
459884.1100
0.000000

N1049082.960
E454819.9040
N1049083.243 PYRAMID
E454819.2815 PEAK
0.000000 ADJ.

1045435.573
469019.8780
N1[illegible] HV-4
E46[illegible] ADJ.
[illegible]

11
41
N1[illegible] ML
E465560.6090 ADJ.
0.000000

1049674.567
463142.9719
N1049675.517 GUOTM
E463140.8803 ADJ.
0.000000

1053443.048
460479.7629
N1053444.132 HILL
E460477.3760
[illegible]

TRAVERSE
LOOP 2 - PART C

N1049083.243 PYR. PK.
E454819.2820
211.210580 REF AZ.
-109.474950 ∡ (39) L
-289.474950
281.331630 AZ.
78.264370 BRG.
4.000000 Q.
5012.017000 DIST TO
0.000000 HV-9
90.000000
5012.017000

-4910.446093 DEP
1003.909149 LAT
N1050087.152 HV-9
E449908.8359
5012.017000

111.070850 ∡ (42) R
-68.525150
212.402480 AZ
32.402480 BRG.
3.000000 Q
971.760000 DIST TO
0.[illegible] SH-60
[illegible]

-52
-81
N1049269.163 SHANARI-LA
E449384.2995
5983.777000

100.441350 ∡ (40) R
-79.154650
133.243830 AZ.
46.352170 BRG.
2.000000 Q
1686.290000 DIST TO
0.000000 HV 8
90.000000
1686.290000

1225.000442 DEP
-1158.856281 LAT
N1048110.307 HV-8
E450609.2299
7670.067000

123.342750 ∡ (41) R
-56.253250
76.590580 AZ.
76.590580 BRG.
1.000000 Q
4321.212000 DIST TO
0.000000 PYR. PK.
90.000000
4321.212000

4210.204043 DEP
978.157540 LAT
N1049083.475 PYR.
E454819.4339
11991.27900 TOTAL

N1049083.243 PYR. PK.
E454819.2820

CLOSE
0.277055 DIST.
33.152905 BRG.
3.000000 Q
5306606.550 AREA
0.000023 EC

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S.O. No. [illegible]

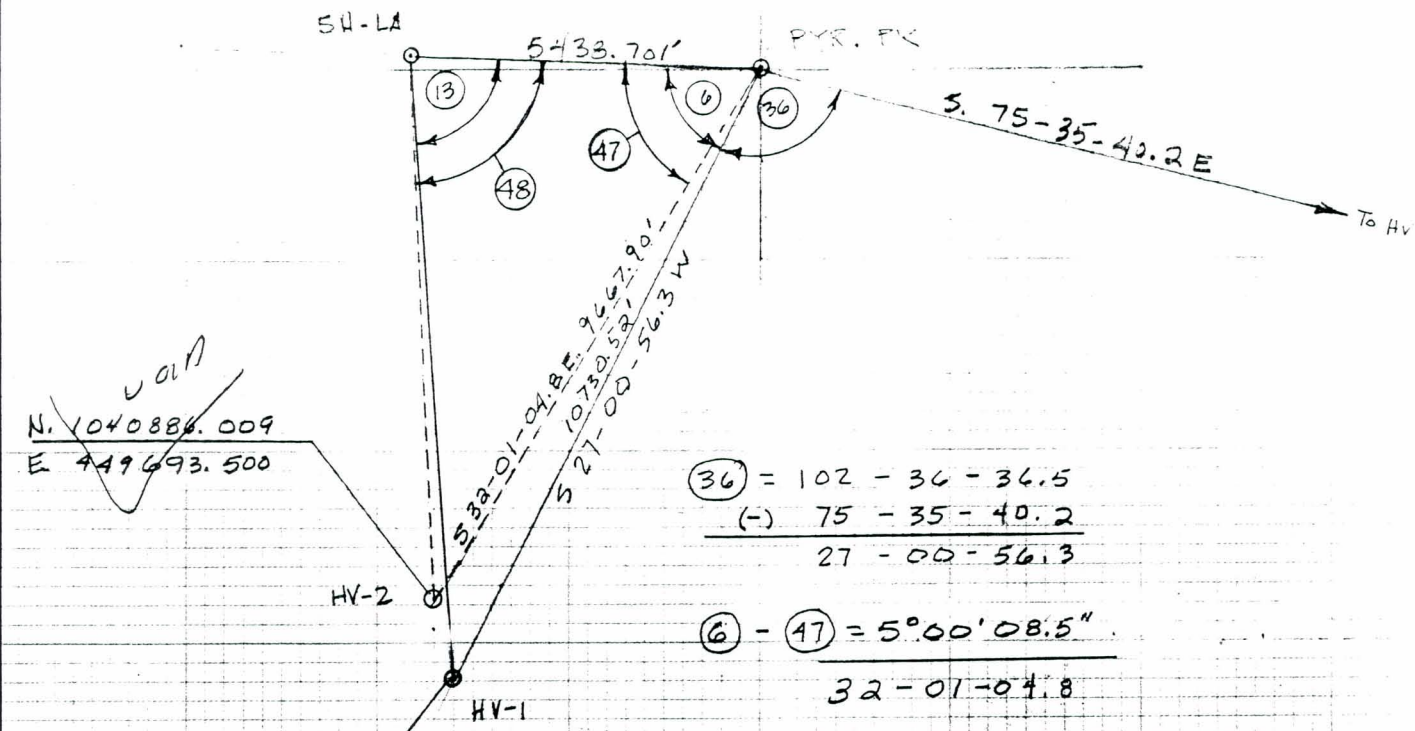
Subject: [illegible]

Sheet No. 6 of 12

Drawing No. [illegible]

Computed by [illegible] Checked By [illegible] Date [illegible]

N. 1,049,083.243
E. 454,819.282



(36) = 102 - 36 - 36.5
(-) 75 - 35 - 40.2
27 - 00 - 56.3

(6) - (47) = 5°00'08.5"
32 - 01 - 04.8

N1049083.243 PYR. PK
E454819.2820
27.005630 BRG.
3.000000 Q
207.005630 AZ.
10730.52000 DIST. TO
0.000000 HV-1
90.000000
10730.52000

-4874.163622
-9559.683281
[redacted] HV-1

[redacted] BRG
3.000000 Q
212.010480 AZ.
9667.900000 DIST. TO
0.000000 HV-2
90.000000
9667.900000

-5125.781945
[redacted] HV-2

S.O. No. 523-02

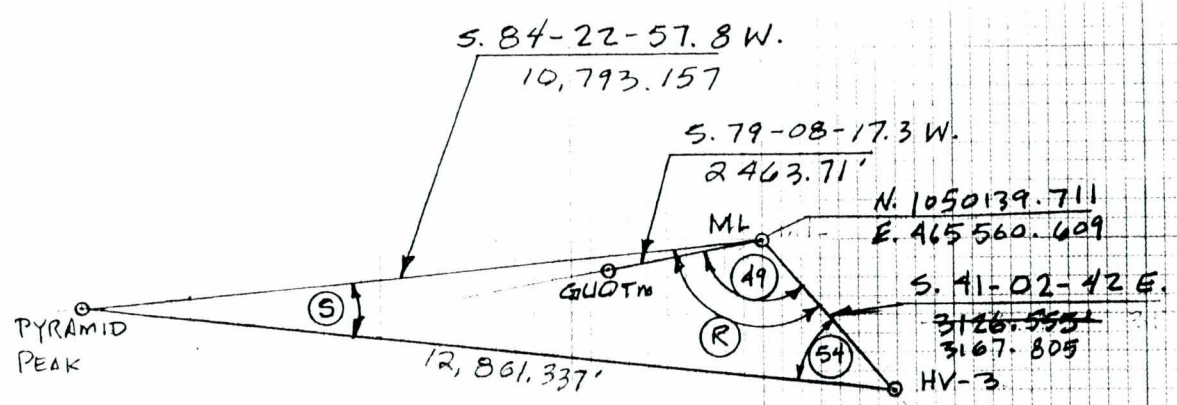
Subject: Flood Plain Tie Line at JW Horz. Control Point 3

Sheet No. 7 of 18

Drawing No.

Computed by KJD Checked By

Date 22 Nov 89



N1050139.711 ML
E465560.6090
41.024200 BRG.
2.000000 Q
188.571800 AZ.
3127.805000 DIST. To
0.000000 HV-3
90.000000
3127.805000

2053.878077 DEP.
-2358.972014 LAT
N1047780.739 HV-3
E467614.4871

TRIANGLE SOLUTION

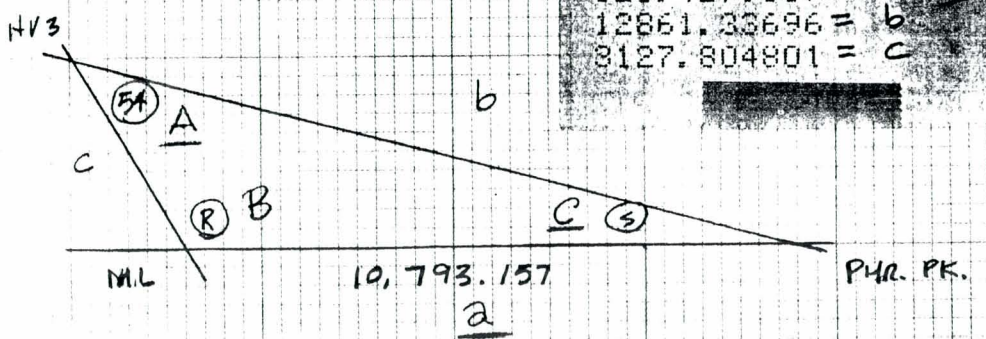
10793.157 = a GIVEN
43.14236111 = 54
11.42972222 = S
125.4279167° = R computed
12861.33696 = b
3127.804801 = c

(49) = 120-11-00

(54) = 43-08-32.5

(R) = 125-25-40.5

((R) + (54)) - 180 = (S) = 11-25-47



Baker Engineers

Baker Engineers

S.O. No. [illegible]

Subject: FLOOD PLAIN DELINEATION

[illegible] Sheet No. 8 of

Drawing No.

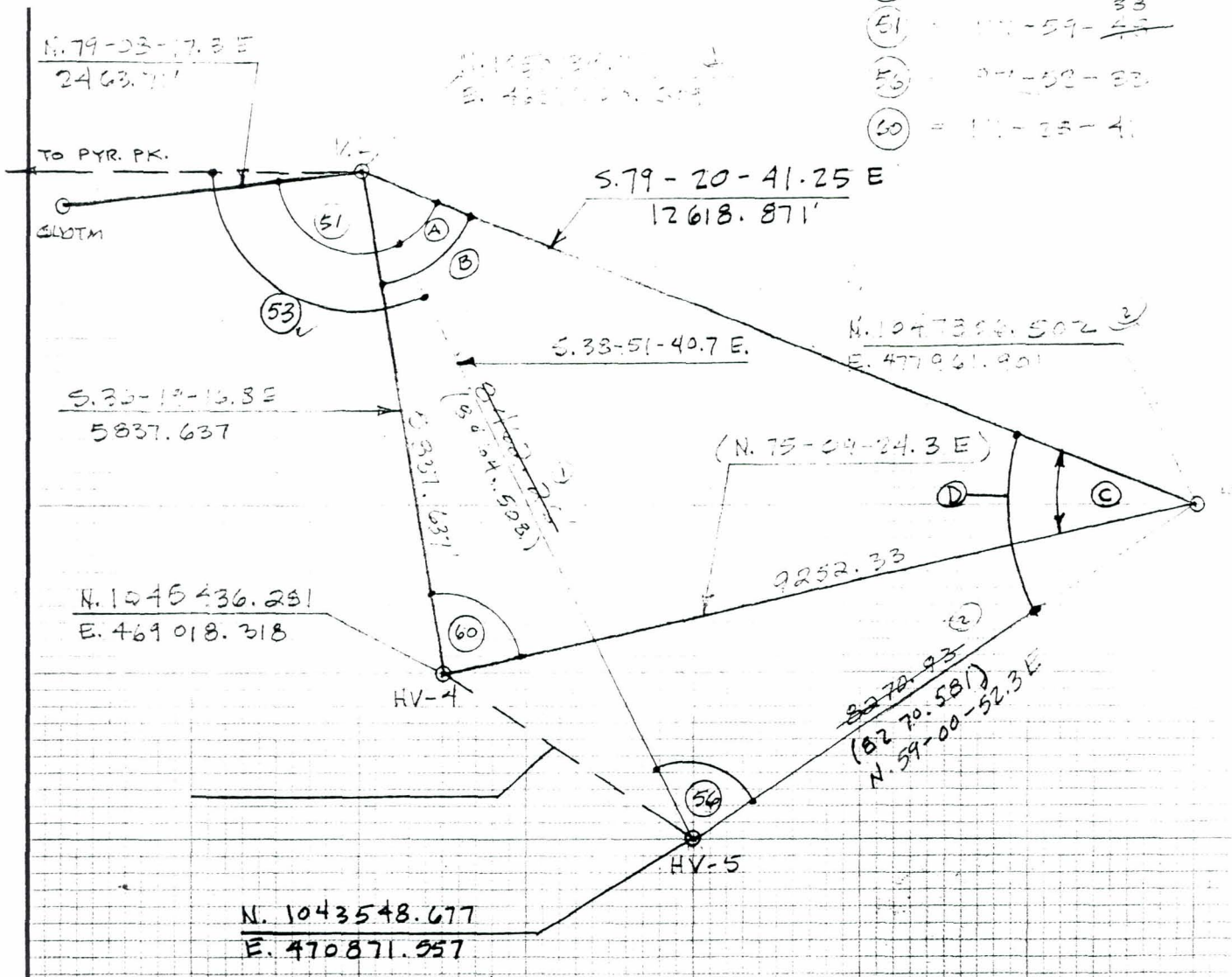
Computed by SED Checked By Date 24 July 89

(53) = 123-14-38

(51) = [illegible]-59-[illegible]

(56) = [illegible]-52-33

(60) = [illegible]-35-4[illegible]



(A) = 40-29-02.24

(B) = 43-01-24.45

(C) = 25-29-54.5

(D) = 41-38-25.75

Baker Engineers

S.O. No. 6223-02

Subject: Flood Plain Delineation
Loop Control Points 5 & 6

Sheet No. 9 of

Drawing No.

Computed by [illegible] Checked By

Date 24 July 89

TRAVERSE

N1050139.711 ML
E465560.6090
36.191680 BRG.
2.000000 Q
143.404320 AZ.
5837.637000 DIST TO
0.000000 HV-4
90.000000
5837.637000

3457.709537 DEP.
-4703.429653 LAT.
N1045436.281 HV-4 ✓
E469018.3185
5837.637000

75.092430 BRG.
1.000000 Q.
75.092430 AZ.
9252.330000 DIST. TO
0.000000 HV-6
90.000000
9252.330000

8943.582419 DEP
2370.220231 LAT
N1047806.502 HV-[redacted] ?
E477961.9010

[redacted]

TRIANGLE SOLUTION

12618.871 DIST. ML→6
5837.637 DIST. ML→4
9252.33 DIST 4→6

111.4780816 ∡ [redacted]
25.49846113 ∡ [redacted]
43.02345729 ∡ [redacted]

[redacted]

INVERSE

N1050139.711 ML
E465560.6090
N1047806.502 HV-6
-2333.209000
E477961.9010
12401.29200

12618.87109 DIST ML→6
79.204125 BRG.
2.000000 Q
100.391875 AZ. ★
12618.87109

[redacted]

N1045436.281
-2370.221000 HV-4
E469018.3180
-8943.583000

9252.330759 DIST. 4→6
75.092429 BRG.
3.000000 Q.
255.092429 AZ
21871.20185

[redacted]

INT[redacted]8
(BRG[redacted])

N1050139.711 ML
E465560.6090
N1047806.502 HV-6
E477961.9010
38.513070 BRG
2.000000 Q
8270.930000 DIST

12618.87109 DIST ML→6
100.391875 AZ ★
1041784.181 HV-5 ?
472292.6823

[redacted]

12618.871
97.87583333
40.48368056

41.64048611 ∡
8464.507787 = b
8270.581272 = c

[redacted]

N1050139.711 ML
E465560.6090
38.514070 BRG.
2.000000 Q
141.081930 AZ
8464.508000 DIST TO
0.000000 HV-5
90.000000
8464.508000

5310.948312
-6591.033584
N1048548.677 HV-5
E470871.5573
846[redacted]

[redacted]

[redacted] BRG.
1.000000 Q
[redacted] AZ.
[redacted] DIST. TO
[redacted] HV-6
90.000000
8270.581000

[redacted]
[redacted]
N1047806.544 HV-6
E[redacted]9087
16735.08900

[redacted]

Baker Engineers

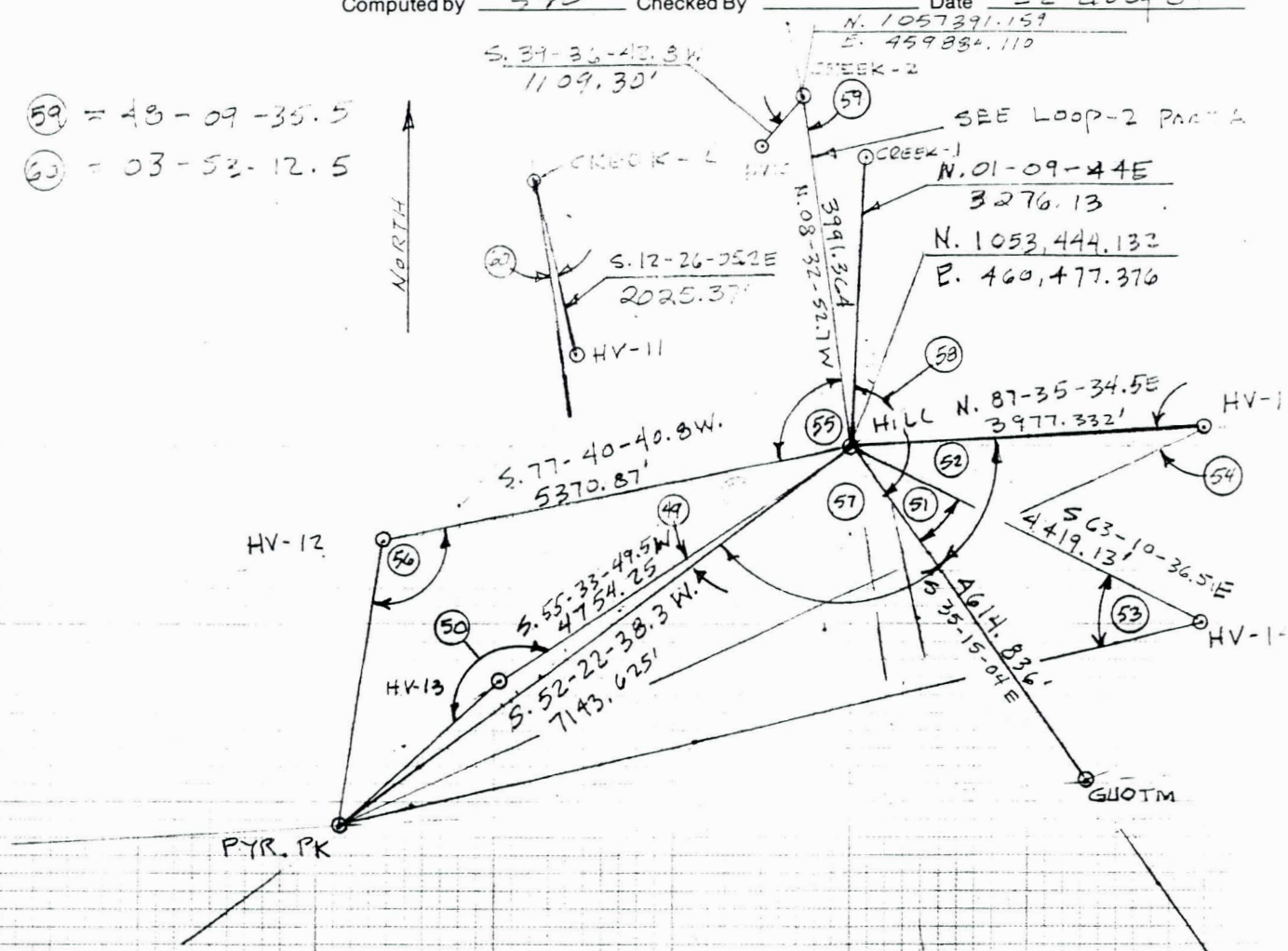
S.O. No. [illegible]

Subject: FLOOD PLAIN DELINEATION

HORIZ CONTROL — Sheet No. 10 of

POINTS 10, 11, 12, 13, 14, 15, & CREEK-1 — Drawing No.

Computed by SKD — Checked By — Date 22 July 89



HV-12
N. 1052297.959
E. 455230.231

CREEK-1
N. 1056719.588
E. 460543.826

HV-13
N. 1050775.656
E. 456556.280

HV-10
N. 1056536.575
E. 459176.838

HV-14
N. 1051450.049
E. 464421.022

HV-11
N. 1055413.301
E. 460320.229

HV-15
N. 1053611.177
E. 464451.199

[illegible] - 1
N.
E.

Baker Engineers

S.O. No. 16423-02

Subject: FLOOD PLAIN DELINEATION
HORZ. CONTROL POINTS 12, 13, 14 & 15

Sheet No. 11 of

Drawing No.

Computed by SKC Checked By Date 22 July 89

INVERSE
FOR POINTS 10, 11, 12, 13, 14, 15, & CREEK-2

N1053444.132
E460477.3760 HILL
N1049083.243
-4360.889000 PYR. PK.
E454819.2820
-5658.094000

7143.625171 DIST.
52.223833 BRG.
3.000000 Q

N1049675.517
-3768.615000 GUOTM
E463140.8800
2663.504000

4614.836138 DIST
35.150402 BRG
2.000000 Q

N1057391.159
3947.027000 CREEK-2
E459884.1100
-593.266000

3991.364013 DIST.
8.325270 BRG.
4.000000 Q

[redacted]

12[redacted] BRG.
[redacted] Q
167.335480 AZ.
2025.370000 DIST TO HV-11
0.000000
90.000000
2025.370000

436.119104
-1977.858378
N1055413.301 HV-11
E460[redacted]

POINTS 12, 13, 14, 15 & CREEK-1

N1053444.132
E460477.3760 HILL
77.404080 BRG
3.000000 Q
257.404080 AZ
5370.870000 DIST TO HV-12
0.000000
90.000000
5370.870000

-5247.145052
-1146.173354
N1052297.959 HV-12
E455230.2309

55.334950 BRG
3.000000 Q
235.334950 AZ.
4754.250000 DIST TO HV-13
0.000000
90.000000
4754.250000

-3921.095684
-2688.475720
N105[redacted] HV-13
E456[redacted]

[redacted]

63.103650 BRG.
2.000000 Q
116.492850 AZ.
4419.130000 DIST TO HV-14
0.000000
90.000000
4419.130000

3943.645847
-1994.088094
N1051450.049 HV-14
E464[redacted]

8[redacted] BRG.
[redacted] Q
87.353450 AZ
3977.332000 DIST TO HV-15
0.000000
90.000000
3977.332000

3973.822583
167.044653
N1053611.177 HV-15
E464[redacted]

1.094400 BRG.
1.000000 Q
1.094400 AZ.
3276.130000 DIST TO CREEK-1
0.000000
90.000000
3276.130000

66.450444
3275.456016
N1056719.588
E460[redacted] CREEK-2

N1[redacted] BRG
E45[redacted] 3.000000 Q
219.364490 AZ
1109.300000 DIST TO HV-10
0.000000
90.000000
1109.300000

-707.[redacted]
-854.[redacted]
N1056[redacted].575 HV-
E459[redacted].8382

Baker Engineers

S.O. No. 1023-02

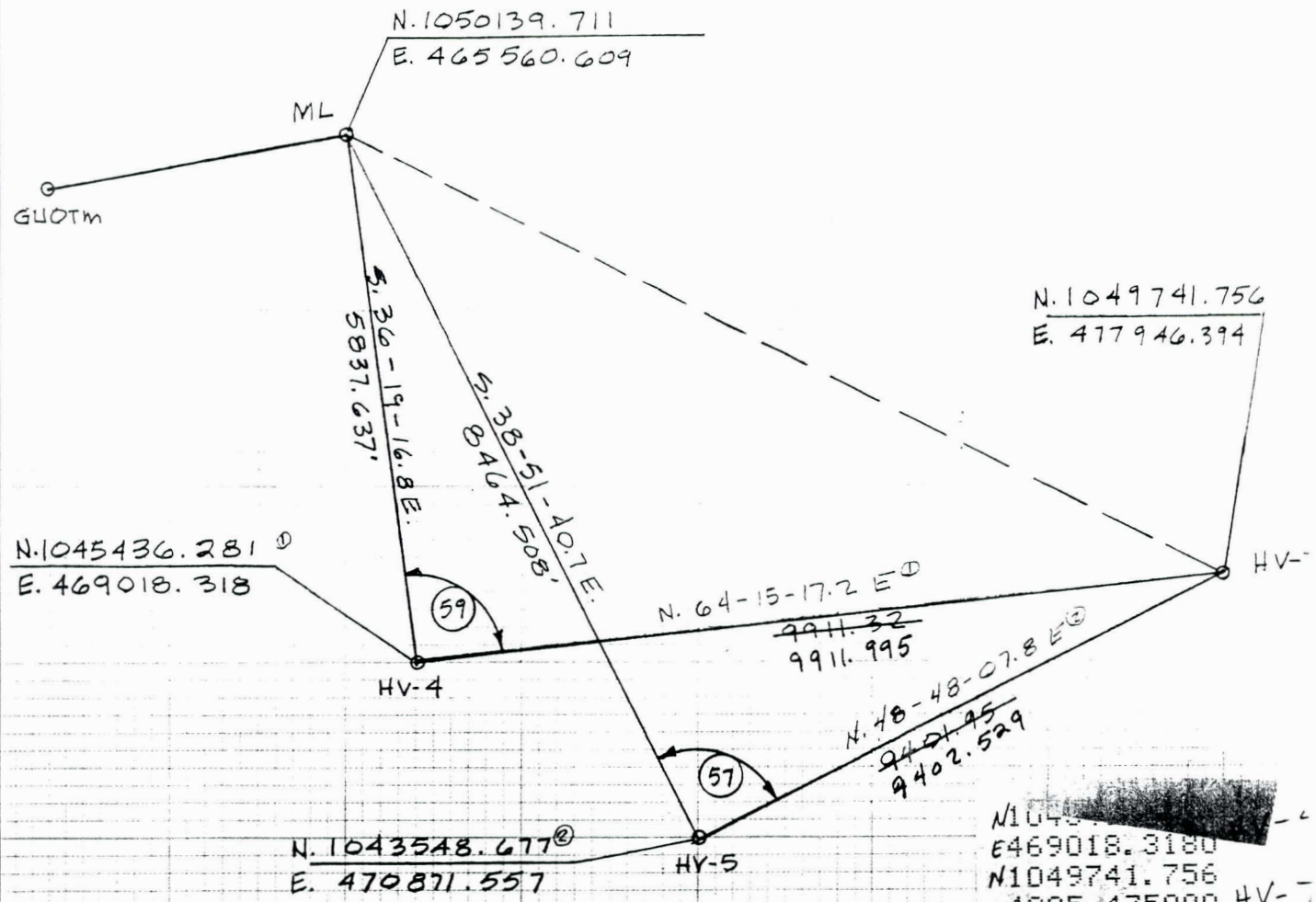
Subject: FLOOD PLAIN DELINEATION

HORIZ. CONTROL POINT 7

Sheet No. 12 of

Drawing No.

Computed by SSO Checked By Date 24 July 89



57 = 87-39-48.5

59 = 100-34-34

[redacted]

BRG/BRG INTERSECTION

N1045436.281 HV-4
E469018.3180
N1043548.677 HV-5
E470871.5570
64.151720 BRG. 4→7
1.000000 Q
48.480780 BRG. 5→7
1.000000 Q

N1049741.756
E477946.3938 HV-7
[redacted]

N1043[redacted]
E469018.3180
N1049741.756
4305.475000 HV-7
E477946.3938
8928.075800

9911.995383 DIST
64.151720 BRG
1.000000 Q
64.151720 AZ
9911.995383

N1043548.677
-6193.079000 HV-
E470871.5570
-7074.836800

9402.528556 DIST
48.480780 BRG.
3.000000 Q
228.480780 AZ.
[redacted]

	BACKSIGHT	⊼ LOCATION	FORESIGHT
	USCGS BOULDER (1924)	KNOLL	BLACK MESA *
2.	BLACK MESA *	USCGS BOULDER (1924)	KNOLL
3.	BLACK MESA *	PYRAMID PEAK	HV-1
4.	" *	"	SHANGRI-LA
5.	SHANGRI-LA	"	HV-1
6.	"	"	HV-9
7	"	"	HV-8
8	"	"	HV-2
9	[redacted] *	"	HV-13
10	[redacted] *	"	GUOTM
11	GUOTM	"	HV-13
	PYRAMID PEAK	SHANGRI-LA	HV 9
13	"	"	HV 8
14	"	"	HV-1
15	"	"	[redacted]
16	"	"	HV-2
17	PYRAMID PEAK	HV-7 (GUOTM)	[redacted]
18	"	" "	"
19	"	" "	[redacted]
20	"	[redacted]	HV-13
21	"		[redacted]
22	"	"	GUOTM
23	GUOTM	"	HV-14
24	"	"	HV-13
25	"	"	HV-15
26	"		[illegible]

	BACKSIGHT	T LOCATION	FORESIGHT
27.	GUOTM	HILL	CREEK No. 2
28	HILL	CREEK No. 2	PYRAMID PEAK
29	"	"	HV-10
30	"	"	HV-11
31	"	"	[redacted]
32	"	"	KNOLL
33	CREEK No. 2	HILL	HV-12
34	"	"	KNOLL
35	PYRAMID	"	CREEK No. 2
36	"	"	KNOLL
37	"	"	SHANGRI-LA
	HILL	HV-12	PYRAMID PEAK
39	PYRAMID PEAK	HV-13	HILL
40	"	"	[redacted]
41	HILL	KNOLL	CREEK No. 2
42	"	"	[redacted]
43	"	"	PYRAMID PEAK
44	PYRAMID PEAK	HV-15	HILL
45	"	"	[redacted]
46	PYRAMID PEAK	HV-14	HILL
47	"	"	[redacted]
48	GUOTM	ML	PYRAMID PEAK
49	"	"	HV-3
	"	"	HV-4
51	"	"	HV-5
52	[redacted]	ML	[redacted]

	BACKSIGHT	T LOCATION	FORESIGHT
53	HV-5	ML	PYRAMID PEAK
54	ML	HV-3	PYRAMID PEAK
55	ML	HV-5	[redacted]
56	"	"	HV-6
57	"	"	HV-7
58	ML	HV-4	[redacted]
59	"	"	HV-7
60	"	"	HV-6
61	"	"	PYRAMID PEAK
62	PYRAMID PEAK	"	ML
63	"	"	[redacted]
	GUOTM	PYRAMID PEAK	HV-4
65	GUOTM	"	[redacted]
66	CREEK NO. 2	"	[redacted]
67	"	"	GUOTM

BAKER
MCFCD
RODGER - CLINE

HORIZONTAL

JAVLIN ENGINEERS, INC.

TELEDYNE

416

FIELD / TRANSIT BOOK

BOOK 1 OF

BODGER CREEK & CLINE CREEK

MARICOPA COUNTY FLOODPLAIN
DELINEATION
FCD-89-15

SURVEY BY: JAYLIM ENGINEERS, INC
PROJECT NO. 4/8014-03

CLIENT: MICHAEL BAKER JR. INC

COUNTY: MARICOPA
STATE: ARIZONA

INDEX

DESCRIPTION	PAGE
LEGEND	2
BASIS OF HORIZONTAL	
BASIS OF VERTICAL	
HORIZONTAL FOR STATE PLANE COORDINATE TIES	10-12
HORIZONTAL CONTROL TRAVERSES	14-63

INDEX CON'T

DESCRIPTION	PAGE

LEGEND

DESCRIPTION	ABBREV.
TRANSIT	T
TRANSIT POINT / TRAVERSE POINT	TP
BACKSIGHT	BS
FORESIGHT	FS
NORTHING	N=
EASTING	E=
HORIZONTAL DISTANCE	HD=
SLOPE DISTANCE	SD=
HORIZONTAL ANGLE	∡=
ZENITH ANGLE	Z∡=
DIRECT	D
REVERSE	R
MEAN ANGLE	M∡
CLOSE HORIZON	CH

Page JK-3 – JK9 are blank

31 May 1989

HORIZONTAL TIES TO STATE PLANE COORDINATE SYSTEM

TEMP. 92°F
CLEAR SKIES
WINDS - CALM

MASON WOMBLE SM
LEE ONUFER ∅
RICHARD CHRISTMAN ∅
RICHARD KLEBIELLO TQ

TO TP 1 "KNOLL" SET 1/2" RB
N=
E=

BS ⊙ USC&GS BC EXFOX IN BOULDER TRIANGULATION
STATION 1924
N=
E=
AZ=

D	00-00-20/20	
R	180-00-30	167-11-15
D	60-00-20	
R	240-00-37	167-11-11
D	120-00-20	
R	300-00-33	167-11-11

FS CH (120-00-19) DSN'-1
D 45-00-20
R 225-00-33

CONTINUED NEXT PAGE

ZD∡ 80-46-00
ZR∡ 279-13-54
MZ∡ 80-46-00

SD= 12860.71
HD= 12692.97
~~(12694.13)~~ ?

CURVATURE & REFRACTION HAS BEEN CALCULATED FOR THE HD.

STATE PLANE COORDINATE TIES

JK 1-11

31 MAY 1989

HORIZONTAL @ TP 1 "KNOLL" 1/2" RB

TO ABOVE

(1) FS@ USC&GS BC FLOW W/COK AZIMUTH MARKER 1947 (BLACK MESA)

N/=

E:

ΔZ:

D 167-11-32 (29)
R 347-11-48
D 227-11-33
R 47-11-46
D 287-11-30
R 107-11-45

167-11-15
167-11-11
167-11-11

BS
CH (287-11-30)

MF 167-11-12.2
P MAY

P 212-11-28
R 32-11-48

ZDA = 93-44-05/06
ZRA = 266-15-46/54
MZA = 93-44-06

SD = 4217.89
HD = 4208.93

DTM-1
SD = 4217.89/86
HD = 4208.91/92
DE = -274.60

C & R CALC INCLUDED

STATE PLANE COORDINATE TIES

JK 1-12

31 MAY 1989

TO USC&GS BC TRIANG. STA 1924

N=

E=

BS ⊙ USC&GS BC MARKER 1947 (BLACK MESA)

N=

E=

D 00-00-20
R 180-00-32
D 60-00-20
R 240-00-30
D 120-00-20
R 300-00-37

FS

CH (120-00-20)

(2) FS ⊙ TP "1" "KNOLL" ½" RS

N=

E=

D 350-22-22
R 170-22-35 350-22-02.5
D 50-22-20
R 230-22-32 350-22-01
D 110-22-24
R 290-22-37 350-22-02

BS M* 350-22-01.5

CH (110-22-21)

M* = 350-22-01.5
(09-37-58.5) ℄L

~~HA?~~

ZD℄ = 82-06-28
ZR℄ = 277-53-32
MZ℄ = 82-06-28

SD = 16985.77
HD = 16823.13 ?
~~(16834.88)~~

CURVATURE & REFRACTION HAS BEEN CALCULATED AND INCLUDED IN HD.

JL 1-13

HORIZONTAL CONTROL
FROM TRANSIT POINT PYRAMID PEAK

7 JUNE 1989

TEMP 95° F
CLEAR SKIES
WINDS - LIGHT

R. KLEBIECKO
R. HILLMAN
R. CHRISTMAN
M. WOMBLE

T ⊙ TP PYRAMID PEAK (1/2" RB)
N:
E:

BS ⊙ BLACK MESA
N:
E:

D 0-00-00
R 180-00-16 0-00-08
(CH D 213-36-27
CH R 33-36-25 213-36-26)

BLACK MESA
ZD ~~
ZR ~~
MZ ~~

SD:
HD:

FS ⊙ SEC COR BC SECTIONS 17,18,19,20
HV-1 1.4' AGL NATURAL GROUND ON PIPE
N:
E:

D 146-23-35
R 326-23-48 146-23-415
(CH D 0-00-00
CH R 180-00-00 0-00-00)

SEC COR
ZD ≈ 93-44-51
ZR ≈ 266-15-04
MZ ≈ 93-44-535

SD: 10,751.10
HD: 10,728.1032
10,730.520'

C&R CALC. NOT VARIFIED

NOTE: CLOSE HORIZON ANGLES (CH) ARE BASED ON 00°-00'-00" AT FORESIGHT

7 JUNE 1989

HORIZONTAL @ TP PYRAMID PEAK

T@ ABOVE

FSO TP SHANGRI-LA

N:

E:

D 211-21-00
R 31-21-15 211-21-075 ≠R
(CH D 0-00-00
CH R 180-00-00 0-00-00)
M4 (148-38-52.5 ≠L)

B.S.@ BLACK MESA

N:

E:

D 0-00-00
R 180-00-16 0-00-08
(CH D 148-38-55
CH R 328-38-56 148-38-555)

SHANGRI-LA

ZD4 = 95-18-25 SD = 5461.49'
ZR4 = 264-41-39 HD = 5438.08'
MZ4 = 95-18-23 5438.701

C & R CALC
NOT VARIFIED

7 JUNE 1989

HORIZONTAL @ TP PYRAMID PEAK

T@ ABOVE

ES @ TP SHANGRI-LA

N =

E =

D 0-00-00
R 180-00-19 0-00-095
(CH D 64-57-23
CH R 244-57-28 64-57-255)

(5) FS @ H&V 1 SEC COR BC SECTIONS 17,18,19,20

N =

E =

D 295-02-39
R 115-02-50 295-02-445 * R
(CH D 0-00-00
CH R 180-00-00 0-00-00)

(64-57-15.5 * L)

JK 1-17

7 JUNE 1989

HORIZONTAL @ TP PYRAMID PEAK

TO: ABOVE

BSC: HMG21-L1

D 0-00-00 ① 0-00-00
R
(CH D ② 09-35-49)
CH R
(CH ① 0-00-00
CH ② 350-24-11)

(6) 3-5 @ [redacted] TGN R3E

N = ① 09-35-49 (9-35-495)
E = ② 19-11-39

D 09-35-49
R
CH D
CH R

(CH ① 350-24-11
CH ② 340-48-20) 350-24-10

ZD-4 90-31-32
ZR4
ZM

SD = 5044.17'
HD = 5011.49'
5012.017'
C+R CALC NOT VARIFIED

PYR. TO HV-9

JKI-18

7 JUNE 1989

HORIZONTAL @ TP PYRAMID PEAK

T @ ABOVE

BS @ SHANGRI-LA

(1) BS @ H&V-8

Hoc.		
∡1	345-01-40	345-01-39 ∡R
∡2	330-03-18	(14-58-21 ∡L)
(CH∡1	14-58-21	14-58-19)
CH∡2	29-56-38	
Z∡ =	97-51-23	SD = 4361.76'
		HD = 4370.82'
		4321.212

(C&R CALC. NOT VERIFIED

7 JUNE 1989

HORIZONTAL AT TP PYRAMID PEAK

TO ABOVE

BS @ SHINGRI-LA

(B) FS @ HV 2

HOR.		
∡1	299-02-45	299-02-425 ∡R
∡2	238-05-25	(60-57-17.5 ∡L)
(CH∡1	60-57-21	60-57-20)
CH∡2	121-54-40	
2∡ =	94-03-32	

SD = 9690.25'
ND = 9665.94'

C&R CALC NOT VARIFIED

9667.90

JK 1-20

7 JUNE 1989

HORIZONTAL AT TP PYRAMID PEAK

TO ABOVE

BS @ BLACK MESA

(1) FS @ H&V-13

HOR.		
#1	345-27-49	345-27-495
#2	330-55-39	
(CH#1	14-32-09	14-32-09)
CH#2	29-04-18	

Z # = 101-36-58

SD 2459.83'

HD 2409.45'

JK1-21

7 JUNE 1989

HORIZONTAL @TP PYRAMID PEAK

TO ABOVE

OS BLACK MESA

(10) TS TP QUOTM

HOR.

#1	25-19-02	25-19-025
#2	50-38-05	
(CH#1	334-40-57	334-40-59)
CH#2	309-21-58	
Z#	92-20-26	

SD= 8347.08
HD= 8340.12

CTR CALL NOT VARIFIED
8341.581

JIL 1-22

7 JUNE 1989

HORIZONTAL @ TP PYRAMID PEAK

TT @ MEDUE

ES @ TP G.U.O.T.M.

(11) FS @ HV-13

Hor.		
#1	320-08-53	320-08-51
#2	280-17-42	
(CH #1	39-51-13	39-51-125)
CH #2	79-42-25	

JIL 1-23

JKI-24

27 JUNE 1989

HORIZONTAL @ TP SHANGRI-LA

TO ⊙ ABOVE

BS ⊙ TP PYRAMID PEAK

D 00-00-20
R 180-00-36
D 60-00-20
R 240-00-37

(14) FS ⊙ HV-9 SEC CO2 17, 18, 19, 20

D 300-43-15
R 120-43-37
D
R

M☆ = 300-42-58 ☆R
(59-17-02 ☆L)

CH = 59-17-02

(13) FS ⊙ HV-8

D 41-27-30
R 221-27-49
D
R

M4 = 41-27-11.5

CH = 318-32-51

TEMP 25°
PARTLY CLOUDY
WINDS - SE MODERATE

EQUIP.
DTM-1

R KLEBIECKO T ⊙
M. WOMBLE SM ⊘

DZ4 94-01-07
RZ4
MZ4

SD = 977.13
HD = 971.74 971.76

DZ4 = 92-47-40
RZ4
MZ4 =

SD = 1688.24
HD = 1686.23
1686.29

HORIZONTAL @ TP SHANGRI-LA

TO ABOVE

NW 27

(14) FSO [redacted] HV-4

D 84-44-22
R 264-44-48 M1= 84-44-07
D
R

CH= 275-15-49

(15) FSO [redacted]

D 333-16-37
R 153-16-55 M1= 333-16-18
D 33-16-35
R 213-16-53 M1= 333-16-155

CH = 26-43-42 333-16-16.75

(16) FSO [redacted]

D 84-58-08 M1-84-57-56.5
R 264-58-41
A1= 84-58-08
A2 84-57-50
A3 84-57-55

CH 275-02-27

A2 275-02-18

JK1-25

27 JUNE 1987

ZD1 SD=
ZR1 HD=
M1=

Z1= HV1-2 SD=
HD=

JK 1-26

JK 1-27

27 JUNE 1989

HORIZONTAL @ HV 7 — TP
GUO — GLOTM

TO ABOVE

BSO TP PYRAMID TRAIL

D 00-00-20
R 180-00-37

CH ——

(11) FSO [redacted]

D 145-48-07
R 325-48-21 MA = 145-47-45.5

CH 214-12-18

(18) FSO [redacted]

D 173-12-25
R 353-12-54 MA = 173-12-11

CH 186-47-47

(19) FSO TP HILL 00-00-00 180-00-37

D 58-49-13
R 238-49-39 MA = 58-48-57.5

CH 301-11-02

ZDA = 86-27-08 SD = 2468.43
HD = 2463.71

ZDA = 88-34-05 SD = 4615.50
HD = 4614.11 7 .04
4614.55Z .06

CHR CALC NOT VARIFIED

JK 1-28

28 JUNE 1989

HORIZONTAL @ TP HILL

TEMP 97°
CLEAR SKIES
WINDS - LIGHT

R. KLEBIECKO T
M. WOMBLE SM

TO MOVE

EQUIP: MILOH DTM-1

BS O PYRAMID PEAK

D 00-00-20
R 180-00-40/41

CH —

(10) FS O UV 13 4.25"

D 3-11-28
R 183-11-55 MA = 3-11-11.25

ZA 93-15-06 SD = 4761.45
HD = 4753.78
4754.25

CH 356-48-53

(11) FS O BLACK MESA

D 190-45-45
R 10-46-03 MA = 190-45-23.5
1.25"

CH 169-14-35

(12) FS O GOOTM 2.25"

D 272-22-49
R 92-23-10 MA = 272-22-29.54 R
87-37-30.75

CH 87-37-33

ZA = —

SD =
HD = —

28 JUNE 1989

HORIZONTAL @ TP HILL

TO ABOVE

BSO GUOTM

D 00-00-20/20
R 180-00-40/42

CH —

(12) FSO HV 14

D 332-04-45
R 152-05-11

M∠ = 332-04-275 ∠R
(27-55-32.5 ∠L)
.5"

CH 27-55-32

(14) FS HV 12

D 90-47-03
R 270-47-28

M∠ = 90-48-45
4"

CH 269-11-19

(15) FSO HV 15

D 302-50-59
R 122-51-19

M∠ = 302-50-385 ∠R
.75"
(57-09-21.5 ∠L)

CH 57-09-31

∠ 90-47-17

SD 4419.14
HDC 4418.72
4419.130'

∠ = 90-14-15

SD = 3977.03
HD = 3977.00
3977.332

28 JUNE 1969

HORIZONTAL @ TP HILL

TO @ ABOVE

BS @ GUOTM

D 00-00-20
R 180-00-40 1/2

(20) FS @ TP CREEK No 1

D 216-25-08
R 36-25-29

MA = 216-24-48 & R
(143-35-12 & L)
4"

CH 143-35-16

ZA 92-30-32

SD = 3279-27
HD = 3276.13

(21) FS @ TP CREEK No 2

D 206-42-20
R 26-42-42

MA = 206-42-01.5 &
153-17-58.5
5"

CH 153-17-58

ZA 91-56-14

SD = 3993.31
HD = 3991.03
3991.364

JX 1-32

28 JUNE 1989

HORIZONTAL @ TP CESCL NO2

TO ABOVE

TO TP HILL

D 00-00-20
R 180-00-43

29 FSO TP PYRAMID

D 37-51-07
R 217-55-23

MA = 39-54-43.5
3.5"

CH 320-05-20

ZA = 87-55-28

SO = 9734.25

ADD .23 FOR PRISM OFFSET

HD = 9727.710
+ 0.23
= 9727.940

9729.927

CHK CALC NOT VERIFIP

29 FSO HV 10

D 48-10-00
R 228-10-22

MA = 48-09-35.5
5"

CH 311-50-20

ZA = 91-13-43

SO = 1109.56
HD = 1109.30

30 FSO HV 11

D 356-07-10
R 176-07-28

MA = 356-06-47.5
2.5"

CH 3-53-15

(03-53-125)

ZA = 91-03-09

SO = 2025.37
HD = 2025.05

JK 1-54

28 JUNE 1989

HORIZONTAL @ TP CREEK NO 2

T @ ABOVE

BS @ TP HILL

D 00-00-20
R 180-00-40

(31) FS @ BLACK MESA

D 261-26-28
R 81-26-47 MA = 261-26-075 ∡R
5.5"
CH 98-33-58 (98-44-21.3 ∡L)

(32) FS @ TP KNOLL

D 269-36-48
R 89-36-57 MA 269-36-225 ∡R
6.5"
CH 90-23-44 (90-23-37.5 ∡L)

DIN 5.65 9992.77
5.00 9992.746

19000

87-50-35
Z4 87-50-35 SD = 9862.35
~~CALCD HD = 9855.362~~
PROGRAM HD = 9855.198

C + R INCLUDED

JL1-35

29 JUNE 1989

HORIZONTAL @ TP HILL

T @ ABOVE

FS @ TP CREEK No 2

D 00-00-20
R 180-00-02

(33) FS @ HV 12

D 266-13-55
R 86-14-14

M4 = 266-13-33.5 ∡R

(93-46-26.5 ∡L) .5"

CH 93-46-26

(34) FS @ TP KRIOLL

D 67-37-21
R 247-37-34

M4 = 67-36-56.5

CH 292-23-09

5.5"

CLEAR SKIES
TEMP 95° F
WINDS: LIGHT

EQUIP: NIKON DTM-1

R. KLEBIEKO
M. WOMBLE

SD = 5377.92
HD = 5370.26

5370.87

Z4 93-03-30

HORIZONTAL @ TP HILL

T @ ABOVE

ZS @ TP PYRAMID

D 00-00-20
R 180-00-40

35 FS @ TP CREEK NO 2

D 119-04-52
R 299-05-13 MA = 119-04-32.5
5.5"

CH 240-55-33

36 FS @ TP KNOLL

D 186-41-48
R 6-42-06 MA = 186-41-27
3"

CH 173-16-36

37 FS @ [redacted]

D 17-00-39
R 197-00-52 MA = 17-00-15.5
8.5

CH 342-59-53

JK 1-38

JK 1-39

29 JUNE 1989

HORIZONTAL @ HV. 12

TO ABOVE

BS @ TP HILL

D 00-00-20
R 180-00 90 ?

38

FS @ TP PYRAMID HILL

D 109-35-45
R 287-36-06

CH 250-24-38

109 35 25
109 35 26

109 35 25.5

29 JUNE 1989

HORIZONTAL @ HV 13

T @ ABOVE

BS @ TP PYRAMID PEAK

D 00-00-20
R 180-00-36

39 FS @ TP HILL

D 187-29-12
R 9-29-32 MA = 189-28-54
6"

CH 170-31-12

40 FS @ BLACK MESA

D 195-46-33
R 15-46-51 MA = 195-46-14
1"

CH 164-13-47

JK1-41

29 JUNE 1989

HORIZONTAL @ HV 13

TO ABOVE

BSO TP HILL

D
R

FS6 BLACK MESA

D
R

CH

VOID

29 JUNE 1989

HORIZONTAL @ TP KNOLL

TO @ MESA

BS @ TP HILL

D 00-00-20
R 180-00-41

(41) FS @ TP CREEK NO 2

D 21-59-51
R 202-00-13

M̄ = 21-59-31.5
7.5"

CH 338-00-21

(42) FS @ BLACK MESA

D 187-27-00
R 7-29-27

M̄ = 187-28-43
1"

CH 172-31-16

(43) FS @ TP PYRAMID PEAK

D 357-19-11
R 177-19-~~48~~ 43

M̄ = 357-18-56.5
2.5"

CH 2-41-01

PPM = 23

M = -58

B5

Z̄ = 91-18-56
91-18-54

SD = 10660.61/58/56/57
59/55
HD = 10,657.77

PPM'S 38 →

SD = 10660.74/71/77
HD = 10,657.93

B5 KNOLL TO HILL

C & R CALC. NOT VARIFIED

10660.72

JKI-43

29 JUNE 1989

HORIZONTAL @ HV 15

TO ABOVE

BS@ TP PYRAMID PEAK

D 00-00-20
R 180-00-41

44 FS@ TP HILL

D 22-46-29
R 202-46-51 M4~ 22-46-09.5
25'

CH 337-13-48

45 FS@ BLACK MESA

D 173-32-01
R 353-32 15 M4~ 173-31-37.5
6.5'

CH 186-28-29

JKI-45

29 JUNE 1986

HORIZONTAL @ HV 14

TO MOVE

BS @ TP HIGHWAY FEAL

D 00-00-20
R 180-00-35

(40) FS @ TP HILL

D 410-40-23
R 220-40-36 MA = 40-40-02
1"

CH 319-19-59

(41) FS @ BLACK MOUNTAIN

D 157-12-43
R 337-13-10 MA = 157-12-29
9"

CH 202-47-22

00-00-00 (D 157-12-33
180-00 (R 337-12-15
179-59-43

(D
(R

JK 1-47

30 JUNE 1989

HORIZONTAL @ TP ML

TO ABOVE

BS @ TP 600TM

D 00-00-20
R 180-00-43.3

TEMP 100° F
CLEAR SKIES
WINDS - CALM

EQUIP: NIKON DTM-1

R. KLEBICKO T
M. WOMBLE SM

ZD ∡ 93-32-19

SD = 2468.49 (BS)
HD = 2463.78

C&F 0.021 m²

49 FS @ TP PYRAMID TRAIL

D 5-15-16
R 185-15-38

M∡ = 5-14-555
.5"

CH 354-45-05

49 FS @ HN 3

D 239-49-22
R 59-49-41

M∡ = 239-49-00 ∡R
4"

CH 120-11-04 (120-11-00 ∡L)

ZD ∡ = 90-59-54

SD = 3126.82
HD = 3126.35

30 JUNE 1969

HORIZONTAL @ TP ML

T @ ABOVE

BS @ TP GUOTM

SEE LAST PG

50

FS @ HV 4

D 244-32-57
R 64-33-12

MA = 244-32-33 ∡R
5"
(115-27-27 ∡L)

CH 115-27-32

Z∡ = 90-53-37

SD: 5836.35
HD: 5835.65
5836.365

5

FS @ HV5

D 242-00-35
R 62-00-52

MA = 242-00-12 ∡R
(117-59-48 ∡L)
0"

CH 117-59-48

Z∡: 90-29-31

SD: 8461.09/05/08/07
HD: 8460.76

C & R CALC
NOT VERIFIED
8462.263

8682.608

JK1-50

30 JUNE 1989

HORIZONTAL @ TP ML

TO ABOVE

BS @ TP PYRAMID

D 00-00-20
R 180-00-42

FS @ TP GUOTM

D 354-45-22
R 174-45-46

M7 · 354-45-03 ∡R
4"
(05-14-57 ∡L)

CH 5-14-53

(54)

JK 1-51

30 JUNE 1969

HORIZONTAL @ TP ML

T @ ABOVE

BS @ HVS

D 00-00-20
R 180-00-43

(53) FS @ TP BYRAMID PEAK

D 123-14-59
R 303-15-20 M.) : 123-14-38

CH 236-45-20 Z"

JK 1-52

JKI-53

30 JUNE 1989

HORIZONTAL @ HV 3

T@ ABOVE

BS@ TP ML

D 00-00-20
R 180-00-42

(54) FS@ PYRAMID POLE

D 43-09-54
R 223-09-13

M42 43-08-32.5 ?
2.5"
X LEFT

CH 316-51-25

JK1-54

5 July 1989

HORIZONTAL @ HV 5

TEMP 105°F — R KLEBICKO
PARTLY CLOUDY — R. CHRISTMAN
WINDS - LIGHT — M. WOMBLE

EQUIP. NIKON DTM-1

TO HOUSE 272-21

BS @ TP ML

D 00-00-20
R 180-00-43

(55) FS @ BLACK MESA

D 65-50-46
R 245-51-02 — MZ = 65-50-22.5
.5"

CH 294-09-38

(56) FS @ HV 6

D 97-52-50
R 277-53-19 — MZ = 97-52-33
5"

CH 262-07-22

ZA 88-21-26 — SD = 8272.89
HD = 8269.49
8270.43

(57) FS @ HV 7

D 87-40-08
R 267-40-32 — MZ = 87-39-48.5
.5"

CH 272-20-11

ZA 87-41-48 — SD = 9407.64 /55/66/68
HD = 9400.09
9401.95

O & R CALC. NOT VARIFIED

JK1-56

JK1-57

5 July 1986

HORIZONTAL @ HV4

TO ABOVE

FSO TPML

D 00-00-20
R 180-00-42

58

FSO BLACK MESA

D 69-47-00
R 249-47-23 MA: 69-46-40.5
35"

CH 290-13-23

59

FSO HV 7

D 100-34-53
R 280-35-17 MA: 100-34-34
6"

CH 259-25-32

60

FSO [redacted]

D 111-29-01
R 271-29-25 MA: 111-28-41

CH 248-31-27 8"

M: .185

ZA: 87-42-32 SD 9917.20 / .15 / .17 .22
FPMS: .58 HO 9909.26
9911.32

C&R CALC NOT VARIFIED

M: .07

ZA 88-24-57 SD 9254.08 / .02 / .10
FPMS: .38 HO 9250.53
9252.33

JK 1-58

5 JULY 1987

HORIZONTAL @ HV 4

TO ABOVE

FS @ TP PYRAMID PEAK

D 320-43-52
R 140-44-09

MA: 320-43-29.5 ∡R
1.5"

CH 39-16-32

(39-16-30.5 ∡R)

JKI-59

5 July 1989

HORIZONTAL @ HX 4

TI @ ABOVE

BS @ TP PYRAMID PLOK

D 00-00-20
R 180-00-42

(62)

FS @ TP ML

D 39-16-49
R 219-17-14 MA: 39-16-30.5

CH 320-43-32 2.5"

(63)

FS @ BLACK MESA

D 109-03-27
R 289-03-47 MA: 109-03-06

CH 250-56-54 0"

JK 1-60

JK1-61

6 JULY 1989

HORIZONTAL @ TP PYRAMID PEAK

TEMP 95°
PARTLY CLOUDY
WINDS - LIGHT
PPTS - 32

R KLEBICKO T
L. LONGORIA Ø
M. WOMBLE SM Ø

To ABOVE

Lo G.VOTM

D 00-00-20
R 181-01-43 VOID
USE → D 45-02-20
R 225-00-12

EQUIP: LICTZ RCOZL
WILD T2

(6A)

Fs @ 1V4

D 18-29-19 04
R 198-28-57 VOID

USE → D 63-28-55
R 243-28-265

MZ = 18-28-14.75
6.25"

CH 341-31-39

ZD 91-07-42
ZR 268-56-50

ZD 91-07-59
ZR 268-56-20
MZ = 91-05-45

M = .088
-101/-001/.10
SD 14659.05 .07/.12
HD 14656.41

CTR CALC NOT VERIFIED
14660.921

JK 1-62

6 JULY 1989

HORIZONTAL @ RIVERSIDE HAZ

TO ABOVE

BS TP GUSTAV

D 00-00-15
R 180-00-05

(65)

ISO BLACK MESA

D 334-41-17.5
R 154-41-05

MA = 334-41-01.25 ±R
-25"

CH 25-18-59

(25-18-58.75 ±R)

JKI-63

6 JUL, 1989

HORIZONTAL @ TP RIBBON PEAK

TO PROPE

BS @ TP CREEK NO. 2

D 00-00-30
R 180-00-21

FS @ [redacted]

D 29-15-46
R 207-15-32

M ∡ = 29-15-13.5
.5"

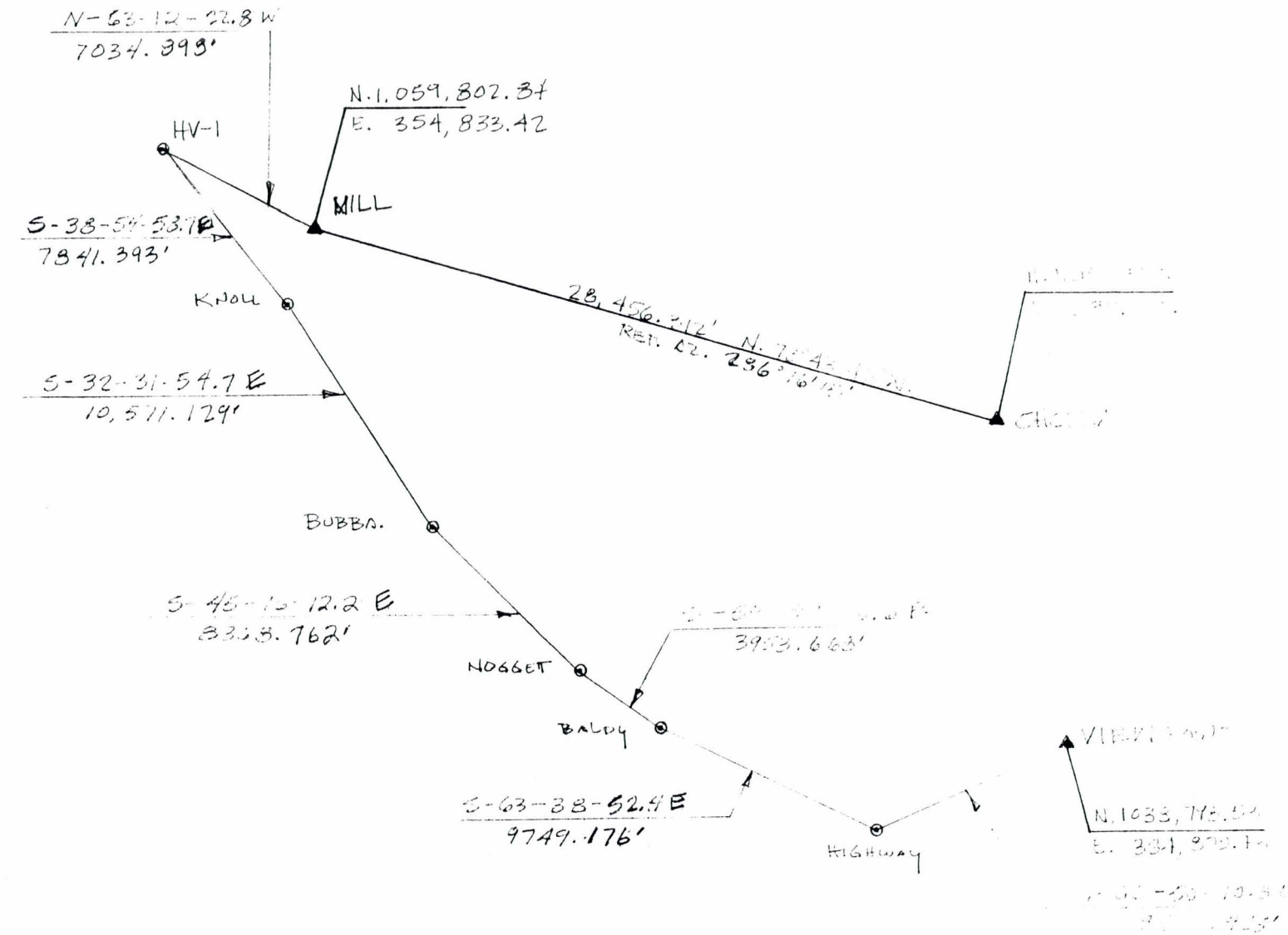
CH 330-44-46

FS @ TP GUOTM

D 54-34-44
R 234-34-37

M ∡ = 54-34-15
3"

CH 305-25-42



Baker Engineers

Subject: Flood Plain Mapping
Harris Co.
Loop 8 Adjusted

S.O. No. 16733-32

Sheet No. 1 of 6

Drawing No.

Computed by TEW

Checked By

Date Nov 30

Baker Engineers

S.O. No. 16923-02

Subject: FLOOD PLAIN DELINEATION
FORT. CONTROL
LOOP # 1 SCALE

Sheet No. 2 of 6

Drawing No.

Computed by JJD Checked By

Date 7 AUG 89

105			-5889.652000
354833.4200	MILL		365109.9144
			5945.433000
1062973.886			
348553.8104			8368.761810 DIST
1062974.022	HV-1		45.161216 BRG
348553.8189			2.000000 Q
0.000000			134.434784 AZ.
			33816.18217
1056872.626			
353479.6440		1059802.840 MILL (REF)	1039791.885
1056872.914	KNOLL	354833.4200	674681.9206
353479.6620			
0.000000		N1062974.022	N1039791.385
		3171.182000 HV-1	-2279.436000 BALDY
1047959.980		E348553.5189	E368340.3425
359164.4506		-6279.601100	3230.428100
N1047960.473	BUBBO		
E359164.4814		7034.897672 DIST.	3953.668447 DIST
0.000000		63.122284 BRG.	54.473358 BRG
		4.000000 Q	2.000000 Q
		296.473716 AZ.	125.122642 AZ.
1042070.166		7034.897672	37769.85061
365109.8734			
N1042070.821	NOGGET	N1056872.914	N1035463.860
E365109.9144		-6101.108000 KNOLL	-4327.525000 HIGHWAY
0.000000		E353479.6620	E377076.4147
		4925.843100	8736.072200
1039791.104			
368340.2968			
N1039791.885	BALDY	7841.393312 DIST.	9749.175868 DIST.
E368340.3425		38.545874 BRG.	63.385243 BRG
0.000000		2.000000 Q	2.000000 Q
		141.050126 AZ.	116.210757 AZ.
		14876.29098	47519.02648
1035462.940			
377076.3571			
N1035463.860	HIGHWAY	N1047960.473	N1038798.530
E377076.4147		-8912.441000 BUBBA	3334.670000 VIEWPOINT
0.000000		E359164.4814	E384870.4300
		5684.819400	7794.015300
1038797.446			
384870.3622		10571.12937 DIST.	8477.422869 DIST.
N1038798.530	VIEWPOINT	32.315467 BRG.	66.501081 BRG.
E384870.4300		2.000000 Q	1.000000 Q
0.000000		147.980533 AZ.	66.501081 AZ.
		2	55996.44935

Baker Engineers

S.O. No. 16923-02

Subject: Flood Plain Delineation
Horiz. Control
Loop 1 Calcs

Sheet No. 3 of 6

Drawing No.

Computed by [illegible] Checked By Date 7 Aug 84

TRAVERSE WITH ADJ.

	E	E
	-6....	1.000000
	N1047959.980	66.501438
	E359164.4506	8477.349000
	25447.64530	0.000000
1059802.840		90.000000
E354836.4200		8477.349000
68.122651	45.160916	
4.000000	2.000000	
296.472349	134.435084	7794.005109
7034.844000	8368.868000	3334.506025
		N1038797.446
0.000000	0.000000	E384870.3622
90.000000	90.000000	55996.76030
7034.844000	8368.868000	
		N1038798.530
-6275.609597	5945.422836	E384870.4800
3171.046107	-5889.813147	
N1062973.886 HV-1	N1042070.166 NOGGET	
E348553.8104	E365109.8734	1.085975
7034.844000	33816.51330	3.344982
		1.000000
		1.938794 10
		0.000019 PR
38545603.00	54.474938	
2.000000	2.000000	
-38545423.00	125.121062	
	3950.449000	
	0.000000	
38.545603	90.000000	
2.000000	3950.449000	
141.050397		
7841.506000		
0.000000	3230.423343	
90.000000	-2279.062092	
7841.506000	N1039791.104 BALDY	
	E368340.2968	
	37769.96230	
4925.833619		
-6101.260485		
N1056872.626 KNILL	63.384020	
E353479.6440	2.000000	
14876.35000	116.211980	
	9749.449000	
	0.000000	
32.315231	90.000000	
2.000000	9749.449000	
147.280769		
10571.29530		
0.000000	8736.060322	
90.000000	-4328.164260	
10571.29530	N1035462.940 HIGHWAY	
	E377076.3571	
	47[illegible]	

Baker Engineers

S.O. No. [illegible]

Subject: [illegible]

Sheet No. 4 of 6

Drawing No.

Computed by [illegible] Checked By Date [illegible] Aug 84

N 1054602.840
E 354133.4200

N 1062973.886
3171.046000
E 348553.8109
-6279.609100

7034.843508 DIST.
68.122651 BRG.
4.000000 Q
296.473349 AZ.
7034.843508

N 1056872.626
-6101.260000 KNOLL
E 353479.6444
4925.833500

7841.505548 DIST.
38.545603 BRG.
2.000000 Q
141.050397 AZ.
14876.34906

N 1047959.980
-8912.646000 BUBBA.
E 359164.4511
5684.806700

10571.29538 DIST.
32.315231 BRG.
2.000000 Q
147.280769 AZ.
25447.64443

N 1042070.167
-5889.813000 NOBBET.
E 365109.8735
[illegible]

[illegible]
45.160916
2.000000
134.435084
38816.51202

N 1039791.105
-2279.062000
E 368340.2968
3230.423300

3956.448912
54.474938
2.000000
125.121062
37769.96093

N 1035462.941
-4328.164000
E 377076.3569
8736.060100

9749.448686 DIST.
63.384020 BRG.
2.000000 Q
116.211980 AZ.
47519.40962

N 1038798.530
3335.589000
E 384870.4300
7794.073100

8477.837547 DIST.
66.495080 BRG.
1.000000 Q
66.495080 AZ.
55997.24716

1035462.941
377076.3570
1038797.447
3334.506000
384870.3620
7794.005000

8477.348890
66.501438
1.000000
66.501438
8477.348890

Baker Engineers

S.O. No. [illegible]

Subject: [illegible]

Sheet No. 5 of 6

Drawing No.

Computed by [illegible] Checked By Date [illegible]

	4	
	2.000000	779
	134.440060	3336.634695
	8369.000000	1038797.447
1059802.840	0.000000	384870.3623
354833.4800	90.000000	55999.16000
63.123680	8369.000000	
4.000000		35.142050
296.472820	5945.237907	2.000000
7034.840000	-5890.187368	144.453950
0.000000	1042068.652	9004.140000
90.000000	365109.1279	0.000000
7034.840000	33817.08000	90.000000
		9004.140000
-6279.764214	54.473920	
3170.731027	2.000000	5195.287857
1062973.571	125.122080	-7354.[illegible]9932
348553.6558	3953.480000	1031443.297
7034.840000	0.000000	390065.6502
	90.000000	65003.30000
38.544670	3953.480000	
2.000000		3.460610
141.051330	3230.336188	1.000000
7841.670000	-2279.239396	3.460610
0.000000	1039789.413	4422.540000
90.000000	368339.4641	0.000000
7841.670000	37770.56000	90.000000
		4422.540000
4925.660650	63.382990	
-6101.610898	2.000000	290.662161
1056871.960	116.213010	4412.978083
353479.3164	9749.450000	1035856.275
14876.51000	0.000000	390356.3124
	90.000000	69425.84000
32.314350	9749.450000	
2.000000		27.120890
147.281650	8735.845076	4.000000
10571.57000	-4328.600941	332.475110
0.000000	1035460.812	17955.78000
90.000000	377075.3092	0.000000
10571.57000	47520.01000	90.000000
		17955.78000
5684.573581	66.493680	
-8913.120411	1.000000	-8208.238896
1047958.840	66.493680	15969.81057
359163.8900	8479.150000	1051826.085
25448.08000	0.000000	38[illegible]8.0735
	[illegible]	87[illegible]
	84[illegible]	

Project B

WILL

HA-1

KNOLL

Bubba

UP

Nugget

AF

Baldy

Jance

Hickory

Crollo

6

Baker Engineers

S.O. No. [illegible]

Subject: [illegible]

Sheet No. 6 of 6

Drawing No.

Computed by [illegible] Checked By Date [illegible]

1051830.000 (4'5 21m)
382150.0000

4.062960
26.121404
1.000000
1.542294 10
0.000050

AWACS TAP

1059802.840 COOK.
354833.4200
1062973.571
348553.6558
N 1062973.886 HU-1
E 348553.8109
0.000000

1056871.960
353479.3164
N 1056872.626 KNOLL
E 353479.6444
0.000000

1047958.840
359163.8900 BUBBA
N 1047959.980
E 359164.4511
0.000000

1042068.652
365109.1279 NUGGET
N 1042070.167
E 365109.8735
0.000000

1039789.413
368339.4641 BALDY
N 1039791.105
E 368340.9968

1035[illegible]
377077.3092
N 1035462.941 HIGHWAY
E 377076.3569
0.000000

1038797.447
384870.3623
N 1038799.956 VP
E 384871.5969
0.000000

1031443.297
390065.6502
N 1031446.209 AF
E 390067.0834
0.000000

1035856.275
390356.3124
N 1035859.385 TOWER
E 390357.8431
0.000000

1051826.085
382148.0735
N 1051830.000 CHOLLA
E 382150.0000
0.000000

Baker Engineers

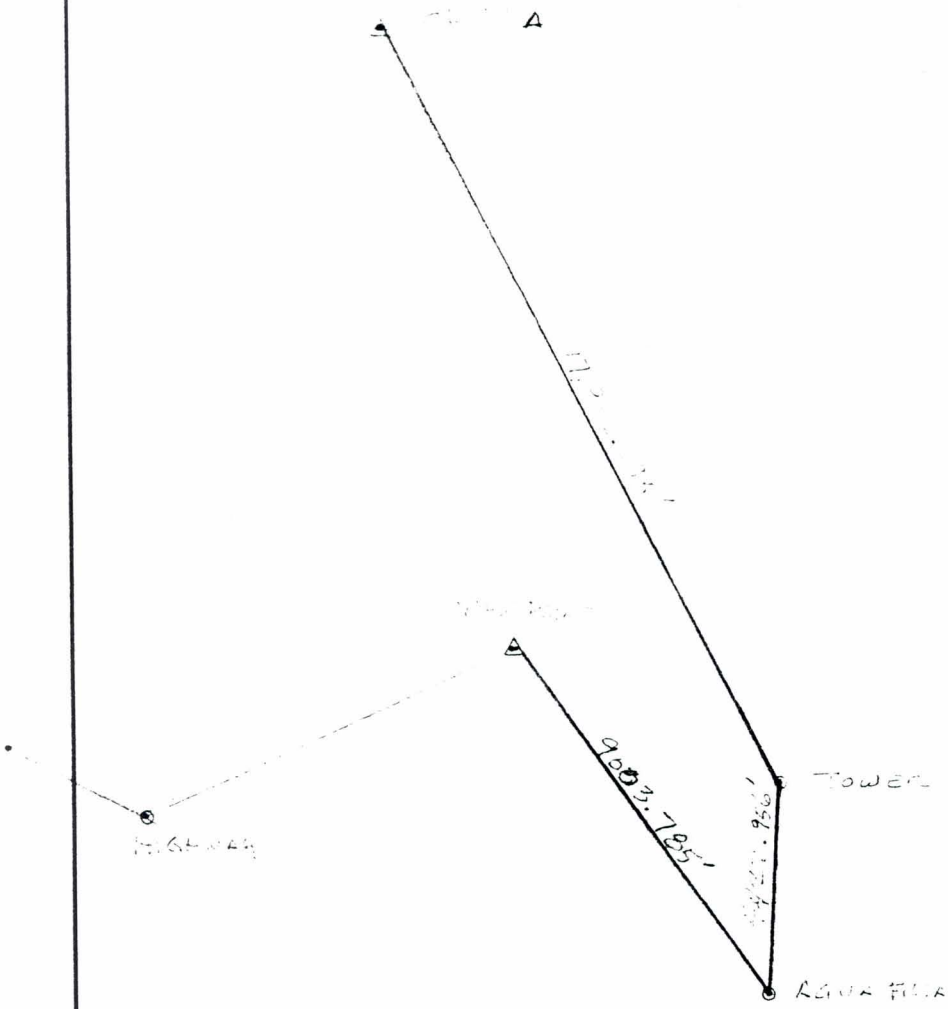
S.O. No. [illegible]

Subject: FLOOD PLAIN [illegible]

[illegible] Sheet No. ____ of ____

LOOP NO 2 Drawing No. ____

Computed by [illegible] Checked By ____ Date 7 AUG 59



N1038796.530
E384870.4300

1031445.191
-7353.389000
E390066.2504
5195.020400

9003.784986
35.144118
2.000000
144.451882
9003.784986

N1035858.569
4413.378000 TOWER
E390357.1747
290.924300

4422.956287 DIST.
3.461707 BRG.
1.000000 Q
3.461707 AZ.
13426.74127

N1051830.000
15971.43100 CHOLLA
E382150.0000
-8207.174700

17956.73480 DIST.
27.114952 BRG.
4.000000 Q
332.481048 AZ.
31383.47608

Baker Engineers

S.O. No. [illegible]

Subject: [illegible]

[illegible] Sheet No. ____ of ____

[illegible] Drawing No. ____

Computed by ____ Checked By ____ Date ____

	3.000000	
1051830.000	183.461003	
382150.0000	4422.744000	
	0.000000	
1035859.385	90.000000	N 1051830.000
390357.8431	4422.744000	E 382150.0000
1035858.569		
390357.1747		
0.000000	-290.759654	N 1035859.385
	-4413.176103	-15970.61500 TOWER
	1031446.208	E 390357.8431
1031446.208	390067.0835	8207.843100
390067.0835	22379.05900	
1031445.191		
390066.2504		17956.31454
0.000000	35.142950	27.120063
	4.000000	2.000000
	324.453050	152.475937
1038799.957	9003.926000	17956.31454
384871.5982	0.000000	
1038798.530	90.000000	
384870.4300	9003.926000	N 1031446.209
0.000000		-4413.176000
		E 390067.0834
	-5195.485254	-290.759700
	7353.748459	
	N 1038799.957	
TRAVERSE	E 384871.5982	4422.743901
	31382.98500	3.461003
		3.000000
		183.461003
		22379.05844
N 1051830.000 CHORD	N 1038798.530	
E 382150.0000	E 384870.4300	N 1038799.956
		7353.747000
27.120063 BRG.	1.844101 DIST.	E 384871.5969
2.000000 Q	39.183151 BRG.	-5195.486500
152.475937 RL	3.000000 Q.	
17956.31500 DIST	3964987484.	9003.925528 DIST.
0.000000	1982825945.	35.142954 BRG.
90.000000	0.000059	4.000000 Q.
17956.31500		324.453046 RL.
		31382.98397
8207.843144		
-15970.61550		
1035859.385 TOWER		
390357.8431		
17956.31500		

Baker Engineers

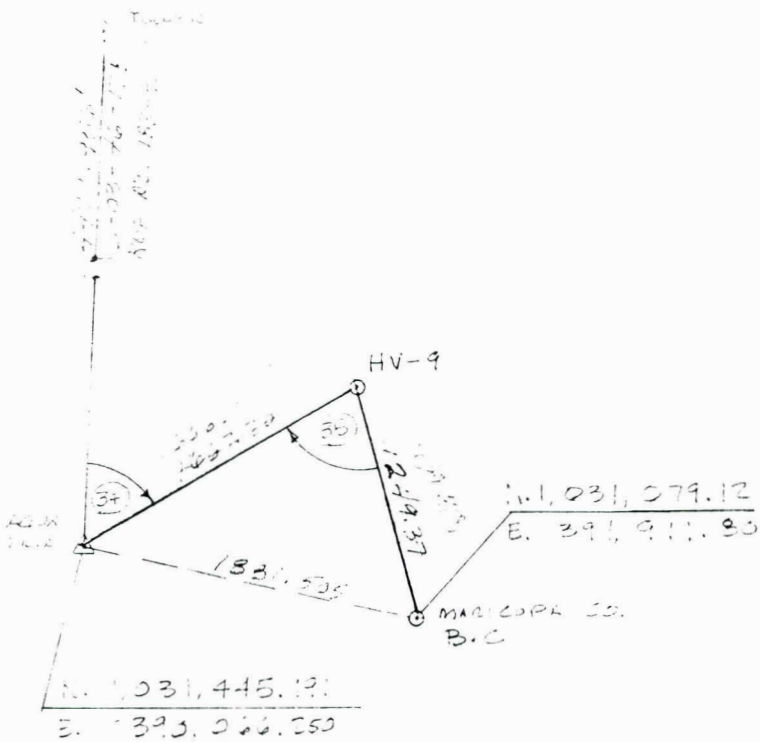
S.O. No. [illegible]

Subject: FLOOD PLAIN DELINEATION FOR 2. CONTROL

Sheet No. 1 of 1

Drawing No.

Computed by SKD Checked By Date 7 AUG 83



N1031079.120
E391911.8000

N1031445.191
366.071000
E390066.2500
-1845.550000

1881.505456 DIST.
78.465093
4.000000
281.130907

1881.505 DIST.
40.67777778° ∡
60.38138889° ∡
78.94083333° ∡
1249.578213 DIST.

TRAVERSE FIELD ∡ WITH ADJ. DIST.

N1031445.191 JOVA
E390066.2500 FWIN
183.461700 REF AZ.

56.461200 ∡ 34 R
-123.134800
60.322900 AZ.
60.322900 BRG
1.000000 Q
1666.607000 DIST TO
0.000000 HV-9
90.000000
1666.607000

1451.133351
819.628508
N1032264.820 HV-9
E391517.3834
166[illegible]

∡ 35 L
-258.562700
161.360200 AZ
18.235800 BRG.
2.000000 Q
1249.578000 DIST
0.000000
90.000000
1249.578000

394.416595
-1185.698413
N1031079.121 MARICOPA CO
E391911.7999 BC
2916.185000

Baker Engineers

S.O. No. [illegible]

Subject: FLOOD PUMP [illegible]

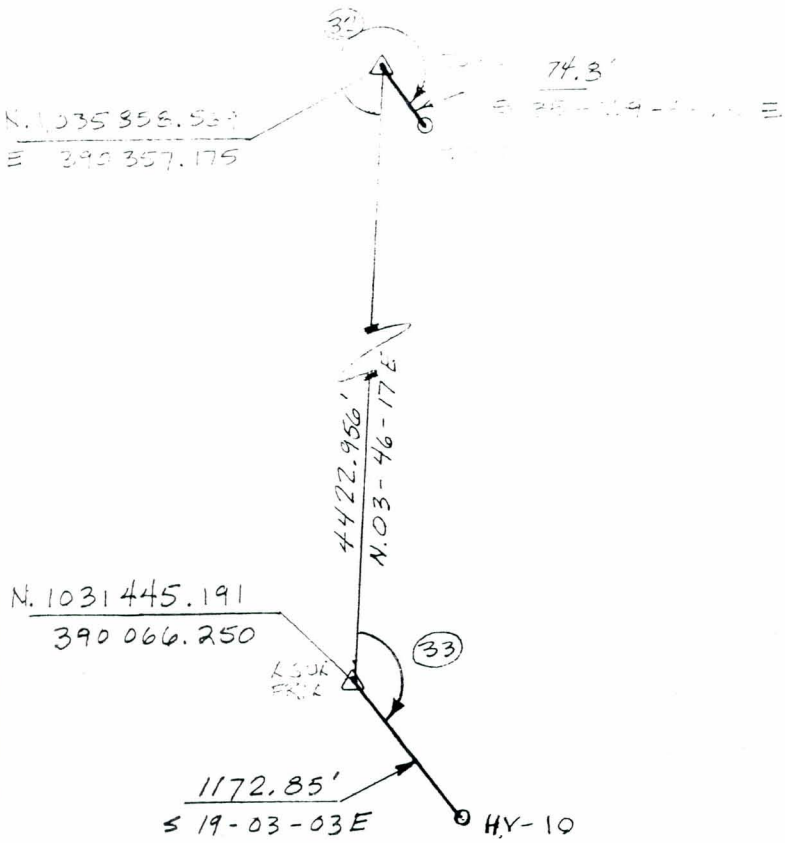
[illegible] Sheet No. 1 of 1

[illegible] PANEL [illegible] Drawing No.

Computed by [illegible] Checked By Date 7 [illegible]

32 = 323-43-43.5

[illegible] = 157 [illegible]



N1035858.569
E390357.1750

35.295450 BRG.
2.000000 Q
144.300550 AZ.
74.500000 DIST.
0.000000
90.000000
74.500000

43.260753
-60.052760
N1035797.916 PANEL
E390400.4358

3.461700 BRG.
3.000000 Q
183.461700 AZ.
4422.956000 DIST.
0.000000
90.000000
4422.956000

-290.922726
-4413.377816
N1031445.191 AGUA FRIA
E390066.2523
4422.956000

19.030300 BRG.
2.000000 Q
160.565700 AZ
1172.850000 DIST.
0.000000
90.000000
1172.850000

382.826031
-1108.612251
N1030336.579 HV-10
E390449.0786
5595.806000

Baker Engineers

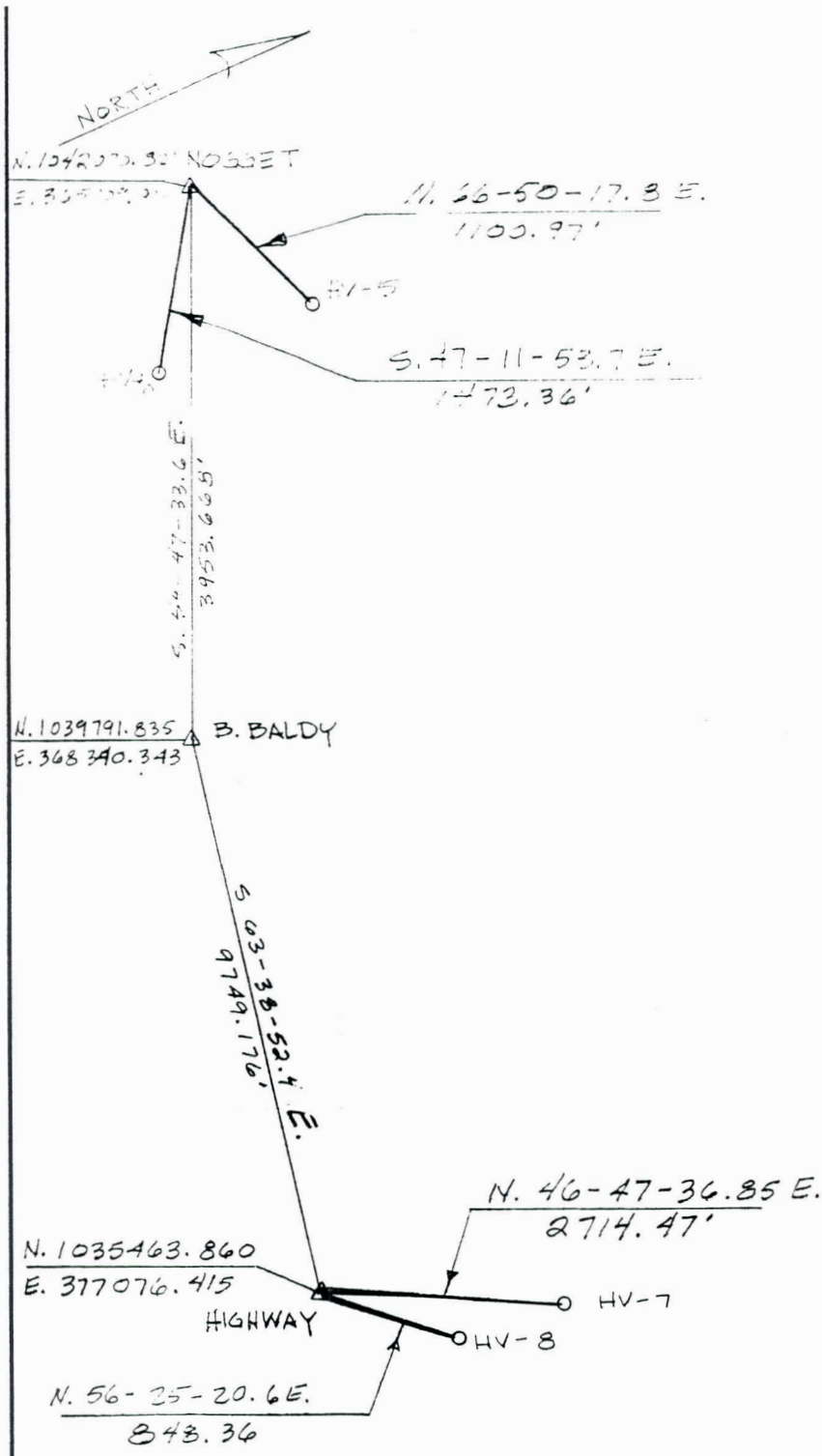
S.O. No. [illegible]

Subject: [illegible]

Sheet No. 1 of [illegible]

Drawing No. [illegible]

Computed by [illegible] Checked By [illegible] Date [illegible]



Baker Engineers

S.O. No. [illegible]

Subject: FLOOD [illegible]

[illegible] Sheet No. [illegible] of [illegible]

[illegible] Drawing No. [illegible]

Computed by [illegible] Checked By [illegible] Date [illegible]

N1042070.821 [illegible]
E365109.9140

66.501780 BRG.
1.000000 Q
66.501780 AZ.
1100.970000 DIST TO
0.000000 HV-5
90.000000
1100.970000

1012.229964
433.042077
N1042503.863 HV-5
E366122.1440

47.115370 BRG.
2.000000 Q
132.480630 AZ.
1473.360000 DIST TO
0.000000 HV-6
90.000000
1473.360000

1081.017657
-1001.094658
N1041069.726 HV-6
E366190.9317

N1035466.000 HIGHWAY
E377076.4150

46.473685 BRG.
1.000000 Q
46.473685 AZ
2714.470000 DIST TO
0.000000 HV-7
90.000000
2714.470000

1978.554906
1858.404656
N1037322.265 HV-7
E379054.9699

56.252065 BRG.
1.000000 Q.
56.252065 AZ.
848.360000 DIST TO
0.000000 HV-8
90.000000
848.360000

706.800576
469.198930
N1035933.059 HV-8
E377783.2156

Baker Engineers

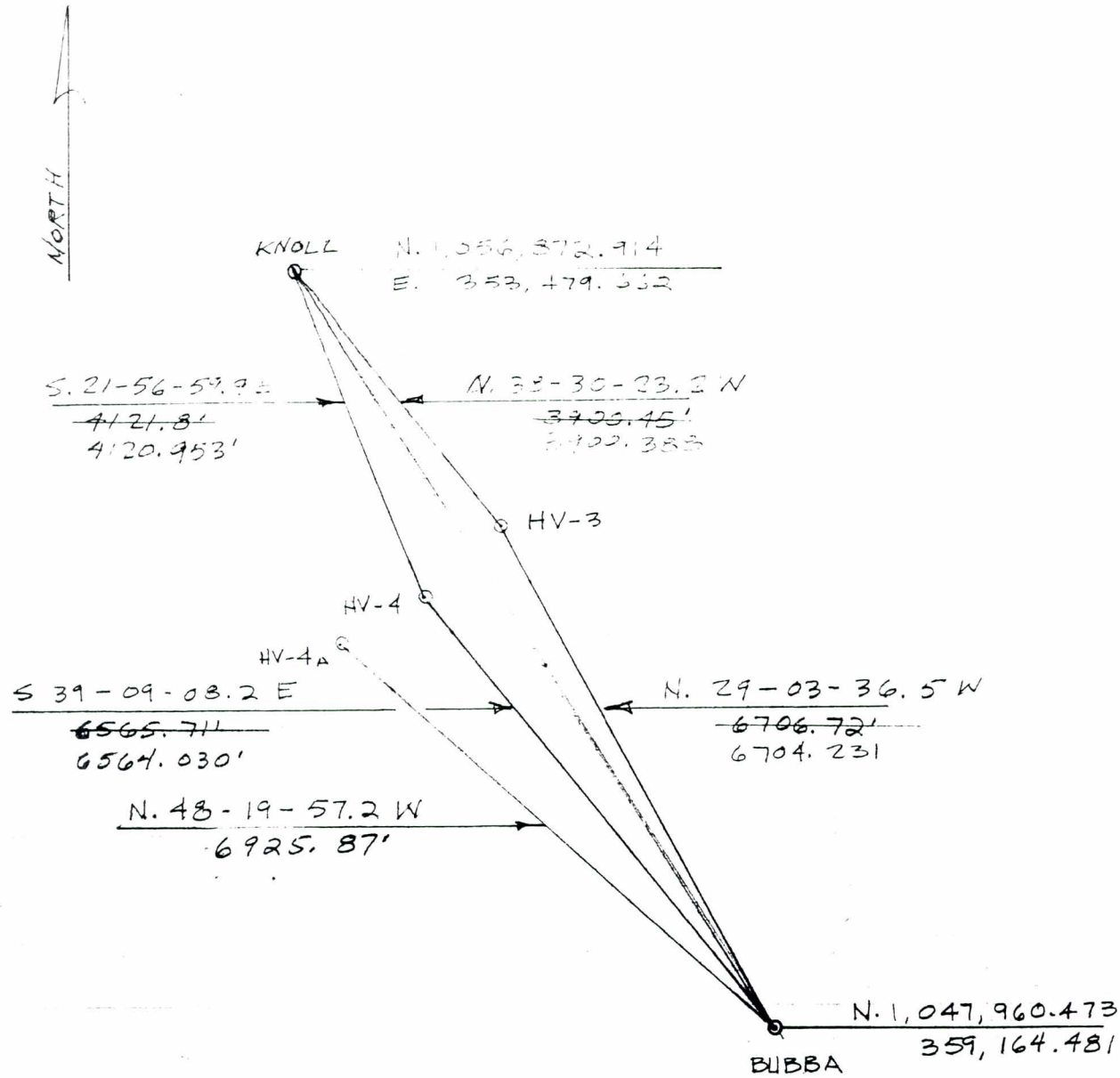
S.O. No. 8523-02

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL
POINTS 3, 4 & 4A

Sheet No. 1 of 2

Drawing No.

Computed by [illegible] Checked By Date 3 AUG 87



Baker Engineers

S.O. No. 16923-03

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL.
POINTS 3, 4 & 4A CALCS

Sheet No. 2 of 2

Drawing No.

Computed by SSO Checked By Date 8 AUG 90

10571.129
6.620416667
10.56188889

162.7976944
4120.952712
6564.030109

N1056872.914 KNOLL
E353473.6620 (REF.)

21.565990 BRG.
2.000000 Q
158.030010 AZ.
4120.953000 DIST TO
0.000000 HV-4
90.000000
4120.953000

1540.399377
-3822.227543
N1053050.686 HV-4
E355020.0614
4120.953000

10571.129 DIST.
5.974588333
3.471722222

170.5536944 @ HV-3
6704.230566 DIST
3900.388000 DIST

39.090820 BRG.
2.000000 Q
140.505180 AZ.
6564.030000 DIST TO
0.000000 BUBBA
90.000000
6564.030000

4144.421053
-5090.212567
N1047960.474 BUBBA ✓
E359164.4824
10684.98300

29.033650 BRG.
4.000000 Q
330.562350 AZ.
6704.231000 DIST TO
0.000000 HV-3
90.000000
6704.231000

-3256.428510
5860.237765
N1053820.712 HV-3
E355908.0539
17389.21400

38.302320 BRG.
4.000000 Q
321.293680 AZ.
3900.388000 DIST TO
0.000000 KNOLL
90.000000
3900.388000

-2428.391936
3052.202345
N1056872.914 KNOLL ✓
E353479.6620
21289.60200

N1047960.473 BUBBA
E359164.4810 (REF)

48.195720 BRG.
4.000000 Q
311.400280 AZ.
6925.870000 DIST TO
0.000000 HV-4A
90.000000
6925.870000

-5173.736027
4604.359975
N1052564.633 HV-4A
E353990.7450

Baker Engineers

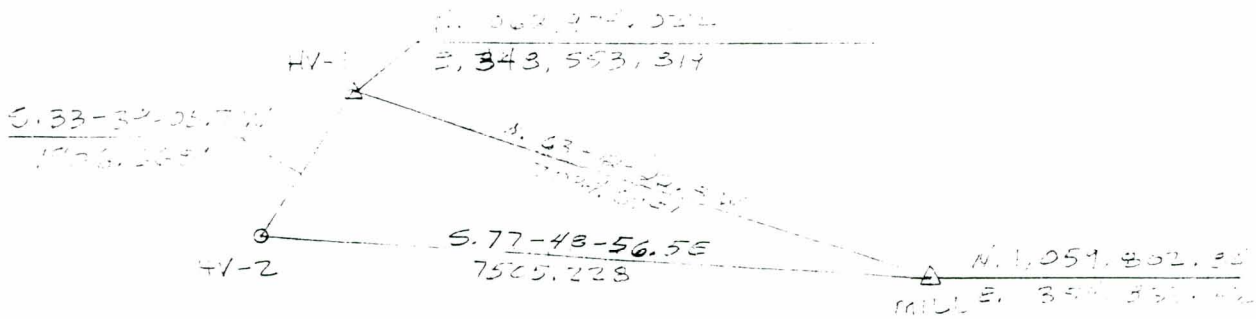
S.O. No. 16923-02

Subject: FLOOD PLAIN DELINEATION
HORIZ. CONTROL
POINT # 2

Sheet No. 1 of 1

Drawing No.

Computed by S.S.O. Checked By Date 8 AUG 84



N1 [illegible] HV-1
E 348553.8190

33.390570 BRG.
3.000000 Q
213.390570 AZ.
1906.668000 DIST. TO
0.000000 HV-2
90.000000
1906.668000

-1056.563299
-1587.153697
N1061386.868 HV-2
E347497.2557
3813.336000

77.485650 BRG.
2.000000 Q
102.110350 AZ.
7505.228000 DIST. TO
0.000000 MILL
90.000000
7505.228000

7336.163310
-1584.031319
N1059802.837 MILL ✓
E354833.4190
1[illegible]

7034.898 DIST
14.609375° ∡ MILL
96.85791667° ∡ HV-1

68.53270833° ∡ HV-2
1906.668085 DIST.
7505.228424 DIST