HYDROLOGIC ANALYSIS OF

SCOTTSDALE ALLUVIAL FANS 1-6
MARICOPA COUNTY, ARIZONA

FOR

MARICOPA COUNTY FLOOD INSURANCE STUDY
FEDERAL EMERGENCY MANAGEMENT AGENCY

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FOR

MARICOPA COUNTY FLOOD INSURANCE STUDY
FEDERAL EMERGENCY MANAGEMENT AGENCY

August 4, 1988
CBA File No. 04856-02-74
BAT-108

CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson, Arizona 85705

Prepared By: Bori A. Touray
Senior Hydrologist

Supervised By: Marie S. Pearthree
Project Manager,
Hydrology Services

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ARIZONA
DEPARTMENT
OF WATER
RESOURCES

Rose Mofford, Governor
C. Laurence Linser,
Acting Director

15 South 15th Avenue
Phoenix, Arizona 85007

November 16, 1988

Mr. William Erickson
Floodplain Administrator
City of Scottsdale
3939 Civic Center Plaza
Scottsdale, Arizona 85251

RE: Scottsdale Alluvial Fan Flood Insurance Study

Dear Mr. Erickson:

This letter is in response to our meeting with Marie Pearthree concerning the Scottsdale Alluvial Fan Flood Insurance Study currently being completed by Cella Barr Associates for the Federal Emergency Management Agency.

Although I am not totally happy with the application of FEMA's Alluvial Fan model here in Arizona, especially on our particular alluvial plain distributary flow areas, I believe that Marie has done as much as she can to make the application of that methodology fit what we know of the watershed being studied. I therefore have no objections to her completing the study as she outlined. It will at least identify some areas that are under development pressure that do have flood hazards and should make it easier for you to require responsible development of those areas.

Please feel free to give me a call if you have any questions or need any additional information. I will see you in January at the AFMA meeting.

Sincerely,

James R. Morris

James R. Morris, P.E.
Chief
Flood Management Section

JRM:rh

cc: Marie S. Pearthree
Project Manager, Hydrology Services
Cella Barr Associates
2075 North 6th Avenue
Tucson, Arizona 85705

2075 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401

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AUG 11 1988
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August 10, 1988

Mr. Jim Morris, P.E.
Flood Management Section
Arizona Department of Water Resources
15 South 15th Avenue
Phoenix, Arizona 85007

Re: **Scottsdale Alluvial Fans 1-6 Flood Insurance Study**
CBA File No. 04856-02-74

Dear Mr. Morris:

Cella Barr Associates is performing a Flood Insurance Study for Scottsdale Alluvial Fans 1-6 in North Scottsdale, Maricopa County, Arizona. Attached is a hydrologic analysis for the 10-, 50-, 100- and 500-year flood events to be employed for the hydraulic analysis. You are invited to review these discharges before we officially adopt them for use in the Flood Insurance Study.

The United States Army Corps of Engineers HEC-1 computer model was used to estimate the discharges for the 10-, 50- and 100-year flood events. The 100-year discharges for the six streams at the apices of the alluvial fans are as follows:

Stream #1 at Concentration Point C2051 - 3,656 cfs
Stream #2 at Concentration Point C51 - 14,867 cfs
Stream #3 at Concentration Point C36 - 887 cfs
Stream #4 at Concentration Point C27 - 10,062 cfs
Stream #5 at Concentration Point S1500 - 3,034 cfs
Stream #6 at Concentration Point S1460 - 6,738 cfs

The HEC-1 input and output data are enclosed as an appendix to the report.

Any comments you may have that are relevant to the acceptability of the proposed discharges will be greatly appreciated. Please send us your comments no later than August 26.

Thank you for your cooperation.

Sincerely,

CELLA BARR ASSOCIATES

Bori A. Touray

Bori Touray
Sr. Hydrologist, Hydrology Services

Marie S. Pearthree

Marie S. Pearthree
Project Manager, Hydrology Services

BAT:sdh

c: Mr. Ray Lenaburg, Project Manager
Mr. Jim Nelson, CBA
Mr. John Wise, CBA

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Labeled 2)

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1.0.0 INTRODUCTION

1.1.0 PURPOSE

The City of Scottsdale recently annexed an area to the north of the City limits. Development in this area is currently low but progressing, hence the need for flood-hazard management and planning. Cella Barr Associates has been contracted by the Federal Emergency Management Agency (FEMA) to perform a detailed Flood Insurance Study of Scottsdale Alluvial Fans 1-6 (Figure 1.1). This report presents the results of the hydrologic study, which was done in preparation for the hydraulic analysis. The discharges presented herein are proposed for use in the completion of this Flood Insurance Study. Based on criteria provided by FEMA, the hydraulic calculations for this study will be limited to the 100-year storm event.

1.2.0 OBJECTIVES

The objectives of this study are:

1. To review available hydrologic and watershed information pertinent to this study;
2. To establish locations of the apices of six alluvial fans from detailed geomorphic analysis, including field reconnaissance;
3. To determine the magnitudes of discharges for various frequencies including the 10-, 50-, 100- and 500-year flood events at the apices of the fans.
4. To assess the validity of the discharges determined herein with the HEC-1 computer model by comparing them to discharges from other methods including the Soil Conservation Service (SCS) TR-55 model and regional regression equations developed by the US Geological Survey.

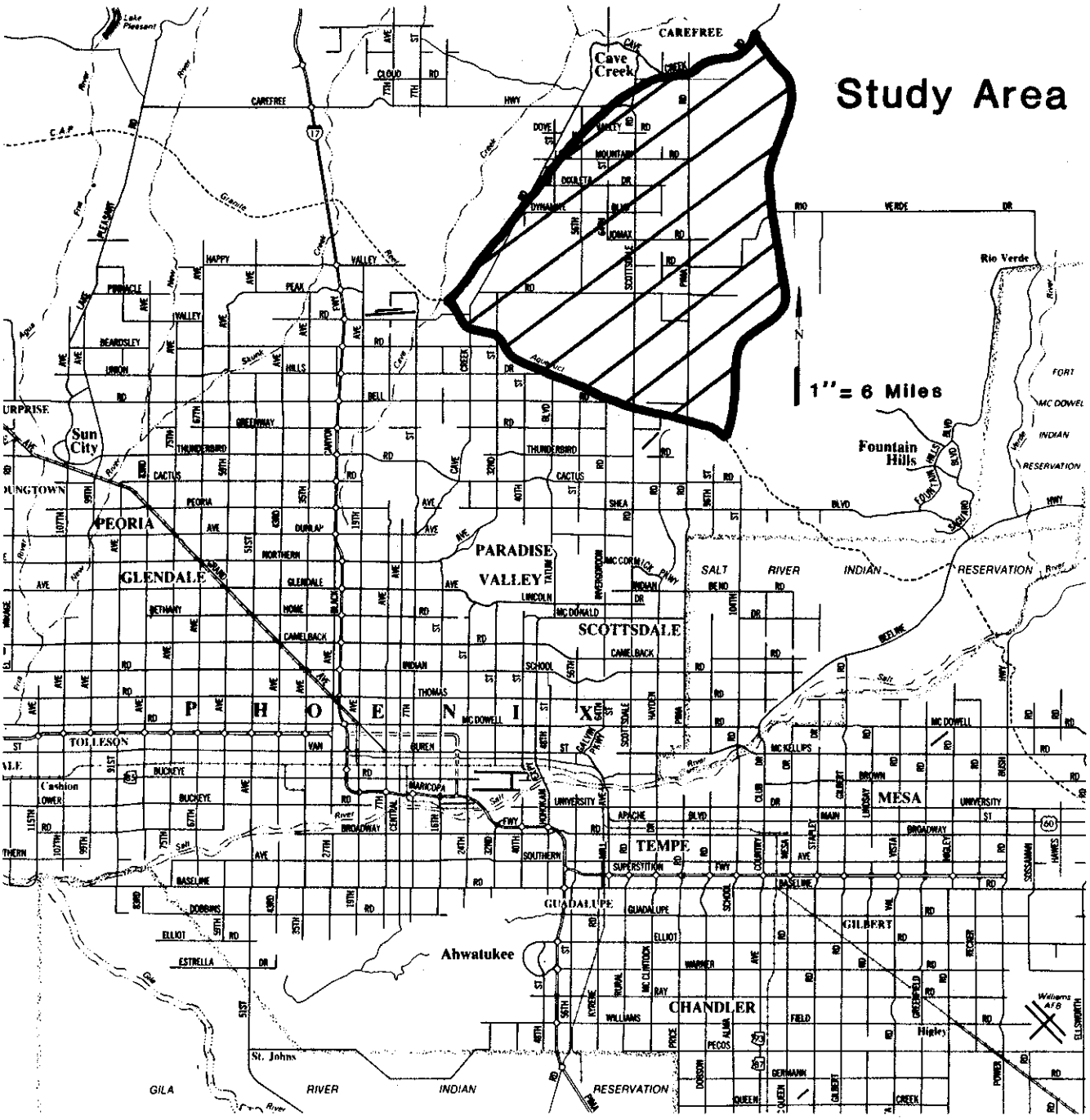

Figure 1.1

LOCATION MAP

SCOTTSDALE ALLUVIAL FANS 1-6

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1.3.0 DESCRIPTION OF STUDY AREA

1.3.1 Location

The study area is approximately 120 square miles in North Scottsdale, Maricopa County, Arizona (see Figure 1.1). It extends from the boundary of the Tonto National Forest to the north to the Central Arizona Project (CAP) canal to the south, and from the McDowell Mountains to the east to Paradise Valley in the west. The area is approximately bounded by Cave Creek Road along the west and north, and by the CAP canal to the south. The eastern limit of the area is an approximate north-south line from the Tonto National Forest to the McDowell Mountains, approximately three miles west of the eastern Scottsdale Corporate boundary (see Figure 1.2). Structural features within the watershed include golf courses and low density housing developments. At the present time, there are no major flood-control structures functioning within the study area.

1.3.2 Physiography and Soils

The area is characterized by a landform assemblage of mountain fronts and piedmonts. The area covered by mountain fronts is relatively small and consists of the McDowell Mountains and isolated hills in the upper part of the watershed. The rest of the area is covered by soils ranging in age from Early Pleistocene to Late Holocene (Reference 1). Attached as part of this report is a second study entitled "Geomorphic Analysis, Scottsdale Piedmont." This study, performed by Philip A. Pearthree and William G. Wellendorf for Cella Barr Associates, consists of a detailed geomorphic analysis of the study area resulting in delineation of subareas subject to active alluvial fan processes of flooding and erosion and areas that are "inactive" with respect to these processes. This analysis is based on a detailed review of the soils of the study area mapped by the Soil Conservation Service and field investigation of areas of incised and non-incised stream

channels. The reader is referred to this report for a full explanation of how the apices of the six alluvial fans were determined for the purposes of this Flood Insurance Study.

The extent of active alluvial fans varies substantially from north to south. The upper part of the study area is dissected by incised sand-bottomed channels ranging in width from 10 feet upstream to 30 feet downstream. The lower part of the area is an alluvial plain with braided or ill-defined channels. Most of the piedmont north of Curry's Corner is comprised of inactive fan areas while the area south of Curry's Corner is dominated by potentially active fan areas (Reference 1). The result is lower topographic relief and young fan deposits in the south. All ~~washes~~ streams are ephemeral and drain to the south-southwest (Figure 1.2).

The topographic relief of the study area ranges from 3,900 feet above mean sea level in the McDowell Mountains to 1,500 feet at the CAP canal in Paradise Valley.

1.3.3 Climate and Vegetation

Amplify

The region is characterized by semi-arid subtropical climate with a mean annual temperature near 80° F and a mean annual precipitation of approximately eight inches. Daytime temperatures are commonly over 100° F in the summer and may reach 110° F or more. Winter night-time temperatures can drop below freezing especially in the McDowell Mountains. Precipitation occurs primarily as light, continuous frontal precipitation in the winter and intense, short-duration thunderstorms in the summer. Occasional heavy precipitation can occur when tropical storms move into Arizona during late August through October (Reference 14).

The area is covered with a sparse distribution of predominantly mesquite trees and creosote bush, with cacti occurring in the upper parts of the watershed.

Average of Transects = 40.0%
Range 23.5% to 63.8%

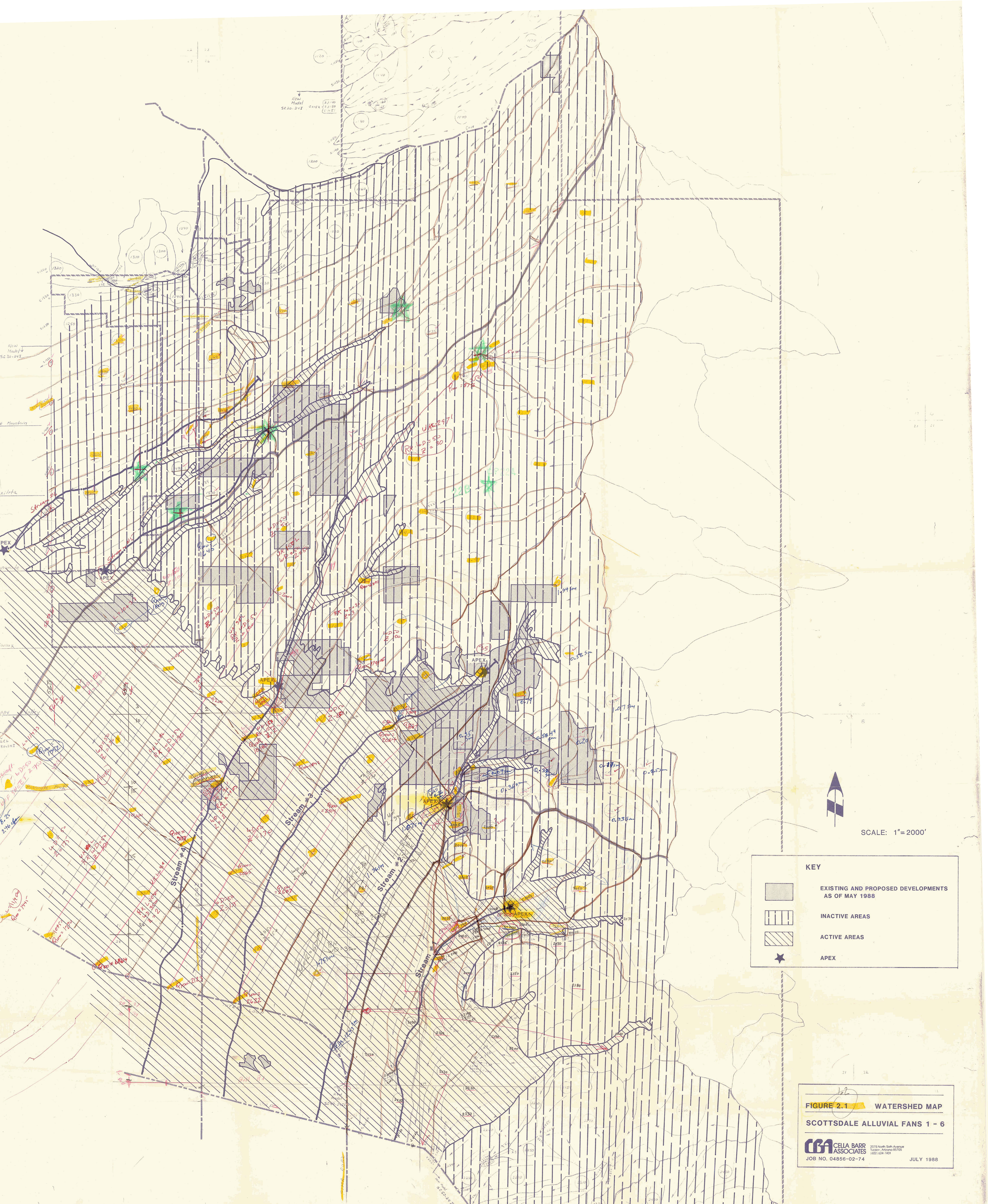

FIGURE 2.1 WATERSHED MAP

SCOTTSDALE ALLUVIAL FANS 1 - 6

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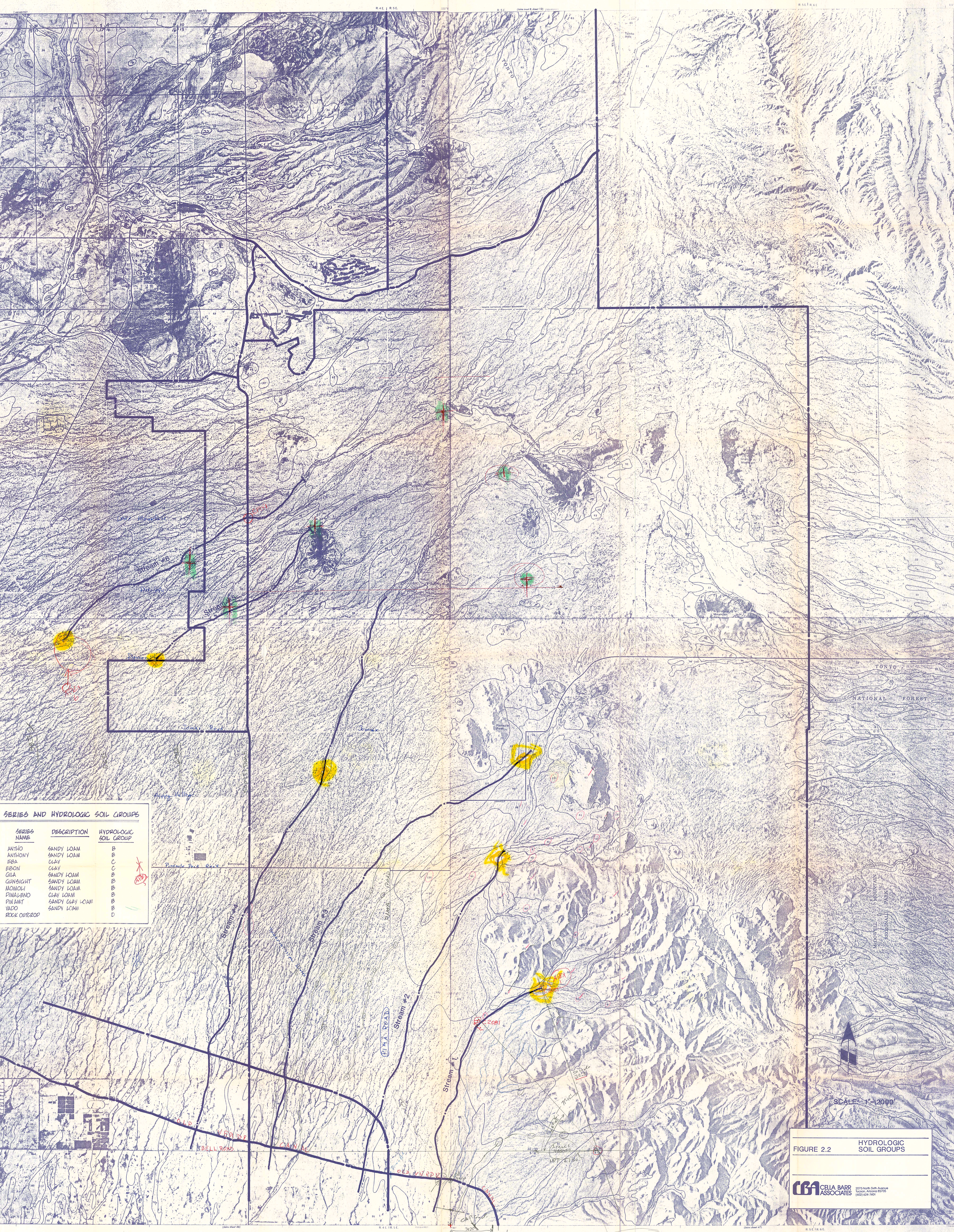

SERIES AND HYDROLOGIC SOIL GROUPS

SERIES NAME	DESCRIPTION	HYDROLOGIC SOIL GROUP
ANTHO	SANDY LOAM	B
ANTHONY	SANDY LOAM	B
EBA	CLAY	C
EBON	CLAY	C
GILA	SANDY LOAM	B
GUNSIGHT	SANDY LOAM	B
MOMOLI	SANDY LOAM	B
PIMALENO	CLAY LOAM	B
PINANT	SANDY CLAY LOAM	B
VADO	SANDY LOAM	B
ROCK OUTCROP		D

FIGURE 2.2 HYDROLOGIC SOIL GROUPS

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Tucson, Arizona 85705
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Orthophotobase compiled from 1972 and 1973 aerial photography by the U.S. Department of The Interior, Geological Survey. Planimetric detail obtained from 7½ minute series maps. 10,000-foot grid based on state coordinate system.

This soil survey was compiled in 1978 by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

Who. How many

1.4.0 PREVIOUS STUDIES

Previous studies for the north Scottsdale drainage area have been consulted in the preparation of this report. The findings of some of the reports are summarized below.

Rhoads (Reference 14) identified hazards posed by fluvial processes in north Scottsdale and proposed planning and policy recommendations to address these hazards. The study calculated flood discharges for various return periods at selected design points. The City of Scottsdale (Reference 17), 1987, assessed the potential of constructing three detention basins. Simons, Li and Associates, 1987 (Reference 18) estimated discharges for the design of the Outer Loop Road drainage system and a proposed development of State Trust Lands.

USCE. Indian Bend Wash Studies

Both Missing

2.0.0 PROCEDURE

The City of Scottsdale contracted Water Resources Associates (WRA) to provide a drainage plan for North Scottsdale. WRA subcontracted Mr. Robert L. Ward, P.E., of Mesa, Arizona, to do the hydrology investigation. Mr. Ward performed a very detailed study of the North Scottsdale area which includes the six alluvial fans under investigation in this report (Reference 2). Mr. Ward's work, which consists of a detailed HEC-1 analysis of the watershed for the 100-year event, has been accepted to date by the City of Scottsdale. This analysis is summarized in Reference 4. At the request of the City of Scottsdale, the results of Mr. Ward's investigation have been incorporated into this Flood Insurance Study, including a review by CBA for applicability. The watershed parameters and precipitation values employed in the HEC-1 analysis were found to be largely in agreement with data obtained by CBA.

Mr. Ward's HEC-1 data for the 100-year event were adopted for the purposes of this Flood Insurance Study. The rainfall amounts for return periods ranging from the 2-year to the 50-year storm were then used in place of the 100-year rainfall in the HEC-1 model to obtain the discharges for the 10- and 50-year return periods. The 500-year discharges were then obtained by a log probability analysis using Weibull platting positions.

As previously stated, the United States Army Corps of Engineers' HEC-1 Flood Hydrograph Package computer model was used to estimate discharges for the study area. The model simulates surface runoff response of a river basin to precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components. Each component models an aspect of the precipitation-runoff process within a portion of the basin, commonly referred to as a subbasin. The result of the modeling process is the computation of streamflow hydrographs at desired locations in the river basin. Below are descriptions of the model components and how they were derived for this study.

2.1.0 STREAM NETWORK MODEL

Six streams and associated alluvial fans were analyzed (Figure 1.2). The watershed drained by each stream was delineated on a topographic map at a scale of 1" = 2,000'. The watershed was then subdivided into subbasins that can be represented by hydrologic processes with model parameters which reflect average conditions within the subarea. Kinematic wave for Not 1500-3500'

The six streams are labeled 1 to 6 (Figure 1.2). Stream 1 has its headwaters in the McDowell Mountains at an elevation of 3,900 feet above Mean Sea Level and drains south to the CAP canal. Slopes range from two to nine percent while overland slopes are up to 70 percent. The channel bottom ranges in width from approximately 10 feet upstream to 200 feet at the CAP canal. WD '50'& 100/120/150/175

1500/2500/3500/z = 2:1

The other five streams head in alluvial areas at approximately 3,000 feet above Mean Sea Level and drain south-southwest to the CAP canal. Channel slopes range from two to nine percent. The bottom widths range from 20 to 75 feet. The upper reaches of the channels are incised but lose definition downstream. Why, because of recreation

2.2.0 PRECIPITATION

The National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume VIII, Arizona, was used to estimate the 24-hour average basin precipitation values for input into the HEC-1 model. The SCS Type IIA distribution was used to simulate the high-intensity rainfall characteristic of the summer convective thunderstorms (Figure 2.1). In his sensitivity analysis, Mr. Ward considered various sources of rainfall amounts and distribution types for his HEC-1 model. He recommended use of the NOAA Atlas 2 data and SCS type IIA distribution (see Appendix).

DESIGN NOTES AND COMPUTATIONS

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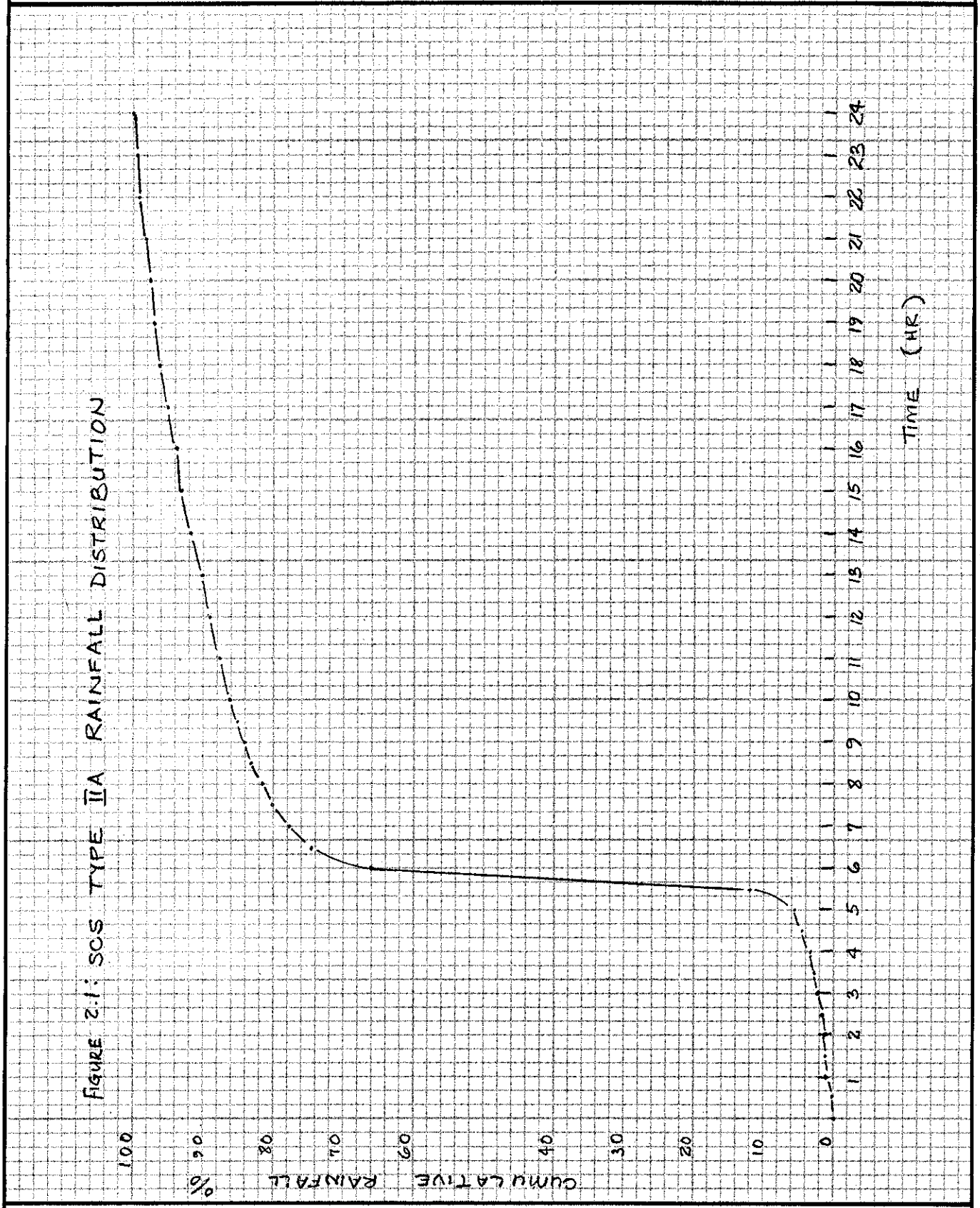

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Phoenix, Arizona 85015
(602) 242-2999

2.3.0 PRECIPITATION LOSSES

2.3.1 Pervious Areas

Land surface interception, depression storage and infiltration area are referred to in the HEC-1 model as precipitation losses (Reference 3). The SCS curve number methodology was used to estimate average precipitation losses for the subbasins. In order to apply this methodology, SCS soil survey maps (Reference 4) were used to determine the various soil types of the study area from which the hydrologic soil groups were determined (Figure 2.2). From the hydrologic soil group and vegetation cover, a curve number was determined for each soil group using TR-55 and adjusted following the method presented by Woodward (Reference 5, 13).

2.3.2 Impervious Areas

Little development currently exists in the study area. Final plats recorded with the City of Scottsdale for existing and planned developments were used to estimate the amount of impervious cover in the subareas. A curve number of 100 was used for impervious areas.

2.3.3 Excess Rainfall

The HEC-1 model calculates the excess rainfall by subtracting losses from the total rainfall using the following equation:

$$ACEXS = \frac{(ACRAN - IA)2}{ACRAN - IA + S}$$

Where ACEXS is the accumulated excess rainfall in inches;
ACRAN is the accumulated rainfall depth in inches;
IA is an initial soil moisture storage capacity in inches; and
S is the available soil moisture storage deficit in inches.

No IA value was specified resulting in the default value being computed as:

$$IA = 0.2*S$$

The available soil moisture storage deficit, S, is computed as follows:

$$S = \frac{1000 - 10*CN}{CN}$$

Where CN is the Curve Number

2.4.0 RUNOFF AND DISCHARGE

The kinematic wave option was utilized by Mr. Ward in the HEC-1 model to determine subbasin runoff. The model uses a simplified momentum equation and the Manning's Equation for Uniform Flow to compute flow at any point in a channel and three conceptual elements to determine subbasin runoff. These elements are flow planes, collector channels and main channel (Reference 3).

The overland flow plane is modeled as a wide rectangular channel of unit width. The element is described by four parameters: a typical overland flow length, slope, roughness factor and the percent of the subbasin area represented by this element. All the parameters, except the roughness, were determined directly from the watershed maps. The roughness was estimated from the HEC-1 manual.

Flow from the overland flow plane travels to a collector channel which drains into a main channel. The channel elements are defined by length, slope, Manning's roughness, coefficients, shape, width and side slope. All the parameters, except the Manning's roughness values, were determined directly from watershed maps and in the field.

NOT USED

NEW RIVER SE QUADRANGLE
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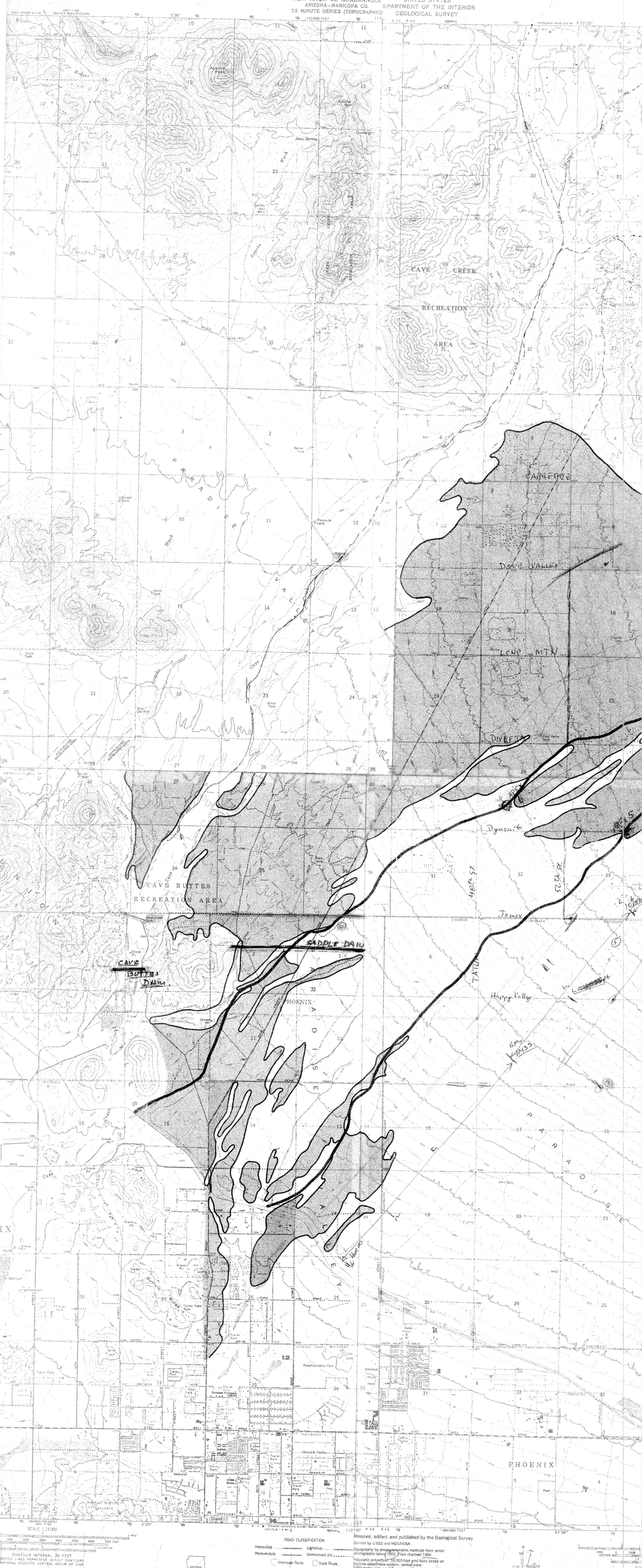
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple and woodland compiled from aerial photographs taken 1978 and other sources. This information not field checked. Map edited 1981

Purple tint indicates extension of urban areas

ROAD CLASSIFICATION

Heavy-duty ——— Light-duty ———
Medium-duty ——— Unimproved dirt - - - -
Interstate Route ⬡ State Route ⬡

QUADRANGLE LOCATION

UNION HILLS, ARIZ.
N3337.5—W11200/7.5

1964
PHOTOREVISED 1981
DMA 2351 II NE-SERIES V898

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964

Polyconic projection. 10,000-foot grid ticks based on Arizona coordinate system, central zone

1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American Datum

Ties to corners on the projected North American Datum 1983 may be obtained between 1 meter south and 30 meters east as shown by dashed corner ticks

Roads may be private. Buildings within the boundaries of Fort National or State reservations shown on this map

Structures shown in purple and woodland compiled from aerial photographs taken 1978 and other sources. This information not field checked. Map edited 1981

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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CONTOUR INTERVAL
NATIONAL

CAVE CREEK QUADRANGLE
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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Carefree
BLACK MOUNTAIN
Lone Mtn
Wildcat
T O N T O
Apex 4
APEX 3
APEX 2
RAWHIDE 1973
OLD Stock TANK
PARADISE VALLEY
V A L L E Y
CANAL
R. 4 E.
R. 5 E.
Mapped, edited, and published by the Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1965
ROAD CLASSIFICATION
Medium-duty
Light-duty
Unimproved dirt
CURRYS CORNER, ARIZ.
N3337.5—W11152.5/7.5
1964
PHOTOREVISED
1973
SCALE 1:24 000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

3.0.0 RESULTS

3.1.0 PRECIPITATION

Three different rainfall zones were identified. Average 100-year 24-hour rainfall in the area drained by Stream 1 is 4.3 inches. Average 100-year 24-hour rainfall for the areas drained by Streams 2, 3 and 4 is 4.4 inches. The third zone, which is drained by Streams 5 and 6, averages 4.8 inches for the 24-hour, 100-year rainfall (Table 3.1). The tables below show the point precipitation values for the various return periods and zones. SCS Type IIA distribution is shown in Table 3.2. Figure 2-1 (page 5)

3.2.0 CURVE NUMBER

Storms that have precipitation intensities necessary to produce flood discharges are probably either thunderstorms or tropical disturbances. These events occur most commonly from mid-summer to early fall when vegetation cover is most sparse due to heat stresses (Reference 14). The vegetation cover for this time of the year is estimated at 15 percent. Curve numbers for the various soil types with 15 percent vegetation cover are shown in Table 3.3.

3.3.0 DISCHARGES

Discharges were computed at various concentration points in the stream basins including the apices of the six alluvial fans (Table 3.4). Where the concentration points in Mr. Ward's HEC-1 model did not coincide precisely with the fan apex locations (streams), the closest concentration point downstream of the apex was chosen to represent the apex location. The discharges range from 1,900 cfs at the apex of Alluvial Fan 5 (Concentration Point S1500) to 14,400 cfs at the apex of Alluvial Fan 2 (Concentration Point C51). Discharges from the SCS TR-55 method provided a check on the precision of the HEC-1 results.

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TABLE 3.1: RAINFALL AMOUNTS FOR 24-HOUR DURATION

RETURN PERIOD	(1)	(2)	(3)	(4)
2 YEAR	2.16	1.95	1.90	1.95
5 YEAR	2.81	2.55	2.49	2.55
10 YEAR	3.24	2.96	2.89	2.96
25 YEAR	3.79	3.46	3.38	3.46
50 YEAR	4.29	3.94	3.85	3.94
100 YEAR	4.78	4.39	4.29	4.39

(1) BASINS 1340-1500

(2) BASINS 39 - 53

(3) BASINS 2005 - 2051

(4) BASINS 1 - 38

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TABLE 3.2: RAINFALL DISTRIBUTION FOR TYPE IIA

TIME (HR)	CUMULATIVE RAINFALL		TIME (HR)	CUMULATIVE RAINFALL	TIME (HR)	CUMULATIVE RAINFALL
0	0		8.5	0.830	17.0	0.950
		.005				
0.5	0.005		9.0	0.840	17.5	0.958
		.004				
1.0	0.009		9.5	0.850	18.0	0.961
		.001				
1.5	0.010		10.0	0.861	18.5	0.963
		.002				
2.0	0.013		10.5	0.868	19.0	0.969
		.006				
2.5	0.019		11.0	0.878	19.5	0.971
		.002				
3.0	0.021		11.5	0.884	20.0	0.974
		.007				
3.5	0.028		12.0	0.891	20.5	0.979
		.004				
4.0	0.032		12.5	0.900	21.0	0.981
		.012				
4.5	0.044		13.0	0.905	21.5	0.985
		.013				
5.0	0.057		13.5	0.912	22.0	0.989
		.043				
5.5	0.100		14.0	0.919	22.5	0.991
		.560				
6.0	0.660		14.5	0.923	23.0	0.993
		.085				
6.5	0.745		15.0	0.930	23.5	0.996
		.031				
7.0	0.776		15.5	0.934	24.0	1.000
		.024				
7.5	0.800		16.0	0.939		
		.016				
8.0	0.816		16.5	0.944		

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2075 North Sixth Avenue
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(602) 624-7401
5062 North 19th Avenue
Phoenix, Arizona 85015
(602) 242-2999

DESIGN NOTES AND COMPUTATIONS

Rev. 4/86

SUBJECT SCOTTSDALE FIS JOB NUMBER

TABLE 3.3: SOIL TYPES, SYMBOL AND CURVE NUMBER

SOIL TYPE	MAP SYMBOL	CURVE NUMBER
ANTHO	1, 2	74
ANTHONY	6	74
EBA	33	82
EBON	44	82
GILA	54	74
GUNSIGHT	63	74
MONOLI	90, 91	74
PINALENO	96	74
PINAMT	98	74
VADO	122	74
ROCK OUTCROP	63, 31	86
	93	
	40	
	41	
	61	
	121	

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SUBJECT | JOB NUMBER

TABLE 3.4: DISCHARGES AT ALLUVIAL FAN APICES

RETURN PERIOD (YRS) / STREAM	1	2	3	4	5	6
CONC. PT	C2051	C51	C35	C27	S1500	S1460
2	406	1700	98	1107	450	874
5	1138	4099	227	2403	925	1871
10	1544	6585	337	3626	1318	2733
25	3001	9031	509	5834	1895	4038
50	3001	12101	675	7891	2485	5442
100	3656	14867	887	10062	3034	6738
500	6200	22000	1470	18000	4500	11000

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SUBJECT SCOTTSDALE FIS

JOB NUMBER 04856-02-74

TABLE 3.5: DISCHARGE COMPARISON FOR VARIOUS METHODS

CONCENTRATION POINT	BASIN ELEVATION	AREA MI^2	T_c (HR)	DISCHARGES (CFS) HEC-1 (cfs)	TR-55 (cfs)	REGRESSION* (cfs)
C2051	2500	1.79	0.48	3656	2824	1607
C51	2500	8.26	0.93	14867	8986	7934
C35	2600	1.29	0.78	887	1638	1250
C27	2500	14.02	1.60	10062	9771	7538
S1500	2400	1.79	1.54	3034	2241	2148
S1460	2400	5.20	0.76	6738	5378	4116

Roske Region 3

$$* \; Q_{100} = 553 A^{0.610} E^{-1.30} P^{0.915}$$

WHERE A = WATERSHED AREA IN MI^2

E = ELEVATION IN THOUSANDS OF FEET

P = ANNUAL RAINFALL IN INCHES

Where is this shown

16

PREPARED BY BAT DATE 7/14/88 CHECKED BY SHEET NO. OF FIGURE #

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The discharges are similar for all the concentration points except for C51 where the TR-55 discharge is 38 percent less (Table 3.5). Regression equations prepared by the United States Geological Survey for the Arizona Department of Transportation (Reference 15) were also used to evaluate 100-year discharges. The regression equation discharges are, on the average, approximately one-third lower than those generated by the HEC-1 model, but the correlation is evident. Discharges are often dissimilar between the HEC-1 model and the regression equations because the standard error of the estimates for the regression equation is 66 percent (Reference 15). An analysis of these regression equations for Pima County, Arizona, shows that they underestimate discharges by approximately 10 percent (Reference 16). A similar analysis for Maricopa County, Arizona, is not available.

3.4.0 500-YEAR DISCHARGES

Discharges were computed utilizing Mr. Ward's HEC-1 model for the 10-, 50-, and 100-year flood events. Computation of the 500-year event is also required; however, rainfall data are not available for this event. Additional discharges were therefore computed with the HEC-1 model for the 2-, 5-, and 25-year events to provide additional data for the normal probability analysis used to obtain the discharges for the 500-year event (Figures 3.1 to 3.6).

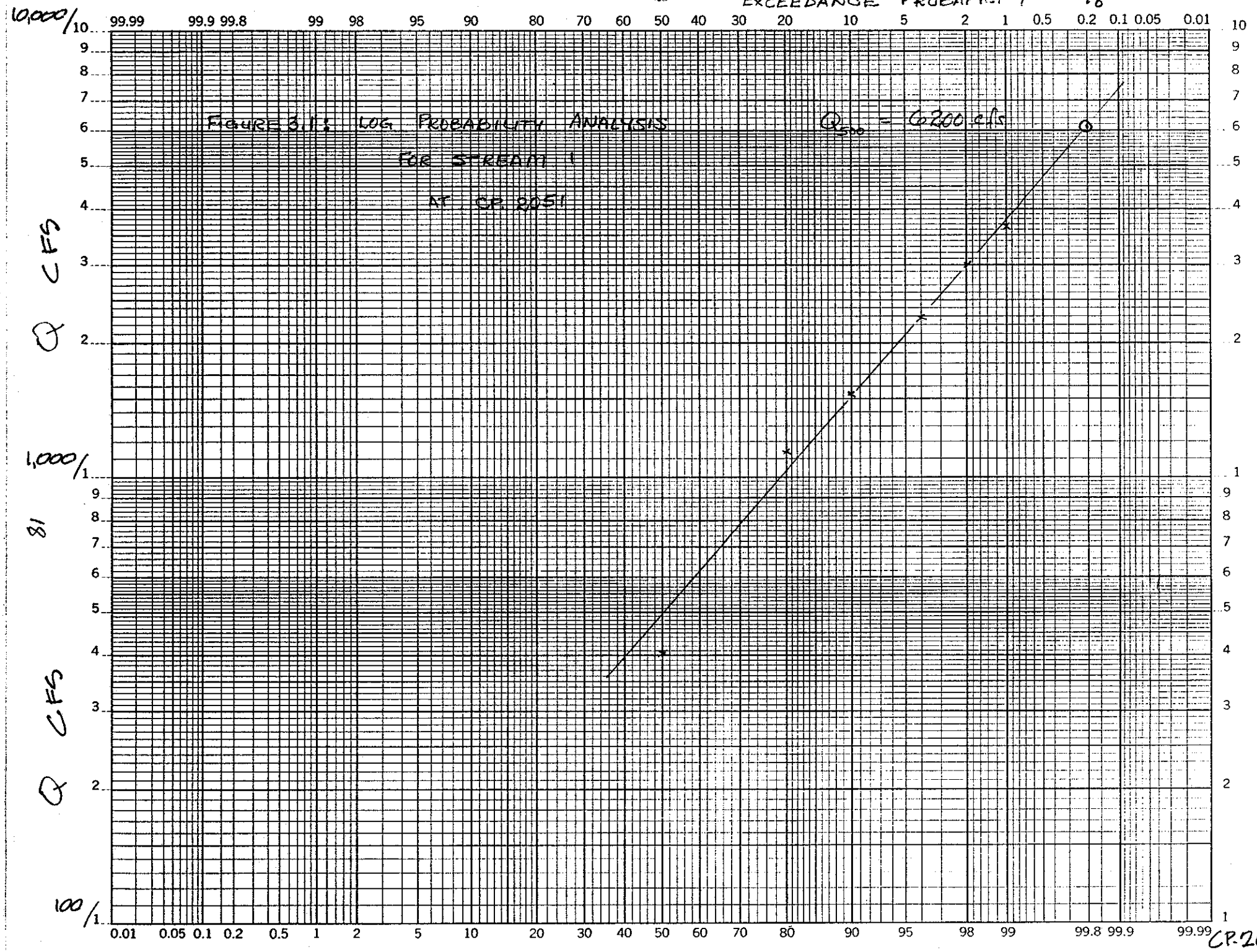


FIGURE 3.1: LOG PROBABILITY ANALYSIS FOR STREAM 1 AT CR. 2051

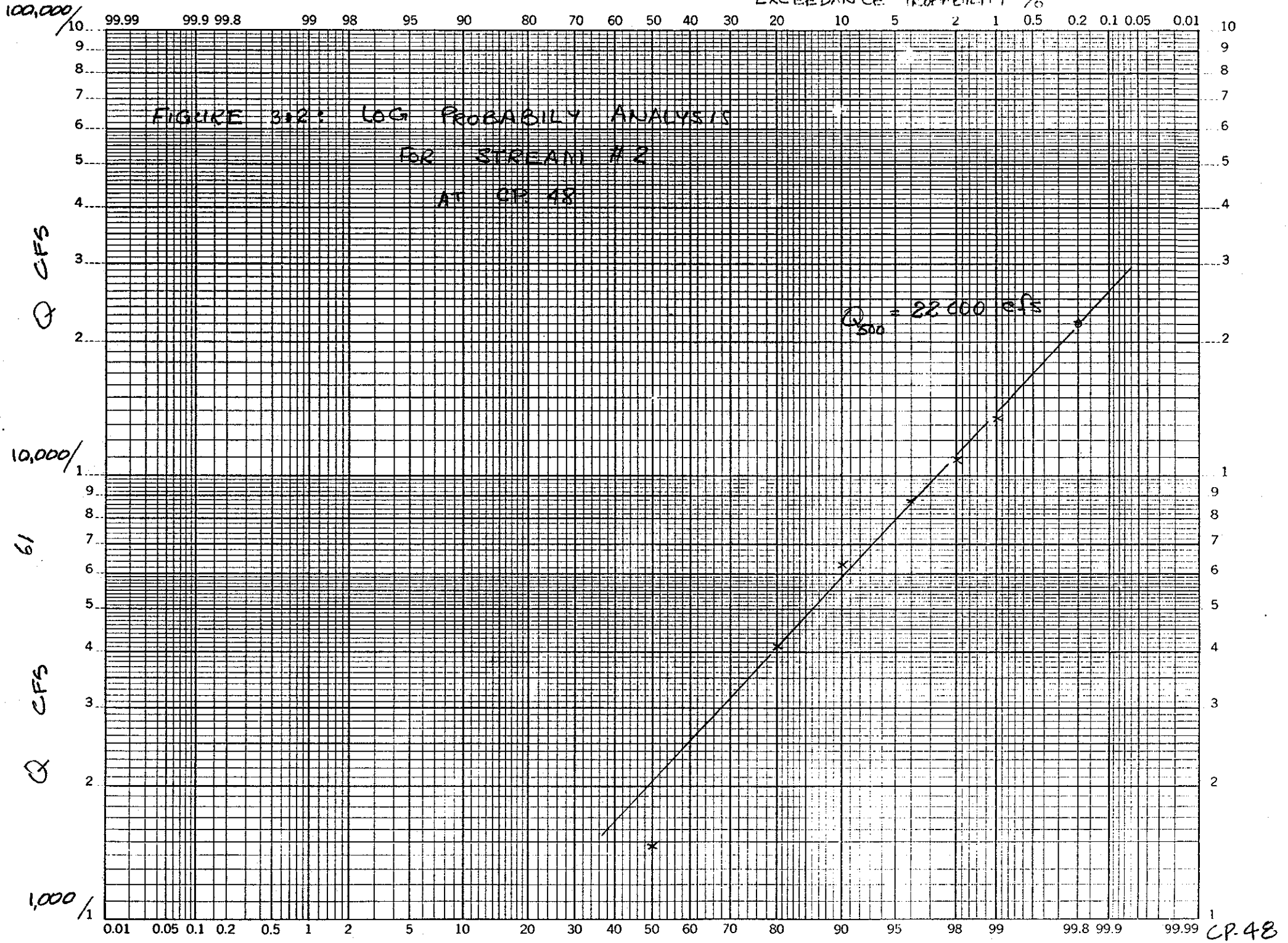
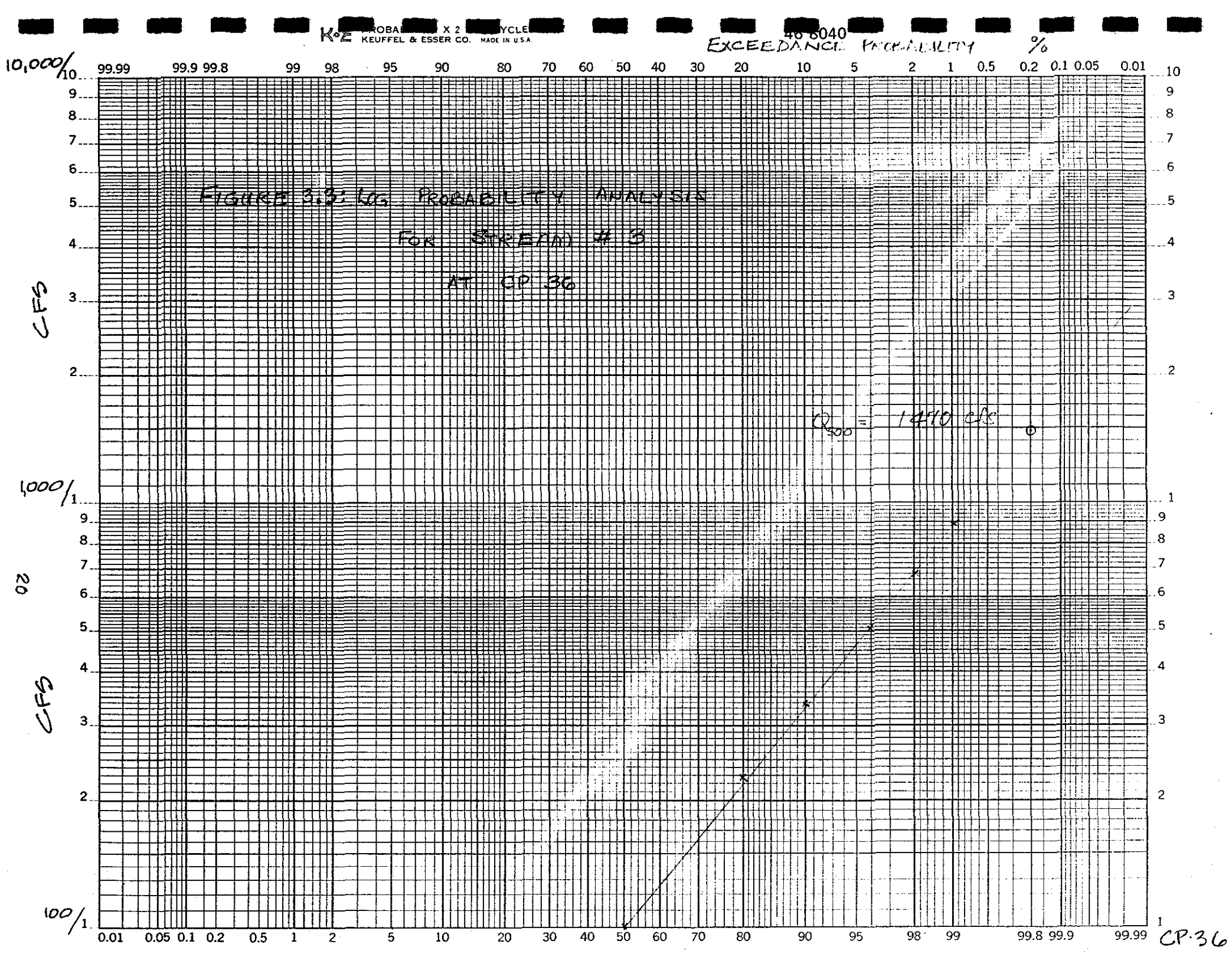


FIGURE 3:2: LOG PROBABILY ANALYSIS FOR STREAM # 2 AT CP. 48


K+E PROBA X 2 CYCLE
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
EXCEEDANCE PROBABILITY %
99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
10,000/10
1,000/1
100/1
CFS
CFS
FIGURE 3.3: LOG PROBABILITY ANALYSIS
FOR STREAM # 3
AT CP 36
Q_{500} = 1470 cfs
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
CP-36

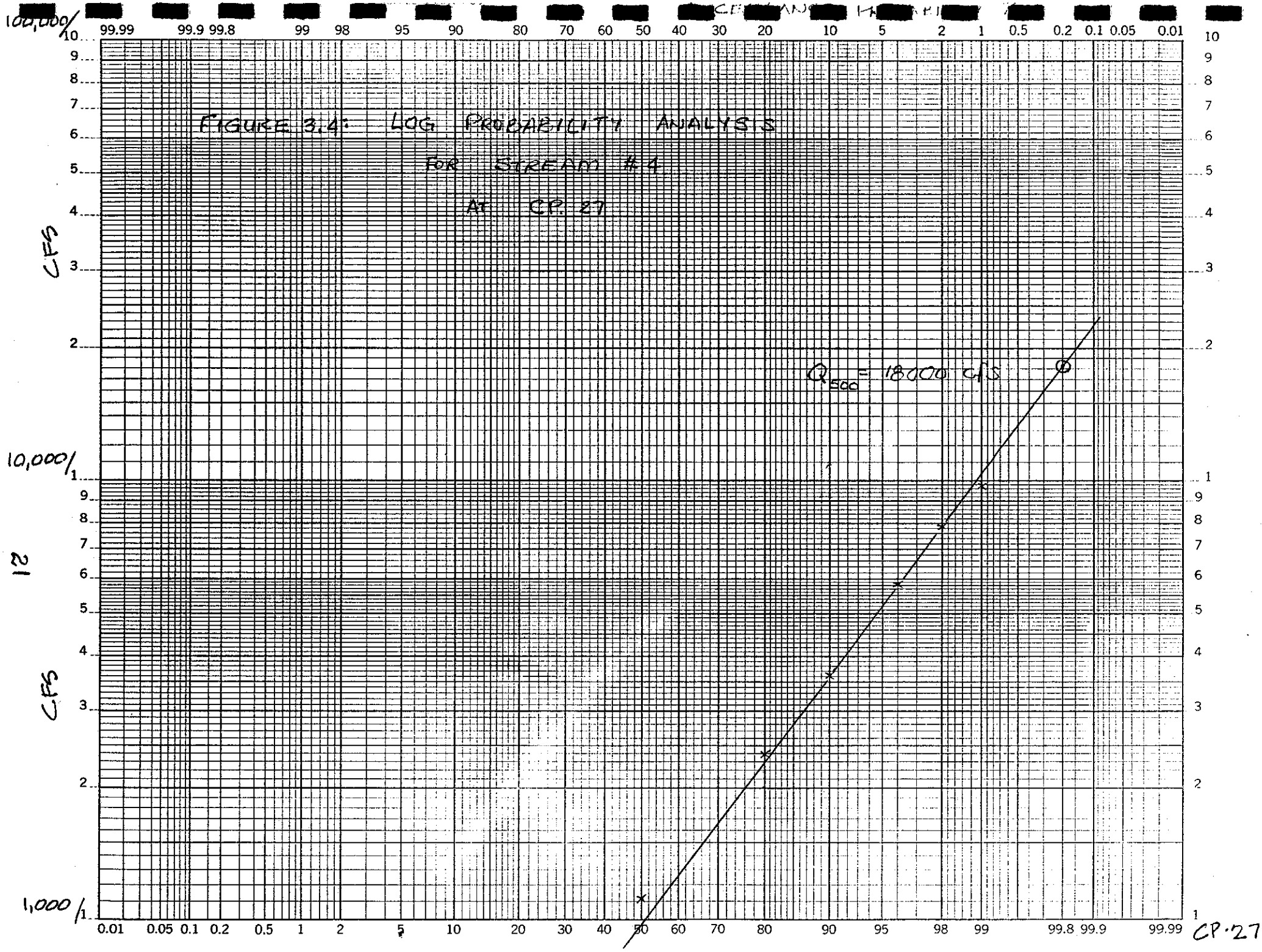


FIGURE 3.4: LOG PROBABILITY ANALYSIS
FOR STREAM #4
AT CP. 27
Q_{500} = 18000 CFS
CFS
100,000
10,000
1,000
99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
CP·27

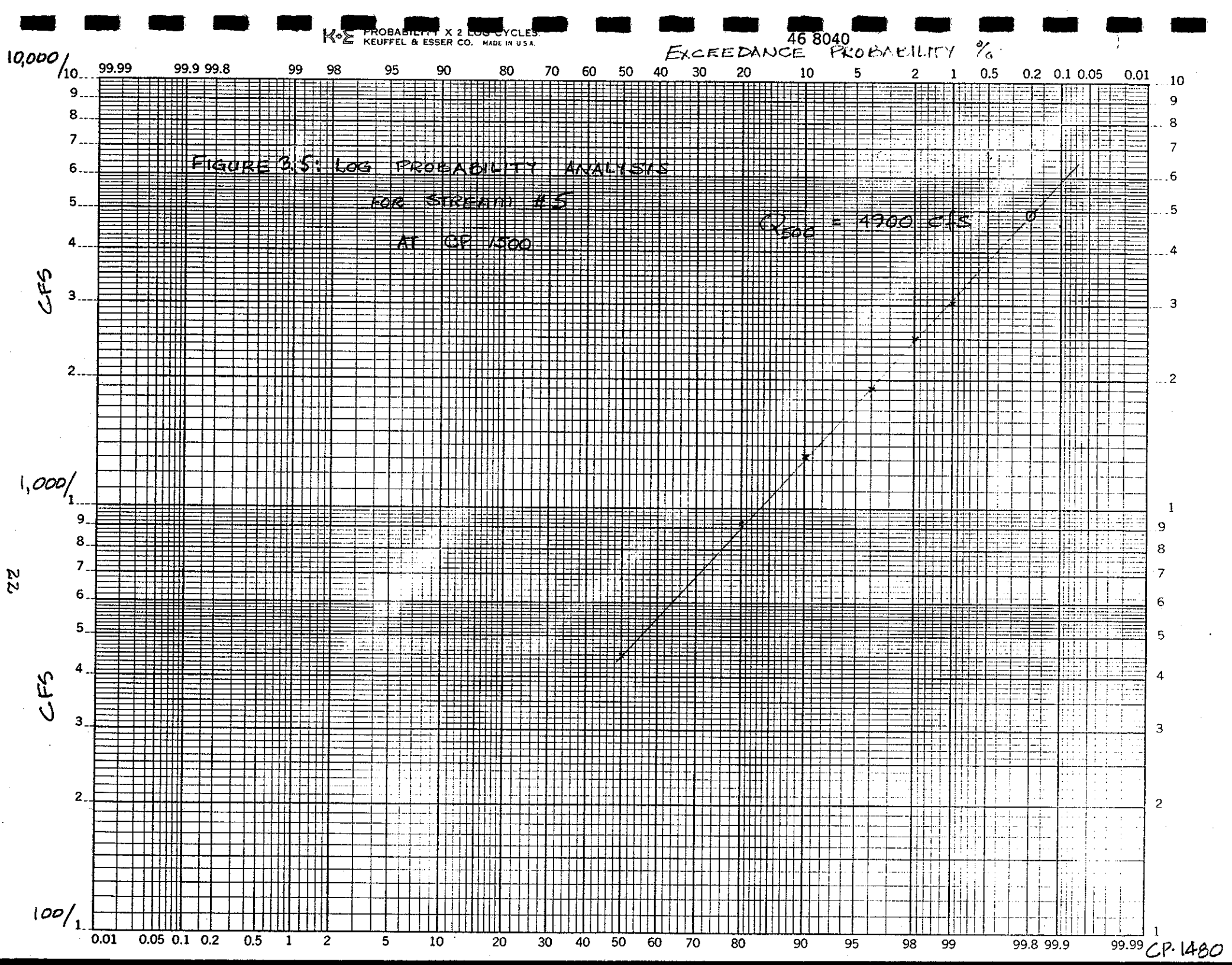


FIGURE 3.5: LOG PROBABILITY ANALYSIS FOR STREAM #5 AT CP 1500

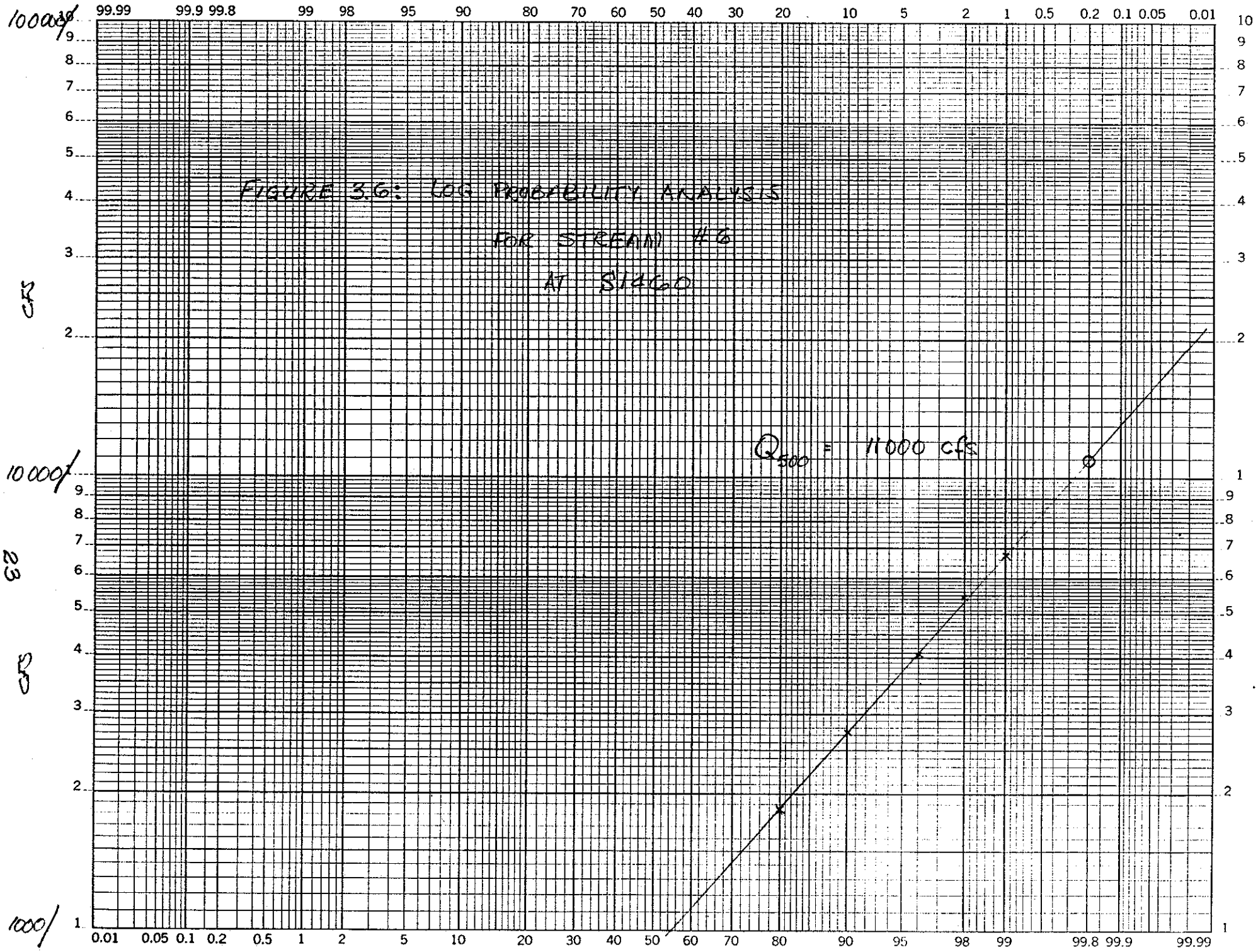


FIGURE 3.6: LOG PROBABILITY ANALYSIS FOR STREAM #6 AT S1460

4.0.0 CONCLUSION

The discharges computed in this study compare favorably with those obtained by using the SCS TR-55. The discharges also correlate well with results of the US Geological Survey regression equations even though the regression equation discharges are, on the average, one-third lower. Based on the general agreement between the TR-55 analysis and results of the HEC-1 model, our review of the HEC-1 model and the acceptance of the results of this model by the City of Scottsdale, it is our opinion that the proposed peak discharges are acceptable for use for the purposes of the Scottsdale Alluvial Fan Flood Insurance Study in Maricopa County.

It is the intent, therefore, of CBA to use the peak discharges determined by the HEC-1 analysis for the 10-, 50-, and 100-year flood events, and the 500-year peak discharges determined by a normal probability analysis in this Flood Insurance Study. These discharges will be utilized at the six alluvial fan apex locations to model downstream alluvial fan flooding conditions in detail and upstream 100-year approximate floodplains.

5.0.0 REFERENCES

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9. DMA, "Alluvial Fan Flooding Methodology, An Analysis," prepared for FEMA, Marina del Rey, California, October 1985.
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11. Dames and Moore, "Computer Program for Determining Flood Depths and Velocities on Alluvial Fans," Bethesda, Maryland, December 1982.
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APPENDIX TO
HYDROLOGIC ANALYSIS OF
SCOTTSDALE ALLUVIAL FANS 1-6
MARICOPA COUNTY, ARIZONA

FOR

MARICOPA COUNTY FLOOD INSURANCE STUDY
FEDERAL EMERGENCY MANAGEMENT AGENCY

August 4, 1988
CBA File No. 04856-02-74
BAT-112

Prepared By: Bori A. Touray
Senior Hydrologist

Supervised By: Marie S. Pearthree
Project Manager,
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6.3.0	Recommendations for Rainfall Data To Be Used For The North Scottsdale Drainage Plan	6
6.4.0	TR-55 Analysis	7

6.1.0 HEC-1 ANALYSIS

STREAM #1 CONCENTRATION POINT C2051

STREAM #2 CONCENTRATION POINT C51

```
!*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED 30 OCT 81           *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:10:10*
*                                       *
*****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted] - SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
    3          ID       [redacted]24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 27FEB88       0     289
    6          IO       5       0
    7          IN      30 27FEB88       0

    8          KK   SUB39
    9          KM       RUNOFF FROM SUB-BASIN 39
   10          BA  1.9422
   11          PB    1.95
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              85    1.60
   18          UK     330   .0433     .20     100
   19          RK   11240   .0253    .045            TRAP      30       3

   20          KK   SUB40
   21          KM       RUNOFF FROM SUB-BASIN 40
   22          BA   .5844
```

Stream #2

Stream #1

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68        KK   SUB46
 69        KM       RUNOFF FROM SUB-BASIN 46
 70        BA   .9268
 71        LS            86
 72        UK    265   .4958     .20     100
 73        RK   3300   .2271    .045    .111    TRAP      10       3
 74        RK   7100   .0535    .045            TRAP      25       3

 75        KK   CP47
 76        KM       COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77        HC       3

 78        KK   SUB47
 79        KM       RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80        BA   .3757
 81        LS            77    1.28
 82        UK    375   .1000     .20     100
 83        RK   9600   .0217    .045            TRAP      50       3     YES

 84        KK   CP48
 85        KM       COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86        HC       3

 87        KK   SUB48
 88        KM       RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89        BA   .0438
 90        LS            73    4.14
 91        UK    150   .0733     .20     100
 92        RK   1300   .0338    .045            TRAP      75       3     YES
```



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

 93        KK   SUB49
 94        KM       RUNOFF FROM SUB-BASIN 49
 95        BA   .3528
 96        LS            79    1.88
 97        UK    135   .0758     .20     100
 98        RK   5400   .0370    .045            TRAP      30       3

 99        KK   SUB50
100        KM       RUNOFF FROM SUB-BASIN 50
101        BA   .3580
102        LS            84    1.39
103        UK    300   .3555     .20     100
104        RK    730   .1506    .045    .036    TRAP      10       3
105        RK   6400   .0453    .045            TRAP      25       3

106        KK   CP51
107        KM       COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108        HC       3

109        KK   2004    DIV
110        KM       DIVERT FLOW TO SUB 2005
111        KM       THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112        KM       SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113        KM       THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114     DT    2003
115     DI       0   15000
116     DQ       0    7500
117     KK   SUB51
118     KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119     BA  1.0675
120     LS       L    S 72    4.06      %                WD    L  UPSTR
121     UK      94   .0213    .10     100
122     RK    6400   .0329    .045            TRAP    1500     2    YES
                L      S      W
123     KK   SUB52
124     KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125     BA  1.3557
126     LS            71     1.15
127     UK      76   .0213    .10     100
128     RK    6633   .0300    .045            TRAP    2500     2    YES

129     KK   SUB53
130     KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131     BA  1.7471
132     LS            74
133     UK      67   .0213    .10     100
134     RK    7767   .0196    .045            TRAP    3500     2    YES
```



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

135     KK   2000     SUB
136     KM        RUNOFF FROM SUB 2000
137     KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138     KM        GEOGRAPHICAL AREA
139     BA   .7999
140     PB   1.90
141     PC      0   .005   .009   .010   .013   .019   .021   .028   .032   .044
142     PC   .057   .100   .660   .745   .776   .800   .816   .830   .840   .850
143     PC   .861   .868   .878   .884   .891   .900   .905   .912   .919   .923
144     PC   .930   .934   .939   .944   .950   .958   .961   .963   .969   .971
145     PC   .974   .979   .981   .985   .989   .991   .993   .996  1.000
146     LS            84
147     UK     400  .2750    .25     100
148     RK    2625  .0785   .045    .072   TRAP     10     3
149     RK    2300  .0217   .045           TRAP     25     3

150     KK   2010     SUB
151     KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152     BA   .0933
153     LS            83     1.37
154     UK     800  .6425    .30     100
155     RK    3000  .0213   .045           TRAP     50     3    YES

156     KK   2003     RET
157     KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158     DR   2003

159     KK   2005     SUB
160     KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161        BA   .1363
162        LS            72    1.76
163        UK    175   .1400    .15     100
164        RK   2600   .0385    .045           TRAP    750      2     YES

165        KK   2011      CP
166        KM        ROUTE SUB 2005 TO CP 2011
167        RK   2200   .0213    .045           TRAP     50      3

168        KK   2012      CP
169        KM        COMBINE SUB 2010 & ROUTE CP 2011
170        HC      2

171        KK   2015     SUB
172        KM        RUNOFF FROM SUB 2015 & ROUTE CP 2012
173        BA   .4053
174        LS            78                                  contrib Area
175        UK    500   .2800    .25     100                  W      E  UPSTR
176        RK   2400   .1358    .045   .061    TRAP     10'      3
177        RK   4700   .0304    .045           TRAP     60      20    YES
```



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

178        KK   2020     SUB
179        KM        RUNOFF FROM SUB 2020
180        BA   .1090
181        LS            85
182        UK    205   .6969    .30     100
183        RK    900   .3889    .045   .011    TRAP     10      3
184        RK   2800   .1428    .045           TRAP     20      3

185        KK   2016      CP
186        KM        ROUTE SUB 2020 TO CP 2016
187        RK   1400   .0343    .045           TRAP     20      3

188        KK   2017      CP
189        KM        COMBINE SUB 2015 & CP 2016
190        HC      2

191        KK   2030     SUB
192        KM        RUNOFF FROM SUB 2030 & ROUTE CP 2017
193        BA   .2346
194        LS            67
195        UK    155   .0614    .15     100
196        RK   3555   .0355    .045   .047    TRAP     10     10
197        RK   2900   .0262    .045           TRAP     60     20    YES

198        KK   2040     SUB
199        KM        RUNOFF FROM SUB 2040
200        BA   .9290
201        LS            82
202        UK    463   .4072    .25     100
203        RK   2700   .1878    .045   .056    TRAP     10      3
204        RK   6800   .0485    .045           TRAP     25      3

205        KK   2050     SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS              81
209          UK     530   .5726     .25     100
210          RK    3400   .2067    .045    .086    TRAP      10       3
211          RK    6200   .0693    .045            TRAP      25       5

212          KK    2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (---)) DIVERSION
  NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8       SUB39
              .
              .
  20          .       SUB40
              .          .
              .          .
  26        CP41............
              V
              V
  29       SUB41 ***
              .
              .
  35          .       SUB42
              .          .
              .          .
  41          .          .      SUB43
              .          .         .
              .          .         .
  47          .          .         .      SUB44
              .          .         .         .
              .          .         .         .
  53          .          .       CP45............
              .          .         V
              .          .         V
  56          .          .      SUB45 ***
              .          .         .
              .          .         .
  62          .          .         .     SUB45A
              .          .         .         .
              .          .         .         .
  68          .          .         .         .      SUB46
              .          .         .         .         .
              .          .         .         .         .
  75          .          .       CP47......................
              .          .         V
              .          .         V
  78          .          .      SUB47 ***
              .          .         .
              .          .         .
  84        CP48......................
              V
```

```
                V
87        SUB48 ***
                .
                .
93              .        SUB49
                .          .
                .          .
99              .          .        SUB50
                .          .          .
                .          .          .
106       CP51.......................
                .
                .
114             .-------)    2003
109       2004
                V
                V
117       SUB51 ***
                V
                V
123       SUB52 ***
                V
                V
129       SUB53 ***
                .
                .
135             .      2000
                .        V
                .        V
150             .      2010 ***
                .        .
                .        .
158             .        .          <-------    2003
156             .        .        2003
                .        .          V
                .        .          V
159             .        .        2005 ***
                .        .          V
                .        .          V
165             .        .        2011
                .        .          .
                .        .          .
168             .      2012............
                .        V
                .        V
171             .      2015 ***
                .        .
                .        .
178             .        .        2020
                .        .          V
                .        .          V
185             .        .        2016
                .        .          .
                .        .          .
188             .      2017............
                .        V
                .        V
```

7-28-93
50/50 split.

Stream 2

Stream 1

```
191          .        2030 ***
             .          .
             .          .
198          .          .        2040
             .          .          .
             .          .          .
205          .          .          .        2050
             .          .          .          .
             .          .          .          .
212          .          .        2051............
```

(53)

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:10:10*
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC40.24I -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
2-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     27FEB88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     28FEB88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB39	502.	6.42	114.	37.	37.	1.94		
+	HYDROGRAPH AT	SUB40	214.	6.25	30.	10.	10.	0.58		
+	2 COMBINED AT	CP41	656.	6.33	144.	47.	47.	2.53		
+	HYDROGRAPH AT	SUB41	648.	6.50	160.	54.	54.	3.32		
+	HYDROGRAPH AT	SUB42	94.	6.25	20.	7.	7.	0.58		
+	HYDROGRAPH AT	SUB43	361.	6.25	63.	20.	20.	1.07		
+	HYDROGRAPH AT	SUB44	280.	6.25	49.	16.	16.	0.85		
+	2 COMBINED AT	CP45	641.	6.25	112.	37.	37.	1.92		
+	HYDROGRAPH AT	SUB45	636.	6.33	122.	40.	40.	2.13		
+	HYDROGRAPH AT	SUB45A	84.	6.17	11.	3.	3.	0.17		
+	HYDROGRAPH AT	SUB46	612.	6.17	59.	19.	19.	0.93		
+	3 COMBINED AT	CP47	1060.	6.17	191.	62.	62.	3.23		
+	HYDROGRAPH AT	SUB47	907.	6.42	198.	65.	65.	3.60		
+	3 COMBINED AT	CP48	1605.	6.50	378.	126.	126.	7.50		
+	HYDROGRAPH AT	SUB48	1590.	6.50	379.	126.	126.	7.55		
+	HYDROGRAPH AT	SUB49	71.	6.25	13.	5.	5.	0.35		
+	HYDROGRAPH AT	SUB50	145.	6.17	20.	6.	6.	0.36		

	3 COMBINED AT						
+		CP51	1700.	6.50	410.	137.	137.	8.26
	DIVERSION TO						
+		2003	850.	6.50	205.	68.	68.	8.26
	HYDROGRAPH AT						
+		2004	850.	6.50	205.	68.	68.	8.26
	HYDROGRAPH AT						
+		SUB51	581.	7.08	214.	75.	75.	9.33
	HYDROGRAPH AT						
+		SUB52	411.	8.08	213.	79.	79.	10.68
	HYDROGRAPH AT						
+		SUB53	291.	9.75	206.	85.	85.	12.43
	HYDROGRAPH AT						
+		2000	289.	6.17	42.	13.	13.	0.80
	HYDROGRAPH AT						
+		2010	300.	6.33	48.	15.	15.	0.89
	HYDROGRAPH AT						
+		2003	850.	6.50	205.	68.	68.	0.00
	HYDROGRAPH AT						
+		2005	846.	6.67	210.	70.	70.	0.14
	ROUTED TO						
+		2011	834.	6.75	210.	70.	70.	0.14
	2 COMBINED AT						
+		2012	1010.	6.58	256.	85.	85.	1.03
	HYDROGRAPH AT						
+		2015	1040.	6.75	270.	90.	90.	1.43
	HYDROGRAPH AT						
+		2020	67.	6.08	6.	2.	2.	0.11
	ROUTED TO						
+		2016	65.	6.17	6.	2.	2.	0.11
	2 COMBINED AT						
+		2017	1052.	6.75	274.	92.	92.	1.54
	HYDROGRAPH AT						
+		2030	1029.	6.92	277.	93.	93.	1.78
	HYDROGRAPH AT						
+		2040	218.	6.25	40.	13.	13.	0.93
	HYDROGRAPH AT						
+		2050	188.	6.25	34.	11.	11.	0.86

	2 COMBINED AT						
+		2051	406.	6.25	73.	25.	25.	1.79

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

```
!*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:06:55*
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.


```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted] - SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
    3          ID       [redacted] 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 27FEB88       0     289
    6          IO       5       0
    7          IN      30 27FEB88       0

    8          KK   SUB39
    9          KM       RUNOFF FROM SUB-BASIN 39
   10          BA  1.9422
   11          PB    2.55
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              85    1.60
   18          UK     330   .0433     .20     100
   19          RK   11240   .0253    .045            TRAP      30       3

   20          KK   SUB40
   21          KM       RUNOFF FROM SUB-BASIN 40
   22          BA   .5844
```

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68        KK   SUB46
 69        KM        RUNOFF FROM SUB-BASIN 46
 70        BA   .9268
 71        LS             86
 72        UK    265   .4958     .20     100
 73        RK   3300   .2271    .045    .111    TRAP      10       3
 74        RK   7100   .0535    .045            TRAP      25       3

 75        KK   CP47
 76        KM        COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77        HC       3

 78        KK   SUB47
 79        KM        RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80        BA   .3757
 81        LS             77    1.28
 82        UK    375   .1000     .20     100
 83        RK   9600   .0217    .045            TRAP      50       3     YES

 84        KK   CP48
 85        KM        COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86        HC       3

 87        KK   SUB48
 88        KM        RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89        BA   .0438
 90        LS             73    4.14
 91        UK    150   .0733     .20     100
 92        RK   1300   .0338    .045            TRAP      75       3     YES
```



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

 93        KK   SUB49
 94        KM        RUNOFF FROM SUB-BASIN 49
 95        BA   .3528
 96        LS             79    1.88
 97        UK    135   .0758     .20     100
 98        RK   5400   .0370    .045            TRAP      30       3

 99        KK   SUB50
100        KM        RUNOFF FROM SUB-BASIN 50
101        BA   .3580
102        LS             84    1.39
103        UK    300   .3555    .20     0/900 continuous SW.   WD
104        RK   730   .1506    .045    .036    TRAP      10       3
105        RK   6400   .0453    .045            TRAP      25       3

106        KK   CP51
107        KM        COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108        HC       3

109        KK   2004     DIV
110        KM        DIVERT FLOW TO SUB 2005
111        KM        THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112        KM        SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113        KM        THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114        DT    2003
115        DI       0   15000   2   = 993 TO 1070 BY SPLIT
116        DQ       0    7500   1

117        KK   SUB51
118        KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119        BA  1.0675
120        LS              72    4.06
121        UK      94   .0213     .10     100
122        RK    6400   .0329    .045            TRAP    1500       2     YES

123        KK   SUB52
124        KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125        BA  1.3557
126        LS              71    1.15
127        UK      76   .0213     .10     100
128        RK    6633   .0300    .045            TRAP    2500       2     YES

129        KK   SUB53
130        KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131        BA  1.7471
132        LS              74
133        UK      67   .0213     .10     100
134        RK    7767   .0196    .045            TRAP    3500       2     YES
```



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

135        KK    2000     SUB
136        KM        RUNOFF FROM SUB 2000
137        KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138        KM        GEOGRAPHICAL AREA
139        BA   .7999
140        PB    2.49
141        PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
142        PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
143        PC    .861    .868    .876    .884    .891    .900    .905    .912    .919    .923
144        PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
145        PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
146        LS              84
147        UK     400   .2750     .25     100
148        RK    2625   .0785    .045    .072    TRAP      10       3
149        RK    2300   .0217    .045            TRAP      25       3

150        KK    2010     SUB
151        KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152        BA   .0933
153        LS              83    1.37
154        UK     800   .6425     .30     100
155        RK    3000   .0213    .045            TRAP      50       3     YES

156        KK    2003     RET
157        KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158        DR    2003

159        KK    2005     SUB
160        KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161          BA   .1363
162          LS              72    1.76
163          UK    175   .1400    .15     100
164          RK   2600   .0385    .045           TRAP     750       2     YES

165          KK   2011      CP
166          KM       ROUTE SUB 2005 TO CP 2011
167          RK   2200   .0213    .045           TRAP      50       3

168          KK   2012      CP
169          KM       COMBINE SUB 2010 & ROUTE CP 2011
170          HC      2

171          KK   2015     SUB
172          KM       RUNOFF FROM SUB 2015 & ROUTE CP 2012
173          BA   .4053
174          LS              78
175          UK    500   .2800     .25     100
176          RK   2400   .1358    .045    .061    TRAP      10       3
177          RK   4700   .0304    .045            TRAP      60      20     YES
1                                          HEC-1 INPUT                                                          PAGE  5

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

178          KK   2020     SUB
179          KM       RUNOFF FROM SUB 2020
180          BA   .1090
181          LS              85
182          UK    205   .6969     .30     100
183          RK    900   .3889    .045    .011    TRAP      10       3
184          RK   2800   .1428    .045            TRAP      20       3

185          KK   2016      CP
186          KM       ROUTE SUB 2020 TO CP 2016
187          RK   1400   .0343    .045            TRAP      20       3

188          KK   2017      CP
189          KM       COMBINE SUB 2015 & CP 2016
190          HC      2

191          KK   2030     SUB
192          KM       RUNOFF FROM SUB 2030 & ROUTE CP 2017
193          BA   .2346
194          LS              67
195          UK    155   .0614     .15     100
196          RK   3555   .0355    .045    .047    TRAP      10      10
197          RK   2900   .0262    .045            TRAP      60      20     YES

198          KK   2040     SUB
199          KM       RUNOFF FROM SUB 2040
200          BA   .9290
201          LS              82
202          UK    463   .4072     .25     100
203          RK   2700   .1878    .045    .056    TRAP      10       3
204          RK   6800   .0485    .045            TRAP      25       3

205          KK   2050     SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS             81
209          UK    530   .5726    .25    100
210          RK   3400   .2067   .045   .086   TRAP    10     3
211          RK   6200   .0693   .045          TRAP    25     5

212          KK   2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION
  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED FLOW
   8       SUB39
              .
              .
  20          .       SUB40
              .          .
              .          .
  26        CP41............
              V
              V
  29       SUB41 ***
              .
              .
  35          .       SUB42
              .          .
              .          .
  41          .          .      SUB43
              .          .         .
              .          .         .
  47          .          .         .      SUB44
              .          .         .         .
              .          .         .         .
  53          .          .       CP45............
              .          .         V
              .          .         V
  56          .          .      SUB45 ***
              .          .         .
              .          .         .
  62          .          .         .     SUB45A
              .          .         .         .
              .          .         .         .
  68          .          .         .         .      SUB46
              .          .         .         .         .
              .          .         .         .         .
  75          .          .       CP47......................
              .          .         V
              .          .         V
  78          .          .      SUB47 ***
              .          .         .
              .          .         .
  84        CP48......................
              V
```

```
            V
 87      SUB48 ***
            .
            .
 93         .       SUB49
            .          .
            .          .
 99         .          .       SUB50
            .          .          .
            .          .          .
106       CP51.......................
            .
            .
114         .-------)    2003
109       2004
            V
            V
117     SUB51 ***
            V
            V
123     SUB52 ***
            V
            V
129     SUB53 ***
            .
            .
135         .        2000
            .          V
            .          V
150         .        2010 ***
            .          .
            .          .
158         .          .          .<-------    2003
156         .          .       2003
            .          .          V
            .          .          V
159         .          .       2005 ***
            .          .          V
            .          .          V
165         .          .       2011
            .          .          .
            .          .          .
168         .        2012............
            .          V
            .          V
171         .        2015 ***
            .          .
            .          .
178         .          .       2020
            .          .          V
            .          .          V
185         .          .       2016
            .          .          .
            .          .          .
188         .        2017............
            .          V
            .          V
```

```
191          .       2030 ***
             .          .
             .          .
198          .          .       2040
             .          .          .
             .          .          .
205          .          .          .       2050
             .          .          .          .
             .          .          .          .
212          .          .       2051............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:06:55*
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC40.241 -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
                    5-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                  NMIN          5  MINUTES IN COMPUTATION INTERVAL
                 IDATE     27FEB88  STARTING DATE
                 ITIME        0000  STARTING TIME
                    NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     28FEB88  ENDING DATE
                NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                  TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB39	1098.	6.25	188.	60.	60.	1.94		
+	HYDROGRAPH AT	SUB40	431.	6.17	51.	16.	16.	0.58		
+	2 COMBINED AT	CP41	1446.	6.17	239.	76.	76.	2.53		
+	HYDROGRAPH AT	SUB41	1535.	6.33	274.	89.	89.	3.32		
+	HYDROGRAPH AT	SUB42	265.	6.17	37.	12.	12.	0.58		
+	HYDROGRAPH AT	SUB43	841.	6.17	104.	33.	33.	1.07		
+	HYDROGRAPH AT	SUB44	633.	6.17	82.	26.	26.	0.85		
+	2 COMBINED AT	CP45	1473.	6.17	186.	59.	59.	1.92		
+	HYDROGRAPH AT	SUB45	1372.	6.25	203.	64.	64.	2.13		
+	HYDROGRAPH AT	SUB45A	170.	6.08	18.	5.	5.	0.17		
+	HYDROGRAPH AT	SUB46	1036.	6.08	98.	30.	30.	0.93		
+	3 COMBINED AT	CP47	2426.	6.17	318.	100.	100.	3.23		
+	HYDROGRAPH AT	SUB47 ✓	2466.	6.25	335.	106.	106.	3.60		
+	3 COMBINED AT	CP48	4112.	6.25	646.	207.	207.	7.50		
+	HYDROGRAPH AT	SUB48 ✓	3889.	6.33	647.	208.	208.	7.55		
+	HYDROGRAPH AT	SUB49 ✓	204.	6.17	24.	8.	8.	0.35		
+	HYDROGRAPH AT	SUB50 ✓	319.	6.17	33.	11.	11.	0.36		

5 year ✓

	3 COMBINED AT						
+		CP51	4099.	6.33	703.	226.	226.	8.26
	DIVERSION TO						
+		2003	2050.	6.33	351.	113.	113.	8.26
	HYDROGRAPH AT						
+		2004	2050.	6.33	351.	113.	113.	8.26
	HYDROGRAPH AT						
+		SUB51	1381.	6.67	381.	127.	127.	9.33
	HYDROGRAPH AT						
+		SUB52	994.	7.33	399.	140.	140.	10.68
	HYDROGRAPH AT						
+		SUB53	713.	8.50	413.	158.	158.	12.43
	HYDROGRAPH AT						
+		2000	599.	6.17	71.	22.	22.	0.80
	HYDROGRAPH AT						
+		2010	617.	6.25	81.	25.	25.	0.89
	HYDROGRAPH AT						
+		2003	2050.	6.33	351.	113.	113.	0.00
	HYDROGRAPH AT						
+		2005	1999.	6.42	363.	117.	117.	0.14
	ROUTED TO						
+		2011	1906.	6.50	369.	118.	118.	0.14
	2 COMBINED AT						
+		2012	2263.	6.42	448.	143.	143.	1.03
	HYDROGRAPH AT						
+		2015	2280.	6.58	483.	154.	154.	1.43
	HYDROGRAPH AT						
+		2020	115.	6.08	11.	3.	3.	0.11
	ROUTED TO						
+		2016	105.	6.17	11.	3.	3.	0.11
	2 COMBINED AT						
+		2017	2300.	6.58	491.	158.	158.	1.54
	HYDROGRAPH AT						
+		2030	2266.	6.67	500.	160.	160.	1.78
	HYDROGRAPH AT						
+		2040	615.	6.17	71.	23.	23.	0.93
	HYDROGRAPH AT						
+		2050	522.	6.17	62.	20.	20.	0.86

```
        2 COMBINED AT
+                          2051     1138.   6.17        133.        43.        43.      1.79


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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 30 OCT 81           *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:02:32*
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL S[redacted]-- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
    3          ID       [redacted] 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 27FEB88       0     289
    6          IO       5       0
    7          IN      30 27FEB88       0

    8          KK   SUB39
    9          KM       RUNOFF FROM SUB-BASIN 39
   10          BA  1.9422
   11          PB    2.96
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              85    1.60
   18          UK     330   .0433     .20     100
   19          RK   11240   .0253    .045            TRAP      30       3

   20          KK   SUB40
   21          KM       RUNOFF FROM SUB-BASIN 40
   22          BA   .5844
```

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68          KK   SUB46
 69          KM       RUNOFF FROM SUB-BASIN 46
 70          BA   .9268
 71          LS            86
 72          UK    265   .4958     .20     100
 73          RK   3300   .2271    .045    .111    TRAP      10       3
 74          RK   7100   .0535    .045            TRAP      25       3

 75          KK   CP47
 76          KM       COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77          HC      3

 78          KK   SUB47
 79          KM       RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80          BA   .3757
 81          LS            77    1.28
 82          UK    375   .1000     .20     100
 83          RK   9600   .0217    .045            TRAP      50       3     YES

 84          KK   CP48
 85          KM       COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86          HC      3

 87          KK   SUB48
 88          KM       RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89          BA   .0438
 90          LS            73    4.14
 91          UK    150   .0733     .20     100
 92          RK   1300   .0338    .045            TRAP      75       3     YES
1                                          HEC-1 INPUT                                                    PAGE  3

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

 93          KK   SUB49
 94          KM       RUNOFF FROM SUB-BASIN 49
 95          BA   .3528
 96          LS            79    1.88
 97          UK    135   .0758     .20     100
 98          RK   5400   .0370    .045            TRAP      30       3

 99          KK   SUB50
100          KM       RUNOFF FROM SUB-BASIN 50
101          BA   .3580
102          LS            84    1.39
103          UK    300   .3555     .20     100
104          RK    730   .1506    .045    .036    TRAP      10       3
105          RK   6400   .0453    .045            TRAP      25       3

106          KK   CP51
107          KM       COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108          HC      3

109          KK   2004     DIV
110          KM       DIVERT FLOW TO SUB 2005
111          KM       THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112          KM       SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113          KM       THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114        DT    2003
115        DI       0   15000
116        DQ       0    7500

117        KK   SUB51
118        KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119        BA  1.0675
120        LS             72    4.06
121        UK      94   .0213     .10     100
122        RK    6400   .0329    .045           TRAP    1500       2     YES

123        KK   SUB52
124        KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125        BA  1.3557
126        LS             71    1.15
127        UK      76   .0213     .10     100
128        RK    6633   .0300    .045           TRAP    2500       2     YES

129        KK   SUB53
130        KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131        BA  1.7471
132        LS             74
133        UK      67   .0213     .10     100
134        RK    7767   .0196    .045           TRAP    3500       2     YES
```



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

135        KK    2000     SUB
136        KM        RUNOFF FROM SUB 2000
137        KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138        KM        GEOGRAPHICAL AREA
139        BA   .7999
140        PB    2.89
141        PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
142        PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
143        PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
144        PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
145        PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
146        LS             84
147        UK     400   .2750     .25     100
148        RK    2625   .0785    .045    .072    TRAP      10       3
149        RK    2300   .0217    .045           TRAP      25       3

150        KK    2010     SUB
151        KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152        BA   .0933
153        LS             83    1.37
154        UK     800   .6425     .30     100
155        RK    3000   .0213    .045           TRAP      50       3     YES

156        KK    2003     RET
157        KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158        DR    2003

159        KK    2005     SUB
160        KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161        BA   .1363
162        LS            72    1.76
163        UK     175   .1400    .15     100
164        RK    2600   .0385   .045            TRAP    750      2    YES

165        KK    2011      CP
166        KM        ROUTE SUB 2005 TO CP 2011
167        RK    2200   .0213   .045            TRAP     50      3

168        KK    2012      CP
169        KM        COMBINE SUB 2010 & ROUTE CP 2011
170        HC       2

171        KK    2015     SUB
172        KM        RUNOFF FROM SUB 2015 & ROUTE CP 2012
173        BA   .4053
174        LS            78
175        UK     500   .2800    .25     100
176        RK    2400   .1358   .045    .061    TRAP     10      3
177        RK    4700   .0304   .045            TRAP     60     20    YES
```



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

178        KK    2020     SUB
179        KM        RUNOFF FROM SUB 2020
180        BA   .1090
181        LS            85
182        UK     205   .6969    .30     100
183        RK     900   .3889   .045    .011    TRAP     10      3
184        RK    2800   .1428   .045            TRAP     20      3

185        KK    2016      CP
186        KM        ROUTE SUB 2020 TO CP 2016
187        RK    1400   .0343   .045            TRAP     20      3

188        KK    2017      CP
189        KM        COMBINE SUB 2015 & CP 2016
190        HC       2

191        KK    2030     SUB
192        KM        RUNOFF FROM SUB 2030 & ROUTE CP 2017
193        BA   .2346
194        LS            67
195        UK     155   .0614    .15     100
196        RK    3555   .0355   .045    .047    TRAP     10     10
197        RK    2900   .0262   .045            TRAP     60     20    YES

198        KK    2040     SUB
199        KM        RUNOFF FROM SUB 2040
200        BA   .9290
201        LS            82
202        UK     463   .4072    .25     100
203        RK    2700   .1878   .045    .056    TRAP     10      3
204        RK    6800   .0485   .045            TRAP     25      3

205        KK    2050     SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS              81
209          UK     530   .5726     .25     100
210          RK    3400   .2067    .045    .086    TRAP      10       3
211          RK    6200   .0693    .045            TRAP      25       5

212          KK    2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (---)) DIVERSION
  NO.      (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8        SUB39
                .
                .
  20            .       SUB40
                .          .
                .          .    .
  26         CP41............
                V
                V
  29        SUB41 ***
                .
                .
  35            .       SUB42
                .          .
                .          .
  41            .          .      SUB43
                .          .         .
                .          .         .
  47            .          .         .      SUB44
                .          .         .         .
                .          .         .         .
  53            .          .       CP45............
                .          .         V
                .          .         V
  56            .          .      SUB45 ***
                .          .         .
                .          .         .
  62            .          .         .     SUB45A
                .          .         .         .
                .          .         .         .
  68            .          .         .         .      SUB46
                .          .         .         .         .
                .          .         .         .         .
  75            .          .       CP47......................
                .          .         V
                .          .         V
  78            .          .      SUB47 ***
                .          .         .
                .          .         .
  84         CP48......................
                V
```

```
            V
 87      SUB48 ***
            .
            .
 93         .       SUB49
            .          .
            .          .
 99         .          .       SUB50
            .          .          .
            .          .          .
106       CP51.......................
            .
            .
114         .-------)    2003
109       2004
            V
            V
117      SUB51 ***
            V
            V
123      SUB52 ***
            V
            V
129      SUB53 ***
            .
            .
135         .        2000
            .          V
            .          V
150         .        2010 ***
            .          .
            .          .
158         .          .          .(-------    2003
156         .          .       2003
            .          .          V
            .          .          V
159         .          .       2005 ***
            .          .          V
            .          .          V
165         .          .       2011
            .          .          .
            .          .          .
168         .        2012............
            .          V
            .          V
171         .        2015 ***
            .          .
            .          .
178         .          .       2020
            .          .          V
            .          .          V
185         .          .       2016
            .          .          .
            .          .          .
188         .        2017............
            .          V
            .          V
```

```
191          .       2030 ***
             .          .
             .          .
198          .          .       2040
             .          .          .
             .          .          .
205          .          .          .       2050
             .          .          .          .
             .          .          .          .
212          .          .       2051............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:02:32*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC40.241 -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
                    10-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE    27FEB88  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE    28FEB88  ENDING DATE
                 NDTIME       0000  ENDING TIME

             COMPUTATION INTERVAL    0.08 HOURS
                 TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH  INCHES
            LENGTH, ELEVATION    FEET
            FLOW                 CUBIC FEET PER SECOND
            STORAGE VOLUME       ACRE-FEET
            SURFACE AREA         ACRES
            TEMPERATURE          DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SUB39	1710.	6.17	244.	76.	76.	1.94		
HYDROGRAPH AT	SUB40	652.	6.08	67.	21.	21.	0.58		
2 COMBINED AT	CP41	2330.	6.17	310.	97.	97.	2.53		
HYDROGRAPH AT 9Route	SUB41 Sub48	2656.	6.25	378.	119.	119.	3.32 0.79		
HYDROGRAPH AT	SUB42	424.	6.17	50.	16.	16.	0.58 +		
HYDROGRAPH AT	SUB43	1167.	6.17	134.	42.	42.	1.07		
HYDROGRAPH AT	SUB44	852.	6.17	105.	33.	33.	0.85		
2 COMBINED AT	CP45	2020.	6.17	240.	75.	75.	1.92		
HYDROGRAPH AT	SUB45	2033.	6.17	261.	81.	81.	2.13		
HYDROGRAPH AT	SUB45A	245.	6.08	23.	7.	7.	0.17		
HYDROGRAPH AT	SUB46	1325.	6.08	127.	39.	39.	0.93		
3 COMBINED AT	CP47	3356.	6.17	410.	127.	127.	3.23		
HYDROGRAPH AT	SUB47	3400.	6.33	464.	143.	143.	+ .38 3.60		
3 COMBINED AT	CP48	6298.	6.25	892.	279.	279.	7.50		
HYDROGRAPH AT	SUB48	6210.	6.25	894.	279.	279.	7.55		
HYDROGRAPH AT	SUB49	341.	6.17	33.	11.	11.	0.35		
HYDROGRAPH AT	SUB50	441.	6.08	44.	14.	14.	0.36		

	3 COMBINED AT	Inflow					
+		CP51	6585.	6.25	968.	304.	8.26
	DI DIVERSION TO	5890					
+		2003	3292.	6.25	484.	152.	8.26
	HYDROGRAPH AT						
+		2004	3292.	6.25	484.	152.	8.26
	HYDROGRAPH AT						
+		SUB51	2533.	6.50	532.	172.	9.33
	HYDROGRAPH AT						
+		SUB52	1752.	7.00	569.	192.	10.68
	HYDROGRAPH AT						
+		SUB53	1219.	7.92	606.	220.	12.43
	HYDROGRAPH AT						
+		2000	849.	6.08	93.	29.	0.80
	HYDROGRAPH AT						
+		2010	839.	6.17	105.	33.	0.89
	HYDROGRAPH AT						
+		2003	3292.	6.25	484.	152.	0.00
	HYDROGRAPH AT						
+		2005	3201.	6.33	499.	156.	0.14
	ROUTED TO						
+		2011	3132.	6.42	505.	158.	0.14
	2 COMBINED AT						
+		2012	3571.	6.42	608.	190.	1.03
	HYDROGRAPH AT						
+		2015	3598.	6.50	654.	205.	1.43
	HYDROGRAPH AT						
+		2020	148.	6.08	14.	4.	-4. 0.11
	ROUTED TO						
+		2016	138.	6.08	14.	4.	4. 0.11
	2 COMBINED AT						
+		2017	3623.	6.50	666.	209.	209. 1.54
	HYDROGRAPH AT						
+		2030	3538.	6.58	677.	212.	212. 1.78
	HYDROGRAPH AT						
+		2040	827.	6.17	95.	30.	30. 0.93
	HYDROGRAPH AT						
+		2050	716.	6.17	83.	26.	26. 0.86

Stream 2 ½ @ Outlet

```
        2 COMBINED AT
+                       2051     1544.   6.17        178.        56.        56.      1.79


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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 10:58:29*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
* (916) 440-3285 OR (FTS) 448-3285  *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted] - SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
    3          ID       [redacted] 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 27FEB88       0     289
    6          IO       5       0
    7          IN      30 27FEB88       0

    8          KK   SUB39
    9          KM       RUNOFF FROM SUB-BASIN 39
   10          BA  1.9422
   11          PB    3.46
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              85    1.60
   18          UK     330   .0433     .20     100
   19          RK   11240   .0253    .045            TRAP      30       3

   20          KK   SUB40
   21          KM       RUNOFF FROM SUB-BASIN 40
   22          BA   .5844
```

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68          KK   SUB46
 69          KM        RUNOFF FROM SUB-BASIN 46
 70          BA   .9268
 71          LS             86
 72          UK    265   .4958     .20     100
 73          RK   3300   .2271    .045    .111    TRAP      10       3
 74          RK   7100   .0535    .045            TRAP      25       3

 75          KK   CP47
 76          KM        COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77          HC       3

 78          KK   SUB47
 79          KM        RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80          BA   .3757
 81          LS             77    1.28
 82          UK    375   .1000     .20     100
 83          RK   9600   .0217    .045            TRAP      50       3     YES

 84          KK   CP48
 85          KM        COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86          HC       3

 87          KK   SUB48
 88          KM        RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89          BA   .0438
 90          LS             73    4.14
 91          UK    150   .0733     .20     100
 92          RK   1300   .0338    .045            TRAP      75       3     YES
1                                          HEC-1 INPUT                                                    PAGE  3

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

 93          KK   SUB49
 94          KM        RUNOFF FROM SUB-BASIN 49
 95          BA   .3528
 96          LS             79    1.88
 97          UK    135   .0758     .20     100
 98          RK   5400   .0370    .045            TRAP      30       3

 99          KK   SUB50
100          KM        RUNOFF FROM SUB-BASIN 50
101          BA   .3580
102          LS             84    1.39
103          UK    300   .3555     .20     100
104          RK    730   .1506    .045    .036    TRAP      10       3
105          RK   6400   .0453    .045            TRAP      25       3

106          KK   CP51
107          KM        COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108          HC       3

109          KK   2004     DIV
110          KM        DIVERT FLOW TO SUB 2005
111          KM        THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112          KM        SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113          KM        THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114          DT    2003
115          DI       0   15000
116          DQ       0    7500

117          KK   SUB51
118          KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119          BA  1.0675
120          LS              72    4.06
121          UK      94   .0213     .10     100
122          RK    6400   .0329    .045           TRAP    1500       2     YES

123          KK   SUB52
124          KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125          BA  1.3557
126          LS              71    1.15
127          UK      76   .0213     .10     100
128          RK    6633   .0300    .045           TRAP    2500       2     YES

129          KK   SUB53
130          KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131          BA  1.7471
132          LS              74
133          UK      67   .0213     .10     100
134          RK    7767   .0196    .045           TRAP    3500       2     YES
```



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

135          KK    2000     SUB
136          KM        RUNOFF FROM SUB 2000
137          KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138          KM        GEOGRAPHICAL AREA
139          BA   .7999
140          PB    3.85
141          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
142          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
143          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
144          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
145          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
146          LS              84
147          UK     400   .2750     .25     100
148          RK    2625   .0785    .045    .072    TRAP      10       3
149          RK    2300   .0217    .045           TRAP      25       3

150          KK    2010     SUB
151          KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152          BA   .0933
153          LS              83    1.37
154          UK     800   .6425     .30     100
155          RK    3000   .0213    .045           TRAP      50       3     YES

156          KK    2003     RET
157          KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158          DR    2003

159          KK    2005     SUB
160          KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161        BA   .1363
162        LS            72    1.76
163        UK     175   .1400    .15     100
164        RK    2600   .0385   .045           TRAP    750      2    YES

165        KK    2011     CP
166        KM       ROUTE SUB 2005 TO CP 2011
167        RK    2200   .0213   .045           TRAP     50      3

168        KK    2012     CP
169        KM       COMBINE SUB 2010 & ROUTE CP 2011
170        HC       2

171        KK    2015    SUB
172        KM       RUNOFF FROM SUB 2015 & ROUTE CP 2012
173        BA   .4053
174        LS            78
175        UK     500   .2800    .25     100
176        RK    2400   .1358   .045    .061   TRAP     10      3
177        RK    4700   .0304   .045           TRAP     60     20    YES
1                                        HEC-1 INPUT                                                    PAGE  5

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

178        KK    2020    SUB
179        KM       RUNOFF FROM SUB 2020
180        BA   .1090
181        LS            85
182        UK     205   .6969    .30     100
183        RK     900   .3889   .045    .011   TRAP     10      3
184        RK    2800   .1428   .045           TRAP     20      3

185        KK    2016     CP
186        KM       ROUTE SUB 2020 TO CP 2016
187        RK    1400   .0343   .045           TRAP     20      3

188        KK    2017     CP
189        KM       COMBINE SUB 2015 & CP 2016
190        HC       2

191        KK    2030    SUB
192        KM       RUNOFF FROM SUB 2030 & ROUTE CP 2017
193        BA   .2346
194        LS            67
195        UK     155   .0614    .15     100
196        RK    3555   .0355   .045    .047   TRAP     10     10
197        RK    2900   .0262   .045           TRAP     60     20    YES

198        KK    2040    SUB
199        KM       RUNOFF FROM SUB 2040
200        BA   .9290
201        LS            82
202        UK     463   .4072    .25     100
203        RK    2700   .1878   .045    .056   TRAP     10      3
204        RK    6800   .0485   .045           TRAP     25      3

205        KK    2050    SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS              81
209          UK    530   .5726    .25     100
210          RK   3400   .2067    .045    .086    TRAP     10       3
211          RK   6200   .0693    .045            TRAP     25       5

212          KK   2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (---)) DIVERSION
   NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
    8       SUB39
              .
              .
   20         .       SUB40
              .          .
              .          .
   26       CP41............
              V
              V
   29      SUB41 ***
              .
              .
   35         .       SUB42
              .          .
              .          .
   41         .          .      SUB43
              .          .         .
              .          .         .
   47         .          .         .      SUB44
              .          .         .         .
              .          .         .         .
   53         .          .      CP45............
              .          .         V
              .          .         V
   56         .          .      SUB45 ***
              .          .         .
              .          .         .
   62         .          .         .     SUB45A
              .          .         .         .
              .          .         .         .
   68         .          .         .         .      SUB46
              .          .         .         .         .
              .          .         .         .         .
   75         .          .      CP47......................
              .          .         V
              .          .         V
   78         .          .      SUB47 ***
              .          .         .
              .          .         .
   84       CP48......................
              V
```

```
            V
 87      SUB48 ***
            .
            .
 93         .       SUB49
            .          .
            .          .
 99         .          .       SUB50
            .          .          .
            .          .          .
106      CP51.......................
            .
            .
114         .-------)    2003
109      2004
            V
            V
117      SUB51 ***
            V
            V
123      SUB52 ***
            V
            V
129      SUB53 ***
            .
            .
135         .        2000
            .          V
            .          V
150         .        2010 ***
            .          .
            .          .
158         .          .          .<-------    2003
156         .          .       2003
            .          .          V
            .          .          V
159         .          .       2005 ***
            .          .          V
            .          .          V
165         .          .       2011
            .          .          .
            .          .          .
168         .        2012............
            .          V
            .          V
171         .        2015 ***
            .          .
            .          .
178         .          .       2020
            .          .          V
            .          .          V
185         .          .       2016
            .          .          .
            .          .          .
188         .        2017............
            .          V
            .          V
```

```
191          .        2030 ***
             .          .
             .          .
198          .          .       2040
             .          .         .
             .          .         .
205          .          .         .       2050
             .          .         .         .
             .          .         .         .
212          .          .       2051............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    ****************************************
*                                       *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981              *                    *  THE HYDROLOGIC ENGINEERING CENTER   *
*          REVISED 30 OCT 81            *                    *         609 SECOND STREET            *
*                                       *                    *      DAVIS, CALIFORNIA 95616         *
*RUN DATE WED, JUL 20 1988 TIME 10:58:29*                    *  (916) 440-3285 OR (FTS) 448-3285    *
*                                       *                    *                                      *
*****************************************                    ****************************************
```

```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC40.24I -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
                    25-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     27FEB88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     28FEB88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH  INCHES
            LENGTH, ELEVATION    FEET
            FLOW                 CUBIC FEET PER SECOND
            STORAGE VOLUME       ACRE-FEET
            SURFACE AREA         ACRES
            TEMPERATURE          DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB39	2498.	6.17	314.	97.	97.	1.94		
+	HYDROGRAPH AT	SUB40	944.	6.08	88.	27.	27.	0.58		
+	2 COMBINED AT	CP41	3338.	6.17	402.	124.	124.	2.53		
+	HYDROGRAPH AT	SUB41	3603.	6.25	492.	153.	153.	3.32		
+	HYDROGRAPH AT	SUB42	711.	6.17	69.	22.	22.	0.58		
+	HYDROGRAPH AT	SUB43	1689.	6.08	175.	54.	54.	1.07		
+	HYDROGRAPH AT	SUB44	1251.	6.08	137.	42.	42.	0.85		
+	2 COMBINED AT	CP45	2940.	6.08	312.	96.	96.	1.92		
+	HYDROGRAPH AT	SUB45	2931.	6.17	340.	105.	105.	2.13		
+	HYDROGRAPH AT	SUB45A	312.	6.08	30.	9.	9.	0.17		
+	HYDROGRAPH AT	SUB46	1682.	6.08	165.	49.	49.	0.93		
+	3 COMBINED AT	CP47	4645.	6.08	534.	163.	163.	3.23		
+	HYDROGRAPH AT	SUB47	4825.	6.25	598.	183.	183.	3.60		
+	3 COMBINED AT	CP48	8783.	6.25	1158.	358.	358.	7.50		
+	HYDROGRAPH AT	SUB48	8625.	6.25	1162.	359.	359.	7.55		
+	HYDROGRAPH AT	SUB49	486.	6.08	44.	14.	14.	0.35		
+	HYDROGRAPH AT	SUB50	603.	6.08	57.	17.	17.	0.36		

+	3 COMBINED AT CP51	9031.	6.25	1260.	390.	390.	8.26
+	DIVERSION TO 2003	4516.	6.25	630.	195.	195.	8.26
+	HYDROGRAPH AT 2004	4516.	6.25	630.	195.	195.	8.26
+	HYDROGRAPH AT SUB51	3960.	6.42	704.	224.	224.	9.33
+	HYDROGRAPH AT SUB52	2845.	6.75	770.	254.	254.	10.68
+	HYDROGRAPH AT SUB53	1967.	7.50	844.	296.	296.	12.43
+	HYDROGRAPH AT 2000	1529.	6.08	151.	46.	46.	0.80
+	HYDROGRAPH AT 2010	1486.	6.17	170.	51.	51.	0.89
+	HYDROGRAPH AT 2003	4516.	6.25	630.	195.	195.	0.00
+	HYDROGRAPH AT 2005	4366.	6.33	649.	201.	201.	0.14
+	ROUTED TO 2011	4315.	6.33	655.	202.	202.	0.14
+	2 COMBINED AT 2012	5112.	6.33	822.	254.	254.	1.03
+	HYDROGRAPH AT 2015	5150.	6.42	881.	273.	273.	1.43
+	HYDROGRAPH AT 2020	228.	6.08	22.	7.	7.	0.11
+	ROUTED TO 2016	218.	6.08	22.	7.	7.	0.11
+	2 COMBINED AT 2017	5190.	6.42	901.	279.	279.	1.54
+	HYDROGRAPH AT 2030	5072.	6.50	924.	286.	286.	1.78
+	HYDROGRAPH AT 2040	1590.	6.08	159.	49.	49.	0.93
+	HYDROGRAPH AT 2050	1411.	6.08	140.	43.	43.	0.86

```
        2 COMBINED AT
+                       2051     3001.    6.08        299.        92.        92.       1.79


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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 10:54:19*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
* (916) 440-3285 OR (FTS) 448-3285  *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1           ID        GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
   2           ID        MODEL [redacted] -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
   3           ID        [redacted] 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
   4           ID        RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
   5           IT       5 27FEB88       0     289
   6           IO       5       0
   7           IN      30 27FEB88       0

   8           KK   SUB39
   9           KM        RUNOFF FROM SUB-BASIN 39
  10           BA  1.9422
  11           PB    3.94
  12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
  13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
  14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
  15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
  16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
  17           LS              85    1.60
  18           UK     330   .0433     .20     100
  19           RK   11240   .0253    .045            TRAP      30       3

  20           KK   SUB40
  21           KM        RUNOFF FROM SUB-BASIN 40
  22           BA   .5844
```

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68          KK   SUB46

 69          KM        RUNOFF FROM SUB-BASIN 46
 70          BA   .9268
 71          LS             86
 72          UK    265   .4958     .20     100
 73          RK   3300   .2271    .045    .111    TRAP      10       3
 74          RK   7100   .0535    .045            TRAP      25       3

 75          KK   CP47
 76          KM        COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77          HC       3

 78          KK   SUB47
 79          KM        RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80          BA   .3757
 81          LS             77    1.28
 82          UK    375   .1000     .20     100
 83          RK   9600   .0217    .045            TRAP      50       3     YES

 84          KK   CP48
 85          KM        COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86          HC       3

 87          KK   SUB48
 88          KM        RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89          BA   .0438
 90          LS             73    4.14
 91          UK    150   .0733     .20     100
 92          RK   1300   .0338    .045            TRAP      75       3     YES
1                                          HEC-1 INPUT                                                    PAGE  3

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

 93          KK   SUB49
 94          KM        RUNOFF FROM SUB-BASIN 49
 95          BA   .3528
 96          LS             79    1.88
 97          UK    135   .0758     .20     100
 98          RK   5400   .0370    .045            TRAP      30       3

 99          KK   SUB50
100          KM        RUNOFF FROM SUB-BASIN 50
101          BA   .3580
102          LS             84    1.39
103          UK    300   .3555     .20     100
104          RK    730   .1506    .045    .036    TRAP      10       3
105          RK   6400   .0453    .045            TRAP      25       3

106          KK   CP51
107          KM        COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108          HC       3

109          KK   2004     DIV
110          KM        DIVERT FLOW TO SUB 2005
111          KM        THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112          KM        SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113          KM        THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114        DT    2003
115        DI       0   15000
116        DQ       0    7500

117        KK   SUB51
118        KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119        BA  1.0675
120        LS              72    4.06
121        UK      94   .0213     .10     100
122        RK    6400   .0329    .045           TRAP    1500       2     YES

123        KK   SUB52
124        KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125        BA  1.3557
126        LS              71    1.15
127        UK      76   .0213     .10     100
128        RK    6633   .0300    .045           TRAP    2500       2     YES

129        KK   SUB53
130        KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131        BA  1.7471
132        LS              74
133        UK      67   .0213     .10     100
134        RK    7767   .0196    .045           TRAP    3500       2     YES
```



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

135        KK    2000     SUB
136        KM        RUNOFF FROM SUB 2000
137        KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138        KM        GEOGRAPHICAL AREA
139        BA   .7999
140        PB    3.85
141        PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
142        PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
143        PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
144        PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
145        PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
146        LS              84
147        UK     400   .2750     .25     100
148        RK    2625   .0785    .045    .072    TRAP      10       3
149        RK    2300   .0217    .045           TRAP      25       3

150        KK    2010     SUB
151        KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152        BA   .0933
153        LS              83    1.37
154        UK     800   .6425     .30     100
155        RK    3000   .0213    .045           TRAP      50       3     YES

156        KK    2003     RET
157        KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158        DR    2003

159        KK    2005     SUB
160        KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161        BA   .1363
162        LS            72    1.76
163        UK    175   .1400    .15     100
164        RK   2600   .0385    .045          TRAP    750      2    YES

165        KK   2011      CP
166        KM       ROUTE SUB 2005 TO CP 2011
167        RK   2200   .0213    .045          TRAP     50      3

168        KK   2012      CP
169        KM       COMBINE SUB 2010 & ROUTE CP 2011
170        HC      2

171        KK   2015     SUB
172        KM       RUNOFF FROM SUB 2015 & ROUTE CP 2012
173        BA   .4053
174        LS            78
175        UK    500   .2800    .25     100
176        RK   2400   .1358    .045   .061   TRAP     10      3
177        RK   4700   .0304    .045          TRAP     60     20    YES
1                                        HEC-1 INPUT                                                    PAGE  5

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

178        KK   2020     SUB
179        KM       RUNOFF FROM SUB 2020
180        BA   .1090
181        LS            85
182        UK    205   .6969    .30     100
183        RK    900   .3889    .045   .011   TRAP     10      3
184        RK   2800   .1428    .045          TRAP     20      3

185        KK   2016      CP
186        KM       ROUTE SUB 2020 TO CP 2016
187        RK   1400   .0343    .045          TRAP     20      3

188        KK   2017      CP
189        KM       COMBINE SUB 2015 & CP 2016
190        HC      2

191        KK   2030     SUB
192        KM       RUNOFF FROM SUB 2030 & ROUTE CP 2017
193        BA   .2346
194        LS            67
195        UK    155   .0614    .15     100
196        RK   3555   .0355    .045   .047   TRAP     10     10
197        RK   2900   .0262    .045          TRAP     60     20    YES

198        KK   2040     SUB
199        KM       RUNOFF FROM SUB 2040
200        BA   .9290
201        LS            82
202        UK    463   .4072    .25     100
203        RK   2700   .1878    .045   .056   TRAP     10      3
204        RK   6800   .0485    .045          TRAP     25      3

205        KK   2050     SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS              81
209          UK     530   .5726     .25     100
210          RK    3400   .2067    ,045    .086    TRAP      10       3
211          RK    6200   .0693    ,045            TRAP      25       5

212          KK    2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (---)) DIVERSION
  NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8       SUB39
              .
              .
  20          .       SUB40
              .          .
              .          .
  26        CP41............
              V
              V
  29       SUB41 ***
              .
              .
  35          .       SUB42
              .          .
              .          .
  41          .          .       SUB43
              .          .          .
              .          .          .
  47          .          .          .       SUB44
              .          .          .          .
              .          .          .          .
  53          .          .        CP45............
              .          .          V
              .          .          V
  56          .          .       SUB45 ***
              .          .          .
              .          .          .
  62          .          .          .      SUB45A
              .          .          .          .
              .          .          .          .
  68          .          .          .          .       SUB46
              .          .          .          .          .
              .          .          .          .          .
  75          .          .        CP47........................
              .          .          V
              .          .          V
  78          .          .       SUB47 ***
              .          .          .
              .          .          .
  84        CP48........................
              V
```

```
            V
 87      SUB48 ***
            .
            .
 93         .       SUB49
            .          .
            .          .
 99         .          .       SUB50
            .          .          .
            .          .          .
106      CP51.......................
            .
            .
114         .-------)    2003
109      2004
            V
            V
117     SUB51 ***
            V
            V
123     SUB52 ***
            V
            V
129     SUB53 ***
            .
            .
135         .        2000
            .          V
            .          V
150         .        2010 ***
            .          .
            .          .
158         .          .          .(-------    2003
156         .          .       2003
            .          .          V
            .          .          V
159         .          .       2005 ***
            .          .          V
            .          .          V
165         .          .       2011
            .          .          .
            .          .          .
168         .        2012............
            .          V
            .          V
171         .        2015 ***
            .          .
            .          .
178         .          .       2020
            .          .          V
            .          .          V
185         .          .       2016
            .          .          .
            .          .          .
188         .        2017............
            .          V
            .          V
```

```
191          .       2030 ***
             .          .
             .          .
198          .          .       2040
             .          .          .
             .          .          .
205          .          .          .       2050
             .          .          .          .
             .          .          .          .
212          .          .       2051............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    ****************************************
*                                       *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*             FEBRUARY 1981             *                    * THE HYDROLOGIC ENGINEERING CENTER    *
*           REVISED 30 OCT 81           *                    *         609 SECOND STREET            *
*                                       *                    *      DAVIS, CALIFORNIA 95616         *
*RUN DATE WED, JUL 20 1988 TIME 10:54:19*                    * (916) 440-3285 OR (FTS) 448-3285     *
*                                       *                    *                                      *
*****************************************                    ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC40.24I -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
50-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

   IT         HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     27FEB88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     28FEB88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA        SQUARE MILES
             PRECIPITATION DEPTH  INCHES
             LENGTH, ELEVATION    FEET
             FLOW                 CUBIC FEET PER SECOND
             STORAGE VOLUME       ACRE-FEET
             SURFACE AREA         ACRES
             TEMPERATURE          DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB39	3121.	6.08	382.	117.	117.	1.94		
+	HYDROGRAPH AT	SUB40	1159.	6.08	111.	34.	34.	0.58		
+	2 COMBINED AT	CP41	4280.	6.08	492.	151.	151.	2.53		
+	HYDROGRAPH AT	SUB41	4520.	6.25	611.	188.	188.	3.32		
+	HYDROGRAPH AT	SUB42	956.	6.08	88.	27.	27.	0.58		
+	HYDROGRAPH AT	SUB43	2150.	6.08	215.	66.	66.	1.07		
+	HYDROGRAPH AT	SUB44	1698.	6.08	170.	52.	52.	0.85		
+	2 COMBINED AT	CP45	3848.	6.08	385.	117.	117.	1.92		
+	HYDROGRAPH AT	SUB45	3749.	6.08	421.	128.	128.	2.13		
+	HYDROGRAPH AT	SUB45A	375.	6.08	36.	11.	11.	0.17		
+	HYDROGRAPH AT	SUB46	2026.	6.08	200.	60.	60.	0.93		
+	3 COMBINED AT	CP47	6151.	6.08	655.	199.	199.	3.23		
+	HYDROGRAPH AT	SUB47	6049.	6.25	746.	225.	225.	3.60		
+	3 COMBINED AT	CP48	11021.	6.17	1444.	441.	441.	7.50		
+	HYDROGRAPH AT	SUB48	10987.	6.17	1448.	442.	442.	7.55		
+	HYDROGRAPH AT	SUB49	611.	6.08	57.	18.	18.	0.35		
+	HYDROGRAPH AT	SUB50	735.	6.08	70.	21.	21.	0.36		

+	3 COMBINED AT	CP51	12101.	6.17	1573.	481.	481.	8.26
+	DIVERSION TO	2003	6051.	6.17	787.	241.	241.	8.26
+	HYDROGRAPH AT	2004	6051.	6.17	787.	241.	241.	8.26
+	HYDROGRAPH AT	SUB51	5620.	6.33	890.	278.	278.	9.33
+	HYDROGRAPH AT	SUB52	4277.	6.67	989.	320.	320.	10.68
+	HYDROGRAPH AT	SUB53	2922.	7.25	1103.	376.	376.	12.43
+	HYDROGRAPH AT	2000	1529.	6.08	151.	46.	46.	0.80
+	HYDROGRAPH AT	2010	1486.	6.17	170.	51.	51.	0.89
+	HYDROGRAPH AT	2003	6051.	6.17	787.	241.	241.	0.00
+	HYDROGRAPH AT	2005	5917.	6.25	815.	249.	249.	0.14
+	ROUTED TO	2011	5685.	6.25	833.	253.	253.	0.14
+	2 COMBINED AT	2012	6849.	6.25	999.	305.	305.	1.03
+	HYDROGRAPH AT	2015	6815.	6.33	1058.	323.	323.	1.43
+	HYDROGRAPH AT	2020	228.	6.08	22.	7.	7.	0.11
+	ROUTED TO	2016	218.	6.08	22.	7.	7.	0.11
+	2 COMBINED AT	2017	6875.	6.33	1078.	330.	330.	1.54
+	HYDROGRAPH AT	2030	6734.	6.42	1101.	337.	337.	1.78
+	HYDROGRAPH AT	2040	1590.	6.08	159.	49.	49.	0.93
+	HYDROGRAPH AT	2050	1411.	6.08	140.	43.	43.	0.86

```
        2 COMBINED AT
+                       2051     3001.   6.08       299.       92.       92.       1.79


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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 10:47:41*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KN.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL[redacted] SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
    3          ID       [redacted] 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 27FEB88       0     289
    6          IO       5       0
    7          IN      30 27FEB88       0

    8          KK   SUB39
    9          KM       RUNOFF FROM SUB-BASIN 39
   10          BA  1.9422
   11          PB    4.39
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS             85    1.60
   18          UK     330   .0433     .20     100
   19          RK   11240   .0253    .045            TRAP      30       3

   20          KK   SUB40
   21          KM       RUNOFF FROM SUB-BASIN 40
   22          BA   .5844
```

```
 23          LS              83    1.06
 24          UK     160   .0627     .20     100
 25          RK    7000   .0350    .045           TRAP      20       3

 26          KK    CP41
 27          KM        COMBINE HYDROGRAPHS SUB39 & SUB40
 28          HC       2

 29          KK   SUB41
 30          KM        RUNOFF FROM SUB-BASIN 41 & ROUTE CP 41
 31          BA   .7911
 32          LS              74    2.04
 33          UK     280   .2386     .20     100
 34          RK    9400   .0282    .045           TRAP      50       3     YES

 35          KK   SUB42
 36          KM        RUNOFF FROM SUB-BASIN 42
 37          BA   .5844
 38          LS              78    1.24
 39          UK     280   .2386     .20     100
 40          RK    8750   .0573    .045           TRAP      20       3

 41          KK   SUB43
 42          KM        RUNOFF FROM SUB-BASIN 43
 43          BA  1.0708
 44          LS              85    1.03
 45          UK     260   .0515     .20     100
 46          RK    7400   .0255    .045           TRAP      25       3
```



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

 47          KK   SUB44
 48          KM        RUNOFF FROM SUB-BASIN 44
 49          BA   .8537
 50          LS              85
 51          UK     260   .0515     .20     100
 52          RK    9840   .0622    .045           TRAP      25       3

 53          KK    CP45
 54          KM        COMBINE HYDROGRAPHS SUB43 & SUB44
 55          HC       2

 56          KK   SUB45
 57          KM        RUNOFF FROM SUB-BASIN 45 & ROUTE CP 45
 58          BA   .2037
 59          LS              81
 60          UK     125   .1166     .20     100
 61          RK    3600   .0366    .045           TRAP      30       3     YES

 62          KK  SUB45A
 63          KM        RUNOFF FROM SUB 45A
 64          BA   .1720
 65          LS              86
 66          UK     275   .2200     .20     100
 67          RK    5400   .0411    .045           TRAP      15       3
```

```
 68          KK   SUB46
 69          KM        RUNOFF FROM SUB-BASIN 46
 70          BA   .9268
 71          LS             86
 72          UK    265   .4958     .20     100
 73          RK   3300   .2271    .045    .111    TRAP     10       3
 74          RK   7100   .0535    .045            TRAP     25       3

 75          KK   CP47
 76          KM        COMBINE HYDROGRAPHS SUB45, SUB45A, & SUB46
 77          HC       3

 78          KK   SUB47
 79          KM        RUNOFF FROM SUB-BASIN 47 & ROUTE CP 47
 80          BA   .3757
 81          LS             77    1.28
 82          UK    375   .1000     .20     100
 83          RK   9600   .0217    .045            TRAP     50       3     YES

 84          KK   CP48
 85          KM        COMBINE HYDROGRAPHS SUB41, SUB42, & SUB47
 86          HC       3

 87          KK   SUB48
 88          KM        RUNOFF FROM SUB-BASIN 48 & ROUTE CP 48
 89          BA   .0438
 90          LS             73    4.14
 91          UK    150   .0733     .20     100
 92          RK   1300   .0338    .045            TRAP     75       3     YES
1                                          HEC-1 INPUT                                                    PAGE  3

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

 93          KK   SUB49
 94          KM        RUNOFF FROM SUB-BASIN 49
 95          BA   .3528
 96          LS             79    1.88
 97          UK    135   .0758     .20     100
 98          RK   5400   .0370    .045            TRAP     30       3

 99          KK   SUB50
100          KM        RUNOFF FROM SUB-BASIN 50
101          BA   .3580
102          LS             84    1.39
103          UK    300   .3555     .20     100
104          RK    730   .1506    .045    .036    TRAP     10       3
105          RK   6400   .0453    .045            TRAP     25       3

106          KK   CP51
107          KM        COMBINE HYDROGRAPHS SUB48, SUB49, & SUB50
108          HC       3

109          KK   2004     DIV
110          KM        DIVERT FLOW TO SUB 2005
111          KM        THIS DIVERT OCCURS AT A BRAIDED CHANNEL BIFURCATION LOCATED 1000 FEET
112          KM        SOUTH OF THE EAST END OF PINNACLE PEAK ROAD.
113          KM        THIS IS AN ACTIVE ALLUVIAL FAN APEX.
```

```
114          DT    2003
115          DI       0   15000
116          DQ       0    7500

117          KK   SUB51
118          KM        RUNOFF FROM SUB-BASIN 51 & ROUTE NON-DIVERTED FLOW FROM DIV 2004
119          BA  1.0675
120          LS              72    4.06
121          UK      94   .0213     .10     100
122          RK    6400   .0329    .045           TRAP    1500       2     YES

123          KK   SUB52
124          KM        RUNOFF FROM SUB-BASIN 52 & ROUTE SUB 51
125          BA  1.3557
126          LS              71    1.15
127          UK      76   .0213     .10     100
128          RK    6633   .0300    .045           TRAP    2500       2     YES

129          KK   SUB53
130          KM        RUNOFF FROM SUB-BASIN 53 & ROUTE SUB 52
131          BA  1.7471
132          LS              74
133          UK      67   .0213     .10     100
134          RK    7767   .0196    .045           TRAP    3500       2     YES
```



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

135          KK    2000     SUB
136          KM        RUNOFF FROM SUB 2000
137          KM        RAINFALL AMOUNT IS CHANGED TO REFLECT TRANSITION INTO A DIFFERENT
138          KM        GEOGRAPHICAL AREA
139          BA   .7999
140          PB    4.29
141          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
142          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
143          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
144          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
145          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
146          LS              84
147          UK     400   .2750     .25     100
148          RK    2625   .0785    .045    .072    TRAP      10       3
149          RK    2300   .0217    .045           TRAP      25       3

150          KK    2010     SUB
151          KM        RUNOFF FROM SUB 2010 & ROUTE SUB 2000
152          BA   .0933
153          LS              83    1.37
154          UK     800   .6425     .30     100
155          RK    3000   .0213    .045           TRAP      50       3     YES

156          KK    2003     RET
157          KM        RETRIEVE DIVERTED FLOW FROM DIV 2004
158          DR    2003

159          KK    2005     SUB
160          KM        RUNOFF FROM 2005 & ROUTE RET 2003
```

```
161        BA   .1363
162        LS            72    1.76
163        UK     175   .1400     .15     100
164        RK    2600   .0385    .045            TRAP     750       2     YES

165        KK    2011      CP
166        KM        ROUTE SUB 2005 TO CP 2011
167        RK    2200   .0213    .045            TRAP      50       3

168        KK    2012      CP
169        KM        COMBINE SUB 2010 & ROUTE CP 2011
170        HC       2

171        KK    2015     SUB
172        KM        RUNOFF FROM SUB 2015 & ROUTE CP 2012
173        BA   .4053
174        LS            78
175        UK     500   .2800     .25     100
176        RK    2400   .1358    .045    .061    TRAP      10       3
177        RK    4700   .0304    .045            TRAP      60      20     YES
1                                          HEC-1 INPUT                                                          PAGE  5

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

178        KK    2020     SUB
179        KM        RUNOFF FROM SUB 2020
180        BA   .1090
181        LS            85
182        UK     205   .6969     .30     100
183        RK     900   .3889    .045    .011    TRAP      10       3
184        RK    2800   .1428    .045            TRAP      20       3

185        KK    2016      CP
186        KM        ROUTE SUB 2020 TO CP 2016
187        RK    1400   .0343    .045            TRAP      20       3

188        KK    2017      CP
189        KM        COMBINE SUB 2015 & CP 2016
190        HC       2

191        KK    2030     SUB
192        KM        RUNOFF FROM SUB 2030 & ROUTE CP 2017
193        BA   .2346
194        LS            67
195        UK     155   .0614     .15     100
196        RK    3555   .0355    .045    .047    TRAP      10      10
197        RK    2900   .0262    .045            TRAP      60      20     YES

198        KK    2040     SUB
199        KM        RUNOFF FROM SUB 2040
200        BA   .9290
201        LS            82
202        UK     463   .4072     .25     100
203        RK    2700   .1878    .045    .056    TRAP      10       3
204        RK    6800   .0485    .045            TRAP      25       3

205        KK    2050     SUB
```

```
206          KM        RUNOFF FROM SUB 2050
207          BA   .8580
208          LS              81
209          UK    530   .5726     .25     100
210          RK   3400   .2067    .045    .086    TRAP      10       3
211          RK   6200   .0693    .045            TRAP      25       5

212          KK   2051      CP
213          KM        COMBINE SUB 2040 & SUB 2050
214          HC       2
215          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (---)) DIVERSION
   NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
    8      SUB39
              .
              .
   20         .       SUB40
              .           .
              .           .
   26       CP41............
              V
              V
   29      SUB41 ***
              .
              .
   35         .       SUB42
              .           .
              .           .
   41         .           .      SUB43
              .           .          .
              .           .          .
   47         .           .          .      SUB44
              .           .          .          .
              .           .          .          .
   53         .           .       CP45............
              .           .          V
              .           .          V
   56         .           .      SUB45 ***
              .           .          .
              .           .          .
   62         .           .          .     SUB45A
              .           .          .          .
              .           .          .          .
   68         .           .          .          .      SUB46
              .           .          .          .          .
              .           .          .          .          .
   75         .           .       CP47......................
              .           .          V
              .           .          V
   78         .           .      SUB47 ***
              .           .          .
              .           .          .
   84       CP48......................
              V
```

```
            V
 87      SUB48 ***
            .
            .
 93         .       SUB49
            .          .
            .          .
 99         .          .       SUB50
            .          .          .
            .          .          .
106      CP51.......................
            .
            .
114         .-------)    2003
109      2004
            V
            V
117      SUB51 ***
            V
            V
123      SUB52 ***
            V
            V
129      SUB53 ***
            .
            .
135         .       2000
            .          V
            .          V
150         .       2010 ***
            .          .
            .          .
158         .          .          .<-------    2003
156         .          .       2003
            .          .          V
            .          .          V
159         .          .       2005 ***
            .          .          V
            .          .          V
165         .          .       2011
            .          .          .
            .          .          .
168         .       2012............
            .          V
            .          V
171         .       2015 ***
            .          .
            .          .
178         .          .       2020
            .          .          V
            .          .          V
185         .          .       2016
            .          .          .
            .          .          .
188         .       2017............
            .          V
            .          V
```

```
191          .       2030 ***
             .          .
             .          .
198          .          .       2040
             .          .          .
             .          .          .
205          .          .          .       2050
             .          .          .          .
             .          .          .          .
212          .          .       2051............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    ****************************************
 *                                       *                    *                                      *
 *  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *            FEBRUARY 1981              *                    * THE HYDROLOGIC ENGINEERING CENTER    *
 *          REVISED 30 OCT 81            *                    *         609 SECOND STREET            *
 *                                       *                    *      DAVIS, CALIFORNIA 95616         *
 *RUN DATE WED, JUL 20 1988 TIME 10:47:41*                    * (916) 440-3285 OR (FTS) 448-3285     *
 *                                       *                    *                                      *
 *****************************************                    ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC40.241 -- SUB-BASIN SERIES 2000 TO 2230 & 39 TO 53
100-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     27FEB88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     28FEB88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB39	3938.	6.08	452.	137.	137.	1.94		
+	HYDROGRAPH AT	SUB40	1361.	6.08	130.	39.	39.	0.58		
+	2 COMBINED AT	CP41	5299.	6.08	582.	177.	177.	2.53		
+	HYDROGRAPH AT	SUB41	5763.	6.17	719.	220.	220.	3.32		
+	HYDROGRAPH AT	SUB42	1151.	6.08	106.	33.	33.	0.58		
+	HYDROGRAPH AT	SUB43	2555.	6.08	253.	77.	77.	1.07		
+	HYDROGRAPH AT	SUB44	2022.	6.08	201.	61.	61.	0.85		
+	2 COMBINED AT	CP45	4577.	6.08	454.	137.	137.	1.92		
+	HYDROGRAPH AT	SUB45	4652.	6.08	498.	151.	151.	2.13		
+	HYDROGRAPH AT	SUB45A	436.	6.08	43.	13.	13.	0.17		
+	HYDROGRAPH AT	SUB46	2349.	6.08	236.	70.	70.	0.93		
+	3 COMBINED AT	CP47	7437.	6.08	776.	233.	233.	3.23		
+	HYDROGRAPH AT	SUB47	7200.	6.17	871.	262.	262.	3.60		
+	3 COMBINED AT	CP48	13947.	6.17	1696.	515.	515.	7.50		
+	HYDROGRAPH AT	SUB48	13601.	6.17	1701.	517.	517.	7.55		
+	HYDROGRAPH AT	SUB49	730.	6.08	69.	21.	21.	0.35		
+	HYDROGRAPH AT	SUB50	859.	6.08	84.	25.	25.	0.36		

+	3 COMBINED AT	CP51	14867.	6.17	1850.	563.	563.	8.26
+	DIVERSION TO 50%	2003	7434.	6.17	925.	282.	282.	8.26
+	HYDROGRAPH AT	2004	7434.	6.17	925.	282.	282.	8.26 +1.06 75
+	HYDROGRAPH AT	SUB51	7175.	6.33 Δt = .16	1056.	328.	328.	9.33
+	HYDROGRAPH AT	SUB52	5728.	6.58 Δt = 0.25	1188.	380.	380.	10.68
+	HYDROGRAPH AT	SUB53	3952.	7.08 Δt 0.50	1349.	451.	451.	12.43
+	HYDROGRAPH AT	2000	1835.	6.08	178.	54.	54.	0.80
+	HYDROGRAPH AT	2010	1821.	6.08	202.	61.	61.	0.89
+	HYDROGRAPH AT	2003	7434.	6.17	925.	282.	282.	0.00
+	HYDROGRAPH AT	2005	7088.	6.25	950.	289.	289.	0.14 ✓
+	ROUTED TO	2011	6924.	6.25	957.	291.	291.	0.14 ✓
+	2 COMBINED AT	2012	8220.	6.25	1157.	352.	352.	1.03
+	HYDROGRAPH AT	2015	8132.	6.33	1230.	374.	374.	1.43
+	HYDROGRAPH AT	2020	265.	6.08	26.	8.	8.	0.11
+	ROUTED TO	2016	256.	6.08	26.	8.	8.	0.11
+	2 COMBINED AT	2017	8199.	6.33	1253.	382.	382.	1.54
+	HYDROGRAPH AT	2030	7927.	6.42	1276.	390.	390.	1.78
+	HYDROGRAPH AT	2040	1932.	6.08	189.	57.	57.	0.93
+	HYDROGRAPH AT	2050	1724.	6.08	169.	51.	51.	0.86

2 COMBINED AT

+	2051	3656.	6.08	358.	109.	109.	1.79

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

STREAM #3 CONCENTRATION POINT C35

STREAM #4 CONCENTRATION POINT C27

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:18:08*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD HAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1           ID        GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
   2           ID        MODEL[redacted]-- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
   3           ID        [redacted], 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
   4           ID        RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
   5           IT       5 18MAR88       0     289
   6           IO       5       0
   7           IN      30 18MAR88       0

   8           KK    SUB1
   9           KM        RUNOFF FROM SUB-BASIN 1
  10           BA   .3371
  11           PB   1.95
  12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
  13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
  14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
  15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
  16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
  17           LS            75
  18           UK     255   .0262     .20     100
  19           RK    7160   .0289    .045            TRAP      35       3

  20           KK    SUB2
  21           KM        RUNOFF FROM SUB-BASIN 2
  22           BA  1.2170
```

```
23        LS              83    1.28
24        UK     337   .0308     .20     100
25        RK   24000   .0196     .045            TRAP     35      3

26        KK    SUB3
27        KM        RUNOFF FROM SUB-BASIN 3
28        BA   .5448
29        LS              81    1.44
30        UK     255   .0262     .20     100
31        RK   16400   .0201     .045            TRAP     35      3

32        KK     CP4
33        KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
34        HC       3

35        KK    SUB4
36        KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
37        BA  1.5102
38        LS              73    3.05                     WD
39        UK      84   .0213     .10     100
40        RK   10633   .0191     .045            TRAP     50     100     YES

41        KK    SUB5
42        KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
43        BA  1.8713
44        LS              74    1.29
45        UK       8   .0213     .10     100             WD
46        RK   11433   .0175     .045            TRAP     50     130     YES
```



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

47        KK    SUB6
48        KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
49        BA  2.7719
50        LS              74
51        UK     146   .0213     .10     100
52        RK   16100   .0124     .045            TRAP     50     150     YES
```

off Sheet

```
53        KK    SUB7
54        KM        RUNOFF FROM SUB-BASIN 7
55        BA   .6690
56        LS              78    2.13
57        UK     255   .0262     .20     100
58        RK   12200   .0197     .045            TRAP     50      50
```

12600

```
59        KK    SUB8
60        KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
61        BA  1.0885
62        LS              74    2.71
63        UK     116   .0213     .10     100
64        RK   10550   .0196     .045            TRAP     50     100     YES
```

10000

```
65        KK    SUB9
66        KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
67        BA  1.4559
68        LS              74
```

```
 69          UK     95   .0213    .10     100
 70          RK  10700   .0187    .045            TRAP     50    130    YES
                 10150
 71          KK  SUB10
 72          KM       RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS             74
 75          UK    107   .0213    .10     100
 76          RK  12400   .0137    .045            TRAP     50    175    YES
                 11400
 77          KK  SUB11
 78          KM       RUNOFF FROM SUB-BASIN 11
 79          BA  .5865
 80          LS             74   1.53
 81          UK    150   .0425    .20     100
 82          RK   6200   .0226    .045            TRAP     50     50
                 7000
 83          KK  SUB12
 84          KM       RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS             74   1.39
 87          UK     95   .0213    .10     100
 88          RK   9850   .0214    .045            TRAP     50    100    YES
1                9200                HEC-1 INPUT                                          PAGE  3

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

 89          KK  SUB13
 90          KM       RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS             74
 93          UK     86   .0213    .10     100
 94          RK  10533   .0192    .045            TRAP     50    130    YES
                 10,100
 95          KK  SUB14
 96          KM       RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS             74
 99          UK     10   .0213    .10     100
100          RK  11200   .0142    .045            TRAP     50    150    YES
                 10,950
101          KK  SUB16
102          KM       RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS             83
105          UK    217   .0581    .20     100
106          RK  14800   .0216    .045            TRAP     25      3

107          KK  SUB17
108          KM       RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS             83
111          UK    285   .0421    .20     100
112          RK  12200   .0254    .045            TRAP     25      3

113          KK  SUB18
114          KM       RUNOFF FROM SUB-BASIN 18
```

```
115        BA  1.2670
116        LS            83
117        UK    285   .0421     .20     100
118        RK  10840   .0259    .045            TRAP      25       3

119        KK  CP19A
120        KM       COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121        HC       3

122        KK  CP19B
123        KM       ROUTE CP19A TO CP19B
124        RK   1100   .0155   0.045            TRAP      35       3

125        KK  SUB15
126        KM       RUNOFF FROM SUB-BASIN 15
127        BA  1.3327
128        LS            82
129        UK    217   .0581     .20     100
130        RK  21200   .0236    .045            TRAP      25       3
```

Artificial Short cut.
19#18 = CP19 RK 5001
CP19B RK 5001
CP19B + 16 = CP19C
RK RK


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

131        KK  CP19C
132        KM       COMBINE HYDROGRAPHS SUB15 & CP19B
133        HC       2

134        KK  SUB19
135        KM       RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136        BA  .1774
137        LS            84
138        UK    275   .0800     .20     100
139        RK   3730   .0352    .045    .160    TRAP      15       3
140        RK   1800   .0200    .045            TRAP      50      30     YES

141        KK  SUB20
142        KM       RUNOFF FROM SUB-BASIN 20
143        BA  .5698
144        LS            84
145        UK    300   .0750     .20     100
146        RK   9640   .0197    .045            TRAP      15       3

147        KK  CP21
148        KM       COMBINE HYDROGRAPHS SUB19 & SUB20
149        HC       2

150        KK  SUB21
151        KM       RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152        BA  3.6841
153        LS            80    1.08
154        UK    297   .0558     .20     100
155        RK  27600   .0196    .045            TRAP      50      30     YES

156        KK  SUB22
157        KM       RUNOFF FROM SUB-BASIN 22
158        BA  1.3860
159        LS            84
```

? Out of logic for Adjoining area

?

```
160        UK    225  .0590    .20     100
161        RK  13000  .0238    .045            TRAP     25      3

162        KK  SUB23
163        KM       RUNOFF FROM SUB-BASIN 23
164        BA  .3945
165        LS            84
166        UK    225  .0590    .20     100
167        RK  10200  .0304    .045            TRAP     20      3

168        KK   CP24
169        KM       COMBINE HYDROGRAPHS SUB22 & SUB23
170        HC       2

171        KK  SUB24
172        KM       RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173        BA  .4550
174        LS            77    1.07
175        UK    295  .0438    .20     100
176        RK   6800  .0257    .045            TRAP     15      3     YES
```



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

177        KK  SUB25
178        KM       RUNOFF FROM SUB-BASIN 25
179        BA  1.5216
180        LS            85    1.02
181        UK    295  .0438    .20     100
182        RK  16700  .0302    .045            TRAP     25      3

183        KK   CP26
184        KM       COMBINE HYDROGRAPHS SUB24 & SUB25
185        HC       2

186        KK  SUB26
187        KM       RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188        BA  .6095
189        LS            74    1.51
190        UK    200  .0250    .20     100
191        RK  11400  .0241    .045            TRAP     30      3     YES

192        KK   CP27
193        KM       COMBINE HYDROGRAPHS SUB21 & SUB26
194        HC       2
```

APEX.

```
195        KK  SUB27
196        KM       RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197        BA  .7639
198        LS            73    1.59
199        UK    159  .0213    .10     100
200        RK   3200  .0310    .045            TRAP   1500      2     YES

201        KK  SUB28
202        KM       RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203        BA  1.4235
204        LS            73    1.27
```

```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045            TRAP   2500      2     YES

207          KK   SUB29
208          KM        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS              74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045            TRAP   3500      2     YES

213          KK   SUB30
214          KM        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS              82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045            TRAP     50    100
```

Stream 4


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

219          KK   SUB31
220          KM        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS              74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045            TRAP     50    130     YES

225          KK   SUB32
226          KM        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS              74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045            TRAP     50    130     YES

231          KK   SUB33
232          KM        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS              74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045            TRAP     50    175     YES

237          KK   SUB34
238          KM        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS              77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045            TRAP     50    100

243          KK   SUB35
244          KM        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS              79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045            TRAP     50    100

249          KK   CP36
250          KM        COMBINE HYDROGRAPHS SUB34 & SUB35
```

3P Stream or 3W

35

```
251          HC      2

252          KK   SUB36
253          KM        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
254          BA  1.4538
255          LS              72    2.11
256          UK     116   .0213    .10     100
257          RK    7767   .0281    .045           TRAP      50     130     YES

258          KK   SUB37
259          KM        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
260          BA  1.1896
261          LS              74    9.58
262          UK      61   .0213    .10     100
263          RK    8433   .0237    .045           TRAP      50     130     YES
1                                          HEC-1 INPUT                                                    PAGE  7

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

264          KK   SUB38
265          KM        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
266          BA  1.2597
267          LS              74
268          UK      84   .0213    .10     100
269          RK    8300   .0176    .045           TRAP      50     150     YES
270          ZZ
1
```

#3

```
             SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (---)) DIVERSION
  NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8        SUB1
              .
              .
  20          .        SUB2
              .          .
              .          .
  26          .          .        SUB3
              .          .          .
              .          .          .
  32        CP4.......................
             V
             V
  35       SUB4 ***
             V
             V
  41       SUB5 ***
             V
             V
  47       SUB6 ***
              .
              .
  53          .        SUB7
              .          V
              .          V
  59          .        SUB8 ***
              .          V
```

```
            .        V
65          .      SUB9 ***
            .        V
            .        V
71          .     SUB10 ***
            .        .
            .        .
77          .        .      SUB11
            .        .        V
            .        .        V
83          .        .      SUB12 ***
            .        .        V
            .        .        V
89          .        .      SUB13 ***
            .        .        V
            .        .        V
95          .        .      SUB14 ***
            .        .        .
            .        .        .
101         .        .        .      SUB16
            .        .        .        .
            .        .        .        .
107         .        .        .        .      SUB17
            .        .        .        .        .
            .        .        .        .        .
113         .        .        .        .        .      SUB18
            .        .        .        .        .        .
            .        .        .        .        .        .
119         .        .        .      CP19A.......................
            .        .        .        V
            .        .        .        V
122         .        .        .      CP19B
            .        .        .        .
            .        .        .        .
125         .        .        .        .      SUB15
            .        .        .        .        .
            .        .        .        .        .
131         .        .        .      CP19C............
            .        .        .        V
            .        .        .        V
134         .        .        .      SUB19 ***
            .        .        .        .
            .        .        .        .
141         .        .        .        .      SUB20
            .        .        .        .        .
            .        .        .        .        .
147         .        .        .       CP21............
            .        .        .        V
            .        .        .        V
150         .        .        .      SUB21 ***
            .        .        .        .
            .        .        .        .
156         .        .        .        .      SUB22
            .        .        .        .        .
            .        .        .        .        .
162         .        .        .        .        .      SUB23
            .        .        .        .        .        .
```

```
                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .      SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .      SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .      SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .      SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .      SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .      SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .      SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .      SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .      SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

1 Stream 3

Stream

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                    ***************************************
*                                       *                    *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS      *
*            FEBRUARY 1981              *                    * THE HYDROLOGIC ENGINEERING CENTER   *
*          REVISED 30 OCT 81            *                    *        609 SECOND STREET            *
*                                       *                    *      DAVIS, CALIFORNIA 95616        *
*RUN DATE WED, JUL 20 1988 TIME 11:18:08*                    * (916) 440-3285 OR (FTS) 448-3285    *
*                                       *                    *                                     *
*****************************************                    ***************************************


                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC80.24I, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
                    2-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE     18MAR88  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     19MAR88  ENDING DATE
                 NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                         SUB1     18.   7.00          8.          3.          3.      0.34

        HYDROGRAPH AT
+                         SUB2    109.   7.08         55.         20.         20.      1.22
```

+	HYDROGRAPH AT	SUB3	44.	7.00	21.	8.	8.	0.54
+	3 COMBINED AT	CP4	171.	7.08	84.	30.	30.	2.10
+	HYDROGRAPH AT	SUB4	178.	7.83	111.	42.	42.	3.61
+	HYDROGRAPH AT	SUB5	190.	8.67	139.	57.	57.	5.48
+	HYDROGRAPH AT	SUB6	197.	10.08	165.	75.	75.	8.25
+	HYDROGRAPH AT	SUB7	40.	7.17	21.	8.	8.	0.67
+	HYDROGRAPH AT	SUB8	67.	7.42	45.	18.	18.	1.76
+	HYDROGRAPH AT	SUB9	93.	7.92	70.	29.	29.	3.21
+	HYDROGRAPH AT	SUB10	117.	8.83	98.	44.	44.	5.33
+	HYDROGRAPH AT	SUB11	38.	6.67	14.	5.	5.	0.59
+	HYDROGRAPH AT	SUB12	82.	7.00	44.	16.	16.	1.92
+	HYDROGRAPH AT	SUB13	97.	7.83	64.	26.	26.	3.14
+	HYDROGRAPH AT	SUB14	100.	9.00	77.	33.	33.	4.26
+	HYDROGRAPH AT	SUB16	244.	6.50	71.	24.	24.	1.48
+	HYDROGRAPH AT	SUB17	196.	6.50	55.	19.	19.	1.15
+	HYDROGRAPH AT	SUB18	239.	6.50	61.	21.	21.	1.27
+	3 COMBINED AT	CP19A	679.	6.50	188.	63.	63.	3.89
+	ROUTED TO	CP19B	675.	6.50	188.	63.	63.	3.89
+	HYDROGRAPH AT	SUB15	144.	6.75	57.	20.	20.	1.33

+	2 COMBINED AT	CP19C	810.	6.58	245.	83.	83.	5.23
+	HYDROGRAPH AT	SUB19	829.	6.58	255.	86.	86.	5.40
+	HYDROGRAPH AT	SUB20	125.	6.42	30.	10.	10.	0.57
+	2 COMBINED AT	CP21	940.	6.58	285.	96.	96.	5.97
+	HYDROGRAPH AT	SUB21	688.	7.67	387.	141.	141.	9.66
+	HYDROGRAPH AT	SUB22	291.	6.33	73.	24.	24.	1.39
+	HYDROGRAPH AT	SUB23	81.	6.42	21.	7.	7.	0.39
+	2 COMBINED AT	CP24	371.	6.33	94.	31.	31.	1.78
+	HYDROGRAPH AT	SUB24	426.	6.50	107.	36.	36.	2.24
+	HYDROGRAPH AT	SUB25	313.	6.50	87.	29.	29.	1.52
+	2 COMBINED AT	CP26	740.	6.50	194.	65.	65.	3.76
+	HYDROGRAPH AT	SUB26	707.	6.75	204.	69.	69.	4.37
+	2 COMBINED AT	CP27	1107.	7.08	590.	211.	211.	14.02
+	HYDROGRAPH AT	SUB27	1130.	7.17	596.	214.	214.	14.79
+	HYDROGRAPH AT	SUB28	926.	8.50	563.	213.	213.	16.21
+	HYDROGRAPH AT	SUB29	660.	10.58	496.	204.	204.	18.09
+	HYDROGRAPH AT	SUB30	194.	6.50	62.	21.	21.	1.33
+	HYDROGRAPH AT	SUB31	196.	7.08	90.	32.	32.	2.56
+	HYDROGRAPH AT	SUB32	205.	7.75	119.	44.	44.	3.96

	HYDROGRAPH AT						
+		SUB33	210.	8.50	141.	55.	55.	5.53
	HYDROGRAPH AT						
+		SUB34	111.	6.33	28.	10.	10.	0.84
	HYDROGRAPH AT						
+		SUB35	98.	6.92	45.	16.	16.	1.29
	2 COMBINED AT						
+		CP36	178.	6.58	73.	26.	26.	2.13
	HYDROGRAPH AT						
+		SUB36	208.	7.08	99.	36.	36.	3.58
	HYDROGRAPH AT						
+		SUB37	222.	7.58	133.	50.	50.	4.77
	HYDROGRAPH AT						
+		SUB38	232.	8.08	152.	59.	59.	6.03

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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:16:19*
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted]-- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
    3          ID       [redacted]24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 18MAR88       0     289
    6          IO       5       0
    7          IN      30 18MAR88       0

    8          KK    SUB1
    9          KM       RUNOFF FROM SUB-BASIN 1
   10          BA   .3371
   11          PB   2.55
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              75
   18          UK     255   .0262     .20     100
   19          RK    7160   .0289    .045            TRAP      35       3

   20          KK    SUB2
   21          KM       RUNOFF FROM SUB-BASIN 2
   22          BA  1.2170
```

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 23          LS              83    1.28
 24          UK     337   .0308     .20     100
 25          RK   24000   .0196    .045           TRAP      35       3

 26          KK    SUB3
 27          KM        RUNOFF FROM SUB-BASIN 3
 28          BA   .5448
 29          LS              81    1.44
 30          UK     255   .0262     .20     100
 31          RK   16400   .0201    .045           TRAP      35       3

 32          KK     CP4
 33          KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
 34          HC       3

 35          KK    SUB4
 36          KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
 37          BA  1.5102
 38          LS              73    3.05
 39          UK      84   .0213     .10     100
 40          RK   10633   .0191    .045           TRAP      50     100     YES

 41          KK    SUB5
 42          KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
 43          BA  1.8713
 44          LS              74    1.29
 45          UK      81   .0213     .10     100
 46          RK   11433   .0175    .045           TRAP      50     130     YES
1                                        HEC-1 INPUT                                                    PAGE  2

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

 47          KK    SUB6
 48          KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
 49          BA  2.7719
 50          LS              74
 51          UK     146   .0213     .10     100
 52          RK   16100   .0124    .045           TRAP      50     150     YES

 53          KK    SUB7
 54          KM        RUNOFF FROM SUB-BASIN 7
 55          BA   .6690
 56          LS              78    2.13
 57          UK     255   .0262     .20     100
 58          RK   12200   .0197    .045           TRAP      50      50

 59          KK    SUB8
 60          KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
 61          BA  1.0885
 62          LS              74    2.71
 63          UK     116   .0213     .10     100
 64          RK   10550   .0196    .045           TRAP      50     100     YES

 65          KK    SUB9
 66          KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
 67          BA  1.4559
 68          LS              74
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 69          UK     95   .0213     .10     100
 70          RK  10700   .0187    .045            TRAP      50     130     YES

 71          KK   SUB10
 72          KM        RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS              74
 75          UK    107   .0213     .10     100
 76          RK  12400   .0137    .045            TRAP      50     175     YES

 77          KK   SUB11
 78          KM        RUNOFF FROM SUB-BASIN 11
 79          BA   .5865
 80          LS              74    1.53
 81          UK    150   .0425     .20     100
 82          RK   6200   .0226    .045            TRAP      50      50

 83          KK   SUB12
 84          KM        RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS              74    1.39
 87          UK     95   .0213     .10     100
 88          RK   9850   .0214    .045            TRAP      50     100     YES
```



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

 89          KK   SUB13
 90          KM        RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS              74
 93          UK     86   .0213     .10     100
 94          RK  10533   .0192    .045            TRAP      50     130     YES

 95          KK   SUB14
 96          KM        RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS              74
 99          UK    101   .0213     .10     100
100          RK  11200   .0142    .045            TRAP      50     150     YES

101          KK   SUB16
102          KM        RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS              83
105          UK    217   .0581     .20     100
106          RK  14800   .0216    .045            TRAP      25       3

107          KK   SUB17
108          KM        RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS              83
111          UK    285   .0421     .20     100
112          RK  12200   .0254    .045            TRAP      25       3

113          KK   SUB18
114          KM        RUNOFF FROM SUB-BASIN 18
```

```
115          BA  1.2670
116          LS            83
117          UK    285   .0421     .20     100
118          RK   10840   .0259    .045           TRAP      25       3

119          KK   CP19A
120          KM        COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121          HC       3

122          KK   CP19B
123          KM        ROUTE CP19A TO CP19B
124          RK    1100   .0155   0.045           TRAP      35       3

125          KK   SUB15
126          KM        RUNOFF FROM SUB-BASIN 15
127          BA  1.3327
128          LS            82
129          UK    217   .0581     .20     100
130          RK   21200   .0236    .045           TRAP      25       3
1                                          HEC-1 INPUT                                                    PAGE  4

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

131          KK   CP19C
132          KM        COMBINE HYDROGRAPHS SUB15 & CP19B
133          HC       2

134          KK   SUB19
135          KM        RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136          BA   .1774
137          LS            84
138          UK    275   .0800     .20     100
139          RK   3730   .0352    .045    .160   TRAP      15       3
140          RK   1800   .0200    .045           TRAP      50      30     YES

141          KK   SUB20
142          KM        RUNOFF FROM SUB-BASIN 20
143          BA   .5698
144          LS            84
145          UK    300   .0750     .20     100
146          RK   9640   .0197    .045           TRAP      15       3

147          KK    CP21
148          KM        COMBINE HYDROGRAPHS SUB19 & SUB20
149          HC       2

150          KK   SUB21
151          KM        RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152          BA  3.6841
153          LS            80    1.08
154          UK    297   .0558     .20     100
155          RK  27600   .0196    .045           TRAP      50      30     YES

156          KK   SUB22
157          KM        RUNOFF FROM SUB-BASIN 22
158          BA  1.3860
159          LS            84
```

```
160        UK     225   .0590     .20     100
161        RK   13000   .0238    .045           TRAP      25       3

162        KK   SUB23
163        KM        RUNOFF FROM SUB-BASIN 23
164        BA   .3945
165        LS              84
166        UK     225   .0590     .20     100
167        RK   10200   .0304    .045           TRAP      20       3

168        KK    CP24
169        KM        COMBINE HYDROGRAPHS SUB22 & SUB23
170        HC       2

171        KK   SUB24
172        KM        RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173        BA   .4550
174        LS              77    1.07
175        UK     295   .0438     .20     100
176        RK    6800   .0257    .045           TRAP      15       3     YES
```



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

177        KK   SUB25
178        KM        RUNOFF FROM SUB-BASIN 25
179        BA  1.5216
180        LS              85    1.02
181        UK     295   .0438     .20     100
182        RK   16700   .0302    .045           TRAP      25       3

183        KK    CP26
184        KM        COMBINE HYDROGRAPHS SUB24 & SUB25
185        HC       2

186        KK   SUB26
187        KM        RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188        BA   .6095
189        LS              74    1.51
190        UK     200   .0250     .20     100
191        RK   11400   .0241    .045           TRAP      30       3     YES

192        KK    CP27
193        KM        COMBINE HYDROGRAPHS SUB21 & SUB26
194        HC       2

195        KK   SUB27
196        KM        RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197        BA   .7639
198        LS              73    1.59
199        UK     159   .0213     .10     100
200        RK    3200   .0310    .045           TRAP    1500       2     YES

201        KK   SUB28
202        KM        RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203        BA  1.4235
204        LS              73    1.27
```

```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045           TRAP    2500       2     YES

207          KK   SUB29
208          KM        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS             74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045           TRAP    3500       2     YES

213          KK   SUB30
214          KM        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS             82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045           TRAP      50     100
```



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

219          KK   SUB31
220          KM        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS             74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045           TRAP      50     130     YES

225          KK   SUB32
226          KM        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS             74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045           TRAP      50     130     YES

231          KK   SUB33
232          KM        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS             74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045           TRAP      50     175     YES

237          KK   SUB34
238          KM        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS             77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045           TRAP      50     100

243          KK   SUB35
244          KM        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS             79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045           TRAP      50     100

249          KK    CP36
250          KM        COMBINE HYDROGRAPHS SUB34 & SUB35
```

```
 251          HC      2

 252          KK   SUB36
 253          KM        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
 254          BA  1.4538
 255          LS              72    2.11
 256          UK     116   .0213     .10     100
 257          RK    7767   .0281    .045           TRAP      50     130     YES

 258          KK   SUB37
 259          KM        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
 260          BA  1.1896
 261          LS              74    9.58
 262          UK      61   .0213     .10     100
 263          RK    8433   .0237    .045           TRAP      50     130     YES
1                                                HEC-1 INPUT                                                    PAGE  7

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

 264          KK   SUB38
 265          KM        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
 266          BA  1.2597
 267          LS              74
 268          UK      84   .0213     .10     100
 269          RK    8300   .0176    .045           TRAP      50     150     YES
 270          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (---)) DIVERSION
  NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8        SUB1
              .
              .
  20          .        SUB2
              .          .
              .          .
  26          .          .        SUB3
              .          .          .
              .          .          .
  32        CP4.......................
              V
              V
  35       SUB4 ***
              V
              V
  41       SUB5 ***
              V
              V
  47       SUB6 ***
              .
              .
  53          .        SUB7
              .          V
              .          V
  59          .        SUB8 ***
              .          V
```

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            .        V
65          .     SUB9 ***
            .        V
            .        V
71          .    SUB10 ***
            .        .
            .        .
77          .        .      SUB11
            .        .         V
            .        .         V
83          .        .      SUB12 ***
            .        .         V
            .        .         V
89          .        .      SUB13 ***
            .        .         V
            .        .         V
95          .        .      SUB14 ***
            .        .         .
            .        .         .
101         .        .         .      SUB16
            .        .         .         .
            .        .         .         .
107         .        .         .         .      SUB17
            .        .         .         .         .
            .        .         .         .         .
113         .        .         .         .         .      SUB18
            .        .         .         .         .         .
            .        .         .         .         .         .
119         .        .         .      CP19A.......................
            .        .         .         V
            .        .         .         V
122         .        .         .      CP19B
            .        .         .         .
            .        .         .         .
125         .        .         .         .      SUB15
            .        .         .         .         .
            .        .         .         .         .
131         .        .         .      CP19C............
            .        .         .         V
            .        .         .         V
134         .        .         .      SUB19 ***
            .        .         .         .
            .        .         .         .
141         .        .         .         .      SUB20
            .        .         .         .         .
            .        .         .         .         .
147         .        .         .       CP21............
            .        .         .         V
            .        .         .         V
150         .        .         .      SUB21 ***
            .        .         .         .
            .        .         .         .
156         .        .         .         .      SUB22
            .        .         .         .         .
            .        .         .         .         .
162         .        .         .         .         .      SUB23
            .        .         .         .         .         .
```

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                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .      SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .      SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .      SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .      SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .      SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .      SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .      SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .      SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .      SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED 30 OCT 81           *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:16:19*
*                                       *
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```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC80.24I, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
                    5-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                  NMIN          5  MINUTES IN COMPUTATION INTERVAL
                 IDATE    18MAR88  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE    19MAR88  ENDING DATE
                NDTIME       0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA        SQUARE MILES
            PRECIPITATION DEPTH  INCHES
            LENGTH, ELEVATION    FEET
            FLOW                 CUBIC FEET PER SECOND
            STORAGE VOLUME       ACRE-FEET
            SURFACE AREA         ACRES
            TEMPERATURE          DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       SUB1      56.    6.58         16.         6.          6.      0.34

        HYDROGRAPH AT
+                       SUB2     239.    6.75         97.        33.         33.      1.22
```

	HYDROGRAPH AT						
+		SUB3	102.	6.67	39.	13.	13.	0.54
	3 COMBINED AT						
+		CP4	393.	6.67	152.	51.	51.	2.10
	HYDROGRAPH AT						
+		SUB4	409.	7.25	213.	75.	75.	3.61
	HYDROGRAPH AT						
+		SUB5	439.	7.83	282.	104.	104.	5.48
	HYDROGRAPH AT						
+		SUB6	460.	8.83	352.	143.	143.	8.25
	HYDROGRAPH AT						
+		SUB7	94.	6.83	40.	14.	14.	0.67
	HYDROGRAPH AT						
+		SUB8	163.	6.92	90.	32.	32.	1.76
	HYDROGRAPH AT						
+		SUB9	231.	7.17	147.	55.	55.	3.21
	HYDROGRAPH AT						
+		SUB10	293.	7.83	217.	86.	86.	5.33
	HYDROGRAPH AT						
+		SUB11	102.	6.42	28.	10.	10.	0.59
	HYDROGRAPH AT						
+		SUB12	222.	6.67	91.	32.	32.	1.92
	HYDROGRAPH AT						
+		SUB13	255.	7.25	139.	50.	50.	3.14
	HYDROGRAPH AT						
+		SUB14	258.	8.08	171.	66.	66.	4.26
	HYDROGRAPH AT						
+		SUB16	541.	6.25	123.	40.	40.	1.48
	HYDROGRAPH AT						
+		SUB17	446.	6.33	96.	31.	31.	1.15
	HYDROGRAPH AT						
+		SUB18	557.	6.25	106.	34.	34.	1.27
	3 COMBINED AT						
+		CP19A	1530.	6.25	324.	105.	105.	3.89
	ROUTED TO						
+		CP19B	1525.	6.33	324.	105.	105.	3.89
	HYDROGRAPH AT						
+		SUB15	328.	6.42	102.	34.	34.	1.33

+	2 COMBINED AT	CP19C	1846.	6.33	426.	138.	138.	5.23
+	HYDROGRAPH AT	SUB19	1855.	6.42	441.	143.	143.	5.40
+	HYDROGRAPH AT	SUB20	278.	6.25	51.	16.	16.	0.57
+	2 COMBINED AT	CP21	2081.	6.42	491.	160.	160.	5.97
+	HYDROGRAPH AT	SUB21	1478.	7.25	697.	240.	240.	9.66
+	HYDROGRAPH AT	SUB22	642.	6.25	123.	39.	39.	1.39
+	HYDROGRAPH AT	SUB23	176.	6.25	35.	11.	11.	0.39
+	2 COMBINED AT	CP24	818.	6.25	158.	51.	51.	1.78
+	HYDROGRAPH AT	SUB24	932.	6.33	188.	60.	60.	2.24
+	HYDROGRAPH AT	SUB25	663.	6.33	145.	46.	46.	1.52
+	2 COMBINED AT	CP26	1595.	6.33	332.	107.	107.	3.76
+	HYDROGRAPH AT	SUB26	1618.	6.50	356.	116.	116.	4.37
+	2 COMBINED AT	CP27	2403.	6.67	1053.	356.	356.	14.02
+	HYDROGRAPH AT	SUB27	2461.	6.83	1078.	366.	366.	14.79
+	HYDROGRAPH AT	SUB28	2119.	7.75	1055.	374.	374.	16.21
+	HYDROGRAPH AT	SUB29	1530.	9.17	982.	374.	374.	18.09
+	HYDROGRAPH AT	SUB30	434.	6.25	107.	35.	35.	1.33
+	HYDROGRAPH AT	SUB31	441.	6.75	166.	56.	56.	2.56
+	HYDROGRAPH AT	SUB32	467.	7.25	230.	80.	80.	3.96

	HYDROGRAPH AT						
+		SUB33	485.	7.75	285.	103.	103.	5.53
	HYDROGRAPH AT						
+		SUB34	275.	6.17	51.	17.	17.	0.84
	HYDROGRAPH AT						
+		SUB35	227.	6.67	84.	28.	28.	1.29
	2 COMBINED AT						
+		CP36	423.	6.33	135.	45.	45.	2.13
	HYDROGRAPH AT						
+		SUB36	509.	6.75	194.	67.	67.	3.58
	HYDROGRAPH AT						
+		SUB37	536.	7.08	259.	91.	91.	4.77
	HYDROGRAPH AT						
+		SUB38	553.	7.50	305.	109.	109.	6.03

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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:14:00*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

```
1                                        HEC-1 INPUT                                                    PAGE  1

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1           ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
   2           ID       MODEL [redacted] -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
   3           ID       [redacted] 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
   4           ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
   5           IT       5 18MAR88       0     289
   6           IO       5       0
   7           IN      30 18MAR88       0

   8           KK    SUB1
   9           KM       RUNOFF FROM SUB-BASIN 1
  10           BA   .3371
  11           PB   2.96
  12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
  13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
  14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
  15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
  16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
  17           LS             75
  18           UK     255   .0262     .20     100
  19           RK    7160   .0289    .045            TRAP      35       3

  20           KK    SUB2
  21           KM       RUNOFF FROM SUB-BASIN 2
  22           BA  1.2170
```

```
 23          LS              83    1.28
 24          UK     337   .0308     .20     100
 25          RK   24000   .0196    .045           TRAP      35       3

 26          KK    SUB3
 27          KM        RUNOFF FROM SUB-BASIN 3
 28          BA   .5448
 29          LS              81    1.44
 30          UK     255   .0262     .20     100
 31          RK   16400   .0201    .045           TRAP      35       3

 32          KK     CP4
 33          KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
 34          HC       3

 35          KK    SUB4
 36          KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
 37          BA  1.5102
 38          LS              73    3.05
 39          UK      84   .0213     .10     100
 40          RK   10633   .0191    .045           TRAP      50     100     YES

 41          KK    SUB5
 42          KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
 43          BA  1.8713
 44          LS              74    1.29
 45          UK      81   .0213     .10     100
 46          RK   11433   .0175    .045           TRAP      50     130     YES
1                                          HEC-1 INPUT                                                    PAGE  2

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

 47          KK    SUB6
 48          KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
 49          BA  2.7719
 50          LS              74
 51          UK     146   .0213     .10     100
 52          RK   16100   .0124    .045           TRAP      50     150     YES

 53          KK    SUB7
 54          KM        RUNOFF FROM SUB-BASIN 7
 55          BA   .6690
 56          LS              78    2.13
 57          UK     255   .0262     .20     100
 58          RK   12200   .0197    .045           TRAP      50      50

 59          KK    SUB8
 60          KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
 61          BA  1.0885
 62          LS              74    2.71
 63          UK     116   .0213     .10     100
 64          RK   10550   .0196    .045           TRAP      50     100     YES

 65          KK    SUB9
 66          KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
 67          BA  1.4559
 68          LS              74
```

```
 69          UK     95   .0213     .10     100
 70          RK  10700   .0187    .045            TRAP     50    130    YES

 71          KK  SUB10
 72          KM       RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS              74
 75          UK    107   .0213     .10     100
 76          RK  12400   .0137    .045            TRAP     50    175    YES

 77          KK  SUB11
 78          KM       RUNOFF FROM SUB-BASIN 11
 79          BA   .5865
 80          LS              74    1.53
 81          UK    150   .0425     .20     100
 82          RK   6200   .0226    .045            TRAP     50     50

 83          KK  SUB12
 84          KM       RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS              74    1.39
 87          UK     95   .0213     .10     100
 88          RK   9850   .0214    .045            TRAP     50    100    YES
```



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

 89          KK  SUB13
 90          KM       RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS              74
 93          UK     86   .0213     .10     100
 94          RK  10533   .0192    .045            TRAP     50    130    YES

 95          KK  SUB14
 96          KM       RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS              74
 99          UK    101   .0213     .10     100
100          RK  11200   .0142    .045            TRAP     50    150    YES

101          KK  SUB16
102          KM       RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS              83
105          UK    217   .0581     .20     100
106          RK  14800   .0216    .045            TRAP     25      3

107          KK  SUB17
108          KM       RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS              83
111          UK    285   .0421     .20     100
112          RK  12200   .0254    .045            TRAP     25      3

113          KK  SUB18
114          KM       RUNOFF FROM SUB-BASIN 18
```

```
115          BA  1.2670
116          LS            83
117          UK    285   .0421     .20     100
118          RK   10840   .0259    .045           TRAP      25       3

119          KK   CP19A
120          KM        COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121          HC       3

122          KK   CP19B
123          KM        ROUTE CP19A TO CP19B
124          RK    1100   .0155   0.045           TRAP      35       3

125          KK   SUB15
126          KM        RUNOFF FROM SUB-BASIN 15
127          BA  1.3327
128          LS            82
129          UK    217   .0581     .20     100
130          RK   21200   .0236    .045           TRAP      25       3
1                                          HEC-1 INPUT                                                    PAGE  4

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

131          KK   CP19C
132          KM        COMBINE HYDROGRAPHS SUB15 & CP19B
133          HC       2

134          KK   SUB19
135          KM        RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136          BA   .1774
137          LS            84
138          UK    275   .0800     .20     100
139          RK   3730   .0352    .045    .160    TRAP      15       3
140          RK   1800   .0200    .045           TRAP      50      30     YES

141          KK   SUB20
142          KM        RUNOFF FROM SUB-BASIN 20
143          BA   .5698
144          LS            84
145          UK    300   .0750     .20     100
146          RK   9640   .0197    .045           TRAP      15       3

147          KK    CP21
148          KM        COMBINE HYDROGRAPHS SUB19 & SUB20
149          HC       2

150          KK   SUB21
151          KM        RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152          BA  3.6841
153          LS            80    1.08
154          UK    297   .0558     .20     100
155          RK  27600   .0196    .045           TRAP      50      30     YES

156          KK   SUB22
157          KM        RUNOFF FROM SUB-BASIN 22
158          BA  1.3860
159          LS            84
```

```
160          UK     225   .0590     .20     100
161          RK   13000   .0238    .045           TRAP      25       3

162          KK   SUB23
163          KM        RUNOFF FROM SUB-BASIN 23
164          BA   .3945
165          LS              84
166          UK     225   .0590     .20     100
167          RK   10200   .0304    .045           TRAP      20       3

168          KK    CP24
169          KM        COMBINE HYDROGRAPHS SUB22 & SUB23
170          HC       2

171          KK   SUB24
172          KM        RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173          BA   .4550
174          LS              77    1.07
175          UK     295   .0438     .20     100
176          RK    6800   .0257    .045           TRAP      15       3     YES
```



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

177          KK   SUB25
178          KM        RUNOFF FROM SUB-BASIN 25
179          BA  1.5216
180          LS              85    1.02
181          UK     295   .0438     .20     100
182          RK   16700   .0302    .045           TRAP      25       3

183          KK    CP26
184          KM        COMBINE HYDROGRAPHS SUB24 & SUB25
185          HC       2

186          KK   SUB26
187          KM        RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188          BA   .6095
189          LS              74    1.51
190          UK     200   .0250     .20     100
191          RK   11400   .0241    .045           TRAP      30       3     YES

192          KK    CP27
193          KM        COMBINE HYDROGRAPHS SUB21 & SUB26
194          HC       2

195          KK   SUB27
196          KM        RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197          BA   .7639
198          LS              73    1.59
199          UK     159   .0213     .10     100
200          RK    3200   .0310    .045           TRAP    1500       2     YES

201          KK   SUB28
202          KM        RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203          BA  1.4235
204          LS              73    1.27
```

```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045           TRAP    2500       2     YES

207          KK   SUB29
208          KH        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS              74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045           TRAP    3500       2     YES

213          KK   SUB30
214          KH        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS              82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045           TRAP      50     100
```



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

219          KK   SUB31
220          KH        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS              74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045           TRAP      50     130     YES

225          KK   SUB32
226          KH        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS              74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045           TRAP      50     130     YES

231          KK   SUB33
232          KH        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS              74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045           TRAP      50     175     YES

237          KK   SUB34
238          KH        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS              77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045           TRAP      50     100

243          KK   SUB35
244          KH        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS              79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045           TRAP      50     100

249          KK    CP36
250          KH        COMBINE HYDROGRAPHS SUB34 & SUB35
```

```
 251          HC      2

 252          KK   SUB36
 253          KM        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
 254          BA  1.4538
 255          LS              72    2.11
 256          UK     116   .0213     .10     100
 257          RK    7767   .0281    .045           TRAP      50     130     YES

 258          KK   SUB37
 259          KM        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
 260          BA  1.1896
 261          LS              74    9.58
 262          UK      61   .0213     .10     100
 263          RK    8433   .0237    .045           TRAP      50     130     YES
1                                                HEC-1 INPUT                                                    PAGE  7

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

 264          KK   SUB38
 265          KM        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
 266          BA  1.2597
 267          LS              74
 268          UK      84   .0213     .10     100
 269          RK    8300   .0176    .045           TRAP      50     150     YES
 270          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (---)) DIVERSION
  NO.      (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
   8         SUB1
               .
               .
  20           .        SUB2
               .          .
               .          .
  26           .          .        SUB3
               .          .          .
               .          .          .
  32         CP4.......................
               V
               V
  35         SUB4 ***
               V
               V
  41         SUB5 ***
               V
               V
  47         SUB6 ***
               .
               .
  53           .        SUB7
               .          V
               .          V
  59           .        SUB8 ***
               .          V
```

```
            .        V
65          .     SUB9 ***
            .        V
            .        V
71          .    SUB10 ***
            .        .
            .        .
77          .        .      SUB11
            .        .         V
            .        .         V
83          .        .      SUB12 ***
            .        .         V
            .        .         V
89          .        .      SUB13 ***
            .        .         V
            .        .         V
95          .        .      SUB14 ***
            .        .         .
            .        .         .
101         .        .         .     SUB16
            .        .         .        .
            .        .         .        .
107         .        .         .        .      SUB17
            .        .         .        .         .
            .        .         .        .         .
113         .        .         .        .         .      SUB18
            .        .         .        .         .         .
            .        .         .        .         .         .
119         .        .         .     CP19A.......................
            .        .         .        V
            .        .         .        V
122         .        .         .     CP19B
            .        .         .        .
            .        .         .        .
125         .        .         .        .      SUB15
            .        .         .        .         .
            .        .         .        .         .
131         .        .         .     CP19C............
            .        .         .        V
            .        .         .        V
134         .        .         .     SUB19 ***
            .        .         .        .
            .        .         .        .
141         .        .         .        .      SUB20
            .        .         .        .         .
            .        .         .        .         .
147         .        .         .      CP21............
            .        .         .        V
            .        .         .        V
150         .        .         .     SUB21 ***
            .        .         .        .
            .        .         .        .
156         .        .         .        .      SUB22
            .        .         .        .         .
            .        .         .        .         .
162         .        .         .        .         .      SUB23
            .        .         .        .         .         .
```

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                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .      SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .      SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .      SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .      SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .      SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .      SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .      SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .      SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .      SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:14:00*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
* (916) 440-3285 OR (FTS) 448-3285  *
*                                   *
*************************************
```

```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC80.24I, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
                    10-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

  6 10        OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     18MAR88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     19MAR88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA        SQUARE MILES
             PRECIPITATION DEPTH  INCHES
             LENGTH, ELEVATION    FEET
             FLOW                 CUBIC FEET PER SECOND
             STORAGE VOLUME       ACRE-FEET
             SURFACE AREA         ACRES
             TEMPERATURE          DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       SUB1      93.   6.42         23.         8.          8.       0.34

        HYDROGRAPH AT
+                       SUB2     361.   6.58        129.        42.         42.       1.22
```

+	HYDROGRAPH AT	SUB3	152.	6.58	52.	17.	17.	0.54
+	3 COMBINED AT	CP4	599.	6.58	204.	68.	68.	2.10
+	HYDROGRAPH AT	SUB4	629.	7.08	294.	101.	101.	3.61
+	HYDROGRAPH AT	SUB5	678.	7.58	400.	142.	142.	5.48
+	HYDROGRAPH AT	SUB6	713.	8.42	513.	196.	196.	8.25
+	HYDROGRAPH AT	SUB7	146.	6.67	56.	19.	19.	0.67
+	HYDROGRAPH AT	SUB8	260.	6.75	128.	44.	44.	1.76
+	HYDROGRAPH AT	SUB9	372.	6.92	212.	75.	75.	3.21
+	HYDROGRAPH AT	SUB10	469.	7.58	321.	120.	120.	5.33
+	HYDROGRAPH AT	SUB11	161.	6.33	39.	13.	13.	0.59
+	HYDROGRAPH AT	SUB12	354.	6.58	129.	44.	44.	1.92
+	HYDROGRAPH AT	SUB13	410.	7.00	201.	70.	70.	3.14
+	HYDROGRAPH AT	SUB14	413.	7.75	252.	93.	93.	4.26
+	HYDROGRAPH AT	SUB16	853.	6.25	162.	52.	52.	1.48
+	HYDROGRAPH AT	SUB17	715.	6.25	126.	40.	40.	1.15
+	HYDROGRAPH AT	SUB18	875.	6.17	140.	45.	45.	1.27
+	3 COMBINED AT	CP19A	2442.	6.25	429.	136.	136.	3.89
+	ROUTED TO	CP19B	2427.	6.25	429.	136.	136.	3.89
+	HYDROGRAPH AT	SUB15	489.	6.33	135.	44.	44.	1.33

+	2 COMBINED AT	CP19C	2899.	6.25	564.	180.	180.	5.23
+	HYDROGRAPH AT	SUB19	2874.	6.33	586.	187.	187.	5.40
+	HYDROGRAPH AT	SUB20	391.	6.17	66.	21.	21.	0.57
+	2 COMBINED AT	CP21	3204.	6.33	652.	208.	208.	5.97
+	HYDROGRAPH AT	SUB21	2208.	7.08	942.	316.	316.	9.66
+	HYDROGRAPH AT	SUB22	1020.	6.17	161.	51.	51.	1.39
+	HYDROGRAPH AT	SUB23	276.	6.17	46.	14.	14.	0.39
+	2 COMBINED AT	CP24	1296.	6.17	207.	65.	65.	1.78
+	HYDROGRAPH AT	SUB24	1441.	6.33	252.	80.	80.	2.24
+	HYDROGRAPH AT	SUB25	1016.	6.25	188.	59.	59.	1.52
+	2 COMBINED AT	CP26	2412.	6.25	440.	139.	139.	3.76
+	HYDROGRAPH AT	SUB26	2555.	6.42	475.	152.	152.	4.37
+	2 COMBINED AT	CP27	3626.	6.42	1418.	468.	468.	14.02
+	HYDROGRAPH AT	SUB27	3744.	6.58	1466.	485.	485.	14.79
+	HYDROGRAPH AT	SUB28	3239.	7.42	1457.	500.	500.	16.21
+	HYDROGRAPH AT	SUB29	2417.	8.58	1391.	509.	509.	18.09
+	HYDROGRAPH AT	SUB30	715.	6.17	144.	46.	46.	1.33
+	HYDROGRAPH AT	SUB31	684.	6.67	227.	75.	75.	2.56
+	HYDROGRAPH AT	SUB32	724.	7.00	319.	107.	107.	3.96

	HYDROGRAPH AT						
+		SUB33	750.	7.50	404.	140.	140.	5.53
	HYDROGRAPH AT						
+		SUB34	468.	6.17	70.	23.	23.	0.84
	HYDROGRAPH AT						
+		SUB35	337.	6.58	113.	37.	37.	1.29
	2 COMBINED AT						
+		CP36	672.	6.25	183.	60.	60.	2.13
	HYDROGRAPH AT						
+		SUB36	790.	6.58	270.	90.	90.	3.58
	HYDROGRAPH AT						
+		SUB37	844.	6.83	360.	122.	122.	4.77
	HYDROGRAPH AT						
+		SUB38	867.	7.25	429.	149.	149.	6.03

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

```
!*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:13:39*
*                                       *
*****************************************
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```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KN.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted], -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
    3          ID       [redacted] 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 18MAR88       0     289
    6          IO       5       0
    7          IN      30 18MAR88       0

    8          KK    SUB1
    9          KM       RUNOFF FROM SUB-BASIN 1
   10          BA   .3371
   11          PB   3.46
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              75
   18          UK     255   .0262     .20     100
   19          RK    7160   .0289    .045            TRAP      35       3

   20          KK    SUB2
   21          KM       RUNOFF FROM SUB-BASIN 2
   22          BA  1.2170
```

```
 23          LS              83    1.28
 24          UK     337   .0308     .20     100
 25          RK   24000   .0196    .045           TRAP      35       3

 26          KK    SUB3
 27          KM        RUNOFF FROM SUB-BASIN 3
 28          BA   .5448
 29          LS              81    1.44
 30          UK     255   .0262     .20     100
 31          RK   16400   .0201    .045           TRAP      35       3

 32          KK     CP4
 33          KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
 34          HC       3

 35          KK    SUB4
 36          KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
 37          BA  1.5102
 38          LS              73    3.05
 39          UK      84   .0213     .10     100
 40          RK   10633   .0191    .045           TRAP      50     100     YES

 41          KK    SUB5
 42          KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
 43          BA  1.8713
 44          LS              74    1.29
 45          UK      81   .0213     .10     100
 46          RK   11433   .0175    .045           TRAP      50     130     YES
1                                          HEC-1 INPUT                                                    PAGE  2

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

 47          KK    SUB6
 48          KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
 49          BA  2.7719
 50          LS              74
 51          UK     146   .0213     .10     100
 52          RK   16100   .0124    .045           TRAP      50     150     YES

 53          KK    SUB7
 54          KM        RUNOFF FROM SUB-BASIN 7
 55          BA   .6690
 56          LS              78    2.13
 57          UK     255   .0262     .20     100
 58          RK   12200   .0197    .045           TRAP      50      50

 59          KK    SUB8
 60          KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
 61          BA  1.0885
 62          LS              74    2.71
 63          UK     116   .0213     .10     100
 64          RK   10550   .0196    .045           TRAP      50     100     YES

 65          KK    SUB9
 66          KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
 67          BA  1.4559
 68          LS              74
```

```
 69          UK     95  .0213    .10    100
 70          RK  10700  .0187   .045          TRAP     50    130    YES

 71          KK  SUB10
 72          KM       RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS            74
 75          UK    107  .0213    .10    100
 76          RK  12400  .0137   .045          TRAP     50    175    YES

 77          KK  SUB11
 78          KM       RUNOFF FROM SUB-BASIN 11
 79          BA  .5865
 80          LS            74   1.53
 81          UK    150  .0425    .20    100
 82          RK   6200  .0226   .045          TRAP     50     50

 83          KK  SUB12
 84          KM       RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS            74   1.39
 87          UK     95  .0213    .10    100
 88          RK   9850  .0214   .045          TRAP     50    100    YES
```



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

 89          KK  SUB13
 90          KM       RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS            74
 93          UK     86  .0213    .10    100
 94          RK  10533  .0192   .045          TRAP     50    130    YES

 95          KK  SUB14
 96          KM       RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS            74
 99          UK    101  .0213    .10    100
100          RK  11200  .0142   .045          TRAP     50    150    YES

101          KK  SUB16
102          KM       RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS            83
105          UK    217  .0581    .20    100
106          RK  14800  .0216   .045          TRAP     25      3

107          KK  SUB17
108          KM       RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS            83
111          UK    285  .0421    .20    100
112          RK  12200  .0254   .045          TRAP     25      3

113          KK  SUB18
114          KM       RUNOFF FROM SUB-BASIN 18
```

```
115          BA  1.2670
116          LS            83
117          UK    285   .0421     .20     100
118          RK   10840   .0259    .045           TRAP      25       3

119          KK   CP19A
120          KM        COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121          HC       3

122          KK   CP19B
123          KM        ROUTE CP19A TO CP19B
124          RK    1100   .0155   0.045           TRAP      35       3

125          KK   SUB15
126          KM        RUNOFF FROM SUB-BASIN 15
127          BA  1.3327
128          LS            82
129          UK    217   .0581     .20     100
130          RK   21200   .0236    .045           TRAP      25       3
1                                          HEC-1 INPUT                                                    PAGE  4

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

131          KK   CP19C
132          KM        COMBINE HYDROGRAPHS SUB15 & CP19B
133          HC       2

134          KK   SUB19
135          KM        RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136          BA   .1774
137          LS            84
138          UK    275   .0800     .20     100
139          RK   3730   .0352    .045    .160   TRAP      15       3
140          RK   1800   .0200    .045           TRAP      50      30     YES

141          KK   SUB20
142          KM        RUNOFF FROM SUB-BASIN 20
143          BA   .5698
144          LS            84
145          UK    300   .0750     .20     100
146          RK   9640   .0197    .045           TRAP      15       3

147          KK    CP21
148          KM        COMBINE HYDROGRAPHS SUB19 & SUB20
149          HC       2

150          KK   SUB21
151          KM        RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152          BA  3.6841
153          LS            80    1.08
154          UK    297   .0558     .20     100
155          RK  27600   .0196    .045           TRAP      50      30     YES

156          KK   SUB22
157          KM        RUNOFF FROM SUB-BASIN 22
158          BA  1.3860
159          LS            84
```

```
160        UK    225  .0590    .20    100
161        RK  13000  .0238   .045          TRAP     25      3

162        KK  SUB23
163        KM       RUNOFF FROM SUB-BASIN 23
164        BA  .3945
165        LS            84
166        UK    225  .0590    .20    100
167        RK  10200  .0304   .045          TRAP     20      3

168        KK   CP24
169        KM       COMBINE HYDROGRAPHS SUB22 & SUB23
170        HC      2

171        KK  SUB24
172        KM       RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173        BA  .4550
174        LS            77   1.07
175        UK    295  .0438    .20    100
176        RK   6800  .0257   .045          TRAP     15      3    YES
```



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

177        KK  SUB25
178        KM       RUNOFF FROM SUB-BASIN 25
179        BA 1.5216
180        LS            85   1.02
181        UK    295  .0438    .20    100
182        RK  16700  .0302   .045          TRAP     25      3

183        KK   CP26
184        KM       COMBINE HYDROGRAPHS SUB24 & SUB25
185        HC      2

186        KK  SUB26
187        KM       RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188        BA  .6095
189        LS            74   1.51
190        UK    200  .0250    .20    100
191        RK  11400  .0241   .045          TRAP     30      3    YES

192        KK   CP27
193        KM       COMBINE HYDROGRAPHS SUB21 & SUB26
194        HC      2

195        KK  SUB27
196        KM       RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197        BA  .7639
198        LS            73   1.59
199        UK    159  .0213    .10    100
200        RK   3200  .0310   .045          TRAP   1500      2    YES

201        KK  SUB28
202        KM       RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203        BA 1.4235
204        LS            73   1.27
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```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045            TRAP    2500       2     YES

207          KK   SUB29
208          KM        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS              74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045            TRAP    3500       2     YES

213          KK   SUB30
214          KM        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS              82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045            TRAP      50     100
```



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

219          KK   SUB31
220          KM        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS              74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045            TRAP      50     130     YES

225          KK   SUB32
226          KM        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS              74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045            TRAP      50     130     YES

231          KK   SUB33
232          KM        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS              74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045            TRAP      50     175     YES

237          KK   SUB34
238          KM        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS              77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045            TRAP      50     100

243          KK   SUB35
244          KM        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS              79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045            TRAP      50     100

249          KK    CP36
250          KM        COMBINE HYDROGRAPHS SUB34 & SUB35
```

```
251          HC      2

252          KK   SUB36
253          KM        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
254          BA  1.4539
255          LS              72    2.11
256          UK     116   .0213     .10     100
257          RK    7767   .0281    .045           TRAP      50     130     YES

258          KK   SUB37
259          KM        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
260          BA  1.1896
261          LS              74    9.58
262          UK      61   .0213     .10     100
263          RK    8433   .0237    .045           TRAP      50     130     YES
1                                                HEC-1 INPUT                                                    PAGE  7

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

264          KK   SUB38
265          KM        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
266          BA  1.2597
267          LS              74
268          UK      84   .0213     .10     100
269          RK    8300   .0176    .045           TRAP      50     150     YES
270          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (---)) DIVERSION
   NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
    8       SUB1
              .
              .
   20         .        SUB2
              .          .
              .          .
   26         .          .        SUB3
              .          .          .
              .          .          .
   32       CP4.......................
              V
              V
   35       SUB4 ***
              V
              V
   41       SUB5 ***
              V
              V
   47       SUB6 ***
              .
              .
   53         .        SUB7
              .          V
              .          V
   59         .        SUB8 ***
              .          V
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          .        V
65        .      SUB9 ***
          .        V
          .        V
71        .     SUB10 ***
          .        .
          .        .
77        .        .      SUB11
          .        .         V
          .        .         V
83        .        .      SUB12 ***
          .        .         V
          .        .         V
89        .        .      SUB13 ***
          .        .         V
          .        .         V
95        .        .      SUB14 ***
          .        .         .
          .        .         .
101       .        .         .      SUB16
          .        .         .         .
          .        .         .         .
107       .        .         .         .      SUB17
          .        .         .         .         .
          .        .         .         .         .
113       .        .         .         .         .      SUB18
          .        .         .         .         .         .
          .        .         .         .         .         .
119       .        .         .      CP19A.......................
          .        .         .         V
          .        .         .         V
122       .        .         .      CP19B
          .        .         .         .
          .        .         .         .
125       .        .         .         .      SUB15
          .        .         .         .         .
          .        .         .         .         .
131       .        .         .      CP19C............
          .        .         .         V
          .        .         .         V
134       .        .         .      SUB19 ***
          .        .         .         .
          .        .         .         .
141       .        .         .         .      SUB20
          .        .         .         .         .
          .        .         .         .         .
147       .        .         .       CP21............
          .        .         .         V
          .        .         .         V
150       .        .         .      SUB21 ***
          .        .         .         .
          .        .         .         .
156       .        .         .         .      SUB22
          .        .         .         .         .
          .        .         .         .         .
162       .        .         .         .         .      SUB23
          .        .         .         .         .         .
```

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                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .      SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .      SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .      SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .      SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .      SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .      SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .      SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .      SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .      SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:13:39*
*                                       *
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
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```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC80.24I, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
                    25-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE     18MAR88  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     19MAR88  ENDING DATE
                 NDTIME       0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                  TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       SUB1     153.   6.33         32.         11.         11.      0.34

        HYDROGRAPH AT
+                       SUB2     525.   6.50        170.         55.         55.      1.22
```

+	HYDROGRAPH AT	SUB3	233.	6.42	70.	23.	23.	0.54
+	3 COMBINED AT	CP4	889.	6.42	272.	88.	88.	2.10
+	HYDROGRAPH AT	SUB4	967.	6.83	403.	134.	134.	3.61
+	HYDROGRAPH AT	SUB5	1045.	7.25	560.	191.	191.	5.48
+	HYDROGRAPH AT	SUB6	1102.	8.00	739.	269.	269.	8.25
+	HYDROGRAPH AT	SUB7	216.	6.58	75.	25.	25.	0.67
+	HYDROGRAPH AT	SUB8	402.	6.67	177.	59.	59.	1.76
+	HYDROGRAPH AT	SUB9	601.	6.67	302.	103.	103.	3.21
+	HYDROGRAPH AT	SUB10	746.	7.17	463.	165.	165.	5.33
+	HYDROGRAPH AT	SUB11	274.	6.25	55.	18.	18.	0.59
+	HYDROGRAPH AT	SUB12	573.	6.42	182.	60.	60.	1.92
+	HYDROGRAPH AT	SUB13	668.	6.83	286.	97.	97.	3.14
+	HYDROGRAPH AT	SUB14	660.	7.50	365.	129.	129.	4.26
+	HYDROGRAPH AT	SUB16	1374.	6.17	213.	67.	67.	1.48
+	HYDROGRAPH AT	SUB17	1097.	6.17	166.	52.	52.	1.15
+	HYDROGRAPH AT	SUB18	1387.	6.17	184.	58.	58.	1.27
+	3 COMBINED AT	CP19A	3859.	6.17	563.	176.	176.	3.89
+	ROUTED TO	CP19B	3717.	6.17	563.	176.	176.	3.89
+	HYDROGRAPH AT	SUB15	771.	6.25	180.	57.	57.	1.33

	2 COMBINED AT						
+		CP19C	4449.	6.17	743.	234.	234.	5.23
	HYDROGRAPH AT						
+		SUB19	4448.	6.25	769.	242.	242.	5.40
	HYDROGRAPH AT						
+		SUB20	609.	6.17	86.	27.	27.	0.57
	2 COMBINED AT						
+		CP21	4970.	6.25	855.	269.	269.	5.97
	HYDROGRAPH AT						
+		SUB21	3272.	6.92	1256.	412.	412.	9.66
	HYDROGRAPH AT						
+		SUB22	1553.	6.17	210.	65.	65.	1.39
	HYDROGRAPH AT						
+		SUB23	425.	6.17	60.	19.	19.	0.39
	2 COMBINED AT						
+		CP24	1978.	6.17	270.	84.	84.	1.78
	HYDROGRAPH AT						
+		SUB24	2177.	6.25	329.	102.	102.	2.24
	HYDROGRAPH AT						
+		SUB25	1512.	6.17	242.	75.	75.	1.52
	2 COMBINED AT						
+		CP26	3646.	6.25	571.	178.	178.	3.76
	HYDROGRAPH AT						
+		SUB26	3814.	6.42	641.	200.	200.	4.37
	2 COMBINED AT						
+		CP27	5834.	6.42	1898.	613.	613.	14.02
	HYDROGRAPH AT						
+		SUB27	5957.	6.58	1962.	636.	636.	14.79
	HYDROGRAPH AT						
+		SUB28	4921.	7.17	1977.	661.	661.	16.21
	HYDROGRAPH AT						
+		SUB29	3713.	8.17	1931.	683.	683.	18.09
	HYDROGRAPH AT						
+		SUB30	1061.	6.17	188.	59.	59.	1.33
	HYDROGRAPH AT						
+		SUB31	1017.	6.58	305.	98.	98.	2.56
	HYDROGRAPH AT						
+		SUB32	1102.	6.83	435.	143.	143.	3.96

	HYDROGRAPH AT						
+		SUB33	1142.	7.25	562.	190.	190.	5.53
	HYDROGRAPH AT						
+		SUB34	788.	6.17	97.	31.	31.	0.84
	HYDROGRAPH AT						
+		SUB35	509.	6.42	153.	50.	50.	1.29
	2 COMBINED AT						
+		CP36	1165.	6.17	250.	80.	80.	2.13
	HYDROGRAPH AT						
+		SUB36	1264.	6.42	373.	122.	122.	3.58
	HYDROGRAPH AT						
+		SUB37	1359.	6.67	497.	165.	165.	4.77
	HYDROGRAPH AT						
+		SUB38	1370.	7.08	599.	202.	202.	6.03

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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *          REVISED 30 OCT 81            *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:12:11*
 *                                       *
 *****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
* (916) 440-3285 OR (FTS) 448-3285  *
*                                   *
*************************************
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```
X     X  XXXXXXX   XXXXX          X
X     X  X        X    X         XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X    X         X
X     X  XXXXXXX   XXXXX         XXX
```

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD HAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.


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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL [redacted], -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
    3          ID       [redacted], 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT      5 18MAR88       0     289
    6          IO      5       0
    7          IN     30 18MAR88       0

    8          KK    SUB1
    9          KM       RUNOFF FROM SUB-BASIN 1
   10          BA   .3371
   11          PB    3.94
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS             75
   18          UK     255   .0262     .20     100
   19          RK    7160   .0289    .045            TRAP      35       3

   20          KK    SUB2
   21          KM       RUNOFF FROM SUB-BASIN 2
   22          BA  1.2170
```

```
 23          LS              83    1.28
 24          UK     337   .0308     .20     100
 25          RK   24000   .0196    .045           TRAP      35       3

 26          KK    SUB3
 27          KM        RUNOFF FROM SUB-BASIN 3
 28          BA   .5448
 29          LS              81    1.44
 30          UK     255   .0262     .20     100
 31          RK   16400   .0201    .045           TRAP      35       3

 32          KK     CP4
 33          KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
 34          HC       3

 35          KK    SUB4
 36          KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
 37          BA  1.5102
 38          LS              73    3.05
 39          UK      84   .0213     .10     100
 40          RK   10633   .0191    .045           TRAP      50     100     YES

 41          KK    SUB5
 42          KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
 43          BA  1.8713
 44          LS              74    1.29
 45          UK      81   .0213     .10     100
 46          RK   11433   .0175    .045           TRAP      50     130     YES
1                                          HEC-1 INPUT                                                    PAGE  2

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

 47          KK    SUB6
 48          KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
 49          BA  2.7719
 50          LS              74
 51          UK     146   .0213     .10     100
 52          RK   16100   .0124    .045           TRAP      50     150     YES

 53          KK    SUB7
 54          KM        RUNOFF FROM SUB-BASIN 7
 55          BA   .6690
 56          LS              78    2.13
 57          UK     255   .0262     .20     100
 58          RK   12200   .0197    .045           TRAP      50      50

 59          KK    SUB8
 60          KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
 61          BA  1.0885
 62          LS              74    2.71
 63          UK     116   .0213     .10     100
 64          RK   10550   .0196    .045           TRAP      50     100     YES

 65          KK    SUB9
 66          KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
 67          BA  1.4559
 68          LS              74
```

```
 69          UK      95   .0213     .10     100
 70          RK   10700   .0187    .045            TRAP      50     130     YES

 71          KK   SUB10
 72          KM        RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS              74
 75          UK     107   .0213     .10     100
 76          RK   12400   .0137    .045            TRAP      50     175     YES

 77          KK   SUB11
 78          KM        RUNOFF FROM SUB-BASIN 11
 79          BA   .5865
 80          LS              74    1.53
 81          UK     150   .0425     .20     100
 82          RK    6200   .0226    .045            TRAP      50      50

 83          KK   SUB12
 84          KM        RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS              74    1.39
 87          UK      95   .0213     .10     100
 88          RK    9850   .0214    .045            TRAP      50     100     YES
```



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

 89          KK   SUB13
 90          KM        RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS              74
 93          UK      86   .0213     .10     100
 94          RK   10533   .0192    .045            TRAP      50     130     YES

 95          KK   SUB14
 96          KM        RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS              74
 99          UK     101   .0213     .10     100
100          RK   11200   .0142    .045            TRAP      50     150     YES

101          KK   SUB16
102          KM        RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS              83
105          UK     217   .0581     .20     100
106          RK   14800   .0216    .045            TRAP      25       3

107          KK   SUB17
108          KM        RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS              83
111          UK     285   .0421     .20     100
112          RK   12200   .0254    .045            TRAP      25       3

113          KK   SUB18
114          KM        RUNOFF FROM SUB-BASIN 18
```

```
115          BA  1.2670
116          LS            93
117          UK    285   .0421     .20     100
118          RK  10840   .0259    .045           TRAP      25       3

119          KK   CP19A
120          KM        COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121          HC       3

122          KK   CP19B
123          KM        ROUTE CP19A TO CP19B
124          RK   1100   .0155   0.045           TRAP      35       3

125          KK   SUB15
126          KM        RUNOFF FROM SUB-BASIN 15
127          BA  1.3327
128          LS            82
129          UK    217   .0581     .20     100
130          RK  21200   .0236    .045           TRAP      25       3
1                                          HEC-1 INPUT                                                    PAGE  4

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

131          KK   CP19C
132          KM        COMBINE HYDROGRAPHS SUB15 & CP19B
133          HC       2

134          KK   SUB19
135          KM        RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136          BA   .1774
137          LS            84
138          UK    275   .0800     .20     100
139          RK   3730   .0352    .045    .160   TRAP      15       3
140          RK   1800   .0200    .045           TRAP      50      30     YES

141          KK   SUB20
142          KM        RUNOFF FROM SUB-BASIN 20
143          BA   .5698
144          LS            84
145          UK    300   .0750     .20     100
146          RK   9640   .0197    .045           TRAP      15       3

147          KK    CP21
148          KM        COMBINE HYDROGRAPHS SUB19 & SUB20
149          HC       2

150          KK   SUB21
151          KM        RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152          BA  3.6841
153          LS            80    1.08
154          UK    297   .0558     .20     100
155          RK  27600   .0196    .045           TRAP      50      30     YES

156          KK   SUB22
157          KM        RUNOFF FROM SUB-BASIN 22
158          BA  1.3860
159          LS            84
```

```
160          UK     225   .0590     .20     100
161          RK   13000   .0238    .045            TRAP      25       3

162          KK   SUB23
163          KM        RUNOFF FROM SUB-BASIN 23
164          BA   .3945
165          LS              84
166          UK     225   .0590     .20     100
167          RK   10200   .0304    .045            TRAP      20       3

168          KK    CP24
169          KM        COMBINE HYDROGRAPHS SUB22 & SUB23
170          HC       2

171          KK   SUB24
172          KM        RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173          BA   .4550
174          LS              77    1.07
175          UK     295   .0438     .20     100
176          RK    6800   .0257    .045            TRAP      15       3     YES
```



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

177          KK   SUB25
178          KM        RUNOFF FROM SUB-BASIN 25
179          BA  1.5216
180          LS              85    1.02
181          UK     295   .0438     .20     100
182          RK   16700   .0302    .045            TRAP      25       3

183          KK    CP26
184          KM        COMBINE HYDROGRAPHS SUB24 & SUB25
185          HC       2

186          KK   SUB26
187          KM        RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188          BA   .6095
189          LS              74    1.51
190          UK     200   .0250     .20     100
191          RK   11400   .0241    .045            TRAP      30       3     YES

192          KK    CP27
193          KM        COMBINE HYDROGRAPHS SUB21 & SUB26
194          HC       2

195          KK   SUB27
196          KM        RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197          BA   .7639
198          LS              73    1.59
199          UK     159   .0213     .10     100
200          RK    3200   .0310    .045            TRAP    1500       2     YES

201          KK   SUB28
202          KM        RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203          BA  1.4235
204          LS              73    1.27
```

```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045           TRAP    2500       2     YES

207          KK   SUB29
208          KM        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS             74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045           TRAP    3500       2     YES

213          KK   SUB30
214          KM        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS             82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045           TRAP      50     100
```



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

219          KK   SUB31
220          KM        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS             74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045           TRAP      50     130     YES

225          KK   SUB32
226          KM        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS             74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045           TRAP      50     130     YES

231          KK   SUB33
232          KM        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS             74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045           TRAP      50     175     YES

237          KK   SUB34
238          KM        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS             77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045           TRAP      50     100

243          KK   SUB35
244          KM        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS             79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045           TRAP      50     100

249          KK    CP36
250          KM        COMBINE HYDROGRAPHS SUB34 & SUB35
```

```
        251          HC      2

        252          KK   SUB36
        253          KH        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
        254          BA  1.4538
        255          LS              72    2.11
        256          UK     116   .0213     .10     100
        257          RK    7767   .0281    .045           TRAP      50     130     YES

        258          KK   SUB37
        259          KH        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
        260          BA  1.1896
        261          LS              74    9.58
        262          UK      61   .0213     .10     100
        263          RK    8433   .0237    .045           TRAP      50     130     YES
1                                                  HEC-1 INPUT                                                    PAGE  7

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

        264          KK   SUB38
        265          KH        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
        266          BA  1.2597
        267          LS              74
        268          UK      84   .0213     .10     100
        269          RK    8300   .0176    .045           TRAP      50     150     YES
        270          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (---)) DIVERSION
   NO.      (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
    8        SUB1
               .
               .
   20          .        SUB2
               .          .
               .          .
   26          .          .        SUB3
               .          .          .
               .          .          .
   32        CP4.......................
               V
               V
   35       SUB4 ***
               V
               V
   41       SUB5 ***
               V
               V
   47       SUB6 ***
               .
               .
   53          .        SUB7
               .          V
               .          V
   59          .        SUB8 ***
               .          V
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          .        V
 65       .     SUB9 ***
          .        V
          .        V
 71       .    SUB10 ***
          .        .
          .        .
 77       .        .      SUB11
          .        .         V
          .        .         V
 83       .        .      SUB12 ***
          .        .         V
          .        .         V
 89       .        .      SUB13 ***
          .        .         V
          .        .         V
 95       .        .      SUB14 ***
          .        .         .
          .        .         .
101       .        .         .      SUB16
          .        .         .         .
          .        .         .         .
107       .        .         .         .      SUB17
          .        .         .         .         .
          .        .         .         .         .
113       .        .         .         .         .      SUB18
          .        .         .         .         .         .
          .        .         .         .         .         .
119       .        .         .      CP19A.......................
          .        .         .         V
          .        .         .         V
122       .        .         .      CP19B
          .        .         .         .
          .        .         .         .
125       .        .         .         .      SUB15
          .        .         .         .         .
          .        .         .         .         .
131       .        .         .      CP19C............
          .        .         .         V
          .        .         .         V
134       .        .         .      SUB19 ***
          .        .         .         .
          .        .         .         .
141       .        .         .         .      SUB20
          .        .         .         .         .
          .        .         .         .         .
147       .        .         .       CP21............
          .        .         .         V
          .        .         .         V
150       .        .         .      SUB21 ***
          .        .         .         .
          .        .         .         .
156       .        .         .         .      SUB22
          .        .         .         .         .
          .        .         .         .         .
162       .        .         .         .         .      SUB23
          .        .         .         .         .         .
```

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                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .     SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .     SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .     SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .     SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .     SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .     SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .     SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .     SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .     SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:12:11*
*                                       *
*****************************************
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
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```
                    GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
                    MODEL SC80.241, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
                    50-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
                    RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE     18MAR88  STARTING DATE
                  ITIME        0000  STARTING TIME
                     NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     19MAR88  ENDING DATE
                 NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                        TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       SUB1     244.   6.25         42.         14.         14.      0.34

        HYDROGRAPH AT
+                       SUB2     729.   6.42        212.         67.         67.      1.22
```

	HYDROGRAPH AT						
+		SUB3	330.	6.33	88.	28.	28.	0.54
	3 COMBINED AT						
+		CP4	1264.	6.33	341.	109.	109.	2.10
	HYDROGRAPH AT						
+		SUB4	1375.	6.67	514.	168.	168.	3.61
	HYDROGRAPH AT						
+		SUB5	1483.	7.08	723.	241.	241.	5.48
	HYDROGRAPH AT						
+		SUB6	1553.	7.75	973.	343.	343.	8.25
	HYDROGRAPH AT						
+		SUB7	301.	6.50	96.	31.	31.	0.67
	HYDROGRAPH AT						
+		SUB8	570.	6.58	229.	75.	75.	1.76
	HYDROGRAPH AT						
+		SUB9	872.	6.67	396.	132.	132.	3.21
	HYDROGRAPH AT						
+		SUB10	1088.	7.00	619.	213.	213.	5.33
	HYDROGRAPH AT						
+		SUB11	421.	6.17	72.	23.	23.	0.59
	HYDROGRAPH AT						
+		SUB12	844.	6.33	238.	77.	77.	1.92
	HYDROGRAPH AT						
+		SUB13	975.	6.75	377.	125.	125.	3.14
	HYDROGRAPH AT						
+		SUB14	955.	7.33	488.	167.	167.	4.26
	HYDROGRAPH AT						
+		SUB16	1899.	6.17	264.	82.	82.	1.48
	HYDROGRAPH AT						
+		SUB17	1460.	6.17	204.	63.	63.	1.15
	HYDROGRAPH AT						
+		SUB18	1773.	6.17	226.	70.	70.	1.27
	3 COMBINED AT						
+		CP19A	5132.	6.17	695.	215.	215.	3.89
	ROUTED TO						
+		CP19B	5058.	6.17	696.	216.	216.	3.89
	HYDROGRAPH AT						
+		SUB15	1094.	6.17	225.	71.	71.	1.33

+	2 COMBINED AT	CP19C	6152.	6.17	920.	286.	286.	5.23
+	HYDROGRAPH AT	SUB19	5861.	6.25	955.	297.	297.	5.40
+	HYDROGRAPH AT	SUB20	819.	6.17	107.	33.	33.	0.57
+	2 COMBINED AT	CP21	6623.	6.17	1061.	330.	330.	5.97
+	HYDROGRAPH AT	SUB21	4438.	6.75	1575.	508.	508.	9.66
+	HYDROGRAPH AT	SUB22	2087.	6.08	259.	80.	80.	1.39
+	HYDROGRAPH AT	SUB23	564.	6.17	74.	23.	23.	0.39
+	2 COMBINED AT	CP24	2648.	6.08	333.	103.	103.	1.78
+	HYDROGRAPH AT	SUB24	2902.	6.25	404.	125.	125.	2.24
+	HYDROGRAPH AT	SUB25	1977.	6.17	296.	91.	91.	1.52
+	2 COMBINED AT	CP26	4782.	6.17	699.	216.	216.	3.76
+	HYDROGRAPH AT	SUB26	5064.	6.33	793.	246.	246.	4.37
+	2 COMBINED AT	CP27	7891.	6.42	2368.	754.	754.	14.02
+	HYDROGRAPH AT	SUB27	7950.	6.50	2444.	781.	781.	14.79
+	HYDROGRAPH AT	SUB28	6828.	7.00	2486.	817.	817.	16.21
+	HYDROGRAPH AT	SUB29	5163.	7.83	2467.	853.	853.	18.09
+	HYDROGRAPH AT	SUB30	1433.	6.17	234.	73.	73.	1.33
+	HYDROGRAPH AT	SUB31	1419.	6.50	389.	124.	124.	2.56
+	HYDROGRAPH AT	SUB32	1567.	6.75	560.	181.	181.	3.96

	HYDROGRAPH AT						
+		SUB33	1619.	7.08	730.	241.	241.	5.53
	HYDROGRAPH AT						
+		SUB34	1037.	6.17	122.	38.	38.	0.84
	HYDROGRAPH AT						
+		SUB35	675.	6.42	192.	61.	61.	1.29
	2 COMBINED AT						
+		CP36	1593.	6.17	314.	100.	100.	2.13
	HYDROGRAPH AT						
+		SUB36	1798.	6.33	476.	154.	154.	3.58
	HYDROGRAPH AT						
+		SUB37	1917.	6.58	635.	207.	207.	4.77
	HYDROGRAPH AT						
+		SUB38	1937.	6.92	772.	255.	255.	6.03

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

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             FEBRUARY 1981             *
 *           REVISED 30 OCT 81           *
 *                                       *
 *RUN DATE WED, JUL 20 1988 TIME 11:08:11*
 *                                       *
 *****************************************
```

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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
    1          ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
    2          ID       MODEL[redacted] -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
    3          ID       [redacted], 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
    4          ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
               *DIAGRAM
    5          IT       5 18MAR88       0     289
    6          IO       5       0
    7          IN      30 18MAR88       0

    8          KK    SUB1
    9          KM       RUNOFF FROM SUB-BASIN 1
   10          BA   .3371
   11          PB    4.39
   12          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
   13          PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
   14          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
   15          PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
   16          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
   17          LS              75
   18          UK     255   .0262     .20     100
   19          RK    7160   .0289    .045            TRAP      35       3

   20          KK    SUB2
   21          KM       RUNOFF FROM SUB-BASIN 2
   22          BA  1.2170
```

```
 23          LS              83    1.28
 24          UK     337   .0308     .20     100
 25          RK   24000   .0196    .045           TRAP      35       3

 26          KK    SUB3
 27          KM        RUNOFF FROM SUB-BASIN 3
 28          BA   .5448
 29          LS              81    1.44
 30          UK     255   .0262     .20     100
 31          RK   16400   .0201    .045           TRAP      35       3

 32          KK     CP4
 33          KM        COMBINE HYDROGRAPHS SUB1, SUB2, & SUB3
 34          HC       3

 35          KK    SUB4
 36          KM        RUNOFF FROM SUB-BASIN 4 & ROUTE CP 4
 37          BA  1.5102
 38          LS              73    3.05
 39          UK      84   .0213     .10     100
 40          RK   10633   .0191    .045           TRAP      50     100     YES

 41          KK    SUB5
 42          KM        RUNOFF FROM SUB-BASIN 5 & ROUTE SUB 4
 43          BA  1.8713
 44          LS              74    1.29
 45          UK      81   .0213     .10     100
 46          RK   11433   .0175    .045           TRAP      50     130     YES
1                                          HEC-1 INPUT                                                    PAGE  2

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

 47          KK    SUB6
 48          KM        RUNOFF FROM SUB-BASIN 6 & ROUTE SUB 5
 49          BA  2.7719
 50          LS              74
 51          UK     146   .0213     .10     100
 52          RK   16100   .0124    .045           TRAP      50     150     YES

 53          KK    SUB7
 54          KM        RUNOFF FROM SUB-BASIN 7
 55          BA   .6690
 56          LS              78    2.13
 57          UK     255   .0262     .20     100
 58          RK   12200   .0197    .045           TRAP      50      50

 59          KK    SUB8
 60          KM        RUNOFF FROM SUB-BASIN 8 & ROUTE SUB 7
 61          BA  1.0885
 62          LS              74    2.71
 63          UK     116   .0213     .10     100
 64          RK   10550   .0196    .045           TRAP      50     100     YES

 65          KK    SUB9
 66          KM        RUNOFF FROM SUB-BASIN 9 & ROUTE SUB 8
 67          BA  1.4559
 68          LS              74
```

```
 69          UK     95  .0213    .10    100
 70          RK  10700  .0187   .045          TRAP     50    130    YES

 71          KK  SUB10
 72          KM       RUNOFF FROM SUB-BASIN 10 ROUTE SUB 9
 73          BA  2.1144
 74          LS            74
 75          UK    107  .0213    .10    100
 76          RK  12400  .0137   .045          TRAP     50    175    YES

 77          KK  SUB11
 78          KM       RUNOFF FROM SUB-BASIN 11
 79          BA  .5865
 80          LS            74   1.53
 81          UK    150  .0425    .20    100
 82          RK   6200  .0226   .045          TRAP     50     50

 83          KK  SUB12
 84          KM       RUNOFF FROM SUB-BASIN 12 & ROUTE SUB 11
 85          BA  1.3317
 86          LS            74   1.39
 87          UK     95  .0213    .10    100
 88          RK   9850  .0214   .045          TRAP     50    100    YES
1                                        HEC-1 INPUT                                                    PAGE  3

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

 89          KK  SUB13
 90          KM       RUNOFF FROM SUB-BASIN 13 & ROUTE SUB 12
 91          BA  1.2211
 92          LS            74
 93          UK     86  .0213    .10    100
 94          RK  10533  .0192   .045          TRAP     50    130    YES

 95          KK  SUB14
 96          KM       RUNOFF FROM SUB-BASIN 14 & ROUTE SUB 13
 97          BA  1.1209
 98          LS            74
 99          UK    101  .0213    .10    100
100          RK  11200  .0142   .045          TRAP     50    150    YES

101          KK  SUB16
102          KM       RUNOFF FROM SUB-BASIN 16
103          BA  1.4809
104          LS            83
105          UK    217  .0581    .20    100
106          RK  14800  .0216   .045          TRAP     25      3

107          KK  SUB17
108          KM       RUNOFF FROM SUB-BASIN 17
109          BA  1.1459
110          LS            83
111          UK    285  .0421    .20    100
112          RK  12200  .0254   .045          TRAP     25      3

113          KK  SUB18
114          KM       RUNOFF FROM SUB-BASIN 18
```

```
115          BA  1.2670
116          LS            83
117          UK    285   .0421     .20     100
118          RK   10840   .0259    .045           TRAP      25       3

119          KK   CP19A
120          KM        COMBINE HYDROGRAPHS SUB16, SUB17, & SUB18
121          HC       3

122          KK   CP19B
123          KM        ROUTE CP19A TO CP19B
124          RK    1100   .0155   0.045           TRAP      35       3

125          KK   SUB15
126          KM        RUNOFF FROM SUB-BASIN 15
127          BA  1.3327
128          LS            82
129          UK    217   .0581     .20     100
130          RK   21200   .0236    .045           TRAP      25       3
1                                          HEC-1 INPUT                                                    PAGE  4

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

131          KK   CP19C
132          KM        COMBINE HYDROGRAPHS SUB15 & CP19B
133          HC       2

134          KK   SUB19
135          KM        RUNOFF FROM SUB-BASIN 19 & ROUTE CP 19C
136          BA   .1774
137          LS            84
138          UK    275   .0800     .20     100
139          RK   3730   .0352    .045    .160   TRAP      15       3
140          RK   1800   .0200    .045           TRAP      50      30     YES

141          KK   SUB20
142          KM        RUNOFF FROM SUB-BASIN 20
143          BA   .5698
144          LS            84
145          UK    300   .0750     .20     100
146          RK   9640   .0197    .045           TRAP      15       3

147          KK    CP21
148          KM        COMBINE HYDROGRAPHS SUB19 & SUB20
149          HC       2

150          KK   SUB21
151          KM        RUNOFF FROM SUB-BASIN 21 & ROUTE CP 21
152          BA  3.6841
153          LS            80    1.08
154          UK    297   .0558     .20     100
155          RK  27600   .0196    .045           TRAP      50      30     YES

156          KK   SUB22
157          KM        RUNOFF FROM SUB-BASIN 22
158          BA  1.3860
159          LS            84
```

```
160        UK     225   .0590     .20     100
161        RK   13000   .0238    .045            TRAP      25       3

162        KK   SUB23
163        KM        RUNOFF FROM SUB-BASIN 23
164        BA   .3945
165        LS              84
166        UK     225   .0590     .20     100
167        RK   10200   .0304    .045            TRAP      20       3

168        KK    CP24
169        KM        COMBINE HYDROGRAPHS SUB22 & SUB23
170        HC       2

171        KK   SUB24
172        KM        RUNOFF FROM SUB-BASIN 24 & ROUTE CP 24
173        BA   .4550
174        LS              77    1.07
175        UK     295   .0438     .20     100
176        RK    6800   .0257    .045            TRAP      15       3     YES
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

177        KK   SUB25
178        KM        RUNOFF FROM SUB-BASIN 25
179        BA  1.5216
180        LS              85    1.02
181        UK     295   .0438     .20     100
182        RK   16700   .0302    .045            TRAP      25       3

183        KK    CP26
184        KM        COMBINE HYDROGRAPHS SUB24 & SUB25
185        HC       2

186        KK   SUB26
187        KM        RUNOFF FROM SUB-BASIN 26 & ROUTE CP 26
188        BA   .6095
189        LS              74    1.51
190        UK     200   .0250     .20     100
191        RK   11400   .0241    .045            TRAP      30       3     YES

192        KK    CP27
193        KM        COMBINE HYDROGRAPHS SUB21 & SUB26
194        HC       2

195        KK   SUB27
196        KM        RUNOFF FROM SUB-BASIN 27 & ROUTE CP 27
197        BA   .7639
198        LS              73    1.59
199        UK     159   .0213     .10     100
200        RK    3200   .0310    .045            TRAP    1500       2     YES

201        KK   SUB28
202        KM        RUNOFF FROM SUB-BASIN 28 & ROUTE SUB 27
203        BA  1.4235
204        LS              73    1.27
```

```
205          UK      96   .0213     .10     100
206          RK    9333   .0303    .045           TRAP    2500       2     YES

207          KK   SUB29
208          KM        RUNOFF FROM SUB-BASIN 29 & ROUTE SUB 28
209          BA  1.8786
210          LS             74
211          UK      88   .0213     .10     100
212          RK   10900   .0147    .045           TRAP    3500       2     YES

213          KK   SUB30
214          KM        RUNOFF FROM SUB-BASIN 30
215          BA  1.3296
216          LS             82    1.52
217          UK     110   .0408     .20     100
218          RK   10640   .0371    .045           TRAP      50     100
```



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

219          KK   SUB31
220          KM        RUNOFF FROM SUB-BASIN 31 & ROUTE SUB 30
221          BA  1.2325
222          LS             74    3.20
223          UK     102   .0213     .10     100
224          RK    9450   .0228    .045           TRAP      50     130     YES

225          KK   SUB32
226          KM        RUNOFF FROM SUB-BASIN 32 & ROUTE SUB 31
227          BA  1.3985
228          LS             74    2.99
229          UK      67   .0213     .10     100
230          RK    9300   .0214    .045           TRAP      50     130     YES

231          KK   SUB33
232          KM        RUNOFF FROM SUB-BASIN 33 & ROUTE SUB 32
233          BA  1.5717
234          LS             74
235          UK      89   .0213     .10     100
236          RK    9500   .0161    .045           TRAP      50     175     YES

237          KK   SUB34
238          KM        RUNOFF FROM SUB-BASIN 34
239          BA   .8433
240          LS             77    2.43
241          UK     110   .0408     .20     100
242          RK    6800   .0644    .045           TRAP      50     100

243          KK   SUB35
244          KM        RUNOFF FROM SUB-BASIN 35
245          BA  1.2879
246          LS             79    1.43
247          UK     265   .0381     .20     100
248          RK   13000   .0319    .045           TRAP      50     100

249          KK    CP36
250          KM        COMBINE HYDROGRAPHS SUB34 & SUB35
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```
        251          HC      2

        252          KK   SUB36
        253          KM        RUNOFF FROM SUB-BASIN 36 & ROUTE CP 36
        254          BA  1.4538
        255          LS             72    2.11
        256          UK    116   .0213    .10     100
        257          RK   7767   .0281    .045           TRAP     50     130     YES

        258          KK   SUB37
        259          KM        RUNOFF FROM SUB-BASIN 37 & ROUTE SUB 36
        260          BA  1.1896
        261          LS             74    9.58
        262          UK     61   .0213    .10     100
        263          RK   8433   .0237    .045           TRAP     50     130     YES
1                                                HEC-1 INPUT                                                    PAGE  7

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

        264          KK   SUB38
        265          KM        RUNOFF FROM SUB-BASIN 38 & ROUTE SUB 37
        266          BA  1.2597
        267          LS             74
        268          UK     84   .0213    .10     100
        269          RK   8300   .0176    .045           TRAP     50     150     YES
        270          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (---)) DIVERSION
   NO.     (.) CONNECTOR        ((---) RETURN OF DIVERTED FLOW
    8       SUB1
              .
              .
   20         .        SUB2
              .          .
              .          .
   26         .          .        SUB3
              .          .          .
              .          .          .
   32       CP4.......................
              V
              V
   35      SUB4 ***
              V
              V
   41      SUB5 ***
              V
              V
   47      SUB6 ***
              .
              .
   53         .        SUB7
              .          V
              .          V
   59         .        SUB8 ***
              .          V
```

```
          .        V
65        .     SUB9 ***
          .        V
          .        V
71        .    SUB10 ***
          .        .
          .        .
77        .        .      SUB11
          .        .         V
          .        .         V
83        .        .      SUB12 ***
          .        .         V
          .        .         V
89        .        .      SUB13 ***
          .        .         V
          .        .         V
95        .        .      SUB14 ***
          .        .         .
          .        .         .
101       .        .         .      SUB16
          .        .         .         .
          .        .         .         .
107       .        .         .         .      SUB17
          .        .         .         .         .
          .        .         .         .         .
113       .        .         .         .         .      SUB18
          .        .         .         .         .         .
          .        .         .         .         .         .
119       .        .         .      CP19A.......................
          .        .         .         V
          .        .         .         V
122       .        .         .      CP19B
          .        .         .         .
          .        .         .         .
125       .        .         .         .      SUB15
          .        .         .         .         .
          .        .         .         .         .
131       .        .         .      CP19C............
          .        .         .         V
          .        .         .         V
134       .        .         .      SUB19 ***
          .        .         .         .
          .        .         .         .
141       .        .         .         .      SUB20
          .        .         .         .         .
          .        .         .         .         .
147       .        .         .       CP21............
          .        .         .         V
          .        .         .         V
150       .        .         .      SUB21 ***
          .        .         .         .
          .        .         .         .
156       .        .         .         .      SUB22
          .        .         .         .         .
          .        .         .         .         .
162       .        .         .         .         .      SUB23
          .        .         .         .         .         .
```

```
                .         .         .         .         .         .
168             .         .         .         .      CP24............
                .         .         .         .         V
                .         .         .         .         V
171             .         .         .         .      SUB24 ***
                .         .         .         .         .
                .         .         .         .         .
177             .         .         .         .         .      SUB25
                .         .         .         .         .         .
                .         .         .         .         .         .
183             .         .         .         .      CP26............
                .         .         .         .         V
                .         .         .         .         V
186             .         .         .         .      SUB26 ***
                .         .         .         .         .
                .         .         .         .         .
192             .         .         .      CP27............
                .         .         .         V
                .         .         .         V
195             .         .         .      SUB27 ***
                .         .         .         V
                .         .         .         V
201             .         .         .      SUB28 ***
                .         .         .         V
                .         .         .         V
207             .         .         .      SUB29 ***
                .         .         .         .
                .         .         .         .
213             .         .         .         .      SUB30
                .         .         .         .         V
                .         .         .         .         V
219             .         .         .         .      SUB31 ***
                .         .         .         .         V
                .         .         .         .         V
225             .         .         .         .      SUB32 ***
                .         .         .         .         V
                .         .         .         .         V
231             .         .         .         .      SUB33 ***
                .         .         .         .         .
                .         .         .         .         .
237             .         .         .         .         .      SUB34
                .         .         .         .         .         .
                .         .         .         .         .         .
243             .         .         .         .         .         .      SUB35
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
249             .         .         .         .         .      CP36............
                .         .         .         .         .         V
                .         .         .         .         .         V
252             .         .         .         .         .      SUB36 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
258             .         .         .         .         .      SUB37 ***
                .         .         .         .         .         V
                .         .         .         .         .         V
264             .         .         .         .         .      SUB38 ***
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*          REVISED 30 OCT 81            *
*                                       *
*RUN DATE WED, JUL 20 1988 TIME 11:08:11*
*                                       *
*****************************************
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```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC80.24I, -- SUB-BASIN SERIES 1 TO 38, OUTER LOOP WATERSHED
100-YR, 24-HR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

   IT         HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE     18MAR88  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     19MAR88  ENDING DATE
                  NDTIME        0000  ENDING TIME

              COMPUTATION INTERVAL    0.08 HOURS
                  TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA        SQUARE MILES
             PRECIPITATION DEPTH  INCHES
             LENGTH, ELEVATION    FEET
             FLOW                 CUBIC FEET PER SECOND
             STORAGE VOLUME       ACRE-FEET
             SURFACE AREA         ACRES
             TEMPERATURE          DEGREES FAHRENHEIT
1
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB1	338.	6.17	51.	16.	16.	0.34		
+	HYDROGRAPH AT	SUB2	950.	6.33	252.	79.	79.	1.22		

+	HYDROGRAPH AT SUB3	411.	6.33	104.	33.	33.	0.54
+	3 COMBINED AT CP4	1645.	6.25	408.	129.	129.	2.10
+	HYDROGRAPH AT SUB4	1809.	6.67	623.	201.	201.	3.61
+	HYDROGRAPH AT SUB5	1952.	6.92	884.	290.	290.	5.48
+	HYDROGRAPH AT SUB6	2033.	7.58	1205.	415.	415.	8.25
+	HYDROGRAPH AT SUB7	392.	6.42	116.	37.	37.	0.67
+	HYDROGRAPH AT SUB8	763.	6.42	282.	91.	91.	1.76
+	HYDROGRAPH AT SUB9	1163.	6.58	489.	161.	161.	3.21
+	HYDROGRAPH AT SUB10	1445.	6.92	769.	260.	260.	5.33
+	HYDROGRAPH AT SUB11	575.	6.17	88.	28.	28.	0.59
+	HYDROGRAPH AT SUB12	1141.	6.25	292.	94.	94.	1.92
+	HYDROGRAPH AT SUB13	1309.	6.67	465.	152.	152.	3.14
+	HYDROGRAPH AT SUB14	1270.	7.17	605.	203.	203.	4.26
+	HYDROGRAPH AT SUB16	2411.	6.08	314.	96.	96.	1.48
+	HYDROGRAPH AT SUB17	1864.	6.17	243.	75.	75.	1.15
+	HYDROGRAPH AT SUB18	2322.	6.08	269.	83.	83.	1.27
+	3 COMBINED AT CP19A	6534.	6.08	826.	254.	254.	3.89
+	ROUTED TO CP19B	6432.	6.17	825.	254.	254.	3.89
+	HYDROGRAPH AT SUB15	1472.	6.17	268.	83.	83.	1.33

+	2 COMBINED AT	CP19C	7904.	6.17	1093.	337.	337.	5.23
+	HYDROGRAPH AT	SUB19	7793.	6.17	1132.	349.	349.	5.40
+	HYDROGRAPH AT	SUB20	1055.	6.08	126.	39.	39.	0.57
+	2 COMBINED AT	CP21	8796.	6.17	1257.	388.	388.	5.97
+	HYDROGRAPH AT	SUB21	5698.	6.67	1883.	601.	601.	9.66
+	HYDROGRAPH AT	SUB22	2732.	6.08	306.	94.	94.	1.39
+	HYDROGRAPH AT	SUB23	738.	6.08	87.	27.	27.	0.39
+	2 COMBINED AT	CP24	3470.	6.08	394.	120.	120.	1.78
+	HYDROGRAPH AT	SUB24	3676.	6.17	482.	147.	147.	2.24
+	HYDROGRAPH AT	SUB25	2516.	6.17	349.	107.	107.	1.52
+	2 COMBINED AT	CP26	6192.	6.17	830.	254.	254.	3.76
+	HYDROGRAPH AT	SUB26	6301.	6.17	954.	292.	292.	4.37
+	2 COMBINED AT	CP27	10062.	6.33	2837.	893.	893.	14.02
+	HYDROGRAPH AT	SUB27	10183.	6.50	2956.	933.	933.	14.79
+	HYDROGRAPH AT	SUB28	9113.	6.83	3027.	979.	979.	16.21
+	HYDROGRAPH AT	SUB29	6864.	7.58	3037.	1030.	1030.	18.09
+	HYDROGRAPH AT	SUB30	1791.	6.17	278.	85.	85.	1.33
+	HYDROGRAPH AT	SUB31	1842.	6.42	468.	147.	147.	2.56
+	HYDROGRAPH AT	SUB32	2065.	6.67	679.	217.	217.	3.96

Apex

Streams #4

+	HYDROGRAPH AT	SUB33	2123.	7.00	893.	291.	291.	5.53
+	HYDROGRAPH AT	SUB34	1309.	6.08	149.	46.	46.	0.84
+	HYDROGRAPH AT	SUB35	887.	6.33	232.	73.	73.	1.29
+	2 COMBINED AT	CP36	2064.	6.17	380.	120.	120.	2.13
+	HYDROGRAPH AT	SUB36	2514.	6.25	586.	187.	187.	3.58
+	HYDROGRAPH AT	SUB37	2587.	6.58	779.	251.	251.	4.77
+	HYDROGRAPH AT	SUB38	2622.	6.83	951.	309.	309.	6.03

34

35

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

STREAM #5 CONCENTRATION POINT S1500

STREAM #6 CONCENTRATION POINT S1460

```
*                                      *                                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                    *   U.S. ARMY CORPS OF ENGINEERS
*            FEBRUARY 1981             *                                                    * THE HYDROLOGIC ENGINEERING CENTER
*          REVISED 01 APR 88           *                                                    *         609 SECOND STREET
*                                      *                                                    *      DAVIS, CALIFORNIA 95616
*  RUN DATE  08/03/1988  TIME  11:33:58 *                                                    *         (916) 551-1748
*                                      *                                                    *
****************************************                                                    ****************************************
```

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

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID       MODEL SC30.2I  --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID       2-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM       RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    2.16
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              83    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP      35       3

 21           KK    1341     DIV
 22           KM       DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

```
24          DI      0    4000
25          DQ      0    2000   50/50

26          KK   1350     SUB
27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
28          BA   .9391
29          LS             80    1.18
30          UK    200   .0200     .10     100
31          RK  13600   .0184    .045           TRAP     35      3     YES
```

(S1350)

```
32          KK   1342     RET
33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
34          DR   1342

35          KK   1370     SUB
36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
37          BA   .8322
38          LS             75    1.54
39          UK    240   .0208     .10     100
40          RK  13400   .0194    .045           TRAP     20      3     YES

41          KK   1360
42          KM        RUNOFF FROM SUB 1360
43          BA   .6557
44          LS             83    1.21
45          UK    250   .0200     .15     100
46          RK   9400   .0245    .045           TRAP     20      3
```



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

47          KK   1371     CP
48          KM        ROUTE SUB 1360 TO CP 1371
49          RK   5300   .0188    .045           TRAP     20      3

50          KK   1372     CP
51          KM        COMBINE SUB 1370 AND CP 1371
52          HC      2

53          KK   1380     SUB
54          KM        RUNOFF FROM SUB 1380
55          BA   .9305
56          LS             82    1.26
57          UK    240   .0555     .20     100
58          RK  18000   .0311    .045           TRAP     20      3

59          KK   1390     SUB
60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
61          BA  1.4599
62          LS             82    1.19
63          UK    300   .0333     .20     100
64          RK  17800   .0191    .045           TRAP     25      3     YES

65          KK   1391     DIV
66          KM        DIVERT FLOW FROM SUB 1390 TO SUB 1410
67          DT   1392
68          DI      0    8000   50/50
69          DQ      0    4000

70          KK   1400     SUB
71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
72          BA  1.3207
73          LS             75    2.74
74          UK    250   .0200     .15     100
75          RK  15000   .0190    .045           TRAP     30      3     YES
```

```
 76          KK    1420     SUB
 77          KM        RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     285   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM        RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.19
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
1                                          HEC-1 INPUT                                                    PAGE  3

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

 88          KK    1440     SUB
 89          KM        RUNOFF FROM SUB 1440
 90          BA  1.8882
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441     CP
 95          KM        COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM        RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM        RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM        RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451     CP
113          KM        COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM        RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM        RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

APE # 6

```
 128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
 129          BA  1.6895
 130          LS              84
 131          UK     285   .0419     .20     100
 132          RK   17600   .0188    .045            TRAP      25       3     YES
1                                          HEC-1 INPUT                                                    PAGE  4

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


 133          KK    1480     SUB
 134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
 135          BA  1.0015
 136          LS              83    1.07
 137          UK     300   .0167     .20     100
 138          RK    7500   .0213    .045            TRAP      25       3     YES

 139          KK    1481     DIV
 140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
 141          DT    1482
 142          DI       0    8000
 143          DO       0    4000     50|50

 144          KK    1490     SUB
 145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
 146          BA  1.3143
 147          LS              75    3.54
 148          UK     280   .0143     .15     100
 149          RK   18800   .0189    .045            TRAP      30      30     YES

 150          KK    1482     RET
 151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
 152          DR    1482

 153          KK    1500     SUB
 154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
 155          BA  1.7949
 156          LS              76    3.72
 157          UK     280   .0143     .15     100
 158          RK   20700   .0161    .045            TRAP      30      40     YES
 159          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   8        1340
              .
              .
  23          .------->    1342
  21       1341
             V
             V
  26       1350 ***
              .
              .
  34          .          .<-------    1342
  32          .       1342
              .          V
              .          V
  35          .       1370 ***
              .          .
              .          .
```

154

```
41    .    .    1360
      .    .      V
      .    .      V
47    .    .    1371
      .    .      .
      .    .      .
50    .    1372...........
      .    .
      .    .
53    .    .    1380 ✓
      .    .      V
      .    .      V
59    .    .    1390 *** ✓
      .    .      .
      .    .      .
67    .    .      .-------->   1392 ✓
65    .    .    1391
      .    .      V
      .    .      V
70    .    .    1400 ***
      .    .      .
      .    .      .
76    .    .      .     1420
      .    .      .
      .    .      .
82    .    .      .      .     1430
      .    .      .      .       .
      .    .      .      .       .
88    .    .      .      .       .     1440
      .    .      .      .       .       .
      .    .      .      .       .       .
94    .    .      .      .     1441............
      .    .      .      .       V
      .    .      .      .       V ✓
97    .    .      .      .     1450 ***
      .    .      .      .       .
      .    .      .      .       .
105   .    .      .      .       .       .<--------   1392
103   .    .      .      .       .     1392
      .    .      .      .       .       V
      .    .      .      .       .       V
106   .    .      .      .       .     1410 *** ✓
      .    .      .      .       .       .
      .    .      .      .       .       .
112   .    .      .      .    ✓1451............
      .    .      .      .       V
      .    .      .      .       V
115   .    .      .      .    ✓1460 ***
      .    .      .      .       .
      .    .      .      .       .
121   .    .      .      .       .     1470
      .    .      .      .       .       V
      .    .      .      .       .       V
127   .    .      .      .       .     1475 ***
      .    .      .      .       .       V
      .    .      .      .       .       V
133   .    .      .      .       .     1480 ***
      .    .      .      .       .       .
      .    .      .      .       .       .
141   .    .      .      .       .       .-------->   1482
139   .    .      .      .       .     1481
      .    .      .      .       .       V
      .    .      .      .       .       V
144   .    .      .      .       .     1490 ***
      .    .      .      .       .       .
      .    .      .      .       .       .
```

STREAM #6

DIVERTS 50/50

Not Part of #6

✓Stream #6

```
152          .          .          .          .          .          .          .\-------    1482
150          .          .          .          .          .          .       1482
             .          .          .          .          .          .          V
             .          .          .          .          .          .          V
153          .          .          .          .          .          .       1500 ***
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                    *  THE HYDROLOGIC ENGINEERING CENTER   *
*          REVISED 01 APR 88           *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE  08/03/1988  TIME  11:33:58 *                    *         (916) 551-1748               *
*                                      *                    *                                      *
****************************************                    ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.2I -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
2-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE    27FEB88  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE    28FEB88  ENDING DATE
                  NDTIME       0000  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT
1
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1340	383.	6.75	97.	32.	32.	1.55		
+	DIVERSION TO	1342	191.	6.75	49.	16.	16.	1.55		

+	HYDROGRAPH AT 1341	191.	6.75	49.	16.	16.	1.55
+	HYDROGRAPH AT 1350	243.	7.17	94.	32.	32.	2.49
+	HYDROGRAPH AT 1342	191.	6.75	49.	16.	16.	.00
+	HYDROGRAPH AT 1370	231.	7.17	75.	26.	26.	.83
+	HYDROGRAPH AT 1360	232.	6.33	43.	14.	14.	.66
+	ROUTED TO 1371	223.	6.50	42.	14.	14.	.66
+	2 COMBINED AT 1372	322.	7.08	117.	40.	40.	1.49
+	HYDROGRAPH AT 1380	238.	6.50	56.	18.	18.	.93
+	HYDROGRAPH AT 1390	447.	6.75	138.	47.	47.	2.39
+	DIVERSION TO 1392	224.	6.75	69.	23.	23.	2.39
+	HYDROGRAPH AT 1391	224.	6.75	69.	23.	23.	2.39
+	HYDROGRAPH AT 1400	300.	7.25 0.5hr	113.	40.	40.	3.71
+	HYDROGRAPH AT 1420	95.	6.58	25.	9.	9.	.68
+	HYDROGRAPH AT 1430	251.	6.83	78.	26.	26.	1.43
+	HYDROGRAPH AT 1440	347.	6.75	100.	34.	34.	1.89
+	2 COMBINED AT 1441	591.	6.83	177.	60.	60.	3.32
+	HYDROGRAPH AT 1450	635.	7.25	203.	71.	71.	4.09
+	HYDROGRAPH AT DR 1392	224.	6.75	69.	23.	23.	.00
+	HYDROGRAPH AT 1410	235.	7.00 0.25hrs	77.	26.	26.	.16
+	2 COMBINED AT 1451	850.	7.17	279.	97.	97.	4.25
+	HYDROGRAPH AT 1460	874.	7.58	299.	107.	107.	5.20
+	HYDROGRAPH AT 1470	81.	6.58	20.	7.	7.	.30

+	HYDROGRAPH AT	1475	506.	6.58	132.	44.	44.	1.99
+	HYDROGRAPH AT DT	1480	686.	6.67	193.	64.	64.	2.99
+	DIVERSION TO DJ	1482	343.	6.67	97.	32.	32.	2.99
+	HYDROGRAPH AT DR	1481	343.	6.67	97.	32.	32.	2.99
+	HYDROGRAPH AT	1490	421.	7.58	136.	48.	48.	4.30
+	HYDROGRAPH AT	1482	343.	6.67	97.	32.	32.	.00
+	HYDROGRAPH AT	1500	450.	7.67	157.	56.	56.	1.79

1

```
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                    *  THE HYDROLOGIC ENGINEERING CENTER   *
*          REVISED 01 APR 88           *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE  08/03/1988  TIME  11:52:19 *                    *          (916) 551-1748              *
*                                      *                    *                                      *
****************************************                    ****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
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DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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

  1           ID        GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID        MODEL SC30.5I  --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID        5-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID        RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM        RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    2.81
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              83    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP      35       3

 21           KK    1341     DIV
 22           KM        DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

```
 24          DI       0    4000
 25          DQ       0    2000

 26          KK    1350     SUB
 27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
 28          BA   .9391
 29          LS              80    1.18
 30          UK     200   .0200     .10     100
 31          RK   13600   .0184    .045           TRAP      35       3     YES

 32          KK    1342     RET
 33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
 34          DR    1342

 35          KK    1370     SUB
 36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
 37          BA   .8322
 38          LS              75    1.54
 39          UK     240   .0208     .10     100
 40          RK   13400   .0194    .045           TRAP      20       3     YES

 41          KK    1360
 42          KM        RUNOFF FROM SUB 1360
 43          BA   .6557
 44          LS              83    1.21
 45          UK     250   .0200     .15     100
 46          RK    9400   .0245    .045           TRAP      20       3
```



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

 47          KK    1371      CP
 48          KM        ROUTE SUB 1360 TO CP 1371
 49          RK    5300   .0188    .045           TRAP      20       3

 50          KK    1372      CP
 51          KM        COMBINE SUB 1370 AND CP 1371
 52          HC       2

 53          KK    1380     SUB
 54          KM        RUNOFF FROM SUB 1380
 55          BA   .9305
 56          LS              82    1.26
 57          UK     240   .0555     .20     100
 58          RK   18000   .0311    .045           TRAP      20       3

 59          KK    1390     SUB
 60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
 61          BA  1.4599
 62          LS              82    1.19
 63          UK     300   .0333     .20     100
 64          RK   17800   .0191    .045           TRAP      25       3     YES

 65          KK    1391     DIV
 66          KM       DIVERT FLOW FROM SUB 1390 TO SUB 1410
 67          DT    1392
 68          DI       0    8000
 69          DQ       0    4000

 70          KK    1400     SUB
 71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
 72          BA  1.3207
 73          LS              75    2.74
 74          UK     250   .0200     .15     100
 75          RK   15000   .0190    .045           TRAP      30       3     YES
```

```
 76          KK    1420     SUB
 77          KM         RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     285   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM         RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.19
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
1                                          HEC-1 INPUT                                                    PAGE  3

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


 88          KK    1440     SUB
 89          KM         RUNOFF FROM SUB 1440
 90          BA  1.8862
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441     CP
 95          KM         COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM         RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM         RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM         RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451     CP
113          KM         COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM         RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM         RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

```
127          KK    1475     SUB
128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
129          BA  1.6895
130          LS              84
131          UK     285   .0419     .20     100
132          RK   17600   .0188    .045           TRAP      25       3     YES
```



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

133          KK    1480     SUB
134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
135          BA  1.0015
136          LS              83    1.07
137          UK     300   .0167     .20     100
138          RK    7500   .0213    .045           TRAP      25       3     YES

139          KK    1481     DIV
140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
141          DT    1482
142          DI       0    8000
143          DQ       0    4000

144          KK    1490     SUB
145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
146          BA  1.3143
147          LS              75    3.54
148          UK     280   .0143     .15     100
149          RK   18800   .0189    .045           TRAP      30      30     YES

150          KK    1482     RET
151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
152          DR    1482

153          KK    1500     SUB
154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
155          BA  1.7949
156          LS              76    3.72
157          UK     280   .0143     .15     100
158          RK   20700   .0181    .045           TRAP      30      40     YES
159          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   8        1340
               .
               .
  23           .------->    1342
  21        1341
               V
               V
  26        1350 ***
               .
               .
  34           .           .<-------    1342
  32           .        1342
               .           V
               .           V
  35           .        1370 ***
               .           .
               .           .
```

```
41          .           .       1360
            .           .         V
            .           .         V
47          .           .       1371
            .           .         .
            .           .         .
50          .       1372............
            .           .
            .           .
53          .           .       1380
            .           .         V
            .           .         V
59          .           .       1390 ***
            .           .         .
            .           .         .
67          .           .         .-------->    1392
65          .           .       1391
            .           .         V
            .           .         V
70          .           .       1400 ***
            .           .         .
            .           .         .
76          .           .         .       1420
            .           .         .         .
            .           .         .         .
82          .           .         .         .       1430
            .           .         .         .         .
            .           .         .         .         .
88          .           .         .         .         .       1440
            .           .         .         .         .         .
            .           .         .         .         .         .
94          .           .         .         .       1441............
            .           .         .         .         V
            .           .         .         .         V
97          .           .         .         .       1450 ***
            .           .         .         .         .
            .           .         .         .         .
105         .           .         .         .         .         .<-------    1392
103         .           .         .         .         .       1392
            .           .         .         .         .         V
            .           .         .         .         .         V
106         .           .         .         .         .       1410 ***
            .           .         .         .         .         .
            .           .         .         .         .         .
112         .           .         .         .       1451............
            .           .         .         .         V
            .           .         .         .         V
115         .           .         .         .       1460 ***
            .           .         .         .         .
            .           .         .         .         .
121         .           .         .         .         .       1470
            .           .         .         .         .         V
            .           .         .         .         .         V
127         .           .         .         .         .       1475 ***
            .           .         .         .         .         V
            .           .         .         .         .         V
133         .           .         .         .         .       1480 ***
            .           .         .         .         .         .
            .           .         .         .         .         .
141         .           .         .         .         .         .-------->    1482
139         .           .         .         .         .       1481
            .           .         .         .         .         V
            .           .         .         .         .         V
144         .           .         .         .         .       1490 ***
            .           .         .         .         .         .
            .           .         .         .         .         .
```

```
 152          .          .          .          .          .          .<-------    1482
 150          .          .          .          .          .          .       1482
              .          .          .          .          .          .          V
              .          .          .          .          .          .          V
 153          .          .          .          .          .          .       1500 ***

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                                  * THE HYDROLOGIC ENGINEERING CENTER    *
*          REVISED 01 APR 88           *                                  *         609 SECOND STREET            *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
* RUN DATE  08/03/1988  TIME  11:52:19 *                                  *          (916) 551-1748              *
*                                      *                                  *                                      *
****************************************                                  ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.5I -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
5-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE    27FEB88  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE    28FEB88  ENDING DATE
                   NDTIME       0000  ENDING TIME
                    ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       1340     802.    6.50        162.        52.         52.      1.55

        DIVERSION TO
+                       1342     401.    6.50         81.        26.         26.      1.55
```

+	HYDROGRAPH AT	1341	401.	6.50	81.	26.	26.	1.55
+	HYDROGRAPH AT	1350	516.	6.83	162.	53.	53.	2.49
+	HYDROGRAPH AT	1342	401.	6.50	81.	26.	26.	.00
+	HYDROGRAPH AT	1370	490.	6.83	133.	44.	44.	.83
+	HYDROGRAPH AT	1360	483.	6.17	71.	22.	22.	.66
+	ROUTED TO	1371	467.	6.33	70.	22.	22.	.66
+	2 COMBINED AT	1372	714.	6.33	203.	66.	66.	1.49
+	HYDROGRAPH AT	1380	508.	6.33	94.	30.	30.	.93
+	HYDROGRAPH AT	1390	940.	6.50	235.	76.	76.	2.39
+	DIVERSION TO	1392	470.	6.50	117.	38.	38.	2.39
+	HYDROGRAPH AT	1391	470.	6.50	117.	38.	38.	2.39
+	HYDROGRAPH AT	1400	637.	6.83	202.	68.	68.	3.71
+	HYDROGRAPH AT	1420	224.	6.42	47.	16.	16.	.68
+	HYDROGRAPH AT	1430	540.	6.58	134.	44.	44.	1.43
+	HYDROGRAPH AT	1440	757.	6.50	174.	57.	57.	1.89
+	2 COMBINED AT	1441	1273.	6.50	308.	100.	100.	3.32
+	HYDROGRAPH AT	1450	1370.	6.83	357.	119.	119.	4.09
+	HYDROGRAPH AT	1392	470.	6.50	117.	38.	38.	.00
+	HYDROGRAPH AT	1410	498.	6.67	131.	43.	43.	.16
+	2 COMBINED AT	1451	1831.	6.83	487.	162.	162.	4.25
+	HYDROGRAPH AT	1460	1871.	7.17	531.	180.	180.	5.20
+	HYDROGRAPH AT	1470	162.	6.42	33.	10.	10.	.30

HYDROGRAPH AT							
+	1475	1036.	6.33	218.	70.	70.	1.99
HYDROGRAPH AT							
+	1480	1404.	6.42	322.	103.	103.	2.99
DIVERSION TO							
+	1482	702.	6.42	161.	52.	52.	2.99
HYDROGRAPH AT							
+	1481	702.	6.42	161.	52.	52.	2.99
HYDROGRAPH AT							
+	1490	873.	7.17	238.	80.	80.	4.30
HYDROGRAPH AT							
+	1482	702.	6.42	161.	52.	52.	.00
HYDROGRAPH AT							
+	1500	925.	7.33	276.	93.	93.	1.79

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED 01 APR 88           *
*                                      *
* RUN DATE  08/03/1988  TIME  13:10:23 *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID        GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID        MODEL SC30.10I  --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID        10-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID        RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM        RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    3.24
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .680    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              63    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP      35       3

 21           KK    1341     DIV
 22           KM        DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

167

```
 24          DI       0    4000
 25          DQ       0    2000

 26          KK    1350     SUB
 27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
 28          BA   .9391
 29          LS             80    1.18
 30          UK    200   .0200     .10     100
 31          RK  13600   .0184    .045           TRAP      35       3     YES

 32          KK    1342     RET
 33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
 34          DR    1342

 35          KK    1370     SUB
 36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
 37          BA   .8322
 38          LS             75    1.54
 39          UK    240   .0208     .10     100
 40          RK  13400   .0194    .045           TRAP      20       3     YES

 41          KK    1360
 42          KM        RUNOFF FROM SUB 1360
 43          BA   .6557
 44          LS             83    1.21
 45          UK    250   .0200     .15     100
 46          RK   9400   .0245    .045           TRAP      20       3
```



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

 47          KK    1371      CP
 48          KM        ROUTE SUB 1360 TO CP 1371
 49          RK   5300   .0188    .045           TRAP      20       3

 50          KK    1372      CP
 51          KM        COMBINE SUB 1370 AND CP 1371
 52          HC       2

 53          KK    1380     SUB
 54          KM        RUNOFF FROM SUB 1380
 55          BA   .9305
 56          LS             82    1.26
 57          UK    240   .0555     .20     100
 58          RK  18000   .0311    .045           TRAP      20       3

 59          KK    1390     SUB
 60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
 61          BA  1.4599
 62          LS             82    1.19
 63          UK    300   .0333     .20     100
 64          RK  17800   .0191    .045           TRAP      25       3     YES

 65          KK    1391     DIV
 66          KM       DIVERT FLOW FROM SUB 1390 TO SUB 1410
 67          DT    1392
 68          DI       0    8000
 69          DQ       0    4000

 70          KK    1400     SUB
 71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
 72          BA  1.3207
 73          LS             75    2.74
 74          UK    250   .0200     .15     100
 75          RK  15000   .0190    .045           TRAP      30       3     YES
```

```
 76          KK    1420     SUB
 77          KM        RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     285   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM        RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.19
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
1                                          HEC-1 INPUT                                                    PAGE  3

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


 88          KK    1440     SUB
 89          KM        RUNOFF FROM SUB 1440
 90          BA  1.8862
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441      CP
 95          KM        COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM        RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM        RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM        RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451      CP
113          KM        COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM        RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM        RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

```
127          KK    1475     SUB
128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
129          BA  1.6895
130          LS              84
131          UK     285   .0419     .20     100
132          RK   17600   .0186    .045           TRAP      25       3     YES
```



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

133          KK    1480     SUB
134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
135          BA  1.0015
136          LS              83    1.07
137          UK     300   .0167     .20     100
138          RK    7500   .0213    .045           TRAP      25       3     YES

139          KK    1481     DIV
140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
141          DT    1482
142          DI       0    8000
143          DQ       0    4000

144          KK    1490     SUB
145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
146          BA  1.3143
147          LS              75    3.54
148          UK     280   .0143     .15     100
149          RK   18800   .0189    .045           TRAP      30      30     YES

150          KK    1482     RET
151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
152          DR    1482

153          KK    1500     SUB
154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
155          BA  1.7949
156          LS              76    3.72
157          UK     280   .0143     .15     100
158          RK   20700   .0181    .045           TRAP      30      40     YES
159          ZZ
```

1

```
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   8        1340
               .
               .
  23           .------->    1342
  21        1341
               V
               V
  26        1350 ***
               .
               .
  34           .          .<-------    1342
  32           .        1342
               .          V
               .          V
  35           .        1370 ***
               .          .
               .          .
```

```
41                  1380
                      V
                      V
47                  1371
                      .
                      .
50          1372............
                      .
                      .
53                  1380
                      V
                      V
59                  1390 ***
                      .
                      .
67                    .-------->    1392
65                  1391
                      V
                      V
70                  1400 ***
                      .
                      .
76                    .       1420
                      .         .
                      .         .
82                    .         .       1430
                      .         .         .
                      .         .         .
88                    .         .         .       1440
                      .         .         .         .
                      .         .         .         .
94                    .         .       1441............
                      .         .         V
                      .         .         V
97                    .         .       1450 ***
                      .         .         .
                      .         .         .
105                   .         .         .         .<-------    1392
103                   .         .         .       1392
                      .         .         .         V
                      .         .         .         V
106                   .         .         .       1410 ***
                      .         .         .         .
                      .         .         .         .
112                   .         .       1451............
                      .         .         V
                      .         .         V
115                   .         .       1460 ***
                      .         .         .
                      .         .         .
121                   .         .         .       1470
                      .         .         .         V
                      .         .         .         V
127                   .         .         .       1475 ***
                      .         .         .         V
                      .         .         .         V
133                   .         .         .       1480 ***
                      .         .         .         .
                      .         .         .         .
141                   .         .         .         .-------->    1482
139                   .         .         .       1481
                      .         .         .         V
                      .         .         .         V
144                   .         .         .       1490 ***
                      .         .         .         .
                      .         .         .         .
```

```
  152          .          .          .          .          .          .          .<-------    1482
  150          .          .          .          .          .          .       1482
               .          .          .          .          .          .          V
               .          .          .          .          .          .          V
  153          .          .          .          .          .          .       1500 ***

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                                  * THE HYDROLOGIC ENGINEERING CENTER    *
*          REVISED 01 APR 88           *                                  *         609 SECOND STREET            *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
* RUN DATE  06/03/1988  TIME  13:10:23 *                                  *          (916) 551-1748              *
*                                      *                                  *                                      *
****************************************                                  ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.101 -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
10-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE    27FEB88  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE    28FEB88  ENDING DATE
                  NDTIME       0000  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                        1340   1164.   6.42         210.        67.         67.      1.55

        DIVERSION TO
+                        1342    582.   6.42         105.        33.         33.      1.55
```

	HYDROGRAPH AT						
+	1341	582.	6.42	105.	33.	33.	1.55
	HYDROGRAPH AT						
+	1350	743.	6.75	211.	68.	68.	2.49
	HYDROGRAPH AT						
+	1342	582.	6.42	105.	33.	33.	.00
	HYDROGRAPH AT						
+	1370	710.	6.67	177.	58.	58.	.83
	HYDROGRAPH AT						
+	1360	677.	6.17	91.	28.	28.	.66
	ROUTED TO						
+	1371	651.	6.25	90.	28.	28.	.66
	2 COMBINED AT						
+	1372	1067.	6.33	267.	86.	86.	1.49
	HYDROGRAPH AT						
+	1380	728.	6.25	122.	39.	39.	.93
	HYDROGRAPH AT						
+	1390	1361.	6.42	305.	98.	98.	2.39
	DIVERSION TO						
+	1392	681.	6.42	153.	49.	49.	2.39
	HYDROGRAPH AT						
+	1391	681.	6.42	153.	49.	49.	2.39
	HYDROGRAPH AT						
+	1400	935.	6.75	268.	88.	88.	3.71
	HYDROGRAPH AT						
+	1420	343.	6.33	63.	21.	21.	.68
	HYDROGRAPH AT						
+	1430	777.	6.50	175.	56.	56.	1.43
	HYDROGRAPH AT						
+	1440	1095.	6.42	228.	73.	73.	1.89
	2 COMBINED AT						
+	1441	1865.	6.42	403.	129.	129.	3.32
	HYDROGRAPH AT						
+	1450	1996.	6.75	471.	154.	154.	4.09
	HYDROGRAPH AT						
+	1392	681.	6.42	153.	49.	49.	.00
	HYDROGRAPH AT						
+	1410	721.	6.58	172.	55.	55.	.16
	2 COMBINED AT						
+	1451	2678.	6.67	642.	209.	209.	4.25
	HYDROGRAPH AT						
+	1460	2733.	7.00	704.	234.	234.	5.20
	HYDROGRAPH AT						
+	1470	228.	6.33	42.	13.	13.	.30

	HYDROGRAPH AT							
+		1475	1480.	6.25	281.	88.	88.	1.99
	HYDROGRAPH AT							
+		1480	1993.	6.33	415.	131.	131.	2.99
	DIVERSION TO							
+		1482	996.	6.33	207.	66.	66.	2.99
	HYDROGRAPH AT							
+		1481	996.	6.33	207.	66.	66.	2.99
	HYDROGRAPH AT							
+		1490	1237.	7.00	314.	104.	104.	4.30
	HYDROGRAPH AT							
+		1482	996.	6.33	207.	66.	66.	.00
	HYDROGRAPH AT							
+		1500	1318.	7.17	365.	121.	121.	1.79

1

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED 01 APR 88          *
*                                      *
*  RUN DATE  08/03/1988  TIME  13:24:44 *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID       MODEL SC30.25I  --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID       25-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM       RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    3.79
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              83    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP      35       3

 21           KK    1341     DIV
 22           KM       DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

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 24          DI       0    4000
 25          DQ       0    2000

 26          KK    1350     SUB
 27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
 28          BA   .9391
 29          LS              80    1.18
 30          UK     200   .0200     .10     100
 31          RK   13600   .0184    .045           TRAP      35       3     YES

 32          KK    1342     RET
 33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
 34          DR    1342

 35          KK    1370     SUB
 36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
 37          BA   .8322
 38          LS              75    1.54
 39          UK     240   .0208     .10     100
 40          RK   13400   .0194    .045           TRAP      20       3     YES

 41          KK    1360
 42          KM        RUNOFF FROM SUB 1360
 43          BA   .6557
 44          LS              83    1.21
 45          UK     250   .0200     .15     100
 46          RK    9400   .0245    .045           TRAP      20       3
```



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

 47          KK    1371      CP
 48          KM        ROUTE SUB 1360 TO CP 1371
 49          RK    5300   .0188    .045           TRAP      20       3

 50          KK    1372      CP
 51          KM        COMBINE SUB 1370 AND CP 1371
 52          HC       2

 53          KK    1380     SUB
 54          KM        RUNOFF FROM SUB 1380
 55          BA   .9305
 56          LS              82    1.26
 57          UK     240   .0555     .20     100
 58          RK   18000   .0311    .045           TRAP      20       3

 59          KK    1390     SUB
 60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
 61          BA  1.4599
 62          LS              82    1.19
 63          UK     300   .0333     .20     100
 64          RK   17800   .0191    .045           TRAP      25       3     YES

 65          KK    1391     DIV
 66          KM       DIVERT FLOW FROM SUB 1390 TO SUB 1410
 67          DT    1392
 68          DI       0    8000
 69          DQ       0    4000

 70          KK    1400     SUB
 71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
 72          BA  1.3207
 73          LS              75    2.74
 74          UK     250   .0200     .15     100
 75          RK   15000   .0190    .045           TRAP      30       3     YES
```

```
 76          KK    1420     SUB
 77          KM        RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     285   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM        RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.19
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
1                                          HEC-1 INPUT                                                    PAGE  3

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


 88          KK    1440     SUB
 89          KM        RUNOFF FROM SUB 1440
 90          BA  1.8882
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441      CP
 95          KM        COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM        RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM        RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM        RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451      CP
113          KM        COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM        RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM        RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

```
127          KK    1475     SUB
128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
129          BA  1.6895
130          LS              84
131          UK     285   .0419     .20     100
132          RK   17600   .0188    .045           TRAP      25       3     YES
```



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

133          KK    1480     SUB
134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
135          BA  1.0015
136          LS              83    1.07
137          UK     300   .0167     .20     100
138          RK    7500   .0213    .045           TRAP      25       3     YES

139          KK    1481     DIV
140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
141          DT    1482
142          DI       0    8000
143          DQ       0    4000

144          KK    1490     SUB
145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
146          BA  1.3143
147          LS              75    3.54
148          UK     280   .0143     .15     100
149          RK   18800   .0189    .045           TRAP      30      30     YES

150          KK    1482     RET
151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
152          DR    1482

153          KK    1500     SUB
154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
155          BA  1.7949
156          LS              76    3.72
157          UK     280   .0143     .15     100
158          RK   20700   .0181    .045           TRAP      30      40     YES
159          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   8        1340
               .
               .
  23           .------->    1342
  21        1341
               V
               V
  26        1350 ***
               .
               .
  34           .          .<-------    1342
  32           .       1342
               .          V
               .          V
  35           .       1370 ***
               .          .
               .          .
```

```
41          .          .       1360
            .          .         V
            .          .         V
47          .          .       1371
            .          .         .
            .          .         .
50          .       1372............
            .          .
            .          .
53          .          .       1380
            .          .         V
            .          .         V
59          .          .       1390 ***
            .          .         .
            .          .         .
67          .          .         .-------->    1392
65          .          .       1391
            .          .         V
            .          .         V
70          .          .       1400 ***
            .          .         .
            .          .         .
76          .          .         .       1420
            .          .         .         .
            .          .         .         .
82          .          .         .         .       1430
            .          .         .         .         .
            .          .         .         .         .
88          .          .         .         .         .       1440
            .          .         .         .         .         .
            .          .         .         .         .         .
94          .          .         .         .       1441............
            .          .         .         .         V
            .          .         .         .         V
97          .          .         .         .       1450 ***
            .          .         .         .         .
            .          .         .         .         .
105         .          .         .         .         .         .<-------    1392
103         .          .         .         .         .       1392
            .          .         .         .         .         V
            .          .         .         .         .         V
106         .          .         .         .         .       1410 ***
            .          .         .         .         .         .
            .          .         .         .         .         .
112         .          .         .         .       1451............
            .          .         .         .         V
            .          .         .         .         V
115         .          .         .         .       1460 ***
            .          .         .         .         .
            .          .         .         .         .
121         .          .         .         .         .       1470
            .          .         .         .         .         V
            .          .         .         .         .         V
127         .          .         .         .         .       1475 ***
            .          .         .         .         .         V
            .          .         .         .         .         V
133         .          .         .         .         .       1480 ***
            .          .         .         .         .         .
            .          .         .         .         .         .
141         .          .         .         .         .         .-------->    1482
139         .          .         .         .         .       1481
            .          .         .         .         .         V
            .          .         .         .         .         V
144         .          .         .         .         .       1490 ***
            .          .         .         .         .         .
            .          .         .         .         .         .
```

```
 152          .          .          .          .          .          .<-------    1482
 150          .          .          .          .          .          .       1482
              .          .          .          .          .          .          V
              .          .          .          .          .          .          V
 153          .          .          .          .          .          .       1500 ***

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                                  * THE HYDROLOGIC ENGINEERING CENTER    *
*          REVISED 01 APR 88           *                                  *        609 SECOND STREET             *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE  08/03/1988  TIME  13:24:44 *                                  *        (916) 551-1748                *
*                                      *                                  *                                      *
****************************************                                  ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.25I -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
25-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE    27FEB88  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE    28FEB88  ENDING DATE
                  NDTIME       0000  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT
1
                                        RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                       1340    1687.   6.33         274.        86.         86.      1.55

        DIVERSION TO
+                       1342     844.   6.33         137.        43.         43.      1.55
```

180

+	HYDROGRAPH AT 1341	844.	6.33	137.	43.	43.	1.55
+	HYDROGRAPH AT 1350	1067.	6.58	279.	88.	88.	2.49
+	HYDROGRAPH AT 1342	844.	6.33	137.	43.	43.	.00
+	HYDROGRAPH AT 1370	1035.	6.58	237.	76.	76.	.83
+	HYDROGRAPH AT 1360	984.	6.08	118.	37.	37.	.66
+	ROUTED TO 1371	925.	6.25	117.	36.	36.	.66
+	2 COMBINED AT 1372	1624.	6.25	353.	112.	112.	1.49
+	HYDROGRAPH AT 1380	1052.	6.17	160.	50.	50.	.93
+	HYDROGRAPH AT 1390	2008.	6.33	400.	126.	126.	2.39
+	DIVERSION TO 1392	1004.	6.33	200.	63.	63.	2.39
+	HYDROGRAPH AT 1391	1004.	6.33	200.	63.	63.	2.39
+	HYDROGRAPH AT 1400	1374.	6.58	360.	116.	116.	3.71
+	HYDROGRAPH AT 1420	535.	6.25	86.	28.	28.	.68
+	HYDROGRAPH AT 1430	1125.	6.33	229.	72.	72.	1.43
+	HYDROGRAPH AT 1440	1645.	6.33	302.	95.	95.	1.89
+	2 COMBINED AT 1441	2770.	6.33	530.	168.	168.	3.32
+	HYDROGRAPH AT 1450	2963.	6.58	623.	200.	200.	4.09
+	HYDROGRAPH AT 1392	1004.	6.33	200.	63.	63.	.00
+	HYDROGRAPH AT 1410	1047.	6.50	226.	71.	71.	.16
+	2 COMBINED AT 1451	3954.	6.58	847.	271.	271.	4.25
+	HYDROGRAPH AT 1460	4038.	6.83	937.	305.	305.	5.20
+	HYDROGRAPH AT 1470	335.	6.25	55.	17.	17.	.30

HYDROGRAPH AT							
+	1475	2128.	6.25	363.	113.	113.	1.99
HYDROGRAPH AT							
+	1480	2840.	6.25	538.	168.	168.	2.99
DIVERSION TO							
+	1482	1420.	6.25	269.	84.	84.	2.99
HYDROGRAPH AT							
+	1481	1420.	6.25	269.	84.	84.	2.99
HYDROGRAPH AT							
+	1490	1761.	6.92	418.	135.	135.	4.30
HYDROGRAPH AT							
+	1482	1420.	6.25	269.	84.	84.	.00
HYDROGRAPH AT							
+	1500	1895.	7.00	486.	158.	158.	1.79
!							

2 Sylan

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED 01 APR 88           *
*                                      *
*  RUN DATE  08/03/1988  TIME  13:39:35 *
*                                      *
****************************************
```

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

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
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NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

  1           ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID       MODEL SC30.50I  --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID       50-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM       RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    4.29
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              83    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP      35       3

 21           KK    1341     DIV
 22           KM       DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

```
 24          DI      0    4000
 25          DQ      0    2000

 26          KK   1350     SUB
 27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
 28          BA   .9391
 29          LS             80    1.18
 30          UK    200   .0200     .10     100
 31          RK  13600   .0184    .045           TRAP     35      3     YES

 32          KK   1342     RET
 33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
 34          OR   1342

 35          KK   1370     SUB
 36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
 37          BA   .8322
 38          LS             75    1.54
 39          UK    240   .0208     .10     100
 40          RK  13400   .0194    .045           TRAP     20      3     YES

 41          KK   1360
 42          KM        RUNOFF FROM SUB 1360
 43          BA   .6557
 44          LS             83    1.21
 45          UK    250   .0200     .15     100
 46          RK   9400   .0245    .045           TRAP     20      3
```



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

 47          KK   1371     CP
 48          KM        ROUTE SUB 1360 TO CP 1371
 49          RK   5300   .0188    .045           TRAP     20      3

 50          KK   1372     CP
 51          KM        COMBINE SUB 1370 AND CP 1371
 52          HC      2

 53          KK   1380     SUB
 54          KM        RUNOFF FROM SUB 1380
 55          BA   .9305
 56          LS             82    1.26
 57          UK    240   .0555     .20     100
 58          RK  18000   .0311    .045           TRAP     20      3

 59          KK   1390     SUB
 60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
 61          BA  1.4599
 62          LS             82    1.19
 63          UK    300   .0333     .20     100
 64          RK  17800   .0191    .045           TRAP     25      3     YES

 65          KK   1391     DIV
 66          KM       DIVERT FLOW FROM SUB 1390 TO SUB 1410
 67          DT   1392
 68          DI      0    8000
 69          DQ      0    4000

 70          KK   1400     SUB
 71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
 72          BA  1.3207
 73          LS             75    2.74
 74          UK    250   .0200     .15     100
 75          RK  15000   .0190    .045           TRAP     30      3     YES
```

```
 76          KK    1420     SUB
 77          KM        RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     265   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM        RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.19
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
```



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

 88          KK    1440     SUB
 89          KM        RUNOFF FROM SUB 1440
 90          BA  1.8882
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441     CP
 95          KM        COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM        RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM        RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM        RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451     CP
113          KM        COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM        RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM        RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

```
127          KK    1475     SUB
128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
129          BA  1.6895
130          LS              84
131          UK     285   .0419     .20     100
132          RK   17600   .0188    .045           TRAP     25       3     YES
```



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

133          KK    1480     SUB
134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
135          BA  1.0015
136          LS              83    1.07
137          UK     300   .0167     .20     100
138          RK    7500   .0213    .045           TRAP     25       3     YES

139          KK    1481     DIV
140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
141          DT    1482
142          DI       0    8000
143          DQ       0    4000

144          KK    1490     SUB
145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
146          BA  1.3143
147          LS              75    3.54
148          UK     280   .0143     .15     100
149          RK   18800   .0189    .045           TRAP     30      30     YES

150          KK    1482     RET
151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
152          DR    1482

153          KK    1500     SUB
154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
155          BA  1.7949
156          LS              76    3.72
157          UK     280   .0143     .15     100
158          RK   20700   .0181    .045           TRAP     30      40     YES
159          ZZ
```

1

```
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   8        1340
               .
               .
  23           .------->    1342
  21        1341
              V
              V
  26        1350 ***
               .
               .
  34           .          .<-------    1342
  32           .        1342
               .          V
               .          V
  35           .        1370 ***
               .          .
               .          .
```

186

```
41          .         .       1360
            .         .         V
            .         .         V
47          .         .       1371
            .         .         .
            .         .         .
50          .      1372............
            .         .
            .         .
53          .         .       1380
            .         .         V
            .         .         V
59          .         .       1390 ***
            .         .         .
            .         .         .
67          .         .         .-------->    1392
65          .         .       1391
            .         .         V
            .         .         V
70          .         .       1400 ***
            .         .         .
            .         .         .
76          .         .         .       1420
            .         .         .         .
            .         .         .         .
82          .         .         .         .       1430
            .         .         .         .         .
            .         .         .         .         .
88          .         .         .         .         .       1440
            .         .         .         .         .         .
            .         .         .         .         .         .
94          .         .         .         .       1441............
            .         .         .         .         V
            .         .         .         .         V
97          .         .         .         .       1450 ***
            .         .         .         .         .
            .         .         .         .         .
105         .         .         .         .         .         .<-------    1392
103         .         .         .         .         .       1392
            .         .         .         .         .         V
            .         .         .         .         .         V
106         .         .         .         .         .       1410 ***
            .         .         .         .         .         .
            .         .         .         .         .         .
112         .         .         .         .       1451............
            .         .         .         .         V
            .         .         .         .         V
115         .         .         .         .       1460 ***
            .         .         .         .         .
            .         .         .         .         .
121         .         .         .         .         .       1470
            .         .         .         .         .         V
            .         .         .         .         .         V
127         .         .         .         .         .       1475 ***
            .         .         .         .         .         V
            .         .         .         .         .         V
133         .         .         .         .         .       1480 ***
            .         .         .         .         .         .
            .         .         .         .         .         .
141         .         .         .         .         .         .-------->    1482
139         .         .         .         .         .       1481
            .         .         .         .         .         V
            .         .         .         .         .         V
144         .         .         .         .         .       1490 ***
            .         .         .         .         .         .
            .         .         .         .         .         .
```

```
  152          .          .          .          .          .          .<-------    1482
  150          .          .          .          .          .          .       1482
               .          .          .          .          .          .          V
               .          .          .          .          .          .          V
  153          .          .          .          .          .          .       1500 ***

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                                  * THE HYDROLOGIC ENGINEERING CENTER    *
*          REVISED 01 APR 88           *                                  *         609 SECOND STREET            *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
* RUN DATE  08/03/1988  TIME  13:39:35 *                                  *         (916) 551-1748               *
*                                      *                                  *                                      *
****************************************                                  ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.501 -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
50-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE    27FEB88  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE    28FEB88  ENDING DATE
                  NDTIME       0000  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

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

        HYDROGRAPH AT
+                        1340    2254.   6.25        334.       103.       103.      1.55

        DIVERSION TO
+                        1342    1127.   6.25        167.        52.        52.      1.55
```

+	HYDROGRAPH AT	1341	1127.	6.25	167.	52.	52.	1.55
+	HYDROGRAPH AT	1350	1390.	6.50	344.	108.	108.	2.49
+	HYDROGRAPH AT	1342	1127.	6.25	167.	52.	52.	.00
+	HYDROGRAPH AT	1370	1353.	6.50	294.	93.	93.	.83
+	HYDROGRAPH AT	1360	1238.	6.08	144.	44.	44.	.66
+	ROUTED TO	1371	1156.	6.17	143.	44.	44.	.66
+	2 COMBINED AT	1372	2134.	6.25	436.	137.	137.	1.49
+	HYDROGRAPH AT	1380	1419.	6.17	195.	60.	60.	.93
+	HYDROGRAPH AT	1390	2630.	6.25	492.	153.	153.	2.39
+	DIVERSION TO	1392	1315.	6.25	246.	77.	77.	2.39
+	HYDROGRAPH AT	1391	1315.	6.25	246.	77.	77.	2.39
+	HYDROGRAPH AT	1400	1816.	6.50	449.	142.	142.	3.71
+	HYDROGRAPH AT	1420	755.	6.17	108.	34.	34.	.68
+	HYDROGRAPH AT	1430	1539.	6.33	285.	89.	89.	1.43
+	HYDROGRAPH AT	1440	2264.	6.25	373.	117.	117.	1.89
+	2 COMBINED AT	1441	3790.	6.25	658.	206.	206.	3.32
+	HYDROGRAPH AT	1450	4035.	6.50	775.	245.	245.	4.09
+	HYDROGRAPH AT	1392	1315.	6.25	246.	77.	77.	.00
+	HYDROGRAPH AT	1410	1380.	6.42	277.	87.	87.	.16
+	2 COMBINED AT	1451	5348.	6.50	1051.	332.	332.	4.25
+	HYDROGRAPH AT	1460	5442.	6.75	1168.	375.	375.	5.20
+	HYDROGRAPH AT	1470	434.	6.17	67.	20.	20.	.30

	HYDROGRAPH AT							
+		1475	2855.	6.17	443.	136.	136.	1.99
	HYDROGRAPH AT							
+		1480	3739.	6.25	654.	202.	202.	2.99
	DIVERSION TO							
+		1482	1870.	6.25	327.	101.	101.	2.99
	HYDROGRAPH AT							
+		1481	1870.	6.25	327.	101.	101.	2.99
	HYDROGRAPH AT							
+		1490	2291.	6.83	516.	165.	165.	4.30
	HYDROGRAPH AT							
+		1482	1870.	6.25	327.	101.	101.	.00
	HYDROGRAPH AT							
+		1500	2485.	6.92	602.	193.	193.	1.79
1								

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED 01 APR 88           *
*                                      *
*  RUN DATE  08/03/1988  TIME  13:57:14 *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID       GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
  2           ID       MODEL SC30.100I --  SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
  3           ID       100-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
  4           ID       RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR
              *DIAGRAM
  5           IT       5 27FEB88       0     289
  6           IO       5       0
  7           IN      30 27FEB88       0

  8           KK    1340     SUB
  9           KM       RUNOFF FROM SUB 1340
 10           BA  1.5539
 11           PB    4.71
 12           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 13           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 14           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 15           PC    .930    .934    .939    .944    .950    .958    .961    .963    .969    .971
 16           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 17           LS              83    1.11
 18           UK     300   .0333     .20     100
 19           RK    3300   .0228    .045    .062    TRAP      10       3
 20           RK   15600   .0199    .045            TRAP     35       3

 21           KK    1341     DIV
 22           KM       DIVERT FLOW FROM SUB 1340 TO SUB 1370
 23           DT    1342
```

```
 24          DI       0    4000
 25          DQ       0    2000

 26          KK    1350     SUB
 27          KM        RUNOFF FROM SUB 1350 AND ROUTE NON-DIVERTED FLOW FROM SUB 1340
 28          BA   .9391
 29          LS             80    1.18
 30          UK     200   .0200     .10     100
 31          RK   13600   .0184    .045           TRAP      35       3     YES

 32          KK    1342     RET
 33          KM        RETRIEVE DIVERTED FLOW FROM SUB 1340 (DIV 1341)
 34          DR    1342

 35          KK    1370     SUB
 36          KM        RUNOFF FROM SUB 1370 AND ROUTE RET 1342
 37          BA   .8322
 38          LS             75    1.54
 39          UK     240   .0208     .10     100
 40          RK   13400   .0194    .045           TRAP      20       3     YES

 41          KK    1360
 42          KM        RUNOFF FROM SUB 1360
 43          BA   .6557
 44          LS             83    1.21
 45          UK     250   .0200     .15     100
 46          RK    9400   .0245    .045           TRAP      20       3
```



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

 47          KK    1371      CP
 48          KM        ROUTE SUB 1360 TO CP 1371
 49          RK    5300   .0188    .045           TRAP      20       3

 50          KK    1372      CP
 51          KM        COMBINE SUB 1370 AND CP 1371
 52          HC       2

 53          KK    1380     SUB
 54          KM        RUNOFF FROM SUB 1380
 55          BA   .9305
 56          LS             82    1.26
 57          UK     240   .0555     .20     100
 58          RK   18000   .0311    .045           TRAP      20       3

 59          KK    1390     SUB
 60          KM        RUNOFF FROM SUB 1390 AND ROUTE SUB 1380
 61          BA  1.4599
 62          LS             82    1.19
 63          UK     300   .0333     .20     100
 64          RK   17800   .0191    .045           TRAP      25       3     YES

 65          KK    1391     DIV
 66          KM       DIVERT FLOW FROM SUB 1390 TO SUB 1410
 67          DT    1392
 68          DI       0    8000
 69          DQ       0    4000

 70          KK    1400     SUB
 71          KM        RUNOFF FROM SUB 1400 AND ROUTE NON-DIVERTED FLOW FROM SUB 1390 (DIV 1391
 72          BA  1.3207
 73          LS             75    2.74
 74          UK     250   .0200     .15     100
 75          RK   15000   .0190    .045           TRAP      30       3     YES
```

```
 76          KK    1420     SUB
 77          KM        RUNOFF FROM SUB 1420
 78          BA   .6808
 79          LS              74    4.63
 80          UK     285   .0230     .10     100
 81          RK   11500   .0191    .045           TRAP      25       3

 82          KK    1430     SUB
 83          KM        RUNOFF FROM SUB 1430
 84          BA  1.4319
 85          LS              81    1.79
 86          UK     240   .0555     .20     100
 87          RK   25800   .0271    .045           TRAP      30       3
1                                          HEC-1 INPUT                                                    PAGE  3

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


 88          KK    1440     SUB
 89          KM        RUNOFF FROM SUB 1440
 90          BA  1.8882
 91          LS              81
 92          UK     240   .0555     .20     100
 93          RK   24800   .0258    .045           TRAP      30       3

 94          KK    1441      CP
 95          KM        COMBINE SUB 1430 AND SUB 1440
 96          HC       2

 97          KK    1450     SUB
 98          KM        RUNOFF FROM SUB 1450 AND ROUTE CP 1441
 99          BA   .7662
100          LS              79    1.04
101          UK     200   .0200     .20     100
102          RK   18200   .0189    .045           TRAP      30       3     YES

103          KK    1392     RET
104          KM        RETRIEVE DIVERTED FLOW FROM SUB 1390
105          DR    1392

106          KK    1410     SUB
107          KM        RUNOFF FROM SUB 1410 AND ROUTE RET 1392
108          BA   .1643
109          LS              82
110          UK     200   .0250     .15     100
111          RK    5400   .0185    .045           TRAP      30       3     YES

112          KK    1451      CP
113          KM        COMBINE SUB 1410 AND SUB 1450
114          HC       2

115          KK    1460     SUB
116          KM        RUNOFF FROM SUB 1460 AND ROUTE CP 1451
117          BA   .9470
118          LS              74    3.98
119          UK     225   .0275     .10     100
120          RK   12400   .0202    .045           TRAP      35      20     YES

121          KK    1470     SUB
122          KM        RUNOFF FROM SUB 1470
123          BA   .2977
124          LS              84
125          UK     200   .0500     .20     100
126          RK   15000   .0293    .045           TRAP      20       3
```

```
127          KK    1475     SUB
128          KM        RUNOFF FROM SUB 1475 AND ROUTE SUB 1470
129          BA  1.6895
130          LS              84
131          UK     285   .0419     .20     100
132          RK   17600   .0188    .045           TRAP      25       3     YES
```



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

133          KK    1480     SUB
134          KM        RUNOFF FROM SUB 1480 AND ROUTE SUB 1475
135          BA  1.0015
136          LS              83    1.07
137          UK     300   .0167     .20     100
138          RK    7500   .0213    .045           TRAP      25       3     YES

139          KK    1481     DIV
140          KM        DIVERT FLOW FROM SUB 1480 TO SUB 1500
141          DT    1482
142          DI       0    8000  50/50% Split
143          DQ       0    4000

144          KK    1490     SUB
145          KM        RUNOFF FROM SUB 1490 AND ROUTE NON-DIVERTED FLOW FROM SUB 1480 (DIV 1481
146          BA  1.3143
147          LS              75    3.54
148          UK     280   .0143     .15     100
149          RK   18800   .0189    .045           TRAP      30      30     YES

150          KK    1482     RET
151          KM        RETRIEVE DIVERTED FLOW FROM SUB 1480
152          DR    1482

153          KK    1500     SUB
154          KM        RUNOFF FROM SUB 1500 AND ROUTE RET 1482
155          BA  1.7949
156          LS              76    3.72
157          UK     280   .0143     .15     100
158          RK   20700   .0181    .045           TRAP      30      40     YES
159          ZZ
```

1

```
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   8        1340
               .
               .
  23           .------->    1342
  21        1341
               V
               V
  26        1350 ***
               .
               .
  34           .           .<-------    1342
  32           .        1342
               .           V
               .           V
  35           .        1370 ***
               .           .
               .           .
```

```
41          .         .      1360
            .         .        V
            .         .        V
47          .         .      1371
            .         .        .
            .         .        .
50          .      1372............
            .         .
            .         .
53          .         .      1380
            .         .        V
            .         .        V
59          .         .      1390 ***
            .         .        .
            .         .        .
67          .         .        .-------->    1392
65          .         .      1391
            .         .        V
            .         .        V
70          .         .      1400 ***
            .         .        .
            .         .        .
76          .         .        .       1420
            .         .        .         .
            .         .        .         .
82          .         .        .         .       1430
            .         .        .         .         .
            .         .        .         .         .
88          .         .        .         .         .       1440
            .         .        .         .         .         .
            .         .        .         .         .         .
94          .         .        .         .       1441............
            .         .        .         .         V
            .         .        .         .         V
97          .         .        .         .       1450 ***
            .         .        .         .         .
            .         .        .         .         .
105         .         .        .         .         .         .<-------    1392
103         .         .        .         .         .       1392
            .         .        .         .         .         V
            .         .        .         .         .         V
106         .         .        .         .         .       1410 ***
            .         .        .         .         .         .
            .         .        .         .         .         .
112         .         .        .         .       1451............
            .         .        .         .         V
            .         .        .         .         V
115         .         .        .         .       1460 ***
            .         .        .         .         .
            .         .        .         .         .
121         .         .        .         .         .       1470
            .         .        .         .         .         V
            .         .        .         .         .         V
127         .         .        .         .         .       1475 ***
            .         .        .         .         .         V
            .         .        .         .         .         V
133         .         .        .         .         .       1480 ***
            .         .        .         .         .         .
            .         .        .         .         .         .
141         .         .        .         .         .         .-------->    1482
139         .         .        .         .         .       1481
            .         .        .         .         .         V
            .         .        .         .         .         V
144         .         .        .         .         .       1490 ***
            .         .        .         .         .         .
            .         .        .         .         .         .
```

150-
153-

P&196 Missing 150 4/53

```
 152          .          .          .          .          .          .<-------    1482
 150          .          .          .          .          .          .       1482
              .          .          .          .          .          .          V
              .          .          .          .          .          .          V
 153          .          .          .          .          .          .       1500 ***

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*            FEBRUARY 1981             *                                  * THE HYDROLOGIC ENGINEERING CENTER    *
*          REVISED 01 APR 88           *                                  *         609 SECOND STREET            *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
* RUN DATE  08/03/1988  TIME  13:57:14 *                                  *         (916) 551-1748               *
*                                      *                                  *                                      *
****************************************                                  ****************************************
```

GENERAL DRAINAGE PLAN FOR NORTH SCOTTSDALE, EXISTING CONDITIONS
MODEL SC30.100I -- SUB-BASIN SERIES 1340 TO 1500, CAREFREE AREA
100-YEAR, 24-HOUR STORM, USING SCS TYPE IIA RAINFALL DISTRIBUTION
RAINFALL FROM NOAA ATLAS, USING 10 SQ MI AREAL REDUCTION FACTOR

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

    IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE    27FEB88  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        289  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE    28FEB88  ENDING DATE
                  NDTIME       0000  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT
1
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1340	2750.	6.25	387.	119.	119.	1.55		
+	DIVERSION TO	1342	1375.	6.25	194.	59.	59.	1.55		

+	HYDROGRAPH AT 1341	1375.	6.25	194.	59.	59.	1.55
+	HYDROGRAPH AT 1350	1702.	6.50	397.	123.	123.	2.49
+	HYDROGRAPH AT 1342	1375.	6.25	194.	59.	59.	.00
+	HYDROGRAPH AT 1370	1622.	6.50	345.	108.	108.	.83
+	HYDROGRAPH AT 1360	1439.	6.08	167.	51.	51.	.66
+	ROUTED TO 1371	1396.	6.17	163.	50.	50.	.66
+	2 COMBINED AT 1372	2673.	6.17	507.	158.	158.	1.49
+	HYDROGRAPH AT 1380	1669.	6.17	227.	69.	69.	.93
+	HYDROGRAPH AT 1390	3287.	6.25	570.	176.	176.	2.39
+	DIVERSION TO 1392	1643.	6.25	285.	88.	88.	2.39
+	HYDROGRAPH AT 1391	1643.	6.25	285.	88.	88.	2.39
+	HYDROGRAPH AT 1400	2233.	6.42	526.	166.	166.	3.71
+	HYDROGRAPH AT 1420	939.	6.17	128.	40.	40.	.68
+	HYDROGRAPH AT 1430	1921.	6.25	330.	103.	103.	1.43
+	HYDROGRAPH AT 1440	2722.	6.25	434.	135.	135.	1.89
+	2 COMBINED AT 1441	4643.	6.25	764.	237.	237.	3.32
+	HYDROGRAPH AT 1450	4971.	6.42	904.	284.	284.	4.09
+	HYDROGRAPH AT 1392	1643.	6.25	285.	88.	88.	.00
+	HYDROGRAPH AT 1410	1657.	6.33	320.	100.	100.	.16
+	2 COMBINED AT 1451	6625.	6.42	1223.	383.	383.	4.25
+	HYDROGRAPH AT 1460	6738.	6.67	1363.	433.	433.	5.20
+	HYDROGRAPH AT 1470	526.	6.17	77.	23.	23.	.30

	HYDROGRAPH AT							
+		1475	3430.	6.17	510.	156.	156.	1.99
	HYDROGRAPH AT							
+		1480	4458.	6.17	753.	231.	231.	2.99
	DIVERSION TO							
+		1482	2229.	6.17	376.	116.	116.	2.99
	HYDROGRAPH AT							
+		1481	2229.	6.17	376.	116.	116.	2.99
	HYDROGRAPH AT							
+		1490	2775.	6.75	601.	191.	191.	4.30
	HYDROGRAPH AT							
+		1482	2229.	6.17	376.	116.	116.	.00
	HYDROGRAPH AT							
+		1500	3034.	6.83	703.	223.	223.	1.79
1								

DA 1.79

100yr

GEOMORPHIC ANALYSIS OF ALLUVIAL FAN ACTIVITY ON THE SCOTTSDALE PIEDMONT

Revised August 8, 1988
May 17, 1988
CBA File No. 04856-02-30
MSP-142

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INTRODUCTION

The objective of this study is to define areas of the piedmont west of the McDowell Mountains in Scottsdale, Arizona that might be subject to active alluvial fan processes. This study has been performed as part of the Scottsdale Flood Insurance Study, which in turn is part of the larger Maricopa County Flood Insurance study being conducted by Cella Barr Associates.

Soil development on fan deposits, local topography, and geomorphology have been used to delineate piedmont areas that have been sites of active fan deposition or erosion in approximately the last 10,000 years. These areas have been designated as "active alluvial fan areas" in which it may be appropriate to apply the Federal Emergency Management Agency's (FEMA) alluvial fan flooding model (Dawdy, 1979). Locations of active fan apices and overall fan shapes can be derived from this work. Much of the Scottsdale Piedmont is composed of older fan deposits. Substantial soil development and dissection of these fans indicates that they have not been subject to active fan processes for much more than 10,000 years. These areas are therefore not likely to be sites of alluvial fan flooding in the foreseeable future.

Define

Defining alluvial fans associated with the larger streams that flow across the Scottsdale Piedmont has been the focus of this study. The alluvial fan flooding model is appropriately applied to floods generated in mountain areas which drain to alluvial fans; it is not appropriate for flooding generated on fans themselves (Dawdy, 1979). The latter type of flooding is expressed as sheetflow or channelized flooding. All portions of the piedmont could be affected by these processes, irrespective of age of the fan.

GEOLOGIC/GEOMORPHIC SETTING

The Scottsdale Piedmont is the area of generally low relief between the McDowell Mountains and the Union Hills. "Piedmont" is a geographic term meaning the area downslope from the topographic mountains. This area may include shallowly buried bedrock surfaces (pediments), fan-shaped alluvial deposits (alluvial fans), and areas of coalesced alluvial fans (bajadas). Alluvial fan processes may occur in any of these domains. Piedmonts of southern and central Arizona typically are composed of alluvial fan deposits of a variety of different ages. Some portions of the Scottsdale Piedmont are composed of alluvial fans that have been active quite recently, while other areas have not been subject to active fan processes for tens of thousands of years or more.

The Quarternary period of geologic history (approximately the past two million years) has been characterized by dramatic changes in global climate. The climatic changes have impacted the fluvial systems of the southwestern United States so as to change the amount of sediment supplied to stream systems. Intervals of high sediment yield from hillslopes correlate with times of extensive alluvial fan deposition on piedmonts (Bull, in press). The Holocene period (the past 10,000 years) has been a time of high sediment yield and extensive fan deposition. Earlier pulses of fan deposition probably occurred during relatively warm climatic intervals like the Holocene. In southern and central Arizona, there has been very little faulting in the past 5 million years (Pearthree and others, 1983) so the climatic controlled pulses of fan aggradation have dominated piedmont evolution.

Piedmonts of the southwestern deserts that are not in proximity to active faults typically are complex mosaics of older and younger fan deposits. Pulses of fan deposition did not completely bury older fan deposits. The result is that a typical piedmont in southern and central Arizona has areas of young (Holocene) fan deposition, and areas that have not been subject to active alluvial fan activity for probably 50,000 years or more (late Pleistocene or older fans). These older fan areas are usually not likely to be subject to active alluvial fan deposition in the time frame relevant to floodplain management.

AGES OF ALLUVIAL FANS BASED ON SOIL DEVELOPMENT

The degree of soil development associated with alluvial fans is fairly diagnostic of the ages of the fans. Soils, as used in this report, "consist of layers or horizons...which differ from the parent material in their morphological, physical, chemical, and minerological properties" (Birkeland, 1984). Some soil properties develop progressively with time. The extent to which these soil properties differ from the parent material (in this case, the original alluvial fan deposits) reflects the age of the alluvial fan.

Soils develop quite slowly in arid and semiarid regions like the Scottsdale Piedmont. Desert soils develop on alluvial fan deposits as a result of inputs of silt and clay from atmospheric dust and calcium carbonate dissolved in rainwater, and weathering of mineral grains of the parent material. Clay and calcium carbonate are leached into the soil during significant precipitation events. The typical result of these processes is a stratification in the soil; clay accumulates at shallow depths and calcium carbonate accumulates at slightly deeper levels. The amount of clay and/or calcium carbonate accumulation reflects the age of the soil.

and Percolation

These soil-forming processes proceed at very slow rates in desert regions. For this reason, deposition or erosion must essentially cease for soils to develop. Therefore, estimating the age of a soil based on the extent of its development is equivalent to estimating the time since active alluvial fan deposition or erosion ceased. Even one alluvial fan flooding event would likely bury or obliterate soils that had taken tens of thousands of years to develop.

Estimating ages of alluvial fans on the Scottsdale Piedmont based on soils depends on correlating the development of some soil properties with the properties of soils of known age in other portions of the desert southwest. Sequences of soils associated with alluvial fans or terraces of different ages has been defined at several localities

in southern Arizona (examples are McFadden, 1981; Pearthree and Calvo, 1987). The ages of these alluvial fans and terraces have been estimated by correlating soil properties with areas in southern New Mexico (Gile and others, 1981) and western Arizona and eastern California (Bull, in press), where the ages of fans and terraces are constrained by independent dating methods. Central Arizona lies between these reference areas both geographically and in terms of climate, so it is appropriate to roughly estimate the ages of alluvial fans on the Scottsdale Piedmont by correlating soil properties.

In both southern New Mexico and western Arizona, there are fairly distinct differences between Holocene and Pleistocene soils (Tables 1 and 2). Pleistocene soils have horizons with substantial increases in clay content (argillic horizons). They also have horizons with thick, obvious calcium carbonate accumulations. Holocene soils show little or no evidence of clay accumulations, and calcium carbonate accumulations are thin and spotty. Similar differences in soil development have been noted in the Scottsdale Piedmont area (Soil Conservation Service, 1986) and they serve to differentiate Holocene (potentially active) and Pleistocene (inactive) alluvial fans.

The Soil Conservation Service (1986) has published a series of soil maps covering the Scottsdale Piedmont. The units mapped by the SCS are based on a variety of soil properties, only some of which reflect the age of the fan or terrace associated with the soil. The published characterizations of soil series include sufficient information concerning clay and calcium accumulations to estimate soil ages (Table 3). Pleistocene soils are distinguished by 1) argillic horizons with clay loam or clay textures; 2) development of soil structure related to clay movement; 3) reddening of horizons of clay accumulation relative to the parent material, and 4) accumulations of calcium carbonate that are sufficient to cause soils horizons to be at least weakly cemented. Some fairly old soils may not retain much evidence of clay accumulation due to erosion. Correlation with the dated soils of western Arizona and southern New

Mexico indicates that at least tens of thousands of years are required to accumulate substantial amounts of clay and/or calcium carbonate in this region. Some of the soils of the Scottsdale Piedmont are probably hundreds of thousands of years old.

The soil units mapped by the SCS are the principal means used to define active (Holocene) and inactive (Pleistocene) alluvial fans (Figure 1). The soil maps were supplemented by independent geologic mapping of some of the northern Scottsdale Piedmont (Wellendorf, 1988), assessment of local topography, and extent of dissection of alluvial fan surfaces. Young alluvial fans are generally undissected or only modestly dissected. Older alluvial fans are generally topographically higher and more dissected (Figure 2). At two locations, our field reconnaissance studies indicated that areas mapped by the SCS (1986) as soil units Vado and Momoli (probably early Holocene in age) are: 1) mapped incorrectly, and are predominantly older units, or 2) are not subject to inundation due to isolation from major washes. These areas are mapped as inactive alluvial fans in this report.

THE DISTRIBUTION OF ACTIVE AND INACTIVE FANS ON THE SCOTTSDALE PIEDMONT

The areal extent of active alluvial fans on the Scottsdale Piedmont varies substantially from north to south. Most of the Piedmont north of Curry's Corner is comprised of inactive fan areas. The larger streams which head in the mountains east and north of Carefree flow very near to Black Mountain, at the northern edge of the area studied. These streams have downcut during the late Quarternary in response to downcutting of Cave Creek, into which they drain. The young deposits associated with these streams are quite restricted and there are essentially no active alluvial fans. South of Curry's Corner and Pinacle Peak, the piedmont is dominated by potentially active fan areas where several alluvial fans coalesce together. The result is that almost all of the lower piedmont has minimal topographic relief and is comprised of young fan deposits.

TABLE 1

Soil properties of the Desert Project, New Mexico (compiled from Gile and others, 1981).

Geomorphic Surface	Estimated Age	Maximum Redness	Maximum Texture	Max. State Calcic Horizon Development
ORGAN	Mid- to late Holocene	5YR-10YR	Sandy Loam	I-II
ISAAC'S RANCH	Latest Pleistocene	5YR	Loam	I-III
JORNADA II	Late Pleist-ocene	2.5YR-5YR	Clay Loam	III-IV
JORNADA I	Middle Pleistocene	2.5YR-5YR	Clay	III-V
DONA ANA	Early to Mid-Pleistocene	10YR-5YR	Sandy Loam/Clay	IV-V

TABLE 2

Soils associated with Quaternary fan deposits of the lower Colorado River region (from Bull, in press).

Surface	Texture Maximum	Color Hue Maximum	Calcic Horizon Stage	Estimated Age
Q3c	Sand	10 YR	I	2,000 - 4,000
Q3b	Sand	7.5 YR	I	4,000 - 8,000
Q2c	Clay Loam	5 YR	II - III	50,000 - 70,000
Q2b	Loam	5 YR	III	70,000 - 200,000
Q2a	Clay Loam	5 YR	II - III	400,000 - 730,000

TABLE 3

Soil units of the Scottsdale Piedmont (Soil Conservation Service, 1986). Soil ages are estimated based on comparisons with the dated soils of Table 1.

Soil Series (Map Units)	Texture Maximum	Color Hue Maximum	Calcic Horizon Stage	Estimated Age	Geomorphic Setting
Anthony (1,2)	Sandy Loam	7.5	None	Late Holocene/ active	Floodplains, alluvial fans, drainageways, very young
Anthony (6)	Sandy Loam	7.5	None	Late Holocene	Floodplains, alluvial fans, young
Arizo (8)	Sandy Loam	7.5	None	Middle to Late Holocene	Floodplains
Brios (10)	Loamy Sand	7.5	None	Middle to Late Holocene	Floodplains, drainageways
Carrizo (10)	Sand	7.5	None	Middle to Late Holocene	Floodplains, drainageways, alluvial fans, terraces
Gila (54)	Sandy Loam	10	I	Middle Holocene	Alluvial fans, floodplains
Gilman (55)	Loam	7.5	I	Middle Holocene	Alluvial fan, floodplains
Maripo (3)	Sandy Loam	7.5	None	Middle to Late Holocene	Floodplains, low terraces
Momoli (90,91)	Sandy Loam	7.5	None	Early to Middle Holocene	Terraces
Vada (122)	Sandy Loam	7.5	I	Early to Middle Holocene	Terraces
Mohall (77)	Clay Loam	5	II	Late Pleistocene	Fan terraces

TABLE 3 (Cont.)

Soil Series (Map Units)	Texture Maximum	Color Hue Maximum	Calcic Horizon Stage	Estimated Age	Geomorphic Setting
Pinaleno (96)	Clay Loam	5	III	Middle to Late Pleistocene	Fan terraces
Pinamt (98)	Sandy Clay Loam	5	III	Middle to Late Pleistocene	Fan terraces
Tremant (112, 113)	Sandy Clay Loam	5	III	Middle to Late Pleistocene	Fan and stream terraces
Rillito (118)	Loam	7.5 10	III	Middle to Late Pleistocene	Fan terraces stripped of B horiz.
Carefree (12)	Clay	5	III	Middle Pleistocene	Fan Terraces
Cipriano (68)	Loam	7.5	IV	Middle Pleistocene	Fan terraces, stripped B horiz.
Eba (33)	Clay	5	III	Middle Pleistocene	Fan and stream terraces
Ebon (44)	Clay	5	III	Middle Pleistocene	Fan and stream terraces
Tres Hermanos	Clay Loam	5	III-IV	Middle Pleistocene	Fan and stream terraces
Sun City (110)	Clay Loam	5	IV-V	Early to Middle Pleistocene	Partially stripped argillis horiz. fan terraces
Gunsight (68)	Sandy Loam	7.5	II	?	Fan terraces - may be thin young soil over buried Pleistocene soil

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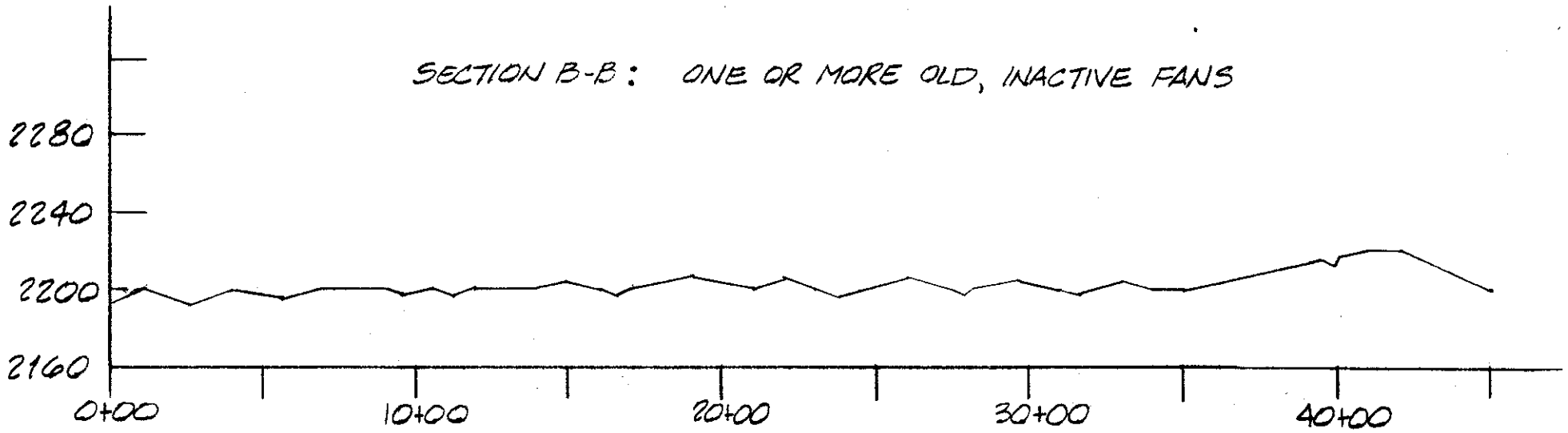


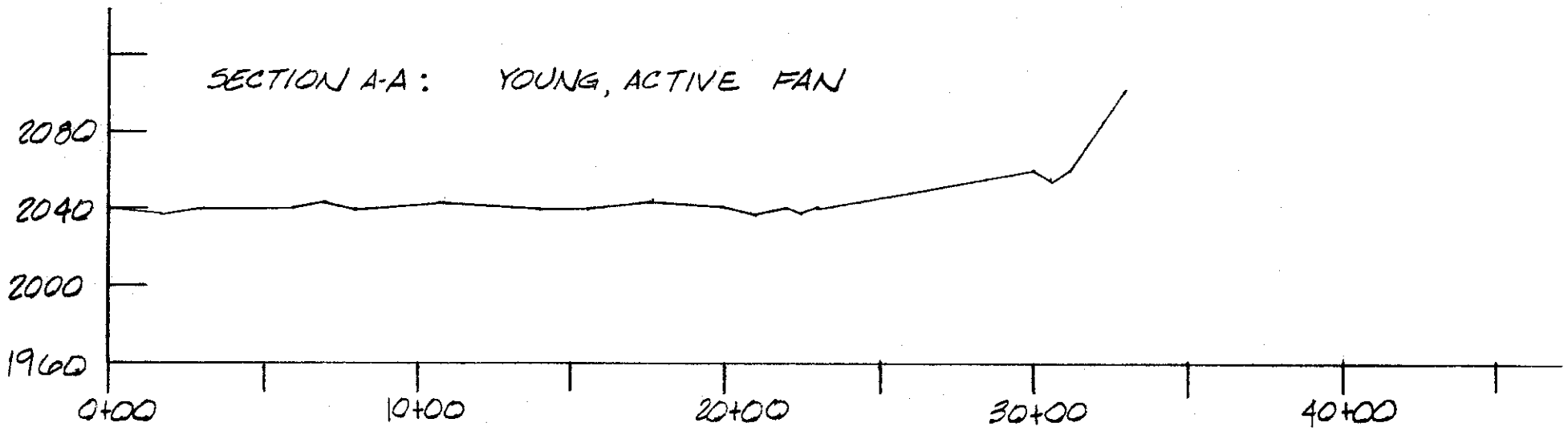


FIGURE 2 TOPOGRAPHIC RELIEF COMPARISON

SCALE:
HORIZ.: 1" = 500'
VERT.: 1" = 80'

6.3.0 RECOMMENDATIONS FOR RAINFALL DATA TO BE USED FOR THE NORTH SCOTTSDALE DRAINAGE PLAN

Recommendations For Rainfall Data To Be Used For The North Scottsdale General Drainage Plan

The runoff response of a watershed is extremely sensitive to the amount, spatial distribution, and temporal distribution of rainfall. Accordingly, these parameters warrant close examination during the course of hydrology studies.

To provide such technical scrutiny, a sensitivity analysis was conducted of an approximate 7 square mile block of drainage area containing 13 sub-basins. Three sub-basins within this overall block were then chosen to represent: 1) a totally mountainous area; 2) a partial mountain-partial foothills area; and 3) a dissected alluvial fan. These three environments represent a wide range of topographic conditions for both overland flow and channel routing parameters. These three sub-basins were used as the basis for independent peak discharge calculations to verify the general accuracy of the computerized rainfall/runoff model.

The watershed was modeled with HEC-1, using the kinematic wave option for both overland flow and channel routing. Using this baseline model, the sensitivity analysis examined the following parameters:

A. Rainfall Amount - Two sources of rainfall data were used: 1) NOAA Atlas 2, Volume VIII, Arizona; and 2) a combination of NOAA Atlas data and City of Phoenix rainfall data (Storm Drain Design Manual, Sept. 1985), whichever gave the higher value for a given frequency-duration.

B. Spatial Distribution - The rainfall was assumed to be evenly distributed over the entire contributing watershed. However, the sensitivity of peak discharge was examined as a function of changing the "areal reduction factor" from 10 square miles to 50 square miles.

C. Temporal Distribution - The following rainfall distributions were evaluated: 1) HEC-1 hypothetical, 24-hour; 2) HEC-1 hypothetical, 1-hour; 3) SCS Type II 24-hour; 4) SCS Type IIA, 24-hour; 5) City of Phoenix, 24-hour.

Where possible, several combinations of these parameters were examined in order to establish the maximum and minimum values that might occur in peak discharge. However, some combinations were not possible. For example, the SCS Type II, IIA, and City of Phoenix distributions only utilize the 24-hour rainfall value. Since the NOAA values were higher than the Phoenix rainfall values for this duration, only the NOAA data was used for these storms.

It should be noted that there is also some incompatibility in comparing runoff response due to changes in areal reduction factors. The HEC-1 program incorporates an internal subroutine that automatically adjusts all rainfall values (on the PH Card) for a given storm duration when using the hypothetical rainfall distribution. This adjustment is initiated by the user inputting a desired drainage area size to be used by the program in computing the areal reduction factor - (ARF). In contrast, the two SCS storms and the City of Phoenix distribution are adjusted as a result of the user modifying only the 24-hour rainfall for the desired areal reduction.

Another incompatibility in computing the ARF arises from the fact that the HEC-1 algorithm produces different results from that obtained from Figure 14 in the NOAA Atlas. Both methods produce nearly identical results for the 24-hour duration, but slightly different values for the shorter durations. For example, HEC-1 will generate an ARF of 0.815 for a 1-hour duration at 50 square miles, while NOAA produces an ARF of 0.800 for the same conditions. It should be noted, however, that these small discrepancies may be due to errors in visually reading such values from graphs.

The results of the sensitivity analysis are presented in tabular form in Table 1 (Table 2, on the same page, shows the results of peak discharge calculations using independent methods) and in graphical form (for the three individual sub-basins used for model verification) on Figures 1, 2, and 3. Figure 4 graphically depicts the variation in peak discharge for a 1-hour hypothetical storm when using NOAA rainfall versus the Osborn/Renard data. A plot of the various rainfall distributions is shown on Figure 5.

During a review of the sensitivity analysis results, some additional investigation was performed relative to recent research on areal reduction factors and accuracy of the rainfall data published in the NOAA Atlas. Using gage data from Walnut Gulch (AZ.) and other portions of Arizona and New

Mexico, Zehr and Myers (1984) concluded that "reductions of point rainfalls for area size in the semi-arid Southwest are greater than previously published nationwide average depth-area curves." This research indicates that ARFs from NOAA do not reduce point rainfall values as much new data indicate they could be reduced. In other words, ARFs from NOAA will tend produce higher areal rainfall (and corresponding peak discharge) than the new data in NWS HYDRO-40 suggests is realistic for areas of the southwest.

To test the sensitivity of these factors, the Type IIA, 24-hour storm was run with ARFs for 10 square miles and 50 square miles, using the data from both NOAA and NWS HYDRO-40. For each of the two drainage area sizes, the average Q_{100} ratios (using ARFs from the two referenced sources) for 15 concentration points in the test basins were compared in order to quantify the change in runoff response. The resulting ratios were found to be as follows:

$$\frac{Q_{100},\ 10\ \text{sq. mi. ARF, NOAA}}{Q_{100},\ 10\ \text{sq. mi. ARF, HYDRO-40}} = 1.10$$

$$\frac{Q_{100},\ 50\ \text{sq. mi. ARF, NOAA}}{Q_{100},\ 50\ \text{sq. mi. ARF, HYDRO-40}} = 1.17$$

As expected, the NOAA Atlas values produce 10% to 17% higher runoff values than the new HYDRO-40 data.

The second research article deals with the accuracy of short-duration rainfall in the NOAA Atlas. Again, using gage data from Walnut Gulch, AZ., Osborn and Renard (1988) demonstrate that the Walnut Gulch data produces substantially higher rainfall values from short-duration rainfall (1-hour and less) for infrequent events such as the 50-and 100-year storms. For example, the rainfall depths for the 100-year event were approximately 27% greater than the data provided by the NOAA Atlas for the same watershed. Using a kinematic cascade rainfall-runoff model (KINEROS), they demonstrate that such changes in rainfall create changes in peak discharge and runoff volume on the order of 31% to 200% and 37% to 200%, respectively.

Although the Osborn/Renard report only addresses the rainfall data for Walnut Gulch, one might assume (for the purpose of a sensitivity analysis) that

the same relative increases in short-duration rainfall might apply to other regions in Arizona that are exposed to short-duration, convective thunderstorms. Accordingly, the 1-hour, 15-minute, and 5-minute rainfall values for the hypothetical 100-year, 1-hour storm were increased by factors of 1.29, 1.25, and 1.20, respectively to match the increases calculated by Osborn and Renard for these duration-frequency combinations.

When input to the HEC-1 model, these new rainfall values caused an average increase of 59% in Q_{100} at the 15 concentration points used in the sensitivity analysis. This data was based on a 100-year, 1-hour storm. The analysis was not extended to longer duration events because the Osborn/Renard data did not go beyond a 1-hour storm.

Based on the results of this analysis, the following recommendations are made relative to rainfall parameters for use in the General Drainage Plan for the North Scottsdale Area:

A. Rainfall Amount - Use NOAA Atlas 2, Volume VIII, Arizona, with separate rainfall calculations for the northern, central, and southern portions of the watershed. Recommended point rainfall values are presented on Tables 3, 4, and 5.

The higher City of Phoenix rainfall data is not recommended for combination with the NOAA data for the following reasons:

1) the City's Storm Drain Design Manual indicates the rainfall is based on WTBM-44, which is believed to be the same data as the NOAA Atlas. Most of the differences with the published Phoenix rainfall data and the NOAA data generated for this study area, occur for durations of 1-hour or less. All rainfall values for less than a 1-hour duration are based on a percentage of the 1-hour value. Accordingly, if the 1-hour value is in error, all lesser duration values will also be in error. An analysis of the published Phoenix 1-hour rainfall values indicate that they are slightly in error when compared to the 1-hour rainfall values that result from using the statistical equations presented on page 15 of the NOAA Atlas. This, of course, causes all lesser duration values to also be in error. Table 6 lists the mathematically computed values that would result from applying the NOAA procedures to the 6-hour and

24-hour values published by Phoenix for the 2- and 100-year events. The data published by Phoenix may have been visually read from hand-drawn curves, rather than being mathematically computed using the recommended equations in the NOAA Atlas.

2) If the Phoenix numbers are not based on the NOAA Atlas, there would arise a problem of technically justifying a valid basis for combining data from two different sources. If a combination of data were to be made that would cause an increase in runoff (beyond the NOAA data), a valid technical basis would be warranted for such a combination in order to defend the data against potential future critics.

The Osborn/Renard research at Walnut Gulch is considered to limited to be applied on a generalized statewide basis at this time. As discussed previously, their research only addressed storm durations up to 1-hour. Accordingly, there is no guidance provided on possible errors associated with longer duration events, such as the 24-hour storm.

B. Spatial Distribution - Recommend that rainfall be evenly distributed over the entire contributing watershed. Point rainfall values should be reduced to simulate a storm size of 10 square miles. The areal reduction factor (ARF) should be taken from the NOAA Atlas, Figure 14. When compared to data in the Zehr/Myer article, the use of Figure 14 (NOAA) will provide a degree of conservatism for runoff calculations.

The lower ARFs suggested in the Zehr/Myer report are not recommended because of their admission of considerable variation in the uncertainty of the results (on a statewide basis) due to sparse data in certain areas of the State.

Adoption of the ARFs from the NOAA Atlas will also, to some extent, counteract the effects of the suggestion by Osborn and Renard that the NOAA rainfall data may be lower that that which actually occurs in various regions of Arizona.

C. Temporal Distribution - Recommend adoption of the 24-hour, SCS Type IIA storm. The 24-hour duration will provide suitable runoff volumes for detention/retention basin design while the Type IIA distribution incorporates a

short burst of high intensity rainfall to simulate convective thunderstorm characteristics that are common to the project area. This intensity will provide the high peak discharges that are recommended for the design of any channel improvements. This distribution was developed on the basis of thunderstorm data collected from the Arizona - New Mexico area.

The HEC-1 hypothetical distribution was rejected because of a tendency to generate peak discharge values that are significantly higher than discharges obtained with other distributions and independent peak discharge calculations. This distribution makes no attempt to acknowledge regional rainfall characteristics. The hypothetical distribution in HEC-1 also exhibits large variations in peak discharge when adjustments are made to reduce point rainfall as a function of the assumed areal extent of a given storm. For example, when adjusting the ARF from 10 square miles to 50 square miles, the HEC-1 hypothetical storm revealed an average decrease of 25% in peak discharge values, while under the same circumstances, the Type IIA storm only caused an average reduction of about 7% in peak discharge. As discussed previously, these differences are due to the way in which the ARF is applied to the rainfall values for the two storms.

It is believed that such large variations in peak discharge (when using the HEC-1 ARF algorithm) might lead to private consultants unwittingly making adjustments for areal distribution of rainfall and ending up with large variations in the peak discharges used for channel improvements in different parts of the watershed. As noted previously, application of the NOAA ARF to the Type II A storm has much less influence on peak discharge.

The City of Phoenix distribution was rejected on the basis that it provides substantially lower rainfall intensities, during the 1-hour burst of rainfall in the middle of the storm, than the Type II, IIA, and HEC-1 hypothetical distributions. For example, maximum rainfall intensities for these distributions (based on a 24-hour rainfall depth of 4.23" and a 5-minute computation interval) were found to be 2.76, 4.68, 4.68, and 8.04 in/hr for the City of Phoenix, Type II, Type IIA, and HEC-1 hypothetical distributions, respectively. The low intensity associated with the Phoenix distribution translates into a

significant reduction in peak discharge (see Figures 1, 2, and 3).

Table 7 lists comments relative to certain advantages and disadvantages associated with each of the referenced rainfall distributions.

References:

Zehr, R. A. and Myers, V. A. (1984). "Depth-Area Ratios In The Semi-Arid Southwest United States", NOAA Technical Memorandum NWS HYDRO-40

Osborn, H. B. and Renard, K. G. (1988). "Rainfall Intensities For Southeastern Arizona", Journal of Irrigation and Drainage Engineering, ASCE, Vol. 114, No.1, pg 195-199

TABLE 1
SUMMARY OF SENSITIVITY ANALYSES
FOR McDOWELL MOUNTAIN AREA
SUB-BASINS 2240 - 2340
(all discharge values in cfs)

Concentration Point or Sub-Basin No.	D.A. (sq. mi.)	24-Hour Hypothetical, NOAA Rainfall 10 Sq. Mi. *NOAA ARF	24-Hour Hypothetical, NOAA Rainfall 50 Sq. Mi. *NOAA ARF	24-Hour Hypothetical, NOAA/PMX Rainfall 10 Sq. Mi. *NOAA ARF	24-Hour Type IIA, NOAA Rainfall 10 Sq. Mi. NOAA ARF	24-Hour Type IIA, NOAA Rainfall 10 Sq. Mi. HYDRO-40 ARF	24-Hour Type IIA, NOAA Rainfall 50 Sq. Mi. NOAA ARF	24-Hour Type IIA, NOAA Rainfall 50 Sq. Mi. HYDRO-40 ARF	24-Hour PMX Distribution, NOAA Rainfall 10 Sq. Mi. NOAA ARF	24-Hour Type II, NOAA Rainfall 10 Sq. Mi. NOAA ARF	1-Hour Hypothetical NOAA Rainfall 10 Sq. Mi. *NOAA ARF	1-Hour Hypothetical Osborn/Renard Rainfall 10 Sq. Mi. *NOAA ARF
2240	.60	712	505	771	664	535	546	431	645	649	543	811
2260	.26	290	219	313	273	241	246	193	285	262	219	352
2255	.30	565	439	607	491	456	462	406	381	480	512	812
2270	.97	2064	1564	2238	1763	1633	1655	1430	1282	1664	2096	3404
2271	1.27	2619	1969	2844	2249	2075	2104	1830	1663	2144	2573	4142
2250	1.49	2850	2160	3089	2610	2410	2443	2072	1942	2369	2893	4940
2251	1.76	3106	2351	3361	2832	2600	2638	2223	2227	2581	3021	5150
2280	1.94	3111	2447	3359	2859	2644	2682	2265	2392	2648	3345	5435
2290	.60	1332	987	1448	1130	1015	1034	841	812	1009	889	1363
2300	1.80	4814	3427	5179	3975	3722	3764	3123	2592	3560	3252	5122
2302	DIVERT	2407	1713	2589	1987	1861	1882	1562	1296	1780	1626	2561
2310	DIVERT	2536	1928	2701	2229	2046	2066	2040	1671	2001	1630	2592
2320	.37	857	665	943	706	655	664	539	500	700	563	876
2330	.68	1211	937	1299	1015	947	959	843	692	993	1054	1576
2340	.50	960	748	1039	847	777	789	670	630	779	756	1233

* These ARFs were actually computed with the HEC-1 algorithm and applied to each of the rainfall values on the PM card.

TABLE 2
PEAK DISCHARGE VERIFICATION
BY INDEPENDENT METHODS

Concentration Point or Sub-Basin No.	Methodology: USGS Regression Equations by Eychaner	Methodology: TR-55 NOAA Rainfall 10 Sq. Mi. ARF	Methodology: Pima Cnty Peak NOAA Rainfall 10 Sq. Mi. ARF
2240	862		
2260	486		
2255	526		
2270	1180	1179	1997
2271			
2250			
2251	1711		
2280			
2290	860	721	918
2300	1738	2216	2734
2302			
2310			
2320	619		
2330	739	646	
2340			

TABLE 3

Sub-Basins 1000 to 1500
(Carefree Area)

** POINT PRECIPITATION VALUES FOR DESIGN STORMS **

	Point Precipitation in Inches								
Storms	5-M.	15-M.	30-M.	1-HR	2-HR	3-HR	6-HR	12 -HR	24 -HR
2 - YR	0.32	0.64	0.88	1.12	1.29	1.40	1.61	1.88	2.16
5 - YR	0.42	0.82	1.14	1.44	1.65	1.80	2.07	2.44	2.81
10 -YR	0.48	0.94	1.30	1.65	1.90	2.06	2.38	2.81	3.24
25 -YR	0.56	1.09	1.52	1.92	2.21	2.40	2.77	3.28	3.79
50 -YR	0.63	1.24	1.71	2.17	2.50	2.71	3.13	3.71	4.29
100-YR	0.70	1.37	1.90	2.41	2.77	3.01	3.48	4.13	4.78

TABLE 4
Sub-Basins 1 to 53
(Outer Loop Area)

** POINT PRECIPITATION VALUES FOR DESIGN STORMS **

	Point Precipitation in Inches								
Storms	5-M.	15-M.	30-M.	1-HR	2-HR	3-HR	6-HR	12 -HR	24 -HR
2 - YR	0.32	0.63	0.87	1.11	1.25	1.34	1.52	1.74	1.95
5 - YR	0.42	0.82	1.14	1.44	1.63	1.75	1.98	2.27	2.55
10 -YR	0.48	0.95	1.32	1.67	1.88	2.02	2.29	2.62	2.96
25 -YR	0.57	1.11	1.54	1.95	2.20	2.36	2.68	3.07	3.46
50 -YR	0.64	1.26	1.75	2.22	2.50	2.68	3.04	3.49	3.94
100-YR	0.72	1.41	1.95	2.47	2.79	2.99	3.39	3.89	4.39

TABLE 5
Sub-Basins 2000 to 2680
(McDowell Mountain Area)

** POINT PRECIPITATION VALUES FOR DESIGN STORMS **

	Point Precipitation in Inches								
Storms	5-M.	15-M.	30-M.	1-HR	2-HR	3-HR	6-HR	12 -HR	24.-HR
2 - YR	0.27	0.54	0.75	0.95	1.10	1.20	1.39	1.64	1.90
5 - YR	0.38	0.75	1.04	1.32	1.51	1.63	1.87	2.18	2.49
10 -YR	0.46	0.90	1.24	1.57	1.79	1.93	2.20	2.54	2.89
25 -YR	0.55	1.08	1.49	1.89	2.14	2.30	2.61	3.00	3.38
50 -YR	0.63	1.25	1.73	2.19	2.46	2.64	2.99	3.42	3.85
100-YR	0.72	1.41	1.95	2.47	2.77	2.97	3.35	3.82	4.29

TABLE 6
Adjusted City of Phoenix Rainfall Data
Using Statistical Equations In NOAA Atlas 2
& Phoenix 6- and 24-Hour Rainfall for the
2- and 100-Year Events

** POINT PRECIPITATION VALUES FOR DESIGN STORMS **

	Point Precipitation in Inches								
Storms	5-M.	15-M.	30-M.	1-HR	2-HR	3-HR	6-HR	12 -HR	24 -HR
2 - YR	0.25	0.50	0.69	0.87	0.97	1.03	1.16	1.30	1.44
5 - YR	0.38	0.74	1.02	1.29	1.43	1.52	1.70	1.89	2.08
10 -YR	0.46	0.90	1.25	1.58	1.74	1.85	2.06	2.29	2.51
25 -YR	0.56	1.10	1.53	1.94	2.14	2.27	2.52	2.79	3.05
50 -YR	0.66	1.29	1.79	2.27	2.50	2.65	2.94	3.25	3.56
100-YR	0.75	1.48	2.05	2.59	2.85	3.02	3.35	3.69	4.04

COMPARISON OF RAINFALL DATA		
TABLE 7 ** RAINFALL DISTRIBUTIONS		
Distribution	Advantages	Disadvantages
HEC-1 Hypothetical	1. Easy to adjust for different storm durations. 2. Contains subroutine to compute ARF. 3. Contains subroutine to convert rainfall data from partial duration series to annual series.	1. Tends to create large peak discharge because of severe rainfall intensity during the middle hour of the storm. 2. Changes in the assumed area of the storm distribution cause large changes in the peak discharge, due to methodology used to compute ARF. 3. Is not necessarily based on rainfall characteristics that are unique to Arizona.
SCS Type IIA	1. Based on storms in the southwestern United States (Arizona & New Mexico). 2. Only requires the user to input one rainfall amount. 3. Does not create large variations in Q_p when ARF is adjusted for different storm size. 4. Incorporates sufficiently severe rainfall intensity to produce conservative runoff values.	1. Not readily adaptable to other storm durations, i.e., user must manually compress the time scale and recompute the rainfall distribution coordinates. 2. User must manually compute ARF and any required adjustments for converting rainfall data from partial duration to annual series.
SCS Type II	1. Same as Comments 2 & 3 for Type IIA storm.	1. Same as Comments 2 & 3 for Type IIA storm. 2. Not based on Arizona storm characteristics. 3. May cause underestimation of peak discharge due to lower rainfall intensity that ocurrs during convective thunderstorms.

City of Phoenix	1. Same as Comments 2 & 3 for Type IIA storm.	1. Same as Comments 1 & 2 for Type II storm. 2. Rainfall intensity during the middle hour of the storm is even is less severe than either the Type II or IIA storms. Therefore, there is a potential to cause an under-estimation of peak discharge.

FIGURE 1

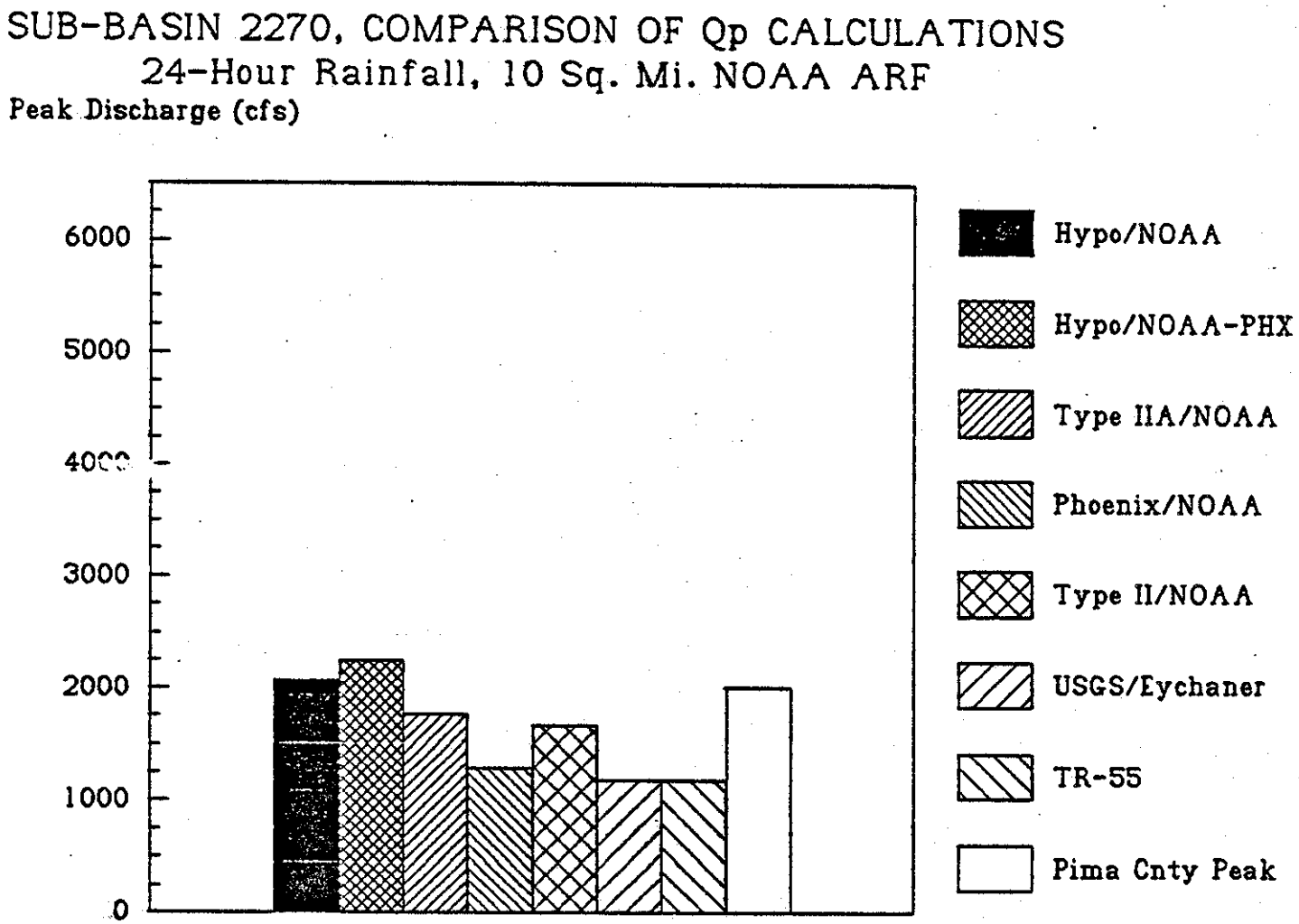

SUB-BASIN 2270, COMPARISON OF Qp CALCULATIONS
24-Hour Rainfall, 10 Sq. Mi. NOAA ARF
Peak Discharge (cfs)
6000
5000
4000
3000
2000
1000
0
Hypo/NOAA
Hypo/NOAA-PHX
Type IIA/NOAA
Phoenix/NOAA
Type II/NOAA
USGS/Eychaner
TR-55
Pima Cnty Peak

FIGURE 2

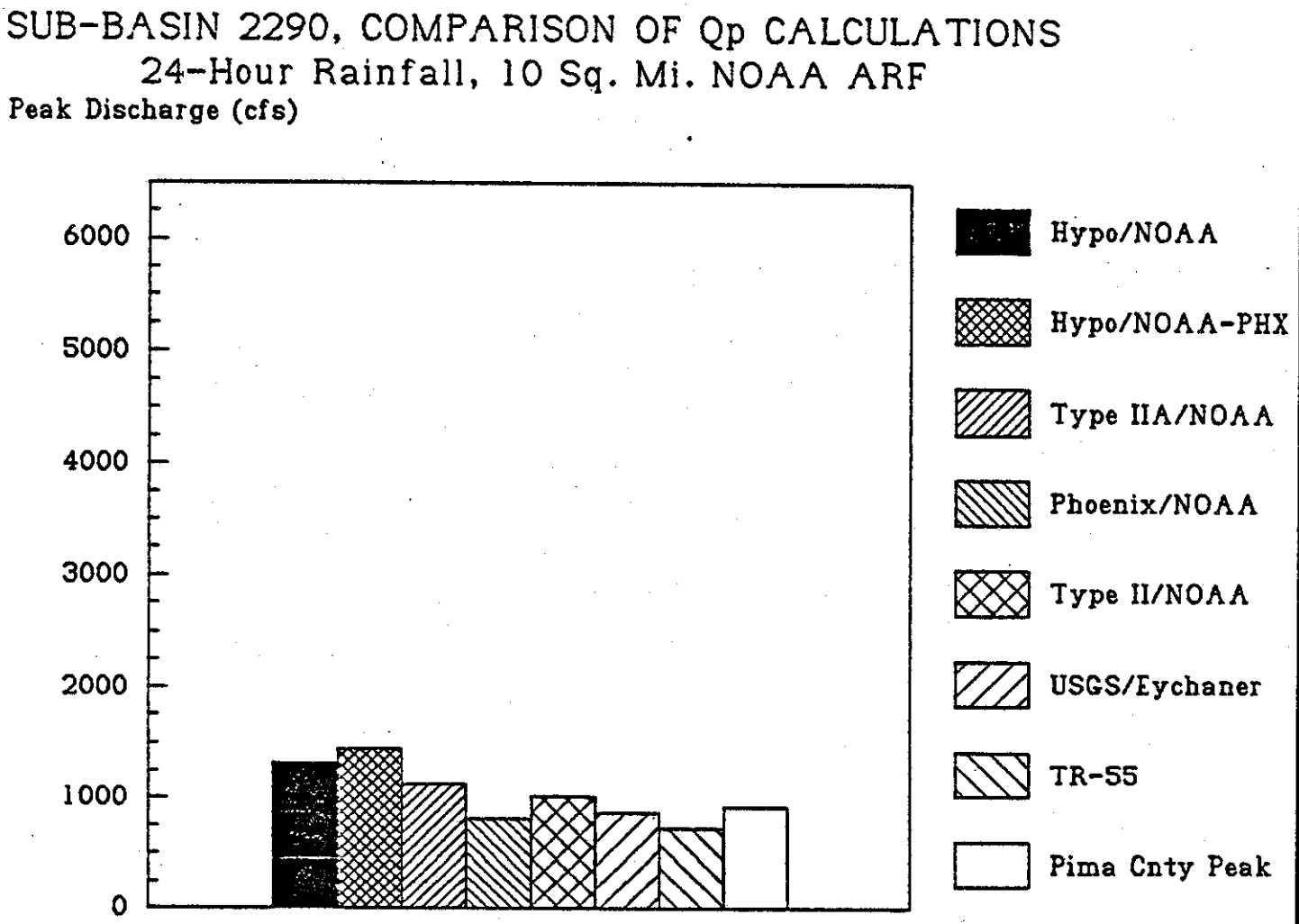

SUB-BASIN 2290, COMPARISON OF Qp CALCULATIONS
24-Hour Rainfall, 10 Sq. Mi. NOAA ARF
Peak Discharge (cfs)
6000
5000
4000
3000
2000
1000
0
Hypo/NOAA
Hypo/NOAA-PHX
Type IIA/NOAA
Phoenix/NOAA
Type II/NOAA
USGS/Eychaner
TR-55
Pima Cnty Peak

FIGURE 3

SUB-BASIN 2300, COMPARISON OF Qp CALCULATIONS
24-Hour Rainfall, 10 Sq. Mi. NOAA ARF

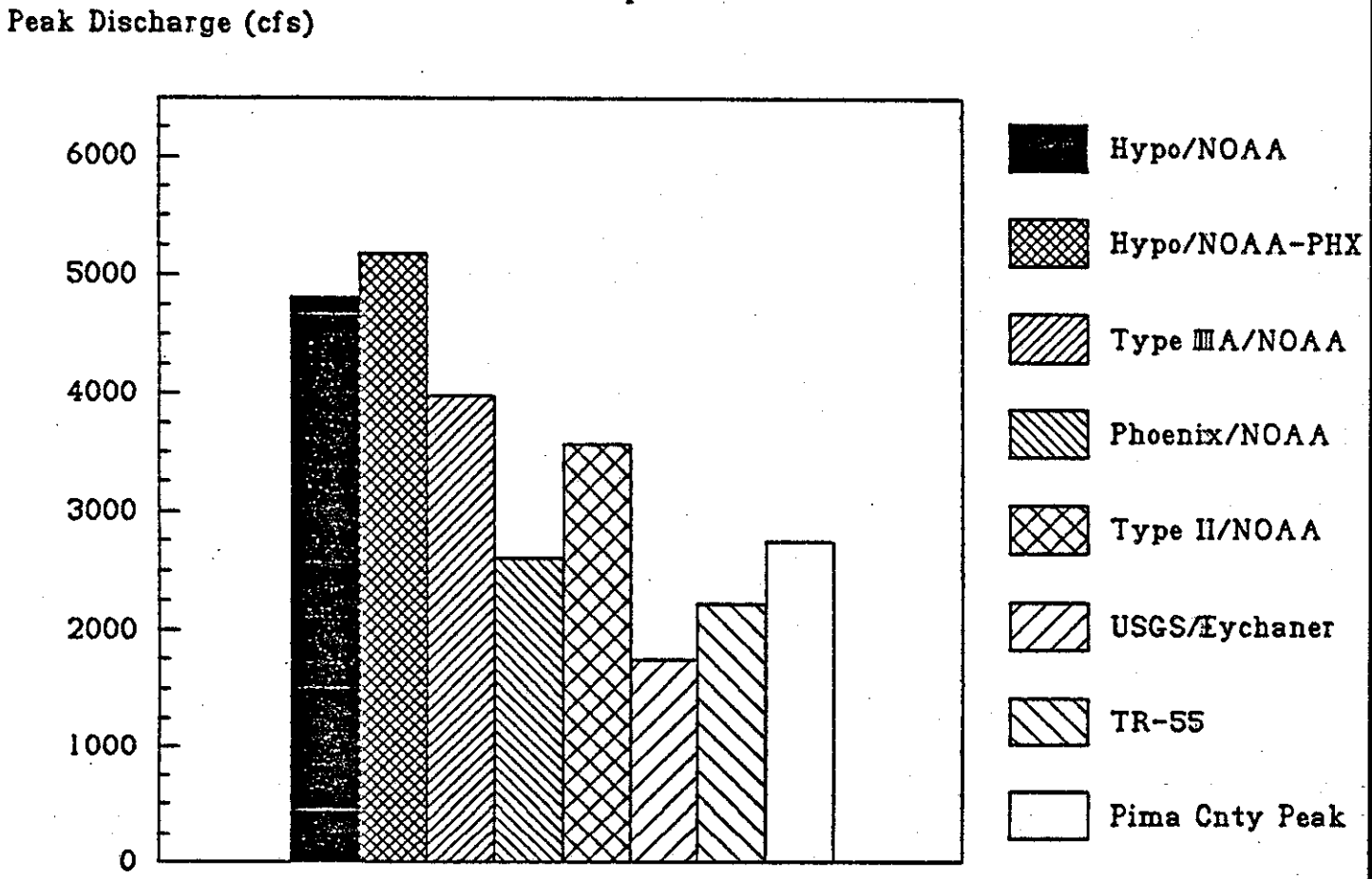


FIGURE 4

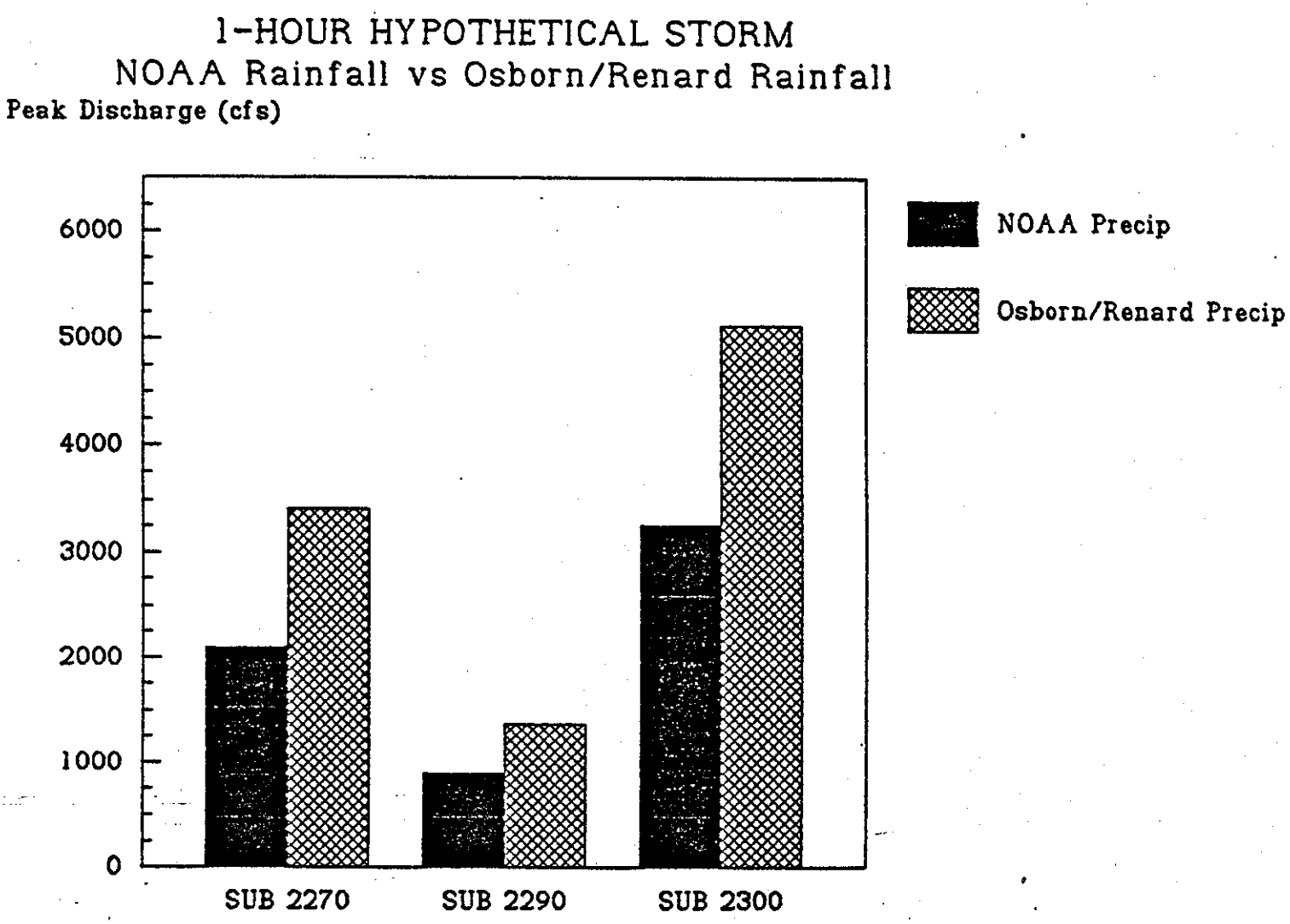
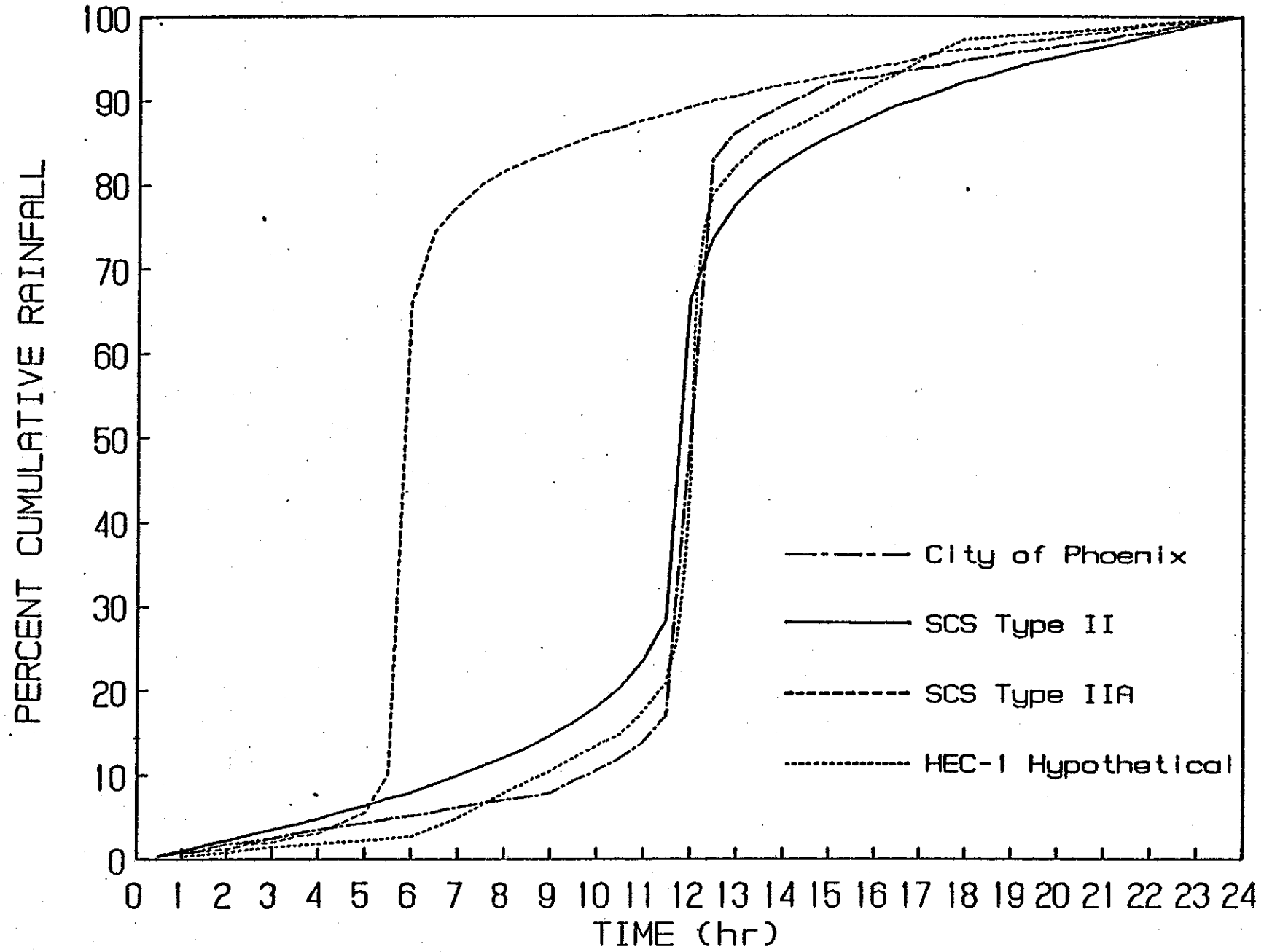

1-HOUR HYPOTHETICAL STORM
NOAA Rainfall vs Osborn/Renard Rainfall
Peak Discharge (cfs)
6000
5000
4000
3000
2000
1000
0
SUB 2270
SUB 2290
SUB 2300
NOAA Precip
Osborn/Renard Precip

FIGURE 5

COMPARISON OF RAINFALL DISTRIBUTIONS



6.4.0 TR-55 ANALYSIS

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location STREAM 1 C2051 Checked ____ Date ____

Circle one: Present Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, Poor condition	63			12	756
B	" "	77			13	1001
C		85			0	0
D		88			75	6600
				Totals =	100	8357

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8357}{100} = 83.57$; Use CN = 84

2. Runoff

Frequency ..... 100 yr

Rainfall, P (24-hour) ..... 4.29 in

Runoff, Q ..... 2.63 in

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location STREAM 1 Checked ____ Date ____

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea 2050

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	2050			
1. Surface description (table 3-1)			DESERT BRUSH			
2. Manning's roughness coeff., n (table 3-1) ..			0.25			
3. Flow length, L (total L $\leq$ 300 ft)	ft		530			
4. Two-yr 24-hr rainfall, P_2	in		1.90			
5. Land slope, s	ft/ft		0.57			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.32	+	0	= 0.32

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)						
8. Flow length, L	ft					
9. Watercourse slope, s	ft/ft					
10. Average velocity, V (figure 3-1)	ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0	+	0	= 0

Channel flow		Segment ID	2050	2050		
12. Cross sectional flow area, a	ft^2		57.0	120.0		
13. Wetted perimeter, p_w	ft		29.0	55.6		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		1.97	2.16		
15. Channel slope, s	ft/ft		0.2067	0.0693		
16. Manning's roughness coeff., n			0.045	0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		23.6	14.6		
18. Flow length, L	ft		3400	6200		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.04	+ 0.12	=	0.16
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					0.48

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location SCOTTSDALE, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 1 C 2051

1. Data:

Drainage area ..... A_m = 1.79 mi^2 (acres/640)

Runoff curve number .... CN = 84 (From worksheet 2)

Time of concentration .. T_c = 0.48 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.29		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.381		
5. Compute I_a/P		0.089		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-11)	csm/in	600		
7. Runoff, Q ..... (From worksheet 2).	in	2.63		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	2824		

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE F/S By BAT Date 7/14/88

Location STREAM 2 C51 Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			5.5	346.5
B		77			23.2	1786.4
C		85			2.6	221.0
D		88			68.7	6045.6
				Totals =	100	8399.5

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8399.5}{100} = 84.0$; Use CN = 84

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	100		
Rainfall, P (24-hour) ..... in	4.39		
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 2 C51

Circle one: (T_c) T_t through subarea 39 & 41

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		39				
1. Surface description (table 3-1)		DESERT BRUSH				
2. Manning's roughness coeff., n (table 3-1) ..		0.20				
3. Flow length, L (total L ≤ 300 ft)	ft	330				
4. Two-yr 24-hr rainfall, P_2	in	1.95				
5. Land slope, s	ft/ft	0.0433				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.50	+	0	=	0.50

Shallow concentrated flow						
Segment ID						
7. Surface description (paved or unpaved)						
8. Flow length, L	ft					
9. Watercourse slope, s	ft/ft					
10. Average velocity, V (figure 3-1)	ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0	+	0	=	0

Channel flow						
Segment ID		39		41		
12. Cross sectional flow area, a	ft^2	288		365		
13. Wetted perimeter, p_w	ft	67.9		84.8		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	4.23		4.31		
15. Channel slope, s	ft/ft	0.0253		0.0282		
16. Manning's roughness coeff., n		0.045		0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	13.8		14.7		
18. Flow length, L	ft	11240		9400		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.23	+	0.18	=	0.41

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 0.91

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

(2)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location STREAM 2 C51 Checked ____ Date ____

Circle one: (Present) Developed STREAM 2 C51

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.

(0.91)

Sheet flow (Applicable to T_c only)		Segment ID			
1. Surface description (table 3-1)					
2. Manning's roughness coeff., n (table 3-1) ..					
3. Flow length, L (total L ≤ 300 ft)	ft				
4. Two-yr 24-hr rainfall, P_2	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	0	+ 0	=	0

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0	+ 0	=	0

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2	48			
13. Wetted perimeter, p_w	ft	672			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	119			
15. Channel slope, s	ft/ft	5.63			
16. Manning's roughness coeff., n		0.0338			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	0.045			
18. Flow length, L	ft	19.3			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1300			
		0.02	+ 0	=	0.02

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 0.93

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS. By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 2 C51

1. Data:

Drainage area ..... A_m = 8.26 mi^2 (acres/640)

Runoff curve number .... CN = 84 (From worksheet 2)

Time of concentration .. T_c = 0.93 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.39		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.381		
5. Compute I_a/P		0.087		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	400		
7. Runoff, Q ..... (From worksheet 2).	in	2.72		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	8986		

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 11/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 8 C36

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			0	0
B		77			50	3850
C		85			30	2550
D		88			20	1760
					Totals = 100	8160

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8160}{100} = 81.6$; Use CN = 82

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... 100 ... yr	100		
Rainfall, P (24-hour) ..... 4.39 ... in	4.39		
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	2.54		

8

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea 35

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			
		35			
1. Surface description (table 3-1)		DESERT BRUSH			
2. Manning's roughness coeff., n (table 3-1) ..		0.20			
3. Flow length, L (total L ≤ 300 ft)	ft	265			
4. Two-yr 24-hr rainfall, P_2	in	1.95			
5. Land slope, s	ft/ft	0.0381			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+ 0	=	0.44

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0	+ 0	=	0

Channel flow		Segment ID			
		35			
12. Cross sectional flow area, a	ft^2	225			
13. Wetted perimeter, p_w	ft	61.6			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	3.65			
15. Channel slope, s	ft/ft	0.0319			
16. Manning's roughness coeff., n		0.045			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	14.0			
18. Flow length, L	ft	13000			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.26	+ 0	=	0.26

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 0.70

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 3 C35

1. Data:

Drainage area ..... A_m = 1.29 mi^2 (acres/640)

Runoff curve number .... CN = 82 (From worksheet 2)

Time of concentration .. T_c = 0.78 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.39		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.439		
5. Compute I_a/P		0.10		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4- II)	csm/in	500		
7. Runoff, Q ..... (From worksheet 2).	in	2.54		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	2705		

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location STREAM 4 C27 Checked _____ Date _____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			6.5	409.5
B		77			21.4	1647.8
C		85			24.2	2057.0
D		88			47.9	4215.2
				Totals =	100	8329.5

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8329.5}{100} = 83.3$; Use CN = 83

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	100		
Rainfall, P (24-hour)	in	4.39		
Runoff, Q ..... (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	2.63		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 4 C27

Circle one: (T_c) T_t through subarea 16, 19 & 21

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				
		16				
1. Surface description (table 3-1)		DESERT BRUSH				
2. Manning's roughness coeff., n (table 3-1) ..		0.20				
3. Flow length, L (total L ≤ 300 ft)	ft	217				
4. Two-yr 24-hr rainfall, P_2	in	1.95				
5. Land slope, s	ft/ft	0.0581				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.32	+	0	=	0.32

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)						
8. Flow length, L	ft					
9. Watercourse slope, s	ft/ft					
10. Average velocity, V (figure 3-1)	ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0	+	0	=	0

Channel flow		Segment ID				
		16		19B		
12. Cross sectional flow area, a	ft^2	200		472		
13. Wetted perimeter, p_w	ft	56.6		85.6		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	3.53		5.51		
15. Channel slope, s	ft/ft	0.0216		0.0155		
16. Manning's roughness coeff., n		0.045		0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	11.3		12.9		
18. Flow length, L	ft	14800		1100		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.36	+	0.02	=	0.38
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					0.70

over →

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE · FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

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.

0.70

Sheet flow (Applicable to T_c only)	Segment ID			
1. Surface description (table 3-1)				
2. Manning's roughness coeff., n (table 3-1) ..				
3. Flow length, L (total L ≤ 300 ft) ..... ft				
4. Two-yr 24-hr rainfall, P_2 ..... 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		+		= 0

Shallow concentrated flow	Segment ID			
7. Surface description (paved or unpaved)				
8. Flow length, L ..... ft				
9. Watercourse slope, s ..... ft/ft				
10. Average velocity, V (figure 3-1) ..... ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		= 0

Channel flow	Segment ID	19	21	
12. Cross sectional flow area, a ..... ft^2		832	931	
13. Wetted perimeter, p_w ..... ft		320	338	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft		2.6	2.75	
15. Channel slope, s ..... ft/ft		0.0200	0.0196	
16. Manning's roughness coeff., n		0.045	0.045	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s		8.9	9.1	
18. Flow length, L ..... ft		1800	27600	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		0.06	+ 0.84	= 0.90

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.60

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: Present Developed STREAM 4 C27

1. Data:

Drainage area ..... A_m = 14.02 mi^2 (acres/640)

Runoff curve number .... CN = 83 (From worksheet 2)

Time of concentration .. T_c = 1.60 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in			
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.410		
5. Compute I_a/P		0.09		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in	265		
7. Runoff, Q ..... (From worksheet 2).	in	2.63		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	9771		

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY Checked ____ Date ____

Circle one: (Present) Developed DIVERSION TO STREAM 5 @ 1500

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A		63			2.5	157.5
B		77			5.6	431.2
C		85			30.2	2567
D		88			61.7	5429.6
					Totals = 100	8585.3

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8585}{100} = 85.9$; Use CN = 86

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	100		
Rainfall, P (24-hour)	in	4.78		
Runoff, Q ..... (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	3.26		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed DIVERSION TO STREAM 5

Circle one: (T_c) T_t through subarea 1470, 1475 & 1480

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			
		1470			
1. Surface description (table 3-1)		DESERT BRUSH			
2. Manning's roughness coeff., n (table 3-1) ..		0.20			
3. Flow length, L (total L ≤ 300 ft)	ft	200			
4. Two-yr 24-hr rainfall, P_2	in	2.16			
5. Land slope, s	ft/ft	0.0500			
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr	0.30	+ 0	=	0.30

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0	+ 0	=	0

Channel flow		Segment ID			
		1470	1475		
12. Cross sectional flow area, a	ft^2	45.7	258		
13. Wetted perimeter, p_w	ft	31.4	62.9		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	1.46	4.10		
15. Channel slope, s	ft/ft	0.0500	0.0188		
16. Manning's roughness coeff., n		0.045	0.045		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s	9.5	11.6		
18. Flow length, L	ft	15000	17600		
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.44	+ 0.42	=	0.86
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				1.16

OVER →

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed DIVERSION TO STREAM 5

Circle one: (T_c) T_t through subarea 1470, 1475 & 1480

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.

1.16

Sheet flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)				
2. Manning's roughness coeff., n (table 3-1) ..				
3. Flow length, L (total L ≤ 300 ft)	ft			
4. Two-yr 24-hr rainfall, P_2	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	0 +	0 =	0

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)				
8. Flow length, L	ft			
9. Watercourse slope, s	ft/ft			
10. Average velocity, V (figure 3-1)	ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0 +	0 =	0

Channel flow		Segment ID		
		1480		
12. Cross sectional flow area, a	ft^2	322		
13. Wetted perimeter, p_w	ft	69.3		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	4.64		
15. Channel slope, s	ft/ft	0.0213		
16. Manning's roughness coeff., n		0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	13.5		
18. Flow length, L	ft	7500		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.15 +	0 =	0.15

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.31

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date _____

Location MARICOPA COUNTY, AZ Checked _____ Date _____

Circle one: (Present) Developed DIVERSION TO STREAM 5 @ S1500

1. Data:

Drainage area ..... A_m = 2.99 mi^2 (acres/640)

Runoff curve number .... CN = 86 (From worksheet 2)

Time of concentration .. T_c = 1.31 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.78		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.326		
5. Compute I_a/P		0.07		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	350		
7. Runoff, Q ..... (From worksheet 2).	in	3.26		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	3411		

DIVERSION = ½ × 3411 = 1705 cfs

18

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 5 @ S1500

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			1	63
B		77			76	5852
C		85			18	1530
D		88			5	440
					Totals = 100	7885

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{7885}{100} = 78.85$; Use CN = 79

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	100		
Rainfall, P (24-hour)	in	4.78		
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	3.26		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 5 @ S1500

Circle one: (T_c) T_t through subarea 1500

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	1500		
1. Surface description (table 3-1)			DESERT BRUSH		
2. Manning's roughness coeff., n (table 3-1) ..			0.15		
3. Flow length, L (total L ≤ 300 ft)	ft		280		
4. Two-yr 24-hr rainfall, P_2	in		2.16		
5. Land slope, s	ft/ft		0.0143		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+ 0	= 0.51

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=

Channel flow		Segment ID	1500		
12. Cross sectional flow area, a	ft^2		325		
13. Wetted perimeter, p_w	ft		230		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		1.41		
15. Channel slope, s	ft/ft		0.0181		
16. Manning's roughness coeff., n			0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		5.6		
18. Flow length, L	ft		20700		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.03	+ 0	= 1.03

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.54

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 5 @ S1500

1. Data:

Drainage area ..... A_m = 1.79 mi^2 (acres/640)

Runoff curve number .... CN = 86 (From worksheet 2)

Time of concentration .. T_c = 1.54 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.78		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.326		
5. Compute I_a/P		0.07		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in	260		
7. Runoff, Q ..... (From worksheet 2).	in	3.26		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	1517		

Q_{TOTAL} = 1517 + 1705 = 3222

2

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location DIVERSION TO STREAM 6 Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			3.7	233
B		77			9.2	708
C		85			44.2	3757
D		88			42.9	3775
				Totals =	100	8474

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8474}{100} = 84.74$ Use CN = 85

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	100		
Rainfall, P (24-hour) ..... in	4.78		
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	3.26		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, ARIZONA Checked ____ Date ____

Circle one: (Present) Developed DIVERSION TO STREAM

Circle one: (T_c) T_t through subarea 1380 & 1390

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				
			1380			
1. Surface description (table 3-1)			DESERT BRUSH			
2. Manning's roughness coeff., n (table 3-1) ..			0.045			
3. Flow length, L (total L ≤ 300 ft)	ft		240			
4. Two-yr 24-hr rainfall, P_2	in		2.16			
5. Land slope, s	ft/ft		0.0555			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.34	+ 0	=	0.34

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)						
8. Flow length, L	ft					
9. Watercourse slope, s	ft/ft					
10. Average velocity, V (figure 3-1)	ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0	+ 0	=	0

Channel flow		Segment ID	1380	1390		
12. Cross sectional flow area, a	ft^2		128	258		
13. Wetted perimeter, p_w	ft		45.2	62.9		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		2.83	4.10		
15. Channel slope, s	ft/ft		0.0311 ✓	0.0191 ✓		
16. Manning's roughness coeff., n			0.045	0.045		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		11.7 ✓	11.7 ✓		
18. Flow length, L	ft		18000 ✓	17800 ✓	RK	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.43	+ 0.42	=	0.85
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					1.19

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed DIVERSION TO STREAM 6 @ S1460

1. Data:

Drainage area ..... A_m = 2.39 mi^2 (acres/640)

Runoff curve number .... CN = 85 (From worksheet 2)

Time of concentration .. T_c = 0.76 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.78		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.353		
5. Compute I_a/P		0.07		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4- II)	csm/in	350		
7. Runoff, Q ..... (From worksheet 2).	in	3.26		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	2726		

DIVERTED FLOW TO S1460 = $\frac{1}{2} \times 2726$ = 1363 cfs.

T_c = 0.76 + 0.87 = 1.63 hr $Q = \frac{300 \times 3.26 \times 2.39}{2}$ = 1169

Worksheet 2: Runoff curve number and runoff

Project SCOTTSDALE . FIS By BAT Date 7/14/88

Location STREAM 6 Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
A	Desert brush, poor condition	63			5.6	353
B		77			69.8	5375
C		85			23.5	1998
D		88			1.1	97
				Totals =	100	7822

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{7822}{100} = 78.2$; Use CN = 78

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	100		
Rainfall, P (24-hour)	in	4.78		
Runoff, Q ..... (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	2.53		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 6

Circle one: (T_c) T_t through subarea 1410 & 1460

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	1410		
1. Surface description (table 3-1)		DESERT BRUSH		
2. ~~Manning~~'s roughness coeff., n (table 3-1) ..		0.15		
3. Flow length, L (total L ≤ 300 ft)	ft	200		
4. Two-yr 24-hr rainfall, P_2	in	2.16		
5. Land slope, s	ft/ft	0.0250		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.32	+ 0	= 0.32

Shallow concentrated flow	Segment ID			
7. Surface description (paved or unpaved)				
8. Flow length, L	ft			
9. Watercourse slope, s	ft/ft			
10. Average velocity, V (figure 3-1)	ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0	+ 0	= 0

Channel flow	Segment ID	1410	1460	
12. Cross sectional flow area, a	ft^2	168	562.5	
13. Wetted perimeter, p_w	ft	55.3	215.2	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	3.04	2.61	
15. Channel slope, s	ft/ft	0.0185	0.0202	
16. Manning's roughness coeff., n		0.045	0.045	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	9.4	8.93	
18. Flow length, L	ft	5400	12400	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.16	+ 0.39	= 0.55
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			0.87

Worksheet 4: Graphical Peak Discharge method

Project SCOTTSDALE FIS By BAT Date 7/14/88

Location MARICOPA COUNTY, AZ Checked ____ Date ____

Circle one: (Present) Developed STREAM 6 @ S1460

1. Data:

Drainage area ..... A_m = 5.20 mi^2 (acres/640)

Runoff curve number .... CN = 78 (From worksheet 2)

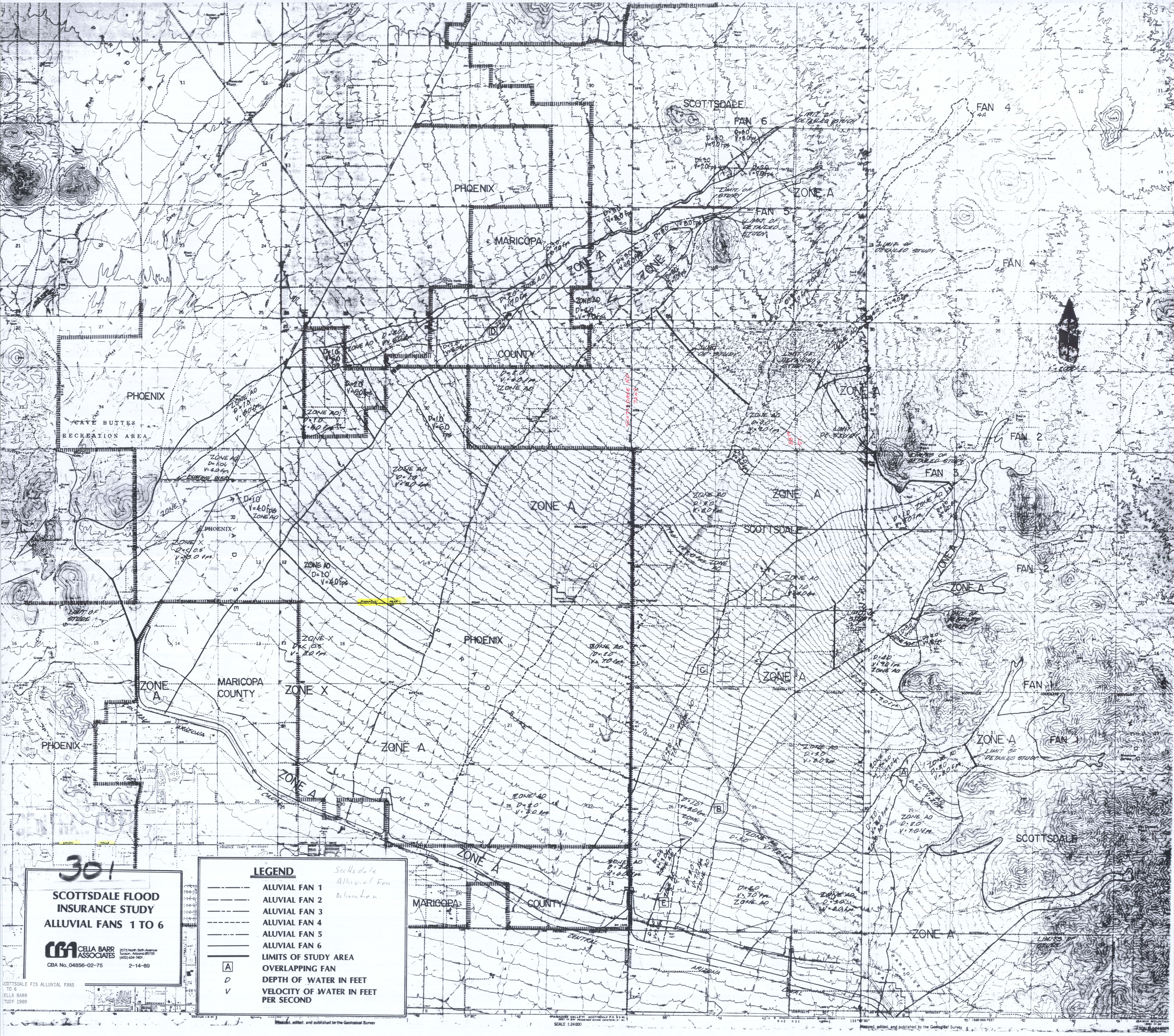
Time of concentration .. T_c = 0.87 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	100		
3. Rainfall, P (24-hour)	in	4.78		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.564		
5. Compute I_a/P		0.12		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	320		
7. Runoff, Q ..... (From worksheet 2).	in	2.53		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	4210		

DIVERSION = 1169 + 4210


SCOTTSDALE FLOOD INSURANCE STUDY
ALLUVIAL FANS 1 TO 6
CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401
CBA No. 04856-02-75
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ALUVIAL FAN 1
ALUVIAL FAN 2
ALUVIAL FAN 3
ALUVIAL FAN 4
ALUVIAL FAN 5
ALUVIAL FAN 6
LIMITS OF STUDY AREA
OVERLAPPING FAN
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V VELOCITY OF WATER IN FEET PER SECOND
Scottsdale Alluvial Fan Delineation
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CAVE BUTTES RECREATION AREA
FAN 1
FAN 2
FAN 3
FAN 4
FAN 5
FAN 6
ZONE A
ZONE X
ZONE AO
LIMIT OF DETAILED STUDY
LIMIT OF STUDY
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