HYDROLOGIC ANALYSIS OF THE CENTENNIAL WASH IN MARICOPA COUNTY, ARIZONA

FOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

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I. INTRODUCTION

Cella Barr Associates (CBA) has been contracted by the Federal Emergency Management Agency (FEMA) to perform a detailed Flood Insurance Re-Study of the Centennial Wash in Maricopa County, Arizona. The study reach for the Centennial Wash commences at the La Paz County line at the upstream limit and extends downstream, a distance of approximately 39.8 miles, to the confluence with the Gila River near Gillespie Dam. The confluence of the Gila River and the Centennial Wash lies approximately 42 miles southwest of Phoenix, Arizona as indicated on the Vicinity Map, Figure 1.

The purpose of this investigation is to estimate 100-year peak discharges at specific locations along the study reach of the Centennial Wash. These discharges are proposed for use in the completion of the Centennial Wash Flood Insurance Re-Study and are to be employed in determining water surface elevations, floodway boundaries and flood zones within the limits of the detailed study reach. For this particular Flood Insurance Re-Study, subsequent floodplain and floodway delineations will be based on the 100-year flood discharges only.

II. WATERSHED DESCRIPTION

General

The Centennial Wash headwaters are located in the Date Creek Mountains near Wickenburg, Arizona, approximately 50 miles northwest of Phoenix. Runoff generated within the 1,870-square mile Centennial Drainage Basin, at the Gila River, tends to flow in a southerly direction (southwesterly within the upper portions and southeasterly in the lower portions) and passes through Yavapai, Maricopa and La Paz Counties. Towns which lie within the subject watershed include Aguila, Wenden and Salome.

The Centennial Wash Drainage Basin is generally elongated in shape, with a total basin length of approximately 110 miles and widths ranging from 15 to 35 miles.

This watershed is characterized by mountain ranges of moderate elevation along the entire perimeter of the basin. The channels of the Centennial Wash drainage basin are characterized by numerous poorly defined, highly dynamic, braided washes that create a poorly defined dominant channel over the majority of the watershed. In most locations, the Centennial Wash channel is wide and shallow and only recognizable by dense stands of native vegetation. In several other locations, the channel loses its definition and becomes part of the irrigated farmland that is prominent in several areas. The channel does not have the capacity to convey major flows and large areas of the watershed are susceptible to shallow flooding due to the flatness of the valley floor. The runoff rate derived from the watershed is attenuated significantly as sheet flow passes downstream across the watershed due to the effects of overbank storage. Channel slopes range from about 0.34 percent to 2.65 percent. Moderate to heavy growth of native vegetation covers most reaches of the channels and associated overbank areas.

The Centennial Wash headwaters at an elevation of 4,506 feet in the Date Creek Mountains and elevations become variably lower, reaching an elevation of about 787 feet at the confluence with the Gila River. This results in a mean slope of 0.64 percent for the overall Centennial Drainage Basin.

Within the Centennial Wash drainage basin, there are five major soils association types: Cherioni-Rock outcrop, Antho-Valencia, Muhall-Leveen, Gilman-Estrella-Avondale and Laveen-Coolidge. Four of the soil associations are of hydrologic Soils Group B and one is of hydrologic Soil Group D, as defined below:

> Cherioni-Rock outcrop, of hydrologic Soil Group D, has a high runoff potential and a very slow rate of water transmission. These very shallow soils, over nearly impervious material, are found in the mountainous portion of the Centennial Wash drainage basin. Approximately 10 to 20 percent of the study areas are comprised of this Soil Group D.
>
> The other four soil associations, comprising about 80 to 90 percent of the study area, are found in the braided channel regions and valley plains. These soils, of Soil Group B, have moderate infiltration rates when wetted and a moderate rate of water transmission. The soils are moderately deep to deep, moderately well to well drained with moderately fine to moderately coarse textures.

The natural vegetation cover in the study area is desert brush. Desert brush includes such plants as mesquite, palo verde, brittle brush, creosote bush, catclaw, ironwood, salt bush, saguaro and mixed cactus, etc. This hydrologic cover type is typical of lower elevations with low annual precipitation. Some irrigated farmlands are located in the study area along the Centennial Wash.

The study area is situated in a semi-arid climatic zone characterized by hot summers lasting from May to September with maximum daily

temperatures averaging more than 90°F (33°C), and mild winters with early morning temperatures usually above the freezing point and afternoon temperatures generally between 65°F (18°C) and 70°F (22°C).

Average annual precipitation varies from 11 inches at Wickenburg to 7 inches at the lower limit of the watershed. The study watershed is subject to three major wet seasons. The first season, during the winter months, is invoked by pacific storms producing gentle, widespread showers. The second season, during the summer months, is characterized by thunderstorms produced by moist air from the Gulf of Mexico. During the third season, from late summer to fall, rain is also delivered through tropical thunderstorms arising in the Pacific.

Physical Characteristics

For the purpose of this study, the Centennial Wash Drainage Basin has been divided into an upper and lower region. As shown on Figure 2, the upper watershed has been designated as that portion of the contributing drainage basin which lies above the Narrows Dam (southeast of Salome) and is represented by Sub-basins 1 through 18. The lower watershed extends from the dam, downstream to the Gila River and is comprised of Sub-basins 19 to 37. General basin characteristics for the two regions are presented in the following text.

Upper Centennial Basin

The Upper Centennial Basin is bounded on the north by the Harcuvar and Date Creek Mountains and on the south by the Harquahala and Vulture Mountains. The Centennial Wash in this vicinity flows in a southwesterly direction through the McMullen Valley before making an abrupt turn near Salome and continuing in a southeasterly direction to the Narrows Dam. The general slope for this reach of the Centennial Wash is 0.96 percent.

A majority of the Upper Centennial Basin remains in a natural state and is currently only impacted by minor flood control measures, highways, railroads and low intensity, irrigated cropland.

A vegetative cover density of about 20 percent Desert Brush extends throughout the undisturbed valley region of this basin, with densities in the mountain regions decreasing due to rocky outcrops.

Lower Centennial Basin

The Lower Centennial Basin is bounded on the north by the Harquahala, Big Horn and Belmont Mountains and on the south by the Little Harquahala, Eagletail and Gila Bend Mountains.

The Centennial Wash in this vicinity flows in a southeasterly direction through the Harquahala Plain before converging on the Gila River. The general slope for this reach is 0.31 percent.

Over the years, the natural condition for the Lower Centennial Basin has been considerably impacted by various land uses and improvements. A large portion of this area has been converted to irrigated cropland. Numerous regional flood control measures have also been instituted within the Lower Centennial Basin. A major segment of the Central Arizona Project, the Granite Reef Aqueduct, crosses the entire basin and passes under the Centennial Wash near Lone Mountain. In addition, major highway and railroad construction has taken place.

A natural, vegetative cover density of about 10 percent Desert Brush exists in the undisturbed valley regions with cover densities decreasing in the mountain regions.

The channel for the Centennial Wash in the Lower Centennial Basin is wide and shallow and sometimes only recognizable by the dense stands of Salt Cedar lining this reach of the watercourse. Runoff from large portions of the Lower Centennial Basin has been stored and/or diverted by flood control structures and is delivered at various locations along the main drainage course. Major tributaries in this region are Tiger Wash and Old Camp/Winters Wash.

Structural Features

Structural features within the watershed include major roadways, railroads, flood control structures and water distribution systems. The installation of these improvements has involved the participation of many Federal, State and Local agencies and represent a considerable investment.

The following text contains more specific information regarding the more prominent facilities.

Upper Centennial Basin

In the Upper Centennial Basin, major roadways include U.S. Highway 60/70 and State Highway 71. These roads traverse the basin from northeast to southwest through the central portion of the subject watershed. At the two locations where these highways cross the Centennial channel, concrete box culverts have been installed to convey runoff beneath the roadway. For the purpose of this study, it has been assumed that these structures will have no affect on the determination of the 100-year peak discharge at the confluence with the Gila River.

The Atchison-Topeka and Santa Fe Railroad traverses the Upper Centennial Watershed adjacent to the previously cited highways. The primary drainage channel crosses the railway near Wenden. Field investigation yielded that a new bridge crossing was under construction. It was the opinion of CBA that this new structure would be capable of passing the 100-year peak discharge and would provide no significant stormwater detention, therefore routings for this structure were not included in the hydrologic analysis.

Flood control structures within the Upper Centennial Basin range from minor features such as spreading dikes and local diversion systems to flood-retarding structures and levees. As determined through field investigation and reconnaissance, many of these structures were not designed to, or are not capable of, storing or diverting the 100-year storm runoff. It was assumed that these structures would have little consequence on the estimated 100-year peak discharge downstream and, therefore, minor features such as spreading dikes and irrigation systems were not modeled in the hydrologic analysis. The following is a discussion regarding the more significant flood control structures in the Upper Centennial Basin.

Ritter Dam is located in the northeastern portion of the upper watershed and was not incorporated into the hydrologic analysis due to its relatively small size and long distance from the downstream concentration points investigated along the study reach.

The Upper Centennial Flood Retarding Structures (FRS) are located along the primary channel between the Towns of Wenden and Aguila. These facilities were constructed in 1956 by the Bureau of Land Management and consist of seven detention structures. During field investigation, it was evident that the two upstream structures had been breeched at some time in the past. In light of the current condition of these facilities and the potential for future failures

of the system, CBA has elected not to incorporate the potential flood control effects of the Upper Centennial FRS in this investigation.

The Narrows Dam is located approximately eight miles southeast of Salome in the Little Harquahala Mountains. This facility is under the jurisdiction of the Bureau of Land Management and Maricopa County. As evidenced during field investigation, the dam is presently in good condition and functioning appropriately. However, we believe its capacity to control the 100-year discharge is marginal. Based on its significant size and storage area, however, we have incorporated the impact of this facility into the hydrologic analysis.

Lower Centennial Basin

In the Lower Centennial Basin, major roadways include the Salome-Buckeye Highway and Interstate 10. These roads traverse the basin from northwest to southeast through the central portion of the subject watershed. At locations where these highways cross the Centennial channel, concrete box culverts and dip sections have been installed to convey runoff beneath and/or across the roadway. For the purpose of this study, it has been assumed that these roadway crossings will have no affect on the determination of the 100-year peak discharges along the study reach.

The Southern Pacific Railroad traverses the Lower Centennial Watershed near the downstream study limits. The railroad crosses the primary drainage channel, and from field investigation, it appears that this facility will not function as a flood detention structure and, therefore, will have minimal affect on the downstream 100-year discharge.

Numerous flood control structures have been constructed within the Lower Centennial Basin. These facilities are depicted on Figure 3.

The Tiger Wash Detention Structure is located north of I-10, in the central region of the Centennial Drainage Basin. This facility detains peak runoff generated by the Tiger Wash Drainage Basin (Sub-Basin 21) and outlets into the Centennial Wash just upstream of I-10. For the purpose of this study, data relevant to the performance of this detention structure was obtained from the McArthur Report (Reference 8) and utilized in the hydrologic analysis.

The Harquahala Flood Retention Structure (FRS) is also located north of I-10 and lies to the east of the Tiger Wash Detention Structure. This facility detains peak runoff generated in the Big Horn Mountains (Sub-Basin 29). Outflow from this structure is conveyed to the Centennial Wash by means of the Saddleback Diversion System.

The Saddleback FRS lies south of I-10 and intercepts runoff from the Harquahala FRS and Sub-Basin 30. Stormwater from this structure is conveyed to the Centennial Wash by the Saddleback Diversion Channel as shown on Figure 3.

Adjacent to the primary drainage channel and south of I-10 is the Centennial Levee Reach I. This levee diverts runoff generated by the area just south of I-10 and upstream from the left overbank of the Centennial Wash.

Information relevant to the performance of the Harquahala FRS, the Saddleback FRS, the Saddleback Diversion and the Centennial Levee was obtained from the "Harquahala Valley Watershed - Supplemental Watershed Work Plan No. 1," March 1977 (Reference 9). These structures are included in the hydrologic analysis.

As illustrated on Figure 3, approximately 40 miles of the Central Arizona Project Canal (Granite Reef Aqueduct) passes through the Centennial watershed. The Granite Reef Aqueduct traverses the basin from west to east through the central portion of the subject basin and lies immediately south of the previously referenced Tiger Wash Detention Basin and Harquahala FRS. Structural data pertaining to this system was obtained from material provided by the U.S. Bureau of Reclamation.

In addition, a lateral branch of the Central Arizona Project (CAP) canal known as the Eagletail Reach passes in a southeasterly direction through Sub-Basins 26 and 27. Structural and performance data for this structure was obtained from the consulting firm Franzoy, Corey and Associates, and is incorporated in the HEC-1 analysis.

III. AVAILABLE INFORMATION

The Centennial Wash Drainage Basin has been the subject of considerable investigation in the past. For the preparation of this report, numerous federal, state and local government agencies and private parties were contacted and relevant material was requested and reviewed. A bibliographic listing of references and personal contacts utilized in the preparation of this report has been provided herein.

The primary reference source employed in this investigation was prepared by Mr. Robin McArthur of the U.S. Soil Conservation Service (Reference 8). This report is titled "Harquahala Valley Watershed, Hydrologic Studies for the Design of Reach 1 and Reach 2 of the Centennial Levee," January 1984. This study did not include the lower portion of Centennial Wash which is designated for Flood Insurance Re-Study as part of this report.

The U.S. Geological Survey has historically maintained several stream gauge recording stations at various locations along the Centennial Wash. For the purpose of this study, only the station that contributed sufficient data was considered relative to estimating a 100-year peak discharge. Of particular interest to this investigation is the water-stage recording station, U.S.G.S. No. 09517500, situated along the Centennial Wash near Arlington, Arizona. This station was located at the Centennial channel crossing of the former U.S. Highway 80, approximately three (3) miles upstream of Gillespie Dam and provides a continuous record of annual peak discharges for the period from January 1961 to September 1979. A Log-Pearson Type III Statistical Analysis was performed for the 19 years of recorded data using procedures outlined in Reference 4. The 100-year peak discharge value estimated by this procedure for the Centennial Wash, at a location approximately 3 miles upstream of Gillespie Dam (Gila River), was 39,200 cfs. This peak discharge is based on a contributing drainage basin area of 1,810 square miles, resulting in an average runoff generation rate of 21.7 cfs per square mile (0.3 cfs per acre) for the watershed.

It is the opinion of CBA, that the analysis of this particular stream gauge data resulted in a value which is too low to correctly represent the potential 100-year peak discharge for the Centennial Wash. This conclusion was reached after consideration of several primary factors:

- The statistical analysis was performed on only 19 years of recorded data.

- The location of the stream gauge recording station is approximately 130 miles from the headwaters of the Centennial Wash. This stream gauge data may not reflect contributions from all portions of the watershed.

- A 100-year storm runoff value of 21.7 cfs per square mile was low by comparison to the results of the McArthur Report (Reference 8).

It is, therefore, the intent of CBA not to utilize the results of the Flood Frequency Analysis presented herein for the current Centennial Wash Flood Insurance Study.

IV. HYDROLOGIC ANALYSIS

General

For the purpose of this study, the Army Corps of Engineers "HEC-1" computer program was utilized to estimate 100-year peak discharges along the study reach of the Centennial Wash. Use of this method was determined to be the preferred procedure during a meeting held on February 25, 1988 at CBA's Phoenix office which included representatives of CBA, the Flood Control District of Maricopa County, the Arizona Department of Water Resources, and several other agencies. The methodology employed for the selection of input parameters for the HEC-1 program is presented in the following text.

Drainage Basins

The Centennial Wash Drainage Basin was delineated using U.S. Geological Survey Quadrangle Maps, aerial photography and field investigation. The exterior watershed boundary and the interior sub-basin boundaries were delineated utilizing the USGS topographic map 7-1/2-minute series (1" = 24,000'). Drainage area sizes, elevations and length of watercourse were also determined using these maps. Due to the large size of these maps, they were not included in this report. The overall watershed was subdivided into sub-basins selected based upon topography and interpretation of characteristic unit flow contributions. The Centennial Wash Drainage Basin divisions and sub-basins are represented on Figure 2 of this report. Table 1 provides a summary of the estimated sub-basin areas.

In order to eliminate duplication of effort and to provide a means of comparison for the CBA results, concentration points for this study were selected to coincide with the concentration points of the McArthur Report within overlapping portions of the study reach.

Drainage Basin boundaries were then determined independently of the McArthur Report and basin areas were estimated with the use of a computer-assisted, digitizing table and manual planimeter. The entire Centennial Wash Watershed was divided into 40 sub-basins ranging in size from 8 to 185 square miles. A comparison was then made between the drainage basins determined by CBA and those estimated in the McArthur report. An acceptable correlation between the two computed basin areas exists. The difference in computed overall watershed area between this study and the McArthur Report, computed at the downstream concentration point for the McArthur Report (CBA Basins 1 through 22) is 0.6 square miles.

Curve Numbers

As determined through field investigation, a generally uniform vegetative cover of desert brush extends throughout the Centennial Wash watershed. Cover density within the valley portions of the study area varies from an estimated 20 percent in the upper regions of the watershed to about 10 percent for the lower regions. The surrounding mountain slopes have somewhat lower vegetative cover densities than the valley areas.

The determination of hydrologic soils groups was performed with the use of the Soil Conservation Service General Soil Maps for Maricopa and Yuma Counties (References 12 and 13). Sub-basins were differentiated and proportioned with respect to the appropriate soils groups.

Based on the above-referenced parameters, weighted curve numbers were then determined for each sub-basin according to the method presented in "Urban Hydrology for Small Watersheds, Soil Conservation Service Technical Release 55," 1986 (Reference 17). Curve numbers for each sub-basin are contained in Table 1 of this report.

Precipitation

Rainfall values were computed utilizing "NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, volume VIII, Arizona" (Reference 18).

As mentioned earlier in this report, Mr. Robin McArthur of the U.S. Soil Conservation Service has prepared a detailed Hydrologic Study of the Centennial Wash for Centennial Levee Reaches I and II. After reviewing this report, CBA computed rainfall values for three sample basins using the same procedure as in the McArthur Study. CBA's results for sub-basins 8, 13 and 20 were then compared with the computed values in the McArthur Study, and the correlation was found to be acceptable.

To avoid duplication of effort, CBA utilized the precipitation values contained in the McArthur Report for sub-basins 1 through 25, 28, 30 and 31 (CBA's sub-basin sizes approximately match those presented in the McArthur Report). Precipitation values for the remaining drainage sub-basins, 26, 27, 29 and 32 through 37, which were not included in McArthur's Report, have been computed by CBA using the same method contained in said report. The procedure Mr. McArthur followed to compute the 100-year 24-hour rainfall values is attached as Appendix III in this report.

Lag Times

As described in the SCS "National Engineering Handbook, Section 4, Hydrology", Chapter 15 (Reference 19), the Time of Concentration for each sub-basin was computed using the Upland method and lag times for the subject basins were estimated in terms of T_c using the empirical relation of:

$$L = 0.6T_c$$

L = Lag Time (hours)
T_c = Time of Concentration (hours)

Table I presents the computed Lag Times used in the HEC-1 analysis.

Stream Channel Routings

Stream channel profiles are utilized by the HEC-1 program to route storm runoff through prescribed channel reaches. For the purpose of this study, channel routings were performed using the normal depth option of the HEC-1 program. Channel cross-sections for the lower portions of the Centennial Wash watershed were developed from topographic mapping (1 in. = 400 ft.; C.I. = 2 ft. and 4 ft., 1978 and 1988) and U.S.G.S. quadrangle sheets, 7.5 minute series topographic maps (1:24,000). Field cross-sections were developed for the upper portion of the watershed and the U.S.G.S. topographic maps (1:24,000) were utilized to determine approximate elevations of the cross-sections.

Flood Control Structures

Structural data, as well as any available hydrologic and hydraulic information, was obtained from local engineering firms and governmental agencies having jurisdiction over the existing structures. For the purpose of this investigation, 100-year composite hydrographs generated by the HEC-1 program were routed through the existing structures, based on data provided to CBA regarding previously performed analyses of the individual structures.

The following is a list of those structures which were modeled for the HEC-1 analysis: Lower Centennial Dam (Narrows Dam), Bureau of Land Management; Tiger Wash Detention Structure, Bureau of Reclamation; Harquahala Flood Retention Structure (FRS), Saddleback FRS, Maricopa County; Old Camp Wash Crossing of the Granite Reef Aqueduct, Central Arizona Water Conservation District; Eagletail Reach (CAP Lateral), Harquahala Valley Irrigation District.

Features which were not included in the HEC-1 analysis include local irrigation canals, levees and spreading dikes. These structures are presumed to effectively control runoff during low flow events, as those

that are produced by a 10- or 25-year storm; however, such structures would have little impact on the 100-year runoff.

Other structures not modeled for this analysis are the Upper Centennial Flood Retarding Structures, due to the structural failures evidenced during field reconnaissance and the Ritter Dam because of its location in the upper watershed and great distance from downstream concentration points.

V. RESULTS

The intent of this investigation is to determine 100-year peak discharges at designated locations along the Centennial Wash. These discharges are proposed for use in the completion of the Centennial Wash Flood Insurance Re-Study and are to be employed in determining water surface elevations, floodway boundaries and flood zones within the limits of the detailed study reach shown on Figures 1, 2, and 3.

The Flood Flow Frequency computer model provided by the U.S. Army Corps of Engineers was used to perform a Log-Pearson Type III Statistical Analysis on the 19 years of recorded gauge data (U.S.G.S. Gauge No. 09517500) located along the Centennial Wash, roughly 3 miles upstream of Gillespie Dam (Gila River). The results of this analysis yielded a 100-year peak discharge of 39,000 cfs. This value appears to be a low estimate, resulting from the relatively short period of record and the downstream location of the recording station with respect to a total basin length of 135 miles for the Centennial watershed. It is our opinion that 19 years of available stream flow data is not adequate to determine the 100-year peak discharge for the Centennial Wash at the Gila River.

Detailed hydrologic analysis of Centennial Wash at Centennial Levee Reaches I and II was performed by Mr. Robin McArthur (Reference 8). His study utilized the Soil Conservation Service TR-20 hydrologic model to determine 100-year discharges along portions of the Centennial Wash, but did not evaluate the lower reaches of the Centennial Wash designated for this Flood Insurance Re-Study.

The drainage areas at the Maricopa County/La Paz County line and at Centennial Levee Reaches I and II calculated by CBA correlate very closely with the drainage areas at the same locations in Mr. McArthur's Report. The 100-year peak discharge values at these locations computed by CBA (using the HEC-1 computer program) also correlate well, but are approximately five to seven percent (5 to 7%) lower when compared with the 100-year discharges presented in McArthur's Report (see Table 2).

Utilizing the HEC-1 computer program, a 100-year peak discharge of 67,300 cfs was estimated for the Centennial Wash at the confluence with the Gila River. Discharges determined at this location and other key locations along the study reach utilizing the HEC-1 computer model are depicted on Table 2. CBA proposes to use the peak discharges determined by the HEC-1 analysis to estimate the 100-year water surface elevations and floodway boundaries for the portions of the Centennial Wash designated for detailed study per this Flood Insurance Re-Study.

TABLE 1

CENTENNIAL WASH

PARAMETERS USED IN THE HEC-1 ANALYSIS

Drainage Sub-Basins	Drainage Area (square miles)	Lag Time (hours)	Curve Number	Precipitation (24 hrs. - 100-yr.) (in.)
1	67.0	5.80	78.0	3.88
2	185.0	15.70	81.0	3.88
3	43.0	4.81	80.0	3.88
4	21.6	3.27	81.0	3.88
4A	18.5	3.40	81.0	3.88
5	48.7	2.90	79.0	3.88
6	23.7	2.59	81.0	3.88
7	44.7	4.01	79.0	3.88
8	31.3	2.89	80.0	3.88
8A	16.2	2.33	80.0	3.88
9	52.2	3.02	80.0	3.88
10	17.0	2.50	79.0	3.88
11	20.2	3.04	78.0	3.88
12	10.6	1.98	79.0	3.88
12A	9.9	1.62	79.0	3.88
13	68.7	3.96	78.0	3.88
14	13.7	0.71	84.0	3.88
15	18.6	3.41	79.0	3.88
16	19.7	1.59	82.0	3.88
17	21.0	1.98	80.0	3.88
18	24.4	2.89	80.0	3.88

TABLE 1 (Cont.)

CENTENNIAL WASH

PARAMETERS USED IN THE HEC-1 ANALYSIS

Drainage Sub-Basins	Drainage Area (square miles)	Lag Time (hours)	Curve Number	Precipitation (24 hrs. - 100-yr.) (in.)
19	10.6	1.18	77.0	3.88
20	50.7	6.63	80.0	3.88
21	76.8	7.00	84.0	3.88
21A	84.4	7.20	84.0	3.88
22	25.1	2.51	79.0	3.88
23	7.9	2.00	77.0	3.88
24	11.2	2.51	77.0	3.88
25	24.9	4.21	77.0	3.88
26	42.4	3.19	79.0	4.12
27	62.1	4.35	77.0	4.12
28	84.4	15.06	75.0	4.12
29	101.3	4.85	83.0	3.93
30	28.6	4.75	78.0	3.93
31	12.0	0.96	86.0	4.12
32	52.4	5.05	79.0	3.93
33	47.0	4.00	80.0	3.93
34	64.3	4.64	81.0	3.93
35	99.6	4.73	87.0	3.93
36	163.1	12.25	79.0	3.93
37	45.8	4.43	83.0	3.93

TABLE 2

ESTIMATES OF 100-YEAR
PEAK DISCHARGES ALONG CENTENNIAL WASH
FROM HEC-1

Location Along Centennial Wash	CBA's Study		Mr. McArthur's Study	
	Drainage Area (square miles)	100-Year Discharge (cfs)	Drainage Area (square miles)	100-Year Discharge (cfs)
At Maricopa County/ La Paz County Line (Concentration Point 12 - Figure 2)	1,031.20	52,200	1,031.21	56,400
At Centennial Levee Reach 2 (Concentration Point 14 - Figure 2)	1,109.70	52,300	1,110.3	55,300
Near Base Line Road (Concentration Point 15, - Figure 2)	1,398.1	58,100	NO DATA	
At Railroad Bridge near Arlington (Concentration Point 17 - Figure 2)	1,824.53	67,300	NO DATA	
At Confluence with Gila River (Concentration Point 18 - Figure 2)	1,870.33	67,300	NO DATA	

VI. REFERENCES

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15. United States Department of Interior, Geological Survey; 15 minute series topographic maps (1:62,500). Salome, Gladden, Aguila, Vulture Mountains, Hope, Lone Mountain, Big Horn Mountains, Belmont Mountains, Eagletail Mountains, Cortez Peak, Arlington, Woolsey Peak and Dendora Valley.

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VII. PERSONAL CONTACTS

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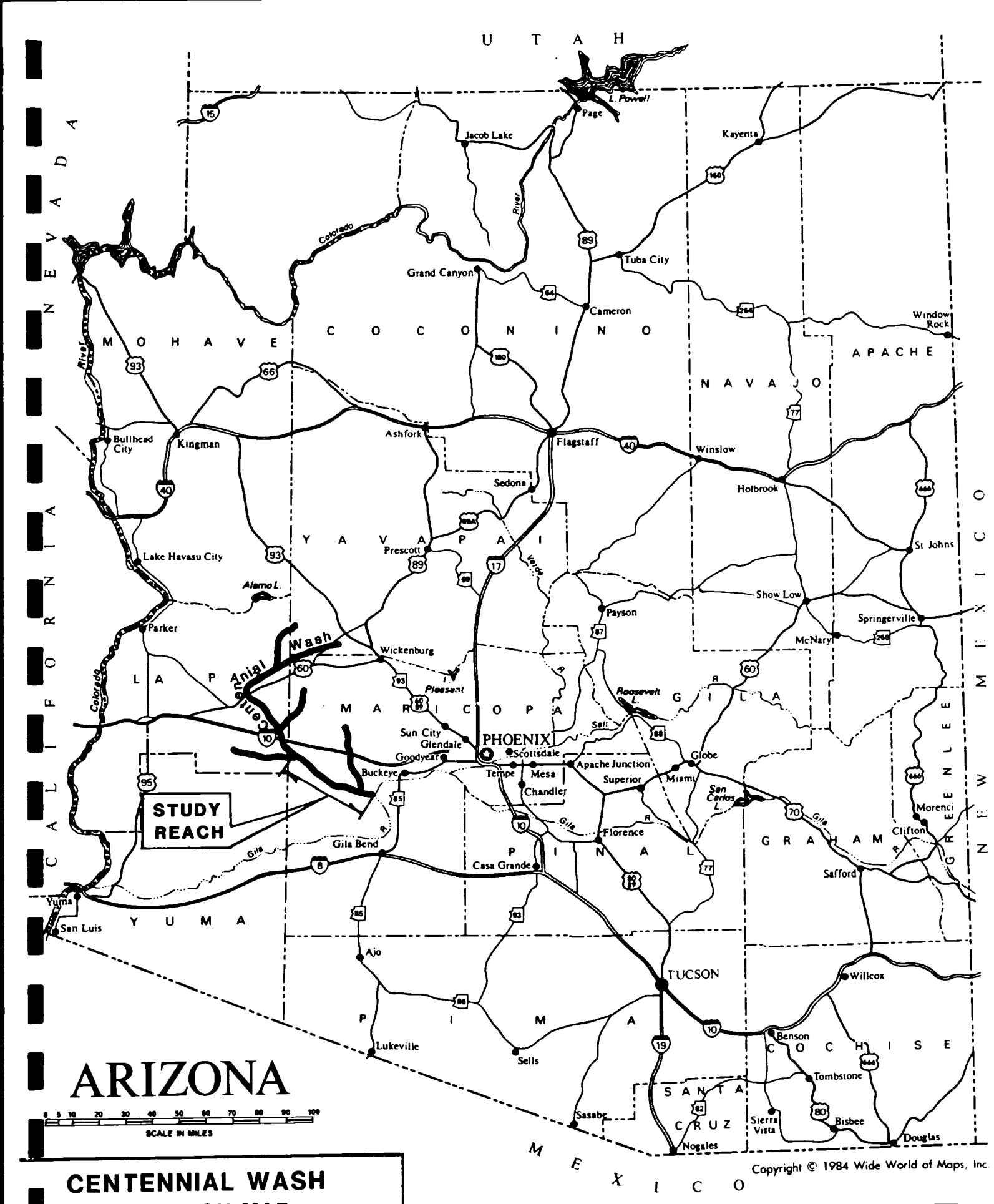
5. MCARTHUR, R.
   Soil Conservation Service, Phoenix, Arizona



ARIZONA

CENTENNIAL WASH
LOCATION MAP

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

FILE NO. 04856-03-74
SEPTEMBER, 1988

FIGURE 1

Model Library \ other Hydro \ Cent ... in

CW_noRL.out

modified for HEC-1 version 4.1

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	SUB 1	7279.	18.50	6534.	3185.	1076.	67.00		
+	ROUTED TO	1	7110.	21.00	6359.	3128.	1076.	67.00		
+									2202.93	21.00
+	HYDROGRAPH AT	SUB 2	10486.	29.00	10267.	7910.	3346.	185.00		
+	HYDROGRAPH AT	SUB 3	5890.	17.00	5043.	2234.	749.	43.00		
+	3 COMBINED AT	1	16524.	22.50	16120.	12502.	5170.	295.00		
+	ROUTED TO	2	16448.	24.50	16074.	12464.	5162.	295.00		
+									2085.05	24.50
+	HYDROGRAPH AT	SUB 4	4125.	15.50	3101.	1172.	391.	21.60		
+	HYDROGRAPH AT	SUB4A	3440.	15.50	2626.	1004.	335.	18.50		
+	3 COMBINED AT	2	17869.	23.50	17398.	13460.	5881.	335.10		
+	HYDROGRAPH AT	SUB 5	9311.	15.00	6690.	2443.	815.	48.70		
+	2 COMBINED AT	3	19492.	22.50	18933.	15478.	6695.	383.80		
+	ROUTED TO	3	19500.	23.50	18915.	15434.	6688.	383.80		
+									2024.21	23.50
+	HYDROGRAPH AT	SUB 6	5325.	14.50	3647.	1287.	429.	23.70		
+	HYDROGRAPH AT	SUB 7	6689.	16.50	5465.	2238.	748.	44.70		
+	3 COMBINED AT	4	27317.	16.00	23263.	18446.	7857.	452.20		
+	ROUTED TO	4	26730.	18.00	22948.	18260.	7831.	452.20		
+									1944.79	18.00
+	HYDROGRAPH AT	SUB 8	6274.	15.00	4494.	1634.	545.	31.30		
+	HYDROGRAPH AT	SUB8A	3764.	14.50	2457.	846.	282.	16.20		
+	3 COMBINED AT	5	31129.	18.00	26075.	19518.	8640.	499.70		
+	HYDROGRAPH AT	SUB 9	10078.	15.00	7392.	2725.	909.	52.20		
+	2 COMBINED AT	6	36933.	17.50	30285.	21848.	9547.	551.90		
+	ROUTED TO	5	36672.	18.50	30200.	21783.	9544.	551.90		
+									1889.47	18.50
+	HYDROGRAPH AT	SUB10	3610.	14.50	2426.	853.	284.	17.00		
+	HYDROGRAPH AT	SUB11	3531.	15.00	2614.	973.	324.	20.20		
+	3 COMBINED AT	7	39628.	18.50	32636.	23237.	10149.	589.10		
+	ROUTED TO	6	38617.	19.50	32556.	23156.	10132.	589.10		
+									1825.04	19.50
+	HYDROGRAPH AT	SUB12	2648.	14.00	1582.	532.	177.	10.60		

	HYDROGRAPH AT								
+		SUB12A	2816.	13.50	1527.	497.	166.	9.90	
	3 COMBINED AT								
+		8	39507.	19.50	33372.	23595.	10459.	609.60	
	HYDROGRAPH AT								
+		SUB13	9907.	16.50	8076.	3303.	1103.	68.70	
	2 COMBINED AT								
+		9	45374.	19.50	39335.	26471.	11562.	678.30	
	HYDROGRAPH AT								
+		SUB15	3154.	15.50	2423.	932.	311.	18.60	
	2 COMBINED AT								
+		10	46817.	19.50	40947.	27296.	11873.	696.90	
	ROUTED TO								
+		7	44035.	22.00	40136.	27146.	11865.	696.90	
+								1771.32	22.00
	HYDROGRAPH AT								
+		SUB14	7985.	12.50	2675.	835.	278.	13.70	
	HYDROGRAPH AT								
+		SUB16	6509.	13.50	3441.	1113.	371.	19.70	
	3 COMBINED AT								
+		11	44994.	21.50	41166.	27682.	12491.	730.30	
	ROUTED TO								
+		1	44253.	22.50	40704.	27584.	12386.	730.30	
+								258.69	22.50
	ROUTED TO								
+		8	43686.	24.50	40447.	27523.	12373.	730.30	
+								1610.99	24.50
	HYDROGRAPH AT								
+		SUB17	5489.	14.00	3273.	1097.	366.	21.00	
	HYDROGRAPH AT								
+		SUB18	4891.	15.00	3503.	1274.	425.	24.40	
	3 COMBINED AT								
+		12	44911.	24.50	41594.	28176.	13127.	775.70	
	ROUTED TO								
+		12	44838.	25.00	41549.	28164.	13114.	775.70	
+								1444.86	25.00
	HYDROGRAPH AT								
+		SUB19	3328.	13.00	1534.	490.	163.	10.60	
	HYDROGRAPH AT								
+		SUB20	5433.	19.00	4992.	2588.	883.	50.70	
	3 COMBINED AT								
+		13	48175.	24.50	44900.	30404.	14142.	837.00	
	HYDROGRAPH AT								
+		SUB21A	9999.	20.00	9289.	4981.	1714.	84.40	
	ROUTED TO								
+		10	9161.	24.50	8443.	4948.	1714.	84.40	
+								1724.49	24.50
	HYDROGRAPH AT								
+		SUB21	9332.	19.50	8609.	4546.	1560.	76.80	
	2 COMBINED AT								
+		14	15639.	23.00	14636.	9426.	3274.	161.20	
	ROUTED TO								
+		2	7507.	31.50	7309.	5256.	2674.	161.20	
+								1408.11	31.50
	2 COMBINED AT								
+		15	51943.	25.00	48692.	35130.	16795.	998.20	
	ROUTED TO								
+		10	51880.	25.50	48701.	35125.	16780.	998.20	
+								1365.29	25.50
	HYDROGRAPH AT								
+		SUB22	5310.	14.50	3578.	1259.	420.	25.10	
	2 COMBINED AT								
+		16	52429.	25.50	49145.	35492.	17153.	1023.30	
	ROUTED TO								
+		11	52218.	26.00	49064.	35482.	17135.	1023.30	
+								1286.23	26.00

	HYDROGRAPH AT								
+		SUB23	1784.	14.00	1080.	365.	122.	7.90	
	2 COMBINED AT								
+		17	52330.	26.00	49159.	35570.	17230.	1031.20	
	ROUTED TO								
+		12	52160.	27.00	49093.	35558.	17213.	1031.20	
+									1270.48 27.00
	HYDROGRAPH AT								
+		SUB24	2154.	14.50	1459.	518.	173.	11.20	
	HYDROGRAPH AT								
+		SUB25	3294.	16.50	2718.	1148.	384.	24.90	
	3 COMBINED AT								
+		18	52897.	26.50	49840.	36227.	17705.	1067.30	
	ROUTED TO								
+		13	52662.	28.00	49623.	36195.	17677.	1067.30	
+									1183.35 28.00
	HYDROGRAPH AT								
+		SUB26	8348.	15.50	6240.	2348.	783.	42.40	
	2 COMBINED AT								
+		19	53200.	28.00	50235.	36817.	18339.	1109.70	
	ROUTED TO								
+		14	52166.	31.50	49472.	36665.	18319.	1109.70	
+									1097.23 31.50
	HYDROGRAPH AT								
+		SUB27	8912.	16.50	7451.	3172.	1061.	62.10	
	ROUTED TO								
+		3	952.	29.00	946.	888.	695.	62.10	
+									1260.18 29.00
	2 COMBINED AT								
+		20	53109.	31.50	50409.	37545.	19014.	1171.80	
	HYDROGRAPH AT								
+		SUB28	4285.	28.50	4195.	3190.	1328.	84.40	
	HYDROGRAPH AT								
+		SUB31	6754.	13.00	2721.	857.	286.	12.60	
	3 COMBINED AT								
+		21	57228.	31.50	54404.	40530.	20421.	1268.20	
	HYDROGRAPH AT								
+		SUB29	15962.	17.00	13675.	6022.	2021.	101.30	
	ROUTED TO								
+		4	340.	35.00	340.	339.	336.	101.30	
+									1408.67 35.00
	ROUTED TO								
+		15	340.	36.00	340.	339.	336.	101.30	
+									1201.80 35.50
	HYDROGRAPH AT								
+		SUB30	3710.	17.00	3166.	1401.	469.	28.60	
	ROUTED TO								
+		5	700.	28.00	698.	653.	431.	28.60	
+									1187.38 28.00
	ROUTED TO								
+		16	700.	30.00	698.	653.	428.	26.60	
+									1144.38 29.50
	3 COMBINED AT								
+		22	58265.	31.50	55438.	41515.	21145.	1398.10	
	ROUTED TO								
+		17	58086.	32.50	55305.	41497.	21130.	1398.10	
+									1052.10 32.50
	HYDROGRAPH AT								
+		SUB32	6774.	17.50	5882.	2668.	896.	52.40	
	2 COMBINED AT								
+		23	58488.	32.00	55764.	42051.	22007.	1450.50	
	ROUTED TO								
+		18	57431.	36.50	54967.	41908.	21980.	1450.50	
+									933.44 36.50
	HYDROGRAPH AT								
+		SUB33	7521.	16.50	6137.	2501.	836.	47.00	
	HYDROGRAPH AT								

+		SUB34	9666.	17.00	8192.	3549.	1189.	64.30	
	3 COMBINED AT								
+		24	57548.	36.50	55116.	42280.	23781.	1561.60	
	HYDROGRAPH AT								
+		SUB35	18727.	17.00	15876.	6837.	2297.	99.60	
	ROUTED TO								
+		6	6206.	23.50	6113.	4938.	2281.	99.60	
+								66.29	23.50
	ROUTED TO								
+		19	6175.	29.00	6078.	4878.	2265.	99.60	
+								1002.75	29.00
	HYDROGRAPH AT								
+		SUB36	10654.	25.50	10351.	7239.	2787.	163.30	
	3 COMBINED AT								
+		25	67676.	36.00	65108.	51887.	28812.	1624.50	
	ROUTED TO								
+		20	67263.	37.50	64808.	51845.	28778.	1824.50	
+								850.26	37.50
	HYDROGRAPH AT								
+		SUB37	7718.	16.50	6451.	2728.	914.	45.80	
	2 COMBINED AT								
+		26	67298.	37.50	64851.	52134.	29583.	1670.30	

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

```
FLOOD HYDROGRAPH PACKAGE (HEC-1)
          FEBRUARY 1981
        REVISED 30 OCT 81

RUN DATE WED, JAN 04 1989 TIME 14:07:22
```

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       MARICOPA CO. FLOOD INSURANCE STUDY
   2          ID       CENTENNIAL WASH  HEC-1 (FILE CWHEC1F)
   3          ID       CURVE NUMBERS DETERMINED BY UPLAND METHOD
   4          ID       CBA JOB NO. 04856-03-74   5 JANUARY 89
   5          IT     30 18APR88    1200     200
   6          IO      3       0
   7          IN     15 18APR88    1200

   8          KK   SUB 1
   9          KM   RUNOFF FROM SUBBASIN 1
  10          KM   SCS DIMENSIONLESS UNIT HYDROGRAPH
  11          KM   LAGTIME = HYDRAULIC LENGTH, AVG. WATERSHED SLOPE AND C.N.
  12          KM   RAINFALL DISTRIBUTION = SCS TYPE II
  13          BA    67.0
  14          PB    3.88
  15          PC       0  0.002  0.005  0.008  0.011  0.014  0.017  0.020  0.023  0.026
  16          PC   0.029  0.032  0.035  0.038  0.041  0.044  0.048  0.052  0.056  0.060
  17          PC   0.064  0.068  0.072  0.076  0.080  0.085  0.090  0.095  0.100  0.105
  18          PC   0.110  0.115  0.120  0.126  0.133  0.140  0.147  0.155  0.163  0.172
  19          PC   0.181  0.191  0.203  0.218  0.236  0.257  0.283  0.387  0.663  0.707
  20          PC   0.735  0.758  0.776  0.791  0.804  0.815  0.825  0.834  0.842  0.849
  21          PC   0.856  0.863  0.869  0.875  0.881  0.887  0.893  0.898  0.903  0.908
  22          PC   0.913  0.918  0.922  0.926  0.930  0.934  0.938  0.942  0.946  0.950
  23          PC   0.953  0.956  0.959  0.962  0.965  0.968  0.971  0.974  0.977  0.980
  24          PC   0.983  0.986  0.989  0.992  0.995  0.998  1.000
```

```
25          LS          78.0
26          UD   5.80

27          KK      1 ROUTE HYDROGRAPH 1 THROUGH REACH 1
28          RL                  0.2
29          RS     10    FLOW     -1
30          RC  0.055   0.040   0.055   53500   0.005
31          RX      0     400     700     900    1100    1400    1700    2100
32          RY   2206    2204    2202    2200    2200    2202    2204    2206

33          KK   SUB 2
34          KM   RUNOFF FROM SUBBASIN 2
35          BA    185
36          LS          81.0
37          UD   15.70

38          KK   SUB 3
39          KM   RUNOFF FROM SUBBASIN 3
40          BA    43.0
41          LS          80.0
42          UD   4.81

43          KK      1 COMBINE 1-3
44          KM   ADD THREE HYDROGRAPHS
45          HC      3
1                                   HEC-1 INPUT                                 PAGE  2

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

46          KK      2 ROUTE HYDROGRAPH 1-3 THROUGH REACH 2
47          RL                  0.2
48          RS      8    FLOW     -1
49          RC  0.055   0.035   0.055   34375  0.0019
50          RX      0     300     800    1200    1600    2000    2300    2460
51          RY   2087    2087    2082    2080    2082    2085    2086    2087

52          KK   SUB 4
53          KM   RUNOFF FROM SUBBASIN 4
54          BA    21.6
55          LS          81.0
56          UD   3.27

57          KK   SUB4A
58          KM   RUNOFF FROM SUBBASIN 4A
59          BA    18.5
60          LS          81.0
61          UD   3.40

62          KK      2 COMBINE 1-3 WITH 4 AND 4A
63          KM   ADD THREE HYDROGRAPHS
64          HC      3

65          KK   SUB 5
66          KM   RUNOFF FROM SUBBASIN 5
67          BA    48.7
68          LS          79.0
69          UD   2.90
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 70          KK       3 COMBINE 1-4A WITH 5
 71          KM   ADD TWO HYDROGRAPHS
 72          HC       2

 73          KK       3 ROUTE HYDROGRAPH 1-5 THROUGH REACH 3
 74          RL                   0.2
 75          RS      10    FLOW      -1
 76          RC   0.055   0.040   0.055   18750  0.0022
 77          RX       0     300     400     800    1500    1800    2400    2700
 78          RY    2028    2026    2023    2020    2020    2023    2026    2028

 79          KK   SUB 6
 80          KM   RUNOFF FROM SUBBASIN 6
 81          BA    23.7
 82          LS            81.0
 83          UD    2.59

 84          KK   SUB 7
 85          KM   RUNOFF FROM SUBBASIN 7
 86          BA    44.7
 87          LS            79.0
 88          UD    4.01
1                                   HEC-1 INPUT                                   PAGE  3

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

 89          KK       4 COMBINE 1-5 WITH 6 AND 7
 90          KM   ADD THREE HYDROGRAPHS
 91          HC       3

 92          KK       4 ROUTE HYDROGRAPH 1-7 THROUGH REACH 4
 93          RL                   0.2
 94          RS      10    FLOW      -1
 95          RC   0.050   0.040   0.055   38541  0.0023
 96          RX       0     200     500     800    1500    1700    1900    2100
 97          RY    1946    1944    1942    1940    1940    1942    1944    1946

 98          KK   SUB 8
 99          KM   RUNOFF FROM SUBBASIN 8
100          BA    31.3
101          LS              80
102          UD    2.89

103          KK   SUB8A
104          KM   RUNOFF FROM SUBBASIN 8A
105          BA    16.2
106          LS            80.0
107          UD    2.33

108          KK       5 COMBINE 1-7 WITH 8 AND 8A
109          KM   ADD THREE HYDROGRAPHS
110          HC       3

111          KK   SUB 9
112          KM   RUNOFF FROM SUBBASIN 9
113          BA    52.2
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114       LS           80.0
115       UD    3.02

116       KK       6 COMBINE 1-8A WITH 9
117       KM    ADD TWO HYDROGRAPHS
118       HC       2

119       KK       5 ROUTE HYDROGRAPH 1-9 THROUGH REACH 5
120       RL                      0.2
121       RS       6     FLOW      -1
122       RC   0.055   0.040   0.055   18229  0.0033
123       RX       0     500    1100    1150    1250    1260    1460    1480
124       RY    1887    1885    1883    1880    1880    1884    1885    1888

125       KK   SUB10
126       KM   RUNOFF FROM SUBBASIN 10
127       BA    17.0
128       LS           79.0
129       UD    2.50
```



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

130       KK   SUB11
131       KM   RUNOFF FROM SUBBASIN 11
132       BA    20.2
133       LS           78.0
134       UD    3.04

135       KK       7 COMBINE 1-9 WITH 10 AND 11
136       KM   ADD THREE HYDROGRAPHS
137       HC       3

138       KK       6 ROUTE HYDROGRAPH 1-11 THROUGH REACH 6
139       RL                      0.2
140       RS       6     FLOW      -1
141       RC   0.050   0.035   0.050   26042  0.0029
142       RX       0     300     700     900    1400    1700    2100    2600
143       RY    1827    1823    1822    1820    1820    1821    1823    1824

144       KK   SUB12
145       KM   RUNOFF FROM SUBBASIN 12
146       BA    10.6
147       LS             79
148       UD    1.98

149       KK  SUB12A
150       KM   RUNOFF FROM SUBBASIN 12A
151       BA     9.9
152       LS           79.0
153       UD    1.62

154       KK       8 COMBINE 1-11 WITH 12 AND 12A
155       KM   ADD THREE HYDROGRAPHS
156       HC       3

157       KK   SUB13
```

```
158          KM   RUNOFF FROM SUBBASIN 13
159          BA    68.7
160          LS           78.0
161          UD    3.96

162          KK       9 COMBINE 1-12A WITH 13
163          KM   ADD TWO HYDROGRAPHS
164          HC       2

165          KK   SUB15
166          KM   RUNOFF FROM SUBBASIN 15
167          BA    18.6
168          LS             79
169          UD    3.41
1                                        HEC-1 INPUT                                        PAGE  5

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

170          KK      10 COMBINE 1-13 WITH 15
171          KM   ADD TWO HYDROGRAPHS
172          HC       2

173          KK       7 ROUTE HYDROGRAPH 1-15 THROUGH REACH 7
174          RL                    0.2
175          RS       6    FLOW     -1
176          RC   0.055   0.040   0.055   26562   0.005
177          RX       0     900     950    1110    1130    1140    1400    1700
178          RY    1764    1763    1760    1760    1764    1762    1762    1764

179          KK   SUB14
180          KM   RUNOFF FROM SUBBASIN 14
181          BA    13.7
182          LS           84.0
183          UD    0.71

184          KK   SUB16
185          KM   RUNOFF FROM SUBBASIN 16
186          BA    19.7
187          LS           82.0
188          UD    1.59

189          KK      11 COMBINE 1-15 WITH 14 AND 16
190          KM   ADD THREE HYDROGRAPHS
191          HC       3

192          KK       1 ROUTE (LOWER CENTENNIAL - NARROWS DAM)
193          KM   ROUTE TOTAL HYDROGRAPH THROUGH RESERVOIR
194          RS       1    ELEV     224
195          SV       0       0       0     500     850    1240    1700    2300    2620    2900
196          SE     224     232  236.86  243.86  245.86  247.86  249.86  251.86  252.86  253.86
197          SQ       0      20     160     547    1030    3150    7550   14000   18000   22500

198          KK       8 ROUTE HYDROGRAPH 1-16 THROUGH REACH 8
199          RL                    0.2
200          RS      10    FLOW     -1
201          RC   0.050   0.035   0.050   49479   0.004
202          RX       0     500     550     640     650     800     820    1500
```

```
 203          RY   1610    1609    1606    1604    1600    1600    1605    1608

 204          KK  SUB17
 205          KM  RUNOFF FROM SUBBASIN 17
 206          BA   21.0
 207          LS           80.0
 208          UD   1.98

 209          KK  SUB18
 210          KM  RUNOFF FROM SUBBASIN 18
 211          BA   24.4
 212          LS           80.0
 213          UD   2.89
1                                    HEC-1 INPUT                                 PAGE  6

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

 214          KK     12 COMBINE 1-16 WITH 17 AND 18
 215          KM  ADD THREE HYDROGRAPHS
 216          HC      3

 217          KK     12 ROUTE HYDROGRAPH 1-18 THROUGH REACH 9
 218          RL                  0.2
 219          RS      4   FLOW    -1
 220          RC  0.050   0.035   0.055   17708  0.0038
 221          RX      0     800    1000    2300    2600    3500    4000    4500
 222          RY   1450    1446    1442    1440    1442    1444    1446    1448

 223          KK  SUB19
 224          KM  RUNOFF FROM SUBBASIN 19
 225          BA   10.6
 226          LS           77.0
 227          UD   1.18

 228          KK  SUB20
 229          KM  RUNOFF FROM SUBBASIN 20
 230          BA   50.7
 231          LS           80.0
 232          UD   6.63

 233          KK     13 COMBINE 1-18 WITH 19 AND 20
 234          KM  ADD THREE HYDROGRAPHS
 235          HC      3

 236          KK  SUB21A
 237          KM  RUNOFF FROM SUBBASIN 21A
 238          BA   84.4
 239          LS           84.0
 240          UD   7.2

 241          KK     10 ROUTE HYDROGRAPH 21A THROUGH REACH 21
 242          RL                  0.2
 243          RS      6   FLOW    -1
 244          RC  0.055   0.040   0.060   63400  0.0088
 245          RX      0     100    1000    1010    1110    1120    2120    2220
 246          RY   1725    1724    1723    1720    1720    1723    1724    1725
```

```
247          KK   SUB21 (TIGER WASH)
248          KM   RUNOFF FROM SUBBASIN 21
249          BA    76.8
250          LS           84.0
251          UD     7.0

252          KK      14 COMBINE 21 WITH 21A
253          KM   ADD TWO HYDROGRAPHS
254          HC       2
```

1 HEC-1 INPUT PAGE 7

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

255          KK       2 ROUTE (TIGER WASH DETENTION BASIN)
256          KM   ROUTE HYDROGRAPH THROUGH TIGER WASH DETENTION BASIN
257          RS       1    ELEV    1390
258          SV       0       0       0    1716    6218    6973    7765    9460   11302   15428
259          SE    1390    1393    1397    1401    1405  1405.5    1406    1407    1408    1410
260          SQ       0     591     903    1132    1322    1637    2287    4307    7108   14651

261          KK      15 COMBINE 1-20 WITH 21
262          KM   ADD TWO HYDROGRAPHS
263          HC       2

264          KK      10 ROUTE HYDROGRAPH 1-21 THROUGH REACH 10
265          RL                  0.2
266          RS      10    FLOW     -1
267          RC   0.055   0.035   0.060   19271  0.0033
268          RX       0     800    1000    2300    2600    3500    4000    4500
269          RY    1370    1366    1362    1360    1362    1364    1366    1368

270          KK   SUB22
271          KM   RUNOFF FROM SUBBASIN 22
272          BA    25.1
273          LS           79.0
274          UD    2.51

275          KK      16 COMBINE 1-21 WITH 22
276          KM   ADD TWO HYDROGRAPHS
277          HC       2

278          KK      11 ROUTE HYDROGRAPH 1-22 THROUGH REACH 11
279          RL                  0.2
280          RS       2    FLOW     -1
281          RC   0.055   0.035   0.055   10937  0.0015
282          RX       0     800    1000    2300    2600    3500    4000    4500
283          RY    1290    1286    1282    1280    1282    1284    1286    1288

284          KK   SUB23
285          KM   RUNOFF FROM SUBBASIN 23
286          BA     7.9
287          LS             77
288          UD    2.00

289          KK      17 COMBINE 1-22 WITH 23
290          KM   ADD TWO HYDROGRAPHS
291          HC       2
```

```
  292          KK      12 ROUTE HYDROGRAPH 1-23 THROUGH REACH 12
  293          RL                      0.2
  294          RS         4     FLOW      -1
  295          RC    0.050    0.035    0.050    17708   0.0027
  296          RX        0      800     1000     2300     2600     3500     4000     4500
  297          RY     1274     1269     1267     1265     1267     1269     1271     1275
1                                      HEC-1 INPUT                                              PAGE  8

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

  298          KK    SUB24
  299          KM    RUNOFF FROM SUBBASIN 24
  300          BA     11.2
  301          LS               77
  302          UD     2.51

  303          KK    SUB25
  304          KM    RUNOFF FROM SUBBASIN 25
  305          BA     24.9
  306          LS            .77.0
  307          UD     4.21

  308          KK      18 COMBINE 1-23 WITH 24 AND 25
  309          KM    ADD THREE HYDROGRAPHS
  310          HC        3

  311          KK      13 ROUTE HYDROGRAPH 1-25 THROUGH REACH 13
  312          RL                      0.2
  313          RS         6     FLOW      -1
  314          RC    0.050    0.035    0.050    21354   0.0027
  315          RX        0     2200     2900     4100     4300     5300     6250     7470
  316          RY     1184     1182     1180   1179.9     1180     1182     1180   1181.4

  317          KK    SUB26
  318          KM    RUNOFF FROM SUBBASIN 26
  319          BA     42.4
  320          PB     4.12
  321          PC        0    0.002    0.005    0.008    0.011    0.014    0.017    0.020    0.023    0.026
  322          PC    0.029    0.032    0.035    0.038    0.041    0.044    0.048    0.052    0.056    0.060
  323          PC    0.064    0.068    0.072    0.076    0.080    0.085    0.090    0.095    0.100    0.105
  324          PC    0.110    0.115    0.120    0.126    0.133    0.140    0.147    0.155    0.163    0.172
  325          PC    0.181    0.191    0.203    0.218    0.236    0.257    0.283    0.387    0.663    0.707
  326          PC    0.735    0.758    0.776    0.791    0.804    0.815    0.825    0.834    0.842    0.849
  327          PC    0.856    0.863    0.869    0.875    0.881    0.887    0.893    0.898    0.903    0.908
  328          PC    0.913    0.918    0.922    0.926    0.930    0.934    0.938    0.942    0.946    0.950
  329          PC    0.953    0.956    0.959    0.962    0.965    0.968    0.971    0.974    0.977    0.980
  330          PC    0.983    0.986    0.989    0.992    0.995    0.998    1.000
  331          LS               79
  332          UD     3.19

  333          KK      19 COMBINE 1-25 WITH 26
  334          KM    ADD TWO HYDROGRAPHS
  335          HC        2

  336          KK      14 ROUTE HYDROGRAPH 1-26 THROUGH REACH 14
  337          RL                      0.2
```

```
338          RS      14    FLOW      -1
339          RC   0.065   0.045   0.065   46354  0.0027
340          RX       0    2900    5300    5440    5630    5720    5730    8140
341          RY    1100    1096    1092    1090    1088    1090    1092    1098
1                                      HEC-1 INPUT                                    PAGE  9

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

342          KK   SUB27
343          KM   RUNOFF FROM SUBBASIN 27
344          BA    62.1
345          LS           77.0
346          UD    4.35

347          KK       3 ROUTE (EAGLETAIL REACH)
348          KM   ROUTE HYDROGRAPH THROUGH DETENTION STRUCTURE
349          RS       1    ELEV  1252.5
350          RV       5      50     155     310     525     790    1110    1485    1905    2355
351          RE  1252.5  1253.0  1253.5  1254.0  1254.5  1255.0  1255.5  1256.0  1256.5  1257.0
352          RQ       0      20      50      90     140     200     260     325     400     475

353          KK      20 COMBINE 1-26 WITH 27
354          KM   ADD TWO HYDROGRAPHS
355          HC       2

356          KK   SUB28
357          KM   RUNNOFF FROM SUBBASIN 28
358          BA    84.4
359          LS           75.0
360          UD   15.06

361          KK   SUB31
362          KM   RUNOFF FROM SUBBASIN 31
363          BA    12.0
364          LS           86.0
365          UD     .96

366          KK      21 COMBINE 1-27 WITH 28 AND 31
367          KM   ADD THREE HYDROGRAPHS
368          HC       3

369          KK   SUB29
370          KM   RUNOFF FROM SUBBASIN 29
371          BA   101.3
372          PB    3.93
373          PC       0   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
374          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
375          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
376          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
377          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
378          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
379          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
380          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
381          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
382          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
383          LS           83.0
384          UD    4.85
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1                                    HEC-1 INPUT                                                  PAGE 10

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

       385           KK       4 ROUTE (HARQUAHALA F.R.S.)
       386           KM   ROUTE HYDROGRAPH 29 THROUGH DETENTION STRUCTURE
       387           RS       1    ELEV    1393
       388           RV       0    1000    1500    2300    3500    5000    7000    8500   12000   14200
       389           RE    1393    1395    1397    1399    1401    1403    1405    1407    1409    1411
       390           RQ       0     121     172     210     243     272     298     322     344    1214

       391           KK      15 ROUTE HYDROGRAPH 29 THROUGH REACH 18
       392           RL                     0.2
       393           RS       6    FLOW      -1
       394           RC   0.040   0.028   0.040   31771  0.0041
       395           RX       0      10      14      24      36      71      83     183
       396           RY  1205.5  1205.5  1203.5  1203.5    1200    1200  1203.5    1205

       397           KK   SUB30
       398           KM   RUNOFF FROM SUBBASIN 30
       399           BA    28.6
       400           LS            78.0
       401           UD    4.75

       402           KK       5 ROUTE (SADDLEBACK F.R.S.)
       403           KM   ROUTE HYDROGRAPH 30 THROUGH DETENTION STRUCTURE
       404           RS       1    ELEV    1179
       405           RV       0     200     400    1000    1750    3000    4500    6800    9300   10500
       406           RE    1179    1181    1183    1185    1187    1189    1191    1193    1195    1197
       407           RQ       0     100     240     440     670     830    1030    1200    1310    1450

       408           KK      16 ROUTE HYDROGRAPH 30 THROUGH REACH 19
       409           RL                     0.2
       410           RS      12    FLOW      -1
       411           RC   0.040   0.030   0.040   43229  0.0038
       412           RX       0      10      24      64      73     205     220     270
       413           RY  1149.5  1149.5    1146    1146    1143    1143    1146    1147

       414           KK      22 COMBINE 1-31 WITH 29 AND 30
       415           KM   ADD THREE HYDROGRAPHS
       416           HC       3

       417           KK      17 ROUTE HYDROGRAPH 1-31 THROUGH REACH 15
       418           RL                     0.2
       419           RS       4    FLOW      -1
       420           RC   0.055   0.035   0.055   20833  0.0030
       421           RX       0    1800    2100    2130    2700    2790    3280    4300
       422           RY    1056    1050    1046    1044    1044    1046    1056  1056.6

       423           KK   SUB32
       424           KM   RUNOFF FROM SUBBASIN 32
       425           BA    52.4
       426           LS            79.0
       427           UD    5.05
1                                    HEC-1 INPUT                                                  PAGE 11

      LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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428   KK      23 COMBINE 1-31 WITH 32
429   KM   ADD TWO HYDROGRAPHS
430   HC       2

431   KK      18 ROUTE HYDROGRAPH 1-32 THROUGH REACH 16
432   RL                     0.2
433   RS      14    FLOW      -1
434   RC   0.065   0.040   0.055   58333  0.0024
435   RX       0     700    1300    1400    1550    1600    1800    2100
436   RY     930     928     924     920     920     924     928     930

437   KK   SUB33
438   KM   RUNOFF FROM SUBBASIN 33
439   BA    47.0
440   LS            80.0
441   UD    4.00

442   KK   SUB34
443   KM   RUNOFF FROM SUBBASIN 34
444   BA    64.3
445   LS            81.0
446   UD    4.64

447   KK      24 COMBINE 1-32 WITH 33 AND 34
448   KM   ADD THREE HYDROGRAPHS
449   HC       3

450   KK   SUB35
451   KM   RUNOFF FROM SUBBASIN 35
452   BA    99.6
453   LS            87.0
454   UD    4.73

455   KK       6 ROUTE (OLD CAMP DETENTION BASIN)
456   KM   ROUTE HYDROGRAPH 35 THROUGH OLD CAMP DETENTION (UPSTRM OF C.A.P.)
457   RS       1    ELEV       0
458   RV       0     163     326     489     652     816     978    1141    1222    1344
459   RE       0       2       4       6       8      10      12      14      15      16
460   RQ       0     156     315     585     825    1020    1200    1335    1410    1500

461   KK      19 ROUTE HYDROGRAPH 35 THROUGH REACH 17
462   RL                     0.2
463   RS      24    FLOW      -1
464   RC   0.060   0.035   0.060  105600  0.0049
465   RX       0     200     400     600     800    1000    1200    1400
466   RY    1004    1003    1002    1000    1000    1002    1003    1004

467   KK   SUB36
468   KM   RUNOFF FROM SUBBASIN 36
469   BA   163.1
470   LS            79.0
471   UD   12.25
```

1 HEC-1 INPUT PAGE 12

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

```
472          KK     25 COMBINE 1-34 WITH 35 AND 36
473          KM   ADD THREE HYDROGRAPHS
474          HC     3

475          KK     20 ROUTE HYDROGRAPH 1-36 THROUGH REACH 20
476          RL                  0.2
477          RS     6    FLOW     -1
478          RC  0.065  0.040  0.060  30729  0.0024
479          RX     0    400    800   1000   1100   1500   1800   2300
480          RY   848    846    842    840    840    842    846    848

481          KK   SUB37
482          KM   RUNOFF FROM SUBBASIN 37
483          BA   45.8
484          LS          83.0
485          UD   4.43

486          KK     26 COMBINE 1-36 WITH 37
487          KM   ADD TWO HYDROGRAPHS
488          HC     2
489          ZZ
```

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 30 OCT 81           *
*                                       *
*RUN DATE WED, JAN 04 1989 TIME 14:07:22*
*                                       *
*****************************************
```

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

MARICOPA CO. FLOOD INSURANCE STUDY
CENTENNIAL WASH HEC-1 (FILE CWHEC1F)
CURVE NUMBERS DETERMINED BY UPLAND METHOD
CBA JOB NO. 04856-03-74 5 JANUARY 89

6 IO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	30	MINUTES IN COMPUTATION INTERVAL
IDATE	18APR88	STARTING DATE
ITIME	1200	STARTING TIME
NQ	200	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	22APR88	ENDING DATE
NDTIME	1530	ENDING TIME

COMPUTATION INTERVAL 0.50 HOURS
TOTAL TIME BASE 99.50 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

*** ***

KK SUB 1

RUNOFF FROM SUBBASIN 1
SCS DIMENSIONLESS UNIT HYDROGRAPH
LAGTIME = HYDRAULIC LENGTH, AVG. WATERSHED SLOPE AND C.N.
RAINFALL DISTROBUTION = SCS TYPE II

IN TIME DATA FOR INPUT TIME SERIES

JXMIN	15	TIME INTERVAL IN MINUTES
JXDATE	16APR88	STARTING DATE
JXTIME	1200	STARTING TIME

SUBBASIN RUNOFF DATA

BA SUBBASIN CHARACTERISTICS

TAREA	67.00	SUBBASIN AREA

PRECIPITATION DATA

PB

STORM	3.88	BASIN TOTAL PRECIPITATION

PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

LS SCS LOSS RATE

STRTL	0.56	INITIAL ABSTRACTION
CRVNBR	78.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

UD SCS DIMENSIONLESS UNITGRAPH

TLAG	5.80	LAG

***

UNIT HYDROGRAPH
60 END-OF-PERIOD ORDINATES

133.	405.	766.	1213.	1772.	2479.	3313.	4055.	4645.	5061.
5302.	5346.	5311.	5114.	4827.	4506.	4147.	3705.	3187.	2713.
2328.	2028.	1763.	1542.	1369.	1208.	1057.	924.	792.	702.

613.	537.	470.	406.	358.	309.	271.	238.	207.	183.
159.	140.	122.	107.	93.	80.	71.	62.	56.	50.
45.	40.	34.	29.	24.	20.	15.	11.	7.	2.

HYDROGRAPH AT STATION SUB 1

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.09, TOTAL EXCESS = 1.79

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 7279.	18.50		6534.	3185.	1076.	779.
		(INCHES)	0.907	1.768	1.792	1.792
		(AC-FT)	3240.	6317.	6403.	6403.

CUMULATIVE AREA = 67.00 SQ MI

```
27 KK     1     ROUTE HYDROGRAPH 1 THROUGH REACH 1
```

HYDROGRAPH ROUTING DATA

```
28 RL       ROUTING LOSSES
                 QLOSS       0.00  INITIAL LOSS
                 CLOSS       0.00  ADDITIONAL FRACTION LOST

29 RS       STORAGE ROUTING
                 NSTPS         10  NUMBER OF SUBREACHES
                  ITYP       FLOW  TYPE OF INITIAL CONDITION
                RSVRIC      -1.00  INITIAL CONDITION
                     X       0.00 WORKING R AND D COEFFICIENT

30 RC       NORMAL DEPTH CHANNEL ROUTING
                   ANL      0.055  LEFT OVERBANK N-VALUE
                  ANCH      0.040  MAIN CHANNEL N-VALUE
                   ANR      0.055  RIGHT OVERBANK N-VALUE
                 RLNTH      53500. REACH LENGTH
                   SEL     0.0050  ENERGY SLOPE
                 ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---	
32 RY	ELEVATION	2206.00	2204.00	2202.00	2200.00	2200.00	2202.00	2204.00	2206.00
31 RX	DISTANCE	0.00	400.00	700.00	900.00	1100.00	1400.00	1700.00	2100.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	92.88	216.38	370.50	555.24	770.60	1016.57	1294.53	1608.90	1960.00
OUTFLOW	0.00	83.44	289.30	620.76	1090.55	1712.60	2500.86	3611.71	4998.36	6604.70
ELEVATION	2200.00	2200.32	2200.63	2200.95	2201.26	2201.58	2201.89	2202.21	2202.53	2202.84
STORAGE	2347.85	2772.45	3233.78	3732.54	4277.57	4871.60	5514.61	6206.62	6947.61	7737.60
OUTFLOW	8441.36	10518.13	12844.43	15416.82	18242.76	21365.62	24799.08	28556.64	32651.51	37096.64
ELEVATION	2203.16	2203.47	2203.79	2204.11	2204.42	2204.74	2205.05	2205.37	2205.68	2206.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 8441. TO 37097.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 1

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 7110.	21.00		6359.	3128.	1076.	779.
		(INCHES)	0.882	1.736	1.792	1.792
		(AC-FT)	3153.	6205.	6403.	6403.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
207.	21.00	191.	110.	40.	29.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
2202.93	21.00	2202.79	2201.89	2200.72	2200.52

CUMULATIVE AREA = 67.00 SQ MI

*** ***

33 KK SUB 2

RUNOFF FROM SUBBASIN 2

SUBBASIN RUNOFF DATA

35 BA SUBBASIN CHARACTERISTICS
TAREA 185.00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02

0.02	0.03	0.05	0.36	0.07	0.04	0.03	0.02	0.02	0.0
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

36 LS SCS LOSS RATE

STRTL	0.47	INITIAL ABSTRACTION
CRVNBR	81.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

37 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	15.70	LAG

UNIT HYDROGRAPH TRUNCATED FROM 159 TO 150 INTERVALS

UNIT HYDROGRAPH
150 END-OF-PERIOD ORDINATES
VOLUME = 1.00

53.	105.	158.	268.	391.	514.	659.	817.	975.	115.
1366.	1577.	1805.	2086.	2367.	2651.	2985.	3319.	3652.	3941.
4222.	4503.	4725.	4919.	5112.	5263.	5368.	5474.	5554.	5571.
5589.	5603.	5585.	5568.	5550.	5453.	5347.	5242.	5124.	5001.
4878.	4745.	4605.	4464.	4312.	4136.	3960.	3780.	3569.	3358.
3147.	2970.	2794.	2619.	2483.	2360.	2237.	2125.	2019.	1914.
1815.	1727.	1640.	1556.	1492.	1428.	1364.	1300.	1236.	1172.
1117.	1064.	1012.	959.	906.	853.	808.	773.	738.	703.
668.	633.	598.	572.	545.	519.	493.	466.	440.	418.
399.	380.	360.	341.	322.	304.	291.	278.	265.	252.
238.	225.	215.	206.	196.	186.	177.	167.	159.	152.
145.	138.	131.	124.	117.	112.	106.	101.	96.	90.
85.	81.	78.	74.	71.	67.	64.	61.	59.	57.
54.	52.	50.	48.	46.	44.	42.	40.	38.	36.
33.	31.	29.	27.	25.	24.	22.	20.	18.	17.

HYDROGRAPH AT STATION SUB 2

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.86, TOTAL EXCESS = 2.02

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 10490.	29.00	10270.	7912.	3347.	2425.
	(INCHES)	0.516	1.591	2.018	2.021
	(AC-FT)	5092.	15693.	19916.	19941.

CUMULATIVE AREA = 185.00 SQ MI

```
38 KK    *    SUB 3  *
         *           *
         *************
                  RUNOFF FROM SUBBASIN 3

            SUBBASIN RUNOFF DATA

40 BA        SUBBASIN CHARACTERISTICS
                TAREA       43.00  SUBBASIN AREA

             PRECIPITATION DATA

14 PB           STORM        3.88  BASIN TOTAL PRECIPITATION

15 PI          INCREMENTAL PRECIPITATION PATTERN
                0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

41 LS        SCS LOSS RATE
                STRTL        0.50  INITIAL ABSTRACTION
                CRVNBR      80.00  CURVE NUMBER
                RTIMP        0.00  PERCENT IMPERVIOUS AREA

42 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG         4.81  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                  50 END-OF-PERIOD ORDINATES
       122.     404.     767.    1249.    1891.    2654.    3312.    3775.    4038.    4101.
      4070.    3853.    3575.    3257.    2865.    2393.    1971.    1663.    1410.    1198.
      1037.     889.     760.     639.     546.     465.     397.     337.     286.     242.
       206.     176.     150.     128.     109.      93.      79.      67.      57.      49.
        43.      38.      33.      28.      23.      19.      15.      11.       6.       2.

    ***          ***          ***          ***          ***
                 HYDROGRAPH AT STATION    SUB 3

    TOTAL RAINFALL =  3.88, TOTAL LOSS =  1.94, TOTAL EXCESS =  1.94

  PEAK FLOW    TIME                    MAXIMUM AVERAGE FLOW
                                6-HR       24-HR       72-HR     99.50-HR

+   (CFS)      (HR)
                        (CFS)
+    5890.     17.00            5043.      2234.        749.        542.
                      (INCHES)  1.090      1.932       1.943       1.943
                       (AC-FT)  2501.      4431.       4456.       4456.

                  CUMULATIVE AREA =    43.00 SQ MI
```

*** ***

```
          ##############
          #            #
 43 KK    #        1   #     COMBINE 1-3
          #            #
          ##############
                    ADD THREE HYDROGRAPHS

 45 HC        HYDROGRAPH COMBINATION
                   ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                        ###

    ###           ###           ###           ###           ###
                    HYDROGRAPH AT STATION       1

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     99.50-HR
+   (CFS)       (HR)
                     (CFS)
+   16527.     22.50              16122.      12504.       5171.       3745.
                    (INCHES)     0.508       1.576       1.956       1.958
                     (AC-FT)     7994.      24802.      30770.      30799.

                     CUMULATIVE AREA =  295.00 SQ MI


### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ### ###

          ##############
          #            #
 46 KK    #        2   #     ROUTE HYDROGRAPH 1-3 THROUGH REACH 2
          #            #
          ##############

        HYDROGRAPH ROUTING DATA

 47 RL        ROUTING LOSSES
                   QLOSS       0.00  INITIAL LOSS
                   CLOSS       0.00  ADDITIONAL FRACTION LOST

 48 RS        STORAGE ROUTING
                   NSTPS          8  NUMBER OF SUBREACHES
                    ITYP       FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                       X       0.00 WORKING R AND D COEFFICIENT

 49 RC        NORMAL DEPTH CHANNEL ROUTING
                     ANL      0.055  LEFT OVERBANK N-VALUE
                    ANCH      0.035  MAIN CHANNEL N-VALUE
                     ANR      0.055  RIGHT OVERBANK N-VALUE
                   RLNTH      34375.  REACH LENGTH
                     SEL     0.0019  ENERGY SLOPE
                   ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                CROSS-SECTION DATA
```

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---	
51 RY	ELEVATION	2087.00	2087.00	2082.00	2080.00	2082.00	2085.00	2086.00	2087.00
50 RX	DISTANCE	0.00	300.00	800.00	1200.00	1600.00	2000.00	2300.00	2460.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	21.42	85.69	192.80	342.76	535.57	768.30	1027.67	1312.03	1621.38
OUTFLOW	0.00	16.31	103.55	305.31	657.53	1192.17	2005.48	3086.29	4385.59	5908.43
ELEVATION	2080.00	2080.37	2080.74	2081.11	2081.47	2081.84	2082.21	2082.58	2082.95	2083.32
STORAGE	1955.73	2315.07	2699.40	3108.73	3544.69	4020.58	4539.31	5097.07	5683.28	6297.35
OUTFLOW	7660.95	9649.97	11882.74	14366.81	17289.46	20738.81	24500.94	28598.67	33029.00	37790.61
ELEVATION	2083.68	2084.05	2084.42	2084.79	2085.16	2085.53	2085.89	2086.26	2086.63	2087.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 11883. TO 37791.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION 2

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 16451.	24.50		16077.	12466.	5163.	3744.
		(INCHES)	0.507	1.572	1.953	1.957
		(AC-FT)	7972.	24726.	30724.	30785.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
427.	24.50	420.	347.	161.	118.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
2085.05	24.50	2085.01	2084.47	2082.63	2081.98

CUMULATIVE AREA = 295.00 SQ MI

52 KK SUB 4

RUNOFF FROM SUBBASIN 4

SUBBASIN RUNOFF DATA

54 BA SUBBASIN CHARACTERISTICS

TAREA 21.60 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

55 LS SCS LOSS RATE

STRTL 0.47 INITIAL ABSTRACTION
CRVNBR 81.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

56 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 3.27 LAG

UNIT HYDROGRAPH
35 END-OF-PERIOD ORDINATES

176.	521.	1043.	1778.	2465.	2851.	2964.	2871.	2595.	2253.
1794.	1355.	1074.	847.	689.	549.	427.	343.	273.	215.
169.	135.	108.	85.	68.	54.	42.	34.	28.	23.
18.	13.	9.	5.	1.					

HYDROGRAPH AT STATION SUB 4

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.86, TOTAL EXCESS = 2.02

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4125.	15.50		3101.	1172.	391.	283.
		(INCHES)	1.335	2.019	2.021	2.021
		(AC-FT)	1538.	2325.	2328.	2328.

CUMULATIVE AREA = 21.60 SQ MI

57 KK SUB4A

RUNOFF FROM SUBBASIN 4A

SUBBASIN RUNOFF DATA

59 BA SUBBASIN CHARACTERISTICS

TAREA 18.50 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

60 LS SCS LOSS RATE

STRTL 0.47 INITIAL ABSTRACTION

CRVNBR 81.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

61 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 3.40 LAG

UNIT HYDROGRAPH
36 END-OF-PERIOD ORDINATES

137.	408.	802.	1373.	1948.	2308.	2437.	2424.	2220.	1968.
1644.	1263.	987.	786.	636.	514.	412.	328.	261.	211.
168.	132.	107.	86.	69.	55.	44.	35.	28.	24.
20.	16.	12.	8.	5.	2.				

HYDROGRAPH AT STATION SUB4A

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.86, TOTAL EXCESS = 2.02

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
		(CFS)				
+	3440.	15.50	2626.	1004.	335.	242.
		(INCHES)	1.320	2.018	2.021	2.021
		(AC-FT)	1302.	1991.	1994.	1994.

CUMULATIVE AREA = 18.50 SQ MI

62 KK 2 COMBINE 1-3 WITH 4 AND 4A

ADD THREE HYDROGRAPHS

64 HC HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 2

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
17871.	23.50		17400.	13462.	5882.	4269.
		(INCHES)	0.483	1.494	1.958	1.964
		(AC-FT)	8628.	26701.	34998.	35107.

CUMULATIVE AREA = 335.10 SQ MI

65 KK SUB 5

RUNOFF FROM SUBBASIN 5

SUBBASIN RUNOFF DATA

67 BA SUBBASIN CHARACTERISTICS

TAREA 48.70 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

68 LS SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

69 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 2.90 LAG

UNIT HYDROGRAPH

31 END-OF-PERIOD ORDINATES

531.	1576.	3226.	5347.	6894.	7433.	7344.	6581.	5612.	4296.

3195. 2447. 1918. 1496. 1141. 889. 689. 528. 402. 313.
244. 189. 145. 111. 87. 71. 57. 42. 30. 18.
6.

HYDROGRAPH AT STATION SUB 5

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9311.	15.00		6690.	2443.	815.	590.
		(INCHES)	1.277	1.866	1.867	1.867
		(AC-FT)	3318.	4845.	4848.	4848.

CUMULATIVE AREA = 48.70 SQ MI

70 KK 3 COMBINE 1-4A WITH 5

ADD TWO HYDROGRAPHS

72 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 3

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 19493.	22.50		18935.	15480.	6696.	4859.
		(INCHES)	0.459	1.500	1.946	1.952
		(AC-FT)	9389.	30705.	39842.	39955.

CUMULATIVE AREA = 383.80 SQ MI

73 KK 3 ROUTE HYDROGRAPH 1-5 THROUGH REACH 3

HYDROGRAPH ROUTING DATA

74 RL ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

75 RS STORAGE ROUTING

NSTPS	10	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

76 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	18750.	REACH LENGTH
SEL	0.0022	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
78 RY	ELEVATION	2028.00	2026.00	2023.00	2020.00	2020.00	2023.00	2026.00	2028.00
77 RX	DISTANCE	0.00	300.00	400.00	800.00	1500.00	1800.00	2400.00	2700.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	135.77	289.35	460.73	649.91	856.91	1081.71	1324.31	1584.72	1862.94
OUTFLOW	0.00	296.75	969.34	1963.72	3272.12	4898.21	6850.42	9139.56	12173.77	15649.70
ELEVATION	2020.00	2020.42	2020.84	2021.26	2021.68	2022.11	2022.53	2022.95	2023.37	2023.79
STORAGE	2158.96	2472.79	2804.42	3153.86	3521.11	3907.59	4316.81	4748.92	5203.92	5681.82
OUTFLOW	19521.01	23794.42	28476.41	33573.50	39092.34	45021.45	51412.53	58273.07	65610.36	73434.74
ELEVATION	2024.21	2024.63	2025.05	2025.47	2025.89	2026.32	2026.74	2027.16	2027.58	2028.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 969. TO 73435.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 3

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 19501.	23.50	18917.	15436.	6689.	4857.
		(INCHES) 0.458	1.496	1.944	1.951
		(AC-FT) 9380.	30617.	39802.	39938.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
216.	23.50	211.	184.	92.	67.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE

		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
2024.21	23.50	2024.14	2023.75	2022.04	2021.50

CUMULATIVE AREA = 383.80 SQ MI

79 KK — SUB 6

RUNOFF FROM SUBBASIN 6

SUBBASIN RUNOFF DATA

81 BA — SUBBASIN CHARACTERISTICS
TAREA 23.70 SUBBASIN AREA

PRECIPITATION DATA

14 PB — STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI — INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

82 LS — SCS LOSS RATE
STRTL 0.47 INITIAL ABSTRACTION
CRVNBR 81.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

83 UD — SCS DIMENSIONLESS UNITGRAPH
TLAG 2.59 LAG

UNIT HYDROGRAPH
28 END-OF-PERIOD ORDINATES

335.	1018.	2110.	3323.	3942.	4007.	3656.	3109.	2332.	1683.
1256.	963.	727.	540.	406.	303.	225.	171.	129.	97.
73.	55.	42.	33.	25.	17.	10.	3.		

HYDROGRAPH AT STATION SUB 6

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.86, TOTAL EXCESS = 2.02

		MAXIMUM AVERAGE FLOW			
PEAK FLOW	TIME	6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				

		(CFS)				
+	5325.	14.50	3647.	1287.	429.	311.
		(INCHES)	1.431	2.020	2.021	2.021
		(AC-FT)	1809.	2554.	2555.	2555.

CUMULATIVE AREA = 23.70 SQ MI

64 KK — SUB 7

RUNOFF FROM SUBBASIN 7

SUBBASIN RUNOFF DATA

66 BA — SUBBASIN CHARACTERISTICS

TAREA 44.70 SUBBASIN AREA

PRECIPITATION DATA

14 PB — STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI — INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

87 LS — SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

88 UD — SCS DIMENSIONLESS UNITGRAPH

TLAG 4.01 LAG

UNIT HYDROGRAPH

42 END-OF-PERIOD ORDINATES

214.	665.	1279.	2134.	3217.	4178.	4777.	5036.	5038.	4792.
4389.	3909.	3288.	2618.	2116.	1739.	1431.	1210.	1003.	825.
679.	560.	466.	381.	315.	259.	214.	179.	146.	122.
101.	83.	69.	57.	49.	42.	35.	28.	21.	15.
10.	4.								

HYDROGRAPH AT STATION SUB 7

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 6689.	16.50		5465.	2238.	748.	541.
		(INCHES)	1.137	1.862	1.867	1.867
		(AC-FT)	2710.	4439.	4450.	4450.

CUMULATIVE AREA = 44.70 SQ MI

89 KK 4 COMBINE 1-5 WITH 6 AND 7

ADD THREE HYDROGRAPHS

91 HC HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 4

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 27317.	16.00		23264.	18448.	7858.	5709.
		(INCHES)	0.478	1.517	1.939	1.946
		(AC-FT)	11536.	36590.	46759.	46943.

CUMULATIVE AREA = 452.20 SQ MI

92 KK 4 ROUTE HYDROGRAPH 1-7 THROUGH REACH 4

HYDROGRAPH ROUTING DATA

93 RL ROUTING LOSSES

QLOSS 0.00 INITIAL LOSS

CLOSS 0.00 ADDITIONAL FRACTION LOST

94 RS STORAGE ROUTING

NSTPS 10 NUMBER OF SUBREACHES

ITYP FLOW TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

95 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	38541.	REACH LENGTH
SEL	0.0023	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK --- +		------ MAIN CHANNEL ------- +			--- RIGHT OVERBANK ---	
97 RY	ELEVATION	1946.00	1944.00	1942.00	1940.00	1940.00	1942.00	1944.00	1946.00
96 RX	DISTANCE	0.00	200.00	500.00	800.00	1500.00	1700.00	1900.00	2100.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	206.61	435.28	686.01	958.80	1253.64	1570.55	1909.51	2270.53	2653.60
OUTFLOW	0.00	186.86	606.63	1220.96	2021.18	3006.15	4178.09	5679.08	7458.64	9454.66
ELEVATION	1940.00	1940.32	1940.63	1940.95	1941.26	1941.58	1941.89	1942.21	1942.53	1942.84
STORAGE	3058.74	3485.93	3935.19	4406.25	4895.94	5403.28	5928.27	6470.90	7031.18	7609.10
OUTFLOW	11670.34	14108.74	16773.07	19671.49	22809.45	26177.34	29776.47	33608.45	37675.14	41978.54
ELEVATION	1943.16	1943.47	1943.79	1944.11	1944.42	1944.74	1945.05	1945.37	1945.68	1946.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 5679. TO 41979.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 4

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 26730.	18.00		22948.	18262.	7832.	5693.
		(INCHES)	0.472	1.502	1.932	1.941
		(AC-FT)	11379.	36221.	46601.	46814.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
548.	18.00	491.	416.	207.	152.

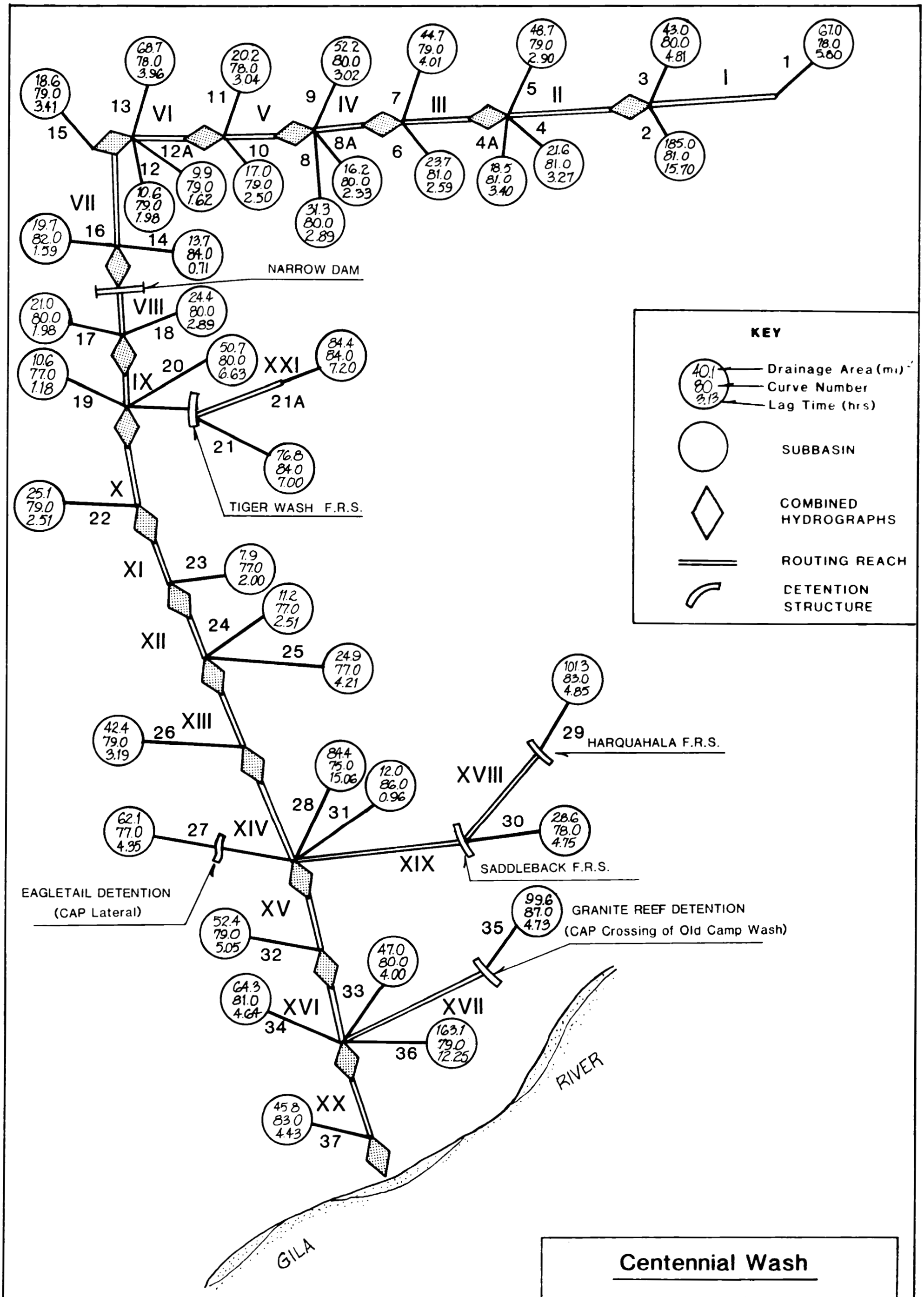
PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1944.79	18.00	1944.43	1943.92	1942.15	1941.60

CUMULATIVE AREA = 452.20 SQ MI

*** ***

```
          ##############
          #            #
 98 KK    #    SUB 8   #
          #            #
          ##############
                    RUNOFF FROM SUBBASIN 8

               SUBBASIN RUNOFF DATA

100 BA           SUBBASIN CHARACTERISTICS
                      TAREA       31.30  SUBBASIN AREA

                 PRECIPITATION DATA

 14 PB                STORM        3.88  BASIN TOTAL PRECIPITATION

 15 PI              INCREMENTAL PRECIPITATION PATTERN
                     0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                     0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                     0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                     0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                     0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

101 LS           SCS LOSS RATE
                      STRTL        0.50  INITIAL ABSTRACTION
                     CRVNBR       80.00  CURVE NUMBER
                      RTIMP        0.00  PERCENT IMPERVIOUS AREA

102 UD           SCS DIMENSIONLESS UNITGRAPH
                      TLAG        2.89  LAG

                                                  ###

                                                UNIT HYDROGRAPH
                                            31 END-OF-PERIOD ORDINATES
                    344.    1022.    2092.    3463.    4458.    4794.    4725.    4230.    3597.    2741.
                   2041.    1563.    1225.     955.     724.     566.     438.     336.     256.     198.
                    155.     120.      92.      70.      55.      45.      36.      26.      18.      11.
                      3.

      ###              ###              ###              ###              ###
                        HYDROGRAPH AT STATION    SUB 8

      TOTAL RAINFALL =  3.88, TOTAL LOSS =  1.94, TOTAL EXCESS =  1.94

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      99.50-HR
+   (CFS)       (HR)
                          (CFS)
+    6274.     15.00                   4494.        1634.         545.         394.
                          (INCHES)     1.335        1.942        1.943        1.943
                          (AC-FT)      2228.        3241.        3243.        3243.

                          CUMULATIVE AREA =   31.30 SQ MI
```

```
103 KK     SUBBA

                    RUNOFF FROM SUBBASIN 8A

            SUBBASIN RUNOFF DATA

105 BA          SUBBASIN CHARACTERISTICS
                     TAREA      16.20  SUBBASIN AREA

                PRECIPITATION DATA

 14 PB               STORM       3.88  BASIN TOTAL PRECIPITATION

 15 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                    0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

10e LS          SCS LOSS RATE
                     STRTL       0.50  INITIAL ABSTRACTION
                     CRVNBR     80.00  CURVE NUMBER
                     RTIMP       0.00  PERCENT IMPERVIOUS AREA

107 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG       2.33  LAG

                                                  UNIT HYDROGRAPH
                                              25 END-OF-PERIOD ORDINATES
                290.    896.   1896.   2740.   3025.   2890.   2473.   1880.   1302.    944.
                704.    514.    374.    273.    198.    144.    106.     77.     56.     41.
                 31.     24.     17.     11.      5.

                          HYDROGRAPH AT STATION    SUBBA

            TOTAL RAINFALL =  3.88, TOTAL LOSS =  1.94, TOTAL EXCESS =  1.94

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                    6-HR      24-HR      72-HR     99.50-HR
+   (CFS)       (HR)
                          (CFS)
+    3764.     14.50                2457.       846.       282.       204.
                         (INCHES)    1.410      1.943      1.943      1.943
                         (AC-FT)     1218.      1678.      1679.      1679.

                          CUMULATIVE AREA =   16.20 SQ MI
```

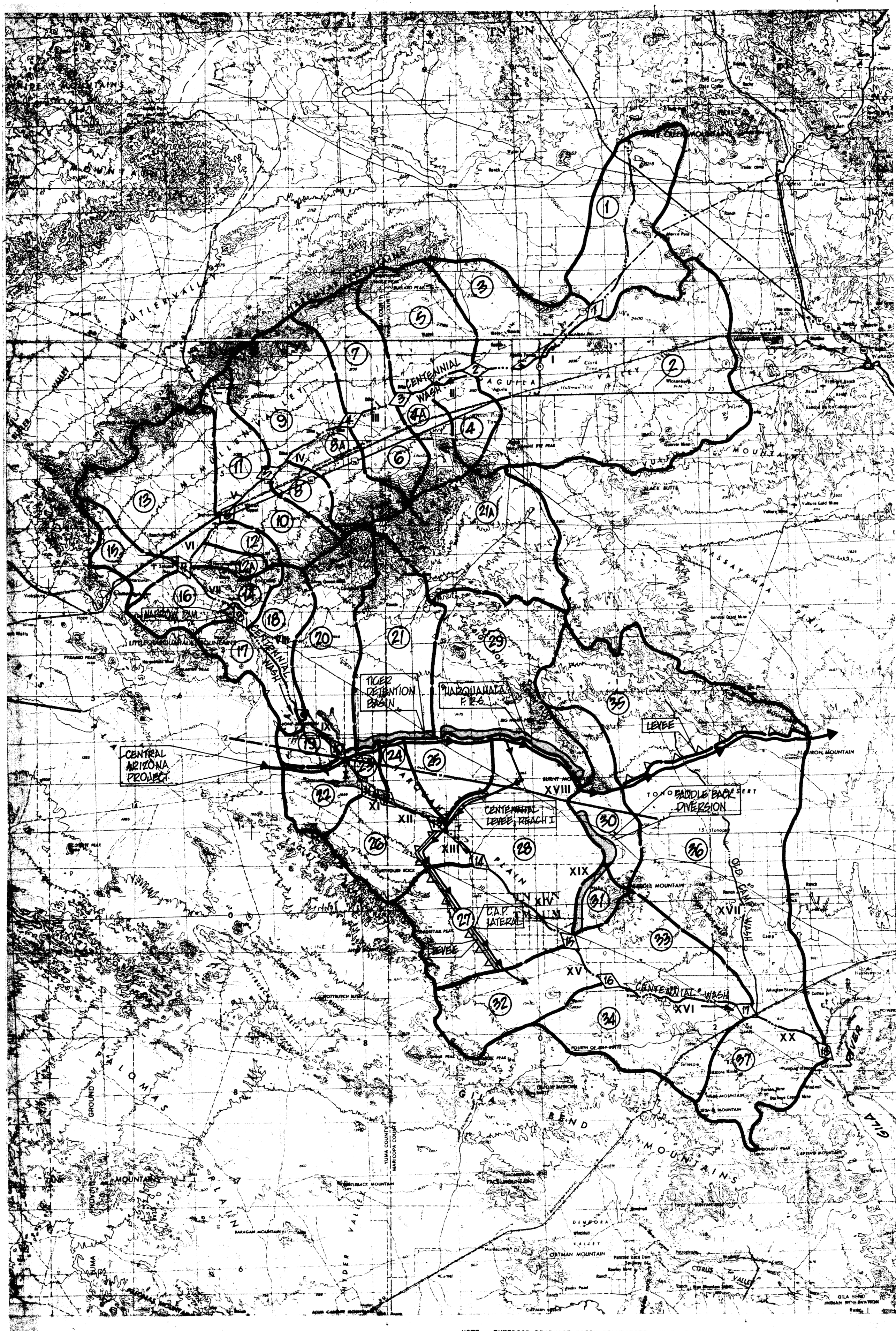


Centennial Wash

SCHEMATIC OF THE BASIN LOGIC USED IN HEC-1

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

JOB NO. 04856-03-74 JANUARY 1989



NOTE: EXTERIOR DRAINAGE BASIN BOUNDARIES AND INTERIOR SUB-BASIN BOUNDARIES WERE DELINEATED ON U.S.G.S. TOPOGRAPHIC MAPS (7.5 MINUTE, 1:24000). THIS MAP IS AN EXHIBIT TO SHOW BASIN DIVISIONS AS INPUT IN THE HEC-1 ANALYSIS AND SHOULD NOT BE USED TO CHECK BASIN DELINEATION OR AREA.

KEY

- 4 — CONCENTRATION POINT
- DRAINAGE BASIN BOUNDARY
- SUBBASIN BOUNDARY
- 10 — SUBBASIN NUMBER
- XX — ROUTING REACH NUMBER
- CENTRAL ARIZONA PROJECT
- DETENTION STRUCTURE

1" = 4 miles
Approximate Scale

FIGURE 3

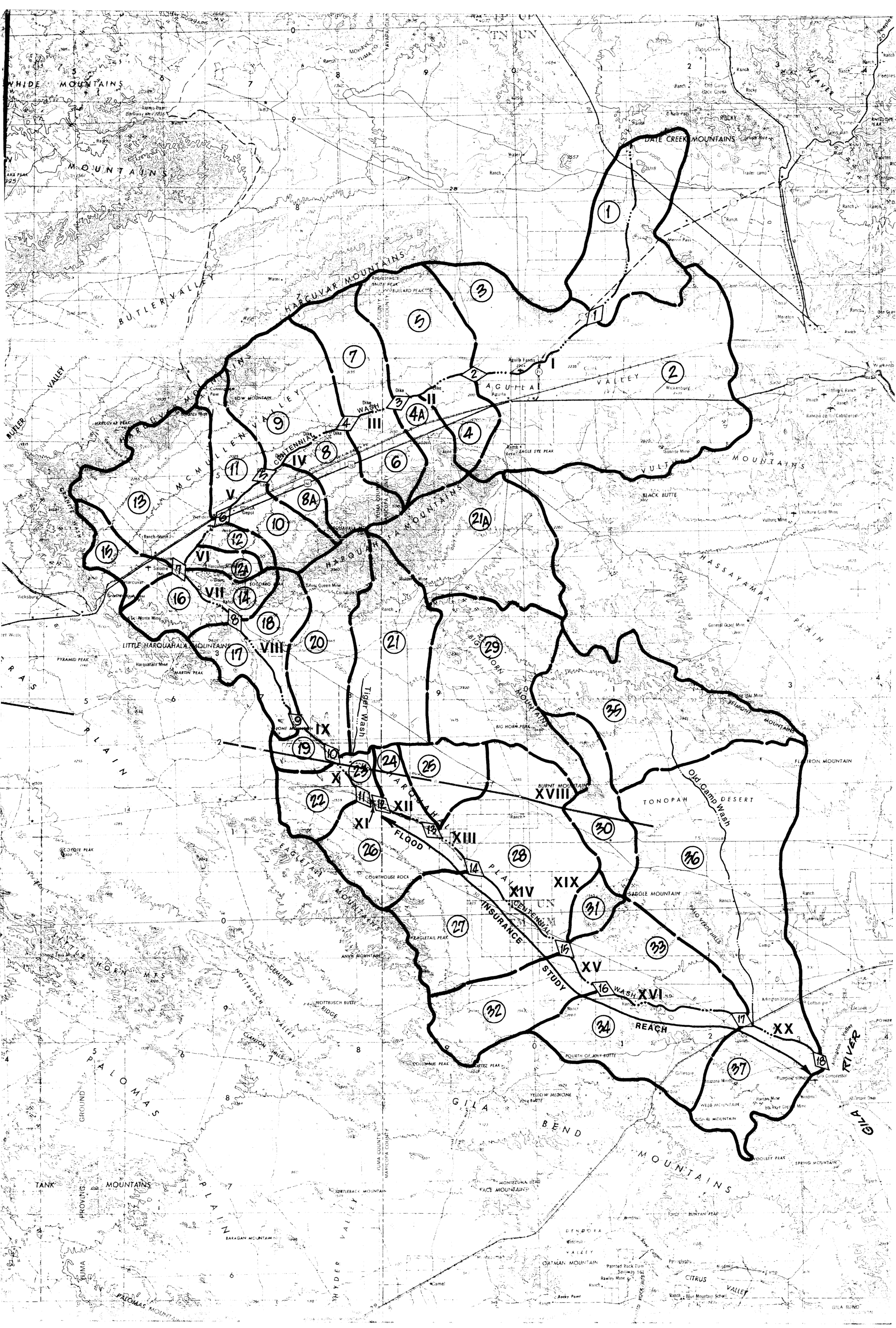
Centennial Wash Flood Insurance Study Maricopa County, Arizona

TOPOGRAPHIC MAP SHOWING FLOOD CONTROL STRUCTURES ALONG CENTENNIAL WASH

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

JOB NO. 04856-04-74 SEPTEMBER 1988

REVISED DECEMBER 1988



NOTE: EXTERIOR DRAINAGE BASIN BOUNDARIES AND INTERIOR SUB-BASIN BOUNDARIES WERE DELINEATED ON U.S.G.S. TOPOGRAPHIC MAPS (7.5 MINUTE, 1:24000). THIS MAP IS AN EXHIBIT TO SHOW BASIN DIVISIONS AS INPUT IN THE HEC-1 ANALYSIS AND SHOULD NOT BE USED TO CHECK BASIN DELINEATION OR AREA.

KEY

- ◇2 — CONCENTRATION POINTS
- ——— DRAINAGE BASIN BOUNDARY
- — — — SUBBASIN BOUNDARY
- (12) — SUBBASIN NUMBER
- XV — ROUTING REACH NUMBER

1" = 4 miles
Approximate Scale

FIGURE 2

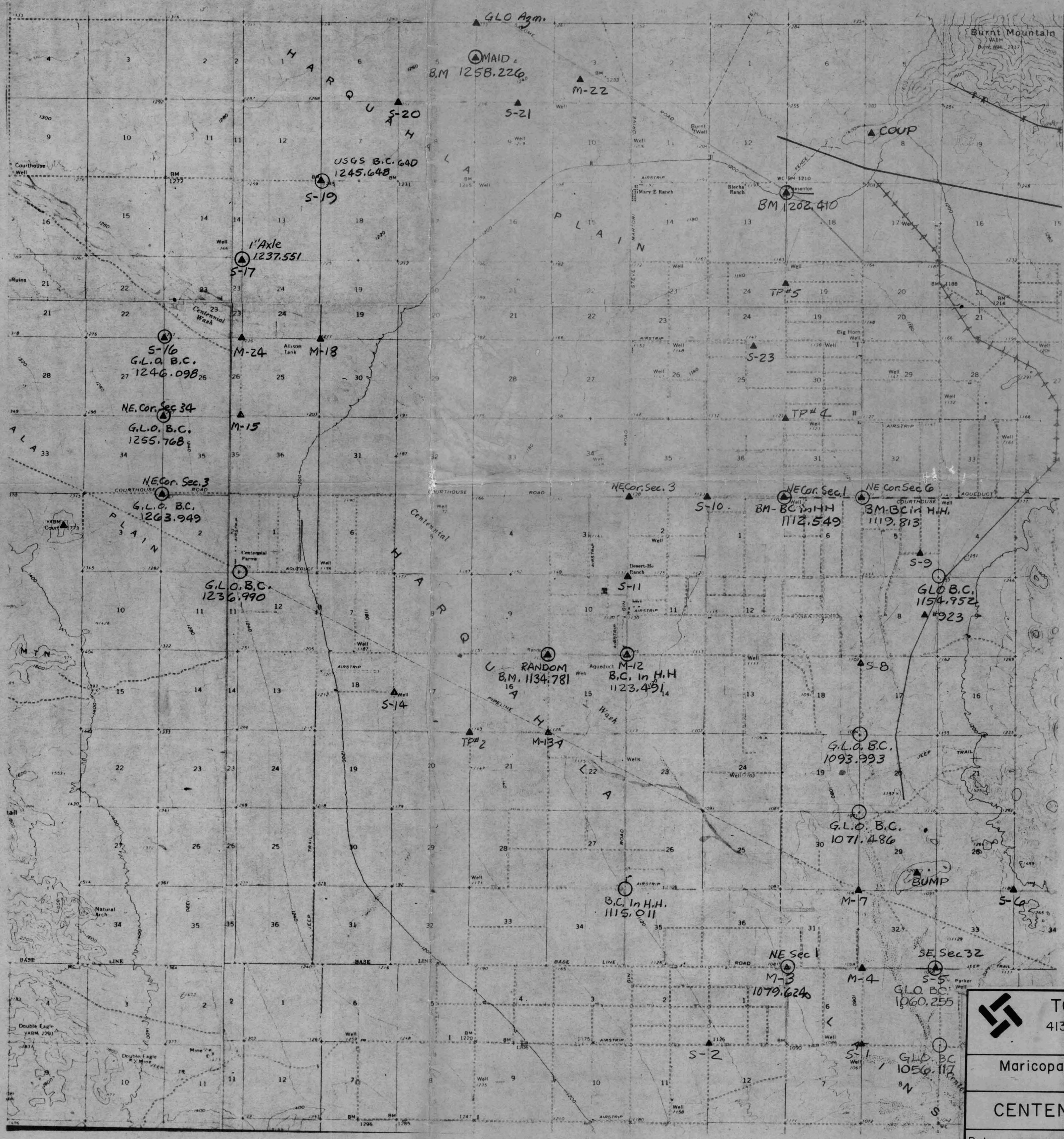
Centennial Wash Flood Insurance Study Maricopa County, Arizona

TOPOGRAPHIC MAP SHOWING CENTENNIAL WASH SUBBASINS

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

JOB NO. 04856-04-74 SEPTEMBER 1988

REVISED DECEMBER, 1988



N

SCALE = 1:62,500

○ = B.M.

▲ = HORIZ. CONTROL POINT

TOUPS CORPORATION
4131 N. 24th Street Phoenix, Az. 85016
(602) 264-9665

Maricopa County Flood Control Dist.
S.C.S.

CENTENNIAL WASH MAPPING

Date	Job	Sheet of
		File

MOSHER: - N934,902.19 ~ E104,834.[illegible]
MAID: - N928,560.24 ~ E110,323.[illegible]
PLEASATON: N919,200.09 - E131,298.[illegible]
COUP: - N922,327.36 ~ E135,269.[illegible]
COURT - N896,978.57 ~ E82,135.[illegible]
DAVIS: - N845,929.40 ~ E135,591.79
RANDOM - N888,268.14 ~ E114,99[illegible]
BUMP: - N873,328.34 ~ E139,935.61

MAID TO COUP
S75°58'18.03"E ~ 25,713.035

MAID TO COURT
S41°44'59.17"W ~ 42,331.271

PLEASATON TO COUP
N52°07'31.90"E ~ 5,093.825

RANDOM TO COUP
N30°45'31.64"E ~ 39,634.715

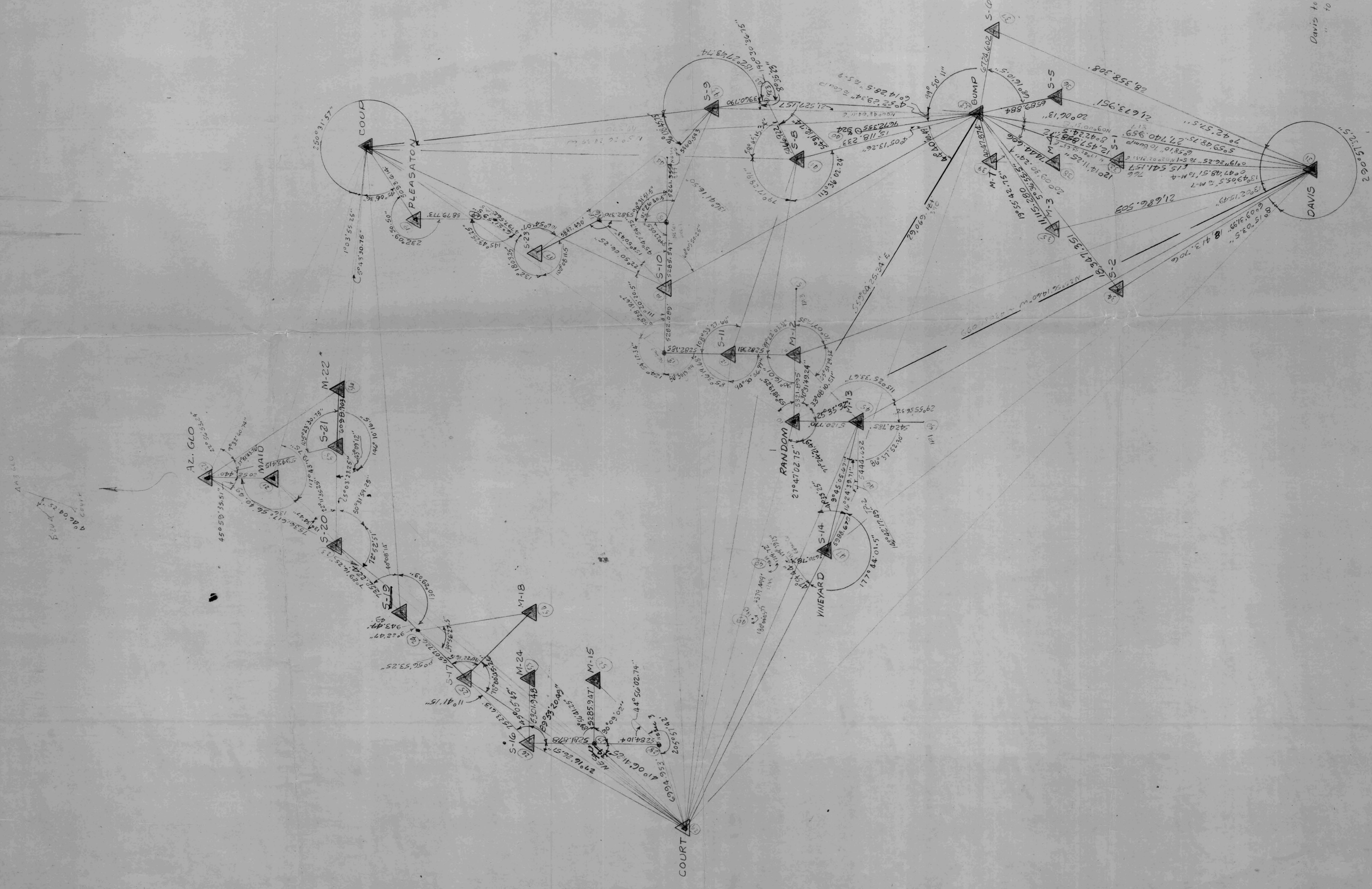
RANDOM TO DAVIS
S25°56'14.60"E ~ 47,081.099

RANDOM TO COURT
N75°09'18.55"W ~ 33,998.234

RANDOM TO BUMP
S59°04'25.34"E ~ 29,069.390

BUMP TO DAVIS
S09°00'31.15"W ~ 27,740.817

DAVIS TO COURT
N46°19'10.01"W ~ 73,916.060



*** ***

108 KK — 5 — COMBINE 1-7 WITH 8 AND 8A

ADD THREE HYDROGRAPHS

110 HC HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

***

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

HYDROGRAPH AT STATION 5

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 31129.	18.00		26075.	13520.	8641.	6292.
		(INCHES)	0.485	1.453	1.929	1.941
		(AC-FT)	12930.	38717.	51417.	51736.

CUMULATIVE AREA = 499.70 SQ MI

*** ***

111 KK — SUB 9

RUNOFF FROM SUBBASIN 9

SUBBASIN RUNOFF DATA

113 BA SUBBASIN CHARACTERISTICS

TAREA 52.20 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

114 LS SCS LOSS RATE

STRTL 0.50 INITIAL ABSTRACTION
CRVNBR 80.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

115 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 3.02 LAG

UNIT HYDROGRAPH
32 END-OF-PERIOD ORDINATES

517.	1519.	3115.	5233.	6871.	7648.	7658.	7046.	6162.	4975.
3687.	2846.	2206.	1763.	1380.	1062.	826.	649.	505.	391.
304.	239.	188.	146.	112.	89.	73.	59.	45.	32.
20.	8.								

HYDROGRAPH AT STATION SUB 9

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.94, TOTAL EXCESS = 1.94

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
			(CFS)			
+	10078.	15.00	7392.	2725.	909.	658.
			(INCHES) 1.317	1.942	1.943	1.943
			(AC-FT) 3685.	5435.	5409.	5409.

CUMULATIVE AREA = 52.20 SQ MI

11c KK 6 COMBINE 1-8A WITH 9
ADD TWO HYDROGRAPHS

118 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 6

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
			(CFS)			
+	36933.	17.50	30286.	21849.	9548.	6949.
			(INCHES) 0.510	1.472	1.930	1.941
			(AC-FT) 15018.	43337.	56815.	57145.

CUMULATIVE AREA = 551.90 SQ MI

*** ***

```
          ###############
          #             #
119 KK    #         5   #     ROUTE HYDROGRAPH 1-9 THROUGH REACH 5
          #             #
          ###############
```

HYDROGRAPH ROUTING DATA

120 RL ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

121 RS STORAGE ROUTING

NSTPS	6	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

122 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	18229.	REACH LENGTH
SEL	0.0033	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
124 RY	ELEVATION	1887.00	1885.00	1883.00	1880.00	1880.00	1884.00	1885.00	1888.00
123 RX	DISTANCE	0.00	500.00	1100.00	1150.00	1250.00	1260.00	1460.00	1480.00

###

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	18.33	38.08	59.26	81.86	105.88	131.32	158.18	194.51	253.12
OUTFLOW	0.00	51.31	165.34	330.19	542.25	800.10	1103.32	1452.02	1896.19	2449.66
ELEVATION	1880.00	1880.42	1880.84	1881.26	1881.68	1882.11	1882.53	1882.95	1883.37	1883.79
STORAGE	336.01	454.16	609.26	790.31	990.41	1209.55	1447.73	1703.65	1963.69	2224.22
OUTFLOW	3153.58	4064.32	5240.03	6750.94	8562.14	10683.76	13127.99	16047.79	19538.98	23353.33
ELEVATION	1884.21	1884.63	1885.05	1885.47	1885.89	1886.32	1886.74	1887.16	1887.58	1888.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 330. TO 23353.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 5

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR

+ (CFS)	(HR)					
		(CFS)				
+ 36672.	18.50		30201.	21784.	9545.	6945.
		(INCHES)	0.509	1.468	1.930	1.940
		(AC-FT)	14975.	43206.	56797.	57106.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)					
522.	18.50		449.	350.	160.	117.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)					
1889.47	18.50		1888.76	1887.80	1885.02	1883.79

CUMULATIVE AREA = 551.90 SQ MI

*** ***

125 BA — SUB10

RUNOFF FROM SUBBASIN 10

SUBBASIN RUNOFF DATA

127 BA — SUBBASIN CHARACTERISTICS

TAREA	17.00	SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM	3.88	BASIN TOTAL PRECIPITATION

15 PI — INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.36	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

128 LS — SCS LOSS RATE

STRTL	0.53	INITIAL ABSTRACTION
CRVNBR	79.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

129 UD — SCS DIMENSIONLESS UNITGRAPH

TLAG	2.50	LAG

***

UNIT HYDROGRAPH
27 END-OF-PERIOD ORDINATES

260.	795.	1660.	2537.	2957.	2957.	2624.	2165.	1563.	1131.
836.	638.	471.	352.	262.	194.	144.	107.	80.	59.
44.	33.	26.	20.	14.	8.	3.			

HYDROGRAPH AT STATION SUB10

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3210.	14.50		2426.	853.	284.	206.
		(INCHES)	1.327	1.866	1.867	1.867
		(AC-FT)	1203.	1692.	1692.	1692.

CUMULATIVE AREA = 17.00 SQ MI

130 KK SUB11

RUNOFF FROM SUBBASIN 11

SUBBASIN RUNOFF DATA

132 BA SUBBASIN CHARACTERISTICS
TAREA 20.20 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

133 LS SCS LOSS RATE
STRTL 0.56 INITIAL ABSTRACTION
CRVNBR 78.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

134 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 3.04 LAG

UNIT HYDROGRAPH

32 END-OF-PERIOD ORDINATES

197.	578.	1185.	1995.	2627.	2939.	2947.	2725.	2390.	1946.
1448.	1114.	866.	692.	543.	417.	327.	257.	200.	154.
121.	95.	75.	58.	45.	36.	29.	24.	18.	13.
9.	4.								

HYDROGRAPH AT STATION SUB11

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.09, TOTAL EXCESS = 1.79

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 3531.	15.00	2614.	973.	324.	235.
		(INCHES) 1.203	1.792	1.792	1.792
		(AC-FT) 1296.	1929.	1930.	1930.

CUMULATIVE AREA = 20.20 SQ MI

135 KK 7 COMBINE 1-9 WITH 10 AND 11

ADD THREE HYDROGRAPHS

137 HC HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 7

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 39628.	18.50	32637.	23239.	10150.	7385.
		(INCHES) 0.515	1.467	1.922	1.933
		(AC-FT) 16183.	46093.	60394.	60729.

CUMULATIVE AREA = 589.10 SQ MI

138 KK 6 ROUTE HYDROGRAPH 1-11 THROUGH REACH 6

HYDROGRAPH ROUTING DATA

139 RL	ROUTING LOSSES		
	QLOSS	0.00	INITIAL LOSS
	CLOSS	0.00	ADDITIONAL FRACTION LOST
140 RS	STORAGE ROUTING		
	NSTPS	6	NUMBER OF SUBREACHES
	ITYP	FLOW	TYPE OF INITIAL CONDITION
	RSVRIC	-1.00	INITIAL CONDITION
	X	0.00	WORKING R AND D COEFFICIENT
141 RC	NORMAL DEPTH CHANNEL ROUTING		
	ANL	0.050	LEFT OVERBANK N-VALUE
	ANCH	0.035	MAIN CHANNEL N-VALUE
	ANR	0.050	RIGHT OVERBANK N-VALUE
	RLNTH	26042.	REACH LENGTH
	SEL	0.0029	ENERGY SLOPE
	ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
143 RY	ELEVATION	1827.00	1823.00	1822.00	1820.00	1820.00	1821.00	1823.00	1824.00
142 RX	DISTANCE	0.00	300.00	700.00	900.00	1400.00	1700.00	2100.00	2600.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	126.36	285.18	476.12	693.48	935.18	1205.21	1521.68	1886.85	2299.95
OUTFLOW	0.00	229.74	778.11	1666.20	2959.85	4584.49	6623.62	9108.09	12024.19	15361.07
ELEVATION	1820.00	1820.37	1820.74	1821.11	1821.47	1821.84	1822.21	1822.58	1822.95	1823.32
STORAGE	2759.74	3265.77	3792.80	4325.91	4865.11	5410.39	5961.76	6519.21	7082.75	7652.38
OUTFLOW	19217.51	23645.77	28820.25	34495.46	40652.78	47277.80	54358.92	61886.63	69852.98	78251.25
ELEVATION	1823.68	1824.05	1824.42	1824.79	1825.16	1825.53	1825.89	1826.26	1826.63	1827.00

WARNING ### MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 12024. TO 78251.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION 6

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 38617.	19.50	32557.	23158.	10133.	7372.
		(INCHES) 0.514	1.462	1.919	1.929
		(AC-FT) 16144.	45932.	60297.	60621.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
781.	19.50	689.	527.	257.	189.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
(FEET)	(HR)				
1825.04	19.50	1824.66	1823.95	1822.26	1821.70

CUMULATIVE AREA = 589.10 SQ MI

144 KK — SUB12

RUNOFF FROM SUBBASIN 12

SUBBASIN RUNOFF DATA

14a BA — SUBBASIN CHARACTERISTICS

TAREA 10.60 SUBBASIN AREA

PRECIPITATION DATA

14 PB — STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI — INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

147 LS — SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

148 UD — SCS DIMENSIONLESS UNITGRAPH

TLAG 1.98 LAG

UNIT HYDROGRAPH
22 END-OF-PERIOD ORDINATES

279.	889.	1781.	2267.	2242.	1890.	1369.	905.	627.	446.
307.	214.	148.	102.	71.	49.	34.	24.	18.	12.
7.	2.								

HYDROGRAPH AT STATION SUB12

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
2648.	14.00		1582.	532.	177.	128.
		(INCHES)	1.388	1.866	1.867	1.867
		(AC-FT)	785.	1055.	1055.	1055.

CUMULATIVE AREA = 10.60 SQ MI

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          ***************
          *             *
14HR      *   SUB12A    *
          *             *
          ***************
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RUNOFF FROM SUBBASIN 12A

SUBBASIN RUNOFF DATA

151 BA SUBBASIN CHARACTERISTICS

TAREA	9.90	SUBBASIN AREA

PRECIPITATION DATA

14 PB	STORM	3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

152 LS SCS LOSS RATE

STRTL	0.53	INITIAL ABSTRACTION
CRVNBR	79.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

153 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	1.62	LAG

***

UNIT HYDROGRAPH
18 END-OF-PERIOD ORDINATES

411.	1372.	2383.	2541.	2125.	1422.	888.	587.	373.	245.
157.	101.	66.	43.	28.	20.	12.	5.		

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

HYDROGRAPH AT STATION SUB12A

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	99.50-HR
PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW (CFS)				
2816.	13.50		1527.	497.	166.	120.
		(INCHES)	1.434	1.867	1.867	1.867
		(AC-FT)	757.	986.	986.	986.

CUMULATIVE AREA = 9.90 SQ MI

154 KO — 8 — COMBINE 1-11 WITH 12 AND 12A

ADD THREE HYDROGRAPHS

156 HC — HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 8

			6-HR	24-HR	72-HR	99.50-HR
PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW (CFS)				
39508.	19.50		33373.	23597.	10460.	7620.
		(INCHES)	0.509	1.440	1.914	1.927
		(AC-FT)	16548.	46803.	62241.	62662.

CUMULATIVE AREA = 609.60 SQ MI

157 KK — SUB13

RUNOFF FROM SUBBASIN 13

SUBBASIN RUNOFF DATA

159 BA — SUBBASIN CHARACTERISTICS
TAREA 68.70 SUBBASIN AREA

PRECIPITATION DATA

14 PB — STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

160 LS SCS LOSS RATE

STRTL	0.56	INITIAL ABSTRACTION
CRVNBR	78.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

161 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	3.96	LAG

UNIT HYDROGRAPH
42 END-OF-PERIOD ORDINATES

340.	1054.	2030.	3390.	5110.	6573.	7479.	7843.	7823.	7394.
6738.	5956.	4944.	3920.	3176.	2600.	2152.	1811.	1498.	1217.
1010.	828.	688.	563.	460.	382.	312.	261.	215.	177.
146.	118.	99.	83.	72.	61.	49.	38.	29.	20.
10.	1.								

HYDROGRAPH AT STATION SUB13

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.09, TOTAL EXCESS = 1.79

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9907.	16.50		8076.	3303.	1103.	798.
		(INCHES)	1.093	1.788	1.792	1.792
		(AC-FT)	4005.	6550.	6565.	6565.

CUMULATIVE AREA = 68.70 SQ MI

162 KK 9 COMBINE 1-12A WITH 13

ADD TWO HYDROGRAPHS

164 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 9

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
45375.	19.50		39335.	26472.	11563.	8419.
		(INCHES)	0.539	1.451	1.902	1.914
		(AC-FT)	19505.	52506.	68803.	69227.

CUMULATIVE AREA = 678.30 SQ MI

165 KK SUB15

RUNOFF FROM SUBBASIN 15

SUBBASIN RUNOFF DATA

167 BA SUBBASIN CHARACTERISTICS

TAREA 18.60 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

168 LS SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

169 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 3.41 LAG

UNIT HYDROGRAPH

36 END-OF-PERIOD ORDINATES

137.	407.	799.	1370.	1946.	2311.	2443.	2431.	2232.	1981.
1661.	1278.	998.	794.	643.	521.	418.	332.	265.	214.
170.	134.	109.	88.	70.	56.	45.	36.	29.	24.
20.	16.	12.	9.	5.	2.				

HYDROGRAPH AT STATION SUB15

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
3154.	15.50	2423.	932.	311.	225.
		(INCHES) 1.211	1.864	1.867	1.867
		(AC-FT) 1201.	1849.	1852.	1852.

CUMULATIVE AREA = 18.60 SQ MI

170 KK 10 COMBINE 1-13 WITH 15

ADD TWO HYDROGRAPHS

172 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 10

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
46818.	19.50	40947.	27297.	11873.	8644.
		(INCHES) 0.546	1.457	1.901	1.912
		(AC-FT) 20304.	54143.	70652.	71079.

CUMULATIVE AREA = 696.90 SQ MI

173 KK 7 ROUTE HYDROGRAPH 1-15 THROUGH REACH 7

HYDROGRAPH ROUTING DATA

174 RL ROUTING LOSSES

	QLOSS	0.00	INITIAL LOSS
	CLOSS	0.00	ADDITIONAL FRACTION LOST

175 RS STORAGE ROUTING

NSTPS	6	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

176 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	2652.	REACH LENGTH
SEL	0.0050	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
178 RY	ELEVATION	1764.00	1763.00	1760.00	1760.00	1764.00	1762.00	1762.00	1764.00
177 RX	DISTANCE	0.00	900.00	950.00	1110.00	1130.00	1140.00	1400.00	1700.00

xxx

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	20.83	42.25	64.25	86.84	110.02	133.78	158.13	183.06	208.58
OUTFLOW	0.00	31.59	100.89	199.49	324.14	472.95	644.69	838.45	1053.60	1289.61
ELEVATION	1760.00	1760.21	1760.42	1760.63	1760.84	1761.05	1761.26	1761.47	1761.68	1761.89
STORAGE	251.89	316.15	385.17	458.98	537.56	627.63	745.59	892.21	1067.48	1271.39
OUTFLOW	1555.05	1889.39	2285.68	2740.63	3253.63	3721.45	4361.61	5130.76	6037.80	7098.64
ELEVATION	1762.11	1762.32	1762.53	1762.74	1762.95	1763.16	1763.37	1763.58	1763.79	1764.00

xxx WARNING xxx MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 838. TO 1290.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

xxx xxx xxx xxx xxx

HYDROGRAPH AT STATION 7

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
			(CFS)			
+	44034.	22.00	40136.	27147.	11866.	8635.
			(INCHES)	0.535	1.449	1.900	1.911
			(AC-FT)	19902.	53846.	70608.	71011.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	99.50-HR
+	(AC-FT)	(HR)				
	1395.	22.00	1270.	854.	369.	269.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	99.50-HR
+	(FEET)	(HR)				
	1771.33	22.00	1770.56	1767.98	1764.57	1763.43

CUMULATIVE AREA = 696.90 SQ MI

SUB14

RUNOFF FROM SUBBASIN 14

SUBBASIN RUNOFF DATA

181 BA SUBBASIN CHARACTERISTICS
TAREA 13.70 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

182 LS SCS LOSS RATE
STRTL 0.38 INITIAL ABSTRACTION
CRVNBR 84.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

183 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.71 LAG

UNIT HYDROGRAPH
9 END-OF-PERIOD ORDINATES

3542.	6922.	4205.	1735.	739.	317.	136.	63.	22.

HYDROGRAPH AT STATION SUB14

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.61, TOTAL EXCESS = 2.27

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
		(CFS)				
+	7985.	12.50	2675.	835.	278.	201.
		(INCHES)	1.815	2.266	2.266	2.266
		(AC-FT)	1326.	1655.	1655.	1655.

CUMULATIVE AREA = 13.70 SQ MI

```
          ##############
          #            #
184 KK    #    SUB16   #
          #            #
          ##############
                    RUNOFF FROM SUBBASIN 16

               SUBBASIN RUNOFF DATA

160 BA           SUBBASIN CHARACTERISTICS
                      TAREA      19.70  SUBBASIN AREA

                 PRECIPITATION DATA

 14 PB                STORM       3.88  BASIN TOTAL PRECIPITATION

 15 PI              INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02
                      0.02      0.03      0.05      0.38      0.07      0.04      0.03      0.02      0.02      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01

167 LS           SCS LOSS RATE
                      STRTL       0.44  INITIAL ABSTRACTION
                      CRVNBR     82.00  CURVE NUMBER
                      RTIMP       0.00  PERCENT IMPERVIOUS AREA

169 UD           SCS DIMENSIONLESS UNITGRAPH
                      TLAG        1.59  LAG

                                                  ###

                                                UNIT HYDROGRAPH
                                              18 END-OF-PERIOD ORDINATES
                  851.     2858.     4857.     5127.     4205.     2739.     1701.     1120.      713.      462.
                  291.      190.      123.       77.       52.       35.       20.        6.

          ###             ###             ###             ###             ###
                          HYDROGRAPH AT STATION    SUB16

          TOTAL RAINFALL =  3.88, TOTAL LOSS =  1.78, TOTAL EXCESS =  2.10

     PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR     99.50-HR
+    (CFS)         (HR)
                        (CFS)
+     6509.       13.50                  3441.       1113.        371.        268.
                        (INCHES)        1.624       2.101       2.101       2.101
                        (AC-FT)         1706.       2207.       2207.       2207.

                        CUMULATIVE AREA =   19.70 SQ MI
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197 SQ DISCHARGE 0. 20. 160. 547. 1030. 3150. 7550. 14000. 18000. 22500.

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*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 160.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 1

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 44251.	22.50		40703.	27585.	12386.	9061.
		(INCHES)	0.518	1.405	1.892	1.913
		(AC-FT)	20183.	54713.	73705.	74512.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
4253.	22.50	4033.	3208.	1955.	1496.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
258.69	22.50	257.91	254.96	250.35	246.73

CUMULATIVE AREA = 730.30 SQ MI

*** ***

198 KK 8 ROUTE HYDROGRAPH 1-16 THROUGH REACH 8

HYDROGRAPH ROUTING DATA

199 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

200 RS STORAGE ROUTING
NSTPS 10 NUMBER OF SUBREACHES
ITYP FLOW TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

201 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.035	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	49479.	REACH LENGTH
SEL	0.0040	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+ ------ MAIN CHANNEL -------	+ --- RIGHT OVERBANK ---				
203 RY	ELEVATION	1610.00	1609.00	1606.00	1604.00	1600.00	1600.00	1605.00	1608.00
202 RX	DISTANCE	0.00	500.00	550.00	640.00	650.00	800.00	820.00	1500.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	90.70	183.44	278.23	375.06	473.94	574.86	677.83	783.92	903.01
OUTFLOW	0.00	139.13	443.50	875.27	1419.54	2067.47	2813.11	3652.14	4434.17	5123.78
ELEVATION	1600.00	1600.53	1601.05	1601.58	1602.11	1602.63	1603.16	1603.68	1604.21	1604.74
STORAGE	1046.28	1266.27	1570.14	1951.28	2408.99	2943.27	3531.28	4125.97	4787.49	5605.58
OUTFLOW	5866.66	6897.23	8506.76	10635.66	13151.84	16100.30	19781.32	23982.34	28532.98	33805.11
ELEVATION	1605.26	1605.79	1606.32	1606.84	1607.37	1607.89	1608.42	1608.95	1609.47	1610.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 875. TO 33805.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 8

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 43685.	24.50	40446.	27524.	12374.	9038.
	(INCHES)	0.515	1.402	1.890	1.908
	(AC-FT)	20056.	54592.	73630.	74324.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
714.	24.50	664.	467.	217.	160.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1610.99	24.50	1610.66	1609.26	1605.74	1604.33

CUMULATIVE AREA = 730.30 SQ MI

*** ***

204 KK SUB17

RUNOFF FROM SUBBASIN 17

SUBBASIN RUNOFF DATA

206 BA SUBBASIN CHARACTERISTICS
TAREA 21.00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.36	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

207 LS SCS LOSS RATE
STRTL 0.50 INITIAL ABSTRACTION
CRVNBR 80.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

208 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 1.98 LAG

UNIT HYDROGRAPH
22 END-OF-PERIOD ORDINATES

553.	1761.	3526.	4490.	4442.	3744.	2711.	1792.	1243.	883.
608.	425.	293.	203.	141.	98.	67.	48.	36.	24.
13.	3.								

HYDROGRAPH AT STATION SUB17

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.94, TOTAL EXCESS = 1.94

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5489.	14.00		3273.	1097.	366.	265.
		(INCHES)	1.449	1.943	1.943	1.943
		(AC-FT)	1623.	2176.	2176.	2176.

CUMULATIVE AREA = 21.00 SQ MI

209 KK SUB18

RUNOFF FROM SUBBASIN 18

SUBBASIN RUNOFF DATA

211 BA SUBBASIN CHARACTERISTICS
TAREA 24.40 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.36	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

212 LS SCS LOSS RATE
STRTL 0.50 INITIAL ABSTRACTION
CRVNBR 80.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

213 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 2.89 LAG

UNIT HYDROGRAPH
31 END-OF-PERIOD ORDINATES

268.	796.	1631.	2700.	3476.	3737.	3684.	3297.	2804.	2137.
1591.	1219.	955.	744.	565.	441.	341.	262.	199.	154.
120.	93.	72.	55.	43.	35.	28.	21.	14.	8.
2.									

HYDROGRAPH AT STATION SUB18

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.94, TOTAL EXCESS = 1.94

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4891.	15.00		3503.	1274.	425.	307.
		(INCHES)	1.335	1.942	1.943	1.943
		(AC-FT)	1737.	2527.	2528.	2528.

CUMULATIVE AREA = 24.40 SQ MI

```
214 KK      *          *
            *     12   *      COMBINE 1-16 WITH 17 AND 18
            *          *
            **********
                        ADD THREE HYDROGRAPHS

216 HC            HYDROGRAPH COMBINATION
                        ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

          ***             ***             ***             ***             ***
                          HYDROGRAPH AT STATION       12

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     99.50-HR
+   (CFS)     (HR)
                          (CFS)
+   44910.    24.50                   41593.      28177.      13128.       9610.
                         (INCHES)      0.499       1.351       1.888       1.910
                          (AC-FT)    20625.      55837.      78119.      79028.

                          CUMULATIVE AREA =  775.70 SQ MI


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

            **********
            *          *
217 KK      *     12   *      ROUTE HYDROGRAPH 1-18 THROUGH REACH 9
            *          *
            **********

              HYDROGRAPH ROUTING DATA

218 RL            ROUTING LOSSES
                        QLOSS        0.00  INITIAL LOSS
                        CLOSS        0.00  ADDITIONAL FRACTION LOST

219 RS            STORAGE ROUTING
                        NSTPS           4  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                        RSVRIC       -1.00  INITIAL CONDITION
                            X        0.00 WORKING R AND D COEFFICIENT

220 RC            NORMAL DEPTH CHANNEL ROUTING
                          ANL       0.050  LEFT OVERBANK N-VALUE
                         ANCH       0.035  MAIN CHANNEL N-VALUE
                          ANR       0.055  RIGHT OVERBANK N-VALUE
                        RLNTH       17708.  REACH LENGTH
                          SEL      0.0038  ENERGY SLOPE
                        ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                              --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
222 RY          ELEVATION   1450.00   1446.00   1442.00   1440.00   1442.00   1444.00   1446.00   1448.00
```

221 RX DISTANCE 0.00 800.00 1000.00 2300.00 2600.00 3500.00 4000.00 4500.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	45.04	180.17	405.39	720.02	1101.77	1539.82	2034.18	2583.03	3169.73
OUTFLOW	0.00	119.41	758.20	2235.44	4876.97	9015.96	14459.10	21291.91	30263.53	41806.25
ELEVATION	1440.00	1440.53	1441.05	1441.58	1442.11	1442.63	1443.16	1443.68	1444.21	1444.74
STORAGE	3790.21	4444.47	5135.55	5875.96	6667.04	7508.79	8392.21	9298.72	10227.74	11179.29
OUTFLOW	54948.43	69683.13	85864.91	103680.58	123241.28	144565.05	168049.84	193406.25	220520.98	249381.84
ELEVATION	1445.26	1445.79	1446.32	1446.84	1447.37	1447.89	1448.42	1448.95	1449.47	1450.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 9016. TO 249381.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION 12

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 44836.	25.00		41548.	28165.	13115.	9595.
		(INCHES)	0.498	1.350	1.886	1.907
		(AC-FT)	20602.	55864.	78039.	78901.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
828.	25.00	788.	602.	322.	239.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1444.86	25.00	1444.72	1444.02	1442.69	1442.09

CUMULATIVE AREA = 775.70 SQ MI

*** ***

223 KK SUB19

RUNOFF FROM SUBBASIN 19

SUBBASIN RUNOFF DATA

225 BA SUBBASIN CHARACTERISTICS

TAREA 10.60 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.36	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

226 LS SCS LOSS RATE

STRTL 0.60 INITIAL ABSTRACTION
CRVNBR 77.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

227 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 1.18 LAG

UNIT HYDROGRAPH
14 END-OF-PERIOD ORDINATES

892. 2927. 3557. 2792. 1523. 873. 491. 277. 157. 90.
50. 31. 16. 4.

HYDROGRAPH AT STATION SUB19

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.16, TOTAL EXCESS = 1.72

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)					
			(CFS)				
+	3328.	13.00		1534.	490.	163.	118.
			(INCHES)	1.345	1.719	1.719	1.719
			(AC-FT)	760.	972.	972.	972.

CUMULATIVE AREA = 10.60 SQ MI

228 KK SUB20

RUNOFF FROM SUBBASIN 20

SUBBASIN RUNOFF DATA

230 BA SUBBASIN CHARACTERISTICS

TAREA 50.70 SUBBASIN AREA

PRECIPITATION DATA

```
 14 PB              STORM        3.88  BASIN TOTAL PRECIPITATION

 15 PI           INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02
                   0.02      0.03      0.05      0.38      0.07      0.04      0.03      0.02      0.02      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01

231 LS            SCS LOSS RATE
                    STRTL        0.50  INITIAL ABSTRACTION
                    CRVNBR      80.00  CURVE NUMBER
                    RTIMP        0.00  PERCENT IMPERVIOUS AREA

232 UD            SCS DIMENSIONLESS UNITGRAPH
                    TLAG         6.63  LAG

                                                ***

                                          UNIT HYDROGRAPH
                                      68 END-OF-PERIOD ORDINATES
          78.       220.       414.       647.       947.      1309.      1732.      2224.      2657.      3024.
        3302.      3465.      3540.      3554.      3528.      3390.      3222.      3038.      2831.      2586.
        2309.      1998.      1739.      1527.      1352.      1197.      1064.       951.       857.       763.
         680.       603.       525.       473.       421.       372.       333.       295.       261.       232.
         204.       182.       162.       143.       129.       114.       101.        91.        80.        71.
          63.        56.        50.        45.        39.        36.        33.        30.        27.        24.
          21.        18.        15.        12.        10.         7.         5.         2.

      ***         ***         ***         ***         ***
                   HYDROGRAPH AT STATION    SUB20

        TOTAL RAINFALL =  3.88, TOTAL LOSS =  1.94, TOTAL EXCESS =  1.94

    PEAK FLOW     TIME                       MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR     99.50-HR
  +   (CFS)       (HR)
                            (CFS)
  +    5433.     19.00                4992.       2588.        883.        639.
                          (INCHES)    0.915       1.898       1.943       1.943
                           (AC-FT)    2475.       5133.       5254.       5254.

                          CUMULATIVE AREA =   50.70 SQ MI


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

              ***************
              *             *
233 KK        *       13    *     COMBINE 1-18 WITH 19 AND 20
              *             *
              ***************
                             ADD THREE HYDROGRAPHS

235 HC           HYDROGRAPH COMBINATION
                   ICOMP            3  NUMBER OF HYDROGRAPHS TO COMBINE
```

HYDROGRAPH AT STATION 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
+ 48171.	24.50	44897.	30403.	14144.	10352.
		(INCHES) 0.499	1.351	1.885	1.907
		(AC-FT) 22263.	60304.	84160.	85126.

CUMULATIVE AREA = 837.00 SQ MI

236 KK SUB21A

RUNOFF FROM SUBBASIN 21A

SUBBASIN RUNOFF DATA

238 BA SUBBASIN CHARACTERISTICS
TAREA 84.40 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

239 LS SCS LOSS RATE
STRTL 0.38 INITIAL ABSTRACTION
CRVNBR 84.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

240 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 7.20 LAG

UNIT HYDROGRAPH
74 END-OF-PERIOD ORDINATES

110.	295.	554.	884.	1273.	1720.	2308.	2956.	3647.	4235.
4718.	5107.	5328.	5440.	5469.	5432.	5284.	5059.	4802.	4522.

4217.	3850.	3435.	3006.	2639.	2345.	2095.	1874.	1679.	1506.
1372.	1237.	1109.	998.	888.	787.	713.	640.	571.	516.
461.	410.	370.	329.	293.	265.	238.	212.	192.	172.
154.	139.	124.	111.	100.	89.	79.	72.	65.	58.
54.	50.	45.	41.	36.	32.	28.	24.	20.	17.
13.	9.	6.	2.						

HYDROGRAPH AT STATION SUB214

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.61, TOTAL EXCESS = 2.27

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 9993.	20.00	9289.	4981.	1714.	1240.
	(INCHES)	1.023	2.195	2.266	2.266
	(AC-FT)	4606.	9879.	10193.	10193.

CUMULATIVE AREA = 84.40 SQ MI

241 KK — ROUTE HYDROGRAPH 21A THROUGH REACH 21

HYDROGRAPH ROUTING DATA

242 RL — ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

243 RS — STORAGE ROUTING

NSTPS	6	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

244 RC — NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.060	RIGHT OVERBANK N-VALUE
RLNTH	63400.	REACH LENGTH
SEL	0.0088	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+ ------ MAIN CHANNEL -------	+ --- RIGHT OVERBANK ---				
246 RY	ELEVATION	1725.00	1724.00	1723.00	1720.00	1720.00	1723.00	1724.00	1725.00
245 RX	DISTANCE	0.00	100.00	1000.00	1010.00	1110.00	1120.00	2120.00	2220.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	38.64	77.95	117.93	158.58	199.91	241.91	284.57	327.92	371.93
OUTFLOW	0.00	37.86	120.49	237.45	384.58	559.39	760.18	985.75	1235.13	1507.60
ELEVATION	1720.00	1720.26	1720.53	1720.79	1721.05	1721.32	1721.58	1721.84	1722.11	1722.37
STORAGE	416.61	461.97	542.35	798.97	1247.10	1886.74	2663.06	3462.96	4283.01	5123.23
OUTFLOW	1802.57	2119.57	2482.67	3000.91	3790.55	4948.04	6725.17	8967.00	11595.98	14591.78
ELEVATION	1722.63	1722.89	1723.16	1723.42	1723.68	1723.95	1724.21	1724.47	1724.74	1725.00

HYDROGRAPH AT STATION 10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9161.	24.50		8443.	4945.	1714.	1240.
		(INCHES)	0.930	2.180	2.266	2.266
		(AC-FT)	4187.	9814.	10199.	10199.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
587.	24.50	546.	301.	106.	76.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1724.49	24.50	1724.41	1723.64	1721.43	1721.03

CUMULATIVE AREA = 84.40 SQ MI

247 KK SUB21 (TIGER WASH)

RUNOFF FROM SUBBASIN 21

SUBBASIN RUNOFF DATA

249 BA SUBBASIN CHARACTERISTICS

TAREA 76.80 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01

0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

250 LS SCS LOSS RATE
STRTL 0.38 INITIAL ABSTRACTION
CRVNBR 84.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

251 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 7.00 LAG

UNIT HYDROGRAPH
72 END-OF-PERIOD ORDINATES

106.	289.	543.	861.	1247.	1699.	2264.	2908.	3546.	4111.
4526.	4843.	5055.	5099.	5099.	5055.	4843.	4610.	4358.	4076.
3744.	3373.	2950.	2583.	2267.	2020.	1805.	1609.	1433.	1304.
1175.	1049.	943.	837.	738.	667.	597.	532.	479.	426.
378.	340.	301.	268.	242.	215.	193.	174.	154.	139.
124.	110.	99.	88.	78.	70.	63.	56.	52.	48.
44.	39.	35.	31.	27.	23.	19.	16.	12.	9.
5.	2.								

HYDROGRAPH AT STATION SUB21

TOTAL RAINFALL = 3.88, TOTAL LOSS = 1.61, TOTAL EXCESS = 2.27

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)					
			(CFS)				
+	9332.	19.50		8609.	4546.	1560.	1129.
			(INCHES)	1.042	2.202	2.266	2.266
			(AC-FT)	4269.	9018.	9280.	9280.

CUMULATIVE AREA = 76.80 SQ MI

252 KK 14 COMBINE 21 WITH 21A
ADD TWO HYDROGRAPHS

254 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 14

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
15639.	23.00	14636.	9426.	3274.	2369.
		(INCHES) 0.844	2.175	2.266	2.266
		(AC-FT) 7257.	18697.	19479.	19479.

CUMULATIVE AREA = 161.20 SQ MI

*** ***

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          ***************
          *             *
255 KK    *         2   *     ROUTE (TIGER WASH DETENTION BASIN)
          *             *
          ***************
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ROUTE HYDROGRAPH THROUGH TIGER WASH DETENTION BASIN

HYDROGRAPH ROUTING DATA

242 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

257 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 1390.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

258 SV	STORAGE	0.0	0.0	0.0	1716.0	6216.0	6973.0	7765.0	9460.0	11302.0	15428.0
259 SE	ELEVATION	1390.00	1393.00	1397.00	1401.00	1405.00	1405.50	1406.00	1407.00	1408.00	1410.00
260 SQ	DISCHARGE	0.	591.	903.	1132.	1322.	1637.	2287.	4307.	7108.	14651.

***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 903.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 2

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
7509.	31.50	7311.	5258.	2675.	2109.

	(INCHES)	0.422	1.213	1.851	2.017
	(AC-FT)	3625.	10429.	15918.	17340.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
11521.	31.50	11411.	10011.	6836.	5223.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1408.11	31.50	1408.05	1407.28	1405.15	1402.61

CUMULATIVE AREA = 161.20 SQ MI

```
261 KK      15    COMBINE 1-20 WITH 21
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ADD TWO HYDROGRAPHS

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263 HC      HYDROGRAPH COMBINATION
            ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
```

HYDROGRAPH AT STATION 15

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 51945.	25.00	48694.	35132.	16794.	12461.
	(INCHES)	0.454	1.309	1.877	1.925
	(AC-FT)	24146.	69683.	99932.	102466.

CUMULATIVE AREA = 998.20 SQ MI

```
264 KK      10    ROUTE HYDROGRAPH 1-21 THROUGH REACH 10
```

HYDROGRAPH ROUTING DATA

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265 RL      ROUTING LOSSES
```

	QLOSS	0.00	INITIAL LOSS
	CLOSS	0.00	ADDITIONAL FRACTION LOST

266 RS STORAGE ROUTING

NSTPS	10	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

267 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.035	MAIN CHANNEL N-VALUE
ANR	0.060	RIGHT OVERBANK N-VALUE
RLNTH	19271.	REACH LENGTH
SEL	0.0033	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
269 RY	ELEVATION	1370.00	1366.00	1362.00	1360.00	1362.00	1364.00	1366.00	1368.00
268 RX	DISTANCE	0.00	800.00	1000.00	2300.00	2600.00	3500.00	4000.00	4500.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	49.02	196.08	441.18	783.58	1199.02	1675.73	2213.72	2811.03	3449.50
OUTFLOW	0.00	111.28	706.56	2083.18	4544.80	8401.18	13470.68	19831.90	28181.84	38918.44
ELEVATION	1360.00	1360.53	1361.05	1361.58	1362.11	1362.63	1363.16	1363.68	1364.21	1364.74
STORAGE	4124.75	4836.76	5588.84	6394.60	7255.50	8171.56	9132.95	10119.47	11130.50	12166.04
OUTFLOW	51129.51	64803.35	79812.03	96309.83	114387.55	134057.55	155657.00	178936.15	203795.94	230223.00
ELEVATION	1365.26	1365.79	1366.32	1366.84	1367.37	1367.89	1368.42	1368.95	1369.47	1370.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 707. TO 230223.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 51882.	25.50		48703.	35127.	16780.	12415.
		(INCHES)	0.454	1.309	1.876	1.918
		(AC-FT)	24150.	69674.	99847.	102092.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
416.	25.50	399.	319.	177.	134.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1365.29	25.50	1365.16	1364.51	1363.10	1362.48

CUMULATIVE AREA = 998.20 SQ MI

270 KK SUB22

RUNOFF FROM SUBBASIN 22

SUBBASIN RUNOFF DATA

272 BA SUBBASIN CHARACTERISTICS

TAREA 25.10 SUBBASIN AREA

PRECIPITATION DATA

14 PE STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

273 LS SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

274 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 2.51 LAG

UNIT HYDROGRAPH
27 END-OF-PERIOD ORDINATES

381.	1162.	2426.	3719.	4349.	4352.	3874.	3208.	2325.	1682.
1245.	951.	705.	526.	392.	290.	215.	161.	120.	89.
65.	50.	40.	30.	21.	13.	5.			

HYDROGRAPH AT STATION SUB22

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.01, TOTAL EXCESS = 1.87

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5310.	14.50		3578.	1259.	420.	304.
		(INCHES)	1.325	1.866	1.867	1.867
		(AC-FT)	1774.	2498.	2499.	2499.

CUMULATIVE AREA = 25.10 SQ MI

275 KK 16 COMBINE 1-21 WITH 22

ADD TWO HYDROGRAPHS

277 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 16

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
		(CFS)			
52431.	25.50	49148.	35494.	17153.	12719.
		(INCHES) 0.447	1.290	1.870	1.916
		(AC-FT) 24371.	70401.	102068.	104591.

CUMULATIVE AREA = 1023.30 SQ MI

278 KK 11 ROUTE HYDROGRAPH 1-22 THROUGH REACH 11

HYDROGRAPH ROUTING DATA

279 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

280 RS STORAGE ROUTING
NSTPS 2 NUMBER OF SUBREACHES
ITYP FLOW TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

281 RC NORMAL DEPTH CHANNEL ROUTING
ANL 0.055 LEFT OVERBANK N-VALUE
ANCH 0.035 MAIN CHANNEL N-VALUE

ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	10937.	REACH LENGTH
SEL	0.0015	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL		------- +		--- RIGHT OVERBANK ---	
283 RY	ELEVATION	1290.00	1286.00	1282.00	1280.00	1282.00	1284.00	1286.00	1288.00
282 RX	DISTANCE	0.00	800.00	1000.00	2300.00	2600.00	3500.00	4000.00	4500.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	27.82	111.28	250.38	444.71	680.49	951.04	1256.37	1595.36	1957.72
OUTFLOW	0.00	75.02	476.36	1404.48	3064.10	5664.07	9081.93	13370.67	19000.30	26241.85
ELEVATION	1280.00	1280.53	1281.05	1281.58	1282.11	1282.63	1283.16	1283.68	1284.21	1284.74
STORAGE	2340.95	2745.04	3171.87	3629.17	4117.76	4637.66	5183.29	5743.17	6316.97	6904.67
OUTFLOW	34484.34	43722.91	53873.89	65043.66	77295.61	90640.11	105325.60	121168.49	138095.82	156097.60
ELEVATION	1285.26	1285.79	1286.32	1286.84	1287.37	1287.89	1288.42	1288.95	1289.47	1290.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 53874. TO 156098.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION 11

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 52220.	26.00		49067.	35484.	17135.	12683.
		(INCHES)	0.446	1.290	1.868	1.911
		(AC-FT)	24331.	70382.	101961.	104298.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
1551.	26.00	1485.	1184.	669.	507.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1286.23	26.00	1286.07	1285.28	1283.65	1282.92

CUMULATIVE AREA = 1023.30 SQ MI

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          **************
          *            *
  284 KK  *    SUB23   *
          *            *
          **************
              RUNOFF FROM SUBBASIN 23
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            SUBBASIN RUNOFF DATA

 286 BA       SUBBASIN CHARACTERISTICS
                   TAREA        7.90  SUBBASIN AREA

              PRECIPITATION DATA

 14 PB             STORM        3.88  BASIN TOTAL PRECIPITATION

 15 PI          INCREMENTAL PRECIPITATION PATTERN
                  0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                  0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                  0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                  0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                  0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

 287 LS       SCS LOSS RATE
                   STRTL        0.60  INITIAL ABSTRACTION
                   CRVNBR      77.00  CURVE NUMBER
                   RTIMP        0.00  PERCENT IMPERVIOUS AREA

 288 UD       SCS DIMENSIONLESS UNITGRAPH
                   TLAG         2.00  LAG

                                              ***

                                        UNIT HYDROGRAPH
                                   22 END-OF-PERIOD ORDINATES
            203.     646.    1299.    1666.    1666.    1412.    1039.     687.     475.     340.
            234.     164.     114.      79.      55.      39.      27.      19.      14.      10.
              6.       2.

       ***           ***          ***          ***          ***
                  HYDROGRAPH AT STATION    SUB23

      TOTAL RAINFALL =  3.88, TOTAL LOSS =  2.16, TOTAL EXCESS =  1.72

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR       72-HR      99.50-HR

 +   (CFS)       (HR)
                            (CFS)
 +    1784.      14.00                 1080.        365.        122.          88.
                          (INCHES)     1.271       1.719       1.719        1.719
                           (AC-FT)      535.        724.        724.         724.

                          CUMULATIVE AREA =    7.90 SQ MI


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

            **************
            *            *
 289 KK     *        17  *     COMBINE 1-22 WITH 23
            *            *
            **************
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ADD TWO HYDROGRAPHS

291 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 17

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 52331.	26.00	49161.	35571.	17231.	12772.
	(INCHES)	0.443	1.283	1.864	1.910
	(AC-FT)	24377.	70554.	102531.	105022.

CUMULATIVE AREA = 1031.20 SQ MI

292 KK 12 ROUTE HYDROGRAPH 1-23 THROUGH REACH 12

HYDROGRAPH ROUTING DATA

293 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

294 RS STORAGE ROUTING
NSTPS 4 NUMBER OF SUBREACHES
ITYP FLOW TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

295 RC NORMAL DEPTH CHANNEL ROUTING
ANL 0.050 LEFT OVERBANK N-VALUE
ANCH 0.035 MAIN CHANNEL N-VALUE
ANR 0.050 RIGHT OVERBANK N-VALUE
RLNTH 17708. REACH LENGTH
SEL 0.0027 ENERGY SLOPE
ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
297 RY	ELEVATION	1274.00	1269.00	1267.00	1265.00	1267.00	1269.00	1271.00	1275.00
296 RX	DISTANCE	0.00	800.00	1000.00	2300.00	2600.00	3500.00	4000.00	4500.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	45.04	180.17	405.39	720.14	1105.82	1553.45	2063.00	2633.23	3252.47
OUTFLOW	0.00	100.65	639.11	1884.31	4110.99	7606.96	12224.02	18045.46	25701.19	35581.62
ELEVATION	1265.00	1265.53	1266.05	1266.58	1267.11	1267.63	1268.16	1268.68	1269.21	1269.74
STORAGE	3917.89	4629.46	5384.67	6173.11	6993.64	7846.26	8730.97	9647.78	10589.39	11545.13
OUTFLOW	46914.40	59716.16	74042.81	89870.61	107164.32	125923.40	146151.53	167855.28	191581.93	216831.03
ELEVATION	1270.26	1270.79	1271.32	1271.84	1272.37	1272.89	1273.42	1273.95	1274.47	1275.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 18045. TO 216831.
- THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION 12

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 52163.	27.00		49055.	35560.	17215.	12724.
		(INCHES)	0.443	1.282	1.863	1.902
		(AC-FT)	24345.	70532.	102436.	104629.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
1052.	27.00	1009.	806.	451.	341.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1270.48	27.00	1270.35	1269.69	1268.26	1267.59

CUMULATIVE AREA = 1031.20 SQ MI

*** ***

xxxxxxxxxxxxxx
x x
298 KK x SUB24 x
x x
xxxxxxxxxxxxxx

RUNOFF FROM SUBBASIN 24

SUBBASIN RUNOFF DATA

300 BA SUBBASIN CHARACTERISTICS
TAREA 11.20 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 3.88 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN
0.00 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

301 LS SCS LOSS RATE

STRTL	0.60	INITIAL ABSTRACTION
CRVNBR	77.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

302 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	2.51	LAG

***

UNIT HYDROGRAPH
27 END-OF-PERIOD ORDINATES

170.	519.	1083.	1660.	1941.	1942.	1729.	1432.	1037.	750.
556.	424.	314.	235.	175.	130.	96.	72.	54.	40.
29.	22.	16.	13.	9.	6.	2.			

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

HYDROGRAPH AT STATION SUB24

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.16, TOTAL EXCESS = 1.72

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)					
			(CFS)				
+	2154.	14.50		1459.	518.	173.	125.
			(INCHES)	1.211	1.718	1.719	1.719
			(AC-FT)	723.	1026.	1027.	1027.

CUMULATIVE AREA = 11.20 SQ MI

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303 KK SUB25

RUNOFF FROM SUBBASIN 25

SUBBASIN RUNOFF DATA

305 BA SUBBASIN CHARACTERISTICS

TAREA	24.90	SUBBASIN AREA

PRECIPITATION DATA

14 PB

STORM	3.88	BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

306 LS SCS LOSS RATE

STRTL	0.60	INITIAL ABSTRACTION
CRVNBR	77.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

307 UC SCS DIMENSIONLESS UNITGRAPH

TLAG	4.21	LAG

UNIT HYDROGRAPH
44 END-OF-PERIOD ORDINATES

104.	328.	630.	1045.	1578.	2093.	2463.	2665.	2694.	2636.
2445.	2221.	1949.	1609.	1290.	1064.	882.	737.	627.	524.
433.	361.	300.	252.	207.	174.	143.	120.	100.	84.
70.	58.	49.	40.	34.	29.	25.	21.	18.	14.
11.	8.	5.	2.						

HYDROGRAPH AT STATION SUB25

TOTAL RAINFALL = 3.88, TOTAL LOSS = 2.16, TOTAL EXCESS = 1.72

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
		(CFS)				
+	3294.	16.50	2718.	1148.	384.	278.
		(INCHES)	1.015	1.714	1.719	1.719
		(AC-FT)	1348.	2276.	2282.	2282.

CUMULATIVE AREA = 24.90 SQ MI

308 KK 18 COMBINE 1-23 WITH 24 AND 25

ADD THREE HYDROGRAPHS

310 HC HYDROGRAPH COMBINATION

ICOMP	3	NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 18

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
52898.	26.50		49842.	36228.	17709.	13126.
		(INCHES)	0.434	1.262	1.851	1.896
		(AC-FT)	24715.	71858.	105377.	107938.

CUMULATIVE AREA = 1067.30 SQ MI

311 KK — ROUTE HYDROGRAPH 1-25 THRUGH REACH 13

HYDROGRAPH ROUTING DATA

312 RL — ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

313 RS — STORAGE ROUTING

NSTPS	6	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

314 RC — NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.035	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	21354.	REACH LENGTH
SEL	0.0027	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
316 RY	ELEVATION	1184.00	1182.00	1180.00	1179.90	1180.00	1182.00	1180.00	1181.40
315 RX	DISTANCE	0.00	2200.00	2900.00	4100.00	4300.00	5300.00	6250.00	7470.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	121.00	321.07	571.28	871.63	1222.11	1622.74	2073.47	2563.46	3083.69
OUTFLOW	0.00	157.10	670.89	1509.85	2685.67	4218.42	6130.94	8452.32	11293.86	14555.89
ELEVATION	1179.90	1180.12	1180.33	1180.55	1180.76	1180.98	1181.19	1181.41	1181.63	1181.84
STORAGE	3633.98	4210.75	4812.64	5439.63	6091.74	6768.95	7471.28	8198.71	8951.26	9728.91
OUTFLOW	18335.17	22851.67	27872.09	33384.53	39385.46	45875.11	52855.70	60330.64	68304.11	76780.82
ELEVATION	1182.06	1182.27	1182.49	1182.71	1182.92	1183.14	1183.35	1183.57	1183.78	1184.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 22852. TO 76781.

THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION 13

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 52664.	28.00		49623.	36197.	17681.	13045.
		(INCHES)	0.432	1.261	1.848	1.884
		(AC-FT)	24607.	71795.	105207.	107268.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
1242.	28.00	1191.	951.	535.	401.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1183.35	28.00	1183.25	1182.78	1181.80	1181.37

CUMULATIVE AREA = 1067.30 SQ MI

317 KK SUB26

RUNOFF FROM SUBBASIN 26

7 IN TIME DATA FOR INPUT TIME SERIES

JXMIN	15	TIME INTERVAL IN MINUTES
JXDATE	18APR88	STARTING DATE
JXTIME	1200	STARTING TIME

SUBBASIN RUNOFF DATA

319 BA SUBBASIN CHARACTERISTICS

TAREA	42.40	SUBBASIN AREA

PRECIPITATION DATA

320 PB

STORM	4.12	BASIN TOTAL PRECIPITATION

321 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

```
          ###############
          #             #
189 KK    #       11    #     COMBINE 1-15 WITH 14 AND 16
          #             #
          ###############
                          ADD THREE HYDROGRAPHS

191 HC                HYDROGRAPH COMBINATION
                           ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ###

     ###              ###              ###              ###              ###
                          HYDROGRAPH AT STATION       11

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR      99.50-HR
+   (CFS)     (HR)
                           (CFS)
+   44991.    21.50                    41164.       27682.       12492.        9105.
                          (INCHES)      0.524        1.410        1.909         1.922
                           (AC-FT)     20412.       54907.       74334.        74874.

                          CUMULATIVE AREA =  730.30 SQ MI


          ###############
          #             #
192 KK    #       1     #     ROUTE (LOWER CENTENNIAL - NARROWS DAM)
          #             #
          ###############
                          ROUTE TOTAL HYDROGRAPH THROUGH RESERVOIR

                HYDROGRAPH ROUTING DATA

174 RL            ROUTING LOSSES
                       QLOSS        0.00  INITIAL LOSS
                       CLOSS        0.00  ADDITIONAL FRACTION LOST

194 RS            STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC      224.00  INITIAL CONDITION
                           X        0.00 WORKING R AND D COEFFICIENT

195 SV              STORAGE         0.0       0.0       0.0     500.0     850.0    1240.0    1700.0    2300.0    2620.0    2900.0

196 SE              ELEVATION     224.00    232.00    236.86    243.86    245.86    247.86    249.86    251.86    252.86    253.86
```

331 LS SCS LOSS RATE
STRTL 0.53 INITIAL ABSTRACTION
CRVNBR 79.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

332 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 3.19 LAG

UNIT HYDROGRAPH
34 END-OF-PERIOD ORDINATES

368.	1082.	2191.	3722.	5061.	5799.	5948.	5674.	5085.	4323.
3345.	2556.	2004.	1592.	1276.	1009.	791.	622.	493.	389.
304.	239.	191.	152.	119.	93.	75.	61.	50.	40.
29.	21.	12.	3.						

HYDROGRAPH AT STATION SUB2C

TOTAL RAINFALL = 4.12, TOTAL LOSS = 2.06, TOTAL EXCESS = 2.06

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 8349.	15.50		6240.	2348.	783.	567.
		(INCHES)	1.368	2.059	2.061	2.061
		(AC-FT)	3094.	4657.	4661.	4661.

CUMULATIVE AREA = 42.40 SQ MI

333 KK 19 COMBINE 1-25 WITH 26
ADD TWO HYDROGRAPHS

335 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 19

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 53202.	28.00		50235.	36818.	18346.	13611.

(INCHES)	0.421	1.234	1.844	1.891
(AC-FT)	24910.	73027.	109164.	111923.

CUMULATIVE AREA = 1109.70 SQ MI

*** ***

336 KK 14 ROUTE HYDROGRAPH 1-26 THROUGH REACH 14

HYDROGRAPH ROUTING DATA

337 RL ROUTING LOSSES
- QLOSS 0.00 INITIAL LOSS
- CLOSS 0.00 ADDITIONAL FRACTION LOST

338 RS STORAGE ROUTING
- NSTPS 14 NUMBER OF SUBREACHES
- ITYP FLOW TYPE OF INITIAL CONDITION
- RSVRIC -1.00 INITIAL CONDITION
- X 0.00 WORKING R AND D COEFFICIENT

339 RC NORMAL DEPTH CHANNEL ROUTING
- ANL 0.065 LEFT OVERBANK N-VALUE
- ANCH 0.045 MAIN CHANNEL N-VALUE
- ANR 0.065 RIGHT OVERBANK N-VALUE
- RLNTH 46354. REACH LENGTH
- SEL 0.0027 ENERGY SLOPE
- ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---			------ MAIN CHANNEL -------			--- RIGHT OVERBANK ---	
341 RY	ELEVATION	1100.00	1096.00	1092.00	1090.00	1088.00	1090.00	1092.00	1098.00
340 RX	DISTANCE	0.00	2900.00	5300.00	5440.00	5630.00	5720.00	5730.00	8140.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	29.71	118.85	267.42	465.83	696.47	958.94	1340.65	2125.70	3335.93
OUTFLOW	0.00	22.28	141.44	417.03	932.09	1662.43	2610.83	3958.31	5971.77	8887.00
ELEVATION	1088.00	1088.63	1089.26	1089.89	1090.53	1091.16	1091.79	1092.42	1093.05	1093.68
STORAGE	4971.35	7031.95	9517.74	12431.66	15812.03	19670.65	24005.14	28706.59	33715.77	39032.71
OUTFLOW	12947.70	18367.96	25343.48	33994.13	44481.53	57141.51	72368.65	91153.86	112509.87	136501.47
ELEVATION	1094.32	1094.95	1095.58	1096.21	1096.84	1097.47	1098.11	1098.74	1099.37	1100.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1662. TO 136501.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 14

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  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      99.50-HR
+   (CFS)       (HR)
                           (CFS)
+   52167.      31.50                  49473.      36666.       18325.       13516.
                         (INCHES)       0.415       1.229        1.842        1.878
                          (AC-FT)      24532.      72726.      109042.      111143.

 PEAK STORAGE   TIME                             MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      99.50-HR
+  (AC-FT)      (HR)
     1297.      31.50                   1238.        945.         478.         353.

  PEAK STAGE    TIME                              MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      99.50-HR
+   (FEET)      (HR)
   1097.23      31.50                 1097.09     1096.32      1094.39      1093.04

                          CUMULATIVE AREA = 1109.70 SQ MI


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

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              *            *
  342 KK      *    SUB27   *
              *            *
              **************
                         RUNOFF FROM SUBBASIN 27

                SUBBASIN RUNOFF DATA

  344 BA          SUBBASIN CHARACTERISTICS
                        TAREA        62.10   SUBBASIN AREA

                  PRECIPITATION DATA

  320 PB                STORM         4.12   BASIN TOTAL PRECIPITATION

  321 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.02
                     0.02     0.03     0.05     0.38     0.07     0.04     0.03     0.02     0.02     0.01
                     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01

  345 LS          SCS LOSS RATE
                        STRTL         0.60   INITIAL ABSTRACTION
                        CRVNBR       77.00   CURVE NUMBER
                        RTIMP         0.00   PERCENT IMPERVIOUS AREA

  346 UD          SCS DIMENSIONLESS UNITGRAPH
                        TLAG          4.35   LAG
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UNIT HYDROGRAPH
45 END-OF-PERIOD ORDINATES

235.	754.	1443.	2385.	3604.	4849.	5785.	6338.	6508.	6466.
6083.	5587.	5003.	4265.	3454.	2822.	2357.	1968.	1671.	1412.
1189.	976.	828.	689.	583.	484.	406.	337.	284.	239.
200.	169.	140.	118.	97.	83.	70.	62.	53.	45.
36.	28.	21.	14.	7.					

HYDROGRAPH AT STATION SUB27

TOTAL RAINFALL = 4.12, TOTAL LOSS = 2.21, TOTAL EXCESS = 1.91

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+	(CFS)	(HR)				
		(CFS)				
+	8912.	12.50	7451.	3172.	1061.	768.
		(INCHES)	1.116	1.900	1.906	1.906
		(AC-FT)	3695.	6292.	6313.	6313.

CUMULATIVE AREA = 62.10 SQ MI

347 KK — 3 — ROUTE (EAGLETAIL REACH)

ROUTE HYDROGRAPH THROUGH DETENTION STRUCTURE

HYDROGRAPH ROUTING DATA

337 RL — ROUTING LOSSES
- QLOSS 0.00 INITIAL LOSS
- CLOSS 0.00 ADDITIONAL FRACTION LOST

349 RS — STORAGE ROUTING
- NSTPS 1 NUMBER OF SUBREACHES
- ITYP ELEV TYPE OF INITIAL CONDITION
- RSVRIC 1252.50 INITIAL CONDITION
- X 0.00 WORKING R AND D COEFFICIENT

350 SV	STORAGE	5.0	50.0	155.0	310.0	525.0	790.0	1110.0	1485.0	1905.0	2355.0
351 SE	ELEVATION	1252.50	1253.00	1253.50	1254.00	1254.50	1255.00	1255.50	1256.00	1256.50	1257.00
352 SQ	DISCHARGE	0.	20.	50.	90.	140.	200.	260.	325.	400.	475.

HYDROGRAPH AT STATION 3

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
952.	29.00		946.	888.	695.	554.
		(INCHES)	0.142	0.532	1.250	1.376
		(AC-FT)	469.	1761.	4136.	4558.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
(AC-FT)	(HR)				
5220.	29.00	5164.	4832.	3678.	2902.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
(FEET)	(HR)				
1260.18	29.00	1260.14	1259.75	1258.47	1257.35

CUMULATIVE AREA = 62.10 SQ MI

353 KK 20 COMBINE 1-26 WITH 27

ADD TWO HYDROGRAPHS

355 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)					
		(CFS)				
53110.	31.50		50410.	37547.	19020.	14070.
		(INCHES)	0.400	1.192	1.811	1.851
		(AC-FT)	24997.	74473.	113179.	115701.

CUMULATIVE AREA = 1171.80 SQ MI

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          I          I
356 KK    I    SUB28 I
          I          I
          IIIIIIIIIIIIII
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RUNNOFF FROM SUBBASIN 28

SUBBASIN RUNOFF DATA

358 BA SUBBASIN CHARACTERISTICS

TAREA	84.40	SUBBASIN AREA

PRECIPITATION DATA

320 PB STORM	4.12	BASIN TOTAL PRECIPITATION

321 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

359 LS SCS LOSS RATE

STRTL	0.67	INITIAL ABSTRACTION
CRVNBR	75.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

360 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	15.06	LAG

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UNIT HYDROGRAPH TRUNCATED FROM 153 TO 150 INTERVALS

UNIT HYDROGRAPH
150 END-OF-PERIOD ORDINATES
VOLUME = 1.00

26.	52.	78.	137.	198.	259.	335.	413.	491.	591.
695.	800.	930.	1069.	1209.	1366.	1531.	1696.	1845.	1984.
2124.	2238.	2334.	2429.	2503.	2555.	2608.	2641.	2649.	2658.
2660.	2651.	2643.	2620.	2568.	2516.	2461.	2400.	2340.	2277.
2207.	2138.	2066.	1979.	1892.	1804.	1699.	1595.	1491.	1404.
1317.	1230.	1168.	1107.	1046.	993.	940.	888.	843.	800.
756.	722.	690.	658.	626.	595.	563.	535.	509.	483.
456.	430.	404.	383.	365.	348.	330.	313.	296.	280.
267.	254.	241.	228.	215.	203.	193.	183.	174.	164.
155.	146.	139.	133.	126.	119.	113.	106.	102.	97.
92.	87.	83.	78.	74.	71.	67.	64.	60.	57.
54.	51.	49.	46.	43.	41.	39.	37.	35.	34.
32.	30.	29.	28.	27.	26.	25.	24.	22.	21.
20.	19.	18.	17.	16.	15.	14.	13.	12.	11.
11.	10.	9.	8.	7.	6.	5.	4.	4.	3.

###

HYDROGRAPH AT STATION SUB28

TOTAL RAINFALL = 4.12, TOTAL LOSS = 2.36, TOTAL EXCESS = 1.76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4285.	28.50		4195.	3190.	1328.	962.
		(INCHES)	0.462	1.406	1.756	1.757
		(AC-FT)	2080.	6327.	7903.	7910.

CUMULATIVE AREA = 64.40 SQ MI

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          *            *
361 KK    *    SUB31   *
          *            *
          **************
                 RUNOFF FROM SUBBASIN 31

            SUBBASIN RUNOFF DATA

363 BA        SUBBASIN CHARACTERISTICS
                TAREA       12.00  SUBBASIN AREA

              PRECIPITATION DATA

320 PB          STORM        4.12  BASIN TOTAL PRECIPITATION

321 PI          INCREMENTAL PRECIPITATION PATTERN
                0.00   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01
                0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.02   0.02
                0.02   0.03   0.05   0.38   0.07   0.04   0.03   0.02   0.02   0.01
                0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01
                0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01

364 LS        SCS LOSS RATE
                STRTL        0.33  INITIAL ABSTRACTION
                CRVNBR      86.00  CURVE NUMBER
                RTIMP        0.00  PERCENT IMPERVIOUS AREA

365 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG         0.96  LAG

                                   ***

                              UNIT HYDROGRAPH
                         12 END-OF-PERIOD ORDINATES
     1600.   4569.   4358.   2450.   1236.    633.    323.    165.     84.     45.
       22.      2.

   ***        ***        ***        ***        ***
         HYDROGRAPH AT STATION    SUB31
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TOTAL RAINFALL = 4.12, TOTAL LOSS = 1.46, TOTAL EXCESS = 2.66

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 6754.	13.00	2721.	857.	286.	207.
	(INCHES)	2.108	2.655	2.655	2.655
	(AC-FT)	1349.	1699.	1699.	1699.

CUMULATIVE AREA = 12.00 SQ MI

368 KK 21 COMBINE 1-27 WITH 28 AND 31

ADD THREE HYDROGRAPHS

368 HC HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 21

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
	(CFS)				
+ 57229.	31.50	54405.	40531.	20427.	15239.
	(INCHES)	0.399	1.189	1.797	1.853
	(AC-FT)	26978.	80393.	121551.	125310.

CUMULATIVE AREA = 1268.20 SQ MI

369 KK SUB29

RUNOFF FROM SUBBASIN 29

7 IN TIME DATA FOR INPUT TIME SERIES
JXMIN 15 TIME INTERVAL IN MINUTES
JXDATE 18APR88 STARTING DATE
JXTIME 1200 STARTING TIME

```
SUBBASIN RUNOFF DATA

371 BA     SUBBASIN CHARACTERISTICS
               TAREA      101.30  SUBBASIN AREA

           PRECIPITATION DATA

372 PB         STORM        3.93  BASIN TOTAL PRECIPITATION

373 PI       INCREMENTAL PRECIPITATION PATTERN
             0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
             0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
             0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
             0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
             0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

383 LS     SCS LOSS RATE
               STRTL        0.41  INITIAL ABSTRACTION
               CRVNBR      83.00  CURVE NUMBER
               RTIMP        0.00  PERCENT IMPERVIOUS AREA

384 UD     SCS DIMENSIONLESS UNITGRAPH
               TLAG         4.85  LAG

                                       ***

                                 UNIT HYDROGRAPH
                             50 END-OF-PERIOD ORDINATES
       282.      933.     1773.     2885.     4361.     6120.     7660.     8761.     9401.     9580.
      9523.     9062.     8426.     7698.     6809.     5736.     4735.     3981.     3382.     2876.
      2481.     2138.     1829.     1546.     1313.     1125.      959.      818.      694.      590.
       500.      429.      365.      314.      266.      229.      194.      165.      139.      121.
       103.       92.       81.       69.       58.       47.       38.       28.       19.        9.

   ***        ***        ***        ***        ***
               HYDROGRAPH AT STATION    SUB29

   TOTAL RAINFALL =  3.93, TOTAL LOSS =  1.70, TOTAL EXCESS =  2.23

  PEAK FLOW     TIME                   MAXIMUM AVERAGE FLOW
                               6-HR       24-HR       72-HR     99.50-HR
+   (CFS)       (HR)
                      (CFS)
+   15962.      17.00          13675.      6022.       2021.      1462.
                   (INCHES)    1.255       2.211       2.226      2.226
                   (AC-FT)     6781.      11945.      12024.     12024.

                      CUMULATIVE AREA =  101.30 SQ MI


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

           ***************
           *             *
385 KK     *           4 *      ROUTE (HARQUAHALA F.R.S.)
           *             *
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ROUTE HYDROGRAPH 29 THROUGH DETENTION STRUCTURE

HYDROGRAPH ROUTING DATA

337 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

387 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 1393.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

388 SV	STORAGE	0.0	1000.0	1500.0	2300.0	3500.0	5000.0	7000.0	8500.0	12000.0	14200.0
389 SE	ELEVATION	1393.00	1395.00	1397.00	1399.00	1401.00	1403.00	1405.00	1407.00	1409.00	1411.00
390 SQ	DISCHARGE	0.	121.	172.	210.	243.	272.	298.	322.	344.	1214.

HYDROGRAPH AT STATION 4

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 340.	35.00		340.	339.	336.	281.
		(INCHES)	0.031	0.125	0.370	0.428
		(AC-FT)	169.	673.	1998.	2315.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
11424.	35.00	11409.	11259.	10689.	8646.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1408.67	35.00	1408.66	1408.58	1408.25	1405.57

CUMULATIVE AREA = 101.30 SQ MI

391 KK 15 ROUTE HYDROGRAPH 29 THROUGH REACH 18

HYDROGRAPH ROUTING DATA

392 RL ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

393 RS STORAGE ROUTING

NSTPS	6	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

394 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.040	LEFT OVERBANK N-VALUE
ANCH	0.028	MAIN CHANNEL N-VALUE
ANR	0.040	RIGHT OVERBANK N-VALUE
RLNTH	31771.	REACH LENGTH
SEL	0.0041	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
39c RY	ELEVATION	1205.50	1205.50	1203.50	1203.50	1200.00	1200.00	1203.50	1205.00
395 RX	DISTANCE	0.00	10.00	14.00	24.00	36.00	71.00	83.00	183.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	7.60	15.62	24.05	32.91	42.19	51.88	61.99	72.53	83.48
OUTFLOW	0.00	15.26	48.95	97.21	158.66	232.57	318.50	416.19	525.49	646.33
ELEVATION	1200.00	1200.29	1200.58	1200.87	1201.16	1201.45	1201.74	1202.03	1202.32	1202.61
STORAGE	94.85	106.64	118.85	134.96	155.44	180.12	208.99	242.06	278.26	314.72
OUTFLOW	778.66	922.51	1077.91	1119.80	1328.10	1568.37	1841.09	2148.64	2515.77	2926.57
ELEVATION	1202.89	1203.18	1203.47	1203.76	1204.05	1204.34	1204.63	1204.92	1205.21	1205.50

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 233. TO 2927.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION 15

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
		(CFS)				
340.	36.00		340.	339.	336.	275.
		(INCHES)	0.031	0.125	0.370	0.419
		(AC-FT)	169.	673.	1998.	2262.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
9.	35.50	9.	9.	9.	7.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
(FEET)	(HR)				
1201.80	36.00	1201.80	1201.80	1201.79	1201.48

CUMULATIVE AREA = 101.30 SQ MI

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          *             *
397 KK    *    SUB30    *
          *             *
          ***************
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RUNOFF FROM SUBBASIN 30

SUBBASIN RUNOFF DATA

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399 BA      SUBBASIN CHARACTERISTICS
              TAREA      28.60  SUBBASIN AREA

            PRECIPITATION DATA

372 PB        STORM      3.93  BASIN TOTAL PRECIPITATION

373 PI        INCREMENTAL PRECIPITATION PATTERN
                0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

400 LS      SCS LOSS RATE
              STRTL      0.56  INITIAL ABSTRACTION
              CRVNBR    78.00  CURVE NUMBER
              RTIMP      0.00  PERCENT IMPERVIOUS AREA

401 UD      SCS DIMENSIONLESS UNITGRAPH
              TLAG       4.75  LAG
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***

UNIT HYDROGRAPH
50 END-OF-PERIOD ORDINATES

83.	276.	525.	857.	1299.	1824.	2266.	2570.	2735.	2763.
2735.	2570.	2376.	2155.	1879.	1547.	1271.	1078.	912.	774.
673.	572.	489.	406.	351.	296.	254.	213.	182.	152.
131.	111.	95.	80.	69.	58.	50.	41.	36.	30.
27.	24.	20.	17.	14.	11.	8.	6.	3.	0.

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

HYDROGRAPH AT STATION SUB30

TOTAL RAINFALL = 3.93, TOTAL LOSS = 2.10, TOTAL EXCESS = 1.83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 3710.	17.00	3166.	1401.	469.	340.
		(INCHES) 1.029	1.822	1.831	1.831
		(AC-FT) 1570.	2779.	2793.	2793.

CUMULATIVE AREA = 28.60 SQ MI

402 KK 5 ROUTE (SADDLEBACK F.R.S.)

ROUTE HYDROGRAPH 30 THROUGH DETENTION STRUCTURE

HYDROGRAPH ROUTING DATA

392 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

404 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 1179.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

405 SV	STORAGE	0.0	200.0	400.0	1000.0	1750.0	3000.0	4500.0	6800.0	9300.0	10500.0
406 SE	ELEVATION	1179.00	1181.00	1183.00	1185.00	1187.00	1189.00	1191.00	1193.00	1195.00	1197.00
407 SQ	DISCHARGE	0.	100.	240.	440.	670.	830.	1030.	1200.	1310.	1450.

HYDROGRAPH AT STATION 5

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 700.	28.00	698.	653.	431.	324.
		(INCHES) 0.227	0.849	1.680	1.746
		(AC-FT) 346.	1295.	2563.	2663.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR

+ (AC-FT)	(HR)				
1987.	28.00	1968.	1743.	1030.	769.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1187.38	28.00	1187.35	1186.89	1184.76	1183.41

CUMULATIVE AREA = 28.60 SQ MI

409 KK — ROUTE HYDROGRAPH 30 THROUGH REACH 19

HYDROGRAPH ROUTING DATA

409 RL — ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

410 RS — STORAGE ROUTING

NSTPS	12	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

411 RC — NORMAL DEPTH CHANNEL ROUTING

ANL	0.040	LEFT OVERBANK N-VALUE
ANCH	0.030	MAIN CHANNEL N-VALUE
ANR	0.040	RIGHT OVERBANK N-VALUE
RLNTH	43229.	REACH LENGTH
SEL	0.0038	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---			
413 RY	ELEVATION	1149.50	1149.50	1146.00	1146.00	1143.00	1143.00	1146.00	1147.00
412 RX	DISTANCE	0.00	10.00	24.00	64.00	73.00	205.00	220.00	270.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	45.28	91.49	138.63	186.69	235.69	285.61	336.47	388.25	444.24
OUTFLOW	0.00	67.90	216.45	427.17	692.77	1008.94	1372.76	1782.10	2235.35	2346.87
ELEVATION	1143.00	1143.34	1143.68	1144.03	1144.37	1144.71	1145.05	1145.39	1145.74	1146.08
STORAGE	515.37	592.77	676.16	761.41	847.13	933.31	1019.95	1107.06	1194.64	1282.68
OUTFLOW	2938.74	3606.89	4354.90	5188.90	6088.56	7051.61	8076.16	9160.64	10303.70	11504.13
ELEVATION	1146.42	1146.76	1147.11	1147.45	1147.79	1148.13	1148.47	1148.82	1149.16	1149.50

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 216. TO 11504.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.

THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION 16

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 700.	30.00		698.	653.	428.	318.
		(INCHES)	0.227	0.846	1.671	1.715
		(AC-FT)	346.	1294.	2549.	2617.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
16.	29.50	16.	15.	11.	9.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1144.38	30.00	1144.37	1144.32	1143.99	1143.75

CUMULATIVE AREA = 28.60 SQ MI

414 KK 22 COMBINE 1-31 WITH 29 AND 30

ADD THREE HYDROGRAPHS

416 HC HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 22

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 58266.	31.50		55439.	41517.	21152.	15832.
		(INCHES)	0.369	1.104	1.688	1.746
		(AC-FT)	27490.	82347.	125861.	130189.

CUMULATIVE AREA = 1398.10 SQ MI

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          ***************
          *             *
417 KK    *      17     *     ROUTE HYDROGRAPH 1-31 THROUGH REACH 15
          *             *
          ***************

            HYDROGRAPH ROUTING DATA

418 RL        ROUTING LOSSES
                  QLOSS        0.00  INITIAL LOSS
                  CLOSS        0.00  ADDITIONAL FRACTION LOST

419 RS        STORAGE ROUTING
                  NSTPS           4  NUMBER OF SUBREACHES
                   ITYP        FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC       -1.00  INITIAL CONDITION
                      X        0.00 WORKING R AND D COEFFICIENT

420 RC        NORMAL DEPTH CHANNEL ROUTING
                    ANL       0.055  LEFT OVERBANK N-VALUE
                   ANCH       0.035  MAIN CHANNEL N-VALUE
                    ANR       0.055  RIGHT OVERBANK N-VALUE
                  RLNTH       20833.  REACH LENGTH
                    SEL      0.0030  ENERGY SLOPE
                   ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
422 RY       ELEVATION   1056.00   1050.00   1048.00   1044.00   1044.00   1048.00   1056.00   1056.60
421 RX       DISTANCE       0.00   1800.00   2100.00   2130.00   2700.00   2790.00   3280.00   4300.00

                                                  ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA
          STORAGE       0.00    187.09    386.80    599.14    830.61   1088.15   1371.78   1681.49   2017.28   2379.16
          OUTFLOW       0.00    678.47   2182.44   4349.53   7322.15  10963.21  15277.24  20273.53  25963.71  32361.08
        ELEVATION    1044.00   1044.66   1045.33   1045.99   1046.65   1047.32   1047.98   1048.64   1049.31   1049.97
          STORAGE    2788.57   3271.34   3827.51   4457.08   5160.06   5936.44   6786.23   7709.42   8706.02   9892.33
          OUTFLOW   39210.54  47074.23  55987.37  66015.54  77233.25  89715.39 103535.23 118764.00 135470.90 150104.33
        ELEVATION    1050.63   1051.29   1051.96   1052.62   1053.28   1053.95   1054.61   1055.27   1055.94   1056.60

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     4350. TO   150104.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***           ***           ***           ***           ***
                     HYDROGRAPH AT STATION       17

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      99.50-HR
+   (CFS)       (HR)
                          (CFS)
+   58088.      32.50               55304.      41499.      21137.       15777.
                        (INCHES)     0.368       1.104       1.687        1.740
                        (AC-FT)     27424.      82313.     125771.      129737.
```

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
990.	32.50	946.	735.	422.	323.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
1052.10	32.50	1051.90	1050.76	1048.36	1047.40

CUMULATIVE AREA = 1398.10 SQ MI

423 KK SUB32

RUNOFF FROM SUBBASIN 32

SUBBASIN RUNOFF DATA

425 BA SUBBASIN CHARACTERISTICS

TAREA 52.40 SUBBASIN AREA

PRECIPITATION DATA

372 PB STORM 3.93 BASIN TOTAL PRECIPITATION

373 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

426 LS SCS LOSS RATE

STRTL 0.53 INITIAL ABSTRACTION

CRVNBR 79.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

427 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 5.05 LAG

UNIT HYDROGRAPH

52 END-OF-PERIOD ORDINATES

135.	440.	835.	1352.	2031.	2847.	3617.	4208.	4587.	4754.
4763.	4641.	4358.	4032.	3657.	3197.	2659.	2208.	1890.	1616.
1384.	1207.	1042.	898.	762.	652.	562.	482.	414.	352.
303.	256.	222.	189.	164.	140.	121.	103.	89.	76.
65.	56.	49.	44.	39.	33.	28.	23.	18.	14.
9.	5.								

HYDROGRAPH AT STATION SUB32

TOTAL RAINFALL = 3.93, TOTAL LOSS = 2.02, TOTAL EXCESS = 1.91

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
	(CFS)				
6774.	17.50	5882.	2668.	896.	648.
	(INCHES)	1.044	1.893	1.907	1.907
	(AC-FT)	2917.	5291.	5329.	5329.

CUMULATIVE AREA = 52.40 SQ MI

428 KK 23 COMBINE 1-31 WITH 32

ADD TWO HYDROGRAPHS

430 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 23

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
	(CFS)				
58488.	32.00	55763.	42054.	22013.	16425.
	(INCHES)	0.357	1.078	1.693	1.746
	(AC-FT)	27651.	83413.	130989.	135066.

CUMULATIVE AREA = 1450.50 SQ MI

431 KK 18 ROUTE HYDROGRAPH 1-32 THROUGH REACH 16

HYDROGRAPH ROUTING DATA

432 RL ROUTING LOSSES

QLOSS	0.00	INITIAL LOSS
CLOSS	0.00	ADDITIONAL FRACTION LOST

433 RS STORAGE ROUTING

NSTPS	14	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

434 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.065	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	58333.	REACH LENGTH
SEL	0.0024	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
435 RY	ELEVATION	930.00	928.00	924.00	920.00	920.00	924.00	928.00	930.00
436 RX	DISTANCE	0.00	700.00	1300.00	1400.00	1550.00	1600.00	1800.00	2100.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	112.68	239.25	379.76	534.17	702.49	884.72	1080.87	1295.74	1573.95
OUTFLOW	0.00	96.16	313.47	633.66	1053.60	1573.89	2196.77	2925.26	3824.26	4956.51
ELEVATION	920.00	920.53	921.05	921.58	922.11	922.63	923.16	923.68	924.21	924.74
STORAGE	1926.36	2352.96	2853.74	3428.72	4077.89	4801.25	5634.41	6650.82	7852.71	9240.08
OUTFLOW	6270.91	7795.27	9553.58	11567.64	13857.81	16443.37	19090.04	22172.76	25793.16	29990.18
ELEVATION	925.26	925.79	926.32	926.84	927.37	927.89	928.42	928.95	929.47	930.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 2197. TO 16443.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 18

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 57432.	36.50		54966.	41911.	21986.	16294.
		(INCHES)	0.352	1.075	1.691	1.732
		(AC-FT)	27256.	83130.	130826.	133987.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
1308.	36.50	1250.	941.	486.	361.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
933.44	36.50	933.13	931.49	928.29	926.45

CUMULATIVE AREA = 1450.50 SQ MI

KK SUB33

RUNOFF FROM SUBBASIN 33

SUBBASIN RUNOFF DATA

BA SUBBASIN CHARACTERISTICS
TAREA 47.00 SUBBASIN AREA

PRECIPITATION DATA

PB STORM 3.93 BASIN TOTAL PRECIPITATION

PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

LS SCS LOSS RATE
STRTL 0.50 INITIAL ABSTRACTION
CRVNBR 80.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

UD SCS DIMENSIONLESS UNITGRAPH
TLAG 4.00 LAG

UNIT HYDROGRAPH
42 END-OF-PERIOD ORDINATES

226.	704.	1354.	2259.	3405.	4414.	5042.	5309.	5309.	5042.
4615.	4103.	3443.	2739.	2215.	1819.	1495.	1266.	1049.	860.
710.	584.	487.	397.	328.	270.	223.	186.	152.	127.
105.	86.	71.	59.	51.	44.	36.	29.	22.	16.
9.	3.								

HYDROGRAPH AT STATION SUB33

TOTAL RAINFALL = 3.93, TOTAL LOSS = 1.95, TOTAL EXCESS = 1.98

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR (CFS)	24-HR	72-HR	99.50-HR

+	7521.	16.50		6137.	2501.	836.	605.
			(INCHES)	1.214	1.979	1.984	1.984
			(AC-FT)	3043.	4960.	4973.	4973.

CUMULATIVE AREA = 47.00 SQ MI

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          ***************
          *             *
442 KK    *    SUB34    *
          *             *
          ***************
```

RUNOFF FROM SUBBASIN 34

SUBBASIN RUNOFF DATA

```
444 BA          SUBBASIN CHARACTERISTICS
                     TAREA        64.30  SUBBASIN AREA

                PRECIPITATION DATA

372 PB               STORM         3.93  BASIN TOTAL PRECIPITATION

373 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                    0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.02
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

445 LS          SCS LOSS RATE
                     STRTL         0.47  INITIAL ABSTRACTION
                     CRVNBR       81.00  CURVE NUMBER
                     RTIMP         0.00  PERCENT IMPERVIOUS AREA

446 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG          4.64  LAG

                                        ***

                                    UNIT HYDROGRAPH
                                48 END-OF-PERIOD ORDINATES
                  201.    661.   1259.   2062.   3123.   4332.   5321.   5979.   6304.   6341.
                 6197.   5790.   5317.   4757.   4064.   3330.   2753.   2324.   1961.   1675.
                 1438.   1221.   1026.    866.    736.    624.    527.    445.    374.    317.
                  269.    229.    193.    165.    139.    118.     99.     84.     71.     63.
                   55.     47.     40.     32.     25.     19.     12.      6.

      ***             ***             ***             ***             ***
                        HYDROGRAPH AT STATION    SUB34

       TOTAL RAINFALL =  3.93, TOTAL LOSS =  1.87, TOTAL EXCESS =  2.06

PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
```

			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9666.	17.00		8192.	3545.	1183.	860.
		(INCHES)	1.185	2.053	2.063	2.063
		(AC-FT)	4062.	7039.	7074.	7074.

CUMULATIVE AREA = 64.30 SQ MI

447 KK — 24 — COMBINE 1-32 WITH 33 AND 34

ADD THREE HYDROGRAPHS

449 HC — HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 24

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 57549.	36.50		55116.	42285.	23787.	17759.
		(INCHES)	0.328	1.007	1.699	1.753
		(AC-FT)	27330.	83872.	141541.	146034.

CUMULATIVE AREA = 1561.80 SQ MI

450 KK — SUB35

RUNOFF FROM SUBBASIN 35

SUBBASIN RUNOFF DATA

452 BA — SUBBASIN CHARACTERISTICS
TAREA 99.60 SUBBASIN AREA

PRECIPITATION DATA

372 PB — STORM 3.93 BASIN TOTAL PRECIPITATION

```
373 PI        INCREMENTAL PRECIPITATION PATTERN
                0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.02
                0.02    0.03    0.05    0.38    0.07    0.04    0.03    0.02    0.02    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01
                0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.01

453 LS        SCS LOSS RATE
                STRTL        0.30  INITIAL ABSTRACTION
                CRVNBR      87.00  CURVE NUMBER
                RTIMP        0.00  PERCENT IMPERVIOUS AREA

454 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG         4.73  LAG

                                        ***

                                   UNIT HYDROGRAPH
                               49 END-OF-PERIOD ORDINATES
        293.     973.    1850.    3020.    4578.    6414.    7952.    9004.    9568.    9657.
       9525.    8952.    8265.    7481.    6500.    5348.    4398.    3726.    3151.    2677.
       2323.    1974.    1683.    1432.    1208.    1019.     873.     732.     625.     523.
        450.     380.     326.     275.     236.     199.     170.     142.     123.     104.
         93.      81.      69.      58.      47.      37.      27.      17.       8.

     ***           ***          ***          ***          ***
                     HYDROGRAPH AT STATION    SUB35

     TOTAL RAINFALL =  3.93, TOTAL LOSS =  1.36, TOTAL EXCESS =  2.57

   PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     99.50-HR
 +   (CFS)       (HR)
                          (CFS)
 +   18727.     17.00               15876.       6837.       2297.       1662.
                      (INCHES)      1.482       2.553       2.573       2.573
                       (AC-FT)      7872.      13561.      13665.      13665.

                      CUMULATIVE AREA =    99.60 SQ MI


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

            **************
            *            *
455 KK      *       6    *     ROUTE (OLD CAMP DETENTION BASIN)
            *            *
            **************
                   ROUTE HYDROGRAPH 35 THROUGH OLD CAMP DETENTION (UPSTRM OF C.A.P.)

        HYDROGRAPH ROUTING DATA

432 RL        ROUTING LOSSES
                QLOSS        0.00  INITIAL LOSS
                CLOSS        0.00  ADDITIONAL FRACTION LOST
```

457 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 0.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

458 SV	STORAGE	0.0	163.0	326.0	489.0	652.0	816.0	978.0	1141.0	1222.0	1344.0
459 SE	ELEVATION	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	15.00	16.00
460 SQ	DISCHARGE	0.	150.	315.	585.	825.	1020.	1200.	1335.	1410.	1500.

HYDROGRAPH AT STATION 6

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 6206.	23.50	6113.	4936.	2281.	1659.
		(INCHES) 0.571	1.844	2.556	2.568
		(AC-FT) 3031.	9795.	13576.	13641.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
7724.	23.50	7597.	6005.	2624.	1907.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
68.29	23.50	67.25	54.20	24.92	18.14

CUMULATIVE AREA = 99.60 SQ MI

461 KK 19 ROUTE HYDROGRAPH 35 THROUGH REACH 17

HYDROGRAPH ROUTING DATA

462 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

463 RS STORAGE ROUTING

NSTPS	24	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

464 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.060	LEFT OVERBANK N-VALUE
ANCH	0.035	MAIN CHANNEL N-VALUE
ANR	0.060	RIGHT OVERBANK N-VALUE
RLNTH	105600.	REACH LENGTH
SEL	0.0049	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---			+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
466 RY	ELEVATION	1004.00	1003.00	1002.00	1000.00	1002.00	1002.00	1003.00	1004.00
465 RX	DISTANCE	0.00	200.00	400.00	600.00	800.00	1000.00	1200.00	1400.00

xxx

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	112.82	247.12	402.92	580.21	778.98	999.24	1241.00	1504.24	1788.97
OUTFLOW	0.00	46.19	153.35	315.88	534.96	813.27	1154.00	1560.57	2032.47	2565.19
ELEVATION	1000.00	1000.21	1000.42	1000.63	1000.84	1001.05	1001.26	1001.47	1001.68	1001.89
STORAGE	2097.88	2447.07	2839.25	3274.41	3752.54	4273.65	4837.74	5444.81	6094.85	6787.88
OUTFLOW	3278.39	4125.85	5067.71	6109.25	7255.04	8509.32	9876.11	11359.29	12962.61	14689.76
ELEVATION	1002.11	1002.32	1002.53	1002.74	1002.95	1003.16	1003.37	1003.58	1003.79	1004.00

xxx WARNING xxx MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 2565. TO 14689.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

xxx xxx xxx xxx xxx

HYDROGRAPH AT STATION 19

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)	(CFS)				
+ 6175.	29.00		6078.	4878.	2265.	1645.
		(INCHES)	0.567	1.821	2.537	2.547
		(AC-FT)	3014.	9675.	13476.	13525.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)					
138.	29.00		136.	115.	61.	45.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)					
1002.75	29.00		1002.73	1002.47	1001.50	1001.11

CUMULATIVE AREA = 99.60 SQ MI

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467 KK      SUB3c
```

RUNOFF FROM SUBBASIN 3c

SUBBASIN RUNOFF DATA

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469 BA      SUBBASIN CHARACTERISTICS
              TAREA     1e3.10  SUBBASIN AREA

            PRECIPITATION DATA

372 PB            STORM      3.93  BASIN TOTAL PRECIPITATION

373 PI      INCREMENTAL PRECIPITATION PATTERN
              0.00   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01
              0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.02   0.02
              0.02   0.03   0.05   0.38   0.07   0.04   0.03   0.02   0.02   0.01
              0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01
              0.01   0.01   0.01   0.01   0.01   0.01   0.01   0.01

470 LS      SCS LOSS RATE
              STRTL      0.53  INITIAL ABSTRACTION
              CRVNBR    79.00  CURVE NUMBER
              RTIMP      0.00  PERCENT IMPERVIOUS AREA

471 UD      SCS DIMENSIONLESS UNITGRAPH
              TLAG      12.25  LAG
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UNIT HYDROGRAPH
125 END-OF-PERIOD ORDINATES

76.	151.	277.	454.	630.	857.	1084.	1349.	1651.	1954.
2357.	2761.	3202.	3681.	4160.	4564.	4967.	5307.	5585.	5862.
6013.	6165.	6253.	6278.	6303.	6278.	6253.	6165.	6013.	5862.
5686.	5509.	5320.	5118.	4917.	4664.	4412.	4135.	3832.	3530.
3278.	3026.	2811.	2635.	2458.	2307.	2156.	2017.	1891.	1765.
1673.	1581.	1489.	1397.	1305.	1229.	1153.	1078.	1002.	927.
876.	826.	775.	725.	674.	637.	599.	561.	523.	485.
458.	430.	402.	374.	347.	328.	309.	290.	271.	252.
238.	224.	211.	197.	183.	173.	163.	153.	142.	132.
125.	117.	110.	102.	95.	90.	84.	79.	74.	69.
66.	63.	60.	57.	54.	51.	48.	45.	42.	39.
36.	33.	30.	28.	25.	23.	20.	18.	15.	13.
10.	8.	5.	3.	0.					

HYDROGRAPH AT STATION SUB3c

TOTAL RAINFALL = 3.93. TOTAL LOSS = 2.02. TOTAL EXCESS = 1.91

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 10654.	25.50	10351.	7239.	2787.	2017.
		(INCHES) 0.590	1.651	1.907	1.907
		(AC-FT) 5133.	14359.	16587.	16587.

CUMULATIVE AREA = 163.10 SQ MI

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***************
*             *
*      25     *    COMBINE 1-34 WITH 35 AND 36
*             *
***************
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ALL THREE HYDROGRAPHS

474 HC HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION 25

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)				
		(CFS)			
+ 67675.	36.00	65106.	51898.	28818.	21421.
		(INCHES) 0.332	1.058	1.762	1.810
		(AC-FT) 32284.	102939.	171481.	176149.

CUMULATIVE AREA = 1824.50 SQ MI

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***************
*             *
*      20     *    ROUTE HYDROGRAPH 1-36 THROUGH REACH 20
*             *
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HYDROGRAPH ROUTING DATA

476 RL ROUTING LOSSES
QLOSS 0.00 INITIAL LOSS
CLOSS 0.00 ADDITIONAL FRACTION LOST

477 RS STORAGE ROUTING
NSTPS 6 NUMBER OF SUBREACHES

	ITYP	FLOW TYPE OF INITIAL CONDITION
	RSVRIC	-1.00 INITIAL CONDITION
	X	0.00 WORKING R AND D COEFFICIENT

478 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.065	LEFT OVERBANK N-VALUE
ANCH	0.040	MAIN CHANNEL N-VALUE
ANR	0.060	RIGHT OVERBANK N-VALUE
RLNTH	30729.	REACH LENGTH
SEL	0.0024	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
480 RY	ELEVATION	848.00	844.00	842.00	840.00	840.00	842.00	846.00	848.00
479 RY	DISTANCE	0.00	400.00	800.00	1000.00	1100.00	1500.00	1800.00	2300.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	48.46	134.44	257.95	418.97	617.02	841.35	1087.57	1355.68	1645.67
OUTFLOW	0.00	56.62	230.75	557.37	1070.19	1848.37	3011.84	4420.45	6074.70	7976.42
ELEVATION	840.00	840.42	840.84	841.26	841.68	842.11	842.53	842.95	843.37	843.79
STORAGE	1957.55	2291.31	2646.97	3024.50	3423.93	3854.91	4341.10	4883.57	5482.31	6137.33
OUTFLOW	10128.45	12534.34	15198.17	18124.32	21317.47	24802.22	28203.85	32194.92	36586.83	41396.46
ELEVATION	844.21	844.63	845.05	845.47	845.89	846.32	846.74	847.16	847.58	848.00

HYDROGRAPH AT STATION 20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
+ (CFS)	(HR)					
		(CFS)				
+ 67261.	37.50		64805.	51857.	28784.	21316.
		(INCHES)	0.330	1.057	1.760	1.801
		(AC-FT)	32135.	102856.	171276.	175288.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (AC-FT)	(HR)				
1610.	37.50	1554.	1260.	740.	557.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	99.50-HR
+ (FEET)	(HR)				
850.26	37.50	850.05	848.92	846.41	845.00

CUMULATIVE AREA = 1824.50 SQ MI

481 KK SUB37

RUNOFF FROM SUBBASIN 37

SUBBASIN RUNOFF DATA

483 BA SUBBASIN CHARACTERISTICS
TAREA 45.80 SUBBASIN AREA

PRECIPITATION DATA

372 PB STORM 3.93 BASIN TOTAL PRECIPITATION

373 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.02	0.03	0.05	0.38	0.07	0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		

484 LS SCS LOSS RATE
STRTL 0.41 INITIAL ABSTRACTION
CRVNBR 83.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

485 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 4.43 LAG

UNIT HYDROGRAPH
46 END-OF-PERIOD ORDINATES

165.	531.	1016.	1674.	2532.	3434.	4130.	4557.	4714.	4700.
4472.	4129.	3733.	3238.	2638.	2146.	1806.	1507.	1273.	1089.
918.	766.	641.	540.	456.	380.	320.	265.	225.	188.
160.	134.	113.	95.	80.	67.	57.	49.	43.	37.
30.	24.	19.	14.	9.	4.				

HYDROGRAPH AT STATION SUB37

TOTAL RAINFALL = 3.93, TOTAL LOSS = 1.70, TOTAL EXCESS = 2.23

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	99.50-HR
* (CFS)	(HR)					
		(CFS)				
* 7718.	16.50		6451.	2728.	914.	661.
		(INCHES)	1.310	2.215	2.226	2.226
		(AC-FT)	3199.	5411.	5436.	5436.

CUMULATIVE AREA = 45.80 SQ MI

```
                ##############
                #            #
46a KK          #       26   #     COMBINE 1-36 WITH 37
                #            #
                ##############
                          ADD TWO HYDROGRAPHS

488 HC                HYDROGRAPH COMBINATION
                            ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ###

          ###             ###             ###             ###             ###
                              HYDROGRAPH AT STATION       26

 PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      99.50-HR
+   (CFS)       (HR)
                                (CFS)
+   6729.       37.50                    6484.       5214.       2958.       2197.
                              (INCHES)    0.322       1.037       1.765       1.812
                              (AC-FT)    32156.     103431.     176063.     180725.

                          CUMULATIVE AREA = 1870.30 SQ MI
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
+                        SUB 1      7279.    18.50       6534.       3185.       1076.      67.00

          ROUTED TO
+                           1       7110.    21.00       6359.       3128.       1076.      67.00
+                                                                                          2202.93     21.00

          HYDROGRAPH AT
+                        SUB 2     10490.    29.00      10270.       7912.       3347.     185.00

          HYDROGRAPH AT
+                        SUB 3      5890.    17.00       5043.       2234.        749.      43.00

          3 COMBINED AT
+                           1      16527.    22.50      16122.      12504.       5171.     295.00

          ROUTED TO
+                           2      16451.    24.50      16077.      12466.       5163.     295.00
+                                                                                          2085.05     24.50

          HYDROGRAPH AT
+                        SUB 4      4125.    15.50       3101.       1172.        391.      21.60

          HYDROGRAPH AT
```

	SUB4A	3440.	15.50	2626.	1004.	335.	16.50	
3 COMBINED AT								
	2	17871.	23.50	17400.	13462.	5882.	335.10	
HYDROGRAPH AT								
	SUB 5	9311.	15.00	6690.	2443.	815.	48.70	
2 COMBINED AT								
	3	19493.	22.50	18935.	15480.	6696.	383.80	
ROUTED TO								
	3	19501.	23.50	18917.	15436.	6689.	383.80	
							2024.21	23.50
HYDROGRAPH AT								
	SUB 6	5325.	14.50	3647.	1287.	429.	23.70	
HYDROGRAPH AT								
	SUB 7	6689.	16.50	5465.	2239.	748.	44.70	
3 COMBINED AT								
	4	27317.	16.00	23264.	18448.	7858.	452.20	
ROUTED TO								
	4	26730.	16.00	22948.	18262.	7832.	452.20	
							1944.79	16.00
HYDROGRAPH AT								
	SUB 8	6274.	15.00	4494.	1634.	545.	31.30	
HYDROGRAPH AT								
	SUB8A	3764.	14.50	2457.	846.	282.	16.20	
3 COMBINED AT								
	5	31129.	18.00	26075.	19520.	8641.	499.70	
HYDROGRAPH AT								
	SUB 9	10078.	15.00	7392.	2725.	909.	52.20	
2 COMBINED AT								
	6	36933.	17.50	30286.	21849.	9548.	551.90	
ROUTED TO								
	5	36672.	18.50	30201.	21784.	9545.	551.90	
							1889.47	18.50
HYDROGRAPH AT								
	SUB10	3610.	14.50	2426.	853.	284.	17.00	
HYDROGRAPH AT								
	SUB11	3531.	15.00	2614.	973.	324.	20.20	
3 COMBINED AT								
	7	39628.	18.50	32637.	23239.	10150.	589.10	
ROUTED TO								

	6	38617.	19.50	32557.	23158.	10133.	589.10	
							1825.04	19.50
HYDROGRAPH AT								
SUB12		2649.	14.00	1582.	532.	177.	10.60	
HYDROGRAPH AT								
SUB12A		2816.	13.50	1527.	497.	166.	9.90	
3 COMBINED AT								
	8	39508.	19.50	33373.	23597.	10460.	609.60	
HYDROGRAPH AT								
SUB13		9907.	16.50	8076.	3303.	1103.	68.70	
2 COMBINED AT								
	9	45375.	19.50	39335.	26472.	11563.	678.30	
HYDROGRAPH AT								
SUB15		3154.	15.50	2423.	932.	311.	18.60	
2 COMBINED AT								
	10	46826.	19.50	40947.	27297.	11873.	696.90	
ROUTED TO								
	7	44034.	22.00	40136.	27147.	11866.	696.90	
							1771.33	22.00
HYDROGRAPH AT								
SUB14		7985.	12.50	2675.	835.	278.	13.70	
HYDROGRAPH AT								
SUB16		6509.	13.50	3441.	1113.	371.	19.70	
3 COMBINED AT								
	11	44991.	21.50	41164.	27682.	12492.	730.30	
ROUTED TO								
	1	44251.	22.50	40703.	27585.	12386.	730.30	
							258.69	22.50
ROUTED TO								
	8	43685.	24.50	40446.	27524.	12374.	730.30	
							1610.99	24.50
HYDROGRAPH AT								
SUB17		5489.	14.00	3273.	1097.	366.	21.00	
HYDROGRAPH AT								
SUB18		4891.	15.00	3503.	1274.	425.	24.40	
3 COMBINED AT								
	12	44910.	24.50	41593.	28177.	13128.	775.70	
ROUTED TO								
	12	44836.	25.00	41548.	28165.	13115.	775.70	
							1444.86	25.00

HYDROGRAPH AT	SUB19	3328.	13.00	1534.	490.	163.	10.60	
HYDROGRAPH AT	SUB20	5433.	19.00	4992.	2588.	883.	50.70	
3 COMBINED AT	13	48171.	24.50	44897.	30403.	14144.	837.00	
HYDROGRAPH AT	SUB21A	9999.	20.00	9289.	4981.	1714.	84.40	
ROUTED TO	10	9161.	24.50	8443.	4948.	1714.	84.40	1724.49 24.50
HYDROGRAPH AT	SUB21	9332.	19.50	8609.	4546.	1560.	76.80	
2 COMBINED AT	14	15639.	23.00	14636.	9426.	3274.	161.20	
ROUTED TO	2	7509.	31.50	7311.	5258.	2675.	161.20	1408.11 31.50
2 COMBINED AT	15	51945.	25.00	48694.	35132.	16794.	998.20	
ROUTED TO	10	51882.	25.50	48703.	35127.	16780.	998.20	1365.29 25.50
HYDROGRAPH AT	SUB22	5310.	14.50	3578.	1259.	420.	25.10	
2 COMBINED AT	16	52431.	25.50	49148.	35494.	17153.	1023.30	
ROUTED TO	11	52220.	26.00	49067.	35484.	17135.	1023.30	1286.23 26.00
HYDROGRAPH AT	SUB23	1784.	14.00	1080.	365.	122.	7.90	
2 COMBINED AT	17	52331.	26.00	49161.	35571.	17231.	1031.20	
ROUTED TO	12	52163.	27.00	49095.	35560.	17215.	1031.20	1270.48 27.00
HYDROGRAPH AT	SUB24	2154.	14.50	1459.	518.	173.	11.20	

HYDROGRAPH AT								
	SUB25	3294.	16.50	2718.	1148.	384.	24.90	
3 COMBINED AT								
	18	52898.	26.50	49842.	36228.	17709.	1067.30	
ROUTED TO								
	13	52664.	28.00	49623.	36197.	17681.	1067.30	
							1183.35	28.00
HYDROGRAPH AT								
	SUB26	8348.	15.50	6240.	2348.	783.	42.40	
2 COMBINED AT								
	19	53202.	28.00	50235.	36818.	18346.	1109.70	
ROUTED TO								
	14	52967.	31.50	49473.	36666.	18325.	1109.70	
							1097.23	31.50
HYDROGRAPH AT								
	SUB27	8912.	16.50	7451.	3172.	1061.	62.10	
ROUTED TO								
	3	952.	29.00	946.	888.	695.	62.10	
							1260.15	29.00
2 COMBINED AT								
	20	53110.	31.50	50410.	37547.	19020.	1171.80	
HYDROGRAPH AT								
	SUB28	4285.	28.50	4195.	3190.	1328.	84.40	
HYDROGRAPH AT								
	SUB31	6754.	13.00	2721.	857.	286.	12.00	
3 COMBINED AT								
	21	57229.	31.50	54405.	40531.	20427.	1268.20	
HYDROGRAPH AT								
	SUB29	15962.	17.00	13675.	6022.	2021.	101.30	
ROUTED TO								
	4	340.	35.00	340.	339.	336.	101.30	
							1408.67	35.00
ROUTED TO								
	15	340.	36.00	340.	339.	336.	101.30	
							1201.80	36.00
HYDROGRAPH AT								
	SUB30	3710.	17.00	3166.	1401.	469.	28.60	
ROUTED TO								
	5	700.	28.00	698.	653.	431.	28.60	
							1187.38	28.00

ROUTED TO								
+	16	709.	30.00	698.	653.	428.	28.60	
+							1144.38	30.00
3 COMBINED AT								
+	22	58266.	31.50	55439.	41517.	21152.	1398.10	
ROUTED TO								
+	17	58082.	32.50	55304.	41499.	21137.	1398.10	
+							1052.10	32.50
HYDROGRAPH AT								
+	SUB32	6774.	17.50	5882.	2668.	896.	52.40	
2 COMBINED AT								
+	23	58488.	32.00	55763.	42054.	22013.	1450.50	
ROUTED TO								
+	18	57432.	36.50	54966.	41911.	21986.	1450.50	
+							933.44	36.50
HYDROGRAPH AT								
+	SUB33	7521.	16.50	6137.	2501.	836.	47.00	
HYDROGRAPH AT								
+	SUB34	9666.	17.00	8192.	3549.	1189.	64.30	
3 COMBINED AT								
+	24	57549.	36.50	55116.	42285.	23767.	1561.80	
HYDROGRAPH AT								
+	SUB35	18727.	17.00	15876.	6837.	2297.	99.60	
ROUTED TO								
+	6	6206.	23.50	6113.	4938.	2281.	99.60	
+							68.29	23.50
ROUTED TO								
+	19	6175.	29.00	6078.	4878.	2265.	99.60	
+							1002.75	29.00
HYDROGRAPH AT								
+	SUB36	10654.	25.50	10351.	7239.	2787.	163.10	
3 COMBINED AT								
+	25	67675.	36.00	65106.	51898.	28818.	1824.50	
ROUTED TO								
+	20	67261.	37.50	64805.	51857.	28784.	1824.50	
+							850.26	37.50
HYDROGRAPH AT								
+	SUB37	7718.	16.50	6451.	2728.	914.	45.80	
2 COMBINED AT								
+	26	67296.	37.50	64849.	52146.	29589.	1870.30	

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

STORM PRECIPITATION VOLUMES

R McArthur 1/04

PURPOSE: Precipitation volumes are required as input to the TR-20 rainfall-runoff model. The frequency of the precipitation amounts by duration are used as the basis of estimating the flood frequency.

PROCEDURE: The precipitation are taken from "NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States, Volume VIII, Arizona"; NWS, NOAA, USDC. Procedures outlined in this source were followed including using a grid to determine the average precipitation over the area of interest, conversion of partial duration to annual series, derivation of shorter duration precipitation volumes, and point-to-areal adjustments.

The recommendations of TSC TECHNICAL NOTE-HYDROLOGY-PO-6 (Rev.2) were also followed in using NOAA Atlas 2.

Due to the large size of the contributing area the area was divided into 5 subareas to determine if there was a significant difference in average point values by geographical location. The 5 subdivisions included:

"A" - the area above Aguila (the upper part of the D.A.)

"B" - the north side of McMullen Valley; bounded by Centennial Wash along the south side and the Harcuvar mountains on the north side.

"C" - the south side of McMullen Valley; bounded on the north by Centennial Wash and along the south by the Harquahala Mountains

"D" - the northwest part of Harquahala Valley including Tiger Wash; Centennial Wash as the southern Boundary

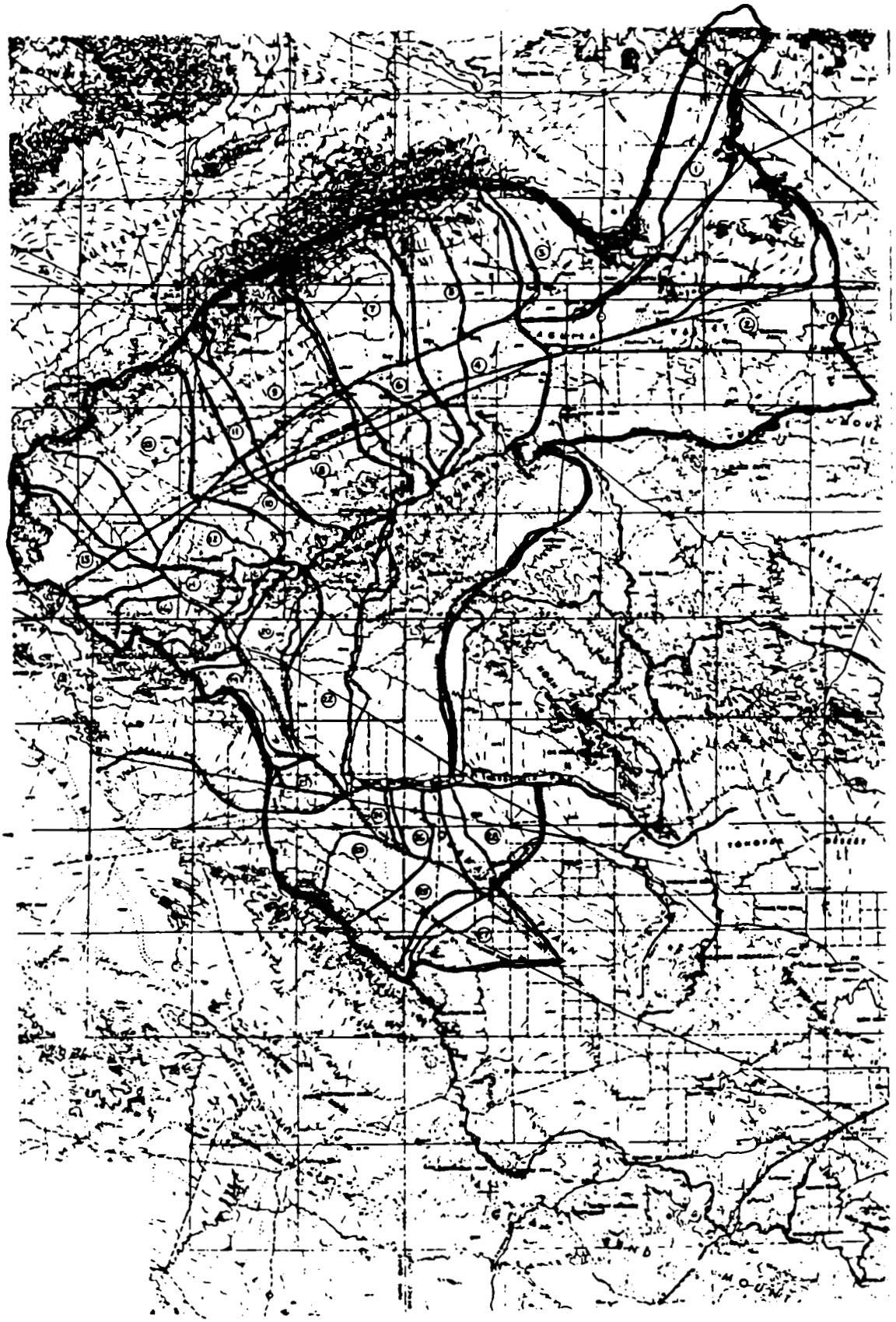
"E" the west part of Harquahala Valley bounded on the west by the low elevation extension of the Little Harquahala Mountains and the Eagletail Mountains and on the east by Centennial Wash

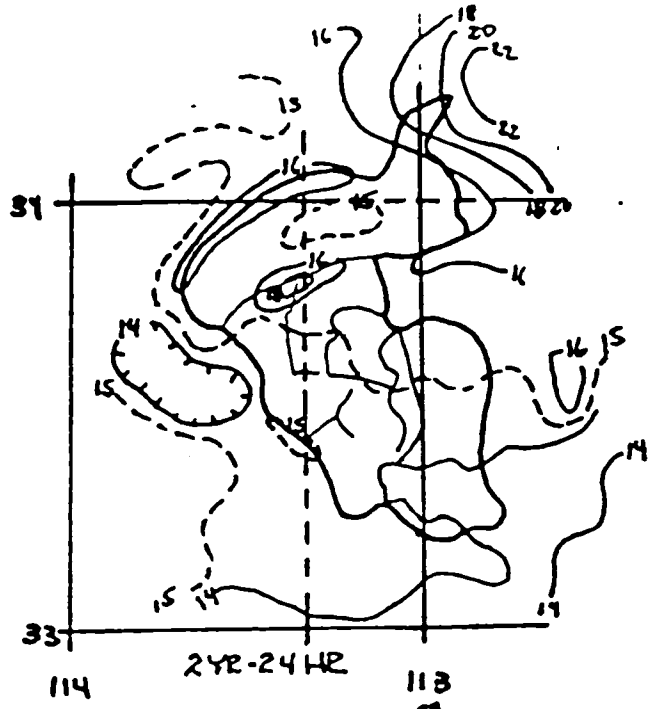
Fifty grid points were used to derive the average point precipitation volumes.

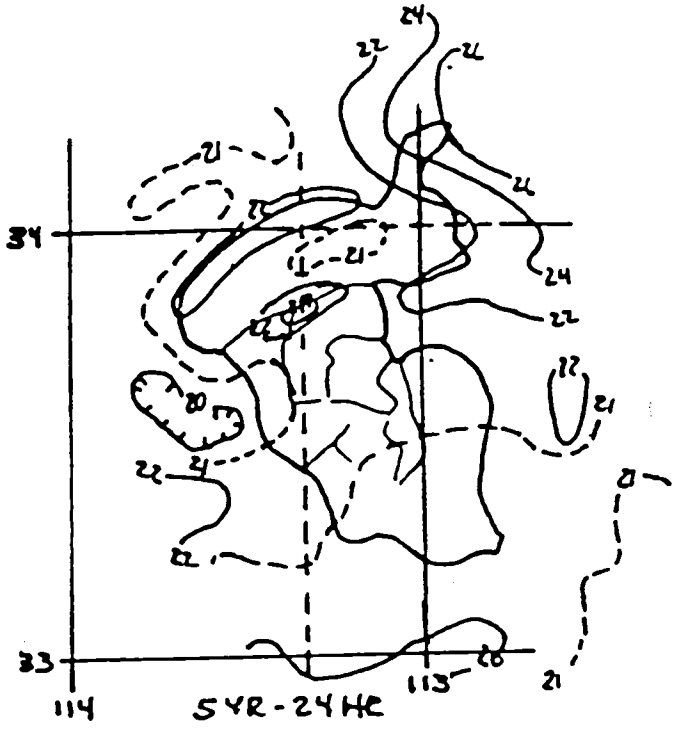
Point-to-area reduction was done by assume the center (maximum contribution) of the storm in the lower part of the watershed and decreasing amount in an upstream direction. The drainage areas were accumulated from the lowest point in the watershed to the highest point. Point-to-areal factors were altered to reflect major changes in the accumulated drainage area. Beyond 300 M^2 there is little change in the point-to-area curve for the 24-hour duration storms.

RESULTS & CONCLUSIONS: Derivation of average point precipit for each of the 5 subdivisions concluded that there is not a significant difference with geographical location. There one average value was used for each frequency. The results are presented along with the areal reductions for the 24-hour and the 6-hour storm durations.

The 24-hour duration is best suited to fit the time of concentration for the entire area. The 6-hour duration




34
33
114
113
2YR-24HR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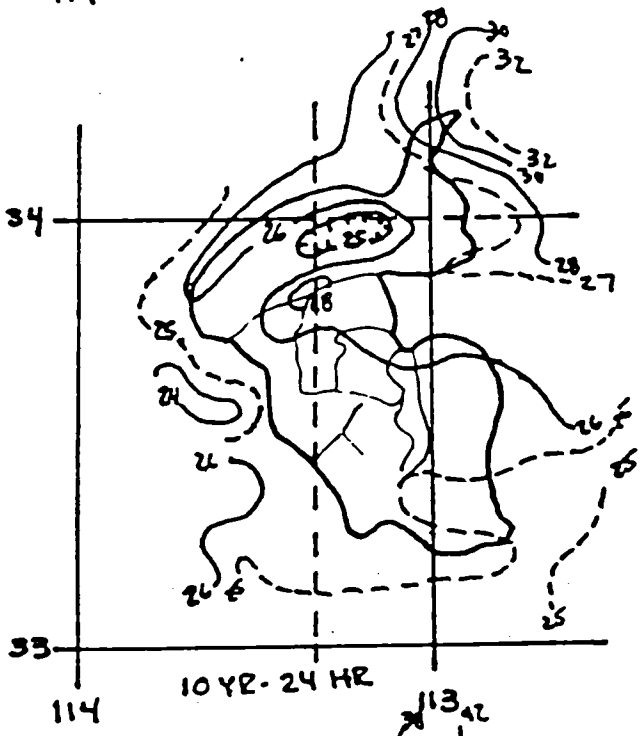
33
114
113
5YR-24HR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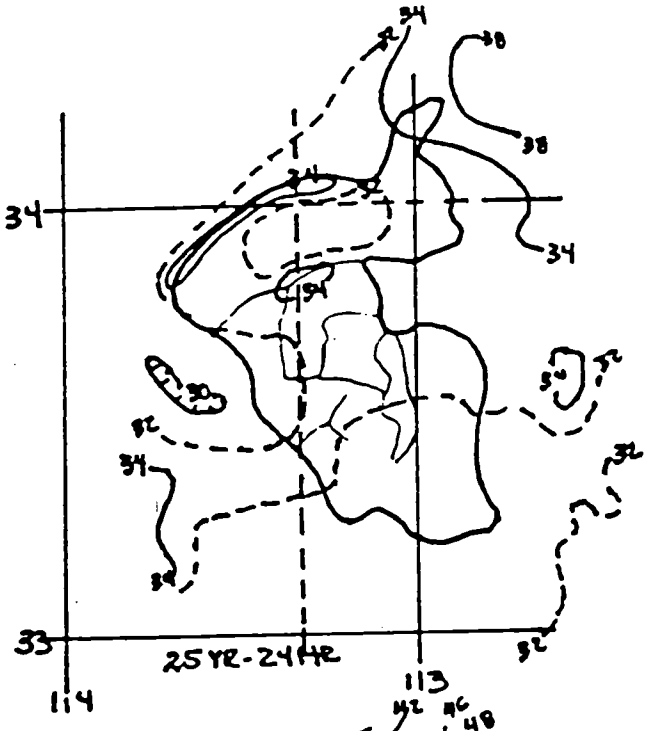
33
114
10YR-24HR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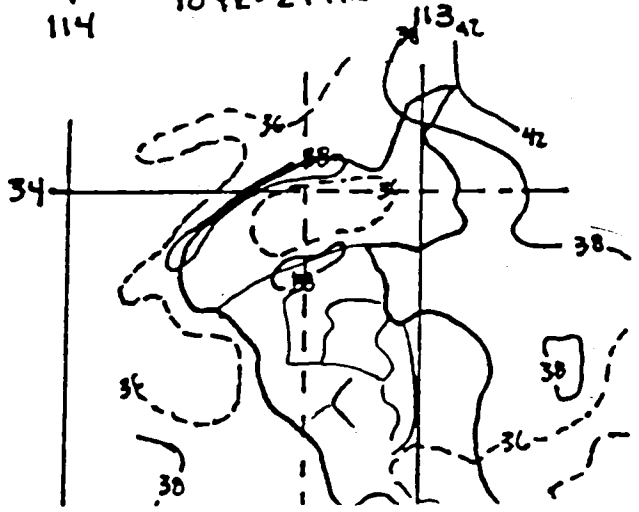
33
114
113
25YR-24HR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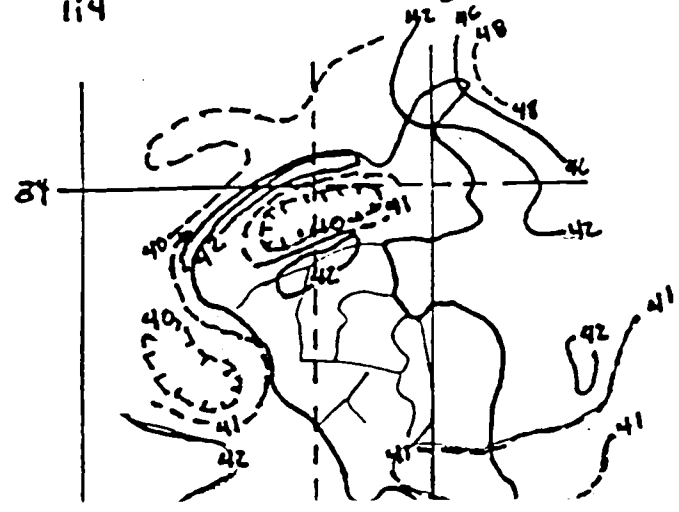
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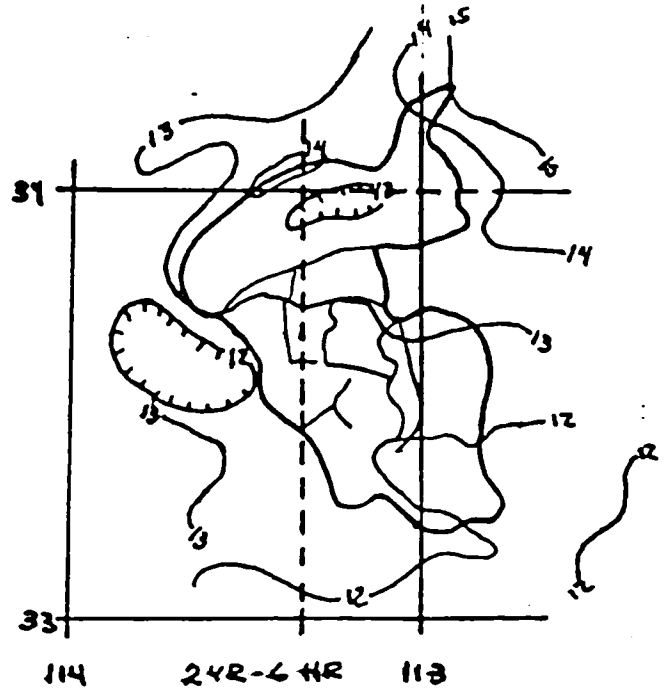
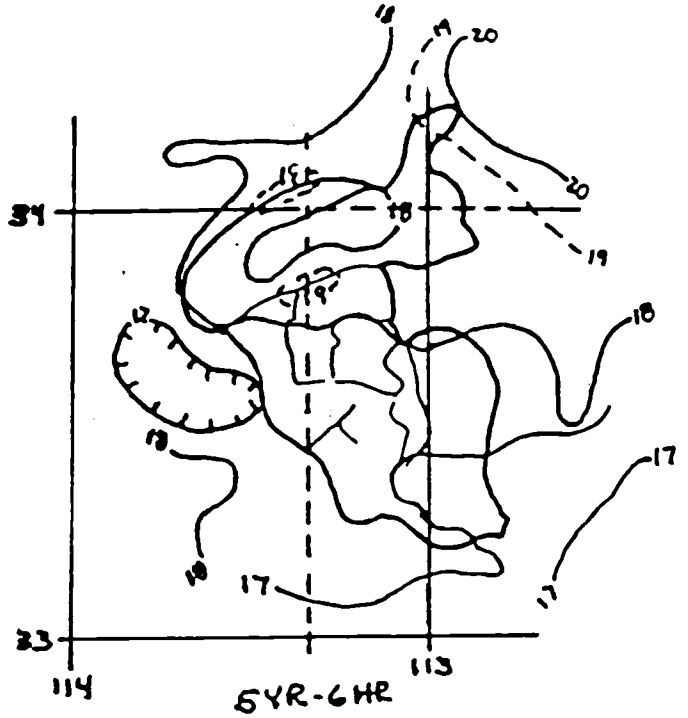


2YR-6HR



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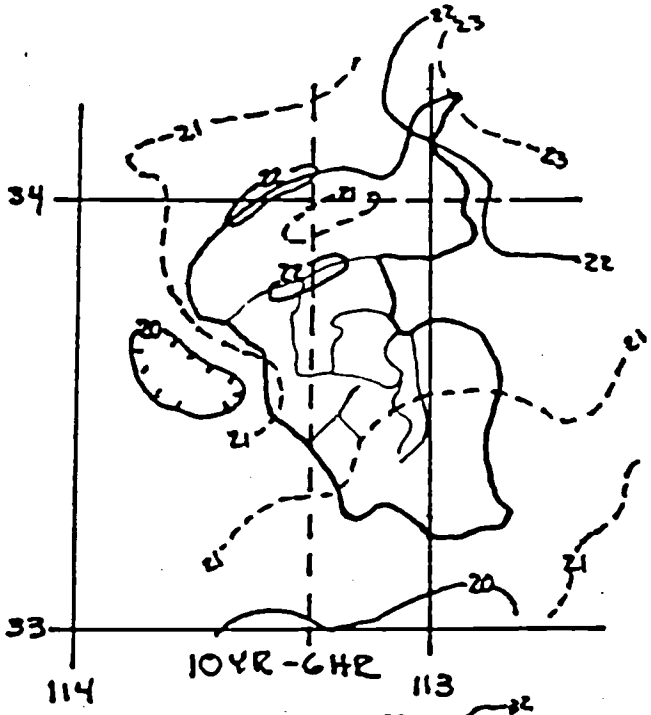

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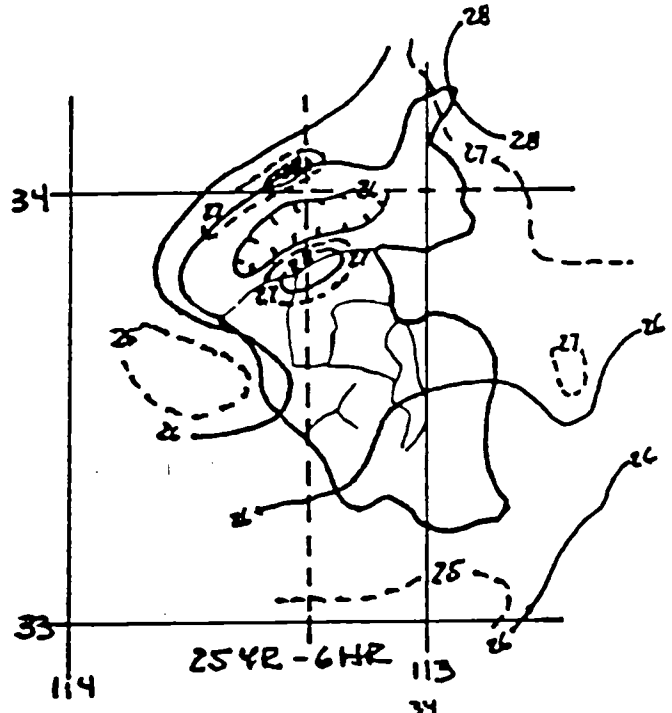
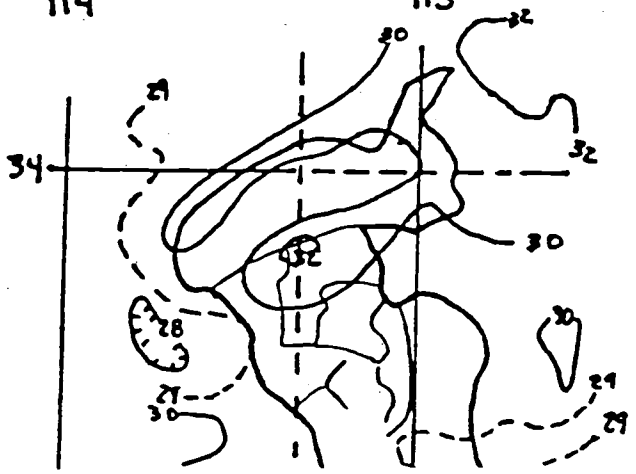
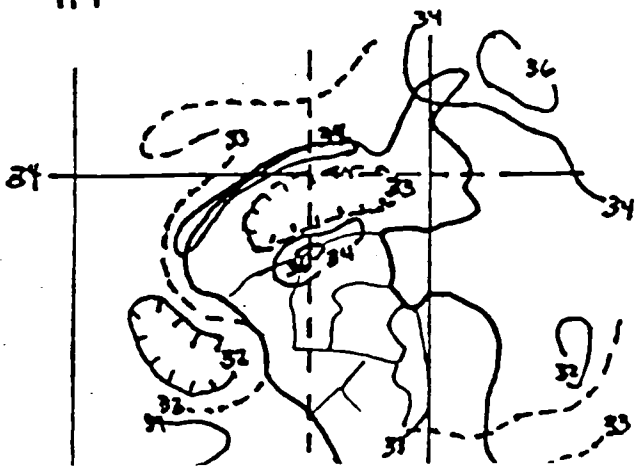
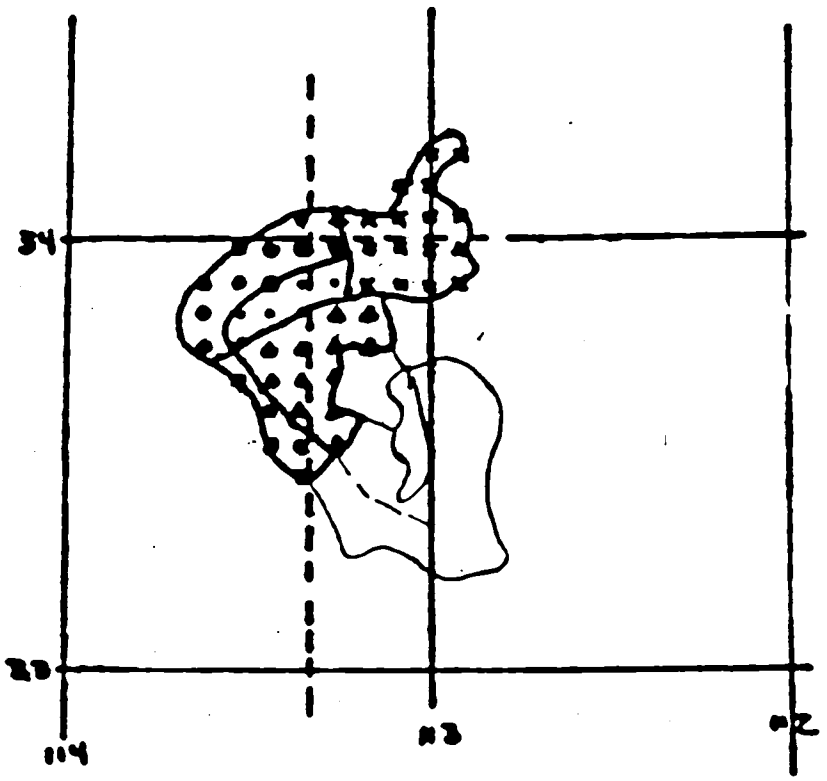


25YR-6HR







GRID FOR ESTIMATING
AVERAGE POINT PRECIPITATION

HARQUAHALA VALLEY WATERSHED

ARIZONA HAROVAHALA VALLEY WATERSHED

R. McArthur 9/20/83

DERIVATION OF AREAL PRECIPITATION VOLUMES

TO BE USED IN THE TR-20 ANALYSIS OF CENTENNIAL WASH

PART OF DRAINAGE AREA		AREAL REDUCTION FACTOR	6-HOUR PRECIPITATION VOLUMES FOR SELECTED RETURN PERIOD													
			500-YR		100-YR		50-YR		25-YR		10-YR		5-YR		2-YR	
FR	TO		POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL
001	122	0.832 348.93	4.5	3.74	3.46	2.88	3.01	2.50	2.62	2.18	2.10	1.75	1.72	1.43	1.16	0.97
015	132	0.840 279.89		3.78		2.91		2.53		2.20		1.76		1.44		0.97
020	151	0.849 217.04		3.82		2.94		2.56		2.22		1.78		1.46		0.98
027	152	0.962 (19.89mi²)		4.33		3.33		2.90		2.52		2.02		1.65		1.12

ARIZONA HARQUAHALA VALLEY WATERSHED

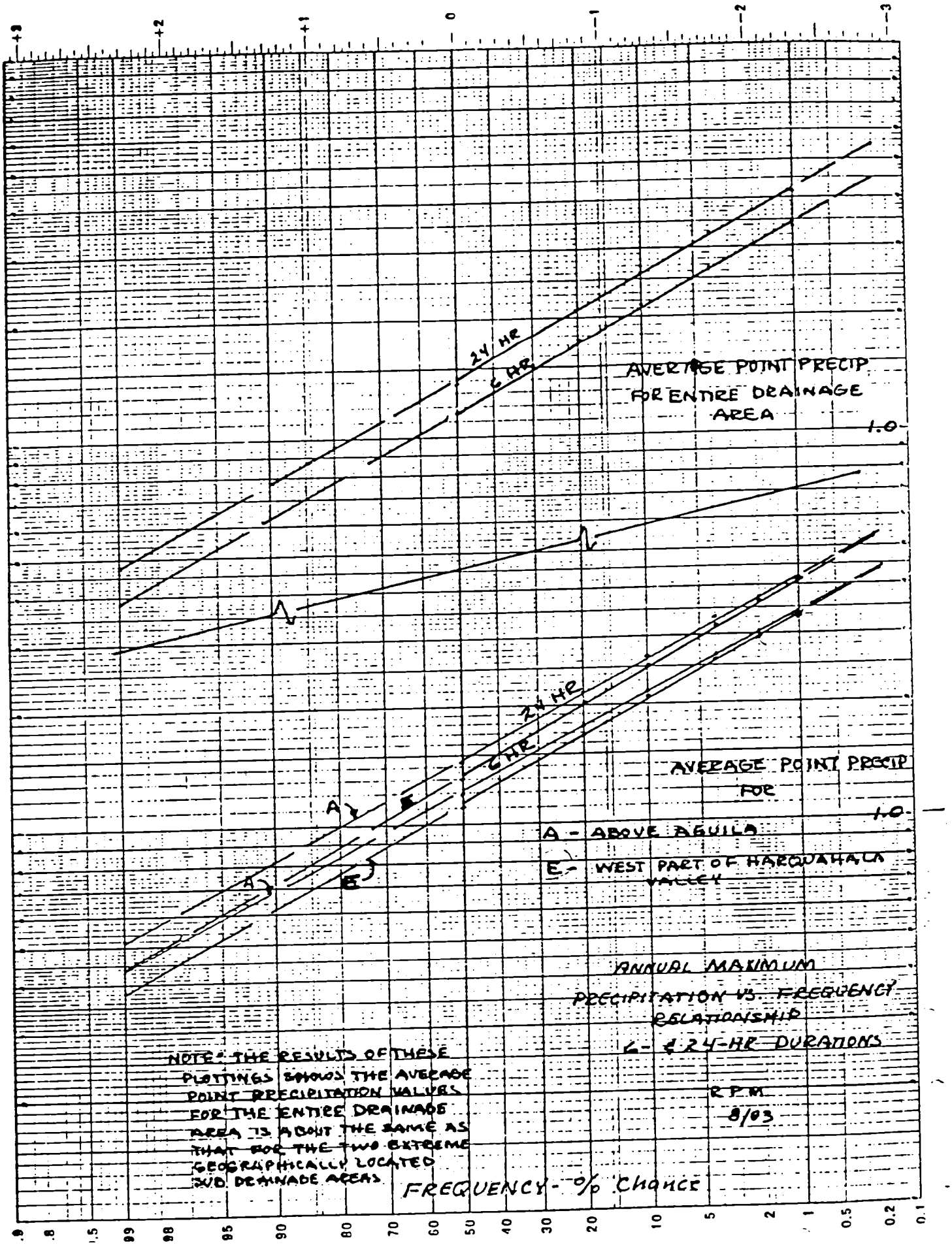
R. McArthur 9/8/83

DERIVATION OF AREAL PRECIPITATION VOLUMES

TO BE USED IN THE TR-20 ANALYSIS OF CENTENNIAL WASH

* PART OF DRAINAGE AREA		AREAL REDUCTION FACTOR	24 HOUR PRECIPITATION VOLUMES FOR SELECTED RETURN PERI													
			500-YR		100-YR		50-YR		25-YR		10-YR		5-YR		2-YR	
FR	TO		POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREAL	POINT	AREA
			5.5		4.25		3.71		3.20		2.58		2.10		1.40	
001	122	0.908		4.99		3.86		3.37		2.91		2.34		1.91		1.27
015	132	0.912		5.02		3.88		3.38		2.92		2.35		1.92		1.28
020	151	0.916		5.04		3.89		3.40		2.93		2.36		1.92		1.28
027	152	0.969		5.33		4.12		3.60		3.10		2.50		2.03		1.36

* REFER TO TR-20 FOR IDENTITY OF LOCATIONS


+3
+2
+1
0
-1
-2
-3
24 HR
6 HR
AVERAGE POINT PRECIP FOR ENTIRE DRAINAGE AREA
1.0
24 HR
6 HR
AVERAGE POINT PRECIP FOR
1.0
A - ABOVE AGUILA
E - WEST PART OF HARQUAHALA VALLEY
A
E
A
E
ANNUAL MAXIMUM PRECIPITATION VS. FREQUENCY RELATIONSHIP
6 & 24-HR DURATIONS
R.P.M.
8/03
NOTE: THE RESULTS OF THESE PLOTTINGS SHOWS THE AVERAGE POINT PRECIPITATION VALUES FOR THE ENTIRE DRAINAGE AREA IS ABOUT THE SAME AS THAT FOR THE TWO EXTREME GEOGRAPHICALLY LOCATED SUB DRAINAGE AREAS
FREQUENCY - % CHANCE
.9
.8
.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

ARIZONA HARQUAHALA VALLEY WATERSHED

R. McArthur 8/26/83

COMPUTATION OF MAXIMUM ANNUAL PRECIPITATION 1 2
FREQUENCY VALUES FOR 6 HR & 24 HR DURATIONS ANNUAL SERIES

FOR ENTIRE DRAINAGE AREA ABOVE PROPOSED CENTENNIAL WASH LEVEE

6 HOUR DURATION

FREQUENCY (YRS)	MAP VALUE (INS.)	FACTOR	PLOTTED VALUE (IN.)	VALUE USED (IN.)
(500)				(4.5)
100	3.36	1.00	3.36	3.46
50	3.01	1.00	3.01	3.01
25	2.66	1.00	2.66	2.62
10	2.16	0.99	2.14	2.10
5	1.82	0.96	1.75	1.72
2	1.32	0.88	1.16	1.16

USE

24 HOUR DURATION

(500)				(5.5)
100	4.15	1.00	4.15	4.25
50	3.71	1.00	3.71	3.71
25	3.28	1.00	3.28	3.20
10	2.62	0.99	2.59	2.58
5	2.19	0.96	2.10	2.10
2	1.57	0.88	1.38	1.40

ARIZONA HARQUAHALA VALLEY WATERSHED

R. McArthur 8/26/83

COMPUTATION OF MAXIMUM ANNUAL PRECIPITATION- 2 2
FREQUENCY VOLUMES FOR 6HR & 24 HR DURATIONS ANNUAL SERIES

6 HOUR DURATION

FREQUENCY (Yrs)	FACTOR	A ABOVE AGUILA MAP VALUE (In)	A PLOTTED VALUE (In)	A VALUE USED (In.)	B NORTHSIDE OF MCMULLEN VALLEY MAP VALUE (In)	B PLOTTED VALUE (In.)	B VALUE USED (In.)	C SOUTHSIDE OF MCMULLEN VALLEY MAP VALUE (In.)	C PLOTTED VALUE (In.)	C VALUE USED (In.)	D NW PART OF HARQUAHALA VALLEY MAP VALUE (In.)	D PLOTTED VALUE (In)	D VALUE USED (In)	E W PART OF HARQUAHALA VALLEY MAP VALUE (In.)	E PLOTTED VALUE (In)	E VALUE USED (In.)
(500)				(4.35)												(4.35)
100	1.00	3.36	3.36	3.42	3.35	3.35		3.36	3.36		3.37	3.37		3.31	3.31	3.35
50	1.00	3.03	3.03	3.03	3.00	3.00		3.02	3.02		3.03	3.03		2.93	2.93	2.95
25	1.00	2.66	2.66	2.66	2.67	2.67		2.66	2.66		2.68	2.68		2.60	2.60	2.58
10	0.99	2.18	2.16	2.16	2.16	2.14		2.16	2.14		2.16	2.14		2.11	2.09	2.05
5	0.96	1.84	1.77	1.77	1.83	1.76		1.83	1.76		1.80	1.73		1.74	1.67	1.68
2	0.88	1.36	1.20	1.22	1.34	1.18		1.33	1.17		1.28	1.13		1.25	1.10	1.13

24 HOUR DURATION

		A			B		C		D		E		
(500)				(5.4)									(5.4)
100	1.00	4.19	4.19	4.19	4.13	4.13	4.07	4.07	4.17	4.17	4.13	4.13	4.08
50	1.00	3.71	3.71	3.70	3.71	3.71	3.69	3.69	3.74	3.74	3.64	3.64	3.59
25	1.00	3.31	3.31	3.22	3.29	3.29	3.27	3.27	3.28	3.28	3.15	3.15	3.10
10	0.99	2.67	2.64	2.60	2.57	2.54	2.62	2.59	2.61	2.58	2.53	2.50	2.50
5	0.96	2.23	2.14	2.13	2.19	2.10	2.20	2.11	2.16	2.07	2.10	2.02	2.00
2	0.88	1.62	1.43	1.45	1.58	1.39	1.59	1.40	1.52	1.34	1.48	1.30	1.33

ARIZONA HARQUAHALA VALLEY WATERSHED

RMcArthur 8/26/83

DETERMINATION OF AVERAGE POINT PRECIPITATION 1/2

CENTENNIAL WASH

SOURCE: NOAA ATLAS 2 Vol. VIII Arizona Precip-Frequency Atlas of the Western U.S.

PART OF D.A.	GRID VALUES OF PRECIP & MEAN COMPUTATIONS											
	6 HR DURATION						24 HR DURATION					
	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A ABOVE AGUILA	1.5	1.96	2.3	2.8	3.14	3.5	2.1	2.6	3.1	3.6	4.0	4.65
	1.38	1.86	2.19	2.68	3.08	3.36	1.59	2.25	2.68	3.32	3.72	4.16
	1.38	1.85	2.18	2.67	3.08	3.35	1.58	2.18	2.65	3.3	3.7	4.16
	1.38	1.85	2.18	2.66	3.12	3.34	1.6	2.23	2.7	3.32	3.72	4.17
	1.42	1.91	2.26	2.69	3.06	3.42	1.59	2.46	2.9	3.5	3.85	4.38
	1.38	1.87	2.2	2.68	3.01	3.38	1.54	2.3	2.7	3.38	3.78	4.19
	1.36	1.84	2.18	2.67	3.02	3.35	1.56	2.18	2.66	3.3	3.7	4.16
	1.34	1.83	2.17	2.65	2.92	3.33	1.63	2.15	2.62	3.28	3.68	4.13
	1.36	1.83	2.16	2.65	3.05	3.33	1.9	2.2	2.68	3.27	3.7	4.14
	1.36	1.85	2.18	2.66	2.99	3.36	1.6	2.22	2.68	3.33	3.62	4.18
	1.32	1.82	2.15	2.64	2.99	3.33	1.55	2.15	2.62	3.25	3.6	4.13
	1.3	1.8	2.12	2.62	3.05	3.3	1.52	2.1	2.55	3.2	3.75	4.11
	1.34	1.83	2.16	2.63	2.99	3.34	1.55	2.16	2.63	3.25	3.6	4.13
	1.32	1.8	2.13	2.62	2.98	3.36	1.52	2.2	2.62	3.25	3.55	4.16
	1.28	1.75	2.1	2.58	3.03	3.28	1.48	2.05	2.45	3.15	3.7	3.96
	1.33	1.81	2.18	2.65	3.00	3.4	1.59	2.15	2.61	3.22	3.6	4.12
17	1.38	1.86	2.16	2.68	3.0	3.4	1.62	2.25	2.62	3.4	3.8	4.22
	Σ 23.13	Σ 31.32	37.00	45.23	51.51	57.19	27.52	37.83	45.47	56.32	63.07	71.15
M	1.36	1.84	2.18	2.66	3.03	3.36	1.62	2.23	2.67	3.31	3.71	4.19
B NORTHSIDE OF MCMULLEN VALLEY	1.28	1.75	2.08	2.6	2.98	3.28	1.48	2.1	2.45	3.18	3.55	3.95
	1.36	1.95	2.22	2.82	3.03	3.45	1.52	2.25	2.63	3.45	3.9	4.3
	1.25	1.82	2.12	2.6	2.98	3.28	1.65	2.18	2.53	3.18	3.58	4.05
	1.42	1.85	2.18	2.66	3.0	3.34	1.6	2.22	2.6	3.2	3.58	4.1
	1.32	1.78	2.12	2.55	2.97	3.25	1.53	2.16	2.54	3.18	3.58	3.95
	1.38	1.82	2.23	2.8	3.05	3.45	1.58	2.2	2.62	3.3	3.9	4.3
	1.32	1.86	2.18	2.68	3.0	3.33	1.65	2.2	2.59	3.3	3.68	4.1
	1.37	1.82	2.12	2.7	3.03	3.42	1.65	2.2	2.61	3.45	3.85	4.25
	1.35	1.83	2.14	2.67	3.0	3.39	1.55	2.22	2.6	3.38	3.78	4.18
	1.32	1.8	2.16	2.63	2.94	3.34	1.55	2.16	2.57	3.24	3.70	4.14
10	Σ 13.37	18.28	21.55	26.70	29.98	33.53	15.79	21.89	25.74	32.86	37.10	41.32
M	1.34	1.83	2.16	2.67	3.00	3.35	1.58	2.19	2.57	3.29	3.71	4.13
C SOUTH SIDE OF MCMULLEN	1.32	1.82	2.15	2.65	3.0	3.3	1.52	2.16	2.6	3.2	3.6	4.0
	1.32	1.8	2.1	2.6	2.99	3.28	1.50	2.1	2.55	3.15	3.56	3.95
	1.33	1.9	2.22	2.82	3.2	3.6	1.80	2.4	2.85	3.45	3.85	4.2
	1.34	1.8	2.18	2.65	3.0	3.32	1.60	2.19	2.6	3.21	3.7	4.1

ARIZONA HARQUAHALA VALLEY WATERSHED

RMcArthur 8/26/83

DETERMINATION OF AVERAGE POINT PRECIPITATION 2/2

CENTENNIAL WASH

SOURCE: NOAA ATLAS 2 Vol. VIII Arizona Precip-Frequency Atlas of the Western U.S.

PART OF D.A.	GRID VALUES OF PRECIP & MEAN COMPUTATIONS											
	6 HR DURATION						24 HR DURATION					
	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
	1.33	1.86	2.19	2.69	3.1	3.39	1.58	2.19	2.7	3.35	3.78	4.18
D	1.30	1.8	2.18	2.68	3.0	3.38	1.55	2.17	2.63	3.32	3.78	4.18
N N PART OF	1.34	1.9	2.2	2.8	3.18	3.5	1.6	2.4	2.75	3.4	3.8	4.25
HARQUAHALA	1.31	1.82	2.18	2.69	3.1	3.38	1.54	2.15	2.63	3.35	3.78	4.19
VALLEY	1.28	1.78	2.16	2.67	2.99	3.37	1.48	2.12	2.68	3.28	3.73	4.17
INCLUDE	1.25	1.75	2.14	2.64	2.96	3.35	1.47	2.11	2.57	3.25	3.7	4.14
TIGER	1.23	1.73	2.12	2.63	2.94	3.33	1.46	2.12	2.55	3.21	3.68	4.15
WASH	1.3	1.83	2.18	2.7	3.1	3.4	1.59	2.2	2.6	3.3	3.67	4.13
	1.26	1.78	2.14	2.65	2.99	3.35	1.49	2.11	2.57	3.19	3.78	4.19
	1.29	1.73	2.12	2.62	2.95	3.33	1.46	2.09	2.54	3.18	3.7	4.16
	1.23	1.81	2.19	2.7	3.05	3.39	1.6	2.2	2.62	3.29	3.69	4.13
	1.23	1.76	2.13	2.63	2.96	3.33	1.47	2.09	2.56	3.18	3.72	4.19
12 Σ	15.35	21.55	25.93	32.10	36.32	40.49	18.29	25.95	31.30	39.30	44.90	50.06
M	1.28	1.80	2.16	2.68	3.03	3.37	1.52	2.16	2.61	3.28	3.74	4.17
E	1.28	1.74	2.12	2.62	2.95	3.32	1.47	2.12	2.54	3.18	3.64	4.12
W PART	1.27	1.71	2.12	2.58	2.95	3.33	1.43	2.04	2.54	3.22	3.63	4.15
OF	1.23	1.72	2.1	2.64	2.91	3.3	1.48	2.09	2.52	3.1	3.62	4.18
HARQUAHALA	1.25	1.75	2.09	2.57	2.93	3.31	1.48	2.13	2.53	3.1	3.68	4.12
VALLEY	1.25	1.76	2.12	2.6	2.92	3.31	1.52	2.12	2.53	3.15	3.61	4.12
ABOVE												
LEVEE												
LOCATION												
5 Σ	6.23	8.68	10.55	13.01	14.66	16.57	7.38	10.50	12.66	15.25	18.18	20.64
M	1.25	1.74	2.11	2.60	2.93	3.31	1.48	2.10	2.53	3.15	3.64	4.13
ENTIRE												
AREA												
50 Σ	66.04	90.79	107.98	132.98	150.59	167.96	78.53	109.34	130.91	163.84	185.36	207.55
M	1.32	1.82	2.16	2.66	3.01	3.36	1.57	2.19	2.62	3.28	3.71	4.15

ARIZONA HARQUAHALA VALLEY WATERSHED

R. McARTHUR 8/29/83

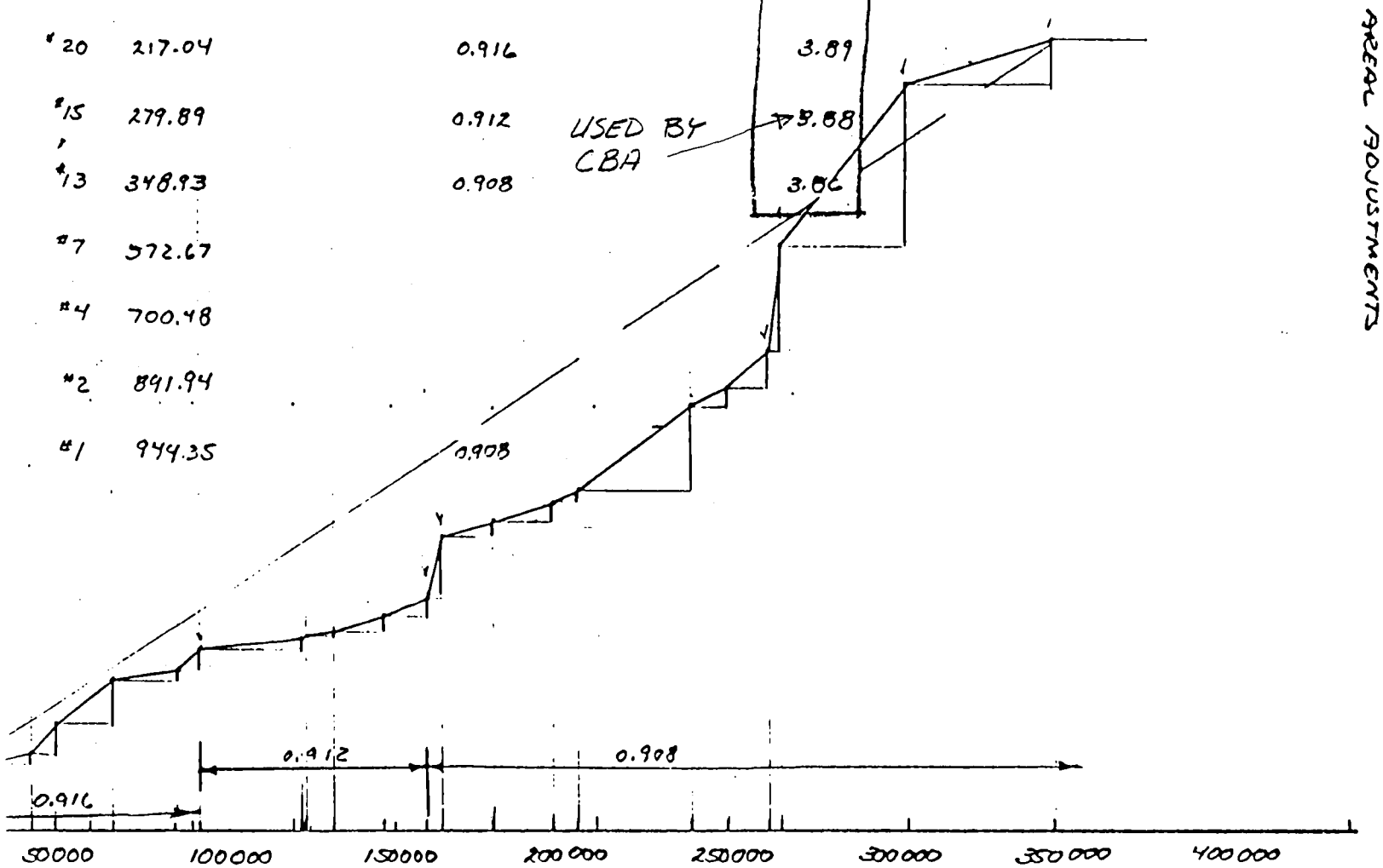
DERIVATION OF DRAINAGE AREAS TO USE FOR POINT-TO-AREAL ADJUSTMENTS

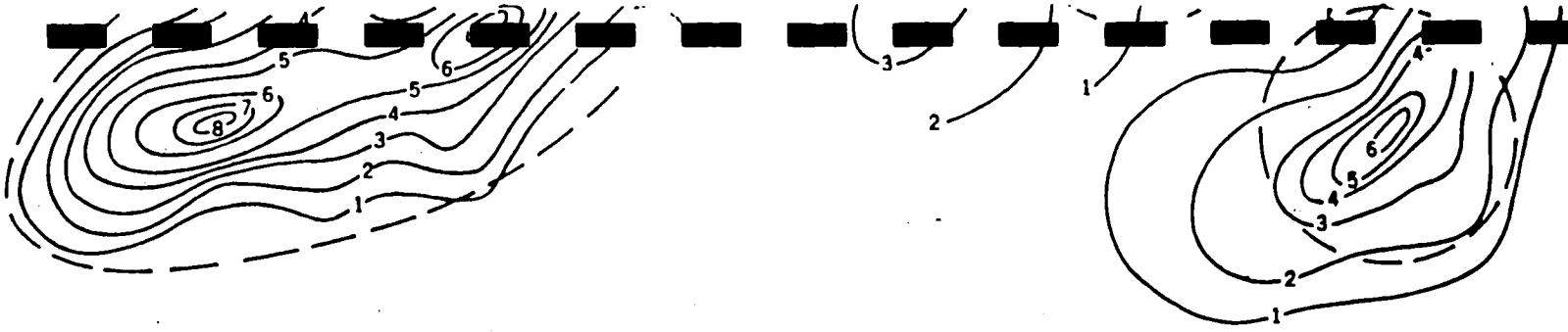
24 HOUR DURATION

	ACCUM. DRAINAGE AREA	FREQUENCY	POINT/AREA	POINT PRECIP (IN.)	AREAL PRECIP (IN.)
#27	19.89	100	0.969	4.25	4.12
#20	217.04		0.916		3.89
#15	279.89		0.912		3.88
#13	348.93		0.908		3.86
#7	572.67				
#4	700.48				
#2	891.94				
#1	944.35		0.908		

USED BY CBA

USED BY CBA

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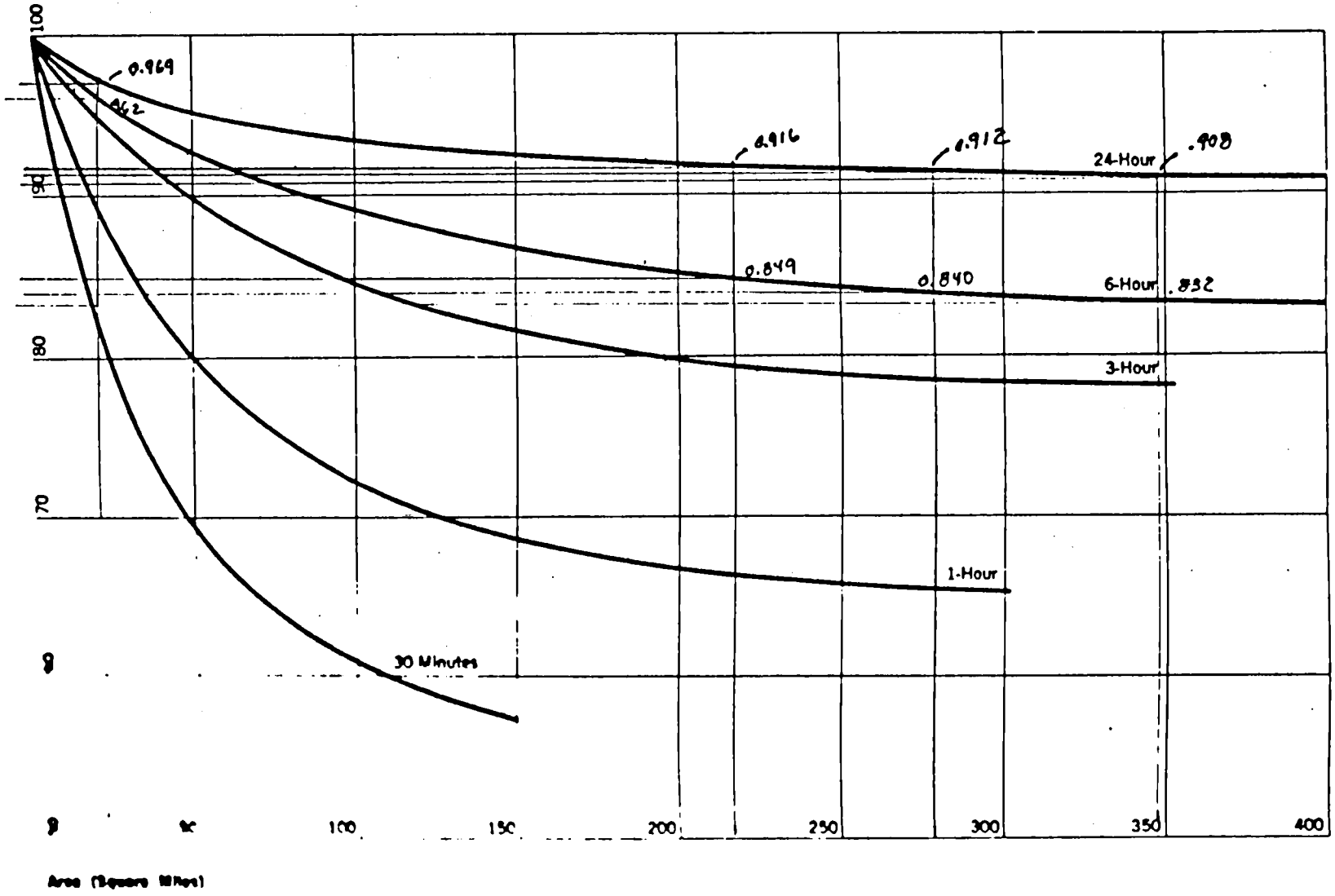
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30 Minutes
0
50
100
150
200
250
300
350
400
Area (Square Miles)