# Hydrology Report
For
# Camp Creek Tributaries Floodplain Delineation Study

Prepared for:

## Flood Control District of Maricopa County

**Contract No: FCD-2004C023**

Prepared by:


Prestige
Engineering Consultants

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*Phoenix, Arizona 85051*


**November 11, 2005**

Registered Professional Engineer (Civil)
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# SECTION 4: EXISTING CONDITION HYDROLOGIC ANALYSIS

## 4.1 Method Description

The purpose of the hydrologic analysis is to estimate the peak discharges for the 1% storm (100-year recurrence interval storm) at key locations for floodplain delineation purposes. The key locations are the confluences of the tributaries with Camp Creek and other washes and locations along the washes where significant flow changes occur.

The primary focus of this report is to document the hydrologic and hydraulic data, the assumptions and procedures used in conducting this study. This report is structured in the Technical Data Notebook (TDN) format in accordance with Arizona Department of Water Resources requirements of State Standard SS1-97 and State Standard SSA1-97.
The study area is approximately 10 square miles and is located in Maricopa County Unincorporated Areas and in Tonto National Forest.

Watershed modeling is performed using methodologies in the **Drainage Design Manual for Maricopa County, Volume I, Hydrology (or Drainage Design Manual)** (Flood Control District of Maricopa County, 1995). The analytical method used for this study is rainfall-runoff modeling. Rational method was not employed. Rainfall-runoff modeling is performed using the US Army Corps of Engineers (COE) HEC-1 Computer Program, version 4.1 dated June 1998. Both the 100-year, 6-hour and 24-hour duration storms are modeled for the existing condition. The two storm durations are used in order to determine which generates the higher magnitude of peak discharges at the various locations in the watershed.

The rainfall depth-duration-frequency data are obtained from NOAA Atlas II, Arizona. The rainfall distributions used are the SCS Type II for the 24-hour storm and the 6-hour storm patterns suggested in the Drainage Design Manual.

Rainfall losses are estimated using the Green and Ampt infiltration equation with surface retention losses.

The S-Graph method contained in the Drainage Design Manual is used for the runoff hydrograph development. The Mountain type S-Graphs are used for the watershed to reflect the rugged terrain of the study area.

Normal Depth method is used to route the flood hydrographs from concentration point to concentration point within the watershed.

## 4.2 Parameter Estimation

### 4.2.1 Drainage Boundaries

The study area comprises of approximately 10.6 square miles of watershed of tributaries located on the west of Camp Creek. Camp Creek itself flows from northwest to southeast within the study area. Some of the west tributaries flow from west to east.

The study watershed is divided into twenty-five subbasins based on topography and channel network. The drainage pattern appears to be distributary in nature in the watershed with each subbasin having multiple flow channels. The major channels were identified as the tributaries and subbasins were determined for each.

The watershed can be characterized as a rugged desert mountain and hill slope terrain. The elevations of this terrain range from 3300 feet to 2200 feet at the Camp Creek flow line.

Currently, there is little development within the study watershed. Land use was therefore not a significant factor in the subbasin delineation process. Development consists of scattered and isolated single-family dwellings located in the southern

fringe of the watershed. There is a golf course development at northwestern corner of the watershed that covers a small part of one of the subbasins.

The jurisdictional limits of the watershed include only Maricopa County Unincorporated areas and Tonto National Forest.

### 4.2.2 Physical Parameters

#### 4.2.2.1 General

Physically based hydrologic parameters for the watershed and modeling subbasins are determined based on the Drainage Design Manual. The procedures used for estimating the parameters are discussed in the sections below. Supporting data and calculations are provided in the Appendices.

#### 4.2.2.2 Watershed Subbasin Delineation and Area Parameters

The watershed and subbasin boundaries are delineated using the topographic base map discussed in Section 2. Subbasin boundaries were digitized directly into the digital topographic basemap in AutoCAD format. The final subbasin boundaries are plotted on Plates 1 through 5. The areas and other physical parameters such as basin slope, drainage path lengths and centroid lengths were determined for the subbasins. The subbasin areas and lengths are summarized in Table 4-1 below.

#### 4.2.2.3 Rainfall Loss Parameters

Rainfall losses for the watershed are estimated using the Green and Ampt infiltration method of HEC-1. The variable XKSAT (hydraulic conductivity at natural saturation) is estimated by evaluating the soil properties and textures as they occur in the watershed and assigning values to those soils using the methods outlined in the Drainage Design Manual.

The variables PSIF (wetting front capillary suction) and DTHETA (antecedent volumetric soil moisture deficit) are functions of soil texture and therefore that of XKSAT as well. The variable DTHETA is additionally related to the moisture condition of the soil and is categorized as DRY, NORMAL or SATURATED. Dry DTHETA is considered typical for natural land while normal DTHETA is for developed areas where irrigation and other factors tend to maintain higher soil moisture content. Saturated DTHETA conditions are not considered to exist in watershed for this study.

**Table 4-1**

**Summary of Subbasin Geometric Data**

| Subbasin ID | Area (sq. mi) | Drainage Path Length, L, (mi.) | Length from Centroid to Outlet, $L_{ca}$ (mi.) |
|---|---|---|---|
| 1 | 0.359 | 2.18 | 1.07 |
| 2 | 0.329 | 1.70 | 0.82 |
| 3 | 0.840 | 2.84 | 1.67 |
| 4 | 0.340 | 1.86 | 0.94 |
| 5 | 0.128 | 0.51 | 0.32 |
| 6 | 0.530 | 1.75 | 0.83 |
| 7 | 0.596 | 2.90 | 1.75 |
| 8 | 0.275 | 2.15 | 0.77 |
| 9 | 0.433 | 1.51 | 0.60 |
| 10 | 0.223 | 0.97 | 0.50 |
| 11 | 0.498 | 1.22 | 0.52 |
| 12 | 0.361 | 2.10 | 1.21 |
| 13 | 0.382 | 2.06 | 1.26 |
| 14 | 0.408 | 2.21 | 1.08 |
| 15 | 0.483 | 1.99 | 0.82 |
| 16 | 0.427 | 2.02 | 1.02 |
| 17 | 0.239 | 1.32 | 0.42 |
| 18 | 0.423 | 1.32 | 0.57 |
| 19 | 0.594 | 1.33 | 0.67 |
| 20 | 0.510 | 1.72 | 0.86 |
| 21 | 0.279 | 1.61 | 1.04 |
| 22 | 0.641 | 1.54 | 0.73 |
| 23 | 0.548 | 1.90 | 1.08 |
| 24 | 0.405 | 2.01 | 1.37 |
| 25 | 0.338 | 1.39 | 0.96 |

The variable RTIMP, the effective imperviousness, is attributed to rock outcrop in natural areas. Roofs, paving, permanent water surfaces, and compaction associated with gravel roads contribute to RTIMP in developed areas. Surface retention, IA (initial abstraction) is an estimate of the initial surface storage during storm events.

Values were determined for XKSAT and PSIF for bare ground and then adjusted to account for vegetation. Composite loss parameters were calculated for natural and developed land areas within each subbasin. The two composite values were then averaged to obtain the final Green and Ampt method parameters.

The bare ground value of XKSAT is estimated using the soils data and applies to the pervious portion of the entire subbasin for both natural and developed areas. Values for PSIF, DTHETA (dry and normal) are directly related to the bare ground XKSAT value obtained from Figure 4.3 of the Drainage Design Manual. Values of PSIF corresponding to bare ground XKSAT remain constant for all pervious areas in the subbasin, and DTHETA (dry and normal) are estimated for developed areas respectively. As a final step, the bare ground XKSAT value is adjusted for vegetation per the Drainage Design Manual using the subbasin average vegetative cover percentage.

**Soil Parameters**

Soil properties and texture classifications are used to estimate the bare ground XKSAT parameter for the Green and Ampt loss equation. Rock outcrop percentage is typically part of soil study reports.

Two sources of information are used to obtain the soil data for this study. Each source provided mapped soil unit boundaries with soil types. The rock outcrop percentages are also provided for map units in which they are significant. Plate 2 is a composite of the two sources as they occur in the watershed.

One source of the soils information is from SCS soil survey data, "Aguila-Carefree Soil survey". This soil map coverage does not extend over the entire study watershed. Flood Control District staff (Engineering Department) therefore inferred the soil parameters from surface geological coverage from Tonto National Forest for the study area. These soil data were supplied by the District in digital format. Table 4-2 summarizes the bare ground XKSAT values and their corresponding percentage rock outcrop that occur within the study watershed.

**Table 4-2**

**Summary of XKSAT and RTIMP values for soil map units within the Camp Creek Tributaries Watershed**

| Soil Class | Bare Ground XSAT (in/hr) | RTIMP % |
|---|---|---|
| 6 | 0.62 | 0.0 |
| 33 | 0.23 | 0.0 |
| 34 | 0.23 | 0.0 |
| 41 | 0.17 | 0.0 |
| 61 | 0.15 | 0.0 |
| 63 | 0.14 | 25 |
| 96 | 0.07 | 0.0 |

**IA – Surface Retention**

Surface retention losses (IA) are assigned to each soil map unit. The basis of the assignment is the establishment of a relation of soil map unit descriptions and average ground slope of each subbasin to the descriptions of natural surface cover listed in Table 4.1 of the Drainage Design Manual. Those classifications and their corresponding IA values are:

1. Desert and rangeland, flat slope; IA=0.35 inches
2. Hill slopes, Sonoran Desert; IA=0.15 inches
3. Mountain, with vegetated surface; IA=0.25 inches

Soil map units descriptions with average ground slopes of 0 to 10% are assigned an IA of 0.35 inches and soil and 3% to 30% are assigned 0.25.

**Natural Area Parameters for each Subbasin**

XKSAT, PSIF, DTHETA (dry) AND RTIMP – Composite values for natural area for these parameters are summarized in the Tables 4-3 below. These composite values are area-weighted logarithms per Section 4.4.1.1 of Drainage Design Manual. The area-weighted logarithm of XKSAT is first determined and its value is then used to select the PSIF and DTHETA values from the graph in Figure 4.3 of the Drainage Design Manual. The computations for the area-weighted XKSAT values are given in a spreadsheet in Appendix 1.

**Table 4-3**

**Summary of Log Adjusted Composite Bare Ground XKSAT Values and Corresponding PSIF and DTHETA (Dry) Values**

| Subbasin ID | XKSAT (Bare Ground) | PSIF (inches) | DTHETA-Dry (inches) |
|---|---|---|---|
| 1 | 0.248 | 4.9 | 0.35 |
| 2 | 0.273 | 4.7 | 0.35 |
| 3 | 0.185 | 5.2 | 0.37 |
| 4 | 0.207 | 5.3 | 0.25 |
| 5 | 0.316 | 4.4 | 0.38 |
| 6 | 0.275 | 4.6 | 0.35 |
| 7 | 0.147 | 6.0 | 0.35 |
| 8 | 0.156 | 5.9 | 0.40 |
| 9 | 0.176 | 5.8 | 0.40 |
| 10 | 0.305 | 4.4 | 0.39 |
| 11 | 0.213 | 5.2 | 0.35 |
| 12 | 0.225 | 5.0 | 0.36 |
| 13 | 0.181 | 5.6 | 0.37 |
| 14 | 0.196 | 5.4 | 0.38 |
| 15 | 0.169 | 5.8 | 0.37 |
| 16 | 0.173 | 5.8 | 0.39 |
| 17 | 0.199 | 5.2 | 0.37 |
| 18 | 0.283 | 4.6 | 0.35 |
| 19 | 0.163 | 5.9 | 0.40 |
| 20 | 0.183 | 5.6 | 0.37 |
| 21 | 0.217 | 5.2 | 0.37 |
| 22 | 0.171 | 5.8 | 0.39 |
| 23 | 0.228 | 5.0 | 0.36 |
| 24 | 0.190 | 5.5 | 0.38 |
| 25 | 0.174 | 5.8 | 0.39 |

**Vegetative Cover Density**

Vegetation transects were taken at various locations within the watershed and used in conjunction with aerial photographs to estimate density of vegetation within each subbasin. Photographs showing vegetation cover throughout the watershed are shown below. Table 4-4 summarizes the vegetation transect data.

**Table 4-4**

**Vegetation Transect Data**

| Photograph Number | Location Taken | Vegetation Description | Estimated % Vegetation Cover |
|---|---|---|---|
| 1 | Subbasin 18 area | Paolo Verde Trees, Mesquite, Creosote, Brittle Brush | 20 |
| 2 | Subbasin 21 area | Mesquite, Creosote, Saguaro, Various Cacti | 20 |
| 3 | Subbasin 3 area | Paolo Verde Trees, Mesquite, Creosote, Saguaro, Various Cacti | 25 |
| 4 | Subbasin 21 area | Paolo Verde Trees, Mesquite, Creosote | 25 |
| 5 | Subbasin 13 area | Paolo Verde Trees, Mesquite, Creosote, Saguaro | 30 |
| 6 | Subbasin 13 area | Paolo Verde Trees, Mesquite, Creosote, Saguaro | 30 |

**Photo 1 – Vegetation Transect 1**

**Photo 2 – Vegetation Transect 2**

**Photo 3 – Vegetation Transect 3**

**Photo 4 – Vegetation Transect 4**

**Photo 5 – Vegetation Transect 5**

**Photo 6 – Vegetation Transect 6**

The vegetative cover density is used to adjust the XSAT values in accordance Section 4.4.1.2 of the Drainage Design Manual. The graph in Figure 4.4 was used to determine vegetation correction factors for XSAT bare ground values. These adjusted values are given in Table 4-5 below.

**RTIMP**

The percentage rock outcrop values to be used for the rainfall loss equation are obtained for each soil type within the subbasins. The composite RTIMP values are then determined for each subbasin as area-weighted average value. The composite values for RTIMP are given in Table 4-5 below.

## Table 4-5

## Summary of Vegetation Adjusted Composite XKSAT Values and Corresponding Composite % Rock Outcrop Values

| Subbasin ID | XKSAT (Bare Ground) | Vegetation Cover % | Vegetation Cover Correction Factor | Composite XKSAT Adjusted for Vegetation | Composite % Rock Outcrop |
|---|---|---|---|---|---|
| 1 | 0.248 | 25 | 1.17 | 0.29 | 0.0 |
| 2 | 0.273 | 25 | 1.17 | 0.32 | 0.0 |
| 3 | 0.185 | 25 | 1.17 | 0.22 | 0.4 |
| 4 | 0.207 | 20 | 1.17 | 0.23 | 6.0 |
| 5 | 0.316 | 25 | 1.17 | 0.37 | 0.0 |
| 6 | 0.275 | 25 | 1.17 | 0.32 | 0.0 |
| 7 | 0.147 | 25 | 1.17 | 0.17 | 9.0 |
| 8 | 0.156 | 25 | 1.22 | 0.18 | 15.9 |
| 9 | 0.176 | 25 | 1.17 | 0.20 | 0.0 |
| 10 | 0.305 | 25 | 1.17 | 0.36 | 0.0 |
| 11 | 0.213 | 25 | 1.17 | 0.25 | 0.9 |
| 12 | 0.225 | 25 | 1.17 | 0.26 | 1.9 |
| 13 | 0.181 | 30 | 1.17 | 0.22 | 2.7 |
| 14 | 0.196 | 25 | 1.17 | 0.23 | 0.0 |
| 15 | 0.169 | 25 | 1.17 | 0.20 | 0.0 |
| 16 | 0.173 | 25 | 1.17 | 0.20 | 0.0 |
| 17 | 0.199 | 20 | 1.11 | 0.22 | 0.0 |
| 18 | 0.283 | 20 | 1.11 | 0.31 | 0.0 |
| 19 | 0.163 | 25 | 1.17 | 0.19 | 0.0 |
| 20 | 0.183 | 25 | 1.17 | 0.21 | 0.0 |
| 21 | 0.217 | 20 | 1.11 | 0.24 | 0.0 |
| 22 | 0.171 | 25 | 1.17 | 0.20 | 0.0 |
| 23 | 0.228 | 25 | 1.17 | 0.27 | 0.0 |
| 24 | 0.190 | 25 | 1.17 | 0.22 | 0.0 |
| 25 | 0.174 | 20 | 1.11 | 0.20 | 0.0 |

**Land Use Parameters for Subbasins**

This study does not consider future condition land use for the watershed. The hydrologic study and the 100-year floodplains to be derived from it will be based solely on the existing land use condition. In general, under the existing condition, the study watershed is essentially undeveloped. The watershed is sub-divided into polygons of common land use elements. There are two categories of land use, either "natural" or "developed". The developed areas consist of scattered single-family residences on large acreages and are located in the southern portion of the watershed. There is a golf course development at the northwestern end of the watershed. The loss parameters, RTIMP, vegetation cover density (VCD) and IA are affected by land use. Due to the sparse nature of existing development, land use will have no appreciable effect on VCD. Land use does have some effect on RTIMP, percent imperviousness, and composite values have been determined for the subbasins. The IA values were also adjusted for the subbasins to reflect the land use.

**Area Weighted Rainfall Loss Parameters for each Subbasin**

Table 4-6 below summarizes the final area weighting calculations for rainfall loss parameters for each subbasin in the study watershed.

## Table 4-6

## Summary of Area Weighted Rainfall Loss Parameters for Subbasins

| Subbasin ID | Total Area (sq. mi) | IA (inches) | DTHETA | PSIF (Inches) | XKSAT (in/hr) | RTIMP (%) |
|---|---|---|---|---|---|---|
| 1 | 0.36 | 0.33 | 0.35 | 4.80 | 0.39 | 11 |
| 2 | 0.33 | 0.25 | 0.35 | 4.65 | 0.43 | 2 |
| 3 | 0.84 | 0.30 | 0.37 | 5.30 | 0.29 | 7 |
| 4 | 0.34 | 0.33 | 0.38 | 5.60 | 0.26 | 13 |
| 5 | 0.13 | 0.25 | 0.35 | 4.40 | 0.49 | 0 |
| 6 | 0.53 | 0.27 | 0.35 | 4.60 | 0.43 | 9 |
| 7 | 0.6 | 0.26 | 0.40 | 6.00 | 0.23 | 13 |
| 8 | 0.28 | 0.26 | 0.39 | 5.80 | 0.24 | 21 |
| 9 | 0.43 | 0.25 | 0.38 | 5.60 | 0.22 | 2 |
| 10 | 0.22 | 0.25 | 0.35 | 4.45 | 0.47 | 0 |
| 11 | 0.50 | 0.25 | 0.37 | 5.20 | 0.31 | 1 |
| 12 | 0.36 | 0.25 | 0.36 | 5.00 | 0.35 | 2 |
| 13 | 0.38 | 0.25 | 0.38 | 5.60 | 0.30 | 3 |
| 14 | 0.41 | 0.25 | 0.37 | 5.30 | 0.31 | 0 |
| 15 | 0.48 | 0.25 | 0.39 | 5.70 | 0.26 | 0 |
| 16 | 0.43 | 0.25 | 0.39 | 5.70 | 0.27 | 0 |
| 17 | 0.24 | 0.25 | 0.37 | 5.30 | 0.29 | 0 |
| 18 | 0.42 | 0.25 | 0.35 | 4.60 | 0.38 | 0 |
| 19 | 0.59 | 0.25 | 0.39 | 5.80 | 0.25 | 0 |
| 20 | 0.51 | 0.25 | 0.38 | 5.60 | 0.29 | 0 |
| 21 | 0.28 | 0.25 | 0.36 | 5.10 | 0.31 | 0 |
| 22 | 0.64 | 0.25 | 0.37 | 5.70 | 0.27 | 0 |
| 23 | 0.55 | 0.25 | 0.36 | 5.00 | 0.35 | 0 |
| 24 | 0.41 | 0.25 | 0.38 | 5.40 | 0.30 | 0 |
| 25 | 0.34 | 0.25 | 0.39 | 5.70 | 0.27 | 0 |

#### 4.2.2.4 Unit Hydrograph Parameters

Rainfall excess on a watershed is routed to produce a storm discharge hydrograph at the outlet of the watershed (or subbasin) by either hydraulic routing or hydrologic routing method. The method of choice for routing the rainfall excess for this study is by means of hydrologic routing. The Drainage Design Manual recommends two methods for hydrograph generation for watersheds within Maricopa County: the Clark Unit hydrograph and by selected S-Graphs.

S-Graph is a dimensionless form of unit hydrograph that can be used in place of unit hydrographs for performing flood studies. For this study, S-Graph method is selected for generating the hydrographs for the watershed. The Drainage Design Manual provides two types of regional S-Graphs for hydrologic routing; Phoenix Mountain and Phoenix Valley S-Graphs. S-Graphs are generally used for large watersheds. However, this watershed is very mountainous and rugged and therefore not suitable for Clark Unit Hydrograph method. The basin slopes range from about 140 to 400 feet per mile with an average slope of 226 feet per mile over the watershed (See subbasin slopes in Table 4-7). The Phoenix Mountain S-Graph is therefore selected for generating hydrographs for this watershed.

**S-Graph Parameters**

The parameter required for developing hydrographs by the S-Graph method is LAG. Basin LAG is a function of watershed physical characteristics. It is a function of the watershed length, slope and surface roughness.

$$\mathbf{Lag} = \mathbf{C}\left(\frac{\mathbf{LLca}}{\mathbf{S^p}}\right)^{\mathbf{m}}$$

Where Lag = Basin lag in hours

L = Length of the longest watercourse in the basin in miles

Lca = Length along the watercourse to a point opposite the centroid in miles

S = Watercourse slope in feet per mile

C = A coefficient and m & p are exponents

C = 24 Kn

Where Kn is an estimated Manning's n for all channels within the basin and m = 0.38. Traditionally, p is taken as 0.5

Kn is a measure of the hydraulic efficiency of the watershed and is not necessarily constant for all rainfall depths for a particular watershed. Table 5.4 of the Drainage Design Manual provides a guide for selection of Kn values based on S-Graph type and topographic nature of the watershed. This was used, in addition to engineering judgment, to determine the Kn values for the subbasins. The selected values for Kn are given in Table 4-7.

The S-Graph unit hydrograph parameters were generated using the Districts MCUHP2 (Maricopa County Unit Hydrograph Program 2) computer program, which is now in the DDSMW software. The input parameters for this S-Graph unit hydrograph are summarized in Table 4-7 below. The table also includes the computed values for LAG.

# Table 4-7

## Summary of S-Graph Parameters

| Subbasin ID | Length L (mi) | Length to Centroid Lca (mi) | Slope (ft/mi) | Kn | Computed LAG (min) |
|---|---|---|---|---|---|
| 1 | 2.18 | 1.07 | 174.4 | 0.056 | 42 |
| 2 | 1.70 | 0.82 | 179.4 | 0.059 | 36 |
| 3 | 2.84 | 1.67 | 142.1 | 0.06 | 50 |
| 4 | 1.86 | 0.94 | 139.9 | 0.06 | 60 |
| 5 | 0.51 | 0.32 | 211.7 | 0.060 | 16 |
| 6 | 1.75 | 0.83 | 196.9 | 0.056 | 34 |
| 7 | 2.90 | 1.75 | 181.8 | 0.059 | 59 |
| 8 | 2.15 | 0.77 | 153.6 | 0.058 | 39 |
| 9 | 1.51 | 0.60 | 172.5 | 0.060 | 31 |
| 10 | 0.97 | 0.50 | 303.2 | 0.060 | 22 |
| 11 | 1.22 | 0.52 | 241.1 | 0.060 | 26 |
| 12 | 2.10 | 1.21 | 185.6 | 0.060 | 46 |
| 13 | 2.06 | 0.97 | 174.6 | 0.060 | 47 |
| 14 | 2.21 | 1.08 | 253.4 | 0.060 | 42 |
| 15 | 1.99 | 0.82 | 197.2 | 0.060 | 38 |
| 16 | 2.02 | 1.02 | 217.8 | 0.060 | 41 |
| 17 | 1.32 | 0.42 | 325.0 | 0.060 | 23 |
| 18 | 1.32 | 0.57 | 292.1 | 0.060 | 26 |
| 19 | 1.33 | 0.67 | 243.8 | 0.060 | 29 |
| 20 | 1.72 | 0.86 | 137.8 | 0.060 | 39 |
| 21 | 1.61 | 0.65 | 288.3 | 0.060 | 36 |
| 22 | 1.54 | 0.73 | 207.3 | 0.060 | 33 |
| 23 | 1.90 | 0.73 | 312.9 | 0.060 | 38 |
| 24 | 2.01 | 0.97 | 296.2 | 0.060 | 43 |
| 25 | 1.39 | 0.85 | 393.4 | 0.060 | 31 |

#### 4.2.2.5 Reach Route Parameters

Routing of subbasin hydrographs is performed using the normal depth option of the Modified Puls channel storage method of HEC-1. Routing reach paths are shown in Plate 1 (Watershed Subbasins). Plate 4 (HEC-1 Schematic) shows the routing reach scheme within the watershed, with each route identified by a label that consists of the upstream and downstream concentration point (CP) numbers that define the reach.

**Cross section Geometry**

Representative cross section geometry for each route was obtained from the topographic data of both the 2-foot contour and the 10-foot contour maps. The normal depth method requires 8-point geometric data to define the routing reach cross section. The points are station and the corresponding elevations, covering both the main channel and the overbank areas of the watercourse.

**Mannings' n Estimates**

The normal depth method for channel routing requires an estimate of channel roughness in the form of Manning's n value for each cross section. Representative n-value estimates was based on photographs taken during field visits and engineering judgment. A separated Manning's n report has been prepared as part of the hydraulic analyses report. The hydrologic routing requires a less elaborate Manning's n evaluation, since a single value is required for each routing reach. The representative routing reach Manning's n values are determined by selection of the predominant values for all cross sections located within each reach. Appendix 2 shows photographs of channel sections used as routing reaches. Table 4-8 below is a summary of routing reach parameters.

**Table 4-8**

**Routing Reach Physical Parameters**

| Route ID | Upstream CP | Downstream CP | Length (ft) | Slope (ft/ft) | Channel "n" Value | Overbank "n" Value |
|---|---|---|---|---|---|---|
| R3-A | 3 | A | 5649 | 0.0375 | 0.035 | 0.075 |
| R7-6 | 7 | 6 | 7167 | 0.0450 | 0.035 | 0.075 |
| R9-6 | 9 | 6 | 4780 | 0.0580 | 0.035 | 0.075 |
| R11-C | 11 | C | 3517 | 0.0830 | 0.035 | 0.075 |
| R12-11 | 12 | 11 | 5674 | 0.0530 | 0.040 | 0.080 |
| R13-12 | 13 | 12 | 2975 | 0.0470 | 0.040 | 0.080 |
| R20-13 | 20 | 12 | 6689 | 0.0470 | 0.035 | 0.080 |
| R15-11 | 15 | 11 | 4392 | 0.0630 | 0.040 | 0.075 |
| R19-F | 19 | F | 6408 | 0.0620 | 0.035 | 0.075 |
| R22-19 | 22 | 19 | 4366 | 0.0890 | 0.035 | 0.075 |
| R6-B | 6 | B | 2669 | 0.0880 | 0.035 | 0.075 |

### Computational Parameters

Other than the physical parameters that describe the routing reaches, the normal depth method is also a function of two computational parameters. These are the model computational time interval (NMIN) and the number of routing steps (NSTPS)

### Computational Time Interval

The modeling computational time interval directly impacts the hydrologic routing of a flood hydrograph and the minimum allowable reach length. Values of NMIN are selected to provide adequate definition of the unit hydrograph and should lie within the range of 0.1 to 0.25 times the time of concentration. NMIN can be selected to be as small as possible, but a value too small results in excessive computer output. NMIN is typically taken in multiples of 5 minutes. Due to the small sizes of the subbasins in this study, the NMIN value used is 5 minutes.

NSTPS is the number of routing steps to be used in the storage routing. NSTPS is normally estimated as

$$\text{NSTPS} = \frac{\text{Routing Length}}{\text{Velocity x NMIN}}$$

Table 4-9 below shows the values used for NSTPS for the hydrologic model.

**Table 4-9**

**Routing Reach NSTPS Parameters**

| Route ID | Upstream CP | Downstream CP | Length (ft) | Slope (ft/ft) | Estimated Channel Velocity (fps) | Estimated NSTPS |
|---|---|---|---|---|---|---|
| R3-A | 3 | A | 5649 | 0.0375 | 6.6 | 3 |
| R7-6 | 7 | 6 | 7167 | 0.0450 | 7.0 | 3 |
| R9-6 | 9 | 6 | 4780 | 0.0580 | 5.7 | 3 |
| R11-C | 11 | C | 3517 | 0.0830 | 11.4 | 1 |
| R12-11 | 12 | 11 | 5674 | 0.0530 | 9.8 | 2 |
| R13-12 | 13 | 12 | 2975 | 0.0470 | 6.0 | 2 |
| R20-13 | 20 | 12 | 6689 | 0.0470 | 6.0 | 4 |
| R15-11 | 15 | 11 | 4392 | 0.0630 | 7.3 | 2 |
| R19-F | 19 | F | 6408 | 0.0620 | 7.5 | 3 |
| R22-19 | 22 | 19 | 4366 | 0.0890 | 6.9 | 2 |
| R6-B | 6 | B | 2669 | 0.0880 | 10.0 | 1 |

### 4.2.3 Statistical Parameters

#### 4.2.3.1 Precipitation Statistics

There are no statistical data of significant record available for this watershed other than the regional precipitation data published by the National Oceanic and Atmospheric Administration (NOAA). The precipitation-duration-frequency statistics used for this study are derived from the NOAA Atlas 2 for Arizona.

#### 4.2.3.2 Stream Discharge Statistics

There are no statistical flow data available for the study watershed

### 4.2.4 Precipitation Data

#### 4.2.4.1 Rainfall Distribution

The storm frequencies specified for analysis in this study are the 100-year, 6-hour and 24-hour duration storms. The rainfall distributions for the 6-hour storm are based on the watershed area. Those distributions are listed in the Drainage Design Manual with each precipitation pattern valid for a certain watershed area and are automatically coded into the model by the MCUHP2 program (DDMSW). The 24-hour rainfall distribution used for this study is the SCS Type II.

#### 4.2.4.2 Point Precipitation Data

Point precipitation values used for this study are derived from the isopluvial maps in the Drainage Design Manual. Refer to Figures 4-1 and 4-2 for a depiction of the study watershed overlaid by isolpuvials of the 100-year 6 –hour and 24-hour storms, respectively. The average 100-year 6 –hour and 24-hour point precipitation values used for modeling this watershed are 3.5 inches and 4.8 inches, respectively.

#### 4.2.4.3 Areal Precipitation Reduction

No precipitation reduction factor was applied to the precipitation depths for the study watershed. This is due to the small size of the watershed and its subbasins.

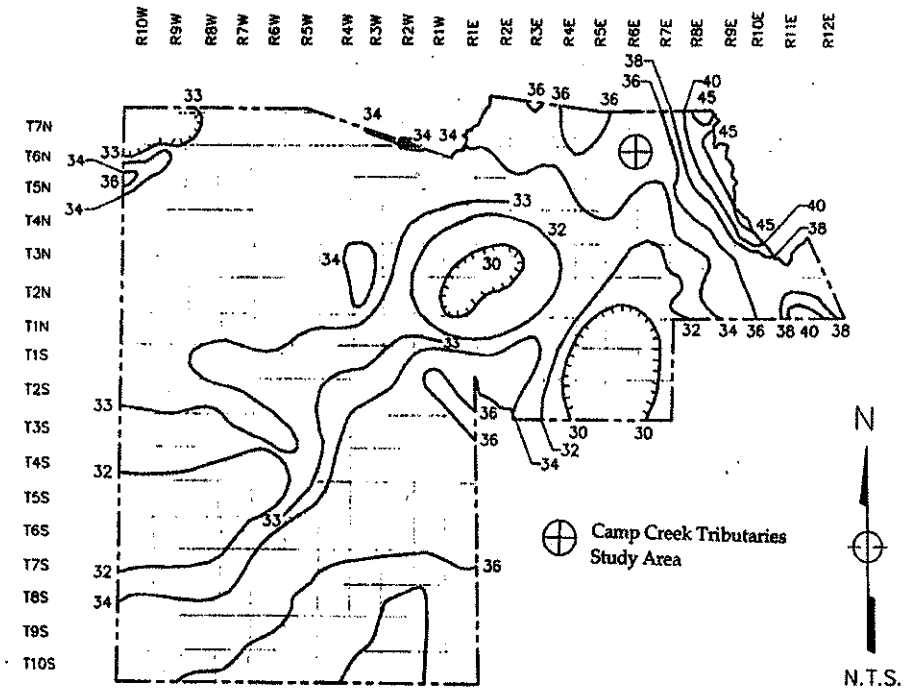


**FIGURE 4-1 Isopluvial Map for the 100-year, 6 Hour Storm**

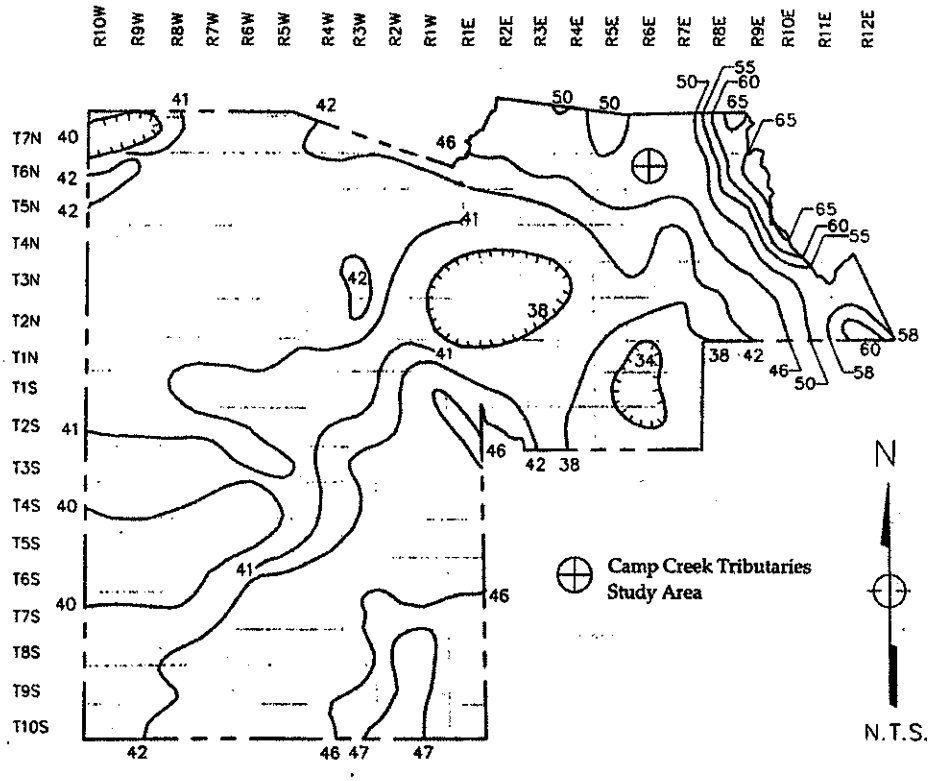


**FIGURE 4-2 Isopluvial Map for the 100-year, 24-Hour Storm**

## 4.3 HEC-1 Model Results

HEC-1 models for both the 100-year, 6-hour and 24-hour storms are developed for this study using the Districts pre-processing software, DDMSW. Both models were run using a computational interval of 5 minutes. The DDMSW summary sheets are shown in Appendix 3

The results for each model are summarized in Tables 4-10 and 4-11 below. Appendices 5 and 6 are listings of the 100-year 6-hour storm HEC-1 output and the 100-year 24-hour storm HEC-1 output, respectively.

## Table 4-10

## Summary of HEC-1 Model Results for the 100-year 24-Hour Storm

| HEC-1 ID | Peak Discharge (cfs) | Drainage Area (sq. mi.) | Unit Discharge (cfs/sq.mi.) | Time to Peak (hours) | Type of Hydrograph |
|---|---|---|---|---|---|
| SUB-3 | 771 | 0.84 | 918 | 12.50 | Hydrograph |
| SUB-4 | 285 | 0.34 | 838 | 12.67 | Hydrograph |
| CP-3 | 1030 | 1.18 | 873 | 12.58 | Combine |
| R3-A | 967 | 1.18 | 819 | 12.75 | Routed |
| SUB-2 | 355 | 0.33 | 1076 | 12.33 | Hydrograph |
| CP-A1 | 1133 | 1.51 | 750 | 12.75 | Hydrograph |
| SUB-1 | 364 | 0.36 | 1011 | 12.42 | Hydrograph |
| CP-A | 1423 | 1.87 | 761 | 12.50 | Combine |
| SUB-7 | 514 | 0.60 | 857 | 12.67 | Hydrograph |
| SUB-8 | 326 | 0.28 | 1164 | 12.42 | Hydrograph |
| CP-7 | 749 | 0.88 | 851 | 12.50 | Combine |
| R7-6 | 736 | 0.88 | 836 | 12.67 | Routed |
| SUB-9 | 588 | 0.43 | 1367 | 12.25 | Hydrograph |
| R9-6 | 555 | 0.43 | 1291 | 12.42 | Routed |
| SUB-6 | 611 | 0.53 | 1153 | 12.33 | Hydrograph |
| CP-6 | 1641 | 1.84 | 892 | 12.42 | Combine |
| R6-B | 1636 | 1.84 | 889 | 12.50 | Routed |
| SUB-5 | 229 | 0.13 | 1762 | 12.08 | Hydrograph |
| CP-B | 1681 | 1.97 | 853 | 12.50 | Combine |
| SUB-20 | 545 | 0.51 | 1069 | 12.42 | Hydrograph |
| R20-13 | 512 | 0.51 | 1004 | 12.58 | Routed |
| SUB-13 | 337 | 0.38 | 887 | 12.50 | Hydrograph |
| CP-13 | 854 | 0.89 | 959 | 12.58 | Combine |
| R13-12 | 826 | 0.89 | 928 | 12.67 | Routed |
| SUB-12 | 337 | 0.36 | 936 | 12..50 | Hydrograph |

**Table 4-10 (Continued)**

**Summary of HEC-1 Model Results for the 100-year 24-Hour Storm**

| HEC-1 ID | Peak Discharge (cfs) | Drainage Area (sq. mi.) | Unit Discharge (cfs/sq.mi.) | Time to Peak (hours) | Type of Hydrograph |
|---|---|---|---|---|---|
| CP-12A | 1083 | 1.25 | 866 | 12.67 | Combine |
| SUB-16 | 447 | 0.43 | 1040 | 12.50 | Hydrograph |
| CP-12 | 1432 | 1.68 | 905 | 12.67 | Combine |
| R12-11 | 1410 | 1.68 | 896 | 12.58 | Routed |
| SUB-15 | 539 | 0.48 | 1123 | 12.75 | Hydrograph |
| R15-11 | 530 | 0.48 | 1104 | 12.33 | Routed |
| SUB-11 | 709 | 0.50 | 1418 | 12.75 | Hydrograph |
| CP-11 | 2197 | 2.66 | 826 | 12.42 | Combine |
| R11-C | 2046 | 2.66 | 818 | 12.50 | Routed |
| SUB-10 | 332 | 0.22 | 1509 | 12.67 | Hydrograph |
| CP-C | 2100 | 2.88 | 780 | 12.42 | Combine |
| SUB-14 | 416 | 0.41 | 1015 | 12.50 | Hydrograph |
| SUB-17 | 378 | 0.24 | 1575 | 12.67 | Hydrograph |
| SUB-22 | 789 | 0.64 | 1233 | 12.25 | Hydrograph |
| R22-19 | 789 | 0.64 | 1233 | 12.42 | Routed |
| SUB-19 | 815 | 0.59 | 1381 | 12.33 | Hydrograph |
| CP-19 | 1510 | 1.23 | 1228 | 12.42 | Combine |
| R19-F | 1469 | 1.23 | 1194 | 12.50 | Routed |
| SUB-18 | 585 | 0.42 | 1393 | 12.08 | Hydrograph |
| CP-F | 1826 | 1.65 | 1107 | 12.50 | Combine |
| SUB-21 | 322 | 0.28 | 1150 | 12.42 | Hydrograph |
| SUB-23 | 585 | 0.55 | 1064 | 12.58 | Hydrograph |
| SUB-24 | 405 | 405 | 988 | 12.58 | Hydrograph |
| SUB-25 | 436 | 4.36 | 1282 | 12.67 | Hydrograph |

## Table 4-11

## Summary of HEC-1 Model Results for the 100-year 6-Hour Storm

| HEC-1 ID | Peak Discharge (cfs) | Drainage Area (sq. mi.) | Unit Discharge (cfs/sq.mi.) | Time to Peak (hours) | Type of Hydrograph |
|---|---|---|---|---|---|
| SUB-3 | 549 | 0.84 | 654 | 4.58 | Hydrograph |
| SUB-4 | 211 | 0.34 | 621 | 4.67 | Hydrograph |
| CP-3 | 753 | 1.18 | 638 | 4.58 | Combine |
| R3-A | 734 | 1.18 | 622 | 4.75 | Routed |
| SUB-2 | 222 | 0.33 | 673 | 4.42 | Hydrograph |
| CP-A1 | 887 | 1.51 | 587 | 4.67 | Hydrograph |
| SUB-1 | 245 | 0.36 | 681 | 4.50 | Hydrograph |
| CP-A | 1101 | 1.87 | 589 | 4.67 | Combine |
| SUB-7 | 386 | 0.60 | 643 | 4.67 | Hydrograph |
| SUB-8 | 237 | 0.28 | 846 | 4.42 | Hydrograph |
| CP-7 | 593 | 0.88 | 674 | 4.58 | Combine |
| R7-6 | 586 | 0.88 | 666 | 4.75 | Routed |
| SUB-9 | 395 | 0.43 | 919 | 4.33 | Hydrograph |
| R9-6 | 387 | 0.43 | 900 | 4.50 | Routed |
| SUB-6 | 391 | 0.53 | 738 | 4.33 | Hydrograph |
| CP-6 | 1239 | 1.84 | 673 | 4.58 | Combine |
| R6-B | 1235 | 1.84 | 671 | 4.67 | Routed |
| SUB-5 | 116 | 0.13 | 892 | 4.08 | Hydrograph |
| CP-B | 1264 | 1.97 | 642 | 4.58 | Combine |
| SUB-20 | 366 | 0.51 | 718 | 4.42 | Hydrograph |
| R20-13 | 341 | 0.51 | 669 | 4.75 | Routed |
| SUB-13 | 246 | 0.36 | 683 | 4.50 | Hydrograph |
| CP-13 | 571 | 0.89 | 642 | 4.67 | Hydrograph |
| R13-12 | 567 | 0.389 | 637 | 4.75 | Routed |
| SUB-12 | 229 | 0.36 | 636 | 4.50 | Combined |

## Table 4-11 (Continued)

## Summary of HEC-1 Model Results for the 100-year 6-Hour Storm

| HEC-1 ID | Peak Discharge (cfs) | Drainage Area (sq. mi.) | Unit Discharge (cfs/sq.mi.) | Time to Peak (hours) | Type of Hydrograph |
|---|---|---|---|---|---|
| CP-12A | 762 | 1.25 | 610 | 4.67 | |
| SUB-16 | 301 | 0.43 | 700 | 4.50 | Hydrograph |
| CP-12 | 1024 | 1.68 | 610 | 4.67 | Combine |
| R12-11 | 1017 | 1.68 | 605 | 4.83 | Routed |
| SUB-15 | 364 | 0.48 | 758 | 4.42 | Hydrograph |
| R15-11 | 359 | 0.48 | 748 | 4.50 | Routed |
| SUB-11 | 442 | 0.50 | 884 | 4.25 | Hydrograph |
| CP-11 | 1524 | 2.66 | 573 | 4.75 | Combine |
| R11-C | 1519 | 2.66 | 571 | 4.83 | Routed |
| SUB-10 | 182 | 0.22 | 827 | 4.17 | Hydrograph |
| CP-C | 1561 | 2.88 | 542 | 4.75 | Combine |
| SUB-14 | 279 | 0.41 | 680 | 4.50 | Hydrograph |
| SUB-17 | 226 | 0.24 | 942 | 4.25 | Hydrograph |
| SUB-22 | 519 | 0.64 | 811 | 4.33 | Hydrograph |
| R22-19 | 514 | 0.64 | 803 | 4.50 | Routed |
| SUB-19 | 519 | 0.59 | 880 | 4.33 | Hydrograph |
| CP-19 | 998 | 1.23 | 811 | 4.33 | Combine |
| R19-F | 985 | 1.23 | 801 | 4.58 | Routed |
| SUB-18 | 357 | 0.42 | 850 | 4.25 | Hydrograph |
| CP-F | 1246 | 1.65 | 755 | 4.50 | Combine |
| SUB-21 | 212 | 0.28 | 757 | 4.42 | Hydrograph |
| SUB-23 | 383 | 0.55 | 696 | 4.50 | Hydrograph |
| SUB-24 | 273 | 0.41 | 674 | 4.50 | Hydrograph |
| SUB-25 | 280 | 0.34 | 824 | 4.33 | Hydrograph |

## 4.4 Calibration/Verification of Model

Calibration of the HEC-1 models is not possible because of lack of available gaged data. In lieu of calibration, indirect verification methods are used. The indirect verification methods used are:

### 4.4.1 Unit Peak Discharge Curves

Section 8.2 of the latest version of the Drainage Design Manual (Draft, 2003) provides various envelopes curves for comparison to HEC-1 results. There are 7 envelope curves presented and these represent envelopes of maximum observed flood discharges for different hydrologic regions. The envelope Curve C (Malvick et. al., 1980) is built into the District's DDMSW software and is used for the comparison. Figures 4-4 and 4-7 show the plots of the 24-hour and 6-hour unit peak discharges obtained from the HEC-1 on the envelope curve, respectively. The result for the 24-hour unit discharge shows several data points above the envelope curve. This may be due to the small areas of the subbasins within the watershed resulting in high unit discharges. However, the 6-hour unit discharges plotted below the envelope curve.

A second envelope curve (Boughton et. al., 1987) is also built into the District's DDMSW software and is used for the comparison. Figures 4-5 and 4-8 show the plots of the 24-hour and 6-hour unit peak discharges obtained from the HEC-1 on the envelope curve, respectively. All data points for both the 6-hour and 24-hour 100-year unit discharges on Boughton's comparative graph are well below the envelope curve.

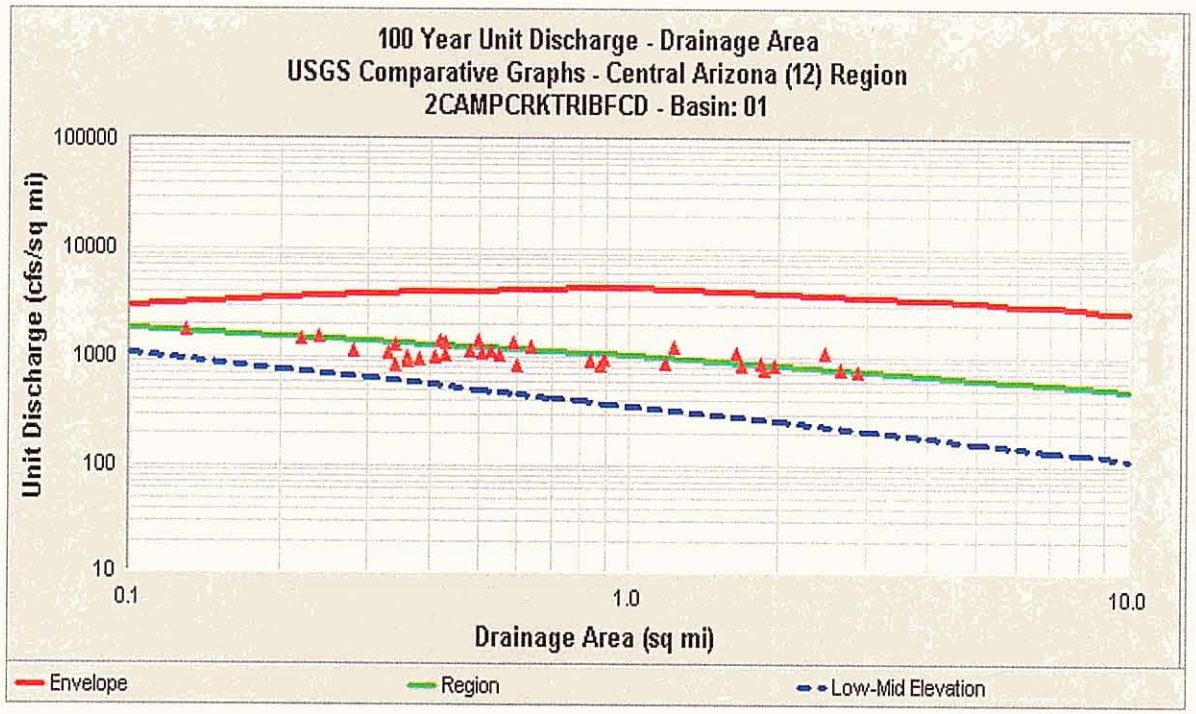


**FIGURE 4-3 100-Year 24-Hr Unit Discharge on USGS Envelope Curve for Region 12**

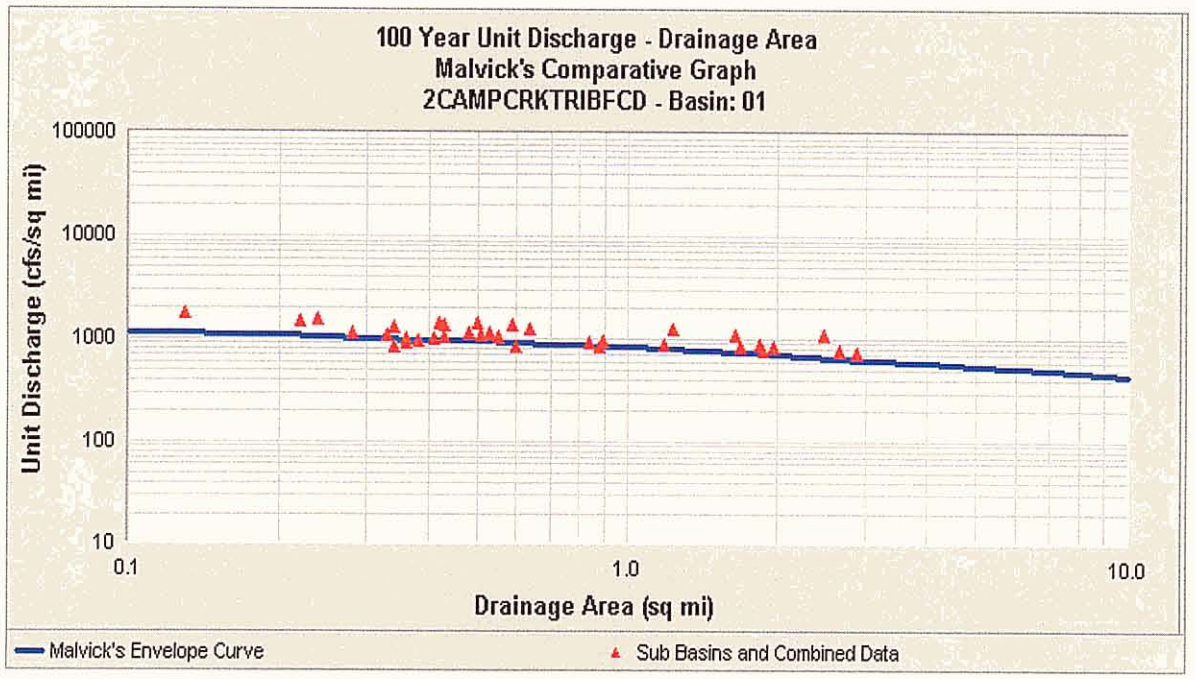


**FIGURE 4-4 100-Year 24-Hr Unit Discharge on Malvick's Regression Curve**

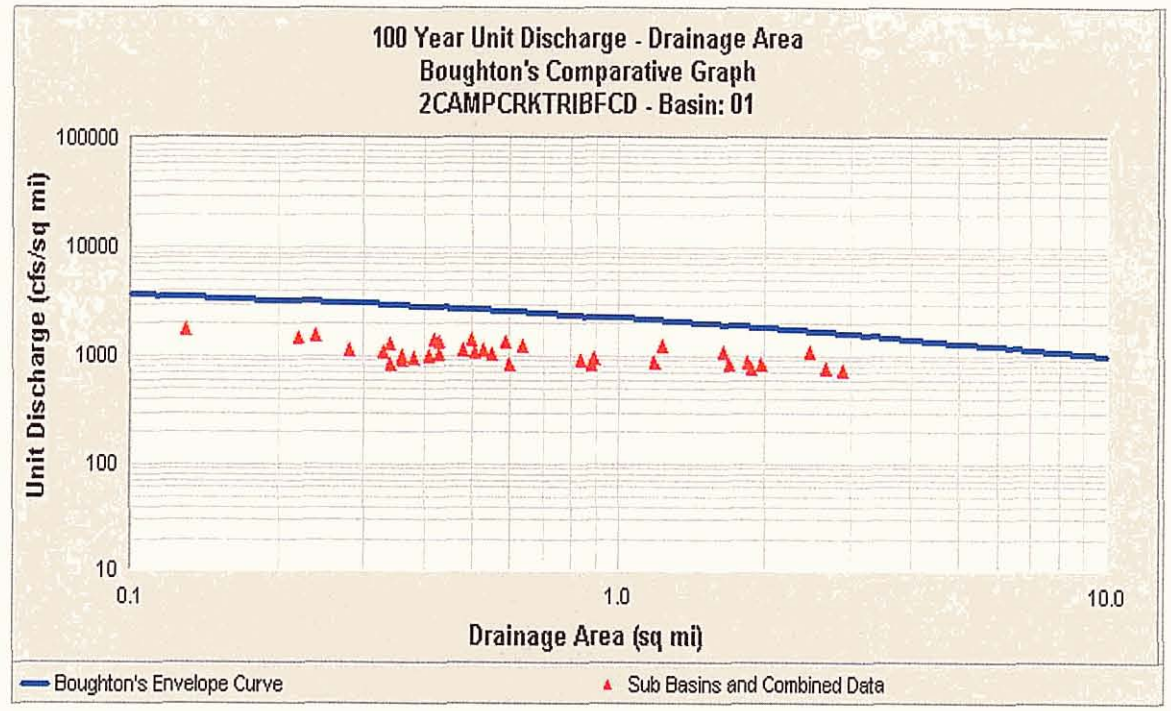


**FIGURE 4-5 100-Year 24-Hr Unit Discharge on Boughton's Envelope Curve for Region 12**

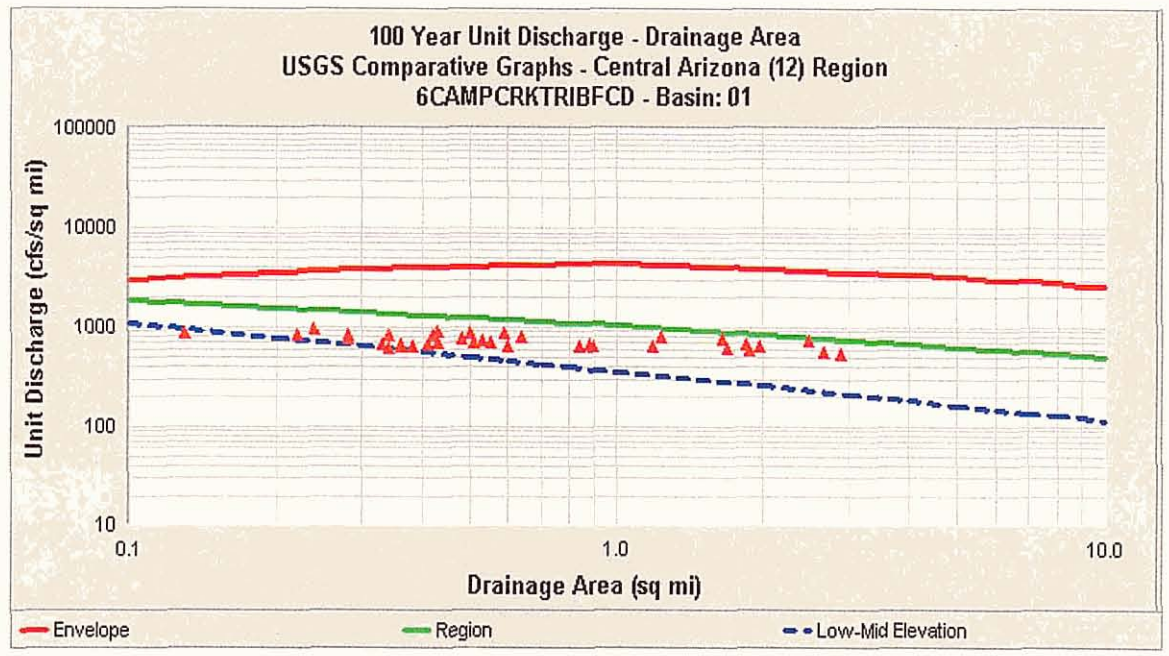


**FIGURE 4-6 100-Year 6-Hr Unit Discharge on USGS Envelope Curve for Region 12**

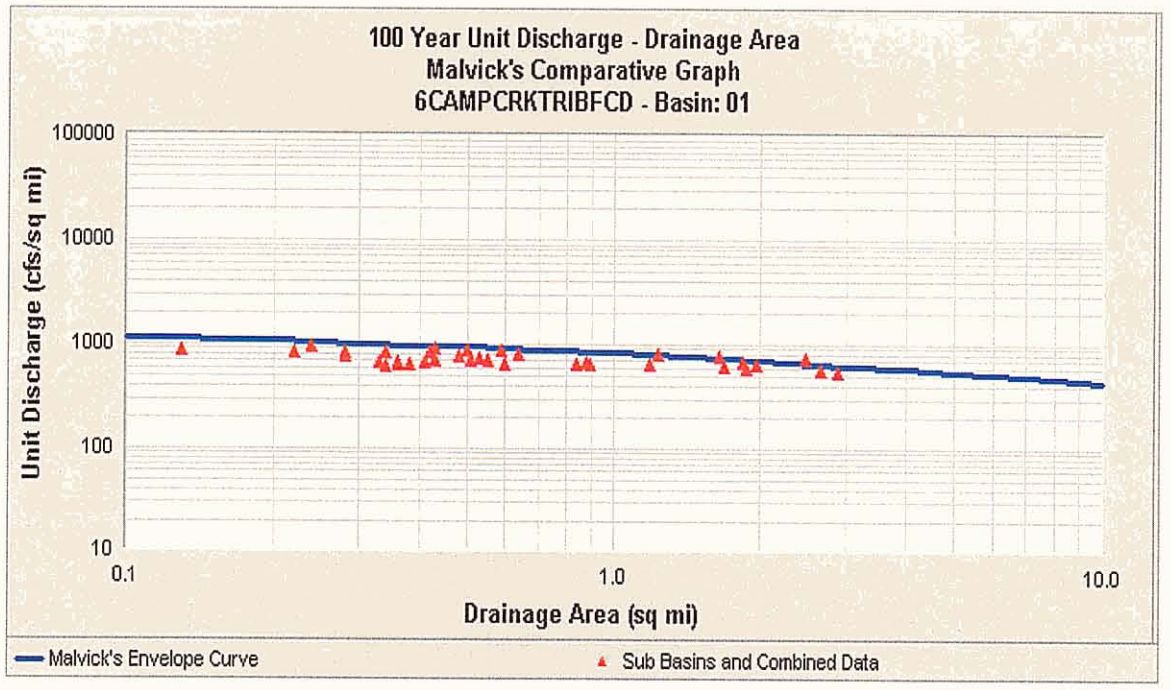


**FIGURE 4-7 100-Year 6-Hr Unit Discharge on Malvick's Regression Curve**

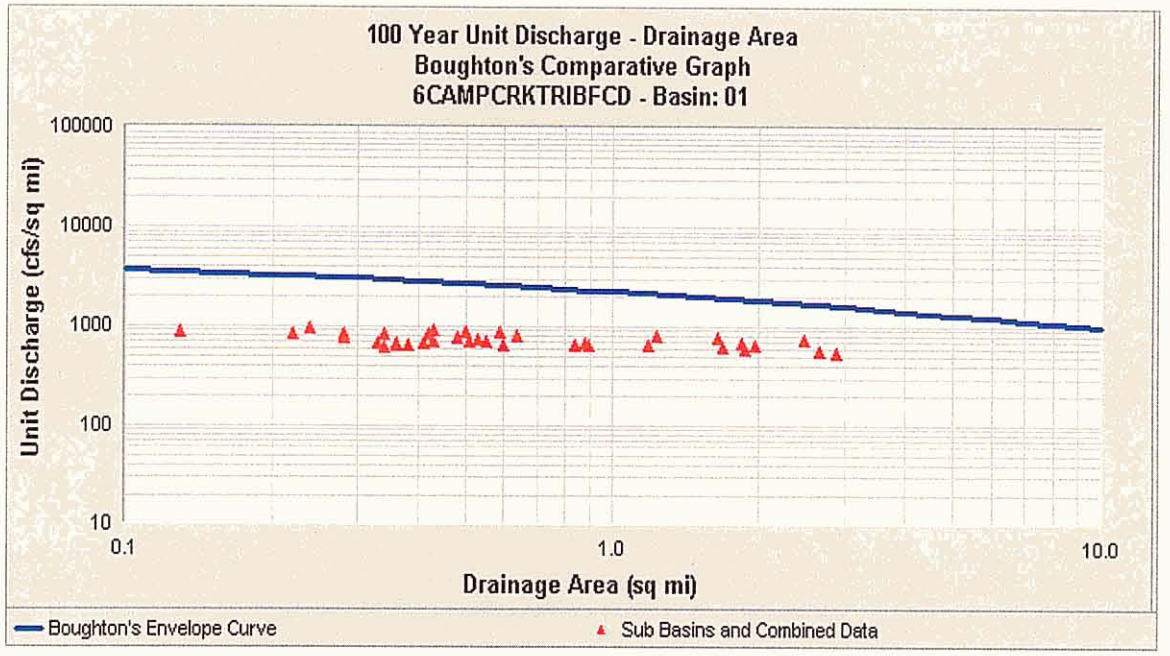


**FIGURE 4-8 100-Year 6-Hr Unit Discharge on Boughton's Envelope Curve for Region 12**

### 4.4.2 USGS Regional Regression Equation

Section 8.3 of the latest version of the Drainage Design Manual (Draft, 2003) provides regional regression equations together with envelope curves for comparison to rainfall-runoff models developed for watershed within Arizona. The Camp Creek Tributaries Floodplain Delineation Study watershed falls within Region 12 of the flood regions for Arizona. These curves are derived from stream gage data for Arizona washes and frequency analysis performed using Log-Pearson Type 3 distribution to provide a regional regression line. Envelope curves were also provided for both upper and lower limits.

The USGS comparative regression line and envelope curves for Region 12 are built into the District's DDMSW software and are used for the comparison. Figures 4-3 and 4-6 show the plots of the 24-hour and 6-hour unit peak discharges obtained from the HEC-1 on the USGS envelope curves, respectively. All data points for both the 6-hour and 24-hour 100-year unit discharges on the USGS comparative graph are well below the envelope curve. The data for the 100-year 24-hour storm scatter well around the regression line while all data for the 100-year 6-hour storm are distributed below the regression line.

## 4.5 Special Problems and Solutions

<u>HEC-1 Warning and Errors</u>

The only warning message encountered in either of the HEC-1 models was:

> "*** WARNING*** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN xxx AND xxx....."

This warning specifies a range of peak flows for which the routing numerics may be unstable. Each routing reach for which a warning message is issued was checked for the following:

1. The routed peak discharge was compared to the range listed in the warning message

2. The routed peak discharge was compared with the inflow peak discharge to determine if an increase resulted due to the routing computations and
3. The routed hydrograph was plotted and checked for oscillations if either item 1 or 2 above was concern.

This evaluation shows no routing oscillations, therefore the warning was ignored.

## 4.6 Discussion of the Results

The two storm durations, the 100-year 6-hour and 24-hour were modeled to determine which duration controls the hydrology for the watershed. The storm duration that generates the higher peak discharge is the controlling storm since the results are to be used primarily for floodplain delineation, which is based on peak discharge. Table 4-12 below compares the peak discharges for both storm durations.

The table shows that the 24-Hour storm controls the peak discharges for all the subbasins of the watershed; therefore this should be the storm duration used for the floodplain delineation.

The results will be submitted to FEMA for review and approval. The results are summarized into the requisite FEMA form MT-2, Form 2 and are given in Appendix 6 for each of the tributaries studied. Only the hydrology section of this form has been filled. The hydraulics portion of this form are given in other sections of the TDN.

**Table 4-12**

**Summary of HEC-1 Results of the Controlling Storm Duration**

| HEC-1 ID | 100-Year 6-Hour Peak Flow (cfs) | 100-Year 24-Hour Peak Flow (cfs) | Controlling Duration |
|---|---|---|---|
| SUB-1 | 245 | 364 | 24-Hour |
| SUB-2 | 222 | 355 | 24-Hour |
| SUB-3 | 549 | 771 | 24-Hour |
| SUB-4 | 211 | 285 | 24-Hour |
| SUB-5 | 116 | 229 | 24-Hour |
| SUB-6 | 391 | 611 | 24-Hour |
| SUB-7 | 386 | 514 | 24-Hour |
| SUB-8 | 237 | 326 | 24-Hour |
| SUB-9 | 395 | 588 | 24-Hour |
| SUB-10 | 182 | 332 | 24-Hour |
| SUB-11 | 442 | 709 | 24-Hour |
| SUB-12 | 229 | 337 | 24-Hour |
| SUB-13 | 246 | 359 | 24-Hour |
| SUB-14 | 279 | 416 | 24-Hour |
| SUB-15 | 364 | 539 | 24-Hour |
| SUB-16 | 301 | 447 | 24-Hour |
| SUB-17 | 226 | 378 | 24-Hour |
| SUB-18 | 357 | 585 | 24-Hour |
| SUB-19 | 519 | 815 | 24-Hour |
| SUB-20 | 366 | 545 | 24-Hour |
| SUB-21 | 212 | 322 | 24-Hour |
| SUB-22 | 519 | 789 | 24-Hour |
| SUB-23 | 383 | 585 | 24-Hour |
| SUB-24 | 273 | 405 | 24-Hour |
| SUB-25 | 280 | 436 | 24-Hour |
| CP-3 | 753 | 1030 | 24-Hour |
| CP-6 | 1239 | 1641 | 24-Hour |
| CP-7 | 593 | 749 | 24-Hour |
| CP-11 | 1524 | 2060 | 24-Hour |
| CP-12 | 1024 | 1432 | 24-Hour |
| CP-13 | 571 | 854 | 24-Hour |
| CP-19 | 998 | 1510 | 24-Hour |
| CP-A1 | 887 | 1133 | 24-Hour |
| CP-A | 1101 | 1423 | 24-Hour |
| CP-B | 1264 | 1681 | 24-Hour |
| CP-C | 1561 | 2100 | 24-Hour |
| CP-F | 1246 | 1826 | 24-Hour |

## 4.7 References

1. Arizona Department of Transportation, 1994, Drainage Design Manual.
2. Arizona Department of Water Resources, Engineering Division, Flood Management Section, September 1991, Instructions for Submitting Technical Documentation for Flood Study (SS A-97).
3. Boughton, W.C., Renard, K.G., Stone, J.J, 1987, Flood frequency estimates in Southeastern Arizona, Journal of Irrigation and Drainage Engineering, American Society of Civil Engineers, Vol. 113, No. 4, pp. 1419-1488
4. Flood Control District of Maricopa County, 1992, Drainage Design Manual for Maricopa County, Arizona, Volume 1, Hydrology. January 1995 Revisions.
5. Flood Control District of Maricopa County, 1992, Drainage Design Manual for Maricopa County, Arizona, Volume 1, Hydrology. September 2000 Revisions.
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7. Malvick, A.J., 1980, A magnitude-frequency-area relation for relation for floods in Arizona; A study to advance the methodology of assessing the vulnerability of bridges to floods for the Arizona Department of Transportation: Engineering Experiment Station, College of Engineering, University of Arizona, 17 p.
8. Sabol, G.V., 1987, S-Graph Study (Report for the Flood Control District of Maricopa County), Phoenix, Arizona, 29 p. plus appendices.
9. Sabol, G.V., 1993b, S-Graph Kn Study (Report for the Flood Control District of Maricopa County), Phoenix, Arizona, 12 p. plus appendices.
10. U.S Army Corps of Engineers, 1990, HEC-1 Flood Hydrograph Package Users Manual.
11. U.S Army Corps of Engineers, June 1998, HEC-1 Flood Hydrograph Package Software, Version 4.1.
12. U.S. Department of Agriculture, Soil Conservation Service, 1986, Soil Survey of Agilla-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona
13. U.S Department of Commerce, National Oceanic and Atmospheric Administration, 1984, Depth-Area Ratios in the Semi-Arid Southwest United States: NOAA Technical Memorandum NWS Hydro-40.
14. Federal Emergency Management Agency (Form 81-89A, Sept 2002), Riverine Hydrology & Hydraulics Form.

# APPENDIX 1

## Camp Creek Tributaries FDS

## Watershed Subbasin Parameters Computation Sheets

## Camp Creek Floodplain Delineation Study - FCD 2004-C023
## SUBBASIN RAINFALL LOSS PARAMETER CALCULATIONS

| Sub-basin No. | Soil Type | Soil Type Area in Subbasin (SF) | Soil Type Area in Subbasin (Sq.Mi) | XKSAT | A-XKSAT (SF) | Arithm WtD XKSAT | Vegetation % | Vegetation Correction Factor | Alog(XKSAT) | Log Composite XKSAT | XKSAT ADJ for VEG | Rock Outcrop | Wtd % Rock (RTIMP%) | DTHETA (Normal) | DTHETA (Dry) | PSIF | IA | Kn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | 862,874.99 | 0.031 | 0.62 | 534,982.49 | | 25 | 1.2 | -0.006 | | | 0 | | 0.25 | 0.35 | 4.9 | 0.35 | 0.06 |
| | 33 | 4,554,929.44 | 0.163 | 0.23 | 1,047,633.77 | | 25 | 1.2 | -0.104 | | | 0 | | 0.25 | 0.35 | 4.9 | 0.35 | 0.06 |
| | 34 | 4,292,743.96 | 0.154 | 0.23 | 987,331.11 | | 25 | 1.2 | -0.098 | | | 0 | | 0.25 | 0.35 | 4.9 | 0.35 | 0.06 |
| | 41 | 286,647.05 | 0.010 | 0.17 | 48,730.00 | | 25 | 1.2 | -0.008 | | | 0 | | 0.25 | 0.35 | 4.9 | 0.35 | 0.06 |
| | | *9,997,195.44* | 0.359 | | 2,618,677.37 | 0.26 | | | | 0.248 | 0.290 | | 0.00 | | | | | |
| 2 | 6 | 2,101,632.96 | 0.075 | 0.62 | 1,303,012.44 | | 25 | 1.2 | -0.016 | | | 0 | | 0.25 | 0.35 | 4.7 | 0.25 | 0.06 |
| | 33 | 3,284,836.24 | 0.118 | 0.23 | 755,512.34 | | 25 | 1.2 | -0.075 | | | 0 | | 0.25 | 0.35 | 4.7 | 0.25 | 0.06 |
| | 34 | 2,120,491.88 | 0.076 | 0.23 | 487,713.13 | | 25 | 1.2 | -0.049 | | | 0 | | 0.25 | 0.35 | 4.7 | 0.25 | 0.06 |
| | 41 | 1,670,495.25 | 0.060 | 0.17 | 283,984.19 | | 25 | 1.2 | -0.046 | | | 0 | | 0.25 | 0.35 | 4.7 | 0.25 | 0.06 |
| | | *9,177,456.33* | 0.329 | | 2,830,222.10 | 0.31 | | | | 0.273 | 0.319 | | 0.00 | | | | | |
| 3 | 6 | 1,239,381.82 | 0.044 | 0.62 | 768,416.73 | | 25 | 1.2 | -0.009 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | 33 | 7,569,047.87 | 0.272 | 0.23 | 1,740,881.01 | | 25 | 1.2 | -0.173 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | 34 | 1,159,322.74 | 0.042 | 0.23 | 266,644.23 | | 25 | 1.2 | -0.027 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | 61 | 12,196,594.18 | 0.437 | 0.15 | 1,829,489.13 | | 25 | 1.2 | -0.360 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | 63 | 366,166.16 | 0.013 | 0.14 | 51,263.26 | | 25 | 1.2 | -0.011 | | | 25 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | 96 | 789,632.68 | 0.028 | 0.07 | 55,274.29 | | 25 | 1.2 | -0.033 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.35 | 0.05 |
| | | *23,320,145.45* | 0.836 | | 4,711,968.65 | 0.20 | | | | 0.185 | 0.216 | | 0.393 | | | | | |
| 4 | 6 | 111,326.05 | 0.004 | 0.62 | 69,022.15 | | 20 | 1.1 | -0.001 | | | 0 | | 0.25 | 0.38 | 5.3 | 0.35 | 0.05 |
| | 33 | 7,103,902.11 | 0.255 | 0.23 | 1,633,897.49 | | 20 | 1.1 | -0.163 | | | 0 | | 0.25 | 0.38 | 5.3 | 0.35 | 0.05 |
| | 63 | 2,259,719.81 | 0.081 | 0.14 | 316,360.77 | | 20 | 1.1 | -0.069 | | | 25 | | 0.25 | 0.38 | 5.3 | 0.35 | 0.05 |
| | | *9,474,947.97* | 0.340 | | 2,019,280.41 | 0.21 | | | | 0.207 | 0.230 | | 5.96 | | | | | |
| 5 | 6 | 1,629,839.65 | 0.058 | 0.62 | 1,010,500.58 | | 25 | 1.2 | -0.012 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | 33 | 360,885.54 | 0.013 | 0.23 | 83,003.67 | | 25 | 1.2 | -0.008 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | 41 | 1,581,270.80 | 0.057 | 0.17 | 268,816.04 | | 25 | 1.2 | -0.044 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | | *3,571,995.99* | 0.128 | | 1,362,320.29 | 0.38 | | | | 0.316 | 0.369 | | 0.00 | | | | | |
| 6 | 6 | 4,466,530.65 | 0.160 | 0.62 | 2,769,249.00 | | 25 | 1.2 | -0.033 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | 33 | 4,474,395.89 | 0.160 | 0.23 | 1,029,111.05 | | 25 | 1.2 | -0.102 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | 41 | 5,745,527.54 | 0.206 | 0.17 | 976,739.68 | | 25 | 1.2 | -0.159 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | 61 | 79,541.59 | 0.003 | 0.15 | 11,931.24 | | 25 | 1.2 | -0.002 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | | *14,765,995.67* | 0.530 | | 4,787,030.98 | 0.32 | | | | 0.275 | 0.321 | | 0.00 | | | | | |
| 7 | 33 | 1,940,034.27 | 0.070 | 0.23 | 446,207.88 | | 25 | 1.2 | -0.044 | | | 0 | | 0.25 | 0.40 | 6.0 | 0.25 | 0.06 |
| | 61 | 7,737,965.39 | 0.278 | 0.15 | 1,160,694.81 | | 25 | 1.2 | -0.229 | | | 0 | | 0.25 | 0.40 | 6.0 | 0.25 | 0.06 |
| | 63 | 5,952,757.38 | 0.214 | 0.14 | 833,386.03 | | 25 | 1.2 | -0.182 | | | 25 | | 0.25 | 0.40 | 6.0 | 0.25 | 0.06 |
| | 96 | 981,894.35 | 0.035 | 0.07 | 68,732.60 | | 25 | 1.2 | -0.041 | | | 0 | | 0.25 | 0.40 | 6.0 | 0.25 | 0.06 |
| | | *16,612,651.39* | 0.596 | | 2,509,021.33 | 0.15 | | | | 0.147 | 0.172 | | 8.96 | | | | | |

## SUBBASIN RAINFALL LOSS PARAMETER CALCULATIONS

| Sub-basin No. | Soil Type | Soil Type Area in Subbasin (SF) | Soil Type Area in Subbasin (Sq.Mi) | XKSAT | A-XKSAT (SF) | Arithm WtD XKSAT | Vegetation % | Vegetation Correction Factor | Alog(XKSAT) | Log Composite XKSAT | XKSAT ADJ for VEG | Rock Outcrop | Wtd % Rock (RTIMP%) | DTHETA (Normal) | DTHETA (Dry) | PSIF | IA | Kn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 6 | 154,366.72 | 0.006 | 0.62 | 95,707.37 | | 25 | 1.2 | -0.001 | | | 0 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | 33 | 971,972.62 | 0.035 | 0.23 | 223,553.70 | | 25 | 1.2 | -0.022 | | | 0 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | 41 | 31,897.49 | 0.001 | 0.17 | 5,422.57 | | 25 | 1.2 | -0.001 | | | 0 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | 61 | 1,633,957.23 | 0.059 | 0.15 | 245,093.58 | | 25 | 1.2 | -0.048 | | | 0 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | 63 | 4,868,655.30 | 0.175 | 0.14 | 681,611.74 | | 25 | 1.2 | -0.149 | | | 25 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | | *7,660,849.36* | 0.275 | | 1,251,388.97 | 0.16 | | | | 0.156 | 0.182 | | 15.89 | | | | | |
| 9 | 6 | 1,179,496.16 | 0.042 | 0.62 | 731,287.62 | | 25 | 1.2 | -0.009 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 41 | 2,074,629.92 | 0.074 | 0.17 | 352,687.09 | | 25 | 1.2 | -0.057 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 61 | 8,815,066.06 | 0.316 | 0.15 | 1,322,259.91 | | 25 | 1.2 | -0.261 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | | *12,069,192.14* | 0.433 | | 2,406,234.61 | 0.20 | | | | 0.176 | 0.205 | | 0.00 | | | | | |
| 10 | 6 | 2,901,452.88 | 0.104 | 0.62 | 1,798,900.79 | | 25 | 1.2 | -0.022 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | 41 | 2,292,260.80 | 0.082 | 0.17 | 389,684.34 | | 25 | 1.2 | -0.063 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | 61 | 1,017,796.41 | 0.037 | 0.15 | 152,669.46 | | 25 | 1.2 | -0.030 | | | 0 | | 0.25 | 0.35 | 4.4 | 0.25 | 0.06 |
| | | *6,211,510.09* | 0.223 | | 2,341,254.58 | 0.38 | | | | 0.305 | 0.356 | | 0.00 | | | | | |
| 11 | 6 | 3,158,260.50 | 0.113 | 0.62 | 1,958,121.51 | | 25 | 1.2 | -0.024 | | | 0 | | 0.25 | 0.36 | 5.2 | 0.25 | 0.06 |
| | 41 | 3,316,741.23 | 0.119 | 0.17 | 563,846.01 | | 25 | 1.2 | -0.092 | | | 0 | | 0.25 | 0.36 | 5.2 | 0.25 | 0.06 |
| | 61 | 6,904,543.65 | 0.248 | 0.15 | 1,035,681.55 | | 25 | 1.2 | -0.204 | | | 0 | | 0.25 | 0.36 | 5.2 | 0.25 | 0.06 |
| | 63 | 505,257.12 | 0.018 | 0.14 | 70,736.00 | | 25 | 1.2 | -0.015 | | | 25 | | 0.25 | 0.36 | 5.2 | 0.25 | 0.06 |
| | | *13,884,802.50* | 0.498 | | 3,628,385.06 | 0.26 | | | | 0.213 | 0.248 | | 0.91 | | | | | |
| 12 | 6 | 2,791,609.73 | 0.100 | 0.62 | 1,730,798.03 | | 25 | 1.2 | -0.021 | | | 0 | | 0.25 | 0.37 | 5.0 | 0.25 | 0.06 |
| | 33 | 134,044.88 | 0.005 | 0.23 | 30,830.32 | | 25 | 1.2 | -0.003 | | | 0 | | 0.25 | 0.37 | 5.0 | 0.25 | 0.06 |
| | 41 | 872,567.83 | 0.031 | 0.17 | 148,336.53 | | 25 | 1.2 | -0.024 | | | 0 | | 0.25 | 0.37 | 5.0 | 0.25 | 0.06 |
| | 61 | 5,495,753.87 | 0.197 | 0.15 | 824,363.08 | | 25 | 1.2 | -0.162 | | | 0 | | 0.25 | 0.37 | 5.0 | 0.25 | 0.06 |
| | 63 | 775,092.25 | 0.028 | 0.14 | 108,512.92 | | 25 | 1.2 | -0.024 | | | 25 | | 0.25 | 0.37 | 5.0 | 0.25 | 0.06 |
| | | *10,069,068.56* | 0.361 | | 2,842,840.88 | 0.28 | | | | 0.225 | 0.262 | | 1.92 | | | | | |
| 13 | 6 | 1,463,498.60 | 0.052 | 0.62 | 907,369.13 | | 30 | 1.2 | -0.011 | | | 0 | | 0.25 | 0.38 | 5.6 | 0.25 | 0.06 |
| | 61 | 8,015,078.53 | 0.288 | 0.15 | 1,202,261.78 | | 30 | 1.2 | -0.237 | | | 0 | | 0.25 | 0.38 | 5.6 | 0.25 | 0.06 |
| | 63 | 1,161,752.66 | 0.042 | 0.14 | 162,645.37 | | 30 | 1.2 | -0.036 | | | 25 | | 0.25 | 0.38 | 5.6 | 0.25 | 0.06 |
| | | *10,640,329.79* | 0.382 | | 2,272,276.28 | 0.21 | | | | 0.181 | 0.221 | | 2.73 | | | | | |
| 14 | 6 | 1,920,758.32 | 0.069 | 0.62 | 1,190,870.16 | | 25 | 1.2 | -0.014 | | | 0 | | 0.30 | 0.37 | 5.4 | 0.25 | 0.06 |
| | 41 | 2,693,991.05 | 0.097 | 0.17 | 457,978.48 | | 25 | 1.2 | -0.074 | | | 0 | | 0.25 | 0.37 | 5.4 | 0.25 | 0.06 |
| | 61 | 6,774,577.75 | 0.243 | 0.15 | 1,016,186.66 | | 25 | 1.2 | -0.200 | | | 0 | | 0.25 | 0.37 | 5.4 | 0.25 | 0.06 |
| | | *11,389,327.12* | 0.409 | | 2,665,035.30 | 0.23 | | | | 0.196 | 0.229 | | 0.00 | | | | | |
| 15 | 6 | 1,137,736.69 | 0.041 | 0.62 | 705,396.75 | | 25 | 1.2 | -0.008 | | | 0 | | 0.30 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 41 | 64,639.74 | 0.002 | 0.17 | 10,988.76 | | 25 | 1.2 | -0.002 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 61 | 12,255,136.24 | 0.440 | 0.15 | 1,838,270.44 | | 25 | 1.2 | -0.362 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | | *13,457,512.67* | 0.483 | | 2,554,655.94 | 0.19 | | | | 0.169 | 0.197 | | 0.00 | | | | | |

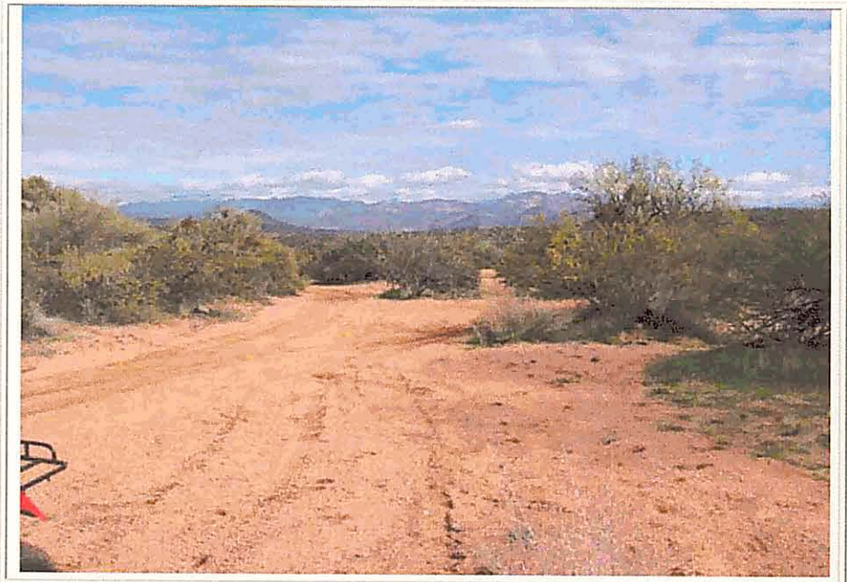
## SUBBASIN RAINFALL LOSS PARAMETER CALCULATIONS

| Sub-basin No. | Soil Type | Soil Type Area In Subbasin (SF) | Soil Type Area in Subbasin (Sq.Mi) | XKSAT | A-XKSAT (SF) | Arithm WtD XKSAT | Vegetation % | Vegetation Correction Factor | Alog(XKSAT) | Log Composite XKSAT | XKSAT ADJ for VEG | Rock Outcrop | Wtd % Rock (RTIMP%) | DTHETA (Normal) | DTHETA (Dry) | PSIF | IA | Kn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 6 | 681,625.48 | 0.024 | 0.62 | 422,607.80 | | 25 | 1.2 | -0.005 | | | 0 | | 0.30 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 33 | 1,250,650.18 | 0.045 | 0.23 | 287,649.54 | | 25 | 1.2 | -0.029 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 41 | 1,482,048.63 | 0.053 | 0.17 | 251,948.27 | | 25 | 1.2 | -0.041 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 61 | 8,446,363.41 | 0.303 | 0.15 | 1,266,954.51 | | 25 | 1.2 | -0.250 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | | *11,860,687.70* | 0.425 | | 2,229,160.12 | 0.19 | | | | 0.173 | 0.202 | | 0.00 | | | | | |
| 17 | 6 | 1,249,174.76 | 0.045 | 0.62 | 774,488.35 | | 20 | 1.1 | -0.009 | | | 0 | | 0.29 | 0.37 | 5.2 | 0.25 | 0.06 |
| | 41 | 964,740.55 | 0.035 | 0.17 | 164,005.89 | | 20 | 1.1 | -0.027 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.25 | 0.06 |
| | 61 | 4,452,541.04 | 0.160 | 0.15 | 667,881.16 | | 20 | 1.1 | -0.132 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.25 | 0.06 |
| | | *6,666,456.35* | 0.239 | | 1,606,375.40 | 0.24 | | | | 0.199 | 0.221 | | 0.00 | | | | | |
| 18 | 6 | 4,992,233.03 | 0.179 | 0.62 | 3,095,184.48 | | 20 | 1.1 | -0.037 | | | 0 | | 0.28 | 0.35 | 4.6 | 0.25 | 0.06 |
| | 41 | 3,035,667.56 | 0.109 | 0.17 | 516,063.49 | | 20 | 1.1 | -0.084 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | 61 | 3,755,223.42 | 0.135 | 0.15 | 563,283.51 | | 20 | 1.1 | -0.111 | | | 0 | | 0.25 | 0.35 | 4.6 | 0.25 | 0.06 |
| | | *11,783,124.01* | 0.423 | | 4,174,531.48 | 0.35 | | | | 0.283 | 0.314 | | 0.00 | | | | | |
| 19 | 6 | 976,258.35 | 0.035 | 0.62 | 605,280.18 | | 25 | 1.2 | -0.007 | | | 0 | | 0.30 | 0.40 | 5.9 | 0.25 | 0.06 |
| | 61 | 15,572,948.10 | 0.559 | 0.15 | 2,335,942.22 | | 25 | 1.2 | -0.460 | | | 0 | | 0.25 | 0.40 | 5.9 | 0.25 | 0.06 |
| | | *16,549,206.45* | 0.594 | | 2,941,222.39 | 0.18 | | | | 0.163 | 0.190 | | 0.00 | | | | | |
| 20 | 6 | 2,011,264.22 | 0.072 | 0.62 | 1,246,983.82 | | 25 | 1.2 | -0.015 | | | 0 | | 0.30 | 0.37 | 5.6 | 0.25 | 0.06 |
| | 61 | 12,204,072.34 | 0.438 | 0.15 | 1,830,610.85 | | 25 | 1.2 | -0.361 | | | 0 | | 0.25 | 0.37 | 5.6 | 0.25 | 0.06 |
| | | *14,215,336.56* | 0.510 | | 3,077,594.67 | 0.22 | | | | 0.183 | 0.214 | | 0.00 | | | | | |
| 21 | 6 | 1,769,389.29 | 0.063 | 0.62 | 1,097,021.36 | | 20 | 1.1 | -0.013 | | | 0 | | 0.29 | 0.37 | 5.2 | 0.25 | 0.06 |
| | 41 | 2,772,245.02 | 0.099 | 0.17 | 471,281.65 | | 20 | 1.1 | -0.077 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.25 | 0.06 |
| | 61 | 3,223,466.43 | 0.116 | 0.15 | 483,519.96 | | 20 | 1.1 | -0.095 | | | 0 | | 0.25 | 0.37 | 5.2 | 0.25 | 0.06 |
| | | *7,765,100.74* | 0.279 | | 2,051,822.98 | 0.26 | | | | 0.217 | 0.241 | | 0.00 | | | | | |
| 22 | 6 | 1,645,745.78 | 0.059 | 0.62 | 1,020,362.38 | | 25 | 1.2 | -0.012 | | | 0 | | 0.30 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 61 | 16,232,549.27 | 0.582 | 0.15 | 2,434,882.39 | | 25 | 1.2 | -0.480 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | | *17,878,295.05* | 0.641 | | 3,455,244.77 | 0.19 | | | | 0.171 | 0.199 | | 0.00 | | | | | |
| 23 | 6 | 4,377,366.02 | 0.157 | 0.62 | 2,713,966.93 | | 25 | 1.2 | -0.033 | | | 0 | | 0.30 | 0.36 | 5.0 | 0.25 | 0.06 |
| | 41 | 1,272,358.20 | 0.046 | 0.17 | 216,300.89 | | 25 | 1.2 | -0.035 | | | 0 | | 0.25 | 0.36 | 5.0 | 0.25 | 0.06 |
| | 61 | 9,599,453.46 | 0.344 | 0.15 | 1,439,918.02 | | 25 | 1.2 | -0.284 | | | 0 | | 0.25 | 0.36 | 5.0 | 0.25 | 0.06 |
| | | *15,249,177.68* | 0.547 | | 4,370,185.85 | 0.29 | | | | 0.228 | 0.266 | | 0.00 | | | | | |
| 24 | 6 | 1,833,595.67 | 0.066 | 0.62 | 1,136,829.32 | | 25 | 1.2 | -0.014 | | | 0 | | 0.30 | 0.38 | 5.5 | 0.25 | 0.06 |
| | 41 | 629,777.99 | 0.023 | 0.17 | 107,062.26 | | 25 | 1.2 | -0.017 | | | 0 | | 0.25 | 0.38 | 5.5 | 0.25 | 0.06 |
| | 61 | 8,822,797.82 | 0.316 | 0.15 | 1,323,419.67 | | 25 | 1.2 | -0.261 | | | 0 | | 0.25 | 0.38 | 5.5 | 0.25 | 0.06 |
| | | *11,286,171.48* | 0.405 | | 2,567,311.25 | 0.23 | | | | 0.190 | 0.222 | | 0.00 | | | | | |
| 25 | 6 | 975,231.73 | 0.035 | 0.62 | 604,643.67 | | 25 | 1.2 | -0.007 | | | 0 | | 0.30 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 41 | 64,113.66 | 0.002 | 0.17 | 10,899.32 | | 25 | 1.2 | -0.002 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | 61 | 8,417,788.00 | 0.302 | 0.15 | 1,262,668.20 | | 25 | 1.2 | -0.249 | | | 0 | | 0.25 | 0.39 | 5.8 | 0.25 | 0.06 |
| | | *9,457,133.39* | 0.339 | | 1,878,211.19 | 0.20 | | | | 0.174 | 0.203 | | 0.00 | | | | | |

# APPENDIX 2

Camp Creek Tributaries FDS

Photographs of Routing Channels

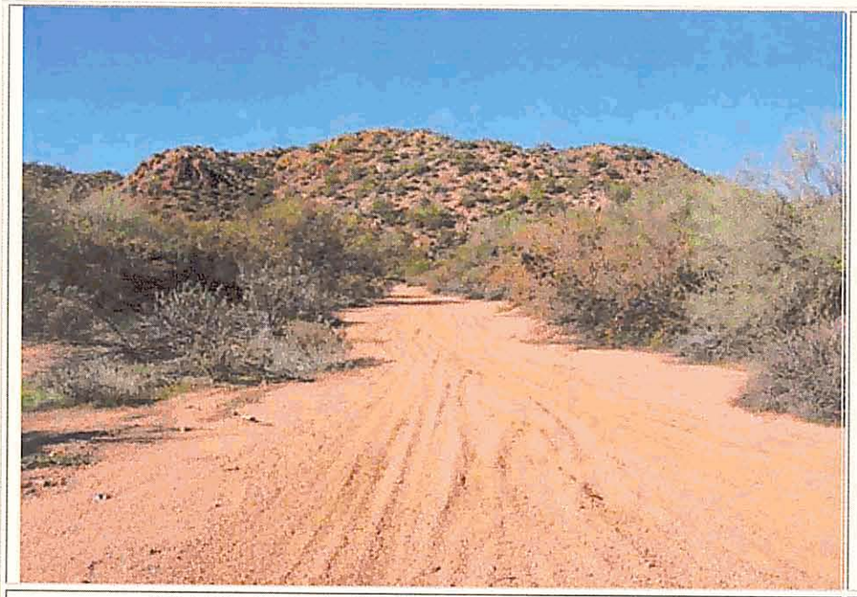


REACH R3-A –CHANNEL & OVERBANKS

REACH R6-B –CHANNEL & OVERBANKS

REACH R3-A –CHANNEL & OVERBANKS

REACH R3-A –CHANNEL & OVERBANKS



REACH R11-C–CHANNEL & OVERBANKS

REACH R12-11 –CHANNEL

REACH R13-12–CHANNEL & OVERBANKS

REACH R20-13 –CHANNEL & OVERBANKS

REACH R15-11–CHANNEL & OVERBANKS

REACH R19-F–CHANNEL & OVERBANKS

REACH R22-19–CHANNEL & OVERBANKS

# APPENDIX 3

Camp Creek Tributaries FDS

DDMSW Printouts

# APPENDIX 4

HEC-1 Output
For the
100-Year 24-Hour Peak Discharges

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1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN  1998               *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   24JUL05  TIME  08:25:45  *                    *          (916) 756-1104              *
*                                      *                    *                                      *
****************************************                    ****************************************

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

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

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

1                                                HEC-1 INPUT                                                PAGE  1

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

  1           ID   CAMP CREEK TRIBUTARIES FLOODPLAIN DELINEATION STUDY
  2           ID   CONTRACT NO. FCD 2004C023
  3           ID   PRESTIGE ENGINEERING CONSULTANTS, LLC - KOFI AWUMAH
  4           ID   CMCRK24.DAT
  5           ID   100-YEAR 24-HOUR STORM FREQUENCY HYDROLOGY MODEL
  6           ID   EXISTING CONDITION MODEL
  7           ID   WATERSHED AREA = 10.58 SQUARE MILES
  8           ID   RAINFALL LOSS METHOD = GREEN & AMPT METHOD
  9           ID   UNIT HYDROGRAPH METHOD = S-GRAPH (PHOENIX MOUNTAIN TYPE)
 10           ID   CHANNEL ROUTING METHOD = NORMAL DEPTH
 11           ID   LAND USE DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
 12           ID   SOILS DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
 13           ID   DATE OF MODEL RUN = 7-24-2005
              *DIAGRAM
 14           IT       5                    2000
 15           IO       3

 16           KK   SUB-3   BASIN
 17           KM   SUBBASIN 3 RUNOFF
 18           BA     .84
 19           IN      15
 20           PB    4.80
 21           PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 22           PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 23           PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 24           PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 25           PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 26           PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 27           PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 28           PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 29           PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 30           PC    .983    .986    .989    .992    .995    .998   1.000
 31           LG     .30     .37    5.30     .29    7.00
 32           UI     56.     56.    130.    223.    318.    381.    435.    527.    663.    447.
 33           UI    361.    326.    295.    268.    239.    216.    185.    156.    140.    130.
 34           UI    119.     98.     84.     72.     66.     62.     52.     43.     43.     35.
 35           UI     28.     28.     28.     28.     14.     11.     11.     11.     11.     11.
 36           UI     11.     11.     11.     11.     11.     11.      0.      0.      0.      0.
 37           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 38           KK   SUB-4   BASIN
 39           KM   SUBBASIN 4 RUNOFF
 40           BA     .34
 41           LG     .33     .38    5.60     .26   13.00
 42           UI     19.     19.     28.     60.     81.    112.    128.    143.    161.    201.
 43           UI    219.    145.    124.    113.    105.     96.     89.     80.     74.     65.
 44           UI     57.     50.     46.     44.     40.     35.     31.     25.     24.     22.
 45           UI     21.     20.     15.     15.     15.     11.      9.      9.      9.      9.
 46           UI      9.      4.      4.      4.      4.      4.      4.      4.      4.      4.
 47           UI      4.      4.      4.      4.      4.      0.      0.      0.      0.      0.
 48           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                                HEC-1 INPUT                                                PAGE  2

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

 49           KK    CP-3
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 50          KM   COMBINE SUB-3 AND SUB-4
 51          HC       2
             *

 52          KK    R3-A   ROUTE   REACH
 53          KM    ROUTE CP-3 TO CP-A
 54          RS       3    FLOW      -1
 55          RC   0.075   0.035   0.075    5649  0.0375  438.00
 56          RX    51.0    68.0    90.0   160.0   253.0   287.0   291.0   295.0
 57          RY   437.0   435.5   434.7   434.3   432.6   434.4   436.0   438.0
             *

 58          KK   SUB-2   BASIN
 59          KM   SUBBASIN 2 RUNOFF
 60          BA     .33
 61          LG     .25     .35    4.65     .43    2.00
 62          UI     31.     51.    119.    189.    231.    301.    309.    201.    173.    151.
 63          UI    130.    110.     88.     75.     67.     54.     42.     37.     34.     24.
 64          UI     24.     17.     15.     15.     12.      6.      6.      6.      6.      6.
 65          UI      6.      6.      6.      0.      0.      0.      0.      0.      0.      0.
 66          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 67          KK   CP-A1
 68          KM   COMBINE SUBBASIN 2 AND R3-A
 69          HC       2
             *

 70          KK   SUB-1   BASIN
 71          KM   SUBBASIN 1 RUNOFF
 72          BA     .36
 73          LG     .33     .35    4.80     .39   11.00
 74          UI     29.     32.     94.    147.    190.    223.    289.    301.    198.    169.
 75          UI    151.    135.    117.    102.     83.     72.     66.     58.     47.     37.
 76          UI     34.     32.     25.     22.     20.     14.     14.     14.     12.      6.
 77          UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
 78          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 79          KK    CP-A
 80          KM    COMBINE SUBBASINS 1,AND CP-A1
 81          HC       2
             *

 82          KK   SUB-7   BASIN
 83          KM   SUBBASIN 7 RUNOFF
 84          BA     .60
 85          LG     .26     .40    6.00     .23   13.00
 86          UI     34.     34.     52.    109.    149.    203.    231.    258.    295.    372.
 87          UI    367.    250.    216.    199.    182.    167.    154.    140.    127.    112.
 88          UI     96.     86.     81.     76.     71.     56.     52.     43.     42.     37.
 89          UI     37.     29.     26.     26.     24.     17.     17.     17.     17.     17.
 90          UI     10.      7.      7.      7.      7.      7.      7.      7.      7.      7.
1                                                HEC-1 INPUT                                          PAGE  3

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

 91          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 92          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 93          KK   SUB-8   BASIN
 94          KM   SUBBASIN 8 RUNOFF
 95          BA     .28
 96          LG     .26     .39    5.80     .24   21.00
 97          UI     24.     33.     84.    133.    167.    201.    272.    184.    146.    129.
 98          UI    114.     98.     84.     68.     59.     53.     45.     36.     30.     26.
 99          UI     23.     18.     18.     12.     12.     12.      9.      5.      5.      5.
100          UI      5.      5.      5.      5.      5.      5.      0.      0.      0.      0.
101          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

102          KK    CP-7
103          KM    COMBINE SUBBASINS 7 & 8
104          HC       2
             *

105          KK    R7-6   ROUTE   REACH
106          KM    ROUTE CP-7 TO CP-6
107          RS       5    FLOW      -1
108          RC   0.075   0.035   0.075    7167  0.0450  514.00
109          RX    34.0    56.0   150.0   243.0   290.0   307.0   313.0   316.7
110          RY   514.0   512.5   512.0   510.0   510.0   512.0   512.8   513.0
             *

111          KK   SUB-9   BASIN
112          KM   SUBBASIN 9 RUNOFF
113          BA     .43
114          LG     .25     .38    5.60     .22    2.00
115          UI     47.    101.    229.    325.    420.    487.    305.    257.    219.    183.
116          UI    144.    116.    103.     80.     60.     53.     43.     36.     27.     23.
117          UI     23.     12.      9.      9.      9.      9.      9.      9.      0.      0.
118          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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 119          KK    R9-6   ROUTE   REACH
 120          KM    ROUTE SUBBASIN 9 TO CP-9
 121          RS       5    FLOW      -1
 122          RC   0.075   0.035   0.075    4780  0.0580  420.00
 123          RX    17.4    28.6    41.8    73.0   248.0   276.0   290.0   293.0
 124          RY   420.0   418.0   416.0   413.7   414.0   416.0   418.0   418.7
              *

 125          KK   SUB-6   BASIN
 126          KM   SUBBASIN 6 RUNOFF
 127          BA     .53
 128          LG     .27     .35    4.60     .43    9.00
 129          UI     52.     95.    224.    337.    413.    579.    423.    318.    276.    238.
 130          UI    201.    162.    132.    117.     96.     74.     63.     57.     41.     40.
 131          UI     27.     26.     26.     14.     10.     10.     10.     10.     10.     10.
 132          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 133          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 134          KK    CP-6
 135          KM    COMBINE R7-6, R9-6 & SUBBASIN 6
 136          HC       3
              *

 137          KK    R6-B   ROUTE   REACH
 138          KM    ROUTE CP-6 TO CP-B
 139          RS       5    FLOW      -1
 140          RC   0.075   0.035   0.075    2669  0.0880  318.00
 141          RX    19.4    28.7    42.4   113.8   204.0   273.8   304.0   344.0
 142          RY   318.0   316.0   314.0   312.8   313.9   314.0   315.4   316.0
              *

 143          KK   SUB-5   BASIN
 144          KM   SUBBASIN 5 RUNOFF
 145          BA     .13
 146          LG     .25     .35    4.40     .49     .00
 147          UI     40.    154.    261.    168.    121.     80.     57.     36.     25.     16.
 148          UI     13.      5.      5.      5.      0.      0.      0.      0.      0.      0.
 149          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 150          KK    CP-B
 151          KM    COMBINE R6-B AND SUBBASIN 5
 152          HC       2
              *

 153          KK  SUB-20   BASIN
 154          KM   SUBBASIN 20 RUNOFF
 155          BA     .51
 156          LG     .25     .38    5.60     .29     .00
 157          UI     44.     61.    155.    246.    310.    373.    504.    342.    270.    239.
 158          UI    211.    182.    157.    126.    108.     98.     83.     66.     56.     48.
 159          UI     43.     34.     34.     22.     22.     22.     17.      8.      8.      8.
 160          UI      8.      8.      8.      8.      8.      8.      0.      0.      0.      0.
 161          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 162          KK  R20-13   ROUTE   REACH
 163          KM   ROUTE CP-20 TO CP-13
 164          RS       4    FLOW      -1
 165          RC   0.080   0.035   0.080    6689  0.0470  953.00
 166          RX    30.2    55.5    77.6   160.0   222.1   241.7   385.0   414.0
 167          RY   953.0   950.0   948.0   947.1   948.0   948.3   950.0   952.0
              *

 168          KK  SUB-13   BASIN
 169          KM   SUBBASIN 13 RUNOFF
 170          BA     .38
 171          LG     .25     .38    5.60     .30    3.00
 172          UI     27.     27.     73.    117.    166.    195.    224.    294.    275.    188.
 173          UI    163.    148.    133.    118.    106.     90.     76.     67.     62.     56.
 174          UI     45.     37.     35.     30.     29.     21.     21.     19.     13.     13.
 175          UI     13.     13.      6.      5.      5.      5.      5.      5.      5.      5.
1                                          HEC-1 INPUT                                          PAGE  5

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

 176          UI      5.      5.      5.      0.      0.      0.      0.      0.      0.      0.
 177          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 178          KK   CP-13
 179          KM   COMBINE SUB-13 & R20-13
 180          HC       2
              *

 181          KK  R13-12   ROUTE   REACH
 182          KM   ROUTE CP-13 FLOW TO CP-12
 183          RS       4    FLOW      -1
 184          RC   0.080   0.040   0.080    2975  0.0470  801.00
 185          RX    22.4    25.0    62.0    89.0   215.0   336.0   366.0   372.0
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186          RY   800.0   799.7   796.0   797.6   797.5   798.0   800.0   801.0
             *

187          KK  SUB-12   BASIN
188          KM   SUBBASIN 12 RUNOFF
189          BA     .36
190          LG     .25     .36    5.00     .35    2.00
191          UI     26.     26.     74.    117.    163.    192.    223.    301.    237.    175.
192          UI    154.    138.    125.    110.     97.     83.     68.     63.     58.     49.
193          UI     41.     34.     31.     29.     24.     20.     20.     14.     13.     13.
194          UI     13.      9.      5.      5.      5.      5.      5.      5.      5.      5.
195          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
196          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

197          KK  CP-12A
198          KM   COMBINE R13-12 AND SUBBASIN 12
199          HC       2
             *

200          KK  SUB-16   BASIN
201          KM   SUBBASIN 16 RUNOFF
202          BA     .43
203          LG     .25     .39    5.70     .27     .00
204          UI     35.     42.    116.    184.    236.    277.    371.    334.    230.    201.
205          UI    177.    157.    138.    115.     94.     84.     76.     63.     51.     45.
206          UI     38.     35.     27.     27.     19.     17.     17.     17.      7.      7.
207          UI      7.      7.      7.      7.      7.      7.      7.      0.      0.      0.
208          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

209          KK   CP-12
210          KM   COMBINE SUBBASIN 16 AND CP-12A
211          HC       2
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

212          KK  R12-11   ROUTE   REACH
213          KM   ROUTE CP-12 TO CP-11
214          RS       6    FLOW      -1
215          RC   0.080   0.040   0.080    5674  0.0530  686.00
216          RX    75.2    83.0   122.0   182.0   218.0   264.5   273.0   284.0
217          RY   686.0   684.0   683.4   683.0   682.0   684.0   684.7   686.0
             *

218          KK  SUB-15   BASIN
219          KM   SUBBASIN 15 RUNOFF
220          BA     .48
221          LG     .25     .39    5.70     .26     .00
222          UI     43.     63.    156.    246.    307.    377.    483.    308.    255.    224.
223          UI    197.    171.    142.    114.    102.     92.     72.     57.     51.     47.
224          UI     35.     33.     26.     21.     21.     21.      8.      8.      8.      8.
225          UI      8.      8.      8.      8.      8.      0.      0.      0.      0.      0.
226          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

227          KK  R15-11   ROUTE   REACH
228          KM   ROUTE SUBBASIN 15 FLOWS TO CP-11
229          RS       5    FLOW      -1
230          RC   0.075   0.040   0.075    4392  0.0630  738.00
231          RX    20.0    50.0    58.0   125.6   155.0   163.5   175.5   200.0
232          RY   738.0   733.2   732.0   731.4   731.5   732.1   734.0   738.0
             *

233          KK  SUB-11   BASIN
234          KM   SUBBASIN 11 RUNOFF
235          BA     .50
236          LG     .25     .37    5.20     .31    1.00
237          UI     64.    189.    385.    523.    673.    415.    339.    278.    220.    163.
238          UI    141.    101.     79.     66.     49.     38.     32.     27.     12.     12.
239          UI     12.     12.     12.     12.      0.      0.      0.      0.      0.      0.
240          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

241          KK   CP-11
242          KM   COMBINE R12-11, R15-11 AND SUBBASIN 11
243          HC       3
             *

244          KK   R11-C   ROUTE   REACH
245          KM   ROUTE CP-11 TO CP-C
246          RS       5    FLOW      -1
247          RC   0.075   0.035   0.075    3517  0.0830  455.50
248          RX    40.9   262.0   439.0   615.0   664.0   748.0   822.0   865.0
249          RY   455.5   452.8   452.0   451.0   450.0   452.0   454.0   455.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

250          KK  SUB-10   BASIN
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251          KM   SUBBASIN 10 RUNOFF
252          BA     .22
253          LG     .25     .35    4.45     .47     .00
254          UI     34.    134.    237.    354.    234.    180.    142.    103.     79.     60.
255          UI     42.     34.     26.     17.     17.      7.      7.      7.      7.      7.
256          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
257          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

258          KK    CP-C
259          KM   COMBINE R11-C & SUBBASIN 1-
260          HC       2
             *

261          KK  SUB-14   BASIN
262          KM   SUBBASIN 14 RUNOFF
263          BA     .41
264          LG     .25     .37    5.30     .31     .00
265          UI     33.     37.    107.    167.    217.    254.    330.    343.    225.    193.
266          UI    172.    153.    134.    116.     95.     82.     75.     66.     54.     42.
267          UI     39.     36.     28.     25.     23.     16.     16.     16.     13.      6.
268          UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
269          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

270          KK  SUB-17   BASIN
271          KM   SUBBASIN 17 RUNOFF
272          BA     .24
273          LG     .25     .37    5.30     .29     .00
274          UI     35.    127.    235.    347.    273.    194.    156.    119.     87.     71.
275          UI     50.     40.     29.     23.     17.     14.      7.      7.      7.      7.
276          UI      7.      0.      0.      0.      0.      0.      0.      0.      0.      0.
277          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

278          KK  SUB-22   BASIN
279          KM   SUBBASIN 22 RUNOFF
280          BA     .64
281          LG     .25     .37    5.70     .27     .00
282          UI     65.    125.    293.    430.    533.    734.    475.    383.    331.    282.
283          UI    237.    185.    156.    140.    105.     84.     73.     61.     50.     41.
284          UI     32.     32.     24.     13.     13.     13.     13.     13.     13.     13.
285          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
286          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

287          KK  R22-19   ROUTE   REACH
288          KM   ROUTE SUBBASIN 22 TO CP-19
289          RS       5    FLOW      -1
290          RC   0.075   0.035   0.075    4366  0.0890  101.90
291          RX   168.0   209.0   354.7   471.0   542.8   644.0   683.5   694.5
292          RY   101.9   100.0   100.0    98.2    97.9   100.0   101.3   101.8
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

293          KK  SUB-19   BASIN
294          KM   SUBBASIN 19 RUNOFF
295          BA     .59
296          LG     .25     .39    5.80     .25     .00
297          UI     69.    168.    364.    502.    705.    585.    410.    347.    290.    234.
298          UI    177.    154.    122.     91.     77.     61.     53.     36.     34.     30.
299          UI     13.     13.     13.     13.     13.     13.      0.      0.      0.      0.
300          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

301          KK   CP-19
302          KM   COMBINE R22-19 & SUBBASIN 19
303          HC       2
             *

304          KK   R19-F   ROUTE   REACH
305          KM   ROUTE CP-19 TO CP-F
306          RS       6    FLOW      -1
307          RC   0.075   0.035   0.075    6408  0.0620  760.00
308          RX   117.8   145.0   174.0   305.0   382.4   499.8   554.0   586.0
309          RY   752.6   750.0   748.8   747.4   746.6   750.0   750.0   760.0
             *

310          KK  SUB-18   BASIN
311          KM   SUBBASIN 18 RUNOFF
312          BA     .42
313          LG     .25     .35    4.60     .38     .00
314          UI     55.    161.    327.    444.    572.    353.    288.    236.    186.    138.
315          UI    120.     86.     67.     56.     42.     32.     27.     23.     10.     10.
316          UI     10.     10.     10.     10.      0.      0.      0.      0.      0.      0.
317          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

318          KK    CP-F
319          KM    COMBINE R19-F AND SUBBASIN 18
320          HC       2
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 321          KK  SUB-21   BASIN
 322          KM   SUBBASIN 21 RUNOFF
 323          BA     .28
 324          LG     .25      .36     5.10      .31      .00
 325          UI     26.      43.     101.     160.     196.     255.     262.     171.     147.     128.
 326          UI    111.      93.      74.      63.      57.      46.      36.      31.      29.      21.
 327          UI     20.      15.      13.      13.      10.       5.       5.       5.       5.       5.
 328          UI      5.       5.       5.       0.       0.       0.       0.       0.       0.       0.
 329          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *
1                                                HEC-1 INPUT                                                    PAGE  9

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


 330          KK  SUB-23   BASIN
 331          KM   SUBBASIN 23 RUNOFF
 332          BA     .55
 333          LG     .25      .36     5.00      .35      .00
 334          UI     48.      71.     176.     279.     348.     427.     547.     349.     289.     254.
 335          UI    223.     194.     161.     129.     115.     104.      82.      65.      58.      53.
 336          UI     39.      37.      29.      24.      24.      24.       9.       9.       9.       9.
 337          UI      9.       9.       9.       9.       9.       0.       0.       0.       0.       0.
 338          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

 339          KK   DUMMY
 340          KM   COMBINE HYDROGRAPHS TO REDUCE NO OF HYDROGRAPHS
 341          HC       3
              *

 342          KK  SUB-24   BASIN
 343          KM   SUBBASIN 24 RUNOFF
 344          BA     .41
 345          LG     .25      .38     5.40      .30      .00
 346          UI     32.      33.     101.     156.     206.     242.     303.     353.     227.     191.
 347          UI    172.     153.     135.     118.      99.      81.      75.      68.      55.      46.
 348          UI     40.      35.      33.      24.      24.      19.      16.      16.      16.      10.
 349          UI      6.       6.       6.       6.       6.       6.       6.       6.       6.       0.
 350          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 351          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

 352          KK  SUB-25   BASIN
 353          KM   SUBBASIN 25 RUNOFF
 354          BA     .34
 355          LG     .25      .39     5.70      .27      .00
 356          UI     37.      79.     179.     254.     329.     381.     239.     201.     171.     143.
 357          UI    113.      91.      81.      63.      47.      41.      33.      28.      21.      18.
 358          UI     18.       9.       7.       7.       7.       7.       7.       7.       0.       0.
 359          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 360          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    16      SUB-3
              .
              .
    38        .       SUB-4
              .           .
              .           .
    49      CP-3............
              V
              V
    52      R3-A
              .
              .
    58        .       SUB-2
              .           .
              .           .
    67     CP-A1............
              .
              .
    70        .       SUB-1
              .           .
              .           .
    79      CP-A............
              .
              .
    82        .       SUB-7
              .           .
              .           .
    93        .           .       SUB-8
              .           .           .
              .           .           .
   102        .        CP-7............
              .           V
              .           V
   105        .        R7-6
              .           .
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111          .          .       SUB-9
             .          .          V
             .          .          V
119          .          .        R9-6
             .          .          .
             .          .          .
125          .          .          .       SUB-6
             .          .          .          .
             .          .          .          .
134          .       CP-6.......................
             .          V
             .          V
137          .       R6-B
             .          .
             .          .
143          .          .       SUB-5
             .          .          .
             .          .          .
150          .       CP-B............
             .          .
             .          .
153          .          .      SUB-20
             .          .          V
             .          .          V
162          .          .      R20-13
             .          .          .
             .          .          .
168          .          .          .      SUB-13
             .          .          .          .
             .          .          .          .
178          .          .       CP-13............
             .          .          V
             .          .          V
181          .          .      R13-12
             .          .          .
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187          .          .          .      SUB-12
             .          .          .          .
             .          .          .          .
197          .          .      CP-12A............
             .          .          .
             .          .          .
200          .          .          .      SUB-16
             .          .          .          .
             .          .          .          .
209          .          .       CP-12............
             .          .          V
             .          .          V
212          .          .      R12-11
             .          .          .
             .          .          .
218          .          .          .      SUB-15
             .          .          .          V
             .          .          .          V
227          .          .          .      R15-11
             .          .          .          .
             .          .          .          .
233          .          .          .          .      SUB-11
             .          .          .          .          .
             .          .          .          .          .
241          .          .       CP-11........................
             .          .          V
             .          .          V
244          .          .       R11-C
             .          .          .
             .          .          .
250          .          .          .      SUB-10
             .          .          .          .
             .          .          .          .
258          .          .        CP-C............
             .          .          .
             .          .          .
261          .          .          .      SUB-14
             .          .          .          .
             .          .          .          .
270          .          .          .          .      SUB-17
             .          .          .          .          .
             .          .          .          .          .
278          .          .          .          .          .      SUB-22
             .          .          .          .          .          V
             .          .          .          .          .          V
287          .          .          .          .          .      R22-19
             .          .          .          .          .          .
             .          .          .          .          .          .
293          .          .          .          .          .          .      SUB-19
             .          .          .          .          .          .          .
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301          .          .          .          .          .      CP-19............
             .          .          .          .          .          V
             .          .          .          .          .          V
304          .          .          .          .          .      R19-F
             .          .          .          .          .          .
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310          .          .          .          .          .          .      SUB-18
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  318           .         .         .         .         .       CP-F...........
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                .         .         .         .         .         .
  321           .         .         .         .         .         .     SUB-21
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
  330           .         .         .         .         .         .         .     SUB-23
                .         .         .         .         .         .         .         .
                .         .         .         .         .         .         .         .
  339           .         .         .         .         .     DUMMY.......................
                .         .         .         .         .         .
                .         .         .         .         .         .
  342           .         .         .         .         .         .     SUB-24
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
  352           .         .         .         .         .         .         .     SUB-25

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                          ****************************************
 *                                      *                                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998               *                                          *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                                          *         609 SECOND STREET            *
 *                                      *                                          *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   24JUL05  TIME  08:25:45  *                                          *          (916) 756-1104              *
 *                                      *                                          *                                      *
 ****************************************                                          ****************************************


                        CAMP CREEK TRIBUTARIES FLOODPLAIN DELINEATION STUDY
                        CONTRACT NO. FCD 2004C023
                        PRESTIGE ENGINEERING CONSULTANTS, LLC - KOFI AWUMAH
                        CMCRK24.DAT
                        100-YEAR 24-HOUR STORM FREQUENCY HYDROLOGY MODEL
                        EXISTING CONDITION MODEL
                        WATERSHED AREA = 10.58 SQUARE MILES
                        RAINFALL LOSS METHOD = GREEN & AMPT METHOD
                        UNIT HYDROGRAPH METHOD = S-GRAPH (PHOENIX MOUNTAIN TYPE)
                        CHANNEL ROUTING METHOD = NORMAL DEPTH
                        LAND USE DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
                        SOILS DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
                        DATE OF MODEL RUN = 7-24-2005

  15 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      7    0  ENDING DATE
                      NDTIME        2235  ENDING TIME
                       ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE  166.58 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


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


            **************
            *            *
  16 KK     *     SUB-3  *        BASIN
            *            *
            **************
                        SUBBASIN 3 RUNOFF

  19 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN          15  TIME INTERVAL IN MINUTES
                      JXDATE      1    0  STARTING DATE
                      JXTIME           0  STARTING TIME

              SUBBASIN RUNOFF DATA

  18 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .84  SUBBASIN AREA
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                PRECIPITATION DATA

20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

21 PI            INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                    .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

31 LG            GREEN AND AMPT LOSS RATE
                      STRTL        .30  STARTING LOSS
                        DTH        .37  MOISTURE DEFICIT
                       PSIF       5.30  WETTING FRONT SUCTION
                      XKSAT        .29  HYDRAULIC CONDUCTIVITY
                      RTIMP       7.00  PERCENT IMPERVIOUS AREA

31 UI            INPUT UNITGRAPH,  46 ORDINATES,  VOLUME = 1.00
                     56.0      56.0     130.0     223.0     318.0     381.0     435.0     527.0     663.0     447.0
                    361.0     326.0     295.0     268.0     239.0     216.0     185.0     156.0     140.0     130.0
                    119.0      98.0      84.0      72.0      66.0      62.0      52.0      43.0      43.0      35.0
                     28.0      28.0      28.0      28.0      14.0      11.0      11.0      11.0      11.0      11.0
                     11.0      11.0      11.0      11.0      11.0      11.0
                                                                   ***

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

                      HYDROGRAPH AT STATION    SUB-3

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.07, TOTAL EXCESS =    1.73

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    771.      12.50                146.         39.         13.          6.
                         (INCHES)  1.619       1.716       1.718       1.718
                          (AC-FT)    73.         77.         77.         77.

                         CUMULATIVE AREA =     .84 SQ MI


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


            **************
            *            *
38 KK       *    SUB-4   *        BASIN
            *            *
            **************
                      SUBBASIN 4 RUNOFF

               SUBBASIN RUNOFF DATA

40 BA            SUBBASIN CHARACTERISTICS
                      TAREA        .34  SUBBASIN AREA

                PRECIPITATION DATA

20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

21 PI            INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .01     .00     .01
.01     .01     .01     .01     .01     .01     .01     .01     .03     .03
.03     .09     .09     .09     .01     .01     .01     .01     .01     .01
.01     .01     .01     .01     .01     .01     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00

41 LG          GREEN AND AMPT LOSS RATE
                    STRTL        .33  STARTING LOSS
                      DTH        .38  MOISTURE DEFICIT
                     PSIF       5.60  WETTING FRONT SUCTION
                    XKSAT        .26  HYDRAULIC CONDUCTIVITY
                    RTIMP      13.00  PERCENT IMPERVIOUS AREA

39 UI          INPUT UNITGRAPH,  55 ORDINATES,  VOLUME = 1.00
                 19.0     19.0     28.0     60.0     81.0    112.0    128.0    143.0    161.0    201.0
                219.0    145.0    124.0    113.0    105.0     96.0     89.0     80.0     74.0     65.0
                 57.0     50.0     46.0     44.0     40.0     35.0     31.0     25.0     24.0     22.0
                 21.0     20.0     15.0     15.0     15.0     11.0      9.0      9.0      9.0      9.0
                  9.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0
                  4.0      4.0      4.0      4.0      4.0

                                                                  ***

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

                     HYDROGRAPH AT STATION    SUB-4

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    2.86, TOTAL EXCESS =    1.94

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     285.     12.67                 64.         18.          6.          3.
                        (INCHES)    1.758       1.940       1.944       1.944
                         (AC-FT)     32.         35.         35.         35.

                       CUMULATIVE AREA =     .34 SQ MI


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


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            *            *
49 KK       *     CP-3   *
            *            *
            **************
                     COMBINE SUB-3 AND SUB-4

51 HC          HYDROGRAPH COMBINATION
                    ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                     HYDROGRAPH AT STATION     CP-3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1030.     12.58                211.         56.         19.          8.
                        (INCHES)    1.659       1.781       1.783       1.783
                         (AC-FT)    104.        112.        112.        112.

                       CUMULATIVE AREA =    1.18 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              *            *
  52 KK       *     R3-A   *        ROUTE   REACH
              *            *
              **************
                          ROUTE CP-3 TO CP-A

                HYDROGRAPH ROUTING DATA

  54 RS           STORAGE ROUTING
                       NSTPS            3  NUMBER OF SUBREACHES
                        ITYP         FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC        -1.00  INITIAL CONDITION
                            X          .00 WORKING R AND D COEFFICIENT

  55 RC           NORMAL DEPTH CHANNEL
                         ANL         .075  LEFT OVERBANK N-VALUE
                        ANCH         .035  MAIN CHANNEL N-VALUE
                         ANR         .075  RIGHT OVERBANK N-VALUE
                       RLNTH        5649.  REACH LENGTH
                         SEL       .0375  ENERGY SLOPE
                       ELMAX        438.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  57 RY        ELEVATION    437.00    435.50    434.70    434.30    432.60    434.40    436.00    438.00
  56 RX        DISTANCE      51.00     68.00     90.00    160.00    253.00    287.00    291.00    295.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

           STORAGE        .00       .39      1.54      3.47      6.17      9.64     13.88     19.50     26.71     34.35
           OUTFLOW        .00      6.67     42.36    124.88    268.94    487.63    790.29   1108.69   1739.55   2604.72
         ELEVATION     432.60    432.88    433.17    433.45    433.74    434.02    434.31    434.59    434.87    435.16

           STORAGE      42.30     50.51     58.87     67.38     76.02     84.80     93.71    102.65    111.61    120.59
           OUTFLOW    3610.68   4753.55   6025.68   7421.67   8937.34  10569.41  12322.68  14193.99  16173.27  18257.71
         ELEVATION     435.44    435.73    436.01    436.29    436.58    436.86    437.15    437.43    437.72    438.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     1740. TO    18258.
                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     R3-A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     967.     12.75                  210.         56.         19.          8.
                        (INCHES)    1.658      1.780       1.783       1.783
                         (AC-FT)     104.        112.        112.        112.

  PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       6.      12.75                    1.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
    434.46     12.75                 433.42      432.96      432.72      432.66

                        CUMULATIVE AREA =    1.18 SQ MI


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

              **************
              *            *
  58 KK       *    SUB-2   *        BASIN
              *            *
              **************
                          SUBBASIN 2 RUNOFF

                SUBBASIN RUNOFF DATA

  60 BA           SUBBASIN CHARACTERISTICS
                       TAREA         .33  SUBBASIN AREA

                  PRECIPITATION DATA

  20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

  21 PI             INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .01     .00     .01
.01     .01     .01     .01     .01     .01     .01     .01     .03     .03
.03     .09     .09     .09     .01     .01     .01     .01     .01     .01
.01     .01     .01     .01     .01     .01     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00

61 LG          GREEN AND AMPT LOSS RATE
                    STRTL         .25  STARTING LOSS
                      DTH         .35  MOISTURE DEFICIT
                     PSIF        4.65  WETTING FRONT SUCTION
                    XKSAT         .43  HYDRAULIC CONDUCTIVITY
                    RTIMP        2.00  PERCENT IMPERVIOUS AREA

59 UI          INPUT UNITGRAPH,  33 ORDINATES,  VOLUME = 1.00
                 31.0      51.0     119.0     189.0     231.0     301.0     309.0     201.0     173.0     151.0
                130.0     110.0      88.0      75.0      67.0      54.0      42.0      37.0      34.0      24.0
                 24.0      17.0      15.0      15.0      12.0       6.0       6.0       6.0       6.0       6.0
                  6.0       6.0       6.0

                                                                  ***

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

                     HYDROGRAPH AT STATION    SUB-2

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.38, TOTAL EXCESS =    1.42

  PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     355.     12.33                49.          13.           4.           2.
                        (INCHES)   1.386        1.414        1.414        1.414
                         (AC-FT)     24.          25.          25.          25.

                        CUMULATIVE AREA =     .33 SQ MI


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


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            *            *
  67 KK     *     CP-A1  *
            *            *
            **************
                      COMBINE SUBBASIN 2 AND R3-A

  69 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                     HYDROGRAPH AT STATION    CP-A1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1133.     12.75                260.          69.          23.          10.
                        (INCHES)   1.598        1.700        1.702        1.702
                         (AC-FT)    129.         137.         137.         137.

                        CUMULATIVE AREA =    1.51 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 70 KK    *     SUB-1  *        BASIN
          *            *
          **************
                         SUBBASIN 1 RUNOFF

             SUBBASIN RUNOFF DATA

 72 BA         SUBBASIN CHARACTERISTICS
                    TAREA          .36  SUBBASIN AREA

               PRECIPITATION DATA

 20 PB               STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                     .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00

 73 LG           GREEN AND AMPT LOSS RATE
                      STRTL         .33  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.80  WETTING FRONT SUCTION
                      XKSAT         .39  HYDRAULIC CONDUCTIVITY
                      RTIMP       11.00  PERCENT IMPERVIOUS AREA

 71 UI           INPUT UNITGRAPH,  38 ORDINATES,  VOLUME = 1.00
                     29.0      32.0      94.0     147.0     190.0     223.0     289.0     301.0     198.0     169.0
                    151.0     135.0     117.0     102.0      83.0      72.0      66.0      58.0      47.0      37.0
                     34.0      32.0      25.0      22.0      20.0      14.0      14.0      14.0      12.0       6.0
                      6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0
                                                                   ***

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

                       HYDROGRAPH AT STATION    SUB-1

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.05, TOTAL EXCESS =    1.75

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     364.     12.42                     62.         17.          6.          2.
                         (INCHES)     1.595      1.748       1.750       1.750
                          (AC-FT)      31.         34.         34.         34.

                         CUMULATIVE AREA =     .36 SQ MI


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

          **************
          *            *
 79 KK    *      CP-A  *
          *            *
          **************
                         COMBINE SUBBASINS 1,AND CP-A1

 81 HC           HYDROGRAPH COMBINATION
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                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                      HYDROGRAPH AT STATION     CP-A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                                   (CFS)
+    1423.     12.50                321.         86.         29.          12.
                              (INCHES)       1.597       1.709       1.711       1.711
                               (AC-FT)        159.        170.        171.        171.

                            CUMULATIVE AREA =    1.87 SQ MI


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


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            *            *
  82 KK     *     SUB-7  *        BASIN
            *            *
            **************
                      SUBBASIN 7 RUNOFF

               SUBBASIN RUNOFF DATA

  84 BA          SUBBASIN CHARACTERISTICS
                       TAREA          .60  SUBBASIN AREA

                 PRECIPITATION DATA

  20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

  21 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .01        .00        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .03        .03
                      .03        .09        .09        .09        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00        .00        .00        .00        .00        .00        .00

  85 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .26  STARTING LOSS
                         DTH         .40  MOISTURE DEFICIT
                        PSIF        6.00  WETTING FRONT SUCTION
                       XKSAT         .23  HYDRAULIC CONDUCTIVITY
                       RTIMP       13.00  PERCENT IMPERVIOUS AREA

  83 UI          INPUT UNITGRAPH,  54 ORDINATES,  VOLUME =  .99
                      34.0       34.0       52.0      109.0      149.0      203.0      231.0      258.0      295.0      372.0
                     367.0      250.0      216.0      199.0      182.0      167.0      154.0      140.0      127.0      112.0
                      96.0       86.0       81.0       76.0       71.0       56.0       52.0       43.0       42.0       37.0
                      37.0       29.0       26.0       26.0       24.0       17.0       17.0       17.0       17.0       17.0
                      10.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0
                       7.0        7.0        7.0        7.0

                                                                  ***

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

                      HYDROGRAPH AT STATION    SUB-7

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    2.83, TOTAL EXCESS =    1.97

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
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                                           6-HR          24-HR         72-HR     166.58-HR
 +    (CFS)         (HR)
                                 (CFS)
 +     514.        12.67                   115.            32.           11.            5.
                               (INCHES)   1.779          1.959         1.963         1.963
                                (AC-FT)     57.            63.           63.           63.

                               CUMULATIVE AREA =      .60 SQ MI


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

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                *            *
  93 KK         *   SUB-8    *        BASIN
                *            *
                **************
                                 SUBBASIN 8 RUNOFF

                 SUBBASIN RUNOFF DATA

  95 BA            SUBBASIN CHARACTERISTICS
                         TAREA          .28  SUBBASIN AREA

                   PRECIPITATION DATA

  20 PB                  STORM         4.80  BASIN TOTAL PRECIPITATION

  21 PI              INCREMENTAL PRECIPITATION PATTERN
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                          .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                          .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                          .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                          .00       .00       .00       .00       .00       .00       .00       .00

  96 LG            GREEN AND AMPT LOSS RATE
                        STRTL          .26  STARTING LOSS
                          DTH          .39  MOISTURE DEFICIT
                         PSIF         5.80  WETTING FRONT SUCTION
                        XKSAT          .24  HYDRAULIC CONDUCTIVITY
                        RTIMP        21.00  PERCENT IMPERVIOUS AREA

  94 UI            INPUT UNITGRAPH,  36 ORDINATES,   VOLUME =  .98
                        24.0      33.0      84.0     133.0     167.0     201.0     272.0     184.0     146.0     129.0
                       114.0      98.0      84.0      68.0      59.0      53.0      45.0      36.0      30.0      26.0
                        23.0      18.0      18.0      12.0      12.0      12.0       9.0       5.0       5.0       5.0
                         5.0       5.0       5.0       5.0       5.0       5.0

                                                                 ***

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

                              HYDROGRAPH AT STATION      SUB-8

      TOTAL RAINFALL =     4.80, TOTAL LOSS =     2.57, TOTAL EXCESS =     2.23

   PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                           6-HR          24-HR         72-HR     166.58-HR
 +    (CFS)        (HR)
                                 (CFS)
 +     326.        12.42                    57.            17.            6.            2.
                               (INCHES)   1.908          2.195         2.198         2.198
                                (AC-FT)     28.            33.           33.           33.

                               CUMULATIVE AREA =      .28 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 102 KK     *      CP-7  *
            *            *
            **************
                          COMBINE SUBBASINS 7 & 8

 104 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     CP-7

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     749.     12.50                172.         48.         16.           7.
                        (INCHES)    1.818       2.034       2.038        2.038
                         (AC-FT)     85.         95.         96.          96.

                        CUMULATIVE AREA =     .88 SQ MI


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

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            *            *
 105 KK     *      R7-6  *        ROUTE   REACH
            *            *
            **************
                          ROUTE CP-7 TO CP-6

              HYDROGRAPH ROUTING DATA

 107 RS          STORAGE ROUTING
                      NSTPS           5  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 108 RC          NORMAL DEPTH CHANNEL
                        ANL        .075  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
                        ANR        .075  RIGHT OVERBANK N-VALUE
                      RLNTH       7167.  REACH LENGTH
                        SEL       .0450  ENERGY SLOPE
                      ELMAX       514.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 110 RY       ELEVATION    514.00    512.50    512.00    510.00    510.00    512.00    512.80    513.00
 109 RX       DISTANCE      34.00     56.00    150.00    243.00    290.00    307.00    313.00    316.70

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.83      4.06      6.69      9.72     13.15     16.99     21.22     25.86     30.90
          OUTFLOW        .00     33.14    110.94    230.42    393.28    602.18    860.08   1170.04   1535.11   1958.35
        ELEVATION     510.00    510.21    510.42    510.63    510.84    511.05    511.26    511.47    511.68    511.89

          STORAGE      36.47     43.33     51.61     60.53     69.64     78.95     88.36     97.89    107.52    117.26
          OUTFLOW    2497.41   3163.01   3912.88   4758.26   5684.97   6692.32   7776.10   8933.17  10161.49  11459.40
        ELEVATION     512.11    512.32    512.53    512.74    512.95    513.16    513.37    513.58    513.79    514.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      393. TO    11459.
                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     R7-6

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     736.     12.67                172.         48.         16.           7.
                        (INCHES)    1.816       2.034       2.038        2.038
                         (AC-FT)     85.         95.         96.          96.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
```

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+  (AC-FT)      (HR)
       3.      12.67                    1.          0.          0.          0.

  PEAK STAGE    TIME                              MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   511.16      12.67                  510.43      510.14      510.05      510.02

                        CUMULATIVE AREA =     .88 SQ MI


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


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            *            *
  111 KK    *    SUB-9   *        BASIN
            *            *
            **************
                        SUBBASIN 9 RUNOFF

              SUBBASIN RUNOFF DATA

  113 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .43  SUBBASIN AREA

                  PRECIPITATION DATA

   20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

   21 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                       .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                       .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00

  114 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .25  STARTING LOSS
                         DTH         .38  MOISTURE DEFICIT
                        PSIF        5.60  WETTING FRONT SUCTION
                       XKSAT         .22  HYDRAULIC CONDUCTIVITY
                       RTIMP        2.00  PERCENT IMPERVIOUS AREA

  112 UI          INPUT UNITGRAPH,  28 ORDINATES,  VOLUME = 1.01
                      47.0      101.0      229.0      325.0      420.0      487.0      305.0      257.0      219.0      183.0
                     144.0      116.0      103.0       80.0       60.0       53.0       43.0       36.0       27.0       23.0
                      23.0       12.0        9.0        9.0        9.0        9.0        9.0        9.0

                                                                                  ***

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

                        HYDROGRAPH AT STATION    SUB-9

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.13, TOTAL EXCESS =    1.67

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    588.      12.25                    77.         19.          6.          3.
                        (INCHES)      1.655       1.683       1.683       1.683
                         (AC-FT)       38.         39.         39.         39.

                        CUMULATIVE AREA =     .43 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 119 KK     *     R9-6   *        ROUTE   REACH
            *            *
            **************
                           ROUTE SUBBASIN 9 TO CP-9

               HYDROGRAPH ROUTING DATA

 121 RS          STORAGE ROUTING
                      NSTPS            5  NUMBER OF SUBREACHES
                       ITYP         FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC        -1.00  INITIAL CONDITION
                          X          .00 WORKING R AND D COEFFICIENT

 122 RC          NORMAL DEPTH CHANNEL
                        ANL         .075  LEFT OVERBANK N-VALUE
                       ANCH         .035  MAIN CHANNEL N-VALUE
                        ANR         .075  RIGHT OVERBANK N-VALUE
                      RLNTH        4780.  REACH LENGTH
                        SEL        .0580  ENERGY SLOPE
                      ELMAX        420.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                                 --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 124 RY        ELEVATION    420.00    418.00    416.00    413.70    414.00    416.00    418.00    418.70
 123 RX        DISTANCE      17.40     28.60     41.80     73.00    248.00    276.00    290.00    293.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      3.57     10.28     17.33     24.71     32.42     40.46     48.84     57.45     66.23
          OUTFLOW        .00    106.62    601.59   1391.10   2438.02   3725.04   5242.76   6997.36   9149.68  11531.40
        ELEVATION     413.70    414.03    414.36    414.69    415.03    415.36    415.69    416.02    416.35    416.68

          STORAGE      75.17     84.28     93.55    102.98    112.56    122.25    132.04    141.90    151.83    161.82
          OUTFLOW   14135.16  16954.76  19984.97  23221.44  26663.30  30302.53  34143.47  38175.32  42393.77  46795.58
        ELEVATION     417.02    417.35    417.68    418.01    418.34    418.67    419.01    419.34    419.67    420.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      107. TO    46796.
                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     R9-6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     555.     12.42        77.         19.          6.           3.
                        (INCHES)     1.655       1.683       1.683        1.683
                         (AC-FT)      38.         39.         39.          39.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       2.      12.42                  0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   414.33      12.42               413.83      413.74      413.71       413.70

                        CUMULATIVE AREA =     .43 SQ MI


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

            **************
            *            *
 125 KK     *    SUB-6   *        BASIN
            *            *
            **************
                           SUBBASIN 6 RUNOFF

               SUBBASIN RUNOFF DATA

 127 BA          SUBBASIN CHARACTERISTICS
                      TAREA          .53  SUBBASIN AREA

                 PRECIPITATION DATA

  20 PB               STORM        4.80  BASIN TOTAL PRECIPITATION
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 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                     .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00

 128 LG           GREEN AND AMPT LOSS RATE
                      STRTL          .27  STARTING LOSS
                        DTH          .35  MOISTURE DEFICIT
                       PSIF         4.60  WETTING FRONT SUCTION
                      XKSAT          .43  HYDRAULIC CONDUCTIVITY
                      RTIMP         9.00  PERCENT IMPERVIOUS AREA

 126 UI           INPUT UNITGRAPH,  31 ORDINATES,  VOLUME = 1.00
                      52.0      95.0     224.0     337.0     413.0     579.0     423.0     318.0     276.0     238.0
                     201.0     162.0     132.0     117.0      96.0      74.0      63.0      57.0      41.0      40.0
                      27.0      26.0      26.0      14.0      10.0      10.0      10.0      10.0      10.0      10.0
                      10.0

                                                                                  ***

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

                        HYDROGRAPH AT STATION    SUB-6

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.14, TOTAL EXCESS =    1.66

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    611.      12.33                 87.         24.          8.          3.
                        (INCHES)    1.532       1.656       1.658       1.658
                         (AC-FT)     43.         47.         47.         47.

                        CUMULATIVE AREA =     .53 SQ MI


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


            **************
            *            *
 134 KK     *     CP-6   *
            *            *
            **************
                        COMBINE R7-6, R9-6 & SUBBASIN 6

 136 HC           HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                                  ***

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

                        HYDROGRAPH AT STATION     CP-6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+   1641.      12.42                335.         91.         30.         13.
                        (INCHES)    1.694       1.842       1.845       1.845
                         (AC-FT)    166.        181.        181.        181.

                        CUMULATIVE AREA =    1.84 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 137 KK       *     R6-B   *        ROUTE   REACH
              *            *
              **************
                                ROUTE CP-6 TO CP-B

                HYDROGRAPH ROUTING DATA

 139 RS           STORAGE ROUTING
                       NSTPS           5  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

 140 RC           NORMAL DEPTH CHANNEL
                         ANL        .075  LEFT OVERBANK N-VALUE
                        ANCH        .035  MAIN CHANNEL N-VALUE
                         ANR        .075  RIGHT OVERBANK N-VALUE
                       RLNTH       2669.  REACH LENGTH
                         SEL       .0880  ENERGY SLOPE
                       ELMAX       318.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 142 RY        ELEVATION    318.00    316.00    314.00    312.80    313.90    314.00    315.40    316.00
 141 RX        DISTANCE      19.40     28.70     42.40    113.80    204.00    273.80    304.00    344.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00       .32      1.30      2.92      5.20      8.84     12.87     17.03     21.31     25.73
            OUTFLOW        .00     17.77    112.83    332.67    716.44   1324.82   2437.89   3814.24   5435.89   7290.41
          ELEVATION     312.80    313.07    313.35    313.62    313.89    314.17    314.44    314.72    314.99    315.26

            STORAGE      30.30     35.19     40.40     45.70     51.03     56.37     61.74     67.13     72.54     77.97
            OUTFLOW    9358.28  11647.30  14180.93  16967.95  19967.48  23172.12  26575.60  30172.57  33958.29  37928.60
          ELEVATION     315.54    315.81    316.08    316.36    316.63    316.91    317.18    317.45    317.73    318.00

 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       18. TO    37929.
                 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     R6-B

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+    1636.     12.50          335.        91.         30.         13.
                        (INCHES)      1.694       1.842       1.845       1.845
                         (AC-FT)        166.        181.        181.        181.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
        2.     12.50                     1.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   314.24      12.50                  313.44      313.07      312.89      312.85

                        CUMULATIVE AREA =    1.84 SQ MI


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

              **************
              *            *
 143 KK       *     SUB-5  *        BASIN
              *            *
              **************
                                SUBBASIN 5 RUNOFF

                SUBBASIN RUNOFF DATA

 145 BA           SUBBASIN CHARACTERISTICS
                       TAREA         .13  SUBBASIN AREA

                  PRECIPITATION DATA

  20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION
```

```
21 PI          INCREMENTAL PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                 .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00

146 LG         GREEN AND AMPT LOSS RATE
                STRTL          .25  STARTING LOSS
                  DTH          .35  MOISTURE DEFICIT
                 PSIF         4.40  WETTING FRONT SUCTION
                XKSAT          .49  HYDRAULIC CONDUCTIVITY
                RTIMP          .00  PERCENT IMPERVIOUS AREA

144 UI         INPUT UNITGRAPH,  14 ORDINATES,  VOLUME =  .98
                 40.0     154.0     261.0     168.0     121.0      80.0      57.0      36.0      25.0      16.0
                 13.0       5.0       5.0       5.0

                                                                  ***

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

                     HYDROGRAPH AT STATION    SUB-5

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.50, TOTAL EXCESS =    1.30

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    229.      12.08                 18.          4.          1.          1.
                        (INCHES)    1.275       1.275       1.275       1.275
                         (AC-FT)      9.          9.          9.          9.

                       CUMULATIVE AREA =     .13 SQ MI


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


            **************
            *            *
150 KK      *     CP-B   *
            *            *
            **************
                     COMBINE R6-B AND SUBBASIN 5

152 HC         HYDROGRAPH COMBINATION
                ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                     HYDROGRAPH AT STATION     CP-B

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+   1681.      12.50                353.         96.         32.         14.
                        (INCHES)    1.667       1.805       1.808       1.808
                         (AC-FT)    175.        190.        190.        190.

                       CUMULATIVE AREA =    1.97 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  153 KK      *   SUB-20   *        BASIN
              *            *
              **************
                             SUBBASIN 20 RUNOFF

                SUBBASIN RUNOFF DATA

  155 BA          SUBBASIN CHARACTERISTICS
                        TAREA          .51   SUBBASIN AREA

                  PRECIPITATION DATA

   20 PB                STORM        4.80   BASIN TOTAL PRECIPITATION

   21 PI            INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                        .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                        .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00

  156 LG          GREEN AND AMPT LOSS RATE
                        STRTL          .25   STARTING LOSS
                          DTH          .38   MOISTURE DEFICIT
                         PSIF         5.60   WETTING FRONT SUCTION
                        XKSAT          .29   HYDRAULIC CONDUCTIVITY
                        RTIMP          .00   PERCENT IMPERVIOUS AREA

  154 UI          INPUT UNITGRAPH,  36 ORDINATES,   VOLUME = 1.00
                     44.0      61.0     155.0     246.0     310.0     373.0     504.0     342.0     270.0     239.0
                    211.0     182.0     157.0     126.0     108.0      98.0      83.0      66.0      56.0      48.0
                     43.0      34.0      34.0      22.0      22.0      22.0      17.0       8.0       8.0       8.0
                      8.0       8.0       8.0       8.0       8.0       8.0

                                                                     ***

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

                           HYDROGRAPH AT STATION     SUB-20

     TOTAL RAINFALL =     4.80, TOTAL LOSS =     3.32, TOTAL EXCESS =      1.48

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR       72-HR    166.58-HR
+   (CFS)         (HR)
                               (CFS)
+      545.       12.42                     81.          20.          7.           3.
                              (INCHES)    1.480        1.480        1.480        1.480
                              (AC-FT)       40.          40.          40.          40.

                           CUMULATIVE AREA =      .51 SQ MI


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

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              *            *
  162 KK      *   R20-13   *        ROUTE    REACH
              *            *
              **************
                             ROUTE CP-20 TO CP-13
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                HYDROGRAPH ROUTING DATA

 164 RS          STORAGE ROUTING
                      NSTPS           4  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X         .00  WORKING R AND D COEFFICIENT

 165 RC          NORMAL DEPTH CHANNEL
                        ANL        .080  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
                        ANR        .080  RIGHT OVERBANK N-VALUE
                      RLNTH       6689.  REACH LENGTH
                        SEL       .0470  ENERGY SLOPE
                      ELMAX       953.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 167 RY        ELEVATION    953.00    950.00    948.00    947.10    948.00    948.30    950.00    952.00
 166 RX        DISTANCE      30.20     55.50     77.60    160.00    222.10    241.70    385.00    414.00

                                                    ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.19      4.76     10.69     18.27     27.15     37.44     49.15     62.26     76.79
          OUTFLOW        .00     20.64    131.06    391.23    877.80   1604.79   2520.04   3623.38   4916.28   6401.30
        ELEVATION     947.10    947.41    947.72    948.03    948.34    948.65    948.96    949.27    949.58    949.89

          STORAGE      92.50    108.61    125.05    141.84    158.97    176.43    194.23    212.22    230.34    248.58
          OUTFLOW    8111.29  10025.06  12119.66  14389.73  16831.05  19440.24  22227.31  25223.68  28382.20  31699.71
        ELEVATION     950.21    950.52    950.83    951.14    951.45    951.76    952.07    952.38    952.69    953.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      878. TO    31700.
                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   R20-13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     512.      12.58       81.         20.          7.           3.
                       (INCHES)     1.480        1.480        1.480        1.480
                        (AC-FT)       40.          40.          40.          40.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR    166.58-HR
+  (AC-FT)      (HR)
       3.      12.58        1.          0.           0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR    166.58-HR
+   (FEET)      (HR)
   948.11      12.58      947.40      947.17       947.13       947.13

                       CUMULATIVE AREA =      .51 SQ MI


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


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            *            *
 168 KK     *   SUB-13   *        BASIN
            *            *
            **************
                       SUBBASIN 13 RUNOFF

              SUBBASIN RUNOFF DATA

 170 BA          SUBBASIN CHARACTERISTICS
                      TAREA         .38  SUBBASIN AREA

                 PRECIPITATION DATA

 20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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.00     .00     .00     .00     .00     .00     .00     .01     .00     .01
.01     .01     .01     .01     .01     .01     .01     .01     .03     .03
.03     .09     .09     .09     .01     .01     .01     .01     .01     .01
.01     .01     .01     .01     .01     .01     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00
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171 LG          GREEN AND AMPT LOSS RATE
                     STRTL        .25  STARTING LOSS
                       DTH        .38  MOISTURE DEFICIT
                      PSIF       5.60  WETTING FRONT SUCTION
                     XKSAT        .30  HYDRAULIC CONDUCTIVITY
                     RTIMP       3.00  PERCENT IMPERVIOUS AREA

169 UI          INPUT UNITGRAPH,  43 ORDINATES,  VOLUME = 1.00
                    27.0     27.0     73.0    117.0    166.0    195.0    224.0    294.0    275.0    188.0
                   163.0    148.0    133.0    118.0    106.0     90.0     76.0     67.0     62.0     56.0
                    45.0     37.0     35.0     30.0     29.0     21.0     21.0     19.0     13.0     13.0
                    13.0     13.0      6.0      5.0      5.0      5.0      5.0      5.0      5.0      5.0
                     5.0      5.0      5.0
                                                                  ***
     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SUB-13

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.24, TOTAL EXCESS =    1.56

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     359.     12.50                 62.          16.           5.           2.
                        (INCHES)   1.526        1.568        1.569        1.569
                         (AC-FT)     31.          32.          32.          32.

                       CUMULATIVE AREA =     .38 SQ MI


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


            **************
            *            *
178 KK      *    CP-13   *
            *            *
            **************
                        COMBINE SUB-13 & R20-13

180 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***
     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    CP-13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     854.     12.58                144.          36.          12.           5.
                        (INCHES)   1.500        1.518        1.518        1.518
                         (AC-FT)     71.          72.          72.          72.

                       CUMULATIVE AREA =     .89 SQ MI


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


            **************
            *            *
181 KK      *   R13-12   *        ROUTE   REACH
            *            *
            **************
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ROUTE CP-13 FLOW TO CP-12

HYDROGRAPH ROUTING DATA

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183 RS          STORAGE ROUTING
                     NSTPS          4  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00  WORKING R AND D COEFFICIENT

184 RC          NORMAL DEPTH CHANNEL
                       ANL       .080  LEFT OVERBANK N-VALUE
                      ANCH       .040  MAIN CHANNEL N-VALUE
                       ANR       .080  RIGHT OVERBANK N-VALUE
                     RLNTH      2975.  REACH LENGTH
                       SEL      .0470  ENERGY SLOPE
                     ELMAX      801.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

| | | --- LEFT OVERBANK --- | + ------ MAIN CHANNEL -------- | | | + --- RIGHT OVERBANK --- | | |
|---|---|---|---|---|---|---|---|---|
| 186 RY | ELEVATION | 800.00 | 799.70 | 796.00 | 797.60 | 797.50 | 798.00 | 800.00 | 801.00 |
| 185 RX | DISTANCE | 22.40 | 25.00 | 62.00 | 89.00 | 215.00 | 336.00 | 366.00 | 372.00 |

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| STORAGE | .00 | .06 | .25 | .57 | 1.02 | 1.59 | 2.61 | 6.56 | 11.64 | 17.04 |
| OUTFLOW | .00 | 1.58 | 10.03 | 29.58 | 63.71 | 115.51 | 108.36 | 373.29 | 887.20 | 1666.52 |
| ELEVATION | 796.00 | 796.26 | 796.53 | 796.79 | 797.05 | 797.32 | 797.58 | 797.84 | 798.11 | 798.37 |
| STORAGE | 22.54 | 28.17 | 33.92 | 39.78 | 45.76 | 51.86 | 58.05 | 64.26 | 70.50 | 76.77 |
| OUTFLOW | 2639.60 | 3791.42 | 5111.63 | 6592.63 | 8228.53 | 10016.96 | 11972.24 | 14073.87 | 16312.42 | 18684.24 |
| ELEVATION | 798.63 | 798.90 | 799.16 | 799.42 | 799.68 | 799.95 | 800.21 | 800.47 | 800.74 | 801.00 |

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 30. TO 18684.
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 R13-12

| PEAK FLOW | TIME | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|---|
| + (CFS) | (HR) | | | | | |
| | | (CFS) | | | | |
| + 826. | 12.67 | | 144. | 36. | 12. | 5. |
| | | (INCHES) | 1.499 | 1.518 | 1.518 | 1.518 |
| | | (AC-FT) | 71. | 72. | 72. | 72. |

| PEAK STORAGE | TIME | MAXIMUM AVERAGE STORAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| + (AC-FT) | (HR) | | | | |
| 3. | 12.67 | 1. | 0. | 0. | 0. |

| PEAK STAGE | TIME | MAXIMUM AVERAGE STAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| + (FEET) | (HR) | | | | |
| 798.07 | 12.67 | 796.97 | 796.32 | 796.11 | 796.05 |

CUMULATIVE AREA = .89 SQ MI

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

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            *            *
187 KK      *   SUB-12   *        BASIN
            *            *
            **************
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SUBBASIN 12 RUNOFF

SUBBASIN RUNOFF DATA

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189 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .36  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB               STORM       4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                    .00    .00    .00    .00    .00    .00    .00    .00

190 LG          GREEN AND AMPT LOSS RATE
                    STRTL          .25  STARTING LOSS
                      DTH          .36  MOISTURE DEFICIT
                     PSIF         5.00  WETTING FRONT SUCTION
                    XKSAT          .35  HYDRAULIC CONDUCTIVITY
                    RTIMP         2.00  PERCENT IMPERVIOUS AREA

188 UI          INPUT UNITGRAPH,  42 ORDINATES,  VOLUME = 1.00
                   26.0    26.0    74.0   117.0   163.0   192.0   223.0   301.0   237.0   175.0
                  154.0   138.0   125.0   110.0    97.0    83.0    68.0    63.0    58.0    49.0
                   41.0    34.0    31.0    29.0    24.0    20.0    20.0    14.0    13.0    13.0
                   13.0     9.0     5.0     5.0     5.0     5.0     5.0     5.0     5.0     5.0
                    5.0     5.0

                                                          ***

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

                       HYDROGRAPH AT STATION   SUB-12

  TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.30, TOTAL EXCESS =    1.50

 PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR    166.58-HR
+  (CFS)       (HR)
                         (CFS)
+    337.     12.50                  57.         15.          5.           2.
                       (INCHES)   1.475       1.503       1.503        1.503
                        (AC-FT)     28.         29.         29.          29.

                       CUMULATIVE AREA =    .36 SQ MI


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

            **************
            *            *
197 KK      *   CP-12A   *
            *            *
            **************
                          COMBINE R13-12 AND SUBBASIN 12

199 HC          HYDROGRAPH COMBINATION
                    ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                       HYDROGRAPH AT STATION   CP-12A

 PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR    166.58-HR
+  (CFS)       (HR)
                         (CFS)
+   1083.     12.67                 201.         51.         17.           7.
                       (INCHES)   1.492       1.513       1.514        1.514
                        (AC-FT)     99.        101.        101.         101.

                       CUMULATIVE AREA =   1.25 SQ MI


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

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            *            *
200 KK      *   SUB-16   *       BASIN
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*             *
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                SUBBASIN 16 RUNOFF

          SUBBASIN RUNOFF DATA

202 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .43  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                     .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00

203 LG          GREEN AND AMPT LOSS RATE
                     STRTL          .25  STARTING LOSS
                       DTH          .39  MOISTURE DEFICIT
                      PSIF         5.70  WETTING FRONT SUCTION
                     XKSAT          .27  HYDRAULIC CONDUCTIVITY
                     RTIMP          .00  PERCENT IMPERVIOUS AREA

201 UI          INPUT UNITGRAPH,  37 ORDINATES,  VOLUME =  .99
                    35.0      42.0     116.0     184.0     236.0     277.0     371.0     334.0     230.0     201.0
                   177.0     157.0     138.0     115.0      94.0      84.0      76.0      63.0      51.0      45.0
                    38.0      35.0      27.0      27.0      19.0      17.0      17.0      17.0       7.0       7.0
                     7.0       7.0       7.0       7.0       7.0       7.0       7.0
                                                                    ***

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

                     HYDROGRAPH AT STATION   SUB-16

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.30, TOTAL EXCESS =    1.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    447.      12.42                 69.          17.           6.           2.
                        (INCHES)   1.484       1.484        1.484        1.484
                        (AC-FT)      34.          34.          34.          34.

                       CUMULATIVE AREA =     .43 SQ MI


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


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             *            *
209 KK       *    CP-12   *
             *            *
             **************
                     COMBINE SUBBASIN 16 AND CP-12A

211 HC          HYDROGRAPH COMBINATION
                     ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE
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                    HYDROGRAPH AT STATION    CP-12

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+   1432.     12.58                269.          68.          23.          10.
                        (INCHES)  1.490       1.506        1.506        1.506
                        (AC-FT)    134.        135.         135.         135.

                       CUMULATIVE AREA =    1.68 SQ MI


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


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          *            *
212 KK    *    R12-11  *        ROUTE   REACH
          *            *
          **************
                        ROUTE CP-12 TO CP-11

             HYDROGRAPH ROUTING DATA

214 RS          STORAGE ROUTING
                      NSTPS            6  NUMBER OF SUBREACHES
                       ITYP         FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC        -1.00  INITIAL CONDITION
                          X          .00 WORKING R AND D COEFFICIENT

215 RC          NORMAL DEPTH CHANNEL
                        ANL         .080  LEFT OVERBANK N-VALUE
                       ANCH         .040  MAIN CHANNEL N-VALUE
                        ANR         .080  RIGHT OVERBANK N-VALUE
                      RLNTH        5674.  REACH LENGTH
                        SEL        .0530  ENERGY SLOPE
                      ELMAX        686.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
217 RY        ELEVATION    686.00    684.00    683.40    683.00    682.00    684.00    684.70    686.00
216 RX        DISTANCE      75.20     83.00    122.00    182.00    218.00    264.50    273.00    284.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .17       .68      1.54      2.74      4.30      6.67     10.01     13.97     18.44
          OUTFLOW        .00      2.51     15.93     46.97    101.15    173.90    272.30    462.10    759.49   1123.49
        ELEVATION     682.00    682.21    682.42    682.63    682.84    683.05    683.26    683.47    683.68    683.89

          STORAGE      23.36     28.43     33.59     38.85     44.18     49.59     55.06     60.61     66.23     71.92
          OUTFLOW    1572.84   2108.45   2709.72   3373.98   4099.17   4883.02   5723.92   6620.51   7571.64   8576.32
        ELEVATION     684.11    684.32    684.53    684.74    684.95    685.16    685.37    685.58    685.79    686.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      272. TO      8576.
                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   R12-11

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+   1410.     12.75                269.          68.          23.          10.
                        (INCHES)  1.490       1.506        1.506        1.506
                        (AC-FT)    134.        135.         135.         135.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR    166.58-HR
+  (AC-FT)      (HR)
       4.     12.75                  1.          0.           0.           0.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR    166.58-HR
+   (FEET)      (HR)
   684.03     12.75               682.86      682.27       682.09       682.04

                       CUMULATIVE AREA =    1.68 SQ MI


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218 KK      *    SUB-15  *        BASIN
            *            *
            **************
                          SUBBASIN 15 RUNOFF

                SUBBASIN RUNOFF DATA

220 BA            SUBBASIN CHARACTERISTICS
                       TAREA          .48  SUBBASIN AREA

                  PRECIPITATION DATA

 20 PB                 STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI              INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                       .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                       .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00

221 LG            GREEN AND AMPT LOSS RATE
                       STRTL          .25  STARTING LOSS
                         DTH          .39  MOISTURE DEFICIT
                        PSIF         5.70  WETTING FRONT SUCTION
                       XKSAT          .26  HYDRAULIC CONDUCTIVITY
                       RTIMP          .00  PERCENT IMPERVIOUS AREA

219 UI            INPUT UNITGRAPH,  35 ORDINATES,  VOLUME = 1.01
                       43.0      63.0     156.0     246.0     307.0     377.0     483.0     308.0     255.0     224.0
                      197.0     171.0     142.0     114.0     102.0      92.0      72.0      57.0      51.0      47.0
                       35.0      33.0      26.0      21.0      21.0      21.0       8.0       8.0       8.0       8.0
                        8.0       8.0       8.0       8.0       8.0
                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-15

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.28, TOTAL EXCESS =    1.52

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                           (CFS)
+    539.      12.33                 79.         20.          7.          3.
                        (INCHES)   1.529      1.529       1.529       1.529
                         (AC-FT)     39.         39.         39.         39.

                        CUMULATIVE AREA =     .48 SQ MI


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


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            *            *
227 KK      *    R15-11  *        ROUTE   REACH
            *            *
            **************
                          ROUTE SUBBASIN 15 FLOWS TO CP-11

                HYDROGRAPH ROUTING DATA

229 RS            STORAGE ROUTING
                      NSTPS           5  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
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                    X          .00 WORKING R AND D COEFFICIENT

230 RC        NORMAL DEPTH CHANNEL
                   ANL        .075  LEFT OVERBANK N-VALUE
                  ANCH        .040  MAIN CHANNEL N-VALUE
                   ANR        .075  RIGHT OVERBANK N-VALUE
                 RLNTH       4392.  REACH LENGTH
                   SEL       .0630  ENERGY SLOPE
                 ELMAX       738.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
232 RY      ELEVATION   738.00    733.20    732.00    731.40    731.50    732.10    734.00    738.00
231 RX      DISTANCE     20.00     50.00     58.00    125.60    155.00    163.50    175.50    200.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.61      4.86      8.65     12.60     16.72     20.98     25.40     29.97     34.70
          OUTFLOW        .00     54.70    266.90    686.89   1255.98   1960.49   2792.35   3745.78   4816.82   6002.43
        ELEVATION     731.40    731.75    732.09    732.44    732.79    733.14    733.48    733.83    734.18    734.53

          STORAGE      39.57     44.60     49.77     55.10     60.57     66.20     71.97     77.90     83.98     90.21
          OUTFLOW    7300.23   8708.46  10225.78  11851.14  13583.74  15422.98  17368.43  19419.75  21576.77  23839.38
        ELEVATION     734.87    735.22    735.57    735.92    736.26    736.61    736.96    737.30    737.65    738.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       55. TO    23839.
                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   R15-11

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                             (CFS)
+     530.      12.50                79.          20.          7.           3.
                          (INCHES)  1.529        1.529       1.529        1.529
                           (AC-FT)    39.          39.         39.          39.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       1.      12.50                 0.           0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
    732.31     12.50               731.62      731.46      731.42       731.39

                         CUMULATIVE AREA =     .48 SQ MI


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


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            *            *
233 KK      *   SUB-11   *        BASIN
            *            *
            **************
                         SUBBASIN 11 RUNOFF

              SUBBASIN RUNOFF DATA

235 BA          SUBBASIN CHARACTERISTICS
                     TAREA         .50  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                     .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

 236 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .37  MOISTURE DEFICIT
                       PSIF        5.20  WETTING FRONT SUCTION
                      XKSAT         .31  HYDRAULIC CONDUCTIVITY
                      RTIMP        1.00  PERCENT IMPERVIOUS AREA

 234 UI          INPUT UNITGRAPH,  24 ORDINATES,  VOLUME = 1.00
                     64.0     189.0     385.0     523.0     673.0     415.0     339.0     278.0     220.0     163.0
                    141.0     101.0      79.0      66.0      49.0      38.0      32.0      27.0      12.0      12.0
                     12.0      12.0      12.0      12.0

                                                                   ***

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

                        HYDROGRAPH AT STATION   SUB-11

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.29, TOTAL EXCESS =    1.51

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    709.      12.17                  80.         20.          7.          3.
                        (INCHES)    1.491       1.504       1.505       1.505
                         (AC-FT)     40.         40.         40.         40.

                       CUMULATIVE AREA =     .50 SQ MI


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


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            *            *
 241 KK     *     CP-11  *
            *            *
            **************
                        COMBINE R12-11, R15-11 AND SUBBASIN 11

 243 HC          HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                   ***

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

                        HYDROGRAPH AT STATION    CP-11

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+   2060.      12.67                 428.        108.         36.         16.
                        (INCHES)    1.497       1.510       1.510       1.510
                         (AC-FT)     212.        214.        214.        214.

                       CUMULATIVE AREA =    2.66 SQ MI


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


            **************
            *            *
 244 KK     *     R11-C  *        ROUTE   REACH
            *            *
            **************
                        ROUTE CP-11 TO CP-C

              HYDROGRAPH ROUTING DATA

 246 RS          STORAGE ROUTING
                      NSTPS           5  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
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                    X          .00 WORKING R AND D COEFFICIENT

247 RC        NORMAL DEPTH CHANNEL
                   ANL         .075  LEFT OVERBANK N-VALUE
                  ANCH         .035  MAIN CHANNEL N-VALUE
                   ANR         .075  RIGHT OVERBANK N-VALUE
                 RLNTH        3517.  REACH LENGTH
                   SEL        .0830  ENERGY SLOPE
                 ELMAX        455.5  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                  CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
249 RY      ELEVATION   455.50    452.80    452.00    451.00    450.00    452.00    454.00    455.00
248 RX      DISTANCE     40.90    262.00    439.00    615.00    664.00    748.00    822.00    865.00

                                                  ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .31      1.23      2.77      5.05      8.72     13.86     20.48     28.74     38.74
          OUTFLOW        .00     12.89     81.83    241.25    482.79    913.78   1632.28   2726.28   4532.08   6758.44
        ELEVATION     450.00    450.29    450.58    450.87    451.16    451.45    451.74    452.03    452.32    452.61

          STORAGE      50.43     63.15     76.67     90.99    106.12    122.08    138.88    156.53    174.95    193.93
          OUTFLOW    9434.49  12571.42  16135.29  20120.84  24525.05  29345.27  34589.73  40261.61  46427.98  53047.83
        ELEVATION     452.89    453.18    453.47    453.76    454.05    454.34    454.63    454.92    455.21    455.50

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       13. TO    53048.
                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    R11-C

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)      (HR)
                           (CFS)
+    2046.    12.75         428.       108.         36.         16.
                        (INCHES)      1.497      1.510       1.510       1.510
                         (AC-FT)       212.       214.        214.        214.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)     (HR)
       3.      12.75           1.         0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+   (FEET)     (HR)
   451.85     12.75         450.76     450.21      450.07      450.03

                        CUMULATIVE AREA =    2.66 SQ MI


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


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            *            *
250 KK      *    SUB-10  *        BASIN
            *            *
            **************
                        SUBBASIN 10 RUNOFF

              SUBBASIN RUNOFF DATA

252 BA          SUBBASIN CHARACTERISTICS
                     TAREA         .22  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                     .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

 253 LG          GREEN AND AMPT LOSS RATE
                    STRTL          .25  STARTING LOSS
                      DTH          .35  MOISTURE DEFICIT
                     PSIF         4.45  WETTING FRONT SUCTION
                    XKSAT          .47  HYDRAULIC CONDUCTIVITY
                    RTIMP          .00  PERCENT IMPERVIOUS AREA

 251 UI          INPUT UNITGRAPH,  20 ORDINATES,  VOLUME = 1.01
                      34.0      134.0      237.0      354.0      234.0      180.0      142.0      103.0       79.0       60.0
                      42.0       34.0       26.0       17.0       17.0        7.0        7.0        7.0        7.0        7.0

                                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-10

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.48, TOTAL EXCESS =    1.32

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     332.     12.17                 32.           8.           3.           1.
                        (INCHES)   1.337        1.337        1.337        1.337
                         (AC-FT)     16.          16.          16.          16.

                        CUMULATIVE AREA =     .22 SQ MI


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


            **************
            *            *
 258 KK     *     CP-C   *
            *            *
            **************
                        COMBINE R11-C & SUBBASIN 1-

 260 HC          HYDROGRAPH COMBINATION
                    ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                                  ***

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

                        HYDROGRAPH AT STATION     CP-C

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    2100.     12.75                460.         116.          39.          17.
                        (INCHES)   1.485        1.496        1.497        1.497
                         (AC-FT)    228.         230.         230.         230.

                        CUMULATIVE AREA =    2.88 SQ MI


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


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            *            *
 261 KK     *   SUB-14   *        BASIN
            *            *
            **************
                        SUBBASIN 14 RUNOFF

               SUBBASIN RUNOFF DATA

 263 BA          SUBBASIN CHARACTERISTICS
                    TAREA          .41  SUBBASIN AREA

                 PRECIPITATION DATA
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20 PB              STORM        4.80  BASIN TOTAL PRECIPITATION

21 PI           INCREMENTAL PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

264 LG          GREEN AND AMPT LOSS RATE
                  STRTL        .25  STARTING LOSS
                    DTH        .37  MOISTURE DEFICIT
                   PSIF       5.30  WETTING FRONT SUCTION
                  XKSAT        .31  HYDRAULIC CONDUCTIVITY
                  RTIMP        .00  PERCENT IMPERVIOUS AREA

262 UI          INPUT UNITGRAPH,  38 ORDINATES,  VOLUME = 1.00
                   33.0      37.0     107.0     167.0     217.0     254.0     330.0     343.0     225.0     193.0
                  172.0     153.0     134.0     116.0      95.0      82.0      75.0      66.0      54.0      42.0
                   39.0      36.0      28.0      25.0      23.0      16.0      16.0      16.0      13.0       6.0
                    6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0

                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-14

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.33, TOTAL EXCESS =    1.47

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     416.     12.42                 65.         16.          5.          2.
                           (INCHES)  1.466       1.466       1.466       1.466
                            (AC-FT)   32.         32.         32.         32.

                        CUMULATIVE AREA =     .41 SQ MI


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


            **************
            *            *
270 KK      *   SUB-17   *        BASIN
            *            *
            **************
                        SUBBASIN 17 RUNOFF

              SUBBASIN RUNOFF DATA

272 BA          SUBBASIN CHARACTERISTICS
                   TAREA        .24  SUBBASIN AREA

                PRECIPITATION DATA

20 PB              STORM        4.80  BASIN TOTAL PRECIPITATION

21 PI           INCREMENTAL PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00

273 LG        GREEN AND AMPT LOSS RATE
                STRTL        .25  STARTING LOSS
                  DTH        .37  MOISTURE DEFICIT
                 PSIF       5.30  WETTING FRONT SUCTION
                XKSAT        .29  HYDRAULIC CONDUCTIVITY
                RTIMP        .00  PERCENT IMPERVIOUS AREA

271 UI        INPUT UNITGRAPH,  21 ORDINATES,  VOLUME = 1.00
                35.0     127.0     235.0     347.0     273.0     194.0     156.0     119.0      87.0      71.0
                50.0      40.0      29.0      23.0      17.0      14.0       7.0       7.0       7.0       7.0
                 7.0

                                                          ***

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

                    HYDROGRAPH AT STATION   SUB-17

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.29, TOTAL EXCESS =    1.51

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     378.     12.17                39.          10.           3.           1.
                        (INCHES)   1.500        1.500        1.500        1.500
                         (AC-FT)     19.          19.          19.          19.

                        CUMULATIVE AREA =     .24 SQ MI


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


            **************
            *            *
278 KK      *    SUB-22  *        BASIN
            *            *
            **************
                          SUBBASIN 22 RUNOFF

              SUBBASIN RUNOFF DATA

280 BA          SUBBASIN CHARACTERISTICS
                  TAREA         .64  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB              STORM        4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                  .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                  .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                  .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
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                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00

 281 LG          GREEN AND AMPT LOSS RATE
                      STRTL        .25  STARTING LOSS
                        DTH        .37  MOISTURE DEFICIT
                       PSIF       5.70  WETTING FRONT SUCTION
                      XKSAT        .27  HYDRAULIC CONDUCTIVITY
                      RTIMP        .00  PERCENT IMPERVIOUS AREA

 279 UI          INPUT UNITGRAPH,  30 ORDINATES,  VOLUME = 1.00
                     65.0     125.0     293.0     430.0     533.0     734.0     475.0     383.0     331.0     282.0
                    237.0     185.0     156.0     140.0     105.0      84.0      73.0      61.0      50.0      41.0
                     32.0      32.0      24.0      13.0      13.0      13.0      13.0      13.0      13.0      13.0

                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-22

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.28, TOTAL EXCESS =    1.52

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     789.     12.33            105.          26.          9.           4.
                         (INCHES)      1.521       1.521       1.521       1.521
                          (AC-FT)       52.         52.         52.         52.

                         CUMULATIVE AREA =     .64 SQ MI


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


            **************
            *            *
 287 KK     *   R22-19   *        ROUTE   REACH
            *            *
            **************
                        ROUTE SUBBASIN 22 TO CP-19

               HYDROGRAPH ROUTING DATA

 289 RS          STORAGE ROUTING
                      NSTPS          5  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 290 RC          NORMAL DEPTH CHANNEL
                        ANL       .075  LEFT OVERBANK N-VALUE
                       ANCH       .035  MAIN CHANNEL N-VALUE
                        ANR       .075  RIGHT OVERBANK N-VALUE
                      RLNTH      4366.  REACH LENGTH
                        SEL      .0890  ENERGY SLOPE
                      ELMAX      101.9  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 292 RY       ELEVATION    101.90    100.00    100.00     98.20     97.90    100.00    101.30    101.80
 291 RX       DISTANCE     168.00    209.00    354.70    471.00    542.80    644.00    683.50    694.50

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .64      2.43      4.79      7.64     11.01     14.87     19.23     24.10     29.46
          OUTFLOW        .00     18.04    119.48    321.45    624.31   1037.30   1570.34   2233.37   3036.14   3988.20
        ELEVATION      97.90     98.11     98.32     98.53     98.74     98.95     99.16     99.37     99.58     99.79

          STORAGE      35.40     44.70     54.23     64.00     73.99     84.21     94.67    105.34    116.20    127.25
          OUTFLOW    5105.93   6727.76   8590.44  10672.62  12963.69  15456.48  18145.69  21029.73  24102.01  27366.82
        ELEVATION     100.01    100.22    100.43    100.64    100.85    101.06    101.27    101.48    101.69    101.90

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      119. TO    27367.
                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   R22-19
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  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     789.     12.42           105.          26.           9.            4.
                         (INCHES)        1.521        1.521        1.521        1.521
                          (AC-FT)           52.          52.          52.          52.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR     166.58-HR
+  (AC-FT)      (HR)
       2.     12.42                 0.           0.           0.           0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR     166.58-HR
+   (FEET)      (HR)
    98.83     12.42                98.12        97.96        97.92        97.91

                         CUMULATIVE AREA =      .64 SQ MI


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


            **************
            *            *
 293 KK     *   SUB-19   *        BASIN
            *            *
            **************
                          SUBBASIN 19 RUNOFF

              SUBBASIN RUNOFF DATA

 295 BA         SUBBASIN CHARACTERISTICS
                      TAREA          .59  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB               STORM        4.80  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00

 296 LG         GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .39  MOISTURE DEFICIT
                       PSIF        5.80  WETTING FRONT SUCTION
                      XKSAT         .25  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

 294 UI         INPUT UNITGRAPH,  26 ORDINATES,  VOLUME = 1.00
                     69.0      168.0      364.0      502.0      705.0      585.0      410.0      347.0      290.0      234.0
                    177.0      154.0      122.0       91.0       77.0       61.0       53.0       36.0       34.0       30.0
                     13.0       13.0       13.0       13.0       13.0       13.0
                                                                   ***

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

                        HYDROGRAPH AT STATION   SUB-19

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.27, TOTAL EXCESS =    1.53

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
```

```
+   (CFS)       (HR)
                                (CFS)
+     815.      12.25                    98.          24.          8.           4.
                            (INCHES)    1.540        1.540        1.540        1.540
                            (AC-FT)      48.          48.          48.          48.

                            CUMULATIVE AREA =     .59 SQ MI


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


              **************
              *            *
 301 KK       *    CP-19   *
              *            *
              **************
                            COMBINE R22-19 & SUBBASIN 19

 303 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                            HYDROGRAPH AT STATION    CP-19

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                                (CFS)
+    1510.      12.33                   202.          51.          17.           7.
                            (INCHES)    1.530        1.530        1.530        1.530
                            (AC-FT)      100.         100.         100.         100.

                            CUMULATIVE AREA =    1.23 SQ MI


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


              **************
              *            *
 304 KK       *    R19-F   *        ROUTE   REACH
              *            *
              **************
                            ROUTE CP-19 TO CP-F

             HYDROGRAPH ROUTING DATA

 306 RS          STORAGE ROUTING
                      NSTPS           6  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

 307 RC          NORMAL DEPTH CHANNEL
                        ANL        .075  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
                        ANR        .075  RIGHT OVERBANK N-VALUE
                      RLNTH       6408.  REACH LENGTH
                        SEL       .0620  ENERGY SLOPE
                      ELMAX       760.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                         CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 309 RY        ELEVATION    752.60    750.00    748.80    747.40    746.60    750.00    750.00    760.00
 308 RX        DISTANCE     117.80    145.00    174.00    305.00    382.40    499.80    554.00    586.00

                                                                  ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      4.80     19.12     42.82     73.92    110.31    153.42    197.53    242.64    288.66
          OUTFLOW        .00    172.72   1096.07   3215.45   7312.58  13092.75  21058.53  30621.61  41665.15  54160.25
        ELEVATION     746.60    747.31    748.01    748.72    749.42    750.13    750.83    751.54    752.24    752.95

          STORAGE     335.01    381.60    428.42    475.47    522.76    570.28    618.03    666.02    714.25    762.71
          OUTFLOW   68045.54  83212.29  99610.71 117199.00 135941.10 155806.00 176766.20 198797.20 221877.00 245986.00
        ELEVATION     753.65    754.36    755.06    755.77    756.47    757.18    757.88    758.59    759.29    760.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      173. TO   245986.
                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    R19-F
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  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                              (CFS)
+    1469.     12.50          202.          51.          17.           7.
                        (INCHES)        1.530        1.530        1.530       1.530
                         (AC-FT)         100.         100.         100.        100.

 PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR     166.58-HR
+  (AC-FT)      (HR)
       4.      12.50                    1.           0.           0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR     166.58-HR
+   (FEET)      (HR)
   748.13      12.50                  746.95       746.69       746.63       746.63

                        CUMULATIVE AREA =     1.23 SQ MI


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


            **************
            *            *
 310 KK     *   SUB-18   *        BASIN
            *            *
            **************
                        SUBBASIN 18 RUNOFF

              SUBBASIN RUNOFF DATA

 312 BA          SUBBASIN CHARACTERISTICS
                      TAREA          .42  SUBBASIN AREA

                 PRECIPITATION DATA

  20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

  21 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00

 313 LG           GREEN AND AMPT LOSS RATE
                       STRTL        .25  STARTING LOSS
                         DTH        .35  MOISTURE DEFICIT
                        PSIF       4.60  WETTING FRONT SUCTION
                       XKSAT        .38  HYDRAULIC CONDUCTIVITY
                       RTIMP        .00  PERCENT IMPERVIOUS AREA

 311 UI           INPUT UNITGRAPH,  24 ORDINATES,  VOLUME = 1.01
                      55.0      161.0      327.0      444.0      572.0      353.0      288.0      236.0      186.0      138.0
                     120.0       86.0       67.0       56.0       42.0       32.0       27.0       23.0       10.0       10.0
                      10.0       10.0       10.0       10.0
                                                                   ***

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

                        HYDROGRAPH AT STATION   SUB-18

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.38, TOTAL EXCESS =    1.42

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
```

```
+   (CFS)      (HR)
                        (CFS)
+     585.     12.17                  65.          16.          5.           2.
                     (INCHES)      1.432        1.432       1.432        1.432
                      (AC-FT)        32.          32.         32.          32.

                       CUMULATIVE AREA =      .42 SQ MI


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

               **************
               *            *
 318 KK        *    CP-F    *
               *            *
               **************
                           COMBINE R19-F AND SUBBASIN 18

 320 HC           HYDROGRAPH COMBINATION
                        ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                    ***

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

                       HYDROGRAPH AT STATION      CP-F

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                        (CFS)
+    1826.     12.42                    267.          67.          22.          10.
                     (INCHES)          1.505        1.505        1.505        1.505
                      (AC-FT)           132.         132.         132.         132.

                       CUMULATIVE AREA =      1.65 SQ MI


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

               **************
               *            *
 321 KK        *   SUB-21   *         BASIN
               *            *
               **************
                           SUBBASIN 21 RUNOFF

                 SUBBASIN RUNOFF DATA

 323 BA           SUBBASIN CHARACTERISTICS
                        TAREA         .28  SUBBASIN AREA

                  PRECIPITATION DATA

  20 PB                 STORM        4.80  BASIN TOTAL PRECIPITATION

  21 PI             INCREMENTAL PRECIPITATION PATTERN
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                        .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                        .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                        .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00

 324 LG           GREEN AND AMPT LOSS RATE
                        STRTL         .25  STARTING LOSS
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```
                  DTH          .36  MOISTURE DEFICIT
                 PSIF         5.10  WETTING FRONT SUCTION
                XKSAT          .31  HYDRAULIC CONDUCTIVITY
                RTIMP          .00  PERCENT IMPERVIOUS AREA

 322 UI         INPUT UNITGRAPH,  33 ORDINATES,   VOLUME = 1.00
                  26.0      43.0     101.0     160.0     196.0     255.0     262.0     171.0     147.0     128.0
                 111.0      93.0      74.0      63.0      57.0      46.0      36.0      31.0      29.0      21.0
                  20.0      15.0      13.0      13.0      10.0       5.0       5.0       5.0       5.0       5.0
                   5.0       5.0       5.0

                                                           ***

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

                   HYDROGRAPH AT STATION    SUB-21

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.31, TOTAL EXCESS =    1.49

  PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                       6-HR         24-HR       72-HR     166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    322.      12.33                    45.           11.          4.           2.
                        (INCHES)      1.487         1.487       1.487        1.487
                         (AC-FT)        22.           22.         22.          22.

                   CUMULATIVE AREA =       .28 SQ MI


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

              **************
              *            *
 330 KK       *   SUB-23   *        BASIN
              *            *
              **************
                      SUBBASIN 23 RUNOFF

             SUBBASIN RUNOFF DATA

 332 BA         SUBBASIN CHARACTERISTICS
                TAREA           .55  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB                STORM          4.80  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

 333 LG         GREEN AND AMPT LOSS RATE
                STRTL          .25  STARTING LOSS
                  DTH          .36  MOISTURE DEFICIT
                 PSIF         5.00  WETTING FRONT SUCTION
                XKSAT          .35  HYDRAULIC CONDUCTIVITY
                RTIMP          .00  PERCENT IMPERVIOUS AREA

 331 UI         INPUT UNITGRAPH,  35 ORDINATES,   VOLUME =  .99
                  48.0      71.0     176.0     279.0     348.0     427.0     547.0     349.0     289.0     254.0
                 223.0     194.0     161.0     129.0     115.0     104.0      82.0      65.0      58.0      53.0
                  39.0      37.0      29.0      24.0      24.0      24.0       9.0       9.0       9.0       9.0
                   9.0       9.0       9.0       9.0       9.0
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      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SUB-23

    TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.36, TOTAL EXCESS =    1.44

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     585.     12.33                 84.          21.           7.           3.
                        (INCHES)   1.425        1.425        1.425        1.425
                         (AC-FT)     42.          42.          42.          42.

                        CUMULATIVE AREA =     .55 SQ MI


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


            **************
            *            *
  339 KK    *     DUMMY  *
            *            *
            **************
                          COMBINE HYDROGRAPHS TO REDUCE NO OF HYDROGRAPHS

  341 HC          HYDROGRAPH COMBINATION
                       ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                                  ***

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

                        HYDROGRAPH AT STATION    DUMMY

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    2711.     12.42                396.          99.          33.          14.
                        (INCHES)   1.485        1.485        1.485        1.485
                         (AC-FT)    196.         196.         196.         196.

                        CUMULATIVE AREA =    2.48 SQ MI


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


            **************
            *            *
  342 KK    *    SUB-24  *        BASIN
            *            *
            **************
                          SUBBASIN 24 RUNOFF

              SUBBASIN RUNOFF DATA

  344 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .41  SUBBASIN AREA

                  PRECIPITATION DATA

   20 PB                STORM        4.80  BASIN TOTAL PRECIPITATION

   21 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                       .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                       .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00

345 LG          GREEN AND AMPT LOSS RATE
                    STRTL        .25  STARTING LOSS
                      DTH        .38  MOISTURE DEFICIT
                     PSIF       5.40  WETTING FRONT SUCTION
                    XKSAT        .30  HYDRAULIC CONDUCTIVITY
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

343 UI          INPUT UNITGRAPH,  39 ORDINATES,  VOLUME =  .99
                     32.0     33.0    101.0    156.0    206.0    242.0    303.0    353.0    227.0    191.0
                    172.0    153.0    135.0    118.0     99.0     81.0     75.0     68.0     55.0     46.0
                     40.0     35.0     33.0     24.0     24.0     19.0     16.0     16.0     16.0     10.0
                      6.0      6.0      6.0      6.0      6.0      6.0      6.0      6.0      6.0
                                                                  ***

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

                      HYDROGRAPH AT STATION   SUB-24

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.32, TOTAL EXCESS =    1.48

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     405.     12.42                64.          16.           5.           2.
                        (INCHES)   1.456        1.456        1.456        1.456
                        (AC-FT)     32.          32.          32.          32.

                       CUMULATIVE AREA =     .41 SQ MI


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


            **************
            *            *
352 KK      *   SUB-25   *        BASIN
            *            *
            **************
                      SUBBASIN 25 RUNOFF

              SUBBASIN RUNOFF DATA

354 BA          SUBBASIN CHARACTERISTICS
                    TAREA        .34  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB              STORM       4.80  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                    .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00

355 LG          GREEN AND AMPT LOSS RATE
                    STRTL        .25  STARTING LOSS
                      DTH        .39  MOISTURE DEFICIT
```

```
                    PSIF        5.70  WETTING FRONT SUCTION
                   XKSAT         .27  HYDRAULIC CONDUCTIVITY
                   RTIMP         .00  PERCENT IMPERVIOUS AREA

353 UI        INPUT UNITGRAPH,  28 ORDINATES,  VOLUME =  .99
                 37.0      79.0     179.0     254.0     329.0     381.0     239.0     201.0     171.0     143.0
                113.0      91.0      81.0      63.0      47.0      41.0      33.0      28.0      21.0      18.0
                 18.0       9.0       7.0       7.0       7.0       7.0       7.0       7.0
                                                                  ***

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

                    HYDROGRAPH AT STATION   SUB-25

   TOTAL RAINFALL =    4.80, TOTAL LOSS =    3.30, TOTAL EXCESS =    1.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+    436.      12.25                55.         14.          5.          2.
                          (INCHES)  1.495       1.495       1.495       1.495
                          (AC-FT)   27.         27.         27.         27.

                         CUMULATIVE AREA =     .34 SQ MI
```

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-3 | 771. | 12.50 | 146. | 39. | 13. | .84 | | |
| + | HYDROGRAPH AT | SUB-4 | 285. | 12.67 | 64. | 18. | 6. | .34 | | |
| + | 2 COMBINED AT | CP-3 | 1030. | 12.58 | 211. | 56. | 19. | 1.18 | | |
| + | ROUTED TO | R3-A | 967. | 12.75 | 210. | 56. | 19. | 1.18 | | |
| + | | | | | | | | | 434.46 | 12.75 |
| + | HYDROGRAPH AT | SUB-2 | 355. | 12.33 | 49. | 13. | 4. | .33 | | |
| + | 2 COMBINED AT | CP-A1 | 1133. | 12.75 | 260. | 69. | 23. | 1.51 | | |
| + | HYDROGRAPH AT | SUB-1 | 364. | 12.42 | 62. | 17. | 6. | .36 | | |
| + | 2 COMBINED AT | CP-A | 1423. | 12.50 | 321. | 86. | 29. | 1.87 | | |
| + | HYDROGRAPH AT | SUB-7 | 514. | 12.67 | 115. | 32. | 11. | .60 | | |
| + | HYDROGRAPH AT | SUB-8 | 326. | 12.42 | 57. | 17. | 6. | .28 | | |
| + | 2 COMBINED AT | CP-7 | 749. | 12.50 | 172. | 48. | 16. | .88 | | |
| + | ROUTED TO | R7-6 | 736. | 12.67 | 172. | 48. | 16. | .88 | | |
| + | | | | | | | | | 511.16 | 12.67 |
| + | HYDROGRAPH AT | SUB-9 | 588. | 12.25 | 77. | 19. | 6. | .43 | | |
| + | ROUTED TO | R9-6 | 555. | 12.42 | 77. | 19. | 6. | .43 | | |
| + | | | | | | | | | 414.33 | 12.42 |
| + | HYDROGRAPH AT | SUB-6 | 611. | 12.33 | 87. | 24. | 8. | .53 | | |
| + | 3 COMBINED AT | CP-6 | 1641. | 12.42 | 335. | 91. | 30. | 1.84 | | |
| + | ROUTED TO | R6-B | 1636. | 12.50 | 335. | 91. | 30. | 1.84 | | |
| + | | | | | | | | | 314.24 | 12.50 |
| + | HYDROGRAPH AT | SUB-5 | 229. | 12.08 | 18. | 4. | 1. | .13 | | |
| + | 2 COMBINED AT | CP-B | 1681. | 12.50 | 353. | 96. | 32. | 1.97 | | |
| + | HYDROGRAPH AT | SUB-20 | 545. | 12.42 | 81. | 20. | 7. | .51 | | |
| + | ROUTED TO | R20-13 | 512. | 12.58 | 81. | 20. | 7. | .51 | | |
| + | | | | | | | | | 948.11 | 12.58 |
| + | HYDROGRAPH AT | SUB-13 | 359. | 12.50 | 62. | 16. | 5. | .38 | | |
| + | 2 COMBINED AT | CP-13 | 854. | 12.58 | 144. | 36. | 12. | .89 | | |
| + | ROUTED TO | R13-12 | 826. | 12.67 | 144. | 36. | 12. | .89 | | |
| + | | | | | | | | | 798.07 | 12.67 |
| + | HYDROGRAPH AT | SUB-12 | 337. | 12.50 | 57. | 15. | 5. | .36 | | |
| + | 2 COMBINED AT | CP-12A | 1083. | 12.67 | 201. | 51. | 17. | 1.25 | | |
| + | HYDROGRAPH AT | SUB-16 | 447. | 12.42 | 69. | 17. | 6. | .43 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | CP-12 | 1432. | 12.58 | 269. | 68. | 23. | 1.68 | |
| + | ROUTED TO | R12-11 | 1410. | 12.75 | 269. | 68. | 23. | 1.68 | |
| + | | | | | | | | | 684.03 12.75 |
| + | HYDROGRAPH AT | SUB-15 | 539. | 12.33 | 79. | 20. | 7. | .48 | |
| + | ROUTED TO | R15-11 | 530. | 12.50 | 79. | 20. | 7. | .48 | |
| + | | | | | | | | | 732.31 12.50 |
| + | HYDROGRAPH AT | SUB-11 | 709. | 12.17 | 80. | 20. | 7. | .50 | |
| + | 3 COMBINED AT | CP-11 | 2060. | 12.67 | 428. | 108. | 36. | 2.66 | |
| + | ROUTED TO | R11-C | 2046. | 12.75 | 428. | 108. | 36. | 2.66 | |
| + | | | | | | | | | 451.85 12.75 |
| + | HYDROGRAPH AT | SUB-10 | 332. | 12.17 | 32. | 8. | 3. | .22 | |
| + | 2 COMBINED AT | CP-C | 2100. | 12.75 | 460. | 116. | 39. | 2.88 | |
| + | HYDROGRAPH AT | SUB-14 | 416. | 12.42 | 65. | 16. | 5. | .41 | |
| + | HYDROGRAPH AT | SUB-17 | 378. | 12.17 | 39. | 10. | 3. | .24 | |
| + | HYDROGRAPH AT | SUB-22 | 789. | 12.33 | 105. | 26. | 9. | .64 | |
| + | ROUTED TO | R22-19 | 789. | 12.42 | 105. | 26. | 9. | .64 | |
| + | | | | | | | | | 98.83 12.42 |
| + | HYDROGRAPH AT | SUB-19 | 815. | 12.25 | 98. | 24. | 8. | .59 | |
| + | 2 COMBINED AT | CP-19 | 1510. | 12.33 | 202. | 51. | 17. | 1.23 | |
| + | ROUTED TO | R19-F | 1469. | 12.50 | 202. | 51. | 17. | 1.23 | |
| + | | | | | | | | | 748.13 12.50 |
| + | HYDROGRAPH AT | SUB-18 | 585. | 12.17 | 65. | 16. | 5. | .42 | |
| + | 2 COMBINED AT | CP-F | 1826. | 12.42 | 267. | 67. | 22. | 1.65 | |
| + | HYDROGRAPH AT | SUB-21 | 322. | 12.33 | 45. | 11. | 4. | .28 | |
| + | HYDROGRAPH AT | SUB-23 | 585. | 12.33 | 84. | 21. | 7. | .55 | |
| + | 3 COMBINED AT | DUMMY | 2711. | 12.42 | 396. | 99. | 33. | 2.48 | |
| + | HYDROGRAPH AT | SUB-24 | 405. | 12.42 | 64. | 16. | 5. | .41 | |
| + | HYDROGRAPH AT | SUB-25 | 436. | 12.25 | 55. | 14. | 5. | .34 | |

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

# APPENDIX 5

HEC-1 Output
For the
100-Year 6-Hour Peak Discharges

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   24JUL05  TIME  10:53:26   *
 *                                       *
*****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*   HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*          (916) 756-1104           *
*                                   *
*************************************
```

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

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

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

```
1                                    HEC-1 INPUT                                                    PAGE  1

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

    1           ID   CAMP CREEK TRIBUTARIES FLOODPLAIN DELINEATION STUDY
    2           ID   CONTRACT NO. FCD 2004C023
    3           ID   PRESTIGE ENGINEERING CONSULTANTS, LLC - KOFI AWUMAH
    4           ID   CMCRK6.DAT
    5           ID   100-YEAR  6-HOUR STORM FREQUENCY HYDROLOGY MODEL
    6           ID   EXISTING CONDITION MODEL
    7           ID   WATERSHED AREA = 10.58 SQUARE MILES
    8           ID   RAINFALL LOSS METHOD = GREEN & AMPT METHOD
    9           ID   UNIT HYDROGRAPH METHOD = S-GRAPH (PHOENIX MOUNTAIN TYPE)
   10           ID   CHANNEL ROUTING METHOD = NORMAL DEPTH
   11           ID   LAND USE DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
   12           ID   SOILS DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
   13           ID   DATE OF MODEL RUN = 7-24-2005
                *DIAGRAM
   14           IT       5                    2000
   15           IO       3

   16           KK   SUB-3   BASIN
   17           KM   SUBBASIN 3 RUNOFF
   18           BA     .84
   19           IN      15
   20           PB    3.50
   21           PC    .000    .014    .019    .029    .045    .058    .070    .083    .096    .109
   22           PC    .124    .140    .162    .208    .292    .467    .676    .806    .876    .918
   23           PC    .947    .961    .973    .987   1.00
   24           LG     .30     .37    5.30     .29   7.00
   25           UI     56.     56.    130.    223.    318.    381.    435.    527.    663.    447.
   26           UI    361.    326.    295.    268.    239.    216.    185.    156.    140.    130.
   27           UI    119.     98.     84.     72.     66.     62.     52.     43.     43.     35.
   28           UI     28.     28.     28.     28.     14.     11.     11.     11.     11.     11.
   29           UI     11.     11.     11.     11.     11.     11.      0.      0.      0.      0.
   30           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

   31           KK   SUB-4   BASIN
   32           KM   SUBBASIN 4 RUNOFF
   33           BA     .34
   34           LG     .33     .38    5.60     .26   13.00
   35           UI     19.     19.     28.     60.     81.    112.    128.    143.    161.    201.
   36           UI    219.    145.    124.    113.    105.     96.     89.     80.     74.     65.
   37           UI     57.     50.     46.     44.     40.     35.     31.     25.     24.     22.
   38           UI     21.     20.     15.     15.     15.     11.      9.      9.      9.      9.
   39           UI      9.      4.      4.      4.      4.      4.      4.      4.      4.      4.
   40           UI      4.      4.      4.      4.      4.      0.      0.      0.      0.      0.
   41           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

   42           KK    CP-3
   43           KM   COMBINE SUB-3 AND SUB-4
   44           HC       2
                *
1                                    HEC-1 INPUT                                                    PAGE  2

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

   45           KK    R3-A   ROUTE   REACH
   46           KM    ROUTE CP-3 TO CP-A
   47           RS       3    FLOW      -1
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```
 48          RC   0.075   0.035   0.075    5649  0.0375  438.00
 49          RX    51.0    68.0    90.0   160.0   253.0   287.0   291.0   295.0
 50          RY   437.0   435.5   434.7   434.3   432.6   434.4   436.0   438.0
             *

 51          KK   SUB-2   BASIN
 52          KM   SUBBASIN 2 RUNOFF
 53          BA     .33
 54          LG     .25     .35    4.65     .43    2.00
 55          UI     31.     51.    119.    189.    231.    301.    309.    201.    173.    151.
 56          UI    130.    110.     88.     75.     67.     54.     42.     37.     34.     24.
 57          UI     24.     17.     15.     15.     12.      6.      6.      6.      6.      6.
 58          UI      6.      6.      6.      0.      0.      0.      0.      0.      0.      0.
 59          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 60          KK   CP-A1
 61          KM   COMBINE SUBBASIN 2 & R3-A
 62          HC      2
             *

 63          KK   SUB-1   BASIN
 64          KM   SUBBASIN 1 RUNOFF
 65          BA     .36
 66          LG     .33     .35    4.80     .39   11.00
 67          UI     29.     32.     94.    147.    190.    223.    289.    301.    198.    169.
 68          UI    151.    135.    117.    102.     83.     72.     66.     58.     47.     37.
 69          UI     34.     32.     25.     22.     20.     14.     14.     14.     12.      6.
 70          UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
 71          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 72          KK   CP-A
 73          KM   COMBINE SUBBASINS 1, AND R3-A
 74          HC      2
             *

 75          KK   SUB-7   BASIN
 76          KM   SUBBASIN 7 RUNOFF
 77          BA     .60
 78          LG     .26     .40    6.00     .23   13.00
 79          UI     34.     34.     52.    109.    149.    203.    231.    258.    295.    372.
 80          UI    367.    250.    216.    199.    182.    167.    154.    140.    127.    112.
 81          UI     96.     86.     81.     76.     71.     56.     52.     43.     42.     37.
 82          UI     37.     29.     26.     26.     24.     17.     17.     17.     17.     17.
 83          UI     10.      7.      7.      7.      7.      7.      7.      7.      7.      7.
 84          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 85          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```



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

 86          KK   SUB-8   BASIN
 87          KM   SUBBASIN 8 RUNOFF
 88          BA     .28
 89          LG     .26     .39    5.80     .24   21.00
 90          UI     24.     33.     84.    133.    167.    201.    272.    184.    146.    129.
 91          UI    114.     98.     84.     68.     59.     53.     45.     36.     30.     26.
 92          UI     23.     18.     18.     12.     12.     12.      9.      5.      5.      5.
 93          UI      5.      5.      5.      5.      5.      5.      0.      0.      0.      0.
 94          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

 95          KK   CP-7
 96          KM   COMBINE SUBBASINS 7 & 8
 97          HC      2
             *

 98          KK   R7-6   ROUTE   REACH
 99          KM   ROUTE CP-7 TO CP-6
100          RS      5    FLOW      -1
101          RC   0.075   0.035   0.075    7167  0.0450  514.00
102          RX    34.0    56.0   150.0   243.0   290.0   307.0   313.0   316.7
103          RY   514.0   512.5   512.0   510.0   510.0   512.0   512.8   513.0
             *

104          KK   SUB-9   BASIN
105          KM   SUBBASIN 9 RUNOFF
106          BA     .43
107          LG     .25     .38    5.60     .22    2.00
108          UI     47.    101.    229.    325.    420.    487.    305.    257.    219.    183.
109          UI    144.    116.    103.     80.     60.     53.     43.     36.     27.     23.
110          UI     23.     12.      9.      9.      9.      9.      9.      9.      0.      0.
111          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

112          KK   R9-6   ROUTE   REACH
113          KM   ROUTE SUBBASIN 9 TO CP-9
114          RS      5    FLOW      -1
115          RC   0.075   0.035   0.075    4780  0.0580  420.00
116          RX    17.4    28.6    41.8    73.0   248.0   276.0   290.0   293.0
117          RY   420.0   418.0   416.0   413.7   414.0   416.0   418.0   418.7
             *
```

```
118          KK   SUB-6   BASIN
119          KM   SUBBASIN 6 RUNOFF
120          BA     .53
121          LG     .27      .35     4.60      .43     9.00
122          UI     52.      95.     224.     337.     413.     579.     423.     318.     276.     238.
123          UI    201.     162.     132.     117.      96.      74.      63.      57.      41.      40.
124          UI     27.      26.      26.      14.      10.      10.      10.      10.      10.      10.
125          UI     10.       0.       0.       0.       0.       0.       0.       0.       0.       0.
126          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *
1                                                HEC-1 INPUT                                                    PAGE  4
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

127          KK    CP-6
128          KM    COMBINE R7-6, R9-6 & SUBBASIN 6
129          HC       3
             *

130          KK    R6-B   ROUTE   REACH
131          KM    ROUTE CP-6 TO CP-B
132          RS       5    FLOW      -1
133          RC   0.075   0.035   0.075    2669  0.0880  318.00
134          RX    19.4    28.7    42.4   113.8   204.0   273.8   304.0   344.0
135          RY   318.0   316.0   314.0   312.8   313.9   314.0   315.4   316.0
             *

136          KK   SUB-5   BASIN
137          KM   SUBBASIN 5 RUNOFF
138          BA     .13
139          LG     .25      .35     4.40      .49      .00
140          UI     40.     154.     261.     168.     121.      80.      57.      36.      25.      16.
141          UI     13.       5.       5.       5.       0.       0.       0.       0.       0.       0.
142          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *

143          KK    CP-B
144          KM    COMBINE R6-B AND SUBBASIN 5
145          HC       2
             *

146          KK  SUB-20   BASIN
147          KM   SUBBASIN 20 RUNOFF
148          BA     .51
149          LG     .25      .38     5.60      .29      .00
150          UI     44.      61.     155.     246.     310.     373.     504.     342.     270.     239.
151          UI    211.     182.     157.     126.     108.      98.      83.      66.      56.      48.
152          UI     43.      34.      34.      22.      22.      22.      17.       8.       8.       8.
153          UI      8.       8.       8.       8.       8.       8.       0.       0.       0.       0.
154          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *

155          KK  R20-13   ROUTE   REACH
156          KM   ROUTE CP-20 TO CP-13
157          RS       4    FLOW      -1
158          RC   0.080   0.035   0.080    6689  0.0470  953.00
159          RX    30.2    55.5    77.6   160.0   222.1   241.7   385.0   414.0
160          RY   953.0   950.0   948.0   947.1   948.0   948.3   950.0   952.0
             *

161          KK  SUB-13   BASIN
162          KM   SUBBASIN 13 RUNOFF
163          BA     .38
164          LG     .25      .38     5.60      .30     3.00
165          UI     27.      27.      73.     117.     166.     195.     224.     294.     275.     188.
166          UI    163.     148.     133.     118.     106.      90.      76.      67.      62.      56.
167          UI     45.      37.      35.      30.      29.      21.      21.      19.      13.      13.
168          UI     13.      13.       6.       5.       5.       5.       5.       5.       5.       5.
1                                                HEC-1 INPUT                                                    PAGE  5
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

169          UI      5.       5.       5.       0.       0.       0.       0.       0.       0.       0.
170          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *

171          KK   CP-13
172          KM   COMBINE SUB-13 & R20-13
173          HC       2
             *

174          KK  R13-12   ROUTE   REACH
175          KM   ROUTE CP-13 FLOW TO CP-12
176          RS       4    FLOW      -1
177          RC   0.080   0.040   0.080    2975  0.0470  801.00
178          RX    22.4    25.0    62.0    89.0   215.0   336.0   366.0   372.0
179          RY   800.0   799.7   796.0   797.6   797.5   798.0   800.0   801.0
             *

180          KK  SUB-12   BASIN
181          KM   SUBBASIN 12 RUNOFF
182          BA     .36
183          LG     .25      .36     5.00      .35     2.00
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184        UI     26.     26.     74.    117.    163.    192.    223.    301.    237.    175.
185        UI    154.    138.    125.    110.     97.     83.     68.     63.     58.     49.
186        UI     41.     34.     31.     29.     24.     20.     20.     14.     13.     13.
187        UI     13.      9.      5.      5.      5.      5.      5.      5.      5.      5.
188        UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
189        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

190        KK  CP-12A
191        KM   COMBINE R13-12 & SUBBASIN 12
192        HC       2
           *

193        KK  SUB-16   BASIN
194        KM   SUBBASIN 16 RUNOFF
195        BA     .43
196        LG     .25     .39    5.70     .27     .00
197        UI     35.     42.    116.    184.    236.    277.    371.    334.    230.    201.
198        UI    177.    157.    138.    115.     94.     84.     76.     63.     51.     45.
199        UI     38.     35.     27.     27.     19.     17.     17.     17.      7.      7.
200        UI      7.      7.      7.      7.      7.      7.      7.      0.      0.      0.
201        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

202        KK   CP-12
203        KM   COMBINE SUBBASIN 16, AND CP-12A
204        HC       2
           *
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

205        KK  R12-11   ROUTE   REACH
206        KM   ROUTE CP-12 TO CP-11
207        RS       6    FLOW      -1
208        RC   0.080   0.040   0.080    5674  0.0530  686.00
209        RX    75.2    83.0   122.0   182.0   218.0   264.5   273.0   284.0
210        RY   686.0   684.0   683.4   683.0   682.0   684.0   684.7   686.0
           *

211        KK  SUB-15   BASIN
212        KM   SUBBASIN 15 RUNOFF
213        BA     .48
214        LG     .25     .39    5.70     .26     .00
215        UI     43.     63.    156.    246.    307.    377.    483.    308.    255.    224.
216        UI    197.    171.    142.    114.    102.     92.     72.     57.     51.     47.
217        UI     35.     33.     26.     21.     21.     21.      8.      8.      8.      8.
218        UI      8.      8.      8.      8.      8.      0.      0.      0.      0.      0.
219        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

220        KK  R15-11   ROUTE   REACH
221        KM   ROUTE SUBBASIN 15 FLOWS TO CP-11
222        RS       5    FLOW      -1
223        RC   0.075   0.040   0.075    4392  0.0630  738.00
224        RX    20.0    50.0    58.0   125.6   155.0   163.5   175.5   200.0
225        RY   738.0   733.2   732.0   731.4   731.5   732.1   734.0   738.0
           *

226        KK  SUB-11   BASIN
227        KM   SUBBASIN 11 RUNOFF
228        BA     .50
229        LG     .25     .37    5.20     .31    1.00
230        UI     64.    189.    385.    523.    673.    415.    339.    278.    220.    163.
231        UI    141.    101.     79.     66.     49.     38.     32.     27.     12.     12.
232        UI     12.     12.     12.     12.      0.      0.      0.      0.      0.      0.
233        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

234        KK   CP-11
235        KM   COMBINE R12-11, R15-11 AND SUBBASIN 11
236        HC       3
           *

237        KK   R11-C   ROUTE   REACH
238        KM   ROUTE CP-11 TO CP-C
239        RS       5    FLOW      -1
240        RC   0.075   0.035   0.075    3517  0.0830  455.50
241        RX    40.9   262.0   439.0   615.0   664.0   748.0   822.0   865.0
242        RY   455.5   452.8   452.0   451.0   450.0   452.0   454.0   455.0
           *
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

243        KK  SUB-10   BASIN
244        KM   SUBBASIN 10 RUNOFF
245        BA     .22
246        LG     .25     .35    4.45     .47     .00
247        UI     34.    134.    237.    354.    234.    180.    142.    103.     79.     60.
248        UI     42.     34.     26.     17.     17.      7.      7.      7.      7.      7.
249        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
250        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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*

KK    CP-C
KM   COMBINE R11-C & SUBBASIN 1-
HC       2
*

KK  SUB-14   BASIN
KM   SUBBASIN 14 RUNOFF
BA     .41
LG     .25      .37     5.30      .31      .00
UI     33.      37.     107.     167.     217.     254.     330.     343.     225.     193.
UI    172.     153.     134.     116.      95.      82.      75.      66.      54.      42.
UI     39.      36.      28.      25.      23.      16.      16.      16.      13.       6.
UI      6.       6.       6.       6.       6.       6.       6.       6.       0.       0.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*

KK  SUB-17   BASIN
KM   SUBBASIN 17 RUNOFF
BA     .24
LG     .25      .37     5.30      .29      .00
UI     35.     127.     235.     347.     273.     194.     156.     119.      87.      71.
UI     50.      40.      29.      23.      17.      14.       7.       7.       7.       7.
UI      7.       0.       0.       0.       0.       0.       0.       0.       0.       0.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*

KK  SUB-22   BASIN
KM   SUBBASIN 22 RUNOFF
BA     .64
LG     .25      .37     5.70      .27      .00
UI     65.     125.     293.     430.     533.     734.     475.     383.     331.     282.
UI    237.     185.     156.     140.     105.      84.      73.      61.      50.      41.
UI     32.      32.      24.      13.      13.      13.      13.      13.      13.      13.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*

KK  R22-19   ROUTE   REACH
KM   ROUTE SUBBASIN 22 TO CP-19
RS       5    FLOW      -1
RC   0.075   0.035   0.075    4366  0.0890  101.90
RX   168.0   209.0   354.7   471.0   542.8   644.0   683.5   694.5
RY   101.9   100.0   100.0    98.2    97.9   100.0   101.3   101.8
*
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1



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

KK  SUB-19   BASIN
KM   SUBBASIN 19 RUNOFF
BA     .59
LG     .25      .39     5.80      .25      .00
UI     69.     168.     364.     502.     705.     585.     410.     347.     290.     234.
UI    177.     154.     122.      91.      77.      61.      53.      36.      34.      30.
UI     13.      13.      13.      13.      13.      13.       0.       0.       0.       0.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*

KK   CP-19
KM   COMBINE R22-19 & SUBBASIN 19
HC       2
*

KK   R19-F   ROUTE   REACH
KM   ROUTE CP-19 TO CP-F
RS       6    FLOW      -1
RC   0.075   0.035   0.075    6408  0.0620  760.00
RX   117.8   145.0   174.0   305.0   382.4   499.8   554.0   586.0
RY   752.6   750.0   748.8   747.4   746.6   750.0   750.0   760.0
*

KK  SUB-18   BASIN
KM   SUBBASIN 18 RUNOFF
BA     .42
LG     .25      .35     4.60      .38      .00
UI     55.     161.     327.     444.     572.     353.     288.     236.     186.     138.
UI    120.      86.      67.      56.      42.      32.      27.      23.      10.      10.
UI     10.      10.      10.      10.       0.       0.       0.       0.       0.       0.
UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*

KK    CP-F
KM    COMBINE R19-F AND SUBBASIN 18
HC       2
*

KK  SUB-21   BASIN
KM   SUBBASIN 21 RUNOFF
BA     .28
LG     .25      .36     5.10      .31      .00
UI     26.      43.     101.     160.     196.     255.     262.     171.     147.     128.
UI    111.      93.      74.      63.      57.      46.      36.      31.      29.      21.
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 320          UI     20.     15.     13.     13.     10.      5.      5.      5.      5.      5.
 321          UI      5.      5.      5.      0.      0.      0.      0.      0.      0.      0.
 322          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
1                                                HEC-1 INPUT                                                    PAGE  9

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

 323          KK  SUB-23   BASIN
 324          KM   SUBBASIN 23 RUNOFF
 325          BA     .55
 326          LG     .25     .36    5.00     .35     .00
 327          UI     48.     71.    176.    279.    348.    427.    547.    349.    289.    254.
 328          UI    223.    194.    161.    129.    115.    104.     82.     65.     58.     53.
 329          UI     39.     37.     29.     24.     24.     24.      9.      9.      9.      9.
 330          UI      9.      9.      9.      9.      9.      0.      0.      0.      0.      0.
 331          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 332          KK   DUMMY
 333          KM   COMBINE HYDROGRAPHS TO REDUCE NO OF HYDROGRAPHS
 334          HC       3
              *

 335          KK  SUB-24   BASIN
 336          KM   SUBBASIN 24 RUNOFF
 337          BA     .41
 338          LG     .25     .38    5.40     .30     .00
 339          UI     32.     33.    101.    156.    206.    242.    303.    353.    227.    191.
 340          UI    172.    153.    135.    118.     99.     81.     75.     68.     55.     46.
 341          UI     40.     35.     33.     24.     24.     19.     16.     16.     16.     10.
 342          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 343          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 344          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 345          KK  SUB-25   BASIN
 346          KM   SUBBASIN 25 RUNOFF
 347          BA     .34
 348          LG     .25     .39    5.70     .27     .00
 349          UI     37.     79.    179.    254.    329.    381.    239.    201.    171.    143.
 350          UI    113.     91.     81.     63.     47.     41.     33.     28.     21.     18.
 351          UI     18.      9.      7.      7.      7.      7.      7.      7.      0.      0.
 352          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 353          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   16      SUB-3
           .
           .
   31      .       SUB-4
           .          .
           .          .
   42     CP-3...........
          V
          V
   45     R3-A
           .
           .
   51      .       SUB-2
           .          .
           .          .
   60    CP-A1...........
           .
           .
   63      .       SUB-1
           .          .
           .          .
   72     CP-A...........
           .
           .
   75      .       SUB-7
           .          .
           .          .
   86      .          .       SUB-8
           .          .          .
           .          .          .
   95      .        CP-7...........
           .          V
           .          V
   98      .        R7-6
           .          .
           .          .
  104      .          .       SUB-9
           .          .          V
           .          .          V
  112      .          .       R9-6
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118          .          .          .      SUB-6
             .          .          .          .
             .          .          .          .
127          .     CP-6.......................
             .        V
             .        V
130          .     R6-B
             .          .
             .          .
136          .          .     SUB-5
             .          .          .
             .          .          .
143          .     CP-B............
             .          .
             .          .
146          .          .    SUB-20
             .          .         V
             .          .         V
155          .          .    R20-13
             .          .          .
             .          .          .
161          .          .          .     SUB-13
             .          .          .          .
             .          .          .          .
171          .          .     CP-13............
             .          .         V
             .          .         V
174          .          .    R13-12
             .          .          .
             .          .          .
180          .          .          .     SUB-12
             .          .          .          .
             .          .          .          .
190          .          .    CP-12A............
             .          .          .
             .          .          .
193          .          .          .     SUB-16
             .          .          .          .
             .          .          .          .
202          .          .     CP-12............
             .          .         V
             .          .         V
205          .          .    R12-11
             .          .          .
             .          .          .
211          .          .          .     SUB-15
             .          .          .          V
             .          .          .          V
220          .          .          .     R15-11
             .          .          .          .
             .          .          .          .
226          .          .          .          .     SUB-11
             .          .          .          .          .
             .          .          .          .          .
234          .          .     CP-11........................
             .          .         V
             .          .         V
237          .          .    R11-C
             .          .          .
             .          .          .
243          .          .          .     SUB-10
             .          .          .          .
             .          .          .          .
251          .          .     CP-C............
             .          .          .
             .          .          .
254          .          .          .     SUB-14
             .          .          .          .
             .          .          .          .
263          .          .          .          .     SUB-17
             .          .          .          .          .
             .          .          .          .          .
271          .          .          .          .          .     SUB-22
             .          .          .          .          .         V
             .          .          .          .          .         V
280          .          .          .          .          .     R22-19
             .          .          .          .          .          .
             .          .          .          .          .          .
286          .          .          .          .          .          .     SUB-19
             .          .          .          .          .          .          .
             .          .          .          .          .          .          .
294          .          .          .          .          .     CP-19............
             .          .          .          .          .         V
             .          .          .          .          .         V
297          .          .          .          .          .     R19-F
             .          .          .          .          .          .
             .          .          .          .          .          .
303          .          .          .          .          .          .     SUB-18
             .          .          .          .          .          .          .
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311          .          .          .          .          .     CP-F............
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             .          .          .          .          .          .
314          .          .          .          .          .          .     SUB-21
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  323          .          .          .          .          .          .          .      SUB-23
               .          .          .          .          .          .          .          .
  332          .          .          .          .          .      DUMMY.......................
               .          .          .          .          .          .
               .          .          .          .          .          .
  335          .          .          .          .          .          .     SUB-24
               .          .          .          .          .          .          .
               .          .          .          .          .          .          .
  345          .          .          .          .          .          .          .      SUB-25

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*************************************                                    *************************************
 *                                   *                                    *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*                                    *   U.S. ARMY CORPS OF ENGINEERS    *
 *             JUN   1998            *                                    *   HYDROLOGIC ENGINEERING CENTER   *
 *           VERSION 4.1             *                                    *         609 SECOND STREET         *
 *                                   *                                    *      DAVIS, CALIFORNIA 95616      *
 *  RUN DATE   24JUL05  TIME  10:53:26 *                                   *          (916) 756-1104           *
 *                                   *                                    *                                   *
 *************************************                                    *************************************
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                        CAMP CREEK TRIBUTARIES FLOODPLAIN DELINEATION STUDY
                        CONTRACT NO. FCD 2004C023
                        PRESTIGE ENGINEERING CONSULTANTS, LLC - KOFI AWUMAH
                        CMCRK6.DAT
                        100-YEAR  6-HOUR STORM FREQUENCY HYDROLOGY MODEL
                        EXISTING CONDITION MODEL
                        WATERSHED AREA = 10.58 SQUARE MILES
                        RAINFALL LOSS METHOD = GREEN & AMPT METHOD
                        UNIT HYDROGRAPH METHOD = S-GRAPH (PHOENIX MOUNTAIN TYPE)
                        CHANNEL ROUTING METHOD = NORMAL DEPTH
                        LAND USE DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
                        SOILS DATA SOURCE = FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (DEC 2004)
                        DATE OF MODEL RUN = 7-24-2005

 15 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      7    0  ENDING DATE
                     NDTIME        2235  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE  166.58 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


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


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            *            *
 16 KK      *     SUB-3  *        BASIN
            *            *
            **************
                        SUBBASIN 3 RUNOFF

 19 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN          15  TIME INTERVAL IN MINUTES
                     JXDATE      1    0  STARTING DATE
                     JXTIME           0  STARTING TIME

             SUBBASIN RUNOFF DATA

 18 BA          SUBBASIN CHARACTERISTICS
                      TAREA         .84  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
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                .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00

24 LG        GREEN AND AMPT LOSS RATE
                STRTL        .30  STARTING LOSS
                  DTH        .37  MOISTURE DEFICIT
                 PSIF       5.30  WETTING FRONT SUCTION
                XKSAT        .29  HYDRAULIC CONDUCTIVITY
                RTIMP       7.00  PERCENT IMPERVIOUS AREA

24 UI        INPUT UNITGRAPH,  46 ORDINATES,  VOLUME = 1.00
                56.0     56.0    130.0    223.0    318.0    381.0    435.0    527.0    663.0    447.0
               361.0    326.0    295.0    268.0    239.0    216.0    185.0    156.0    140.0    130.0
               119.0     98.0     84.0     72.0     66.0     62.0     52.0     43.0     43.0     35.0
                28.0     28.0     28.0     28.0     14.0     11.0     11.0     11.0     11.0     11.0
                11.0     11.0     11.0     11.0     11.0     11.0
                                                          ***
   ***          ***          ***          ***          ***

                HYDROGRAPH AT STATION    SUB-3

  TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.10, TOTAL EXCESS =    1.40

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR      24-HR      72-HR    166.58-HR
+  (CFS)       (HR)
                          (CFS)
+    549.      4.58                125.        31.        10.         5.
                        (INCHES)   1.381      1.393      1.393      1.393
                         (AC-FT)    62.        62.        62.        62.

                        CUMULATIVE AREA =     .84 SQ MI


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


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          *            *
31 KK     *    SUB-4   *        BASIN
          *            *
          **************
                SUBBASIN 4 RUNOFF

          SUBBASIN RUNOFF DATA

33 BA        SUBBASIN CHARACTERISTICS
                TAREA        .34  SUBBASIN AREA

             PRECIPITATION DATA

20 PB           STORM       3.50  BASIN TOTAL PRECIPITATION

21 PI         INCREMENTAL PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .01
                .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00

34 LG        GREEN AND AMPT LOSS RATE
                STRTL        .33  STARTING LOSS
                  DTH        .38  MOISTURE DEFICIT
                 PSIF       5.60  WETTING FRONT SUCTION
                XKSAT        .26  HYDRAULIC CONDUCTIVITY
                RTIMP      13.00  PERCENT IMPERVIOUS AREA

32 UI        INPUT UNITGRAPH,  55 ORDINATES,  VOLUME = 1.00
                19.0     19.0     28.0     60.0     81.0    112.0    128.0    143.0    161.0    201.0
               219.0    145.0    124.0    113.0    105.0     96.0     89.0     80.0     74.0     65.0
                57.0     50.0     46.0     44.0     40.0     35.0     31.0     25.0     24.0     22.0
                21.0     20.0     15.0     15.0     15.0     11.0      9.0      9.0      9.0      9.0
                 9.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0      4.0
                 4.0      4.0      4.0      4.0      4.0
                                                          ***
   ***          ***          ***          ***          ***

                HYDROGRAPH AT STATION    SUB-4

  TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.94, TOTAL EXCESS =    1.56
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  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     211.      4.67                 56.          14.           5.           2.
                          (INCHES)  1.527       1.558        1.558        1.558
                           (AC-FT)   28.          28.          28.          28.

                          CUMULATIVE AREA =     .34 SQ MI


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            *            *
  42 KK     *     CP-3   *
            *            *
            **************
                        COMBINE SUB-3 AND SUB-4

  44 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                        HYDROGRAPH AT STATION     CP-3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     753.      4.58                181.          46.          15.           7.
                          (INCHES)  1.422       1.441        1.441        1.441
                           (AC-FT)   90.          91.          91.          91.

                          CUMULATIVE AREA =    1.18 SQ MI


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


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            *            *
  45 KK     *     R3-A   *        ROUTE   REACH
            *            *
            **************
                        ROUTE CP-3 TO CP-A

             HYDROGRAPH ROUTING DATA

  47 RS          STORAGE ROUTING
                      NSTPS           3  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

  48 RC          NORMAL DEPTH CHANNEL
                        ANL        .075  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
                        ANR        .075  RIGHT OVERBANK N-VALUE
                      RLNTH       5649.  REACH LENGTH
                        SEL      .0375  ENERGY SLOPE
                      ELMAX      438.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  50 RY       ELEVATION   437.00    435.50    434.70    434.30    432.60    434.40    436.00    438.00
  49 RX       DISTANCE     51.00     68.00     90.00    160.00    253.00    287.00    291.00    295.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .39      1.54      3.47      6.17      9.64     13.88     19.50     26.71     34.35
          OUTFLOW        .00      6.67     42.36    124.88    268.94    487.63    790.29   1108.69   1739.55   2604.72
        ELEVATION     432.60    432.88    433.17    433.45    433.74    434.02    434.31    434.59    434.87    435.16

          STORAGE      42.30     50.51     58.87     67.38     76.02     84.80     93.71    102.65    111.61    120.59
          OUTFLOW    3610.68   4753.55   6025.68   7421.67   8937.34  10569.41  12322.68  14193.99  16173.27  18257.71
        ELEVATION     435.44    435.73    436.01    436.29    436.58    436.86    437.15    437.43    437.72    438.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     1740. TO    18258.
                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     R3-A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     734.      4.75           180.          46.          15.           7.
                        (INCHES)      1.422        1.441        1.441        1.441
                         (AC-FT)       89.          91.          91.          91.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR    166.58-HR
+  (AC-FT)      (HR)
        4.      4.75                1.           0.           0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR    166.58-HR
+   (FEET)      (HR)
    434.25      4.75             433.38       432.82       432.67       432.64

                        CUMULATIVE AREA =    1.18 SQ MI


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


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            *            *
  51 KK     *     SUB-2  *        BASIN
            *            *
            **************
                    SUBBASIN 2 RUNOFF

              SUBBASIN RUNOFF DATA

  53 BA         SUBBASIN CHARACTERISTICS
                      TAREA          .33  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB               STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

  54 LG         GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.65  WETTING FRONT SUCTION
                      XKSAT         .43  HYDRAULIC CONDUCTIVITY
                      RTIMP        2.00  PERCENT IMPERVIOUS AREA

  52 UI         INPUT UNITGRAPH,  33 ORDINATES,  VOLUME = 1.00
                    31.0      51.0     119.0     189.0     231.0     301.0     309.0     201.0     173.0     151.0
                   130.0     110.0      88.0      75.0      67.0      54.0      42.0      37.0      34.0      24.0
                    24.0      17.0      15.0      15.0      12.0       6.0       6.0       6.0       6.0       6.0
                     6.0       6.0       6.0
                                                                  ***

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

                    HYDROGRAPH AT STATION    SUB-2

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.40, TOTAL EXCESS =    1.10

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     222.      4.42            39.          10.           3.           1.
                        (INCHES)      1.094        1.096        1.096        1.096
                         (AC-FT)       19.          19.          19.          19.

                        CUMULATIVE AREA =     .33 SQ MI


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


            **************
            *            *
  60 KK     *     CP-A1  *
            *            *
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                    COMBINE SUBBASIN 2 & R3-A

  62 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     CP-A1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                                  (CFS)
+     887.      4.67                219.         55.          18.          8.
                              (INCHES)       1.349        1.365        1.365        1.365
                               (AC-FT)         109.         110.         110.         110.

                        CUMULATIVE AREA =    1.51 SQ MI


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


            **************
            *            *
  63 KK     *    SUB-1   *        BASIN
            *            *
            **************
                    SUBBASIN 1 RUNOFF

              SUBBASIN RUNOFF DATA

  65 BA          SUBBASIN CHARACTERISTICS
                      TAREA          .36  SUBBASIN AREA

                 PRECIPITATION DATA

  20 PB               STORM         3.50  BASIN TOTAL PRECIPITATION

  21 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                      .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                      .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                      .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00

  66 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .33  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.80  WETTING FRONT SUCTION
                      XKSAT         .39  HYDRAULIC CONDUCTIVITY
                      RTIMP       11.00  PERCENT IMPERVIOUS AREA

  64 UI          INPUT UNITGRAPH,  38 ORDINATES,  VOLUME = 1.00
                     29.0      32.0      94.0     147.0     190.0     223.0     289.0     301.0     198.0     169.0
                    151.0     135.0     117.0     102.0      83.0      72.0      66.0      58.0      47.0      37.0
                     34.0      32.0      25.0      22.0      20.0      14.0      14.0      14.0      12.0       6.0
                      6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0

                                                                  ***

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

                        HYDROGRAPH AT STATION     SUB-1

    TOTAL RAINFALL =     3.50, TOTAL LOSS =     2.15, TOTAL EXCESS =     1.35

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                                  (CFS)
+     245.      4.50                 52.          13.           4.           2.
                              (INCHES)       1.334        1.345        1.345        1.345
                               (AC-FT)          26.          26.          26.          26.

                        CUMULATIVE AREA =     .36 SQ MI


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


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            *            *
  72 KK     *    CP-A    *
            *            *
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 98 KK     *      R7-6  *        ROUTE   REACH
           *            *
           **************
                          ROUTE CP-7 TO CP-6

              HYDROGRAPH ROUTING DATA

100 RS          STORAGE ROUTING
                     NSTPS           5  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

101 RC          NORMAL DEPTH CHANNEL
                       ANL        .075  LEFT OVERBANK N-VALUE
                      ANCH        .035  MAIN CHANNEL N-VALUE
                       ANR        .075  RIGHT OVERBANK N-VALUE
                     RLNTH       7167.  REACH LENGTH
                       SEL       .0450  ENERGY SLOPE
                     ELMAX       514.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                         CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL -------- + --- RIGHT OVERBANK ---
103 RY        ELEVATION    514.00    512.50    512.00    510.00    510.00    512.00    512.80    513.00
102 RX        DISTANCE      34.00     56.00    150.00    243.00    290.00    307.00    313.00    316.70

                                                          ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.83      4.06      6.69      9.72     13.15     16.99     21.22     25.86     30.90
          OUTFLOW        .00     33.14    110.94    230.42    393.28    602.18    860.08   1170.04   1535.11   1958.35
        ELEVATION     510.00    510.21    510.42    510.63    510.84    511.05    511.26    511.47    511.68    511.89

          STORAGE      36.47     43.33     51.61     60.53     69.64     78.95     88.36     97.89    107.52    117.26
          OUTFLOW    2497.41   3163.01   3912.88   4758.26   5684.97   6692.32   7776.10   8933.17  10161.49  11459.40
        ELEVATION     512.11    512.32    512.53    512.74    512.95    513.16    513.37    513.58    513.79    514.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      393. TO    11459.
                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     R7-6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     586.      4.75                153.         39.         13.           6.
                         (INCHES)  1.617       1.652       1.652        1.652
                          (AC-FT)    76.         78.         78.          78.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       3.       4.75                  1.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   511.04       4.75               510.40      510.11      510.04       510.02

                        CUMULATIVE AREA =     .88 SQ MI


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           *            *
104 KK     *     SUB-9  *        BASIN
           *            *
           **************
                          SUBBASIN 9 RUNOFF

              SUBBASIN RUNOFF DATA

106 BA          SUBBASIN CHARACTERISTICS
                     TAREA         .43  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB               STORM        3.50  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                      .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                      .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
```

```
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

107 LG          GREEN AND AMPT LOSS RATE
                     STRTL        .25  STARTING LOSS
                       DTH        .38  MOISTURE DEFICIT
                      PSIF       5.60  WETTING FRONT SUCTION
                     XKSAT        .22  HYDRAULIC CONDUCTIVITY
                     RTIMP       2.00  PERCENT IMPERVIOUS AREA

105 UI          INPUT UNITGRAPH,  28 ORDINATES,  VOLUME = 1.01
                    47.0     101.0     229.0     325.0     420.0     487.0     305.0     257.0     219.0     183.0
                   144.0     116.0     103.0      80.0      60.0      53.0      43.0      36.0      27.0      23.0
                    23.0      12.0       9.0       9.0       9.0       9.0       9.0       9.0
                                                                   ***

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

                    HYDROGRAPH AT STATION    SUB-9

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.02, TOTAL EXCESS =    1.48

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                           (CFS)
+     395.      4.33                 69.         17.          6.           2.
                        (INCHES)   1.482       1.483       1.483        1.483
                         (AC-FT)     34.         34.         34.          34.

                       CUMULATIVE AREA =     .43 SQ MI


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


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            *            *
112 KK      *     R9-6   *        ROUTE   REACH
            *            *
            **************
                           ROUTE SUBBASIN 9 TO CP-9

                HYDROGRAPH ROUTING DATA

112 RS          STORAGE ROUTING
                     NSTPS          5  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

115 RC          NORMAL DEPTH CHANNEL
                       ANL       .075  LEFT OVERBANK N-VALUE
                      ANCH       .035  MAIN CHANNEL N-VALUE
                       ANR       .075  RIGHT OVERBANK N-VALUE
                     RLNTH      4780.  REACH LENGTH
                       SEL      .0580  ENERGY SLOPE
                     ELMAX      420.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
117 RY       ELEVATION    420.00    418.00    416.00    413.70    414.00    416.00    418.00    418.70
116 RX       DISTANCE      17.40     28.60     41.80     73.00    248.00    276.00    290.00    293.00
                                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      3.57     10.28     17.33     24.71     32.42     40.46     48.84     57.45     66.23
          OUTFLOW        .00    106.62    601.59   1391.10   2438.02   3725.04   5242.76   6997.36   9149.68  11531.40
        ELEVATION     413.70    414.03    414.36    414.69    415.03    415.36    415.69    416.02    416.35    416.68

          STORAGE      75.17     84.28     93.55    102.98    112.56    122.25    132.04    141.90    151.83    161.82
          OUTFLOW   14135.16  16954.76  19984.97  23221.44  26663.30  30302.53  34143.47  38175.32  42393.77  46795.58
        ELEVATION     417.02    417.35    417.68    418.01    418.34    418.67    419.01    419.34    419.67    420.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      107. TO    46796.
                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     R9-6

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                           (CFS)
+     387.      4.50                 69.         17.          6.           2.
                        (INCHES)   1.481       1.483       1.483        1.483
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                    (AC-FT)        34.         34.         34.         34.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       1.       4.50                 0.          0.          0.          0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                    6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
    414.22      4.50              413.83      413.73      413.71      413.70

                    CUMULATIVE AREA =     .43 SQ MI


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


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            *            *
 118 KK     *    SUB-6   *        BASIN
            *            *
            **************
                    SUBBASIN 6 RUNOFF

              SUBBASIN RUNOFF DATA

 120 BA         SUBBASIN CHARACTERISTICS
                     TAREA          .53  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB              STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 121 LG         GREEN AND AMPT LOSS RATE
                     STRTL         .27  STARTING LOSS
                       DTH         .35  MOISTURE DEFICIT
                      PSIF        4.60  WETTING FRONT SUCTION
                     XKSAT         .43  HYDRAULIC CONDUCTIVITY
                     RTIMP        9.00  PERCENT IMPERVIOUS AREA

 119 UI         INPUT UNITGRAPH,  31 ORDINATES,  VOLUME = 1.00
                    52.0      95.0     224.0     337.0     413.0     579.0     423.0     318.0     276.0     238.0
                   201.0     162.0     132.0     117.0      96.0      74.0      63.0      57.0      41.0      40.0
                    27.0      26.0      26.0      14.0      10.0      10.0      10.0      10.0      10.0      10.0
                    10.0

                                                                  ***

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

                    HYDROGRAPH AT STATION    SUB-6

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.23, TOTAL EXCESS =    1.27

 PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                                   (CFS)
+     391.      4.33                 72.         18.          6.          3.
                                (INCHES)      1.261       1.267       1.267       1.267
                                 (AC-FT)       36.         36.         36.         36.

                    CUMULATIVE AREA =     .53 SQ MI


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


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            *            *
 127 KK     *    CP-6    *
            *            *
            **************
                    COMBINE R7-6, R9-6 & SUBBASIN 6

 129 HC         HYDROGRAPH COMBINATION
                     ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

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

                        HYDROGRAPH AT STATION     CP-6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    1239.      4.58                292.         74.         25.          11.
                          (INCHES)  1.477       1.501       1.501        1.501
                          (AC-FT)   145.        147.        147.         147.

                        CUMULATIVE AREA =    1.84 SQ MI


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


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            *            *
  130 KK    *     R6-B   *        ROUTE   REACH
            *            *
            **************
                          ROUTE CP-6 TO CP-B

              HYDROGRAPH ROUTING DATA

  132 RS        STORAGE ROUTING
                     NSTPS           5  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

  133 RC        NORMAL DEPTH CHANNEL
                       ANL        .075  LEFT OVERBANK N-VALUE
                      ANCH        .035  MAIN CHANNEL N-VALUE
                       ANR        .075  RIGHT OVERBANK N-VALUE
                     RLNTH       2669.  REACH LENGTH
                       SEL       .0880  ENERGY SLOPE
                     ELMAX       318.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  135 RY        ELEVATION   318.00    316.00    314.00    312.80    313.90    314.00    315.40    316.00
  134 RX        DISTANCE     19.40     28.70     42.40    113.80    204.00    273.80    304.00    344.00

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .32      1.30      2.92      5.20      8.84     12.87     17.03     21.31     25.73
          OUTFLOW        .00     17.77    112.83    332.67    716.44   1324.82   2437.89   3814.24   5435.89   7290.41
        ELEVATION     312.80    313.07    313.35    313.62    313.89    314.17    314.44    314.72    314.99    315.26

          STORAGE      30.30     35.19     40.40     45.70     51.03     56.37     61.74     67.13     72.54     77.97
          OUTFLOW    9358.28  11647.30  14180.93  16967.95  19967.48  23172.12  26575.60  30172.57  33958.29  37928.60
        ELEVATION     315.54    315.81    316.08    316.36    316.63    316.91    317.18    317.45    317.73    318.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       18. TO    37929.
                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     R6-B

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    1235.      4.67                292.         74.         25.          11.
                          (INCHES)  1.477       1.501       1.501        1.501
                          (AC-FT)   145.        147.        147.         147.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       2.       4.67                  0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   314.13       4.67               313.42      312.97      312.86       312.83

                        CUMULATIVE AREA =    1.84 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              **************
              *            *
  136 KK      *     SUB-5  *        BASIN
              *            *
              **************
                              SUBBASIN 5 RUNOFF

                 SUBBASIN RUNOFF DATA

  138 BA           SUBBASIN CHARACTERISTICS
                        TAREA          .13  SUBBASIN AREA

                   PRECIPITATION DATA

   20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

   21 PI             INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                        .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                        .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                        .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                        .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00

  139 LG           GREEN AND AMPT LOSS RATE
                        STRTL         .25  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.40  WETTING FRONT SUCTION
                        XKSAT         .49  HYDRAULIC CONDUCTIVITY
                        RTIMP         .00  PERCENT IMPERVIOUS AREA

  137 UI           INPUT UNITGRAPH,  14 ORDINATES,  VOLUME =  .98
                       40.0     154.0     261.0     168.0     121.0      80.0      57.0      36.0      25.0      16.0
                       13.0       5.0       5.0       5.0

                                                                  ***

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

                          HYDROGRAPH AT STATION    SUB-5

     TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.54, TOTAL EXCESS =     .96

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
 +   (CFS)       (HR)
                          (CFS)
 +    116.       4.08                   13.          3.          1.           0.
                        (INCHES)      .944        .944        .944         .944
                         (AC-FT)        7.          7.          7.           7.

                        CUMULATIVE AREA =     .13 SQ MI


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


              **************
              *            *
  143 KK      *      CP-B  *
              *            *
              **************
                              COMBINE R6-B AND SUBBASIN 5

  145 HC           HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION     CP-B

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
 +   (CFS)       (HR)
                          (CFS)
 +   1264.       4.58                  305.         78.         26.          11.
                        (INCHES)     1.441       1.465       1.465        1.465
                         (AC-FT)     151.        154.        154.         154.

                        CUMULATIVE AREA =    1.97 SQ MI


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


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146 KK     *    SUB-20  *        BASIN
           *            *
           **************
                         SUBBASIN 20 RUNOFF

              SUBBASIN RUNOFF DATA

148 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .51  SUBBASIN AREA

                PRECIPITATION DATA

 20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

 21 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

149 LG          GREEN AND AMPT LOSS RATE
                     STRTL         .25  STARTING LOSS
                       DTH         .38  MOISTURE DEFICIT
                      PSIF        5.60  WETTING FRONT SUCTION
                     XKSAT         .29  HYDRAULIC CONDUCTIVITY
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

147 UI          INPUT UNITGRAPH,  36 ORDINATES,  VOLUME = 1.00
                    44.0      61.0     155.0     246.0     310.0     373.0     504.0     342.0     270.0     239.0
                   211.0     182.0     157.0     126.0     108.0      98.0      83.0      66.0      56.0      48.0
                    43.0      34.0      34.0      22.0      22.0      22.0      17.0       8.0       8.0       8.0
                     8.0       8.0       8.0       8.0       8.0       8.0
                                                                   ***

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

                      HYDROGRAPH AT STATION   SUB-20

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.27, TOTAL EXCESS =    1.23

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     366.      4.42                  67.         17.          6.          2.
                        (INCHES)    1.225       1.225       1.225       1.225
                         (AC-FT)      33.         33.         33.         33.

                       CUMULATIVE AREA =     .51 SQ MI


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


           **************
           *            *
155 KK     *    R20-13  *        ROUTE   REACH
           *            *
           **************
                         ROUTE CP-20 TO CP-13

              HYDROGRAPH ROUTING DATA

157 RS          STORAGE ROUTING
                     NSTPS           4  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

158 RC          NORMAL DEPTH CHANNEL
                       ANL        .080  LEFT OVERBANK N-VALUE
                      ANCH        .035  MAIN CHANNEL N-VALUE
                       ANR        .080  RIGHT OVERBANK N-VALUE
                     RLNTH       6689.  REACH LENGTH
                       SEL       .0470  ENERGY SLOPE
                     ELMAX       953.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                         --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
160 RY       ELEVATION    953.00    950.00    948.00    947.10    948.00    948.30    950.00    952.00
159 RX       DISTANCE      30.20     55.50     77.60    160.00    222.10    241.70    385.00    414.00
                                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.19      4.76     10.69     18.27     27.15     37.44     49.15     62.26     76.79
          OUTFLOW        .00     20.64    131.06    391.23    877.80   1604.79   2520.04   3623.38   4916.28   6401.30
```

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ELEVATION | 947.10 | 947.41 | 947.72 | 948.03 | 948.34 | 948.65 | 948.96 | 949.27 | 949.58 | 949.89 |
| STORAGE | 92.50 | 108.61 | 125.05 | 141.84 | 158.97 | 176.43 | 194.23 | 212.22 | 230.34 | 248.58 |
| OUTFLOW | 8111.29 | 10025.06 | 12119.66 | 14389.73 | 16831.05 | 19440.24 | 22227.31 | 25223.68 | 28382.20 | 31699.71 |
| ELEVATION | 950.21 | 950.52 | 950.83 | 951.14 | 951.45 | 951.76 | 952.07 | 952.38 | 952.69 | 953.00 |

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 878. TO 31700.
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 R20-13

| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|---|
| + | | (CFS) | | | | |
| + 341. | 4.75 | | 67. | 17. | 6. | 2. |
| | | (INCHES) | 1.225 | 1.225 | 1.225 | 1.225 |
| | | (AC-FT) | 33. | 33. | 33. | 33. |

| PEAK STORAGE (AC-FT) | TIME (HR) | MAXIMUM AVERAGE STORAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| + 2. | 4.75 | 1. | 0. | 0. | 0. |

| PEAK STAGE (FEET) | TIME (HR) | MAXIMUM AVERAGE STAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| + 947.97 | 4.75 | 947.39 | 947.17 | 947.13 | 947.13 |

CUMULATIVE AREA = .51 SQ MI

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

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              **************
              *            *
161 KK        *   SUB-13   *        BASIN
              *            *
              **************
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SUBBASIN 13 RUNOFF

SUBBASIN RUNOFF DATA

163 BA SUBBASIN CHARACTERISTICS
TAREA .38 SUBBASIN AREA

PRECIPITATION DATA

20 PB STORM 3.50 BASIN TOTAL PRECIPITATION

21 PI INCREMENTAL PRECIPITATION PATTERN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| .01 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .02 | .02 | .02 | .03 |
| .03 | .03 | .06 | .06 | .06 | .07 | .07 | .07 | .04 | .04 |
| .04 | .02 | .02 | .02 | .01 | .01 | .01 | .01 | .01 | .01 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | | | | | | | | |

164 LG GREEN AND AMPT LOSS RATE

| | | |
|---|---|---|
| STRTL | .25 | STARTING LOSS |
| DTH | .38 | MOISTURE DEFICIT |
| PSIF | 5.60 | WETTING FRONT SUCTION |
| XKSAT | .30 | HYDRAULIC CONDUCTIVITY |
| RTIMP | 3.00 | PERCENT IMPERVIOUS AREA |

162 UI INPUT UNITGRAPH, 43 ORDINATES, VOLUME = 1.00

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 27.0 | 27.0 | 73.0 | 117.0 | 166.0 | 195.0 | 224.0 | 294.0 | 275.0 | 188.0 |
| 163.0 | 148.0 | 133.0 | 118.0 | 106.0 | 90.0 | 76.0 | 67.0 | 62.0 | 56.0 |
| 45.0 | 37.0 | 35.0 | 30.0 | 29.0 | 21.0 | 21.0 | 19.0 | 13.0 | 13.0 |
| 13.0 | 13.0 | 6.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 5.0 | 5.0 | 5.0 | | | | | | | |

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

HYDROGRAPH AT STATION SUB-13

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.23, TOTAL EXCESS = 1.27

| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|---|
| + | | (CFS) | | | | |
| + 246. | 4.50 | | 52. | 13. | 4. | 2. |
| | | (INCHES) | 1.269 | 1.274 | 1.274 | 1.274 |

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                    (AC-FT)        26.         26.         26.         26.

                    CUMULATIVE AREA =      .38 SQ MI


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


          **************
          *            *
 171 KK   *     CP-13  *
          *            *
          **************
                    COMBINE SUB-13 & R20-13

 173 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                    HYDROGRAPH AT STATION    CP-13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     571.      4.67                  119.         30.         10.          4.
                        (INCHES)     1.242       1.246       1.246       1.246
                         (AC-FT)      59.         59.         59.         59.

                    CUMULATIVE AREA =      .89 SQ MI


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


          **************
          *            *
 174 KK   *    R13-12  *        ROUTE   REACH
          *            *
          **************
                    ROUTE CP-13 FLOW TO CP-12

             HYDROGRAPH ROUTING DATA

 176 RS          STORAGE ROUTING
                      NSTPS           4  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 177 RC          NORMAL DEPTH CHANNEL
                        ANL        .080  LEFT OVERBANK N-VALUE
                       ANCH        .040  MAIN CHANNEL N-VALUE
                        ANR        .080  RIGHT OVERBANK N-VALUE
                      RLNTH       2975.  REACH LENGTH
                        SEL       .0470  ENERGY SLOPE
                      ELMAX       801.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 179 RY       ELEVATION    800.00    799.70    796.00    797.60    797.50    798.00    800.00    801.00
 178 RX       DISTANCE      22.40     25.00     62.00     89.00    215.00    336.00    366.00    372.00

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .06       .25       .57      1.02      1.59      2.61      6.56     11.64     17.04
          OUTFLOW        .00      1.58     10.03     29.58     63.71    115.51    108.36    373.29    887.20   1666.52
        ELEVATION     796.00    796.26    796.53    796.79    797.05    797.32    797.58    797.84    798.11    798.37

          STORAGE      22.54     28.17     33.92     39.78     45.76     51.86     58.05     64.26     70.50     76.77
          OUTFLOW    2639.60   3791.42   5111.63   6592.63   8228.53  10016.96  11972.24  14073.87  16312.42  18684.24
        ELEVATION     798.63    798.90    799.16    799.42    799.68    799.95    800.21    800.47    800.74    801.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       30. TO    18684.
                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   R13-12

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
```

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+     567.      4.75                    119.        30.        10.         4.
                          (INCHES)     1.242      1.246      1.246      1.246
                          (AC-FT)       59.        59.        59.        59.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR      72-HR    166.58-HR
+  (AC-FT)      (HR)
        2.      4.75                     1.         0.         0.         0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR      72-HR    166.58-HR
+   (FEET)      (HR)
    797.94      4.75                  796.95     796.25     796.08     796.04

                          CUMULATIVE AREA =      .89 SQ MI


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


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            *            *
 180 KK     *    SUB-12  *        BASIN
            *            *
            **************
                          SUBBASIN 12 RUNOFF

              SUBBASIN RUNOFF DATA

 182 BA         SUBBASIN CHARACTERISTICS
                      TAREA          .36  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB               STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 183 LG         GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .36  MOISTURE DEFICIT
                       PSIF        5.00  WETTING FRONT SUCTION
                      XKSAT         .35  HYDRAULIC CONDUCTIVITY
                      RTIMP        2.00  PERCENT IMPERVIOUS AREA

 181 UI         INPUT UNITGRAPH,  42 ORDINATES,  VOLUME = 1.00
                    26.0      26.0      74.0     117.0     163.0     192.0     223.0     301.0     237.0     175.0
                   154.0     138.0     125.0     110.0      97.0      83.0      68.0      63.0      58.0      49.0
                    41.0      34.0      31.0      29.0      24.0      20.0      20.0      14.0      13.0      13.0
                    13.0       9.0       5.0       5.0       5.0       5.0       5.0       5.0       5.0       5.0
                     5.0       5.0

                                                                  ***

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

                       HYDROGRAPH AT STATION   SUB-12

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.29, TOTAL EXCESS =    1.21

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR      72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     229.      4.50                    47.        12.         4.         2.
                          (INCHES)     1.209      1.212      1.212      1.212
                          (AC-FT)       23.        23.        23.        23.

                          CUMULATIVE AREA =      .36 SQ MI


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


            **************
            *            *
 190 KK     *    CP-12A  *
            *            *
            **************
                          COMBINE R13-12 & SUBBASIN 12

 192 HC         HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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                                                                  ***
     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION   CP-12A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     762.      4.67                166.         42.         14.          6.
                          (INCHES)  1.232       1.236       1.236       1.236
                           (AC-FT)   82.         82.         82.         82.

                          CUMULATIVE AREA =    1.25 SQ MI


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


            **************
            *            *
 193 KK     *   SUB-16   *        BASIN
            *            *
            **************
                           SUBBASIN 16 RUNOFF

              SUBBASIN RUNOFF DATA

 195 BA         SUBBASIN CHARACTERISTICS
                     TAREA          .43  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB              STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 196 LG         GREEN AND AMPT LOSS RATE
                     STRTL         .25  STARTING LOSS
                       DTH         .39  MOISTURE DEFICIT
                      PSIF        5.70  WETTING FRONT SUCTION
                     XKSAT         .27  HYDRAULIC CONDUCTIVITY
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

 194 UI         INPUT UNITGRAPH,  37 ORDINATES,  VOLUME =  .99
                    35.0      42.0     116.0     184.0     236.0     277.0     371.0     334.0     230.0     201.0
                   177.0     157.0     138.0     115.0      94.0      84.0      76.0      63.0      51.0      45.0
                    38.0      35.0      27.0      27.0      19.0      17.0      17.0      17.0       7.0       7.0
                     7.0       7.0       7.0       7.0       7.0       7.0       7.0
                                                                  ***
     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION   SUB-16

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.24, TOTAL EXCESS =    1.26

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     301.      4.50                 57.         14.          5.          2.
                          (INCHES)  1.240       1.240       1.240       1.240
                           (AC-FT)   28.         28.         28.         28.

                          CUMULATIVE AREA =     .43 SQ MI


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


            **************
            *            *
 202 KK     *    CP-12   *
            *            *
            **************
                           COMBINE SUBBASIN 16, AND CP-12A

 204 HC         HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    CP-12

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1024.      4.67                223.          56.          19.          8.
                        (INCHES)   1.234        1.237        1.237        1.237
                         (AC-FT)    111.         111.         111.         111.

                       CUMULATIVE AREA =    1.68 SQ MI


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


            **************
            *            *
 205 KK     *   R12-11   *        ROUTE   REACH
            *            *
            **************
                        ROUTE CP-12 TO CP-11

              HYDROGRAPH ROUTING DATA

 207 RS          STORAGE ROUTING
                      NSTPS          6  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 208 RC          NORMAL DEPTH CHANNEL
                        ANL       .080  LEFT OVERBANK N-VALUE
                       ANCH       .040  MAIN CHANNEL N-VALUE
                        ANR       .080  RIGHT OVERBANK N-VALUE
                      RLNTH      5674.  REACH LENGTH
                        SEL      .0530  ENERGY SLOPE
                      ELMAX      686.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 210 RY        ELEVATION   686.00    684.00    683.40    683.00    682.00    684.00    684.70    686.00
 209 RX        DISTANCE     75.20     83.00    122.00    182.00    218.00    264.50    273.00    284.00

                                                                    ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00       .17       .68      1.54      2.74      4.30      6.67     10.01     13.97     18.44
          OUTFLOW       .00      2.51     15.93     46.97    101.15    173.90    272.30    462.10    759.49   1123.49
        ELEVATION    682.00    682.21    682.42    682.63    682.84    683.05    683.26    683.47    683.68    683.89

          STORAGE     23.36     28.43     33.59     38.85     44.18     49.59     55.06     60.61     66.23     71.92
          OUTFLOW   1572.84   2108.45   2709.72   3373.98   4099.17   4883.02   5723.92   6620.51   7571.64   8576.32
        ELEVATION    684.11    684.32    684.53    684.74    684.95    685.16    685.37    685.58    685.79    686.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      272. TO      8576.
                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   R12-11

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1017.      4.83                223.          56.          19.          8.
                        (INCHES)   1.234        1.237        1.237        1.237
                         (AC-FT)    111.         111.         111.         111.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR    166.58-HR
+  (AC-FT)      (HR)
       3.       4.83                 1.           0.           0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR    166.58-HR
+   (FEET)      (HR)
   683.83       4.83               682.82       682.22       682.07       682.03

                       CUMULATIVE AREA =    1.68 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 211 KK       *   SUB-15   *        BASIN
              *            *
              **************
                             SUBBASIN 15 RUNOFF

                 SUBBASIN RUNOFF DATA

 213 BA            SUBBASIN CHARACTERISTICS
                        TAREA          .48  SUBBASIN AREA

                   PRECIPITATION DATA

  20 PB                 STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI              INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                        .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                        .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                        .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                        .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00

 214 LG            GREEN AND AMPT LOSS RATE
                        STRTL         .25  STARTING LOSS
                          DTH         .39  MOISTURE DEFICIT
                         PSIF        5.70  WETTING FRONT SUCTION
                        XKSAT         .26  HYDRAULIC CONDUCTIVITY
                        RTIMP         .00  PERCENT IMPERVIOUS AREA

 212 UI             INPUT UNITGRAPH,  35 ORDINATES,  VOLUME = 1.01
                       43.0      63.0     156.0     246.0     307.0     377.0     483.0     308.0     255.0     224.0
                      197.0     171.0     142.0     114.0     102.0      92.0      72.0      57.0      51.0      47.0
                       35.0      33.0      26.0      21.0      21.0      21.0       8.0       8.0       8.0       8.0
                        8.0       8.0       8.0       8.0       8.0

                                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-15

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.22, TOTAL EXCESS =    1.28

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    364.       4.42                67.          17.           6.           2.
                         (INCHES)  1.290       1.290        1.290        1.290
                          (AC-FT)    33.          33.          33.          33.

                         CUMULATIVE AREA =     .48 SQ MI


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

              **************
              *            *
 220 KK       *   R15-11   *        ROUTE   REACH
              *            *
              **************
                             ROUTE SUBBASIN 15 FLOWS TO CP-11

                HYDROGRAPH ROUTING DATA

 222 RS            STORAGE ROUTING
                       NSTPS           5  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

 223 RC            NORMAL DEPTH CHANNEL
                         ANL        .075  LEFT OVERBANK N-VALUE
                        ANCH        .040  MAIN CHANNEL N-VALUE
                         ANR        .075  RIGHT OVERBANK N-VALUE
                       RLNTH       4392.  REACH LENGTH
                         SEL       .0630  ENERGY SLOPE
                       ELMAX       738.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 225 RY        ELEVATION   738.00    733.20    732.00    731.40    731.50    732.10    734.00    738.00
 224 RX        DISTANCE     20.00     50.00     58.00    125.60    155.00    163.50    175.50    200.00

                                                                                  ***
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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| STORAGE | .00 | 1.61 | 4.86 | 8.65 | 12.60 | 16.72 | 20.98 | 25.40 | 29.97 | 34.70 |
| OUTFLOW | .00 | 54.70 | 266.90 | 686.89 | 1255.98 | 1960.49 | 2792.35 | 3745.78 | 4816.82 | 6002.43 |
| ELEVATION | 731.40 | 731.75 | 732.09 | 732.44 | 732.79 | 733.14 | 733.48 | 733.83 | 734.18 | 734.53 |
| STORAGE | 39.57 | 44.60 | 49.77 | 55.10 | 60.57 | 66.20 | 71.97 | 77.90 | 83.98 | 90.21 |
| OUTFLOW | 7300.23 | 8708.46 | 10225.78 | 11851.14 | 13583.74 | 15422.98 | 17368.43 | 19419.75 | 21576.77 | 23839.38 |
| ELEVATION | 734.87 | 735.22 | 735.57 | 735.92 | 736.26 | 736.61 | 736.96 | 737.30 | 737.65 | 738.00 |

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 55. TO 23839.
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 R15-11

| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|---|
| 359. | 4.50 | (CFS) | 67. | 17. | 6. | 2. |
| | | (INCHES) | 1.290 | 1.290 | 1.290 | 1.290 |
| | | (AC-FT) | 33. | 33. | 33. | 33. |

| PEAK STORAGE (AC-FT) | TIME (HR) | MAXIMUM AVERAGE STORAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| 1. | 4.50 | 0. | 0. | 0. | 0. |

| PEAK STAGE (FEET) | TIME (HR) | MAXIMUM AVERAGE STAGE 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|
| 732.17 | 4.50 | 731.61 | 731.45 | 731.42 | 731.39 |

CUMULATIVE AREA = .48 SQ MI

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

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226 KK      **************
            *            *
            *   SUB-11   *        BASIN
            *            *
            **************
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SUBBASIN 11 RUNOFF

SUBBASIN RUNOFF DATA

228 BA SUBBASIN CHARACTERISTICS
TAREA .50 SUBBASIN AREA

PRECIPITATION DATA

20 PB STORM 3.50 BASIN TOTAL PRECIPITATION

21 PI INCREMENTAL PRECIPITATION PATTERN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| .01 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .02 | .02 | .02 | .03 |
| .03 | .03 | .06 | .06 | .06 | .07 | .07 | .07 | .04 | .04 |
| .04 | .02 | .02 | .02 | .01 | .01 | .01 | .01 | .01 | .01 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | | | | | | | | |

229 LG GREEN AND AMPT LOSS RATE

| | | |
|---|---|---|
| STRTL | .25 | STARTING LOSS |
| DTH | .37 | MOISTURE DEFICIT |
| PSIF | 5.20 | WETTING FRONT SUCTION |
| XKSAT | .31 | HYDRAULIC CONDUCTIVITY |
| RTIMP | 1.00 | PERCENT IMPERVIOUS AREA |

227 UI INPUT UNITGRAPH, 24 ORDINATES, VOLUME = 1.00

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 64.0 | 189.0 | 385.0 | 523.0 | 673.0 | 415.0 | 339.0 | 278.0 | 220.0 | 163.0 |
| 141.0 | 101.0 | 79.0 | 66.0 | 49.0 | 38.0 | 32.0 | 27.0 | 12.0 | 12.0 |
| 12.0 | 12.0 | 12.0 | 12.0 | | | | | | |

***

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

HYDROGRAPH AT STATION SUB-11

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.25, TOTAL EXCESS = 1.25

| PEAK FLOW (CFS) | TIME (HR) | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 166.58-HR |
|---|---|---|---|---|---|

```
                        (CFS)
+     442.      4.25                  67.         17.          6.           2.
                      (INCHES)      1.241       1.241       1.241        1.241
                       (AC-FT)       33.         33.         33.          33.

                      CUMULATIVE AREA =      .50 SQ MI


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


            **************
            *            *
 234 KK     *     CP-11  *
            *            *
            **************
                      COMBINE R12-11, R15-11 AND SUBBASIN 11

 236 HC          HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                      HYDROGRAPH AT STATION    CP-11

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                        (CFS)
+    1524.      4.75                 356.         89.         30.          13.
                      (INCHES)      1.245       1.247       1.247        1.247
                       (AC-FT)      177.        177.        177.         177.

                      CUMULATIVE AREA =    2.66 SQ MI


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


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            *            *
 237 KK     *     R11-C  *        ROUTE   REACH
            *            *
            **************
                      ROUTE CP-11 TO CP-C

              HYDROGRAPH ROUTING DATA

 239 RS          STORAGE ROUTING
                      NSTPS           5  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 240 RC          NORMAL DEPTH CHANNEL
                        ANL        .075  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
                        ANR        .075  RIGHT OVERBANK N-VALUE
                      RLNTH       3517.  REACH LENGTH
                        SEL      .0830  ENERGY SLOPE
                      ELMAX       455.5  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 242 RY        ELEVATION    455.50    452.80    452.00    451.00    450.00    452.00    454.00    455.00
 241 RX        DISTANCE      40.90    262.00    439.00    615.00    664.00    748.00    822.00    865.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .31      1.23      2.77      5.05      8.72     13.86     20.48     28.74     38.74
          OUTFLOW        .00     12.89     81.83    241.25    482.79    913.78   1632.28   2726.28   4532.08   6758.44
        ELEVATION     450.00    450.29    450.58    450.87    451.16    451.45    451.74    452.03    452.32    452.61

          STORAGE      50.43     63.15     76.67     90.99    106.12    122.08    138.88    156.53    174.95    193.93
          OUTFLOW    9434.49  12571.42  16135.29  20120.84  24525.05  29345.27  34589.73  40261.61  46427.98  53047.83
        ELEVATION     452.89    453.18    453.47    453.76    454.05    454.34    454.63    454.92    455.21    455.50


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       13. TO    53048.
               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    R11-C

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
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                                        6-HR        24-HR        72-HR     166.58-HR
+   (CFS)        (HR)
                                  (CFS)
+    1519.       4.83                356.          89.          30.           13.
                            (INCHES)      1.245        1.247        1.247        1.247
                             (AC-FT)       177.         177.         177.         177.

 PEAK STORAGE    TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR     166.58-HR
+  (AC-FT)       (HR)
        3.       4.83                  1.           0.           0.           0.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR     166.58-HR
+   (FEET)       (HR)
    451.69       4.83                450.73       450.19       450.06       450.03

                            CUMULATIVE AREA =    2.66 SQ MI


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


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            *            *
 243 KK     *    SUB-10  *        BASIN
            *            *
            **************
                          SUBBASIN 10 RUNOFF

              SUBBASIN RUNOFF DATA

 245 BA         SUBBASIN CHARACTERISTICS
                      TAREA          .22  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB               STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 246 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.45  WETTING FRONT SUCTION
                      XKSAT         .47  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

 244 UI          INPUT UNITGRAPH,  20 ORDINATES,  VOLUME = 1.01
                     34.0      134.0      237.0      354.0      234.0      180.0      142.0      103.0       79.0       60.0
                     42.0       34.0       26.0       17.0       17.0        7.0        7.0        7.0        7.0        7.0
                                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-10

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.51, TOTAL EXCESS =     .99

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR     166.58-HR
+   (CFS)        (HR)
                                  (CFS)
+     182.       4.17                 24.           6.           2.            1.
                            (INCHES)      1.009        1.009        1.009        1.009
                             (AC-FT)        12.          12.          12.          12.

                            CUMULATIVE AREA =     .22 SQ MI


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


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            *            *
 251 KK     *      CP-C  *
            *            *
            **************
                          COMBINE R11-C & SUBBASIN 1-

 253 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION     CP-C

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1561.      4.75                380.         95.         32.          14.
                        (INCHES)    1.227       1.229       1.229        1.229
                         (AC-FT)    188.        189.        189.         189.

                        CUMULATIVE AREA =    2.88 SQ MI


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


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            *            *
 254 KK     *   SUB-14   *        BASIN
            *            *
            **************
                          SUBBASIN 14 RUNOFF

              SUBBASIN RUNOFF DATA

 256 BA         SUBBASIN CHARACTERISTICS
                      TAREA         .41  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB               STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 257 LG         GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .37  MOISTURE DEFICIT
                       PSIF        5.30  WETTING FRONT SUCTION
                      XKSAT         .31  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

 255 UI         INPUT UNITGRAPH,  38 ORDINATES,  VOLUME = 1.00
                    33.0      37.0     107.0     167.0     217.0     254.0     330.0     343.0     225.0     193.0
                   172.0     153.0     134.0     116.0      95.0      82.0      75.0      66.0      54.0      42.0
                    39.0      36.0      28.0      25.0      23.0      16.0      16.0      16.0      13.0       6.0
                     6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0
                                                                  ***
     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION   SUB-14

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.28, TOTAL EXCESS =    1.22

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     279.      4.50                 53.         13.          4.           2.
                        (INCHES)    1.210       1.210       1.210        1.210
                         (AC-FT)    26.         26.         26.          26.

                        CUMULATIVE AREA =     .41 SQ MI


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


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            *            *
 263 KK     *   SUB-17   *        BASIN
            *            *
            **************
                          SUBBASIN 17 RUNOFF

              SUBBASIN RUNOFF DATA
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265 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .24  SUBBASIN AREA

                PRECIPITATION DATA

20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

21 PI             INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

266 LG          GREEN AND AMPT LOSS RATE
                     STRTL         .25  STARTING LOSS
                       DTH         .37  MOISTURE DEFICIT
                      PSIF        5.30  WETTING FRONT SUCTION
                     XKSAT         .29  HYDRAULIC CONDUCTIVITY
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

264 UI          INPUT UNITGRAPH,  21 ORDINATES,  VOLUME = 1.00
                    35.0      127.0      235.0      347.0      273.0      194.0      156.0      119.0       87.0       71.0
                    50.0       40.0       29.0       23.0       17.0       14.0        7.0        7.0        7.0        7.0
                     7.0

                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-17

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.24, TOTAL EXCESS =    1.26

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR     166.58-HR
+   (CFS)        (HR)
                          (CFS)
+     226.       4.25                   33.           8.           3.           1.
                        (INCHES)      1.260        1.260        1.260        1.260
                         (AC-FT)        16.          16.          16.          16.

                        CUMULATIVE AREA =      .24 SQ MI


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


            **************
            *            *
271 KK      *    SUB-22  *        BASIN
            *            *
            **************
                          SUBBASIN 22 RUNOFF

               SUBBASIN RUNOFF DATA

273 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .64  SUBBASIN AREA

                PRECIPITATION DATA

20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

21 PI             INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

274 LG          GREEN AND AMPT LOSS RATE
                     STRTL         .25  STARTING LOSS
                       DTH         .37  MOISTURE DEFICIT
                      PSIF        5.70  WETTING FRONT SUCTION
                     XKSAT         .27  HYDRAULIC CONDUCTIVITY
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

272 UI          INPUT UNITGRAPH,  30 ORDINATES,  VOLUME = 1.00
                    65.0      125.0      293.0      430.0      533.0      734.0      475.0      383.0      331.0      282.0
                   237.0      185.0      156.0      140.0      105.0       84.0       73.0       61.0       50.0       41.0
                    32.0       32.0       24.0       13.0       13.0       13.0       13.0       13.0       13.0       13.0

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                    HYDROGRAPH AT STATION   SUB-22

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.22, TOTAL EXCESS =    1.28

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     519.      4.33          88.        22.         7.          3.
                        (INCHES)     1.283      1.283       1.283       1.283
                         (AC-FT)      44.        44.         44.         44.

                        CUMULATIVE AREA =    .64 SQ MI


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


            **************
            *            *
 280 KK     *   R22-19   *        ROUTE   REACH
            *            *
            **************
                        ROUTE SUBBASIN 22 TO CP-19

               HYDROGRAPH ROUTING DATA

 282 RS          STORAGE ROUTING
                      NSTPS          5  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 283 RC          NORMAL DEPTH CHANNEL
                        ANL       .075  LEFT OVERBANK N-VALUE
                       ANCH       .035  MAIN CHANNEL N-VALUE
                        ANR       .075  RIGHT OVERBANK N-VALUE
                      RLNTH      4366.  REACH LENGTH
                        SEL      .0890  ENERGY SLOPE
                      ELMAX      101.9  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 285 RY       ELEVATION    101.90    100.00    100.00     98.20     97.90    100.00    101.30    101.80
 284 RX       DISTANCE     168.00    209.00    354.70    471.00    542.80    644.00    683.50    694.50

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .64      2.43      4.79      7.64     11.01     14.87     19.23     24.10     29.46
          OUTFLOW        .00     18.04    119.48    321.45    624.31   1037.30   1570.34   2233.37   3036.14   3988.20
        ELEVATION      97.90     98.11     98.32     98.53     98.74     98.95     99.16     99.37     99.58     99.79

          STORAGE      35.40     44.70     54.23     64.00     73.99     84.21     94.67    105.34    116.20    127.25
          OUTFLOW    5105.93   6727.76   8590.44  10672.62  12963.69  15456.48  18145.69  21029.73  24102.01  27366.82
        ELEVATION     100.01    100.22    100.43    100.64    100.85    101.06    101.27    101.48    101.69    101.90

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      119. TO    27367.
                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   R22-19

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     514.      4.50          88.        22.         7.          3.
                        (INCHES)     1.283      1.283       1.283       1.283
                         (AC-FT)      44.        44.         44.         44.

  PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       1.       4.50           0.         0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
    98.67       4.50          98.11      97.95       97.92       97.91

                        CUMULATIVE AREA =    .64 SQ MI


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                *            *
  286 KK        *   SUB-19   *        BASIN
                *            *
                **************
                          SUBBASIN 19 RUNOFF

              SUBBASIN RUNOFF DATA

  288 BA        SUBBASIN CHARACTERISTICS
                      TAREA          .59  SUBBASIN AREA

                PRECIPITATION DATA

   20 PB              STORM        3.50  BASIN TOTAL PRECIPITATION

   21 PI          INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

  289 LG        GREEN AND AMPT LOSS RATE
                      STRTL         .25  STARTING LOSS
                        DTH         .39  MOISTURE DEFICIT
                       PSIF        5.80  WETTING FRONT SUCTION
                      XKSAT         .25  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

  287 UI        INPUT UNITGRAPH,  26 ORDINATES,  VOLUME = 1.00
                    69.0      168.0      364.0      502.0      705.0      585.0      410.0      347.0      290.0      234.0
                   177.0      154.0      122.0       91.0       77.0       61.0       53.0       36.0       34.0       30.0
                    13.0       13.0       13.0       13.0       13.0       13.0
                                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-19

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.20, TOTAL EXCESS =    1.30

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     519.      4.33                83.         21.          7.           3.
                         (INCHES)  1.309       1.309       1.309        1.309
                          (AC-FT)    41.         41.         41.          41.

                         CUMULATIVE AREA =     .59 SQ MI


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


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                *            *
  294 KK        *    CP-19   *
                *            *
                **************
                          COMBINE R22-19 & SUBBASIN 19

  296 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                                  ***

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

                        HYDROGRAPH AT STATION    CP-19

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     998.      4.33                171.         43.         14.           6.
                         (INCHES)  1.295       1.295       1.295        1.295
                          (AC-FT)    85.         85.         85.          85.

                         CUMULATIVE AREA =    1.23 SQ MI


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

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                *            *
297 KK          *    R19-F   *        ROUTE   REACH
                *            *
                **************
                              ROUTE CP-19 TO CP-F

                HYDROGRAPH ROUTING DATA

299 RS            STORAGE ROUTING
                       NSTPS          6  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC      -1.00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

300 RC            NORMAL DEPTH CHANNEL
                         ANL       .075  LEFT OVERBANK N-VALUE
                        ANCH       .035  MAIN CHANNEL N-VALUE
                         ANR       .075  RIGHT OVERBANK N-VALUE
                       RLNTH      6408.  REACH LENGTH
                         SEL      .0620  ENERGY SLOPE
                       ELMAX      760.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
302 RY        ELEVATION   752.60    750.00    748.80    747.40    746.60    750.00    750.00    760.00
301 RX        DISTANCE    117.80    145.00    174.00    305.00    382.40    499.80    554.00    586.00

                                                        ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      4.80     19.12     42.82     73.92    110.31    153.42    197.53    242.64    288.66
          OUTFLOW        .00    172.72   1096.07   3215.45   7312.58  13092.75  21058.53  30621.61  41665.15  54160.25
        ELEVATION     746.60    747.31    748.01    748.72    749.42    750.13    750.83    751.54    752.24    752.95

          STORAGE     335.01    381.60    428.42    475.47    522.76    570.28    618.03    666.02    714.25    762.71
          OUTFLOW   68045.54  83212.29  99610.71 117199.00 135941.10 155806.00 176766.20 198797.20 221877.00 245986.00
        ELEVATION     753.65    754.36    755.06    755.77    756.47    757.18    757.88    758.59    759.29    760.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      173. TO   245986.
                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    R19-F

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                             (CFS)
+     985.      4.58          171.        43.         14.           6.
                         (INCHES)      1.295       1.295       1.295       1.295
                         (AC-FT)        85.         85.         85.         85.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)      (HR)
       3.       4.58                   1.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR    166.58-HR
+   (FEET)      (HR)
   747.93       4.58                746.94      746.68      746.63       746.63

                         CUMULATIVE AREA =    1.23 SQ MI


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


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                *            *
303 KK          *    SUB-18  *        BASIN
                *            *
                **************
                              SUBBASIN 18 RUNOFF

                SUBBASIN RUNOFF DATA

305 BA            SUBBASIN CHARACTERISTICS
                       TAREA         .42  SUBBASIN AREA

                  PRECIPITATION DATA

 20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

 21 PI              INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                       .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                       .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
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                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

306 LG          GREEN AND AMPT LOSS RATE
                     STRTL        .25  STARTING LOSS
                       DTH        .35  MOISTURE DEFICIT
                      PSIF       4.60  WETTING FRONT SUCTION
                     XKSAT        .38  HYDRAULIC CONDUCTIVITY
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

304 UI          INPUT UNITGRAPH,  24 ORDINATES,  VOLUME = 1.01
                    55.0     161.0     327.0     444.0     572.0     353.0     288.0     236.0     186.0     138.0
                   120.0      86.0      67.0      56.0      42.0      32.0      27.0      23.0      10.0      10.0
                    10.0      10.0      10.0      10.0

                                                                  ***

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

                        HYDROGRAPH AT STATION   SUB-18

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.35, TOTAL EXCESS =    1.15

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    357.       4.25                 52.         13.          4.          2.
                         (INCHES)   1.159       1.159       1.159       1.159
                          (AC-FT)    26.         26.         26.         26.

                         CUMULATIVE AREA =     .42 SQ MI


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


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            *            *
311 KK      *     CP-F   *
            *            *
            **************
                        COMBINE R19-F AND SUBBASIN 18

313 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     CP-F

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+   1246.       4.50                224.         56.         19.          8.
                         (INCHES)   1.261       1.261       1.261       1.261
                          (AC-FT)   111.        111.        111.        111.

                         CUMULATIVE AREA =    1.65 SQ MI


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


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            *            *
314 KK      *   SUB-21   *        BASIN
            *            *
            **************
                        SUBBASIN 21 RUNOFF

              SUBBASIN RUNOFF DATA

316 BA          SUBBASIN CHARACTERISTICS
                     TAREA         .28  SUBBASIN AREA

                PRECIPITATION DATA

20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

21 PI           INCREMENTAL PRECIPITATION PATTERN
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .01
                    .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
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                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

317 LG          GREEN AND AMPT LOSS RATE
                    STRTL        .25  STARTING LOSS
                      DTH        .36  MOISTURE DEFICIT
                     PSIF       5.10  WETTING FRONT SUCTION
                    XKSAT        .31  HYDRAULIC CONDUCTIVITY
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

315 UI          INPUT UNITGRAPH,  33 ORDINATES,  VOLUME = 1.00
                   26.0     43.0    101.0    160.0    196.0    255.0    262.0    171.0    147.0    128.0
                  111.0     93.0     74.0     63.0     57.0     46.0     36.0     31.0     29.0     21.0
                   20.0     15.0     13.0     13.0     10.0      5.0      5.0      5.0      5.0      5.0
                    5.0      5.0      5.0

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

                    HYDROGRAPH AT STATION   SUB-21

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.25, TOTAL EXCESS =    1.25

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    212.       4.42                 37.          9.          3.          1.
                         (INCHES)  1.241       1.241       1.241       1.241
                          (AC-FT)    19.         19.         19.         19.

                         CUMULATIVE AREA =     .28 SQ MI


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


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            *            *
323 KK      *   SUB-23   *        BASIN
            *            *
            **************
                    SUBBASIN 23 RUNOFF

              SUBBASIN RUNOFF DATA

325 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .55  SUBBASIN AREA

                PRECIPITATION DATA

20 PB                STORM       3.50  BASIN TOTAL PRECIPITATION

21 PI             INCREMENTAL PRECIPITATION PATTERN
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .01
                    .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

326 LG          GREEN AND AMPT LOSS RATE
                     STRTL        .25  STARTING LOSS
                       DTH        .36  MOISTURE DEFICIT
                      PSIF       5.00  WETTING FRONT SUCTION
                     XKSAT        .35  HYDRAULIC CONDUCTIVITY
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

324 UI          INPUT UNITGRAPH,  35 ORDINATES,  VOLUME =  .99
                   48.0     71.0    176.0    279.0    348.0    427.0    547.0    349.0    289.0    254.0
                  223.0    194.0    161.0    129.0    115.0    104.0     82.0     65.0     58.0     53.0
                   39.0     37.0     29.0     24.0     24.0     24.0      9.0      9.0      9.0      9.0
                    9.0      9.0      9.0      9.0      9.0

                                                                  ***

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

                    HYDROGRAPH AT STATION   SUB-23

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.34, TOTAL EXCESS =    1.16

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    383.       4.42                 68.         17.          6.          2.
                         (INCHES)  1.157       1.157       1.157       1.157
                          (AC-FT)    34.         34.         34.         34.
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                    CUMULATIVE AREA =      .55 SQ MI

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          *            *
 332 KK   *    DUMMY   *
          *            *
          **************
                    COMBINE HYDROGRAPHS TO REDUCE NO OF HYDROGRAPHS

 334 HC         HYDROGRAPH COMBINATION
                     ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***
     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    DUMMY

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    1821.      4.50                330.         82.         27.          12.
                         (INCHES)  1.235       1.235       1.235        1.235
                          (AC-FT)   163.        163.        163.         163.

                    CUMULATIVE AREA =    2.48 SQ MI

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

          **************
          *            *
 335 KK   *   SUB-24   *        BASIN
          *            *
          **************
                    SUBBASIN 24 RUNOFF

            SUBBASIN RUNOFF DATA

 337 BA         SUBBASIN CHARACTERISTICS
                     TAREA          .41  SUBBASIN AREA

                PRECIPITATION DATA

  20 PB              STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI           INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                     .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                     .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                     .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00

 338 LG         GREEN AND AMPT LOSS RATE
                     STRTL         .25  STARTING LOSS
                       DTH         .38  MOISTURE DEFICIT
                      PSIF        5.40  WETTING FRONT SUCTION
                     XKSAT         .30  HYDRAULIC CONDUCTIVITY
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

 336 UI         INPUT UNITGRAPH,  39 ORDINATES,  VOLUME =  .99
                    32.0      33.0     101.0     156.0     206.0     242.0     303.0     353.0     227.0     191.0
                   172.0     153.0     135.0     118.0      99.0      81.0      75.0      68.0      55.0      46.0
                    40.0      35.0      33.0      24.0      24.0      19.0      16.0      16.0      16.0      10.0
                     6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0       6.0
                                                          ***
     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION   SUB-24

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.28, TOTAL EXCESS =    1.22

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     273.     4.50                 53.         13.          4.           2.
                         (INCHES)  1.202       1.202       1.202        1.202
                          (AC-FT)    26.         26.         26.          26.
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                    CUMULATIVE AREA =     .41 SQ MI

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

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          *            *
 345 KK   *   SUB-25   *        BASIN
          *            *
          **************
                    SUBBASIN 25 RUNOFF

             SUBBASIN RUNOFF DATA

 347 BA        SUBBASIN CHARACTERISTICS
                    TAREA          .34  SUBBASIN AREA

               PRECIPITATION DATA

  20 PB             STORM        3.50  BASIN TOTAL PRECIPITATION

  21 PI          INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                    .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                    .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00

 348 LG        GREEN AND AMPT LOSS RATE
                    STRTL         .25  STARTING LOSS
                      DTH         .39  MOISTURE DEFICIT
                     PSIF        5.70  WETTING FRONT SUCTION
                    XKSAT         .27  HYDRAULIC CONDUCTIVITY
                    RTIMP         .00  PERCENT IMPERVIOUS AREA

 346 UI         INPUT UNITGRAPH,  28 ORDINATES,  VOLUME =  .99
                   37.0      79.0     179.0     254.0     329.0     381.0     239.0     201.0     171.0     143.0
                  113.0      91.0      81.0      63.0      47.0      41.0      33.0      28.0      21.0      18.0
                   18.0       9.0       7.0       7.0       7.0       7.0       7.0       7.0
                                                                  ***
     ***            ***            ***            ***            ***

                     HYDROGRAPH AT STATION   SUB-25

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.24, TOTAL EXCESS =    1.26

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+    280.       4.33                46.         11.          4.          2.
                          (INCHES)  1.250       1.250       1.250       1.250
                           (AC-FT)   23.         23.         23.         23.

                          CUMULATIVE AREA =     .34 SQ MI
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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-3 | 549. | 4.58 | 125. | 31. | 10. | .84 | | |
| + | HYDROGRAPH AT | SUB-4 | 211. | 4.67 | 56. | 14. | 5. | .34 | | |
| + | 2 COMBINED AT | CP-3 | 753. | 4.58 | 181. | 46. | 15. | 1.18 | | |
| + | ROUTED TO | R3-A | 734. | 4.75 | 180. | 46. | 15. | 1.18 | | |
| + | | | | | | | | | 434.25 | 4.75 |
| + | HYDROGRAPH AT | SUB-2 | 222. | 4.42 | 39. | 10. | 3. | .33 | | |
| + | 2 COMBINED AT | CP-A1 | 887. | 4.67 | 219. | 55. | 18. | 1.51 | | |
| + | HYDROGRAPH AT | SUB-1 | 245. | 4.50 | 52. | 13. | 4. | .36 | | |
| + | 2 COMBINED AT | CP-A | 1101. | 4.67 | 270. | 68. | 23. | 1.87 | | |
| + | HYDROGRAPH AT | SUB-7 | 386. | 4.67 | 101. | 26. | 9. | .60 | | |
| + | HYDROGRAPH AT | SUB-8 | 237. | 4.42 | 52. | 13. | 4. | .28 | | |
| + | 2 COMBINED AT | CP-7 | 593. | 4.58 | 153. | 39. | 13. | .88 | | |
| + | ROUTED TO | R7-6 | 586. | 4.75 | 153. | 39. | 13. | .88 | | |
| + | | | | | | | | | 511.04 | 4.75 |
| + | HYDROGRAPH AT | SUB-9 | 395. | 4.33 | 69. | 17. | 6. | .43 | | |
| + | ROUTED TO | R9-6 | 387. | 4.50 | 69. | 17. | 6. | .43 | | |
| + | | | | | | | | | 414.22 | 4.50 |
| + | HYDROGRAPH AT | SUB-6 | 391. | 4.33 | 72. | 18. | 6. | .53 | | |
| + | 3 COMBINED AT | CP-6 | 1239. | 4.58 | 292. | 74. | 25. | 1.84 | | |
| + | ROUTED TO | R6-B | 1235. | 4.67 | 292. | 74. | 25. | 1.84 | | |
| + | | | | | | | | | 314.13 | 4.67 |
| + | HYDROGRAPH AT | SUB-5 | 116. | 4.08 | 13. | 3. | 1. | .13 | | |
| + | 2 COMBINED AT | CP-B | 1264. | 4.58 | 305. | 78. | 26. | 1.97 | | |
| + | HYDROGRAPH AT | SUB-20 | 366. | 4.42 | 67. | 17. | 6. | .51 | | |
| + | ROUTED TO | R20-13 | 341. | 4.75 | 67. | 17. | 6. | .51 | | |
| + | | | | | | | | | 947.97 | 4.75 |
| + | HYDROGRAPH AT | SUB-13 | 246. | 4.50 | 52. | 13. | 4. | .38 | | |
| + | 2 COMBINED AT | CP-13 | 571. | 4.67 | 119. | 30. | 10. | .89 | | |
| + | ROUTED TO | R13-12 | 567. | 4.75 | 119. | 30. | 10. | .89 | | |
| + | | | | | | | | | 797.94 | 4.75 |
| + | HYDROGRAPH AT | SUB-12 | 229. | 4.50 | 47. | 12. | 4. | .36 | | |
| + | 2 COMBINED AT | CP-12A | 762. | 4.67 | 166. | 42. | 14. | 1.25 | | |
| + | HYDROGRAPH AT | SUB-16 | 301. | 4.50 | 57. | 14. | 5. | .43 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2 COMBINED AT | | | | | | | | |
| + | | CP-12 | 1024. | 4.67 | 223. | 56. | 19. | 1.68 | |
| | ROUTED TO | | | | | | | | |
| + | | R12-11 | 1017. | 4.83 | 223. | 56. | 19. | 1.68 | |
| + | | | | | | | | | 683.83 4.83 |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-15 | 364. | 4.42 | 67. | 17. | 6. | .48 | |
| | ROUTED TO | | | | | | | | |
| + | | R15-11 | 359. | 4.50 | 67. | 17. | 6. | .48 | |
| + | | | | | | | | | 732.17 4.50 |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-11 | 442. | 4.25 | 67. | 17. | 6. | .50 | |
| | 3 COMBINED AT | | | | | | | | |
| + | | CP-11 | 1524. | 4.75 | 356. | 89. | 30. | 2.66 | |
| | ROUTED TO | | | | | | | | |
| + | | R11-C | 1519. | 4.83 | 356. | 89. | 30. | 2.66 | |
| + | | | | | | | | | 451.69 4.83 |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-10 | 182. | 4.17 | 24. | 6. | 2. | .22 | |
| | 2 COMBINED AT | | | | | | | | |
| + | | CP-C | 1561. | 4.75 | 380. | 95. | 32. | 2.88 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-14 | 279. | 4.50 | 53. | 13. | 4. | .41 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-17 | 226. | 4.25 | 33. | 8. | 3. | .24 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-22 | 519. | 4.33 | 88. | 22. | 7. | .64 | |
| | ROUTED TO | | | | | | | | |
| + | | R22-19 | 514. | 4.50 | 88. | 22. | 7. | .64 | |
| + | | | | | | | | | 98.67 4.50 |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-19 | 519. | 4.33 | 83. | 21. | 7. | .59 | |
| | 2 COMBINED AT | | | | | | | | |
| + | | CP-19 | 998. | 4.33 | 171. | 43. | 14. | 1.23 | |
| | ROUTED TO | | | | | | | | |
| + | | R19-F | 985. | 4.58 | 171. | 43. | 14. | 1.23 | |
| + | | | | | | | | | 747.93 4.58 |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-18 | 357. | 4.25 | 52. | 13. | 4. | .42 | |
| | 2 COMBINED AT | | | | | | | | |
| + | | CP-F | 1246. | 4.50 | 224. | 56. | 19. | 1.65 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-21 | 212. | 4.42 | 37. | 9. | 3. | .28 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-23 | 383. | 4.42 | 68. | 17. | 6. | .55 | |
| | 3 COMBINED AT | | | | | | | | |
| + | | DUMMY | 1821. | 4.50 | 330. | 82. | 27. | 2.48 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-24 | 273. | 4.50 | 53. | 13. | 4. | .41 | |
| | HYDROGRAPH AT | | | | | | | | |
| + | | SUB-25 | 280. | 4.33 | 46. | 11. | 4. | .34 | |

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

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              **************
                             COMBINE SUBBASINS 1, AND R3-A

   74 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION     CP-A

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+    1101.      4.67                    270.         68.         23.          10.
                         (INCHES)     1.343       1.361       1.361        1.361
                          (AC-FT)      134.        136.        136.         136.

                         CUMULATIVE AREA =    1.87 SQ MI


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


              **************
              *            *
   75 KK      *     SUB-7  *        BASIN
              *            *
              **************
                             SUBBASIN 7 RUNOFF

                 SUBBASIN RUNOFF DATA

   77 BA          SUBBASIN CHARACTERISTICS
                        TAREA          .60  SUBBASIN AREA

                  PRECIPITATION DATA

   20 PB                STORM        3.50  BASIN TOTAL PRECIPITATION

   21 PI            INCREMENTAL PRECIPITATION PATTERN
                        .00        .00        .00        .00        .00        .00        .00        .00        .00        .01
                        .01        .01        .00        .00        .00        .00        .00        .00        .00        .00
                        .00        .00        .00        .00        .00        .00        .00        .01        .00        .01
                        .01        .01        .01        .01        .01        .01        .02        .02        .02        .03
                        .03        .03        .06        .06        .06        .07        .07        .07        .04        .04
                        .04        .02        .02        .02        .01        .01        .01        .01        .01        .01
                        .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                        .00        .00

   78 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .26  STARTING LOSS
                          DTH         .40  MOISTURE DEFICIT
                         PSIF        6.00  WETTING FRONT SUCTION
                        XKSAT         .23  HYDRAULIC CONDUCTIVITY
                        RTIMP       13.00  PERCENT IMPERVIOUS AREA

   76 UI          INPUT UNITGRAPH,  54 ORDINATES,  VOLUME =  .99
                       34.0       34.0       52.0      109.0      149.0      203.0      231.0      258.0      295.0      372.0
                      367.0      250.0      216.0      199.0      182.0      167.0      154.0      140.0      127.0      112.0
                       96.0       86.0       81.0       76.0       71.0       56.0       52.0       43.0       42.0       37.0
                       37.0       29.0       26.0       26.0       24.0       17.0       17.0       17.0       17.0       17.0
                       10.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0        7.0
                        7.0        7.0        7.0        7.0

                                                                  ***

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

                          HYDROGRAPH AT STATION    SUB-7

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.89, TOTAL EXCESS =    1.61

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     386.     4.67                    101.         26.          9.           4.
                         (INCHES)     1.573       1.603       1.603        1.603
                          (AC-FT)       50.         51.         51.          51.

                         CUMULATIVE AREA =     .60 SQ MI


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


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              *            *
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 86 KK     *     SUB-8  *        BASIN
           *            *
           **************
                         SUBBASIN 8 RUNOFF

                 SUBBASIN RUNOFF DATA

 88 BA            SUBBASIN CHARACTERISTICS
                        TAREA          .28  SUBBASIN AREA

                  PRECIPITATION DATA

 20 PB                  STORM         3.50  BASIN TOTAL PRECIPITATION

 21 PI              INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                       .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                       .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                       .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
                       .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00

 89 LG            GREEN AND AMPT LOSS RATE
                        STRTL          .26  STARTING LOSS
                          DTH          .39  MOISTURE DEFICIT
                         PSIF         5.80  WETTING FRONT SUCTION
                        XKSAT          .24  HYDRAULIC CONDUCTIVITY
                        RTIMP        21.00  PERCENT IMPERVIOUS AREA

 87 UI            INPUT UNITGRAPH,  36 ORDINATES,  VOLUME =  .98
                      24.0      33.0      84.0     133.0     167.0     201.0     272.0     184.0     146.0     129.0
                     114.0      98.0      84.0      68.0      59.0      53.0      45.0      36.0      30.0      26.0
                      23.0      18.0      18.0      12.0      12.0      12.0       9.0       5.0       5.0       5.0
                       5.0       5.0       5.0       5.0       5.0       5.0
                                                                          ***

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

                        HYDROGRAPH AT STATION    SUB-8

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.72, TOTAL EXCESS =    1.78

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     237.      4.42                52.         13.          4.           2.
                        (INCHES)   1.739       1.757       1.757        1.757
                         (AC-FT)     26.         26.         26.          26.

                        CUMULATIVE AREA =     .28 SQ MI


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


           **************
           *            *
 95 KK     *     CP-7   *
           *            *
           **************
                         COMBINE SUBBASINS 7 & 8

 97 HC            HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                          ***

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

                        HYDROGRAPH AT STATION     CP-7

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+     593.      4.58                153.         39.         13.           6.
                        (INCHES)   1.618       1.652       1.652        1.652
                         (AC-FT)     76.         78.         78.          78.

                        CUMULATIVE AREA =     .88 SQ MI


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


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           *            *
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# APPENDIX 6

## FEMA FORMS (MT-2 FORM 2)

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
*Expires September 30, 2005*

## PAPERWORK REDUCTION ACT

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Flooding Source: Camp Creek Tributaries-Tributary A
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 1.87 | | 1423 |
| CP-3 | 0.84 | | 771 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
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Flooding Source: Camp Creek Tributaries-Tributary A1
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| AT CONFLUENCE WITH TRIB A | 0.36 | | 364 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
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Flooding Source: Camp Creek Tributaries-Trributary A2
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confluence with Trib-A | 0.34 | | 285 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary B1
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confluence with Trib-B | 0.43 | | 588 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) | |
|---|---|---|---|---|
| | | | Effective | Proposed/Revised |
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary B2
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confluence with Trib-B | 0.28 | | 326 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) | |
|---|---|---|---|---|
| | | | Effective | Proposed/Revised |
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary C
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 2.88 | | 2100 |
| CP-12 | 1.68 | | 1432 |
| CP-13 | 0.89 | | 854 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary C1
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confluence of Trib C | 0.48 | 530 | |
| | | 539 | |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary C2
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confluence with Trib-C | 0.43 | | 447 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) | |
|---|---|---|---|---|
| | | | Effective | Proposed/Revised |
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
*Expires September 30, 2005*

## PAPERWORK REDUCTION ACT

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Flooding Source: Camp Creek Tributaries-Tributary C3
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Confleunec with Trib-C | 0.51 | | 512 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
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Flooding Source: Camp Creek Tributaries-Tributary D
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.41 | | 416 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) | |
|---|---|---|---|---|
| | | | Effective | Proposed/Revised |
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
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Flooding Source: Camp Creek Tributaries-Tributary E
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.24 | | 378 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 3067-0148*
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Flooding Source: Camp Creek Tributaries-Tributary F
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 1.65 | | 1826 |
| CP-19 | 1.23 | | 1510 |
| CP-22 | 0.64 | | 789 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Water-Surface Elevations (ft.) Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary G
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.28 | | 322 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Water-Surface Elevations (ft.) Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary H
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.55 | | 585 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary I
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.41 | | 406 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) Effective | Proposed/Revised |
|---|---|---|---|---|
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

FEDERAL EMERGENCY MANAGEMENT AGENCY

# RIVERINE HYDROLOGY & HYDRAULICS FORM

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Flooding Source: Camp Creek Tributaries-Tributary J
**Note:** Fill out one form for each flooding source studied

## A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

| Location | Drainage Area (Sq. Mi.) | FIS (cfs) | Revised (cfs) |
|---|---|---|---|
| At Camp Creek Confluence | 0.34 | | 436 |

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

## B. HYDRAULICS

1. Reach to be Revised

| | Description | Cross Section | Water-Surface Elevations (ft.) | |
|---|---|---|---|---|
| | | | Effective | Proposed/Revised |
| Downstream Limit | | | | |
| Upstream Limit | | | | |

2. Hydraulic Method Used

Hydraulic Analysis [HEC-2 , HEC-RAS, Other (Attach description)]

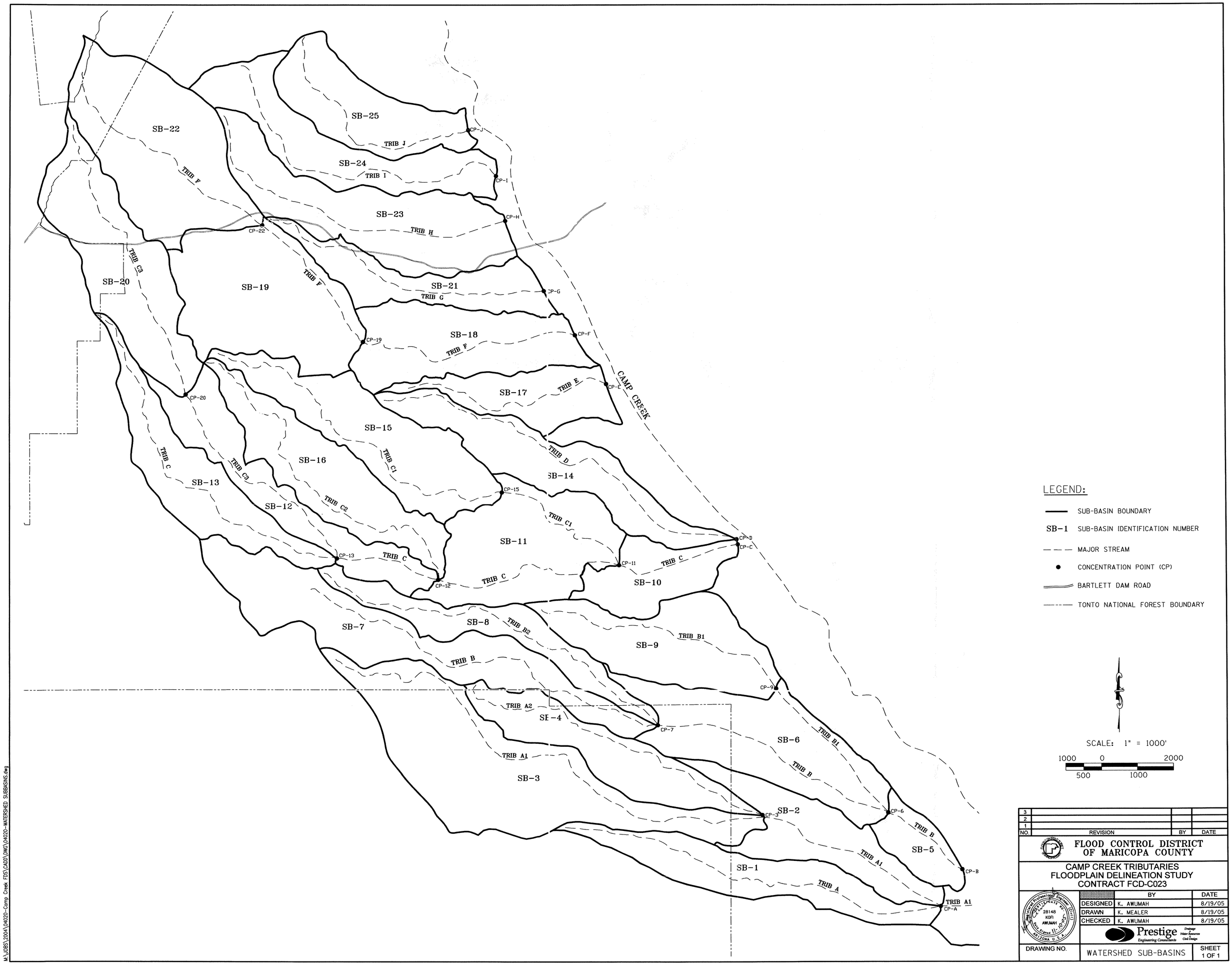
# APPENDIX 7

Camp Creek Tributaries FDS

CD of All Project Files

# PLATE 1

## WATERSHED MAP




| NO. | REVISION | BY | DATE |
|---|---|---|---|
| 3 | | | |
| 2 | | | |
| 1 | | | |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAMP CREEK TRIBUTARIES
FLOODPLAIN DELINEATION STUDY
CONTRACT FCD-C023

| | BY | DATE |
|---|---|---|
| DESIGNED | K. AWUMAH | 8/19/05 |
| DRAWN | K. MEALER | 8/19/05 |
| CHECKED | K. AWUMAH | 8/19/05 |

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed 11-10-05 ARIZONA U.S.A.

Prestige Engineering Consultants — Drainage & Water Resources & Civil Design

DRAWING NO.

WATERSHED SUB-BASINS

SHEET 1 OF 1

M:\JOBS\2004\04020-Camp Creek FDS\CADD\DWG\04020-WATERSHED SUBBASINS.dwg

# PLATE 2

## SOILS MAP

**LEGEND:**

| | |
|---|---|
| ——— | SUB-BASIN BOUNDARY |
| SB-A1A | SUB-BASIN DESIGNATION |
| *33* | SOIL TYPE |

SCALE: 1" = 1000'

1000 0 2000

500 1000

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| 3 | | | |
| 2 | | | |
| 1 | | | |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAMP CREEK TRIBUTARIES
FLOODPLAIN DELINEATION STUDY
CONTRACT FCD-C023

| | BY | DATE |
|---|---|---|
| DESIGNED | K. AWUMAH | 8/08/05 |
| DRAWN | B. DENETDALE | 8/08/05 |
| CHECKED | K. AWUMAH | 8/08/05 |

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed 8-08-05 ARIZONA, U.S.A.

Prestige Engineering Consultants — Drainage, Water Resources, Civil Design

DRAWING NO. | SOILS MAP | SHEET 1 OF 1

Dec 02, 2005 - 9:53am
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# PLATE 3

## EXISTING LAND USE MAP

LEGEND:

SUBBASIN BOUNDARY

TONTO NATIONAL FOREST BOUNDARY

BARTLETT DAM ROAD

R43 RESIDENTIAL (VERY LOW DENSITY)

GOLF COURSE

OPEN DESERT

SCALE: 1" = 1000'

1000 0 2000

500 1000

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| 3 | | | |
| 2 | | | |
| 1 | | | |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAMP CREEK TRIBUTARIES
FLOODPLAIN DELINEATION STUDY
CONTRACT FCD-C023

| | BY | DATE |
|---|---|---|
| DESIGNED | K. AWUMAH | 8/19/05 |
| DRAWN | B. DENETDALE | 8/19/05 |
| CHECKED | K. AWUMAH | 8/19/05 |

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed 8-19-05 ARIZONA U.S.A.

Prestige Engineering Consultants — Drainage, Water Resources, Civil Design

DRAWING NO.

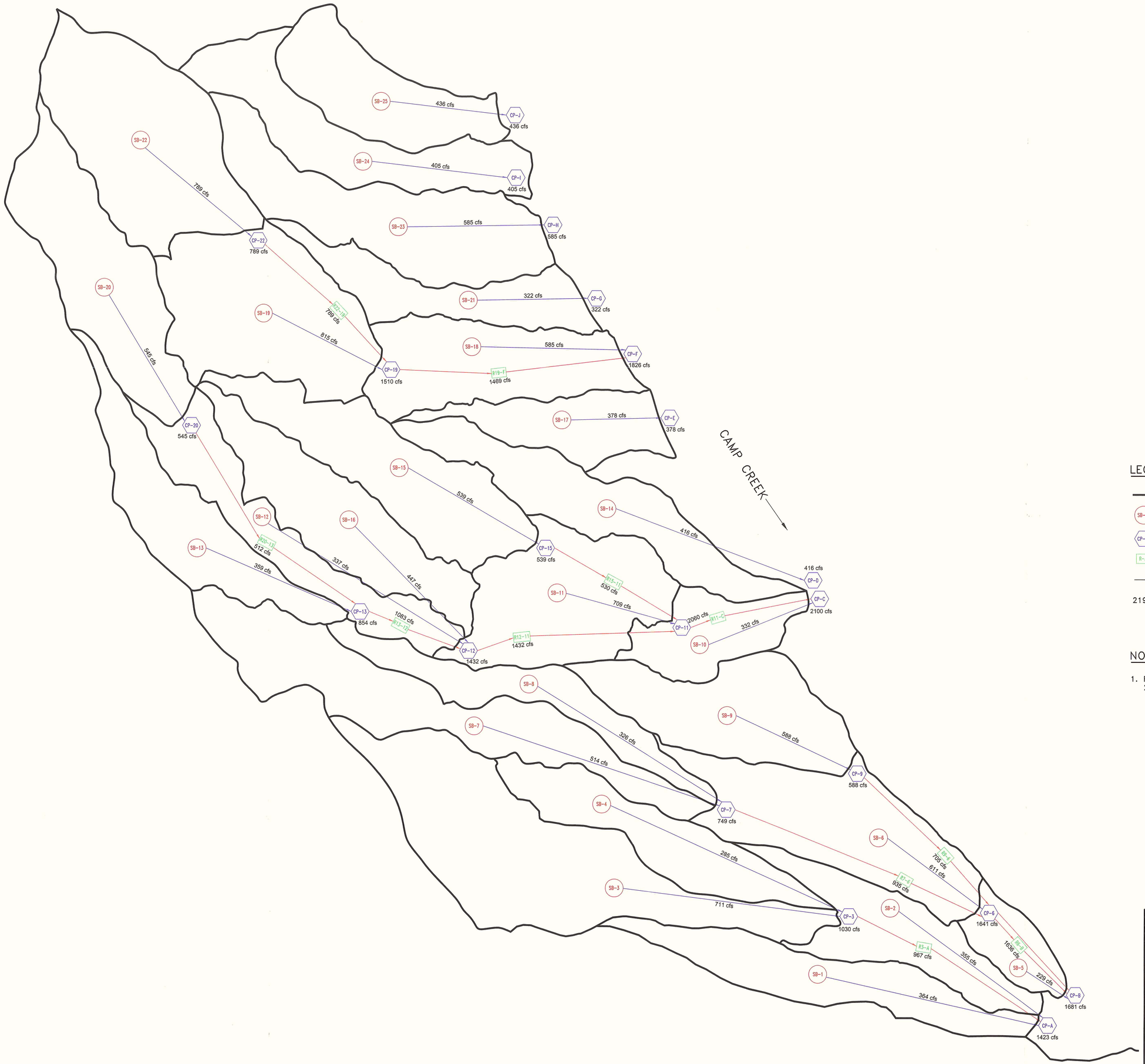
LAND USE MAP

SHEET 1 OF 1

M:\JOBS\200A\04020-Camp Creek FDS\CADD\DWG\04020-LAND USE MAP.dwg

# PLATE 4

## HEC-1 SCHEMATIC MAP




## LEGEND:

- SUB-BASIN BOUNDARY
- SB-A1 SUB-BASIN HYDROGRAPH
- CP-A1 HYDROGRAPH CONCENTRATION POINT
- R-A1 HYDROGRAPH ROUTE
- FLOW DIRECTION (CHANNEL)

2197 cfs = PEAK DISCHARGE AT CONCENTRATION POINT

## NOTES:

1. PEAK DISCHARGES ARE FOR THE 100-YEAR 24-HOUR STORM.

SCALE: 1" = 1000'

1000 0 2000

500 1000

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| 3 | | | |
| 2 | | | |
| 1 | | | |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAMP CREEK TRIBUTARIES FLOODPLAIN DELINEATION STUDY CONTRACT FCD-C023

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed 8-08-05 ARIZONA U.S.A.

| | BY | DATE |
|---|---|---|
| DESIGNED | K. AWUMAH | 8/08/05 |
| DRAWN | K. MEALER | 8/08/05 |
| CHECKED | K. AWUMAH | 8/08/05 |

Prestige Engineering Consultants — Drainage & Water Resources, Civil Design

DRAWING NO. | HEC-1 SCHEMATIC | SHEET 1 OF 1

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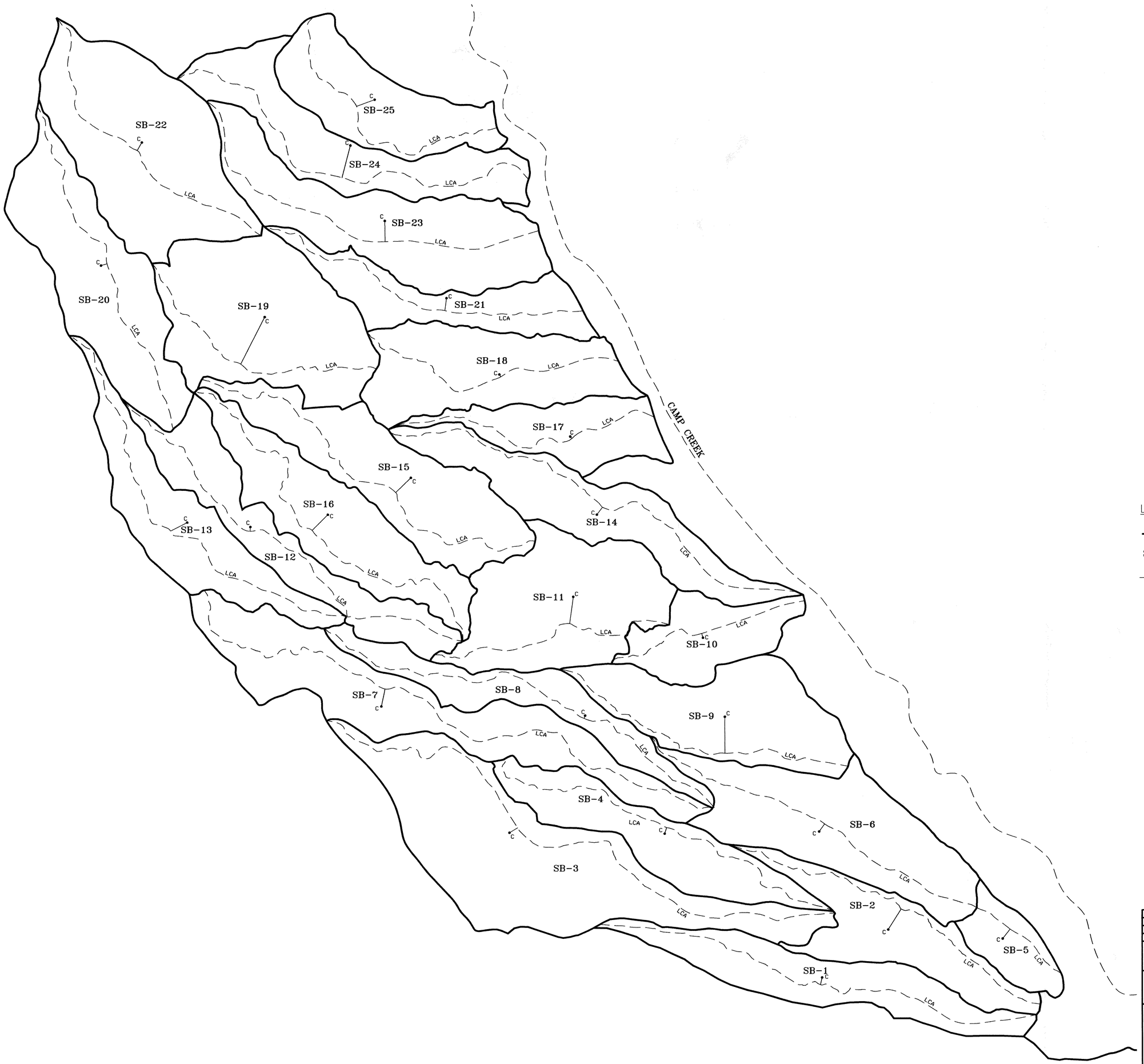
# PLATE 5

## LAG TIME PATH MAP




LEGEND:

SUB-BASIN BOUNDARY

SB-1 SUB-BASIN IDENTIFICATION NUMBER

LAG TIME PATH

C CENTROID

LCA LENGTH FROM CENTROID TO CONCENTRATION POINT

SCALE: 1" = 1000'

1000 0 2000

500 1000

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| 3 | | | |
| 2 | | | |
| 1 | | | |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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| CHECKED | K. AWUMAH | 8/19/05 |

Registered Professional Engineer (Civil) CERTIFICATE NO. 28148 KOFI AWUMAH Date Signed 11-16-05 ARIZONA U.S.A.

Prestige Engineering Consultants — Drainage, Water Resources & Civil Design

DRAWING NO.

LAG TIME PATH SCHEMATIC

SHEET 1 OF 1

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