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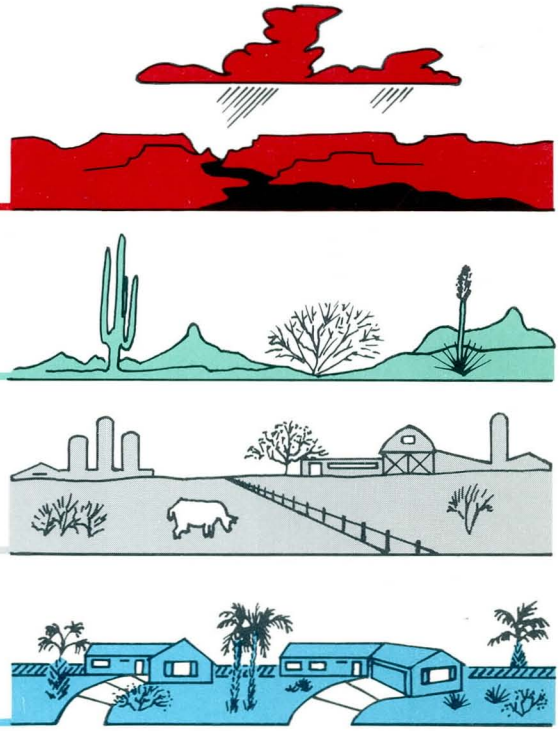

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

JANUARY, 1987

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EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

JANUARY, 1987

FLOOD CONTROL DISTRICT
of
Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 262-1501

D. E. Sagramoso, P.E., Chief Engineer and General Manager

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MAR 19 1987

RE: **Eastern Maricopa County Area Drainage Master Study (ADMS)**

The attached report is the culmination of the initial phase of the **Eastern Maricopa County Area Drainage Master Study (ADMS)**, a study sponsored equally by the District, Maricopa County Highway Department, the City of Mesa, and the U.S.D.A. Soil Conservation Service. The **ADMS** was performed by A-N West, Inc., Consulting Engineers, under contract to the District.

This **ADMS** evaluated existing and possible future hydrologic conditions in a 68-square mile area for purposes of defining area hydrology and providing a database framework for that area. This report summarizes hydrologic and related data and is to be used for information and as input for regulation. In the course of conducting the ADMS, a 100-year stormwater drainage system was considered as a potential **Area Drainage Master Plan (ADMP)**. That concept is described in this report. Lower levels of protection are currently being evaluated by the consultant in an extension of the original study.

NOTE THAT THE **ADMP** HAS NOT BEEN ADOPTED. HOWEVER, THE CONCEPT IS SUPPORTED BY BOTH THE DISTRICT AND THE CITY OF MESA. Users of this report should be alert for updates.

The District is now in the process of updating the hydrology to incorporate the newly published Soil Conservation Service curve numbers (210-VI-TR-55, Second Ed., June 1986) and to reflect ADOT's drainage design for the extension of the Superstition Freeway. Our goal is to keep the hydrology current through periodic updates using data input from you. Please keep us informed of changes that have an impact on the model.

Questions may be addressed to Ms. Kebba Buckley, at the District, 262-1501, or to Mr. Keith Nath at the City of Mesa, 834-2512.

D E Sagramoso

D. E. Sagramoso, P. E.

EASTERN MARICOPA COUNTY
AREA DRAINAGE MASTER STUDY

JANUARY, 1987

Prepared for:
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
3335 West Durango Street
Phoenix, Arizona 85009

Prepared by:
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1.0 INTRODUCTION

1.1 Project History and Study Area Boundary

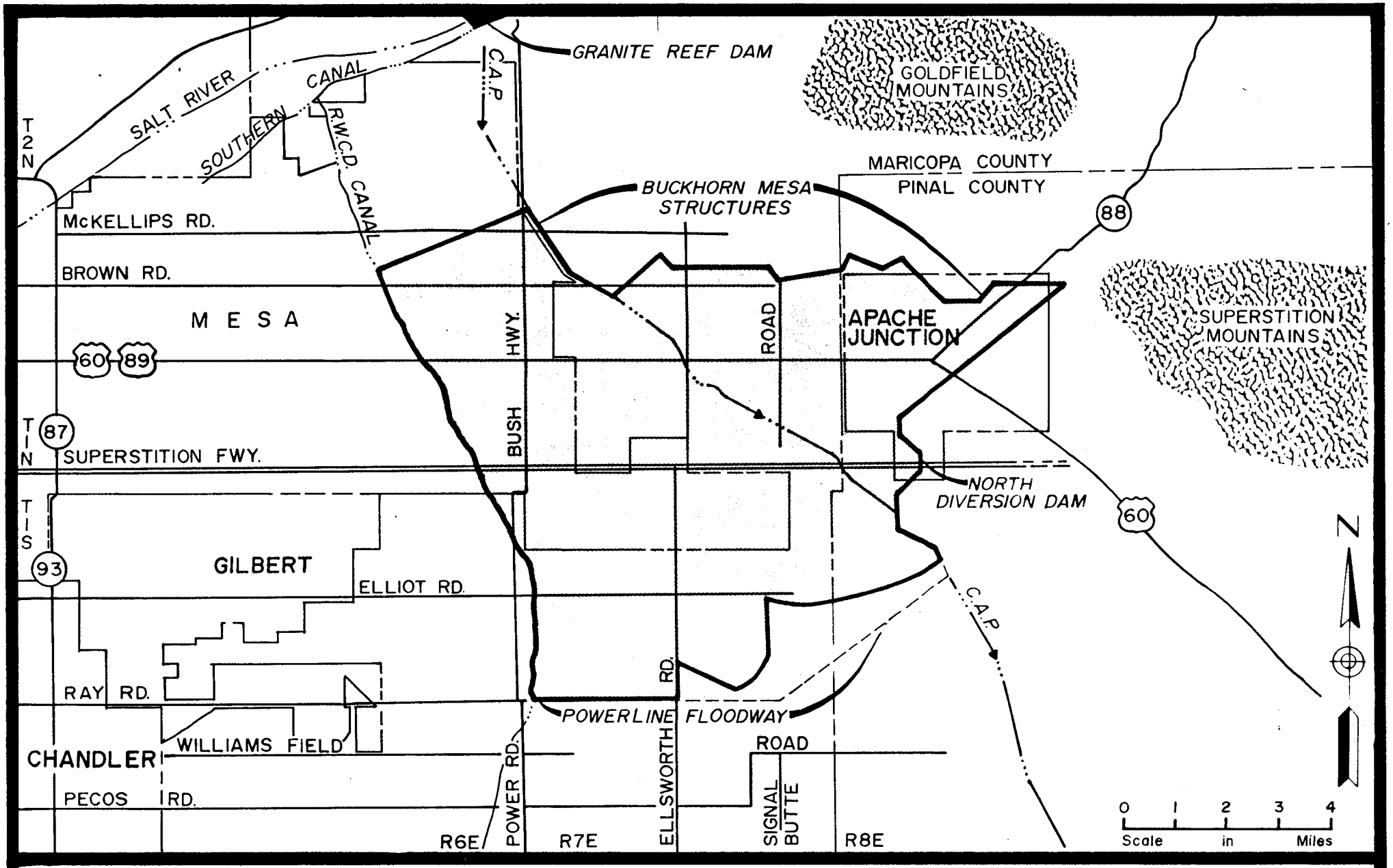
Project History:

This report was prepared by A-N West, Inc. under contract (FCD 84-26) to the Flood Control District of Maricopa County (FCDMC). The original project name was Master Drainage Plan for Eastern Maricopa County, Phase I. After the commencement of this study, the FCDMC initiated a program of Area Drainage Master Studies (ADMS's) of which this became the first. This study is now called the "Eastern Maricopa County Area Drainage Master Study". The purpose of this study is to develop an Area Drainage Master Plan (ADMP) to be used for stormwater planning in this portion of Eastern Maricopa County. This study was initiated due to previous flooding conditions within the 68-square mile study area (see Location Map, Figure 1). One of the significant flooding events occurred September 30- October 3, 1983. Floodwaters rose as existing channels and street capacities were exceeded, damaging and flooding many residences in the developed portions of the study area.

Again, on July 17-18, 1984, the study area was subjected to localized flooding as a result of runoff from an intense rainstorm. The rainstorm was centered near University Drive and the Central Arizona Project (CAP) Canal and produced rainfall intensities in excess of the 100-year point precipitation values. According to the FCDMC, the partially completed Signal Butte Floodway and CAP Canal effectively reduced the peak flows from the storm event through retention of almost 200 acre-feet of water before embankment failures occurred (see Report on Flooding in Eastern Maricopa County, July 17-18, 1984, FCDMC, November 15, 1984). In some areas, three to four feet of water ponded and flows were estimated as high as 2,500 cfs.

Study Area Boundary:

The study area (see Figure 1, Location Map) is located in eastern Maricopa County and northwest Pinal County between the Salt River and Gila River. The 68-square mile study area is bounded on the north and east by the Soil Conservation Service/FCDMC Buckhorn-Mesa Flood Retarding Structures, on the south by approximately the Powerline Floodway and east of Signal Butte Road by the Elliot Road alignment,



LOCATION MAP

FIGURE 1

AN WEST INC.
Consulting Engineers

and on the west by the Roosevelt Water Conservation District (RWCD) irrigation canal. The RWCD Floodway is being constructed along the east side of the RWCD canal. This SCS/FCDMC floodway will outlet into the Gila River and will be used as the outlet for this Area Drainage Master Plan (ADMP)

There are four jurisdictions within the study area, namely Maricopa County, the City of Mesa, Pinal County, and the City of Apache Junction.

1.2 Purpose

The purpose of this report is to document the study approach and decisions reached in identifying the selected drainage system. The two objectives of the study were:

1) To provide a plan for flood protection within the study area in order to minimize or eliminate existing flooding problems and minimize stormwater problems resulting from urbanization.

2) Reduce the peak inflows into the RWCD Floodway to maintain its design integrity.

The HEC-1 computer program was employed to model the approximate 68-square mile watershed for existing and proposed future conditions and the selected alternative. The selected drainage system serves to eliminate or minimize the existing flooding problems presently occurring and meets the design discharges for the RWCD Floodway for the 100-year, 24-hour flood event. The selected alternative incorporates a system of regional detention basins and channels to reduce existing condition runoff peaks to acceptable inflows into the Soil Conservation Service/FCDMC RWCD Floodway.

1.3 Study Approach

Numerous meetings were held with representatives of the Flood Control District of Maricopa County (FCDMC), City of Mesa (COM), USDA Soil Conservation Service (SCS), City of Apache Junction (COAJ), Arizona Department of Transportation (ADOT), and Bureau of Reclamation (USBR) to obtain information concerning the study area. In addition, letters were sent to public agencies and utility companies requesting pertinent

information for the study area. Information received was used to help develop HEC-1 computer models of the existing watershed, the future watershed (year 2000), and the selected area drainage master plan.

In modeling the study area, the following assumptions were made:

1. All the SCS Buckhorn-Mesa flood retarding structures (including the Weekes Wash Dam) were in place and provide a minimum of 100-year flood protection. As of December 1986, there is no committed local sponsor for the Weekes Wash FRS project. Future studies should re-evaluate the assumption of the Weekes Wash FRS being constructed.

2. Apache Trail (US 60-80-89) did not alter runoff patterns and the numerous culverts under Apache Trail had 100-year capacity (see Appendix C).

3. The Superstition Freeway was in place from the RWCD irrigation canal to the North Diversion Dam (see Figure 1, Location Map). It was further assumed that the offsite drainage system for the Superstition, which has not yet been established, would collect, concentrate, and pass offsite flows at several crossings.

4. The HEC-1 model's kinematic wave subroutine adequately represented the routing characteristics of the runoff occurring in the subareas.

5. The Central Arizona Project (CAP) functioned as designed and that overchutes passed concentrated flows without altering the runoff hydrograph (i.e., minimal ponding and detention at overchutes) (see Appendix C).

The HEC-1 computer model was oriented to model the 100-year, 24-hour flood event. The 100-year, 24-hour storm was used for consistency with the Soil Conservation Service RWCD Floodway design storm. This duration would also produce a reasonable worst case volume for detention facility design. The 2-, 5-, 10-, and 50-year rainfall-runoff events were also computed with the same model by changing only the precipitation values.

Numerous field visits were conducted in order to become familiar with the watershed and to verify both the existing condition hydrology model and the results of the modeling effort. Information concerning existing condition flow patterns, wash locations, and sizes was obtained during site visits.

2.0 WATERSHED DESCRIPTION

2.1 Topography

The study area is approximately 68-square miles in size and lies in the alluvial fans of the Usery and Goldfield Mountains to the north. Except a few rock outcrops the land has an approximately uniform slope from northeast to southwest at generally less than a 2 percent grade. The study area currently drains to the upstream side of the Roosevelt Water Conservation District (RWCD) irrigation canal and eventually flows south to the Gila River. The RWCD Floodway is currently under construction paralleling the RWCD irrigation canal. The Floodway will outlet into the Gila River.

2.2 Vegetation

Natural vegetation is sparse with plant species being typical to desert areas where average annual rainfall is less than ten (10) inches. The natural vegetation consists predominately of the following: creosote bushes, mesquite trees, and various cacti. In undeveloped areas, annual grasses generally occur after winter rains. Vegetation in the developed areas generally corresponds to the natural, low water use vegetation.

2.3 Runoff Characteristics

The natural drainage features in the study area generally consist of numerous small, low capacity washes which flow only during and immediately following heavy precipitation. As the capacity of these shallow washes is exceeded, overflow occurs and excess runoff occurs as sheet flow.

The Central Arizona Project (CAP) aquaduct crosses the area on a northwest to southeast alignment. The CAP collects runoff at the upstream face of the aquaduct embankment and passes concentrated flows across the CAP at the sixteen (16) overchute locations within the study area. The Bureau of Reclamation (USBR) has indicated that the overchutes were sized to pass 100-year discharges (see Appendix C). Some of the overchutes are fed by a flat distribution channel to equalize flow through them. The capacity of the washes receiving the overchute flows is usually not adequate to carry 100-year discharges.

Apache Trail (US 60-80-89) has an east-west alignment and concentrates and passes stormwater runoff through numerous (60+) culverts discharging into small downstream washes. On a 100-year flood basis, the adequacy of these receiving washes is suspect.

Numerous small channels have been built in the study area to route the smaller flows around or through developed areas. Without exception, these channels are inadequate to convey existing 100-year discharges.

The Broadway Road channel west of Power Road, the Superstition Freeway channel west of Power Road and the Sossaman Road channel collect overland flows and transport them to the east side of the RWCD irrigation canal. All three channels have less than existing condition 100-year discharge capacity.

Currently (December, 1985), 30 to 40 percent of the watershed is developed. The study area is developing rapidly and is one of the fastest growing areas in Maricopa County. Part of the effect of urbanization is the increase in runoff due to reduced infiltration of rainfall and a decrease in the travel time due to more impervious drainageways which, together, tend to increase the peak runoff significantly.

3.0 PRECIPITATION DATA

Typically, there are two seasonal precipitation patterns that cause flooding in the study area. The summer thunderstorm or monsoonal rains are short in duration and produce high intensity rainfall. They consist of sporadic showers and cloud bursts over small areas. The variable winter low pressure rains are of longer duration and produce lower intensity rainfall.

All precipitation values used in the study were interpreted from the U.S. Department of Commerce's publication entitled "NOAA Atlas No. 2, Precipitation - Frequency Atlas of the Western United States, Vol. VIII - Arizona", dated 1973. The NOAA Atlas gives precipitation values for return intervals of 2-, 5-, 10-, 25-, 50-, and 100-year for 6- and 24-hour durations. Procedures used to determine precipitation values for various return interval storms and rainfall durations based on the NOAA Atlas are outlined in the ADOT publication entitled "Addendum to Hydrologic Design for Highway Drainage in Arizona" dated April, 1975. These procedures were used to generate the following rainfall values used in the study.

PRECIPITATION VALUES

RETURN INTERVAL (years)	24 HOUR (inches)
2	1.35
5	1.90
10	2.30
50	3.20
100	3.65

The SCS Type II rainfall distribution was used by the HEC-1 computer program in computing all rainfall-runoff relationships. The Type II distribution is a dimensionless rainfall distribution based on U.S. Weather Bureau technical papers. The Type II rainfall distribution is used for the State of Arizona for areas less than 400 square miles, rainfall durations up to 24-hours, and return intervals of 1 to 100 years.

4.0 HYDROLOGY

4.1 Development of Hydrographs

The Corps of Engineers' HEC-1 computer program was used to develop peak discharges and hydrograph volumes for the 24-hour, 2-, 5-, 10-, 50-, and 100-year storms. A description of the HEC-1 computer program and input parameters is found in Appendix B.

In the HEC-1 computer model, the SCS curve number technique was used to compute surface water runoff from the inputted synthetic rainfall. The Kinematic Wave procedure was used to route runoff hydrographs through the study area. The HEC-1 computer program combined hydrographs, diverted portions of hydrographs to other basins, and modeled the future retention schemes being applied in the study area. A description of the Kinematic Wave procedure is given in Appendix B.

4.2 Drainage Areas

The drainage boundaries for the HEC-1 computer models were determined by using the following data or methods:

1. U.S.G.S. Quadrangle Maps-Buckhorn (1973), Apache Junction (1973), Higley (1981), and Desert Well (1981).

2. Bureau of Reclamation, CAP, Salt-Gila Aqueduct - Reach 1&2, Protective Works Drawings (1981).

3. Soil Conservation Service, RWCD Channel TR-20 Model Schematic (1974).

4. ADOT, as-built drawings for Apache Trail (State Highway 60) (1962 and 1963).

5. ADOT, Superstition Freeway as-built and right-of-way drawings (1974, 1975, and 1983).

6. Drainage Reports for General Motors Desert Proving Grounds prepared by Ellis, Murphy & Holgate Consulting Engineers (1976 and 1977).

7. Aerial stereophotos (July, 1984).

8. Drainage Report for Leisure World Homes prepared by PRC Engineering (1984).

9. Numerous field investigations.

4.3 Curve Numbers

A 40-acre grid was transposed over the study area for use in evaluating subbasin characteristics. Each 40-acre parcel was considered individually to evaluate the current development, SCS curve number, and hydrologic soil group. This grid system was used to obtain composite or weighted curve numbers and drainage areas for each subbasin. A 1" = 1,200' aerial photo was used to evaluate urbanization (photo date December 1984). Curve numbers for each type of development were generated for and approved by Flood Control District of Maricopa County and are listed in Table B-1 in Appendix B.

4.4 Time of Concentration

The time of concentration for each subbasin is calculated internally by HEC-1 using the overland flow, collector, and main channel parameters input into the Kinematic Wave model (see Appendix B, Kinematic Wave Procedure Description and Exhibits 3 and 4, Existing and Future Development and Selected Alternative HEC-1 Subarea Input Parameters).

4.5 Retention Ordinances

There are four jurisdictions within the watershed and all four have different ordinances establishing procedures for addressing stormwater runoff. The jurisdictions and their respective criteria are as follows:

1. Maricopa County - Detention of the difference between the 100-year, 2-hour pre- and post-development runoff volumes.

2. City of Mesa - Retention of 50-year, 24-hour storm runoff (3.2 inches).

3. City of Apache Junction - Retention of 10-year, 24-hour storm runoff (2.4").

5.0 COMPUTER MODELING OF EXISTING CONDITIONS

5.1 Assumptions of Existing Condition Model

In modeling the study area with the HEC-1 computer model using the SCS curve number and Kinematic Wave options, the following assumptions were made for the existing condition model in addition to the assumptions listed in Section 1.3 Study Approach:

1. No retention is modeled for existing condition. Existing retention is difficult to identify and quantify. The effectiveness of existing retention facilities is also difficult to determine. For these reasons, the conservative assumption of no retention was used in modeling existing conditions.

2. Only development shown on the December 1984 Landis Aerial photos was considered as development for existing conditions.

3. Major stormwater conveyance facilities have 100-year capacity and the study area reacts the same for all frequency events (i.e. the same flow patterns and conveyance channels are used to collect and route the storm runoff for the 2- to 50-year flows as were used on the 100-year flows).

4. Once stormwater has entered a collector or main channel, no breakouts occur and runoff does not become overland flow again. The two exceptions were along Broadway between Ellsworth and Hawes Roads and at the intersection of Sossaman and Guadalupe Roads. These two exceptions were modeled by diverting breakout flows.

5.2 Description of Existing Condition Model

The description of the existing condition model is addressed in two parts. Section 5.2.1 contains a generalized description of the study area as it exists now. Section 5.2.2 describes how these conditions were modeled.

5.2.1 Study Area Characteristics

The sixty-eight (68) square mile study area consists almost exclusively of soils in hydrologic soil group B. The few instances of type C and D

4. Pinal County - No established policy.

The Cities of Mesa and Apache Junction have only had jurisdictional authority in the study area for three and five years previous to 1985, respectively. For the most part, retention of floodwaters is non-existent in the study area excepting a couple of large developments in the west central portion of the study area. These developments are using a series of lakes on their golf courses to provide the retention.

soils that exist are found near washes and at rock outcroppings, respectively.

The area above the Superstition Freeway alignment (the upper one-half of the study area) is about 45 percent developed while the area below the freeway is less than 10 percent developed including the dairies in the southwest portion of the study area.

Development above the Central Arizona Project typically consists of single family residences on medium to large lots and many trailer parks and recreation vehicle parks typically having small lots.

Most of the area between the CAP and Sossaman Road is developed in trailer parks with residential and small lots.

The area between Sossaman Road and the RWCD Canal has been developed into planned area developments of single family homes. These are typically large-scale developments incorporating residential, commercial, multi-family, and recreational land uses.

There are some orchards near the RWCD canal in the north and central portion of the study area as of December 1984.

The only major structures in the study area which have an effect on the natural drainage patterns of the area are the Central Arizona Project Aqueduct, Apache Trail (US 60-80-89), the Sossaman Road Channel, Broadway Road Channel, the General Motors Desert Proving Grounds, and the partially completed Superstition Freeway. Most roads and streets in the study area are designed to pass runoff across the road in approximately the natural drainage path using roadway dip sections. Very few culverts exist in the study area except along Apache Trail (U.S. 60-89).

There is a major golf course along the RWCD irrigation canal between Broadway Road and Southern Avenue designed to convey the RWCD Floodway design discharges. This golf course is the only portion of the RWCD Floodway completed in the study area.

5.2.2 HEC-2 Model Parameters

A copy of the HEC-1 computer model input and output is presented in Appendix D. Exhibit 1, Existing and Future Development HEC-1 Schematic shows a schematic of the existing condition HEC-1 model. The study area was divided into 47 subbasins using natural and man-made drainage boundaries determined from the sources listed in Section 4.2 Drainage Areas. A 40-acre grid was transposed over the study area for use in evaluating subbasin characteristics. Each 40-acre parcel was considered individually to evaluate the current development, SCS curve number, and hydrologic soil group. Exhibit 2, Existing Condition Land Use Map, shows curve numbers used for the existing condition HEC-1 model. This grid system was used to obtain composite or weighted curve numbers and drainage areas for each subbasin. Table 1, Hydrologic Parameters, Existing and Future Condition, lists the 47 subareas and the associated drainage areas modeled for existing and future conditions.

Kinematic wave parameters are average values representing the whole subbasin and, therefore, are not totally physically oriented. Exhibit 3, Existing and Future Development HEC-1 Input Subarea Parameters shows locations of the existing main and collector channels used in the HEC-1 computer model. Main channel and collector channel definitions were taken from major existing washes or existing man-made structures from USGS quadrangle maps, visual inspection, and engineering plans. Overland flow lengths were determined from USGS quadrangle maps and then adjusted to produce consistent results over the study area. (See Appendix B - Verification of Runoff Values).

Where surface water diversions occur, the rating curves were generated using the design plans of the structures or using information received from USBR or FCDMC personnel. This was done for the Sossaman Channel at Guadalupe Road, the CAP overchutes, the Hawes Road and Broadway intersection, and others.

5.3 Results of Existing Condition Computer Model

The SCS design discharges along the RWCD Floodway are compared to the existing condition, future condition, and selected alternative discharges in Table 2. The existing and future condition discharges along the RWCD floodway exceed the SCS design discharges as expected

TABLE 1

HYDROLOGIC PARAMETERS

EXISTING AND FUTURE CONDITIONS

SUBAREA I.D.	AREA (Sq.mi.)	WEIGHTED CURVE NO. (CN) EXISTING	FUTURE
SUB2	3.41	81	87
SUB4	3.27	83	85
SUB6	3.41	84	86
SUB8	1.84	83	86
SUB10	0.33	83	86
SUB12	0.75	84	85
SUB14	1.17	86	88
SUB16	0.71	84	86
SUB18	1.50	83	85
SUB20	1.05	85	89
SUB24	2.11	86	87
SUB26	2.69	84	86
SUB28	0.97	79	87
SUB30	1.33	75	86
SUB32	2.27	85	87
SUB34	1.84	84	87
SUB36	0.33	84	89
SUB38	0.99	84	87
SUB40	0.45	84	89
SUB46	2.11	85	87
SUB48	0.91	81	88
SUB50	1.82	79	86
SUB56	0.75	75	75
SUB58	0.46	84	86

SUBAREA I.D.	AREA (Sq.mi.)	WEIGHTED CURVE NO. (CN) EXISTING	FUTURE
SUB60	0.45	83	86
SUB62	2.32	80	85
SUB68	0.77	78	78
SUB70	1.43	85	88
SUB72	1.38	85	85
SUB74	2.78	85	88
SUB76	2.13	84	88
SUB78	0.12*	83	87
SUB82	0.73	84	84
SUB84	0.15	83	83
SUB86	0.80	83	84
SUB88	0.34	83	83
SUB90	2.27	83	90
SUB92	1.84	82	82
SUB94	0.87*	84	88
SUB96	0.14	83	83
SUB98	0.13	83	91
SUB100	0.75	83	91
SUB102	2.67	83	88
SUB104	3.11	83	84
SUB106	2.66	83	83
SUB108	2.00	82	82
SUB110	1.35	83	83

* For Future Condition

SUB78 = 0.72 mi^2

SUB94 = 0.27 mi^2

TABLE 2

COMPARISON OF 100-YEAR 24-HOUR PEAK DISCHARGES

LOCATION RWCD FLOODWAY AT	SCS DESIGN DISCHARGES (cfs)	EXISTING AND FUTURE CONDITION			SELECTED ALTERNATIVE	
		HEC-1 CONCENTRATION POINT	EXISTING CONDITION DISCHARGE (cfs)	FUTURE CONDITION DISCHARGE (cfs)	HEC-1 CONCENTRATION POINT	DISCHARGE (cfs)
Brown Road	1,160				BROWN	391
University Boulevard		SUB2	987	1,367	UNIV	1,928
Apache Trail (US 60)	1,965	CO5	1,882	2,525	US60	1,994
Broadway Rd.	2,290	CO7	2,985	3,339	BROAD	2,499 (1)
Southern Ave.	3,440	CO9	2,900	3,641	CO30	2,519 (2)
Superstition Freeway	4,720	CO27	6,191	8,760	COFREE	3,664 (3)
Baseline Rd.	4,700	CO29	5,971	9,356	COBASE	3,796
Guadalupe Rd.	4,860	CO31	5,806	9,741	COGUAD	4,739
Elliot Road	5,110	CO67	11,399	18,536	COB117	5,108
Warner Road	5,280	CO93	15,829	24,846	CO127	5,213
Ray Road	5,890	CO111	19,553	28,204	CO130	5,756

(1) Flow in RWCD Floodway 1,800 Feet South of Broadway Road.
(2) Reduced Drainage Area and Flow to Southern Avenue due to proposed University channel system.
(3) Restrictive capacity of existing ADOT Superstition Freeway Channel West of Power Road limits inflow at Freeway.

because the RWCD design discharges are based on 1-inch of runoff being retained within the watershed and a less dense development pattern than is now occurring over the watershed. The discharge at Ray Road for existing condition exceeds the RWCD Floodway capacity by over 13,600 cfs or 3.3 times the design capacity. Upstream detention is required to reduce inflows into the RWCD Floodway to its design capacity. The 100-year discharges for all 47 subbasins are found in the HEC-1 Runoff Summary Table in Appendix D. The 2-year to 50-year flows are also found in Appendix D.

6.0 COMPUTER MODELING OF FUTURE DEVELOPMENT CONDITION

6.1 Assumptions of Future Development Condition Model

In formulating the future condition model, the following assumptions were made in addition to those listed in Section 1.3 Study Approach:

1. The 2000 year land use plans for Maricopa County, City of Mesa, and City of Apache Junction defined the fully developed future condition of the study area.

2. Retention in the study area was not considered at the request of the FCDMC. This assumption was made due to the uncertainty of the retention policy areas would be developed under and how well they are enforced. Also, FCDMC wanted to illustrate the need for retention by estimating the runoff from the study area if there were no stormwater regulatory controls on development.

3. Embankment between subarea 78 and subarea 94 was removed and stormwater is no longer detained. Embankment is an existing irrigation water retention facility. As the area develops it is assumed that it will not be needed and will be removed.

4. Major stormwater conveyance facilities have 100-year capacity and the study area reacts the same for all frequency events (i.e., the same flow patterns and conveyance channels are used to collect and route the storm runoff on a 2- to 50-year basis is used on a 100-year storm).

5. Once the water has entered a collector or main channel, no breakouts occur and runoff does not become overland flow again. The two exceptions were along Broadway between Ellsworth and Hawes Roads and at the intersection of Sossaman and Guadalupe Roads. These two exceptions were modeled by diverting breakout flows.

6.2 Description of Future Condition Model

The only adjustments made in the existing condition model to make it a future condition model were an increase in the curve number corresponding to the future development, shorter overland flow lengths, and reduced overland flow slopes when justified.

The future development for the study area was taken from 1) Mesa General Plan, Part Ten: Land Use, October, 1981, 2) Apache Junction 2001 Land Use Map Revised October 31, 1983, and 3) Maricopa County, Arizona Composite Land Use Plan, 1983.

With the exception of about six square miles of land, all of the study area in Maricopa County was assumed to be in the City of Mesa by the year 2000. A copy of the HEC-1 computer model input is in Appendix E. Exhibit 1, Existing and Future Development HEC-1 Schematic, shows a schematic of the HEC-1 model for the future condition.

6.3 Results of Future Condition Computer Model

A copy of the HEC-1 computer model output Runoff Summary Table for all frequencies is in Appendix E. Discharges at the RWCD Floodway from the future condition model are compared to the existing and selected alternative discharges in Table 2.

The future condition discharge along the RWCD at Ray Road exceeds the RWCD Floodway capacity by over 22,300 cfs or 4.8 times the design capacity. Upstream detention is required to reduce watershed runoff reaching the RWCD to the design capacity. Without any retention ordinances in effect, 80 percent of the peak flow at Ray Road would have to be retained to meet the RWCD design capacity.

7.0 DEVELOPMENT OF ALTERNATIVE MASTER DRAINAGE SYSTEMS

Three basic detention/conveyance philosophies were investigated in developing the alternatives to the Master Drainage Plan:

1. Use numerous (28) small basins to keep channel network small.

2. Use fewer (19) large basins to keep channel network small to medium in size.

3. Use a major channel storage system to both convey and store stormwater.

A fourth alternative developed was a hybrid of the small and large basin concepts (21 basins). This alternative was added at the request of the City of Mesa and the FCDMC. This fourth alternative was considered to be the preferred alternative.

Figures 2 through 5 are the schematics of the four alternatives evaluated. An economic analysis was performed on each channel section to determine if an earth-lined channel with velocities of approximately 5 feet per second or a concrete-lined section with velocities of approximately 10 feet per second was the most economical. The cost of the extra right-of-way required for the unlined channel exceeded the cost of the concrete channel lining. Therefore, the concrete-lined channel was presented. Channels were sized for subcritical flow and basin volumes and sizes were estimated from the existing condition hydrology. Further explanation of each alternative, the analysis performed, and comparative summary is contained in Alternative Drainage Systems, Eastern Maricopa County Master Drainage Plan, Phase I, Executive Summary, Presentation of Alternatives, June 25, 1985, by Anderson-Nichols & Company, Inc. (now A-N West, Inc.).

The preferred alternative was reviewed by the City of Mesa engineering department and was presented to the City of Mesa City Council for review and conceptual approval on July 23, 1985. The preferred alternative concept was accepted by the City Council on the condition that the plan be presented to the public for review and approval.

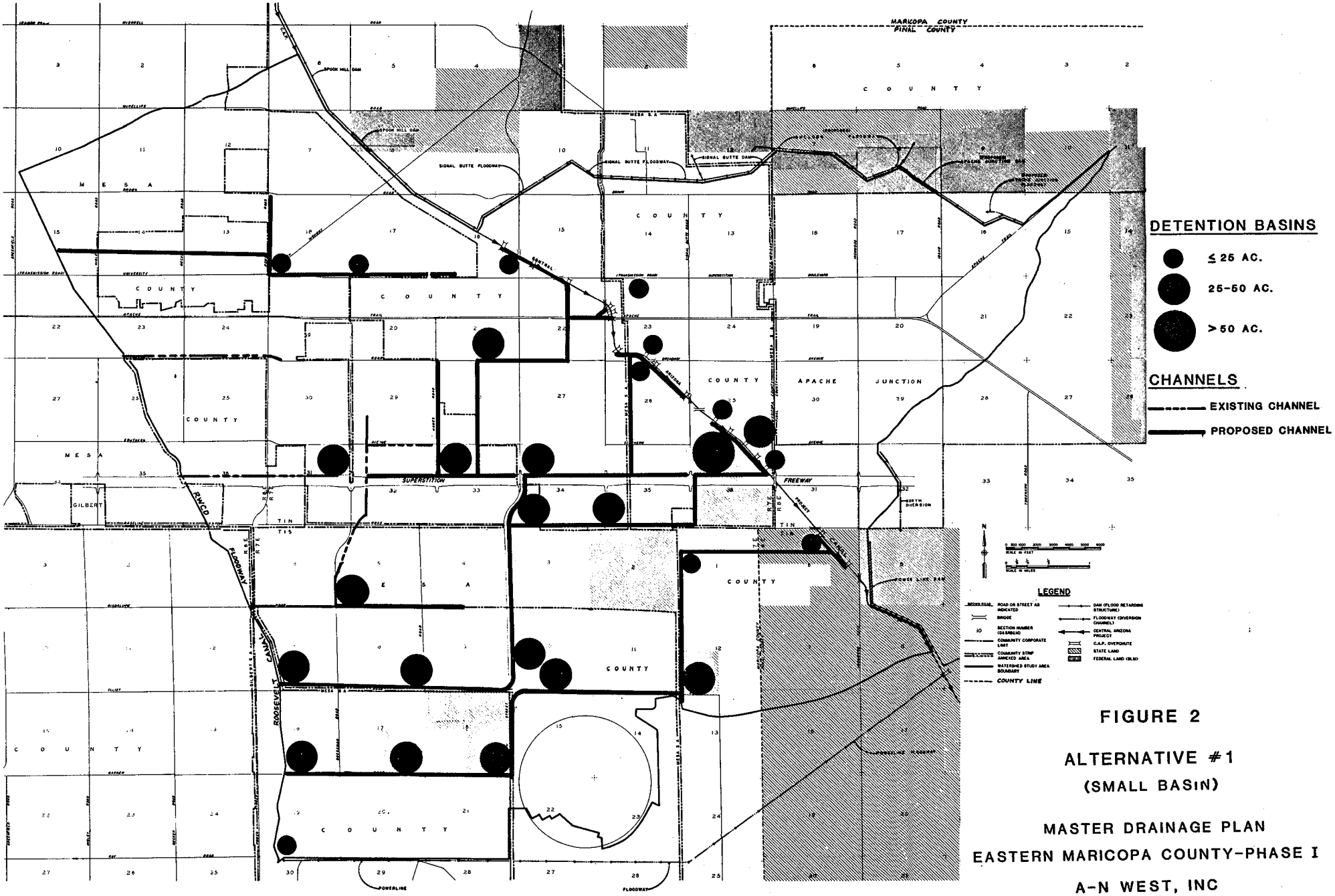


FIGURE 2

ALTERNATIVE #1
(SMALL BASIN)

MASTER DRAINAGE PLAN
EASTERN MARICOPA COUNTY-PHASE I
A-N WEST, INC

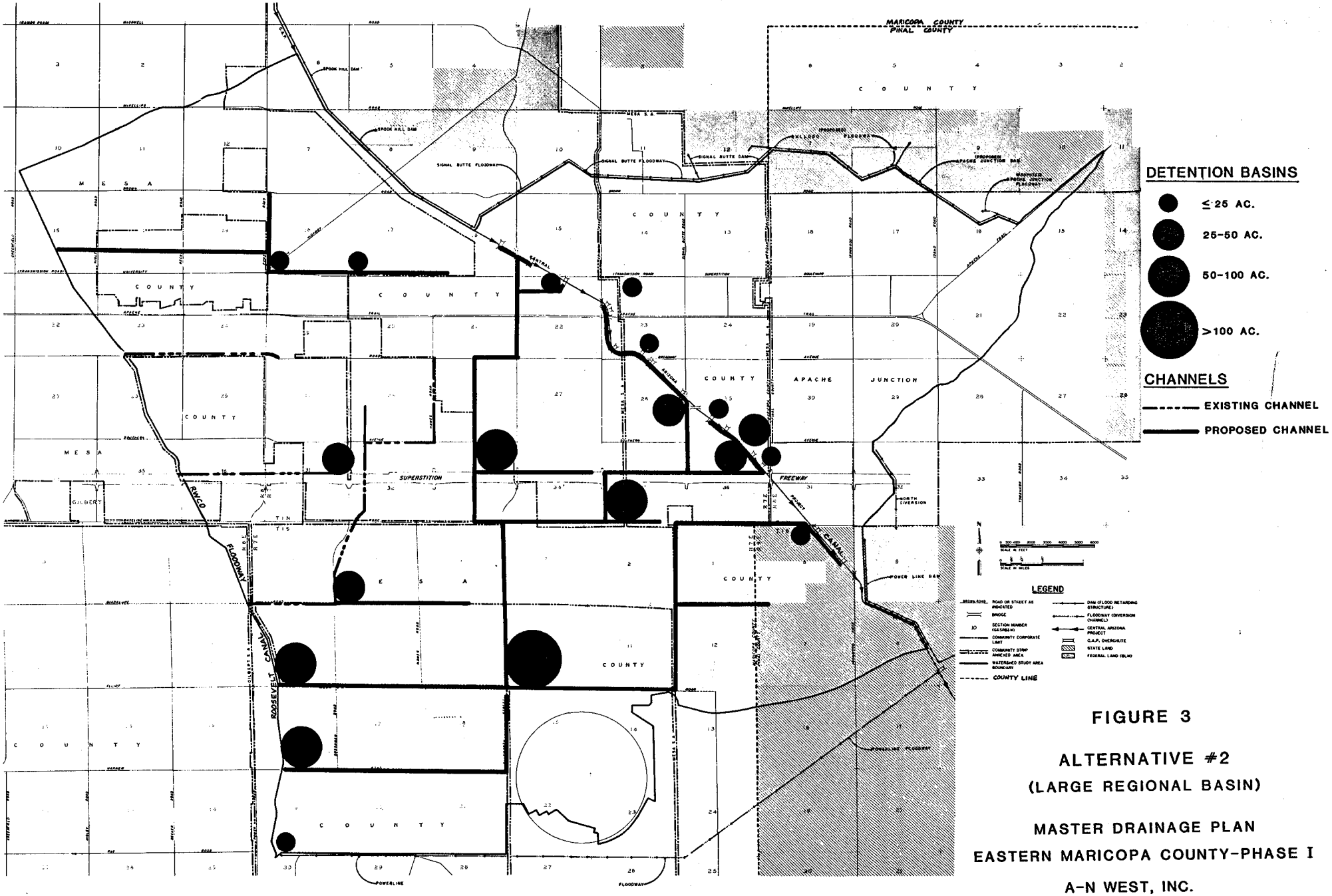


FIGURE 3

ALTERNATIVE #2
(LARGE REGIONAL BASIN)

MASTER DRAINAGE PLAN
EASTERN MARICOPA COUNTY-PHASE I
A-N WEST, INC.

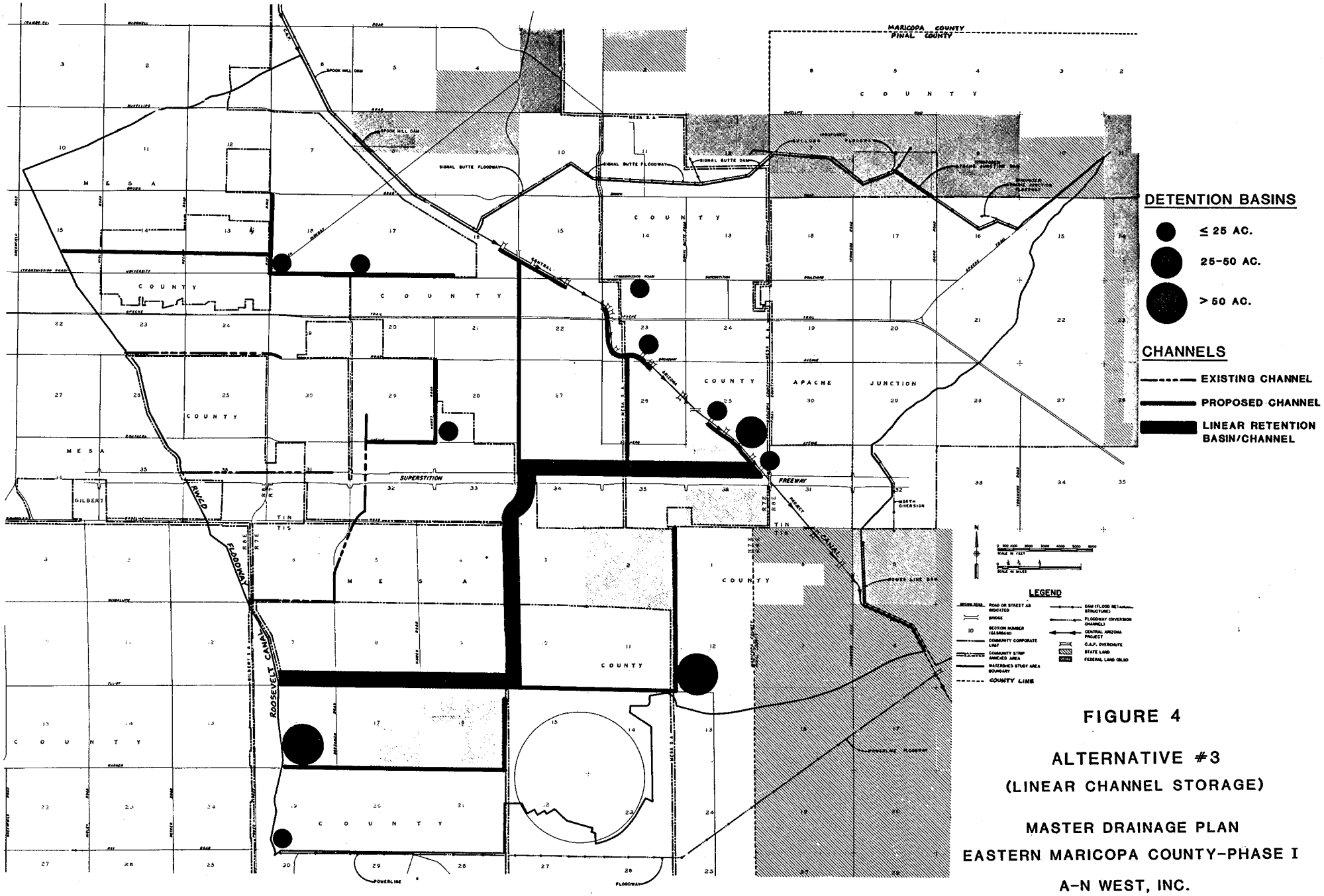


FIGURE 4

ALTERNATIVE #3

(LINEAR CHANNEL STORAGE)

MASTER DRAINAGE PLAN

EASTERN MARICOPA COUNTY-PHASE I

A-N WEST, INC.

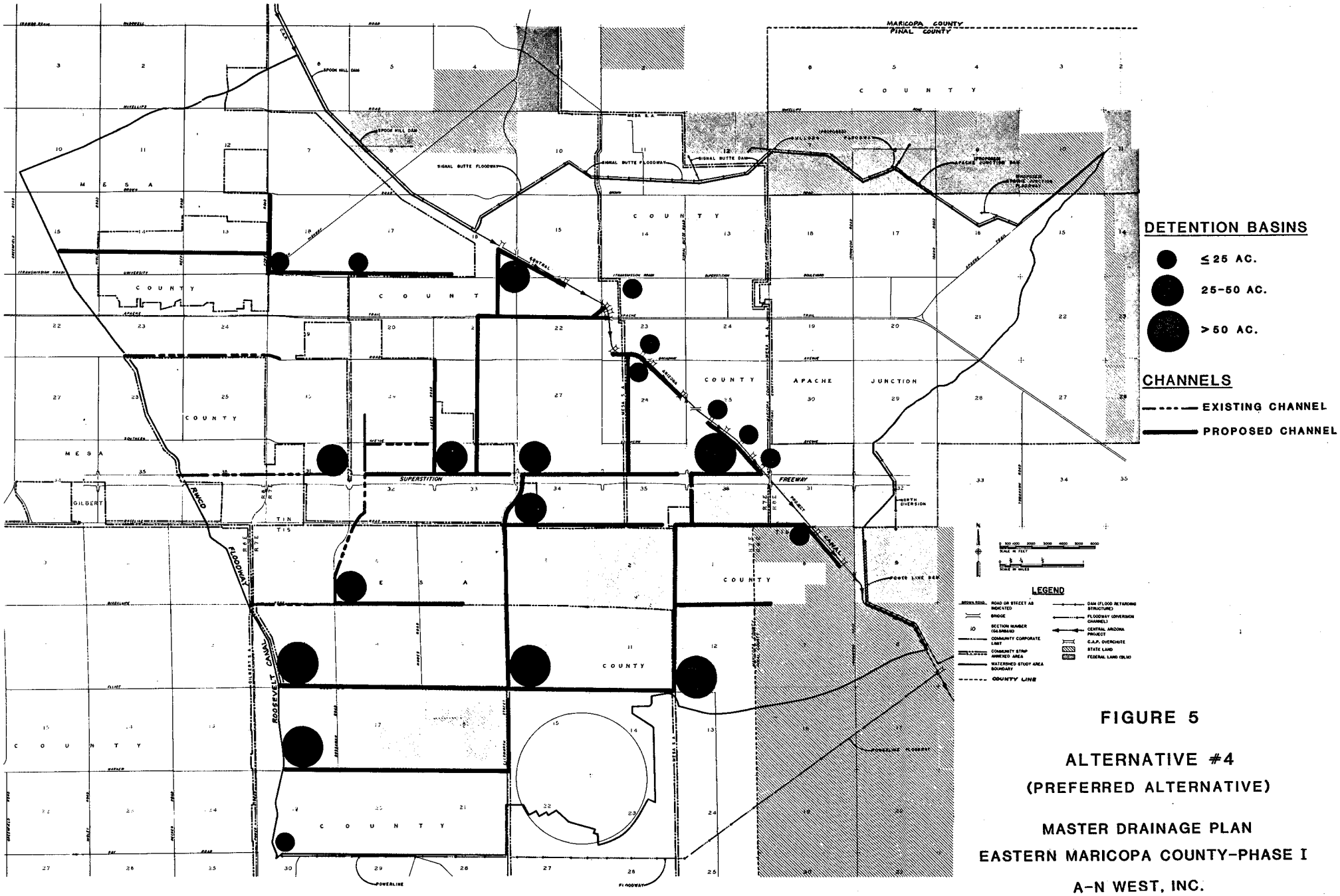


FIGURE 5

ALTERNATIVE #4

(PREFERRED ALTERNATIVE)

MASTER DRAINAGE PLAN

EASTERN MARICOPA COUNTY-PHASE I

A-N WEST, INC.

The FCDMC reviewed and approved this plan in concept and presented it to the Flood Control Advisory Board (FCAB). The FCAB gave conceptual approval to the preferred alternative.

8.0 COMPUTER MODELING OF SELECTED MASTER DRAINAGE SYSTEM

The preferred alternative was amended to include the drainage system above the CAP in addition to some alignment changes below the CAP due to input from Pinal County, the City of Apache Junction, the City of Mesa, and the Flood Control District of Maricopa County. To distinguish this new plan from the preferred alternative, it was referred to as the selected alternative. Figure 6 is the schematic for the selected alternative.

8.1 Assumptions

For the selected alternative HEC-1 computer model, the following assumptions were made in addition to those listed in Section 1.3 Study Approach:

1. Future development would provide, as a minimum, retention equal to the increase in runoff due to the development. Therefore, using existing development conditions to produce stormwater runoff will be a conservative estimate of future runoff conditions as the area develops providing jurisdictional retention requirements.

2. As a result of Assumption 1, the worst definitive condition for the watershed is the existing condition. Therefore, the selected alternative will be modeled under present (December, 1985) development conditions. Updated Landis photos were used to update development as of December 1985.

3. All area within the City of Mesa developed in the two to four years previous to December 1985 would have 50-year, 24-hour retention, but this volume would be modeled 75 percent effective.

4. All area contributing runoff to an area developed with 50-year, 24-hour retention would contribute to the volume of runoff reaching the hypothetical retention facility modeled by HEC-1.

5. The retention was provided as a single basin at the downstream-most point in the development.

6. No significant existing retention in Pinal County or the City of Apache Junction exists. It is assumed that future development will

either be sparse enough not to increase runoff significantly or retention will be provided to prevent an increase in stormwater flows.

7. The overflow characteristics of the retention facilities could be represented by a weir with a length proportional to the volume being stored.

8. The kinematic wave routing procedure represents flow and routing characteristics of the subbasin.

9. The major stormwater conveyance facilities have 100-year capacity and the study area reacts the same for all frequency events.

10. Stormwater does not break out of collector or main channels and become overland flow. The two exceptions modeled were Broadway between Ellsworth and Hawes Roads and Sossaman and Guadalupe Roads.

11. The Red Mountain Freeway and Southeast Loop Freeway corridors would be along Ellsworth Road (north of Warner Road).

8.2 Description

The study area was divided into sixty-nine (69) subareas. Proposed channels and natural drainage boundaries were used to delineate subarea boundaries. USGS quadrangle maps and the aerial stereophotos were used to define natural boundaries. The existing condition curve numbers were modified to reflect development occurring during the study. These curve numbers were used to obtain composite or weighted curve numbers, and retention volumes for each subbasin. Table 3, Hydrologic Parameters, Selected Alternative, lists each subarea drainage area and weighted curve number. Subarea kinematic wave parameters are average values representing the whole subbasin and, therefore, are not totally physically based. Exhibit 4, Selected Alternate HEC-1 Subarea Input Parameters is a subarea parameter map of the study area. Exhibit 5 is the HEC-1 schematic for the selected alternative model.

The existing retention volumes were generated for areas developed in the last two to four years by determining the 50-year, 24-hour runoff volume for the development. A 75 percent effectiveness factor was used

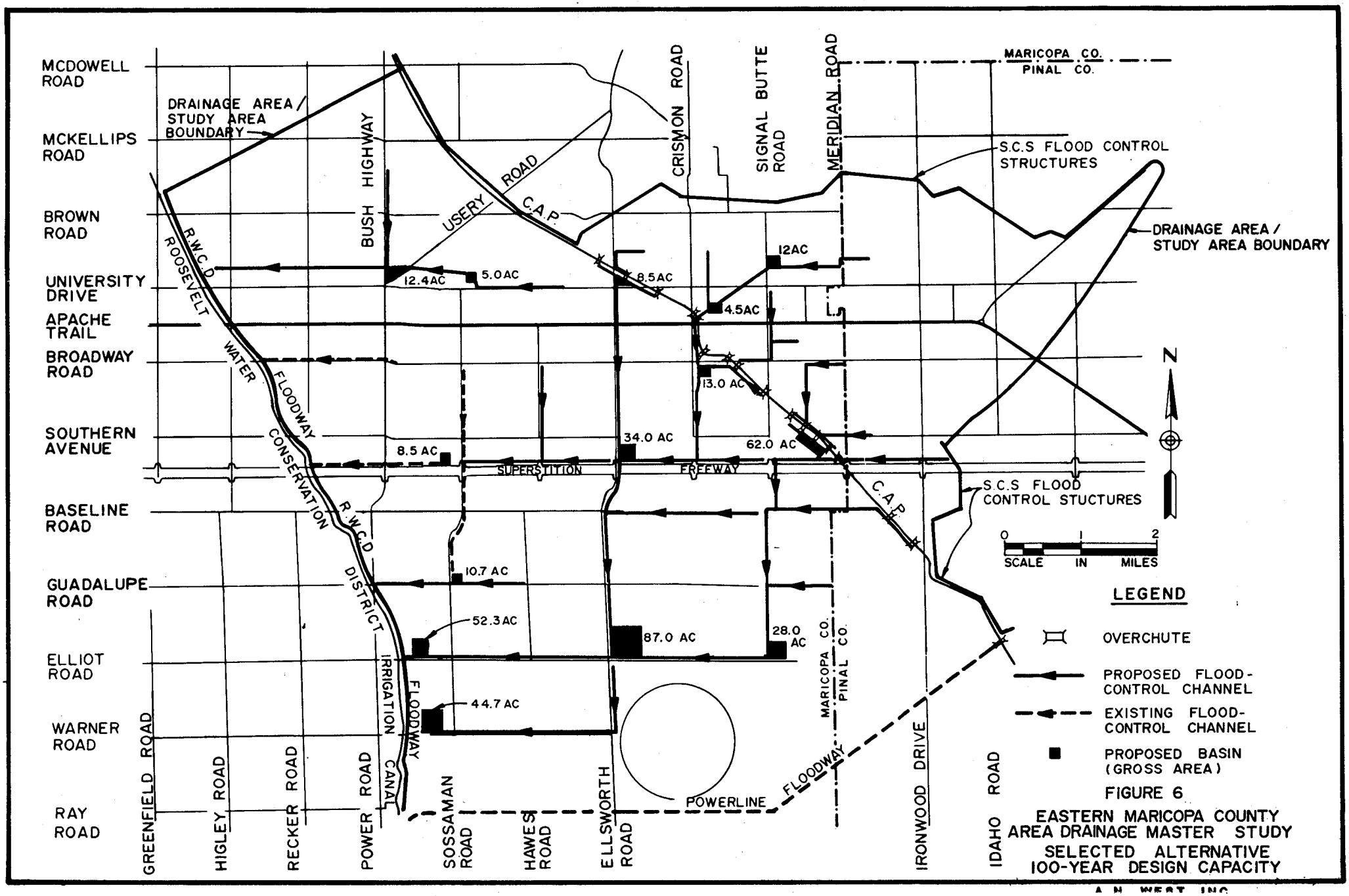


FIGURE 6
EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY
SELECTED ALTERNATIVE
100-YEAR DESIGN CAPACITY

A.N. WEST INC.

TABLE 3

HYDROLOGIC PARAMETERS

SELECTED ALTERNATIVE

SUBAREA I.D.	AREA (Sq.mi.)	WEIGHTED CURVE NO. (CN)
SUB02	1.32	85.0
SUB04	0.95	83.0
SUB06	0.44	85.0
SUB08	0.35	83.5
SUB10	0.98	83.0
SUB12	0.72	83.0
SUB14	0.52	83.5
SUB16	1.22	83.8
SUB18	1.07	86.0
SUB20	0.77	86.0
SUB22	0.38	85.0
SUB24	0.45	85.5
SUB26	1.80	84.9
SUB28	0.33	85.2
SUB30	1.56	84.9
SUB32	1.62	86.4
SUB34	2.30	83.0
SUB36	1.12	79.0
SUB38	0.29	75.0
SUB40	1.21	84.7
SUB42	0.97	84.0
SUB44	0.31	86.4
SUB46	0.31	86.5
SUB48	0.42	85.0
SUB50	1.00	80.3
SUB52	1.82	80.8
SUB54	1.04	75.0
SUB56	0.75	75.0
SUB58	0.71	84.0
SUB60	0.42	83.0
SUB62	0.33	85.6
SUB64	0.33	83.0
SUB66	0.92	86.6
SUB68	1.53	85.1

SUBAREA I.D.	AREA (Sq.mi.)	WEIGHTED CURVE NO. (CN)
SUB70	1.65	83.0
SUB72A	0.66	83.0
SUB72B	0.43	83.0
SUB72C	0.44	83.0
SUB72D	0.16	83.0
SUB74	0.82	85.2
SUB76	0.84	84.4
SUB76A	0.20	86.1
SUB78	0.63	83.0
SUB80	1.00	83.0
SUB82	0.56	83.0
SUB84	0.76	83.0
SUB86	1.01	76.1
SUB88	1.95	83.0
SUB90	0.31	82.8
SUB92	2.00	85.1
SUB94	0.90	84.6
SUB96	5.02	84.0
SUB98	0.70	84.6
SUB100	0.15	83.0
SUB102	0.88	83.0
SUB104	0.68	83.0
SUB106	0.45	83.0
SUB108	1.31	83.0
SUB110	3.15	83.0
SUB112	1.18	83.0
SUB114	1.45	83.0
SUB116	0.67	83.0
SUB118	0.17	83.0
SUB120	2.66	83.0
SUB122	0.76	81.0
SUB124	1.24	82.0
SUB126	0.60	75.0
SUB128	1.55	83.0
SUB130	1.35	83.0

to reduce total 50-year retention volume modeled. The runoff from the drainage area contributing to an area developed with 50-year retention was modeled to flow into the hypothetical 50-year retention basin. The 50-year retention facility was modeled as a basin with a weir overflow (C = 2.67) to allow runoff in excess of the retention volume to pass by the basin. Weir lengths were graduated by the volume of stormwater being retained as defined below:

RETENTION VOLUME (acre-feet)	WEIR LENGTH (feet)
0 - 10	30
10 - 25	75
25 - 50	150
50 - 100	300
100+	500

The only storm drain in the study area affecting the drainage system is the 48-inch diameter pipe under Brown Road west of Recker Road. The storm drain capacity was modeled to take into account the runoff conveyed in it.

Proposed channel parameters and regional detention basin volumes for the selected alternative were estimated in the model. In general, base flows were allowed to bypass the regional basins before wiering over into the basin, with the goal to keep channels small and pass approximately the 10-year flow by the basins. At one location at the CAP and Superstition, the entire inflow was routed through the basin because diverting was not feasible.

Basins along the proposed RWCD Floodway were sized to restrict flow passing the basin to the difference between the RWCD Floodway capacity upstream and downstream of the inflow locations.

A copy of the selected alternative HEC-1 computer input and output is presented in Appendix F. Exhibit 5 shows a schematic of the HEC-1 model for the selected alternative.

8.3 Results

The selected alternative modeling established channel and basin sizes and location. As a result of modeling the selected alternative in detail, four of the basins proposed in the preferred alternative were eliminated and four were significantly smaller than originally estimated during the alternative analysis.

The drainage area above the CAP was re-evaluated several times, eliminating four detention basins and splitting one of the basins into two due to inadequate available undeveloped land and limited conveyance capacity in the wash between the basins.

The channel proposed along Ellsworth Road is intended to be the offsite drainage system for the proposed Red Mountain/Southeast Loop Freeway. If some other corridor is chosen for this project freeway, the proposed freeway, Ellsworth Road channel would be replaced by the offsite drainage channel for the freeway.

The 100-year discharge along the RWCD Floodway for the selected plan were below design discharges established by the SCS. A comparison of RWCD Floodway discharges are in Table 2.

After the channels for the study were designed, the HEC-1 computer model was updated to reflect the new channel parameters for the northwest area (SCS Reach 6). This model is not sensitive to small changes in channel base width and side slopes. The discharges calculated with the new channel parameters were not significantly different from those calculated using the initial estimated parameters. Therefore, the channel parameters for all the study area were not updated to reflect designed channels.

The basin indicated on Figure 6 just west of Sossaman Road along the north right-of-way of the Superstition Freeway is intended to be part of the ADOT offsite drainage facilities. This basin will be in the ADOT right-of-way and will be necessary to limit the flow into the existing ADOT channel west of Power Road.

All channels were proposed as concrete-lined to limit right-of-way requirements.

All basins except the basin at the CAP and Superstition Freeway were considered to contain diverted flows until after the storm event. The basins outlet works would be opened manually after the storm had passed. The basin at the CAP and Superstition was considered to route flow through the basin.

9.0 PRELIMINARY PLAN PREPARATION OF THE SELECTED MASTER DRAINAGE SYSTEM

The discharges calculated with the HEC-1 computer model were used by A-N West to develop the preliminary design for the subcritical flow channels (see Preliminary Plans for Eastern Maricopa County Master Drainage Plan, dated May 22, 1986). Natural ground profiles along street centerlines were surveyed by Aerial Mapping Company. The SCS datum along the RWCD Floodway alignment was used. This survey checked very closely into existing survey monuments along the Central Arizona Project (CAP) and Superstition Freeway alignment. Sheet 3 of 20 of the Preliminary Plans for Eastern Maricopa County ADMS shows the locations of the bench marks tied into.

Natural ground profiles along the Superstition Freeway was taken from the 1974, 200-scale, 5-foot contour interval mapping of the freeway alignment.

The proposed depth of flow was typically 4.5 feet, minimum freeboard was 1.5 foot, velocities were 10.2 feet per second or less, and side slopes were 1.5 horizontal:1.0 vertical. All channels are proposed to be concrete-lined (n = .016) to minimize right-of-way requirements. The proposed channel slopes were established to keep the flow subcritical and drop structures were located where the channel depth was equal to the flow depth plus the minimum freeboard (usually 6.0 feet). For hydraulic considerations, the drop structure height was equal to the flow depth.

Exceptions to these channel depths occur when the flow depth was less than 4.5 feet in proposed "V" channels (no bottom width). In these cases, the channel was designed for flow less than 4.5 feet deep.

Specific channel parameters are listed in tabular form on each plan and profile sheet of the preliminary plans.

Where the proposed channels intersect with existing major streets, box culverts were sized to have the same flow area as the upstream channel. The box culverts were sized to have some freeboard so that backwater in the upstream channel does not occur. Typically, the proposed culverts are six feet high with a flow depth of about 4.5 feet.

Each channel is represented on the plan of the system as a channel baseline approximately 100 feet upstream of the roadway centerline. Because roadway

right-of-way varies and the acceptability of shared right-of-way between the proposed channels and the roadways is questionable, exact channel locations are not assessable.

Most of the existing ground profiles used in the channel design are at the adjacent roadway centerline. Therefore, during final design natural ground elevations along the proposed channel baselines would require additional survey.

The diversion structures between the channels and regional detention basins were designed to divert peak flows into the basins and allow base flows to continue in the channels. These weir overflows typically divert flows in excess of the 10-year runoff peaks into the basins. Since the configuration of basins cannot be established until available right-of-way is assessed, exact details of the hydraulics of the diversion structure will be analyzed during the final design of the system.

The regional detention basins were sized to contain the diverted volumes from the 100-year runoff event. Basin freeboard was considered to be two feet, side slopes were eight horizontal to one vertical, and the depth was established by the channel depth at the downstream end of the basin (gravity outflow). Two exceptions to this basin design criteria occur in basins located at the CAP and the Superstition Freeway and at the Superstition Freeway and Ellsworth Road. Both of these basins were sized assuming three horizontal to one vertical sideslopes with the basin at the CAP and the Superstition Freeway also having all flows routed through the basin. This exception was made to minimize land area required along the Freeway where a multi-use basin was not considered as practical, especially if combined with an ADOT drainage system.

Basins were assumed to be square or rectangular and land slope was not considered in establishing basin sizes due to a lack of topographic information. Since most of the basins will be dry for runoff events less than a 10-year frequency, multi-level basins were not analyzed.

10.0 COST-ESTIMATE AND IMPLEMENTATION PLAN

Cost Estimate

A preliminary cost estimate was performed for the selected alternative channel and basin system.

Table 4 presents the selected alternative cost estimate.

TABLE 4
SELECTED ALTERNATIVE
COST ESTIMATE

CHANNELS	QUANTITY	UNIT* COST	ITEMIZED COST	TOTAL COST
Excavation	2,257,000 C.Y.	$ 2.00/C.Y.	$ 4,515,000	
Lining (6" thick)	165,560 C.Y.	160.00/C.Y.	26,500,000	
Culverts	9,450 C.Y.	200.00/C.Y.	1,890,000	
Right-of-Way	339 AC.	45,000/AC	15,255,000	**$48,300,000**
REGIONAL DETENTION BASINS				
Excavation	6,432,200 C.Y.	$ 1.50/C.Y.	$ 9,650,000	
Weir Lining (6" thick)	9,520 C.Y.	160.00/C.Y.	1,525,000	
Outlet Works	14 EA.	20,000/EA.	280,000	
Right-of-Way	410 AC.	45,000/AC.	18,450,000	**$29,800,000**
			GRAND TOTAL	**$78,100,000**

* From ADOT Construction Costs, 1985. Unit prices may need to be updated as more site-specific information becomes available.

All quantities in Table 4 were determined using information from preliminary plans for Eastern Maricopa County Master Drainage Plan. Unit costs for excavation and concrete were estimated from Arizona Department of Transportation Construction Costs 1985. Unit costs for the basin outlet works were estimated. The right-of-way unit cost had been estimated and obtained from the earlier report, Alternative Drainage Systems, Eastern

Maricopa County Master Drainage Plan, Phase 1, Executive Summary, June 25, 1985.

Implementation Plan

Implementation scheduling for the Area Drainage Master Plan (ADMP) will be correlated with the construction schedule of the RWCD Floodway. The RWCD Floodway will be constructed from Ray Road at the south end of the study area to Brown Road at the north end. Therefore, the portion of the ADMP outletting to the southern end of the RWCD Floodway would be constructed first. The ADMP has been divided into seven zones as shown on Figure 7. The cost estimates for each zone is detailed in Appendix G. A logical implementation schedule for the ADMP follows in Table 5.

TABLE 5

IMPLEMENTATION SCHEDULING

ITEM	CY 86 CY 87	CY 88	CY 89	CY 90	CY 91 CY 92
	*FY 86-87	FY 87-88	FY 88-89	FY 89-90	FY 90-91	FY-91-92
Land Acquisition	Zone 2	Zone 3 Zone 4 Zone 5	Zone 7 Zone 1			
Final Design	Zone 2	Zone 3 Zone 4 Zone 5	Zone 7 Zone 1			
Utility Relocation		Zone 2	Zone 3 Zone 4 Zone 5	Zone 7 Zone 1		
Construction			Zone 2 Basins	Zone 2 Other Zone 4 Basins Zone 5 Basins	Zone 7 Basins Zone 1 Basins Zone 3 Basins Zone 4 Other Zone 5 Other	Zone 7 Other Zone 1 Other Zone 3 Other

*Fiscal Year - July to June

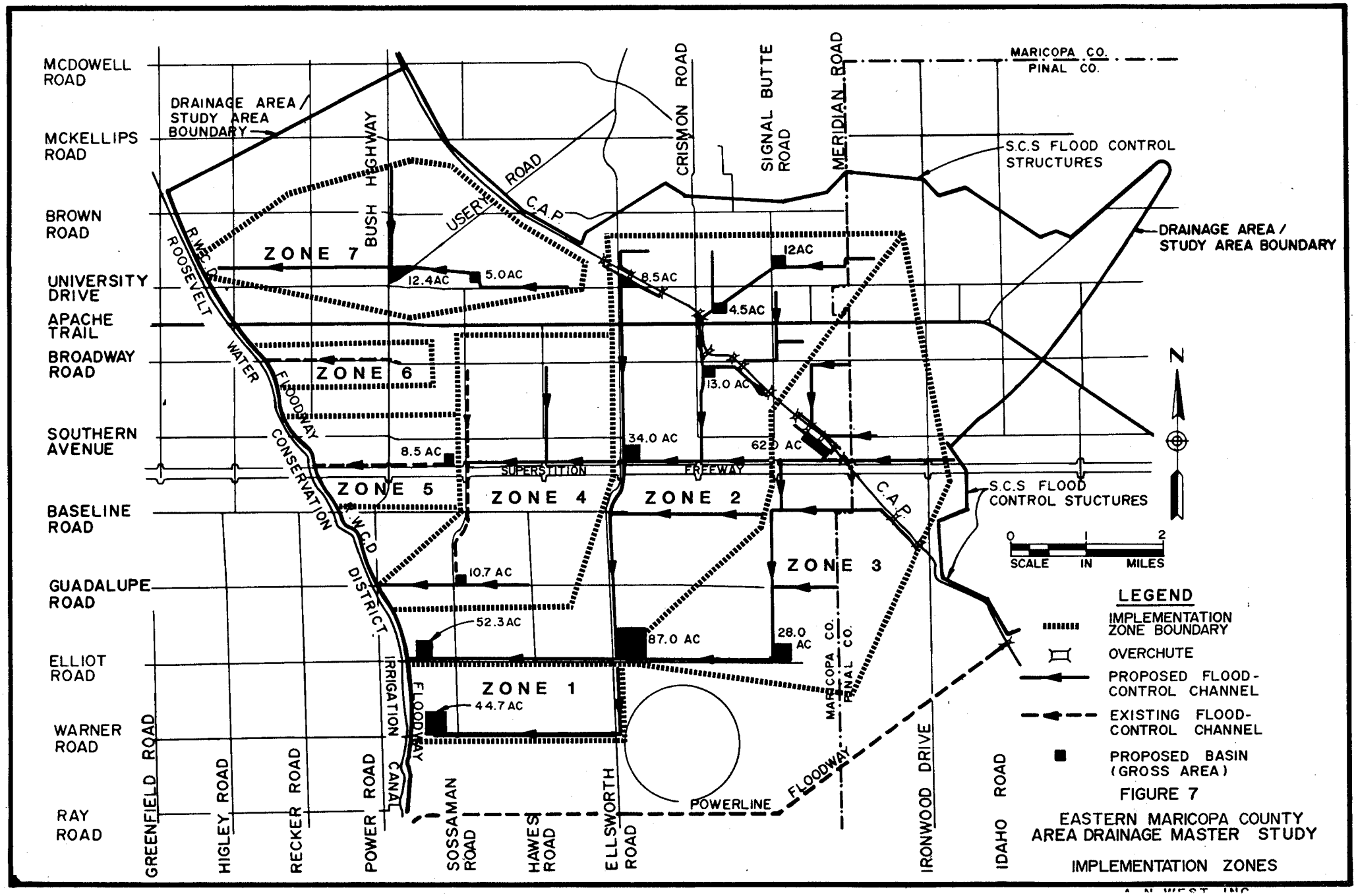


FIGURE 7

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

IMPLEMENTATION ZONES

11.0 CONCLUSIONS

The Eastern Maricopa County Area Drainage Master Plan has been designed on a preliminary basis. Three HEC-1 hydrologic models were developed to define existing, future development without retention, and the selected alternative system. The existing and future development condition models do not consider any existing or future retention. The discharge generated at Ray Road from these two models were 19,600 and 28,200 cfs, respectively. The RWCD Floodway design capacity at Ray Road is 5,890 cfs.

The selected alternative drainage plan combined small and large regional basins with a network of lined channels. This system provides flood protection within the 68-square mile study area and reduces the flow along the Soil Conservation Service's RWCD Floodway to be at or below the design discharge.

This developed drainage plan minimizes major watershed flooding problems, provides a positive drainage system to the RWCD Floodway and protects the integrity of the RWCD Floodway. This selected alternative system has about 45 miles of lined channels and 14 regional detention basins containing 2,500 acre-feet of available storage. It provides the stormwater protection desired in the watershed.

The preferred alternative was accepted by the City of Mesa City Council and the Flood Control Advisory Board as a basis for the ADMP contingent upon public input and approval. The preferred alternative was adjusted according to review comments by the agencies. The selected alternative was then computer modeled. Preliminary plans and profile sheets were developed for the proposed facilities except the basin located just east of Power Road along the Superstition Freeway. It is proposed that this basin will be within the Freeway right-of-way and will be an integral part of the Freeway drainage system.

This ADMP is expected to be a dynamic plan. As more information becomes available within the watershed, this model and plan may need to be adjusted to reflect significant watershed changes. As the Superstition Freeway drainage concept is implemented, the Red Mountain Freeway and Southeast Loop Freeway corridors are chosen, and as other drainage facilities are

implemented, the model and plan may need to be updated to reflect these changes.

12.0 - REFERENCES

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3. Hydrologic Design for Highway Drainage in Arizona, Revised April 1975, ADOT.

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11. Mesa General Plan, Part Ten: Land Use, October 1981, City of Mesa.

12. Section 7, Analysis of CAP Design and Construction Implementation, October 1984, International Engineering Company, Inc.

13. Report on Flooding in Eastern Maricopa County, November 1984, Flood Control District of Maricopa County.

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15. Plan and Profile RWCD Floodway Apache Junction-Gilbert WPP, 1975, Soil Conservation Service.

16. Plan and Profile RWCD Floodway Williams-Chandler WPP, 1974, Soil Conservation Service.

17. Central Arizona Project, Salt-Gila Aqueduct, Reach 1B, Plan and Profile, and Overchute Details, May 1982, USBR.

18. Central Arizona Project, Salt-Gila Aqueduct, Reach 2, Plan and Profile, and Overchute Details, May 1980, USBR.

19. Review of Specifications, Design Data for Reach 1, Salt-Gila Aqueduct, Central Arizona Project, Arizona, May 1980, USBR.

20. Review of Specifications, Design Data for Reach 2, Salt-Gila Aqueduct, Central Arizona Project, Arizona, November 1980, USBR.

21. East Mesa Town Center, Conceptual Storm Drainage Report, August 1984, PRC Engineering.

22. USGS Quadrangle Maps - Buckhorn (1973), Apache Junction (1973), Higley (1981), and Desert Well (1981).

23. HEC-1 Flood Hydrograph Package Users Manual, September 1981, U.S. Army Corps of Engineers.

24. Introduction and application of Kinematic Wave Routing Techniques Using HEC-1, Training Document No. 10, May 1979, U.S. Army Corps of Engineers.

25. Zoning Maps, March 1985, City of Mesa.

26. Apache Trail (State Highway 60) As-Built, 1962 and 1963, ADOT.

27. Superstition Freeway As-Builts and Right-of-Way Drawings, 1974, 1975, and 1983, ADOT.

28. RWCD Floodway TR-20 Model Schematic and Drainage Boundary Map, 1974, Soil Conservation Service.

13.0 AGREEMENTS CHRONOLOGY

DATE	DECISION	BY WHO
8/24/84	1000-scale exhibits format changed from four, 24" x 36" to two, 36" x 60" sheets.	FCDMC
8/29/84	Flood Control District will review all flood reports from July 1984 flooding and will transmit pertinent information to ANCo to implement into study.	FCDMC
9/12/84	ANCo not to address proposed County Highway Department projects.	FCDMC
9/28-10/1/84	FCDMC asked ANCo to develop a set of CN's using undeveloped desert CN=83 & development CN's to increase from CN=83.	FCDMC
1/3/85	Southern study boundary redefined to exclude Powerline Floodway due to lack of hydrographic information along the Floodway.	FCDMC SCS
1/4/85	ANCo not to address localized flood problems individually, but selected alternative should provide flood relief for them. ANCo should try to use proposed Red Mountain/Southeast Loop (along Ellsworth Road) Freeway right-of-way for stormwater facility alternatives to save on total system cost. 75% effectiveness factor to be used on Mesa Retention especially in residential areas.	FCDMC/Mesa
3/25/85	Future condition model is to be without detention or retention.	FCDMC
4/22/85	Joint use of electrical easement is a possibility for Colby/Decatur Alignment. Other DOE easements have joint use, but all are subject to DOE review to determine acceptability of proposed facilities.	DOE (Boulder City, NV)
7/23/85	City of Mesa City Council Service Committee accepted proposed alternative with public involvement.	Mesa
7/25/85	Review comments from FCDMC on proposed alternative: 1. Change alignment of channel to Ellsworth, 2. Move basin east of Crismon & Broadway.	FCDMC
8/1/85	Existing and future condition models approved by FCD.	FCDMC

DATE	DECISION	BY WHO
8/9/85	Topo map to be produced above CAP rather than strip topo.	FCDMC
9/5/85	Apache Junction and Pinal County indicated that they would not be able to participate in plan financially, but was interested in the plan.	FCD/AJ/ PC

NOTE:

FCDMC = Flood Control District of Maricopa County
SCS = Soil Conservation Service
Mesa = City of Mesa
DOE = U.S. Department of Energy
AJ = City of Apache Junction
PC = Pinal County

APPENDIX A

PRECIPITATION DOCUMENTATION

ADDENDUM to "HYDROLOGIC DESIGN FOR HIGHWAY DRAINAGE IN ARIZONA" April 1975

Steps to be used to determine precipitation values for various durations and return periods.

STEP 1. From the precipitation maps in the manual "Hydrologic Design for Highway Drainage in Arizona", determine the precipitation values for the 6 and 24 hour duration storms for return periods of 2, 5, 10, 25, 50 and 100 years. Tabulate these values in Table 1 in the column headed 'Map Values'

FOR: EASTERN MARICOPA COUNTY
MASTER DRAINAGE PLAN

TABLE 1

10/84
LSM

Return Period (Years)	DURATION		Precipitation Values (inches)			
			6 hour duration		24 hour duration	
	1 Hour	2 Hour	Map Value	Corrected Value	Map Value	Corrected Value
2	0.91	0.99	1.15	1.15	1.35	1.35
5	1.30	1.40	1.60	1.60	1.90	1.90
10	1.52	1.65	1.65	1.90	2.30	2.30
25	1.85	2.02	2.35	2.35	2.85	2.80
50	2.13	2.32	2.70	2.70	3.20	3.20
100	2.42	2.63	3.05	3.05	3.60	3.65

NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors in reading the maps, these values should be plotted on the diagram "Precipitation Depth versus Return Period" Fig. 1.

Project No. 4458

Station EAST MARICOPA COUNTY
MASTER DRAINAGE PLAN

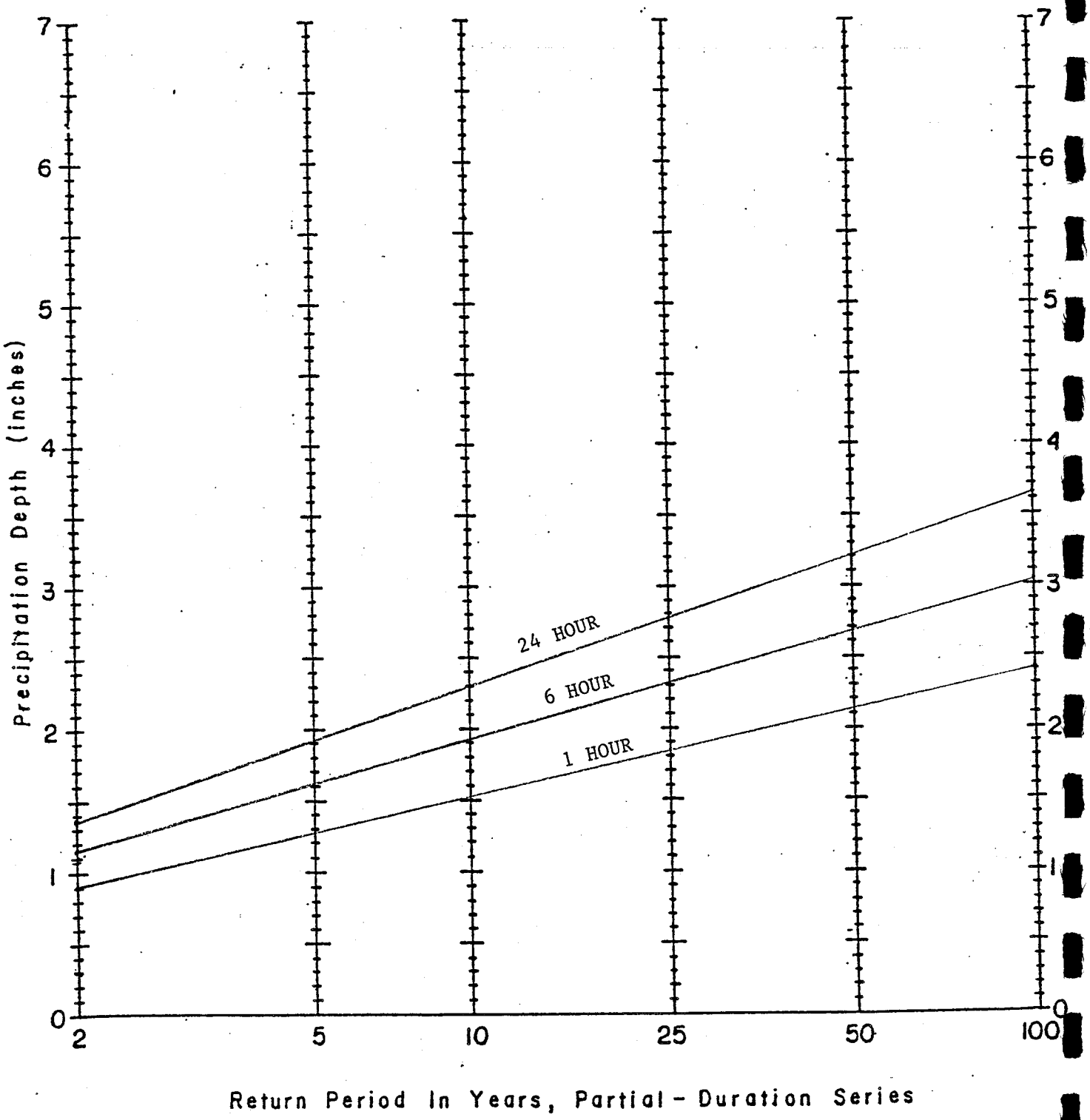

Figure 1 Precipitation Depth Versus Return Period for Partial – Duration Series

APPENDIX B

HYDROLOGY

- DESCRIPTION OF HEC-1 COMPUTER PROGRAM AND INPUT PARAMETERS
- DESCRIPTION OF KINEMATIC WAVE PROCEDURE
- TABLE B-1 , SCS CURVE NUMBERS BY ZONING AND SOIL TYPE
- VERIFICATION OF RUNOFF VALUES

APPENDIX B

DESCRIPTION OF HEC-1 COMPUTER PROGRAM

The HEC-1 computer program was developed by the U.S. Army Corps of Engineers at the Hydrologic Engineering Center, Davis, California - HEC-1 is a single-event, rainfall-runoff computer model capable of executing a variety of computational procedures.

In addition to being capable of simulating the usual rainfall-runoff event processes from synthetic or natural rainstorms, HEC-1 will also simulate multiple floods for multiple basin development plans and perform the economic analysis of flood damages. HEC-1 can optimize unit hydrographs, loss rates, or streamflow routing parameters by matching recorded and simulated hydrograph values. It can perform snow melt computations, unit hydrograph computations, hydrograph routing and combining computations, and hydrograph balancing computations. There are seven (7) different types of flood routing procedures including Muskingum, Modified Puls, and Kinematic Wave. HEC-1 has incorporated four (4) different loss rate calculation procedures including Exponential, Initial and Uniform, Holter and SCS Curve Number. HEC-1 also have the capability of doing dam safety analysis.

HEC-1 INPUT CARD IDENTIFICATION

IDENTIFICATION SYMBOL	CARD DESCRIPTION
JOB INITIALIZATION CARDS	
ID	Job Title Information
*DIAGRAM	Flow Chart Request
IT	Time Specification
IO	Output Control
IN	Time Interval for Data Input
PRECIPITATION DATA CARDS	
PG	Storm Total Precipitation for a Station (Gage)
PI	Incremental Precipitation Time Series
PR, PT, PW	Precipitation Gage Weighting
SUBBASIN DEFINITION CARDS	
KK	Station Computation Identifier
KM	Message
BA	Subbasin Area
LS	SCS Curve Number Loss Rate
UK	Kinematic Overland Flow
RK	Kinematic Collectors/Main Channels
RETENTION BASIN DEFINITION CARDS	
RS	Storage Routing
SV	Reservoir Volumes
SE	Reservoir Elevations
SS	Spillway/Weir Definition
HYDROGRAPH TRANSFORMATION CARDS	
HC	Combine Hydrographs
DT	Combine Identifier
DI	Diversion Inflow Table
DQ	Diversion Outflow Table
DR	Retrieve Previously Diverted Hydrograph
END OF ANALYSIS CARD	
ZZ	End-of-Job

APPENDIX B

KINEMATIC WAVE PROCEDURE DESCRIPTION

From Introduction and Application of Kinematic Wave Routing Techniques Using HEC-1, U.S. Army Corps of Engineers, May, 1979

The Kinematic Wave Flood Routing incorporated into the HEC-1 Flood Hydrograph Package involves simulating the natural complexities of a basin with a number of simple elements, such as overland flows planes, stream segments used as collector channels, and lengths of representative main channels shown in Figures B-2 and B-2. If the gradually varied unsteady flow assumptions are not violated, then combinations of these basic elements have proven to be quite representative of the actual behavior of most systems.

One of the attractive features of the kinematic wave approach to rainfall-runoff modeling is that the various physical processes of the movement of water over the basin surface, with the attendant infiltration, flow into stream channels, and flow through the channel network are considered. Parameters, such as roughness, slope, catchment lengths and areas, and stream channel dimensions are used to define the processes.

Studies dealing with urban hydrology usually require delineation of subbasins that are smaller than 2 mi^2 in extent (about 5 km^2). Studies dealing with the effects of channel modifications may permit use of large areas; however, as the area is increased the assumptions required to apply the kinematic wave method become more tenuous.

The runoff process is idealized in HEC-1 through the use of the following flow elements: 1) one or two typical overland flow elements, 2) a typical collector channel element, and 3) a main channel element. Schematic drawings of these elements are shown in Figure B-1 Figure B-2 illustrates the relationships of the various types of elements to each other. The elements are specified to represent typical features of the basin, and thus, the parameters chosen for the individual elements should be representative of the entire subbasin. The runoff simulation process is automatically expanded from the typical elements to the whole subbasin by the program. Because land

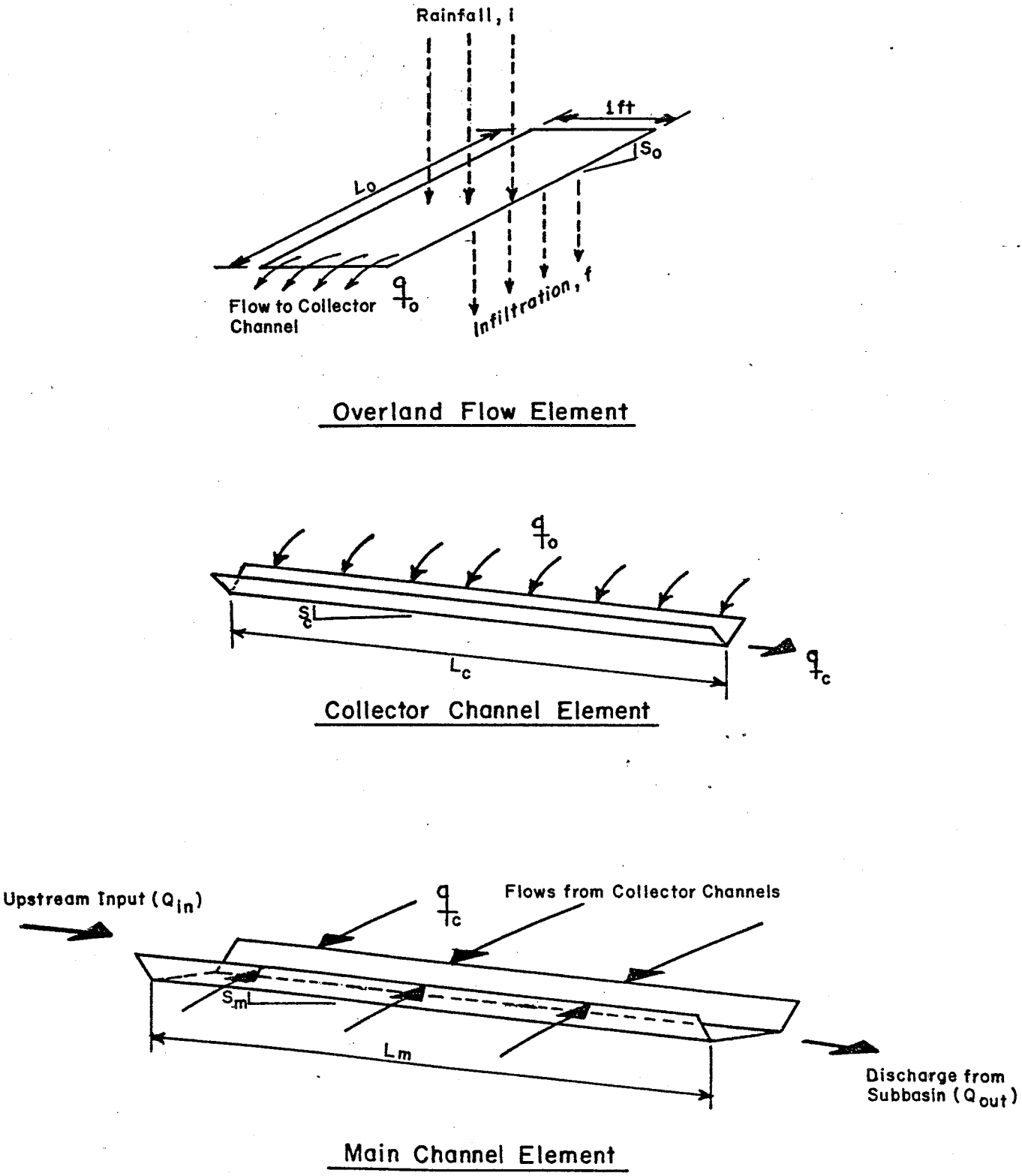

Figure B-1 Elements Used in Kinematic Wave Calculations

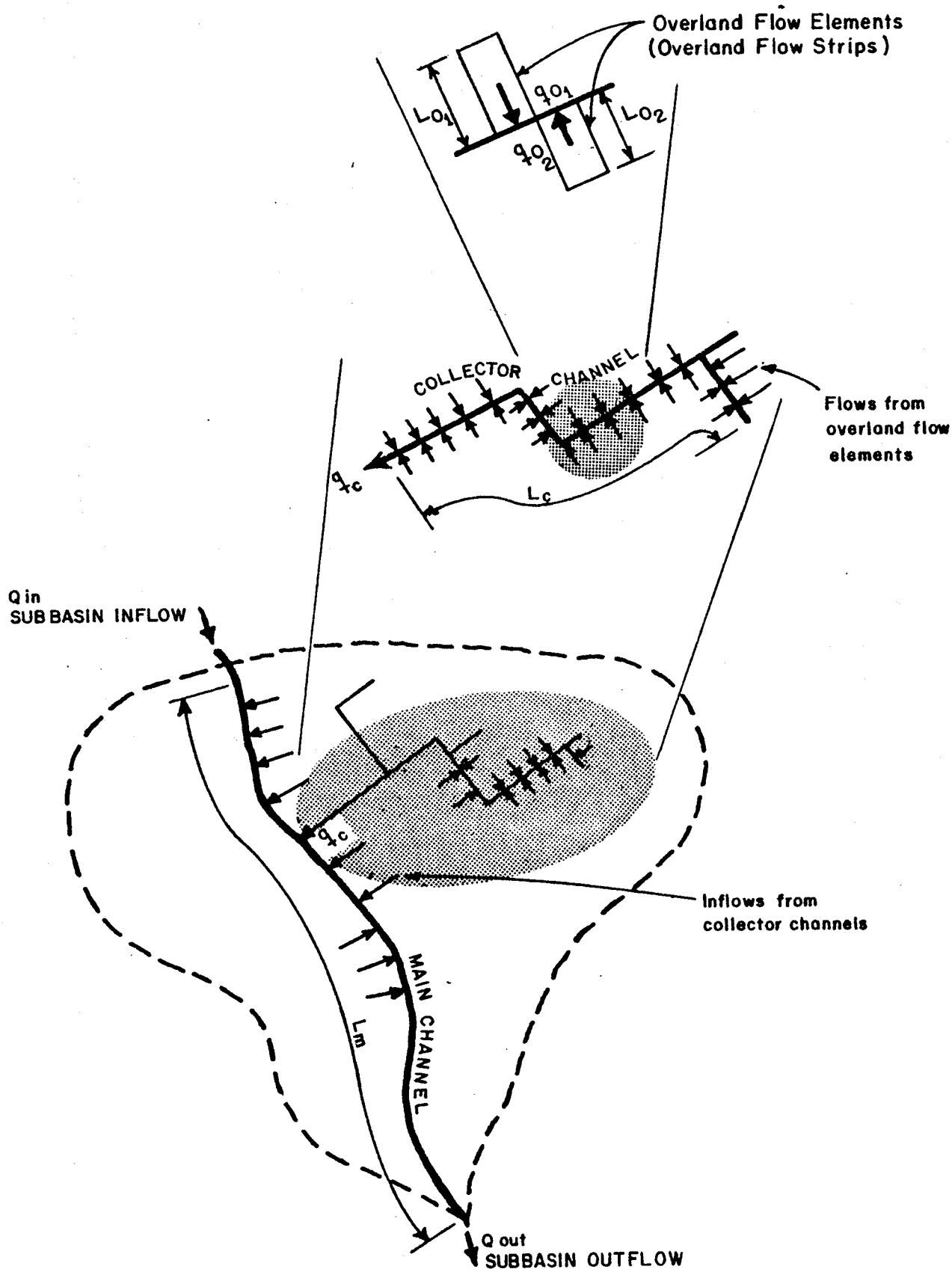

Figure B-2 Relationships Between Flow Elements

use and development practices are usually very similar within a selected hydrologic unit, assigning a single value to a given parameter usually gives good results.

The basic overland flow element is simply a sloping rectangular plane surface upon which the rain falls. Some of the rainfall is lost by infiltration; the remainder runs off the lower edge of the plane into a channel.

In general, the catchment flow lengths and roughness coefficients will be much greater for these areas. The length of flow to be used is the representative maximum distance for water to travel as overland flow for this type of land surface.

The user of this method should think of the overland flow strips as representing typical flow surfaces rather than actual planar surfaces, except when very small areas (such as one city lot) are being considered.

The collector channel element is used to model the flow in its path from the point where it first becomes channel flow to the point where it enters the main channel. The inflow to the collector channel is taken as a uniformly distributed flow along the entire length of the channel. This correctly represents the situation where overland flow runs directly into the gutter, and also provides a reasonable approximation of the flow inputs into the storm drain system from individual catch basins and tributary collector pipes which are distributed along the collector channel.

The main channel can carry both inflows from upstream subbasins as well as flows supplied by the collector channels within the subbasin. The inflow from the collector channels is taken to be uniformly distributed along the length of the main channel. The lateral inflow is determined by scaling up the collector channel flow to match the total subbasin areas and then dividing the flow by the total main channel length.

If desired, the subbasin flow can be computed separately and combined with routed flow at the subbasin outlet. Any of the routing methods available in HEC-1 can be used for channel routing (Muskingum, modified Puls, Tatum, etc.) if desired.

There are certain weaknesses inherent in the kinematic wave routing approach which should be kept in mind by the modeler. These include the following: 1) in kinematic wave routing, the theory does not provide for attenuation of the flood wave. As a consequence, peak flows may be over-estimated. 2) Surcharging of storm drains frequently occurs during major storm events; no explicit provision for surcharging is provided by this method. 3) Also, ponding and local storage of water during major events is not accounted for.

As with any type of hydrologic model, however, it is imperative that the modeler check the performance of his modeling effort against observed data. Use of the model without a procedure for verifying its ability to correctly simulate the behavior of a given basin is strongly discouraged.

TABLE B-1

SCS CURVE NUMBERS BY ZONING AND SOIL TYPE

Eastern Maricopa County

Master Drainage Plan

Zoning	Type 'B' Soil	Type 'C' Soil	Type 'D' Soil
Natural Desert	83	89	92
Desert Golf Course	83	89	92
R1-190	83	89	92
R1-130	83	89	92
R1-70	83	89	92
R1-43	83	89	93
R1-35	84	90	93
R1-18	85	90	93
R1-10	86	91	93
R1-7	87	91	93
Mobile Homes	88	91	93
Multi-Family	89	92	94
Commercial	91	94	95
Industrial	91	94	95
Golf Courses/Parks/Lawns	70	75	80
Orchards	75	80	85

APPENDIX B

VERIFICATION OF RUNOFF VALUES

HEC-1 Existing Condition Model output peak discharges were compared with two other studies for the drainage areas upstream of the CAP. Sources of comparison data used were 1) U.S. Bureau of Reclamation (USBR), Hydrology for Reach 1B and Reach 2, Salt-Gila Aqueduct (1980) and 2) International Engineering Company, Inc. (IECO), Analysis of CAP Design and Construction Implementation (October 1984).

The IECO study was performed for the USBR to determine the effect of the CAP construction on the July 17-18, 1984 flood event. Peak discharge data for the three studies were compared on a discharge per square mile basis. Since the two comparison studies are related, their results were very consistent. These two studies used a 100-year, 3-hour storm because of the limited drainage areas of the studies and future development conditions.

The A-N West study used the 100-year, 24-hour storm because of the large study area being analyzed and existing development conditions. The results from the IECO and USBR studies were used as a guide to adjusting subarea runoff parameters. The runoff curves for the A-N West existing condition model differs from those generated for the USBR and IECO studies because of the difference in storm duration and development conditions.

APPENDIX C

MODELING ASSUMPTIONS - BACK-UP MATERIAL

APPENDIX C

COMPARISON OF U.S. 60 CULVERT CAPACITIES
TO 100-YEAR DRAINAGE
(CRISMON ROAD TO MERIDIAN ROAD)

LOCATION	U.S. 60 STATION	NO. OF CELLS	SPAN	RISE	LENGTH	TYPE	$\frac{HW}{D}$ ASSUMED	Q	HEC-1 SUBAREA	Q_{100}
E. of Crismon	636+35	3	8'	4'	58'	RCB	1.0	550		
	645+20	1	10'	4'	72'	RCB	1.0	230		
	656+15	1	6'	3'	50'	RCB	1.0	90		
	663+24	1	6'	3'	52'	RCB	1.0	90		
	676+57	2	10'	4'	59'	RCB	1.0	460		
							$\sum$	1420	SUB34	752
Signal Butte	686+96	1	6'	3'	49'	RCB	1.0	90		
	695+34	1	6'	3'	50'	RCB	1.0	90		
	706+50	1	8'	3'	50'	RCB	1.0	120		
	714+99	1	8'	3'	50'	RCB	1.0	120		
	727+25	1	10'	4'	51'	RCB	1.0	230		
							$\sum$	650	SUB38	638

APPENDIX C

COMPARISON OF U.S. 60 CULVERT CAPACITIES
TO 100-YEAR DISCHARGE
(BROADWAY TO SUPERSTITION FREEWAY)

U.S. 60 CULVERT STATION	SIZE	ESTIMATED CAPACITY cfs [1]	DRAINAGE AREA SQ. MI.	HEC-1 SUBAREA	DRAINAGE AREA SQ. MI.	Q_{100} cfs
912+98	48"	110	0.04	SUB26	0.38	701
919+70	48"	110				
927+78	36"	50	0.11	SUB32 [2]	0.11	222
933+00	10 x 5	430	1.94	SUB28 [2]	0.17	315
937+70	2 @ 6 x 5	516		SUB30 [2]	0.65	1117
		3155			1.94	3154
943+81	21"	9				
952+10	2 @ 12 x 8	2200		SUB36 [2]	1.12	1722
959+45	6 x 4	198	0.13	SUB40	0.13	243
966+56	6 x 4	198	0.05	3	0.06	67
972+00	24"	15		3	0.08	84
					0.14	151
979+35	6 x 4	198	0.13	SUB50	0.17	322
992+29	6 X 7	432	0.27	SUB54	0.29	505

1. From Master Storm Drainage Study for the City of Apache Junction. High water assumed to be 2' over top of culvert except for 24" where 1.5' over top of culvert was assumed.

2. Flow in excess of culvert capacity flows to next culvert (down station) to Station 952+10 or else over U.S. 60 roadway. All flow combines approximately 1/4 mile down stream of U.S. 60 in Subarea 38.

3. Discharge determination was from hand calculations using SCS method for concentration points 35 and 36.

APPENDIX C

CENTRAL ARIZONA PROJECT CANAL
OVERCHUTE DESIGN DISCHARGES
AND 100-YEAR DISCHARGE COMPARISON

OVERCHUTE STA.	SIZE	USBR DESIGN Q (cfs)	EXISTING CONDITION HEC-1 CONC. PT.	EXISTING CONDITION Q_{100} (cfs)	SELECTED ALTERNATIVE (EXISTING CONDITION) HEC-1 CONC. PT.	SELECTED ALTERNATIVE (EXISTING CONDITION) Q_{100} (cfs)
Reach 1						
345+30	3BBL 54"	460	SUB10	248	SUB64	248
347+00	40'10" Flume	870	SUB12	593	CO62	608
396+00	40'10" Flume	800	SUB16	493	SUB58	493
427+15	3BBL 72"	565				
			SUB18	677	CO72D	502
429+20	3BBL 72"	448				
456+50	2BBL 60"	270				
			CO37	823	CO76	1177
471+03	3BBL 72"	910				
479+00	5BBL 72"	575	SUB41	456	SUB76A	157
504+25	5BBL 72"	575	SUB41	456		
529+50	5BBL 72"	840				
			CO73	1231		
542+50	5BBL 72"	840				
552+50	5BBL 72"	760	SUB77	919	CO98	3726
563+50	5BBL 72"	760	SUB77	919		
574+50	3BBL 54"	400	SUB78	94		
Reach 2						
131+90	2BBL 72"	217*				
			CO101	1181	SUB102	645
158+00	2BBL 72"	217*				

*July 1985 design Q. October 28, 1980 USBR memorandum from O.B. Ridgley concerning review of Specifications Design Data for Reach 2 indicates a 100-year 3-hour peak discharge of 1155 cfs for Stations 131+90 and 158+00.

APPENDIX D

RUNOFF SUMMARY TABLE - HEC-1 INPUT AND OUTPUT
- EXISTING CONDITION

RUNOFF SUMMARY TABLE

EXISTING DEVELOPMENT
WITHOUT RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
SUB2	3.41	987	13.25	680	13.50	270	14.25	145	15.00	45	17.00
RO3	3.41	990	13.50	648	13.75	249	15.00	133	16.00	44	18.50
SUB4	3.27	892	13.50	621	13.75	254	14.75	147	15.75	50	18.25
CO5	6.68	1,882	13.50	1,269	13.75	503	15.00	278	16.00	93	18.50
RO5	6.68	1,880	13.75	1,263	14.00	499	15.25	278	16.50	93	19.00
SUB6	3.41	2,985	12.25	2,457	12.50	1,116	12.50	526	12.75	152	13.25
CO7	10.09	2,985	12.25	2,457	12.50	1,116	12.50	526	12.75	152	13.25
RO7	10.09	2,518	12.75	1,895	12.75	915	13.00	357	16.75	121	19.75
SUB8	1.84	613	13.25	419	13.50	162	14.25	88	15.00	29	17.50
CO9	11.93	2,900	12.75	2,086	12.75	959	13.00	427	16.50	145	19.75
SUB10	0.33	248	12.50	182	12.50	72	12.50	44	12.75	13	13.50
SUB12	0.75	593	12.50	423	12.50	162	12.75	94	13.00	30	13.50
CO13	1.08	840	12.50	605	12.50	228	12.75	136	12.75	43	13.50
RO13	1.08	740	12.50	535	12.75	210	13.00	124	13.25	42	14.00
SUB14	1.17	531	12.75	399	12.75	172	13.00	96	13.25	32	14.25
CO15	2.25	1,270	12.50	934	12.75	382	13.00	220	13.25	73	14.00
SUB16	0.71	493	12.50	357	12.50	145	12.75	76	13.00	25	14.00
SUB18	1.50	677	12.75	471	12.75	194	13.25	106	14.00	32	15.25
CO19	2.21	1,073	12.50	779	12.75	319	13.00	169	13.50	51	14.75
RO19	2.21	1,063	12.75	755	12.75	310	13.25	166	13.75	51	15.00
SUB20	1.05	860	12.50	643	12.50	264	12.75	136	12.75	40	13.50
CO21	3.26	1,723	12.50	1,244	12.75	494	13.00	260	13.50	81	14.50
RO21	3.26	1,652	12.75	1,214	12.75	481	13.25	260	13.50	81	14.50
CO23	5.51	2,883	12.75	2,148	12.75	855	13.00	472	13.25	151	14.25
DT31	5.51	1,500	12.75	1,500	12.75	855	0.25	472	0.25	151	0.25
SUB23	5.51	1,383	12.75	648	12.75	0	0.25	0	0.25	0	0.25
RO23	5.51	1,334	12.75	556	13.00	0	0.25	0	0.25	0	0.25
SUB24	2.11	1,767	12.50	1,311	12.50	547	12.75	263	13.00	81	14.00
CO25	7.62	2,653	12.75	1,503	12.75	547	12.75	263	13.00	81	14.00
RO25	7.62	2,619	12.75	1,422	13.00	514	13.00	253	13.25	79	14.25
SUB26	2.69	788	13.25	563	13.50	231	14.25	132	15.25	46	17.50
CO26	10.31	3,291	12.75	1,931	13.00	661	13.00	328	13.25	104	14.50
CO27	22.24	6,191	12.75	3,920	12.75	1,619	13.00	693	13.50	214	14.75
RO27	22.24	5,711	13.00	3,840	13.00	1,492	13.25	689	13.75	213	15.00
SUB28	0.97	265	13.25	189	13.50	63	14.25	33	15.25	9	18.25
CO29	23.21	5,971	13.00	4,004	13.00	1,530	13.25	708	13.75	218	19.50
RO29	23.21	5,794	13.00	3,801	13.25	1,566	13.50	667	14.25	216	20.00
SUB30	1.33	129	15.75	88	16.50	31	19.50	16	22.25	4	29.75
CO31	24.54	5,806	13.00	3,809	13.25	1,567	13.50	667	14.25	216	20.00
SUB31	0.00	1,500	12.50	1,500	12.50	855	13.00	472	13.25	151	14.25
RO31	0.00	1,500	13.25	1,500	13.25	825	13.25	456	13.75	149	14.75
SUB32	2.27	709	13.50	497	13.50	207	14.50	120	15.25	43	17.50
CO33	2.27	2,208	13.25	1,978	13.25	964	13.50	531	13.75	172	15.00
SUB34	1.84	752	12.75	579	13.00	234	13.75	128	14.00	41	15.75
RO35	1.84	745	13.00	564	13.25	232	13.75	128	14.25	41	15.75

RUNOFF SUMMARY TABLE

EXISTING DEVELOPMENT
WITHOUT RETENTION

		100-YEAR		50-YEAR		10-YEAR		5-YEAR		2-YEAR	
HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK
SUB36	0.33	284	12.50	210	12.50	86	12.50	53	12.75	16	13.25
CO37	2.17	823	13.00	639	13.00	260	13.75	144	14.25	47	15.75
SUB38	0.99	638	12.50	447	12.75	186	13.00	98	13.25	31	14.25
RO39	0.99	610	12.75	426	12.75	175	13.25	96	13.50	30	14.50
SUB40	0.45	383	12.50	313	12.50	127	12.50	68	12.75	24	13.25
CO41	1.44	911	12.50	608	12.75	248	13.00	137	13.25	43	14.25
D43	1.44	456	12.50	304	12.75	124	13.00	69	13.25	21	14.25
SUB41	1.44	456	12.50	304	12.75	124	13.00	69	13.25	21	14.25
CO45	3.61	1,226	12.75	895	13.00	369	13.25	197	13.75	64	15.25
RO45	3.61	1,221	12.75	881	13.00	357	13.50	195	14.25	63	15.75
SUB46	2.11	843	13.00	603	13.00	255	13.75	145	14.00	51	15.75
CO46	5.72	2,026	13.00	1,484	13.00	612	13.50	339	14.25	114	15.75
RO46	5.72	2,026	13.00	1,465	13.25	609	13.75	336	14.50	114	16.00
CO47	7.99	4,174	13.00	3,442	13.25	1,540	13.50	852	14.00	277	15.50
RO47	7.99	4,168	13.25	3,419	13.25	1,528	13.75	847	14.25	277	15.50
SUB48	0.91	275	13.25	193	13.25	71	14.25	39	15.00	12	17.50
CO49	8.90	4,442	13.25	3,612	13.25	1,595	13.75	882	14.25	286	15.75
RO49	8.90	4,398	13.25	3,565	13.50	1,588	14.00	877	14.25	285	16.00
SUB50	1.82	365	13.50	258	14.00	95	15.25	50	16.25	15	20.25
CO51	10.72	4,472	13.25	3,804	13.50	1,665	14.00	911	14.50	293	16.00
D50	10.72	2,422	13.00	1,598	13.50	376	14.00	86	14.50	0	16.00
SUB53	10.72	2,320	13.00	2,205	13.50	1,289	14.00	825	14.50	293	16.00
RO53	10.72	2,320	13.50	2,188	13.50	1,283	14.00	824	14.50	293	16.25
CO55	35.26	7,985	13.00	5,899	13.25	2,685	13.75	1,474	14.50	495	16.25
RO55	35.26	7,949	13.25	5,741	13.50	2,580	14.00	1,462	14.75	492	16.75
SUB56	0.75	93	14.75	60	15.25	21	17.50	11	19.75	3	26.25
CO57	36.01	7,979	13.25	5,761	13.50	2,583	14.00	1,463	14.75	492	16.75
SUB57	0.00	456	12.50	304	12.75	124	13.00	69	13.25	21	14.25
RO57	0.00	451	12.75	298	12.75	119	13.25	65	13.75	21	14.50
SUB58	0.46	191	12.75	146	13.00	60	13.50	33	14.00	11	15.50
CO59	0.46	643	12.75	435	12.75	177	13.25	98	13.75	31	14.75
RO59	0.46	602	12.75	430	13.00	174	13.50	97	13.75	31	14.75
SUB60	0.45	265	12.50	189	12.50	80	12.75	45	13.00	14	14.00
CO61	0.91	813	12.75	559	13.00	238	13.25	132	13.50	43	14.75
RO61	0.91	750	13.25	497	13.25	202	14.00	112	14.50	37	16.25
SUB62	2.32	726	13.00	529	13.25	191	14.00	101	14.75	28	17.00
CO63	3.23	1,429	13.25	1,026	13.25	392	14.00	212	14.50	64	16.50
SUB63	0.00	2,422	13.25	1,598	13.50	376	14.00	86	14.50	0	0.25
RO63	0.00	2,413	13.50	1,571	13.50	366	14.25	81	15.00	0	0.25
CO65	3.23	3,646	13.50	2,556	13.50	758	14.00	292	14.75	64	16.50
RO65	3.23	3,620	13.50	2,519	13.50	751	14.25	289	15.00	64	16.50
CO67	39.24	11,399	13.25	8,280	13.50	3,292	14.00	1,747	14.75	556	16.75
RO67	39.24	11,376	13.50	8,235	13.75	3,143	14.25	1,697	15.25	550	17.25
SUB68	0.77	197	13.00	125	13.25	41	14.25	21	15.00	6	18.25
CO69	40.01	11,541	13.50	8,347	13.75	3,184	14.25	1,718	15.25	556	17.25

RUNOFF SUMMARY TABLE

EXISTING DEVELOPMENT
WITHOUT RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
RO69	40.01	11,329	13.75	8,233	13.75	3,183	14.50	1,702	15.50	555	17.50
SUB70	1.43	662	12.75	508	13.00	214	13.50	121	13.75	40	15.00
RO71	1.43	659	13.00	497	13.00	211	13.50	118	14.00	39	15.50
SUB72	1.38	571	13.00	412	13.00	174	13.50	102	14.00	34	15.50
CO73	2.81	1,231	13.00	909	13.00	385	13.50	219	14.00	73	15.50
SUB74	2.78	1,052	13.00	754	13.25	317	13.75	185	14.50	65	16.00
RO75	2.78	1,021	13.25	730	13.50	308	14.25	180	15.00	64	16.50
SUB76	2.13	874	13.00	616	13.25	237	13.75	134	14.25	44	16.00
CO77	4.91	1,839	13.25	1,288	13.50	526	14.00	307	14.75	108	16.50
D79	4.91	919	13.25	644	13.50	263	14.00	154	14.75	54	16.50
SUB77	4.91	919	13.25	644	13.50	263	14.00	154	14.75	54	16.50
CO81	7.72	2,096	13.00	1,524	13.25	631	13.75	361	14.25	123	16.00
RO81	7.72	2,067	13.25	1,507	13.25	622	14.00	359	14.50	123	16.00
SUB82	0.73	273	13.00	193	13.00	83	13.75	47	14.25	16	15.75
CO82	8.45	2,318	13.25	1,697	13.25	704	13.75	405	14.50	139	16.00
RO82	8.45	2,304	13.25	1,654	13.50	703	14.00	404	14.50	139	16.25
SUB78	0.12	94	12.25	67	12.25	27	12.50	16	12.75	5	13.25
SUB79	0.00	919	13.25	644	13.50	263	14.00	154	14.75	54	16.50
CO83	0.12	943	13.25	663	13.25	272	14.00	158	14.75	56	16.50
RO83	0.12	934	13.25	662	13.50	269	14.25	158	14.75	55	16.50
SUB84	0.15	123	12.25	92	12.50	38	12.50	19	12.75	6	13.25
CO85	0.27	960	13.25	681	13.50	278	14.00	163	14.75	57	16.50
RO85	0.27	925	13.50	671	13.50	278	14.25	162	15.00	57	16.75
SUB86	0.80	303	13.00	214	13.00	85	13.50	48	14.25	15	15.75
CO86	1.07	1,195	13.25	855	13.50	352	14.25	205	14.75	71	16.50
RO86	1.07	1,170	13.25	844	13.50	351	14.25	204	15.00	71	16.75
CO87	9.52	3,474	13.25	2,497	13.50	1,042	14.00	602	14.75	208	16.25
SUB88	0.34	184	12.50	144	12.75	55	13.00	32	13.25	9	14.25
CO89	9.86	3,569	13.25	2,561	13.50	1,073	14.00	617	14.75	214	16.25
RO89	9.86	3,480	13.50	2,494	13.75	1,057	14.25	610	15.00	211	16.75
SUB90	2.27	744	13.00	551	13.25	212	14.00	118	14.75	37	16.75
CO91	12.13	4,155	13.50	2,997	13.50	1,266	14.25	727	15.00	249	16.75
RO91	12.13	4,073	13.50	2,953	13.75	1,232	14.75	710	15.50	244	17.50
SUB92	1.84	609	13.00	423	13.25	163	14.00	93	14.75	28	16.75
CO92	13.97	4,598	13.50	3,320	13.75	1,382	14.50	797	15.25	271	17.50
RO92	13.97	4,500	13.75	3,267	14.00	1,377	14.75	795	15.50	271	17.50
CO93	53.98	15,829	13.75	11,477	13.75	4,539	14.50	2,497	15.50	826	17.50
SUB94	0.87	491	12.50	342	12.75	150	13.00	87	13.25	28	14.25
RO95	0.87	485	12.75	326	12.75	149	13.25	86	13.50	28	14.50
SUB96	0.14	104	12.50	75	12.50	29	12.75	18	13.00	5	13.75
CO97	1.01	559	12.75	386	12.75	169	13.25	98	13.50	32	14.50
SUB98	0.13	99	12.25	70	12.25	28	12.50	17	12.75	5	13.25
RO99	0.13	97	12.50	69	12.50	26	12.50	16	12.75	5	13.50
SUB100	0.75	567	12.50	404	12.50	154	12.50	93	12.75	29	13.50
CO100	0.88	665	12.50	474	12.50	180	12.50	109	12.75	34	13.50

RUNOFF SUMMARY TABLE

EXISTING DEVELOPMENT
WITHOUT RETENTION

		100-YEAR		50-YEAR		10-YEAR		5-YEAR		2-YEAR	
HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK
CO101	1.89	1,181	12.50	734	12.50	306	12.75	183	13.25	58	14.00
RO100	1.89	911	13.00	606	13.00	281	13.50	162	13.75	51	15.00
SUB102	2.67	731	13.50	512	13.75	203	14.75	115	15.50	38	18.25
CO103	4.56	1,552	13.00	1,067	13.25	426	13.75	236	14.00	74	15.75
SUB104	3.11	873	13.50	611	13.75	250	14.75	137	15.50	45	18.00
CO105	7.67	2,338	13.25	1,629	13.50	641	14.25	352	14.75	114	17.25
RO105	7.67	2,324	13.25	1,624	13.50	641	14.25	352	15.00	113	17.50
SUB106	2.66	714	13.25	524	13.75	210	14.50	121	15.25	39	17.75
CO107	10.33	3,039	13.25	2,143	13.50	850	14.25	471	15.00	152	17.50
RO107	10.33	2,911	13.50	2,074	14.00	830	14.75	464	15.75	151	18.25
SUB108	2.00	524	13.50	385	13.75	151	14.50	86	15.50	26	18.00
CO108	12.33	3,436	13.50	2,439	14.00	980	14.75	548	15.75	178	18.25
CO109	66.31	19,224	13.75	13,911	13.75	5,500	14.50	3,045	15.50	1,001	17.50
RO109	66.31	19,218	13.75	13,802	14.00	5,472	14.75	3,042	15.75	997	17.75
SUB110	1.35	418	13.25	294	13.50	124	14.00	70	14.75	24	16.50
CO111	67.66	19,553	13.75	14,051	14.00	5,584	14.75	3,103	15.75	1,019	17.75

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

  1           ID       EASTERN MARICOPA COUNTY MASTER DRAINAGE PLAN
  2           ID       TOTAL 70 SQ. MI. DRAINAGE AREA - EXISTING CONDITION
  3           ID       12 JUNE 1985  - 100 YEAR RAINFALL - REVISED JUNE 24, 1986
              *DIAGRAM
  4           IT     15                    120
  5           IO      3
  6           PG      1    3.65
  7           PG     10
  8           IN     30                     48
  9           PI   0.011   0.029   0.018   0.022   0.022   0.026   0.022   0.026   0.029   0.026
 10           PI   0.029   0.033   0.033   0.033   0.040   0.040   0.048   0.051   0.058   0.066
 11           PI   0.084   0.113   0.175   1.387   0.263   0.135   0.099   0.077   0.066   0.058
 12           PI   0.051   0.044   0.040   0.040   0.037   0.033   0.029   0.029   0.029   0.026
 13           PI   0.026   0.022   0.026   0.023   0.021   0.018   0.022   0.018

 14           KK    SUB2
 15           KM       RUNOFF FROM SUBBASIN 2
 16           PR     10
 17           PW      1
 18           PT      1
 19           PW      1
 20           BA   3.41
 21           LS            81
 22           UK    250  0.0050   0.200     100
 23           RK  19000  0.0094   0.040    0.27    TRAP     0.0     2.0
 24           RK   6250  0.0001   0.025            TRAP    80.0     3.0

 25           KK    R03
 26           KM       ROUTE FLOWS FROM SUB2 TO SUB4
 27           RK   4940  .00015   0.025            TRAP   110.0     3.0     YES

 28           KK    SUB4
 29           KM       RUNOFF FROM SUBBASIN 4
 30           PR     10
 31           PW      1
 32           PT      1
 33           PW      1
 34           BA   3.27
 35           LS            83
 36           UK    750  0.0050   0.200     100
 37           RK  19600  0.0120   0.040    0.28    TRAP     2.0     4.0
 38           RK   4940  .00015   0.025            TRAP   110.0     3.0

 39           KK    C05
 40           KM       COMBINE FLOWS FROM SUB2 AND SUB4
 41           HC      2

 42           KK    R05
 43           KM       ROUTE FLOWS FROM SUB4 TO SUB6
 44           RK   4050  0.0003   0.025            TRAP    90.0     3.0     YES
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 45           KK    SUB6
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46          KM       RUNOFF FROM SUBBASIN 6
47          PR      10
48          PW       1
49          PT       1
50          PW       1
51          BA    3.41
52          LS             84
53          UK     120  0.0050   0.200     100
54          RK    6000  0.0067   0.050    0.24    TRAP    20.0     0.0
55          RK    7750  0.0067   0.016            TRAP    19.0     2.0

56          KK     C07
57          KM       COMBINE FLOWS FROM SUB 4 AND SUB 6
58          HC       2

59          KK     R07
60          KM       ROUTE FLOWS FROM SUB6 TO SUB8
61          RK    7470  0.0005   0.025            TRAP   120.0     3.0     YES

62          KK    SUB8
63          KM       RUNOFF FROM SUBBASIN 8
64          PR      10
65          PW       1
66          PT       1
67          PW       1
68          BA    1.84
69          LS             83
70          UK     750  0.0050   0.200     100
71          RK    6200  0.0071   0.050    0.90    TRAP    20.0    0.00
72          RK    7470  0.0005   0.025            TRAP   120.0     3.0

73          KK     C09
74          KM       COMBINE FLOWS FROM SUB6 AND SUB8
75          HC       2

76          KK   SUB10
77          KM       RUNOFF FROM SUBBASIN 10
78          PR      10
79          PW       1
80          PT       1
81          PW       1
82          BA    0.33
83          LS             83
84          UK     500  0.0230   0.200     100
85          RK    3000  0.0167   0.040  0.0646    TRAP     2.0     4.0
86          RK    1480  0.0042   0.035            TRAP     8.0     1.5

87          KK   SUB12
88          KM       RUNOFF FROM SUBBASIN 12
89          PR      10
90          PW       1
91          PT       1
92          PW       1
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

93          BA    0.75
94          LS             84
95          UK     500  0.0180   0.200     100
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 96          RK    6600  0.0174   0.040  0.0710    TRAP     2.0     4.0
 97          RK    1060  0.0056   0.035            TRAP     8.0     1.5

 98          KK    CO13
 99          KM       COMBINE RUNOFF FROM SUB10 AND SUB12
100          HC       2

101          KK    RO13
102          KM       ROUTE FLOWS FROM SUB10 AND SUB12 TO SUB14
103          RK   10400  0.0098   0.035            TRAP     5.0     3.0     YES

104          KK   SUB14
105          KM       RUNOFF FROM SUBBASIN 14
106          PR      10
107          PW       1
108          PT       1
109          PW       1
110          BA    1.17
111          LS              86
112          UK      85   0.005   0.200     100
113          RK    8500  0.0067   0.050   0.036    TRAP    20.0     0.0
114          RK    2600  0.0075   0.040            TRAP    32.0     6.0

115          KK    CO15
116          KM       COMBINE FLOWS FROM SUB10 AND SUB12 AND SUB14
117          HC       2

118          KK   SUB16
119          KM       RUNOFF FROM SUBBASIN 16
120          PR      10
121          PW       1
122          PT       1
123          PW       1
124          BA    0.71
125          LS              84
126          UK     500  0.0133   0.200     100
127          RK    8800  0.0148   0.040   0.158    TRAP     2.0     4.0
128          RK    1700  0.0055   0.035            TRAP     8.0     1.5

129          KK   SUB18
130          KM       RUNOFF FROM SUBBASIN 18
131          PR      10
132          PW       1
133          PT       1
134          PW       1
135          BA    1.50
136          LS              83
137          UK    1000  0.0150   0.200     100
138          RK    4800  0.0115   0.040  0.1033    TRAP     2.0     4.0
139          RK   10000  0.0102   0.035            TRAP    20.0     3.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

140          KK    CO19
141          KM       COMBINE RUNOFF FROM SUB 16 AND SUB 18
142          HC       2

143          KK    RO19
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144        KM       ROUTE FLOWS FROM SUB16 AND SUB18 TO SUB20
145        RK    8300  0.0102   0.035           TRAP     5.0     2.0     YES

146        KK   SUB20
147        KM       RUNOFF FROM SUBBASIN 20
148        PR      10
149        PW       1
150        PT       1
151        PW       1
152        BA    1.05
153        LS             85
154        UK      90   0.005   0.200     100
155        RK    5250  0.0075   0.050   0.043    TRAP    20.0     0.0
156        RK    8300  0.0102   0.035           TRAP     5.0     2.0

157        KK    CO21
158        KM       COMBINE RUNOFF FROM SUB 16 & 18 AND SUB 20
159        HC       2

160        KK    RO21
161        KM       ROUTE FLOWS FROM SUB20 TO SUB14
162        RK    2600  0.0054    .035           TRAP     5.0     2.0     YES

163        KK    CO23
164        KM       COMBINE RUNOFF FROM SUB14 AND SUB20
165        HC       2

166        KK   SUB23
167        KM       DIVERT RUNOFF FROM SUB20 AND SUB14 TO SUB32
168        DT    DT31
169        DI       0    1500    1750    2000    3000    4000
170        DQ       0    1500    1500    1500    1500    1500

171        KK    RO23
172        KM       ROUTE FLOWS FROM SUB 14 TO SUB 24
173        RK    5200   .0068    .025           TRAP      60       4     YES

174        KK   SUB24
175        KM       RUNOFF FROM SUBBASIN 24
176        PR      10
177        PW       1
178        PT       1
179        PW       1
180        BA    2.11
181        LS             86
182        UK     100  0.0050   0.200     100
183        RK    7000  0.0070   0.050    0.10    TRAP    20.0    0.00
184        RK    9600  0.0038   0.035           TRAP    30.0    4.00
1                                        HEC-1 INPUT

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


185        KK    CO25
186        KM       COMBINE FLOWS FROM SUB23 AND SUB24
187        HC       2

188        KK    RO25
189        KM       ROUTE FLOWS FROM SUB24 TO SUB26
190        RK    9000  0.0064   0.025           TRAP    12.0     2.0     YES
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191          KK   SUB26
192          KM       RUNOFF FROM SUBBASIN 26
193          PR      10
194          PW       1
195          PT       1
196          PW       1
197          BA    2.69
198          LS              84
199          UK    1250  0.0050   0.200     100
200          RK    3500  0.0060   0.050    0.14    TRAP    20.0     0.0
201          RK    9000  0.0064   0.025            TRAP    12.0     2.0

202          KK   CO26
203          KM       COMBINE FLOWS FROM SUB24 AND SUB26
204          HC       2

205          KK   CO27
206          KM       COMBINE RUNOFF FROM SUB8 AND SUB26
207          HC       2

208          KK   RO27
209          KM       ROUTE SUB8 THROUGH RWCD SUB28
210          RK    2970  0.0007   0.025            TRAP     140     3.0     YES

211          KK   SUB28
212          KM       RUNOFF FROM SUBBASIN 28
213          PR      10
214          PW       1
215          PT       1
216          PW       1
217          BA    0.97
218          LS              79
219          UK     870  0.0060   0.200     100
220          RK    2500  0.0020   0.040    0.04    TRAP     2.0     4.0
221          RK    8800  0.0059   0.035            TRAP    10.0     3.0

222          KK   CO29
223          KM       COMBINE SUB28 AND RWCD FLOWS
224          HC       2

225          KK   RO29
226          KM       ROUTE FLOWS FROM SUB28 TO SUB30
227          RK    6070  0.0003   0.025            TRAP   140.0     3.0     YES
1                                          HEC-1 INPUT

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


228          KK   SUB30
229          KM       RUNOFF FROM SUBBASIN 30
230          PR      10
231          PW       1
232          PT       1
233          PW       1
234          BA    1.33
235          LS              75
236          UK    1250  0.0020   0.200     100
237          RK    5000  0.0060   0.040    0.07    TRAP     2.0     4.0
238          RK    6070  0.0003   0.025            TRAP   140.0     3.0
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239          KK    CO31
240          KM        COMBINE FLOWS FROM SUB28 AND SUB30
241          HC       2

242          KK   SUB31
243          KM        DIVERTED FLOWS FROM SUB20 AND SUB14
244          DR    DT31

245          KK    RO31
246          KM        ROUTE FLOWS FROM SUB31 AND SUB32
247          RK   11200  0.0054   0.035           TRAP    30.0      2.0     YES

248          KK   SUB32
249          KM        RUNOFF FROM SUBBASIN 32
250          PR      10
251          PW       1
252          PT       1
253          PW       1
254          BA    2.27
255          LS              85
256          UK    1250   0.005   0.200     100
257          RK    6000  0.0083   0.040   0.086    TRAP     2.0     4.0
258          RK   11200  0.0054   0.035           TRAP    30.0     2.0

259          KK   CO33
260          KM        COMBINE FLOWS FROM SUB31 AND SUB32
261          HC       2

262          KK   SUB34
263          KM        RUNOFF FROM SUBBASIN 34
264          PR      10
265          PW       1
266          PT       1
267          PW       1
268          BA    1.84
269          LS              84
270          UK    1000  0.0100   0.200     100
271          RK    5000  0.0111   0.040   0.090    TRAP     2.0     4.0
272          RK   13700  0.0102   0.035           TRAP    10.0     3.0
1                                          HEC-1 INPUT

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


273          KK    RO35
274          KM        ROUTE FLOWS FROM SUB34 AND SUB36
275          RK    3200  0.0093   0.035           TRAP    20.0     3.0     YES

276          KK   SUB36
277          KM        RUNOFF FROM SUBBASIN 36
278          PR      10
279          PW       1
280          PT       1
281          PW       1
282          BA    0.33
283          LS              84
284          UK     250  0.0067   0.200     100
285          RK    1500  0.0167   0.040  0.0269    TRAP     2.0     4.0
286          RK    3200  0.0093   0.035           TRAP    20.0     3.0
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287          KK    CO37
288          KM        COMBINE FLOWS FROM SUB34 AND SUB36
289          HC       2

290          KK   SUB38
291          KM        RUNOFF FROM SUBBASIN 38
292          PR      10
293          PW       1
294          PT       1
295          PW       1
296          BA    0.99
297          LS              84
298          UK     500  0.0125   0.200     100
299          RK    4000  0.0125   0.040  0.0574    TRAP     2.0     4.0
300          RK   14000  0.0090   0.035            TRAP    10.0     3.0

301          KK    RO39
302          KM        ROUTE FLOWS FROM SUB38 TO SUB40
303          RK    6000  0.0120   0.035            TRAP    10.0     3.0     YES

304          KK   SUB40
305          KM        RUNOFF FROM SUBBASIN 40
306          PR      10
307          PW       1
308          PT       1
309          PW       1
310          BA    0.45
311          LS              84
312          UK     350  0.0180   0.200     100
313          RK    2500  0.0100   0.040  0.0448    TRAP     2.0     4.0
314          RK    6000  0.0120   0.035            TRAP    10.0     3.0

315          KK    CO41
316          KM        COMBINE FLOWS FROM SUB38 AND SUB40
317          HC       2
```



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

318          KK   SUB41
319          KM        DIVERT 50% FROM SUB40 TO SUB60
320          DT     D43
321          DI       0     100    1000   10000
322          DQ       0      50     500    5000

323          KK    CO45
324          KM        COMBINE FLOWS FROM 50% OF SUB40 TO SUB36
325          HC       2

326          KK    RO45
327          KM        ROUTE FLOWS FROM SUB45 TO SUB46
328          RK   11200  0.0082   0.035            TRAP    10.0     3.0     YES

329          KK   SUB46
330          KM        RUNOFF FROM SUBBASIN 46
331          PR      10
332          PW       1
333          PT       1
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334          PW      1
335          BA   2.11
336          LS            85
337          UK   1250   0.010   0.200     100
338          RK   2500  0.0100   0.040  0.0368    TRAP     2.0     4.0
339          RK  11200  0.0082   0.035            TRAP    10.0     3.0

340          KK   CD46
341          KM       COMBINE FLOWS FROM SUB45 AND SUB46
342          HC      2

343          KK   RD46
344          KM       ROUTE SUB46 TO SUB32
345          RK   9200  0.0060   0.035            TRAP    10.0     1.0     YES

346          KK   CD47
347          KM       COMBINE RUNOFF FROM SUB32 AND SUB46
348          HC      2

349          KK   RD47
350          KM       ROUTE SUB46 AND SUB32 TO SUB48
351          RK   2800  0.0071    .035            TRAP    10.0     2.5     YES

352          KK  SUB48
353          KM       RUNOFF FROM SUBBASIN 48
354          PR     10
355          PW      1
356          PT      1
357          PW      1
358          BA   0.91
359          LS            81
360          UK    967  0.0065   0.200     100
361          RK   2300  0.0087   0.040   0.130    TRAP     2.0     4.0
362          RK  10000  0.0070   0.035            TRAP    30.0     4.0
1                                          HEC-1 INPUT

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


363          KK   CD49
364          KM       COMBINE SUB48 AND SUB32
365          HC      2

366          KK   RD49
367          KM       ROUTE SUB48 TO SUB50
368          RK   5550  0.0015   0.035            TRAP    50.0     2.5     YES

369          KK  SUB50
370          KM       RUNOFF FROM SUBBASIN 50
371          PR     10
372          PW      1
373          PT      1
374          PW      1
375          BA   1.82
376          LS            79
377          UK   1300   0.006   0.200     100
378          RK   5000  0.0050   0.040   0.072    TRAP     2.0     4.0
379          RK   7300  0.0058   0.035            TRAP    15.0     3.0

380          KK   CD51
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381          KM        COMBINE RUNOFF FROM SUB48 AND SUB50
382          HC       2

383          KK   SUB53
384          KM        DIVERT FLOWS FROM SUB51 TO SUB64
385          DT     D50
386          DI       0     530     930    1500    2240    4100    7500
387          DQ       0       0      90     300     640    1780    5180

388          KK    RO53
389          KM        ROUTE SUB50 TO RWCD SUB30
390          RK    5300   .0025   0.035            TRAP    40.0     2.5     YES

391          KK    CO55
392          KM        COMBINE RUNOFF FROM SUB30 AND SUB53
393          HC       2

394          KK    RO55
395          KM        ROUTE FLOWS FROM SUB30 TO SUB56
396          RK    5630  0.0008   0.025            TRAP   145.0     3.0     YES

397          KK   SUB56
398          KM        RUNOFF FROM SUBBASIN 56
399          PT      10
400          PW       1
401          PT       1
402          PW       1
403          BA    0.75
404          LS             75
405          UK    1250   0.006   0.200     100
406          RK    3500   0.004   0.040   0.050    TRAP     2.0     4.0
407          RK    5630  0.0003   0.025            TRAP   145.0     3.0
```



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

408          KK    CO57
409          KM        COMBINE FLOWS FROM SUB55 AND SUB56
410          HC       2

411          KK   SUB57
412          KM        DIVERTED FLOWS OF SUB40
413          DR     D43

414          KK    RO57
415          KM        ROUTE DIVERTED FLOWS FROM SUB40 TO SUB58
416          RK    7000   .0072   0.035            TRAP    10.0     3.0     YES

417          KK   SUB58
418          KM        RUNOFF FROM SUBBASIN 58
419          PR      10
420          PW       1
421          PT       1
422          PW       1
423          BA    0.46
424          LS             84
425          UK    1000   0.010   0.200     100/
426          RK    2000    .008   0.040    .029    TRAP     2.0     4.0
427          RK    7000   .0072   0.035            TRAP    10.0     3.0
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428          KK    CO59
429          KM       COMBINE FLOWS FROM SUB57 AND SUB58
430          HC      2

431          KK    RO59
432          KM       ROUTE FLOWS FROM SUB58 AND SUB60
433          RK    5200  0.0720   0.035           TRAP    10.0     3.0     YES

434          KK   SUB60
435          KM       RUNOFF FROM SUBBASIN 60
436          PR      10
437          PW       1
438          PT       1
439          PW       1
440          BA    0.45
441          LS              83
442          UK     500   0.010    .200     100
443          RK    2400   .0087    .040    .034    TRAP     2.0     4.0
444          RK    5200    .072    .035            TRAP    10.0     3.0

445          KK    CO61
446          KM       COMBINE FLOWS FROM SUB58 AND SUB60
447          HC      2

448          KK    RO61
449          KM       ROUTE FLOWS FROM SUB60 TO SUB62
450          RK   19000  0.0065   0.035            TRAP    10.0     3.0     YES
1                                          HEC-1 INPUT

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


451          KK   SUB62
452          KM       RUNOFF FROM SUBBASIN 62
453          PR      10
454          PW       1
455          PT       1
456          PW       1
457          BA    2.32
458          LS              80
459          UK   750.0   0.008   0.200     100
460          RK    3000     .01   0.040     .04    TRAP     2.0     4.0
461          RK   19000   .0065   0.035            TRAP     10.     3.0

462          KK    CO63
463          KM       COMBINE FLOWS FROM SUB60 AND SUB62
464          HC      2

465          KK   SUB63
466          KM       DIVERTED FLOWS OF SUB50
467          DR     D50

468          KK    RO63
469          KM       ROUTE DIVERTED FLOWS FROM SUB50 TO SUB62
470          RK    5000   .0026    .035            TRAP    30.0     4.0     YES

471          KK    CO65
472          KM       COMBINE RUNOFF FROM SUB62 AND SUB63 (DIVERTED FLOWS OF SUB50)
473          HC      2
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474          KK    RO65
475          KM        ROUTE SUB62 TO RWCD SUB56
476          RK    3400   .0056    .035           TRAP    30.0     4.0     YES

477          KK    CO67
478          KM        COMBINE RUNOFF FROM SUB56 AND SUB65
479          HC       2

480          KK    RO67
481          KM        ROUTE FLOWS FROM SUB67 TO SUB68
482          RK    6030  0.0003   0.025           TRAP   150.0     3.0     YES

483          KK   SUB68
484          KM        RUNOFF FROM SUBBASIN 68
485          PR      10
486          PW       1
487          PT       1
488          PW       1
489          BA    0.77
490          LS             78
491          UK     250   0.007   0.200     100
492          RK    3500   .0043   0.040     .05   TRAP     2.0     4.0
493          RK    6030  0.0003   0.025           TRAP   150.0     3.0
1                                          HEC-1 INPUT

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


494          KK    CO69
495          KM        COMBINE FLOWS FROM SUB56 AND SUB68
496          HC       2

497          KK    RO69
498          KM        ROUTE FLOWS FROM SUB63 TO SUB108
499          RK    1400  0.0003   0.035           TRAP     150       3     YES

500          KK   SUB70
501          KM        RUNOFF FROM SUBBASIN 70
502          PR      10
503          PW       1
504          PT       1
505          PW       1
506          BA    1.43
507          LS             85
508          UK    1000   0.011   0.200     100
509          RK    3500   0.012   0.040  0.0502   TRAP     2.0     4.0
510          RK   11200   0.011   0.035           TRAP    10.0     3.0

511          KK    RO71
512          KM        ROUTE FLOWS FROM SUB70 AND SUB72
513          RK    8800  0.0090   0.035           TRAP    10.0     3.0     YES

514          KK   SUB72
515          KM        RUNOFF FROM SUBBASIN 72
516          PR      10
517          PW       1
518          PT       1
519          PW       1
520          BA    1.38
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521          LS            85
522          UK    1250   0.011   0.200     100
523          RK    2500   0.009   0.040  0.0359    TRAP     2.0     4.0
524          RK    8800   0.009   0.035            TRAP    10.0     3.0

525          KK    CO73
526          KM       COMBINE FLOWS FROM SUB70 AND SUB72
527          HC      2

528          KK   SUB74
529          KM       RUNOFF FROM SUBBASIN 74
530          PR     10
531          PW      1
532          PT      1
533          PW      1
534          BA    2.78
535          LS            85
536          UK    1500   0.015   0.200     100
537          RK    5000   0.013   0.040   0.009    TRAP     2.0     4.0
538          RK    8400   0.009   0.035            TRAP    15.0     3.0
1                                          HEC-1 INPUT

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


539          KK    RO75
540          KM       ROUTE FLOWS FROM SUB74 TO SUB76
541          RK   14400  0.0100   0.035            TRAP    15.0     3.0     YES

542          KK   SUB76
543          KM       RUNOFF FROM SUBBASIN 76
544          PR     10
545          PW      1
546          PT      1
547          PW      1
548          BA    2.13
549          LS            84
550          UK    1250   0.013   0.200     100
551          RK    7000   0.010   0.040   0.176    TRAP     2.0     4.0
552          RK   14400   0.010   0.035            TRAP    15.0     3.0

553          KK    CO77
554          KM       COMBINE FLOWS FROM SUB74 AND SUB76
555          HC      2

556          KK   SUB77
557          KM       DIVERT 50% OF SUB76 TO SUB79
558          DT     D79
559          DI      0     100    1000   10000
560          DQ      0      50     500    5000

561          KK    CO81
562          KM       COMBINE FLOWS FROM 50% OF SUB76 AND SUB72
563          HC      2

564          KK    RO81
565          KM       ROUTE FLOWS FROM SUB81 TO SUB82
566          RK    5400  0.0111   0.035            TRAP    10.0     3.0     YES

567          KK   SUB82
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568        KM       RUNOFF FROM SUBBASIN 82
569        PR      10
570        PW       1
571        PT       1
572        PW       1
573        BA    0.73
574        LS              84
575        UK    1250   0.010   0.200     100
576        RK    2000  0.0100   0.040    .029    TRAP     2.0     4.0
577        RK    5400  0.0111   0.035            TRAP    10.0     3.0

578        KK    CO82
579        KM       COMBINE FLOWS FROM SUB81 AND SUB82
580        HC       2
1                                        HEC-1 INPUT

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


581        KK    RO82
582        KM       ROUTE SUB82 TO SUB84
583        RK    4800   .0069    .035            TRAP    10.0     4.0     YES

584        KK   SUB78
585        KM       RUNOFF FROM SUBBASIN 78
586        PR      10
587        PW       1
588        PT       1
589        PW       1
590        BA    0.12
591        LS              83
592        UK     500   0.023   0.200     100
593        RK    1600   0.013   0.040   0.043    TRAP     2.0     4.0
594        RK     400   0.017   0.035            TRAP     8.0     1.5

595        KK   SUB79
596        KM       DIVERTED FLOWS OF 50% OF SUB 77
597        DR     D79

598        KK    CO83
599        KM       COMBINE RUNOFF FROM SUB78 AND DIVERTED FLOWS OF 50% OF SUB76
600        HC       2

601        KK    RO83
602        KM       ROUTE FLOWS FROM SUB83 TO SUB84
603        RK    1700  0.0059   0.035            TRAP    10.0     3.0     YES

604        KK   SUB84
605        KM       RUNOFF FROM SUBBASIN 84
606        PR      10
607        PW       1
608        PT       1
609        PW       1
610        BA    0.15
611        LS              83
612        UK     250   0.008   0.200     100
613        RK    1200  0.0086   0.040    0.05    TRAP     2.0     4.0
614        RK    1700  0.0059   0.035            TRAP    10.0     3.0

615        KK    CO85
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616        KM      COMBINE FLOWS FROM SUB83 AND SUB84
617        HC     2

618        KK   RO85
619        KM      ROUTE SUB84 TO SUB86
620        RK   7000   .0069    .035          TRAP    10.0     4.0    YES

621        KK   SUB86
622        KM      RUNOFF FROM SUBBASIN 86
623        PR    10
624        PW     1
625        PT     1
626        PW     1
1                                   HEC-1 INPUT

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

627        BA    .80
628        LS            83
629        UK   1000   .008    .200     100
630        RK   3200   .012    .040    .046   TRAP     2.0     4.0
631        RK   7800   .060    .035           TRAP    10.0     4.0

632        KK   CO86
633        KM      COMBINE SUB84 AND SUB86
634        HC     2

635        KK   RO86
636        KM      ROUTE FLOWS FROM SUB86 TO SUB88
637        RK   4000  0.0600   0.035          TRAP    10.0     4.0   YES

638        KK   CO87
639        KM      COMBINE SUB82 AND SUB86
640        HC     2

641        KK   SUB88
642        KM      RUNOFF FROM SUBBASIN 88
643        PR    10
644        PW     1
645        PT     1
646        PW     1
647        BA    .34
648        LS            83
649        UK    500   .008    .200     100
650        RK   4600   .012    .040    .066   TRAP     2.0     4.0
651        RK   4000   .060    .035           TRAP    10.0     4.0

652        KK   CO89
653        KM      COMBINE RUNOFF FROM SUB82 AND SUB88
654        HC     2

655        KK   RO89
656        KM      ROUTE FLOWS FROM SUB88 TO SUB90
657        RK  14300  0.0073   0.035          TRAP    10.0     3.0    YES

658        KK   SUB90
659        KM      RUNOFF FROM SUBBASIN 90
660        PR    10
661        PW     1
662        PT     1
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663          PW      1
664          BA   2.27
665          LS             83
666          UK   1100   0.007   0.200     100
667          RK   3000  0.0083   0.040    0.04    TRAP     2.0     4.0
668          RK  14300  0.0073   0.035            TRAP    10.0     3.0
1                                          HEC-1 INPUT

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


669          KK   CO91
670          KM       COMBINE FLOWS FROM SUB88 AND SUB90
671          HC      2

672          KK   RO91
673          KM       ROUTE FLOWS FROM SUB90 TO SUB92
674          RK  14400  0.0043   0.035            TRAP    10.0     3.0     YES

675          KK  SUB92
676          KM       RUNOFF FROM SUBBASIN 92
677          PR     10
678          PW      1
679          PT      1
680          PW      1
681          BA   1.84
682          LS             82
683          UK    850   0.006   0.200     100
684          RK   2000  0.0050   0.040   0.029    TRAP     2.0     4.0
685          RK  14400  0.0043   0.035            TRAP    10.0     3.0

686          KK   CO92
687          KM       COMBINE FLOWS FROM SUB90 AND SUB92
688          HC      2

689          KK   RO92
690          KM       ROUTE SUB92 TO RWCD SUB68
691          RK   3400   .0080    .035            TRAP    20.0     3.0     YES

692          KK   CO93
693          KM       COMBINE RUNOFF FROM SUB68 AND SUB92
694          HC      2

695          KK  SUB94
696          KM       RUNOFF FROM SUBBASIN 94
697          PR     10
698          PW      1
699          PT      1
700          PW      1
701          BA   0.87
702          LS             84
703          UK    650  0.0175   0.200     100
704          RK   6000  0.0083   0.040   0.043    TRAP     2.0     4.0
705          RK  -2500  0.0048   0.035            TRAP    10.0     3.0

706          KK   RO95
707          KM       ROUTE FLOWS FROM SUB94 TO SUB96
708          RK   3600  0.0028   0.035            TRAP    10.0     3.0     YES

709          KK  SUB96
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710          KM       RUNOFF FROM SUBBASIN 96
711          PR      10
712          PW       1
713          PT       1
714          PW       1
1                                        HEC-1 INPUT                                                    PAGE 17

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

715          BA     .14
716          LS             83
717          UK     300    .008    .200     100
718          RK    1000   .0013    .040   .0143    TRAP     2.0     4.0
719          RK    3600   .0028    .035            TRAP    10.0     3.0

720          KK    CO97
721          KM       COMBINE FLOWS FROM SUB94 AND SUB96
722          HC       2

723          KK   SUB98
724          KM       RUNOFF FROM SUBBASIN 98
725          PR      10
726          PW       1
727          PT       1
728          PW       1
729          BA    0.13
730          LS             83
731          UK     350   0.010   0.200     100
732          RK    1200   0.013   0.040   0.017    TRAP     2.0     4.0
733          RK     100   0.006   0.035            TRAP     8.0     1.5

734          KK    RO99
735          KM       ROUTE FLOWS FROM SUB98 TO SUB100
736          RK    1200  0.0060   0.035            TRAP     8.0     1.5     YES

737          KK  SUB100
738          KM       RUNOFF FROM SUBBASIN 100
739          PR      10
740          PW       1
741          PT       1
742          PW       1
743          BA     .75
744          LS             83
745          UK     350   0.010    .200     100
746          RK    4000    .013    .040    .075    TRAP     2.0     4.0
747          RK    1200    .006    .035            TRAP     8.0     1.5

748          KK   CO100
749          KM       COMBINE FLOWS FROM SUB98 AND SUB100
750          HC       2

751          KK   CO101
752          KM       COMBINE RUNOFF HYDROGRAPHS FROM SUB 96 AND SUB 100
753          HC       2

754          KK   RO100
755          KM       ROUTE FLOWS FROM SUB100 TO SUB102
756          RK   18000  0.0083   0.035            TRAP    10.0     3.0     YES
1                                        HEC-1 INPUT
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 757        KK  SUB102
 758        KM       RUNOFF FROM SUBBASIN 102
 759        PR      10
 760        PW       1
 761        PT       1
 762        PW       1
 763        BA    2.67
 764        LS              83
 765        UK    1500  0.0080   0.200     100
 766        RK    5000  0.0100   0.040    0.07    TRAP     2.0     4.0
 767        RK   18000  0.0083   0.035            TRAP    10.0     3.0

 768        KK   CD103
 769        KM       COMBINE FLOWS FROM SUB100 AND SUB102
 770        HC       2

 771        KK  SUB104
 772        KM       RUNOFF FROM SUBBASIN 104
 773        PR      10
 774        PW       1
 775        PT       1
 776        PW       1
 777        BA    3.11
 778        LS              83
 779        UK    1500   0.009   0.200     100
 780        RK    4000  0.0100   0.040    0.06    TRAP     2.0     4.0
 781        RK   20000  0.0060   0.035            TRAP    10.0     3.0

 782        KK   CD105
 783        KM       COMBINE SUBBASIN 102 AND 104
 784        HC       2

 785        KK   RD105
 786        KM       ROUTE SUB102 AND SUB104 TO SUB106
 787        RK    5800   .0043    .035            TRAP    25.0     2.0     YES

 788        KK  SUB106
 789        KM       RUNOFF FROM SUBBASIN 106
 790        PR      10
 791        PW       1
 792        PT       1
 793        PW       1
 794        BA    2.66
 795        LS              83
 796        UK    1500   0.007   0.200     100
 797        RK    1500  0.0067   0.040    0.02    TRAP     2.0     4.0
 798        RK    8000  0.0053   0.035            TRAP     5.0     4.0

 799        KK   CD107
 800        KM       COMBINE SUB102, SUB104 AND SUB106
 801        HC       2
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 802        KK   RD107
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KM        ROUTE FLOWS FROM SUB107 TO SUB108
RK   16000  0.0046   0.035           TRAP    10.0     4.0     YES

KK  SUB108
KM        RUNOFF FROM SUBBASIN 108
PR      10
PW       1
PT       1
PW       1
BA    2.00
LS              82
UK    1100   0.006   0.200     100
RK    2000  0.0050   0.040    0.03    TRAP     2.0     4.0
RK   16000  0.0046   0.035           TRAP    10.0     4.0

KK   CO108
KM        COMBINE FLOWS FROM SUB107 AND SUB108
HC       2

KK   CO109
KM        COMBINE RUNOFF FROM SUB93 AND SUB108
HC       2

KK   RO109
KM        ROUTE FLOWS FROM SUB109 TO SUB110
RK    4180  0.0003   0.025           TRAP   170.0     3.0     YES

KK  SUB110
KM        RUNOFF FROM SUBBASIN 110
PR      10
PW       1
PT       1
PW       1
BA    1.35
LS              83
UK     250   0.004   0.200     100
RK   14000  0.0045   0.040    0.20    TRAP     2.0     4.0
RK    4180  0.0003   0.025           TRAP   170.0     3.0

KK   CO111
KM        COMBINE FLOWS FROM SUB109 AND SUB110
HC       2
ZZ
```

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	SUB2	987.	13.25	434.	149.	120.	3.41		
+	ROUTED TO	R03	990.	13.50	430.	149.	120.	3.41		
+	HYDROGRAPH AT	SUB4	892.	13.50	440.	154.	124.	3.27		
+	2 COMBINED AT	C05	1882.	13.50	869.	303.	244.	6.68		
+	ROUTED TO	R05	1880.	13.75	868.	302.	244.	6.68		
+	HYDROGRAPH AT	SUB6	2985.	12.25	597.	185.	149.	3.41		
+	2 COMBINED AT	C07	2985.	12.25	1392.	487.	393.	10.09		
+	ROUTED TO	R07	2518.	12.75	1352.	480.	387.	10.09		
+	HYDROGRAPH AT	SUB8	613.	13.25	261.	89.	72.	1.84		
+	2 COMBINED AT	C09	2900.	12.75	1613.	568.	459.	11.93		
+	HYDROGRAPH AT	SUB10	248.	12.50	54.	17.	14.	0.33		
+	HYDROGRAPH AT	SUB12	593.	12.50	128.	40.	32.	0.75		
+	2 COMBINED AT	C013	840.	12.50	182.	57.	46.	1.08		
+	ROUTED TO	R013	740.	12.50	179.	57.	46.	1.08		
+	HYDROGRAPH AT	SUB14	531.	12.75	202.	66.	53.	1.17		
+	2 COMBINED AT	C015	1270.	12.50	381.	122.	99.	2.25		
+	HYDROGRAPH AT	SUB16	493.	12.50	117.	37.	30.	0.71		
	HYDROGRAPH AT									

+		SUB18	677.	12.75	234.	75.	61.	1.50
	2 COMBINED AT							
+		CD19	1073.	12.50	351.	113.	91.	2.21
	ROUTED TO							
+		RO19	1063.	12.75	347.	112.	91.	2.21
	HYDROGRAPH AT							
+		SUB20	860.	12.50	183.	57.	46.	1.05
	2 COMBINED AT							
+		CO21	1723.	12.50	529.	170.	137.	3.26
	ROUTED TO							
+		RO21	1652.	12.75	529.	170.	137.	3.26
	2 COMBINED AT							
+		CO23	2883.	12.75	909.	292.	236.	5.51
	DIVERSION TO							
+		DT31	1500.	12.75	752.	253.	204.	5.51
	HYDROGRAPH AT							
+		SUB23	1383.	12.75	158.	39.	32.	5.51
	ROUTED TO							
+		RO23	1334.	12.75	178.	45.	36.	5.51
	HYDROGRAPH AT							
+		SUB24	1767.	12.50	374.	118.	95.	2.11
	2 COMBINED AT							
+		CO25	2653.	12.75	552.	163.	131.	7.62
	ROUTED TO							
+		RO25	2619.	12.75	553.	163.	131.	7.62
	HYDROGRAPH AT							
+		SUB26	788.	13.25	410.	139.	112.	2.69
	2 COMBINED AT							
+		CO26	3291.	12.75	961.	302.	244.	10.31
	2 COMBINED AT							
+		CO27	6191.	12.75	2570.	871.	702.	22.24
	ROUTED TO							
+		RO27	5711.	13.00	2577.	873.	705.	22.24
	HYDROGRAPH AT							
+		SUB28	265.	13.25	119.	40.	33.	0.97
	2 COMBINED AT							
+		CO29	5971.	13.00	2696.	914.	737.	23.21
	ROUTED TO							
+		RO29	5794.	13.00	2624.	903.	728.	23.21
	HYDROGRAPH AT							

+	SUB30	129.	15.75	99.	41.	33.	1.33
2 COMBINED AT +	CO31	5806.	13.00	2712.	944.	761.	24.54
HYDROGRAPH AT +	SUB31	1500.	12.50	752.	253.	204.	0.00
ROUTED TO +	RO31	1500.	13.25	739.	251.	202.	0.00
HYDROGRAPH AT +	SUB32	709.	13.50	348.	119.	96.	2.27
2 COMBINED AT +	CO33	2208.	13.25	1087.	369.	298.	2.27
HYDROGRAPH AT +	SUB34	752.	12.75	290.	95.	77.	1.84
ROUTED TO +	RO35	745.	13.00	291.	95.	77.	1.84
HYDROGRAPH AT +	SUB36	284.	12.50	57.	18.	14.	0.33
2 COMBINED AT +	CO37	823.	13.00	345.	113.	91.	2.17
HYDROGRAPH AT +	SUB38	638.	12.50	163.	52.	42.	0.99
ROUTED TO +	RO39	610.	12.75	165.	52.	42.	0.99
HYDROGRAPH AT +	SUB40	383.	12.50	77.	24.	19.	0.45
2 COMBINED AT +	CO41	911.	12.50	240.	76.	62.	1.44
DIVERSION TO +	D43	456.	12.50	120.	38.	31.	1.44
HYDROGRAPH AT +	SUB41	456.	12.50	120.	38.	31.	1.44
2 COMBINED AT +	CO45	1226.	12.75	465.	151.	122.	3.61
ROUTED TO +	RO45	1221.	12.75	459.	150.	121.	3.61
HYDROGRAPH AT +	SUB46	843.	13.00	352.	115.	93.	2.11
2 COMBINED AT +	CO46	2026.	13.00	807.	265.	214.	5.72
ROUTED TO							

+		R046	2026.	13.00	807.	265.	214.	5.72
	2 COMBINED AT							
+		C047	4174.	13.00	1895.	635.	512.	7.99
	ROUTED TO							
+		R047	4168.	13.25	1892.	635.	512.	7.99
	HYDROGRAPH AT							
+		SUB48	275.	13.25	122.	41.	33.	0.91
	2 COMBINED AT							
+		C049	4442.	13.25	2013.	677.	546.	8.90
	ROUTED TO							
+		R049	4398.	13.25	2001.	674.	544.	8.90
	HYDROGRAPH AT							
+		SUB50	365.	13.50	209.	74.	60.	1.82
	2 COMBINED AT							
+		C051	4742.	13.25	2210.	748.	604.	10.72
	DIVERSION TO							
+		D50	2422.	13.00	761.	194.	156.	10.72
	HYDROGRAPH AT							
+		SUB53	2320.	13.00	1449.	555.	448.	10.72
	ROUTED TO							
+		R053	2320.	13.50	1433.	551.	445.	10.72
	2 COMBINED AT							
+		C055	7985.	13.00	4135.	1495.	1206.	35.26
	ROUTED TO							
+		R055	7949.	13.25	4114.	1488.	1200.	35.26
	HYDROGRAPH AT							
+		SUB56	93.	14.75	62.	24.	19.	0.75
	2 COMBINED AT							
+		C057	7979.	13.25	4174.	1512.	1220.	36.01
	HYDROGRAPH AT							
+		SUB57	456.	12.50	120.	38.	31.	0.00
	ROUTED TO							
+		R057	451.	12.75	123.	39.	32.	0.00
	HYDROGRAPH AT							
+		SUB58	191.	12.75	74.	24.	19.	0.46
	2 COMBINED AT							
+		C059	643.	12.75	197.	63.	51.	0.46
	ROUTED TO							
+		R059	602.	12.75	196.	63.	51.	0.46
	HYDROGRAPH AT							

+	SUB60	265.	12.50	72.	23.	19.	0.45
2 COMBINED AT +	CO61	813.	12.75	268.	86.	70.	0.91
ROUTED TO +	RO61	750.	13.25	260.	85.	69.	0.91
HYDROGRAPH AT +	SUB62	726.	13.00	297.	101.	81.	2.32
2 COMBINED AT +	CO63	1429.	13.25	555.	186.	150.	3.23
HYDROGRAPH AT +	SUB63	2422.	13.25	761.	194.	156.	0.00
ROUTED TO +	RO63	2413.	13.50	755.	194.	156.	0.00
2 COMBINED AT +	CO65	3646.	13.50	1307.	380.	306.	3.23
ROUTED TO +	RO65	3620.	13.50	1309.	380.	307.	3.23
2 COMBINED AT +	CO67	11399.	13.25	5469.	1892.	1526.	39.24
ROUTED TO +	RO67	11376.	13.50	5473.	1894.	1528.	39.24
HYDROGRAPH AT +	SUB68	197.	13.00	88.	30.	24.	0.77
2 COMBINED AT +	CO69	11541.	13.50	5548.	1924.	1552.	40.01
ROUTED TO +	RO69	11329.	13.75	5539.	1921.	1550.	40.01
HYDROGRAPH AT +	SUB70	662.	12.75	241.	78.	63.	1.43
ROUTED TO +	RO71	659.	13.00	243.	79.	63.	1.43
HYDROGRAPH AT +	SUB72	571.	13.00	232.	76.	61.	1.38
2 COMBINED AT +	CO73	1231.	13.00	473.	154.	124.	2.81
HYDROGRAPH AT +	SUB74	1052.	13.00	444.	148.	119.	2.78
ROUTED TO +	RO75	1021.	13.25	436.	147.	118.	2.78
HYDROGRAPH AT							

+		SUB76	874.	13.00	334.	110.	88.	2.13
+	2 COMBINED AT	C077	1839.	13.25	765.	256.	207.	4.91
+	DIVERSION TO	D79	919.	13.25	383.	128.	103.	4.91
+	HYDROGRAPH AT	SUB77	919.	13.25	383.	128.	103.	4.91
+	2 COMBINED AT	C081	2096.	13.00	854.	282.	228.	7.72
+	ROUTED TO	R081	2067.	13.25	853.	282.	227.	7.72
+	HYDROGRAPH AT	SUB82	273.	13.00	117.	39.	31.	0.73
+	2 COMBINED AT	C082	2318.	13.25	968.	321.	259.	8.45
+	ROUTED TO	R082	2304.	13.25	963.	320.	258.	8.45
+	HYDROGRAPH AT	SUB78	94.	12.25	20.	6.	5.	0.12
+	HYDROGRAPH AT	SUB79	919.	13.25	383.	128.	103.	0.00
+	2 COMBINED AT	C083	943.	13.25	399.	134.	108.	0.12
+	ROUTED TO	R083	934.	13.25	399.	134.	108.	0.12
+	HYDROGRAPH AT	SUB84	123.	12.25	25.	8.	6.	0.15
+	2 COMBINED AT	C085	960.	13.25	420.	142.	115.	0.27
+	ROUTED TO	R085	925.	13.50	417.	141.	114.	0.27
+	HYDROGRAPH AT	SUB86	303.	13.00	124.	41.	33.	0.80
+	2 COMBINED AT	C086	1195.	13.25	539.	182.	147.	1.07
+	ROUTED TO	R086	1170.	13.25	539.	182.	147.	1.07
+	2 COMBINED AT	C087	3474.	13.25	1502.	502.	405.	9.52
	HYDROGRAPH AT							

+	SUB88	184.	12.50	54.	17.	14.	0.34
2 COMBINED AT							
+	CD89	3569.	13.25	1553.	519.	419.	9.86
ROUTED TO							
+	RO89	3480.	13.50	1532.	516.	416.	9.86
HYDROGRAPH AT							
+	SUB90	744.	13.00	336.	112.	91.	2.27
2 COMBINED AT							
+	CD91	4155.	13.50	1861.	628.	507.	12.13
ROUTED TO							
+	RO91	4073.	13.50	1836.	623.	502.	12.13
HYDROGRAPH AT							
+	SUB92	609.	13.00	258.	87.	70.	1.84
2 COMBINED AT							
+	CD92	4598.	13.50	2076.	710.	573.	13.97
ROUTED TO							
+	RO92	4500.	13.75	2078.	710.	573.	13.97
2 COMBINED AT							
+	CD93	15829.	13.75	7592.	2631.	2123.	53.98
HYDROGRAPH AT							
+	SUB94	491.	12.50	141.	45.	36.	0.87
ROUTED TO							
+	RO95	485.	12.75	142.	45.	37.	0.87
HYDROGRAPH AT							
+	SUB96	104.	12.50	23.	7.	6.	0.14
2 COMBINED AT							
+	CD97	559.	12.75	164.	53.	42.	1.01
HYDROGRAPH AT							
+	SUB98	99.	12.25	21.	7.	5.	0.13
ROUTED TO							
+	RO99	97.	12.50	22.	7.	5.	0.13
HYDROGRAPH AT							
+	SUB100	567.	12.50	123.	39.	31.	0.75
2 COMBINED AT							
+	CD100	665.	12.50	145.	45.	37.	0.88
2 COMBINED AT							
+	CD101	1181.	12.50	308.	98.	79.	1.89
ROUTED TO							
+	RO100	911.	13.00	299.	97.	79.	1.89
HYDROGRAPH AT							

+		SUB102	731.	13.50	370.	128.	103.	2.67
+	2 COMBINED AT	CO103	1552.	13.00	669.	225.	182.	4.56
+	HYDROGRAPH AT	SUB104	873.	13.50	436.	150.	121.	3.11
+	2 COMBINED AT	CO105	2338.	13.25	1106.	375.	303.	7.67
+	ROUTED TO	RO105	2324.	13.25	1100.	374.	301.	7.67
+	HYDROGRAPH AT	SUB106	714.	13.25	389.	133.	108.	2.66
+	2 COMBINED AT	CO107	3039.	13.25	1480.	507.	409.	10.33
+	ROUTED TO	RO107	2911.	13.50	1455.	502.	405.	10.33
+	HYDROGRAPH AT	SUB108	524.	13.50	268.	93.	75.	2.00
+	2 COMBINED AT	CO108	3436.	13.50	1716.	595.	480.	12.33
+	2 COMBINED AT	CO109	19224.	13.75	9282.	3227.	2603.	66.31
+	ROUTED TO	RO109	19218.	13.75	9349.	3233.	2608.	66.31
+	HYDROGRAPH AT	SUB110	418.	13.25	187.	64.	51.	1.35
+	2 COMBINED AT	CO111	19553.	13.75	9517.	3297.	2659.	67.66

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

APPENDIX E

RUNOFF SUMMARY TABLE - HEC-1 INPUT AND OUTPUT
- FUTURE CONDITION

RUNOFF SUMMARY TABLE

FUTURE DEVELOPMENT
WITHOUT RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
SUB2	3.41	1,367	13.00	974	13.25	427	13.75	234	14.25	87	15.75
RO3	3.41	1,386	13.25	975	13.50	406	14.25	220	15.25	85	17.00
SUB4	3.27	1,298	13.00	912	13.00	366	13.50	191	14.25	65	16.80
CO5	6.68	2,525	13.25	1,739	13.25	729	14.25	395	15.00	147	16.75
RO5	6.68	2,484	13.50	1,739	13.50	719	14.50	393	15.25	146	17.00
SUB6	3.41	3,337	12.25	2,673	12.50	1,498	12.50	744	12.50	198	13.00
CO7	10.09	3,339	12.25	2,690	12.50	1,498	12.50	744	12.50	198	13.00
RO7	10.09	3,032	13.50	2,286	12.75	1,136	13.25	505	15.50	191	17.75
SUB8	1.84	690	13.00	535	13.25	216	14.00	125	14.75	44	16.50
CO9	11.93	3,641	13.50	2,601	13.75	1,257	13.25	616	15.50	231	17.50
SUB10	0.33	382	12.25	306	12.25	143	12.50	104	12.50	30	12.50
SUB12	0.75	765	12.25	596	12.25	319	12.50	183	12.50	42	13.00
CO13	1.08	1,146	12.25	902	12.25	462	12.50	287	12.50	66	12.75
RO13	1.08	1,134	12.50	837	12.50	388	12.75	231	12.75	65	13.25
SUB14	1.17	989	12.50	765	12.50	342	12.50	211	12.75	67	13.25
CO15	2.25	2,123	12.50	1,601	12.50	719	12.75	442	12.75	132	13.25
SUB16	0.71	750	12.25	590	12.25	320	12.50	218	12.50	48	13.00
SUB18	1.50	781	12.75	591	12.75	222	13.00	128	13.25	39	14.50
CO19	2.21	1,403	12.50	1,074	12.50	441	12.50	254	12.50	62	14.75
RO19	2.21	1,301	12.75	976	12.50	426	12.75	231	12.75	62	14.00
SUB20	1.05	1,109	12.50	831	12.50	402	12.50	246	12.75	84	13.00
CO21	3.26	2,347	12.50	1,808	12.50	786	12.75	477	12.74	133	13.25
RO21	3.26	2,177	12.50	1,629	12.50	759	12.75	440	13.00	131	13.50
CO23	5.51	4,300	12.50	3,230	12.50	1,478	12.75	869	12.75	261	13.25
DT31	5.51	1,500	12.50	1,500	12.50	1,478	0.25	869	0.25	261	0.25
SUB23	5.51	2,800	12.50	1,730	12.50	0	0.25	0	0.25	0	0.25
RO23	5.51	2,378	12.75	1,481	12.75	0	0.25	0	0.25	0	0.25
SUB24	2.11	2,032	12.50	1,439	12.50	647	12.75	341	12.75	103	13.50
CO25	7.62	4,181	12.50	2,888	12.50	647	12.75	341	12.75	103	13.50
RO25	7.62	3,946	12.75	2,753	12.75	572	13.00	339	13.00	100	13.75
SUB26	2.69	2,758	12.25	2,157	12.25	1,233	12.50	785	12.50	215	12.75
CO26	10.31	5.979	12.50	3,892	12.75	1,442	12.50	835	12.75	224	13.00
CO27	22.24	8,760	12.75	6,452	12.75	2,517	12.75	1,139	13.00	330	14.00
RO27	22.24	8,749	12.75	6,028	12.75	2,341	13.00	1,094	13.25	328	14.25
SUB28	0.97	960	12.50	807	12.50	408	12.50	238	12.75	61	14.75
CO29	23.21	9,356	12.75	6,563	12.75	2,544	13.00	1,259	13.00	366	14.25
RO29	23.21	9,179	13.00	6,552	13.00	2,366	13.25	1,271	13.25	351	14.75
SUB30	1.33	939	12.50	675	12.75	259	12.75	122	13.25	40	14.50
CO31	24.54	9,741	13.00	7,025	13.00	2,589	13.25	1,393	13.25	390	14.75
SUB31	0.00	1,500	12.25	1,500	12.25	1,478	12.75	869	12.75	261	13.25
RO31	0.00	1,500	13.00	1,500	13.00	1,356	13.00	782	13.00	237	14.00
SUB32	2.27	1,247	12.75	959	12.75	426	13.00	227	13.25	75	14.25
CO33	2.27	2,747	12.75	2,459	12.75	1,782	13.00	1,003	13.25	310	14.00
SUB34	1.84	1,496	12.50	1,112	12.50	516	12.75	251	13.00	80	13.75
RO35	1.84	1,325	12.50	1,208	12.75	469	13.00	242	13.25	79	14.00

RUNOFF SUMMARY TABLE

FUTURE DEVELOPMENT
WITHOUT RETENTION

		100-YEAR		50-YEAR		10-YEAR		5-YEAR		2-YEAR	
HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK
SUB36	0.33	352	12.50	299	12.50	135	12.50	72	12.75	25	13.00
CO37	2.17	1,677	12.50	1,237	12.50	571	12.75	299	13.00	99	13.75
SUB38	0.99	980	12.50	823	12.50	424	12.50	239	12.75	62	13.25
RO39	0.99	891	12.50	705	12.75	410	12.75	223	13.00	61	13.25
SUB40	0.45	508	12.25	407	12.25	247	12.50	179	12.50	68	12.75
CO41	1.44	1,331	12.50	1,071	12.50	575	12.50	333	12.75	91	13.00
D43	1.44	625	12.50	535	12.50	288	12.50	166	12.75	46	13.00
SUB41	1.44	665	12.50	535	12.50	288	12.50	166	12.75	46	13.00
CO45	3.61	2,343	12.50	1,772	12.50	855	12.75	445	13.00	136	13.50
RO45	3.61	2,295	12.75	1,764	12.75	800	13.00	423	13.25	131	14.00
SUB46	2.11	1,292	12.50	956	12.75	440	12.75	246	13.00	78	14.00
CO46	5.72	3,514	12.75	2,720	12.75	1,224	13.00	662	13.25	209	14.00
RO46	5.72	3,434	12.75	2,604	13.00	1,186	13.00	636	13.25	206	14.25
CO47	7.99	6,180	12.75	4,950	13.00	2,968	13.00	1,639	13.25	508	14.25
RO47	7.99	6,025	12.75	4,944	13.00	2,839	13.00	1,590	13.25	507	14.25
SUB48	0.91	928	12.25	764	12.50	481	12.50	283	12.50	97	12.75
CO49	8.90	6,558	12.75	5,220	12.75	3,001	13.00	1,690	13.25	540	14.25
RO49	8.90	6,305	13.00	5,215	13.00	2,881	13.25	1,679	13.50	534	14.50
SUB50	1.82	1,731	12.50	1,414	12.50	650	12.50	364	12.75	101	13.25
CO51	10.72	7,072	12.75	5,695	13.00	3,125	13.25	1,836	13.50	594	14.25
D50	10.72	4,752	12.50	3,375	12.50	1,182	13.24	454	13.50	14	14.25
SUB53	10.72	2,320	12.50	2,320	12.50	1,942	13.25	1,382	13.50	580	14.25
RO53	10.72	2,320	13.00	2,320	12.75	1,924	13.25	1,345	13.75	580	14.50
CO55	35.26	12,061	13.00	9,345	13.00	4,514	13.25	2,700	13.50	969	14.75
RO55	35.26	11,731	13.00	9,064	13.25	4,359	13.50	2,698	13.75	960	15.00
SUB56	0.75	95	14.75	62	15.25	21	17.50	11	19.50	3	26.00
CO57	36.01	11,752	13.00	9,079	13.25	4,360	13.50	2,698	13.75	960	15.00
SUB57	0.00	665	12.50	535	12.50	288	12.50	166	12.75	46	13.00
RO57	0.00	642	12.75	526	12.75	284	12.75	157	13.00	45	13.50
SUB58	0.46	383	12.50	285	12.50	118	12.75	62	13.00	18	13.75
CO59	0.46	969	12.50	763	12.50	402	12.75	220	13.00	63	13.50
RO59	0.46	932	12.75	762	12.75	358	13.00	209	13.00	62	13.75
SUB60	0.45	476	12.25	374	12.25	199	12.50	136	12.50	34	12.75
CO61	0.91	1,255	12.50	973	12.50	475	12.75	264	12.75	83	13.50
RO61	0.91	1,181	12.75	930	13.00	388	13.25	207	13.75	64	14.75
SUB62	2.32	1,111	12.75	791	13.00	332	13.50	193	14.00	63	15.25
CO63	3.23	2,291	12.75	1,720	13.00	708	13.25	399	13.75	126	15.00
SUB63	0.00	4,752	12.75	3,375	13.00	1,182	13.25	454	13.50	14	14.25
RO63	0.00	4,633	13.00	3,322	13.00	1,158	13.25	430	13.75	7	15.00
CO65	3.23	6,824	13.00	5,042	13.00	1,866	13.25	829	13.75	132	15.00
RO65	3.23	6,784	13.00	4,828	13.00	1,782	13.50	797	13.75	131	15.25
CO67	39.24	18,536	13.00	13,765	13.25	6,143	13.50	3,495	13.75	1,091	15.00
RO67	39.24	18,257	13.25	13,720	13.25	5,944	13.50	3,432	14.00	1,091	15.25
SUB68	0.77	197	13.00	125	13.25	41	14.25	21	15.00	6	18.25
CO69	40.01	18,443	13.25	13,845	13.25	5,979	13.50	3,449	14.00	1,094	15.25

RUNOFF SUMMARY TABLE

FUTURE DEVELOPMENT
WITHOUT RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
RO69	40.01	18,293	13.25	13,539	13.50	5,908	13.75	3,388	14.25	1,094	15.50
SUB70	1.43	1,160	12.50	878	12.50	409	12.75	251	12.75	77	13.50
RO71	1.43	1,114	12.75	864	12.75	382	13.00	233	13.00	74	13.75
SUB72	1.38	972	12.50	702	12.50	303	12.75	150	13.00	44	14.00
CO73	2.81	1,903	12.75	1,503	12.75	671	12.75	283	13.00	118	13.75
SUB74	2.78	1,567	12.50	1,185	12.75	544	12.75	296	13.00	109	14.00
RO75	2.78	1,516	12.75	1,129	13.00	516	13.25	280	13.75	107	14.50
SUB76	2.13	1,159	12.75	889	12.75	404	13.00	209	13.25	77	14.25
CO77	4.91	2,675	12.75	1,957	12.75	896	13.25	483	13.50	184	14.50
D79	4.91	1,338	12.75	979	12.75	448	13.25	242	13.50	92	14.50
SUB77	4.91	1,338	12.75	979	12.75	448	13.25	242	13.50	92	14.50
CO81	7.72	3,240	12.75	2,482	12.75	1,089	13.00	595	13.25	204	14.00
RO81	7.72	3,106	12.75	2,331	12.75	1,040	13.25	584	13.25	204	14.25
SUB82	0.73	684	12.50	477	12.50	165	12.75	91	12.75	26	13.50
CO82	8.45	3,352	12.75	2,646	12.75	1,164	13.00	659	13.25	227	14.25
RO82	8.45	3,306	12.75	2,556	13.00	1,145	13.25	646	13.50	225	14.25
SUB78	0.72	864	12.25	697	12.25	372	12.25	247	12.50	78	12.75
SUB79	0.00	1,338	12.75	979	12.75	448	13.25	242	13.50	92	14.50
CO83	0.72	1,632	12.75	1,235	12.75	532	13.00	291	13.50	113	14.25
RO83	0.72	1,631	12.75	1,224	12.75	526	13.25	289	13.50	112	14.25
SUB84	0.15	138	12.25	105	12.25	53	12.50	28	12.50	7	13.00
CO85	0.87	1,694	12.75	1,279	12.75	540	13.25	299	13.50	116	14.25
RO85	0.87	1,689	12.75	1,254	12.75	539	13.25	295	13.75	115	14.50
SUB86	0.80	741	12.25	566	12.25	302	12.50	180	12.50	46	13.00
CO86	1.67	2,169	12.50	1,612	12.50	711	12.75	433	12.75	134	14.50
RO86	1.67	2,077	12.75	1,581	12.75	700	12.75	403	12.75	134	14.50
CO87	10.12	5,382	12.75	4,070	12.75	1,776	13.00	985	13.50	358	14.50
SUB88	0.34	310	12.25	235	12.25	121	12.50	57	12.50	16	13.00
CO89	10.46	5,529	12.75	4,196	12.75	1,817	13.00	1,007	13.50	365	14.50
RO89	10.46	5,331	13.00	4,078	13.00	1,791	13.25	991	13.75	357	14.75
SUB90	2.27	2,189	12.50	1,777	12.50	850	12.75	492	13.00	184	13.25
CO91	12.73	6,707	12.75	4,995	13.00	2,277	13.25	1,262	13.50	458	14.75
RO91	12.73	6,514	13.00	4,844	13.00	2,203	13.50	1,218	14.00	445	15.25
SUB92	1.84	785	12.75	588	13.00	227	13.25	119	13.75	37	15.25
CO92	14.57	7,184	13.00	5,433	13.00	2,430	13.50	1,336	14.00	482	15.25
RO92	14.57	7,051	13.00	5,290	13.25	2,392	13.50	1,332	14.00	482	15.25
CO93	54.58	24,846	13.25	18,567	13.25	8,229	13.75	4,684	14.25	1,569	15.50
SUB94	0.27	260	12.50	209	12.50	108	12.50	60	12.50	21	13.00
RO95	0.27	239	12.75	198	12.75	100	12.75	56	12.75	21	13.00
SUB96	0.14	116	12.50	96	12.50	48	12.50	25	12.75	7	13.25
CO97	0.41	341	12.50	262	12.50	137	12.75	81	12.75	27	13.00
SUB98	0.13	157	12.25	124	12.25	62	12.25	41	12.50	19	12.75
RO99	0.13	142	12.50	108	12.50	61	12.50	40	12.50	18	12.75
SUB100	0.75	1,003	12.25	832	12.25	492	12.25	351	12.50	177	12.50
CO100	0.88	1,141	12.25	939	12.25	542	12.25	391	12.50	193	12.50

RUNOFF SUMMARY TABLE

FUTURE DEVELOPMENT
WITHOUT RETENTION

		100-YEAR		50-YEAR		10-YEAR		5-YEAR		2-YEAR	
HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK
CO101	1.29	1,392	12.25	1,101	12.25	627	12.50	435	12.50	195	12.50
RO100	1.29	1,231	12.75	1,111	12.50	591	12.75	333	12.75	118	13.25
SUB102	2.67	1,239	13.00	909	13.25	400	13.75	237	14.25	90	15.50
CO103	3.96	2,329	12.75	1,830	13.00	754	12.75	416	13.00	145	13.75
SUB104	3.11	935	13.50	662	13.50	280	14.50	159	15.25	53	17.50
CO105	7.07	2,924	12.75	2,330	13.00	822	13.50	475	14.00	173	15.25
RO105	7.07	2,919	13.00	2,285	13.00	820	13.75	474	14.25	173	15.50
SUB106	2.66	714	13.25	524	13.75	210	14.50	121	15.25	39	17.75
CO107	9.73	3,594	13.00	2,741	13.00	1,012	13.75	581	14.25	205	15.75
RO107	9.73	3,433	13.50	2,644	13.50	995	14.25	573	15.00	203	16.25
SUB108	2.00	524	13.50	385	13.75	151	14.50	86	15.50	26	18.00
CO108	11.73	3,958	13.50	3,027	13.50	1,142	14.25	657	15.00	226	16.50
CO109	66.31	28,782	13.25	21,439	13.25	9,277	13.75	5,284	14.25	1,782	15.50
RO109	66.31	27,787	13.25	21,364	13.50	9,045	14.00	5,213	14.25	1,774	15.75
SUB110	1.35	418	13.25	294	13.50	124	14.00	70	14.75	24	16.50
CO111	67.66	28,204	13.25	21,658	13.50	9,170	14.00	5,277	14.25	1,796	15.75

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

  1           ID        EASTERN MARICOPA COUNTY MASTER DRAINAGE PLAN
  2           ID        TOTAL 70 SQ. MI. DRAINAGE AREA - FUTURE CONDITION
  3           ID        25 APRIL 1985  -  100 YEAR RAINFALL
              *DIAGRAM
  4           IT      15                    120
  5           IO       3
  6           PG       1    3.65
  7           PG      10
  8           IN      30                     48
  9           PI   0.011   0.029   0.018   0.022   0.022   0.026   0.022   0.026   0.029   0.026
 10           PI   0.029   0.033   0.033   0.033   0.040   0.040   0.048   0.051   0.058   0.066
 11           PI   0.084   0.113   0.175   1.387   0.263   0.135   0.099   0.077   0.066   0.058
 12           PI   0.051   0.044   0.040   0.040   0.037   0.033   0.029   0.029   0.029   0.026
 13           PI   0.026   0.022   0.026   0.023   0.021   0.018   0.022   0.018

 14           KK    SUB2
 15           KM        RUNOFF FROM SUBBASIN 2
 16           KO       3
 17           PR      10
 18           PW       1
 19           PT       1
 20           PW       1
 21           BA    3.41
 22           LS              87
 23           UK     100   0.005   0.200     100
 24           RK   19000  0.0094   0.050    0.27    TRAP    20.0     2.0
 25           RK    6250  0.0001   0.025            TRAP    80.0     3.0

 26           KK     RO3
 27           KM        ROUTE FLOWS FROM SUB2 TO SUB 4
 28           KO       3
 29           RK    4940 0.00015   0.025            TRAP   110.0     3.0     YES

 30           KK    SUB4
 31           KM        RUNOFF FROM SUBBASIN 4
 32           KO       3
 33           PR      10
 34           PW       1
 35           PT       1
 36           PW       1
 37           BA    3.27
 38           LS              85
 39           UK     100  0.0050   0.200     100
 40           RK   19600   0.009   0.050    0.28    TRAP    20.0     0.0
 41           RK    4940 0.00015   0.025            TRAP   110.0     3.0

 42           KK     CO5
 43           KM        COMBINE FLOWS FROM SUB2 AND SUB4
 44           KO       3
 45           HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 46           KK     RO5
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47          KM       ROUTE FLOWS FROM SUB4 TO SUB6
48          RK    4050  0.0003   0.025            TRAP    90.0     3.0     YES

49          KK    SUB6
50          KM       RUNOFF FROM SUBBASIN 6
51          PR      10
52          PW       1
53          PT       1
54          PW       1
55          BA    3.41
56          LS             86
57          UK     120   0.005   0.200     100
58          RK    6000  0.0067   0.050    0.24    TRAP    20.0     0.0
59          RK    7750  0.0067   0.016            TRAP    19.0     2.0

60          KK     C07
61          KM       COMBINE FLOWS FROM SUB4 AND SUB6
62          KO       3
63          HC       2

64          KK     R07
65          KM       ROUTE FLOWS FROM SUB6 TO SUB8
66          RK    7470  0.0005   0.025            TRAP   120.0     3.0     YES

67          KK    SUB8
68          KM       RUNOFF FROM SUBBASIN 8
69          PR      10
70          PW       1
71          PT       1
72          PW       1
73          BA    1.84
74          LS             86
75          UK     750  0.0050   0.200     100
76          RK    8000  0.0060   0.050    0.90    TRAP    20.0    0.00
77          RK    7470  0.0005   0.025            TRAP   120.0     3.0

78          KK     C09
79          KM       COMBINE FLOWS FROM SUB6 AND SUB8
80          HC       2

81          KK   SUB10
82          KM       RUNOFF FROM SUBBASIN 10
83          PR      10
84          PW       1
85          PT       1
86          PW       1
87          BA    0.33
88          LS             86
89          UK     110  0.0050   0.200     100
90          RK    1800  0.0110   0.050  0.0646    TRAP    20.0     0.0
91          RK    1480  0.0042   0.035            TRAP     8.0     1.5
```



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

92          KK   SUB12
93          KM       RUNOFF FROM SUBBASIN 12
94          PR      10
95          PW       1
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 96          PT      1
 97          PW      1
 98          BA   0.75
 99          LS            85
100          UK    110  0.0050   0.200     100
101          RK   4000  0.0100   0.050  0.0750    TRAP    20.0     0.0
102          RK   1060  0.0056   0.035            TRAP     8.0     1.5

103          KK   CO13
104          KM       COMBINE RUNOFF FROM SUB10 AND SUB12
105          HC      2

106          KK   RO13
107          KM       ROUTE FLOWS FROM SUB10 AND SUB12 TO SUB14
108          RK  10400  0.0098   0.035            TRAP     5.0     3.0     YES

109          KK  SUB14
110          KM       RUNOFF FROM SUBBASIN 14
111          PR     10
112          PW      1
113          PT      1
114          PW      1
115          BA   1.17
116          LS            88
117          UK     85   0.005   0.200     100
118          RK   8500  0.0067   0.050   0.120    TRAP    20.0     0.0
119          RK   2600  0.0075   0.040            TRAP    32.0     6.0

120          KK   CO15
121          KM       COMBINE FLOWS FROM SUB10 AND SUB12 AND SUB14
122          HC      2

123          KK  SUB16
124          KM       RUNOFF FROM SUBBASIN 16
125          PR     10
126          PW      1
127          PT      1
128          PW      1
129          BA   0.71
130          LS            86
131          UK    110  0.0050   0.200     100
132          RK   5000  0.0060   0.040   0.158    TRAP    20.0     0.0
133          RK   1700  0.0055   0.035            TRAP     8.0     1.5

134          KK  SUB18
135          KM       RUNOFF FROM SUBBASIN 18
136          PR     10
137          PW      1
138          PT      1
139          PW      1
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

140          BA   1.50
141          LS            85
142          UK    110  0.0050   0.200     100
143          RK   6000  0.0070   0.050   .0237    TRAP    20.0     0.0
144          RK  10000  0.0102   0.035            TRAP    20.0     3.0
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145        KK    CO19
146        KM        COMBINE RUNOFF FROM SUB 16 AND SUB 18
147        HC       2

148        KK    RO19
149        KM        ROUTE FLOWS FROM SUB16 AND SUB18 TO SUB20
150        RK    8300  0.0102   0.035            TRAP     5.0     2.0     YES

151        KK   SUB20
152        KM        RUNOFF FROM SUBBASIN 20
153        PR      10
154        PW       1
155        PT       1
156        PW       1
157        BA    1.05
158        LS              89
159        UK      90   0.005   0.200     100
160        RK    5250  0.0075   0.050   0.043    TRAP    20.0     0.0
161        RK    8300  0.0102   0.035            TRAP     5.0     2.0

162        KK    CO21
163        KM        COMBINE FLOWS FROM SUB16 AND SUB18 AND SUB20
164        HC       2

165        KK    RO21
166        KM        ROUTE FLOWS FROM SUB20 TO SUB14
167        RK    2600  0.0054    .035            TRAP     5.0     2.0     YES

168        KK    CO23
169        KM        COMBINE RUNOFF FROM SUB 14 AND SUB 20
170        HC       2

171        KK   SUB23
172        KM        DIVERT RUNOFF FROM SUB20 AND SUB14 TO SUB32
173        DT    DT31
174        DI       0    1500    1750    2000    3000    4000
175        DQ       0    1500    1500    1500    1500    1500

176        KK    RO23
177        KM        ROUTE FLOWS FROM SUB 14 TO SUB 24
178        RK    5200   .0068    .025            TRAP      60       4     YES

179        KK   SUB24
180        KM        RUNOFF FROM SUBBASIN 24
181        PR      10
182        PW       1
183        PT       1
184        PW       1
185        BA    2.11
1                                        HEC-1 INPUT

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

186        LS              87
187        UK     100  0.0050   0.150    .100
188        RK    7000  0.0070   0.050    0.10    TRAP    20.0    0.00
189        RK    9600  0.0038   0.035            TRAP    30.0    4.00

190        KK    CO25
191        KM        COMBINE FLOWS FROM SUB23 AND SUB24
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192          HC      2

193          KK    RO25
194          KM        ROUTE FLOWS FROM SUB24 TO SUB 26
195          RK    9000  0.0064   0.025            TRAP    12.0     2.0     YES

196          KK   SUB26
197          KM        RUNOFF FROM SUBBASIN 26
198          PR      10
199          PW       1
200          PT       1
201          PW       1
202          BA    2.69
203          LS              86
204          UK     100  0.0050   0.200     100
205          RK    3500  0.0060   0.050    0.14    TRAP    20.0     0.0
206          RK    9000  0.0064   0.025            TRAP    12.0     2.0

207          KK    CO26
208          KM        COMBINE FLOWS FROM SUB24 AND SUB26
209          HC       2

210          KK    CO27
211          KM        COMBINE RUNOFF FROM SUB8 AND SUB26
212          HC       2

213          KK    RO27
214          KM        ROUTE SUB8 THROUGH RWCD SUB28
215          RK    2970  0.0007   0.025            TRAP     140     3.0     YES

216          KK   SUB28
217          KM        RUNOFF FROM SUBBASIN 28
218          PR      10
219          PW       1
220          PT       1
221          PW       1
222          BA    0.97
223          LS              87
224          UK     150  0.0050   0.200     100
225          RK    3500  0.0040   0.050    0.14    TRAP    20.0     0.0
226          RK    8900  0.0059   0.035            TRAP    10.0     3.0

227          KK    CO29
228          KM        COMBINE SUB28 AND RWCD FLOWS
229          HC       2
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

230          KK    RO29
231          KM        ROUTE FLOWS FROM SUB28 TO SUB30
232          RK    6070  0.0003   0.025            TRAP   140.0     3.0     YES

233          KK   SUB30
234          KM        RUNOFF FROM SUBBASIN 30
235          PR      10
236          PW       1
237          PT       1
238          PW       1
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239          BA    1.33
240          LS              86
241          UK     110  0.0050   0.200     100
242          RK    6100  0.0050   0.050    0.27    TRAP    20.0     0.0
243          RK    6070  0.0003   0.025            TRAP   140.0     3.0

244          KK    CO31
245          KM        COMBINE FLOWS FROM SUB28 AND SUB30
246          HC       2

247          KK   SUB31
248          KM        DIVERTED FLOWS FROM SUB20 AND SUB14
249          DR    DT31

250          KK    RO31
251          KM        ROUTE FLOWS FROM SUB31 TO SUB32
252          RK   11200  0.0054   0.035            TRAP    30.0     2.0     YES

253          KK   SUB32
254          KM        RUNOFF FROM SUBBASIN 32
255          PR      10
256          PW       1
257          PT       1
258          PW       1
259          BA    2.27
260          LS              87
261          UK      90   0.005   0.200     100
262          RK   10000  0.0065   0.050   0.086    TRAP    20.0     0.0
263          RK   11200  0.0054   0.035            TRAP    30.0     2.0

264          KK    CO33
265          KM        COMBINE FLOWS FROM SUB31 AND SUB32
266          HC       2

267          KK   SUB34
268          KM        RUNOFF FROM SUBBASIN 34
269          PR      10
270          PW       1
271          PT       1
272          PW       1
273          BA    1.84
274          LS              87
275          UK     110  0.0050   0.200     100
276          RK    5000  0.0111   0.050  0.0197    TRAP    20.0     0.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

277          RK   13700  0.0102   0.035            TRAP    10.0     3.0

278          KK    RO35
279          KM        ROUTE FLOWS FROM SUB34 TO SUB36
280          RK    3200  0.0093   0.035            TRAP    20.0     3.0     YES

281          KK   SUB36
282          KM        RUNOFF FROM SUBBASIN 36
283          PR      10
284          PW       1
285          PT       1
286          PW       1
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287          BA    0.33
288          LS              89
289          UK     110  0.0050   0.200     100
290          RK    3200  0.0070   0.050  0.0126    TRAP    20.0     0.0
291          RK    3200  0.0093   0.035            TRAP    20.0     3.0

292          KK    C037
293          KM        COMBINE FLOWS FROM SUB34 AND SUB36
294          HC       2

295          KK   SUB38
296          KM        RUNOFF FROM SUBBASIN 38
297          PR      10
298          PW       1
299          PT       1
300          PW       1
301          BA    0.99
302          LS              87
303          UK     110  0.0050   0.200     100
304          RK    2500  0.0060   0.050  0.0574    TRAP    20.0     0.0
305          RK   14000  0.0090   0.035            TRAP    10.0     3.0

306          KK    R039
307          KM        ROUTE FLOWS FROM SUB38 TO SUB40
308          RK    6000  0.0120   0.035            TRAP    10.0     3.0     YES

309          KK   SUB40
310          KM        RUNOFF FROM SUBBASIN 40
311          PR      10
312          PW       1
313          PT       1
314          PW       1
315          BA    0.45
316          LS              89
317          UK      90  0.0050   0.200     100
318          RK    3500  0.0060   0.050    0.09    TRAP    20.0     0.0
319          RK    6000  0.0120   0.035            TRAP    10.0     3.0
1                                              HEC-1 INPUT

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


320          KK    C041
321          KM        COMBINE FLOWS FROM SUB38 AND SUB40
322          HC       2

323          KK   SUB41
324          KM        DIVERT 50% FROM SUB40 TO SUB60
325          DT     D43
326          DI       0     100    1000   10000
327          DQ       0      50     500    5000

328          KK    C045
329          KM        COMBINE FLOWS FROM 50% OF SUB40 TO SUB36
330          HC       2

331          KK    R045
332          KM        ROUTE FLOWS FROM SUB45 TO SUB46
333          RK   11200  0.0082   0.035            TRAP    10.0     3.0     YES
```

```
334        KK   SUB46
335        KM       RUNOFF FROM SUBBASIN 46
336        PR     10
337        PW      1
338        PT      1
339        PW      1
340        BA   2.11
341        LS            87
342        UK     90   0.005   0.200     100
343        RK   7000  0.0070   0.050  0.0368    TRAP    20.0     0.0
344        RK  11200  0.0082   0.035            TRAP    10.0     3.0

345        KK   CO46
346        KM       COMBINE FLOWS FROM SUB45 AND SUB46
347        HC      2

348        KK   RO46
349        KM       ROUTE SUB46 TO SUB32
350        RK   9200  0.0060   0.035            TRAP    10.0     1.0     YES

351        KK   CO47
352        KM       COMBINE RUNOFF FROM SUB32 AND SUB46
353        HC      2

354        KK   RO47
355        KM       ROUTE SUB46 AND SUB32 TO SUB48
356        RK   2800  0.0071    .035            TRAP    10.0     2.5     YES

357        KK   SUB48
358        KM       RUNOFF FROM SUBBASIN 48
359        PR     10
360        PW      1
361        PT      1
362        PW      1
363        BA   0.91
364        LS            88
```



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

365        UK     75   0.005   0.200     100
366        RK   3300  0.0060   0.050   0.130    TRAP    20.0     0.0
367        RK  10000  0.0070   0.035            TRAP    30.0     4.0

368        KK   CO49
369        KM       COMBINE SUB48 AND SUB32
370        HC      2

371        KK   RO49
372        KM       ROUTE SUB48 TO SUB50
373        RK   5550  0.0015   0.035            TRAP    50.0     2.5     YES

374        KK   SUB50
375        KM       RUNOFF FROM SUBBASIN 50
376        PR     10
377        PW      1
378        PT      1
379        PW      1
380        BA   1.82
381        LS            86
```

```
382        UK    110   0.005   0.200     100
383        RK   6100  0.0050   0.050   0.230    TRAP    20.0     0.0
384        RK   7300  0.0058   0.035            TRAP    15.0     3.0

385        KK   C051
386        KM       COMBINE RUNOFF FROM SUB48 AND SUB50
387        HC      2

388        KK   SUB53
389        KM       DIVERT FLOWS FROM SUB51 TO SUB64
390        DT    D50
391        DI      0     530     930    1500    2240    4100    7500
392        DQ      0       0      90     300     640    1780    5180

393        KK   R053
394        KM       ROUTE SUB50 TO RWCD SUB30
395        RK   5300   .0025   0.035            TRAP    40.0     2.5     YES

396        KK   C055
397        KM       COMBINE RUNOFF FROM SUB30 AND SUB53
398        HC      2

399        KK   R055
400        KM       ROUTE FLOWS FROM SUB30 TO SUB56
401        RK   5630  0.0008   0.025            TRAP   145.0     3.0     YES

402        KK   SUB56
403        KM       RUNOFF FROM SUBBASIN 56
404        PT     10
405        PW      1
406        PT      1
407        PW      1
408        BA   0.75
409        LS            75
410        UK   1250   0.006   0.200     100
1                                     HEC-1 INPUT

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

411        RK   3500   0.006   0.040   0.050    TRAP     2.0     4.0
412        RK   5630  0.0003   0.025            TRAP   145.0     3.0

413        KK   C057
414        KM       COMBINE FLOWS FROM SUB55 AND SUB56
415        HC      2

416        KK   SUB57
417        KM       DIVERTED FLOWS OF SUB40
418        DR    D43

419        KK   R057
420        KM       ROUTE DIVERTED FLOWS FROM SUB40 TO SUB58
421        RK   7000   .0072   0.035            TRAP    10.0     3.0     YES

422        KK   SUB58
423        KM       RUNOFF FROM SUBBASIN 58
424        PR     10
425        PW      1
426        PT      1
427        PW      1
```

```
428        BA    0.46
429        LS            86
430        UK     110   0.005   0.200     100
431        RK    9500    .007   0.050    .230    TRAP    20.0     0.0
432        RK    7000   .0072   0.035            TRAP    10.0     3.0

433        KK    CO59
434        KM       COMBINE FLOWS FROM SUB57 AND SUB58
435        HC       2

436        KK    RO59
437        KM       ROUTE FLOWS FROM SUB58 TO SUB60
438        RK    5200  0.0720   0.035            TRAP    10.0     3.0     YES

439        KK   SUB60
440        KM       RUNOFF FROM SUBBASIN 60
441        PR      10
442        PW       1
443        PT       1
444        PW       1
445        BA    0.45
446        LS            86
447        UK     110   0.005    .200     100
448        RK    3300   .0060    .050    .110    TRAP    20.0     0.0
449        RK    5200    .072    .035            TRAP    10.0     3.0

450        KK    CO61
451        KM       COMBINE FLOWS FROM SUB58 AND SUB60
452        HC       2
1                                        HEC-1 INPUT

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


453        KK    RO61
454        KM       ROUTE FLOWS FROM SUB60 TO SUB62
455        RK   19000  0.0065   0.035            TRAP    10.0     3.0     YES

456        KK   SUB62
457        KM       RUNOFF FROM SUBBASIN 62
458        PR      10
459        PW       1
460        PT       1
461        PW       1
462        BA    2.32
463        LS            85
464        UK   750.0   0.005   0.150     100
465        RK    3000    .007   0.040     .04    TRAP     2.0     4.0
466        RK   19000   .0065   0.035            TRAP     10.     3.0

467        KK    CO63
468        KM       COMBINE FLOWS FROM SUB60 AND SUB62
469        HC       2

470        KK   SUB63
471        KM       DIVERTED FLOWS OF SUB50
472        DR     D50

473        KK    RO63
474        KM       ROUTE DIVERTED FLOWS FROM SUB50 TO SUB62
```

```
475          RK    5000   .0026    .035            TRAP    30.0     4.0     YES

476          KK    CO65
477          KM       COMBINE RUNOFF FROM SUB62 AND SUB63 (DIVERTED FLOWS OF SUB50)
478          HC      2

479          KK    RO65
480          KM       ROUTE SUB62 TO RWCD SUB56
481          RK    3400   .0056    .035            TRAP    30.0     4.0     YES

482          KK    CO67
483          KM       COMBINE RUNOFF FROM SUB56 AND SUB65
484          HC      2

485          KK    RO67
486          KM       ROUTE FLOWS FROM SUB67 TO SUB68
487          RK    6030  0.0003   0.025            TRAP   150.0     3.0     YES

488          KK   SUB68
489          KM       RUNOFF FROM SUBBASIN 68
490          PR      10
491          PW       1
492          PT       1
493          PW       1
494          BA    0.77
495          LS              78
496          UK     250   0.007   0.200     100
497          RK    3500   .0043   0.040     .05    TRAP     2.0     4.0
1                                          HEC-1 INPUT

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

498          RK    6030  0.0003   0.025            TRAP   150.0     3.0

499          KK    CO69
500          KM       COMBINE FLOWS FROM SUB56 AND SUB68
501          HC      2

502          KK    RO69
503          KM       ROUTE FLOWS FROM SUB68 TO SUB108
504          RK    1400   .0003    .035            TRAP   150.0     3.0     YES

505          KK   SUB70
506          KM       RUNOFF FROM SUBBASIN 70
507          PR      10
508          PW       1
509          PT       1
510          PW       1
511          BA    1.43
512          LS              88
513          UK      90   0.005   0.200     100
514          RK    4000   0.007   0.050  0.0129    TRAP    20.0     0.0
515          RK   11200   0.011   0.035            TRAP    10.0     3.0

516          KK    RO71
517          KM       ROUTE FLOWS FROM SUB70 TO SUB72
518          RK    8800  0.0090   0.035            TRAP    10.0     3.0     YES

519          KK   SUB72
520          KM       RUNOFF FROM SUBBASIN 72
```

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521          PR      10
522          PW       1
523          PT       1
524          PW       1
525          BA    1.38
526          LS             85
527          UK     100   0.005   0.200     100
528          RK    4000   0.007   0.050  0.0143    TRAP    20.0     0.0
529          RK    8800   0.009   0.035            TRAP    10.0     3.0

530          KK    CO73
531          KM        COMBINE FLOWS FROM SUB70 AND SUB72
532          HC       2

533          KK   SUB74
534          KM        RUNOFF FROM SUBBASIN 74
535          PR      10
536          PW       1
537          PT       1
538          PW       1
539          BA    2.78
540          LS             88
541          UK     110   0.005   0.200     100
542          RK    7000  0.0065   0.050  0.0276    TRAP    20.0     0.0
543          RK    8400   0.009   0.035            TRAP    15.0     3.0
1                                          HEC-1 INPUT

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


544          KK    RO75
545          KM        ROUTE FLOWS FROM SUB74 TO SUB76
546          RK   14400  0.0100   0.035            TRAP    15.0     3.0     YES

547          KK   SUB76
548          KM        RUNOFF FROM SUBBASIN 76
549          PR      10
550          PW       1
551          PT       1
552          PW       1
553          BA    2.13
554          LS             88
555          UK     100   0.005   0.200     100
556          RK    7000  0.0065   0.050  0.0251    TRAP    20.0     0.0
557          RK   14400   0.010   0.035            TRAP    15.0     3.0

558          KK    CO77
559          KM        COMBINE FLOWS FROM SUB74 AND SUB76
560          HC       2

561          KK   SUB77
562          KM        DIVERT 50% OF SUB76 TO SUB79
563          DT     D79
564          DI       0     100    1000   10000
565          DQ       0      50     500    5000

566          KK    CO81
567          KM        COMBINE FLOWS FROM 50% OF SUB76 AND SUB72
568          HC       2
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569          KK    RO81
570          KM        ROUTE FLOWS FROM SUB81 TO SUB82
571          RK    5400  0.0111   0.035            TRAP    10.0     3.0     YES

572          KK   SUB82
573          KM        RUNOFF FROM SUBBASIN 82
574          PR      10
575          PW       1
576          PT       1
577          PW       1
578          BA    0.73
579          LS              84
580          UK     110   0.005   0.200     100
581          RK    7500  0.0070   0.050    .180    TRAP    20.0     0.0
582          RK    5400  0.0111   0.035            TRAP    10.0     3.0

583          KK    CO82
584          KM        COMBINE FLOWS FROM SUB81 AND SUB82
585          HC       2
1                                        HEC-1 INPUT

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


586          KK    RO82
587          KM        ROUTE SUB82 TO SUB84
588          RK    4800   .0069    .035            TRAP    10.0     4.0     YES

589          KK   SUB78
590          KM        RUNOFF FROM SUBBASIN 78
591          PR      10
592          PW       1
593          PT       1
594          PW       1
595          BA    0.72
596          LS              87
597          UK     100   0.005   0.200     100
598          RK    2650   0.007   0.050   0.072    TRAP    20.0     0.0
599          RK     400   0.017   0.035            TRAP     8.0     1.5

600          KK   SUB79
601          KM        DIVERTED FLOWS OF 50% OF SUB 77
602          DR     D79

603          KK    CO83
604          KM        COMBINE RUNOFF FROM SUB78 AND DIVERTED FLOWS OF 50% OF SUB76
605          HC       2

606          KK    RO83
607          KM        ROUTE FLOWS FROM SUB83 TO SUB84
608          RK    1700  0.0059   0.035            TRAP    10.0     3.0     YES

609          KK   SUB84
610          KM        RUNOFF FROM SUBBASIN 84
611          PR      10
612          PW       1
613          PT       1
614          PW       1
615          BA    0.15
616          LS              83
```

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617          UK     110   0.005   0.200     100
618          RK    2800  0.0070   0.050    0.08    TRAP    20.0     0.0
619          RK    1700  0.0059   0.035            TRAP    10.0     3.0

620          KK    CO85
621          KM        COMBINE FLOWS FROM SUB83 AND SUB84
622          HC       2

623          KK    RO85
624          KM        ROUTE SUB84 TO SUB86
625          RK    7000   .0069    .035            TRAP    10.0     4.0     YES

626          KK   SUB86
627          KM        RUNOFF FROM SUBBASIN 86
628          PR      10
629          PW       1
630          PT       1
631          PW       1
1                                        HEC-1 INPUT

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

632          BA     .80
633          LS              84
634          UK     110    .005    .200     100
635          RK    3300    .006    .050    .110    TRAP    20.0     0.0
636          RK    7800    .060    .035            TRAP    10.0     4.0

637          KK    CO86
638          KM        COMBINE FLOWS FROM SUB84 AND SUB86
639          HC       2

640          KK    RO86
641          KM        ROUTE FLOWS FROM SUB86 TO SUB88
642          RK    4000  0.0600   0.035            TRAP    10.0     4.0     YES

643          KK    CO87
644          KM        COMBINE SUB82 AND SUB86
645          HC       2

646          KK   SUB88
647          KM        RUNOFF FROM SUBBASIN 88
648          PR      10
649          PW       1
650          PT       1
651          PW       1
652          BA     .34
653          LS              83
654          UK     110    .005    .200     100
655          RK    3300    .006    .050    .110    TRAP    20.0     0.0
656          RK    4000    .060    .035            TRAP    10.0     4.0

657          KK    CO89
658          KM        COMBINE FLOWS FROM SUB86 AND SUB88
659          HC       2

660          KK    RO89
661          KM        ROUTE FLOWS FROM SUB88 TO SUB90
662          RK   14300  0.0073   0.035            TRAP    10.0     3.0     YES
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```
663          KK   SUB90
664          KM        RUNOFF FROM SUBBASIN 90
665          PR      10
666          PW       1
667          PT       1
668          PW       1
669          BA    2.27
670          LS             90
671          UK    1100   0.005   0.050     100
672          RK    3000  0.0083   0.050    0.04    TRAP    20.0     0.0
673          RK   14300  0.0073   0.035            TRAP    10.0     3.0
1                                          HEC-1 INPUT

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


674          KK    CO91
675          KM        COMBINE FLOWS FROM SUB88 AND SUB90
676          HC       2

677          KK    RO91
678          KM        ROUTE FLOWS FROM SUB90 TO SUB92
679          RK   14400  0.0043   0.035            TRAP    10.0     3.0     YES

680          KK   SUB92
681          KM        RUNOFF FROM SUBBASIN 92
682          PR      10
683          PW       1
684          PT       1
685          PW       1
686          BA    1.84
687          LS             82
688          UK     850   0.020   0.200     100
689          RK    2000  0.0050   0.040   0.029    TRAP     2.0     4.0
690          RK   14400  0.0043   0.035            TRAP    10.0     3.0

691          KK    CO92
692          KM        COMBINE FLOWS FROM SUB90 AND SUB92
693          HC       2

694          KK    RO92
695          KM        ROUTE SUB92 TO RWCD SUB68
696          RK    3400   .0080    .035            TRAP    20.0     3.0     YES

697          KK    CO93
698          KM        COMBINE RUNOFF FROM SUB68 AND SUB92
699          HC       2

700          KK   SUB94
701          KM        RUNOFF FROM SUBBASIN 94
702          PR      10
703          PW       1
704          PT       1
705          PW       1
706          BA    0.27
707          LS             88
708          UK     110  0.0050   0.200     100
709          RK    6000  0.0083   0.050   0.043    TRAP     2.0     4.0
710          RK    2500  0.0048   0.035            TRAP    10.0     3.0
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```
711          KK    RO95
712          KM        ROUTE FLOWS FROM SUB94 TO SUB96
713          RK    3600  0.0028   0.035           TRAP    10.0     3.0     YES

714          KK   SUB96
715          KM        RUNOFF FROM SUBBASIN 96
716          PR      10
717          PW       1
718          PT       1
719          PW       1
1                                        HEC-1 INPUT

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

720          BA     .14
721          LS              83
722          UK     110    .005    .200     100
723          RK    1000   .0013    .050   .0143    TRAP     2.0     4.0
724          RK    3600   .0028    .035           TRAP    10.0     3.0

725          KK    CO97
726          KM        COMBINE FLOWS FROM SUB94 AND SUB96
727          HC       2

728          KK   SUB98
729          KM        RUNOFF FROM SUBBASIN 98
730          PR      10
731          PW       1
732          PT       1
733          PW       1
734          BA    0.13
735          LS              91
736          UK     250   0.005   0.200     100
737          RK    1200   0.013   0.050   0.017    TRAP     2.0     4.0
738          RK     100   0.006   0.035           TRAP     8.0     1.5

739          KK    RO99
740          KM        ROUTE FLOWS FROM SUB98 TO SUB100
741          RK    1200  0.0060   0.035           TRAP     8.0     1.5     YES

742          KK  SUB100
743          KM        RUNOFF FROM SUBBASIN 100
744          PR      10
745          PW       1
746          PT       1
747          PW       1
748          BA     .75
749          LS              91
750          UK     110   0.005    .200     100
751          RK    4000    .013    .050    .075    TRAP     2.0     4.0
752          RK    1200    .006    .035           TRAP     8.0     1.5

753          KK   CO100
754          KM        COMBINE FLOWS FROM SUB98 AND SUB100
755          HC       2

756          KK   CO101
757          KM        COMBINE RUNOFF HYDROGRAPHS FROM SUB 96 AND SUB 100
758          HC       2
```

```
759          KK   RO100
760          KM        ROUTE FLOWS FROM SUB100 TO SUB102
761          RK   18000  0.0083   0.035           TRAP    10.0     3.0     YES
1                                          HEC-1 INPUT

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


762          KK  SUB102
763          KM        RUNOFF FROM SUBBASIN 102
764          PR      10
765          PW       1
766          PT       1
767          PW       1
768          BA    2.67
769          LS              88
770          UK    1500  0.0050   0.125     100
771          RK    5000  0.0083   0.040    0.07    TRAP     2.0     4.0
772          RK   18000  0.0083   0.035           TRAP    10.0     3.0

773          KK   CO103
774          KM        COMBINE FLOWS FROM SUB100 AND SUB102
775          HC       2

776          KK  SUB104
777          KM        RUNOFF FROM SUBBASIN 104
778          PR      10
779          PW       1
780          PT       1
781          PW       1
782          BA    3.11
783          LS              84
784          UK    1500   0.009   0.200     100
785          RK    4000  0.0100   0.040    0.06    TRAP     2.0     4.0
786          RK   20000  0.0060   0.035           TRAP    10.0     3.0

787          KK   CO105
788          KM        COMBINE SUBBASIN 102 AND 104
789          KO       3
790          HC       2

791          KK   RO105
792          KM        ROUTE SUB102 AND SUB104 TO SUB106
793          KO       3
794          RK    5800   .0043    .035           TRAP    25.0     2.0     YES

795          KK  SUB106
796          KM        RUNOFF FROM SUBBASIN 106
797          PR      10
798          PW       1
799          PT       1
800          PW       1
801          BA    2.66
802          LS              83
803          UK    1500   0.007   0.200     100
804          RK    1500  0.0067   0.040    0.02    TRAP     2.0     4.0
805          RK    8000  0.0053   0.035           TRAP     5.0     4.0
1                                          HEC-1 INPUT

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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806     KK   CO107
807     KM       COMBINE SUB102, SUB104 AND SUB106
808     KO      3
809     HC      2

810     KK   RO107
811     KM       ROUTE FLOWS FROM SUB107 TO SUB108
812     RK   16000  0.0046   0.035           TRAP    10.0     4.0     YES

813     KK  SUB108
814     KM       RUNOFF FROM SUBBASIN 108
815     PR     10
816     PW      1
817     PT      1
818     PW      1
819     BA   2.00
820     LS             82
821     UK   1100   0.006   0.200     100
822     RK   2000  0.0050   0.040    0.03    TRAP     2.0     4.0
823     RK  16000  0.0046   0.035           TRAP    10.0     4.0

824     KK   CO108
825     KM       COMBINE FLOWS FROM SUB107 AND SUB108
826     KO      3
827     HC      2

828     KK   CO109
829     KM       COMBINE RUNOFF FROM SUB93 AND SUB108
830     KO      3
831     HC      2

832     KK   RO109
833     KM       ROUTE FLOWS FROM SUB109 TO SUB110
834     KO      3
835     RK   4180  0.0003   0.025           TRAP   170.0     3.0     YES

836     KK  SUB110
837     KM       RUNOFF FROM SUBBASIN 110
838     PR     10
839     PW      1
840     PT      1
841     PW      1
842     BA   1.35
843     LS             83
844     UK    250   0.004   0.200     100
845     RK  14000  0.0045   0.040    0.20    TRAP     2.0     4.0
846     RK   4180  0.0003   0.025           TRAP   170.0     3.0

847     KK   CO111
848     KM       COMBINE FLOWS FROM SUB109 AND SUB110
849     KO      3
850     HC      2
851     ZZ
```

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	SUB2	1367.	13.00	569.	190.	154.	3.41		
+	ROUTED TO	R03	1386.	13.25	579.	194.	156.	3.41		
+	HYDROGRAPH AT	SUB4	1298.	13.00	509.	170.	138.	3.27		
+	2 COMBINED AT	C05	2525.	13.25	1076.	364.	294.	6.68		
+	ROUTED TO	R05	2484.	13.50	1081.	366.	295.	6.68		
+	HYDROGRAPH AT	SUB6	3337.	12.25	641.	199.	160.	3.41		
+	2 COMBINED AT	C07	3339.	12.25	1673.	564.	455.	10.09		
+	ROUTED TO	R07	3032.	13.50	1639.	557.	450.	10.09		
+	HYDROGRAPH AT	SUB8	690.	13.00	293.	99.	80.	1.84		
+	2 COMBINED AT	C09	3641.	13.50	1933.	656.	529.	11.93		
+	HYDROGRAPH AT	SUB10	382.	12.25	63.	19.	16.	0.33		
+	HYDROGRAPH AT	SUB12	765.	12.25	136.	42.	34.	0.75		
+	2 COMBINED AT	C013	1146.	12.25	198.	62.	50.	1.08		
+	ROUTED TO	R013	1134.	12.50	208.	64.	52.	1.08		
+	HYDROGRAPH AT	SUB14	989.	12.50	228.	72.	58.	1.17		
+	2 COMBINED AT	C015	2123.	12.50	436.	136.	110.	2.25		
+	HYDROGRAPH AT	SUB16	750.	12.25	133.	41.	33.	0.71		
	HYDROGRAPH AT									

+		SUB18	781.	12.75	251.	81.	65.	1.50
	2 COMBINED AT						
+		CO19	1403.	12.50	383.	122.	98.	2.21
	ROUTED TO						
+		RO19	1301.	12.75	381.	121.	98.	2.21
	HYDROGRAPH AT						
+		SUB20	1109.	12.50	215.	67.	54.	1.05
	2 COMBINED AT						
+		CO21	2347.	12.50	594.	189.	152.	3.26
	ROUTED TO						
+		RO21	2177.	12.50	596.	189.	153.	3.26
	2 COMBINED AT						
+		CO23	4300.	12.50	1032.	325.	263.	5.51
	DIVERSION TO						
+		DT31	1500.	12.50	737.	252.	203.	5.51
	HYDROGRAPH AT						
+		SUB23	2800.	12.50	295.	74.	60.	5.51
	ROUTED TO						
+		RO23	2378.	12.75	309.	77.	62.	5.51
	HYDROGRAPH AT						
+		SUB24	2032.	12.50	399.	125.	100.	2.11
	2 COMBINED AT						
+		CO25	4181.	12.50	708.	202.	163.	7.62
	ROUTED TO						
+		RO25	3946.	12.75	727.	207.	167.	7.62
	HYDROGRAPH AT						
+		SUB26	2758.	12.25	508.	157.	127.	2.69
	2 COMBINED AT						
+		CO26	5979.	12.50	1232.	364.	293.	10.31
	2 COMBINED AT						
+		CO27	8760.	12.75	3128.	1020.	823.	22.24
	ROUTED TO						
+		RO27	8749.	12.75	3141.	1023.	825.	22.24
	HYDROGRAPH AT						
+		SUB28	960.	12.50	189.	58.	47.	0.97
	2 COMBINED AT						
+		CO29	9356.	12.75	3326.	1081.	872.	23.21
	ROUTED TO						
+		RO29	9179.	13.00	3314.	1082.	873.	23.21
	HYDROGRAPH AT						

+		SUB30	939.	12.50	233.	74.	60.	1.33
	2 COMBINED AT							
+		CO31	9741.	13.00	3538.	1156.	933.	24.54
	HYDROGRAPH AT							
+		SUB31	1500.	12.25	737.	252.	203.	0.00
	ROUTED TO							
+		RO31	1500.	13.00	727.	250.	201.	0.00
	HYDROGRAPH AT							
+		SUB32	1247.	12.75	409.	131.	106.	2.27
	2 COMBINED AT							
+		CO33	2747.	12.75	1137.	381.	307.	2.27
	HYDROGRAPH AT							
+		SUB34	1496.	12.50	340.	107.	86.	1.84
	ROUTED TO							
+		RO35	1325.	12.50	339.	107.	86.	1.84
	HYDROGRAPH AT							
+		SUB36	352.	12.50	67.	21.	17.	0.33
	2 COMBINED AT							
+		CO37	1677.	12.50	406.	128.	103.	2.17
	HYDROGRAPH AT							
+		SUB38	980.	12.50	190.	59.	48.	0.99
	ROUTED TO							
+		RO39	891.	12.50	196.	61.	49.	0.99
	HYDROGRAPH AT							
+		SUB40	508.	12.25	94.	29.	24.	0.45
	2 COMBINED AT							
+		CO41	1331.	12.50	290.	90.	72.	1.44
	DIVERSION TO							
+		D43	665.	12.50	145.	45.	36.	1.44
	HYDROGRAPH AT							
+		SUB41	665.	12.50	145.	45.	36.	1.44
	2 COMBINED AT							
+		CO45	2343.	12.50	551.	173.	140.	3.61
	ROUTED TO							
+		RO45	2295.	12.75	572.	179.	144.	3.61
	HYDROGRAPH AT							
+		SUB46	1292.	12.50	387.	123.	99.	2.11
	2 COMBINED AT							
+		CO46	3514.	12.75	959.	302.	243.	5.72
	ROUTED TO							

+		R046	3434.	12.75	950.	300.	242.	5.72
	2 COMBINED AT						
+		C047	6180.	12.75	2087.	681.	549.	7.99
	ROUTED TO						
+		R047	6025.	12.75	2086.	682.	550.	7.99
	HYDROGRAPH AT						
+		SUB48	928.	12.25	184.	57.	46.	0.91
	2 COMBINED AT						
+		C049	6558.	12.75	2264.	739.	596.	8.90
	ROUTED TO						
+		R049	6305.	13.00	2275.	743.	599.	8.90
	HYDROGRAPH AT						
+		SUB50	1731.	12.50	340.	105.	85.	1.82
	2 COMBINED AT						
+		C051	7072.	12.75	2602.	848.	684.	10.72
	DIVERSION TO						
+		D50	4752.	12.50	1149.	290.	234.	10.72
	HYDROGRAPH AT						
+		SUB53	2320.	12.50	1454.	558.	450.	10.72
	ROUTED TO						
+		R053	2320.	13.00	1442.	555.	448.	10.72
	2 COMBINED AT						
+		C055	12061.	13.00	4980.	1711.	1380.	35.26
	ROUTED TO						
+		R055	11731.	13.00	4926.	1705.	1375.	35.26
	HYDROGRAPH AT						
+		SUB56	95.	14.75	63.	24.	20.	0.75
	2 COMBINED AT						
+		C057	11752.	13.00	4985.	1729.	1395.	36.01
	HYDROGRAPH AT						
+		SUB57	665.	12.50	145.	45.	36.	0.00
	ROUTED TO						
+		R057	642.	12.75	151.	46.	37.	0.00
	HYDROGRAPH AT						
+		SUB58	383.	12.50	82.	26.	21.	0.46
	2 COMBINED AT						
+		C059	969.	12.50	233.	72.	58.	0.46
	ROUTED TO						
+		R059	932.	12.75	233.	72.	58.	0.46
	HYDROGRAPH AT						

+		SUB60	476.	12.25	85.	26.	21.	0.45
	2 COMBINED AT							
+		C061	1255.	12.50	317.	99.	79.	0.91
	ROUTED TO							
+		R061	1181.	12.75	335.	104.	84.	0.91
	HYDROGRAPH AT							
+		SUB62	1111.	12.75	379.	123.	100.	2.32
	2 COMBINED AT							
+		C063	2291.	12.75	712.	227.	183.	3.23
	HYDROGRAPH AT							
+		SUB63	4752.	12.75	1149.	290.	234.	0.00
	ROUTED TO							
+		R063	4633.	13.00	1147.	291.	235.	0.00
	2 COMBINED AT							
+		C065	6824.	13.00	1859.	519.	418.	3.23
	ROUTED TO							
+		R065	6784.	13.00	1863.	519.	419.	3.23
	2 COMBINED AT							
+		C067	18536.	13.00	6848.	2248.	1814.	39.24
	ROUTED TO							
+		R067	18257.	13.25	6751.	2232.	1800.	39.24
	HYDROGRAPH AT							
+		SUB68	197.	13.00	88.	30.	24.	0.77
	2 COMBINED AT							
+		C069	18443.	13.25	6837.	2262.	1825.	40.01
	ROUTED TO							
+		R069	18293.	13.25	6824.	2263.	1825.	40.01
	HYDROGRAPH AT							
+		SUB70	1160.	12.50	277.	87.	70.	1.43
	ROUTED TO							
+		R071	1114.	12.75	279.	88.	71.	1.43
	HYDROGRAPH AT							
+		SUB72	972.	12.50	237.	75.	60.	1.38
	2 COMBINED AT							
+		C073	1903.	12.75	516.	162.	131.	2.81
	HYDROGRAPH AT							
+		SUB74	1567.	12.50	524.	169.	136.	2.78
	ROUTED TO							
+		R075	1516.	12.75	517.	167.	135.	2.78
	HYDROGRAPH AT							

+	SUB76	1159.	12.75	396.	127.	103.	2.13
2 COMBINED AT +	C077	2675.	12.75	911.	295.	238.	4.91
DIVERSION TO +	D79	1338.	12.75	455.	147.	119.	4.91
HYDROGRAPH AT +	SUB77	1338.	12.75	455.	147.	119.	4.91
2 COMBINED AT +	C081	3240.	12.75	972.	310.	250.	7.72
ROUTED TO +	R081	3106.	12.75	969.	309.	250.	7.72
HYDROGRAPH AT +	SUB82	648.	12.50	125.	39.	32.	0.73
2 COMBINED AT +	C082	3532.	12.75	1094.	349.	281.	8.45
ROUTED TO +	R082	3306.	12.75	1089.	348.	281.	8.45
HYDROGRAPH AT +	SUB78	864.	12.25	141.	44.	35.	0.72
HYDROGRAPH AT +	SUB79	1338.	12.75	455.	147.	119.	0.00
2 COMBINED AT +	C083	1632.	12.75	592.	191.	154.	0.72
ROUTED TO +	R083	1631.	12.75	592.	191.	154.	0.72
HYDROGRAPH AT +	SUB84	138.	12.25	25.	8.	6.	0.15
2 COMBINED AT +	C085	1694.	12.75	617.	199.	161.	0.87
ROUTED TO +	R085	1689.	12.75	614.	198.	160.	0.87
HYDROGRAPH AT +	SUB86	741.	12.25	140.	43.	35.	0.80
2 COMBINED AT +	C086	2169.	12.50	750.	241.	195.	1.67
ROUTED TO +	R086	2077.	12.75	751.	242.	195.	1.67
2 COMBINED AT +	C087	5382.	12.75	1840.	590.	476.	10.12
HYDROGRAPH AT							

+	SUB88	310.	12.25	57.	18.	14.	0.34
2 COMBINED AT							
+	CO89	5529.	12.75	1895.	608.	490.	10.46
ROUTED TO							
+	RO89	5331.	13.00	1872.	604.	487.	10.46
HYDROGRAPH AT							
+	SUB90	2189.	12.50	468.	147.	119.	2.27
2 COMBINED AT							
+	CO91	6707.	12.75	2323.	751.	606.	12.73
ROUTED TO							
+	RO91	6514.	13.00	2291.	745.	601.	12.73
HYDROGRAPH AT							
+	SUB92	785.	12.75	263.	87.	70.	1.84
2 COMBINED AT							
+	CO92	7184.	13.00	2552.	832.	671.	14.57
ROUTED TO							
+	RO92	7051.	13.00	2552.	833.	672.	14.57
2 COMBINED AT							
+	CO93	24846.	13.25	9355.	3096.	2497.	54.58
HYDROGRAPH AT							
+	SUB94	260.	12.50	53.	17.	13.	0.27
ROUTED TO							
+	RO95	239.	12.75	56.	17.	14.	0.27
HYDROGRAPH AT							
+	SUB96	116.	12.50	24.	7.	6.	0.14
2 COMBINED AT							
+	CO97	341.	12.50	79.	25.	20.	0.41
HYDROGRAPH AT							
+	SUB98	157.	12.25	29.	9.	7.	0.13
ROUTED TO							
+	RO99	142.	12.50	29.	9.	7.	0.13
HYDROGRAPH AT							
+	SUB100	1003.	12.25	169.	53.	43.	0.75
2 COMBINED AT							
+	CO100	1141.	12.25	198.	62.	50.	0.88
2 COMBINED AT							
+	CO101	1392.	12.25	275.	87.	70.	1.29
ROUTED TO							
+	RO100	1231.	12.75	276.	87.	70.	1.29
HYDROGRAPH AT							

+		SUB102	1239.	13.00	484.	159.	128.	2.67
	2 COMBINED AT						
+		CD103	2329.	12.75	760.	245.	198.	3.96
	HYDROGRAPH AT						
+		SUB104	935.	13.50	459.	156.	126.	3.11
	2 COMBINED AT						
+		CD105	2924.	12.75	1216.	402.	324.	7.07
	ROUTED TO						
+		RO105	2919.	13.00	1210.	400.	323.	7.07
	HYDROGRAPH AT						
+		SUB106	714.	13.25	389.	133.	108.	2.66
	2 COMBINED AT						
+		CD107	3594.	13.00	1599.	533.	430.	9.73
	ROUTED TO						
+		RO107	3433.	13.50	1566.	529.	426.	9.73
	HYDROGRAPH AT						
+		SUB108	524.	13.50	268.	93.	75.	2.00
	2 COMBINED AT						
+		CD108	3958.	13.50	1834.	622.	502.	11.73
	2 COMBINED AT						
+		CD109	28782.	13.25	11188.	3717.	2999.	66.31
	ROUTED TO						
+		RO109	27787.	13.25	11071.	3699.	2984.	66.31
	HYDROGRAPH AT						
+		SUB110	418.	13.25	187.	64.	51.	1.35
	2 COMBINED AT						
+		CD111	28204.	13.25	11257.	3762.	3035.	67.66

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

APPENDIX F

RUNOFF SUMMARY TABLE - HEC-1 INPUT AND OUTPUT
- SELECTED ALTERNATIVE

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
SUB02	1.32	1,004	12.50	721	12.50	263	12.75	143	13.00	41	14.00
D2	1.32	201	12.50	144	12.50	53	12.75	29	13.00	8	14.00
DIV02	1.32	803	12.50	577	12.50	210	12.75	114	13.00	32	14.00
RET02	1.32	556	12.75	380	13.00	102	14.00	49	15.00	8	23.50
RED2	0.00	201	12.50	144	12.50	53	12.75	29	13.00	8	14.00
CO02	1.32	701	12.75	446	13.00	128	13.75	62	15.00	10	23.25
DRECK	1.32	581	12.25	346	12.50	8	13.75	0	15.00	0	23.25
DIVREC	1.32	120	12.25	120	12.50	120	13.75	62	15.00	10	23.25
ROPFBR	1.32	120	12.50	120	12.75	120	14.00	61	15.00	10	23.50
SUB04	0.95	816	12.50	675	12.50	244	12.50	123	12.75	34	13.50
RET04	0.95	345	13.00	202	13.00	28	16.50	5	26.25	2	27.25
CO04	2.27	465	13.00	322	13.00	124	14.00	64	15.00	12	23.50
DH	2.27	330	12.75	187	12.75	0	14.00	0	15.00	0	23.50
DIVHIG	2.27	135	12.75	135	12.75	124	14.00	64	15.00	12	23.50
RO48BR	2.27	135	13.00	135	13.00	123	14.25	64	15.25	12	23.50
REDH	0.00	330	13.00	187	13.00	0	0.25	0	0.25	0	0.25
DHIG	0.00	214	13.00	122	13.00	0	0.25	0	0.25	0	0.25
DIHIG	0.00	115	13.00	66	13.00	0	0.25	0	0.25	0	0.25
ROSFBR	0.00	114	13.00	63	13.25	0	0.25	0	0.25	0	0.25
SUB06	0.44	315	12.25	240	12.25	124	12.50	80	12.50	19	13.00
BROWN	2.71	391	12.50	317	12.50	152	12.50	85	12.50	20	13.00
ROBR	2.71	379	12.75	268	13.50	146	14.50	76	15.75	17	15.25
SUB08	0.35	342	12.25	263	12.25	131	12.50	79	12.50	22	13.00
D08	0.35	79	12.25	60	12.25	30	12.50	18	12.50	5	13.00
DIV08	0.35	263	12.25	202	12.25	101	12.50	61	12.50	17	13.00
RET08	0.35	10	18.50	4	24.75	0	0.25	0	0.25	0	0.25
RED08	0.00	79	12.25	60	12.25	30	12.50	18	12.50	5	13.00
CO08	0.35	79	12.25	60	12.25	30	12.50	18	12.50	5	13.00
ADOBE	3.06	412	12.75	280	13.00	150	14.50	78	15.75	19	15.25
ROADOB	3.06	358	13.25	276	13.50	148	15.00	78	16.25	19	16.00
SUB10	0.98	622	12.50	401	12.75	149	13.00	89	13.25	27	14.25
D10	0.98	397	12.25	176	12.50	0	13.00	0	13.25	0	14.25
DIV10	0.98	225	12.25	225	12.50	149	13.00	89	13.25	27	14.25
ROB01	0.98	225	12.50	225	12.75	143	13.00	86	13.50	27	14.50
SUB12	0.72	465	12.50	297	12.75	110	13.00	66	13.25	20	14.25
CO12	1.70	690	12.50	522	12.75	254	13.00	151	13.25	47	14.25
SUB14	0.52	278	12.50	203	12.75	84	13.00	45	13.25	14	14.50
D14	0.52	167	12.50	122	12.75	50	13.00	27	13.25	9	14.50
DIV14	0.52	111	12.50	81	12.75	34	13.00	18	13.25	6	14.50
RET14	0.52	36	14.00	22	14.50	4	19.75	0	0.25	0	0.25
RED14	0.00	167	12.50	122	12.75	50	13.00	27	13.25	9	14.50
CO14	0.52	167	12.50	122	12.75	50	13.00	27	13.25	9	14.50
RO14	0.52	165	12.75	118	12.75	50	13.25	27	13.50	8	14.75
SUB16	1.22	589	12.75	429	12.75	182	13.25	101	13.50	34	14.50
D16	1.22	496	12.75	356	12.75	151	13.25	84	13.50	28	14.50

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
DIV16	1.22	102	12.75	73	12.75	31	13.25	17	13.50	6	14.50
RET16	1.22	17	15.50	8	18.00	0	0.25	0	0.25	0	0.25
RED16	0.00	496	12.75	356	12.75	151	13.25	84	13.50	28	14.50
CO16	1.22	496	12.75	356	12.75	151	13.24	84	13.50	28	14.50
CON17	1.74	661	12.75	474	12.75	201	13.25	110	13.50	37	14.50
COT17	3.44	1,307	12.50	995	12.75	452	13.00	259	13.50	83	14.50
D17	3.44	807	12.25	495	12.50	0	13.00	0	13.50	0	14.50
DIV17	3.44	500	12.25	500	12.50	452	13.00	259	13.50	83	14.50
ROB02	3.44	500	13.00	500	13.25	448	13.25	257	13.50	83	14.50
REDREC	0.00	581	12.75	346	13.00	8	13.75	0	0.25	0	0.25
RORECK	0.00	513	13.00	330	13.00	4	14.25	0	0.25	0	0.25
ROREEE	0.00	498	13.00	300	13.25	3	14.50	0	0.25	0	0.25
SUB18	1.07	693	12.50	555	12.50	225	12.50	130	12.75	41	13.25
CORECK	4.51	1,287	13.00	1,001	13.00	575	13.00	335	13.50	107	14.50
RO18EE	4.51	1,285	13.00	999	13.25	575	13.25	331	13.50	107	14.50
SUB20	0.77	916	12.25	740	12.25	399	12.25	255	12.25	116	12.50
D20	0.77	183	12.25	148	12.25	80	12.25	51	12.25	23	12.50
DIV20	0.77	733	12.25	592	12.25	319	12.25	204	12.25	93	12.50
RET20	0.77	38	15.75	15	21.00	3	25.25	3	25.25	1	25.75
RED20	0.00	183	12.25	148	12.25	80	12.25	51	12.25	23	12.50
CO20	0.77	186	12.25	150	12.25	81	12.25	51	12.25	23	12.50
REDHIG	0.00	214	13.00	122	13.00	0	0.25	0	0.25	0	0.25
ROHIG	0.00	213	13.00	116	13.25	0	0.25	0	0.25	0	0.25
RODHEE	0.00	193	13.00	109	13.25	0	0.25	0	0.25	0	0.25
COZIEE	5.28	1,519	13.00	1,134	13.25	593	13.25	342	13.50	111	14.50
ELEC	8.34	1,866	13.00	1,409	13.25	665	13.25	384	13.75	113	14.50
ROELEC	8.34	1,830	13.00	1,378	13.50	660	13.50	382	14.00	113	15.00
SUB22	0.38	386	12.25	300	12.25	157	12.50	105	12.50	24	13.00
UNIV	8.72	1,928	13.00	1,426	13.50	693	13.50	401	14.00	121	14.75
ROUNIV	8.72	1,908	13.25	1,411	13.75	681	14.00	401	14.25	118	16.00
SUB24	0.45	442	12.25	343	12.25	196	12.50	111	12.50	29	13.00
US60	9.17	1,994	13.25	1,459	13.75	710	14.00	422	14.25	126	16.00
ROUS60	9.17	1,958	13.50	1,447	13.75	708	14.25	415	14.50	126	16.25
SUB26	1.80	1,754	12.25	1,357	12.25	739	12.50	481	12.50	109	13.00
RO26	1.80	1,642	12.25	1,311	12.50	707	12.50	439	12.50	108	13.00
SUB28	0.33	373	12.25	297	12.25	137	12.50	98	12.50	26	12.75
D28	0.33	336	12.25	268	12.25	123	12.50	89	12.50	23	12.75
DIV28	0.33	37	12.25	30	12.25	14	12.50	10	12.50	3	12.75
RET28	0.33	3	14.75	1	18.00	0	0.25	0	0.25	0	0.25
RED28	0.00	336	12.25	268	12.25	123	12.50	89	12.50	23	12.75
CO28	0.33	336	12.25	268	12.25	123	12.50	89	12.50	23	12.75
CO29	2.13	1,978	12.25	1,522	12.25	830	12.50	527	12.50	127	13.00
BROAD	11.30	2,499	12.50	1,880	12.75	864	12.50	532	12.50	158	16.00
RBROAD	11.30	2,519	12.75	1,850	13.00	814	14.50	471	15.00	149	17.25
SUB30	1.56	565	13.00	395	13.25	143	14.00	83	14.75	28	16.25

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
RET30	1.56	258	14.50	152	15.50	25	24.25	0	0.25	0	0.25
CO34	12.86	2,519	12.75	1,850	13.00	814	14.50	471	15.00	149	17.25
SUB32	1.62	1,533	12.50	1,048	12.75	421	12.75	196	13.00	61	14.25
D32	1.62	1,073	12.50	734	12.75	295	12.75	137	13.00	43	14.25
DIV32	1.62	460	12.50	314	12.75	126	12.75	59	13.00	18	14.25
RET32	1.62	48	14.75	23	17.00	0	0.25	0	0.25	0	0.25
RE32	0.00	1,073	12.50	734	12.75	295	12.75	137	13.00	43	14.25
CO32	1.62	1,073	12.50	734	12.75	295	12.75	137	13.00	43	14.25
BAS03	1.62	773	12.25	434	12.25	0	12.75	0	13.00	0	14.25
DIV33	1.62	300	12.25	300	12.25	295	12.75	137	13.00	43	14.25
RO33	1.62	300	13.00	300	12.75	274	13.00	131	13.25	42	14.50
SUB34	2.30	1,976	12.50	1,493	12.50	549	12.75	262	13.00	81	13.50
D34	2.30	1,383	12.50	1,045	12.50	384	12.75	183	13.00	57	13.50
DIV34	2.30	593	12.50	448	12.50	165	12.75	79	13.00	24	13.50
RET34	2.30	49	15.25	20	19.25	0	0.25	0	0.25	0	0.25
RE34	0.00	1,383	12.50	1,045	12.50	384	12.75	183	13.00	57	13.50
CO34	2.30	1,383	12.50	1,045	12.50	384	12.75	183	13.00	57	13.50
CO35	3.92	1,654	12.50	1,340	12.50	606	12.75	287	13.25	88	14.25
COFREE	16.78	3,664	12.75	2,507	13.00	1,001	14.25	599	14.75	192	17.00
ROFREE	16.78	3,496	13.00	2,445	13.25	1,000	14.50	596	15.00	192	17.50
SUB36	1.12	306	13.25	218	13.50	72	14.25	38	15.25	11	18.25
COBASE	17.90	3,796	13.00	2,659	13.25	1,071	14.50	634	15.00	202	17.50
ROBASE	17.90	3,597	13.25	2,569	13.50	1,070	15.00	626	15.25	200	18.25
SUB38	0.29	50	13.00	33	13.00	11	14.00	5	15.00	1	18.75
CO38	18.19	3,645	13.25	2,601	13.50	1,080	15.00	631	15.25	201	18.25
SUB40	1.21	714	12.50	475	12.50	168	13.00	93	13.50	32	14.50
RO40	1.21	652	12.75	470	12.75	167	13.25	92	13.75	32	14.75
SUB42	0.97	201	14.25	148	14.50	61	15.75	36	17.00	13	20.25
CO42	2.18	704	12.75	496	12.75	177	13.25	99	13.75	34	15.00
SUB44	0.31	369	12.25	296	12.25	157	12.25	101	12.50	36	12.50
RO44	0.31	314	12.25	246	12.25	143	12.50	95	12.50	34	12.75
CO44	2.49	868	12.50	649	12.50	231	12.75	118	13.50	41	14.75
RO45	2.49	867	12.75	641	12.75	228	13.00	118	13.50	41	14.75
SUB46	0.31	348	12.25	277	12.25	146	12.50	99	12.50	29	12.75
CO46	2.80	1,059	12.50	792	12.50	325	12.50	181	12.50	60	12.75
SUB48	0.42	414	12.25	319	12.25	160	12.50	84	12.50	26	13.00
RET48	0.42	90	13.25	48	13.75	7	20.50	0	0.25	0	0.25
RO48	0.42	89	13.25	48	14.00	7	20.75	0	0.25	0	0.25
COSOSS	3.22	1,059	12.50	792	12.50	325	12.50	181	12.50	60	12.75
ROSOSS	3.22	1,038	12.75	777	12.75	310	12.75	180	12.75	53	13.25
SUB50	1.00	288	13.00	207	13.25	74	14.25	40	15.00	12	17.75
CO50	4.22	1,284	12.75	925	12.75	334	12.75	187	12.75	55	15.00
RO50	4.22	1,256	13.00	902	13.00	328	13.00	183	13.00	55	15.25
SUB52	1.82	329	14.00	229	14.50	92	16.00	51	17.25	16	21.25
D52	1.82	263	14.00	184	14.50	73	16.00	41	17.25	13	21.25

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

		100-YEAR		50-YEAR		10-YEAR		5-YEAR		2-YEAR	
HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK	PEAK FLOW	TIME OF PEAK
DIV52	1.82	66	14.00	46	14.50	18	16.00	10	17.25	3	21.25
RET52	1.82	6	27.00	0	0.25	0	0.25	0	0.25	0	0.25
RE52	0.00	263	14.00	184	14.50	73	16.00	41	17.25	13	21.25
CO52	1.82	263	14.00	184	14.50	73	16.00	41	17.25	13	21.25
CO53	6.04	1,450	13.00	1,019	13.00	353	13.25	193	14.25	61	15.75
BAS04	6.04	450	12.50	19	13.00	0	13.25	0	14.25	0	15.75
DIVSOS	6.04	1,000	12.50	1,000	13.00	353	13.25	193	14.25	61	15.75
ROGUAD	6.04	1,000	12.75	987	13.25	353	13.25	192	14.25	61	16.00
SUB54	1.04	128	14.50	87	15.00	30	17.25	16	19.25	4	25.25
CO54	7.08	1,123	14.25	1,040	13.25	364	13.50	198	14.25	62	16.25
COGAUL	25.27	4,739	13.25	3,605	13.50	1,412	15.00	825	15.25	262	18.00
ROGUAL	25.27	4,608	13.50	3,520	13.75	1,404	15.25	823	15.75	260	18.75
SUB56	0.75	113	14.00	74	14.25	26	16.00	13	17.75	3	23.50
SUB58	0.71	493	12.50	357	12.50	143	12.75	75	13.00	25	14.00
RO58	0.71	432	12.75	332	12.75	141	13.00	75	13.25	25	14.00
SUB60	0.42	315	12.50	223	12.50	87	12.50	53	12.75	16	13.50
RO60	0.42	311	12.50	219	12.50	83	12.75	50	13.00	16	13.50
SUB62	0.33	357	12.25	281	12.25	143	12.50	99	12.50	23	12.75
CO62	0.75	608	12.25	455	12.50	223	12.50	134	12.50	35	13.00
SUB64	0.33	248	12.50	182	12.50	72	12.50	44	12.75	13	13.50
RO64	0.33	245	12.50	178	12.50	68	12.75	41	13.00	13	13.50
CO64	1.79	1,246	12.50	906	12.50	362	12.50	209	12.75	64	13.75
BAS06	1.79	881	12.25	541	12.25	0	12.50	0	12.75	0	13.75
DIV64	1.79	365	12.25	365	12.25	362	12.50	209	12.75	64	13.75
RO65	1.79	365	12.75	365	12.75	356	12.75	200	12.75	64	13.75
SUB66	0.92	1,035	12.25	824	12.25	428	12.50	238	12.50	76	12.75
CO66	2.71	1,377	12.25	1,132	12.25	752	12.50	379	12.75	115	13.00
RO66	2.71	1,219	12.50	1,093	12.50	672	12.50	378	12.75	114	13.25
SUB68	1.53	617	13.00	437	13.25	179	13.75	104	14.25	37	16.00
CO68	4.24	1,632	12.50	1,339	12.50	765	12.75	413	12.75	127	13.50
SUB70	1.65	625	12.75	479	13.00	180	13.50	101	14.25	32	16.00
SUB72A	0.66	269	12.75	204	13.00	81	13.50	43	14.00	14	15.50
CO72A	2.31	893	12.75	683	13.00	262	13.50	143	14.00	46	15.75
BAS07	2.31	643	12.25	433	12.50	12	13.50	0	14.00	0	15.75
DIV72	2.31	250	12.25	250	12.50	250	13.50	143	14.00	46	15.75
RO07	2.31	250	12.50	250	12.75	250	13.75	143	14.25	46	16.00
SUB72B	0.43	177	12.75	134	13.00	53	13.50	28	14.00	9	15.50
CO72B	2.74	427	12.75	384	13.00	300	13.75	171	14.25	54	15.75
SUB72C	0.44	182	12.75	136	13.00	54	13.50	30	13.75	9	15.25
CO72C	3.18	609	12.75	520	13.00	354	13.50	199	14.00	63	15.75
BAS07A	3.18	174	12.50	85	12.75	0	13.50	0	14.00	0	15.75
DIV73	3.18	435	12.50	435	12.75	354	13.50	199	14.00	63	15.75
SUB72D	0.16	67	12.75	49	12.75	20	13.25	11	13.75	3	15.25
CO72D	3.34	502	12.75	484	12.75	374	13.50	210	14.00	67	15.75
RO72	3.34	501	12.75	484	13.00	370	13.75	210	14.25	67	15.75

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
SUB74	0.82	476	12.50	352	12.75	155	13.00	83	13.25	28	14.25
RO74	0.82	469	12.75	349	12.75	152	13.00	81	13.25	28	14.50
SUB76	0.84	728	12.50	574	12.50	172	12.75	88	13.00	30	14.00
CO76	1.66	1,177	12.50	881	12.50	308	13.00	168	13.25	57	14.25
SUB76A	0.20	157	12.50	121	12.50	51	12.50	34	12.75	11	13.25
CO76A	1.86	1,334	12.50	1,002	12.50	352	12.75	194	13.25	65	14.00
RO76	1.86	1,275	12.50	936	12.50	349	13.00	193	13.25	65	14.00
CO77	5.20	1,755	12.50	1,380	12.75	653	13.25	360	13.75	117	14.75
BAS09	5.20	1,135	12.25	760	12.25	33	13.00	0	13.75	0	14.75
DIV77	5.20	620	12.25	620	12.25	620	13.00	360	13.75	117	14.75
RO77	5.20	620	12.50	620	12.50	620	13.25	359	13.75	117	15.00
SUB78	0.63	243	12.75	184	13.00	73	13.50	40	14.00	13	15.75
CO78	5.83	863	12.75	804	13.00	693	13.50	397	13.75	129	15.00
SUB80	1.00	343	13.00	234	13.25	97	14.00	54	14.50	18	16.50
CO80	6.83	1,198	13.00	1,031	13.00	782	13.50	445	14.00	143	15.25
RO80	6.88	1,188	13.00	1,029	13.25	778	13.50	444	14.00	143	15.25
CO81	11.07	2,573	12.50	2,189	12.75	1,332	13.25	754	13.50	249	14.75
BAS10	11.07	2,323	12.00	1,939	12.25	1,082	12.25	504	12.50	0	14.75
DIV81	11.07	250	12.00	250	12.25	250	12.25	250	12.50	249	14.75
RO81	11.07	250	12.25	250	12.50	250	12.50	250	12.75	249	14.75
SUB82	0.56	300	12.50	236	12.75	90	13.00	52	13.25	16	14.25
RO82	0.56	280	12.75	231	12.75	89	13.00	51	13.25	16	14.25
SUB84	0.76	446	12.50	316	12.50	135	12.75	76	13.00	23	14.00
CO84	1.32	708	12.50	519	12.50	219	13.00	127	13.25	39	14.25
CO85	12.39	958	12.50	569	12.50	469	13.00	377	13.25	285	14.50
RO85	12.39	918	12.75	763	12.75	465	13.00	373	13.50	285	14.75
SUB86	1.01	148	14.25	99	14.50	36	16.25	19	18.00	5	24.00
RO86	1.01	148	14.25	99	14.75	36	16.50	19	18.25	5	24.25
CO86	13.40	1,011	12.75	817	12.75	476	13.25	379	13.50	285	14.75
SUB88	1.95	642	13.00	475	13.25	190	14.00	103	14.50	33	16.75
CO88	15.35	1,599	12.75	1,234	13.00	633	13.25	459	13.75	310	15.00
SUB90	0.31	203	12.50	148	12.50	64	12.75	33	13.00	10	13.75
RO90	0.31	203	12.75	135	12.75	60	13.25	33	13.25	10	14.25
SUB92	2.00	872	12.75	676	13.00	280	13.50	155	14.00	55	15.25
RO92	2.00	841	13.00	659	13.00	276	13.50	155	14.00	55	15.25
SUB94	0.90	365	13.00	254	13.25	104	13.75	60	14.25	21	15.75
CO94	2.90	1,206	13.00	909	13.00	379	13.50	215	14.00	75	15.50
SUB96	5.02	2,071	13.00	1,480	13.00	585	13.50	332	14.00	111	15.75
CO96	7.92	3,277	13.00	2,389	13.00	964	13.50	547	14.00	185	15.50
CO97	8.23	3,405	13.00	2,498	13.00	1,015	13.50	573	14.00	192	15.50
SUB98	0.70	460	12.50	337	12.50	153	12.75	83	13.00	28	13.75
CO98	8.93	3,726	12.75	2,715	13.00	1,106	13.50	623	14.00	208	15.50
BAS13	8.93	3,226	12.25	2,215	12.25	606	12.75	123	13.25	0	15.50
DIV98	8.93	500	12.25	500	12.25	500	12.75	500	13.25	208	15.50
RO98	8.93	500	12.50	500	12.50	500	13.00	500	13.50	208	15.50

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
SUB100	0.15	122	12.50	92	12.50	37	12.50	19	12.75	6	13.25
CO100	9.08	622	12.50	592	12.50	523	13.00	511	13.50	210	15.50
RO100	9.08	611	12.50	569	12.50	523	13.00	510	13.75	210	15.50
SUB102	0.88	645	12.50	454	12.50	169	12.75	100	13.00	30	13.75
RO102	0.88	586	12.50	405	12.75	162	13.00	95	13.25	30	14.00
RO103	0.88	554	12.75	401	12.75	156	13.00	94	13.25	29	14.25
SUB104	0.68	257	13.00	182	13.00	72	13.50	41	14.25	13	15.75
CO104	1.56	804	12.75	570	12.75	223	13.25	128	13.25	39	14.25
CO105	10.64	1,372	12.75	1,129	12.75	742	13.00	634	13.50	242	15.25
RO105	10.64	1,347	12.75	1,103	12.75	742	13.25	628	13.75	242	15.50
SUB106	0.45	187	12.75	131	13.00	53	13.50	30	14.00	10	15.50
CO106	11.09	1,534	12.75	1,227	12.75	793	13.25	658	13.75	251	15.50
SUB108	1.31	354	13.50	249	13.75	103	14.50	58	15.25	20	18.00
CO108	12.40	1,788	12.75	1,420	13.00	860	13.25	698	13.75	266	15.50
RO108	12.40	1,779	13.00	1,409	13.00	858	13.50	694	14.00	266	15.50
SUB110	3.15	935	13.25	663	13.50	264	14.25	143	15.25	47	17.50
CO110	15.55	2,658	13.00	2,000	13.25	1,084	13.75	816	14.25	304	15.75
BAS15	15.55	1,578	12.50	920	12.50	4	13.75	0	14.25	0	15.75
DIV110	15.55	1,080	12.50	1,080	12.50	1,080	13.75	816	14.25	304	15.75
RO110	15.55	1,080	13.25	1,080	13.25	1,077	14.00	816	14.50	304	16.00
SUB112	1.18	321	13.50	225	13.75	93	14.50	52	15.50	17	18.00
CO112	16.73	1,401	13.50	1,305	13.75	1,163	14.00	863	14.75	318	16.00
CO113	32.08	2,932	13.00	2,494	13.00	1,766	13.75	1,307	14.25	615	15.50
BAS16	32.08	1,932	12.50	1,494	12.50	766	13.00	307	13.25	0	15.50
DIV113	32.08	1,000	12.50	1,000	12.50	1,000	13.00	1,000	13.25	615	15.50
RO113	32.08	1,000	13.25	1,000	13.25	1,000	13.75	1,000	14.00	615	15.75
SUB114	1.45	525	13.00	366	13.25	152	13.75	88	14.25	29	15.75
CO114	33.53	1,525	13.00	1,366	13.25	1,152	13.75	1,088	14.25	644	15.75
SUB116	0.67	271	13.00	174	13.25	68	14.00	38	14.50	12	16.50
CO116	34.20	1,795	13.00	1,541	13.25	1,219	13.75	1,125	14.50	655	15.75
RO116	34.20	1,774	13.00	1,537	13.25	1,217	14.00	1,125	14.50	654	15.75
CO117	34.95	1,845	13.00	1,587	13.25	1,233	14.00	1,131	14.50	655	15.75
BAS17	34.95	1,345	12.50	1,087	12.50	733	13.00	631	13.25	155	14.50
DIV117	34.95	500	12.50	500	12.50	500	13.00	500	13.25	500	14.50
COB117	60.22	5,108	13.50	4,020	13.75	1,904	15.25	1,323	15.75	759	18.50
RO117	60.22	5,003	13.75	3,946	14.00	1,898	15.25	1,315	16.00	758	18.75
SUB118	0.17	66	12.75	44	13.00	16	13.50	9	14.00	3	15.75
CO118	60.39	5,038	13.75	3,972	14.00	1,909	15.25	1,321	16.00	760	18.75
SUB120	2.66	714	13.25	524	13.75	210	14.50	121	15.25	39	17.75
RO120	2.66	713	13.50	522	13.75	209	14.50	121	15.50	39	18.00
SUB122	0.76	256	13.00	189	13.25	71	13.75	39	14.50	11	16.25
CO122	3.42	937	13.25	681	13.50	271	14.25	154	15.25	49	17.50
RO122	3.42	933	13.25	679	13.50	270	14.25	154	15.25	49	17.50
SUB124	1.24	442	13.00	304	13.00	120	13.75	68	14.50	20	16.25
CO124	4.66	1,345	13.25	965	13.25	382	14.00	216	14.75	67	17.25

RUNOFF SUMMARY TABLE

SELECTED ALTERNATIVE
WITH EXISTING RETENTION

HEC-1 ID NO.	DRAINAGE AREA (Mi^2)	100-YEAR PEAK FLOW	100-YEAR TIME OF PEAK	50-YEAR PEAK FLOW	50-YEAR TIME OF PEAK	10-YEAR PEAK FLOW	10-YEAR TIME OF PEAK	5-YEAR PEAK FLOW	5-YEAR TIME OF PEAK	2-YEAR PEAK FLOW	2-YEAR TIME OF PEAK
RO124	4.66	1,343	13.25	959	13.50	381	14.25	216	15.00	67	17.25
SUB126	0.60	105	13.25	68	13.50	22	14.75	11	16.00	3	20.75
CO126	5.26	1,448	13.25	1,028	13.50	403	14.25	226	15.00	68	17.25
BAS18	5.26	1,273	12.25	853	12.50	228	13.00	51	13.75	0	17.25
DIV126	5.26	175	12.25	175	12.50	175	13.00	175	13.75	68	17.25
CO127	65.65	5,213	13.75	4,147	14.00	2,084	15.25	1,496	16.00	824	18.75
RO128	65.65	5,101	14.00	4,065	14.25	2,083	15.50	1,493	16.25	824	18.75
SUB128	1.55	438	13.25	323	13.50	129	14.50	73	15.25	25	17.50
CO128	67.20	5,484	13.75	4,359	14.00	2,191	15.50	1,558	16.25	847	18.75
RO128	67.20	5,475	14.00	4,345	14.25	2,190	15.75	1,558	16.25	846	19.00
SUB130	1.35	462	13.00	333	13.00	147	13.50	83	14.00	28	15.25
CO130	68.55	5,756	14.00	4,556	14.25	2,270	15.50	1,606	16.25	826	19.00
BAS19	68.55	0	14.00	0	14.25	0	15.50	0	16.25	0	19.00
DIV130	68.55	5,756	14.00	4,556	14.25	2,270	15.50	1,606	16.25	826	19.00

SELECTED ALTERNATIVE - PART 1 INPUT

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1                                   HEC-1 INPUT

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

  1         ID       EASTERN MARICOPA COUNTY MASTER DRAINAGE PLAN     <EMARSHORT>
  2         ID       R.W.C.D. TO GUADALUPE ROAD - SELECTED ALTERNATIVE -  100 YEAR FLOW
  3         ID       DECEMBER 1985 - EXISTING CONDITION - RWCD REACH 6 & 5
            *DIAGRAM
  4         IT     15                    120
  5         IO      3
  6         PG      1    3.65
  7         PG     10
  8         IN     30                     48
  9         PI  0.011   0.029   0.018   0.022   0.022   0.026   0.022   0.026   0.029   0.026
 10         PI  0.029   0.033   0.033   0.033   0.040   0.040   0.048   0.051   0.058   0.066
 11         PI  0.084   0.113   0.175   1.387   0.263   0.135   0.099   0.077   0.066   0.058
 12         PI  0.051   0.044   0.040   0.040   0.037   0.033   0.029   0.029   0.029   0.026
 13         PI  0.026   0.022   0.026   0.023   0.021   0.018   0.022   0.018

 14         KK  SUB02
 15         KM       RUNOFF FROM SUBBASIN 2
 16         PR     10
 17         PW      1
 18         PT      1
 19         PW      1
 20         BA   1.32
 21         LS            85
 22         UK    110   0.005   0.200     100
 23         RK   5000   0.012   0.030   0.016    TRAP      40    0.01
 24         RK   6000   0.006   0.020            TRAP     100    0.01

 25         KK  DIV02
 26         KM       DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
 27         DT     D2
 28         DI      0       5   10000
 29         DQ      0       1    2000

 30         KK  RET02
 31         KM       BASIN FOR 50-YEAR RETENTION
 32         RS      1    STOR     0.0
 33         SV      0    13.6    20.0    30.0
 34         SE      0     2.5     3.5     5.0
 35         SQ      0       0     200     800

 36         KK   RED2
 37         KM       RETRIEVE DIVERTED FLOWS FROM SUB02
 38         DR     D2

 39         KK   CD02
 40         KM       COMBINE FLOWS FROM SUB02
 41         HC      2

 42         KK  DIVREC
 43         KM       DIVERT FLOWS >120 CFS SOUTH ON RECKER ROAD
 44         DT  DRECK
 45         DI      0     120     121     125     320    1120    5120
 46         DQ      0       0       1       5     200    1000    5000
1                                   HEC-1 INPUT

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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47          KK  ROPFBR
48          KM       ROUTE 48" PIPE FLOW TO HIGLEY (WEST ON BROWN RD)
49          RK    5280  0.0087   0.013           CIRC     4.0

50          KK   SUB04
51          KM       RUNOFF FROM SUBBASIN 4
52          PR      10
53          PW       1
54          PT       1
55          PW       1
56          BA    0.95
57          LS             83
58          UK     110   0.005   0.200     100
59          RK    3090   0.008   0.016    0.16    TRAP      40    0.01
60          RK    2800   0.015   0.200            TRAP     100      20

61          KK   RET04
62          KM       BASIN FOR 50-YEAR RETENTION
63          RS       1    STOR     0.0
64          SV       0      10      26      50      75
65          SE       0       1    2.26    3.26    3.50
66          SQ       0       2       5     800    1100

67          KK    CO04
68          KM       COMBINE FLOW AT BROWN AND HIGLEY ROADS
69          HC       2

70          KK  DIVHIG
71          KM       DIVERT FLOWS >135 CFS
72          DT      DH
73          DI       0     135     136     140     335    1135    5135
74          DQ       0       0       1       5     200    1000    5000

75          KK  RO48BR
76          KM       ROUTE 48" PIPE FLOWS TO R.W.C.D. CANAL
77          RK    4290  0.0082   0.013           CIRC     4.0

78          KK    REDH
79          KM       RETRIEVE FLOWS DIVERTED AS STREET FLOWS
80          DR      DH

81          KK   DIHIG
82          KM       DIVERT FLOWS GOING SOUTH ON HIGLEY
83          DT    DHIG
84          DI       0    10.0    1000   10000
85          DQ       0     6.5     650    6500

86          KK  ROSFBR
87          KM       ROUTE FLOW FROM HIGLEY TO R.W.C.D. WEST ON BROWN ROAD
88          RK    4290  0.0063   0.016           TRAP    40.0    0.01
1                                          HEC-1 INPUT

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

89          KK   SUB06
90          KM       RUNOFF FROM SUBBASIN 6
91          PR      10
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 92          PW      1
 93          PT      1
 94          PW      1
 95          BA   0.44
 96          LS           85.0                    79
 97          UK    110   0.005   0.200      65
 98          UK   1325   0.010   0.200      35
 99          RK   2600   0.005   0.016    0.11    TRAP      40    0.01
100          RK   4400   0.007   0.020            TRAP     100    0.01

101          KK  BROWN
102          KM       COMBINE FLOW ENTERING R.W.C.D. ALONG BROWN ROAD
103          HC      3

104          KK   ROBR
105          KM       ROUTE R.W.C.D. FLOWS TO ADOBE
106          RK   2950  0.0001   0.030            TRAP      80       3

107          KK   SUB08
108          KM       RUNOFF FROM SUBBASIN 8
109          PR     10
110          PW      1
111          PT      1
112          PW      1
113          BA   0.35
114          LS           83.5
115          UK    110   0.005   0.200     100
116          RK   1800   0.007   0.016   0.014    TRAP      40    0.01
117          RK   3700   0.009   0.016            TRAP      60    0.01

118          KK   DIV08
119          KM       DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
120          DT    D08
121          DI      0    10.0     100    1000   10000
122          DQ      0     2.3      23     230    2300

123          KK   RET08
124          KM       BASIN FOR 50-YEAR RETENTION
125          RS      1    STOR     0.0
126          SV      0    21.6    40.0    60.0
127          SE      0     2.6     3.6     5.0
128          SQ      0       0     200     800

129          KK   RED08
130          KM       RETRIEVE DIVERTED FLOWS FROM SUBBASIN 8
131          DR    D08
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1 HEC-1 INPUT

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


132          KK    C008
133          KM       COMBINE FLOWS FROM SUBBASIN 8
134          HC      2

135          KK   ADOBE
136          KM       COMBINE FLOWS IN R.W.C.D. AT ADOBE
137          HC      2

138          KK  ROADOB
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139          KM       ROUTE R.W.C.D. FLOWS FROM ADOBE TO ELECTRIC EASEMENT
140          RK    1600  0.0001   0.030            TRAP      80       3

141          KK   SUB10
142          KM       RUNOFF FROM SUBBAIN 10
143          PR      10
144          PW       1
145          PT       1
146          PW       1
147          BA    0.98
148          LS             83
149          UK     350   0.014   0.200     100
150          RK    5500   0.015   0.050    0.04    TRAP      20       10
151          RK    5800  0.0026   0.016            TRAP      16      1.5

152          KK   DIV10
153          KM       DIVERT OFF FLOW INTO REGIONAL BASIN 01
154          DT     D10
155          DI       0     225     226     325     625    1000    10000
156          DQ       0       0       1     100     400     775     9775

157          KK   ROB01
158          KM       ROUTE BASIN OUTFLOW TO BASIN AT POWER ROAD AND UNIVERSITY
159          RK    5350  0.0028   0.016            TRAP      13      1.5

160          KK   SUB12
161          KM       RUNOFF FROM SUBBASIN 12
162          PR      10
163          PW       1
164          PT       1
165          PW       1
166          BA    0.72
167          LS             83
168          UK     350  0.0140   0.200     100
169          RK    7500  0.0147   0.050    0.13    TRAP      20       10
170          RK    5350  0.0028   0.016            TRAP      13      1.5

171          KK    CO12
172          KM       COMBINE FLOWS ON UNIVERSITY - INFLOW TO BASIN FROM EAST
173          HC       2
1                                          HEC-1 INPUT

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


174          KK   SUB14
175          KM       RUNOFF FROM SUBBASIN 14
176          PR      10
177          PW       1
178          PT       1
179          PW       1
180          BA    0.52
181          LS           83.5
182          UK     800  0.0140   0.200     100
183          RK    2500  0.0095   0.030   0.087    TRAP      40     0.01
184          RK    3800  0.0035   0.016            TRAP    5.75      1.5

185          KK   DIV14
186          KM       DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
187          DT     D14
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188        DI      0     10     100    1000   10000
189        DQ      0      6      60     600    6000

190        KK   RET14
191        KM       BASIN FRO 50-YEAR RETENTION
192        RS      1    STOR     0.0
193        SV      0     7.2      12      20
194        SE      0     2.6     3.6     5.0
195        SQ      0       0      80     300

196        KK   RED14
197        KM       RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 14
198        DR    D14

199        KK    CO14
200        KM       COMBINE FLOWS FROM SUBBASIN 14
201        HC      2

202        KK    RO14
203        KM       ROUTE SUB14 FLOWS TO BASIN AT POWER ROAD AND UNIVERSITY
204        RK    5200  0.0026   0.016           TRAP      12     1.5

205        KK   SUB16
206        KM       RUNOFF FROM SUBBASIN 16
207        PR     10
208        PW      1
209        PT      1
210        PW      1
211        BA    1.22
212        LS           83.8
213        UK     500  0.0140   0.200     100
214        RK    7500  0.0147   0.050    0.10    TRAP      20      10
215        RK    5200  0.0026   0.016           TRAP      12     1.5
1                                        HEC-1 INPUT

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


216        KK   DIV16
217        KM       DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
218        DT    D16
219        DI      0    10.0     100    1000   10000
220        DQ      0     8.3      83     830    8300

221        KK   RET16
222        KM       BASIN FOR 50-YEAR RETENTION
223        RS      1    STOR     0.0
224        SV      0    12.0    20.0    30.0
225        SE      0     2.5     3.5     5.0
226        SQ      0       0     200     800

227        KK   RED16
228        KM       RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 16
229        DR    D16

230        KK    CO16
231        KM       COMBINE FLOWS FROM SUBBASIN 16
232        HC      2

233        KK   CON17
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234          KM       COMBINE FLOWS AT UNIVERSITY ON POWER ROAD - INFLOW FROM NORTH
235          HC      2

236          KK   COT17
237          KM       TOTAL INFLOW INTO REGIONAL BASIN 02 AT UNIVERSITY AND POWER ROAD
238          HC      2

239          KK   DIV17
240          KM       DIVERT OFF FLOW INTO REGIONAL BASIN 02
241          DT     D17
242          DI      0     500     501     600    1000   10000
243          DQ      0       0       1     100     500    9500

244          KK   ROB02
245          KM       ROUTE BASIN OUTFLOW TO .6 MI WEST OF RECKER ROAD
246          RK    8700   0.008   0.016           TRAP    30.0     1.5

247          KK  REDREC
248          KM       RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 2
249          DR   DRECK

250          KK  RORECK
251          KM       ROUTE DIVERTED FLOWS SOUTH ON RECKER RD TO ELEC EASEMENT
252          RK    4100  0.0052   0.016           TRAP      40    0.01

253          KK  ROREEE
254          KM       ROUTE RECKER RD FLOWS .6 MI WEST DOWN ELEC EASEMENT
255          RK    3400  0.0024   0.016           TRAP      20     1.5
1                                          HEC-1 INPUT

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


256          KK   SUB18
257          KM       RUNOFF FROM SUBBASIN 18
258          PR      10
259          PW       1
260          PT       1
261          PW       1
262          BA    1.07
263          LS           86.0                     83
264          UK    1110   0.009   0.050      60
265          UK    1500   0.007   0.200      40
266          RK    4100   0.007   0.016    0.15   TRAP      40    0.01
267          RK    8500  0.0024   0.016           TRAP      20     1.5

268          KK  CORECK
269          KM       COMBINE ELEC EASEMENT FLOWS AT .25 MI WEST OF RECKER ROAD
270          HC       3

271          KK  RO18EE
272          KM       ROUTE FLOWS TO R.W.C.D. AT ELECTRIC EASEMENT
273          RK    4300  0.0024   0.016           TRAP      20     1.5

274          KK   SUB20
275          KM       RUNOFF FROM SUBBASIN 20
276          PR      10
277          PW       1
278          PT       1
279          PW       1
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280        BA    0.77
281        LS            86
282        UK     110   0.050   0.200     100
283        RK    3200   0.008   0.016    0.11    TRAP      40    0.01
284        RK    6500  0.0024   0.016            TRAP      20    0.01

285        KK   DIV20
286        KM        DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
287        DT     D20
288        DI       0      10     100    1000   10000
289        DQ       0       2      20     200    2000

290        KK   RET20
291        KM        BASIN FOR 50-YEAR RETENTION
292        RS       1    STOR       0
293        SV       0      15      50     100     175
294        SE       0       1     2.6     3.6     4.0
295        SQ       0       2       5     800    1500

296        KK   RED20
297        KM        RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 20
298        DR     D20
1                                        HEC-1 INPUT

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


299        KK    CO20
300        KM        COMBINE FLOWS FROM SUBBASIN 20
301        HC       2

302        KK  REDHIG
303        KM        RETRIEVE DIVERTED FLOWS ON HIGLEY ROAD FROM SUBBASIN 4
304        DR    DHIG

305        KK   ROHIG
306        KM        ROUTE DIVERTED FLOWS DOWN HIGLEY ROAD TO ELEC. EASEMENT
307        RK    4100   0.041   0.016            TRAP      40    0.01

308        KK  RODHEE
309        KM        ROUTE HIGLEY FLOWS WEST IN ELECTRIC EASEMENT TO R.W.C.D.
310        RK    2300  0.0024   0.016            TRAP      20     1.5

311        KK  CO21EE
312        KM        COMBINE ELECTRIC EASEMENT FLOWS AT R.W.C.D.
313        HC       3

314        KK    ELEC
315        KM        COMBINE FLOWS IN R.W.C.D. AT ELECTRIC EASEMENT
316        HC       2

317        KK  ROELEC
318        KM        ROUTE R.W.D.C. FLOWS FROM ELEC EASEMENT TO UNIVERSITY
319        RK    1200  0.0001   0.030            TRAP      80       3

320        KK   SUB22
321        KM        RUNOFF FROM SUBBASIN 22
322        PR      10
323        PW       1
324        PT       1
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325          PW      1
326          BA   0.38
327          LS            85
328          UK    110   0.005   0.200     100
329          RK   1800   0.006   0.016    0.04    TRAP      40    0.01
330          RK   7800   0.007   0.016            TRAP      40    0.01

331          KK   UNIV
332          KM       COMBINE FLOW IN R.W.C.D. AT UNIVERSITY
333          HC      2

334          KK  ROUNIV
335          KM       ROUTE R.W.C.D. FLOWS FROM UNIVERSITY TO APACHE TRAIL
336          RK   3340 0.00015   0.030            TRAP     110       3

337          KK   SUB24
338          KM       RUNOFF FROM SUBBASIN 24
339          PR     10
340          PW      1
341          PT      1
342          PW      1
1                                        HEC-1 INPUT

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

343          BA   0.45
344          LS          85.5
345          UK    110   0.005   0.200     100
346          RK   1700   0.006   0.016    0.06    TRAP      40    0.01
347          RK   5800   0.006   0.060            TRAP      10       2

348          KK   US60
349          KM       COMBINE FLOWS AT APACHE TRAIL (US-60)
350          HC      2

351          KK  ROUS60
352          KM       ROUTE FLOWS FROM APACHE TRAIL TO BROADWAY
353          RK   2672  0.0003   0.027            TRAP      90       3

354          KK   SUB26
355          KM       RUNOFF FROM SUBBASIN 26
356          PR     10
357          PW      1
358          PT      1
359          PW      1
360          BA   1.80
361          LS          84.9
362          UK    110   0.005   0.200     100
363          RK   5000   0.006   0.050    0.26    TRAP      10       2
364          RK   7500   0.007   0.016            TRAP      12     1.5

365          KK   RO26
366          KM       ROUTE FLOWS TO R.W.C.D. AT BROADWAY
367          RK   1800  0.0055   0.016            TRAP      19     2.0

368          KK   SUB28
369          KM       RUNOFF FROM SUBBASIN 28
370          PR     10
371          PW      1
372          PT      1
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373          PW      1
374          BA   0.33
375          LS           85.2
376          UK    110   0.005   0.200     100
377          RK   2650  0.0075   0.016   0.066    TRAP      40    0.01
378          RK   1800  0.0055   0.016            TRAP      19     2.0

379          KK   DIV28
380          KM        DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
381          DT    D28
382          DI      0      10     100    1000   10000
383          DQ      0       9      90     900    9000

384          KK   RET28
385          KM        BASIN FOR 50-YEAR RETENTION
386          RS      1    STOR       0
387          SV      0     2.5     4.0     4.1
388          SE      0     2.6     3.6     3.7
389          SQ      0       0      80    1000
1                                              HEC-1 INPUT

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


390          KK   RED28
391          KM        RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 28
392          DR    D28

393          KK    CO28
394          KM        COMBINE FLOWS FROM SUBBASIN 28
395          HC      2

396          KK    CO29
397          KM        COMBINE FLOWS IN BROADWAY CHANNEL AT R.W.C.D.
398          HC      2

399          KK   BROAD
400          KM        COMBINE FLOWS IN R.W.C.D. AT BROADWAY
401          HC      2

402          KK  RBROAD
403          KM        ROUTE FLOWS FROM BROADWAY TO SUPERSTITION FREEWAY
404          RK   8870  0.0004   0.025            TRAP     120     3.0

405          KK   SUB30
406          KM        RUNOFF FROM SUBBASIN 30 - LEISURE WORLD
407          PR     10
408          PW      1
409          PT      1
410          PW      1
411          BA   1.56
412          LS           84.9
413          UK    110   0.005   0.200     100
414          RK   7300  0.0060   0.070    0.20    TRAP      40    0.01
415          RK   8870  0.0004   0.025            TRAP     120     3.0

416          KK   RET30
417          KM        BASIN FOR 50-YEAR RETENTION
418          RS      1    STOR       0
419          SV      0      25      61      67      75      78
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420        SE      0     1.3     2.6     3.1     3.6     3.7
421        SQ      0       0       0     275     800     925

422        KK    CO34
423        KM        COMBINE FLOWS IN RWCD ABOVE FREEWAY
424        HC      2

425        KK   SUB32
426        KM        RUNOFF FROM SUBBASIN 32
427        PR     10
428        PW      1
429        PT      1
430        PW      1
431        BA   1.62
432        LS           86.4
433        UK    110   0.005   0.200     100
434        RK   7200  0.0065   0.016   0.057    TRAP      40    0.01
435        RK  19000  0.0062   0.030            TRAP      20     2.0
1                                        HEC-1 INPUT

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


436        KK   DIV32
437        KM        DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION BASIN
438        DT    D32
439        DI      0      10     100    1000   10000
440        DQ      0       7      70     700    7000

441        KK   RET32
442        KM        BASIN FOR 50-YEAR RETENTION
443        RS      1    STOR       0
444        SV      0      12    31.2      37      45      47
445        SE      0     1.3     2.6     3.1     3.6     3.7
446        SQ      0       0       0     140     400     460

447        KK    RE32
448        KM        RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 32
449        DR    D32

450        KK    CO32
451        KM        COMBINE FLOWS FROM SUBBASIN 32
452        HC      2

453        KK   DIV33
454        KM        DIVERT FLOWS GOING TO REGIONAL BASIN 03
455        DT   BAS03
456        DI      0     300     301     500     800    1500
457        DQ      0       0       1     200     500    1200

458        KK    RO33
459        KM        ROUTE FLOWS FROM SUBBASIN 32 TO RWCD
460        RK    9000  0.0064   0.025            TRAP      12     2.0

461        KK   SUB34
462        KM        RUNOFF FROM SUBBASIN 34
463        PR     10
464        PW      1
465        PT      1
466        PW      1
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467          BA    2.30
468          LS           83.0
469          UK    1250  0.0077   0.032     100
470          RK   12000  0.0056   0.016    0.58    TRAP      40    0.01
471          RK    9000  0.0064   0.025            TRAP      12     2.0

472          KK   DIV34
473          KM        DIVERT FLOWS NOT GOING TO RETENTION BASIN
474          DT     D34
475          DI       0      10     100    1000   10000
476          DQ       0       7      70     700    7000
1                                              HEC-1 INPUT

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


477          KK   RET34
478          KM        BASIN FOR 50-YEAR RETENTION
479          RS       1    STOR       0
480          SV       0      18      43      52      63      64
481          SE       0     1.3     2.6     3.1     3.6     3.7
482          SQ       0       0       0     140     400     460

483          KK    RE34
484          KM        RETRIEVE DIVERTED HYDROGRAPH FROM SUBBASIN 32
485          DR     D34

486          KK    CO34
487          KM        COMBINE FLOWS FROM SUB34
488          HC       2

489          KK    CO35
490          KM        COMBINE FLOWS IN FREEWAY CHANNEL AT RWCD
491          HC       2

492          KK  COFREE
493          KM        COMBINE FLOWS IN RWCD AT FREEWAY
494          HC       2

495          KK  ROFREE
496          KM        ROUTE RWCD FLOWS TO BASELINE
497          RK    2950  0.0003   0.027            TRAP     140     3.0

498          KK   SUB36
499          KM        RUNOFF FROM SUBBASIN 36
500          PR      10
501          PW       1
502          PT       1
503          PW       1
504          BA    1.12
505          LS           79.0
506          UK     870  0.0060   0.200     100
507          RK    2500  0.0020   0.040    0.04    TRAP       2     4.0
508          RK    8800  0.0059   0.035            TRAP      10     3.0

509          KK  COBASE
510          KM        COMBINE FLOWS IN RWCD AT BASELINE
511          HC       2

512          KK  ROBASE
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513          KM       ROUTE RWCD FLOWS TO GUADALUPE
514          RK    6070  0.0003   0.025           TRAP     140     3.0

515          KK   SUB38
516          KM       RUNOFF FROM SUBBASIN 38
517          PR      10
518          PW       1
519          PT       1
520          PW       1
521          BA    0.29
1                                          HEC-1 INPUT

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

522          LS             75
523          UK      50   0.006   0.025     100
524          RK    1000   0.005   0.025   0.005    TRAP       2     2.0
525          RK    6070  0.0003   0.025           TRAP     140     3.0

526          KK    CO38
527          KM       COMBINE FLOWS ABOVE GUADALUPE
528          HC       2

529          KK   SUB40
530          KM       RUNOFF FROM SUBBASIN 40
531          PR      10
532          PW       1
533          PT       1
534          PW       1
535          BA    1.21
536          LS           84.7
537          UK     260   0.006    0.16     100
538          RK    8500   0.010   0.060   0.165    TRAP      40    0.01
539          RK    5200   0.080   0.016           TRAP      40    0.01

540          KK   RO40
541          KM       ROUTE SUB40 FLOWS TO SUB42
542          RK    7000  0.0070   0.016           TRAP      15     1.5

543          KK   SUB42
544          KM       RUNOFF FROM SUBBASIN 42
545          PR      10
546          PW       1
547          PT       1
548          PW       1
549          BA    0.97
550          LS             84
551          UK    1600  0.0075    0.20     100
552          RK    8300   0.008   0.082    0.15    TRAP      40    0.01
553          RK    7000   0.007   0.016           TRAP      15     1.5

554          KK    CO42
555          KM       COMBINE FLOWS OF SUB40 AND SUB42
556          HC       2

557          KK   SUB44
558          KM       RUNOFF FROM SUBBASIN 44
559          PR      10
560          PW       1
561          PT       1
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562          PW      1
563          BA   0.31
564          LS           86.4
565          UK     50   0.005   0.200     100
566          RK   2500   0.008   0.016    0.01    TRAP      40    0.01
567          RK   1500   0.004   0.016            TRAP      40    0.01
1                                          HEC-1 INPUT

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


568          KK   RO44
569          KM       ROUTE SUB44 FLOW TO CONFLUENCE WITH SUB42
570          RK   2300  0.0087   0.030            TRAP      15       2

571          KK   CO44
572          KM       COMBINE FLOWS OF SUB40, 42, AND SUB44
573          HC      2

574          KK   RO45
575          KM       ROUTE COMBINED FLOWS TO SOSSAMAN CHANNEL
576          RK   4300  0.0065   0.016            TRAP      15     1.5

577          KK  SUB46
578          KM       RUNOFF FROM SUBBASIN 46
579          PR     10
580          PW      1
581          PT      1
582          PW      1
583          BA   0.31
584          LS           86.5
585          UK    110   0.005   0.200     100
586          RK   2600  0.0038   0.016    0.05    TRAP      40    0.01
587          RK   4300  0.0065   0.016            TRAP      15     1.5

588          KK   CO46
589          KM       COMBINE FLOWS FROM SUB 44 AND SUB 46 (TOTAL IN FREEWAY CHANNEL)
590          HC      2

591          KK  SUB48
592          KM       RUNOFF FROM SUBBASIN 48
593          PR     10
594          PW      1
595          PT      1
596          PW      1
597          BA   0.42
598          LS             85
599          UK    150   0.005   0.200     100
600          RK   3100  0.0061   0.016   0.035    TRAP      40    0.01
601          RK   4350  0.0062   0.016            TRAP      10     1.5

602          KK  RET48
603          KM       BASIN FOR 50-YEAR RETENTION
604          RS      1    STOR       0
605          SV      0       7    17.5      22      27      28
606          SE      0     1.3     2.6     3.1     3.6     3.7
607          SQ      0       0       0      70     200     240

608          KK   RO48
609          KM       ROUTE SUB46 FLOWS TO FREEWAY
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610          RK    2200  0.0045   0.030           TRAP      25     1.5
1                                          HEC-1 INPUT

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


611          KK  COSOSS
612          KM       COMBINE FLOWS BELOW FREEWAY IN SOSSAMAN CHANNEL
613          HC      2

614          KK  ROSOSS
615          KM       ROUTE FLOWS TO BASELINE IN SOSSAMAN CHANNEL
616          RK    3800  0.0040   0.030           TRAP      50     3.0

617          KK   SUB50
618          KM       RUNOFF FROM SUBBASIN 50
619          PR     10
620          PW      1
621          PT      1
622          PW      1
623          BA    1.0
624          LS           80.3
625          UK     967  0.0065   0.200     100
626          RK    2300  0.0087   0.040    0.13    TRAP       2     4.0
627          RK    9000  0.0070   0.035           TRAP      30     4.0

628          KK    CO50
629          KM       COMBINE FLOWS IN SOSSAMAN CHANNEL AT BASELINE
630          HC      2

631          KK    RO50
632          KM       ROUTE FLOWS TO GUADALUPE
633          RK    5300   0.038   0.030           TRAP      50     3.0

634          KK   SUB52
635          KM       RUNOFF FROM SUBBASIN 52
636          PR     10
637          PW      1
638          PT      1
639          PW      1
640          BA    1.82
641          LS           80.8
642          UK    1750   0.005   0.200     100
643          RK    4950  0.0051   0.040   0.072    TRAP     2.0     4.0
644          RK    8150  0.0061   0.016           TRAP      15     1.5

645          KK   DIV52
646          KM       DIVERT FLOWS NOT GOING TO 50-YEAR RETENTION
647          DT     D52
648          DI       0      10     100    1000   10000
649          DQ       0       8      80     800    8000

650          KK   RET52
651          KM       BASIN FOR 50-YEAR RETENTION
652          RS       1    STOR       0
653          SV       0      12      28      42      60      62
654          SE       0     1.3     2.6     3.1     3.6     3.7
655          SQ       0       0       0      70     200     240
1                                          HEC-1 INPUT
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

656         KK    RE52
657         KM        RETRIEVE DIVERTED FLOWS FROM SUB52
658         DR     D52

659         KK    CO52
660         KM        COMBINE FLOW FROM SUBBASIN 52
661         HC       2

662         KK    CO53
663         KM        COMBINE FLOW AT SOSSAMAN AND GUADALUPE
664         HC       2

665         KK  DIVSOS
666         KM        DIVERT FLOWS INTO REGIONAL BASIN 04
667         DT   BAS04
668         DI       0    1000    1500    2000    4000
669         DQ       0       0     500    1000    3000

670         KK  ROGUAD
671         KM        ROUTE BASIN OUTFLOW TO RWCD @ GUADALUPE
672         RK    5250  0.0048   0.016            TRAP    15.0     1.5

673         KK   SUB54
674         KM        RUNOFF FROM SUBBASIN 54
675         PR      10
676         PW       1
677         PT       1
678         PW       1
679         BA    1.04
680         LS              75
681         UK    1750   0.006   0.200     100
682         RK    5000   0.005   0.040    0.07    TRAP     2.0     4.0
683         RK    5250  0.0048   0.016            TRAP    15.0     1.5

684         KK    CO54
685         KM        COMBINE FLOWS IN GUADALUPE CHANNEL AT RWCD
686         HC       2

687         KK  COGUAL
688         KM        COMBINE RWCD FLOWS AT GUADALUPE
689         HC       2

690         KK  ROGUAL
691         KM        ROUTE RWCD FLOW TO ELLIOT
692         KO       1
693         RK    5750  0.0003  0.0270            TRAP     140     3.0
694         ZZ
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SELECTED ALTERNATIVE - PART 2 INPUT


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

  1           ID        EASTERN MARICOPA COUNTY MASTER DRAINAGE PLAN      <EMCSHORT2>
  2           ID        DRAINAGE AREA BELOW GUADALUPE ROAD AND R.W.C.D. - SELECTED ALTERNATIVE
  3           ID        DECEMBER 1985 - EXISTING CONDITION - RWCD REACH 6
              $DIAGRAM
  4           IT      15                    120
  5           IO       3
  6           PG       1    3.65
  7           PG      10
  8           IN      30                     48
  9           PI   0.011   0.029   0.018   0.022   0.022   0.026   0.022   0.026   0.029   0.026
 10           PI   0.029   0.033   0.033   0.033   0.040   0.040   0.048   0.051   0.058   0.066
 11           PI   0.084   0.113   0.175   1.387   0.263   0.135   0.099   0.077   0.066   0.058
 12           PI   0.051   0.044   0.040   0.040   0.037   0.033   0.029   0.029   0.029   0.026
 13           PI   0.026   0.022   0.026   0.023   0.021   0.018   0.022   0.018

 14           KK  ROGUAL
 15           KM        HYDROGRAPH AT RWCD AND ELLIOT
 16           BA   25.27
 17           IN      15                    120
 18           QI       0       0       0       0       0       0       0       0       0       0
 19           QI       0       0       0       0       0       0       0       0       0       0
 20           QI       0       0       0       0       0       0       0       0       0       0
 21           QI       0       0       0       0       0       0       0       0       0       0
 22           QI       0       0       0       0       0       0       0       0       0       0
 23           QI      33     372    1887    4160    4608    4376    4225    4148    4052    3910
 24           QI    3708    3441    3144    2865    2638    2446    2276    2128    1993    1874
 25           QI    1769    1674    1585    1500    1425    1359    1301    1248    1200    1156
 26           QI    1114    1076    1040    1006     975     946     919     893     868     846
 27           QI     824     804     786     768     751     735     719     705     690     677
 28           QI     662     647     631     613     594     573     551     529     507     485
 29           QI     463     441     420     400     380     362     344     327     310     295

 30           KK   SUB56
 31           KM        RUNOFF FROM SUBBASIN 56
 32           PR      10
 33           PW       1
 34           PT       1
 35           PW       1
 36           BA    0.75
 37           LS            75
 38           UK    1250   0.006   0.200     100
 39           RK    5000  0.0036   0.040   0.050    TRAP     2.0     4.0
 40           RK    3700  0.0050   0.016           TRAP    15.0     1.5

 41           KK   SUB58
 42           KM        RUNOFF FROM SUBBASIN 58
 43           PR      10
 44           PW       1
 45           PT       1
 46           PW       1
 47           BA    0.71
 48           LS            84.0
 49           UK     500  0.0133   0.200     100
 50           RK    8000  0.0150   0.040    0.10    TRAP     2.0     4.0
 51           RK    1700  0.0055   0.035           TRAP     5.0     1.5
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 52           KK   RO58
 53           KM       ROUTE FLOWS FROM SUB58 TO REGIONAL BASIN 06
 54           RK   2000   0.001   0.035           TRAP    10.0     1.5

 55           KK   SUB60
 56           KM       RUNOFF FROM SUBBASIN 60
 57           PR     10
 58           PW      1
 59           PT      1
 60           PW      1
 61           BA   0.42
 62           LS            83
 63           UK    500  0.0200   0.200     100
 64           RK   3500  0.0257   0.040    0.08    TRAP     2.0     4.0
 65           RK   2000  0.0075   0.016            TRAP     5.0     1.5

 66           KK   RO60
 67           KM       ROUTE SUBBASIN 60 TO OVERCHUTE IN SUB 62
 68           RK   2500   0.006   0.016            TRAP    10.0     1.5

 69           KK   SUB62
 70           KM       RUNOFF FROM SUBBASIN 62
 71           PR     10
 72           PW      1
 73           PT      1
 74           PW      1
 75           BA   0.33
 76           LS          85.6
 77           UK    110   0.005   0.200     100
 78           RK   3000  0.0067   0.016   0.024    TRAP      40    0.01
 79           RK   1200  0.0042   0.035            TRAP       5     1.5

 80           KK   CO62
 81           KM       COMBINE FLOWS THROUGH OVERCHUTE IN SUB 62
 82           HC      2

 83           KK   SUB64
 84           KM       RUNOFF FROM SUBBASIN 64
 85           PR     10
 86           PW      1
 87           PT      1
 88           PW      1
 89           BA   0.33
 90           LS            83
 91           UK    500  0.0230   0.200     100
 92           RK   3000  0.0167   0.040   0.066    TRAP     2.0     4.0
 93           RK   1500  0.0095   0.035            TRAP     5.0     1.5

 94           KK   RO64
 95           KM       ROUTE FLOWS FROM SUB64 TO REGIONAL BASIN 06
 96           RK   2000   0.002   0.016            TRAP    10.0     1.5
1                                          HEC-1 INPUT

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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 97          KK    CO64
 98          KM        COMBINE FLOWS FROM SUB 58, 62 AND 64 INFLOW TO REGIONAL BASIN 06
 99          HC       3

100          KK   DIV64
101          KM        DIVERT FLOWS GOING TO REGIONAL BASIN 06
102          DT   BAS06
103          DI       0     365     500    1000    2500
104          DQ       0       0     135     635    2135

105          KK    RO65
106          KM        ROUTE FLOWS FROM REGIONAL BASIN 06 TO BROADWAY
107          RK    6600  0.0088   0.016            TRAP      15     1.5

108          KK   SUB66
109          KM        RUNOFF FROM SUBBASIN 66
110          PR      10
111          PW       1
112          PT       1
113          PW       1
114          BA    0.92
115          LS            86.6
116          UK     150   0.005   0.200     100
117          RK    3400  0.0088   0.016   0.115    TRAP      40    0.01
118          RK    6600  0.0088   0.016            TRAP      15     1.5

119          KK    CO66
120          KM        COMBINE FLOWS IN ELLSWORTH CHANNEL AT BROADWAY
121          HC       2

122          KK    RO66
123          KM        ROUTE FLOWS FROM BROADWAY TO FREEWAY
124          RK    7200  0.0043   0.016            TRAP      10     1.5

125          KK   SUB68
126          KM        RUNOFF FROM SUBBASIN 68
127          PR      10
128          PW       1
129          PT       1
130          PW       1
131          BA    1.53
132          LS            85.1
133          UK    1250   0.010   0.200     100
134          RK    7500  0.0068   0.035    0.20    TRAP    10.0     3.0
135          RK    7200  0.0043   0.016            TRAP    10.0     1.5

136          KK    CO68
137          KM        COMBINE FLOWS IN ELLSWORTH CHANNEL AT FREEWAY
138          HC       2
1                                          HEC-1 INPUT

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

139          KK   SUB70
140          KM        RUNOFF FROM SUBBASIN 70
141          PR      10
142          PW       1
143          PT       1
144          PW       1
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145          BA    1.65
146          LS              83
147          UK    1000  0.0100   0.200     100
148          RK    7500  0.0107   0.035   0.165    TRAP      15     3.0
149          RK    6500  0.0054   0.016            TRAP      10     1.5

150          KK  SUB72A
151          KM        RUNOFF FROM SUBBASIN 72A
152          PR      10
153          PW       1
154          PT       1
155          PW       1
156          BA    0.66
157          LS              83
158          UK    1000  0.0115   0.200     100
159          RK    3000  0.0100   0.040   .0943    TRAP     2.0     4.0
160          RK    8500  0.0088   0.035            TRAP    20.0     3.0

161          KK   CO72A
162          KM        COMBINE FLOWS INTO REGIONAL BASIN 07
163          HC       2

164          KK   DIV72
165          KM        DIVERT FLOWS INTO REGIONAL BASIN 07
166          DT   BAS07
167          DI       0     250     500    1000    2000    4000
168          DQ       0       0     250     750    1750    3750

169          KK    RO07
170          KM        ROUTE FLOWS TO REGIONAL BASIN 07A
171          RK    2600  0.0185   0.035            TRAP    20.0     3.0

172          KK  SUB72B
173          KM        RUNOFF FROM SUBBASIN 72B
174          PR      10
175          PW       1
176          PT       1
177          PW       1
178          BA    0.43
179          LS              83
180          UK    1000  0.0115   0.200     100
181          RK    6000  0.0115   0.040    0.11    TRAP     2.0     4.0
182          RK    2150  0.0181   0.035            TRAP    20.0     3.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


183          KK   CO72B
184          KM        COMBINE FLOW AT REGIONAL BASIN 07A
185          HC       2

186          KK  SUB72C
187          KM        RUNOFF FROM SUBBASIN 72C
188          PR      10
189          PW       1
190          PT       1
191          PW       1
192          BA    0.44
193          LS              83
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194          UK    1000  0.0115   0.200     100
195          RK    5000  0.0180   0.040    0.11    TRAP      2       4
196          RK    1800  0.0122   0.035            TRAP     20       3

197          KK   CD72C
198          KM        COMBINE FLOW AT REGIONAL BASIN 07A
199          HC       2

200          KK   DIV73
201          KM        DIVERT FLOW INTO REGIONAL BASIN AT C.A.P. (BASIN 07A)
202          DT  BAS07A
203          DI       0     435     935    1935    3935
204          DQ       0       0     500    1500    3500

205          KK  SUB72D
206          KM        RUNOFF FROM SUBBASIN 72D
207          PR      10
208          PW       1
209          PT       1
210          PW       1
211          BA    0.16
212          LS              83
213          UK    1000  0.0115   0.200     100
214          RK    1800  0.0156   0.040    0.05    TRAP      2       4
215          RK     500  0.0140   0.035            TRAP     20       3

216          KK   CD72D
217          KM        COMBINE FLOW AT C.A.P. OVERCHUTE
218          HC       2

219          KK    RO72
220          KM        ROUTE FLOWS FROM C.A.P. AT APACHE TRAIL TO BROADWAY BASIN
221          RK    2760  0.0037   0.016            TRAP    4.0     1.5

222          KK   SUB74
223          KM        RUNOFF FROM SUBBASIN 74
224          PR      10
225          PW       1
226          PT       1
227          PW       1
228          BA    0.82
229          LS            85.2
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1 HEC-1 INPUT

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

230          UK     500   0.005   0.200     100
231          RK    5500  0.0076   0.035   0.137    TRAP   10.0     3.0
232          RK    3300  0.0121   0.016            TRAP    5.0     1.5

233          KK    RO74
234          KM        ROUTE FLOW FROM SUB 74 TO C.A.P.
235          RK    2000  0.0050   0.016            TRAP   10.0     1.5

236          KK   SUB76
237          KM        RUNOFF FROM SUBBASIN 76
238          PR      10
239          PW       1
240          PT       1
241          PW       1
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242          BA    0.84
243          LS            84.4
244          UK     200   0.005   0.200     100
245          RK    5500  0.0073   0.030    0.08    TRAP    40.0    0.01
246          RK    2300  0.0035   0.040            TRAP    40.0     4.0

247          KK   CO 76
248          KM        COMBINE FLOWS ABOVE CAP AT BROADWAY
249          HC       2

250          KK  SUB76A
251          KM        RUNOFF FROM SUBBASIN 76A
252          PR      10
253          PT       1
254          PW       1
255          PT       1
256          BA    0.20
257          LS            86.1
258          UK     500   0.015   0.200     100
259          RK    2800  0.0079   0.040    0.05    TRAP     2.0     4.0
260          RK    1800  0.0022   0.035            TRAP     5.0     1.5

261          KK   CO76A
262          KM        COMBINE FLOWS ON BROADWAY ROAD BELOW C.A.P.
263          HC       2

264          KK    RO76
265          KM        ROUTE FLOWS TO REGIONAL BASIN 09
266          RK    2500  0.0064    .016            TRAP    10.0     1.5

267          KK    CO77
268          KM        COMBINE INFLOW TO REGIONAL BASIN 09
269          HC       2

270          KK   DIV77
271          KM        DIVERT FLOWS INTO REGIONAL BASIN 09
272          DT   BAS09
273          DI       0     620    1000    5000
274          DQ       0       0     380    4380
1                                          HEC-1 INPUT

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


275          KK    RO77
276          KM        ROUTE FLOWS FROM REGIONAL BASIN 09 TO FREEWAY
277          RK    7100  0.0070   0.016            TRAP    10.0     1.5

278          KK   SUB78
279          KM        RUNOFF FROM SUBBASIN 78
280          PR      10
281          PW       1
282          PT       1
283          PW       1
284          BA    0.63
285          LS              83
286          UK    1000   0.010   0.200     100
287          RK    4000  0.0113   0.040   0.032    TRAP     2.0     4.0
288          RK    7100  0.0070   0.016            TRAP    10.0     1.5
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```
289          KK    CO78
290          KM       COMBINE FLOWS FROM SUB 78 AND REGIONAL BASIN OUTFLOW
291          HC      2

292          KK   SUB80
293          KM       RUNOFF FROM SUBBASIN 80
294          PR     10
295          PW      1
296          PT      1
297          PW      1
298          BA    1.0
299          LS             83
300          UK   1250   0.010   0.200     100
301          RK   4700   0.013   0.040   0.015    TRAP     2.0     4.0
302          RK   6600  0.0061   0.016           TRAP    10.0     1.5

303          KK    CO80
304          KM       COMBINE FLOWS AT FREEWAY AND CRISMON
305          HC     2

306          KK    RO80
307          KM       ROUTE FLOWS TO ELLSWORTH ABOVE FREEWAY
308          RK   5300   0.006   0.016           TRAP    10.0     1.5

309          KK    CO81
310          KM       COMBINE INFLOW TO REGIONAL BASIN 10
311          HC      2

312          KK   DIV81
313          KM       DIVERT FLOWS INTO REGIONAL BASIN 10
314          DT   BAS10
315          DI      0     250     500    1000    2000    4000
316          DQ      0       0     250     750    1750    3750
1                                          HEC-1 INPUT

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


317          KK    RO81
318          KM       ROUTE BASIN OUTFLOW TO BASELINE
319          RK   3500  0.0029   0.016           TRAP    10.0     1.5

320          KK   SUB82
321          KM       RUNOFF FROM SUBBASIN 82
322          PR     10
323          PW      1
324          PT      1
325          PW      1
326          BA   0.56
327          LS             83
328          UK    500   0.008   0.200     100
329          RK   3600   0.012   0.040   0.066    TRAP     2.0     4.0
330          RK   6500  0.0043   0.016           TRAP    10.0     1.5

331          KK    RO82
332          KM       ROUTE SUBBASIN 82 FLOWS TO ELLSWORTH
333          RK   5200  0.0054   0.016           TRAP    10.0     1.5

334          KK   SUB84
335          KM       RUNOFF FROM SUBBASIN 84
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336          PR      10
337          PW       1
338          PT       1
339          PW       1
340          BA    0.76
341          LS             83
342          UK     500   0.010   0.200     100
343          RK    3000  0.0087   0.040    0.05    TRAP     2.0     4.0
344          RK    5200  0.0054   0.016            TRAP    10.0     1.5

345          KK    CO84
346          KM       COMBINE FLOWS ALONG FREEWAY AT ELLSWORTH
347          HC       2

348          KK    CO85
349          KM       COMBINE INFLOWS AT BASELINE AND ELLSWORTH
350          HC       2

351          KK    RO85
352          KM       ROUTE FLOWS TO ELLIOT
353          RK   10400  0.0038   0.016            TRAP    10.0     1.5

354          KK   SUB86
355          KM       RUNOFF FROM SUBBASIN 86
356          PR      10
357          PW       1
358          PT       1
359          PW       1
360          BA    1.01
361          LS           76.1
362          UK    1500   0.005   0.200     100
363          RK    4500  0.0067   0.035   0.337    TRAP     2.0     3.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

364          RK    6800  0.0044   0.016            TRAP    10.0     1.5

365          KK    RO86
366          KM       ROUTE BASIN 86 FLOW TO ELLIOT
367          RK    3400  0.0028   0.016            TRAP    10.0     1.5

368          KK    CO86
369          KM       COMBINE FLOW ON ELLSWORTH AT ELLIOT
370          HC       2

371          KK   SUB88
372          KM       RUNOFF FROM SUBBASIN 88
373          PR      10
374          PW       1
375          PT       1
376          PW       1
377          BA    1.95
378          LS             83
379          UK    1100   0.007   0.200     100
380          RK    3000  0.0083   0.040    0.04    TRAP     2.0     4.0
381          RK   11300  0.0073   0.035            TRAP    10.0     3.0

382          KK    CO88
383          KM       COMBINE FLOW AT ELLSWORTH AND ELLIOT
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384          HC      2

385          KK   SUB90
386          KM       RUNOFF FROM SUBBASIN 90
387          PR      10
388          PW       1
389          PT       1
390          PW       1
391          BA    0.31
392          LS           82.8
393          UK     500   0.015   0.200     100
394          RK    2800  0.0079   0.040    0.05    TRAP     2.0     4.0
395          RK    1800  0.0022   0.035            TRAP     5.0     1.5

396          KK    RO90
397          KM       ROUTE TO REGIONAL BASIN 13
398          RK    5500   0.001   0.016            TRAP    20.0     1.5

399          KK   SUB92
400          KM       RUNOFF FROM SUBBASIN 92
401          PR      10
402          PW       1
403          PT       1
404          PW       1
405          BA     2.0
406          LS           85.1
407          UK    1000   0.011   0.200     100
408          RK   13000   0.010   0.035    0.40    TRAP     2.0     4.0
409          RK    3000  0.0131   0.016            TRAP    10.0     1.5
1                                          HEC-1 INPUT

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


410          KK    RO92
411          KM       ROUTE FLOWS TO C.A.P.
412          RK    4500  0.0081   0.016            TRAP    10.0     1.5

413          KK   SUB94
414          KM       RUNOFF FROM SUBBASIN 94
415          PR      10
416          PW       1
417          PT       1
418          PW       1
419          BA    0.90
420          LS           84.6
421          UK    1250   0.011   0.200     100
422          RK    6200  0.0062   0.035    0.09    TRAP     2.0     4.0
423          RK    4500  0.0081   0.016            TRAP    10.0     1.5

424          KK    CO94
425          KM       COMBINE FLOWS IN MOUNTAIN ST. @ C.A.P.
426          HC      2

427          KK   SUB96
428          KM       RUNOFF FROM SUBBASIN 96
429          PR      10
430          PW       1
431          PT       1
432          PW       1
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433          BA    5.02
434          LS           84
435          UK    1250   0.013   0.200     100
436          RK    9000   0.010   0.040     0.5    TRAP     2.0     4.0
437          RK   11800   0.010   0.016            TRAP    15.0     3.0

438          KK    CO96
439          KM       COMBINE INFLOW INTO REGIONAL BASIN 12
440          HC       2

441          KK    CO97
442          KM       COMBINE FLOWS INTO REGIONAL BASIN 13 (FROM NORTH)
443          HC       2

444          KK   SUB98
445          KM       RUNOFF FROM SUBBASIN 98
446          PR      10
447          PW       1
448          PT       1
449          PW       1
450          BA    0.70
451          LS           84.6
452          UK     650  0.0175   0.200     100
453          RK    2300  0.0065   0.040   0.035    TRAP     2.0     4.0
454          RK    6600  0.0076   0.016            TRAP    10.0     1.5
1                                             HEC-1 INPUT

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


455          KK    CO98
456          KM       COMBINE INFLOWS INTO REGIONAL BASIN 13
457          HC       2

458          KK   DIV98
459          KM       DIVERT FLOWS INTO REGIONAL BASIN 13
460          DT   BAS13
461          DI       0     500    1000    2000    4000
462          DQ       0       0     500    1500    3500

463          KK    RO98
464          KM       ROUTE BASIN OUTFLOW TO SIGNAL BUTTE
465          RK    4000  0.0059   0.016            TRAP    10.0     1.5

466          KK  SUB100
467          KM       RUNOFF FROM SUBBASIN 100
468          PR      10
469          PW       1
470          PT       1
471          PW       1
472          BA    0.15
473          LS            83
474          UK     250   0.008    0.20     100
475          RK    1200  0.0086   0.040    0.05    TRAP     2.0     4.0
476          RK    4000  0.0059   0.016            TRAP    10.0     1.5

477          KK   CO100
478          KM       COMBINE FLOWS @ SIGNAL BUTTE AND FREEWAY
479          HC       2
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480          KK   RO100
481          KM        ROUTE FLOWS TO BASELINE AND SIGNAL BUTTE
482          RK    3000   0.005   0.016            TRAP    10.0     1.5

483          KK  SUB102
484          KM        RUNOFF FROM SUBBASIN 102
485          PR      10
486          PW       1
487          PT       1
488          PW       1
489          BA    0.88
490          LS              83
491          UK     350   0.010   0.200     100
492          RK    3400  0.0147   0.040    0.04    TRAP     2.0     4.0
493          RK    3900  0.0005   0.035            TRAP     5.0     3.0

494          KK   RO102
495          KM        ROUTE FLOWS TO BASELINE AND CAP
496          RK    2000   0.001   0.016            TRAP    10.0     1.5
1                                          HEC-1 INPUT

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


497          KK   RO103
498          KM        ROUTE FLOWS TO SIGNAL BUTTE AND BASELINE
499          RK    7000  0.0074   0.016            TRAP    10.0     1.5

500          KK  SUB104
501          KM        RUNOFF FROM SUBBASIN 104
502          PR      10
503          PW       1
504          PT       1
505          PW       1
506          BA    0.68
507          LS              83
508          UK    1000   0.008   0.200     100
509          RK    3200   0.012   0.040   0.046    TRAP     2.0     4.0
510          RK    7000  0.0074   0.016            TRAP    10.0     1.5

511          KK   CO104
512          KM        COMBINE FLOWS AT SIGNAL BUTTE AND BASELINE
513          HC       2

514          KK   CO105
515          KM        COMBINE FLOWS ON SIGNAL BUTTE AT BASELINE
516          HC       2

517          KK   RO105
518          KM        ROUTE FLOWS TO GUADALUPE AT SIGNAL BUTTE
519          RK    5400   0.0050  0.016            TRAP    10.0     1.5

520          KK  SUB106
521          KM        RUNOFF FROM SUBBASIN 106
522          PR      10
523          PW       1
524          PT       1
525          PW       1
526          BA    0.45
527          LS              83
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528          UK     750   0.008   0.200     100
529          RK    4100  0.0061   0.040    0.02    TRAP     2.0     4.0
530          RK    5400  0.0050   0.016            TRAP    10.0     1.5

531          KK   CO106
532          KM        COMBINE FLOWS AT GUADALUPE ROAD ON SIGNAL BUTTE
533          HC       2

534          KK  SUB108
535          KM        RUNOFF FROM SUBBASIN 108
536          PR      10
537          PW       1
538          PT       1
539          PW       1
540          BA    1.31
541          LS              83
542          UK    1500   0.008   0.200     100
543          RK    7000  0.0086   0.040    0.07    TRAP     2.0     4.0
1                                          HEC-1 INPUT

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

544          RK    5500  0.0073   0.016            TRAP    10.0     1.5

545          KK   CO108
546          KM        COMBINE FLOWS AT GUADALUPE @ SIGNAL BUTTE
547          HC       2

548          KK   RO108
549          KM        ROUTE FLOWS TO REGIONAL BASIN 15
550          RK    5000  0.0042   0.016            TRAP    10.0     1.5

551          KK  SUB110
552          KM        RUNOFF FROM SUBBASIN 110
553          PR      10
554          PW       1
555          PT       1
556          PW       1
557          BA    3.15
558          LS              83
559          UK    1500   0.009   0.200     100
560          RK    4800   0.009   0.040    0.06    TRAP     2.0     4.0
561          RK   10000  0.0045   0.035            TRAP    10.0     3.0

562          KK   CO110
563          KM        COMBINE INFLOW INTO REGIONAL BASIN 15
564          HC       2

565          KK  DIV110
566          KM        DIVERT FLOW INTO REGIONAL BASIN 15
567          DT   BAS15
568          DI       0    1080    2000    4000
569          DQ       0       0     920    2920

570          KK   RO110
571          KM        ROUTE FLOW TO REGIONAL BASIN 16
572          RK   10500  0.0051   0.016            TRAP    10.0     1.5

573          KK  SUB112
574          KM        RUNOFF FROM SUBBASIN 112
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575          PR      10
576          PW       1
577          PT       1
578          PW       1
579          BA    1.18
580          LS              83
581          UK    1500  0.0080   0.200     100
582          RK    6000  0.0067   0.035    0.07    TRAP    10.0     3.0
583          RK   10500  0.0051   0.016            TRAP    10.0     1.5

584          KK   CO112
585          KM        COMBINE FLOWS ALONG ELLIOT @ ELLSWORTH
586          HC       2
1                                          HEC-1 INPUT

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


587          KK   CO113
588          KM        COMBINE FLOWS AT REGIONAL BASIN 16
589          HC       2

590          KK  DIV113
591          KM        DIVERT FLOWS INTO REGIONAL BASIN 16
592          DT   BAS16
593          DI       0    1000    1500    2000    4000   10000
594          DQ       0       0     500    1000    3000    9000

595          KK   RO113
596          KM        ROUTE SUBBASIN 16 OUTFLOW TO SOSSAMAN ROAD
597          RK   10700  0.0056   0.016            TRAP    10.0     1.5

598          KK  SUB114
599          KM        RUNOFF FROM SUBBASIN 114
600          PR      10
601          PW       1
602          PT       1
603          PW       1
604          BA    1.45
605          LS              83
606          UK     750  0.0080   0.200     100
607          RK    6800  0.0059   0.040    0.04    TRAP     2.0     4.0
608          RK   10700  0.0056   0.016            TRAP    10.0     1.5

609          KK   CO114
610          KM        COMBINE FLOWS IN ELLIOT @ SOSSAMAN
611          HC       2

612          KK  SUB116
613          KM        RUNOFF FROM SUBBASIN 116
614          PR      10
615          PW       1
616          PT       1
617          PW       1
618          BA    0.67
619          LS              83
620          UK     750  0.0080   0.200     100
621          RK    5200  0.0069   0.040    0.03    TRAP     2.0     4.0
622          RK    5150  0.0012   0.035            TRAP    50.0     2.0
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623          KK   CO116
624          KM        COMBINE FLOWS AT ELLIOT AND SOSSAMAN ROAD
625          HC       2

626          KK   RO116
627          KM        ROUTE FLOWS TO RWCD AND REGIONAL BASIN 17
628          RK    3700  0.0054   0.016            TRAP    10.0     1.5
1                                          HEC-1 INPUT

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


629          KK   CO117
630          KM        COMBINE FLOWS IN ELLIOT CHANNEL AT RWCD
631          HC       2

632          KK  DIV117
633          KM        DIVERT FLOWS INTO REGIONAL BASIN 17
634          DT   BAS17
635          DI       0     500    1500    2500    4500
636          DQ       0       0    1000    2000    4000

637          KK  COB117
638          KM        COMBINE FLOWS IN RWCD (OUTFLOW FROM REGIONAL BASIN 17 ADDED)
639          HC       2

640          KK   RO117
641          KM        ROUTE FLOWS TO WARNER ROAD
642          RK    6030  0.0003   0.025            TRAP   150.0     3.0

643          KK  SUB118
644          KM        RUNOFF FROM SUBBASIN 118
645          PR      10
646          PW       1
647          PT       1
648          PW       1
649          BA    0.17
650          LS              83
651          UK     250   0.007   0.200     100
652          RK    1000  0.0043   0.040    0.05    TRAP     2.0     4.0
653          RK    3600  0.0003   0.025            TRAP   150.0     3.0

654          KK   CO118
655          KM        COMBINE FLOWS IN RWCD ABOVE WARNER ROAD
656          HC       2

657          KK  SUB120
658          KM        RUNOFF FROM SUBBASIN 120
659          PR      10
660          PW       1
661          PT       1
662          PW       1
663          BA    2.66
664          LS              83
665          UK    1500   0.007   0.200     100
666          RK    1500  0.0067   0.040    0.02    TRAP     2.0     4.0
667          RK    8000  0.0053   0.035            TRAP     5.0     4.0

668          KK   RO120
669          KM        ROUTE FLOWS TO SUB122
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670          RK    8700  0.0068   0.015            TRAP    10.0     1.5
1                                          HEC-1 INPUT

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


671          KK  SUB122
672          KM        RUNOFF FROM SUBBASIN 122
673          PR      10
674          PW       1
675          PT       1
676          PW       1
677          BA    0.76
678          LS              81
679          UK     750  0.0080   0.200     100
680          RK    6000  0.0083   0.040    0.03    TRAP     2.0     4.0
681          RK    8700  0.0068   0.016            TRAP    10.0     1.5

682          KK   CO122
683          KM        COMBINE FLOWS IN WARNER ROAD JUST WEST OF HAWES ROAD
684          HC       2

685          KK   RO122
686          KM        ROUTE WARNER ROAD FLOWS TO SOSSAMAN ROAD
687          RK    2500  0.0040   0.016            TRAP    10.0     1.5

688          KK  SUB124
689          KM        RUNOFF FROM SUBBASIN 124
690          PR      10
691          PW       1
692          PT       1
693          PW       1
694          BA    1.24
695          LS              82
696          UK     850   0.006   0.200     100
697          RK    3250  0.0062   0.040    0.06    TRAP     2.0     4.0
698          RK    6400   0.005   0.035            TRAP    10.0     3.0

699          KK   CO124
700          KM        COMBINE FLOWS AT WARNER AND SOSSAMAN ROAD
701          HC       2

702          KK   RO124
703          KM        ROUTE FLOWS TO RWCD AND REGIONAL BASIN 18
704          RK    3600  0.0036   0.016            TRAP    10.0     1.5

705          KK  SUB126
706          KM        RUNOFF FROM SUBBASIN 126
707          PR      10
708          PW       1
709          PT       1
710          PW       1
711          BA    0.60
712          LS              75
713          UK     250   0.007   0.200     100
714          RK    3500  0.0043   0.040    0.45    TRAP     2.0     4.0
715          RK    6030  0.0003   0.025            TRAP   150.0     3.0
1                                          HEC-1 INPUT

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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716          KK   CO126
717          KM        COMBINE FLOWS AT RWCD @ WARNER RD (INFLOW TO REGIONAL BASIN 18)
718          HC       2

719          KK  DIV126
720          KM        DIVERT FLOWS INTO REGIONAL BASIN 18
721          DT   BAS18
722          DI       0     175    1175    4175    8175   10175
723          DQ       0       0    1000    4000    8000   10000

724          KK   CO127
725          KM        COMBINE FLOWS IN RWCD AT WARNER ROAD
726          HC       2

727          KK   RO128
728          KM        ROUTE FLOW SOUTH TO SUBBASIN 128
729          RK    2200  0.0003   0.025           TRAP     170     3.0

730          KK  SUB128
731          KM        RUNOFF FROM SUBBASIN 128
732          PR      10
733          PW       1
734          PT       1
735          PW       1
736          BA    1.55
737          LS             83
738          UK    1100  0.0060   0.200     100
739          RK    2000  0.0050   0.040    0.05    TRAP     2.0     4.0
740          RK   15000  0.0043   0.035           TRAP    10.0     4.0

741          KK   CO128
742          KM        COMBINE FLOWS 2200' SOUTH OF WARNER ROAD
743          HC       2

744          KK   RO128
745          KM        ROUTE FLOWS TO RAY ROAD AND REGIONAL BASIN 19
746          RK    3600  0.0003   0.025           TRAP   170.0     3.0

747          KK  SUB130
748          KM        RUNOFF FROM SUBBASIN 130
749          PR      10
750          PW       1
751          PT       1
752          PW       1
753          BA    1.35
754          LS             83
755          UK     250  0.0040   0.200     100
756          RK   14000  0.0045   0.040    0.20    TRAP     2.0     4.0
757          RK    3600  0.0030   0.025           TRAP   170.0     3.0
1                                          HEC-1 INPUT

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


758          KK   CO130
759          KM        COMBINE FLOWS IN RWCD AT RAY ROAD
760          HC       2
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761        KK  DIV130
762        KM        DIVERT FLOWS INTO REGIONAL BASIN 19
763        DT   BAS19
764        DI       0    5890    6000    6890    8890   10890   15890
765        DQ       0       0     110    1000    3000    5000   10000
766        ZZ
```

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	SUB02	1004.	12.50	226.	72.	58.	1.32		
+	DIVERSION TO	D2	201.	12.50	45.	14.	12.	1.32		
+	HYDROGRAPH AT	DIV02	803.	12.50	181.	57.	46.	1.32		
+	ROUTED TO	RET02	556.	12.75	155.	50.	41.	1.32		
+									4.39	12.75
+	HYDROGRAPH AT	RED2	201.	12.50	45.	14.	12.	0.00		
+	2 COMBINED AT	CD02	701.	12.75	198.	65.	52.	1.32		
+	DIVERSION TO	DRECK	581.	12.25	95.	24.	19.	1.32		
+	HYDROGRAPH AT	DIVREC	120.	12.25	103.	41.	33.	1.32		
+	ROUTED TO	ROPFBR	120.	12.50	103.	41.	33.	1.32		
+	HYDROGRAPH AT	SUB04	816.	12.50	156.	49.	39.	0.95		
+	ROUTED TO	RET04	345.	13.00	107.	36.	29.	0.95		
+									2.69	13.00
+	2 COMBINED AT	CD04	465.	13.00	209.	77.	62.	2.27		
+	DIVERSION TO	DH	330.	12.75	80.	20.	16.	2.27		
+	HYDROGRAPH AT	DIVHIG	135.	12.75	129.	57.	46.	2.27		
+	ROUTED TO	RO48BR	135.	13.00	128.	57.	46.	2.27		
+	HYDROGRAPH AT	REDH	330.	13.00	80.	20.	16.	0.00		
+	DIVERSION TO	DHIG	214.	13.00	52.	13.	10.	0.00		

	HYDROGRAPH AT								
+		DIHIG	115.	13.00	28.	7.	6.	0.00	
	ROUTED TO								
+		ROSFBR	114.	13.00	28.	7.	6.	0.00	
	HYDROGRAPH AT								
+		SUB06	315.	12.25	72.	23.	18.	0.44	
	3 COMBINED AT								
+		BROWN	391.	12.50	223.	86.	70.	2.71	
	ROUTED TO								
+		ROBR	379.	12.75	216.	85.	69.	2.71	
	HYDROGRAPH AT								
+		SUB08	342.	12.25	61.	19.	15.	0.35	
	DIVERSION TO								
+		D08	79.	12.25	14.	4.	3.	0.35	
	HYDROGRAPH AT								
+		DIV08	263.	12.25	47.	14.	12.	0.35	
	ROUTED TO								
+		RET08	10.	18.50	9.	3.	3.	0.35	
+									2.65 18.50
	HYDROGRAPH AT								
+		RED08	79.	12.25	14.	4.	3.	0.00	
	2 COMBINED AT								
+		CO08	79.	12.25	16.	8.	6.	0.35	
	2 COMBINED AT								
+		ADOBE	412.	12.75	229.	93.	75.	3.06	
	ROUTED TO								
+		ROADOB	358.	13.25	232.	94.	76.	3.06	
	HYDROGRAPH AT								
+		SUB10	622.	12.50	152.	49.	39.	0.98	
	DIVERSION TO								
+		D10	397.	12.25	39.	10.	8.	0.98	
	HYDROGRAPH AT								
+		DIV10	225.	12.25	114.	39.	32.	0.98	
	ROUTED TO								
+		ROB01	225.	12.50	114.	39.	32.	0.98	
	HYDROGRAPH AT								
+		SUB12	465.	12.50	112.	36.	29.	0.72	
	2 COMBINED AT								
+		CO12	690.	12.50	226.	75.	60.	1.70	
	HYDROGRAPH AT								

+		SUB14	278.	12.50	85.	27.	22.	0.52	
	DIVERSION TO								
+		D14	167.	12.50	51.	16.	13.	0.52	
	HYDROGRAPH AT								
+		DIV14	111.	12.50	34.	11.	9.	0.52	
	ROUTED TO								
+		RET14	36.	14.00	20.	7.	6.	0.52	
+									3.05 14.00
	HYDROGRAPH AT								
+		RED14	167.	12.50	51.	16.	13.	0.00	
	2 COMBINED AT								
+		CO14	167.	12.50	70.	24.	19.	0.52	
	ROUTED TO								
+		RO14	165.	12.75	68.	23.	19.	0.52	
	HYDROGRAPH AT								
+		SUB16	598.	12.75	193.	62.	50.	1.22	
	DIVERSION TO								
+		D16	496.	12.75	160.	52.	42.	1.22	
	HYDROGRAPH AT								
+		DIV16	102.	12.75	33.	11.	9.	1.22	
	ROUTED TO								
+		RET16	17.	15.50	12.	5.	4.	1.22	
+									2.59 15.50
	HYDROGRAPH AT								
+		RED16	496.	12.75	160.	52.	42.	0.00	
	2 COMBINED AT								
+		CO16	496.	12.75	168.	56.	45.	1.22	
	2 COMBINED AT								
+		CON17	661.	12.75	236.	80.	64.	1.74	
	2 COMBINED AT								
+		CDT17	1307.	12.50	462.	155.	125.	3.44	
	DIVERSION TO								
+		D17	807.	12.25	122.	31.	25.	3.44	
	HYDROGRAPH AT								
+		DIV17	500.	12.25	339.	124.	100.	3.44	
	ROUTED TO								
+		ROB02	500.	13.00	335.	123.	99.	3.44	
	HYDROGRAPH AT								
+		REDREC	581.	12.75	95.	24.	19.	0.00	
	ROUTED TO								
+		RORECK	513.	13.00	95.	24.	19.	0.00	

+	ROUTED TO	ROREEE	498.	13.00	96.	24.	19.	0.00	
+	HYDROGRAPH AT	SUB18	693.	12.50	181.	58.	47.	1.07	
+	3 COMBINED AT	CORECK	1287.	13.00	608.	205.	166.	4.51	
+	ROUTED TO	RD18EE	1285.	13.00	609.	206.	166.	4.51	
+	HYDROGRAPH AT	SUB20	916.	12.25	148.	46.	37.	0.77	
+	DIVERSION TO	D20	183.	12.25	30.	9.	7.	0.77	
+	HYDROGRAPH AT	DIV20	733.	12.25	119.	37.	30.	0.77	
+	ROUTED TO	RET20	38.	15.75	29.	12.	10.	0.77	
+									2.64 15.75
+	HYDROGRAPH AT	RED20	183.	12.25	30.	9.	7.	0.00	
+	2 COMBINED AT	CO20	186.	12.25	50.	21.	17.	0.77	
+	HYDROGRAPH AT	REDHIG	214.	13.00	52.	13.	10.	0.00	
+	ROUTED TO	ROHIG	213.	13.00	53.	13.	11.	0.00	
+	ROUTED TO	RODHEE	193.	13.00	54.	14.	11.	0.00	
+	3 COMBINED AT	CO21EE	1519.	13.00	713.	241.	194.	5.28	
+	2 COMBINED AT	ELEC	1866.	13.00	933.	335.	270.	8.34	
+	ROUTED TO	ROELEC	1830.	13.00	933.	335.	270.	8.34	
+	HYDROGRAPH AT	SUB22	386.	12.25	69.	21.	17.	0.38	
+	2 COMBINED AT	UNIV	1928.	13.00	995.	356.	287.	8.72	
+	ROUTED TO	ROUNIV	1908.	13.25	976.	352.	284.	8.72	
	HYDROGRAPH AT								

+		SUB24	442.	12.25	83.	26.	21.	0.45	
	2 COMBINED AT								
+		US60	1994.	13.25	1040.	378.	305.	9.17	
	ROUTED TO								
+		ROUS60	1958.	13.50	1040.	377.	304.	9.17	
	HYDROGRAPH AT								
+		SUB26	1754.	12.25	326.	101.	81.	1.80	
	ROUTED TO								
+		RO26	1642.	12.25	327.	101.	82.	1.80	
	HYDROGRAPH AT								
+		SUB28	373.	12.25	61.	19.	15.	0.33	
	DIVERSION TO								
+		D28	336.	12.25	55.	17.	14.	0.33	
	HYDROGRAPH AT								
+		DIV28	37.	12.25	6.	2.	2.	0.33	
	ROUTED TO								
+		RET28	3.	14.75	2.	1.	1.	0.33	
+									2.63 14.75
	HYDROGRAPH AT								
+		RED28	336.	12.25	55.	17.	14.	0.00	
	2 COMBINED AT								
+		CO28	336.	12.25	56.	18.	14.	0.33	
	2 COMBINED AT								
+		CO29	1978.	12.25	383.	119.	96.	2.13	
	2 COMBINED AT								
+		BROAD	2499.	12.50	1391.	496.	400.	11.30	
	ROUTED TO								
+		RBROAD	2519.	12.75	1394.	499.	403.	11.30	
	HYDROGRAPH AT								
+		SUB30	565.	13.00	237.	80.	65.	1.56	
	ROUTED TO								
+		RET30	258.	14.50	133.	49.	40.	1.56	
+									3.07 14.50
	2 COMBINED AT								
+		CO34	2519.	12.75	1510.	548.	442.	12.86	
	HYDROGRAPH AT								
+		SUB32	1533.	12.50	295.	93.	75.	1.62	
	DIVERSION TO								
+		D32	1073.	12.50	206.	65.	52.	1.62	
	HYDROGRAPH AT								
+		DIV32	460.	12.50	88.	28.	22.	1.62	

+	ROUTED TO	RET32	48.	14.75	31.	12.	10.	1.62	
+									2.77 14.75
+	HYDROGRAPH AT	RE32	1073.	12.50	206.	65.	52.	0.00	
+	2 COMBINED AT	C032	1073.	12.50	231.	77.	62.	1.62	
+	DIVERSION TO	BAS03	773.	12.25	67.	17.	13.	1.62	
+	HYDROGRAPH AT	DIV33	300.	12.25	164.	60.	49.	1.62	
+	ROUTED TO	R033	300.	13.00	162.	60.	48.	1.62	
+	HYDROGRAPH AT	SUB34	1976.	12.50	388.	121.	97.	2.30	
+	DIVERSION TO	D34	1383.	12.50	272.	85.	68.	2.30	
+	HYDROGRAPH AT	DIV34	593.	12.50	117.	36.	29.	2.30	
+	ROUTED TO	RET34	49.	15.25	36.	14.	12.	2.30	
+									2.77 15.25
+	HYDROGRAPH AT	RE34	1383.	12.50	272.	85.	68.	0.00	
+	2 COMBINED AT	C034	1383.	12.50	298.	99.	80.	2.30	
+	2 COMBINED AT	C035	1654.	12.50	458.	159.	128.	3.92	
+	2 COMBINED AT	COFREE	3664.	12.75	1935.	707.	571.	16.78	
+	ROUTED TO	ROFREE	3496.	13.00	1947.	709.	572.	16.78	
+	HYDROGRAPH AT	SUB36	306.	13.25	138.	47.	38.	1.12	
+	2 COMBINED AT	COBASE	3796.	13.00	2084.	755.	609.	17.90	
+	ROUTED TO	ROBASE	3597.	13.25	2036.	745.	601.	17.90	
+	HYDROGRAPH AT	SUB38	50.	13.00	29.	10.	8.	0.29	

	2 COMBINED AT								
+		CO38	3645.	13.25	2062.	755.	609.	18.19	
	HYDROGRAPH AT								
+		SUB40	714.	12.50	196.	64.	51.	1.21	
	ROUTED TO								
+		RO40	652.	12.75	196.	64.	51.	1.21	
	HYDROGRAPH AT								
+		SUB42	201.	14.25	128.	47.	38.	0.97	
	2 COMBINED AT								
+		CO42	704.	12.75	317.	111.	90.	2.18	
	HYDROGRAPH AT								
+		SUB44	367.	12.25	60.	18.	15.	0.31	
	ROUTED TO								
+		RO44	314.	12.25	60.	19.	15.	0.31	
	2 COMBINED AT								
+		CO44	868.	12.50	375.	130.	105.	2.49	
	ROUTED TO								
+		RO45	867.	12.75	374.	130.	105.	2.49	
	HYDROGRAPH AT								
+		SUB46	348.	12.25	60.	19.	15.	0.31	
	2 COMBINED AT								
+		CO46	1059.	12.50	431.	148.	120.	2.80	
	HYDROGRAPH AT								
+		SUB48	414.	12.25	77.	24.	19.	0.42	
	ROUTED TO								
+		RET48	90.	13.25	43.	15.	12.	0.42	
+									3.18 13.25
	ROUTED TO								
+		RO48	89.	13.25	43.	15.	12.	0.42	
	2 COMBINED AT								
+		COSOSS	1059.	12.50	472.	163.	132.	3.22	
	ROUTED TO								
+		ROSOSS	1038.	12.75	476.	164.	132.	3.22	
	HYDROGRAPH AT								
+		SUB50	288.	13.00	131.	44.	36.	1.00	
	2 COMBINED AT								
+		CO50	1284.	12.75	606.	208.	168.	4.22	
	ROUTED TO								
+		RO50	1256.	13.00	605.	208.	168.	4.22	
	HYDROGRAPH AT								
+		SUB52	329.	14.00	217.	80.	64.	1.82	

	DIVERSION TO								
+		D52	263.	14.00	173.	64.	51.	1.82	
	HYDROGRAPH AT								
+		DIV52	66.	14.00	43.	16.	13.	1.82	
	ROUTED TO								
+		RET52	6.	27.00	5.	1.	1.	1.82	
+									2.64 27.00
	HYDROGRAPH AT								
+		RE52	263.	14.00	173.	64.	51.	0.00	
	2 COMBINED AT								
+		CO52	263.	14.00	173.	65.	52.	1.82	
	2 COMBINED AT								
+		CO53	1450.	13.00	774.	273.	221.	6.04	
	DIVERSION TO								
+		BAS04	450.	12.50	72.	18.	15.	6.04	
	HYDROGRAPH AT								
+		DIVSDS	1000.	12.50	702.	255.	206.	6.04	
	ROUTED TO								
+		ROGUAD	1000.	12.75	703.	255.	206.	6.04	
	HYDROGRAPH AT								
+		SUB54	128.	14.50	91.	35.	28.	1.04	
	2 COMBINED AT								
+		CO54	1123.	14.25	792.	290.	234.	7.08	
	2 COMBINED AT								
+		COGUAL	4739.	13.25	2825.	1046.	844.	25.27	
	ROUTED TO								
+		ROGUAL	4608.	13.50	2787.	1032.	832.	25.27	

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

SELECTED ALTERNATIVE - PART 2 OUTPUT

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	ROGUAL	4608.	13.50	2787.	1032.	832.	25.27		
+	HYDROGRAPH AT	SUB56	113.	14.00	69.	26.	21.	0.75		
+	HYDROGRAPH AT	SUB58	493.	12.50	117.	37.	30.	0.71		
+	ROUTED TO	RO58	432.	12.75	120.	38.	31.	0.71		
+	HYDROGRAPH AT	SUB60	315.	12.50	69.	22.	18.	0.42		
+	ROUTED TO	RO60	311.	12.50	69.	22.	18.	0.42		
+	HYDROGRAPH AT	SUB62	357.	12.25	61.	19.	15.	0.33		
+	2 COMBINED AT	CO62	608.	12.25	131.	41.	33.	0.75		
+	HYDROGRAPH AT	SUB64	248.	12.50	54.	17.	14.	0.33		
+	ROUTED TO	RO64	245.	12.50	55.	17.	14.	0.33		
+	3 COMBINED AT	CO64	1246.	12.50	304.	96.	77.	1.79		
+	DIVERSION TO	BAS06	881.	12.25	104.	26.	21.	1.79		
+	HYDROGRAPH AT	DIV64	365.	12.25	200.	70.	56.	1.79		
+	ROUTED TO	RO65	365.	12.75	199.	70.	56.	1.79		
+	HYDROGRAPH AT	SUB66	1035.	12.25	180.	56.	45.	0.92		
+	2 COMBINED AT	CO66	1377.	12.25	378.	125.	101.	2.71		
+	ROUTED TO	RO66	1219.	12.50	377.	125.	101.	2.71		
	HYDROGRAPH AT									

+	SUB68	617.	13.00	250.	83.	67.	1.53
2 COMBINED AT							
+	CO68	1632.	12.50	624.	208.	168.	4.24
HYDROGRAPH AT							
+	SUB70	625.	12.75	247.	82.	66.	1.65
HYDROGRAPH AT							
+	SUB72A	269.	12.75	101.	33.	27.	0.66
2 COMBINED AT							
+	CO72A	893.	12.75	349.	115.	93.	2.31
DIVERSION TO							
+	BAS07	643.	12.25	143.	36.	29.	2.31
HYDROGRAPH AT							
+	DIV72	250.	12.25	206.	80.	64.	2.31
ROUTED TO							
+	RO07	250.	12.50	205.	79.	64.	2.31
HYDROGRAPH AT							
+	SUB72B	177.	12.75	66.	22.	17.	0.43
2 COMBINED AT							
+	CO72B	427.	12.75	271.	101.	82.	2.74
HYDROGRAPH AT							
+	SUB72C	182.	12.75	69.	22.	18.	0.44
2 COMBINED AT							
+	CO72C	609.	12.75	339.	123.	100.	3.18
DIVERSION TO							
+	BAS07A	174.	12.50	25.	6.	5.	3.18
HYDROGRAPH AT							
+	DIV73	435.	12.50	314.	117.	95.	3.18
HYDROGRAPH AT							
+	SUB72D	67.	12.75	25.	8.	7.	0.16
2 COMBINED AT							
+	CO72D	502.	12.75	339.	125.	101.	3.34
ROUTED TO							
+	RO72	501.	12.75	338.	125.	101.	3.34
HYDROGRAPH AT							
+	SUB74	476.	12.50	142.	45.	37.	0.82
ROUTED TO							
+	RO74	469.	12.75	143.	45.	37.	0.82
HYDROGRAPH AT							
+	SUB76	728.	12.50	140.	44.	36.	0.84
2 COMBINED AT							

+	CD 76	1177.	12.50	282.	90.	73.	1.66
HYDROGRAPH AT +	SUB76A	157.	12.50	37.	12.	9.	0.20
2 COMBINED AT +	CD76A	1334.	12.50	319.	102.	82.	1.86
ROUTED TO +	RD76	1275.	12.50	320.	102.	82.	1.86
2 COMBINED AT +	CD77	1755.	12.50	658.	227.	183.	5.20
DIVERSION TO +	BAS09	1135.	12.25	174.	44.	35.	5.20
HYDROGRAPH AT +	DIV77	620.	12.25	484.	184.	148.	5.20
ROUTED TO +	RD77	620.	12.50	481.	183.	148.	5.20
HYDROGRAPH AT +	SUB78	243.	12.75	97.	32.	26.	0.63
2 COMBINED AT +	CD78	863.	12.75	578.	215.	173.	5.83
HYDROGRAPH AT +	SUB80	343.	13.00	148.	50.	40.	1.00
2 COMBINED AT +	CD80	1198.	13.00	725.	265.	213.	6.83
ROUTED TO +	RD80	1188.	13.00	723.	264.	213.	6.83
2 COMBINED AT +	CD81	2573.	12.50	1345.	472.	381.	11.07
DIVERSION TO +	BAS10	2323.	12.00	1095.	309.	249.	11.07
HYDROGRAPH AT +	DIV81	250.	12.00	250.	163.	132.	11.07
ROUTED TO +	RD81	250.	12.25	250.	163.	132.	11.07
HYDROGRAPH AT +	SUB82	300.	12.50	89.	29.	23.	0.56
ROUTED TO +	RD82	280.	12.75	89.	29.	23.	0.56
HYDROGRAPH AT +	SUB84	446.	12.50	122.	39.	31.	0.76
2 COMBINED AT							

+	CO84	708.	12.50	211.	67.	54.	1.32
2 COMBINED AT							
+	CO85	958.	12.50	460.	231.	186.	12.39
ROUTED TO							
+	RO85	918.	12.75	455.	229.	185.	12.39
HYDROGRAPH AT							
+	SUB86	148.	14.25	100.	37.	30.	1.01
ROUTED TO							
+	RO86	148.	14.25	100.	37.	30.	1.01
2 COMBINED AT							
+	CO86	1011.	12.75	554.	266.	215.	13.40
HYDROGRAPH AT							
+	SUB88	642.	13.00	292.	97.	78.	1.95
2 COMBINED AT							
+	CO88	1599.	12.75	845.	363.	293.	15.35
HYDROGRAPH AT							
+	SUB90	203.	12.50	50.	16.	13.	0.31
ROUTED TO							
+	RO90	203.	12.75	50.	16.	13.	0.31
HYDROGRAPH AT							
+	SUB92	872.	12.75	327.	107.	87.	2.00
ROUTED TO							
+	RO92	841.	13.00	326.	107.	87.	2.00
HYDROGRAPH AT							
+	SUB94	365.	13.00	145.	48.	39.	0.90
2 COMBINED AT							
+	CO94	1206.	13.00	472.	155.	125.	2.90
HYDROGRAPH AT							
+	SUB96	2071.	13.00	806.	264.	213.	5.02
2 COMBINED AT							
+	CO96	3277.	13.00	1277.	419.	338.	7.92
2 COMBINED AT							
+	CO97	3405.	13.00	1327.	435.	351.	8.23
HYDROGRAPH AT							
+	SUB98	460.	12.50	120.	38.	31.	0.70
2 COMBINED AT							
+	CO98	3726.	12.75	1446.	473.	382.	8.93
DIVERSION TO							
+	BAS13	3226.	12.25	952.	238.	192.	8.93
HYDROGRAPH AT							

+		DIV98	500.	12.25	496.	235.	190.	8.93
	ROUTED TO							
+		RO98	500.	12.50	496.	235.	189.	8.93
	HYDROGRAPH AT							
+		SUB100	122.	12.50	25.	8.	6.	0.15
	2 COMBINED AT							
+		CO100	622.	12.50	517.	242.	196.	9.08
	ROUTED TO							
+		RO100	611.	12.50	516.	242.	195.	9.08
	HYDROGRAPH AT							
+		SUB102	645.	12.50	142.	45.	36.	0.88
	ROUTED TO							
+		RO102	586.	12.50	142.	45.	36.	0.88
	ROUTED TO							
+		RO103	554.	12.75	142.	45.	36.	0.88
	HYDROGRAPH AT							
+		SUB104	257.	13.00	105.	35.	28.	0.68
	2 COMBINED AT							
+		CO104	804.	12.75	247.	79.	64.	1.56
	2 COMBINED AT							
+		CO105	1372.	12.75	759.	322.	260.	10.64
	ROUTED TO							
+		RO105	1347.	12.75	759.	321.	259.	10.64
	HYDROGRAPH AT							
+		SUB106	187.	12.75	68.	22.	18.	0.45
	2 COMBINED AT							
+		CO106	1534.	12.75	827.	343.	277.	11.09
	HYDROGRAPH AT							
+		SUB108	354.	13.50	185.	64.	52.	1.31
	2 COMBINED AT							
+		CO108	1788.	12.75	1011.	407.	329.	12.40
	ROUTED TO							
+		RO108	1779.	13.00	1009.	407.	328.	12.40
	HYDROGRAPH AT							
+		SUB110	935.	13.25	461.	155.	125.	3.15
	2 COMBINED AT							
+		CO110	2658.	13.00	1470.	562.	453.	15.55
	DIVERSION TO							
+		BAS15	1578.	12.50	450.	113.	91.	15.55
	HYDROGRAPH AT							

+	DIV110	1080.	12.50	1019.	449.	362.	15.55
ROUTED TO							
+	RO110	1080.	13.25	1017.	447.	361.	15.55
HYDROGRAPH AT							
+	SUB112	321.	13.50	166.	57.	46.	1.18
2 COMBINED AT							
+	CO112	1401.	13.50	1182.	504.	407.	16.73
2 COMBINED AT							
+	CO113	2932.	13.00	2019.	868.	700.	32.08
DIVERSION TO							
+	BAS16	1932.	12.50	1020.	271.	219.	32.08
HYDROGRAPH AT							
+	DIV113	1000.	12.50	1000.	597.	481.	32.08
ROUTED TO							
+	RO113	1000.	13.25	1000.	594.	479.	32.08
HYDROGRAPH AT							
+	SUB114	525.	13.00	214.	71.	58.	1.45
2 COMBINED AT							
+	CO114	1525.	13.00	1208.	665.	537.	33.53
HYDROGRAPH AT							
+	SUB116	271.	13.00	96.	32.	26.	0.67
2 COMBINED AT							
+	CO116	1795.	13.00	1303.	697.	563.	34.20
ROUTED TO							
+	RO116	1774.	13.00	1302.	697.	562.	34.20
2 COMBINED AT							
+	CO117	1845.	13.00	1372.	722.	583.	34.95
DIVERSION TO							
+	BAS17	1345.	12.50	872.	373.	301.	34.95
HYDROGRAPH AT							
+	DIV117	500.	12.50	500.	350.	282.	34.95
2 COMBINED AT							
+	COB117	5108.	13.50	3287.	1381.	1114.	60.22
ROUTED TO							
+	RO117	5003.	13.75	3254.	1359.	1097.	60.22
HYDROGRAPH AT							
+	SUB118	66.	12.75	25.	8.	7.	0.17
2 COMBINED AT							
+	CO118	5038.	13.75	3271.	1368.	1103.	60.39
HYDROGRAPH AT							

+		SUB120	714.	13.25	389.	133.	108.	2.66
+	ROUTED TO	RO120	713.	13.50	387.	133.	107.	2.66
+	HYDROGRAPH AT	SUB122	256.	13.00	103.	35.	28.	0.76
+	2 COMBINED AT	CO122	937.	13.25	490.	167.	135.	3.42
+	ROUTED TO	RO122	933.	13.25	490.	167.	135.	3.42
+	HYDROGRAPH AT	SUB124	442.	13.00	182.	60.	48.	1.24
+	2 COMBINED AT	CO124	1345.	13.25	671.	227.	183.	4.66
+	ROUTED TO	RO124	1343.	13.25	671.	228.	184.	4.66
+	HYDROGRAPH AT	SUB126	105.	13.25	57.	21.	17.	0.60
+	2 COMBINED AT	CO126	1448.	13.25	728.	248.	200.	5.26
+	DIVERSION TO	BAS18	1273.	12.25	553.	145.	117.	5.26
+	HYDROGRAPH AT	DIV126	175.	12.25	175.	104.	84.	5.26
+	2 COMBINED AT	CO127	5213.	13.75	3446.	1471.	1187.	65.65
+	ROUTED TO	RO128	5101.	14.00	3434.	1462.	1180.	65.65
+	HYDROGRAPH AT	SUB128	438.	13.25	219.	75.	61.	1.55
+	2 COMBINED AT	CO128	5484.	13.75	3620.	1538.	1241.	67.20
+	ROUTED TO	RO128	5475.	14.00	3597.	1524.	1229.	67.20
+	HYDROGRAPH AT	SUB130	462.	13.00	199.	66.	53.	1.35
+	2 COMBINED AT	CO130	5756.	14.00	3742.	1590.	1283.	68.55
+	DIVERSION TO	BAS19	0.	14.00	0.	0.	0.	68.55
	HYDROGRAPH AT							

+	DIV130	5756.	14.00	3742.	1590.	1283.	68.55

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

APPENDIX G

COST SUMMARY BY ZONE

APPENDIX G
COST ESTIMATE SUMMARY BY ZONE (cont'd)

ZONE	LAND ACQUISITION ($45,000/Ac)		CONSTRUCTION		
	CHANNEL	BASINS	CHANNEL	BASINS	TOTAL
4	$ 1,370,000	$ 480,000	Excavation ($2.00/C.Y.) $ 270,000 Culvert ($200/C.Y.) $ 140,000 Channel Lining ($1.60/C.Y.) $ 1,590,000	Excavation ($1.50/C.Y.) $ 130,000 Weir Lining ($160/C.Y.) $ 20,000 Outlet Structure ($20,000 ea) $ 20,000	
TOTAL	$ 1,370,000	$ 480,000	$ 2,010,000	$ 170,000	$ 4,030,000
5	- 0 -	$ 380,000	- 0 -	Excavation ($1.50/C.Y.) $ 160,000 Weir Lining ($160/C.Y.) $ 40,000 Outlet Structure ($20,000 ea) $ 20,000	
TOTAL	$ - 0 -	$ 380,000	$ - 0 -	$ 220,000	$ 600,000
6	$ - 0 -	- 0 -	$ - 0 -	$ - 0 -	$ - 0 -
TOTAL	$ - 0 -	$ - 0 -	$ - 0 -	$ - 0 -	$ - 0 -
7	$ 2,300,000	$ 780,000	Excavation ($2.00/C.Y.) $ 570,000 Culverts ($200/C.Y.) $ 290,000 Channel Lining ($160/C.Y.) $ 3,360,000	Excavation ($1.50/C.Y.) $ 290,000 Weir Lining ($160/C.Y.) $ 90,000 Outlet Structure ($20,000 ea) $ 20,000	
TOTAL	$ 2,300,000	$ 780,000	$ 4,220,000	$ 400,000	$ 7,700,000
GRAND TOTAL	$15,400,000	$18,520,000	$32,880,000	$11,220,000	$78,020,000

APPENDIX G

COST ESTIMATE SUMMARY BY ZONE

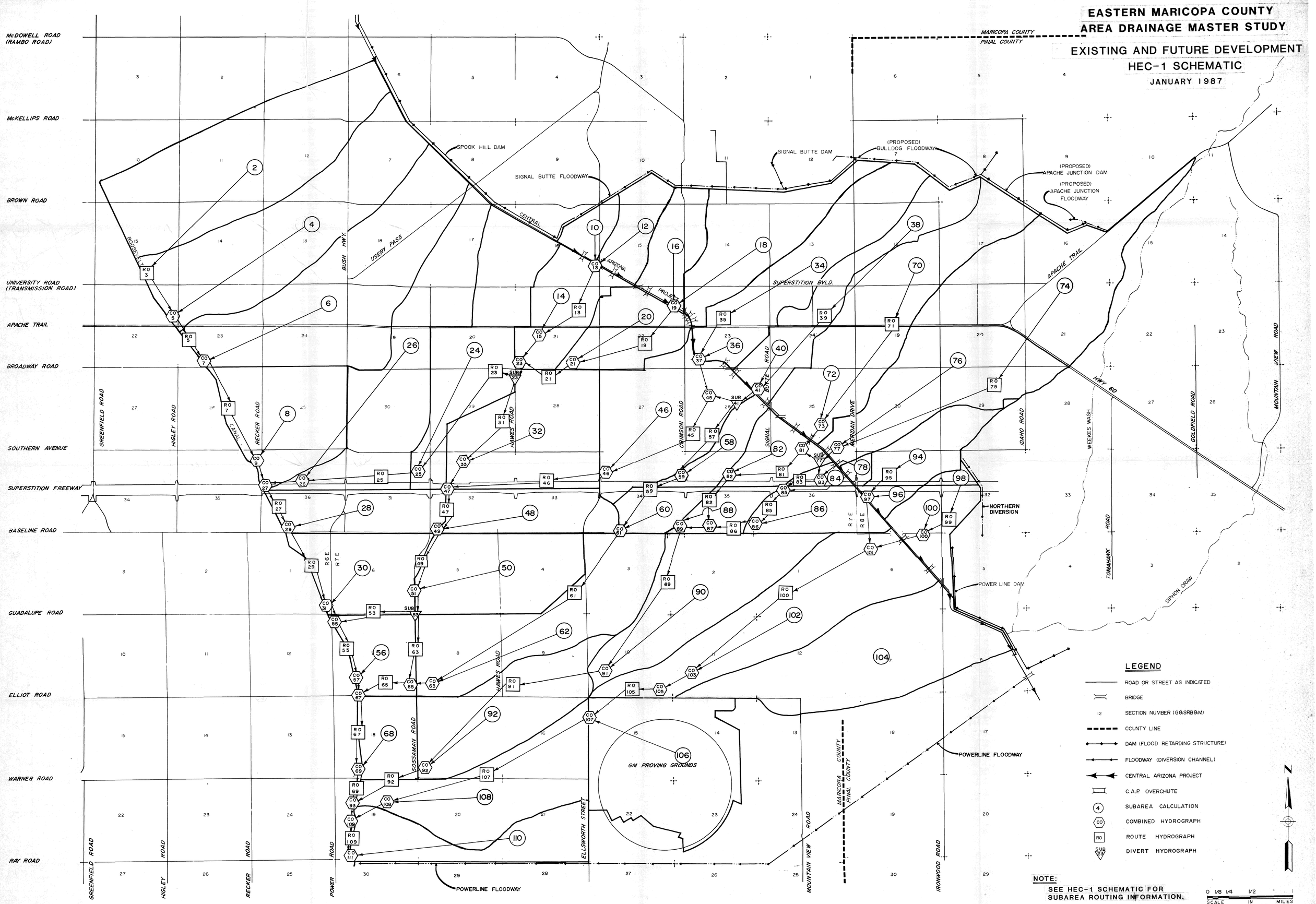
ZONE	LAND ACQUISITION ($45,000/Ac)		CONSTRUCTION		TOTAL
	CHANNEL	BASINS	CHANNEL	BASINS	
1	$ 1,260,000	$ 2,030,000	Excavation ($2.00/C.Y.) $ 290,000 Culverts ($200/C.Y.) $ 64,000 Channel Lining ($160/C.Y.) $ 1,810,000	Excavation ($1.50/C.Y.) $ 880,000 Weir Lining ($160/C.Y.) $ 100,000 Outlet Structure ($20,000/ea) $ 20,000	
TOTAL	$ 1,260,000	$ 2,030,000	$ 2,160,000	$ 1,000,000	$ 6,450,000
2	$ 6,795,000	$10,800,000	Excavation ($2.00/C.Y.) $ 1,880,000 Culverts ($200/C.Y.) $ 840,000 Channel Lining ($160/C.Y.) $11,060,000	Excavation ($1.50/C.Y.) $ 5,880,000 Weir Lining ($160/C.Y.) $ 1,100,000 Outlet Structure ($20,000 ea) $ 200,000	
TOTAL	$ 6,795,000	$10,800,000	$13,780,000	$ 7,180,000	$38,560,000
3	$ 3,670,000	$ 4,050,000	Excavation ($2.00/C.Y.) $ 1,500,000 Culverts ($200/C.Y.) $ 540,000 Channel Lining ($160/C.Y.) $ 8,600,000	Excavation($1.50/C.Y.) $ 2,060,000 Weir Lining ($160/C.Y.) $ 170,000 Outlet Structure ($20,000 ea) $ 20,000	
TOTAL	$ 3,670,000	$ 4,050,000	$10,710,000	$ 2,250,000	$20,680,000

EXHIBIT 1

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

EXISTING AND FUTURE DEVELOPMENT HEC-1 SCHEMATIC

JANUARY 1987



NOTE:
SEE HEC-1 SCHEMATIC FOR SUBAREA ROUTING INFORMATION.

AN WEST INC. Consulting Engineers

EXHIBIT 2

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

EXISTING CONDITION LAND USE MAP

JANUARY 1987

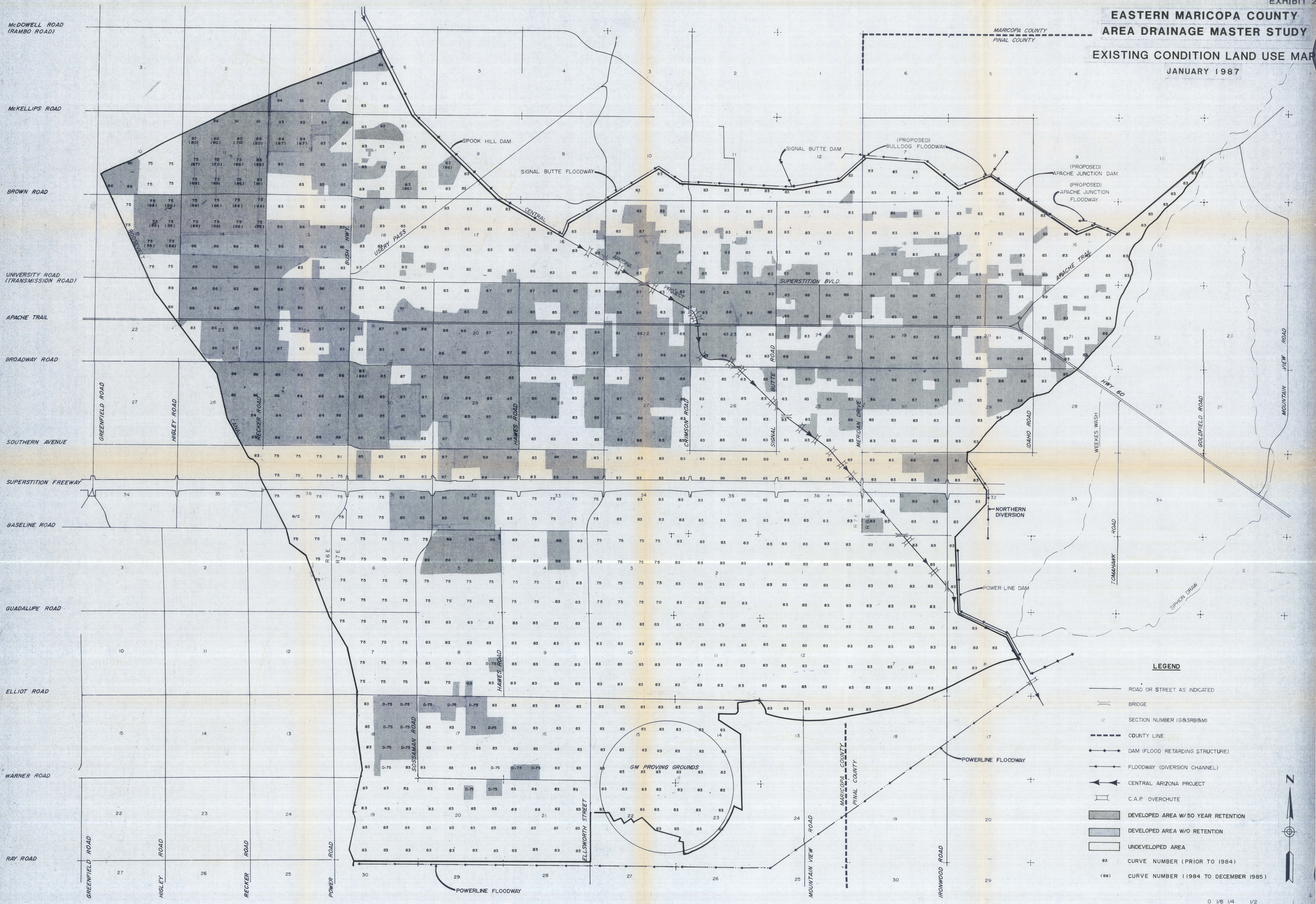
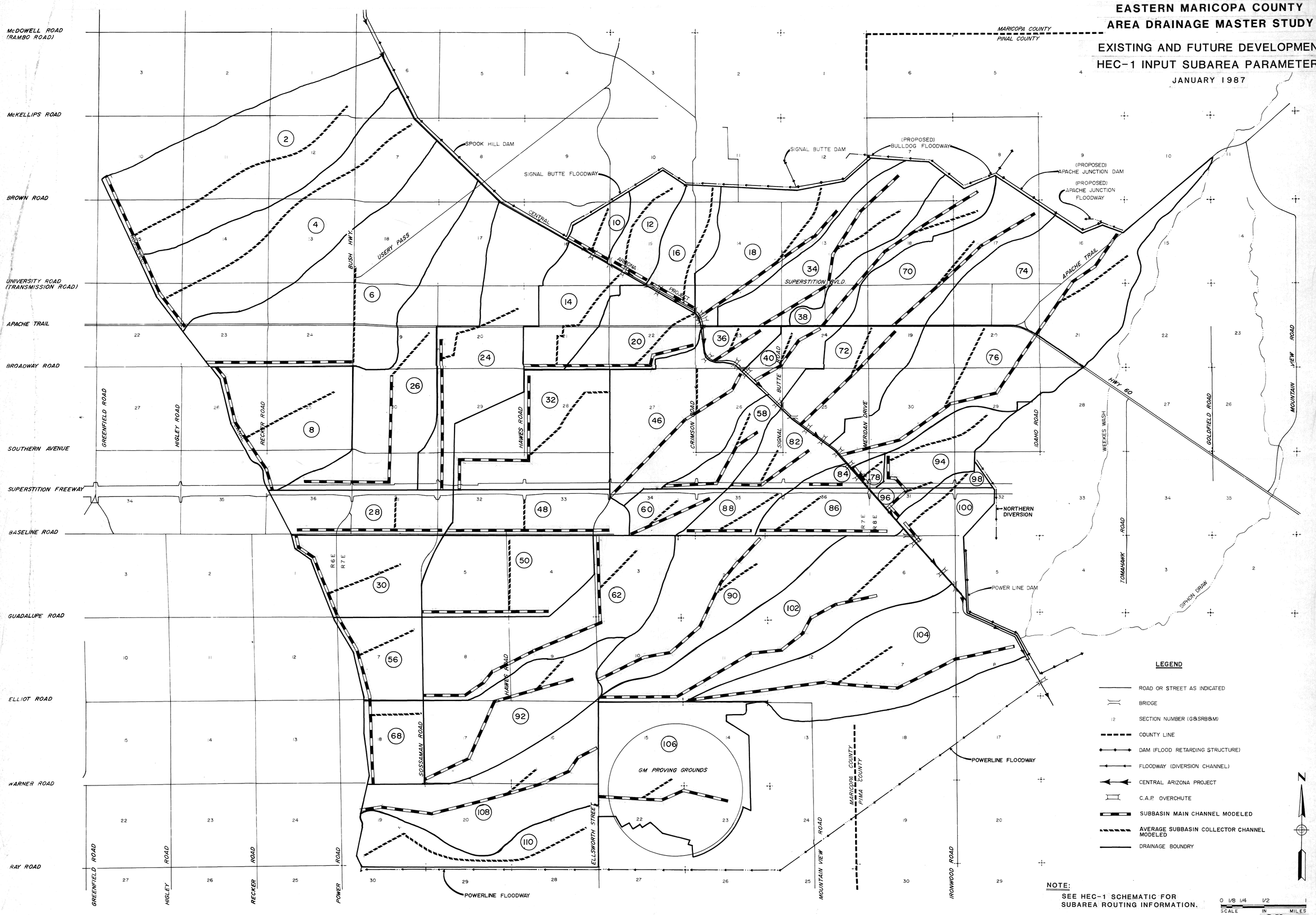


EXHIBIT 3

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

EXISTING AND FUTURE DEVELOPMENT HEC-1 INPUT SUBAREA PARAMETERS

JANUARY 1987



NOTE:
SEE HEC-1 SCHEMATIC FOR SUBAREA ROUTING INFORMATION.

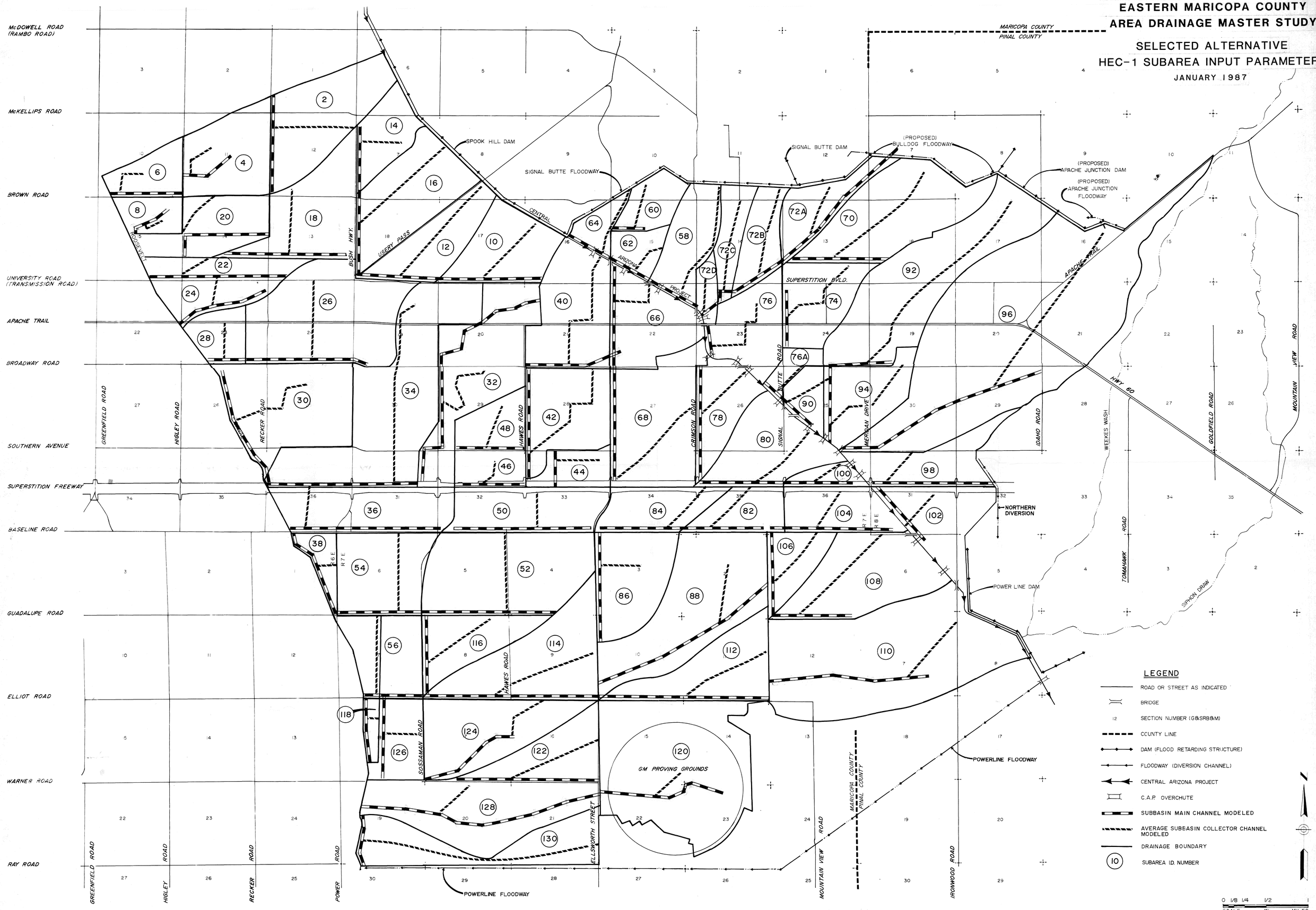
AN WEST INC. Consulting Engineers

EXHIBIT 4

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

SELECTED ALTERNATIVE HEC-1 SUBAREA INPUT PARAMETERS

JANUARY 1987



AN WEST INC. Consulting Engineers

EXHIBIT 5

EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY

SELECTIVE ALTERNATIVE HEC-1 SCHEMATIC

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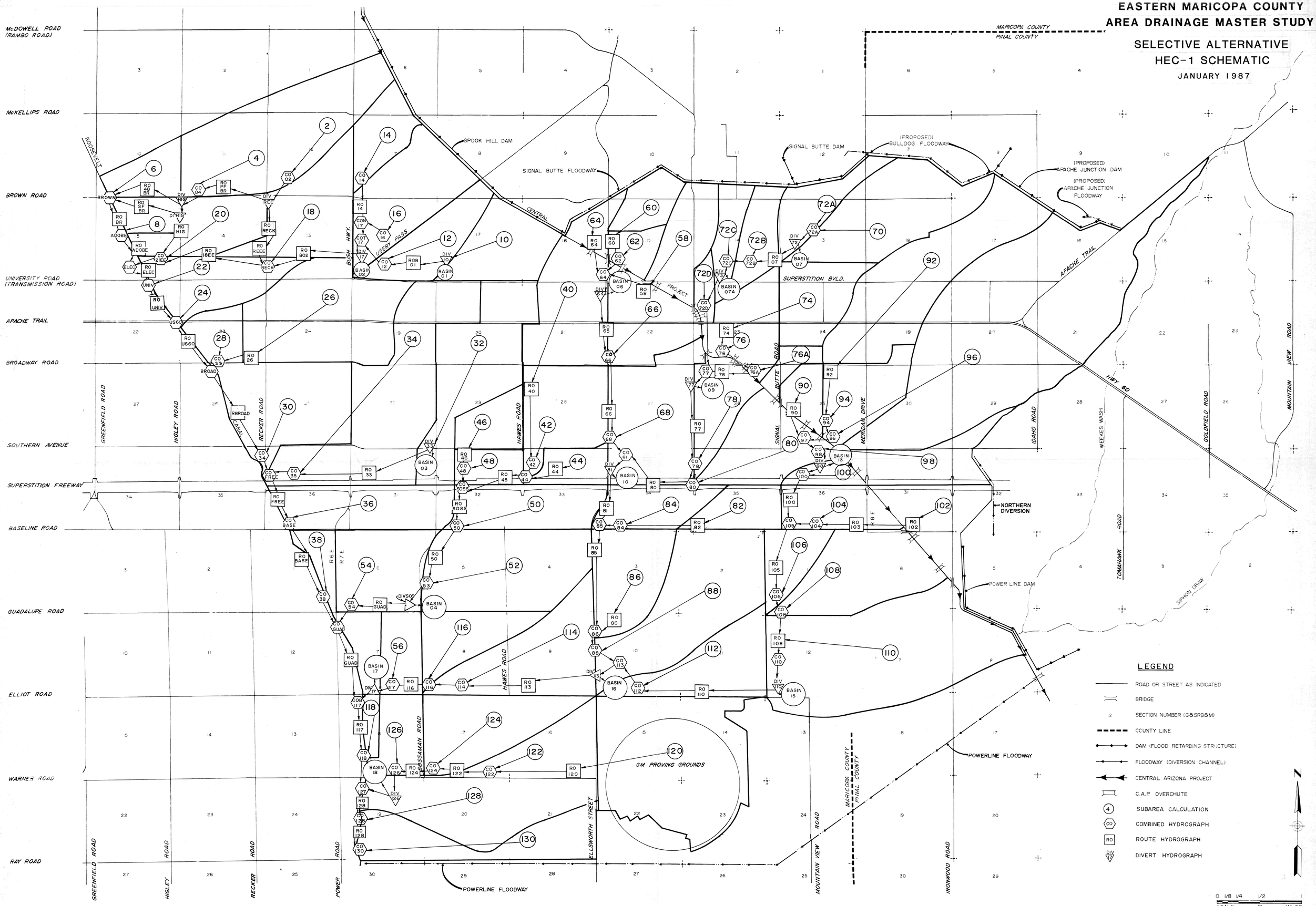

AN WEST INC.
Consulting Engineers