HYDRO LIBRARY

FINAL REPORT
FLOOD INSURANCE STUDY
FOR
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA
MARICOPA COUNTY, ARIZONA

REMA

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS / LAND SURVEYORS

FLOOD CONTROL DISTRICT
RECEIVED
AUG 30 1990

	CH ENG		P & PM
	DEP		HYDRO
	ADMIN		LMGT
	FINANCE		FILE
	C & O		
	ENGR		

REMARKS

FINAL REPORT
FLOOD INSURANCE STUDY
FOR
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA
MARICOPA COUNTY, ARIZONA

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

Submitted To: Federal Emergency Management Agency
500 C. Street, S.W.
Washington, D.C. 20472

Prepared For: Flood Control District of Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009
CONTACT: Ms. Jan Farmer (602) 262-1501

Prepared By: Wood & Associates, Inc.
Consulting Civil Engineers
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
CONTACT: Ms. Lynn M. Thomas, P.E. (602) 957-3149

Registered Professional Engineer (Civil)
CERTIFICATE NO. 23268
LYNN M. THOMAS
Date Signed 8-29-90
ARIZONA, U.S.A.

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO. 13138
DARREL E. WOOD
Date Signed 8-29-90
ARIZONA, U.S.A.

August 1990
WA #89500

TABLE OF CONTENTS

1.0 INTRODUCTION
- 1.1 Purpose of Study 1
- 1.2 Authority and Acknowledgments 1
- 1.3 Coordination 1

2.0 AREA STUDIED
- 2.1 Scope of Study 2
- 2.2 Community Description 3
- 2.3 Principle Flood Problems 4
- 2.4 Flood Protection Measures 4

3.0 ENGINEERING METHODS
- 3.1 Hydrologic Analyses 5
- 3.2 Hydraulic Analyses 8

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS
- 4.1 Floodplain Boundaries 9

5.0 INSURANCE APPLICATION 10

6.0 FLOOD INSURANCE RATE MAP 12

7.0 OTHER STUDIES 12

8.0 LOCATION OF DATA 12

9.0 BIBLIOGRAPHY AND REFERENCES 13

FIGURES

Figure 1 - Vicinity Map 14
Figure 2 - Queen Creek ADMS HEC-1 Schematic 15

TABLES

Table 1 - Summary of Discharges 7

EXHIBITS

Exhibit 1 - Flood Profile 16
Exhibit 2 - Floodplain Work Maps 20
Exhibit 3 - Elevation Reference Marks 28

APPENDIX

Appendix A - Addendum No. 1
Appendix B - Coordination Correspondence
Appendix C - Hydrologic Data
Appendix D - Hydraulic Data
Appendix E - List of Other Studies

Registered Professional Engineer (Civil)
CERTIFICATE NO.
23268
LYNN M.
THOMAS
Date Signed 8-29-90
ARIZONA, U.S.A.

FLOOD INSURANCE STUDY
FOR
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA
MARICOPA COUNTY, ARIZONA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards associated with the upstream area of the perched Southern Pacific Railroad in the Queen Creek area of unincorporated Maricopa County, Arizona and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Wood & Associates, Inc., the study contractor, for the Flood Control District of Maricopa County, Arizona, under FCD Contract No. 89-53. This work was completed in January 1990.

1.3 Coordination

The Flood Control District of Maricopa County contracted the professional services of Wood & Associates, Inc. in August 1986, to accomplish a regional stormwater study for a portion of unincorporated Maricopa County referred to as the Queen Creek area. During this study, a flood hazard area was identified along the upstream side of the perched Southern Pacific Railroad. Federal, State and local agencies were contacted to obtain information pertaining to floodplain characteristics in the Queen Creek area (See Appendix A).

Copies of this study have been sent to Maricopa Department of Planning and Zoning, Town of Gilbert, City of Mesa, and Arizona Department of Water Resources.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study includes a portion of Williams Air Force Base, portions of the incorporated communities of the Town of Gilbert, City of Mesa, Queen Creek and a portion of unincorporated Maricopa County. The community of Queen Creek was incorporated by voters on July 25, 1989. At report time, corporation limits were not published but will be forwarded to the Federal Emergency Management Agency once available. The area of study is shown on the Vicinity Map and Floodplain Work Maps (Figure 1 and Exhibit 2). The Southern Pacific Railroad traverses the Queen Creek area in a northwesterly-southeasterly direction (approximately 8.6 miles). The railroad track is above adjacent ground. Intermittent flows collect along the northeast side of the track and are conveyed northwesterly to the East Maricopa Floodway (EMF). The EMF was a Soil Conservation Services' sponsored floodway which provides a regional drain from eastern portions of Maricopa County and western portions of Pinal County to the Gila River.

A detailed hydraulic analysis was prepared for the upstream area of the perched Southern Pacific Railroad from the north bank of the wash known as Queen Creek to the east bank of the EMF. A detailed floodplain delineation presently exists for the EMF. Results of this delineation were used to start the HEC-2 backwater analysis (See Reference 6) for this portion of the study.

During the detailed hydraulic analysis, a breakout of flow at the Germann Road crossing was identified. An approximate hydraulic analysis was prepared along the southwest side of the Southern Pacific Railroad track from Germann Road to the EMF.

An approximate hydraulic analysis was prepared for the upstream area of the perched Southern Pacific Railroad from the south bank of the wash known as Queen Creek to the Maricopa/Pinal County limits. This area flows into the wash known as Queen Creek. The Southern Pacific Railroad and the Rittenhouse Road Bridge crossing Queen Creek are capable of conveying the 100-year peak discharge westerly. Presently, an approximate floodplain delineation exists for Queen Creek and is published on the Flood Insurance Rate Map (Community Panel Numbers 04013C 2965D and 04013C 3075D) effective date April 15, 1988.

2.2 Community Description

The Queen Creek area is situated in the southeast portion of Maricopa County. Currently, there are two industrial developments, several scattered small neighborhood commercial developments and several rural in nature residences within the study area. A portion of the study area is undeveloped land and has been left in its natural arid state. The majority of the area has a long history of intensive agricultural uses predominately citrus, cotton and alfalfa.

In 1970, the area had a population of 1,516. By 1980, the area's population increased by 84.4 percent to 2,796. The area's population increased another 40.1 percent to 3,916 over the period 1980 to 1985. From a 1985 base of 3,916 persons, the population is projected to increase to 13,248 persons in 2005, an increase of more than 238 percent. In comparison, during the 1985-2005 period, Maricopa County's population is projected to increase by 80 percent. Additional population growth in the Queen Creek Area is projected for seasonal residents. From a 1985 base of 79 persons in 34 households, seasonal population is projected to reach 150 persons in 67 households in 2005 (See Reference No. 13).

Maricopa County enforces a zoning ordinance to regulate land development. Along the study area, a major employment center land use is planned.

The Queen Creek area is composed of alluvial plains with mountains located along the southern border. Construction of the Central Arizona Project Canal situated east of the study area has significantly reduced the contributing watershed. The contributing watershed gently slopes westerly at an approximate 0.5 percent slope. The highest elevation within this study area is 1460 at the southeast portion of the railroad to 1325 at the northwest portion of the railroad.

The climate of the study area is typical of the arid southwest with short, mild winters and long, hot summers. The average annual temperature is 69 degrees Fahrenheit. The average annual precipitation is approximately 7.5 inches. Three types of storms produce precipitation in the area: general winter storms, general summer storms and local storms. Summer storms normally consist of high intensity, short duration local storms, but severe general storms, usually associated with tropical cyclones, do occur. General winter storms cover large areas and are usually of long duration. Their intensities are normally light to moderate.

2.3 Principle Flood Problems

Historical records indicate forty floods of varying magnitudes have occurred in the area since 1910. These floods have damaged agricultural lands, residences, retail-commercial property, roads, highways, irrigation canals, the Southern Pacific Railroad (SPRR), Williams Air Force Base and other physical features of the watershed. Twenty-seven floods occurred during the summer months and thirteen floods occurred during the winter months. Runoff in 1926, 1930, 1941, 1943, 1954, 1959, 1966, and 1971 caused particularly serious damage. The floods, although varying in size, have occurred on the average of once every one and one-half years. In addition, Soil Conservation Services have photographs documenting flooding which occurred during September 8-11, 1933, July 1936, March 1937 and September 1946.

Rail traffic along the Southern Pacific Railroad was delayed during the 1954 flood as water threatened to breach the track. Although the Powerline, Rittenhouse, and Vineyard Road Flood Retarding Structures constructed during the period 1967, 1968 and 1969 as well as the Whitlow Ranch Dam constructed in 1960 provide partial protection in the project area, a flood expected on the average of once in 100 years would seriously affect the economy of this area. Evidence of this fact occurred during the runoff event of 1971.

The potential for erosion has been observed in the three barrel - 4' x 10' box culvert crossing located in Power Road. Currently, there is approximately one (1) foot of siltation in this culvert. In addition, vegetation within the study area is sparse but tends to be thicker along the northeast side of the perched SPRR.

2.4 Flood Protection Measures

Several flood control structures have been constructed which affect flooding in the study area. The Soil Conservation Services' sponsored Powerline Rittenhouse and Vineyard Road Flood Retarding Structures and Army Corps of Engineers' sponsored Whitlow Ranch Dam were constructed for the purpose of providing flood protection to the study area. In addition, the EMF along the west border of the study area was constructed for the purpose of providing topographic relief to the eastern portion of Maricopa County. A new detention policy was adopted in 1988 for Maricopa County which minimizes storm water runoff as development occurs. All of these flood control measures have been implemented in an effort to effectively provide stormwater management for both existing and future development.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval), have been selected as having special significance for floodplain management and for flood insurance premium rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the 100-year flood event.

The detailed hydrologic analysis for this study was obtained from the services associated with the Queen Creek ADMS. The watershed investigated for the Queen Creek ADMS is comprised of approximately 171 square miles of which approximately 70 square miles are situated in Maricopa County's jurisdictional limits. The remaining portion of watershed is situated in Pinal County's jurisdictional limits. This Flood Insurance Study encompasses the hydrology associated with approximately 52 square miles of which approximately 18 square miles are situated in Maricopa County's jurisdictional limits (See Figure 2). In an effort to efficiently computer model the Queen Creek ADMS watershed, the area was divided into seven phases. The hydrology affecting the upstream area of the perched SPRR is known as Phase II & Phase III.

3.1 Hydrologic Analyses (Cont.)

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the recurrence intervals of the 2-, 5-, 10-, 25-, 50- and 100-year rainfall-runoff events in accordance with the Queen Creek ADMS, FCD Contract No. 86-23. Results of the analyses were used to establish the existing 100-year peak discharge floodplain delineation for the Flood Insurance Study upstream of the perched Southern Pacific Railroad.

Discharges for the flooding sources studied in detail were developed using the HEC-1 Flood Hydrograph Package (See Reference No. 5). The SCS Dimensionless Unit Hydrograph option was employed to relate the drainage characteristics of soil groups to a curve number. The Muskingham Flood Routing option was employed to simulate flood wave movement through stream reaches and reservoirs. The SCS Type II rainfall distribution was used as input in the HEC-1 computer model to simulate rainfall-runoff relationships.

Each basin was divided into subwatersheds approximately one (1) square mile in size. Curve Numbers, times of concentration and travel times were calculated as outlined in the Urban Hydrology for Small Watersheds, Technical Release No. 55, (See Reference No. 9).

Soil classification and cover conditions were determined from soil surveys (See Reference No. 7 & 8). Antecedent moisture condition type II was used for the soil moisture content.

The National Oceanic and Atmospheric Administration precipitation frequency atlas (See Reference No. 10) was used to select rainfall amounts for the 100-year event. The depth-area relationship was employed to simulate areal reduction of rainfall within the Queen Creek Area.

Due to recent adoption of retention policies for areas within Maricopa County, the existing condition hydrology was used to delineate the 100-year floodplain upstream of the Southern Pacific Railroad within the Queen Creek area. The portion of watershed located in Pinal County is in the process of adopting a retention/detention policy. Therefore, it is assumed the future condition hydrology will have the affect of minimizing flood hazards within the area.

Peak discharge-drainage area relationships for the flooding sources studied in detail are shown in Table 1.

Table 1 Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	100-Year Peak Discharge (cubic feet per second)
Northeast side of Southern Pacific Railroad		
From Maricopa/Pinal County Line To South bank of Queen Creek	23.86	1208
From North bank of Queen Creek To Ocotillo Road	3.44	393
From Ocotillo Road To Queen Creek Road	10.05	828
From Queen Creek Road To South of Germann Road	16.15	1172
From South of Germann Road To Germann Road	22.25	1358
From Germann Road To Confluence of East Maricopa Floodway	23.24	1085
Southwest side of Southern Pacific Railroad		
From Germann Road To Confluence of East Maricopa Floodway	N/A	313

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the community were carried out to provide estimates of the elevations of the flood associated with the 100-year recurrence interval.

Cross-section data for the backwater analysis was obtained from topographic maps compiled from aerial photographs (Reference 12). Bridges and culverts were surveyed to obtain elevation data and structural geometry. Land subsidence and earth fissures have been identifed within the Queen Creek area. Therefore, elevation reference marks (ERM's) were not based on the National Geodetic Vertical Datum of 1929 as specified in aerial mapping and surveying guidelines (Reference 2). The elevation reference data for this report and base flood elevations are level circuits run and adjusted in the period January, 1986 to September, 1986 for the "on rock" established NGVD published mark Designation X473 1981 Hawk Rock (Reference 14).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). Selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods for the 100-year recurrence interval were computed using the Corps of Engineers' HEC-2 step-backwater computer program (Reference 6). The starting water-surface elevation for the delineation was taken from results of the East Maricopa Floodway Study.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and floodplain areas. The channel "n" values for the Southern Pacific Railroad delineation ranged from 0.014 to 0.050, and the overbank "n" values ranged from 0.014 to 0.100.

The hydraulic analysis for this study was based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.2 Hydraulic Analyses (Cont.)

A Zone AH was delineated on the Floodplain Work Maps (Exhibit 2) for the portion of the detailed study area which conveys 100-year ponded shallow flooding with average depths between 1 and 3 feet northwesterly to the Eastern Maricopa Floodway. The encroachment table card method 1, in the the HEC-2 computer model, was used to establish the Zone AH limit where flooding depths are one (1) foot or less.

A Zone A was delineated on the Floodplain Work Maps (Exhibit 2) for the portion of the approximate study areas.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps, the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineation of the 100-year floodplain boundary to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the area studied in detail, the 100-year floodplain boundary has been delineated using the flood elevations determined at each cross section of the HEC-2 computer model.

Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=200' with a contour interval of 2 feet (Reference 12).

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

5.0 INSURANCE APPLICATION (Cont.)

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less that 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

7. OTHER STUDIES

Several studies relevent to the Queen Creek area have been prepared over the years and a comprehensive list is included in Appendix D.

8. LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, Arizona 85009.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Federal Emergency Management Agency, Flood Insurance Rate Map, Map Number 04013C3075D, Effective April 15, 1988.

2. Federal Emergency Management Agency, Guidelines and Specifications for Study Contractors, September 1985.

3. Flood Control District of Maricopa County, Drainage Regulation for the Unincorporated Area of Maricopa County, Arizona, September 1988.

4. Maricopa County Department of Planning and Development, Maricopa County Zoning Ordinance, 1985.

5. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis California, January 1985.

6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Davis California, September 1982.

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

8. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Eastern Maricopa and Northern Pinal Counties, Arizona, November 1974.

9. U.S. Department of Agriculture, Soil Conservation Services Technical Release No. 55, Urban Hydrology for Small Watersheds, Second Edition, June 1986.

10. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Atlas 2 Precipitation - Frequency Atlas of the Western United States, Volume VIII - Arizona, J.F. Miller, R.H. Frederick, R.J. Tracey, 1973.

11. U.S. Department of Interior, Geologic Survey, 7.5 Minute Series (Topographic) Map, Scale 1:24,000, Contour Interval 10 Feet: Desert Well, Arizona (1973): Higley, Arizona (1981); Sacaton NE, Arizona (1973).

12. Wood & Associates, Inc., Queen Creek ADMS Topographic Mapping, Scale: 1" = 200', Contour Interval 2 Feet, October & November 1986.

13. Maricopa County Department of Planning and Development, Queen Creek Land Use Plan, June 1988.

14. U.S. Department of Interior, Geologic Survey, Benchmark Designation X473, 1981.

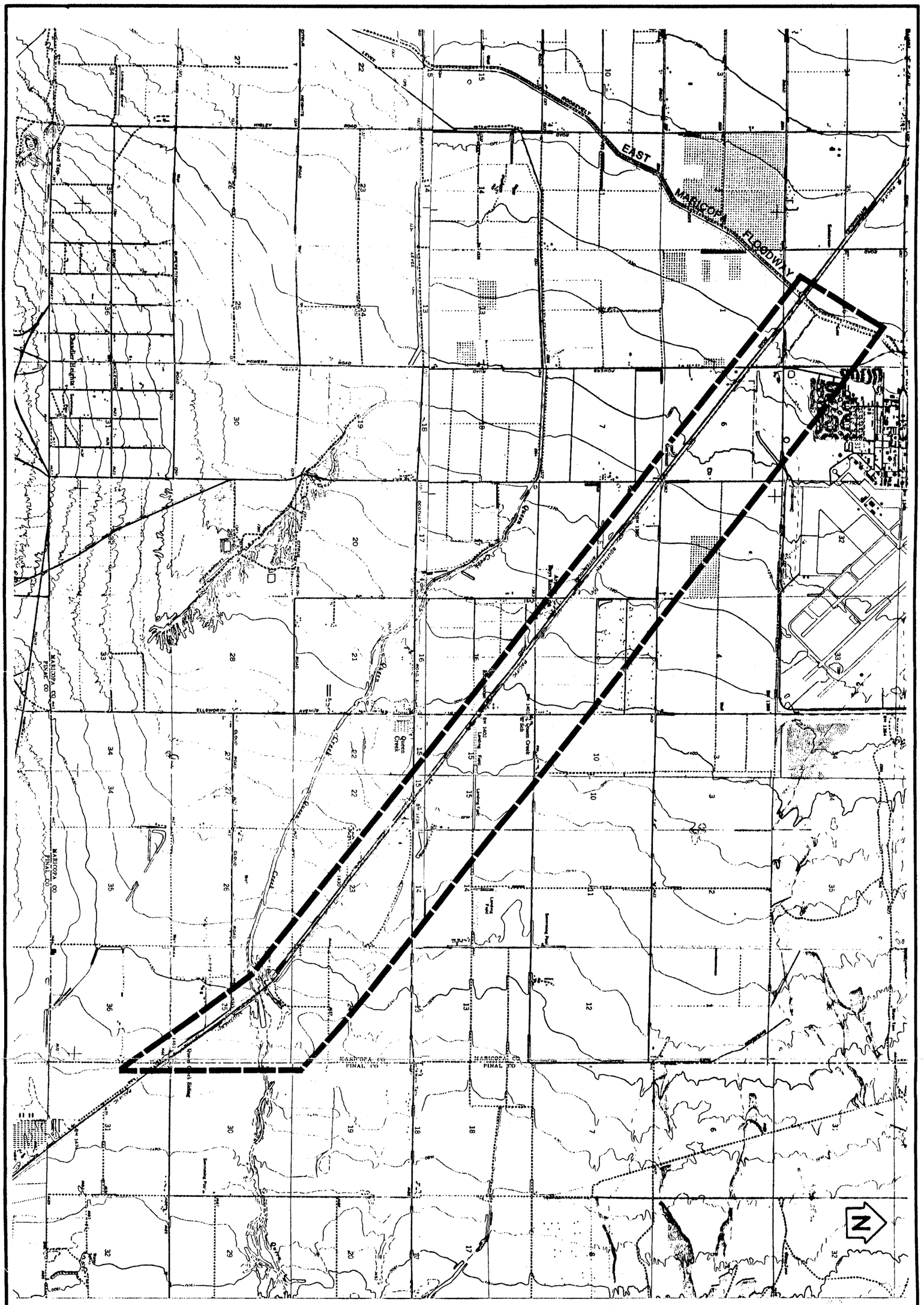


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

APPROXIMATE SCALE
1 0 1 2 MILES

VICINITY MAP

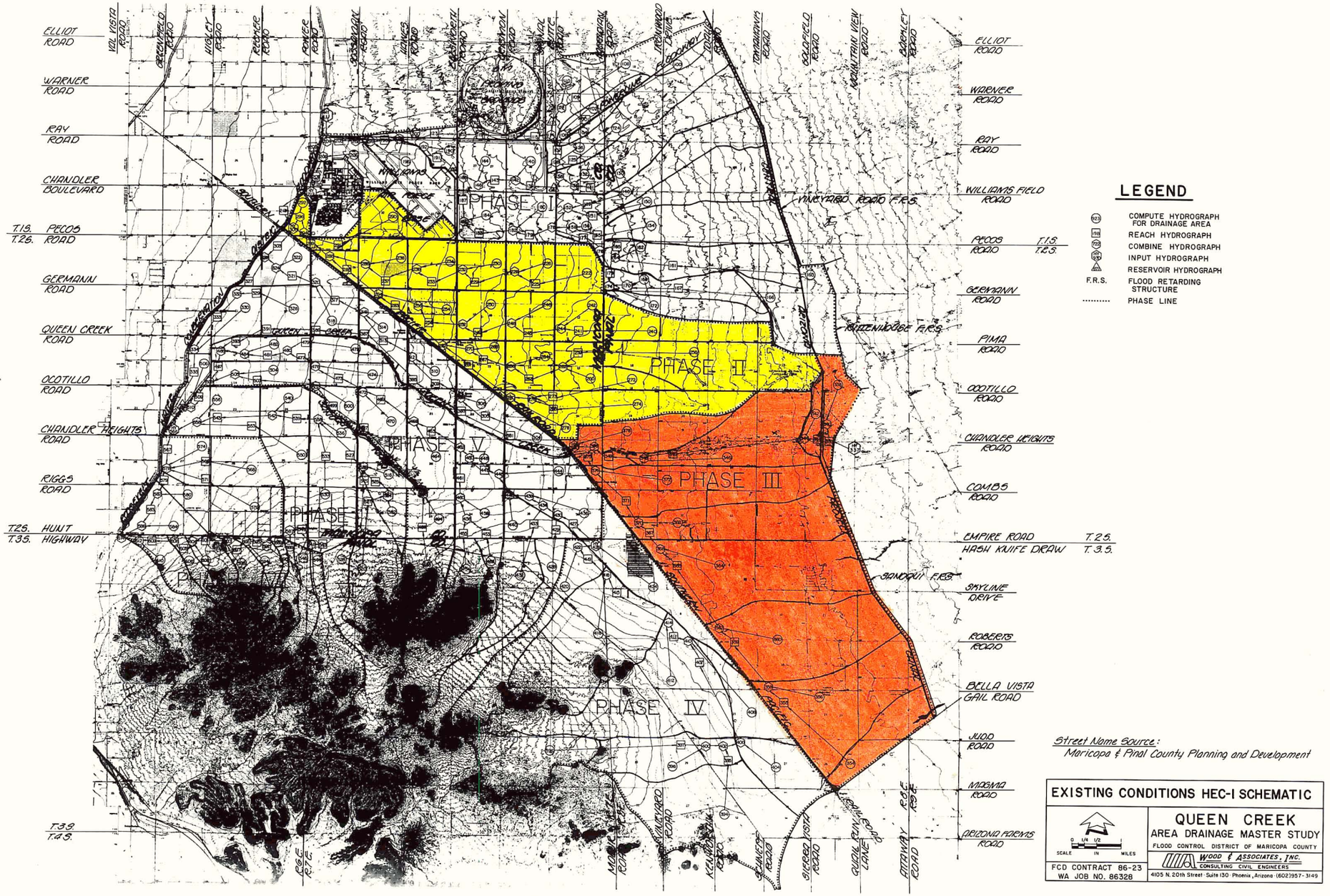
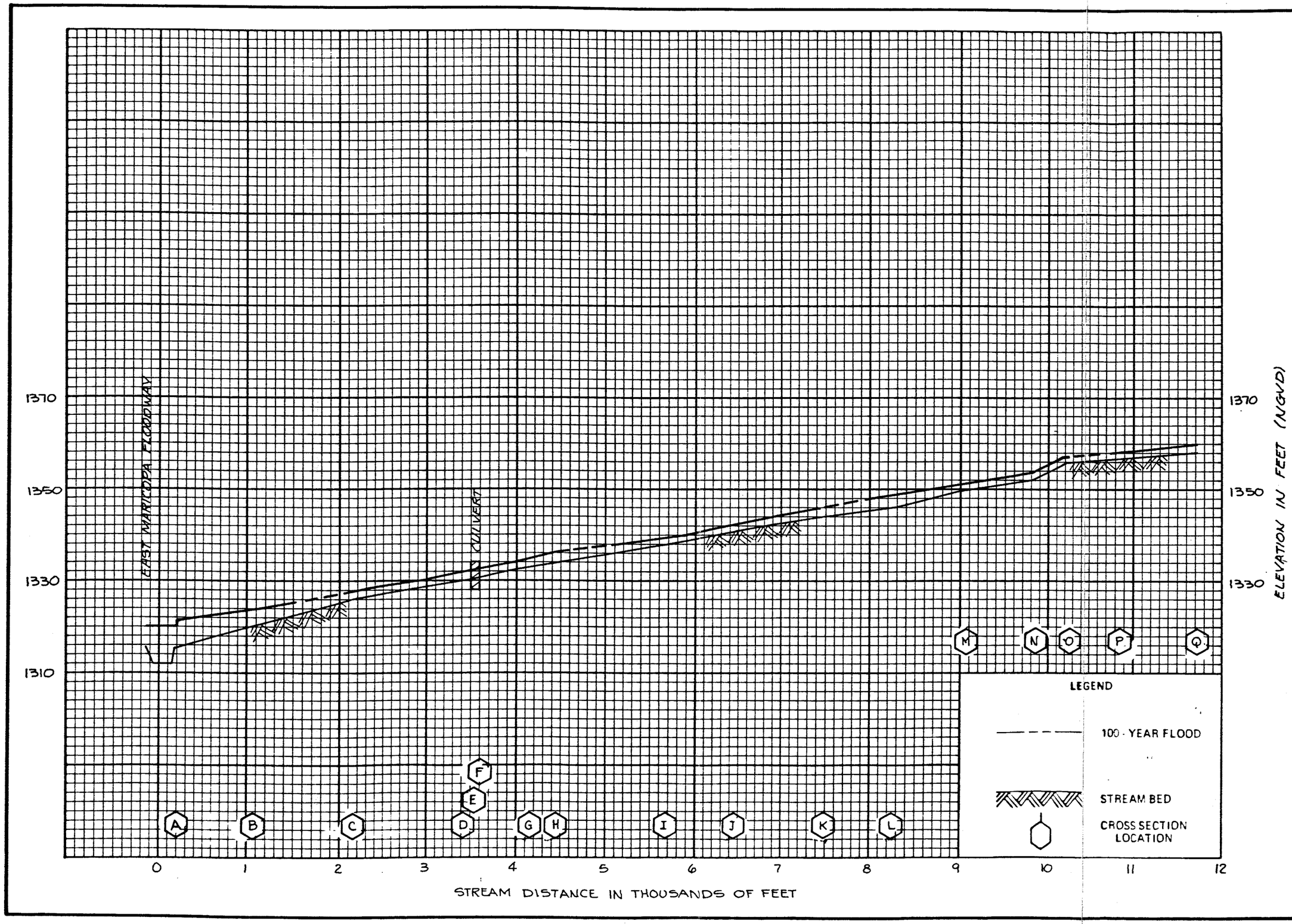

ELLIOT ROAD
WARNER ROAD
RAY ROAD
CHANDLER BOULEVARD
T.1S. T.2S. PECOS ROAD
GERMANN ROAD
QUEEN CREEK ROAD
OCOTILLO ROAD
CHANDLER HEIGHTS ROAD
RIGGS ROAD
T.2S. T.3S. HUNT HIGHWAY
T.3S. T.4S.
VAL VISTA ROAD
GREENFIELD ROAD
HIGLEY ROAD
POWERS ROAD
SOSSAMAN ROAD
HAWES ROAD
ELLSWORTH ROAD
RECREATIONAL VEHICLE PARK
INDIANWOOD DETOUR
TOWNSHIP ROAD
TOMAHAWK ROAD
GOLDFIELD ROAD
MOUNTAIN VIEW ROAD
BARKLEY ROAD
WILLIAMS FIELD ROAD
T.1S. T.2S.
PIMA ROAD
COMBS ROAD
EMPIRE ROAD T.2S.
HASH KNIFE DRAW T.3S.
BAYLINE DRIVE
ROBERTS ROAD
BELLA VISTA
GAIL ROAD
JUDD ROAD
MAGMA ROAD
ARIZONA FARMS ROAD
R6E R7E
MOON ROAD
SOUTHERN BOULEVARD
KENWORTHY ROAD
SENECA ROAD
SIERRA VISTA ROAD
QUAIL RUN LANE
PITTSBURG ROAD
PHASE I
PHASE II
PHASE III
PHASE IV
PHASE V
PHASE VI
WILLIAMS FIELD
QUEEN CREEK
VINEYARD ROAD F.R.S.
BRIDENBAUGH F.R.S.
BIANCHI F.R.S.
LEGEND
COMPUTE HYDROGRAPH FOR DRAINAGE AREA
REACH HYDROGRAPH
COMBINE HYDROGRAPH
INPUT HYDROGRAPH
RESERVOIR HYDROGRAPH
F.R.S. FLOOD RETARDING STRUCTURE
PHASE LINE
Street Name Source:
Maricopa & Pinal County Planning and Development
EXISTING CONDITIONS HEC-I SCHEMATIC
SCALE IN MILES
QUEEN CREEK
AREA DRAINAGE MASTER STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street · Suite 130 · Phoenix, Arizona · (602) 957-3149
FCD CONTRACT 86-23
WA JOB NO. 86328

FIGURE 2

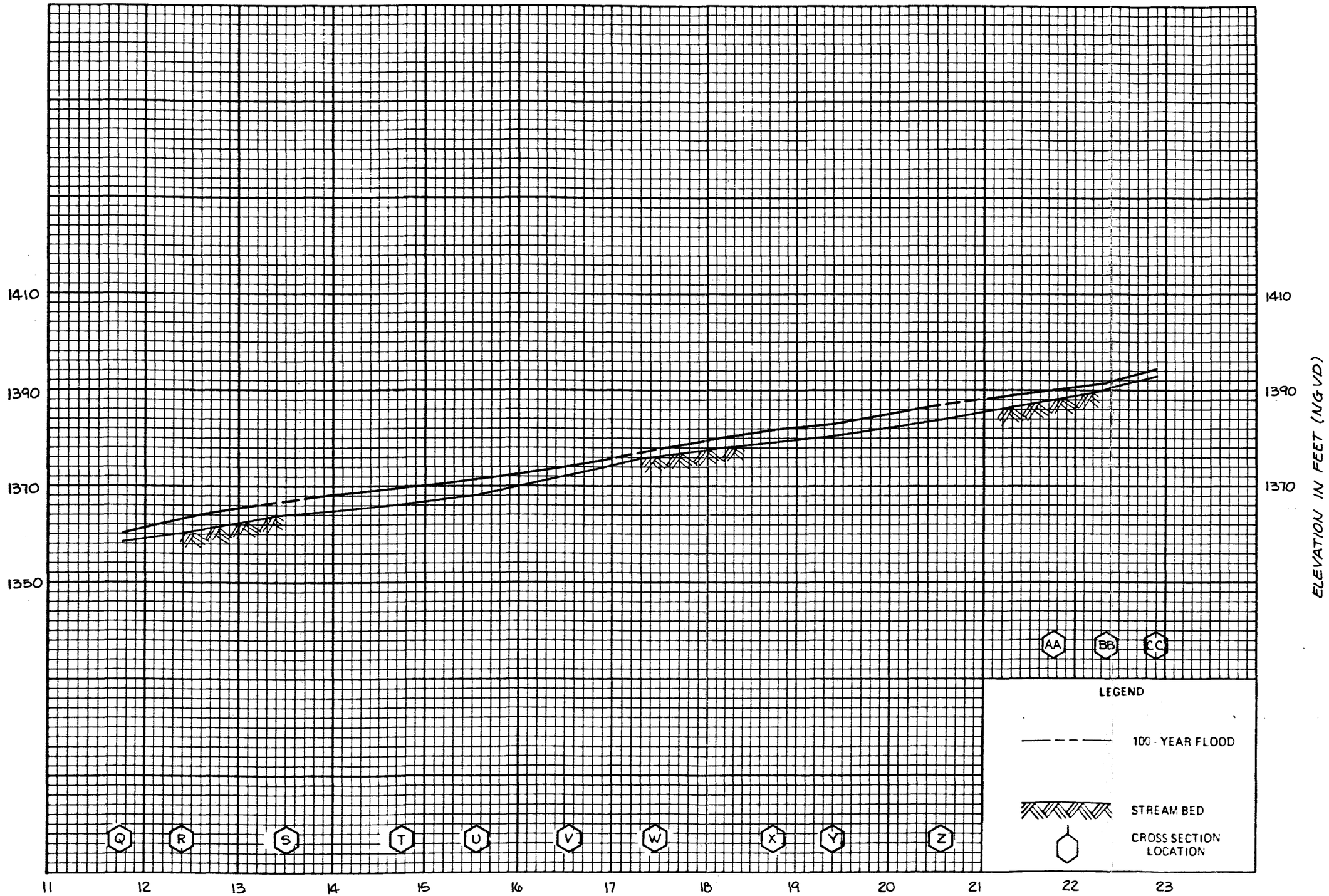


FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

EXHIBIT 1A

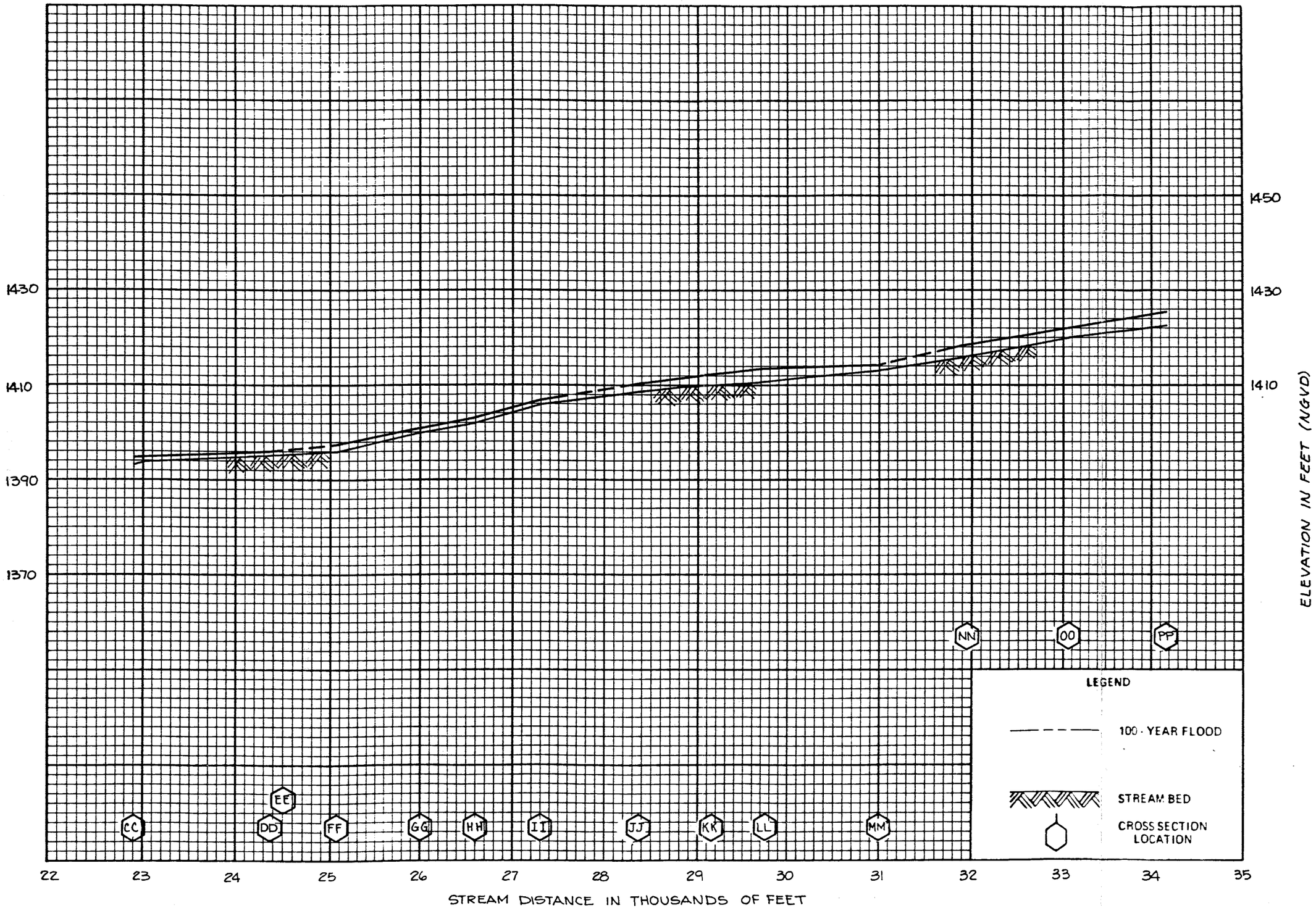


FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

EXHIBIT 1B

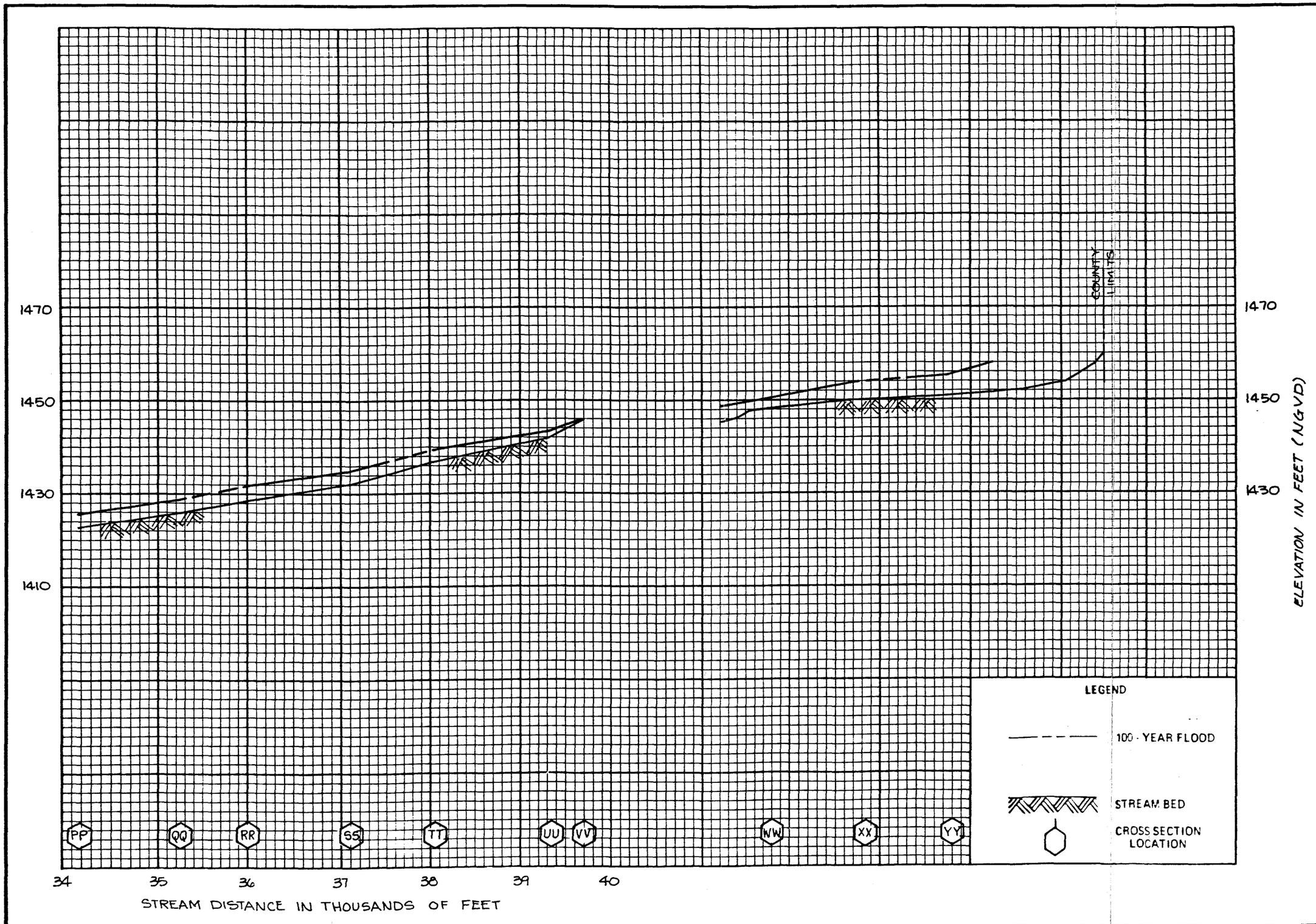


FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

EXHIBIT 1C



FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

EXHIBIT 1D

FLOOD INSURANCE STUDY

SOUTHERN PACIFIC RAILROAD

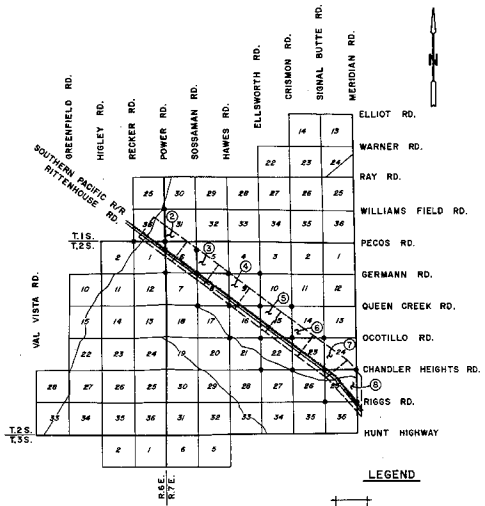
QUEEN CREEK AREA, MARICOPA COUNTY

FCD CONTRACT 89-53 WA JOB NO. 89500

ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
RM 18	1325.64	Brass cap in hand hole near Williams Air Force Base entrance just south on Power Road.
RM 26	1315.16	Brass cap flush at intersection of Pecos and Recker Roads.
RM 27	1332.42	P.K. nail at intersection of Power and Pecos Roads.
RM 32	1335.49	P.K. nail on Power Road 1320' south of Pecos Road.
RM 38	1336.29	Brass cap flush at intersection of Germann and Power Roads.
RM 33	1349.93	Hub and tack on Sossaman Road, 1320' south of Pecos Road, 25.5' east and 6' north of the SE corner of 6' industrial chain link fence.
RM 39	1355.38	1" pipe in pot hole at intersection of Sossaman and Germann Roads.
RM 51	1359.51	P.K. nail 200' north of Queen Creek Wash near the intersection of Queen Creek and Sossaman Roads.
RM 40	1374.53	1" pipe flush at intersection of Hawes and Germann Roads.
RM 52	1375.61	P.K. nail at intersection of Howard Pile Drive and Hawes Roads.
RM 62	1381.29	Brass cap flush at intersection of Ocotillo and Hawes Roads.
RM 41	1391.17	Brass cap in hand hole at intersection of Ellsworth and Germann Roads.
RM 53	1394.55	Brass cap in hand hole at intersection of Queen Creek and Ellsworth Roads.
RM 63	1399.80	Brass cap in hand hole at intersection of Ellsworth and Ocotillo Roads.
RM 74	1400.63	Brass cap in hand hole at intersection of Ellsworth and Chandler Heights Roads.
RM 54	1412.06	Brass cap in hand hole at intersection of Crismon and Queen Creek Roads.
RM 64	1415.08	1" pipe flush at intersection of Crismon and Ocotillo Roads.
RM 75	1416.87	Hub and tack 46' west of intersection of Crismon and Chandler Heights Roads.
RM 65	1429.50	P.K. nail at intersection of Ocotillo and Signal Butte Roads.
RM 76	1441.68	Hub and tack near intersection of Signal Butte and Chandler Heights Roads, 10' + north of 10' dirt road and 43' + east of railroad tracks.
RM 87	1437.66	Hub and tack at intersection of Riggs and Signal Butte Roads.
RM 77	1456.41	Hub and tack at intersection of Chandler Heights and Meridian Roads, 19' + west of power lines on north edge 10' dirt road.
RM 88	1459.95	P.K. nail near intersection of Riggs and Meridian Roads.



FLIGHT DATE

OCTOBER 19,1986
NOVEMBER 22,1986

LEGEND

32 — SECTION NUMBER

MAPPING LIMITS

2 SHEET NUMBER

● ERM (ELEVATION REFERENCE MARK)

LEGEND

Corporate Limits	Corporate Limits
County Limits	County Boundary
Excluded Areas	Limit of Study
100-Year Floodplain Boundary	
Approximate (100-Year) Floodplain Boundary	
Cross Section	A — A
Elevation Reference Marks	RM7 X
River Mile	M 1.561
Flowline	
Base Flood Elevations	580
Zone designations	ZONE AH
Elevations from Field Survey Dated 11-28-89	(1357.44)
Elevations from Field Survey Dated 1-8-90 and approved construction drawings for the R.W.C.D. Floodway - Reach 4 Dated 4-24-86	1321.0

PREPARED FOR:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

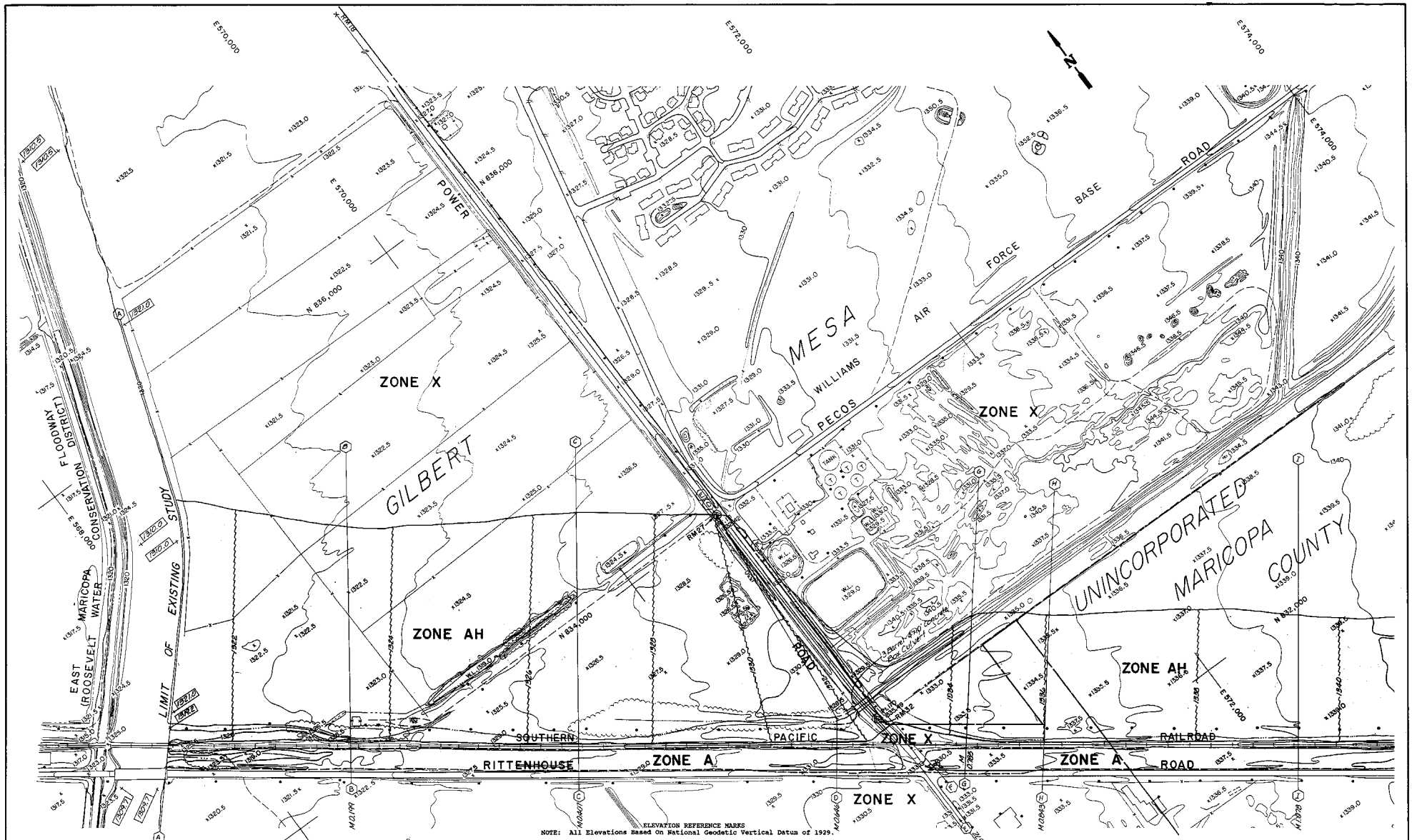
PREPARED BY:

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602)957-3149

	BY	DATE		DATE
DESIGN	L. Thomas	1/90	SUBMITTED BY: L. Thomas	1/17/90
DESIGN CHK.	D. Wood	1/90	RECOMMENDED BY:	DATE
PLANS	K. McNevich	1/90	APPROVED BY:	DATE
PLANS CHK.	L. Thomas	1/90	CHIEF ENGINEER & GENERAL MANAGER	

EXHIBIT 2



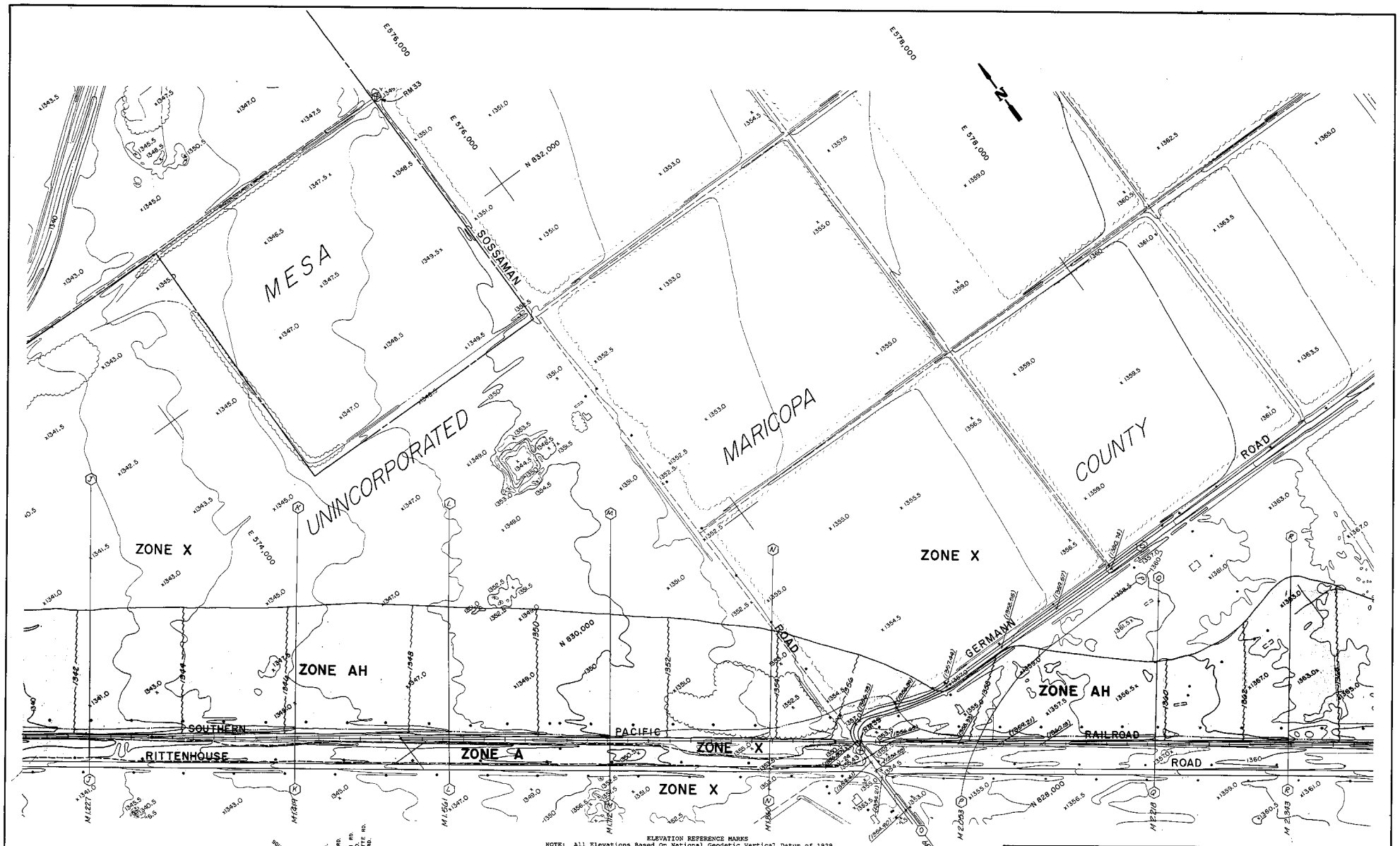
NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

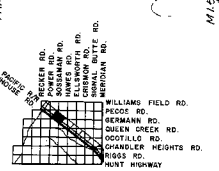
ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
RM 10	1325.64	Brass cap in hand hole near Williams Air Force Base entrance just south on Power Road.
RM 26	1315.16	Brass cap flush at intersection of Pecos and Reckar Roads.
RM 27	1332.42	P.K. nail at intersection of Power and Pecos Roads.
RM 32	1335.49	P.K. nail on Power Road 1320' south of Pecos Road.
RM 38	1336.29	Brass cap flush at intersection of Germann and Power Roads.

1321.0 Elevations from Field Survey Dated 1-8-90 and approved construction drawings for the R.W.C.D. Floodway - Reach 4 Dated 4-24-86

SOUTHERN PACIFIC RITTENHOUSE
RECKER RD.
POWER RD.
SOSSAMAN RD.
HAWES RD.
ELLSWORTH RD.
CRISMON RD.
MESA DRIVE
MERIDIAN RD.
WILLIAMS FIELD RD.
PECOS RD.
GERMANN RD.
QUEEN CREEK RD.
OCOTILLO RD.
CHANDLER HEIGHTS RD.
RIGGS RD.
HUNT HIGHWAY





ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
RM 33	1349.93	Hub and tack on Sossamen Road, 1320' south of Pecos Road, 25.5' east and 6' north of the SE corner of 6' industrial chain link fence.
RM 39	1355.38	1" pipe in pot hole at intersection of Sossaman and Germann Roads.
RM 51	1359.51	P.K. nail 200' north of Queen Creek Wash near the intersection of Queen Creek and Sossaman Roads.

(1357.44)

Elevations from Field Survey Dated 11-28-89

200' 0 200' 400'
SCALE IN FEET

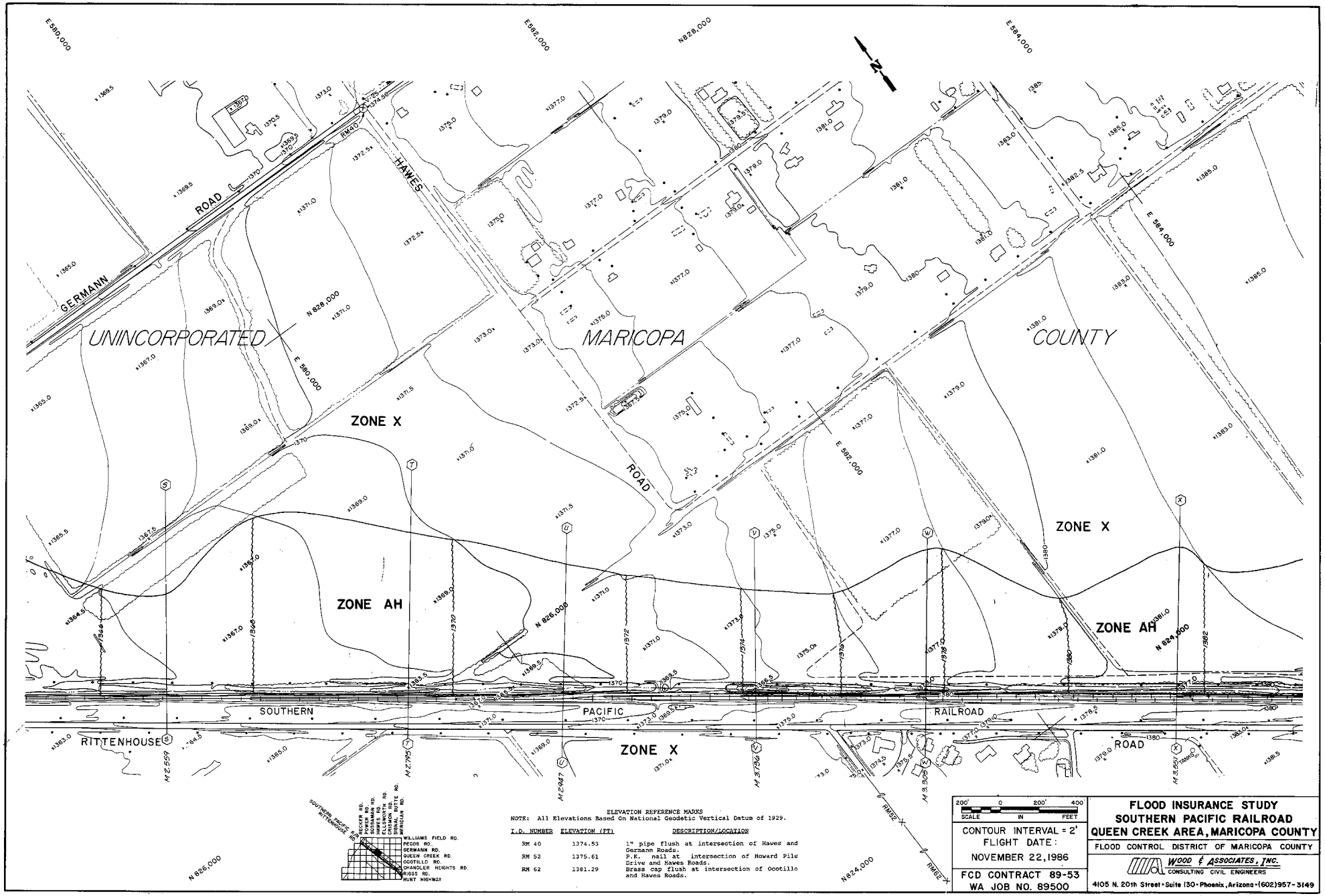
CONTOUR INTERVAL = 2'
FLIGHT DATE:
NOVEMBER 22, 1986

FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149



ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

T.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
RM 40	1374.53	1" pipe flush at intersection of Hawes and Germann Roads.
RM 52	1375.61	P.K. nail at intersection of Howard Pile Drive and Hawes Roads.
RM 62	1381.29	Brass cap flush at intersection of Ocotillo and Hawes Roads.

200' 0 200' 400'
SCALE IN FEET

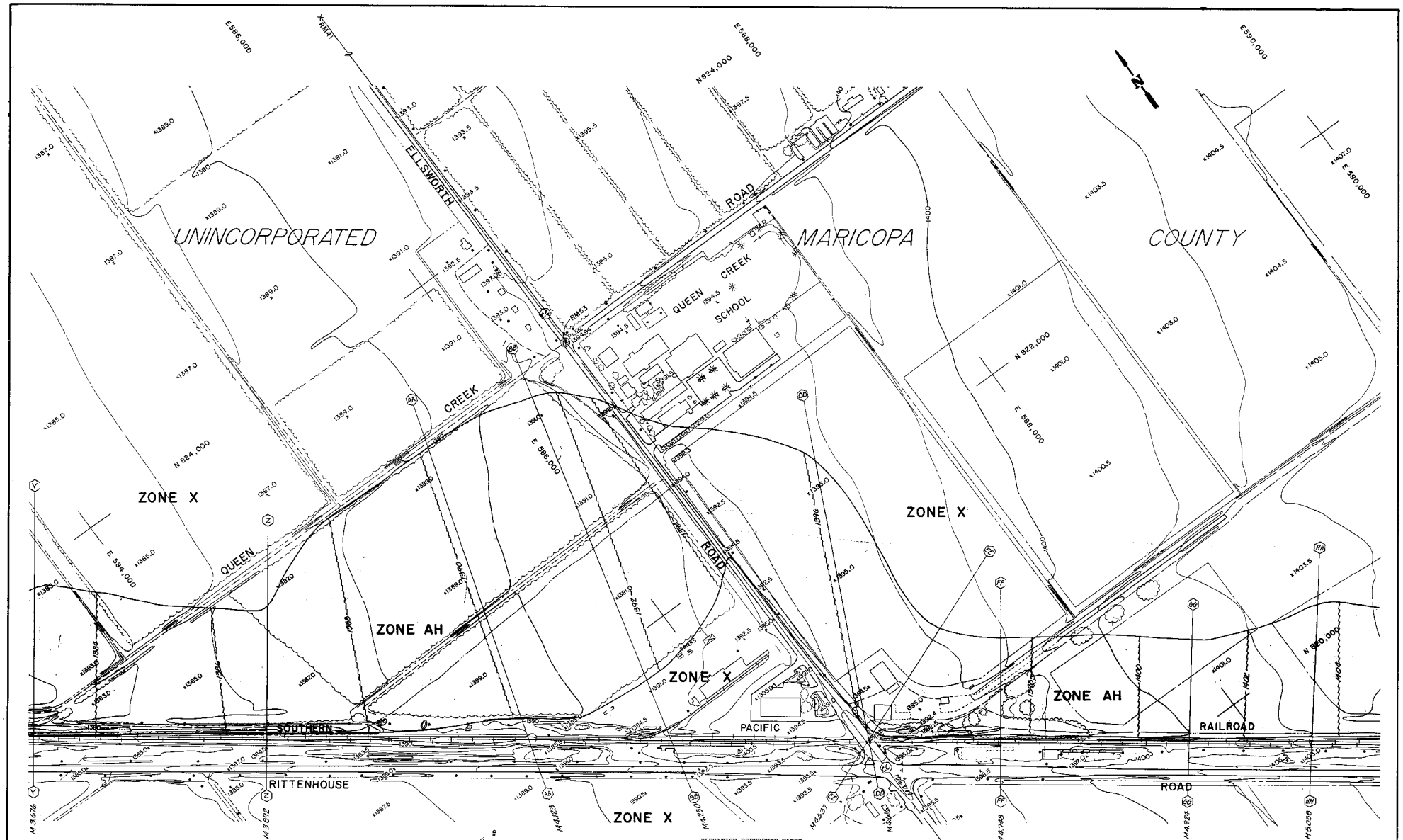
CONTOUR INTERVAL = 2'
FLIGHT DATE:
NOVEMBER 22, 1986

FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149



ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATIONS
RM 41	1391.17	Brass cap in hand hole at intersection of Ellsworth and Germann Roads.
RM 53	1394.55	Brass cap in hand hole at intersection of Queen Creek and Ellsworth Roads.
RM 63	1399.80	Brass cap in hand hole at intersection of Ellsworth and Ocotillo Roads.
RM 74	1400.63	Brass cap in hand hole at intersection of Ellsworth and Chandler Heights Roads.

200' 0 200' 400'
SCALE IN FEET

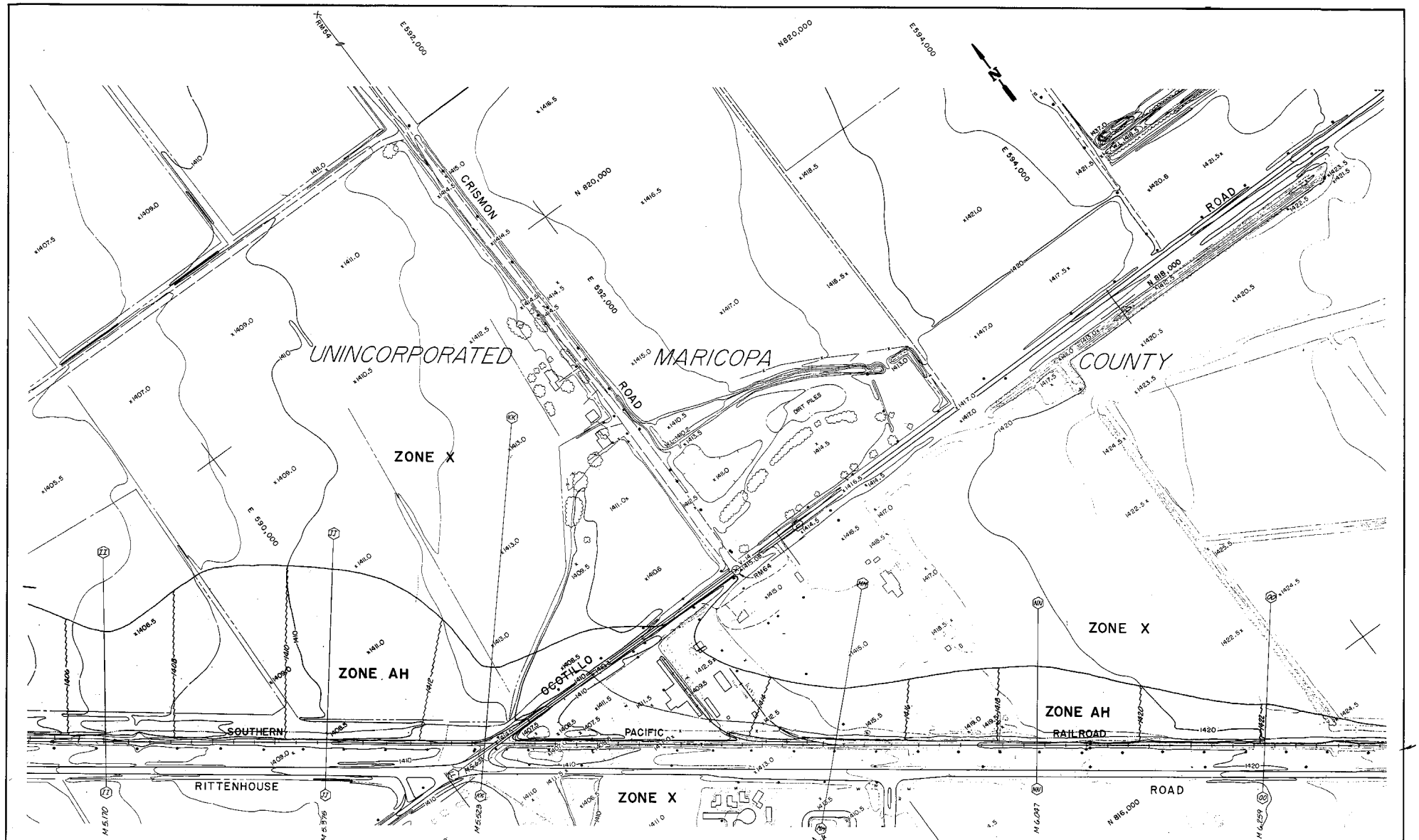
CONTOUR INTERVAL = 2'
FLIGHT DATE:
NOVEMBER 22, 1986

FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149



ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATIONS
RM 54	1412.06	Brass cap in hand hole at intersection of Crismon and Queen Creek Roads.
RM 64	1415.08	1" pipe flush at intersection of Crismon and Ocotillo Roads.
RM 75	1416.87	Hub and tack 46' west of intersection of Crismon and Chandler Heights Roads.

200' 0 200' 400'
SCALE IN FEET

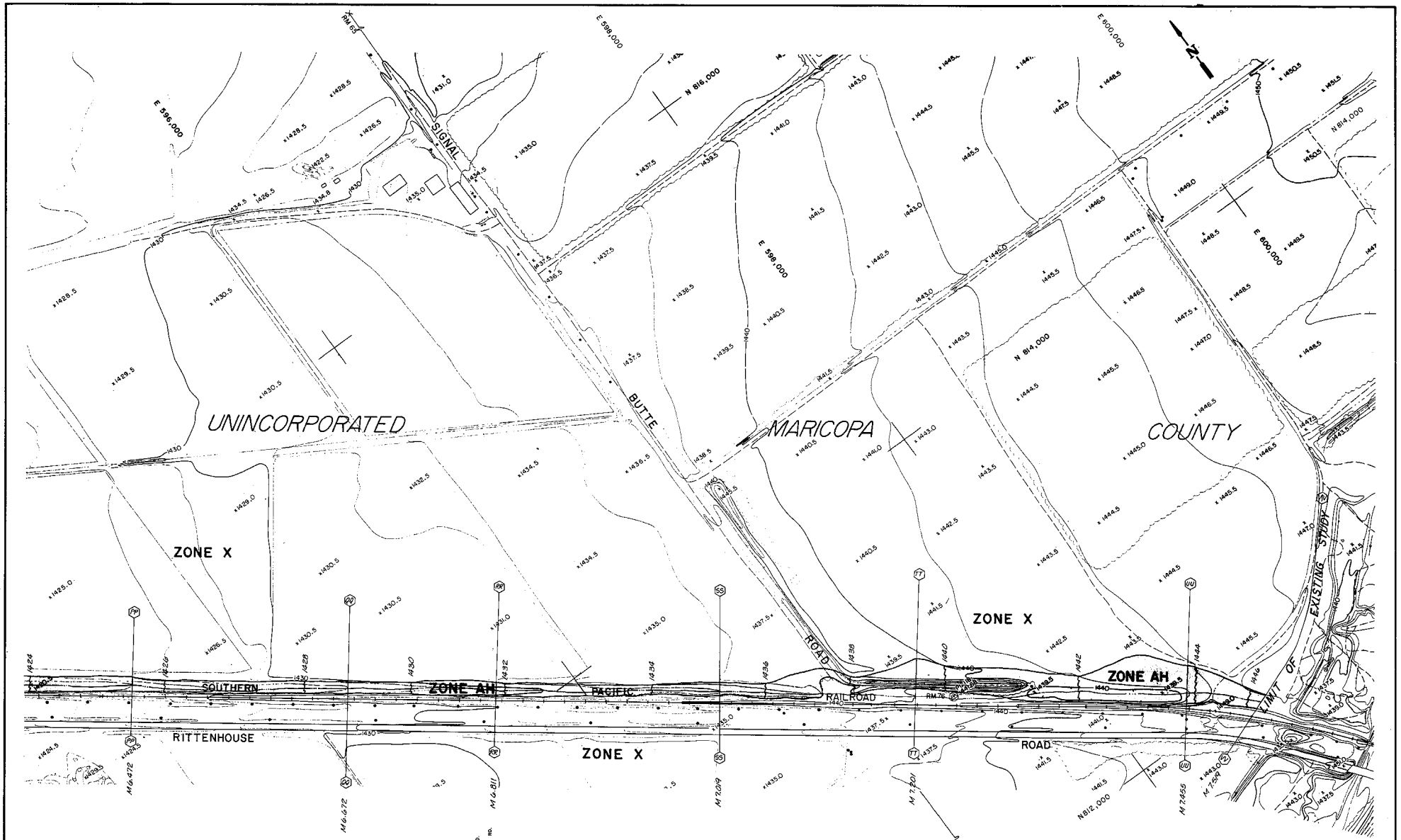
CONTOUR INTERVAL = 2'
FLIGHT DATE:
NOVEMBER 22, 1986

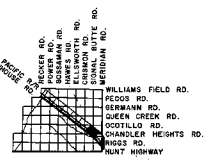
FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149





ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATIONS
RM 65	1429.50	P.K. nail at intersection of Ocotillo and Signal Butte Roads.
RM 76	1441.68	Hub and tack near intersection of Signal Butte and Chandler Heights Roads, 10' + north of 10' dirt road and 43' + east of railroad tracks.
RM 87	1437.66	Hub and tack at intersection of Riggs and Signal Butte Roads.

200' 0 200' 400'
SCALE IN FEET

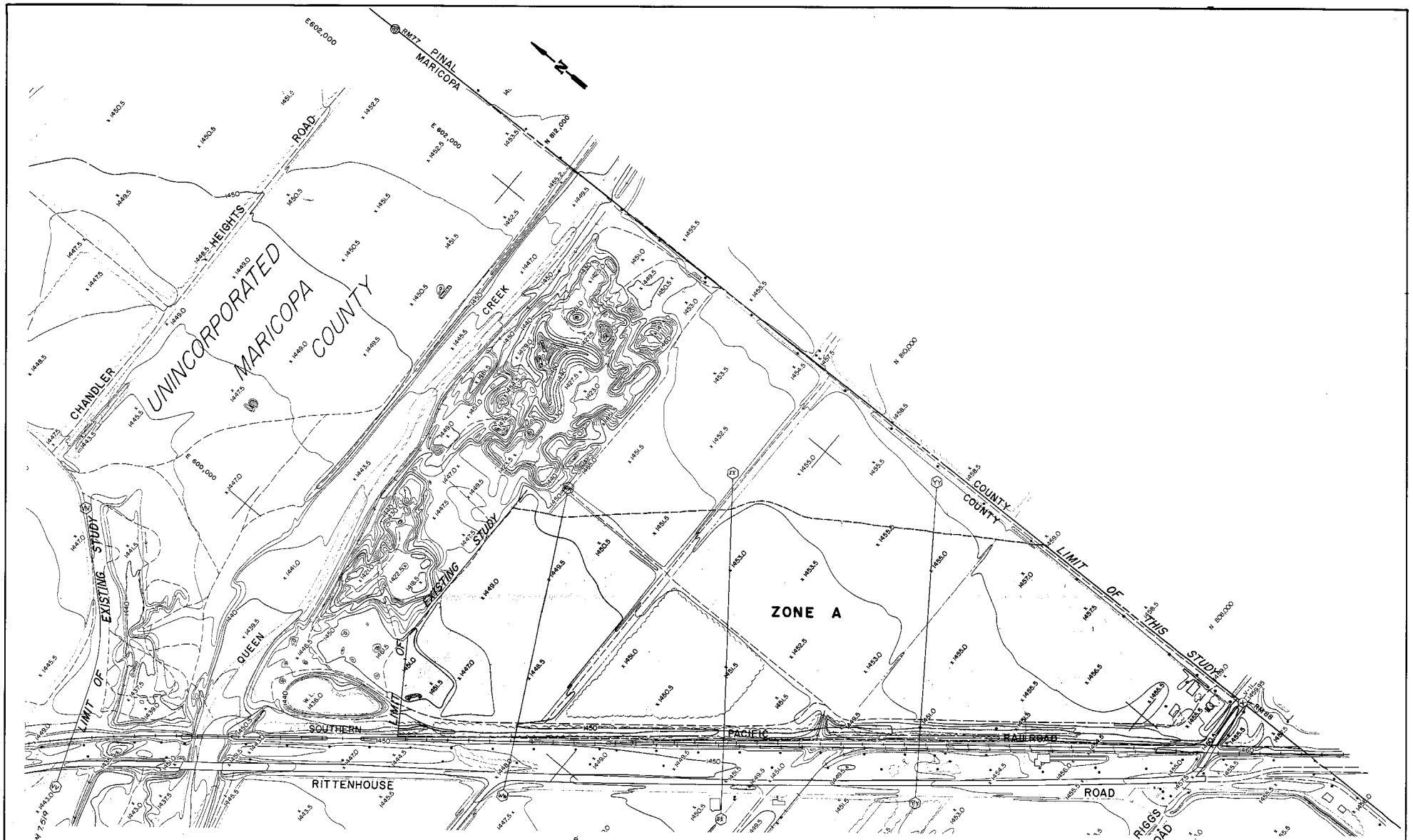
CONTOUR INTERVAL = 2'
FLIGHT DATE:
OCTOBER 19, 1986
NOVEMBER 22, 1986

FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149



ELEVATION REFERENCE MARKS

NOTE: All Elevations Based On National Geodetic Vertical Datum of 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATIONS
RM 77	1456.41	Hub and tack at intersection of Chandler Heights and Meridian Roads, 19' + west of power lines on north edge 10' dirt road.
RM 88	1459.95	P.K. nail near intersection of Riggs and Meridian Roads.

200' 0 200' 400'
SCALE IN FEET

CONTOUR INTERVAL = 2'
FLIGHT DATE:
OCTOBER 19, 1986
NOVEMBER 22, 1986

FCD CONTRACT 89-53
WA JOB NO. 89500

FLOOD INSURANCE STUDY
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA, MARICOPA COUNTY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 N. 20th Street • Suite 130 • Phoenix, Arizona • (602) 957-3149

EXHIBIT 3
ELEVATION REFERENCE MARKS

NOTE: The elevation reference data for this report and base flood elevations are level circuits run and adjusted in the period January, 1986 to September, 1986 for the "on rock" established NGVD published mark Designation X473 1981 Hawk Rock (Reference 14).

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
RM 18	1325.64	Brass cap in hand hole near Williams Air Force Base entrance just south on Power Road.
RM 26	1315.16	Brass cap flush at intersection of Pecos and Recker Roads.
RM 27	1332.42	P.K. nail at intersection of Power and Pecos Roads.
RM 32	1335.49	P.K. nail on Power Road 1320' south of Pecos Road.
RM 38	1336.29	Brass cap flush at intersection of Germann and Power Roads.
RM 33	1349.93	Hub and tack on Sossaman Road, 1320' south of Pecos Road, 25.5' east and 6' north of the SE corner of 6' industrial chain link fence.
RM 39	1355.38	1" pipe in pot hole at intersection of Sossaman and Germann Roads.
RM 51	1359.51	P.K. nail 200' north of Queen Creek Wash near the intersection of Queen Creek and Sossaman Roads.
RM 40	1374.53	1" pipe flush at intersection of Hawes and Germann Roads.
RM 52	1375.61	P.K. nail at intersection of Howard Pile Drive and Hawes Roads.
RM 62	1381.29	Brass cap flush at intersection of Ocotillo and Hawes Roads.
RM 41	1391.17	Brass cap in hand hole at intersection of Ellsworth and Germann Roads.
RM 53	1394.55	Brass cap in hand hole at intersection of Queen Creek and Ellsworth Roads.
RM 63	1399.80	Brass cap in hand hole at intersection of Ellsworth and Ocotillo Roads.
RM 74	1400.63	Brass cap in hand hole at intersection of Ellsworth and Chandler Heights Roads.
RM 54	1412.06	Brass cap in hand hole at intersection of Crismon and Queen Creek Roads.
RM 64	1415.08	1" pipe flush at intersection of Crismon and Ocotillo Roads.
RM 75	1416.87	Hub and tack 46' west of intersection of Crismon and Chandler Heights Roads.
RM 65	1429.50	P.K. nail at intersection of Ocotillo and Signal Butte Roads.
RM 76	1441.68	Hub and tack near intersection of Signal Butte and Chandler Heights Roads, 10' + north of 10' dirt road and 43' + east of railroad tracks.
RM 87	1437.66	Hub and tack at intersection of Riggs and Signal Butte Roads.
RM 77	1456.41	Hub and tack at intersection of Chandler Heights and Meridian Roads, 19' + west of power lines on north edge 10' dirt road.
RM 88	1459.95	P.K. nail near intersection of Riggs and Meridian Roads.

Appendix A

Addendum No. 1

ADDENDUM NO. 1
TO
FLOOD INSURANCE STUDY
FOR
SOUTHERN PACIFIC RAILROAD
QUEEN CREEK AREA
MARICOPA COUNTY, ARIZONA
CASE NUMBER: 90-09-68P

Submitted To: Federal Emergency Management Agency
500 C. Street, S.W.
Washington, D.C. 20472

Prepared For: Flood Control District of Maricopa County
FCD Contract No. 89-53
3335 West Durango Street
Phoenix, Arizona 85009
Contact: Ms. Jan Farmer (602) 262-1501

Prepared By: Wood & Associates, Inc.
Consulting Civil Engineers
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
Contact: Ms. Lynn Thomas, P.E. (602) 957-3149

June 1990
WA #89500

Addendum No. 1
Flood Insurance Study
Queen Creek Area

This addendum serves to respond to review comments received from the Federal Emergency Management Agency in a letter dated May 10, 1990 for the Flood Insurance Study along the upstream area of the Southern Pacific Railroad in the Queen Creek Area, Maricopa County, Arizona.

FEMA Comment

1. Please submit data which support the starting water surface elevation of 1321.30 feet (National Geodetic Vertical Datum) used in the HEC-2 hydraulic computer model for the 100-year recurrence interval flood along the Southern Pacific Railroad.

Wood & Associates' Response

Paragraph 4 on page 8 of the FIS report should be revised as follows:

> "The starting water surface elevation for the delineation shown on the work maps was based on computations started at critical depth. The approximate water surface elevation of 1321.30 was entered into the HEC-2 input data. The HEC-2 output data computed a starting water surface elevation of 1321.27. Copies of relevant drawings for the East Maricopa Floodway - Reach 4 construction and an approval letter are included (Attachment 1) with this addendum in an effort to provide an explanation for the decision to start computations at critical depth."

FEMA Comment

2. Our review of the submitted HEC-2 model determined that encroachment method 1 is used for most of the cross-sections modeled. Please submit an explanation of why this method was used to establish the 100-year floodplain boundary.

Wood & Associates' Response

During calibration of the HEC-2 model, encroachment method 1 was used to determine the floodplain boundary with average depths between 1 and 3 feet. Several cross-sections modeled were not extended vertically in the HEC-2 output and therefore, encroachment target stations have been deleted from the enclosed (Attachment 2) revised HEC-2 computer model. Several other cross-sections modeled are extended vertically and target stations have been selected in order to delineate a hydraulically acceptable floodplain boundary.

Addendum No. 1
Flood Insurance Study
Queen Creek Area

FEMA Comment

3. Our review of the calculated water-surface elevations and the topographic data at almost every cross-section indicates that the area inundated by the 100-year flood would be greater than that delineated on the topographic work maps entitled "Flood Insurance Study, Southern Pacific Railroad, Queen Creek Area, Maricopa County, Arizona," prepared by Wood & Associates, dated January 1990. Please submit an explanation for this discrepancy, a revised HEC-2 hydraulic model, and/or revised 100-year floodplain boundary delineations.

Wood & Associates' Response

Encroachment method 1 was used with the target station selected at the floodplain water depth of one foot or less. Results of this approach designated a hydraulically acceptable floodplain delineation, particularly since this portion of the area is characteristic of parallel contour lines with no well defined channel. In addition, this approach provides a floodplain with average depths between 1 and 3 feet.

FEMA Comment

4. The submitted HEC-2 hydraulic computer model for the 100-year recurrence interval flood along the Southern Pacific Railroad in the Queen Creek Area of Maricopa County, Arizona, and the work maps referenced in Item 3 contained the following discrepancies between the channel distances:

	HEC-2	Work Maps
XSEC	XLCH	XLCH
0.681	210	50
4.616	1500	1000

To resolve these discrepancies, please submit a revised HEC-2 hydraulic computer model and/or revised work maps.

Wood & Associates' Response

Channel distances shown on the "Work Maps" at the above referenced cross-sections were verified to be correct and the HEC-2 hydraulic computer model was revised, accordingly. The revised HEC-2 model is included (Attachment 2) in this addendum.

Addendum No. 1
Flood Insurance Study
Queen Creek Area

FEMA Comment

5. Please submit a hydraulic analysis that supports the Zone A flooding located between the East Maricopa Floodway limit of study and Germann Road.

Wood & Associates' Response

At the Southern Pacific Railroad crossing with Germann Road, a breakout of flow was calculated and split flow quantities were evaluated using the flow distribution in the HEC-2 output file. A HEC-2 hydraulic analysis was used to support the approximate Zone A delineation and is included (Attachment 3) in this addendum for additional supporting data.

In summary, we feel this addendum will satisfy the additional data required to complete the evaluation. We respectfully request FEMA continue processing this Request for a Flood Insurance Study/Flood Insurance Rate Map (FIRM) Revision. Please do not hesitate to call, should you need further clarification or additional data. We look forward to your response in the near future.

Very truly yours,

WOOD & ASSOCIATES, INC.

Lynn M. Thomas

Lynn M. Thomas, P.E.
Principal

LMT/tjb

Enclosures

ATTACHMENT 1

RWCD (EMF) FLOODWAY-REACH 4

a representative of our Technical Evaluation Contractor, we confirmed that reach 6 of the EMF had been completed.

We have completed our review of the data submitted and have determined that the floodplain boundaries as defined by the right-of-way limits for the EMF shown on the submitted construction drawings represent the best available flood data for reaches 1 through 6 of the EMF from the Maricopa/Pinal County boundary to Brown Road.

We will include this information in the planned Spring 1990 preliminary physical map revision for Maricopa County, Arizona and Incorporated Areas. Please note that you may utilize these data in your floodplain management programs.

If you have any questions regarding this matter, please contact Mr. Alan Johnson of my staff in Washington, D.C., at (202) 646-3403.

Sincerely,

John L. Matticks
Chief, Risk Studies Division
Federal Insurance Administration

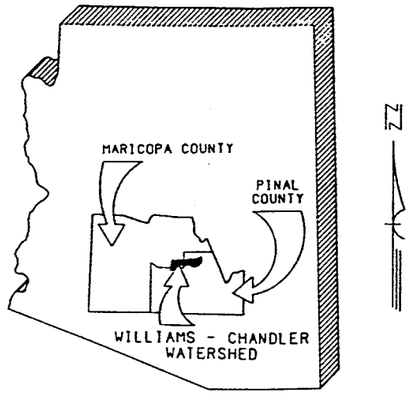
cc: Mr. D.E. Sagramoso, P.E.
Chief Engineer and General Manager, FCDMC

Ms. Jan Farmer
FCDMC

Mr. Charles R. Adams
SCS

FLOOD CONTROL DISTRICT
RECEIVED
AUG 30 '89
IPMS

H96



ARIZONA

WILLIAMS - CHANDLER WATERSHED PROTECTION AND FLOOD PREVENTION PROJECT MARICOPA AND PINAL COUNTIES, ARIZONA PLANS FOR THE CONSTRUCTION OF

R.W.C.D. FLOODWAY-REACH 4

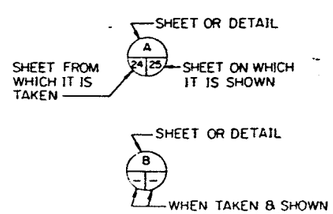
PREPARED FOR THE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BOARD OF SUPERVISORS OF PINAL COUNTY
EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT
BY
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

INDEX OF DRAWINGS

SHEET NO	TITLE
1	INDEX OF DRAWINGS
2	LOCATION MAP AND SPOIL SITES
3	PLAN AND PROFILE STA. 485+13.08 TO 505+00
4	PLAN AND PROFILE STA. 505+00 TO 525+00
5	PLAN AND PROFILE STA. 525+00 TO 545+00
6	PLAN AND PROFILE STA. 545+00 TO 565+00
7	PLAN AND PROFILE STA. 565+00 TO 585+00
8	PLAN AND PROFILE STA. 585+00 TO 605+00
9	PLAN AND PROFILE STA. 605+00 TO 625+00
10	PLAN AND PROFILE STA. 625+00 TO 645+00
11	PLAN AND PROFILE STA. 645+00 TO 665+00
12	PLAN AND PROFILE STA. 665+00 TO 685+00
13	PLAN AND PROFILE STA. 685+00 TO 705+00
14	PLAN AND PROFILE STA. 705+00 TO 725+00
15	PLAN AND PROFILE STA. 725+00 TO 745+28.37
16	TYPICAL EARTH CROSS SECTIONS
17	TYPICAL EARTH CROSS SECTIONS
18	TYPICAL R/C LINED CROSS SECTIONS
19	RETAINING WALL LAYOUT
20	RETAINING WALL STEEL DETAILS
21	JUNCTION LAYOUT
22	JUNCTION LAYOUT DETAILS
23	R/C LINING DETAILS
24	POWER RD. CHANNEL EXPANSION LAYOUT
25	POWER RD. CH. EXP. & MISC DETAILS
26	RITTENHOUSE LAYOUT
27	MISCELLANEOUS DETAILS
28	LOW DROP STRUCTURE
29	WEIR CREST AND BAFFLE STR. LAYOUT
30	BAFFLE STR. PILE DETAILS
31	LOW DROP WEIR & BAFFLE STL. DETAILS
32	SIDE INLET AND SCHEDULES
33	RAMP LAYOUT AND MISCELLANEOUS DETAILS
34	MAINTENANCE ROAD DRAIN DETAILS, RIGHT SIDE
35	OLD BOX CULVERT UNDER SO. PAC. RR.
36	FENCING DETAILS

LEGEND

- □ TEST PIT
- — COORDINATE GRID POINT
- △ SURVEY MONUMENT
- ● BENCH MARK



STRUCTURAL NOTES

1. EXPOSED CONCRETE EDGES SHALL BE CHAMFERED ONE INCH OR ROUNDED.
2. REINFORCING BAR SPACING IS CENTER TO CENTER OF BARS. BAR COVER IS CLEAR DISTANCE FROM SURFACE OF BAR AND FACE OF CONCRETE AND SHALL BE TWO INCHES FOR FORMED AND TOP SURFACES AND THREE INCHES FOR SURFACES PLACED AGAINST EARTH UNLESS OTHERWISE SHOWN.
3. IN SECTIONS WITH A SINGLE MAT OF REINFORCING. THE STEEL SHALL BE POSITIONED IN THE CENTER OF THE SECTION UNLESS OTHERWISE SHOWN.
4. BAR SPLICES SHALL BE LAPPED AS FOLLOWS EXCEPT WERE SPECIFICALLY SHOWN OTHERWISE. SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 1/2 OF THE BARS ARE SPLICED AT ONE LOCATION. BAR SPLICES SHALL BE LAPPED AS FOLLOWS:

SIZES	LAP (IN.)
4	18
5	23
6	27
7	34
8	44

5. ALL EXPOSED METAL INCLUDING ANCHOR BOLTS, NUTS, WASHERS, ETC. SHALL BE GALVANIZED UNLESS OTHERWISE NOTED.
6. ALL CONCRETE SHALL BE 4000X EXCEPT AS NOTED.

GENERAL NOTES

1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL U.S.G.S. DATUM.
2. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION AND IS THE MEASURED HORIZONTAL DISTANCE.
3. ALL SOIL CLASSIFICATION SYMBOLS SHOWN ARE BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487). FIELD IDENTIFICATION WAS USED EXCEPT WHERE INDICATED BY AN ASTERISK (*). THIS DENOTES LABORATORY CLASSIFICATION. LOGS AND DESCRIPTIONS ARE ABRIDGED. COMPLETE DRILLING LOGS, LABORATORY REPORTS AND GEOLOGY REPORTS ARE AVAILABLE FOR INSPECTION AT THE PROJECT OFFICE.
4. ALL BEARINGS ARE REFERENCED TO TRUE NORTH.
5. ALL FLOODWAY CROSS SECTIONS ARE SHOWN LOOKING IN THE DIRECTION OF INCREASING STATIONS EXCEPT AS NOTED.
6. LOCATION OF UTILITIES SHOWN ON THE DRAWINGS IS APPROXIMATE AND IS NOT INTENDED TO BE ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING AND COORDINATING HIS WORK WITH ALL UTILITY COMPANIES AND THE COMMANDER OF CIVIL ENGINEERING, WILLIAMS AIR FORCE BASE, ARIZONA.

EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
APPROVED	APPROVED
DATE 7-18-86 CHAIRMAN BOARD OF SUPERVISORS	DATE 4-24-86 CHIEF ENGINEER

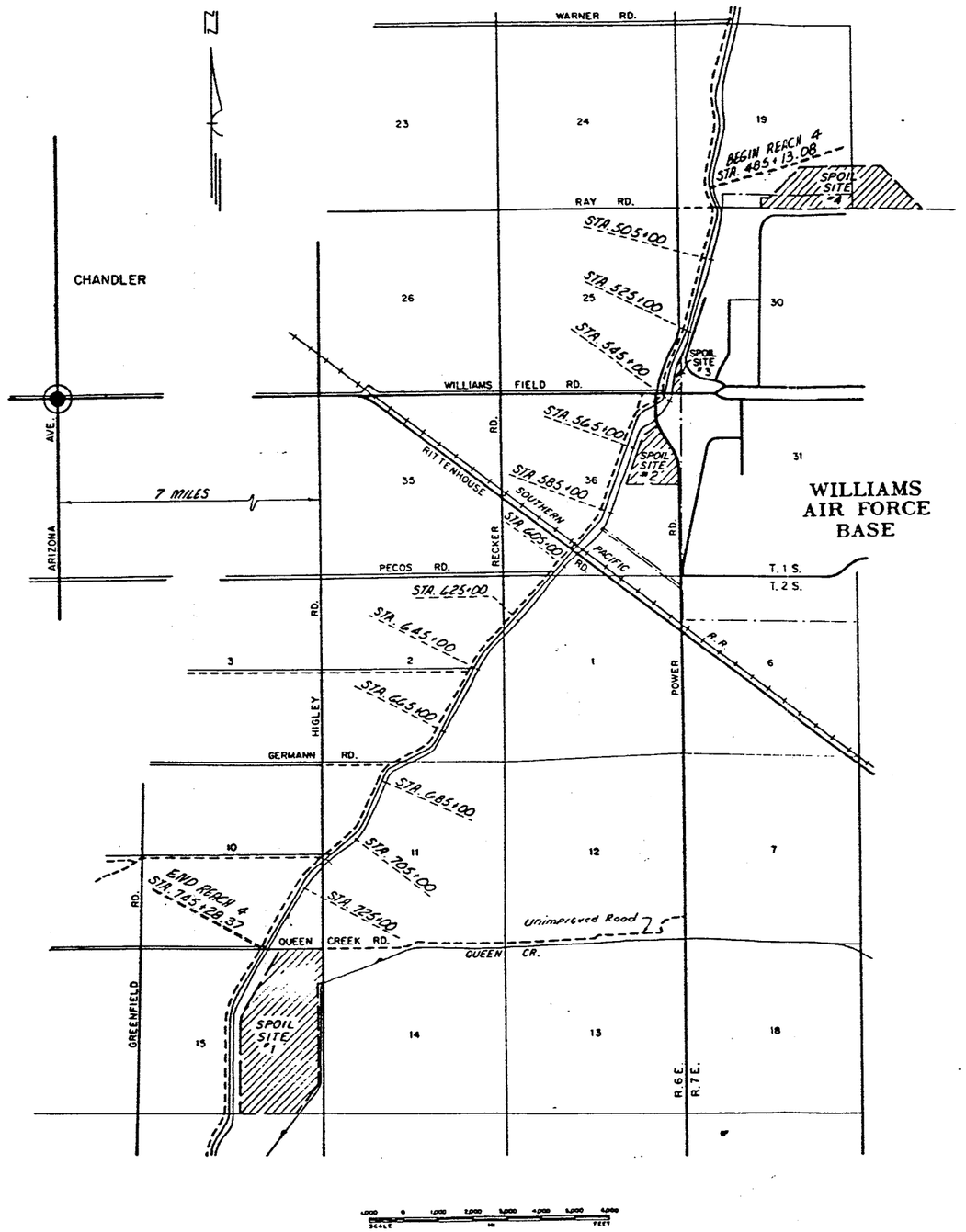
DATE	REVISIONS
7-18-86	SHEETS 12, 15, 17, 28

INDEX OF DRAWINGS
RWCD FLOODWAY - REACH 4
WILLIAMS-CHANDLER WPP
MARICOPA & PINAL COUNTIES, ARIZONA

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed SOIL CONSERVATION SVC. 4/86 Rev. Date
Drawn
Traced
Checked 2/86
Approved by Ralph M. Ennis, State Conservation Engineer
Daniel E. Wheeler 8-4-86, Asst. State Conservation Engineer
Sheet No. 1 of 36
Drawing No. AZ-85010-CH

SCS-ENG-333-5 Rev. 10-73



BENCHMARKS

NO. —	ELEVATION	DESCRIPTION	LOCATION
R4-21	1333.520	1/2" Rebar in Concrete	Sta 491+50.6 R/W line Rt. Side.
R4-20	1331.902	1/2" Rebar in Concrete	Sta. 478+21.68 R/W line Rt. Side.
MCHD	1322.159	Brass Cap Marked 1325.11	S.E. corner Rittenhouse Road Bridge
MCHD	1316.267	Brass Cap Marked 1319.62	N.W. corner Higley Road Bridge
MCHD	1315.223	Brass Cap Marked 1318.63	N.W. corner Queen Creek Road Bridge

NOTES: 1. Spoil in excess of that required to construct the floodway as shown on these plans shall be placed in the designated spoil sites 1,2,3 & 4 as shown on this sheet and staked in the field.

2. Maximum fill height (above existing ground) for spoil sites:

Site	Height (ft)	Approx. Volume
1	As staked in field	780,000 yrd^3
2	6'-0"	400,000 yrd^3
3	As staked in field	30,000 yrd^3
4	3'-0"	700,000 yrd^3

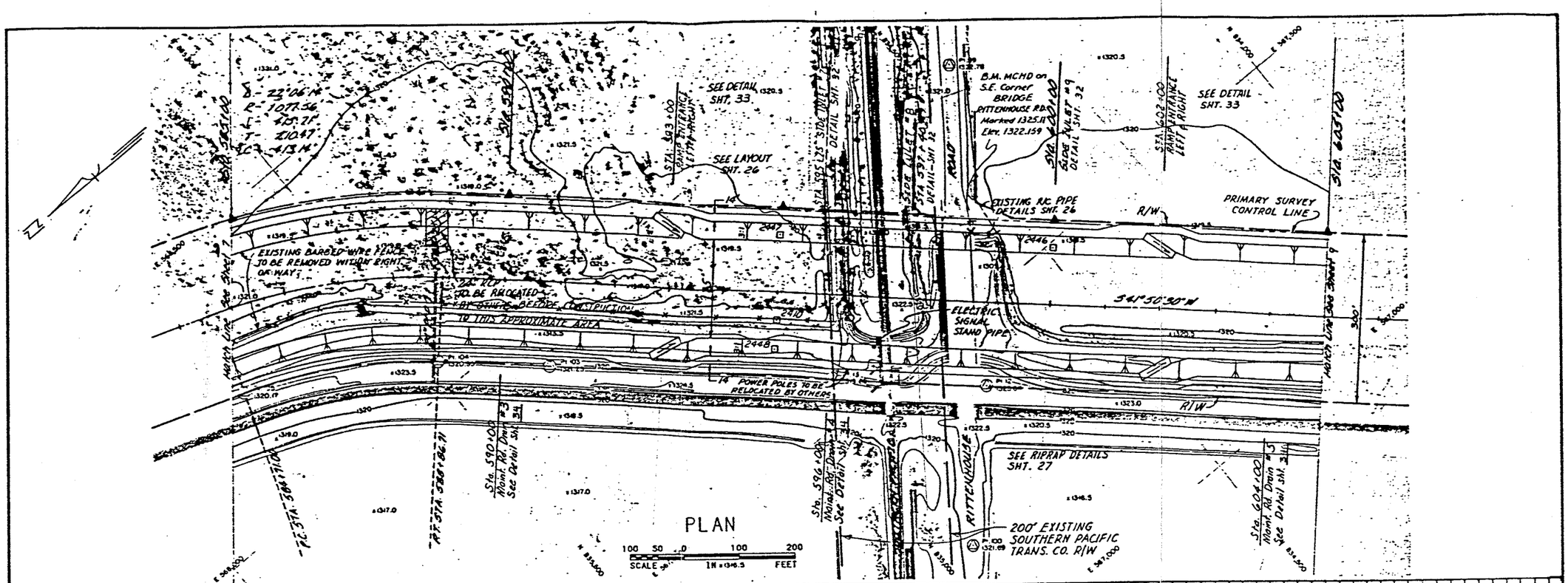
3. Notice shall be given to Williams Air Force Base prior to use of spoil site 4.
Contact: Air Field Manager, Lt. Col. Jerry Homewood, 988-5297
Base Engineers Office, Mike R. Toriello, 988-6887

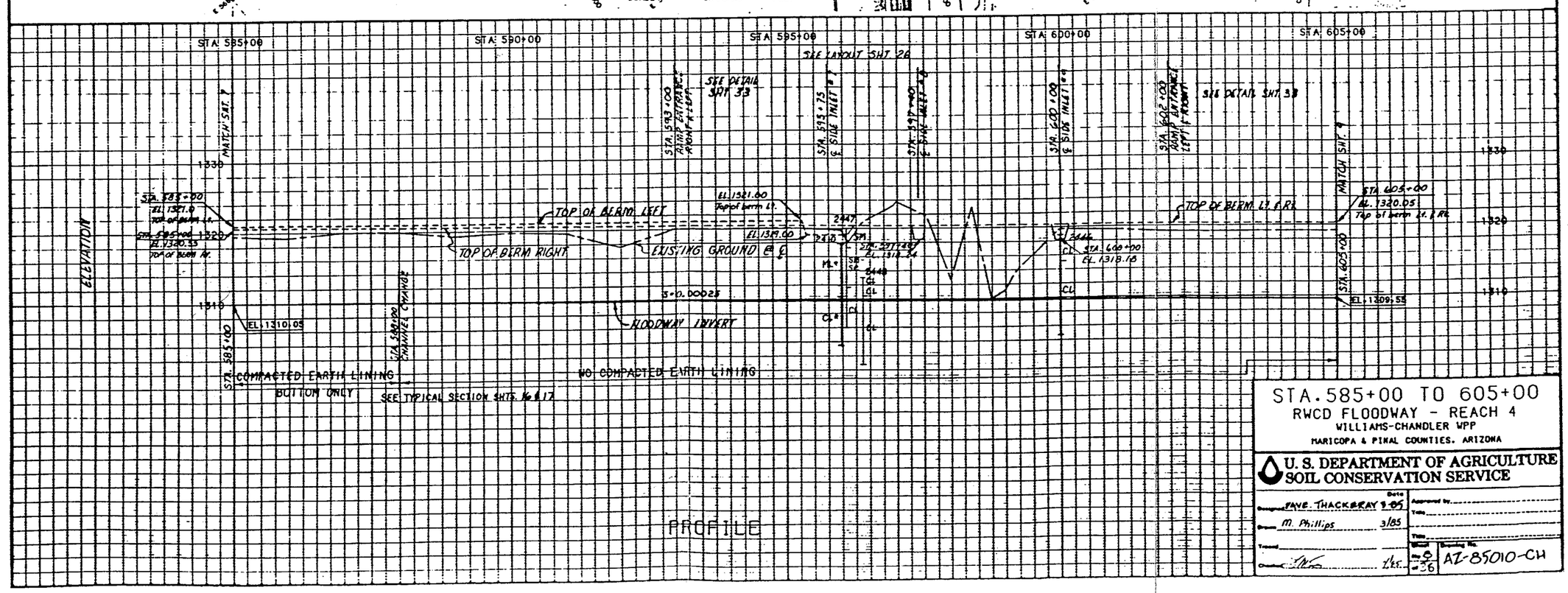
LOCATION MAP
RWCD FLOODWAY - REACH 4
WILLIAMS-CHANDLER WPP
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed DAVE THACKERAY 2/86
Drawn M.S. Phillips 2/86
Traced
Checked
Approved by
Title
Sheet no. 2 of 36
Drawing No. AZ-85010-CH

SCS-ENG-313-S Rev. 10-75

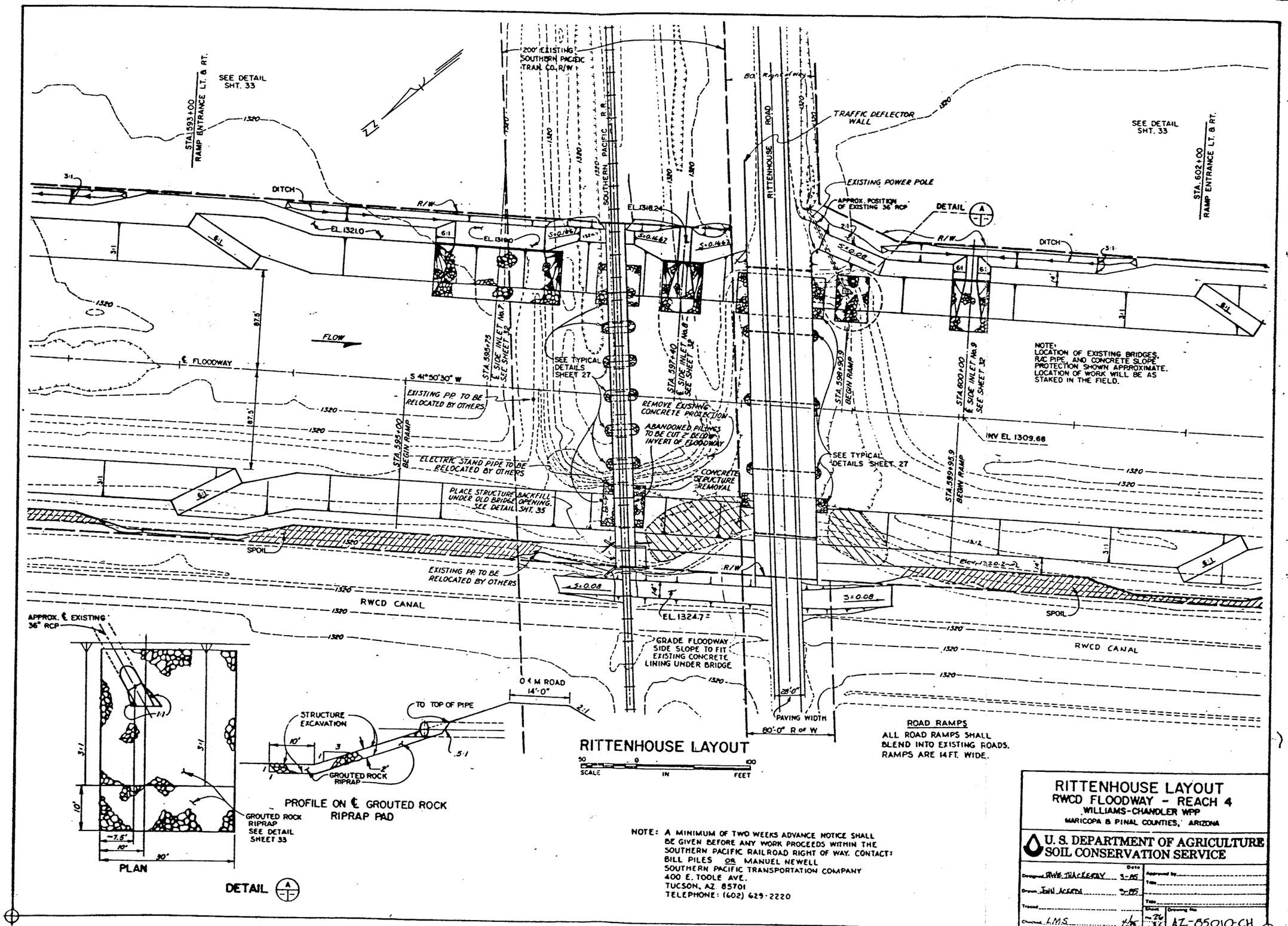




STA. 585+00 TO 605+00
RWCD FLOODWAY - REACH 4
WILLIAMS-CHANDLER WPP
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: DAVE THACKERAY 9-85
Drawn: M. Phillips 3/85
Traced:
Checked: 1/85
Approved by:
Title:
Sheet No. 9 of 36
Drawing No. AZ-85010-CH



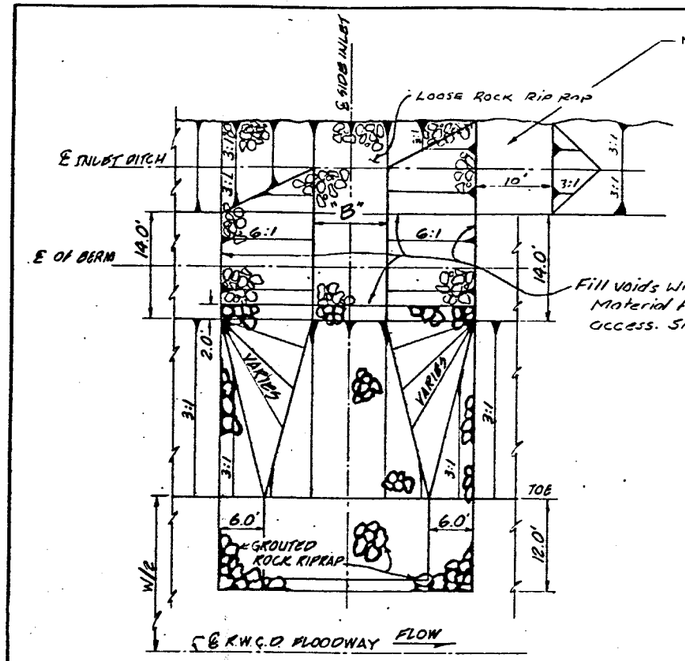
NOTE: A MINIMUM OF TWO WEEKS ADVANCE NOTICE SHALL BE GIVEN BEFORE ANY WORK PROCEEDS WITHIN THE SOUTHERN PACIFIC RAILROAD RIGHT OF WAY. CONTACT:
BILL PILES OR MANUEL NEWELL
SOUTHERN PACIFIC TRANSPORTATION COMPANY
400 E. TOOLE AVE.
TUCSON, AZ. 85701
TELEPHONE: (602) 629-2220

RITTENHOUSE LAYOUT
RWCD FLOODWAY - REACH 4
WILLIAMS-CHANDLER WPP
MARICOPA & PINAL COUNTIES, ARIZONA

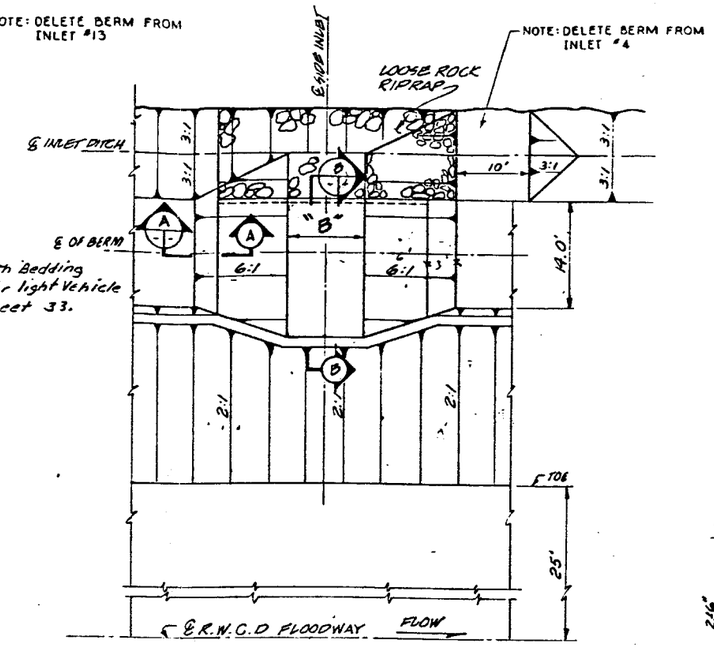
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed RWE THACKERAY	Date 9-85	Approved by	
Drawn JOHN ACKERS	9-85	Title	
Traced		Title	
Checked L.M.S.		Sheet No. 26 of 36	Drawing No. AZ-85010-CH

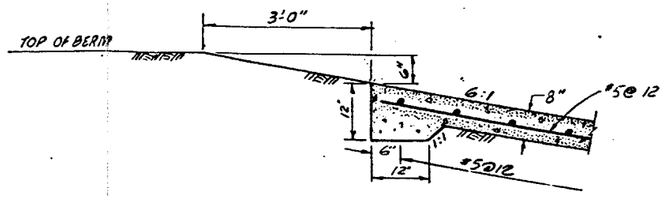
SCS-ENG-313-B Rev. 10-72



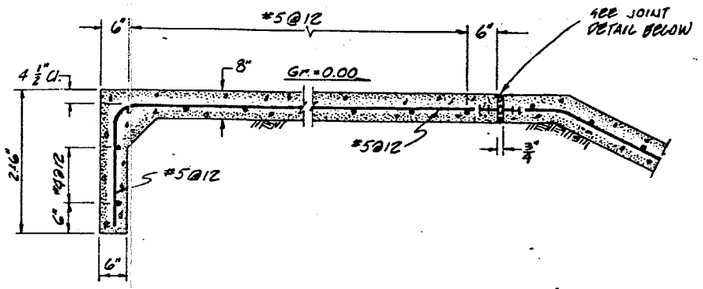
PLAN



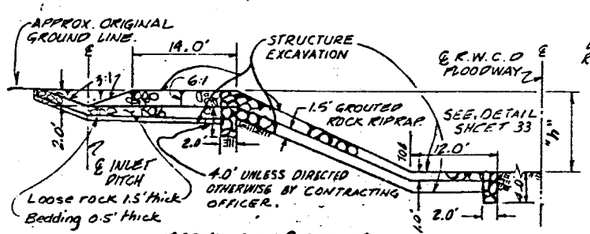
PLAN



SECTION A
(NOT TO SCALE)

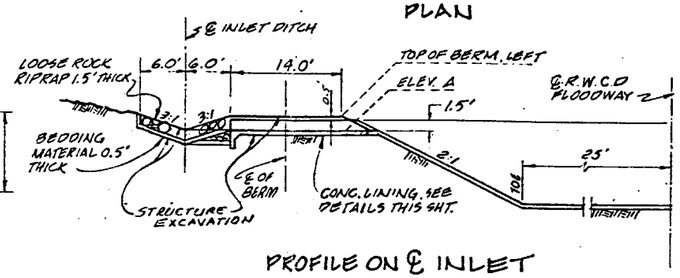


SECTION B
(NOT TO SCALE)



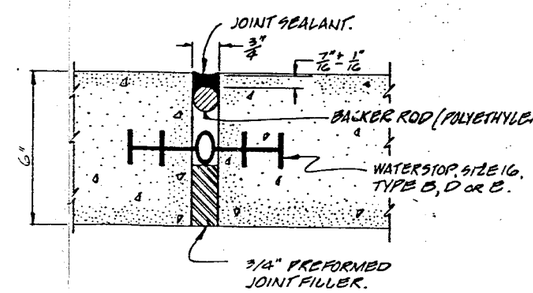
PROFILE ON ℄ INLET

GROUTED ROCK RIPRAP SIDE INLET DETAILS
(NOT TO SCALE)



PROFILE ON ℄ INLET

CONCRETE LINED SIDE INLET DETAILS
(NOT TO SCALE)



JOINT DETAIL
(NOT TO SCALE)

GROUTED ROCK RIPRAP SIDE INLET SCHEDULE				
NUMBER	STATION	"B"	"h"	W/2
5	567+30 Lt	10.0'	10.5'	87.5'
6	580+00 Lt	10.8'	10.83'	87.5'
7	595+75 Lt	80.0'	11.22'	87.5'
8	597+40 Lt	10.0'	10.5'	87.5'
9	600+00 Lt	10.0'	10.5'	87.5'
10	625+25 Lt	10.0'	10.5'	87.5'
11	685+50 Lt	10.0'	10.5'	75.0'
12	714+00 Lt	10.0'	10.5'	75.0'
13	726+50 Lt	10.0'	10.5'	75.0'

CONCRETE LINED SIDE INLET SCHEDULE			
NUMBER	STATION	"B"	ELEV. A
1	498+40 Lt	10.0'	1324.61
2	513+79.5 Lt	40.0'	1323.23
3	541+50 Lt	10.0'	1321.24
4	546+60 Lt	40.0'	1320.94

SIDE INLET DETAILS
R.W.C.D FLOODWAY-REACH 4
WILLIAMS-CHANDLER WPP
MARICOPA & PINAL COUNTIES, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed PAUL THACKERAY 3-85
Drawn JACK LAND 3-85
Traced
Checked T.I., L.M.S. 4-4-85
Approved by
Title
Sheet No. 32 of 36
Drawing No. AZ 85010 CH

SCS-ENG-313-9 Rev. 10-75

ATTACHMENT 2

REVISED HEC-2

ZONE AH 100-YEAR FLOODPLAIN

EMF TO QUEEN CREEK

```
T1       FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2       QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**89500R.DAT**
T3       100-YEAR FLOODPLAIN DELINEATION   REVISED: JUNE 1990
J1   -10       2       0              -1                        1321.30
J2    -1              -1
J3    38      43       1       2      26      39      21      22      27      28
J3    53      54               38      13      14      15      55      26      56
J3    63       1      51       4      42      57              38      39      33
J3     3      10      11      12       5       7       8      16      17      18
J5    +1
JC 0.040   0.050   0.050     0.1     0.3
QT     1    1085
ET           9.1                                                   9900.0 11100.0
X1 0.038      11  9950.0 10062.0
GR1325.4  9900.0  1321.1  9908.0  1320.8  9925.0  1321.1  9950.0  1321.0  9955.0
GR1319.7  9975.0  1319.2 10000.0  1319.2 10025.0  1319.5 10048.0  1321.0 10062.0
GR1321.0 11100.0
ET           9.1                                                   9960.0 11020.0
X1 0.199      16  9990.0 10045.0     880     880     880
X3     0  1322.0
GR1325.0  9835.0  1322.0  9840.0  1322.0  9880.0  1322.0  9945.0  1324.0  9950.0
GR1326.8  9960.0  1322.0  9990.0  1320.0 10000.0  1322.0 10045.0  1322.8 10350.0
GR1322.5 10710.0  1322.0 10910.0  1322.2 11020.0  1322.0 11150.0  1322.3 11360.0
GR1322.7 11760.0
ET           9.1                                                   9960.0 11000.0
X1 0.407      20  9980.0 10575.0    1100    1220    1100
GR1328.0  9840.0  1326.7  9860.0  1326.0  9905.0  1325.6  9925.0  1326.0  9940.0
GR1328.0  9950.0  1329.6  9960.0  1327.0  9980.0  1326.0 10000.0  1327.0 10575.0
GR1326.0 10680.0  1326.0 10730.0  1326.2 10880.0  1326.1 11000.0  1326.0 11100.0
GR1325.9 11200.0  1326.0 11270.0  1325.7 11600.0  1326.0 11900.0  1328.0 12000.0
X1 0.646      24  9970.0 10125.0    1250    1250    1250
X3    10  1330.0
GR1331.6  9750.0  1329.3  9765.0  1330.0  9780.0  1330.8  9800.0  1330.0  9830.0
GR1329.6  9840.0  1330.0  9850.0  1332.0  9860.0  1333.5  9875.0  1332.0  9885.0
GR1330.0  9905.0  1329.7  9925.0  1330.0  9950.0  1330.2  9960.0  1330.0  9970.0
GR1328.5 10000.0  1330.0 10005.0  1331.0 10125.0  1330.7 10270.0  1331.0 10400.0
GR1330.0 10555.0  1330.0 10780.0  1330.0 11000.0  1332.4 11160.0
JC 0.014   0.014   0.014     0.3     0.5
ET           9.1                                                   9725.0 11160.0
NR  1.25     2.4    2.83       0    33.7     3.7   120.0       0  1328.9  1328.8
X1 0.672      19  9984.2 10015.8     170     175     160
X2     0       0       1  1332.0  1334.0
X3    10
QT    -7  9725.0  1335.0  1333.0  9910.0  1335.5  1333.5  9984.2  1333.2  1332.9
QT       10015.8  1333.0  1332.9 10265.0  1334.0  1332.0 10750.0  1333.0  1331.0
QT       11160.0  1332.4  1331.0
GR1333.0  9725.0  1333.5  9910.0  1332.9  9983.2  1332.9  9984.2  1328.9  9984.3
GR1328.9  9994.1  1332.9  9994.2  1332.9  9995.0  1328.9  9995.1  1328.9 10004.9
GR1332.9 10005.0  1332.9 10005.8  1328.9 10015.0  1328.9 10015.7  1332.9 10015.8
GR1332.9 10016.8  1332.0 10265.0  1331.0 10750.0  1330.4 11160.0
JC 0.040   0.050   0.050     0.1     0.3
ET           9.1                                                   9700.0 11140.0
X1 0.681      13  9975.0 10025.0      50      50      50
X3    10  1332.0
GR1332.0  9365.0  1333.2  9525.0  1334.0  9670.0  1335.2  9700.0  1334.0  9710.0
GR1332.0  9975.0  1330.0  9995.0  1329.0 10000.0  1330.0 10015.0  1332.0 10025.0
GR1332.0 10160.0  1332.0 10875.0  1332.0 11140.0
ET           9.1                                                   9950.0 10600.0
X1 0.785      13  9985.0 10430.0     480     550     500
GR1333.5  9580.0  1333.0  9735.0  1333.0  9810.0  1334.0  9930.0  1336.3  9950.0
GR1336.0  9955.0  1334.0  9985.0  1333.0 10000.0  1333.5 10080.0  1334.0 10430.0
GR1334.0 10500.0  1334.0 10560.0  1336.0 10600.0
ET           9.1                                                   9975.0 10600.0
```

```
X1 0.843      13  9990.0 10395.0     370     400     370
GR1334.0  9785.0  1333.9  9800.0  1335.3  9830.0  1334.0  9870.0  1334.0  9955.0
GR1336.0  9960.0  1337.3  9975.0  1335.0  9990.0  1334.0 10000.0  1335.0 10395.0
GR1335.5 10680.0  1336.0 10860.0  1338.0 10920.0
ET           9.1                                                  9970.0 10600.0
X1 1.078      14  9990.0 10500.0    1240    1215    1240
GR1338.0  9625.0  1338.0  9800.0  1340.0  9830.0  1338.0  9875.0  1337.4  9910.0
GR1338.0  9945.0  1340.0  9955.0  1341.0  9970.0  1339.0  9990.0  1338.0 10000.0
GR1338.0 10080.0  1339.0 10500.0  1340.0 11610.0  1340.0 11690.0
ET           9.1                                                  9950.0 10600.0
X1 1.227      16  9980.0 10840.0     790     850     790
GR1343.0  9815.0  1342.0  9840.0  1340.0  9900.0  1339.5  9920.0  1340.0  9925.0
GR1342.0  9935.0  1344.0  9945.0  1344.8  9950.0  1342.0  9970.0  1341.5  9980.0
GR1340.5 10000.0  1341.0 10105.0  1341.5 10600.0  1341.5 10840.0  1342.0 11290.0
GR1344.0 12150.0
ET           9.1                                                  9950.0 10600.0
X1 1.419      17  9980.0 10120.0    1010    1230    1010
GR1348.2  9810.0  1345.0  9835.0  1345.3  9875.0  1344.0  9910.0  1344.0  9920.0
GR1346.0  9930.0  1348.0  9940.0  1348.6  9950.0  1345.0  9980.0  1344.0 10000.0
GR1345.0 10120.0  1346.0 10220.0  1346.1 10310.0  1346.0 10400.0  1345.5 10600.0
GR1345.0 10950.0  1346.0 11230.0
ET           9.1                                                  9960.0 10600.0
X1 1.561      14  9990.0 10040.0     750     750     750
GR1350.5  9820.0  1347.9  9840.0  1347.2  9870.0  1346.0  9920.0  1346.0  9935.0
GR1348.0  9940.0  1350.0  9950.0  1350.7  9960.0  1347.0  9990.0  1346.0 10000.0
GR1347.0 10040.0  1348.0 10480.0  1348.0 11050.0  1350.0 12620.0
ET           9.1                                                  9980.0 10600.0
X1 1.712      15  9995.0 10420.0     790     930     790
GR1351.5  9840.0  1350.0  9860.0  1349.0  9870.0  1350.0  9925.0  1349.0  9945.0
GR1350.0  9955.0  1352.0  9970.0  1352.9  9980.0  1351.0  9995.0  1350.0 10000.0
GR1350.3 10200.0  1350.0 10420.0  1349.9 10550.0  1350.0 10680.0  1352.0 11625.0
ET           9.1                                                  9940.0 10600.0
X1 1.860      12  9975.0 10380.0     780     800     780
GR1353.0  9810.0  1351.0  9840.0  1352.0  9855.0  1354.0  9880.0  1354.8  9920.0
GR1355.0  9940.0  1353.0  9975.0  1352.0 10000.0  1353.0 10380.0  1354.0 10530.0
GR1355.0 10640.0  1356.0 11220.0
WC 0.015   0.015   0.015     0.3     0.5
OT     1    1358
X1 1.939      11  9690.0 10270.0     210     550     370
X2                                                                      15
GR1360.1  8780.0  1359.2  8985.0  1358.3  9190.0  1356.7  9580.0  1356.8  9690.0
GR1356.7  9800.0  1356.4 10000.0  1357.4 10270.0  1358.6 10595.0  1359.6 10925.0
GR1360.7 11260.0
WC 0.040   0.040   0.040     0.1     0.3
ET           9.1                                                  9970.0 10545.0
X1 2.053      17  9990.0 10050.0     600     320     450
X2                                                                      15
GR1356.0  9600.0  1355.0  9680.0  1354.0  9790.0  1354.0  9805.0  1356.0  9830.0
GR1354.0  9850.0  1352.0  9870.0  1352.0  9935.0  1354.0  9950.0  1356.0  9955.0
GR1358.0  9970.0  1356.0  9990.0  1354.7 10000.0  1356.0 10050.0  1356.0 10220.0
GR1358.0 10470.0  1358.0 10545.0
OT     1    1172
X1 2.218       7  9990.0 10370.0     850     880     845
X2                                                                      15
GR1361.9  9965.0  1359.0  9990.0  1358.0 10000.0  1360.0 10370.0  1360.0 11000.0
GR1361.6 11010.0  1360.0 12100.0
X1 2.343       8  9990.0 10030.0     660     730     660
X3     0  1362.0
GR1364.8  9970.0  1362.0  9990.0  1360.0 10000.0  1362.0 10030.0  1362.0 10340.0
GR1363.0 10650.0  1364.0 11380.0  1364.9 11500.0
X1 2.559       7  9980.0 10030.0    1125    1125    1125
GR1368.7  9960.0  1366.0  9980.0  1364.0 10000.0  1366.0 10030.0  1366.0 10130.0
GR1368.0 10850.0  1368.0 12260.0
WC 0.040   0.050   0.050     0.1     0.3
X1 2.795       8  9970.0 10010.0    1250    1250    1250
X3     0  1365.2
```

```
GR1371.4  7740.0  1368.0  7770.0  1363.3 10000.0  1368.0 10010.0  1368.0 10020.0
GR1368.0 10140.0  1370.0 10960.0  1372.0 11740.0
X1 2.947       9  9985.0 10020.0     800     800     800
GR1373.2  9950.0  1368.0  9985.0  1366.0 10000.0  1368.0 10020.0  1370.0 10030.0
GR1370.0 10180.0  1372.0 11240.0  1374.0 11770.0  1376.0 12200.0
X1 3.136      10  9985.0 10030.0    1000    1000    1000
X3     0  1371.0
GR1376.3  9960.0  1370.0  9985.0  1366.5 10000.0  1372.0 10030.0  1374.0 10300.0
GR1374.0 10420.0  1376.0 11170.0  1376.0 11250.0  1376.0 11530.0  1378.0 12000.0
X1 3.305       9  9980.0 10030.0     890     890     890
X3     0  1375.0
GR1380.2  9960.0  1380.0  9970.0  1376.0  9980.0  1373.0 10000.0  1376.0 10030.0
GR1377.0 10190.0  1378.0 10910.0  1380.0 11840.0  1380.0 12230.0
X1 3.551       6  9990.0 10025.0    1300    1300    1300
GR1384.0  9955.0  1378.0  9990.0  1377.0 10000.0  1380.0 10025.0  1382.0 10060.0
GR1384.0 12100.0
X1 3.676       9  9980.0 10015.0     670     670     670
GR1385.9  9965.0  1380.0  9980.0  1378.8 10000.0  1380.0 10015.0  1382.0 10025.0
GR1382.0 10050.0  1382.0 10260.0  1384.0 11090.0  1386.0 12210.0
QT     1     828
X1 3.892       9  9985.0 10030.0    1140    1140    1140
GR1389.6  9960.0  1384.0  9985.0  1382.0 10000.0  1386.0 10030.0  1386.0 10100.0
GR1386.8 10650.0  1387.0 11150.0  1388.0 11540.0  1389.0 12125.0
NC 0.100   0.035   0.050     0.1     0.3
ET           9.1                                                  9560.0 10960.0
X1 4.123      12  9440.0 10090.0    1270    1200    1235
GR1393.1  9440.0  1388.0  9475.0  1390.0  9530.0  1390.0  9560.0  1388.8 10000.0
GR1390.0 10090.0  1390.0 10120.0  1389.4 10300.0  1389.3 10800.0  1390.0 10960.0
GR1390.0 11330.0  1391.0 12450.0
ET           9.1                                                  9300.0 10900.0
X1 4.230       8  9740.0 10180.0     800     700     650
GR1392.0  9045.0  1391.0  9250.0  1391.0  9740.0  1391.0 10000.0  1391.4 10180.0
GR1391.0 10225.0  1391.0 10700.0  1392.0 10900.0
NC 0.015   0.015   0.015     0.3     0.5
X1 4.341       8  9585.0 10480.0     580     520     490
GR1399.5  8420.0  1398.0  8610.0  1396.0  8830.0  1395.0  9175.0  1394.5  9585.0
GR1394.0 10000.0  1394.5 10480.0  1394.9 10880.0
NC 0.040   0.100   0.050     0.1     0.3
ET           9.1                                                  9850.0 11250.0
X1 4.616       9  9930.0 10640.0    1000    1000    1000
GR1399.5  9850.0  1396.0  9930.0  1395.0 10000.0  1394.4 10100.0  1395.0 10640.0
GR1395.1 11130.0  1396.0 12030.0  1396.0 12440.0  1398.0 12560.0
X1 4.637       7  9925.0 10010.0      75     550     110
GR1399.5  9880.0  1398.0  9925.0  1395.3 10000.0  1395.5 10010.0  1396.0 10480.0
GR1398.0 10870.0  1400.0 11320.0
NC 0.040   0.040   0.035     0.1     0.3
X1 4.748       8  9960.0 10070.0     630     330     600
GR1400.6  9950.0  1398.0  9960.0  1396.0 10000.0  1396.0 10070.0  1396.0 10280.0
GR1398.0 10510.0  1400.0 11400.0  1402.0 12720.0
X1 4.924       8  9975.0 10490.0     930    1040     930
GR1403.2  9960.0  1401.0  9975.0  1400.0 10000.0  1401.0 10490.0  1402.0 10760.0
GR1402.0 11000.0  1404.0 12280.0  1404.5 12820.0
X1 5.038       8  9985.0 10640.0     600     630     600
GR1406.2  9965.0  1403.0  9985.0  1402.0 10000.0  1403.0 10640.0  1404.0 11100.0
GR1404.0 11475.0  1406.0 11485.0  1406.0 11800.0
ET           9.1                                                  9970.0 10500.0
X1 5.170      10  9990.0 10100.0     700     700     700
GR1409.6  9970.0  1408.0  9985.0  1407.0  9990.0  1406.0 10000.0  1406.0 10080.0
GR1406.7 10100.0  1406.2 10500.0  1406.0 10740.0  1406.0 11460.0  1408.0 11920.0
ET           9.1                                                  9955.0 10800.0
X1 5.375       9  9990.0 10040.0    1080    1150    1080
GR1411.9  9955.0  1409.0  9990.0  1408.0 10000.0  1409.5 10040.0  1410.0 10350.0
GR1410.6 10800.0  1410.0 11310.0  1411.0 12250.0  1412.0 12755.0
X1 5.523       8  9940.0 10120.0     780     790     780
GR1414.2  9920.0  1414.0  9930.0  1412.0  9940.0  1411.0 10000.0  1412.0 10120.0
GR1413.0 10400.0  1413.0 10860.0  1413.0 11365.0
```

```
NC 0.013   0.013   0.013     0.3     0.3
X1 5.631       8  9730.0 10300.0     340     800     600
GR1414.5  9425.0  1412.0  9730.0  1410.3 10000.0  1412.0 10300.0  1414.0 10500.0
GR1415.0 10870.0  1416.0 11010.0  1416.0 11525.0
OT     1     393
NC 0.040   0.040   0.035     0.1     0.3
X1 5.864       8  9975.0 10390.0    1410    1050    1230
GR1418.0  9940.0  1414.0  9975.0  1413.0 10000.0  1414.0 10020.0  1415.0 10390.0
GR1416.0 10745.0  1417.0 11120.0  1416.8 11350.0
ET           9.1                                                  9960.0 10770.0
X1 6.047       9  9990.0 10020.0     970     980     970
GR1421.0  9960.0  1417.0  9990.0  1416.0 10000.0  1417.0 10020.0  1418.0 10045.0
GR1420.0 10770.0  1420.0 11670.0  1418.0 11685.0  1418.0 11850.0
ET           9.1                                                  9965.0 10510.0
X1 6.259       9  9995.0 10025.0    1120    1120    1120
GR1424.8  9965.0  1421.0  9995.0  1420.0 10000.0  1421.0 10025.0  1422.0 10150.0
GR1424.0 10510.0  1424.0 12010.0  1422.0 12025.0  1422.0 12560.0
X1 6.472      10  9990.0 10015.0    1120    1120    1120
GR1428.9  9950.0  1424.0  9980.0  1423.0  9990.0  1422.0 10000.0  1423.0 10015.0
GR1424.0 10025.0  1426.0 10050.0  1426.0 10545.0  1430.0 11095.0  1430.0 12100.0
X1 6.672       7  9990.0 10015.0    1060    1060    1060
GR1432.4  9945.0  1427.0  9990.0  1426.0 10000.0  1427.0 10015.0  1430.0 10040.0
GR1432.0 11160.0  1434.0 12135.0
X1 6.811      10  9980.0 10020.0     730     730     730
GR1434.5  9950.0  1430.0  9980.0  1429.0 10000.0  1430.0 10020.0  1432.0 10050.0
GR1432.0 10630.0  1434.0 10725.0  1434.0 11315.0  1434.0 11395.0  1436.0 12150.0
X1 7.019      10  9990.0 10020.0    1100    1100    1100
GR1440.1  9945.0  1433.0  9990.0  1432.0 10000.0  1433.0 10020.0  1440.0 10040.0
GR1436.0 10070.0  1436.0 10310.0  1438.0 10890.0  1440.0 10905.0  1440.0 12710.0
X1 7.201       8  9980.0 10090.0     960     960     960
X3     0  1438.0
GR1441.6  9960.0  1441.0  9980.0  1440.0 10000.0  1440.0 10040.0  1434.0 10060.0
GR1438.0 10090.0  1440.0 10220.0  1442.0 10810.0
X1 7.455      10  9980.0 10115.0    1340    1340    1340
GR1448.6  9950.0  1443.0  9980.0  1442.0 10000.0  1442.0 10050.0  1443.0 10115.0
GR1444.0 10190.0  1446.0 11235.0  1446.5 11400.0  1448.0 11990.0  1448.5 12300.0
ET           9.1                                                  9970.0 10050.0
X1 7.519       7  9970.0 10050.0     340     340     340
GR1449.2  9920.0  1448.0  9960.0  1446.0  9970.0  1445.0 10000.0  1446.0 10050.0
GR1446.0 11300.0  1446.0 11640.0
EJ


ER
```

```
*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*                                                   *
*  RUN DATE: 06/08/1990       TIME: 10:52:45.33     *
*****************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 551-1748 (FTS) 448-2105    *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

```
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION   :::
:::          by: HAESTAD METHODS          :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```


==========
H A E S T A D M E T H O D S
==========

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS RUN EXECUTED: 06/08/1990 10:52:45.66

```
*************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*************************************************
```

```
T1      FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2      QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**89500R.DAT**
T3      100-YEAR FLOODPLAIN DELINEATION   REVISED: JUNE 1990

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

   -10.       2.       0.       0. -1.000000     0.00     0.0      0.  1321.300    0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

   -1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

   38.000   43.000    1.000    2.000   26.000   39.000   21.000   22.000   27.000   28.000

   53.000   54.000    0.000   38.000   13.000   14.000   15.000   55.000   26.000   56.000

   63.000    1.000   51.000    4.000   42.000   57.000    0.000   38.000   39.000   33.000

    3.000   10.000   11.000   12.000    5.000    7.000    8.000   16.000   17.000   18.000

J5  LPRNT    NUMSEC                  ********REQUESTED SECTION NUMBERS********

    1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
```

```
   SECND    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       DLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


#PROF 1


CCHV=   0.100 CEHV=   0.300
#SECND 0.038
3280 CROSS SECTION      0.04 EXTENDED      0.27 FEET

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9900.0   11100.0  TYPE=     1  TARGET=    1200.000
     0.04     2.07  1321.27  1321.27     0.00  1321.45     0.17     0.00     0.00  1321.10
    1085.      24.     704.     357.      14.     176.     284.       0.       0.   1321.00
     0.00     1.75     4.01     1.25    0.040    0.050    0.050    0.000  1319.20  9907.68
 0.010008       0.       0.       0.        0        5        0     0.00  1192.32 11100.00


#SECND 0.199
3280 CROSS SECTION      0.20 EXTENDED      0.76 FEET


3470 ENCROACHMENT STATIONS=    9960.0   11020.0  TYPE=     1  TARGET=    1060.000
     0.20     1.47  1323.47     0.00     0.00  1323.49     0.02     2.02     0.02  1322.00
    1085.       6.      97.     982.       7.      80.    1007.      16.      23.   1322.00
     0.25     0.94     1.21     0.98    0.040    0.050    0.050    0.000  1322.00  9980.87
 0.000995     880.     880.     880.        6        0        0     0.00  1039.13 11020.00


#SECND 0.407

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    9960.0   11000.0  TYPE=     1  TARGET=    1040.000
     0.41     0.71  1326.71     0.00     0.00  1326.85     0.14     3.33     0.04  1327.00
    1085.       0.     357.     728.       0.     149.     220.      36.      48.   1327.00
     0.36     0.00     2.40     3.31    0.000    0.050    0.050    0.000  1326.00  9985.85
 0.026034    1100.    1100.    1220.        5        0        0     0.00   815.26 11000.00


#SECND 0.646

3265 DIVIDED FLOW
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       QLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 0.785
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
     0.79     1.21  1334.21  1334.21     0.00  1334.46     0.25     1.29     0.07  1334.00
    1085.       1.    1025.      59.       0.     249.      28.      73.      96.   1334.00
     0.82     1.69     4.12     2.14    0.040    0.050    0.050    0.000  1333.00  9981.84
 0.041777     480.     500.     550.      19       11        0     0.00   582.37 10564.21


*SECNO 0.843

3470 ENCROACHMENT STATIONS=    9975.0   10600.0  TYPE=     1  TARGET=     625.000
     0.84     2.00  1336.00     0.00     0.00  1336.03     0.03     1.55     0.02  1335.00
    1085.       3.     912.     170.       3.     611.     170.      78.     101.   1335.00
     0.89     0.89     1.49     1.00    0.040    0.050    0.050    0.000  1334.00  9983.42
 0.001460     375.     370.     405.       6        0        0     0.00   616.58 10600.00


*SECNO 1.078

3470 ENCROACHMENT STATIONS=    9970.0   10600.0  TYPE=     1  TARGET=     630.000
     1.08     1.29  1339.29     0.00     0.00  1339.36     0.07     3.31     0.01  1339.00
    1085.       0.    1079.       6.       0.     504.       6.      96.     119.   1339.00
     1.05     0.81     2.14     1.00    0.040    0.050    0.050    0.000  1338.00  9987.13
 0.006400    1240.    1240.    1215.       8        0        0     0.00   612.87 10600.00


*SECNO 1.227

3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
     1.23     1.77  1342.27     0.00     0.00  1342.31     0.04     2.95     0.00  1341.50
    1085.       6.    1079.       0.       5.     687.       0.     107.     130. 100000.00
     1.19     1.15     1.57     0.00    0.040    0.050    0.000    0.000  1340.50  9968.11
 0.002442     790.     790.     850.       4        0        0     0.00   631.89 10600.00


*SECNO 1.419
3280 CROSS SECTION      1.42 EXTENDED      0.17 FEET


3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

    0.65     1.15  1331.15     0.00     0.00  1331.17     0.02     4.31     0.01  1330.00
   1085.     221.     106.     758.     167.     119.     743.      56.      78.   1331.00
    0.68     1.32     0.89     1.02    0.040    0.050    0.050    0.000  1330.00  9754.18
 0.001287    1250.    1250.    1250.        9        0        0     0.00  1285.10 11076.96

CCHV=   0.300 CEHV=   0.500

SPECIAL BRIDGE

5227 DOWNSTREAM ELEV IS   1330.80 ,NOT   1331.15 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
    1.25      2.40      2.83      0.00     33.70      3.70    120.00      0.00   1328.90   1328.80

*SECNO 0.672
 PRESS FLOW BECAUSE EGLWC OF   1342.79  EXCEEDS 1.5 DEPTH

3265 DIVIDED FLOW

3280 CROSS SECTION      0.67 EXTENDED      2.64 FEET

PRESSURE AND WEIR FLOW

 EGPRS     EGLWC      H3       QWEIR     QPR       BAREA   TRAPEZOID     ELLC     ELTRD
                                                            AREA
  1334.20  1342.79     0.00      234.      855.      120.      93.     1332.00  1334.00


3470 ENCROACHMENT STATIONS=    9725.0   11160.0  TYPE=     1  TARGET=    1435.000
    0.67     4.14  1333.04     0.00     0.00  1333.04     0.00     1.87     0.00  1332.90
   1085.       0.      62.    1023.       2.     105.    1857.      62.      83.   1332.90
    0.77     0.06     0.59     0.55    0.014    0.014    0.014    0.000  1328.90  9725.00
 0.000012     170.     160.     175.        0        0        6     0.00  1210.26 11160.00


CCHV=   0.100 CEHV=   0.300
*SECNO 0.681
3280 CROSS SECTION      0.68 EXTENDED      1.04 FEET


3470 ENCROACHMENT STATIONS=    9700.0   11140.0  TYPE=     1  TARGET=    1440.000
    0.68     1.04  1333.04     0.00     0.00  1333.05     0.01     0.00     0.00  1332.00
   1085.      48.      45.     992.      71.      52.    1155.      64.      84.   1332.00
    0.78     0.68     0.86     0.86    0.040    0.050    0.050    0.000  1332.00  9837.76
 0.000799      50.      50.      50.        2        0        0     0.00  1302.24 11140.00
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


    1.42     2.17  1346.17     0.00     0.00  1346.32     0.15     3.98     0.03  1345.00
   1085.      12.     814.     258.       6.     234.     174.     121.     146.   1345.00
    1.29     2.15     3.48     1.48    0.040    0.050    0.050    0.000  1344.00  9970.23
 0.006898   1010.    1010.    1230.        4        0        0     0.00   629.77 10600.00


*SECNO 1.561

3470 ENCROACHMENT STATIONS=    9960.0   10600.0  TYPE=     1  TARGET=     640.000
    1.56     2.69  1348.69     0.00     0.00  1348.73     0.04     2.40     0.01  1347.00
   1085.      16.     235.     833.      12.     110.     600.     130.     156.   1347.00
    1.43     1.42     2.15     1.37    0.040    0.050    0.050    0.000  1346.00  9976.28
 0.001836     750.     750.     750.        6        0        0     0.00   623.72 10600.00


*SECNO 1.712

3470 ENCROACHMENT STATIONS=    9980.0   10600.0  TYPE=     1  TARGET=     620.000
    1.71     1.13  1351.03     0.00     0.00  1351.09     0.06     2.36     0.01  1351.00
   1085.       0.     676.     409.       0.     374.     197.     143.     169.   1350.00
    1.55     0.02     1.81     2.08    0.040    0.050    0.050    0.000  1349.90  9994.73
 0.004384     790.     790.     930.        4        0        0     0.00   605.27 10600.00


*SECNO 1.860

3470 ENCROACHMENT STATIONS=    9940.0   10600.0  TYPE=     1  TARGET=     660.000
    1.86     1.81  1353.81     0.00     0.00  1353.87     0.06     2.78     0.00  1353.00
   1085.       7.    1034.      45.       6.     535.      50.     154.     179.   1353.00
    1.67     1.11     1.93     0.89    0.040    0.050    0.050    0.000  1352.00  9960.65
 0.002924     780.     780.     800.        4        0        0     0.00   542.34 10502.99


CCHV=   0.300 CEHV=   0.500
*SECNO 1.939
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    1.94     0.81  1357.21  1357.21     0.00  1357.44     0.23     1.24     0.09  1356.80
   1358.     269.    1089.       0.      82.     271.       0.     158.     184.   1357.40
    1.69     3.27     4.03     0.00    0.015    0.015    0.000    0.000  1356.40  9455.96
 0.004032     210.     370.     550.       20       18        0     0.00   762.43 10218.39
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


FLOW DISTRIBUTION FOR SECNO=      1.94         CWSEL=   1357.21

STA=    9456.    9580.    9690.   10270.
 PER Q=      5.9     13.9     80.2
  AREA=     31.6     50.5    270.6
   VEL=      2.5      3.7      4.0

CEHV=   0.100 CEHV=   0.300
*SECNO 2.053
3280 CROSS SECTION      2.05 EXTENDED      0.11 FEET


3470 ENCROACHMENT STATIONS=    9970.0   10545.0  TYPE=     1  TARGET=     575.000
     2.05     3.40  1358.10     0.00     0.00  1358.15     0.04     0.68     0.02  1356.00
    1358.      26.     357.     975.      22.     166.     644.     163.     191.   1356.00
     1.76     1.17     2.16     1.51    0.040    0.040    0.040    0.000  1354.70  9970.00
 0.000873     600.     450.     320.        3        0        0     0.00   575.00 10545.00


FLOW DISTRIBUTION FOR SECNO=      2.05         CWSEL=   1358.10

STA=    9970.    9990.   10050.   10220.   10470.   10545.
 PER Q=      1.9     26.3     47.7     24.0      0.2
  AREA=     22.2    165.5    358.5    277.2      8.2
   VEL=      1.2      2.2      1.8      1.2      0.2

*SECNO 2.218
     2.22     1.72  1359.72     0.00     0.00  1359.97     0.25     1.77     0.06  1359.00
    1172.       5.    1167.       0.       2.     288.       0.     174.     200.   1360.00
     1.82     2.25     4.06     0.00    0.040    0.040    0.000    0.000  1358.00  9983.75
 0.014278     850.     845.     880.        2        0        0     0.00   335.46 10319.21


FLOW DISTRIBUTION FOR SECNO=      2.22         CWSEL=   1359.72

STA=    9984.    9990.   10370.
 PER Q=      0.4     99.6
  AREA=      2.3    287.6
   VEL=      2.2      4.1

*SECNO 2.343
     2.34     1.21  1363.21     0.00     0.00  1363.26     0.05     3.26     0.02  1362.00
    1172.       7.      97.    1068.       5.      48.     606.     182.     209.   1362.00
     1.93     1.27     2.02     1.76    0.040    0.040    0.040    0.000  1362.00  9981.41
 0.002320     660.     660.     730.        6        0        0     0.00   816.42 10797.04
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 2.559
     2.56     3.05  1367.05     0.00     0.00  1367.23     0.18     3.94     0.04  1366.00
    1172.       8.     474.     691.       4.     103.     308.     196.     227.   1366.00
     2.03     1.85     4.60     2.24    0.040    0.040    0.040    0.000  1364.00  9972.15
 0.005878    1125.    1125.    1125.        7        0        0     0.00   539.29 10511.45


CCHV=   0.100 CEHV=   0.300
*SECNO 2.795
     2.80     4.43  1369.63     0.00     0.00  1369.67     0.04     2.42     0.01  1366.00
    1172.       62.     375.     735.      37.     161.     770.     216.     247.   1366.00
     2.27     1.69     2.32     0.95    0.040    0.050    0.050    0.000  1365.20  9949.81
 0.000953    1250.    1250.    1250.        4        0        0     0.00   860.50 10810.30


*SECNO 2.947
     2.95     4.88  1370.88     0.00     0.00  1371.06     0.18     1.35     0.04  1368.00
    1172.       80.     607.     484.      28.     136.     354.     229.     261.   1368.00
     2.34     2.88     4.48     1.37    0.040    0.050    0.050    0.000  1366.00  9965.64
 0.003759     800.     800.     800.        3        0        0     0.00   678.76 10644.40


*SECNO 3.136
     3.14     3.27  1374.27     0.00     0.00  1374.36     0.10     3.29     0.01  1371.00
    1172.       69.     434.     669.      25.     132.     388.     242.     275.   1372.00
     2.46     2.74     3.29     1.73    0.040    0.050    0.050    0.000  1371.00  9969.59
 0.002910    1000.    1000.    1000.        3        0        0     0.00   550.62 10520.20


*SECNO 3.305
     3.31     2.74  1377.74     0.00     0.00  1377.86     0.12     3.49     0.01  1376.00
    1172.       9.     426.     737.       4.     112.     398.     252.     289.   1376.00
     2.56     2.41     3.79     1.85    0.040    0.050    0.050    0.000  1375.00  9975.64
 0.005558     890.     890.     890.        4        0        0     0.00   749.44 10725.08


*SECNO 3.551
     3.55     4.71  1381.71     0.00     0.00  1381.77     0.06     3.91     0.01  1378.00
    1172.       97.     362.     713.      40.     122.     613.     272.     311.   1380.00
     2.76     2.41     2.96     1.16    0.040    0.050    0.050    0.000  1377.00  9968.34
 0.001880    1300.    1300.    1300.        6        0        0     0.00   772.15 10740.49
```

```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 3.676
     3.68     4.30  1383.10     0.00     0.00  1383.19     0.09     1.41     0.01  1380.00
    1172.      28.     449.     695.      12.     130.     532.     283.     323.   1380.00
     2.84     2.31     3.46     1.31    0.040    0.050    0.050    0.000  1378.80  9972.11
 0.002376     670.     670.     670.        3        0        0     0.00   745.29 10717.40


*SECNO 3.892
     3.89     4.63  1386.63     0.00     0.00  1386.85     0.23     3.62     0.04  1384.00
     828.     48.     584.     196.      15.     133.     174.     296.     340.   1386.00
     2.93     3.16     4.39     1.12    0.040    0.050    0.050    0.000  1382.00  9973.31
 0.005227    1140.    1140.    1140.        3        0        0     0.00   551.23 10524.54


CCHV=   0.100 CEHV=   0.300
*SECNO 4.123

3470 ENCROACHMENT STATIONS=    9560.0   10960.0  TYPE=     1  TARGET=    1400.000
     4.12     1.23  1390.03     0.00     0.00  1390.04     0.02     3.17     0.02100000.00
     828.       0.     287.     541.       0.     334.     461.     311.     367.   1390.00
     3.25     0.00     0.86     1.17    0.000    0.050    0.035    0.000  1388.00  9560.00
 0.001551    1270.    1235.    1200.        4        0        0     0.00  1400.00 10960.00


*SECNO 4.230

3470 ENCROACHMENT STATIONS=    9300.0   10900.0  TYPE=     1  TARGET=    1600.000
     4.23     0.55  1391.55     0.00     0.00  1391.58     0.03     1.53     0.00  1391.00
     828.     139.     212.     478.     240.     204.     305.     324.     390.   1391.40
     3.40     0.58     1.04     1.57    0.100    0.050    0.035    0.000  1391.00  9300.00
 0.003385     800.     650.     700.        3        0        0     0.00  1509.18 10809.18


CCHV=   0.300 CEHV=   0.500
*SECNO 4.341
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     4.34     0.55  1394.55  1394.55     0.00  1394.70     0.15     2.05     0.06  1394.50
     828.       1.     827.       1.       1.     267.       1.     330.     405.   1394.50
     3.45     0.58     3.10     0.58    0.015    0.015    0.015    0.000  1394.00  9545.76
 0.004928     580.     490.     520.        3        5        0     0.00   982.09 10527.85
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


CCHV=   0.100 CEHV=   0.300
*SECNO 4.616

3470 ENCROACHMENT STATIONS=    9850.0   11250.0  TYPE=     1  TARGET=    1400.000
     4.62     1.55  1395.95     0.00     0.00  1395.96     0.01     1.25     0.01  1396.00
     828.       0.     654.     174.       0.     834.     538.     349.     432.   1395.00
     3.85     0.00     0.78     0.32    0.000    0.050    0.100    0.000  1394.40  9933.24
 0.000558    1000.    1000.    1000.        6        0        0     0.00  1316.76 11250.00


*SECNO 4.637
     4.64     1.19  1396.49     0.00     0.00  1396.57     0.08     0.59     0.02  1398.00
     828.       0.     118.     710.       0.      31.     372.     356.     440.   1395.50
     3.89     0.00     3.84     1.91    0.000    0.050    0.100    0.000  1395.30  9966.92
 0.026374      75.     110.     550.        2        0        0     0.00   608.82 10575.74


CCHV=   0.100 CEHV=   0.300
*SECNO 4.748
     4.75     1.55  1397.55     0.00     0.00  1397.58     0.03     1.00     0.01  1398.00
     828.       0.     205.     623.       0.     132.     463.     360.     444.   1396.00
     3.97     0.00     1.55     1.35    0.000    0.035    0.040    0.000  1396.00  9969.02
 0.000925     630.     600.     330.        7        0        0     0.00   489.09 10458.12


*SECNO 4.924
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     4.92     0.91  1400.91  1400.91     0.00  1401.14     0.24     2.51     0.06  1401.00
     828.       0.     828.       0.       0.     213.       0.     369.     455.   1401.00
     4.04     0.00     3.89     0.00    0.000    0.035    0.000    0.000  1400.00  9977.27
 0.024036     930.     930.    1040.       20       14        0     0.00   468.17 10445.44


*SECNO 5.038
     5.04     1.36  1403.36     0.00     0.00  1403.39     0.03     2.23     0.02  1403.00
     828.       0.     815.      13.       0.     561.      29.     375.     464.   1403.00
     4.16     0.44     1.45     0.45    0.040    0.035    0.040    0.000  1402.00  9982.77
 0.001439     600.     600.     630.        8        0        0     0.00   821.19 10803.96
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

*SECNO 5.170
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9970.0   10500.0  TYPE=     1  TARGET=     530.000
     5.17     0.86  1406.86  1406.86     0.00  1407.08     0.22     2.43     0.06  1407.00
     828.      0.     386.     442.      0.      83.     163.     381.     475.   1406.70
     4.21     0.00     4.68     2.70    0.000    0.035    0.040    0.000  1406.00  9991.42
 0.017540     700.     700.     700.       20       14        0     0.00   508.58 10500.00

*SECNO 5.375

3470 ENCROACHMENT STATIONS=    9955.0   10800.0  TYPE=     1  TARGET=     845.000
     5.37     2.73  1410.73     0.00     0.00  1410.77     0.04     3.67     0.02  1409.00
     828.      22.     252.     554.      18.     101.     496.     393.     492.   1409.50
     4.41     1.23     2.48     1.12    0.040    0.035    0.040    0.000  1408.00  9969.13
 0.001331    1080.    1080.    1150.       11        0        0     0.00   830.86 10800.00

*SECNO 5.523
     5.52     1.61  1412.61     0.00     0.00  1412.82     0.20     2.00     0.05  1412.00
     828.       1.     753.      74.       1.     201.      53.     400.     503.   1412.00
     4.47     1.37     3.75     1.39    0.040    0.035    0.040    0.000  1411.00  9936.92
 0.006733     700.     700.     790.        4        0        0     0.00   355.55 10292.47

CCHV=   0.300 CEHV=   0.500
*SECNO 5.631
     5.63     2.63  1412.93     0.00     0.00  1412.94     0.01     0.06     0.06  1412.00
     828.      17.     797.      14.      53.    1014.      43.     410.     511.   1412.00
     4.69     0.32     0.79     0.32    0.015    0.015    0.015    0.000  1410.30  9616.70
 0.000029     340.     600.     800.        3        0        0     0.00   776.17 10392.87

CCHV=   0.100 CEHV=   0.300
*SECNO 5.864
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     5.86     1.54  1414.54  1414.54     0.00  1414.77     0.23     0.08     0.07  1414.00
     393.       3.     390.       0.       1.     101.       0.     427.     526.   1415.00
     4.78     2.53     3.84     0.00    0.040    0.035    0.000    0.000  1413.00  9970.25
 0.026663    1410.    1230.    1050.       20       14        0     0.00   250.60 10220.85
```

```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


#SECNO 6.047
3280 CROSS SECTION      6.05 EXTENDED      0.03 FEET


3470 ENCROACHMENT STATIONS=    9960.0   10770.0  TYPE=     1  TARGET=     810.000
     6.05     2.03  1418.83     0.00     0.00  1418.91     0.08     4.12     0.01  1417.00
     393.      18.     211.     164.      13.      70.     157.     431.     533.   1417.00
     4.91     1.41     3.03     1.05    0.040    0.035    0.040    0.000  1416.00  9976.31
 0.001655     970.     970.     980.        8        0        0     0.00   368.09 10344.40


#SECNO 6.259
3280 CROSS SECTION      6.26 EXTENDED      0.08 FEET


3470 ENCROACHMENT STATIONS=    9965.0   10510.0  TYPE=     1  TARGET=     545.000
     6.26     2.08  1422.08     0.00     0.00  1422.31     0.24     3.36     0.05  1421.00
     393.      9.     228.     156.       5.      47.      73.     435.     540.   1421.00
     4.99     2.05     4.81     2.14    0.040    0.035    0.040    0.000  1420.00  9986.49
 0.007012    1120.    1120.    1120.        6        0        0     0.00   177.53 10164.02


#SECNO 6.472
     6.47     3.51  1425.51     0.00     0.00  1425.67     0.16     3.35     0.01  1423.00
     393.      57.     270.      66.      27.      75.      34.     439.     543.   1423.00
     5.10     2.10     3.59     1.92    0.040    0.035    0.040    0.000  1422.00  9970.74
 0.001646    1120.    1120.    1120.        5        0        0     0.00    73.17 10043.91


#SECNO 6.672
     6.67     2.59  1428.59     0.00     0.00  1429.14     0.55     3.35     0.12  1427.00
     393.      31.     332.      31.      11.      52.      11.     441.     544.   1427.00
     5.15     2.91     6.35     2.91    0.040    0.035    0.040    0.000  1426.00  9976.75
 0.008401    1060.    1060.    1060.        3        0        0     0.00    51.50 10028.25


#SECNO 6.811
     6.81     2.84  1431.84     0.00     0.00  1432.02     0.17     2.84     0.04  1430.00
     393.      19.     332.      42.      11.      94.      26.     443.     545.   1430.00
     5.21     1.65     3.54     1.66    0.040    0.035    0.040    0.000  1429.00  9967.70
 0.002233     730.     730.     730.        4        0        0     0.00    79.97 10047.67
```

```
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


#SECNO 7.019
     7.02     2.94  1434.94     0.00     0.00  1435.27     0.34     3.21     0.05  1433.00
     393.      27.     354.      12.      12.      73.       5.     446.     547.   1433.00
     5.28     2.27     4.84     2.21    0.040    0.035    0.040    0.000  1432.00  9977.71
 0.003972    1100.    1100.    1100.        3        0        0     0.00    47.83 10025.54


#SECNO 7.201
     7.20     1.55  1439.55     0.00     0.00  1439.70     0.15     4.41     0.02  1441.00
     393.       0.     214.     179.       0.      58.      78.     448.     549.   1438.00
     5.36     0.00     3.67     2.29    0.000    0.035    0.040    0.000  1438.00 10044.52
 0.005369     960.     960.     960.        3        0        0     0.00   146.07 10190.59


#SECNO 7.455
     7.45     1.61  1443.61     0.00     0.00  1443.68     0.07     3.97     0.01  1443.00
     393.       1.     382.      10.       1.     175.      14.     453.     554.   1443.00
     5.54     0.72     2.19     0.73    0.040    0.035    0.040    0.000  1442.00  9976.73
 0.001878    1340.    1340.    1340.        5        0        0     0.00   184.01 10160.74


#SECNO 7.519
3280 CROSS SECTION      7.52 EXTENDED      0.40 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9970.0   10050.0  TYPE=     1  TARGET=      80.000
     7.52     1.40  1446.40  1446.40     0.00  1446.86     0.46     1.48     0.12  1446.00
     393.       0.     393.       0.       0.      72.       0.     454.     555. 100000.00
     5.55     0.00     5.46     0.00    0.000    0.035    0.000    0.000  1445.00  9970.00
 0.019308     340.     340.     340.       20       15        0     0.00    80.00 10050.00
```

THIS RUN EXECUTED: 06/08/1990 10:53:26.42

```
*********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*********************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
*	0.038	1085.00	1321.27	1321.27	4.01	0.00	9950.00	10062.00	9900.00	11100.00	9907.68	11100.00
	0.199	1085.00	1323.47	0.00	1.21	880.00	9990.00	10045.00	9960.00	11020.00	9980.87	11020.00
	0.407	1085.00	1326.71	0.00	2.40	1100.00	9980.00	10575.00	9960.00	11000.00	9985.85	11000.00
	0.646	1085.00	1331.15	0.00	0.89	1250.00	9970.00	10125.00	0.00	0.00	9754.18	11076.96
*	0.672	1085.00	1333.04	0.00	0.59	160.00	9984.20	10015.80	9725.00	11160.00	9725.00	11160.00
	0.681	1085.00	1333.04	0.00	0.86	50.00	9975.00	10025.00	9700.00	11140.00	9837.76	11140.00
*	0.785	1085.00	1334.21	1334.21	4.12	500.00	9985.00	10430.00	9950.00	10600.00	9981.84	10364.21
	0.843	1085.00	1336.00	0.00	1.49	370.00	9990.00	10395.00	9975.00	10600.00	9983.42	10600.00
	1.078	1085.00	1339.29	0.00	2.14	1240.00	9990.00	10580.00	9970.00	10600.00	9987.13	10600.00
	1.227	1085.00	1342.27	0.00	1.57	790.00	9980.00	10840.00	9950.00	10600.00	9968.11	10600.00
	1.419	1085.00	1346.17	0.00	3.48	1010.00	9980.00	10120.00	9950.00	10600.00	9970.23	10600.00
	1.561	1085.00	1348.69	0.00	2.15	750.00	9990.00	10040.00	9960.00	10600.00	9976.28	10600.00
	1.712	1085.00	1351.03	0.00	1.81	790.00	9995.00	10420.00	9980.00	10600.00	9994.73	10600.00
	1.860	1085.00	1353.81	0.00	1.93	780.00	9975.00	10380.00	9940.00	10600.00	9960.65	10502.99
*	1.939	1358.00	1357.21	1357.21	4.03	370.00	9690.00	10270.00	0.00	0.00	9455.96	10218.39
	2.053	1358.00	1358.10	0.00	2.16	450.00	9990.00	10050.00	9970.00	10545.00	9970.00	10545.00
	2.218	1172.00	1359.72	0.00	4.06	845.00	9990.00	10370.00	0.00	0.00	9983.75	10319.21

SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
2.343	1172.00	1363.21	0.00	2.02	660.00	9990.00	10030.00	0.00	0.00	9981.41	10797.84
2.559	1172.00	1367.05	0.00	4.60	1125.00	9980.00	10030.00	0.00	0.00	9972.15	10511.45
2.795	1172.00	1369.63	0.00	2.32	1250.00	9970.00	10010.00	0.00	0.00	9949.81	10810.30
2.947	1172.00	1370.88	0.00	4.48	800.00	9985.00	10020.00	0.00	0.00	9965.64	10644.40
3.136	1172.00	1374.27	0.00	3.29	1000.00	9985.00	10030.00	0.00	0.00	9969.59	10520.20
3.305	1172.00	1377.74	0.00	3.79	890.00	9980.00	10030.00	0.00	0.00	9975.64	10725.08
3.551	1172.00	1381.71	0.00	2.96	1300.00	9990.00	10025.00	0.00	0.00	9968.34	10740.49
3.676	1172.00	1383.10	0.00	3.46	670.00	9980.00	10015.00	0.00	0.00	9972.11	10717.40
3.892	828.00	1386.63	0.00	4.39	1140.00	9985.00	10030.00	0.00	0.00	9973.31	10524.54
4.123	828.00	1390.03	0.00	0.86	1235.00	9440.00	10090.00	9560.00	10960.00	9560.00	10960.00
4.230	828.00	1391.55	0.00	1.04	650.00	9740.00	10180.00	9300.00	10900.00	9300.00	10809.18
* 4.341	828.00	1394.55	1394.55	3.10	490.00	9585.00	10490.00	0.00	0.00	9545.76	10527.85
4.616	828.00	1395.95	0.00	0.78	1000.00	9930.00	10640.00	9850.00	11250.00	9933.24	11250.00
4.637	828.00	1396.49	0.00	3.84	110.00	9925.00	10010.00	0.00	0.00	9966.92	10575.74
4.748	828.00	1397.55	0.00	1.55	600.00	9960.00	10070.00	0.00	0.00	9969.02	10458.12
* 4.924	828.00	1400.91	1400.91	3.89	930.00	9975.00	10490.00	0.00	0.00	9977.27	10445.44
5.038	828.00	1403.36	0.00	1.45	600.00	9985.00	10640.00	0.00	0.00	9982.77	10803.96
* 5.170	828.00	1406.86	1406.86	4.68	700.00	9990.00	10100.00	9970.00	10500.00	9991.42	10500.00
5.375	828.00	1410.73	0.00	2.48	1080.00	9990.00	10040.00	9955.00	10800.00	9969.13	10800.00
5.523	828.00	1412.61	0.00	3.75	780.00	9940.00	10120.00	0.00	0.00	9936.92	10292.47
5.631	828.00	1412.93	0.00	0.79	600.00	9730.00	10300.00	0.00	0.00	9616.70	10392.87
* 5.864	393.00	1414.54	1414.54	3.84	1230.00	9975.00	10390.00	0.00	0.00	9970.25	10220.85
6.047	393.00	1418.83	0.00	3.03	970.00	9990.00	10020.00	9960.00	10770.00	9976.31	10344.40
6.259	393.00	1422.08	0.00	4.81	1120.00	9995.00	10025.00	9965.00	10510.00	9986.49	10164.02
6.472	393.00	1425.51	0.00	3.59	1120.00	9990.00	10015.00	0.00	0.00	9970.74	10043.91
6.672	393.00	1428.59	0.00	6.35	1060.00	9990.00	10015.00	0.00	0.00	9976.75	10028.25

	SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
	6.811	393.00	1431.84	0.00	3.54	730.00	9980.00	10020.00	0.00	0.00	9967.70	10047.67
	7.019	393.00	1434.94	0.00	4.84	1100.00	9990.00	10020.00	0.00	0.00	9977.71	10025.54
	7.201	393.00	1439.55	0.00	3.67	960.00	9980.00	10090.00	0.00	0.00	10044.52	10190.59
	7.455	393.00	1443.61	0.00	2.19	1340.00	9980.00	10115.00	0.00	0.00	9976.73	10160.74
*	7.519	393.00	1446.40	1446.40	5.46	340.00	9970.00	10050.00	9970.00	10050.00	9970.00	10050.00

100-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

	SECNO	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
*	0.038	23.86	704.39	356.75	1.75	4.01	1.25	1321.00	1321.27	0.00	1192.32	1319.20	2.10
	0.199	6.28	96.93	981.78	0.94	1.21	0.98	1322.70	1323.47	2.20	1039.13	1322.00	1.01
	0.407	0.00	357.19	727.81	0.00	2.40	3.31	1328.00	1326.71	3.24	815.26	1326.00	1.07
	0.646	221.15	106.29	757.56	1.32	0.89	1.02	1331.60	1331.15	4.45	1285.10	1330.00	1.04
*	0.672	0.10	61.67	1023.23	0.06	0.59	0.55	1330.40	1333.04	1.89	1210.26	1328.90	1.00
	0.681	48.12	44.53	992.35	0.68	0.86	0.86	1332.00	1333.04	0.00	1302.24	1332.00	1.01
*	0.785	0.56	1024.98	59.45	1.69	4.12	2.14	1336.00	1334.21	1.17	582.37	1333.00	1.06
	0.843	2.96	912.27	169.77	0.89	1.49	1.00	1338.00	1336.00	1.79	616.58	1334.00	1.06
	1.078	0.33	1079.12	5.54	0.81	2.14	1.00	1340.00	1339.29	3.28	612.87	1338.00	1.01
	1.227	6.19	1078.81	0.00	1.15	1.57	0.00	1344.00	1342.27	2.99	631.89	1340.50	1.00
	1.419	12.33	814.44	258.23	2.15	3.48	1.48	1346.00	1346.17	3.90	629.77	1344.00	1.40
	1.561	16.44	235.31	833.24	1.42	2.15	1.37	1350.00	1348.69	2.52	623.72	1346.00	1.12
	1.712	0.00	675.96	409.04	0.02	1.81	2.08	1352.00	1351.03	2.34	605.27	1349.90	1.01
	1.860	6.51	1033.77	44.72	1.11	1.93	0.89	1356.00	1353.81	2.78	542.34	1352.00	1.07
*	1.939	268.62	1089.38	0.00	3.27	4.03	0.00	1360.10	1357.21	3.39	762.43	1356.40	1.02
	2.053	25.90	357.01	975.09	1.17	2.16	1.51	1358.00	1358.10	0.89	575.00	1354.70	1.09
	2.218	5.10	1166.90	0.00	2.25	4.06	0.00	1360.00	1359.72	1.62	335.46	1358.00	1.00
	2.343	6.54	97.33	1068.12	1.27	2.02	1.76	1364.00	1363.21	3.49	816.42	1362.00	1.01
	2.559	7.71	473.77	690.52	1.85	4.60	2.24	1368.00	1367.05	3.85	539.29	1364.00	1.45
	2.795	62.03	375.08	734.89	1.69	2.32	0.95	1371.40	1369.63	2.58	860.50	1365.20	1.67
	2.947	80.21	607.33	484.46	2.88	4.48	1.37	1373.20	1370.88	1.25	678.76	1366.00	2.28
	3.136	68.97	433.72	669.31	2.74	3.29	1.73	1376.30	1374.27	3.39	550.62	1371.00	1.33
	3.305	9.13	425.63	737.24	2.41	3.79	1.85	1380.00	1377.74	3.47	749.44	1375.00	1.43
	3.551	96.96	362.26	712.78	2.41	2.96	1.16	1384.00	1381.71	3.97	772.15	1377.00	1.76

SECNO	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
3.676	28.29	448.54	695.16	2.31	3.46	1.31	1385.90	1383.10	1.39	745.29	1378.80	1.89
3.892	48.35	583.61	196.04	3.16	4.39	1.12	1389.00	1386.63	3.52	551.23	1382.00	2.20
4.123	0.00	287.29	540.71	0.00	0.86	1.17	1391.00	1390.03	3.40	1400.00	1388.80	1.06
4.230	138.60	211.64	477.76	0.58	1.04	1.57	1392.00	1391.55	1.52	1509.18	1391.00	1.43
4.341	0.54	826.80	0.66	0.58	3.10	0.58	1394.90	1394.55	3.00	982.09	1394.00	1.01
4.616	0.00	654.14	173.86	0.00	0.78	0.32	1398.00	1395.95	1.41	1316.76	1394.40	1.39
4.637	0.00	117.58	710.41	0.00	3.84	1.91	1399.50	1396.49	0.54	608.82	1395.30	1.23
4.748	0.00	204.74	623.26	0.00	1.55	1.35	1400.60	1397.55	1.06	489.09	1396.00	1.01
4.924	0.00	828.00	0.00	0.00	3.89	0.00	1403.20	1400.91	3.36	468.17	1400.00	1.00
5.038	0.18	814.78	13.04	0.44	1.45	0.45	1406.00	1403.36	2.45	821.19	1402.00	1.06
5.170	0.00	386.21	441.79	0.00	4.68	2.70	1408.00	1406.86	3.50	508.58	1406.00	1.25
5.375	22.14	251.60	554.26	1.23	2.48	1.12	1412.00	1410.73	3.87	830.86	1408.00	1.52
5.523	1.30	752.86	73.84	1.37	3.75	1.39	1413.00	1412.61	1.89	355.55	1411.00	1.23
5.631	16.90	797.25	13.85	0.32	0.79	0.32	1414.50	1412.93	0.31	776.17	1410.30	1.08
5.864	3.26	389.73	0.00	2.53	3.84	0.00	1416.80	1414.54	1.62	250.60	1413.00	1.00
6.047	17.68	211.25	164.07	1.41	3.03	1.05	1418.00	1418.83	4.28	368.09	1416.00	2.03
6.259	9.40	227.50	156.10	2.05	4.81	2.14	1422.00	1422.08	3.25	177.53	1420.00	1.54
6.472	56.89	270.04	66.07	2.10	3.59	1.92	1428.90	1425.51	3.43	73.17	1422.00	1.22
6.672	30.65	331.71	30.65	2.91	6.35	2.91	1432.40	1428.59	3.08	51.50	1426.00	1.23
6.811	18.73	331.87	42.40	1.65	3.54	1.66	1434.50	1431.84	3.25	79.97	1429.00	1.22
7.019	27.09	354.07	11.85	2.27	4.84	2.21	1440.00	1434.94	3.09	47.83	1432.00	1.14
7.201	0.00	214.43	178.57	0.00	3.67	2.29	1441.60	1439.55	4.61	146.07	1438.00	1.17
7.455	0.72	382.11	10.17	0.72	2.19	0.73	1448.50	1443.61	4.06	184.01	1442.00	1.09
7.519	0.00	393.00	0.00	0.00	5.46	0.00	1446.00	1446.40	2.79	80.00	1445.00	1.00

100-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

SECND	XLCH	K*CHSL	EG	HV	HL	OLOSS	10K*S	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
0.038	0.00	0.00	1321.45	0.17	0.00	0.00	100.08	0.00	2.07	40.00	50.00	50.00
0.199	880.00	3.18	1323.49	0.02	2.02	0.02	9.95	15.83	1.47	40.00	50.00	50.00
0.407	1100.00	3.64	1326.85	0.14	3.33	0.04	260.34	35.99	0.71	0.00	50.00	50.00
0.646	1250.00	3.20	1331.17	0.02	4.31	0.01	12.87	56.05	1.15	40.00	50.00	50.00
0.672	160.00	-6.87	1333.04	0.00	1.87	0.00	0.12	62.02	4.14	14.00	14.00	14.00
0.681	50.00	62.00	1333.05	0.01	0.00	0.00	7.99	63.88	1.04	40.00	50.00	50.00
0.785	500.00	2.00	1334.46	0.25	1.29	0.07	417.77	73.46	1.21	40.00	50.00	50.00
0.843	370.00	2.70	1336.03	0.03	1.55	0.02	14.60	78.05	2.00	40.00	50.00	50.00
1.078	1240.00	3.23	1339.36	0.07	3.31	0.01	64.00	96.42	1.29	40.00	50.00	50.00
1.227	790.00	3.16	1342.31	0.04	2.95	0.00	24.42	107.32	1.77	40.00	50.00	0.00
1.419	1010.00	3.47	1346.32	0.15	3.98	0.03	68.98	120.58	2.17	40.00	50.00	50.00
1.561	750.00	2.67	1348.73	0.04	2.40	0.01	18.36	130.42	2.69	40.00	50.00	50.00
1.712	790.00	4.94	1351.09	0.06	2.36	0.01	43.84	143.49	1.13	40.00	50.00	50.00
1.860	780.00	2.69	1353.87	0.06	2.78	0.00	29.24	153.95	1.81	40.00	50.00	50.00
1.939	370.00	11.89	1357.44	0.23	1.24	0.09	40.32	157.90	0.81	15.00	15.00	0.00
2.053	450.00	-3.78	1358.15	0.04	0.68	0.02	8.73	163.24	3.40	40.00	40.00	40.00
2.218	845.00	3.91	1359.97	0.25	1.77	0.06	142.78	174.37	1.72	40.00	40.00	0.00
2.343	660.00	6.06	1363.26	0.05	3.26	0.02	23.20	182.05	1.21	40.00	40.00	40.00
2.559	1125.00	1.78	1367.23	0.18	3.94	0.04	58.78	195.92	3.05	40.00	40.00	40.00
2.795	1250.00	0.96	1369.67	0.04	2.42	0.01	9.53	215.77	4.43	40.00	50.00	50.00
2.947	800.00	1.00	1371.06	0.18	1.35	0.04	37.59	229.41	4.88	40.00	50.00	50.00
3.136	1000.00	5.00	1374.36	0.10	3.29	0.01	29.10	241.60	3.27	40.00	50.00	50.00
3.305	890.00	4.49	1377.86	0.12	3.49	0.01	55.58	252.42	2.74	40.00	50.00	50.00
3.551	1300.00	1.54	1381.77	0.06	3.91	0.01	18.80	271.66	4.71	40.00	50.00	50.00

SECNO	XLCH	K*CHSL	EG	HV	HL	OLOSS	10K*S	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
3.676	670.00	2.69	1383.19	0.09	1.41	0.01	23.76	282.81	4.30	40.00	50.00	50.00
3.892	1140.00	2.81	1386.85	0.23	3.62	0.04	52.27	295.84	4.63	40.00	50.00	50.00
4.123	1235.00	5.51	1390.04	0.02	3.17	0.02	15.51	311.44	1.23	0.00	50.00	35.00
4.230	650.00	3.38	1391.58	0.03	1.53	0.00	33.85	323.81	0.55	100.00	50.00	35.00
* 4.341	490.00	6.12	1394.70	0.15	2.05	0.06	49.28	329.89	0.55	15.00	15.00	15.00
4.616	1000.00	0.40	1395.96	0.01	1.25	0.01	5.58	348.73	1.55	0.00	50.00	100.00
4.637	110.00	8.18	1396.57	0.08	0.59	0.02	263.74	355.56	1.19	0.00	50.00	100.00
4.748	600.00	1.17	1397.58	0.03	1.00	0.01	9.25	359.85	1.55	0.00	35.00	40.00
* 4.924	930.00	4.30	1401.14	0.24	2.51	0.06	240.36	369.06	0.91	0.00	35.00	0.00
5.038	600.00	3.33	1403.39	0.03	2.23	0.02	14.39	374.60	1.36	40.00	35.00	40.00
* 5.170	700.00	5.71	1407.08	0.22	2.43	0.06	175.40	381.32	0.86	0.00	35.00	40.00
5.375	1080.00	1.85	1410.77	0.04	3.67	0.02	13.31	392.54	2.73	40.00	35.00	40.00
5.523	780.00	3.85	1412.82	0.20	2.00	0.05	67.33	400.40	1.61	40.00	35.00	40.00
5.631	600.00	-1.17	1412.94	0.01	0.06	0.06	0.29	409.86	2.63	15.00	15.00	15.00
* 5.864	1230.00	2.20	1414.77	0.23	0.08	0.07	266.63	427.00	1.54	40.00	35.00	0.00
6.047	970.00	3.09	1418.91	0.08	4.12	0.01	16.55	430.82	2.83	40.00	35.00	40.00
6.259	1120.00	3.57	1422.31	0.24	3.36	0.05	70.12	435.50	2.08	40.00	35.00	40.00
6.472	1120.00	1.79	1425.67	0.16	3.35	0.01	16.46	438.86	3.51	40.00	35.00	40.00
6.672	1060.00	3.77	1429.14	0.55	3.35	0.12	84.01	441.42	2.59	40.00	35.00	40.00
6.811	730.00	4.11	1432.02	0.17	2.84	0.04	22.33	443.13	2.84	40.00	35.00	40.00
7.019	1100.00	2.73	1435.27	0.34	3.21	0.05	39.72	445.92	2.94	40.00	35.00	40.00
7.201	960.00	6.25	1439.70	0.15	4.41	0.02	53.69	448.42	1.55	0.00	35.00	40.00
7.455	1340.00	2.99	1443.68	0.07	3.97	0.01	18.78	453.43	1.61	40.00	35.00	40.00
* 7.519	340.00	8.82	1446.86	0.46	1.48	0.12	193.08	454.45	1.40	0.00	35.00	0.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=    0.038  PROFILE= 1  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=    0.672  PROFILE= 1  HYDRAULIC JUMP D.S.

CAUTION  SECNO=    0.785  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    0.785  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=    1.939  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    1.939  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    1.939  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    4.341  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    4.341  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=    4.924  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    4.924  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    4.924  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    5.170  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    5.170  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    5.170  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    5.864  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    5.864  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    5.864  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    7.519  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    7.519  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    7.519  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

THIS RUN EXECUTED: 06/08/1990 10:53:33.28

```
*********************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*********************************************
```

ATTACHMENT 3

HEC-2

ZONE A 100-YEAR SPLIT FLOW

EMF TO GERMANN ROAD

```
T1      FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2      QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**89500L.DAT**
T3      100-YEAR FLOODPLAIN SPLIT FLOW AT GERMANN ROAD-FEBRUARY 1990
J1   -10       2       0          0.0020                          1321.0
J2    -1              -1
J3    38      43       1       2      26      39      21      22      27      28
J3    53      54               38      13      14      15      55      26      56
J3    63       1      51       4      42      57              38      39      33
J3     3      10      11      12       5       7       8      16      17      18
J5   -10     -10
NC 0.040   0.050   0.040     0.1     0.3
QT     1     273
ET           9.1                                                     9790.0  9925.0
X1 0.038      20  9990.0 10030.0
GR1323.3  9790.0  1322.0  9820.0  1320.0  9850.0  1320.0  9870.0  1320.0  9880.0
GR1322.0  9890.0  1324.0  9900.0  1325.5  9925.0  1324.0  9945.0  1322.0  9955.0
GR1320.0  9990.0  1320.0 10000.0  1320.0 10030.0  1320.5 10240.0  1320.0 10530.0
GR1319.5 10900.0  1319.9 11280.0  1319.5 11600.0  1320.0 11870.0  1321.5 12080.0
NC 0.040   0.050   0.050     0.1     0.3
ET           9.1                                                     9835.0  9960.0
X1 0.199      19  9995.0 10025.0     840     840     840
GR1325.2  9835.0  1324.0  9840.0  1322.0  9880.0  1321.0  9920.0  1322.0  9945.0
GR1324.0  9950.0  1326.8  9960.0  1326.0  9970.0  1321.0  9995.0  1320.0 10000.0
GR1321.0 10025.0  1322.0 10050.0  1323.0 10305.0  1322.5 10710.0  1322.0 10915.0
GR1322.0 11020.0  1322.0 11150.0  1322.3 11360.0  1322.7 11760.0
ET           9.1                                                     9750.0  9875.0
X1 0.407      12  9980.0 10575.0    1100    1100    1100
GR1328.5  9840.0  1326.7  9860.0  1326.0  9905.0  1325.6  9925.0  1326.0  9940.0
GR1328.0  9950.0  1329.6  9960.0  1327.0  9980.0  1326.0 10000.0  1327.0 10575.0
GR1328.0 11090.0  1328.0 12000.0
ET           9.1                                                     9750.0  9875.0
X1 0.646      21  9970.0 10300.0    1260    1260    1260
GR1331.6  9750.0  1329.3  9765.0  1330.0  9780.0  1330.8  9800.0  1330.0  9830.0
GR1329.6  9840.0  1330.0  9850.0  1332.0  9860.0  1333.5  9875.0  1332.0  9885.0
GR1330.0  9905.0  1329.7  9925.0  1330.0  9950.0  1330.2  9960.0  1330.0  9970.0
GR1328.5 10000.0  1330.0 10005.0  1331.0 10300.0  1330.0 10555.0  1330.0 10780.0
GR1332.4 11160.0
NC 0.015   0.015   0.015     0.3     0.5
ET           9.1                                                     9260.0  9910.0
X1 0.672       8  9910.0 10260.0     190     130     150
GR1333.5  9260.0  1333.0  9555.0  1334.0  9640.0  1335.5  9910.0  1335.1 10000.0
GR1334.0 10260.0  1333.0 10750.0  1332.4 11160.0
NC 0.040   0.050   0.050     0.1     0.3
ET           9.1                                                     9525.0  9700.0
X1 0.681      12  9975.0 10030.0      80     240     500
GR1333.2  9525.0  1332.0  9570.0  1334.0  9670.0  1335.2  9700.0  1334.0  9730.0
GR1332.0  9975.0  1330.0  9995.0  1328.8 10000.0  1330.0 10020.0  1332.0 10030.0
GR1332.0 10160.0  1332.0 10875.0
ET           9.1                                                     9810.0  9945.0
X1 0.785      13  9980.0 10430.0     560     450     500
GR1333.5  9580.0  1333.7  9810.0  1332.2  9830.0  1334.0  9930.0  1336.3  9945.0
GR1336.0  9950.0  1334.0  9980.0  1333.0 10000.0  1333.5 10080.0  1334.0 10430.0
GR1334.4 10470.0  1334.0 10500.0  1336.0 10600.0
ET           9.1                                                     9830.0  9975.0
X1 0.843      13  9990.0 10395.0     320     380     350
GR1335.3  9785.0  1333.9  9800.0  1335.3  9830.0  1334.0  9870.0  1334.0  9955.0
GR1336.0  9960.0  1336.6  9975.0  1335.0  9990.0  1334.0 10000.0  1335.0 10395.0
GR1335.5 10720.0  1336.0 10860.0  1338.0 10920.0
ET           9.1                                                     9830.0  9970.0
X1 1.078      14  9990.0 10680.0    1240    1240    1240
GR1339.9  9625.0  1338.0  9800.0  1340.0  9830.0  1338.0  9875.0  1337.4  9910.0
GR1338.0  9945.0  1340.0  9955.0  1341.0  9970.0  1339.0  9990.0  1338.0 10000.0
GR1338.0 10080.0  1339.0 10680.0  1340.0 11610.0  1340.0 11690.0
```

```
X1 1.227      15  9980.0 10840.0     790     790     790
GR1343.0  9815.0  1342.0  9840.0  1340.0  9900.0  1339.5  9920.0  1340.0  9925.0
GR1342.0  9935.0  1344.0  9945.0  1344.8  9950.0  1342.0  9970.0  1341.5  9980.0
GR1340.5 10000.0  1341.0 10105.0  1341.5 10840.0  1342.0 11290.0  1344.0 12150.0
ET           9.1                                                  9810.0  9950.0
X1 1.419      16  9980.0 10120.0    1010    1010    1010
GR1346.3  9810.0  1345.0  9835.0  1345.3  9875.0  1344.0  9910.0  1344.0  9920.0
GR1346.0  9930.0  1348.0  9940.0  1348.6  9950.0  1345.0  9980.0  1344.0 10000.0
GR1345.0 10120.0  1346.0 10220.0  1346.1 10310.0  1346.0 10400.0  1345.0 10950.0
GR1346.0 11230.0
ET           9.1                                                  9820.0  9960.0
X1 1.561      14  9990.0 10040.0     750     750     750
GR1348.8  9820.0  1347.9  9840.0  1347.2  9870.0  1346.0  9920.0  1346.0  9935.0
GR1348.0  9940.0  1350.0  9950.0  1350.7  9960.0  1347.0  9990.0  1346.0 10000.0
GR1347.0 10040.0  1348.0 10480.0  1348.0 11050.0  1350.0 12620.0
NC 0.040   0.050   0.040     0.1     0.3
ET           9.1                                                  9840.0  9980.0
X1 1.712      14  9995.0 10450.0     800     800     800
GR1350.9  9840.0  1350.0  9860.0  1349.0  9870.0  1350.0  9925.0  1349.0  9945.0
GR1350.0  9955.0  1352.0  9970.0  1352.9  9980.0  1351.0  9995.0  1350.0 10000.0
GR1350.4 10200.0  1351.0 10450.0  1351.0 11200.0  1352.0 11630.0
ET           9.1                                                  9810.0  9940.0
X1 1.860      12  9975.0 10380.0     780     780     780
GR1353.5  9810.0  1351.0  9840.0  1352.0  9855.0  1354.0  9880.0  1354.8  9920.0
GR1355.0  9940.0  1353.0  9975.0  1352.0 10000.0  1353.0 10380.0  1354.0 10530.0
GR1355.0 10640.0  1356.0 11220.0
NC 0.015   0.015   0.015     0.3     0.5
OT     1    1358
ET           9.1                                                  8985.0 10925.0
X1 1.939      11  9690.0 10270.0     430     830     680
X2                                                                        15
GR1360.1  8780.0  1359.2  8985.0  1358.3  9190.0  1356.7  9580.0  1356.8  9690.0
GR1356.7  9800.0  1356.4 10000.0  1357.4 10270.0  1358.6 10595.0  1359.6 10925.0
GR1360.7 11260.0
NC 0.040   0.040   0.040     0.1     0.3
ET           9.1                                                  9970.0 10470.0
X1 2.053      17  9990.0 10050.0     600     320     450
X2                                                                        15
GR1356.0  9600.0  1355.0  9680.0  1354.0  9790.0  1354.0  9805.0  1356.0  9830.0
GR1354.0  9850.0  1352.0  9870.0  1352.0  9935.0  1354.0  9950.0  1356.0  9955.0
GR1358.0  9970.0  1356.0  9990.0  1354.7 10000.0  1356.0 10050.0  1356.0 10220.0
GR1358.0 10470.0  1358.0 10545.0
EJ


ER
```

```
*************************************************
*  WATER SURFACE PROFILES                       *
*  VERSION OF NOVEMBER 1976                     *
*  UPDATED MAY 1984                             *
*                                               *
*  RUN DATE: 06/08/1990      TIME: 07:18:47.87  *
*************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 551-1748 (FTS) 448-2105    *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X       X     X            X     X
X     X  X       X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X       X                  X
X     X  X       X     X            X
X     X  XXXXXXX   XXXXX            XXXXXXX
```

```
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION   :::
:::          by: HAESTAD METHODS          :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```


==========
H A E S T A D M E T H O D S
==========

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS RUN EXECUTED: 06/08/1990 07:18:48.48

```
*****************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*****************************************
```

```
T1      FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2      QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**89500L.DAT**
T3      100-YEAR FLOODPLAIN SPLIT FLOW AT BERMANN ROAD-FEBRUARY 1990

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

    -10.       2.       0.       0.  0.002000     0.00     0.0      0.  1321.000   0.000

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    -1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   43.000    1.000    2.000   26.000   39.000   21.000   22.000   27.000   28.000

    53.000   54.000    0.000   38.000   13.000   14.000   15.000   55.000   26.000   56.000

    63.000    1.000   51.000    4.000   42.000   57.000    0.000   38.000   39.000   33.000

     3.000   10.000   11.000   12.000    5.000    7.000    8.000   16.000   17.000   18.000

J5  LPRNT    NUMSEC                  ********REQUESTED SECTION NUMBERS********

   -10.000  -10.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

FLOW DISTRIBUTION FOR SECNO= 1.94 CWSEL= 1357.21

STA=	9456.	9580.	9690.	10270.
PER Q=	5.9	13.9	80.2	
AREA=	31.5	50.4	270.3	
VEL=	2.5	3.7	4.0	

FLOW DISTRIBUTION FOR SECNO= 2.05 CWSEL= 1358.10

STA=	9970.	9990.	10050.	10220.	10470.
PER Q=	1.9	26.3	47.7	24.0	
AREA=	22.2	165.6	358.7	277.5	
VEL=	1.2	2.2	1.8	1.2	

THIS RUN EXECUTED: 06/08/1990 07:19:04.40

```
*****************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*****************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100-YEAR FLOODPLAIN SPLI

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
	0.038	273.00	1322.20	0.00	0.00	0.00	9990.00	10030.00	9790.00	9925.00	9815.41	9890.99
	0.199	273.00	1323.46	0.00	0.00	840.00	9995.00	10025.00	9835.00	9960.00	9850.73	9948.66
*	0.407	273.00	1328.38	1328.38	0.00	1100.00	9980.00	10575.00	9750.00	9875.00	9841.37	9875.00
	0.646	273.00	1331.90	0.00	0.00	1260.00	9970.00	10300.00	9750.00	9875.00	9750.00	9859.45
*	0.672	273.00	1333.52	1333.52	0.00	150.00	9910.00	10260.00	9260.00	9910.00	9260.00	9599.20
	0.681	273.00	1333.88	0.00	0.00	500.00	9975.00	10030.00	9525.00	9700.00	9525.00	9664.31
	0.785	273.00	1334.64	0.00	0.00	500.00	9980.00	10430.00	9810.00	9945.00	9810.00	9934.17
	0.843	273.00	1335.11	0.00	0.00	350.00	9990.00	10395.00	9830.00	9975.00	9835.79	9957.78
	1.078	273.00	1339.15	0.00	0.00	1240.00	9990.00	10680.00	9830.00	9970.00	9849.14	9950.75
	1.227	273.00	1341.66	0.00	0.00	790.00	9980.00	10840.00	9815.00	9950.00	9850.06	9933.32
	1.419	273.00	1345.86	0.00	0.00	1010.00	9980.00	10120.00	9810.00	9950.00	9818.32	9929.34
	1.561	273.00	1348.07	0.00	0.00	750.00	9990.00	10040.00	9820.00	9960.00	9836.29	9940.33
	1.712	273.00	1350.54	0.00	0.00	800.00	9995.00	10450.00	9840.00	9980.00	9848.02	9959.04
	1.860	273.00	1353.70	0.00	0.00	780.00	9975.00	10380.00	9810.00	9940.00	9810.00	9876.26
*	1.939	1358.00	1357.21	1357.21	4.03	680.00	9690.00	10270.00	8985.00	10925.00	9456.08	10218.25
	2.053	1358.00	1358.10	0.00	2.16	450.00	9990.00	10050.00	9970.00	10470.00	9970.00	10470.00

100-YEAR FLOODPLAIN SPLI

SUMMARY PRINTOUT

	SECND	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
	0.038	273.00	0.00	0.00	2.38	0.00	0.00	1321.50	1322.20	0.00	75.58	1320.00	1.00
	0.199	273.00	0.00	0.00	1.80	0.00	0.00	1322.70	1323.46	1.27	97.93	1321.00	1.00
*	0.407	273.00	0.00	0.00	6.42	0.00	0.00	1328.00	1328.38	4.91	33.63	1326.47	1.00
	0.646	273.00	0.00	0.00	1.51	0.00	0.00	1332.40	1331.90	3.52	109.45	1329.30	1.00
*	0.672	273.00	0.00	0.00	3.00	0.00	0.00	1332.40	1333.52	1.62	339.20	1333.00	1.00
	0.681	273.00	0.00	0.00	1.86	0.00	0.00	1332.00	1333.88	0.36	139.31	1332.00	1.00
	0.785	273.00	0.00	0.00	1.44	0.00	0.00	1336.00	1334.64	0.76	124.17	1332.20	1.00
	0.843	273.00	0.00	0.00	2.37	0.00	0.00	1338.00	1335.11	0.47	121.99	1334.00	1.00
	1.078	273.00	0.00	0.00	2.28	0.00	0.00	1340.00	1339.15	4.04	101.61	1337.40	1.00
	1.227	273.00	0.00	0.00	2.83	0.00	0.00	1344.00	1341.66	2.51	83.26	1339.50	1.00
	1.419	273.00	0.00	0.00	2.58	0.00	0.00	1346.00	1345.86	4.19	111.01	1344.00	1.00
	1.561	273.00	0.00	0.00	2.18	0.00	0.00	1350.00	1348.07	2.21	104.04	1346.00	1.00
	1.712	273.00	0.00	0.00	2.65	0.00	0.00	1352.00	1350.54	2.47	111.03	1349.00	1.00
	1.860	273.00	0.00	0.00	2.88	0.00	0.00	1356.00	1353.70	3.16	66.26	1351.00	1.00
*	1.939	268.49	1089.51	0.00	3.28	4.03	0.00	1360.70	1357.21	3.51	762.17	1356.40	1.02
	2.053	25.95	357.45	974.60	1.17	2.16	1.53	1358.00	1358.10	0.89	500.00	1354.70	1.00

100-YEAR FLOODPLAIN SPLI

SUMMARY PRINTOUT

SECNO	XLCH	K*CHSL	EG	HV	HL	OLOSS	10K*S	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
0.038	0.00	0.00	1322.29	0.09	0.00	0.00	19.71	0.00	2.20	40.00	0.00	0.00
0.199	840.00	1.19	1323.51	0.05	1.22	0.00	11.20	2.57	2.46	40.00	0.00	0.00
* 0.407	1100.00	4.97	1329.02	0.64	3.26	0.18	211.77	5.02	1.91	40.00	0.00	0.00
0.646	1260.00	2.25	1331.93	0.04	2.86	0.06	8.10	8.24	2.60	40.00	0.00	0.00
* 0.672	150.00	24.67	1333.66	0.14	0.32	0.05	52.71	8.83	0.52	15.00	0.00	0.00
0.681	500.00	-2.00	1333.93	0.05	0.27	0.01	22.98	9.05	1.88	40.00	0.00	0.00
0.785	500.00	0.40	1334.67	0.03	0.73	0.00	8.48	11.21	2.44	40.00	0.00	0.00
0.843	350.00	5.14	1335.20	0.09	0.51	0.02	40.63	12.33	1.11	40.00	0.00	0.00
1.078	1240.00	2.74	1339.23	0.08	4.03	0.00	26.61	15.67	1.75	40.00	0.00	0.00
1.227	790.00	2.66	1341.79	0.12	2.54	0.01	39.76	17.63	2.16	40.00	0.00	0.00
1.419	1010.00	4.46	1345.96	0.10	4.17	0.00	42.90	19.97	1.86	40.00	0.00	0.00
1.561	750.00	2.67	1348.15	0.07	2.18	0.00	21.01	21.97	2.07	40.00	0.00	0.00
1.712	800.00	3.75	1350.65	0.11	2.49	0.01	50.89	24.06	1.54	40.00	0.00	0.00
1.860	780.00	2.56	1353.83	0.13	3.17	0.01	33.27	25.83	2.70	40.00	0.00	0.00
* 1.939	680.00	7.94	1357.44	0.24	2.07	0.05	40.45	28.82	0.81	15.00	15.00	0.00
2.053	450.00	-3.78	1358.15	0.05	0.68	0.02	8.74	34.12	3.40	40.00	40.00	40.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=    0.407  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    0.407  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    0.407  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    0.672  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    0.672  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    0.672  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    1.939  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    1.939  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    1.939  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

THIS RUN EXECUTED: 06/08/1990 07:19:07.20

```
**********************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
ERROR CORR -  01,02,03,04,05,06
MODIFICATION -  50,51,52,53,54,55,56
**********************************************
```

Appendix B

Coordination Correspondance

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

BOARD OF DIRECTORS

Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone
Ed Pastor

RECEIVED
JAN 8 1990
WOOD & ASSOCIATES

Mr. James R. Morris, P.E.
Arizona Department of Water Resources
15 South 15th Avenue
Phoenix, Arizona 85007

SUBJECT: Southern Pacific Railroad/Queen Creek
Floodplain Delineation Study

Dear Mr. Morris:

Enclosed for your review is one copy of the preliminary hydrology and hydraulics for the flood hazard delineation on the referenced study area.

To address all comments and concerns to our Engineer, your timely response will be appreciated by January 12. If you should have questions regarding this matter please contact me at 262-1501.

Sincerely,

Jan M. Farmer
Hydrologist

Enclosure

Copy to: Lynn Thomas, Wood & Associates

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

BOARD of DIRECTORS
Fred Koory, Jr., Chairman
George L. Campbell
Carole Carpenter
Tom Freestone
Ed Pastor

ANNOUNCEMENT OF INTENT TO PERFORM FLOOD ELEVATION STUDY

The Flood Control District of Maricopa County (FCDMC) has contracted Wood and Associates to perform a floodplain redelineation for The Queen Creek from Greenfield Road east to the Maricopa County boundary; Sonoqui Creek from Higley Road east to the Maricopa County Boundary; and Rittenhouse floodplain from Power Road east to the County Boundary (please see attached map).

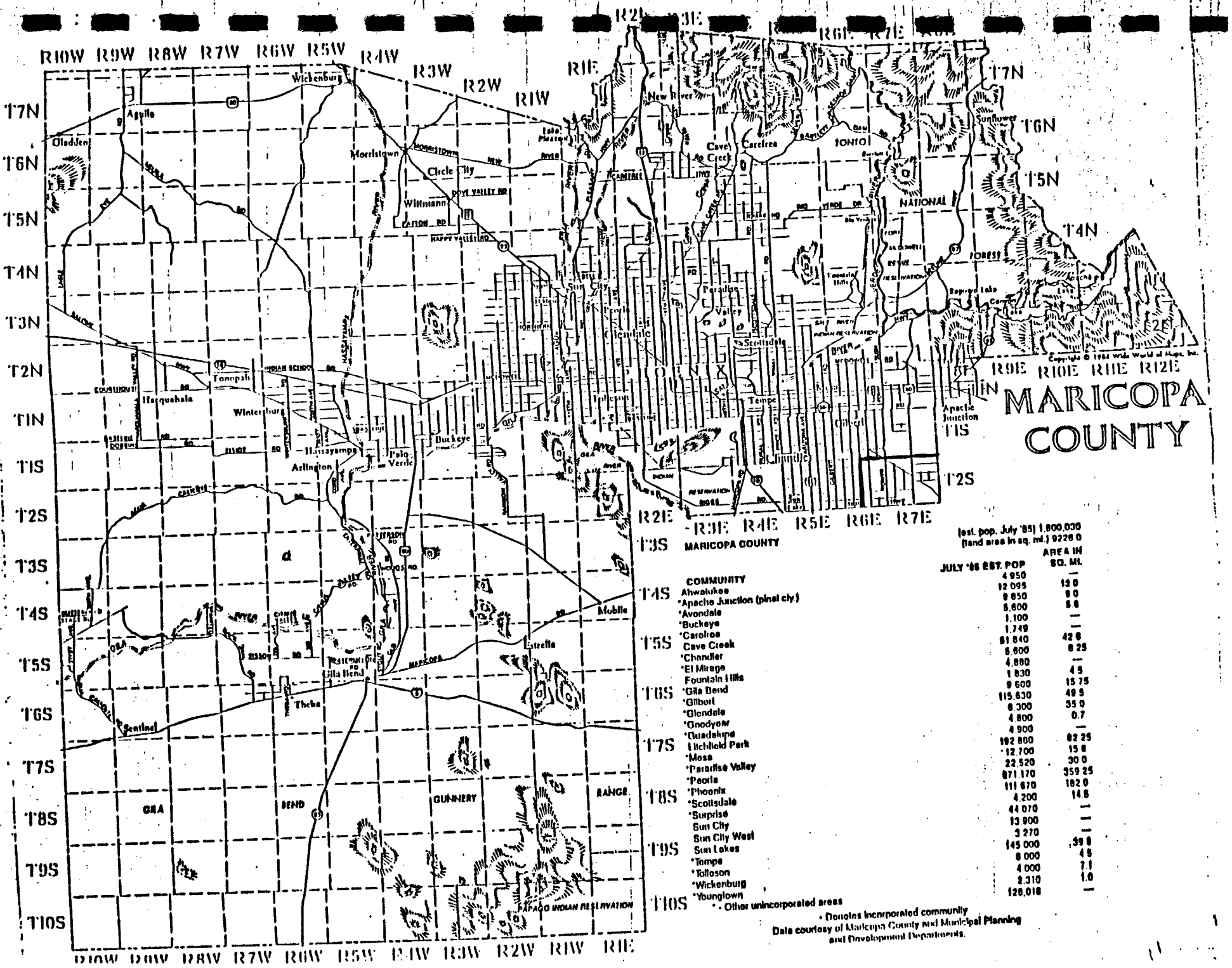
These studies will examine and evaluate the flood hazard areas in the community to determine the flood elevation for those areas. These elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency.

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any of their concerns as well as any relevant technical information to the attention of FCDMC/FEMA, so that they could be considered during the course of this study. Your comments should be addressed to Jan M. Farmer or Doug Plasencia, hydrologists of FCDMC, to be forwarded to the study contractor.

Doug Plasencia
Hydrologist

Enclosure

Copies to: Robert S. Joe, Chief, Planning; Corps of Engineers
Don E. McDaniel, Jr., Assistant County Manager/General Services
Robert C. Esterbrook, County Engineer
Edmond Nassar, U.S.G.S., Water Resources Division
Jim Morris, ADWR
Ralph Arrington, Soil Conservation Service
D. Dean Bibles, Federal Bureau of Land Managment
Lowell Heaten, Bureau of Reclamation
Laura Roglin, Roosevelt Irrigation District
Williams Air Force Base, 82CES/ DE WAB
✓Darrel Wood, Wood and Associates


MARICOPA COUNTY
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E
R9E R10E R11E R12E
T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
Wickenburg
Aguila
Morristown
Circle City
Wittmann
New River
Cave Creek
Carefree
Sunflower
TONTO
NATIONAL
FOREST
Sun City
Peoria
Glendale
Paradise Valley
Scottsdale
PHOENIX
Tolleson
Tempe
Chandler
Apache Junction
Tonopah
Harquahala
Wintersburg
Hassayampa
Arlington
Palo Verde
Buckeye
Mobile
Estrella
Gila Bend
Theba
Sentinel
GILA
BEND
GUNNERY
RANGE
PAPAGO INDIAN RESERVATION
MARICOPA COUNTY
COMMUNITY
Ahwatukee
*Apache Junction (pinal cty.)
*Avondale
*Buckeye
*Carefree
Cave Creek
*Chandler
*El Mirage
Fountain Hills
*Gila Bend
*Gilbert
*Glendale
*Goodyear
*Guadalupe
Litchfield Park
*Mesa
*Paradise Valley
*Peoria
*Phoenix
*Scottsdale
*Surprise
Sun City
Sun City West
Sun Lakes
*Tempe
*Tolleson
*Wickenburg
*Youngtown
* - Other unincorporated areas
• Denotes incorporated community
Data courtesy of Maricopa County and Municipal Planning and Development Departments.
(est. pop. July '85) 1,800,030
(land area in sq. mi.) 9226.0
JULY '85 EST. POP
AREA IN SQ. MI.
4,950 —
12,095 13.0
9,850 9.0
8,600 5.6
1,100 —
1,749 —
81,840 42.6
8,600 8.25
4,880 —
1,830 4.5
9,600 15.75
115,630 49.5
8,300 35.0
4,800 0.7
4,900 —
192,880 82.25
12,700 15.8
22,520 30.0
871,170 359.25
111,670 182.0
4,200 14.5
44,070 —
13,900 —
3,270 —
145,000 39.0
8,000 4.5
4,000 7.1
2,310 1.0
128,018 —

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

BOARD of DIRECTORS
Fred Koory, Jr., Chairman
George L. Campbell
Carole Carpenter
Tom Freestone
Ed Pastor

SEP 23 1987

Mr. Ray Lenaburg, Project Officer
Federal Emergency Management Agency, Region IX
Presidio of San Francisco, Bldg. 105
San Francisco, California 94129

Re: Queen Creek Area Drainage Master Study, Maricopa County, Az

Dear Mr. Lenaburg:

This letter is to inform you that the Flood Control District of Maricopa County has contracted the engineering firm, Wood & Associates, to perform a floodplain redelineation of The Queen Creek from Greenfield Road, east to the Maricopa County boundary; Sonoqui Creek from Higley Road, east to the Maricopa County boundary; and Rittenhouse Floodplain from Power Road, east to the Maricopa County boundary (please see attached map).

For these studies, recent aerial mapping will be utilized to obtain the most up-to-date data on topography. Also, the U.S. Army Corps of Engineers HEC-2 computer model will be used to estimate the floodplain and the floodway boundaries. The study is expected to be completed sometime in 1988.

Your comments and input regarding this ongoing study will be appreciated.

In case of any questions, please feel free to call myself or Jan M. Farmer at (602) 262-1501 .

Sincerely,

Doug Plasencia, Hydrologist

cc: Phil Myers, FEMA
Mary Bandiera, FEMA
Darrel Wood, Wood & Associates

Enclosures: (1)

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

November 10, 1986

Darrel E. Wood, P.E.

Mr. Charles H. Strand
Public Works Director
Town of Gilbert
119 N. Gilbert Road
Gilbert, Arizona 85234

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Strand:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing and proposed water and sewer facilities.
- Benchmark and datum.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by November 21, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

LMT/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

November 10, 1986

Darrel E. Wood, P.E.

Mr. Ed Del Duca
Planning Director
Town of Gilbert
119 N. Gilbert Road
Gilbert, Arizona 85234

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Del Duca:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing and proposed city limits for the Town of Gilbert.
- Existing and proposed land use and zoning maps within the Queen Creek Area.
- Existing and proposed zoning ordinances for the Town of Gilbert.
- Existing and proposed streets and roadways.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by November 21, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

LMT/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

November 10, 1986

Darrel E. Wood, P.E.

Mr. Fred Koory, Jr.
Chairman
Maricopa Association of Governments
Transportation and Planning Office
1820 West Washington Street
Phoenix, Arizona 85007

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Koory:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- The Transportation Improvement Program which has recently been approved.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by November 21, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

LMT/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

November 3, 1986

Mr. Wayne Balmer, AICP
Planning Director
City of Mesa
Planning & Community Development
55 North Center Street
Mesa, Arizona 85201

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Balmer:

As explained in a letter to your office dated September 18, 1986, Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all jurisdictional agencies within the Queen Creek Area. However, we have not received any response from you office. In our efforts to coordinate with your agency, we respectfully request the following information:

- City of Mesa existing and proposed city limits.
- City of Mesa existing and proposed rights-of-way.
- City of Mesa existing and projected land use and zoning maps.

If this information is not available or does not exist, we would like to ask that you respond in writing to our office no later than November 14, 1986. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

November 3, 1986

Darrel E. Wood, P.E.

Mr. Phil C. Hogue
Floodplain Administrator
Pinal County Planning & Zoning Department
P.O. Box D
Florence, Arizona 85232

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Hogue:

As explained in a letter to your office dated September 18, 1986, Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all jurisdictional agencies within the Queen Creek Area. However, we have not received any response from you office. In our efforts to coordinate with your agency, we respectfully request the following information:

- Existing and proposed zoning and land use maps.
- Pinal County floodplain delineations within the Queen Creek Area.
- Pinal County structures which have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area.

If this information is not available or does not exist, we would like to ask that you respond in writing to our office no later than November 14, 1986. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

October 21, 1986

Lt. Col. James M. Owendoff
82nd ABG/DE
Williams Air Force Base, Arizona 85240

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Lt. Col. James M. Owendoff:

As explained in a letter to your office dated September 18, 1986 (copy attached), Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all agencies with jurisdiction within the Queen Creek Area. However, we have not received any response from your office. Therefore, we believe your agency has no information which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area. We respectfully request, for our records, a letter from your agency stating this to be true.

We would be most appreciative of receiving this letter by November 14, 1986 if possible. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood
President

DEW/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

October 21, 1986

Mr. Herb Mattingly
Salt River Valley Water Users Association
1521 N. Project Drive
Phoenix, Arizona 85001

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Mattingly:

As explained in a letter to your office dated September 18, 1986 (copy attached), Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all agencies with jurisdiction within the Queen Creek Area. However, we have not received any response from your office. Therefore, we believe your agency has no information which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area. We respectfully request, for our records, a letter from your agency stating this to be true.

We would be most appreciative of receiving this letter by November 14, 1986 if possible. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood
President

DEW/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

October 21, 1986

Darrel E. Wood, P.E.

Mr. Wayne Balmer, AICP
Planning Director
City of Mesa-Planning & Community Development
P.O. Box D
Florence, Arizona 85232

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Balmer:

As explained in a letter to your office dated September 18, 1986 (copy attached), Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all agencies with jurisdiction within the Queen Creek Area. However, we have not received any response from your office. Therefore, we believe your agency has no information which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area. We respectfully request, for our records, a letter from your agency stating this to be true.

We would be most appreciative of receiving this letter by November 14, 1986 if possible. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood P.E.
President

DEW/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

October 21, 1986

Mr. Ted Barrett
Southern Pacific Transportation Company
401 West Harrison
Phoenix, Arizona 85003

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Barrett:

As explained in a letter to your office dated September 18, 1986 (copy attached), Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all agencies with jurisdiction within the Queen Creek Area. However, we have not received any response from your office. Therefore, we believe your agency has no information which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area. We respectfully request, for our records, a letter from your agency stating this to be true.

We would be most appreciative of receiving this letter by November 14, 1986 if possible. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood
President

DEW/lm

enclosures

cc: Ms. Kebba Buckley

4105 North 20th Street, Suite 120 Phoenix, Arizona 85016 Phone (602) 957-2142

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

October 21, 1986

Mr. Joe Nickus
Roosevelt Water Conservation District
P.O. Box 168
Highley, Arizona 85236

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Nickus:

As explained in a letter to your office dated September 18, 1986 (copy attached), Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. We believe that our office is very near to collecting all pertinent data from all agencies with jurisdiction within the Queen Creek Area. However, we have not received any response from your office. Therefore, we believe your agency has no information which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area. We respectfully request, for our records, a letter from your agency stating this to be true.

We would be most appreciative of receiving this letter by November 14, 1986 if possible. Should you have any questions or comments, please feel free to contact our office. Thank you for your time and attention to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood
President

DEW/lm

enclosures

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

October 20, 1986

Darrel E. Wood, P.E.

Mr. Don E. McDaniel, Jr.
Maricopa County, Arizona
111 South Third Avenue
Phoenix, Arizona 85003

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. McDaniel:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Major and proposed streets.
- Current zoning district and government owned land.
- Projected land use for the year 2000.

To date, we have already collected the following information from your agency:

- Composite future Land Use Plan dated 1983.
- Soil associations dated 1977.
- Generalized Land Use Plan dated 1982.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by November 14, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,
WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure
cc: Ms. Kebba Buckley

4105 North 20th Street, Suite 130 Phoenix, Arizona 85016 Phone (602) 957-2140

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E.

October 20, 1986

Mr. William C. Jenkins, P.E.
Arizona Department of Water Resources
99 East Virginia
Phoenix, Arizona 85004

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Jenkins:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Any flood control structures affecting the Queen Creek Area.
- Any hydrologic studies performed within the Queen Creek Area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by November 14, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

October 14, 1986

Darrel E. Wood, P.E.

Mr. Ralph M. Arrington
State Conservation Engineer
United States Department of Agriculture
Soil Conservation Service
201 East Indianola, Suite 200
Phoenix, Arizona 85012

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Arrington:

As explained in a telephone conversation of October , 1986, the scope of services to be performed by Wood & Associates, Inc. for the Flood Control District of Maricopa County's Queen Creek Area D.M.S. states:

> "The C.A.P. alignment serves as the east upstream boundary. Agencies will furnish compatible hydrographs for use in the HEC-1 computer model, for the C.A.P. overchutes, Vineyard and Rittenhouse structures and the Powerline Floodway, etc."

In collection of all pertinent data, we believe at this time, that the only 100-year compatible hydrograph available is the Queen Creek Flood Detention Dike which is also referred to as the Sonoqui Dike designed by the U.S. Bureau of Reclamation.

It is our understanding that compatible hydrographs are not available for the remaining C.A.P. overchutes within the Queen Creek Area D.M.S. nor the S.C.S. structures mentioned in the scope of services. Therefore, if possible, we would appreciate a letter from your office verifying this to be true. This will enable us to establish other methods for computer modeling of the watershed.

At this time, I would like to express our sincere gratitude for your assistance in collection of any pertinent data and ask that you feel free to call, should you have any questions or comments.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

cc: Ms. Kebba Buckley

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Lt. Col James M. Owendoff
82nd ABG/DE
Williams A.F.B., Arizona 85240

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Owendoff:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- As-built plans of grading and drainage design for Williams Air Force Base.
- Status of new drainage study for Williams Air Force Base and report if available.
- Benchmark and datum.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Grand Ward
Roosevelt Water Conservation District
P.O. Box 168
Higley, Arizona 85236

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Ward:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- As-built plan and profile drawings of the Roosevelt Water Conservation District Canal within the Queen Creek area.
- Any proposed irrigation facilities within the Queen Creek area.
- Benchmark and datum.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 120 Phoenix, Arizona 85016 Phone (602) 957-9440

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Herb Mattingly
Salt River Valley Water Users Association
1521 North Project Drive
Phoenix, Arizona 85001

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Mattingly:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- As-built plan and profile drawings of irrigation facilities within the Queen Creek area.
- Any proposed irrigation facilities within the Queen Creek area.
- Benchmark and datum.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 Phoenix, Arizona 85016 Phone (602) 957-2148

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Wayne Balmer, AICP
Planning Director
City of Mesa-Planning & Community Dev.
55 North Center Street
Mesa, Arizona 85201

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Balmer:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing zoning and land use maps.
- Proposed zoning and land use maps.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 Phoenix, Arizona 85016 Phone (602) 957-9149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Phil C. Hogue
Pinal County-Planning & Zoning Department
P.O. Box D
Florence, Arizona 85232

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Houge:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing zoning and land use maps.
- Proposed zoning and land use maps.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

October 14, 1986

Darrel E. Wood, P.E.

Mr. Lowell Heaton
United States Department of the Interior
Bureau of Reclamation
23636 North 7th Street
Phoenix, Arizona 85024

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Heaton:

As explained in a telephone conversation of October 8, 1986, the scope of services to be performed by Wood & Associates, Inc. for the Flood Control District of Maricopa County's Queen Creek Area D.M.S. states:

> "The C.A.P. alignment serves as the east upstream boundary. Agencies will furnish compatible hydrographs for use in the HEC-1 computer model, for the C.A.P. overchutes, Vineyard and Rittenhouse structures and the Powerline Floodway, etc."

In collection of all pertinent data, we believe at this time, that the only 100-year compatible hydrograph available was provided by you on the Queen Creek Flood Detention Dike, which is also referred to as the Sonoqui Dike.

It is our understanding that compatible hydrographs are not available for the remaining C.A.P. overchutes within the Queen Creek Area D.M.S. nor the S.C.S. structures mentioned in the scope of services. Therefore, if possible, we would appreciate a letter from your office documenting this to be true. This will enable us to establish other methods for computer modeling of the watershed.

At this time, I would like to express our sincere gratitude for your assistance in collection of any pertinent data and ask that you feel free to call, should you have any questions or comments.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

cc: Ms. Kebba Buckley

4105 North 20th Street, Suite 100 Phoenix, Arizona 85016 Phone (602) 957-9140

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 17, 1986

Darrel E. Wood, P.E.

Mr. Lowell Heaton
United State Department of the Interior
Bureau of Reclamation
23636 North 7th Street
Phoenix, Arizona 85024

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Heaton:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Central Arizona Project, Salt-Gila Aqueduct, Reach 2, Plan and Profile and overchute details.
- Central Arizona Project, Salt-Gila Aqueduct, Reach 3, Plan and Profile and overchute details.
- Review of Specifications, Design Data for Reach 2, Salt-Gila Aqueduct, Central Arizona Project.
- Review of Specifications, Design Data for Reach 3, Salt-Gila Aqueduct, Central Arizona Project.
- Any drainage studies which have been completed within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,
WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm
enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Ted Barrett
Southern Pacific Transportation Company
401 West Harrison
Phoenix, Arizona 85003

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Barrett:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Any existing and proposed railroad facilities within the Queen Creek area.
- Drainage studies performed for the Southern Pacific Railroad within the Queen Creek area.
- Major benchmark and datum.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Harry Kent
City Engineer
City of Mesa Engineering Department
55 North Center Street
Mesa, Arizona 85201

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Kent:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing water and sewer facilities within the Queen Creek area.
- Planned water and sewer facilities within the Queen Creek area.
- Existing and planned streets and roadways. Alignments & rights-of-way within the Queen Creek area.
- Drainage studies which affect the Queen Creek area.
- Drainage structures and storm sewers within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,
WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure
cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Dean Griffeth
Queen Creek Irrigation District
P.O. Box 690
Queen Creek, Arizona 85242

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Griffeth:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Any existing and proposed irrigation facilities within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Robert Esterbrooks
County Engineer
Maricopa County Highway Department
3325 West Durango Street
Phoenix, Arizona 85009

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Esterbrooks:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing and planned streets & roadway alignments and rights-of-way.
- Major benchmark and datum.
- As-built plans of drainage structures within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Charles B. Minter
County Engineer
Pinal County Engineering Department
P.O. Box 727
Florence, Arizona 85232

Re: Queen Creek Area D.M.S.
WA #86328

Dear Mr. Minter:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing roadway alignments and rights-of-way.
- Proposed roadway alignments and rights-of-way.
- Benchmark and datums.
- Details of existing and proposed drainage structures.
- Drainage studies which affect the Queen Creek area.
- Existing and proposed water and sewer facilities.
- Storm sewers.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Ralph M. Arrington
State Conservation Engineer
United States Department of Agriculture
Soil Conservation Service
201 East Indianola
Suite 200
Phoenix, Arizona 85012

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Arrington:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- As-built information regarding drainage structures i.e. Power Line Dike, Vineyard Road Dike, Rittenhouse Dike, Roosevelt Water Conservation District (R.W.C.D.) Floodway.
- Benchmark and datum.
- Soil surveys which are relevant to the area.
- Any drainage studies which are within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,
WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure
cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Rein Von Kampen
Salt River Project
1910 East Hampton Avenue
Mesa, Arizona 85204

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Von Kampen:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Information regarding the 69 Kv power line which crosses the C.A.P. canal in Section 18, T-3-S, R-9-E.
- Other existing and proposed electric facilities within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Alan Meins
Mountain Bell Liaison Department
3033 N. 3rd Street Room 806A
Phoenix, Arizona 85012

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Meins:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing and proposed telephone facilities within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Elton Buell
Southwest Gas Corporation - Papago Division
Franchise Engineering-Sta. 450-582
9 South 43rd Avenue
Phoenix, Arizona 85009

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Buell:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Existing and proposed natural gas facilities within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 120 Phoenix, Arizona 85016 Phone (602) 957-9642

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. Gary Madden, Supervisor
A.P.S. Engineering
Survey and R/W Station 3278
P.O. Box 21666
Phoenix, Arizona 85036

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Madden:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- Any existing and proposed electric facilities within the Queen Creek area.
- Any existing and proposed railroad facilities within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 120 Phoenix, Arizona 85016 Phone (602) 957-9140

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Ms. Theresa Dominques
Flood Control District of Maricopa County
3335 West Durango
Phoenix, Arizona 85009

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Ms. Dominques:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- A copy of the study done for East Maricopa County A.D.M.S.
- Any flood insurance studies which have an impact on the Queen Creek area.
- Any information regarding flood control structures within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

September 18, 1986

Darrel E. Wood, P.E.

Mr. William Wakefield
Arizona Department of Transportation
Highway Plans & Services
205 South 17th Avenue, Room 108E
Phoenix, Arizona 85007

Re: Queen Creek Area D.M.S.
WA Job No. 86328

Dear Mr. Wakefield:

Wood & Associates, Inc. has been contracted by the Flood Control District of Maricopa County to perform the Queen Creek Area Drainage Master Study. One of our initial tasks is to assemble all pertinent data by contacting all agencies of jurisdiction within the watershed. The Queen Creek study area is approximately 171 square miles in size and situated entirely within Maricopa County and Pinal County. The study area is located north of the Gila River Indian Reservation, south of Ray Road, east of the Roosevelt Water Conservation District Canal, and west of the Central Arizona Project Canal (see attached exhibit).

In our efforts to coordinate with your agency we respectfully request the following information:

- As-built plan and profile drawings for Hunt Highway.
- Drainage studies which have an impact on the Queen Creek area.
- Drainage structures which are located within the Queen Creek area.

Should there be any other information known to your agency which could have an impact on the surface water hydrology and floodplain hydraulics of the Queen Creek Area, we would be most appreciative of receiving this information by October 17, 1986. Thank you for your time and attention in responding to this request.

Very truly yours,

WOOD & ASSOCIATES, INC.

Darrel E. Wood, P.E.
President

DEW/lm

enclosure

cc: Ms. Theresa Dominques

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149

Appendix C

Hydrologic Data

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

BOARD of DIRECTORS
James D. Bruner
Carole Carpenter
Tom Freestone
Fred Koory, Jr.
Ed Pastor

RECEIVED
NOV 27 1989
WOOD & ASSOCIATES

NOV 22 1989

Ms. Lynn M. Thomas
Wood & Associates Inc.
4105 North 20th Street, Suite 130
Phoenix, Arizona 85016

SUBJECT: Queen Creek ADMS - Review of Hydrology

Dear Ms. Thomas:

The District has completed its review of the HEC-I schematic with the 100 year peak discharges and the Revised Land Ownership Map.

The 100 year hydrograph and peak discharges are acceptable to the District. With the acceptance of this item, we formally accept the hydrology and the completion of this task.

In the final report it should be noted that the hydrograph developed for this study is for the 100 year event, and, ultimately a multi-frequency hydrograph should be developed to correctly determine peak discharges for events other than the 100 year event.

The Revised Land Ownership Map is acceptable to the District.

If you have any questions please contact me.

Sincerely,

H. S. Clement
Planning & Project Management

```
DIAGRAM
ID      QUEEN CREEK AREA DRAINAGE MASTER STUDY PHASE 2
ID      EXISTING CONDITIONS MODEL   **89500E2.DAT**
ID      REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT
T    15                    300
IO     5
IN    15
ID  3.62    0.01
PC  0.00    0.00    0.00    0.01    0.01    0.01    0.02    0.02    0.02    0.03
PC  0.03    0.03    0.04    0.04    0.04    0.04    0.05    0.05    0.06    0.06
PC  0.06    0.07    0.07    0.08    0.08    0.08    0.09    0.10    0.10    0.11
PC  0.11    0.12    0.12    0.13    0.13    0.14    0.15    0.15    0.16    0.17
PC  0.18    0.19    0.20    0.22    0.24    0.26    0.28    0.39    0.66    0.71
PC  0.74    0.76    0.78    0.79    0.80    0.81    0.82    0.83    0.84    0.85
PC  0.86    0.86    0.87    0.88    0.88    0.89    0.89    0.90    0.90    0.91
PC  0.91    0.92    0.92    0.93    0.93    0.93    0.94    0.94    0.95    0.95
PC  0.95    0.96    0.96    0.96    0.96    0.97    0.97    0.97    0.98    0.98
PC  0.98    0.99    0.99    0.99    1.00    1.00    1.00
HD  3.53     18.
HD  3.48     38.
HD  3.41     72.
*SUB222
KM      RUNOFF FROM SUBBASIN 222
BA  0.93
LS           76
UD  1.39
KK RO225
KM      ROUTE SUB222 TO CO228
RM     4    1.56    0.20
KKSUB226
KM      RUNOFF FROM SUBBASIN 226
BA  1.01
LS           78
UD  1.59
KK CO228
KM      COMBINE RUNOFF FROM RO225 AND SUB226
HC     2
KK RO229
KM      ROUTE CO228 TO CO232
RM     4    1.65    0.20
KKSUB230
KM      RUNOFF FROM SUBBASIN 230
BA  1.00
LS           75
UD  1.49
KK CO232
KM      COMBINE RUNOFF FROM RO229 AND SUB230
HC     2
KK RO233
KM      ROUTE CO232 TO CO 236
RM     4    1.62    0.20
KKSUB234
KM      RUNOFF FROM SUB234
BA  1.02
LS           76
UD  1.48
KK CO236
KM      COMBINE RO233 AND SUB234
HC     2
KK RO237
KM      ROUTE CO236 TO CO286
RM    16    3.10    0.20
KKSUB238
KM      RUNOFF FROM SUBBASIN 238
```

```
BA  1.32
LS            75
UD  2.35
KK CO266
KM      COMBINE RUNOFF FROM RO237 AND SUB238
HC     2
KKSUB240
KM      RUNOFF FROM SUBBASIN 240
BA  1.06
LS            77
UD  2.72
KK RO241
KM      ROUTE SUB240 TO CO244
RM     4    1.62    0.20
KKSUB242
KM      RUNOFF FROM SUBBASIN 242
BA  0.98
LS            76
UD  1.36
KK CO244
KM      COMBINE RUNOFF FROM RO241 AND SUB242
HC     2
KK RO245
KM      ROUTE CO244 TO CO248
RM     4    1.84    0.20
KKSUB246
KM      RUNOFF FROM SUBBASIN 246
BA  0.98
LS            75
UD  1.57
KK CO248
KM      COMBINE RO245 AND SUB246
HC     2
KK RO249
KM      ROUTE CO248 TO CO252
RM     4    1.65    0.20
KKSUB250
KM      RUNOFF FROM SUBBASIN 250
BA  1.00
LS            75
UD  1.60
KK CO252
KM      COMBINE RO249 AND SUB250
HC     2
KK RO253
KM      ROUTE CO252 TO CO256
RM    12    3.01    0.20
KKSUB254
KM      RUNOFF FROM SUBBASIN 254
BA  1.28
LS            77
UD  2.36
KK CO256
KM      COMBINE RO253 AND SUB254
HC     2
KKSUB258
KM      RUNOFF FROM SUBBASIN 258
BA  3.68
LS            78
UD  3.87
KK RO259
KM      ROUTE SUB258 TO CO262
RM     6    1.57    0.20
KKSUB260
KM      RUNOFF FROM SUBBASIN 260
BA  0.65
```

```
LS            75
UD  1.21
KK CO262
KM      COMBINE SUB260 AND RO259
HC     2
KK RO263
KM      ROUTE CO262 TO CO266
RM     4    1.56    0.20
KKSUB264
KM      RUNOFF FROM SUBBASIN 264
BA  0.99
LS            76
UD  1.47
KK CO266
KM      COMBINE SUB264 AND RO263
HC     2
KK RO267
KM      ROUTE CO266 TO CO270
RM    14    3.31    0.20
KKSUB268
KM      RUNOFF FROM SUBBASIN 268
BA  0.96
LS            76
UD  2.27
KK CO270
KM      COMBINE RUNOFF FROM RO267 AND SUB268
HC     2
KKSUB272
KM      RUNOFF FROM SUBBASIN 272
BA  0.59
LS            75
UD  1.38
KK RO273
KM      ROUTE SUB272 TO CO276
RM    12    2.91    0.20
KKSUB274
KM      RUNOFF FROM SUBBASIN 274
BA  1.45
LS            76
UD  2.62
KK RO275
KM      ROUTE SUB274 TO CO276
RM    12    2.94    0.20
KK CO276
KM      COMBINE RUNOFF FROM RO275 AND RO273
HC     2
KKSUB278
KM      RUNOFF FROM SUBBASIN 278
BA  1.40
LS            75
UD  2.26
KK CO280
KM      COMBINE SUB278 AND CO276
HC     2
KK RO281
KM      ROUTE CO280 TO CO282
RM    14    3.41    0.20
KK CO282
KM      COMBINE CO270 AND RO281
HC     2
KK RO283
KM      ROUTE CO282 TO CO284
RM    12    2.78    0.20
KK CO284
KM      COMBINE RUNOFF FROM RO283 AND CO256
HC     2
```

```
KK RO285
KM      ROUTE FLOW FROM CO284 TO CO288
KM     8    1.78    0.20
KK CO288
KM      COMBINE RO285 AND CO286
KC     2
KK RO289
KM      ROUTE CO288 TO CO294
KM     4    1.01    0.20
KKSUB290
KM      RUNOFF FROM SUBBASIN 290
BA  1.17
LS            79
UD  1.76
KK RO291
KM      ROUTE SUB290 TO CO294
KM     6    2.38    0.20
KK CO294
KM      COMBINE RUNOFF FROM RO291 AND RO289
KC     2
KKSUB292
KM      RUNOFF FROM SUBBASIN 292
BA  0.64
LS            77
UD  2.20
KK CO296
KM      COMBINE SUB292 AND CO294
KC     2
ZZ
```

ED-1 S/N: 33001208 HWVersion: 3.21

UN DATE: 02/05/1990 TIME: 11:05:34.29

ata File: 89500E2.DAT

```
*************************************
*                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*          FEBRUARY 1981            *
*        REVISED 14 JUN 85          *
*                                   *
*    RUN DATE: 02/05/1990           *
*        TIME: 11:05:39.84          *
*                                   *
*************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*                                   *
* (916) 551-1748 OR (FTS) 448-3285  *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

```
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION  :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```


==========
HAESTAD METHODS
==========

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

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

              $DIAGRAM
  1           ID        QUEEN CREEK AREA DRAINAGE MASTER STUDY PHASE 2
  2           ID        EXISTING CONDITIONS MODEL   ##39500GE2.DAT##
  3           ID        REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT
  4           IT      15                    300
  5           IO       5
  6           IN      15
  7           JD    3.62    0.01
  8           PC    0.00    0.00    0.00    0.01    0.01    0.01    0.02    0.02    0.02    0.03
  9           PC    0.03    0.03    0.04    0.04    0.04    0.04    0.05    0.05    0.06    0.06
 10           PC    0.06    0.07    0.07    0.08    0.08    0.08    0.09    0.10    0.10    0.11
 11           PC    0.11    0.12    0.12    0.13    0.13    0.14    0.15    0.15    0.16    0.17
 12           PC    0.18    0.19    0.20    0.22    0.24    0.26    0.28    0.39    0.66    0.71
 13           PC    0.74    0.76    0.78    0.79    0.80    0.81    0.82    0.83    0.84    0.85
 14           PC    0.86    0.86    0.87    0.88    0.88    0.89    0.89    0.90    0.90    0.91
 15           PC    0.91    0.92    0.92    0.93    0.93    0.93    0.94    0.94    0.95    0.95
 16           PC    0.95    0.96    0.96    0.96    0.96    0.97    0.97    0.97    0.98    0.98
 17           PC    0.98    0.99    0.99    0.99    1.00    1.00    1.00
 18           JD    3.53     18.
 19           JD    3.48     38.
 20           JD    3.41     72.

 21           KK  SUB222
 22           KM        RUNOFF FROM SUBBASIN 222
 23           BA    0.93
 24           LS              76
 25           UD    1.39

 26           KK   RO225
 27           KM        ROUTE SUB222 TO CO228
 28           RM       4    1.56    0.20

 29           KK  SUB226
 30           KM        RUNOFF FROM SUBBASIN 226
 31           BA    1.01
 32           LS              78
 33           UD    1.59

 34           KK   CO228
 35           KM        COMBINE RUNOFF FROM RO225 AND SUB226
 36           HC       2

 37           KK   RO229
 38           KM        ROUTE CO228 TO CO232
 39           RM       4    1.65    0.20

 40           KK  SUB230
 41           KM        RUNOFF FROM SUBBASIN 230
 42           BA    1.00
 43           LS              75
 44           UD    1.49
```

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

  45          KK   CO232
  46          KM        COMBINE RUNOFF FROM RO229 AND SUB230
  47          HC       2

  48          KK   RO233
  49          KM        ROUTE CO232 TO CO 236
  50          RM       4    1.62    0.20

  51          KK  SUB234
  52          KM        RUNOFF FROM SUB234
  53          BA    1.02
  54          LS              76
  55          UD    1.48

  56          KK   CO236
  57          KM        COMBINE RO233 AND SUB234
  58          HC       2

  59          KK   RO237
  60          KM        ROUTE CO236 TO CO286
  61          RM      16    3.10    0.20

  62          KK  SUB238
  63          KM        RUNOFF FROM SUBBASIN 238
  64          BA    1.32
  65          LS              75
  66          UD    2.35

  67          KK   CO286
  68          KM        COMBINE RUNOFF FROM RO237 AND SUB238
  69          HC       2

  70          KK  SUB240
  71          KM        RUNOFF FROM SUBBASIN 240
  72          BA    1.86
  73          LS              77
  74          UD    2.72

  75          KK   RO241
  76          KM        ROUTE SUB240 TO CO244
  77          RM       4    1.62    0.20

  78          KK  SUB242
  79          KM        RUNOFF FROM SUBBASIN 242
  80          BA    0.98
  81          LS              76
  82          UD    1.36

  83          KK   CO244
  84          KM        COMBINE RUNOFF FROM RO241 AND SUB242
  85          HC       2
```

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

  86          KK   RO245
  87          KM        ROUTE CO244 TO CO248
  88          RM       4    1.84    0.20

  89          KK  SUB246
  90          KM        RUNOFF FROM SUBBASIN 246
  91          BA    0.98
  92          LS              75
  93          UD    1.57

  94          KK   CO248
  95          KM        COMBINE RO245 AND SUB246
  96          HC       2

  97          KK   RO249
  98          KM        ROUTE CO248 TO CO252
  99          RM       4    1.65    0.20

 100          KK  SUB250
 101          KM        RUNOFF FROM SUBBASIN 250
 102          BA    1.00
 103          LS              75
 104          UD    1.60

 105          KK   CO252
 106          KM        COMBINE RO249 AND SUB250
 107          HC       2

 108          KK   RO253
 109          KM        ROUTE CO252 TO CO256
 110          RM      12    3.01    0.20

 111          KK  SUB254
 112          KM        RUNOFF FROM SUBBASIN 254
 113          BA    1.28
 114          LS              77
 115          UD    2.36

 116          KK   CO256
 117          KM        COMBINE RO253 AND SUB254
 118          HC       2

 119          KK  SUB258
 120          KM        RUNOFF FROM SUBBASIN 258
 121          BA    3.68
 122          LS              78
 123          UD    3.87

 124          KK   RO259
 125          KM        ROUTE SUB258 TO CO262
 126          RM       8    1.57    0.20
```

pchelpful.com
1m
9ttstrico

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

 127          KK  SUB260
 128          KM       RUNOFF FROM SUBBASIN 260
 129          BA    0.96
 130          LS             75
 131          UD    1.21

 132          KK   CO262
 133          KM       COMBINE SUB260 AND RO259
 134          HC       2

 135          KK   RO263
 136          KM       ROUTE CO262 TO CO266
 137          RM       4    1.56    0.20

 138          KK  SUB264
 139          KM       RUNOFF FROM SUBBASIN 264
 140          BA    0.99
 141          LS             76
 142          UD    1.47

 143          KK   CO266
 144          KM       COMBINE SUB264 AND RO263
 145          HC       2

 146          KK   RO267
 147          KM       ROUTE CO266 TO CO270
 148          RM      14    3.31    0.20

 149          KK  SUB268
 150          KM       RUNOFF FROM SUBBASIN 268
 151          BA    0.96
 152          LS             76
 153          UD    2.27

 154          KK   CO270
 155          KM       COMBINE RUNOFF FROM RO267 AND SUB268
 156          HC       2

 157          KK  SUB272
 158          KM       RUNOFF FROM SUBBASIN 272
 159          BA    0.59
 160          LS             75
 161          UD    1.38

 162          KK   RO273
 163          KM       ROUTE SUB272 TO CO276
 164          RM      12    2.91    0.20

 165          KK  SUB274
 166          KM       RUNOFF FROM SUBBASIN 274
 167          BA    1.45
 168          LS             76
 169          UD    2.62
```

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

 170          KK   RO275
 171          KM        ROUTE SUB274 TO CO276
 172          RM      12    2.94    0.20

 173          KK   CO276
 174          KM        COMBINE RUNOFF FROM RO275 AND RO273
 175          HC       2

 176          KK  SUB278
 177          KM        RUNOFF FROM SUBBASIN 278
 178          BA    1.40
 179          LS              75
 180          UD    2.26

 181          KK   CO280
 182          KM        COMBINE SUB278 AND CO276
 183          HC       2

 184          KK   RO281
 185          KM        ROUTE CO280 TO CO282
 186          RM      14    3.41    0.20

 187          KK   CO282
 188          KM        COMBINE CO270 AND RO281
 189          HC       2

 190          KK   RO283
 191          KM        ROUTE CO282 TO CO284
 192          RM      12    2.78    0.20

 193          KK   CO284
 194          KM        COMBINE RUNOFF FROM RO283 AND CO256
 195          HC       2

 196          KK   RO285
 197          KM        ROUTE FLOW FROM CO284 TO CO288
 198          RM       8    1.78    0.20

 199          KK   CO288
 200          KM        COMBINE RO285 AND CO286
 201          HC       2

 202          KK   RO289
 203          KM        ROUTE CO288 TO CO294
 204          RM       4    1.01    0.20

 205          KK  SUB290
 206          KM        RUNOFF FROM SUBBASIN 290
 207          BA    1.17
 208          LS              79
 209          UD    1.76
```

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

 210          KK   RO291
 211          KM        ROUTE SUB290 TO CO294
 212          RM       6    2.38    0.20

 213          KK   CO294
 214          KM        COMBINE RUNOFF FROM RO291 AND RO289
 215          HC       2

 216          KK  SUB292
 217          KM        RUNOFF FROM SUBBASIN 292
 218          BA    0.64
 219          LS              77
 220          UD    2.20

 221          KK   CO296
 222          KM        COMBINE SUB292 AND CO294
 223          HC       2
 224          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  21      SUB222
              V
              V
  26       RO225
              .
              .
  29          .      SUB226
              .           .
              .           .
  34       CO228............
              V
              V
  37       RO229
              .
              .
  40          .      SUB230
              .           .
              .           .
  45       CO232............
              V
              V
  48       RO233
              .
              .
  51          .      SUB234
              .           .
              .           .
  56       CO236............
              V
              V
  59       RO237
              .
              .
  62          .      SUB238
              .           .
              .           .
  67       CO286............
              .
              .
  70          .      SUB240
              .           V
              .           V
  75          .       RO241
              .           .
              .           .
  78          .           .      SUB242
              .           .           .
              .           .           .
  83          .       CO244............
              .           V
              .           V
  86          .       RO245
              .           .
              .           .
  89          .           .      SUB246
              .           .           .
```

```
 94          .      CD248............
             .          V
             .          V
 97          .      RD249
             .          .
             .          .
100          .          .     SUB250
             .          .          .
             .          .          .
105          .      CD252............
             .          V
             .          V
108          .      RD253
             .          .
             .          .
111          .          .     SUB254
             .          .          .
             .          .          .
116          .      CD256............
             .          .
             .          .
119          .          .     SUB258
             .          .          V
             .          .          V
124          .          .      RD259
             .          .          .
             .          .          .
127          .          .          .     SUB260
             .          .          .          .
             .          .          .          .
132          .          .      CD262............
             .          .          V
             .          .          V
135          .          .      RD263
             .          .          .
             .          .          .
138          .          .          .     SUB264
             .          .          .          .
             .          .          .          .
143          .          .      CD266............
             .          .          V
             .          .          V
146          .          .      RD267
             .          .          .
             .          .          .
149          .          .          .     SUB268
             .          .          .          .
             .          .          .          .
154          .          .      CD270............
             .          .          .
             .          .          .
157          .          .          .     SUB272
             .          .          .          V
             .          .          .          V
162          .          .          .      RD273
             .          .          .          .
             .          .          .          .
165          .          .          .          .     SUB274
             .          .          .          .          V
             .          .          .          .          V
172          .          .          .          .      RD275
             .          .          .          .          .
             .          .          .          .          .
173          .          .          .      CD276............
             .          .          .          .
```

```
176          .          .          .          .     SUB278
             .          .          .          .          .
             .          .          .          .          .
181          .          .          .      CD280............
             .          .          .          V
             .          .          .          V
184          .          .          .      RD281
             .          .          .          .
             .          .          .          .
187          .          .      CD282............
             .          .          V
             .          .          V
190          .          .      RD283
             .          .          .
             .          .          .
193          .      CD284............
             .          V
             .          V
196          .      RD285
             .          .
             .          .
199      CD288............
             V
             V
202      RD289
             .
             .
205          .      SUB290
             .          V
             .          V
210          .      RD291
             .          .
             .          .
213      CD294............
             .
             .
216          .      SUB292
             .          .
             .          .
221      CD296............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*************************************                    *************************************
*                                   *                    *                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)*                    *   U.S. ARMY CORPS OF ENGINEERS    *
*          FEBRUARY 1981            *                    * THE HYDROLOGIC ENGINEERING CENTER *
*        REVISED 14 JUN 85          *                    *         609 SECOND STREET         *
*                                   *                    *      DAVIS, CALIFORNIA 95616      *
*    RUN DATE: 02/05/1990           *                    *                                   *
*        TIME: 11:06:12.74          *                    * (916) 551-1748 OR (FTS) 448-3285  *
*                                   *                    *                                   *
*************************************                    *************************************
```

QUEEN CREEK AREA DRAINAGE MASTER STUDY PHASE 2
EXISTING CONDITIONS MODEL **89500E2.DAT**
REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT

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

  IT        HYDROGRAPH TIME DATA
                  NMIN         15  MINUTES IN COMPUTATION INTERVAL
                 IDATE      1    0  STARTING DATE
                 ITIME        0000  STARTING TIME
                    NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE      4    0  ENDING DATE
                NDTIME        0245  ENDING TIME

            COMPUTATION INTERVAL    0.25 HOURS
                 TOTAL TIME BASE   74.75 HOURS

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

7 JD        INDEX STORM NO. 1
                 STRM        3.62  PRECIPITATION DEPTH
                 TRDA        0.01  TRANSPOSITION DRAINAGE AREA

8 PI          PRECIPITATION PATTERN
                0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.03      0.00
                0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                0.01      0.00      0.00      0.01

16 JD       INDEX STORM NO. 2
                 STRM        3.53  PRECIPITATION DEPTH
                 TRDA       10.00  TRANSPOSITION DRAINAGE AREA
```

```
 6 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.01      0.02      0.00      0.01      0.02      0.00      0.01      0.00
                 0.00      0.01      0.00      0.02      0.00      0.01      0.00      0.01      0.02      0.00
                 0.01      0.00      0.01      0.02      0.00      0.01      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.02      0.01      0.01      0.00      0.01      0.01      0.01
                 0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                 0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.02      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.01

19 JD         INDEX STORM NO. 3
                    STRM        3.48  PRECIPITATION DEPTH
                    TRDA       38.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                 0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                 0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                 0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.01

28 JD         INDEX STORM NO. 4
                    STRM        3.41  PRECIPITATION DEPTH
                    TRDA       72.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                 0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                 0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                 0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.02      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.01
```

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SUB222	232.	13.50	110.	35.	12.	0.93		
ROUTED TO	RO225	194.	15.00	100.	35.	12.	0.93		
HYDROGRAPH AT	SUB226	253.	13.50	130.	42.	14.	1.01		
2 COMBINED AT	CO228	362.	14.25	231.	77.	26.	1.94		
ROUTED TO	RO229	333.	16.00	225.	77.	26.	1.94		
HYDROGRAPH AT	SUB230	226.	13.50	112.	36.	12.	1.00		
2 COMBINED AT	CO232	410.	15.75	314.	113.	38.	2.94		
ROUTED TO	RO233	392.	17.25	307.	113.	38.	2.94		
HYDROGRAPH AT	SUB234	245.	13.50	120.	39.	13.	1.02		
2 COMBINED AT	CO236	441.	17.25	378.	151.	50.	3.96		
ROUTED TO	RO237	430.	20.25	372.	151.	50.	3.96		
HYDROGRAPH AT	SUB238	213.	14.50	138.	48.	16.	1.32		
2 COMBINED AT	CO286	477.	20.00	433.	198.	66.	5.28		
HYDROGRAPH AT	SUB240	297.	15.00	206.	74.	25.	1.86		
ROUTED TO	RO241	278.	16.50	202.	74.	25.	1.86		
HYDROGRAPH AT	SUB242	247.	13.50	116.	37.	12.	0.98		
2 COMBINED AT	CO244	336.	16.25	276.	110.	37.	2.84		
ROUTED TO	RO245	321.	18.25	270.	110.	37.	2.84		
HYDROGRAPH AT	SUB246	211.	13.75	109.	36.	12.	0.98		
2 COMBINED AT	CO248	360.	18.00	331.	145.	48.	3.82		
ROUTED TO	RO249	353.	19.50	326.	145.	48.	3.82		
HYDROGRAPH AT	SUB250	213.	13.75	111.	36.	12.	1.00		
2 COMBINED AT	CO252	384.	19.25	372.	181.	60.	4.82		
ROUTED TO	RO253	380.	22.00	368.	181.	60.	4.82		
HYDROGRAPH AT	SUB254	229.	14.50	148.	51.	17.	1.28		
2 COMBINED AT	CO256	430.	19.25	416.	230.	77.	6.10		
HYDROGRAPH AT	SUB258	473.	16.25	378.	152.	51.	3.68		
ROUTED TO	RO259	465.	17.75	375.	152.	51.	3.68		

HYDROGRAPH AT	SUB260	257.	13.25	112.	36.	12.	0.98
2 COMBINED AT	CO262	500.	17.75	411.	166.	62.	4.66
ROUTED TO	RO263	487.	19.25	407.	166.	62.	4.66
HYDROGRAPH AT	SUB264	239.	13.50	117.	38.	13.	0.99
2 COMBINED AT	CO266	518.	19.25	438.	223.	75.	5.65
ROUTED TO	RO267	503.	22.75	434.	223.	75.	5.65
HYDROGRAPH AT	SUB268	167.	14.50	106.	36.	12.	0.96
2 COMBINED AT	CO270	525.	22.50	459.	257.	87.	6.61
HYDROGRAPH AT	SUB272	140.	13.50	67.	21.	7.	0.57
ROUTED TO	RO273	114.	16.50	65.	21.	7.	0.59
HYDROGRAPH AT	SUB274	227.	14.75	155.	55.	18.	1.45
ROUTED TO	RO275	210.	17.75	151.	55.	18.	1.45
2 COMBINED AT	CO276	291.	17.25	210.	76.	25.	2.04
HYDROGRAPH AT	SUB278	231.	14.50	147.	51.	17.	1.40
2 COMBINED AT	CO280	393.	17.00	315.	126.	42.	3.44
ROUTED TO	RO281	374.	20.50	309.	126.	42.	3.44
2 COMBINED AT	CO282	828.	21.50	750.	381.	128.	10.05
ROUTED TO	RO283	815.	24.25	745.	381.	128.	10.05
2 COMBINED AT	CO284	1172.	23.50	1099.	683.	204.	16.15
ROUTED TO	RO285	1165.	25.25	1094.	682.	204.	16.15
2 COMBINED AT	CO288	1358.	22.25	1320.	787.	268.	21.43
ROUTED TO	RO289	1353.	23.50	1317.	786.	268.	21.43
HYDROGRAPH AT	SUB290	288.	13.75	156.	51.	17.	1.17
ROUTED TO	RO291	239.	16.25	151.	51.	17.	1.17
2 COMBINED AT	CO294	1385.	23.25	1345.	833.	284.	22.60
HYDROGRAPH AT	SUB292	121.	14.25	75.	26.	9.	0.64
2 COMBINED AT	CO296	1398.	23.25	1356.	853.	292.	23.24

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

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITION - PHASE II

CURVE NUMBER WORKSHEETS

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86329 SHEET NO. 1 OF 1
CALCULATED BY LMT DATE 1/89
CHECKED BY BK DATE 1/89

SCS RUNOFF CURVE NUMBERS

Land Use	% Lot Coverage (CN=98)	Percent ARTIFICIAL DESERT / GRASS	Table 2-2 A	B	C	D	Weighted Curve No. A	B	C	D
Rural 190	5	95	63	77	85	88	65	78	86	89
Rural 70	10	90	63	77	85	88	67	79	86	89
Rural 43	15	85	63	77	85	88	68	80	87	90
R1-35	20	40 40	96 39	96 61	96 74	96 80	74	82	88	90
R1-18	25	38 37	96 39	96 61	96 74	96 80	75	84	88	91
R1-10	30	35 35	96 39	96 61	96 74	96 80	77	84	89	91
R1-8	35	32 33	96 39	96 61	96 74	96 80	78	85	89	91
R1-7	35	33 32	96 39	96 61	96 74	96 80	78	86	90	92
R1-6	40	30 30	96 39	96 61	96 74	96 80	80	86	90	92
R-2	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
R-3	50	25 25	96 39	96 61	96 74	96 80	83	88	92	92
R-4	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
R-5	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
C-S	25	60 15	98 96	98 96	98 96	98 96	98	98	98	98
C-O	35	50 15	98 96	98 96	98 96	98 96	98	98	98	98
C-1	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
C-2	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
C-3	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-1	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-2	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-3	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
AD I	0	—	—	—	—	—	98	98	98	98
AD II	25	—	—	—	—	—	98	98	98	98
AD III	30	—	—	—	—	—	98	98	98	98
Golf Course	—	30 70	96 68	96 79	96 86	96 89	76	84	89	91
Desert Shrub	—	—	—	—	—	—	63	77	85	88
Paved Roads	—	—	—	—	—	—	98	98	98	98
Artificial Desert	—	—	—	—	—	—	96	96	96	96
Farmland	—	—	—	—	—	—	64	75	82	85

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location ZZZ Checked EK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.83	62.25
C	FARMLAND	82			0.10	8.20
					Totals = 0.93	70.45

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{70.45}{0.93} = 75.75$; Use CN = 76

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 226 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.58	43.50
C	FARMLAND	82			0.43	35.26
					Totals = 1.01	78.76

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{78.76}{1.01} = 77.98$; Use CN = 78

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 230 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			1.00	75.00
				Totals =	1.00	75.00

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{75.00}{1.00} = 75.00$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 234 Checked ____ Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.30	23.10
B	PAVED ROADS	98			0.03	2.94
B	FARMLAND	75			0.69	51.75
				Totals =	1.02	77.79

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{77.79}{1.02} = 76.26$; Use CN = 76

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 238 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.32	24.64
B	FARMLAND	75			1.00	75.00
					Totals = 1.32	99.64

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{99.64}{1.32} = 75.48$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location ZAO Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.95	71.25
B	DESERT SHRUB, POOR CONDITION	77			0.82	63.14
B	PAVED ROADS	98			0.09	8.82
				Totals =	1.86	143.21

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{143.21}{1.86} = 76.99$; Use CN = 77

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location Z42 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.88	66.00
C	FARMLAND	82			0.10	8.20
					Totals = 0.98	74.20

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{74.20}{0.98} = 75.71$; Use CN = 76

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 24C Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.98	73.50
				Totals =	0.98	73.50

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{73.50}{0.98} = 75.00$; Use CN = 75

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location Z50 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			1.00	75.00
				Totals =	1.00	75.00

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{75.00}{1.00} = 75.00$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location Z54 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.11	8.47
B	RESIDENTIAL AREA	79			0.67	52.93
B	FARMLAND	75			0.50	37.50
				Totals =	1.28	98.90

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{98.90}{1.28} = 77.26$; Use CN = 77

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 258 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			2.19	168.63
B	PAVED ROADS	98			0.24	23.52
B	FARMLAND	75			1.25	93.75
				Totals =	3.68	285.90

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{285.90}{3.68} = 77.69$; Use CN = 78

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 260 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			0.98	73.50
				Totals =	0.98	73.50

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{73.50}{0.98} = 75.00$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek Adms By LMT Date 1/89

Location Z64 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.19	14.63
B	PAVED ROADS	98			0.02	1.96
B	FARMLAND	75			0.67	50.25
B	RESIDENTIAL AREA	79			0.11	8.69
				Totals =	0.99	75.53

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{75.53}{0.99} = 76.29$; Use CN = 76

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Green Creek ADMS By LMT Date 1/89

Location 268 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	COMMERCIAL	98			0.06	5.88
B	FARMLAND	75			0.90	67.50
					Totals = 0.96	73.38

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{73.38}{0.96} = 76.44$; Use CN = 76

2. Runoff

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 272 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	FARMLAND	75			0.59	44.25
				Totals =	0.59	44.25

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{44.25}{0.59} = 75.00$; Use CN = 75

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 274 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
A	DESERT SHRUB, POOR CONDITION	63			0.09	5.67
A	PAVED ROADS	98			0.02	1.96
A	FARMLAND	65			0.11	7.15
B	DESERT SHRUB, POOR CONDITION	77			0.56	43.12
B	PAVED ROADS	98			0.06	5.88
B	FARMLAND	75			0.61	45.75
				Totals =	1.45	109.53

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{109.53}{1.45} = 75.54$; Use CN = 76

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 278 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	RESIDENTIAL AREA	79			0.16	12.64
B	FARMLAND	75			1.24	93.00
					Totals = 1.40	105.64

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{105.64}{1.40} = 75.46$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 290 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			1.05	80.85
B	PAVED ROADS	98			0.12	11.76
					Totals = 1.17	92.61

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{92.61}{1.17} = 79.15$; Use CN = 79

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 292 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.64	
	Totals =				0.64	49.28

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{49.28}{0.64} = 77.00$; Use CN = 77

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITIONS - PHASE II

TIME OF CONCENTRATION WORKSHEETS

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location ZZZ Checked RK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

		Segment ID	AB		
1. Surface description (table 3-1)			CULTIVATED		
2. Manning's roughness coeff., n (table 3-1) ..			0.06		
3. Flow length, L (total L $\leq$ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		1.35		
5. Land slope, s	ft/ft		0.0050		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+	= 0.51

Shallow concentrated flow

		Segment ID	BC		
7. Surface description (paved or unpaved)			UNPAVED		
8. Flow length, L	ft		6200		
9. Watercourse slope, s	ft/ft		0.0035		
10. Average velocity, V (figure 3-1)	ft/s		0.95		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.81	+	= 1.81

Channel flow

		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.32

$T_{LAG} = 0.6 T_c = 1.39$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 22/6 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..			0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51

Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		7100			
9. Watercourse slope, s	ft/ft		0.0032			
10. Average velocity, V (figure 3-1)	ft/s		0.92			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		2.14	+		= 2.14

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					2.65

$T_{LAG} = 0.6\ T_c = 1.59$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Gurley Creek ADMS By LMT Date 1/89

Location 230 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..			0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51

Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		7100			
9. Watercourse slope, s	ft/ft		0.0038			
10. Average velocity, V (figure 3-1)	ft/s		1.00			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.97	+		= 1.97

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.48

$T_{LAG} = 0.6\,T_c = 1.49$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location Z34 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
			AB			
1. Surface description (table 3-1)			CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..			0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51

Shallow concentrated flow		Segment ID				
			BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		7200			
9. Watercourse slope, s	ft/ft		0.0040			
10. Average velocity, V (figure 3-1)	ft/s		1.02			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.96	+		= 1.96

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.47

$T_{LAG} = 0.6 T_c = 1.48$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 238 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
		AB			
1. Surface description (table 3-1)		CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..		0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.51	+		= 0.51

Shallow concentrated flow		Segment ID			
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	12000			
9. Watercourse slope, s	ft/ft	0.0037			
10. Average velocity, V (figure 3-1)	ft/s	0.98			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	3.40	+		= 3.40

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 3.91

$T_{LAG} = 0.6\,T_c = 2.35$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 240 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB		
1. Surface description (table 3-1)			FALLOW		
2. Manning's roughness coeff., n (table 3-1) ..			0.05		
3. Flow length, L (total L $\leq$ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		1.35		
5. Land slope, s	ft/ft		0.0050		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.44	+	= 0.44

Shallow concentrated flow		Segment ID	BC		
7. Surface description (paved or unpaved)			UNPAVED		
8. Flow length, L	ft		18000		
9. Watercourse slope, s	ft/ft		0.0057		
10. Average velocity, V (figure 3-1)	ft/s		1.22		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		4.10	+	= 4.10

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				4.54

$T_{LAG} = 0.6\,T_c = 2.72$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 242 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..			0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.44	+		= 0.44

Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		7000			
9. Watercourse slope, s	ft/ft		0.0043			
10. Average velocity, V (figure 3-1)	ft/s		1.06			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.83	+		= 1.83

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					2.27

$T_{LAG} = 0.6\ T_c = 1.36$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 246 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
		AB			
1. Surface description (table 3-1)		CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..		0.060			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.51	+		= 0.51

Shallow concentrated flow		Segment ID			
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	7000			
9. Watercourse slope, s	ft/ft	0.0033			
10. Average velocity, V (figure 3-1)	ft/s	0.92			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	2.11	+		= 2.11

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.62

$T_{LAG} = 0.6\ T_c = 1.57$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 250 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
		AB			
1. Surface description (table 3-1)		CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..		0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.51	+		= 0.51

Shallow concentrated flow	Segment ID				
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	7000			
9. Watercourse slope, s	ft/ft	0.0031			
10. Average velocity, V (figure 3-1)	ft/s	0.90			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	2.16	+		= 2.16

Channel flow	Segment ID				
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.67

$T_{LAG} = 0.6 T_c = 1.60$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 254 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

		Segment ID				
1. Surface description (table 3-1)		AB				
		SMOOTH				
2. Manning's roughness coeff., n (table 3-1) ..		0.011				
3. Flow length, L (total L ≤ 300 ft)	ft	300				
4. Two-yr 24-hr rainfall, P_2	in	1.35				
5. Land slope, s	ft/ft	0.0050				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.13	+		=	0.13

Shallow concentrated flow

		Segment ID				
7. Surface description (paved or unpaved)		BC				
		UNPAVED				
8. Flow length, L	ft	12 300				
9. Watercourse slope, s	ft/ft	0.0031				
10. Average velocity, V (figure 3-1)	ft/s	0.90				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	3.80	+		=	3.80

Channel flow

		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, P_w	ft					
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 3.93

$T_{LAG} = 0.6 T_c = 2.36$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 258 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
		AB			
1. Surface description (table 3-1)		FALLOW			
2. Manning's roughness coeff., n (table 3-1) ..		0.05			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+	=	0.44

Shallow concentrated flow		Segment ID			
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	24000			
9. Watercourse slope, s	ft/ft	0.0047			
10. Average velocity, V (figure 3-1)	ft/s	1.11			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	6.01	+	=	6.01

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				6.45

$T_{LAG} = 0.6 T_c = 3.87$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location Z60 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB		
1. Surface description (table 3-1)			CULTIVATED		
2. Manning's roughness coeff., n (table 3-1) ..			0.06		
3. Flow length, L (total L $\leq$ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		1.35		
5. Land slope, s	ft/ft		0.0050		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+	= 0.51

Shallow concentrated flow		Segment ID	BC		
7. Surface description (paved or unpaved)			UNPAVED		
8. Flow length, L	ft		5600		
9. Watercourse slope, s	ft/ft		0.0041		
10. Average velocity, V (figure 3-1)	ft/s		1.03		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		1.51	+	= 1.51

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.02

$T_{LAG} = 0.6 T_c = 1.21$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 264 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

		Segment ID				
			AB			
1.	Surface description (table 3-1)		FALLOW			
2.	Manning's roughness coeff., n (table 3-1) ..		0.05			
3.	Flow length, L (total L ≤ 300 ft)	ft	300			
4.	Two-yr 24-hr rainfall, P_2	in	1.35			
5.	Land slope, s	ft/ft	0.0050			
6.	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+	=	0.44

Shallow concentrated flow

		Segment ID				
			BC			
7.	Surface description (paved or unpaved)		UNPAVED			
8.	Flow length, L	ft	6500			
9.	Watercourse slope, s	ft/ft	0.0031			
10.	Average velocity, V (figure 3-1)	ft/s	0.90			
11.	$T_t = \frac{L}{3600\ V}$ Compute T_t	hr	2.01	+	=	2.01

Channel flow

		Segment ID				
12.	Cross sectional flow area, a	ft^2				
13.	Wetted perimeter, p_w	ft				
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15.	Channel slope, s	ft/ft				
16.	Manning's roughness coeff., n					
17.	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18.	Flow length, L	ft				
19.	$T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				2.45

$T_{LAG} = 0.6 T_c = 1.47$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 26A Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			CULTIVATED			
2. Manning's roughness coeff., n (table 3-1) ..			0.06			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51

Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		9900			
9. Watercourse slope, s	ft/ft		0.0027			
10. Average velocity, V (figure 3-1)	ft/s		0.84			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		3.27	+		= 3.27

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 3.78

$T_{LAG} = 0.6 T_c = 2.27$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 272 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)		AB				
8. Flow length, L	ft	UNPAVED				
9. Watercourse slope, s	ft/ft	8700				
10. Average velocity, V (figure 3-1)	ft/s	0.0043				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.05	2.30	+		= 2.30

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.30

$T_{LAG} = 0.6 T_c = 1.38$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 274 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		AB		
8. Flow length, L	ft	UNPAVED		
9. Watercourse slope, s	ft/ft	16500		
10. Average velocity, V (figure 3-1)	ft/s	0.0042		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.05		
		4.37	+	= 4.37

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 4.37

$T_{LAG} = 0.6 T_c = 2.62$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 278 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB		
1. Surface description (table 3-1)			CULTIVATED		
2. Manning's roughness coeff., n (table 3-1) ..			0.06		
3. Flow length, L (total L ≤ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		1.35		
5. Land slope, s	ft/ft		0.0050		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+	= 0.51

Shallow concentrated flow		Segment ID	BC		
7. Surface description (paved or unpaved)			UNPAVED		
8. Flow length, L	ft		11500		
9. Watercourse slope, s	ft/ft		0.0037		
10. Average velocity, V (figure 3-1)	ft/s		0.98		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		3.26	+	= 3.26

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				3.77

$T_{LAG} = 0.6 T_c = 2.26$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 290 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
			AB			
1. Surface description (table 3-1)			BARESOIL			
2. Manning's roughness coeff., n (table 3-1) ..			0.011			
3. Flow length, L (total L $\leq$ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0040			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.14	+		= 0.14

Shallow concentrated flow		Segment ID				
			BC			
7. Surface description (paved or unpaved)			PAVED			
8. Flow length, L	ft		11900			
9. Watercourse slope, s	ft/ft		0.0034			
10. Average velocity, V (figure 3-1)	ft/s		1.18			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		2.80	+		= 2.80

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					2.94

$T_{LAG} = 0.6 T_c = 1.76$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 292 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
1. Surface description (table 3-1)		AE			
2. Manning's roughness coeff., n (table 3-1) ..		FALLOW			
3. Flow length, L (total L ≤ 300 ft)	ft	0.05			
4. Two-yr 24-hr rainfall, P_2	in	300			
5. Land slope, s	ft/ft	1.35			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.0050			
		0.44	+		= 0.44

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)		BC			
8. Flow length, L	ft	UNPAVED			
9. Watercourse slope, s	ft/ft	10 200			
10. Average velocity, V (figure 3-1)	ft/s	0.0029			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.88			
		3.22	+		= 3.22

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				3.66

$T_{LAG} = 0.6T_c = 2.20$

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITIONS - PHASE II

TRAVEL TIME WORKSHEETS

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. 1 OF 1
CALCULATED BY LMT DATE 1/89
CHECKED BY BK DATE 1/89

EXISTING CONDITIONS - PHASE 2
MUSKINGHAM ROUTING COEFFICIENTS

ID	X	$\frac{1}{2(1-X)}$	$\frac{1}{2X}$	NSTPS	AMSKK	NMIN	$\frac{AMSKK * 60}{NMIN * NSTPS}$
213	0.45	0.909	1.11	1	0.08	15	0.32*
225	0.20	0.625	2.5	4	1.56		1.56
229	0.20			4	1.65		1.65
233	0.20			4	1.62		1.62
237	0.20			16	3.10		0.78
241	0.20			4	1.62		1.62
245	0.20			4	1.84		1.85
249	0.20			4	1.65		1.65
253	0.20			12	3.01		1.00
259	0.20			8	1.57		0.79
263	0.20			4	1.56		1.56
267	0.20			14	3.31		0.95
273	0.20			12	2.91		0.97
275	0.20			12	2.94		0.98
281	0.20			14	3.41		0.97
283	0.20			12	2.78		0.93
285	0.20			8	1.76		0.89
289	0.20			4	1.01		1.01
291	0.20	0.625	2.5	6	2.38	15	1.59

* DOES NOT FALL WITHIN LIMITS.

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 229 Checked EL Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	5300		
9. Watercourse slope, s	ft/ft	0.0030		
10. Average velocity, V (figure 3-1)	ft/s	0.89		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.65	+	= 1.65

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			1.65

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Quern Creek ADMS By LMT Date 1/89

Location 233 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

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

Shallow concentrated flow

		Segment ID		
7. Surface description (paved or unpaved)		233		
8. Flow length, L	ft	UNPAVED		
9. Watercourse slope, s	ft/ft	5300		
10. Average velocity, V (figure 3-1)	ft/s	0.0032		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.91	+	=
		1.62		1.62

Channel flow

		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			1.62

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 237 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID				
		237				
7. Surface description (paved or unpaved)		UNPAVED				
8. Flow length, L	ft	10500				
9. Watercourse slope, s	ft/ft	0.0034				
10. Average velocity, V (figure 3-1)	ft/s	0.94				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	3.10	+		=	3.10

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 3.10

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Quincy Creek ADMS By LMT Date 1/89

Location 241 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	5300		
9. Watercourse slope, s	ft/ft	0.0032		
10. Average velocity, V (figure 3-1)	ft/s	0.91		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.62	+	= 1.62

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.62

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ALMS By LMT Date 1/89

Location 245 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)	UNPAVED				
8. Flow length, L ..... ft	5300				
9. Watercourse slope, s ..... ft/ft	0.0025				
10. Average velocity, V (figure 3-1) ..... ft/s	0.80				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	1.84	+		=	1.84

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.84

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 249 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)		249				
8. Flow length, L	ft	UNPAVED				
9. Watercourse slope, s	ft/ft	5300				
10. Average velocity, V (figure 3-1)	ft/s	0.0030				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.89	1.65	+		= 1.65

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.65

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 253 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
	253				
7. Surface description (paved or unpaved)	UNPAVED				
8. Flow length, L ..... ft	10500				
9. Watercourse slope, s ..... ft/ft	0.0036				
10. Average velocity, V (figure 3-1) ..... ft/s	0.97				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	3.01	+		=	3.01

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					3.01

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 259 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	5600			
9. Watercourse slope, s	ft/ft	0.0038			
10. Average velocity, V (figure 3-1)	ft/s	0.99			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.57	+		= 1.57

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.57

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 263 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

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

Shallow concentrated flow

		Segment ID		
		263		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	5400		
9. Watercourse slope, s	ft/ft	0.0035		
10. Average velocity, V (figure 3-1)	ft/s	0.96		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.56	+	= 1.56

Channel flow

		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			1.56

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 267 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
	267				
7. Surface description (paved or unpaved)	UNPAVED				
8. Flow length, L ..... ft	10000				
9. Watercourse slope, s ..... ft/ft	0.0027				
10. Average velocity, V (figure 3-1) ..... ft/s	0.84				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	3.31	+		=	3.31

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 3.31

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 273 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)	273				
8. Flow length, L ..... ft	UNPAVED				
9. Watercourse slope, s ..... ft/ft	10700				
10. Average velocity, V (figure 3-1) ..... ft/s	0.0040				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	1.02		2.91	+	= 2.91

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr				+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.91

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 275 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID			
	275			
7. Surface description (paved or unpaved)	UNPAVED			
8. Flow length, L ..... ft	10600			
9. Watercourse slope, s ..... ft/ft	0.0039			
10. Average velocity, V (figure 3-1) ..... ft/s	1.00			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	2.94	+		= 2.94

Channel flow	Segment ID			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, p_w ..... ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s				
18. Flow length, L ..... ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.94

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 281 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		281		
8. Flow length, L	ft	UNPAVED		
9. Watercourse slope, s	ft/ft	10200		
10. Average velocity, V (figure 3-1)	ft/s	0.0026		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.83	+	=
		3.41		3.41

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			3.41

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 283 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID			
	283			
7. Surface description (paved or unpaved)	UNPAVED			
8. Flow length, L ..... ft	9200			
9. Watercourse slope, s ..... ft/ft	0.0033			
10. Average velocity, V (figure 3-1) ..... ft/s	0.92			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	2.78	+	=	2.78

Channel flow	Segment ID			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r ..... ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s				
18. Flow length, L ..... ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.78

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek PLMS By LMT Date 1/89

Location 285 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID			
7. Surface description (paved or unpaved)	285			
8. Flow length, L ..... ft	UNPAVED			
9. Watercourse slope, s ..... ft/ft	6600			
10. Average velocity, V (figure 3-1) ..... ft/s	0.0041			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	1.03	1.78	+	= 1.78

Channel flow	Segment ID			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, p_w ..... ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s				
18. Flow length, L ..... ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr			+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.78

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 289 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)	UNPAVED				
8. Flow length, L ..... ft	3800				
9. Watercourse slope, s ..... ft/ft	0.0042				
10. Average velocity, V (figure 3-1) ..... ft/s	1.05				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	1.01	+		=	1.01

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.01

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 291 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	8300			
9. Watercourse slope, s	ft/ft	0.0036			
10. Average velocity, V (figure 3-1)	ft/s	0.97			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	2.38	+		= 2.38

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.38

```
#DIAGRAM
 ID      QUEEN CREEK AREA DRAINAGE MASTER STUDY -PHASE 3
 ID      EXISTING CONDITIONS MODEL     **86328E3.DAT**
 ID      REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT
 IT    15                    300
 IO     5
 IN    15
 JD  3.62    0.01
 PC  0.02    0.00    0.00    0.01    0.01    0.01    0.02    0.02    0.02    0.03
 PC  0.03    0.03    0.04    0.04    0.04    0.04    0.05    0.05    0.06    0.06
 PC  0.06    0.07    0.07    0.08    0.08    0.08    0.09    0.10    0.10    0.11
 PC  0.11    0.12    0.12    0.13    0.13    0.14    0.15    0.15    0.16    0.17
 PC  0.18    0.19    0.20    0.22    0.24    0.26    0.28    0.39    0.66    0.71
 PC  0.74    0.76    0.78    0.79    0.80    0.81    0.82    0.83    0.84    0.85
 PC  0.86    0.86    0.87    0.88    0.88    0.89    0.89    0.90    0.90    0.91
 PC  0.91    0.92    0.92    0.93    0.93    0.93    0.94    0.94    0.95    0.95
 PC  0.95    0.96    0.96    0.96    0.96    0.97    0.97    0.97    0.98    0.98
 PC  0.98    0.99    0.99    0.99    1.00    1.00    1.00
 JD  3.53     18.
 JD  3.48     38.
 JD  3.41     72.
KK HY337
 KM      HYDROGRAPH FROM CAP (SALT GILA AQUEDUCT - REACH 3)
 BA  .001
 IN    60                    35
 QI     0       0       0       1       3      11      33      81     208     389
 QI   605     831    1032    1209    1347    1453    1532    1593    1636    1666
 QI  1685    1694    1695    1689    1679    1666    1650    1634    1617    1600
 QI  1583    1565    1547    1529    1511
KK RO339
 KM      ROUTE FLOW FROM HY337 TO CO340
 RM     1    0.08    0.25
KKSUB338
 KM      RUNOFF FROM SUBBASIN 338
 BA  1.04
 LS            75
 UD  1.91
KK CO340
 KM      COMBINE RUNOFF RO339 AND SUB338
 HC     2
KK RO341
 KM      ROUTE FLOW FROM CO340 TO CO344
 RM     1    0.14    0.25
KKSUB342
 KM      RUNOFF FROM SUBBASIN 342
 BA  0.50
 LS            71
 UD  1.75
KK CO344
 KM      COMBINE RO341 AND SUB342
 HC     2
KK RO345
 KM      ROUTE FLOW FROM CO344 TO CO348
 RM     4    1.59    0.25
KKSUB346
 KM      RUNOFF FROM SUBBASIN 346
 BA  3.19
 LS            71
 UD  3.93
KK CO348
 KM      COMBINE SUB346 AND RO345
 HC     2
KK RO349
 KM      ROUTE FLOW FROM CO348 TO CO37A
```

```
KK     1    0.33    0.25
KKSUB354
KM      RUNOFF FROM SUBBASIN 354
BA  1.39
LS            80
UD  3.12
KK RO355
KM      ROUTE FLOW FROM SB354 TO CO358
KM    30    8.60    0.20
KKSUB356
KM      RUNOFF FROM SUBBASIN 356
BA  4.57
LS            75
UD  4.94
KK CO358
KM      COMBINE RO355 AND SUB256
HC     2
KK RO359
KM      ROUTE FLOW FROM CO358 TO CO362
KM    10    2.89    0.20
KKSUB360
KM      RUNOFF FROM SUBBASIN 360
BA  4.87
LS            79
UD  4.12
KK CO362
KM      COMBINE RO359 AND SUB360
HC     2
KK RO363
KM      ROUTE FLOW CO362 TO CO366
KM    22    5.75    0.20
KKSUB364
KM      RUNOFF FROM SUBBASIN 364
BA  5.79
LS            76
UD  5.39
KK CO366
KM      COMBINE RO363 AND SUB364
HC     2
KK RO367
KM      ROUTE FLOW FROM CO366 TO CO370
KM     4    1.26    0.20
KKSUB368
KM      RUNOFF FROM SUBBASIN 368
BA  3.48
LS            75
UD  4.19
KK CO370
KM      COMBINE RO367 AND SUB368
HC     2
KK RO371
KM      ROUTE FLOW FROM CO370 TO CO374
KM     4    2.01    0.20
KKSUB372
KM      RUNOFF FROM SUBBASIN 372
BA  3.77
LS            75
UD  4.60
KK CO374
KM      COMBINE RO371 AND SUB372
HC     2
KK RO375
KM      ROUTE FLOW FROM CO374 TO CO376
KM     4    0.71    0.20
KK CO376
KM      COMBINE RO375 AND RO240
```

```
HC     2
KSUB378
M      RUNOFF FROM SUBBASIN 378
BA  2.23
IS           75
HD  3.22
K CO380
KO     1
M      COMBINE CO376 AND SUB378
HC     2
ZZ
```

HEC-1 S/N: 33001208 HMVersion: 3.21

RUN DATE: 02/05/1990 TIME: 07:31:28.42

Data File: 86328E3.DAT

```
*************************************
*                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*          FEBRUARY 1981            *
*        REVISED 14 JUN 85          *
*                                   *
*    RUN DATE: 02/05/1990           *
*       TIME: 07:31:32.43           *
*                                   *
*************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*                                   *
* (916) 551-1748 OR (FTS) 448-3285  *
*                                   *
*************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

```
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION  :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```


==========
H A E S T A D M E T H O D S
==========

37 Brookside Road * Waterbury, Connecticut 06705 * (203) 755-1666

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

              $DIAGRAM
  1           ID        QUEEN CREEK AREA DRAINAGE MASTER STUDY -PHASE 3
  2           ID        EXISTING CONDITIONS MODEL     ##86328E3.DAT##
  3           ID        REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT
  4           IT      15                    300
  5           IO       5
  6           IN      15
  7           JD    3.62    0.01
  8           PC    0.00    0.00    0.00    0.01    0.01    0.01    0.02    0.02    0.02    0.03
  9           PC    0.03    0.03    0.04    0.04    0.04    0.04    0.05    0.05    0.06    0.06
 10           PC    0.06    0.07    0.07    0.08    0.08    0.09    0.09    0.10    0.10    0.11
 11           PC    0.11    0.12    0.12    0.13    0.13    0.14    0.15    0.15    0.16    0.17
 12           PC    0.18    0.19    0.20    0.22    0.24    0.26    0.28    0.39    0.66    0.71
 13           PC    0.74    0.76    0.78    0.79    0.80    0.81    0.82    0.83    0.84    0.85
 14           PC    0.86    0.86    0.87    0.88    0.88    0.89    0.89    0.90    0.90    0.91
 15           PC    0.91    0.92    0.92    0.93    0.93    0.93    0.94    0.94    0.95    0.95
 16           PC    0.95    0.96    0.96    0.96    0.96    0.97    0.97    0.97    0.98    0.98
 17           PC    0.98    0.99    0.99    0.99    1.00    1.00    1.00
 18           JD    3.53     18.
 19           JD    3.48     38.
 20           JD    3.41     72.

 21           KK   HY337
 22           KM        HYDROGRAPH FROM CAP (SALT GILA AQUEDUCT - REACH 3)
 23           BA    .001
 24           IN      60                    35
 25           QI       0       0       0       1       3      11      33      81     209     389
 26           QI     605     831    1032    1209    1347    1453    1532    1593    1636    1666
 27           QI    1685    1694    1695    1689    1679    1666    1650    1634    1617    1600
 28           QI    1583    1565    1547    1529    1511

 29           KK   RO339
 30           KM        ROUTE FLOW FROM HY337 TO CO340
 31           RM       1    0.08    0.25

 32           KK  SUB338
 33           KM        RUNOFF FROM SUBBASIN 338
 34           BA    1.04
 35           LS              75
 36           UD    1.91

 37           KK   CO340
 38           KM        COMBINE RUNOFF RO339 AND SUB338
 39           HC       2

 40           KK   RO341
 41           KM        ROUTE FLOW FROM CO340 TO CO344
 42           RM       1    0.14    0.25

 43           KK  SUB342
 44           KM        RUNOFF FROM SUBBASIN 342
 45           BA    0.50
 46           LS              71
 47           UD    1.75
```

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

  46          KK   CO344
  47          KM        COMBINE RO341 AND SUB342
  48          HC       2

  51          KK   RO345
  52          KM        ROUTE FLOW FROM CO344 TO CO348
  53          RM       4    1.59    0.25

  54          KK  SUB346
  55          KM        RUNOFF FROM SUBBASIN 346
  56          BA    3.19
  57          LS              71
  58          UD    3.93

  59          KK   CO348
  60          KM        COMBINE SUB346 AND RO345
  61          HC       2

  62          KK   RO349
  63          KM        ROUTE FLOW FROM CO348 TO CO376
  64          RM       1    0.33    0.25

  65          KK  SUB354
  66          KM        RUNOFF FROM SUBBASIN 354
  67          BA    1.38
  68          LS              80
  69          UD    3.12

  70          KK   RO355
  71          KM        ROUTE FLOW FROM SB354 TO CO358
  72          RM      30    8.60    0.20

  73          KK  SUB356
  74          KM        RUNOFF FROM SUBBASIN 356
  75          BA    4.57
  76          LS              75
  77          UD    4.94

  78          KK   CO358
  79          KM        COMBINE RO355 AND SUB256
  80          HC       2

  81          KK   RO359
  82          KM        ROUTE FLOW FROM CO358 TO CO362
  83          RM      10    2.89    0.20

  84          KK  SUB360
  85          KM        RUNOFF FROM SUBBASIN 360
  86          BA    4.87
  87          LS              79
  88          UD    4.12
```

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

 89           KK   CO362
 90           KM        COMBINE RO359 AND SUB360
 91           HC       2

 92           KK   RO363
 93           KM        ROUTE FLOW CO362 TO CO366
 94           RM      22    5.75    0.20

 95           KK  SUB364
 96           KM        RUNOFF FROM SUBBASIN 364
 97           BA    5.79
 98           LS              76
 99           UD    5.39

100           KK   CO366
101           KM        COMBINE RO363 AND SUB364
102           HC       2

103           KK   RO367
104           KM        ROUTE FLOW FROM CO366 TO CO370
105           RM       4    1.26    0.20

106           KK  SUB368
107           KM        RUNOFF FROM SUBBASIN 368
108           BA    3.48
109           LS              75
110           UD    4.19

111           KK   CO370
112           KM        COMBINE RO367 AND SUB368
113           HC       2

114           KK   RO371
115           KM        ROUTE FLOW FROM CO370 TO CO374
116           RM       4    2.01    0.20

117           KK  SUB372
118           KM        RUNOFF FROM SUBBASIN 372
119           BA    3.77
120           LS              75
121           UD    4.60

122           KK   CO374
123           KM        COMBINE RO371 AND SUB372
124           HC       2

125           KK   RO375
126           KM        ROUTE FLOW FROM CO374 TO CO376
127           RM       4    0.71    0.20
```

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

 128          KK   CO376
 129          KM        COMBINE RO375 AND RO349
 130          HC       2

 131          KK  SUB378
 132          KM        RUNOFF FROM SUBBASIN 378
 133          BA    2.23
 134          LS              75
 135          UD    3.22

 136          KK   CO380
 137          KO       1
 138          KM        COMBINE CO376 AND SUB378
 139          HC       2
 140          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

 21       HY337
              V
              V
 29       RO339
              .
              .
 32           .      SUB338
              .           .
              .           .
 37       CO340............
              V
              V
 40       RO341
              .
              .
 43           .      SUB342
              .           .
              .           .
 48       CO344............
              V
              V
 51       RO345
              .
              .
 54           .      SUB346
              .           .
              .           .
 59       CO348............
              V
              V
 62       RO349
              .
              .
 65           .      SUB354
              .           V
              .           V
 70           .       RO355
              .           .
              .           .
 73           .           .      SUB356
              .           .           .
              .           .           .
 78           .       CO358............
              .           V
              .           V
 81           .       RO359
              .           .
              .           .
 84           .           .      SUB360
              .           .           .
              .           .           .
 89           .       CO362............
              .           V
              .           V
 92           .       RO363
              .           .
```

```
 95          .          .     SUB364
             .          .          .
             .          .          .
100          .      C0366............
             .          V
             .          V
103          .      R0367
             .          .
             .          .
106          .          .     SUB368
             .          .          .
             .          .          .
111          .      C0370............
             .          V
             .          V
114          .      R0371
             .          .
             .          .
117          .          .     SUB372
             .          .          .
             .          .          .
122          .      C0374............
             .          V
             .          V
125          .      R0375
             .          .
             .          .
128      C0376............
             .
             .
131          .     SUB378
             .          .
             .          .
136      C0380............
```

***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*************************************
*                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*          FEBRUARY 1981            *
*        REVISED 14 JUN 85          *
*                                   *
*     RUN DATE: 02/05/1990          *
*        TIME: 07:31:53.25          *
*                                   *
*************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
* THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*                                   *
* (916) 551-1748 OR (FTS) 448-3285  *
*                                   *
*************************************
```

```
                    QUEEN CREEK AREA DRAINAGE MASTER STUDY -PHASE 3
                    EXISTING CONDITIONS MODEL     ##86328E3.DAT##
                    REVISED: FEBRUARY 1990 - 100-YEAR RAINFALL EVENT

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

   IT         HYDROGRAPH TIME DATA
                 NMIN         15  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                   NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     4    0  ENDING DATE
                NDTIME       0245  ENDING TIME

             COMPUTATION INTERVAL    0.25 HOURS
                  TOTAL TIME BASE   74.75 HOURS

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

  7 JD        INDEX STORM NO. 1
                 STRM       3.62  PRECIPITATION DEPTH
                 TRDA       0.01  TRANSPOSITION DRAINAGE AREA

  9 PI          PRECIPITATION PATTERN
                 0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                 0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                 0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                 0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                 0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                 0.01      0.00      0.00      0.01

 15 JD        INDEX STORM NO. 2
                 STRM       3.53  PRECIPITATION DEPTH
                 TRDA      18.00  TRANSPOSITION DRAINAGE AREA
```

```
  0 PI          PRECIPITATION PATTERN
                  0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                  0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                  0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                  0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.01

 19 JD        INDEX STORM NO. 3
                    STRM        3.48  PRECIPITATION DEPTH
                    TRDA       38.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                  0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                  0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                  0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.01

 20 JD        INDEX STORM NO. 4
                    STRM        3.41  PRECIPITATION DEPTH
                    TRDA       72.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00      0.01      0.00
                  0.00      0.01      0.00      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.01      0.01      0.00      0.01      0.01      0.01
                  0.01      0.01      0.02      0.02      0.02      0.02      0.11      0.27      0.05      0.03
                  0.02      0.02      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.00      0.01      0.01      0.00      0.01      0.00      0.01      0.00      0.01      0.00
                  0.01      0.00      0.01      0.00      0.00      0.01      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.00      0.01      0.00      0.00      0.01      0.00      0.00
                  0.01      0.00      0.00      0.01

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

          ************
          *          *
 136 KK   *   CO380  *
          *          *
          ************

 137 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          1  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
                            COMBINE CO376 AND SUB378

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

HYDROGRAPH AT 00380
TRANSPOSITION AREA 0.0 SQ MI

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		1845	76	3020.	2		1330	151	1973.	3		0815	226	1512.
1		0015	2	0.	1		1900	77	3037.	2		1345	152	1956.	3		0830	227	1512.
1		0030	3	0.	1		1915	78	3050.	2		1400	153	1938.	3		0845	228	1512.
1		0045	4	0.	1		1930	79	3059.	2		1415	154	1920.	3		0900	229	1512.
1		0100	5	0.	1		1945	80	3062.	2		1430	155	1902.	3		0915	230	1512.
1		0115	6	0.	1		2000	81	3063.	2		1445	156	1884.	3		0930	231	1512.
1		0130	7	0.	1		2015	82	3060.	2		1500	157	1866.	3		0945	232	1512.
1		0145	8	0.	1		2030	83	3056.	2		1515	158	1849.	3		1000	233	1511.
1		0200	9	0.	1		2045	84	3050.	2		1530	159	1831.	3		1015	234	1511.
1		0215	10	0.	1		2100	85	3044.	2		1545	160	1814.	3		1030	235	1511.
1		0230	11	0.	1		2115	86	3037.	2		1600	161	1797.	3		1045	236	1511.
1		0245	12	0.	1		2130	87	3030.	2		1615	162	1781.	3		1100	237	1511.
1		0300	13	0.	1		2145	88	3025.	2		1630	163	1766.	3		1115	238	1511.
1		0315	14	0.	1		2200	89	3021.	2		1645	164	1751.	3		1130	239	1511.
1		0330	15	0.	1		2215	90	3020.	2		1700	165	1737.	3		1145	240	1511.
1		0345	16	0.	1		2230	91	3020.	2		1715	166	1723.	3		1200	241	1511.
1		0400	17	0.	1		2245	92	3022.	2		1730	167	1710.	3		1215	242	1511.
1		0415	18	0.	1		2300	93	3027.	2		1745	168	1698.	3		1230	243	1511.
1		0430	19	1.	1		2315	94	3032.	2		1800	169	1686.	3		1245	244	1511.
1		0445	20	1.	1		2330	95	3039.	2		1815	170	1675.	3		1300	245	1511.
1		0500	21	1.	1		2345	96	3047.	2		1830	171	1665.	3		1315	246	1511.
1		0515	22	1.	2		0000	97	3056.	2		1845	172	1655.	3		1330	247	1511.
1		0530	23	2.	2		0015	98	3064.	2		1900	173	1646.	3		1345	248	1511.
1		0545	24	3.	2		0030	99	3073.	2		1915	174	1638.	3		1400	249	1511.
1		0600	25	4.	2		0045	100	3081.	2		1930	175	1630.	3		1415	250	1511.
1		0615	26	5.	2		0100	101	3088.	2		1945	176	1622.	3		1430	251	1511.
1		0630	27	7.	2		0115	102	3093.	2		2000	177	1616.	3		1445	252	1511.
1		0645	28	9.	2		0130	103	3097.	2		2015	178	1609.	3		1500	253	1511.
1		0700	29	12.	2		0145	104	3098.	2		2030	179	1603.	3		1515	254	1511.
1		0715	30	16.	2		0200	105	3096.	2		2045	180	1598.	3		1530	255	1511.
1		0730	31	21.	2		0215	106	3091.	2		2100	181	1592.	3		1545	256	1511.
1		0745	32	27.	2		0230	107	3082.	2		2115	182	1588.	3		1600	257	1511.
1		0800	33	35.	2		0245	108	3070.	2		2130	183	1583.	3		1615	258	1511.
1		0815	34	44.	2		0300	109	3055.	2		2145	184	1579.	3		1630	259	1511.
1		0830	35	55.	2		0315	110	3036.	2		2200	185	1575.	3		1645	260	1511.
1		0845	36	70.	2		0330	111	3015.	2		2215	186	1571.	3		1700	261	1511.
1		0900	37	89.	2		0345	112	2991.	2		2230	187	1567.	3		1715	262	1511.
1		0915	38	111.	2		0400	113	2965.	2		2245	188	1563.	3		1730	263	1511.
1		0930	39	138.	2		0415	114	2937.	2		2300	189	1560.	3		1745	264	1511.
1		0945	40	168.	2		0430	115	2907.	2		2315	190	1557.	3		1800	265	1511.
1		1000	41	202.	2		0445	116	2877.	2		2330	191	1554.	3		1815	266	1511.
1		1015	42	240.	2		0500	117	2845.	2		2345	192	1551.	3		1830	267	1511.
1		1030	43	281.	2		0515	118	2812.	3		0000	193	1548.	3		1845	268	1511.
1		1045	44	325.	2		0530	119	2778.	3		0015	194	1545.	3		1900	269	1511.
1		1100	45	372.	2		0545	120	2744.	3		0030	195	1543.	3		1915	270	1511.
1		1115	46	421.	2		0600	121	2709.	3		0045	196	1540.	3		1930	271	1511.
1		1130	47	473.	2		0615	122	2673.	3		0100	197	1538.	3		1945	272	1511.
1		1145	48	527.	2		0630	123	2637.	3		0115	198	1535.	3		2000	273	1511.
1		1200	49	587.	2		0645	124	2601.	3		0130	199	1533.	3		2015	274	1511.
1		1215	50	655.	2		0700	125	2565.	3		0145	200	1531.	3		2030	275	1511.
1		1230	51	731.	2		0715	126	2530.	3		0200	201	1530.	3		2045	276	1511.
1		1245	52	815.	2		0730	127	2495.	3		0215	202	1528.	3		2100	277	1511.
1		1300	53	910.	2		0745	128	2460.	3		0230	203	1526.	3		2115	278	1511.
1		1315	54	1016.	2		0800	129	2427.	3		0245	204	1525.	3		2130	279	1511.
1		1330	55	1134.	2		0815	130	2395.	3		0300	205	1523.	3		2145	280	1511.
1		1345	56	1266.	2		0830	131	2364.	3		0315	206	1522.	3		2200	281	1511.
1		1400	57	1408.	2		0845	132	2335.	3		0330	207	1521.	3		2215	282	1511.

1	1415	58	1561.	*	2	0900	133	2308.	*	3	0345	208	1520.	*	3	2230	283	1511.
1	1430	59	1720.	*	2	0915	134	2292.	*	3	0400	209	1519.	*	3	2245	284	1511.
1	1445	60	1880.	*	2	0930	135	2258.	*	3	0415	210	1518.	*	3	2300	285	1511.
1	1500	61	2035.	*	2	0945	136	2235.	*	3	0430	211	1517.	*	3	2315	286	1511.
1	1515	62	2182.	*	2	1000	137	2214.	*	3	0445	212	1517.	*	3	2330	287	1511.
1	1530	63	2315.	*	2	1015	138	2194.	*	3	0500	213	1516.	*	3	2345	288	1511.
1	1545	64	2431.	*	2	1030	139	2175.	*	3	0515	214	1516.	*	4	0000	289	1511.
1	1600	65	2532.	*	2	1045	140	2156.	*	3	0530	215	1515.	*	4	0015	290	1511.
1	1615	66	2618.	*	2	1100	141	2139.	*	3	0545	216	1515.	*	4	0030	291	1511.
1	1630	67	2691.	*	2	1115	142	2121.	*	3	0600	217	1514.	*	4	0045	292	1511.
1	1645	68	2750.	*	2	1130	143	2104.	*	3	0615	218	1514.	*	4	0100	293	1511.
1	1700	69	2798.	*	2	1145	144	2087.	*	3	0630	219	1514.	*	4	0115	294	1511.
1	1715	70	2840.	*	2	1200	145	2071.	*	3	0645	220	1513.	*	4	0130	295	1511.
1	1730	71	2880.	*	2	1215	146	2055.	*	3	0700	221	1513.	*	4	0145	296	1511.
1	1745	72	2916.	*	2	1230	147	2039.	*	3	0715	222	1513.	*	4	0200	297	1511.
1	1800	73	2948.	*	2	1245	148	2023.	*	3	0730	223	1513.	*	4	0215	298	1511.
1	1815	74	2976.	*	2	1300	149	2007.	*	3	0745	224	1512.	*	4	0230	299	1511.
1	1830	75	2999.	*	2	1315	150	1990.	*	3	0800	225	1512.	*	4	0245	300	1511.
				*					*					*				

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
3098.	25.75	(CFS)	3057.	2666.	1722.	1659.
		(INCHES)	0.922	3.216	6.233	6.233
		(AC-FT)	1516.	5287.	10246.	10246.

CUMULATIVE AREA = 30.82 SQ MI

****

HYDROGRAPH AT C0380
TRANSPOSITION AREA 18.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		1845	76	2949.	*	2		1330	151	1955.	*	3		0815	226	1512.
1		0015	2	0.	*	1		1900	77	2966.	*	2		1345	152	1938.	*	3		0830	227	1512.
1		0030	3	0.	*	1		1915	78	2980.	*	2		1400	153	1921.	*	3		0845	228	1512.
1		0045	4	0.	*	1		1930	79	2989.	*	2		1415	154	1904.	*	3		0900	229	1512.
1		0100	5	0.	*	1		1945	80	2993.	*	2		1430	155	1887.	*	3		0915	230	1512.
1		0115	6	0.	*	1		2000	81	2994.	*	2		1445	156	1870.	*	3		0930	231	1512.
1		0130	7	0.	*	1		2015	82	2993.	*	2		1500	157	1852.	*	3		0945	232	1511.
1		0145	8	0.	*	1		2030	83	2989.	*	2		1515	158	1835.	*	3		1000	233	1511.
1		0200	9	0.	*	1		2045	84	2985.	*	2		1530	159	1819.	*	3		1015	234	1511.
1		0215	10	0.	*	1		2100	85	2979.	*	2		1545	160	1802.	*	3		1030	235	1511.
1		0230	11	0.	*	1		2115	86	2973.	*	2		1600	161	1786.	*	3		1045	236	1511.
1		0245	12	0.	*	1		2130	87	2967.	*	2		1615	162	1771.	*	3		1100	237	1511.
1		0300	13	0.	*	1		2145	88	2962.	*	2		1630	163	1756.	*	3		1115	238	1511.
1		0315	14	0.	*	1		2200	89	2959.	*	2		1645	164	1742.	*	3		1130	239	1511.
1		0330	15	0.	*	1		2215	90	2958.	*	2		1700	165	1728.	*	3		1145	240	1511.
1		0345	16	0.	*	1		2230	91	2959.	*	2		1715	166	1715.	*	3		1200	241	1511.
1		0400	17	0.	*	1		2245	92	2962.	*	2		1730	167	1702.	*	3		1215	242	1511.
1		0415	18	0.	*	1		2300	93	2966.	*	2		1745	168	1691.	*	3		1230	243	1511.
1		0430	19	1.	*	1		2315	94	2971.	*	2		1800	169	1680.	*	3		1245	244	1511.
1		0445	20	1.	*	1		2330	95	2978.	*	2		1815	170	1669.	*	3		1300	245	1511.
1		0500	21	1.	*	1		2345	96	2986.	*	2		1830	171	1659.	*	3		1315	246	1511.
1		0515	22	1.	*	2		0000	97	2994.	*	2		1845	172	1650.	*	3		1330	247	1511.
1		0530	23	2.	*	2		0015	98	3003.	*	2		1900	173	1641.	*	3		1345	248	1511.
1		0545	24	3.	*	2		0030	99	3011.	*	2		1915	174	1633.	*	3		1400	249	1511.
1		0600	25	4.	*	2		0045	100	3019.	*	2		1930	175	1625.	*	3		1415	250	1511.
1		0615	26	5.	*	2		0100	101	3026.	*	2		1945	176	1618.	*	3		1430	251	1511.
1		0630	27	7.	*	2		0115	102	3031.	*	2		2000	177	1612.	*	3		1445	252	1511.

1	0645	28	9.	*	2	0130	103	3035.	*	2	2015	178	1606.	*	3	1500	253	1511.
1	0700	29	12.	*	2	0145	104	3035.	*	2	2030	179	1600.	*	3	1515	254	1511.
1	0715	30	16.	*	2	0200	105	3033.	*	2	2045	180	1594.	*	3	1530	255	1511.
1	0730	31	21.	*	2	0215	106	3029.	*	2	2100	181	1589.	*	3	1545	256	1511.
1	0745	32	27.	*	2	0230	107	3020.	*	2	2115	182	1585.	*	3	1600	257	1511.
1	0800	33	35.	*	2	0245	108	3009.	*	2	2130	183	1580.	*	3	1615	258	1511.
1	0815	34	44.	*	2	0300	109	2994.	*	2	2145	184	1576.	*	3	1630	259	1511.
1	0830	35	55.	*	2	0315	110	2976.	*	2	2200	185	1572.	*	3	1645	260	1511.
1	0845	36	70.	*	2	0330	111	2956.	*	2	2215	186	1569.	*	3	1700	261	1511.
1	0900	37	89.	*	2	0345	112	2933.	*	2	2230	187	1565.	*	3	1715	262	1511.
1	0915	38	111.	*	2	0400	113	2908.	*	2	2245	188	1562.	*	3	1730	263	1511.
1	0930	39	138.	*	2	0415	114	2881.	*	2	2300	189	1558.	*	3	1745	264	1511.
1	0945	40	168.	*	2	0430	115	2852.	*	2	2315	190	1555.	*	3	1800	265	1511.
1	1000	41	202.	*	2	0445	116	2823.	*	2	2330	191	1552.	*	3	1815	266	1511.
1	1015	42	240.	*	2	0500	117	2792.	*	2	2345	192	1549.	*	3	1830	267	1511.
1	1030	43	281.	*	2	0515	118	2761.	*	3	0000	193	1547.	*	3	1845	268	1511.
1	1045	44	325.	*	2	0530	119	2728.	*	3	0015	194	1544.	*	3	1900	269	1511.
1	1100	45	372.	*	2	0545	120	2695.	*	3	0030	195	1541.	*	3	1915	270	1511.
1	1115	46	421.	*	2	0600	121	2661.	*	3	0045	196	1539.	*	3	1930	271	1511.
1	1130	47	473.	*	2	0615	122	2627.	*	3	0100	197	1537.	*	3	1945	272	1511.
1	1145	48	526.	*	2	0630	123	2593.	*	3	0115	198	1535.	*	3	2000	273	1511.
1	1200	49	586.	*	2	0645	124	2558.	*	3	0130	199	1533.	*	3	2015	274	1511.
1	1215	50	653.	*	2	0700	125	2524.	*	3	0145	200	1531.	*	3	2030	275	1511.
1	1230	51	728.	*	2	0715	126	2490.	*	3	0200	201	1529.	*	3	2045	276	1511.
1	1245	52	810.	*	2	0730	127	2456.	*	3	0215	202	1527.	*	3	2100	277	1511.
1	1300	53	903.	*	2	0745	128	2423.	*	3	0230	203	1526.	*	3	2115	278	1511.
1	1315	54	1005.	*	2	0800	129	2391.	*	3	0245	204	1524.	*	3	2130	279	1511.
1	1330	55	1120.	*	2	0815	130	2360.	*	3	0300	205	1523.	*	3	2145	280	1511.
1	1345	56	1247.	*	2	0830	131	2331.	*	3	0315	206	1522.	*	3	2200	281	1511.
1	1400	57	1385.	*	2	0845	132	2303.	*	3	0330	207	1521.	*	3	2215	282	1511.
1	1415	58	1531.	*	2	0900	133	2277.	*	3	0345	208	1520.	*	3	2230	283	1511.
1	1430	59	1684.	*	2	0915	134	2252.	*	3	0400	209	1519.	*	3	2245	284	1511.
1	1445	60	1839.	*	2	0930	135	2229.	*	3	0415	210	1518.	*	3	2300	285	1511.
1	1500	61	1988.	*	2	0945	136	2207.	*	3	0430	211	1517.	*	3	2315	286	1511.
1	1515	62	2129.	*	2	1000	137	2186.	*	3	0445	212	1517.	*	3	2330	287	1511.
1	1530	63	2258.	*	2	1015	138	2167.	*	3	0500	213	1516.	*	3	2345	288	1511.
1	1545	64	2370.	*	2	1030	139	2148.	*	3	0515	214	1515.	*	4	0000	289	1511.
1	1600	65	2468.	*	2	1045	140	2131.	*	3	0530	215	1515.	*	4	0015	290	1511.
1	1615	66	2552.	*	2	1100	141	2113.	*	3	0545	216	1514.	*	4	0030	291	1511.
1	1630	67	2622.	*	2	1115	142	2097.	*	3	0600	217	1514.	*	4	0045	292	1511.
1	1645	68	2680.	*	2	1130	143	2080.	*	3	0615	218	1514.	*	4	0100	293	1511.
1	1700	69	2728.	*	2	1145	144	2064.	*	3	0630	219	1513.	*	4	0115	294	1511.
1	1715	70	2770.	*	2	1200	145	2048.	*	3	0645	220	1513.	*	4	0130	295	1511.
1	1730	71	2809.	*	2	1215	146	2033.	*	3	0700	221	1513.	*	4	0145	296	1511.
1	1745	72	2845.	*	2	1230	147	2017.	*	3	0715	222	1513.	*	4	0200	297	1511.
1	1800	73	2877.	*	2	1245	148	2002.	*	3	0730	223	1513.	*	4	0215	298	1511.
1	1815	74	2904.	*	2	1300	149	1987.	*	3	0745	224	1512.	*	4	0230	299	1511.
1	1830	75	2928.	*	2	1315	150	1971.	*	3	0800	225	1512.	*	4	0245	300	1511.
				*					*					*				

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
3035.	25.75	(CFS)	2995.	2616.	1704.	1641.
		(INCHES)	0.904	3.156	6.168	6.168
		(AC-FT)	1485.	5188.	10139.	10139.

CUMULATIVE AREA = 30.82 SQ MI

****

HYDROGRAPH AT CO380
TRANSPOSITION AREA 30.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		1845	76	2910.	2		1330	151	1944.	3		0815	226	1512.
1		0015	2	0.	1		1900	77	2927.	2		1345	152	1928.	3		0830	227	1512.
1		0030	3	0.	1		1915	78	2941.	2		1400	153	1912.	3		0845	228	1512.
1		0045	4	0.	1		1930	79	2950.	2		1415	154	1895.	3		0900	229	1512.
1		0100	5	0.	1		1945	80	2955.	2		1430	155	1878.	3		0915	230	1512.
1		0115	6	0.	1		2000	81	2957.	2		1445	156	1861.	3		0930	231	1512.
1		0130	7	0.	1		2015	82	2956.	2		1500	157	1845.	3		0945	232	1511.
1		0145	8	0.	1		2030	83	2953.	2		1515	158	1828.	3		1000	233	1511.
1		0200	9	0.	1		2045	84	2949.	2		1530	159	1812.	3		1015	234	1511.
1		0215	10	0.	1		2100	85	2943.	2		1545	160	1796.	3		1030	235	1511.
1		0230	11	0.	1		2115	86	2938.	2		1600	161	1780.	3		1045	236	1511.
1		0245	12	0.	1		2130	87	2933.	2		1615	162	1765.	3		1100	237	1511.
1		0300	13	0.	1		2145	88	2928.	2		1630	163	1750.	3		1115	238	1511.
1		0315	14	0.	1		2200	89	2925.	2		1645	164	1737.	3		1130	239	1511.
1		0330	15	0.	1		2215	90	2925.	2		1700	165	1723.	3		1145	240	1511.
1		0345	16	0.	1		2230	91	2925.	2		1715	166	1710.	3		1200	241	1511.
1		0400	17	0.	1		2245	92	2928.	2		1730	167	1698.	3		1215	242	1511.
1		0415	18	0.	1		2300	93	2932.	2		1745	168	1687.	3		1230	243	1511.
1		0430	19	1.	1		2315	94	2938.	2		1800	169	1676.	3		1245	244	1511.
1		0445	20	1.	1		2330	95	2945.	2		1815	170	1666.	3		1300	245	1511.
1		0500	21	1.	1		2345	96	2953.	2		1830	171	1656.	3		1315	246	1511.
1		0515	22	1.	2		0000	97	2961.	2		1845	172	1647.	3		1330	247	1511.
1		0530	23	2.	2		0015	98	2969.	2		1900	173	1638.	3		1345	248	1511.
1		0545	24	3.	2		0030	99	2977.	2		1915	174	1630.	3		1400	249	1511.
1		0600	25	4.	2		0045	100	2985.	2		1930	175	1623.	3		1415	250	1511.
1		0615	26	5.	2		0100	101	2992.	2		1945	176	1616.	3		1430	251	1511.
1		0630	27	7.	2		0115	102	2997.	2		2000	177	1610.	3		1445	252	1511.
1		0645	28	9.	2		0130	103	3000.	2		2015	178	1604.	3		1500	253	1511.
1		0700	29	12.	2		0145	104	3001.	2		2030	179	1598.	3		1515	254	1511.
1		0715	30	16.	2		0200	105	2999.	2		2045	180	1593.	3		1530	255	1511.
1		0730	31	21.	2		0215	106	2994.	2		2100	181	1588.	3		1545	256	1511.
1		0745	32	27.	2		0230	107	2986.	2		2115	182	1583.	3		1600	257	1511.
1		0800	33	35.	2		0245	108	2975.	2		2130	183	1579.	3		1615	258	1511.
1		0815	34	44.	2		0300	109	2961.	2		2145	184	1575.	3		1630	259	1511.
1		0830	35	55.	2		0315	110	2943.	2		2200	185	1571.	3		1645	260	1511.
1		0845	36	70.	2		0330	111	2923.	2		2215	186	1567.	3		1700	261	1511.
1		0900	37	89.	2		0345	112	2901.	2		2230	187	1564.	3		1715	262	1511.
1		0915	38	111.	2		0400	113	2876.	2		2245	188	1561.	3		1730	263	1511.
1		0930	39	138.	2		0415	114	2850.	2		2300	189	1557.	3		1745	264	1511.
1		0945	40	168.	2		0430	115	2822.	2		2315	190	1554.	3		1800	265	1511.
1		1000	41	202.	2		0445	116	2793.	2		2330	191	1551.	3		1815	266	1511.
1		1015	42	240.	2		0500	117	2763.	2		2345	192	1549.	3		1830	267	1511.
1		1030	43	281.	2		0515	118	2732.	3		0000	193	1546.	3		1845	268	1511.
1		1045	44	325.	2		0530	119	2701.	3		0015	194	1543.	3		1900	269	1511.
1		1100	45	372.	2		0545	120	2668.	3		0030	195	1541.	3		1915	270	1511.
1		1115	46	421.	2		0600	121	2635.	3		0045	196	1539.	3		1930	271	1511.
1		1130	47	472.	2		0615	122	2602.	3		0100	197	1536.	3		1945	272	1511.
1		1145	48	526.	2		0630	123	2569.	3		0115	198	1534.	3		2000	273	1511.
1		1200	49	586.	2		0645	124	2535.	3		0130	199	1532.	3		2015	274	1511.
1		1215	50	652.	2		0700	125	2501.	3		0145	200	1530.	3		2030	275	1511.
1		1230	51	726.	2		0715	126	2468.	3		0200	201	1529.	3		2045	276	1511.
1		1245	52	808.	2		0730	127	2435.	3		0215	202	1527.	3		2100	277	1511.
1		1300	53	899.	2		0745	128	2403.	3		0230	203	1525.	3		2115	278	1511.
1		1315	54	1000.	2		0800	129	2371.	3		0245	204	1524.	3		2130	279	1511.
1		1330	55	1112.	2		0815	130	2341.	3		0300	205	1523.	3		2145	280	1511.
1		1345	56	1237.	2		0830	131	2313.	3		0315	206	1522.	3		2200	281	1511.
1		1400	57	1372.	2		0845	132	2285.	3		0330	207	1520.	3		2215	282	1511.
1		1415	58	1515.	2		0900	133	2259.	3		0345	208	1520.	3		2230	283	1511.
1		1430	59	1665.	2		0915	134	2235.	3		0400	209	1519.	3		2245	284	1511.
1		1445	60	1816.	2		0930	135	2212.	3		0415	210	1518.	3		2300	285	1511.
		1500	61	1962.	2		0945	136	2191.	3		0430	211	1517.	3		2315	286	1511.
		1515	62	2100.	2		1000	137	2171.	3		0445	212	1516.	3		2330	287	1511.
		1530	63	2226.	2		1015	138	2152.	3		0500	213	1516.	3		2345	288	1511.

1	1545	64	2837.	*	2	1030	139	2134.	*	3	0515	214	1515.	*	4	0000	289	1511.
1	1600	65	2833.	*	2	1045	140	2117.	*	3	0530	215	1515.	*	4	0015	290	1511.
1	1615	66	2515.	*	2	1100	141	2100.	*	3	0545	216	1514.	*	4	0030	291	1511.
1	1630	67	2585.	*	2	1115	142	2083.	*	3	0600	217	1514.	*	4	0045	292	1511.
1	1645	68	2642.	*	2	1130	143	2067.	*	3	0615	218	1514.	*	4	0100	293	1511.
1	1700	69	2689.	*	2	1145	144	2051.	*	3	0630	219	1513.	*	4	0115	294	1511.
1	1715	70	2731.	*	2	1200	145	2035.	*	3	0645	220	1513.	*	4	0130	295	1511.
1	1730	71	2770.	*	2	1215	146	2020.	*	3	0700	221	1513.	*	4	0145	296	1511.
1	1745	72	2806.	*	2	1230	147	2006.	*	3	0715	222	1513.	*	4	0200	297	1511.
1	1800	73	2837.	*	2	1245	148	1991.	*	3	0730	223	1512.	*	4	0215	298	1511.
1	1815	74	2865.	*	2	1300	149	1976.	*	3	0745	224	1512.	*	4	0230	299	1511.
1	1830	75	2889.	*	2	1315	150	1960.	*	3	0800	225	1512.	*	4	0245	300	1511.
				*					*					*				

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
3001.	25.75	(CFS)	2961.	2588.	1694.	1632.
		(INCHES)	0.893	3.123	6.132	6.132
		(AC-FT)	1468.	5134.	10080.	10080.

CUMULATIVE AREA = 30.82 SQ MI

****

HYDROGRAPH AT C0380
TRANSPOSITION AREA 72.0 SQ MI

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		1845	76	2855.	*	2		1330	151	1930.	*	3		0815	226	1512.
1		0015	2	0.	*	1		1900	77	2873.	*	2		1345	152	1915.	*	3		0830	227	1512.
1		0030	3	0.	*	1		1915	78	2887.	*	2		1400	153	1899.	*	3		0845	228	1512.
1		0045	4	0.	*	1		1930	79	2897.	*	2		1415	154	1882.	*	3		0900	229	1512.
1		0100	5	0.	*	1		1945	80	2902.	*	2		1430	155	1866.	*	3		0915	230	1512.
1		0115	6	0.	*	1		2000	81	2904.	*	2		1445	156	1850.	*	3		0930	231	1512.
1		0130	7	0.	*	1		2015	82	2904.	*	2		1500	157	1834.	*	3		0945	232	1511.
1		0145	8	0.	*	1		2030	83	2902.	*	2		1515	158	1818.	*	3		1000	233	1511.
1		0200	9	0.	*	1		2045	84	2898.	*	2		1530	159	1802.	*	3		1015	234	1511.
1		0215	10	0.	*	1		2100	85	2894.	*	2		1545	160	1786.	*	3		1030	235	1511.
1		0230	11	0.	*	1		2115	86	2889.	*	2		1600	161	1771.	*	3		1045	236	1511.
1		0245	12	0.	*	1		2130	87	2884.	*	2		1615	162	1757.	*	3		1100	237	1511.
1		0300	13	0.	*	1		2145	88	2880.	*	2		1630	163	1743.	*	3		1115	238	1511.
1		0315	14	0.	*	1		2200	89	2878.	*	2		1645	164	1729.	*	3		1130	239	1511.
1		0330	15	0.	*	1		2215	90	2878.	*	2		1700	165	1716.	*	3		1145	240	1511.
1		0345	16	0.	*	1		2230	91	2879.	*	2		1715	166	1704.	*	3		1200	241	1511.
1		0400	17	0.	*	1		2245	92	2882.	*	2		1730	167	1692.	*	3		1215	242	1511.
1		0415	18	0.	*	1		2300	93	2886.	*	2		1745	168	1681.	*	3		1230	243	1511.
1		0430	19	1.	*	1		2315	94	2891.	*	2		1800	169	1671.	*	3		1245	244	1511.
1		0445	20	1.	*	1		2330	95	2898.	*	2		1815	170	1661.	*	3		1300	245	1511.
1		0500	21	1.	*	1		2345	96	2906.	*	2		1830	171	1651.	*	3		1315	246	1511.
1		0515	22	1.	*	2		0000	97	2914.	*	2		1845	172	1643.	*	3		1330	247	1511.
1		0530	23	2.	*	2		0015	98	2922.	*	2		1900	173	1634.	*	3		1345	248	1511.
1		0545	24	3.	*	2		0030	99	2930.	*	2		1915	174	1627.	*	3		1400	249	1511.
1		0600	25	4.	*	2		0045	100	2938.	*	2		1930	175	1620.	*	3		1415	250	1511.
1		0615	26	5.	*	2		0100	101	2944.	*	2		1945	176	1613.	*	3		1430	251	1511.
1		0630	27	7.	*	2		0115	102	2949.	*	2		2000	177	1607.	*	3		1445	252	1511.
1		0645	28	9.	*	2		0130	103	2952.	*	2		2015	178	1601.	*	3		1500	253	1511.
1		0700	29	12.	*	2		0145	104	2953.	*	2		2030	179	1595.	*	3		1515	254	1511.
1		0715	30	16.	*	2		0200	105	2951.	*	2		2045	180	1590.	*	3		1530	255	1511.
1		0730	31	21.	*	2		0215	106	2947.	*	2		2100	181	1586.	*	3		1545	256	1511.
1		0745	32	27.	*	2		0230	107	2939.	*	2		2115	182	1581.	*	3		1600	257	1511.
1		0800	33	35.	*	2		0245	108	2928.	*	2		2130	183	1577.	*	3		1615	258	1511.

1	0815	34	44.	*	2	0300	109	2914.	*	2	2145	184	1573.	*	3	1630	259	1511.
1	0830	35	55.	*	2	0315	110	2897.	*	2	2200	185	1569.	*	3	1645	260	1511.
1	0845	36	70.	*	2	0330	111	2876.	*	2	2215	186	1566.	*	3	1700	261	1511.
1	0900	37	69.	*	2	0345	112	2856.	*	2	2230	187	1562.	*	3	1715	262	1511.
1	0915	38	111.	*	2	0400	113	2832.	*	2	2245	188	1559.	*	3	1730	263	1511.
1	0930	39	138.	*	2	0415	114	2807.	*	2	2300	189	1556.	*	3	1745	264	1511.
1	0945	40	166.	*	2	0430	115	2780.	*	2	2315	190	1553.	*	3	1800	265	1511.
1	1000	41	202.	*	2	0445	116	2752.	*	2	2330	191	1550.	*	3	1815	266	1511.
1	1015	42	240.	*	2	0500	117	2723.	*	2	2345	192	1548.	*	3	1830	267	1511.
1	1030	43	281.	*	2	0515	118	2693.	*	3	0000	193	1545.	*	3	1845	268	1511.
1	1045	44	325.	*	2	0530	119	2663.	*	3	0015	194	1542.	*	3	1900	269	1511.
1	1100	45	372.	*	2	0545	120	2631.	*	3	0030	195	1540.	*	3	1915	270	1511.
1	1115	46	421.	*	2	0600	121	2599.	*	3	0045	196	1538.	*	3	1930	271	1511.
1	1130	47	472.	*	2	0615	122	2567.	*	3	0100	197	1536.	*	3	1945	272	1511.
1	1145	48	526.	*	2	0630	123	2535.	*	3	0115	198	1534.	*	3	2000	273	1511.
1	1200	49	585.	*	2	0645	124	2502.	*	3	0130	199	1532.	*	3	2015	274	1511.
1	1215	50	651.	*	2	0700	125	2469.	*	3	0145	200	1530.	*	3	2030	275	1511.
1	1230	51	724.	*	2	0715	126	2437.	*	3	0200	201	1528.	*	3	2045	276	1511.
1	1245	52	804.	*	2	0730	127	2405.	*	3	0215	202	1526.	*	3	2100	277	1511.
1	1300	53	893.	*	2	0745	128	2374.	*	3	0230	203	1525.	*	3	2115	278	1511.
1	1315	54	992.	*	2	0800	129	2344.	*	3	0245	204	1524.	*	3	2130	279	1511.
1	1330	55	1102.	*	2	0815	130	2315.	*	3	0300	205	1522.	*	3	2145	280	1511.
1	1345	56	1223.	*	2	0830	131	2287.	*	3	0315	206	1521.	*	3	2200	281	1511.
1	1400	57	1353.	*	2	0845	132	2261.	*	3	0330	207	1520.	*	3	2215	282	1511.
1	1415	58	1493.	*	2	0900	133	2236.	*	3	0345	208	1519.	*	3	2230	283	1511.
1	1430	59	1638.	*	2	0915	134	2212.	*	3	0400	209	1518.	*	3	2245	284	1511.
1	1445	60	1784.	*	2	0930	135	2190.	*	3	0415	210	1518.	*	3	2300	285	1511.
1	1500	61	1926.	*	2	0945	136	2169.	*	3	0430	211	1517.	*	3	2315	286	1511.
1	1515	62	2060.	*	2	1000	137	2150.	*	3	0445	212	1516.	*	3	2330	287	1511.
1	1530	63	2183.	*	2	1015	138	2131.	*	3	0500	213	1516.	*	3	2345	288	1511.
1	1545	64	2290.	*	2	1030	139	2114.	*	3	0515	214	1515.	*	4	0000	289	1511.
1	1600	65	2384.	*	2	1045	140	2097.	*	3	0530	215	1515.	*	4	0015	290	1511.
1	1615	66	2465.	*	2	1100	141	2080.	*	3	0545	216	1514.	*	4	0030	291	1511.
1	1630	67	2533.	*	2	1115	142	2064.	*	3	0600	217	1514.	*	4	0045	292	1511.
1	1645	68	2590.	*	2	1130	143	2048.	*	3	0615	218	1514.	*	4	0100	293	1511.
1	1700	69	2636.	*	2	1145	144	2033.	*	3	0630	219	1513.	*	4	0115	294	1511.
1	1715	70	2678.	*	2	1200	145	2018.	*	3	0645	220	1513.	*	4	0130	295	1511.
1	1730	71	2716.	*	2	1215	146	2004.	*	3	0700	221	1513.	*	4	0145	296	1511.
1	1745	72	2751.	*	2	1230	147	1989.	*	3	0715	222	1513.	*	4	0200	297	1511.
1	1800	73	2783.	*	2	1245	148	1975.	*	3	0730	223	1512.	*	4	0215	298	1511.
1	1815	74	2810.	*	2	1300	149	1960.	*	3	0745	224	1512.	*	4	0230	299	1511.
1	1830	75	2834.	*	2	1315	150	1945.	*	3	0800	225	1512.	*	4	0245	300	1511.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
2953.	25.75	(CFS)	2914.	2550.	1680.	1618.
		(INCHES)	0.879	3.077	6.082	6.082
		(AC-FT)	1445.	5058.	9998.	9998.

CUMULATIVE AREA = 30.82 SQ MI

INTERPOLATED HYDROGRAPH AT CO380

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		1845	76	2921.	*	2		1330	151	1947.	*	3		0815	226	1512.
1		0015	2	0.	*	1		1900	77	2908.	*	2		1345	152	1931.	*	3		0830	227	1512.
1		0030	3	0.	*	1		1915	78	2952.	*	2		1400	153	1914.	*	3		0845	228	1512.
1		0045	4	0.	*	1		1930	79	2961.	*	2		1415	154	1898.	*	3		0900	229	1512.

1	0100	5	0.	*	1	1945	80	2966.	*	2	1430	155	1881.	*	3	0915	230	1512.
1	0115	6	0.	*	1	2000	81	2967.	*	2	1445	156	1864.	*	3	0930	231	1512.
1	0130	7	0.	*	1	2015	82	2966.	*	2	1500	157	1847.	*	3	0945	232	1511.
1	0145	8	0.	*	1	2030	83	2963.	*	2	1515	158	1830.	*	3	1000	233	1511.
1	0200	9	0.	*	1	2045	84	2959.	*	2	1530	159	1814.	*	3	1015	234	1511.
1	0215	10	0.	*	1	2100	85	2953.	*	2	1545	160	1797.	*	3	1030	235	1511.
1	0230	11	0.	*	1	2115	86	2948.	*	2	1600	161	1782.	*	3	1045	236	1511.
1	0245	12	0.	*	1	2130	87	2942.	*	2	1615	162	1767.	*	3	1100	237	1511.
1	0300	13	0.	*	1	2145	88	2938.	*	2	1630	163	1752.	*	3	1115	238	1511.
1	0315	14	0.	*	1	2200	89	2935.	*	2	1645	164	1738.	*	3	1130	239	1511.
1	0330	15	0.	*	1	2215	90	2934.	*	2	1700	165	1725.	*	3	1145	240	1511.
1	0345	16	0.	*	1	2230	91	2935.	*	2	1715	166	1712.	*	3	1200	241	1511.
1	0400	17	0.	*	1	2245	92	2937.	*	2	1730	167	1699.	*	3	1215	242	1511.
1	0415	18	0.	*	1	2300	93	2942.	*	2	1745	168	1688.	*	3	1230	243	1511.
1	0430	19	1.	*	1	2315	94	2947.	*	2	1800	169	1677.	*	3	1245	244	1511.
1	0445	20	1.	*	1	2330	95	2954.	*	2	1815	170	1667.	*	3	1300	245	1511.
1	0500	21	1.	*	1	2345	96	2962.	*	2	1830	171	1657.	*	3	1315	246	1511.
1	0515	22	1.	*	2	0000	97	2970.	*	2	1845	172	1648.	*	3	1330	247	1511.
1	0530	23	2.	*	2	0015	98	2979.	*	2	1900	173	1639.	*	3	1345	248	1511.
1	0545	24	3.	*	2	0030	99	2987.	*	2	1915	174	1631.	*	3	1400	249	1511.
1	0600	25	4.	*	2	0045	100	2995.	*	2	1930	175	1624.	*	3	1415	250	1511.
1	0615	26	5.	*	2	0100	101	3001.	*	2	1945	176	1617.	*	3	1430	251	1511.
1	0630	27	7.	*	2	0115	102	3007.	*	2	2000	177	1610.	*	3	1445	252	1511.
1	0645	28	9.	*	2	0130	103	3010.	*	2	2015	178	1604.	*	3	1500	253	1511.
1	0700	29	12.	*	2	0145	104	3011.	*	2	2030	179	1598.	*	3	1515	254	1511.
1	0715	30	16.	*	2	0200	105	3009.	*	2	2045	180	1593.	*	3	1530	255	1511.
1	0730	31	21.	*	2	0215	106	3004.	*	2	2100	181	1588.	*	3	1545	256	1511.
1	0745	32	27.	*	2	0230	107	2996.	*	2	2115	182	1584.	*	3	1600	257	1511.
1	0800	33	35.	*	2	0245	108	2984.	*	2	2130	183	1579.	*	3	1615	258	1511.
1	0815	34	44.	*	2	0300	109	2970.	*	2	2145	184	1575.	*	3	1630	259	1511.
1	0830	35	55.	*	2	0315	110	2953.	*	2	2200	185	1571.	*	3	1645	260	1511.
1	0845	36	70.	*	2	0330	111	2932.	*	2	2215	186	1568.	*	3	1700	261	1511.
1	0900	37	89.	*	2	0345	112	2910.	*	2	2230	187	1564.	*	3	1715	262	1511.
1	0915	38	111.	*	2	0400	113	2885.	*	2	2245	188	1561.	*	3	1730	263	1511.
1	0930	39	138.	*	2	0415	114	2858.	*	2	2300	189	1558.	*	3	1745	264	1511.
1	0945	40	168.	*	2	0430	115	2830.	*	2	2315	190	1555.	*	3	1800	265	1511.
1	1000	41	202.	*	2	0445	116	2801.	*	2	2330	191	1552.	*	3	1815	266	1511.
1	1015	42	240.	*	2	0500	117	2771.	*	2	2345	192	1549.	*	3	1830	267	1511.
1	1030	43	281.	*	2	0515	118	2740.	*	3	0000	193	1546.	*	3	1845	268	1511.
1	1045	44	325.	*	2	0530	119	2709.	*	3	0015	194	1544.	*	3	1900	269	1511.
1	1100	45	372.	*	2	0545	120	2676.	*	3	0030	195	1541.	*	3	1915	270	1511.
1	1115	46	421.	*	2	0600	121	2643.	*	3	0045	196	1539.	*	3	1930	271	1511.
1	1130	47	472.	*	2	0615	122	2609.	*	3	0100	197	1536.	*	3	1945	272	1511.
1	1145	48	526.	*	2	0630	123	2575.	*	3	0115	198	1534.	*	3	2000	273	1511.
1	1200	49	586.	*	2	0645	124	2541.	*	3	0130	199	1532.	*	3	2015	274	1511.
1	1215	50	653.	*	2	0700	125	2508.	*	3	0145	200	1530.	*	3	2030	275	1511.
1	1230	51	727.	*	2	0715	126	2474.	*	3	0200	201	1529.	*	3	2045	276	1511.
1	1245	52	808.	*	2	0730	127	2441.	*	3	0215	202	1527.	*	3	2100	277	1511.
1	1300	53	900.	*	2	0745	128	2408.	*	3	0230	203	1526.	*	3	2115	278	1511.
1	1315	54	1001.	*	2	0800	129	2377.	*	3	0245	204	1524.	*	3	2130	279	1511.
1	1330	55	1114.	*	2	0815	130	2347.	*	3	0300	205	1523.	*	3	2145	280	1511.
1	1345	56	1240.	*	2	0830	131	2318.	*	3	0315	206	1522.	*	3	2200	281	1511.
1	1400	57	1375.	*	2	0845	132	2290.	*	3	0330	207	1521.	*	3	2215	282	1511.
1	1415	58	1520.	*	2	0900	133	2264.	*	3	0345	208	1520.	*	3	2230	283	1511.
1	1430	59	1670.	*	2	0915	134	2240.	*	3	0400	209	1519.	*	3	2245	284	1511.
1	1445	60	1822.	*	2	0930	135	2217.	*	3	0415	210	1518.	*	3	2300	285	1511.
1	1500	61	1969.	*	2	0945	136	2195.	*	3	0430	211	1517.	*	3	2315	286	1511.
1	1515	62	2108.	*	2	1000	137	2175.	*	3	0445	212	1516.	*	3	2330	287	1511.
1	1530	63	2235.	*	2	1015	138	2156.	*	3	0500	213	1516.	*	3	2345	288	1511.
1	1545	64	2346.	*	2	1030	139	2138.	*	3	0515	214	1515.	*	4	0000	289	1511.
1	1600	65	2442.	*	2	1045	140	2121.	*	3	0530	215	1515.	*	4	0015	290	1511.
1	1615	66	2525.	*	2	1100	141	2104.	*	3	0545	216	1514.	*	4	0030	291	1511.
1	1630	67	2596.	*	2	1115	142	2087.	*	3	0600	217	1514.	*	4	0045	292	1511.
1	1645	68	2653.	*	2	1130	143	2070.	*	3	0615	218	1514.	*	4	0100	293	1511.
1	1700	69	2700.	*	2	1145	144	2054.	*	3	0630	219	1513.	*	4	0115	294	1511.
1	1715	70	2742.	*	2	1200	145	2037.	*	3	0645	220	1513.	*	4	0130	295	1511.

1	1730	71	2781.	*	2	1215	146	2024.	*	3	0700	221	1513.	*	4	0145	296	1511.
1	1745	72	2817.	*	2	1230	147	2009.	*	3	0715	222	1513.	*	4	0200	297	1511.
1	1800	73	2848.	*	2	1245	148	1994.	*	3	0730	223	1513.	*	4	0215	298	1511.
1	1815	74	2876.	*	2	1300	149	1979.	*	3	0745	224	1512.	*	4	0230	299	1511.
1	1830	75	2900.	*	2	1315	150	1963.	*	3	0800	225	1512.	*	4	0245	300	1511.
				*					*					*				

****

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
3011.	25.75	(CFS)	2971.	2596.	1697.	1634.
		(INCHES)	0.896	3.133	6.142	6.142
		(AC-FT)	1473.	5149.	10096.	10096.

CUMULATIVE AREA = 30.82 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	HY337	1695.	22.00	1685.	1597.	1372.	0.00		
ROUTED TO	RO339	1695.	22.00	1685.	1597.	1370.	0.00		
HYDROGRAPH AT	SUB338	196.	14.00	113.	38.	13.	1.04		
2 COMBINED AT	CO340	1722.	21.00	1712.	1619.	1383.	1.04		
ROUTED TO	RO341	1722.	21.25	1712.	1619.	1380.	1.04		
HYDROGRAPH AT	SUB342	79.	13.75	44.	15.	5.	0.50		
2 COMBINED AT	CO344	1733.	21.25	1723.	1630.	1385.	1.54		
ROUTED TO	RO345	1732.	22.50	1722.	1628.	1352.	1.54		
HYDROGRAPH AT	SUB346	275.	16.50	225.	94.	31.	3.19		
2 COMBINED AT	CO348	1913.	17.25	1879.	1711.	1383.	4.73		
ROUTED TO	RO349	1912.	17.50	1878.	1711.	1376.	4.73		
HYDROGRAPH AT	SUB354	232.	15.25	170.	62.	21.	1.38		
ROUTED TO	RO355	196.	24.25	158.	62.	21.	1.38		
HYDROGRAPH AT	SUB356	417.	17.50	361.	163.	55.	4.57		
2 COMBINED AT	CO358	417.	17.50	372.	223.	75.	5.95		
ROUTED TO	RO359	406.	20.50	369.	223.	75.	5.95		
HYDROGRAPH AT	SUB360	627.	16.50	511.	209.	70.	4.87		
2 COMBINED AT	CO362	804.	18.00	743.	426.	145.	10.82		
ROUTED TO	RO363	780.	24.00	726.	424.	145.	10.82		
HYDROGRAPH AT	SUB364	521.	18.00	459.	216.	73.	5.79		
2 COMBINED AT	CO366	1034.	23.25	975.	619.	216.	16.61		
ROUTED TO	RO367	1028.	24.50	971.	618.	216.	16.61		
HYDROGRAPH AT	SUB368	360.	16.50	297.	125.	42.	3.48		
2 COMBINED AT	CO370	1128.	24.25	1073.	728.	256.	20.09		
ROUTED TO	RO371	1117.	26.25	1064.	725.	256.	20.09		
HYDROGRAPH AT	SUB372	364.	17.00	309.	135.	45.	3.77		
2 COMBINED AT	CO374	1208.	25.75	1158.	837.	299.	23.86		
ROUTED TO	RO375	1207.	26.50	1157.	836.	299.	23.86		

2 COMBINED AT	CO376	2970.	26.00	2924.	2537.	1672.	28.59
HYDROGRAPH AT	SUB378	282.	15.50	212.	80.	27.	2.23
2 COMBINED AT	CO380	3011.	25.75	2971.	2596.	1697.	30.82

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

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek AOMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITION - PHASE III

CURVE NUMBER WORKSHEETS

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. 1 OF 1
CALCULATED BY LMT DATE 1/89
CHECKED BY BK DATE 1/89

SCS RUNOFF CURVE NUMBERS

Land Use	% Lot Coverage (CN=98)	Percent ARTIFICIAL DESERT / GRASS	Table 2-2 A	B	C	D	Weighted Curve No. A	B	C	D
Rural 190	5	95	63	77	85	88	65	78	86	89
Rural 70	10	90	63	77	85	88	67	79	86	89
Rural 43	15	85	63	77	85	88	68	80	87	90
R1-35	20	40 40	96 39	96 61	96 74	96 80	74	82	88	90
R1-18	25	38 37	96 39	96 61	96 74	96 80	75	84	88	91
R1-10	30	35 35	96 39	96 61	96 74	96 80	77	84	89	91
R1-8	35	32 33	96 39	96 61	96 74	96 80	78	85	89	91
R1-7	35	33 32	96 39	96 61	96 74	96 80	78	86	90	92
R1-6	40	30 30	96 39	96 61	96 74	96 80	80	86	90	92
R-2	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
R-3	50	25 25	96 39	96 61	96 74	96 80	83	88	92	92
R-4	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
R-5	50	25 25	96 39	96 61	96 74	96 80	83	88	92	93
C-S	25	60 15	98 96	98 96	98 96	98 96	98	98	98	98
C-O	35	50 15	98 96	98 96	98 96	98 96	98	98	98	98
C-1	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
C-2	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
C-3	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-1	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-2	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
IND-3	60	25 15	98 96	98 96	98 96	98 96	98	98	98	98
AD I	0	—	—	—	—	—	98	98	98	98
AD II	25	—	—	—	—	—	98	98	98	98
AD III	30	—	—	—	—	—	98	98	98	98
Golf Course	—	30 70	96 68	96 79	96 86	96 89	76	84	89	91
Desert Shrub	—	—	—	—	—	—	63	77	85	88
Paved Roads	—	—	—	—	—	—	98	98	98	98
Artificial Desert	—	—	—	—	—	—	96	96	96	96
Farmland	—	—	—	—	—	—	64	75	82	85

Worksheet 2: Runoff curve number and runoff

Project Gucin Creek ADMS By CMT Date 1/89

Location 338 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
A	DESERT SHRUB, POOR CONDITION	63			0.16	10.08
B	DESERT SHRUB, POOR CONDITION	77			0.88	67.76
				Totals =	1.04	77.84

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{77.84}{1.04} = 74.85$; Use CN = 75

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/87

Location 342 Checked BK Date 1/87

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
A	DESERT BRUSH, POOR CONDITION	63			0.20	12.60
B	DESERT BRUSH, POOR CONDITION	77			0.30	23.10
				Totals =	0.50	35.70

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{35.70}{0.50} = 71.40$; Use CN = 71

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By CMT Date 1/89

Location 346 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
A	DESERT SHRUB, POOR CONDITION	63			1.10	69.30
B	FARMLAND	75			2.09	156.75
					Totals = 3.19	226.05

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{226.05}{3.19} = 70.86$; Use CN = 71

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Quin Creek ADMS By LMT Date 1/89

Location 354 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.10	7.70
B	FARM LAND	75			0.48	36.00
C	DESERT SHRUB, POOR CONDITION	85			0.15	12.75
C	FARM LAND	82			0.65	53.30
				Totals =	1.38	109.75

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{109.75}{1.38} = 79.53$; Use CN = 80

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 356 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			4.33	324.75
C	FARMLAND	82			0.24	19.68
					Totals = 4.57	344.43

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{344.43}{4.57} = 75.37$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 360 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	DESERT BRUSH, POOR CONDITION	77			1.13	87.01
B	FARMLAND	75			1.57	117.75
C	DESERT BRUSH, POOR CONDITION	85			0.22	18.70
C	FARMLAND	82			1.95	159.90
				Totals =	4.87	383.36

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{383.36}{4.87} = 78.72$; Use CN = 79

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 364 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	DESERT BRUSH, POOR CONDITION	77			2.94	226.38
B	FARMLAND	75			2.80	210.00
B	PAVED ROADS	98			0.05	4.90
				Totals =	5.79	441.28

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{441.28}{5.79} = 76.21$; Use CN = 76

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project Queen Creek Adms By LMT Date 1/89

Location 368 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	FARMLAND	75			3.48	261.00
				Totals =	3.48	261.00

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{261.00}{3.48} = 75.00$; Use CN = 75

2. Runoff

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 372 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi^2 ☐ %	Product of CN x area
B	FARMLAND	75			3.77	282.75
	Totals =				3.77	282.75

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{282.75}{3.77} = 75.00$; Use CN = 75

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 2: Runoff curve number and runoff

Project Queen Creek ADMS By LMT Date 1/89

Location 378 Checked BK Date 1/89

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☒ mi² ☐ %	Product of CN x area
B	DESERT SHRUB, POOR CONDITION	77			0.20	15.40
B	FARMLAND	75			2.00	150.00
B	PAVED ROADS	98			0.03	2.94
				Totals =	2.23	168.34

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{168.34}{2.23} = 75.49$; Use CN = 75

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITIONS - PHASE III

TIME OF CONCENTRATION WORKSHEETS

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Green Creek ALMS By LMT Date 1/89

Location 338 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

		Segment ID		
1. Surface description (table 3-1)		AB		
2. Manning's roughness coeff., n (table 3-1) ..		FALLOW		
3. Flow length, L (total L $\leq$ 300 ft)	ft	0.05		
4. Two-yr 24-hr rainfall, P_2	in	300		
5. Land slope, s	ft/ft	1.35		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.0050		
		0.44	+	= 0.44

Shallow concentrated flow

		Segment ID		
7. Surface description (paved or unpaved)		BC		
8. Flow length, L	ft	UNPAVED		
9. Watercourse slope, s	ft/ft	9000		
10. Average velocity, V (figure 3-1)	ft/s	0.0032		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.91		
		2.75	+	= 2.75

Channel flow

		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			3.19

$T_{LAG} = 0.6 T_c = 1.91$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 342 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)					
Segment ID		AB			
1. Surface description (table 3-1)		FALLOW			
2. Manning's roughness coeff., n (table 3-1) ..		0.05			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+	=	0.44

Shallow concentrated flow					
Segment ID		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	7900			
9. Watercourse slope, s	ft/ft	0.0030			
10. Average velocity, V (figure 3-1)	ft/s	0.89			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	2.47	+	=	2.47

Channel flow					
Segment ID					
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				2.91

$T_{LAG} = 0.6\,T_c = 1.75$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 346 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)						
Segment ID		AB				
1. Surface description (table 3-1)		FALLOW				
2. Manning's roughness coeff., n (table 3-1) ..		0.05				
3. Flow length, L (total L ≤ 300 ft)	ft	300				
4. Two-yr 24-hr rainfall, P_2	in	1.35				
5. Land slope, s	ft/ft	0.0050				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.49	+		=	0.44

Shallow concentrated flow						
Segment ID		BC				
7. Surface description (paved or unpaved)		UNPAVED				
8. Flow length, L	ft	22000				
9. Watercourse slope, s	ft/ft	0.0039				
10. Average velocity, V (figure 3-1)	ft/s	1.00				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	6.11	+		=	6.11

Channel flow						
Segment ID						
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					6.55

$T_{LAG} = 0.6 T_c = 3.93$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 354 Checked P.L. Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
1. Surface description (table 3-1)			AB			
2. Manning's roughness coeff., n (table 3-1) ..			FALLOW			
3. Flow length, L (total L $\leq$ 300 ft)		ft	0.05			
4. Two-yr 24-hr rainfall, P_2		in	300			
5. Land slope, s		ft/ft	1.35			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$	Compute T_t	hr	0.0050			
			0.44	+	=	0.44

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)			BC			
8. Flow length, L		ft	UNPAVED			
9. Watercourse slope, s		ft/ft	15600			
10. Average velocity, V (figure 3-1)		ft/s	0.0032			
11. $T_t = \frac{L}{3600\ V}$	Compute T_t	hr	0.91			
			4.76	+	=	4.76

Channel flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, p_w		ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$	Compute r	ft				
15. Channel slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	Compute V	ft/s				
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\ V}$	Compute T_t	hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 5.20

$T_{LAG} = 0.6T_c = 3.12$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 356 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
		AB			
1. Surface description (table 3-1)		FALLOW			
2. Manning's roughness coeff., n (table 3-1) ..		0.05			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+	=	0.44

Shallow concentrated flow		Segment ID			
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	23000			
9. Watercourse slope, s	ft/ft	0.0026			
10. Average velocity, V (figure 3-1)	ft/s	0.82			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	7.79	+	=	7.79

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				8.23

$T_{LAG} = 0.6 T_c = 4.94$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 360 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
		AB			
1. Surface description (table 3-1)		FALLOW			
2. Manning's roughness coeff., n (table 3-1) ..		0.05			
3. Flow length, L (total L $\leq$ 300 ft)	ft	300			
4. Two-yr 24-hr rainfall, P_2	in	1.35			
5. Land slope, s	ft/ft	0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.44	+	=	0.44

Shallow concentrated flow		Segment ID			
		BC			
7. Surface description (paved or unpaved)		UNPAVED			
8. Flow length, L	ft	22000			
9. Watercourse slope, s	ft/ft	0.0035			
10. Average velocity, V (figure 3-1)	ft/s	0.95			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	6.43	+	=	6.43

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				6.87

$T_{LAG} = 0.6 T_c = 4.12$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 364 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			FALLOW			
2. Manning's roughness coeff., n (table 3-1) ..			0.05			
3. Flow length, L (total L ≤ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		1.35			
5. Land slope, s	ft/ft		0.0050			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.44	+		= 0.44

Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			UNPAVED			
8. Flow length, L	ft		28,000			
9. Watercourse slope, s	ft/ft		0.0032			
10. Average velocity, V (figure 3-1)	ft/s		0.91			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		8.55	+		= 8.55

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 8.99

$T_{LAG} = 0.6 T_c = 5.39$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 369 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
			AB		
1. Surface description (table 3-1)			FALLOW		
2. Manning's roughness coeff., n (table 3-1) ..			0.05		
3. Flow length, L (total L $\leq$ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		1.35		
5. Land slope, s	ft/ft		0.0050		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.44	+	= 0.44

Shallow concentrated flow		Segment ID			
			BC		
7. Surface description (paved or unpaved)			UNPAVED		
8. Flow length, L	ft		24000		
9. Watercourse slope, s	ft/ft		0.0040		
10. Average velocity, V (figure 3-1)	ft/s		1.02		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		6.54	+	= 6.54

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 6.98

$T_{LAG} = 0.6 T_c = 4.19$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 372 Checked EK Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
1. Surface description (table 3-1)		AB			
2. Manning's roughness coeff., n (table 3-1) ..		FALLOW			
3. Flow length, L (total L $\leq$ 300 ft)	ft	0.05			
4. Two-yr 24-hr rainfall, P_2	in	300			
5. Land slope, s	ft/ft	1.35			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.0050			
		0.44	+	=	0.44

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)		BC			
8. Flow length, L	ft	UNPAVED			
9. Watercourse slope, s	ft/ft	27600			
10. Average velocity, V (figure 3-1)	ft/s	0.0043			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	1.06			
		7.23	+	=	7.23

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				7.67

$T_{LAG} = 0.6 T_c = 4.60$

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Burro Creek ABMS By LMT Date 1/89

Location 374 Checked BL Date 1/89

Circle one: (Present) Developed

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
	AB				
7. Surface description (paved or unpaved)	UNPAVED				
8. Flow length, L ..... ft	18700				
9. Watercourse slope, s ..... ft/ft	0.0036				
10. Average velocity, V (figure 3-1) ..... ft/s	0.97				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	5.36	+		=	5.36

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 5.36

$T_{LAG} = 0.6 T_c = 3.22$

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS - Hydrology
PROJECT NO. 86328 SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING CONDITIONS - PHASE III

TRAVEL TIME WORKSHEETS

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT Queen Creek ADMS- Hydrology
PROJECT NO. 86328 SHEET NO. 1 OF 1
CALCULATED BY LMT DATE 1/89
CHECKED BY EK DATE 1/89

EXISTING CONDITIONS - PHASE 3
MUSKINGHAM ROUTING COEFFICIENTS

ID	X	$\frac{1}{2(1-X)}$	$\frac{1}{2X}$	NSTPS	AMSKK	NMIN	$\frac{AMSKK*60}{NMIN*NSTPS}$
339	0.25	0.667	2.0	1	0.08	15	0.32*
341	0.25			1	0.14		0.56*
345	0.25			4	1.59		1.59
349	0.25	0.667	2.0	1	0.33		1.32
355	0.20	0.625	2.5	30	8.60		1.15
359	0.20			10	2.89		1.16
363	0.20			22	5.75		1.05
367	0.20			4	1.26		1.26
371	0.20			4	2.01		2.01
375	0.20	0.625	2.5	4	0.71	15	0.71

* DOES NOT FALL WITHIN LIMITS.

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 339 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

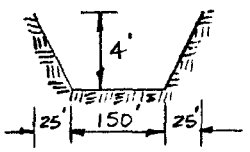
NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)					
8. Flow length, L ..... ft					
9. Watercourse slope, s ..... ft/ft					
10. Average velocity, V (figure 3-1) ..... ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

Channel flow	Segment ID	339			
12. Cross sectional flow area, a ..... ft^2		700.0			
13. Wetted perimeter, p_w ..... ft		200.6			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft		3.5			
15. Channel slope, s ..... ft/ft		0.0058			
16. Manning's roughness coeff., n		0.040			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s		6.53			
18. Flow length, L ..... ft		1900			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		0.08	+		= 0.08
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					0.08



EARTHEN LINED

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 341 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

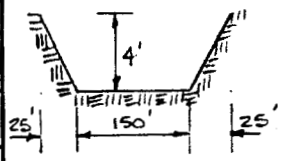
NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=

Channel flow		Segment ID			
		341			
12. Cross sectional flow area, a	ft^2	700.0			
13. Wetted perimeter, p_w	ft	200.6			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	3.5			
15. Channel slope, s	ft/ft	0.0035			
16. Manning's roughness coeff., n		0.040			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	5.07			
18. Flow length, L	ft	2600			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.14	+		= 0.14



EARTHEN LINED

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 0.14

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek Adms By LMT Date 1/89

Location 345 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

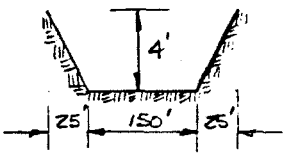
NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)					
8. Flow length, L ..... ft					
9. Watercourse slope, s ..... ft/ft					
10. Average velocity, V (figure 3-1) ..... ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

Channel flow	Segment ID	345			
12. Cross sectional flow area, a ..... ft^2		700.0			
13. Wetted perimeter, p_w ..... ft		200.6			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft		3.5			
15. Channel slope, s ..... ft/ft		0.0042			
16. Manning's roughness coeff., n		0.040			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s		3.14			
18. Flow length, L ..... ft		18000			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		1.59	+	=	1.59
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					1.59



EARTHEN LINED

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 349 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

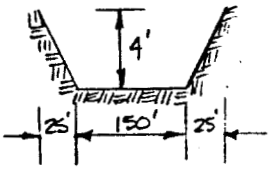
NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)					
8. Flow length, L ..... ft					
9. Watercourse slope, s ..... ft/ft					
10. Average velocity, V (figure 3-1) ..... ft/s					
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	

Channel flow	Segment ID				
	349				
12. Cross sectional flow area, a ..... ft^2	700.0				
13. Wetted perimeter, p_w ..... ft	200.6				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft	3.5				
15. Channel slope, s ..... ft/ft	0.0039				
16. Manning's roughness coeff., n	0.040				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s	5.35				
18. Flow length, L ..... ft	6400				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	0.33	+		=	0.33
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					0.33



EARTHEN LINED

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 355 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow	Segment ID			
	355			
7. Surface description (paved or unpaved)	UNPAVED			
8. Flow length, L ..... ft	13000			
9. Watercourse slope, s ..... ft/ft	0.0007			
10. Average velocity, V (figure 3-1) ..... ft/s	0.42			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	8.60	+		= 8.60

Channel flow	Segment ID			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, p_w ..... ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s				
18. Flow length, L ..... ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 8.60

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 359 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)		359			
8. Flow length, L	ft	UNPAVED			
9. Watercourse slope, s	ft/ft	7800			
10. Average velocity, V (figure 3-1)	ft/s	0.0022			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.75	2.89	+	= 2.89

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.89

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By CMT Date 1/89

Location 363 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)		363				
8. Flow length, L	ft	UNPAVED				
9. Watercourse slope, s	ft/ft	11600				
10. Average velocity, V (figure 3-1)	ft/s	0.0012				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.56	5.75	+		= 5.75

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 5.75

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 367 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		367		
8. Flow length, L	ft	UNPAVED		
9. Watercourse slope, s	ft/ft	3000		
10. Average velocity, V (figure 3-1)	ft/s	0.0017		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.66	+	=
		1.26		1.26

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 1.26

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 371 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)		371				
8. Flow length, L	ft	UNPAVED				
9. Watercourse slope, s	ft/ft	6800				
10. Average velocity, V (figure 3-1)	ft/s	0.0034				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.94		2.01	+	= 2.01

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr				+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 2.01

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Queen Creek ADMS By LMT Date 1/89

Location 375 Checked BK Date 1/89

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

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

Shallow concentrated flow		Segment ID		
		375		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	1500		
9. Watercourse slope, s	ft/ft	0.0013		
10. Average velocity, V (figure 3-1)	ft/s	0.59		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.71	+	= 0.71

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			0.71

Appendix D

Hydraulic Data

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

PROJECT FIS FOR SOUTHERN PACIFIC RR
PROJECT NO. 89500 SHEET NO. 1 OF 3
CALCULATED BY UMT DATE 12/89
CHECKED BY _____ DATE _____

APPROXIMATE HYDRAULIC ANALYSIS

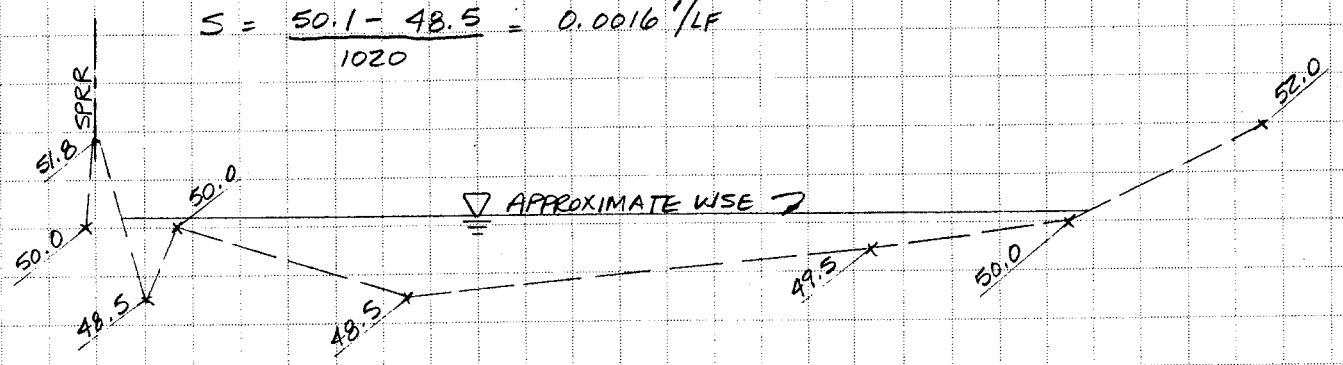
The following analysis was prepared using Manning's Equation to determine normal depth for a 100-year peak discharge. Manning "n" values were selected from engineering judgement, aerial photography and field investigation.

Cross Section WW – Looking Northwest

$Q_{100} = 1208$ cfs

$n = 0.040$

$S = \frac{50.1 - 48.5}{1020} = 0.0016'/LF$



WSE	A	P	v (fps)	Q (cfs)
50.0	764	996	1.25	952
50.2	966	1019	1.43	1384
50.3	1068	1030	1.52	1625
51.8	2744	1205	2.57	7059

APPROXIMATE WSE = 50.2

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

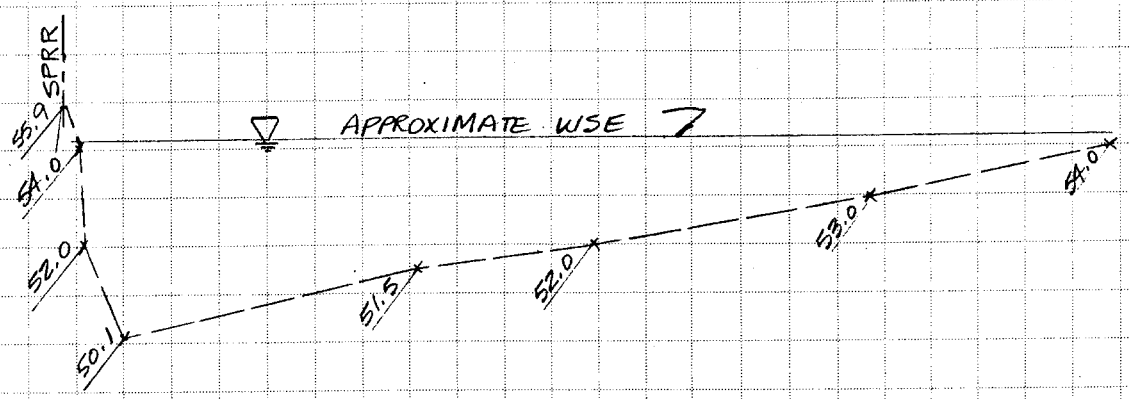
PROJECT FIS FOR SOUTHERN PACIFIC RR
PROJECT NO. 89500 SHEET NO. 2 OF 3
CALCULATED BY LMT DATE 12/89
CHECKED BY _____ DATE _____

Cross Section (XX) - Looking Northwest

$Q_{100} = 1208$ cfs

$n = 0.040$

$S = \frac{51.0 - 50.1}{950} = 0.0009'/LF$



WSE	A	P	V(fps)	Q(cfs)
52.0	456	535	1.03	469
54.0	996	1090	1.05	1045
54.2	1214	1092	1.20	1452
54.5	1542	1094	1.40	2160

APPROXIMATE WSE = 54.2

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016
(602) 957-3149

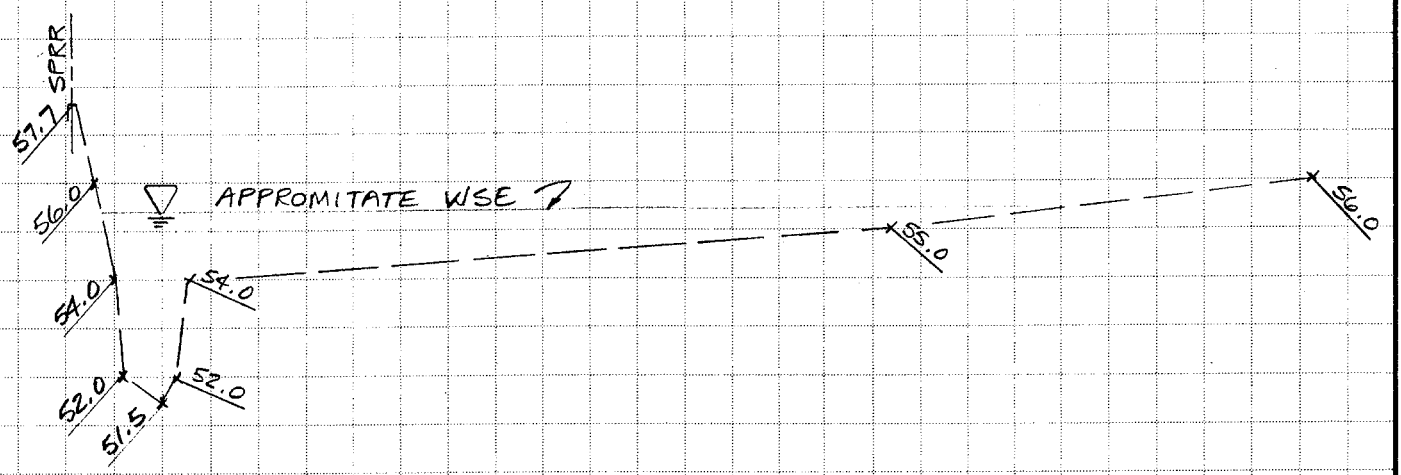
PROJECT: FIS FOR SOUTHERN PACIFIC RR
PROJECT NO. 89500 SHEET NO. 3 OF 3
CALCULATED BY LMT DATE 12/89
CHECKED BY _____ DATE _____

Cross Section (YY) - Looking Northwest

$Q_{100} = 1208$ cfs

$n = 0.040$

$S = \frac{51.5 - 51.0}{470} = 0.0011$ '/LF



WSE	A	P	v (fps)	Q (cfs)
55.0	604	830	0.98	592
55.5	1071	1060	1.24	1329
56.0	1894	1290	1.56	2964

APPROXIMATE WSE = 55.5

```
T1       FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2       QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**895006.DAT**
T3       100-YEAR FLOODPLAIN DELINEATION   FEBRUARY 1990
NR   -10       2       0              -1                        1321.30
NC    -1              -1
J3    38      43       1       2      26      39      21      22      27      28
J3    53      54              38      13      14      15      55      26      56
J3    63       1      51       4      42      57              38      39      33
J3     3      10      11      12       5       7       8      16      17      18
J5    +1
NC 0.040   0.050   0.050     0.1     0.3
NT     1    1085
ET           9.1                                                    9900.0 11100.0
X1 0.038      11  9950.0 10062.0
GR1325.4  9900.0  1321.1  9908.0  1320.8  9925.0  1321.1  9950.0  1321.0  9955.0
GR1319.7  9975.0  1319.2 10000.0  1319.2 10025.0  1319.5 10048.0  1321.0 10062.0
GR1321.0 11100.0
NT           9.1                                                    9960.0 11020.0
X1 0.199      16  9990.0 10045.0     880     880     880
X3     0  1322.0
GR1325.0  9835.0  1322.0  9840.0  1322.0  9880.0  1322.0  9945.0  1324.0  9950.0
GR1326.8  9960.0  1322.0  9990.0  1320.0 10000.0  1322.0 10045.0  1322.8 10350.0
GR1322.5 10710.0  1322.0 10910.0  1322.2 11020.0  1322.0 11150.0  1322.3 11360.0
GR1322.7 11760.0
NT           9.1                                                    9960.0 11000.0
X1 0.407      20  9980.0 10575.0    1100    1220    1100
GR1328.0  9840.0  1326.7  9860.0  1326.0  9905.0  1325.6  9925.0  1326.0  9940.0
GR1328.0  9950.0  1329.6  9960.0  1327.0  9980.0  1326.0 10000.0  1327.0 10575.0
GR1326.0 10680.0  1326.0 10730.0  1326.2 10880.0  1326.1 11000.0  1326.0 11100.0
GR1325.9 11200.0  1326.0 11270.0  1325.7 11600.0  1326.0 11900.0  1328.0 12000.0
NT           9.1                                                    9875.0 11160.0
X1 0.646      24  9970.0 10125.0    1250    1250    1250
X3    10  1330.0
GR1331.6  9750.0  1329.3  9765.0  1330.0  9780.0  1330.8  9800.0  1330.0  9830.0
GR1329.6  9840.0  1330.0  9850.0  1332.0  9860.0  1333.5  9875.0  1332.0  9885.0
GR1330.0  9905.0  1329.7  9925.0  1330.0  9950.0  1330.2  9960.0  1330.0  9970.0
GR1328.5 10000.0  1330.0 10005.0  1331.0 10125.0  1330.7 10270.0  1331.0 10400.0
GR1330.0 10555.0  1330.0 10780.0  1330.0 11000.0  1332.4 11160.0
NC 0.014   0.014   0.014     0.3     0.5
ET           9.1                                                    9725.0 11160.0
BB  1.25     2.4    2.83       0    33.7     3.7   120.0       0  1328.9  1328.8
X1 0.672      19  9984.2 10015.8     170     175     160
X2     0       0       1  1332.0  1334.0
X3    10
BT    -7  9725.0  1335.0  1333.0  9910.0  1335.5  1333.5  9984.2  1333.2  1332.9
BT       10015.8  1333.0  1332.9 10265.0  1334.0  1332.0 10750.0  1333.0  1331.0
BT       11160.0  1332.4  1331.0
GR1333.0  9725.0  1333.5  9910.0  1332.9  9983.2  1332.9  9984.2  1328.9  9984.3
GR1328.9  9994.1  1332.9  9994.2  1332.9  9995.0  1328.9  9995.1  1328.9 10004.9
GR1332.9 10005.0  1332.9 10005.8  1328.9 10015.0  1328.9 10015.7  1332.9 10015.8
GR1332.9 10016.8  1332.0 10265.0  1331.0 10750.0  1330.4 11160.0
NC 0.040   0.050   0.050     0.1     0.3
ET           9.1                                                    9700.0 11140.0
X1 0.681      13  9975.0 10025.0     220     225     210
X3    10  1332.0
GR1332.0  9365.0  1333.2  9525.0  1334.0  9670.0  1335.2  9700.0  1334.0  9710.0
GR1332.0  9975.0  1330.0  9995.0  1329.0 10000.0  1330.0 10015.0  1332.0 10025.0
GR1332.0 10160.0  1332.0 10875.0  1332.0 11140.0
ET           9.1                                                    9950.0 10600.0
X1 0.785      13  9985.0 10430.0     480     550     500
GR1333.5  9580.0  1333.0  9735.0  1333.0  9810.0  1334.0  9930.0  1336.3  9950.0
GR1336.0  9955.0  1334.0  9985.0  1333.0 10000.0  1333.5 10030.0  1334.0 10430.0
GR1334.0 10500.0  1334.0 10560.0  1336.0 10600.0
ET           9.1                                                    9975.0 10600.0
```

```
X1 0.843      13  9990.0 10395.0     375     405     370
GR1334.0  9785.0  1333.9  9800.0  1335.3  9830.0  1334.0  9870.0  1334.0  9955.0
GR1336.0  9960.0  1337.3  9975.0  1335.0  9990.0  1334.0 10000.0  1335.0 10395.0
GR1335.5 10680.0  1336.0 10860.0  1338.0 10920.0
ET           9.1                                                  9970.0 10600.0
X1 1.078      14  9990.0 10580.0    1240    1215    1240
GR1338.0  9625.0  1338.0  9800.0  1340.0  9830.0  1338.0  9875.0  1337.4  9910.0
GR1338.0  9945.0  1340.0  9955.0  1341.0  9970.0  1339.0  9990.0  1338.0 10000.0
GR1338.0 10080.0  1339.0 10580.0  1340.0 11610.0  1340.0 11690.0
ET           9.1                                                  9950.0 10600.0
X1 1.227      16  9980.0 10840.0     790     850     790
GR1343.0  9815.0  1342.0  9840.0  1340.0  9900.0  1339.5  9920.0  1340.0  9925.0
GR1342.0  9935.0  1344.0  9945.0  1344.5  9950.0  1342.0  9970.0  1341.5  9980.0
GR1340.5 10000.0  1341.0 10105.0  1341.5 10600.0  1341.5 10840.0  1342.0 11290.0
GR1344.0 12150.0
ET           9.1                                                  9950.0 10600.0
X1 1.419      17  9980.0 10120.0    1010    1230    1010
GR1348.2  9810.0  1345.0  9835.0  1345.3  9875.0  1344.0  9910.0  1344.0  9920.0
GR1346.0  9930.0  1348.0  9940.0  1348.6  9950.0  1345.0  9980.0  1344.0 10000.0
GR1345.0 10120.0  1346.0 10220.0  1346.1 10310.0  1346.0 10400.0  1345.5 10600.0
GR1345.0 10950.0  1346.0 11230.0
ET           9.1                                                  9960.0 10600.0
X1 1.561      14  9990.0 10040.0     750     750     750
GR1350.5  9820.0  1347.9  9840.0  1347.2  9870.0  1346.0  9920.0  1346.0  9935.0
GR1348.0  9940.0  1350.0  9950.0  1350.7  9960.0  1347.0  9990.0  1346.0 10000.0
GR1347.0 10040.0  1348.0 10480.0  1348.0 11050.0  1350.0 12620.0
ET           9.1                                                  9980.0 10600.0
X1 1.712      15  9995.0 10420.0     790     930     790
GR1351.5  9840.0  1350.0  9860.0  1349.0  9870.0  1350.0  9925.0  1349.0  9945.0
GR1350.0  9955.0  1352.0  9970.0  1352.9  9980.0  1351.0  9995.0  1350.0 10000.0
GR1350.3 10200.0  1350.0 10420.0  1349.9 10550.0  1350.0 10680.0  1352.0 11625.0
ET           9.1                                                  9940.0 10600.0
X1 1.860      12  9975.0 10380.0     780     800     780
GR1353.0  9810.0  1351.0  9840.0  1352.0  9855.0  1354.0  9880.0  1354.0  9920.0
GR1355.0  9940.0  1353.0  9975.0  1352.0 10000.0  1353.0 10380.0  1354.0 10530.0
GR1355.0 10640.0  1356.0 11220.0
DC 0.015   0.015   0.015     0.3     0.5
BT     1    1358
ET           9.1                                                  8985.0 10925.0
X1 1.939      11  9690.0 10270.0     210     550     370
X2                                                                      15
GR1360.1  8780.0  1359.2  8985.0  1358.3  9190.0  1356.7  9580.0  1356.8  9690.0
GR1356.7  9800.0  1356.4 10000.0  1357.4 10270.0  1358.6 10595.0  1359.6 10925.0
GR1360.7 11260.0
NC 0.040   0.040   0.040     0.1     0.3
ET           9.1                                                  9970.0 10545.0
X1 2.053      17  9990.0 10050.0     600     320     450
X2                                                                      15
GR1356.0  9680.0  1355.0  9680.0  1354.0  9790.0  1354.0  9805.0  1356.0  9830.0
GR1354.0  9850.0  1352.0  9870.0  1352.0  9935.0  1354.0  9950.0  1356.0  9955.0
GR1356.0  9970.0  1356.0  9990.0  1354.7 10000.0  1356.0 10050.0  1356.0 10220.0
GR1358.0 10470.0  1358.0 10545.0
BT     1    1172
ET           9.1                                                  9965.0 10370.0
X1 2.218       7  9990.0 10370.0     850     880     845
X2                                                                      15
GR1361.9  9965.0  1359.0  9990.0  1358.0 10000.0  1360.0 10370.0  1360.0 11000.0
GR1361.6 11010.0  1360.0 12100.0
ET           9.1                                                  9970.0 11500.0
X1 2.343       8  9990.0 10030.0     660     730     660
X3     0  1362.0
GR1364.3  9970.0  1362.0  9990.0  1360.0 10000.0  1362.0 10030.0  1362.0 10340.0
GR1363.0 10650.0  1364.0 11380.0  1364.9 11500.0
ET           9.1                                                  9960.0 12260.0
X1 2.559       7  9980.0 10030.0    1125    1125    1125
GR1368.7  9960.0  1366.0  9980.0  1364.0 10000.0  1366.0 10030.0  1366.0 10130.0
```

```
GR1368.0 10850.0  1368.0 12260.0
NC 0.040   0.050   0.050     0.1     0.3
T           9.1                                                  9940.0 11740.0
X1 2.755      8  9970.0 10010.0    1250    1250    1250
X3     0  1365.2
GR1371.4  9940.0  1366.0  9970.0  1363.5 10000.0  1366.0 10310.0  1368.0 10020.0
GR1368.0 10140.0  1370.0 10960.0  1372.0 11740.0
ET          9.1                                                  9950.0 12200.0
X1 2.947      9  9985.0 10020.0     800     800     800
GR1373.2  9950.0  1368.0  9985.0  1366.0 10000.0  1368.0 10020.0  1370.0 10030.0
GR1370.0 10180.0  1372.0 11240.0  1374.0 11770.0  1376.0 12200.0
ET          9.1                                                  9960.0 12000.0
X1 3.136     10  9985.0 10030.0    1000    1000    1000
X3     0  1371.0
GR1376.3  9960.0  1370.0  9985.0  1366.5 10000.0  1372.0 10030.0  1374.0 10300.0
GR1374.0 10420.0  1376.0 11170.0  1376.0 11250.0  1376.0 11530.0  1378.0 12000.0
T           9.1                                                  9980.0 12230.0
X1 3.305      9  9980.0 10030.0     890     890     890
X3     0  1375.0
GR1380.2  9960.0  1380.0  9970.0  1376.0  9980.0  1373.0 10000.0  1376.0 10030.0
GR1377.0 10190.0  1378.0 10910.0  1380.0 11840.0  1380.0 12230.0
ET          9.1                                                  9955.0 12100.0
X1 3.551      6  9990.0 10025.0    1300    1300    1300
GR1384.0  9955.0  1378.0  9990.0  1377.0 10000.0  1380.0 10025.0  1382.0 10860.0
GR1384.0 12100.0
T           9.1                                                  9965.0 12210.0
X1 3.676      9  9980.0 10015.0     670     670     670
GR1385.9  9965.0  1380.0  9980.0  1378.8 10000.0  1380.0 10015.0  1382.0 10025.0
GR1382.0 10050.0  1382.0 10260.0  1384.0 11090.0  1386.0 12210.0
T     1     828
ET          9.1                                                  9960.0 12125.0
X1 3.892      9  9985.0 10030.0    1140    1140    1140
GR1389.6  9960.0  1384.0  9985.0  1382.0 10000.0  1386.0 10030.0  1386.0 10100.0
GR1386.8 10650.0  1387.0 11150.0  1388.0 11540.0  1389.0 12125.0
NC 0.100   0.035   0.050     0.1     0.3
T           9.1                                                  9560.0 10960.0
X1 4.123     12  9440.0 10090.0    1270    1200    1235
GR1393.1  9440.0  1388.0  9475.0  1390.0  9530.0  1390.0  9560.0  1388.8 10000.0
GR1390.0 10090.0  1390.0 10120.0  1389.4 10300.0  1389.3 10800.0  1390.0 10960.0
GR1390.0 11330.0  1391.0 12450.0
ET          9.1                                                  9300.0 10900.0
X1 4.230      8  9740.0 10180.0     800     700     650
GR1392.0  9045.0  1391.0  9250.0  1391.0  9740.0  1391.0 10000.0  1391.4 10180.0
GR1391.0 10225.0  1391.0 10700.0  1392.0 10900.0
NC 0.015   0.015   0.015     0.3     0.5
T           9.1                                                  9175.0 10880.0
X1 4.341      8  9585.0 10480.0     580     520     490
GR1399.5  8420.0  1398.0  8610.0  1396.0  8830.0  1395.0  9175.0  1394.5  9585.0
GR1394.0 10000.0  1394.5 10480.0  1394.9 10880.0
NC 0.040   0.100   0.050     0.1     0.3
T           9.1                                                  9850.0 11250.0
X1 4.616      9  9930.0 10640.0    1100    1380    1500
GR1399.5  9850.0  1396.0  9930.0  1395.0 10000.0  1394.4 10100.0  1395.0 10640.0
GR1395.1 11130.0  1396.0 12030.0  1396.0 12440.0  1398.0 12560.0
ET          9.1                                                  9880.0 10870.0
X1 4.637      7  9925.0 10010.0      75     550     110
GR1399.5  9880.0  1398.0  9925.0  1395.3 10000.0  1395.5 10010.0  1396.0 10480.0
GR1398.0 10870.0  1400.0 11320.0
NC 0.040   0.040   0.035     0.1     0.3
T           9.1                                                  9950.0 10510.0
X1 4.748      8  9960.0 10070.0     630     330     600
GR1400.6  9950.0  1398.0  9960.0  1396.0 10000.0  1396.0 10070.0  1396.0 10280.0
GR1398.0 10510.0  1400.0 11400.0  1402.0 12720.0
T           9.1                                                  9960.0 10760.0
X1 4.924      8  9975.0 10490.0     930    1040     930
GR1403.2  9960.0  1401.0  9975.0  1400.0 10000.0  1401.0 10490.0  1402.0 10760.0
```

```
GR1402.0 11000.0  1404.0 12200.0  1404.5 12520.0
ET          9.1                                                  9965.0 11000.0
X1 5.038      8  9985.0 10640.0     600     630     600
GR1406.2  9965.0  1403.0  9985.0  1402.0 10000.0  1403.0 10640.0  1404.0 11100.0
GR1404.0 11475.0  1406.0 11485.0  1406.0 11600.0
ET          9.1                                                  9970.0 10500.0
X1 5.170     10  9990.0 10100.0     700     700     700
GR1405.6  9970.0  1408.0  9985.0  1407.0  9990.0  1406.0 10000.0  1406.0 10080.0
GR1406.7 10100.0  1406.2 10500.0  1406.0 10740.0  1406.0 11460.0  1408.0 11920.0
ET          9.1                                                  9955.0 10800.0
X1 5.375      9  9990.0 10040.0    1080    1150    1080
GR1411.9  9955.0  1409.0  9990.0  1408.0 10000.0  1409.5 10040.0  1410.0 10350.0
GR1410.6 10800.0  1410.0 11310.0  1411.0 12250.0  1412.0 12755.0
X1 5.523      8  9940.0 10120.0     780     790     780
GR1414.2  9920.0  1414.0  9930.0  1412.0  9940.0  1411.0 10000.0  1412.0 10120.0
GR1413.0 10400.0  1413.0 10860.0  1413.0 11365.0
NC 0.015  0.015   0.015     0.3     0.5
X1 5.631      8  9730.0 10300.0     340     800     600
GR1414.5  9425.0  1412.0  9730.0  1410.3 10000.0  1412.0 10300.0  1414.0 10500.0
GR1415.0 10870.0  1416.0 11010.0  1416.0 11525.0
ET    1    393
NC 0.040  0.040   0.035     0.1     0.3
ET          9.1                                                  9940.0 10745.0
X1 5.864      8  9975.0 10390.0    1410    1050    1230
GR1418.0  9940.0  1414.0  9975.0  1413.0 10000.0  1414.0 10020.0  1415.0 10390.0
GR1416.0 10745.0  1417.0 11120.0  1416.8 11350.0
ET          9.1                                                  9960.0 10770.0
X1 6.047      9  9990.0 10020.0     970     980     970
GR1421.0  9960.0  1417.0  9990.0  1416.0 10000.0  1417.0 10020.0  1418.0 10045.0
GR1420.0 10770.0  1420.0 11670.0  1418.0 11685.0  1418.0 11850.0
ET          9.1                                                  9965.0 10510.0
X1 6.259      9  9995.0 10025.0    1120    1120    1120
GR1424.8  9965.0  1421.0  9995.0  1420.0 10000.0  1421.0 10025.0  1422.0 10150.0
GR1424.0 10510.0  1424.0 12010.0  1422.0 12025.0  1422.0 12560.0
X1 6.472     10  9990.0 10015.0    1120    1120    1120
GR1428.9  9950.0  1424.0  9980.0  1423.0  9990.0  1422.0 10000.0  1423.0 10015.0
GR1424.0 10025.0  1426.0 10050.0  1426.0 10545.0  1430.0 11095.0  1430.0 12100.0
X1 6.672      7  9990.0 10015.0    1060    1060    1060
GR1432.4  9945.0  1427.0  9990.0  1426.0 10000.0  1427.0 10015.0  1430.0 10040.0
GR1432.0 11160.0  1434.0 12135.0
X1 6.811     10  9980.0 10020.0     730     730     730
GR1434.5  9950.0  1430.0  9980.0  1429.0 10000.0  1430.0 10020.0  1432.0 10050.0
GR1432.0 10630.0  1434.0 10725.0  1434.0 11315.0  1434.0 11395.0  1436.0 12150.0
X1 7.019     10  9990.0 10020.0    1100    1100    1100
GR1440.1  9945.0  1433.0  9990.0  1432.0 10000.0  1433.0 10020.0  1440.0 10040.0
GR1436.0 10070.0  1436.0 10310.0  1438.0 10890.0  1440.0 10905.0  1440.0 12710.0
ET          9.1                                                  9960.0 10810.0
X1 7.201      8  9980.0 10090.0     960     960     960
X3    0  1438.0
GR1441.6  9960.0  1441.0  9980.0  1440.0 10000.0  1440.0 10040.0  1434.0 10060.0
GR1438.0 10090.0  1440.0 10220.0  1442.0 10810.0
X1 7.455     10  9980.0 10115.0    1340    1340    1340
GR1448.6  9950.0  1443.0  9980.0  1442.0 10000.0  1442.0 10050.0  1443.0 10115.0
GR1444.0 10190.0  1446.0 11235.0  1446.5 11400.0  1448.0 11990.0  1448.5 12300.0
ET          9.1                                                  9970.0 10050.0
X1 7.519      7  9970.0 10050.0     340     340     340
GR1449.2  9920.0  1448.0  9960.0  1446.0  9970.0  1445.0 10000.0  1446.0 10050.0
GR1446.0 11300.0  1446.0 11640.0
ED
```

```
*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*                                                   *
*  RUN DATE: 02/05/1990       TIME: 10:31:25.24     *
*****************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 551-1748 (FTS) 448-2105    *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

```
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION   :::
:::         by: HAESTAD METHODS           :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```

==========
H A E S T A D M E T H O D S
==========

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS RUN EXECUTED: 02/05/1990 10:31:25.79

```
*************************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
ERROR CORR -  01,02,03,04,05,06
MODIFICATION -  50,51,52,53,54,55,56
*************************************************
```

```
T1      FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD
T2      QUEEN CREEK AREA-MARICOPA COUNTY, ARIZONA**89500R.DAT**
T3      100-YEAR FLOODPLAIN DELINEATION   FEBRUARY 1990

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

    -10.       2.       0.       0. -1.000000     0.00     0.0      0.  1321.300    0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    -1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   43.000    1.000    2.000   26.000   39.000   21.000   22.000   27.000   28.000

    53.000   54.000    0.000   38.000   13.000   14.000   15.000   55.000   26.000   56.000

    63.000    1.000   51.000    4.000   42.000   57.000    0.000   38.000   39.000   33.000

     3.000   10.000   11.000   12.000    5.000    7.000    8.000   16.000   17.000   18.000

J5  LPRNT    NUMSEC                  ********REQUESTED SECTION NUMBERS********

     1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
```

```
SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


PROF 1


CHV=   0.100 CEHV=   0.300
SECNO 0.035
3280 CROSS SECTION      0.04 EXTENDED      0.27 FEET

720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9900.0   11100.0  TYPE=     1  TARGET=    1200.000
    0.04     2.07  1321.27  1321.27     0.00  1321.45     0.17     0.00     0.00  1321.10
   1085.      24.     704.     357.      14.     176.     284.       0.       0.   1321.00
    0.00     1.75     4.01     1.25    0.040    0.050    0.050    0.000  1319.20  9907.68
 0.010008       0.       0.       0.        0        5        0     0.00  1192.32 11100.00


SECNO 0.199
280 CROSS SECTION      0.20 EXTENDED      0.76 FEET


70 ENCROACHMENT STATIONS=    9960.0   11020.0  TYPE=     1  TARGET=    1060.000
    0.20     1.47  1323.47     0.00     0.00  1323.49     0.02     2.02     0.02  1322.00
   1085.       6.      97.     982.       7.      80.    1007.      16.      23.   1322.00
    0.25     0.94     1.21     0.98    0.040    0.050    0.050    0.000  1322.00  9980.87
 0.000995     880.     880.     880.        6        0        0     0.00  1039.13 11020.00


SECNO 0.407

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    9960.0   11000.0  TYPE=     1  TARGET=    1040.000
    0.41     0.71  1326.71     0.00     0.00  1326.85     0.14     3.33     0.04  1327.00
   1085.       0.     357.     728.       0.     149.     220.      36.      48.   1327.00
    0.36     0.00     2.40     3.31    0.000    0.050    0.050    0.000  1326.00  9985.85
 0.026034    1100.    1100.    1220.        5        0        0     0.00   815.26 11000.00


SECNO 0.646

470 ENCROACHMENT STATIONS=    9875.0   11160.0  TYPE=     1  TARGET=    1285.000
    0.65     1.20  1331.20     0.00     0.00  1331.22     0.02     4.36     0.01  1330.00
   1085.     122.     120.     843.      84.     128.     797.      56.      77.   1331.00
    0.67     1.45     0.94     1.06    0.040    0.050    0.050    0.000  1330.00  9892.90
 0.001306    1250.    1250.    1250.        8        0        0     0.00  1187.79 11080.69
```

```
 SECND    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

CHV=   0.300 CEHV=   0.500

SPECIAL BRIDGE

827 DOWNSTREAM ELEV IS   1330.87 ,NOT   1331.20 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

 XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
  1.25     2.40     2.83     0.00    33.70     3.70   120.00     0.00  1328.90  1328.00

1SECND 0.672
PRESS FLOW BECAUSE EGLWC OF   1342.04  EXCEEDS 1.5 DEPTH

3265 DIVIDED FLOW

880 CROSS SECTION      0.67 EXTENDED      2.65 FEET

PRESSURE AND WEIR FLOW

 EGPRS    EGLWC    H3       QWEIR    QPR      BAREA   TRAPEZOID     ELLC     ELTRD
                                                         AREA
 1334.25  1342.04   0.00     243.     845.     120.      93.    1332.00  1334.00


3470 ENCROACHMENT STATIONS=    9725.0   11160.0  TYPE=     1  TARGET=    1435.000
   0.67     4.15  1333.05     0.00     0.00  1333.05     0.00     1.83     0.00  1332.90
  1085.       0.      61.    1023.       2.     105.    1867.      62.      81.  1332.90
   0.76     0.06     0.58     0.55    0.014    0.014    0.014    0.000  1328.90  9725.00
0.000012    170.     160.     175.        0        0        6     0.00  1214.70 11160.00


CDHV=   0.100 CEHV=   0.300
SECND 0.681
860 CROSS SECTION      0.68 EXTENDED      1.05 FEET


470 ENCROACHMENT STATIONS=    9700.0   11140.0  TYPE=     1  TARGET=    1440.000
   0.68     1.05  1333.05     0.00     0.00  1333.06     0.01     0.01     0.00  1332.00
  1085.      49.      44.     992.      73.      53.    1173.      70.      88.  1332.00
   0.84     0.67     0.85     0.85    0.040    0.050    0.050    0.000  1332.00  9835.66
0.000758    220.     210.     225.        2        0        0     0.00  1304.34 11140.00
```

```
  SECND    DEPTH    DWSEL    DRIWS    WSELK    EG       HV       HL       DLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


SECND 0.785
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
    0.79     1.21  1334.21  1334.21     0.00  1334.46     0.25     1.23     0.07  1334.00
   1085.       1.    1025.      60.       0.     249.      28.      88.      99.   1334.00
    0.87     1.69     4.12     2.14    0.040    0.050    0.050    0.000  1333.00  9981.84
 0.041710     480.     500.     550.       19       11        0     0.00   582.38 10564.22


SECND 0.843

3470 ENCROACHMENT STATIONS=    9975.0   10600.0  TYPE=     1  TARGET=     625.000
    0.84     2.00  1336.00     0.00     0.00  1336.04     0.03     1.55     0.02  1335.00
   1085.       3.     912.     170.       3.     611.     170.      54.     105.   1335.00
    0.95     0.89     1.49     1.00    0.040    0.050    0.050    0.000  1334.00  9983.43
 0.001461     375.     370.     405.        6        0        0     0.00   616.57 10600.00


SECND 1.078

3470 ENCROACHMENT STATIONS=    9970.0   10600.0  TYPE=     1  TARGET=     630.000
    1.08     1.29  1339.29     0.00     0.00  1339.36     0.07     3.31     0.01  1339.00
   1085.       0.    1079.       6.       0.     504.       6.     103.     122.   1339.00
    1.11     0.81     2.14     1.00    0.040    0.050    0.050    0.000  1338.00  9987.13
 0.006398    1240.    1240.    1215.        8        0        0     0.00   612.87 10600.00


SECND 1.227

3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
    1.23     1.77  1342.27     0.00     0.00  1342.31     0.04     2.95     0.00  1341.50
   1085.       6.    1079.       0.       5.     687.       0.     114.     133. 100000.00
    1.25     1.15     1.57     0.00    0.040    0.050    0.000    0.000  1340.50  9968.11
 0.002443     790.     790.     850.        4        0        0     0.00   631.89 10600.00


SECND 1.419
3280 CROSS SECTION      1.42 EXTENDED      0.17 FEET


3470 ENCROACHMENT STATIONS=    9950.0   10600.0  TYPE=     1  TARGET=     650.000
```

```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


   1.42     2.17  1346.17     0.00     0.00  1346.32     0.15     3.98     0.03  1345.00
  1085.      12.     814.     258.       6.     234.     174.     127.     149.   1345.00
   1.34     2.15     3.48     1.48    0.040    0.050    0.050    0.000  1344.00  9970.23
0.006898  1010.    1010.    1230.       4        0        0     0.00   629.77 10600.00


*SECNO 1.561

3470 ENCROACHMENT STATIONS=    9960.0   10600.0  TYPE=     1  TARGET=     640.000
   1.56     2.69  1348.69     0.00     0.00  1348.73     0.04     2.40     0.01  1347.00
  1085.      16.     235.     833.      12.     110.     608.     137.     160.   1347.00
   1.48     1.42     2.15     1.37    0.040    0.050    0.050    0.000  1346.00  9976.28
0.001836    750.     750.     750.       6        0        0     0.00   623.72 10600.00


*SECNO 1.712

3470 ENCROACHMENT STATIONS=    9980.0   10600.0  TYPE=     1  TARGET=     620.000
   1.71     1.13  1351.03     0.00     0.00  1351.09     0.06     2.35     0.01  1351.00
  1085.       0.     676.     409.       0.     374.     197.     150.     172.   1350.00
   1.61     0.02     1.81     2.00    0.040    0.050    0.050    0.000  1349.90  9994.73
0.004382    790.     790.     930.       4        0        0     0.00   605.27 10600.00


*SECNO 1.860

3470 ENCROACHMENT STATIONS=    9940.0   10600.0  TYPE=     1  TARGET=     660.000
   1.86     1.81  1353.81     0.00     0.00  1353.87     0.06     2.78     0.00  1353.00
  1085.       7.    1034.      45.       6.     535.      50.     160.     183.   1353.00
   1.72     1.11     1.93     0.89    0.040    0.050    0.050    0.000  1352.00  9960.65
0.002925    780.     780.     800.       4        0        0     0.00   542.32 10502.97


CCHV=   0.300 CEHV=   0.500
*SECNO 1.939
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    8985.0   10925.0  TYPE=     1  TARGET=    1940.000
   1.94     0.81  1357.21  1357.21     0.00  1357.44     0.23     1.24     0.05  1356.80
  1358.     269.    1089.       0.      82.     271.       0.     164.     188.   1357.40
   1.75     3.27     4.03     0.00    0.015    0.015    0.000    0.000  1356.40  9455.96
0.004032    210.     370.     550.      20       18        0     0.00   762.43 10218.39
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       QLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XML      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


LOW DISTRIBUTION FOR SECNO=      1.94         CWSEL=   1357.21

STA=    9456.    9580.    9690.   10270.
 PER Q=      5.9     13.9     80.2
 AREA=      31.6     50.5    270.6
  VEL=       2.5      3.7      4.0

CHV=   0.100 CEHV=   0.300
SECNO 2.053
3280 CROSS SECTION      2.05 EXTENDED      0.11 FEET


3470 ENCROACHMENT STATIONS=    9970.0   10545.0  TYPE=     1  TARGET=     575.000
    2.05     3.40  1358.10     0.00     0.00  1358.15     0.04     0.68     0.02  1356.00
   1358.      26.     357.     975.      22.     166.     644.     170.     195.   1356.00
    1.82     1.17     2.16     1.51    0.040    0.040    0.040    0.000  1354.70  9970.00
0.000873     600.     450.     320.        3        0        0     0.00   575.00 10545.00


FLOW DISTRIBUTION FOR SECNO=      2.05         CWSEL=   1358.10

TA=    9970.    9990.   10050.   10220.   10470.   10545.
 PER Q=      1.9     26.3     47.7     24.0      0.2
 AREA=      22.2    165.5    358.5    277.2      8.2
  VEL=       1.2      2.2      1.8      1.2      0.2

SECNO 2.210

470 ENCROACHMENT STATIONS=    9965.0   10370.0  TYPE=     1  TARGET=     405.000
    2.22     1.72  1359.72     0.00     0.00  1359.98     0.26     1.77     0.06  1359.00
   1172.       5.    1167.       0.       2.     286.       0.     181.     204. 100000.00
    1.87     2.25     4.08     0.00    0.040    0.040    0.000    0.000  1358.00  9983.79
0.014479     850.     845.     880.        3        0        0     0.00   334.59 10318.37


LOW DISTRIBUTION FOR SECNO=      2.22         CWSEL=   1359.72

TA=    9984.    9990.   10370.
 PER Q=      0.4     99.6
 AREA=       2.2    286.2
  VEL=       2.3      4.1
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

*SECNO 2.343

3470 ENCROACHMENT STATIONS=    9970.0   11500.0  TYPE=     1  TARGET=    1530.000
    2.34     1.21  1363.21     0.00     0.00  1363.26     0.05     3.26     0.02  1362.00
   1172.       7.     97.     1068.       5.     48.     607.     188.     213.   1362.00
    1.98     1.26     2.02     1.76    0.040    0.040    0.040    0.000  1362.00  9981.39
 0.002302     660.     660.     730.       6        0        0     0.00   818.13 10799.53

*SECNO 2.559

3470 ENCROACHMENT STATIONS=    9960.0   12260.0  TYPE=     1  TARGET=    2300.000
    2.56     3.05  1367.05     0.00     0.00  1367.24     0.18     3.94     0.04  1366.00
   1172.       8.     475.     689.       4.     103.     306.     202.     230.   1366.00
    2.08     1.86     4.63     2.25    0.040    0.040    0.040    0.000  1364.00  9972.19
 0.005965    1125.    1125.    1125.       7        0        0     0.00   537.59 10509.78

*CEHV=   0.100 CEHV=   0.300
*SECNO 2.795

3470 ENCROACHMENT STATIONS=    9940.0   11740.0  TYPE=     1  TARGET=    1800.000
    2.80     4.43  1369.63     0.00     0.00  1369.67     0.04     2.42     0.01  1366.00
   1172.      62.     374.     736.      37.     162.     773.     222.     251.   1366.00
    2.32     1.68     2.32     0.95    0.040    0.050    0.050    0.000  1365.20  9949.79
 0.000946    1250.    1250.    1250.       4        0        0     0.00   862.02 10811.81

*SECNO 2.947

3470 ENCROACHMENT STATIONS=    9950.0   12200.0  TYPE=     1  TARGET=    2250.000
    2.95     4.88  1370.88     0.00     0.00  1371.06     0.18     1.35     0.04  1368.00
   1172.      80.     609.     483.      28.     136.     352.     236.     265.   1368.00
    2.39     2.89     4.49     1.37    0.040    0.050    0.050    0.000  1366.00  9965.66
 0.003790     800.     800.     800.       3        0        0     0.00   676.99 10642.65

*SECNO 3.136

3470 ENCROACHMENT STATIONS=    9960.0   12000.0  TYPE=     1  TARGET=    2040.000
    3.14     3.27  1374.27     0.00     0.00  1374.37     0.09     3.30     0.01  1371.00
   1172.      69.     433.     670.      25.     132.     389.     248.     279.   1372.00
    2.51     2.73     3.28     1.72    0.040    0.050    0.050    0.000  1371.00  9969.58
 0.002896    1000.    1000.    1000.       3        0        0     0.00   551.45 10521.03
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       QLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

#SECNO 3.305

3470 ENCROACHMENT STATIONS=    9960.0   12230.0  TYPE=     1  TARGET=    2270.000
    3.31     2.74  1377.74     0.00     0.00  1377.86     0.12     3.48     0.01  1376.00
   1172.       9.     426.     737.       4.     112.     397.     259.     292.   1376.00
    2.61     2.41     3.80     1.86    0.040    0.050    0.050    0.000  1375.00  9975.65
0.005582     890.     890.     890.       4        0        0     0.00   748.47 10724.11

#SECNO 3.551

3470 ENCROACHMENT STATIONS=    9955.0   12100.0  TYPE=     1  TARGET=    2145.000
    3.55     4.71  1381.71     0.00     0.00  1381.77     0.06     3.91     0.01  1378.00
   1172.      97.     362.     713.      40.     123.     614.     278.     315.   1380.00
    2.81     2.41     2.96     1.16    0.040    0.050    0.050    0.000  1377.00  9968.33
0.001877    1300.    1300.    1300.       6        0        0     0.00   772.46 10740.79

#SECNO 3.676

3470 ENCROACHMENT STATIONS=    9965.0   12210.0  TYPE=     1  TARGET=    2245.000
    3.68     4.30  1383.10     0.00     0.00  1383.19     0.09     1.41     0.01  1380.00
   1172.      28.     449.     695.      12.     130.     532.     289.     326.   1380.00
    2.89     2.31     3.46     1.31    0.040    0.050    0.050    0.000  1378.00  9972.11
0.002377     670.     670.     670.       3        0        0     0.00   745.24 10717.35

#SECNO 3.892

3470 ENCROACHMENT STATIONS=    9960.0   12125.0  TYPE=     1  TARGET=    2165.000
    3.89     4.63  1386.63     0.00     0.00  1386.85     0.23     3.62     0.04  1384.00
    828.      48.     584.     196.      15.     133.     174.     302.     343.   1386.00
    2.98     3.16     4.39     1.12    0.040    0.050    0.050    0.000  1382.00  9973.31
0.005226    1140.    1140.    1140.       3        0        0     0.00   551.31 10524.63

CCHV=   0.100 CEHV=   0.300
#SECNO 4.123

3470 ENCROACHMENT STATIONS=    9560.0   10960.0  TYPE=     1  TARGET=    1400.000
    4.12     1.23  1390.03     0.00     0.00  1390.04     0.02     3.17     0.02100000.00
    828.       0.     287.     541.       0.     334.     461.     318.     371.   1390.00
    3.30     0.00     0.86     1.17    0.000    0.050    0.035    0.000  1388.80  9560.00
0.001551    1270.    1235.    1200.       4        0        0     0.00  1400.00 10960.00
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      KTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


SECNO 4.230

3470 ENCROACHMENT STATIONS=    9300.0   10900.0  TYPE=     1  TARGET=    1600.000
    4.23     0.55  1391.55     0.00     0.00  1391.58     0.03     1.53     0.00  1391.00
    828.     139.     212.     478.     240.     204.     304.     330.     394.   1391.40
    3.45     0.58     1.04     1.57    0.100    0.050    0.035    0.000  1391.00  9300.00
 0.003396    800.     650.     700.        3        0        0     0.00  1509.00 10809.00


CCHV=   0.300 CEHV=   0.500
SECNO 4.341
185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9175.0   10880.0  TYPE=     1  TARGET=    1705.000
    4.34     0.55  1394.55  1394.55     0.00  1394.70     0.15     2.06     0.06  1394.50
    828.       1.     827.       1.       1.     266.       1.     336.     409.   1394.50
    3.50     0.57     3.11     0.57    0.015    0.015    0.015    0.000  1394.00  9546.26
 0.004962    580.     490.     520.        3        5        0     0.00   980.98 10527.24


CCHV=   0.100 CEHV=   0.300
SECNO 4.616

3470 ENCROACHMENT STATIONS=    9850.0   11250.0  TYPE=     1  TARGET=    1400.000
    4.62     1.69  1396.09     0.00     0.00  1396.09     0.01     1.38     0.01  1396.00
    828.       0.     646.     182.       0.     931.     622.     367.     447.   1395.00
    4.18     0.01     0.69     0.29    0.040    0.050    0.100    0.000  1394.40  9927.92
 0.008379    1100.    1500.    1380.        5        0        0     0.00  1322.00 11250.00


SECNO 4.637

3470 ENCROACHMENT STATIONS=    9880.0   10870.0  TYPE=     1  TARGET=     990.000
    4.64     1.16  1396.46     0.00     0.00  1396.54     0.09     0.42     0.02  1398.00
    828.       0.     119.     709.       0.      30.     357.     374.     455.   1395.50
    4.22     0.00     4.02     1.99    0.000    0.050    0.100    0.000  1395.30  9967.63
 0.029728     75.     110.     550.        2        0        0     0.00   603.00 10570.72


CCHV=   0.100 CEHV=   0.300
SECNO 4.748
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       QLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


3470 ENCROACHMENT STATIONS=    9950.0   10510.0  TYPE=     1  TARGET=     560.000
     4.75     1.55  1397.55     0.00     0.00  1397.58     0.03     1.03     0.01  1398.00
     828.      0.     205.     623.      0.     132.     462.     378.     460.   1396.00
     4.30     0.00     1.55     1.35    0.000    0.035    0.040    0.000  1396.00  9969.06
 0.000929     630.     600.     330.       7        0        0     0.00   488.81 10457.88


#SECNO 4.924
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9960.0   10760.0  TYPE=     1  TARGET=     800.000
     4.92     0.91  1400.91  1400.91     0.00  1401.14     0.23     2.52     0.06  1401.00
     828.      0.     828.      0.      0.     213.      0.     388.     471.   1401.00
     4.37     0.00     3.89     0.00    0.000    0.035    0.000    0.000  1400.00  9977.26
 0.023950     930.     930.    1040.      20       14        0     0.00   468.48 10445.74


SECNO 5.038

3470 ENCROACHMENT STATIONS=    9965.0   11000.0  TYPE=     1  TARGET=    1035.000
     5.04     1.36  1403.36     0.00     0.00  1403.39     0.03     2.23     0.02  1403.00
     828.      0.     815.      13.      0.     561.      29.     393.     480.   1403.00
     4.49     0.44     1.45     0.45    0.040    0.035    0.040    0.000  1402.00  9982.77
 0.001440     600.     600.     630.       8        0        0     0.00   821.08 10803.86


#SECNO 5.170
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9970.0   10500.0  TYPE=     1  TARGET=     530.000
     5.17     0.86  1406.86  1406.86     0.00  1407.08     0.22     2.44     0.06  1407.00
     828.      0.     386.     442.      0.      83.     163.     400.     490.   1406.70
     4.54     0.00     4.68     2.70    0.000    0.035    0.040    0.000  1406.00  9991.42
 0.017540     700.     700.     700.       20       14        0     0.00   508.58 10500.00


SECNO 5.375
```

```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


3470 ENCROACHMENT STATIONS=    9955.0   10800.0  TYPE=     1  TARGET=     845.000
     5.37     2.73  1410.73     0.00     0.00  1410.77     0.04     3.67     0.02  1409.00
     828.      22.     252.     554.      18.     101.     496.     411.     500.   1409.50
     4.74     1.23     2.48     1.12    0.040    0.035    0.040    0.000  1408.00  9969.13
 0.001331    1080.    1080.    1150.       11        0        0     0.00   830.86 10800.00


1SECNO 5.523
     5.52     1.61  1412.61     0.00     0.00  1412.82     0.20     2.00     0.05  1412.00
     828.       1.     753.      74.       1.     201.      53.     419.     519.   1412.00
     4.80     1.37     3.75     1.39    0.040    0.035    0.040    0.000  1411.00  9936.92
 0.006733     780.     780.     790.        4        0        0     0.00   355.55 10292.47


CCHV=   0.300 CEHV=   0.500
1SECNO 5.631
     5.63     2.63  1412.93     0.00     0.00  1412.94     0.01     0.06     0.06  1412.00
     828.      17.     797.      14.      53.    1014.      43.     428.     527.   1412.00
     5.02     0.32     0.79     0.32    0.015    0.015    0.015    0.000  1410.30  9616.70
 0.000029     340.     600.     800.        3        0        0     0.00   776.17 10392.87


CCHV=   0.100 CEHV=   0.300
SECNO 5.864
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    9940.0   10745.0  TYPE=     1  TARGET=     805.000
     5.86     1.54  1414.54  1414.54     0.00  1414.77     0.23     0.08     0.07  1414.00
     393.       3.     390.       0.       1.     101.       0.     445.     541.   1415.00
     5.11     2.53     3.84     0.00    0.040    0.035    0.000    0.000  1413.00  9970.25
 0.026663    1410.    1230.    1050.       20       14        0     0.00   250.60 10220.85


1SECNO 6.047
3280 CROSS SECTION      6.05 EXTENDED      0.83 FEET


3470 ENCROACHMENT STATIONS=    9960.0   10770.0  TYPE=     1  TARGET=     810.000
     6.05     2.83  1418.83     0.00     0.00  1418.91     0.08     4.12     0.01  1417.00
     393.      18.     211.     164.      13.      70.     157.     449.     548.   1417.00
     5.24     1.41     3.83     1.05    0.040    0.035    0.040    0.000  1416.00  9976.31
 0.001655     970.     970.     980.        8        0        0     0.00   368.09 10344.40
```

```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XWL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


#SECNO 6.259
3280 CROSS SECTION      6.26 EXTENDED      0.00 FEET


3470 ENCROACHMENT STATIONS=    9965.0   10510.0  TYPE=     1  TARGET=     545.000
     6.26     2.88  1422.08     0.00     0.00  1422.31     0.24     3.36     0.05  1421.00
     393.      9.     228.     156.       5.      47.      73.     454.     555.   1421.00
     5.32     2.05     4.81     2.14    0.040    0.035    0.040    0.000  1420.00  9986.49
 0.007012    1120.    1120.    1120.       6        0        0     0.00   177.53 10164.02


#SECNO 6.472
     6.47     3.51  1425.51     0.00     0.00  1425.67     0.16     3.35     0.01  1423.00
     393.      57.     270.      66.      27.      75.      34.     457.     558.   1423.00
     5.42     2.10     3.59     1.92    0.040    0.035    0.040    0.000  1422.00  9970.74
 0.001646    1120.    1120.    1120.       5        0        0     0.00    73.17 10043.91


#SECNO 6.672
     6.67     2.59  1428.59     0.00     0.00  1429.14     0.55     3.35     0.12  1427.00
     393.      31.     332.      31.      11.      52.      11.     460.     560.   1427.00
     5.48     2.91     6.35     2.91    0.040    0.035    0.040    0.000  1426.00  9976.75
 0.008401    1060.    1060.    1060.       3        0        0     0.00    51.50 10028.25


#SECNO 6.811
     6.81     2.84  1431.84     0.00     0.00  1432.02     0.17     2.84     0.04  1430.00
     393.      19.     332.      42.      11.      94.      26.     462.     561.   1430.00
     5.54     1.65     3.54     1.66    0.040    0.035    0.040    0.000  1429.00  9967.70
 0.002233     730.     730.     730.       4        0        0     0.00    79.97 10047.67


#SECNO 7.019
     7.02     2.94  1434.94     0.00     0.00  1435.27     0.34     3.21     0.05  1433.00
     393.      27.     354.      12.      12.      73.       5.     464.     563.   1433.00
     5.60     2.27     4.84     2.21    0.040    0.035    0.040    0.000  1432.00  9977.71
 0.003972    1100.    1100.    1100.       3        0        0     0.00    47.83 10025.54


#SECNO 7.201

3470 ENCROACHMENT STATIONS=    9960.0   10810.0  TYPE=     1  TARGET=     850.000
     7.20     1.55  1439.55     0.00     0.00  1439.70     0.15     4.41     0.02  1441.00
     393.       0.     214.     179.       0.      58.      78.     467.     565.   1438.00
     5.69     0.00     3.67     2.29    0.000    0.035    0.040    0.000  1438.00 10044.52
 0.005369     960.     960.     960.       3        0        0     0.00   146.07 10190.59
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WSELX    EG       HV       HL       QLOSS   BANK ELEV
 Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
 TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
 SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


SECNO 7.455
    7.45     1.61  1443.61     0.00     0.00  1443.68     0.07     3.97     0.01  1443.00
    393.       1.     382.      10.       1.     175.      14.     472.     570.   1443.00
    5.87     0.72     2.19     0.73    0.040    0.035    0.040    0.000  1442.00  9976.73
0.001878    1340.    1340.    1340.        5        0        0     0.00   184.01 10160.74


SECNO 7.519
3280 CROSS SECTION      7.52 EXTENDED      0.40 FEET

585 20 TRIALS ATTEMPTED WSEL,CWSEL
593 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

470 ENCROACHMENT STATIONS=    9970.0   10050.0  TYPE=     1  TARGET=      80.000
    7.52     1.40  1446.40  1446.40     0.00  1446.86     0.46     1.48     0.12  1446.00
    393.       0.     393.       0.       0.      72.       0.     473.     571. 100000.00
    5.68     0.00     5.46     0.00    0.000    0.035    0.000    0.000  1445.00  9970.00
0.019308     340.     340.     340.       20       15        0     0.00    80.00 10050.00
```

THIS RUN EXECUTED: 02/05/1990 10:32:08.96

```
**************************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
**************************************************
```

TE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

00-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
0.038	1085.00	1321.27	1321.27	4.01	0.00	9950.00	10062.00	9900.00	11100.00	9907.68	11100.00
0.199	1085.00	1323.47	0.00	1.21	880.00	9990.00	10045.00	9960.00	11020.00	9980.87	11020.00
0.407	1085.00	1326.71	0.00	2.40	1100.00	9980.00	10575.00	9960.00	11000.00	9985.85	11000.00
0.646	1085.00	1331.20	0.00	0.94	1250.00	9970.00	10125.00	9875.00	11160.00	9892.90	11080.69
* 0.672	1085.00	1333.05	0.00	0.58	160.00	9984.20	10015.80	9725.00	11160.00	9725.00	11160.00
0.681	1085.00	1333.05	0.00	0.85	210.00	9975.00	10025.00	9700.00	11140.00	9835.66	11140.00
* 0.785	1085.00	1334.21	1334.21	4.12	500.00	9985.00	10430.00	9950.00	10600.00	9981.84	10564.22
0.843	1085.00	1336.00	0.00	1.49	370.00	9990.00	10395.00	9975.00	10600.00	9983.43	10600.00
1.078	1085.00	1339.29	0.00	2.14	1240.00	9990.00	10580.00	9970.00	10600.00	9987.13	10600.00
1.227	1085.00	1342.27	0.00	1.57	790.00	9980.00	10840.00	9950.00	10600.00	9968.11	10600.00
1.419	1085.00	1346.17	0.00	3.48	1010.00	9980.00	10120.00	9950.00	10600.00	9970.23	10600.00
1.561	1085.00	1348.69	0.00	2.15	750.00	9990.00	10040.00	9960.00	10600.00	9976.28	10600.00
1.712	1085.00	1351.03	0.00	1.81	790.00	9995.00	10420.00	9980.00	10600.00	9994.73	10600.00
1.860	1085.00	1353.81	0.00	1.93	780.00	9975.00	10380.00	9940.00	10600.00	9960.65	10582.97
* 1.939	1358.00	1357.21	1357.21	4.03	370.00	9690.00	10270.00	8985.00	10925.00	9455.96	10218.39
2.053	1358.00	1358.10	0.00	2.16	450.00	9990.00	10050.00	9970.00	10545.00	9970.00	10545.00
2.218	1172.00	1359.72	0.00	4.08	845.00	9990.00	10370.00	9965.00	10370.00	9983.79	10318.37

←Germann Rd.

QC Rd

SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
2.343	1172.00	1363.21	0.00	2.02	660.00	9990.00	10030.00	9970.00	11500.00	9981.39	10799.53
2.559	1172.00	1367.05	0.00	4.63	1125.00	9980.00	10030.00	9960.00	12260.00	9972.19	10509.78
2.795	1172.00	1369.63	0.00	2.32	1250.00	9970.00	10010.00	9940.00	11740.00	9949.79	10811.81
2.947	1172.00	1370.88	0.00	4.49	800.00	9985.00	10020.00	9950.00	12200.00	9965.66	10642.65
3.136	1172.00	1374.27	0.00	3.28	1000.00	9985.00	10030.00	9960.00	12000.00	9969.58	10521.03
3.305	1172.00	1377.74	0.00	3.80	870.00	9980.00	10030.00	9960.00	12230.00	9975.65	10724.11
3.551	1172.00	1381.71	0.00	2.96	1300.00	9990.00	10025.00	9955.00	12100.00	9968.33	10740.79
3.676	1172.00	1383.10	0.00	3.46	670.00	9980.00	10015.00	9965.00	12210.00	9972.11	10717.35
3.892	828.00	1386.63	0.00	4.39	1140.00	9985.00	10030.00	9960.00	12125.00	9973.31	10524.63
4.123	828.00	1390.03	0.00	0.86	1235.00	9440.00	10090.00	9560.00	10960.00	9560.00	10960.00
4.230	828.00	1391.55	0.00	1.04	650.00	9740.00	10180.00	9300.00	10900.00	9300.00	10809.08
4.341	828.00	1394.55	1394.55	3.11	490.00	9585.00	10480.00	9175.00	10880.00	9546.26	10527.24
4.616	828.00	1396.09	0.00	0.69	1500.00	9930.00	10640.00	9850.00	11250.00	9927.92	11250.00
4.637	828.00	1396.46	0.00	4.02	110.00	9925.00	10010.00	9880.00	10870.00	9967.63	10570.72
4.748	828.00	1397.55	0.00	1.55	600.00	9960.00	10070.00	9950.00	10510.00	9969.06	10457.88
4.924	828.00	1400.91	1400.91	3.89	930.00	9975.00	10490.00	9960.00	10760.00	9977.26	10445.74
5.038	828.00	1403.36	0.00	1.45	600.00	9985.00	10640.00	9965.00	11000.00	9982.77	10803.86
5.170	828.00	1406.86	1406.86	4.68	700.00	9990.00	10100.00	9970.00	10500.00	9991.42	10500.00
5.375	828.00	1410.73	0.00	2.48	1080.00	9990.00	10040.00	9955.00	10800.00	9969.13	10500.00
5.523	828.00	1412.61	0.00	3.75	780.00	9940.00	10120.00	0.00	0.00	9936.92	10292.47
5.631	828.00	1412.93	0.00	0.79	600.00	9730.00	10300.00	0.00	0.00	9616.70	10392.87
5.864	393.00	1414.54	1414.54	3.84	1230.00	9975.00	10390.00	9940.00	10745.00	9970.25	10220.85
6.047	393.00	1418.83	0.00	3.03	970.00	9990.00	10020.00	9960.00	10770.00	9976.31	10344.40
6.259	393.00	1422.08	0.00	4.81	1120.00	9995.00	10025.00	9965.00	10510.00	9986.49	10164.02
6.472	393.00	1425.51	0.00	3.59	1120.00	9990.00	10015.00	0.00	0.00	9970.74	10043.91
6.672	393.00	1428.59	0.00	6.35	1060.00	9990.00	10015.00	0.00	0.00	9976.75	10028.25

SECNO	Q	CWSEL	CRIWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
6.811	393.00	1431.84	0.00	3.54	730.00	9980.00	10020.00	0.00	0.00	9967.78	10047.67
7.019	393.00	1434.94	0.00	4.84	1100.00	9990.00	10020.00	0.00	0.00	9977.71	10025.54
7.281	393.00	1439.55	0.00	3.67	960.00	9980.00	10090.00	9960.00	10010.00	10044.52	10190.59
7.455	393.00	1443.61	0.00	2.19	1340.00	9980.00	10115.00	0.00	0.00	9976.73	10160.74
7.519	393.00	1446.40	1446.40	5.46	340.00	9970.00	10050.00	9970.00	10050.00	9970.00	10050.00

100-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

SECNO	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
0.038	23.86	704.39	356.75	1.75	4.01	1.25	1321.00	1321.27	0.00	1192.32	1319.20	2.10
0.199	6.28	96.93	981.78	0.94	1.21	0.98	1322.70	1323.47	2.20	1039.13	1322.00	1.01
0.407	0.00	357.19	727.81	0.00	2.40	3.31	1328.00	1326.71	3.24	815.26	1326.00	1.07
0.646	122.03	120.38	842.59	1.45	0.94	1.06	1332.40	1331.20	4.50	1187.79	1330.00	1.04
0.672	0.12	61.45	1023.43	0.06	0.58	0.55	1330.40	1333.05	1.84	1214.70	1328.90	1.00
0.681	48.82	44.50	991.68	0.67	0.85	0.85	1332.00	1333.05	0.00	1304.34	1332.00	1.01
0.785	0.56	1024.91	59.52	1.69	4.12	2.14	1336.00	1334.21	1.16	582.38	1333.00	1.06
0.843	2.96	912.30	169.74	0.89	1.49	1.00	1338.00	1336.00	1.79	616.57	1334.00	1.06
1.078	0.33	1079.11	5.55	0.81	2.14	1.00	1340.00	1339.29	3.28	612.87	1338.00	1.01
1.227	6.18	1078.81	0.00	1.15	1.57	0.00	1344.00	1342.27	2.98	631.89	1340.50	1.00
1.419	12.33	814.44	258.23	2.15	3.48	1.48	1346.00	1346.17	3.90	629.77	1344.00	1.40
1.561	16.44	235.31	833.24	1.42	2.15	1.37	1350.00	1348.69	2.52	623.72	1346.00	1.12
1.712	0.00	675.97	409.03	0.02	1.81	2.08	1352.00	1351.03	2.34	605.27	1349.90	1.01
1.860	6.51	1033.78	44.71	1.11	1.93	0.89	1356.00	1353.81	2.78	542.32	1352.00	1.07
1.939	268.62	1089.38	0.00	3.27	4.03	0.00	1360.70	1357.21	3.39	762.43	1356.40	1.02
2.053	25.90	357.01	975.09	1.17	2.16	1.51	1358.00	1358.10	0.89	575.00	1354.70	1.09
2.218	5.05	1166.95	0.00	2.25	4.08	0.00	1360.00	1359.72	1.62	334.59	1358.00	1.00
2.343	6.55	97.26	1068.19	1.26	2.02	1.76	1364.90	1363.21	3.49	818.13	1362.00	1.01
2.559	7.67	475.45	688.87	1.86	4.63	2.25	1368.00	1367.05	3.85	537.59	1364.00	1.45
2.795	61.96	374.25	735.79	1.68	2.32	0.95	1372.00	1369.63	2.58	862.02	1365.20	1.67
2.947	80.29	608.95	482.76	2.89	4.49	1.37	1376.00	1370.88	1.24	676.99	1366.00	2.28
3.136	68.92	433.17	669.91	2.73	3.28	1.72	1378.00	1374.27	3.40	551.45	1371.00	1.33
3.305	9.14	426.09	736.77	2.41	3.80	1.86	1380.00	1377.74	3.47	748.47	1375.00	1.43
3.551	96.93	362.08	712.99	2.41	2.96	1.16	1384.00	1381.71	3.97	772.46	1377.00	1.76

SECNO	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
3.676	28.30	448.58	695.12	2.31	3.46	1.31	1386.00	1383.10	1.39	745.24	1379.80	1.89
3.892	48.35	583.55	196.09	3.16	4.39	1.12	1389.00	1386.63	3.52	551.31	1382.00	2.20
4.123	0.00	287.29	540.71	0.00	0.86	1.17	1391.00	1390.03	3.40	1400.00	1388.80	1.06
4.230	138.61	211.61	477.78	0.58	1.04	1.57	1392.00	1391.55	1.53	1509.08	1391.00	1.43
4.341	0.53	826.83	0.64	0.57	3.11	0.57	1394.90	1394.55	3.00	980.98	1394.00	1.01
4.616	0.00	645.82	182.18	0.01	0.69	0.29	1398.00	1396.09	1.54	1322.08	1394.40	1.39
4.637	0.00	110.76	709.23	0.00	4.02	1.99	1400.00	1396.46	0.37	603.08	1395.30	1.24
4.748	0.00	204.76	623.24	0.00	1.55	1.35	1402.00	1397.55	1.09	488.81	1396.00	1.01
4.924	0.00	828.00	0.00	0.00	3.89	0.00	1404.50	1400.91	3.36	468.48	1400.00	1.00
5.038	0.18	814.80	13.02	0.44	1.45	0.45	1406.00	1403.36	2.45	821.08	1402.00	1.06
5.170	0.00	386.21	441.79	0.00	4.68	2.70	1408.00	1406.86	3.50	508.58	1406.00	1.25
5.375	22.14	251.60	554.26	1.23	2.48	1.12	1412.00	1410.73	3.07	830.86	1408.00	1.52
5.523	1.30	752.86	73.84	1.37	3.75	1.39	1413.00	1412.61	1.89	355.55	1411.00	1.23
5.631	16.98	797.25	13.85	0.32	0.79	0.32	1414.50	1412.93	0.31	776.17	1410.30	1.08
5.864	3.26	389.73	0.00	2.53	3.84	0.00	1416.80	1414.54	1.62	250.60	1413.00	1.00
6.047	17.68	211.25	164.07	1.41	3.03	1.05	1418.00	1418.83	4.28	368.09	1416.00	2.03
6.259	9.40	227.50	156.10	2.05	4.81	2.14	1422.00	1422.08	3.25	177.53	1420.00	1.54
6.472	56.89	270.04	66.07	2.10	3.59	1.92	1428.90	1425.51	3.43	73.17	1422.00	1.22
6.672	30.65	331.71	30.65	2.91	6.35	2.91	1432.40	1428.59	3.08	51.50	1426.00	1.23
6.811	18.73	331.87	42.40	1.65	3.54	1.66	1434.50	1431.84	3.25	79.97	1429.00	1.22
7.019	27.09	354.07	11.85	2.27	4.84	2.21	1440.00	1434.94	3.09	47.83	1432.00	1.14
7.201	0.00	214.43	178.57	0.00	3.67	2.29	1442.00	1439.55	4.61	146.07	1438.00	1.17
7.455	0.72	382.11	10.17	0.72	2.19	0.73	1448.50	1443.61	4.06	184.01	1442.00	1.09
7.519	0.00	393.00	0.00	0.00	5.46	0.00	1446.00	1446.40	2.79	88.00	1445.00	1.00

100-YEAR FLOODPLAIN DEL

SUMMARY PRINTOUT

SECNO	XLCH	K*CHSL	EG	HV	HL	OLOSS	10K*S	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
0.038	0.00	0.00	1321.45	0.17	0.00	0.00	100.08	0.00	2.07	40.00	50.00	50.00
0.199	880.00	3.18	1323.49	0.02	2.02	0.02	9.95	15.83	1.47	40.00	50.00	50.00
0.407	1100.00	3.64	1326.85	0.14	3.33	0.04	260.34	35.99	0.71	0.00	50.00	50.00
0.646	1250.00	3.20	1331.22	0.02	4.36	0.01	13.06	55.75	1.20	40.00	50.00	50.00
0.672	160.00	-6.87	1333.05	0.00	1.83	0.00	0.12	61.69	4.15	14.00	14.00	14.00
0.681	210.00	14.76	1333.06	0.01	0.01	0.00	7.58	70.11	1.05	40.00	50.00	50.00
0.785	500.00	2.00	1334.46	0.25	1.23	0.07	417.10	79.83	1.21	40.00	50.00	50.00
0.843	370.00	2.70	1336.04	0.03	1.55	0.02	14.61	84.41	2.00	40.00	50.00	50.00
1.078	1240.00	3.23	1339.36	0.07	3.31	0.01	63.90	102.78	1.29	40.00	50.00	50.00
1.227	790.00	3.16	1342.31	0.04	2.95	0.00	24.43	113.69	1.77	40.00	50.00	0.00
1.419	1010.00	3.47	1346.32	0.15	3.98	0.03	68.98	126.95	2.17	40.00	50.00	50.00
1.561	750.00	2.67	1348.73	0.04	2.40	0.01	18.36	136.78	2.69	40.00	50.00	50.00
1.712	790.00	4.94	1351.09	0.06	2.35	0.01	43.82	149.86	1.13	40.00	50.00	50.00
1.860	780.00	2.69	1353.87	0.06	2.78	0.00	29.25	160.32	1.81	40.00	50.00	50.00
1.939	370.00	11.89	1357.44	0.23	1.24	0.09	40.32	164.27	0.81	15.00	15.00	0.00
2.053	450.00	-3.70	1358.15	0.04	0.68	0.02	8.73	169.60	3.40	40.00	40.00	40.00
2.218	845.00	3.91	1359.98	0.26	1.77	0.06	144.79	180.73	1.72	40.00	40.00	0.00
2.343	660.00	6.06	1363.26	0.05	3.26	0.02	23.02	188.40	1.21	40.00	40.00	40.00
2.559	1125.00	1.78	1367.24	0.18	3.94	0.04	59.65	202.26	3.05	40.00	40.00	40.00
2.795	1250.00	0.96	1369.67	0.04	2.42	0.01	9.46	222.13	4.43	40.00	50.00	50.00
2.947	800.00	1.00	1371.06	0.18	1.35	0.04	37.90	235.78	4.88	40.00	50.00	50.00
3.136	1000.00	5.00	1374.37	0.09	3.30	0.01	28.96	247.96	3.27	40.00	50.00	50.00
3.305	890.00	4.49	1377.86	0.12	3.48	0.01	55.82	258.77	2.74	40.00	50.00	50.00
3.551	1300.00	1.54	1381.77	0.06	3.91	0.01	18.77	278.01	4.71	40.00	50.00	50.00

SECNO	XLCH	K*CHSL	EG	HV	HL	OLOSS	10K*S	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
3.676	670.00	2.69	1383.19	0.09	1.41	0.01	23.77	289.16	4.30	40.00	50.00	50.00
3.892	1140.00	2.81	1386.85	0.23	3.62	0.04	52.26	302.20	4.63	40.00	50.00	50.00
4.123	1235.00	5.51	1390.04	0.02	3.17	0.02	15.51	317.79	1.23	0.00	50.00	35.00
4.230	650.00	3.38	1391.58	0.03	1.53	0.00	33.96	330.16	0.55	100.00	50.00	35.00
4.341	490.00	6.12	1394.70	0.15	2.06	0.06	49.62	336.23	0.55	15.00	15.00	15.00
4.616	1500.00	0.27	1396.09	0.01	1.38	0.01	3.79	366.73	1.69	40.00	50.00	100.00
4.637	110.00	8.18	1396.54	0.09	0.42	0.02	297.28	374.12	1.16	0.00	50.00	100.00
4.748	600.00	1.17	1397.58	0.03	1.03	0.01	9.29	378.34	1.55	0.00	35.00	40.00
4.924	930.00	4.30	1401.14	0.23	2.52	0.06	239.50	387.54	0.91	0.00	35.00	0.00
5.038	600.00	3.33	1403.39	0.03	2.23	0.02	14.40	393.09	1.36	40.00	35.00	40.00
5.170	700.00	5.71	1407.08	0.22	2.44	0.06	175.40	399.81	0.86	0.00	35.00	40.00
5.375	1080.00	1.85	1410.77	0.04	3.67	0.02	13.31	411.02	2.73	40.00	35.00	40.00
5.523	780.00	3.85	1412.82	0.20	2.00	0.05	67.33	418.88	1.61	40.00	35.00	40.00
5.631	600.00	-1.17	1412.94	0.01	0.06	0.06	0.29	428.34	2.63	15.00	15.00	15.00
5.864	1230.00	2.20	1414.77	0.23	0.08	0.07	266.63	445.48	1.54	40.00	35.00	0.00
6.047	970.00	3.09	1418.91	0.08	4.12	0.01	16.55	449.30	2.83	40.00	35.00	40.00
6.259	1120.00	3.57	1422.31	0.24	3.36	0.05	70.12	453.98	2.08	40.00	35.00	40.00
6.472	1120.00	1.79	1425.67	0.16	3.35	0.01	16.46	457.34	3.51	40.00	35.00	40.00
6.672	1060.00	3.77	1429.14	0.55	3.35	0.12	84.01	459.90	2.59	40.00	35.00	40.00
6.811	730.00	4.11	1432.02	0.17	2.84	0.04	22.33	461.61	2.84	40.00	35.00	40.00
7.019	1100.00	2.73	1435.27	0.34	3.21	0.05	39.72	464.40	2.94	40.00	35.00	40.00
7.201	960.00	6.25	1439.70	0.15	4.41	0.02	53.69	466.90	1.55	0.00	35.00	40.00
7.455	1340.00	2.99	1443.68	0.07	3.97	0.01	18.78	471.91	1.61	40.00	35.00	40.00
7.519	340.00	8.82	1446.86	0.46	1.48	0.12	193.08	472.93	1.40	0.00	35.00	0.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=    0.030  PROFILE= 1  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=    0.672  PROFILE= 1  HYDRAULIC JUMP D.S.

CAUTION  SECNO=    0.785  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    0.785  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=    1.939  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    1.939  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    1.939  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    4.341  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    4.341  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=    4.924  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    4.924  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    4.924  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    5.170  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    5.170  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    5.170  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    5.864  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    5.864  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    5.864  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    7.519  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    7.519  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    7.519  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

THIS RUN EXECUTED: 02/05/1990 10:32:16.10

```
*****************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*****************************************
```

Appendix E

List of Other Studies

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

Darrel E. Wood, P.E., L.S.
James S. Campbell, P.E.
Lynn M. Thomas, P.E.

August 31, 1989
FCD Contract 89-53
WA Job No. 89500

FLOOD INSURANCE STUDY FOR SOUTHERN PACIFIC RAILROAD

QUEEN CREEK AREA, MARICOPA COUNTY

Reconnaissance Summary

The following summary is the result of collection of existing information, which pertains to flooding in the study area. The study area is defined as the adjoining area upstream of the Southern Pacific Railroad between the East Maricopa Floodway and the Magma Arizona Railroad. Historically, the contributing watershed area was much larger, but construction of a series of flood retarding structures and the Central Arizona Project Canal has significantly reduced the watershed. The following represents pertinent data obtained relevant to flooding problems in the Queen Creek Area:

Agency	Data Collected
Arizona Public Service	Letter stating no facilities existing in the area
Arizona Department of Transportation	Letter stating no data available for the area
Arizona Department of Water Resources	Letter stating no data available for the area
City of Mesa	Land Use Plan Water and Sewer Master Plans Zoning Maps
El Paso Natural Gas	Letter stating no facilities existing in the area

4105 North 20th Street, Suite 130 • Phoenix, Arizona 85016 • Phone (602) 957-3149 • FAX 955-3765

Agency	Data Collected
Federal Emergency Management Agency	Appeals, Revisions and Amendments to Flood Insurance Maps Flood Insurance Rate Maps Effective April 15, 1988 Flood Insurance Study Guidelines and Specifications for Study Contractors
Flood Control District of Maricopa County	Comprehensive Flood Control Program Report Eastern Maricopa County ADMS Final Report Lower Queen Creek Watershed Drainage Mapping Lower Queen Creek Watershed Modified Puls Reservoir Routing Data Lower Queen Creek Watershed Topographic Mapping Powerline Flood Retarding Structure Summary Sheets Powerline Floodway - 'As-Built' Queen Creek - SCS Data Rittenhouse Flood Retarding Structure - Summary Sheets Report on Flood of 8-19-54 Queen Creek Area & Vicinity Roosevelt Water Conservation District (RWCD) Floodway Reach 1 and Reach 3 - Summary Sheets Sanoqui Wash - SCS Data Supplemental Watershed Agreement No. 2 for Williams-Chandler Watershed Vineyard Road Flood Retarding Structure - Summary Sheet Watershed Plan & EIS on Queen Creek Flood Retarding Structure - Preliminary Watershed Work Plan for Williams-Chandler Watershed

Agency	Data Collected
General Motors	Hydrological Report for G.M. Proving Grounds - Ride & Structure Development Hydrologic Study for G.M. Proving Grounds - 2.5 mile Straightaway Supplement to Hydrologic Report for G.M. Proving Grounds - Ride Structure Development
Maricopa Association of Governments - Transportation Planning Office	MAGTPO Improvement Plans
Maricopa County Records	Accessor's Maps for area within and adjacent to Queen Creek and Sanoqui Wash Parcel Ownership Lists for area within and adjacent to Queen Creek and Sanoqui Wash
Maricopa County Department of Planning and Development	Airport Zoning Ordinance Composite Land Use Plan Generalized Land Use Plan Queen Creek Land Use Plan Record of Commission Action Soil Associations Zoning District Maps Zoning Map
Maricopa County Highway Department	Chandler Heights Bridge over RWCD Floodway
Pinal County Highway Department	Assessor's Maps
Pinal County Planning and Zoning Department	No response
Queen Creek Irrigation District	Distribution System Maps
Roosevelt Water Conservation District	Letter stating no facilities existing in area
Salt River Project	Map of Transmission Lines

Agency	Data Collected
Salt River Valley Water User's Association	Letter stating no facilities existing in area
Southern Pacific Railroad	No response
Southwest Gas Corporation	Gas Maps
Town of Gilbert	Benchmarks for Gilbert Water and Sewer Maps
U.S. Departmnet of Agriculture - Soil Conservation Services	General Soil Map for Gila County General Soil Map for Maricopa County General Soil Map for Pinal County Gila River Indian Reservation Soil Survey - Preliminary Powerline Dam Contract Plans Rittenhouse Flood Retarding Structure - 'AS-BUILT' Plans RWCD Floodway - Update to Hydrology Studies RWCD Reach 3 - Side Inlet Hydrology RWCD Reach 4 - Side Inlet Hydrology Soil Survey of Aguila - Carefree Area Soil Survey of Eastern Maricopa and Northern Pinal County Areas Specifications for Vineyard Road Flood Retarding Structure Urban Hydrology for Small Watersheds TR-55, June 1986
U.S. Department of Interior - Bureau of Reclmation	Queen Creek Flood Detention Structure Report Salt-Gila Aqueduct Reach 2 Salt-Gila Aqueduct Reach 3
U.S. West Communications	Telephone Maps
Williams Air Force Base	No response

In addition, field reconnaissance of the study area was made along the Southern Pacific Railroad. It was noted that the rail was elevated approximately three feet above adjacent ground. It was also noted that existing roadway crossings were constructed to cross above the railroad.