FINAL REPORT
QUEEN CREEK AREA DRAINAGE MASTER STUDY
FCD CONTRACT NO. 86-23

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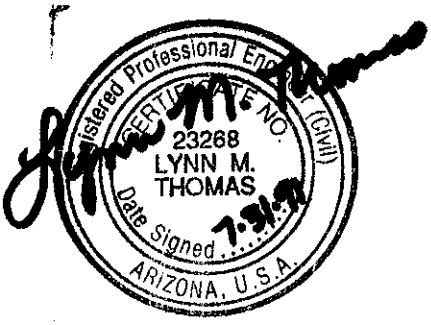


EXECUTIVE SUMMARY

The Queen Creek Area Drainage Master Study has identified existing stormwater problems in the area. These problems are summarized as follows:

- East Maricopa Floodway does not provide adequate capacity for the 100-year rainfall-runoff event.
- Flood hazard areas associated with Queen Creek, Sanoqui Wash, the Southern Pacific Railroad, and the San Tan Mountain foothills do not promote the public health, safety and general welfare of its citizenry.
- Existing levees along Queen Creek and Sanoqui Wash in the downstream portion of the watershed are structurally unstable and have put this area in risk of greater than normal flood damage.
- Numerous areas have been identified to have serious local flooding problems.

As a result, different solutions to mitigate stormwater problems have been recommended. This alternative solution includes the following components:

- Regional Detention Basins
- Queen Creek and Sanoqui Wash Channel Improvements
- San Tan Structures
- Drainageways
- Onsite Retention

These components in development of a drainage master plan will provide a solution to immediate, intermediate, and future flooding conditions in the Queen Creek area.

The Queen Creek Area Drainage Master Plan was designed at a conceptual level to develop the drainage infrastructure required to mitigate stormwater problems within the area. It attempts to maintain the integrity of existing regional flood control facilities, to maintain continuity of drainage across political boundaries, and to serve as a guideline for use in future planning and development. This plan has been developed as a dynamic tool intended to provide maximum flexibility in its acceptance, implementation and regulation.

1.0 INTRODUCTION

1.1 Purpose of Study

The Queen Creek Area Drainage Master Study was prepared by Wood & Associates under contract with the Flood Control District of Maricopa County, Contract No. 86-23. The study identifies stormwater problems in the Queen Creek area (see Figure 1) and provides a master drainage plan which will mitigate these problems. The master drainage plan also serves as a guideline for future planning and development in the Queen Creek area.

1.2 Area Studied

The Queen Creek area (approximately 70 square miles within Maricopa County) includes Williams Air Force Base, General Motors Proving Grounds, portions of the City of Mesa, Town of Gilbert, Town of Queen Creek, and unincorporated Maricopa County. The total contributing watershed area (approximately 244 square miles) also includes portions of Pinal County and the Gila River Indian Reservation. It should be noted that approximately 67 square miles of the 244 total contributes stormwater runoff to the EMF from the Eastern Maricopa County area. This area was studied in 1987 by others.

Situated in southeastern Maricopa County, the majority of the Queen Creek area is cultivated farmland and undeveloped natural desert. Presently, there are two industrial developments, several scattered small neighborhood commercial developments and several residences within the area.

Population growth projections indicate the Queen Creek area will potentially increase 350 percent by the year 2005 (see Reference No. 13). Master drainage planning is critical for this potential growth.

The Queen Creek watershed boundary to the south is the Goldmine and San Tan Mountains. Construction of the Central Arizona Project (CAP) Canal along the east watershed boundary has greatly reduced the natural contributing watershed. The watershed slopes westerly at an approximate 0.5 percent slope to the East Maricopa Floodway (EMF). The EMF is a regional drain which provides topographic relief to the eastern portion of Maricopa County and was constructed to protect the Roosevelt Water Conservation District Canal (see Figure 1).

1.2 Area Studied (Continued)

The climate of the study area is typical of the arid southwest with short, mild winters and long, hot summers. The average annual daily maximum temperature is 85 degrees Fahrenheit and the average annual daily minimum temperature is 53 degrees Fahrenheit. The average annual precipitation is approximately 7.5 inches. Three types of storms produce precipitation in the area: local summer storms, general summer storms and general winter storms. Local summer storms normally consist of high intensity, short duration rainfall. Severe general summer storms are usually associated with tropical cyclones. General winter storms cover large areas and are usually of long duration. Their intensities are normally light to moderate.

Several structures affect historical flooding in the study area (see Figure 2). The Soil Conservation Services' (SCS) sponsored Powerline Floodway, Rittenhouse and Vineyard Road Flood Retarding Structures and the U.S. Army Corps of Engineers' sponsored Whitlow Ranch Dam have been constructed for the purpose of providing flood protection to the downstream area which includes the Queen Creek study area. The U.S. Bureau of Reclamation's sponsored Sanoqui Flood Retarding Structure was constructed for the purpose of providing flood protection to the Central Arizona Project (CAP) Canal. This structure allows a controlled release into Queen Creek during flooding events. The Central Arizona Project Canal's alignment was constructed downstream and parallel to the above referenced SCS's Flood Retarding Structures. These structures have a controlled release draining into the Powerline Floodway which conveys stormwater westerly to the East Maricopa Floodway (EMF). In addition, the EMF along the west border of the study area was constructed for the purpose of providing relief to the eastern portion of Maricopa County southerly to the Gila River.

It should be noted that the Flood Control District of Maricopa County is responsible for the operation and maintenance of the Powerline, Rittenhouse and Vineyard Road Flood Retarding Structures as well as the East Maricopa Floodway and Powerline Floodway.

In addition, there are new flood control policies which affect flooding in the study area. A new retention/detention policy was adopted in 1988 for land within Maricopa County. This policy will potentially reduce stormwater runoff as development occurs. These flood control structures and policies are efforts to minimize stormwater problems for both existing and future development.

1.3 Study Approach

In order to provide a comprehensive drainage study for the Queen Creek area, the scope of work included major tasks that were accomplished as follows:

- Data Collection
- Topographic Mapping
- Rainfall Data
- Hydrology (Existing & Future)
- Hydraulics (Existing)
- Alternative Drainage Systems
- Evaluate Alternatives
- Presentation
- Design Criteria
- Development of Selected Alternative
- Hydrology (Selected Alternative)
- Hydraulics (Selected Alternative)
- Implementation
- Preliminary Cost Estimates
- Maps
- Conferences
- Reports

2.0 Data Collection

Numerous Federal, State and local agencies with jurisdiction in the watershed were contacted for the collection of relevant information. The following represents data obtained:

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
Federal Emergency Management Agency	Appeals, Revisions and Amendments to Flood Insurance Maps Flood Insurance Rate Maps Effective July 2, 1979 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' Plans Queen Creek - SCS Data

2.0 Data Collection (Continued)

Agency	Data Collected
Flood Control District of Maricopa County	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
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

2.0 Data Collection (Continued)

Agency	Data Collected
Pinal County Planning and Zoning Department	Floodplains Map Generalized Land Use Map
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
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 Land Use Map Water and Sewer Maps
U.S. Department 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 Reclamation	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

3.0 TOPOGRAPHIC MAPPING

Topographic maps were generated for the Queen Creek Area Drainage Master Study (approximately 70 square miles within Maricopa County). In addition, other mapping and surveying efforts were accomplished as noted below:

A. Contour maps of the approximate 70 square mile study area within Maricopa County were generated at a scale of one (1) inch equals 200 feet with two (2) foot contour intervals. The final product was final drafted contour maps and photographic mylars.

B. Cross-sections for Queen Creek and Sanoqui Wash were prepared (approximately 20 miles in length at an average of 500 foot intervals). These cross-sections were used for the HEC-2 computer models.

C. Contour maps for the alluvial fan area south of Hunt Highway (Sections 1 and 2, T-2-S, R-6-E and Sections 5 and 6, T-2-S, R-7-E) were prepared at a scale of one (1) inch equals 200 feet with two (2) foot contour intervals. The final product was final drafted contour maps and photo mylars.

D. Photographic mylars were prepared with no survey control at a scale of one (1) inch equals 400 feet for the area between the county line and the CAP Canal (approximately 60 square miles).

E. Field visits were made for the purpose of measuring hydraulic structures and bridges. In addition, stormwater characteristics were observed in an effort to estimate runoff curve numbers and Manning "n" values.

All topographic mapping was completed in accordance with Federal Emergency Management Agency (FEMA) standards, as a minimum. Due to reported land subsidence and earth fissures in the area, elevation reference data were not completely based on the National Geodetic Vertical Datum (NGVD) of 1929 but on level circuits run and adjusted in the period between January and September, 1986. This is a NGVD established "on rock" published benchmark Designation X473 1981 "Hawk Rock".

The Queen Creek area's west (downstream) watershed boundary is defined by the East Maricopa Floodway (EMF) Reach 3 and Reach 4. It should be noted that Reach 4 of the EMF was constructed after the above described mapping was generated. Topographic maps prepared at a scale of one (1) inch equals 200 feet with two (2) foot contour intervals were revised using the EMF-Reach 4 construction drawings.

4.0 RAINFALL DATA

Precipitation values were selected from isopluvial maps in NOAA Atlas (see Reference No. 10). Average precipitation depths were estimated for the Queen Creek watershed area. The isopluvial maps are for 6 and 24-hour durations. The 1 and 2-hour storm duration for several frequency storms was estimated based on equations developed by a multiple-regression screening technique. Table A-1 (see Appendix A) lists precipitation values established for the 2, 5, 10, 25, 50 and 100-year return intervals for 1, 2, 6 and 24-hour durations. Figure A-2 (see Appendix A) displays the procedure for establishing the 1, 6 and 24-hour duration relationships.

The depth-area relationship as established in Reference No. 10 was applied to account for areal reduction within the Queen Creek watershed. Table A-3 (see Appendix A) lists the depth-area values used as input in the HEC-1 computer model to simulate a 24-hour duration relationship.

The SCS Type II rainfall distribution was used as input in the HEC-1 computer model to compute the rainfall-runoff relationship (see Figure A-4, Appendix A). The District provided a 100-year, 24-hour distribution with 15-minute time increments to be used as input in the HEC-1 computer model. Table A-5 (see Appendix A) lists the values of the distribution used.

5.0 HYDROLOGY (EXISTING AND FUTURE)

Standard hydrologic methods were used to determine peak discharges and runoff volumes for this study's 177 square mile watershed. Both the existing condition and future condition hydrology were prepared using the U.S. Army Corps of Engineers', HEC-1 Flood Hydrograph Package. The term "existing condition" refers to the area as shown on the aerial and topographic mapping prepared in 1986 for this study. The term "future condition" refers to the year 2000 projections of the area which were available in early 1987. Due to adoption of a 100-year, 2-hour retention policy in Maricopa County, the future condition hydrology no longer applies to the year 2000 projection of the area, but can be used to assess the sizing of regional detention basins in lieu of onsite detention.

5.1 Procedures and Methods

In hydrologic evaluation of the Queen Creek area, the watershed was divided into seven major areas (see Figure 8). The watershed was then divided into numerous subareas (see Figure 2), each at an average size of one square mile. Elevations and drainage lengths were taken directly from U.S.G.S. Quadrangle Maps (see Reference No. 11). Time of concentrations and travel times were calculated in accordance with procedures established in the Soil Conservation Services', TR-55 (see Reference No. 9).

Curve numbers were selected based on procedures established in TR-55 (see Reference No. 9). These numbers represent composite curve numbers which take into account percent of allowable lot coverage, and assume the remaining area to be 50 percent artificial desert landscaping and 50 percent grass for each zoning classification. Hydrologic soil types were taken from Soil Surveys prepared by the Soil Conservation Services (see Reference Nos. 7 and 8). Aerial maps prepared as a task for this contract and Maricopa County Zoning Maps served as the basis for curve number selection (see Figure 5). Calculated values are shown in Table B-1 (see Appendix B).

All hydrologic characteristics were calculated and are shown in Tables B-2 and B-3 (see Appendix B). These parameters were used as input in the U.S. Army Corps of Engineer's, HEC-1 Flood Hydrograph Package. The SCS Dimensionless Unit Hydrograph option of the HEC-1 computer model was used to simulate rainfall-runoff relationships for the Queen Creek area. In addition, the Muskingham Flood Routing Method and the Precipitation Depth-Area Relationship was used to establish peak discharges and runoff volumes for the 2, 5, 10, 25, 50, and 100-year rainfall-runoff events.

5.2 Limitations and Assumptions

The HEC-1 computer model was used to establish rainfall-runoff conditions for several return frequencies, but it was calibrated based on the 100-year return frequency. This factor is especially important to note in consideration of contributing hydrographs to the Queen Creek watershed. It was anticipated that agencies could furnish compatible hydrographs at the following locations:

Queen Creek and Central Arizona Project Canal

The U.S. Bureau of Reclamation designed a four (4) barrel-72 inch pipe culvert crossing in Queen Creek. They also designed the Sanoqui Flood Retarding Structure which drains to this culvert crossing. The crossing was designed for a 100-year storm event and a compatible 100-year hydrograph was supplied for use as the input hydrograph in the HEC-1 computer model. However, hydrographs for the 2, 5, 10, 25, and 50-year event were not available. Therefore, the 100-year input hydrograph has been used in all the HEC-1 models for all return frequencies.

Powerline Floodway and Central Arizona Project Canal

The Soil Conservation Services (SCS) designed the Powerline Floodway to release floodwaters impounded by the Powerline Flood Retarding Structure (FRS) into the East Maricopa Floodway. Floodwaters impounded by Rittenhouse FRS drain to the Vineyard Road FRS which drain to the Powerline FRS. The SCS's hydrologic analysis for the Powerline Floodway did not produce compatible hydrographs for the 2, 5, 10, 25, 50 and 100-year storm events. The capacity of the Powerline Floodway at the CAP Canal was calculated to be approximately 600 cfs. Therefore, the HEC-1 computer model simulates a base flow of 600 cfs at this location in all the HEC-1 models for all return frequencies.

East Maricopa Floodway at Ray Road

The Flood Control District of Maricopa County supplied compatible 2, 5, 10, 25, 50, and 100-year hydrographs for input into the HEC-1 computer model at the location of the East Maricopa Floodway (EMF) and Ray Road. This hydrograph represents stormwaters within the EMF upstream of its confluence with the Powerline Floodway.

5.2 Limitations and Assumptions (Continued)

The 2, 5, 10, 25, and 50-year HEC-1 computer models include the 100-year input hydrograph supplied for the Queen Creek and CAP Canal location and include a 600 cfs base flow at the Powerline Floodway location. Ultimately, a multi-frequency analysis at these two locations should be developed to correctly determine peak discharges for events other than the 100-year frequency.

In order to simulate the existing condition hydrology, runoff patterns particularly in the Queen Creek and Sanoqui Wash vicinity were established based on U.S.G.S. Quadrangle Maps. Results of floodplain analyses which are discussed in detail in Section 6.0 Hydraulics, indicated an intermingling of floodwaters for single storm events. Results of the HEC-1 model do not account for intermingling of floodwaters in both single and multiple storm events.

Much of the watershed is presently cultivated farmland. Collection, diversion and retention of irrigation waters may significantly alter runoff patterns. This study does not account for these altered runoff patterns. Since the majority of the watershed is undeveloped, no onsite retention has been modeled for the existing conditions hydrology.

5.3 Results and Conclusions

In 1989, the Flood Control District of Maricopa County (District) prepared a hydraulic analysis for the East Maricopa Floodway (EMF) within the Queen Creek area. This analysis was based on EMF construction drawings and used 100-year peak discharges established in the hydrologic analysis (see Table B-4, Appendix B). Table B-5 (see Appendix B) includes descriptions of HEC-1 reach number locations. Results of the District's hydraulic analysis indicated that the EMF's capacity was exceeded within the Queen Creek area. In addition, the Soil Conservation Services (SCS) based the EMF design on the 100-year peak discharge values (see Appendix E) established in 1974. Peak discharge values established in the hydrologic analysis were larger values than those used to design the EMF. Therefore, the design integrity of the EMF has been documented to require additional flood control measures in order to reduce flooding problems within the area.

Results of the hydrologic analysis also established numerous local flooding problems within the study area. Development of a flood control system will need to account for both local and regional flooding problems. Table B-4 (see Appendix B) summarizes peak discharges for 2, 5, 10, 25, 50 and 100-year single storm events.

6.0 HYDRAULICS (EXISTING CONDITIONS)

Floodplain characteristics were developed for existing conditions of the 10, 50, and 100-year flood events along the portion of Queen Creek and Sanoqui Wash within Maricopa County. Queen Creek was investigated from the EMF to the Maricopa-Pinal County line (approximately 10 miles). Sanoqui Wash was investigated from the EMF to the Maricopa-Pinal County line (approximately 10 miles). Using the U.S. Army Corps of Engineers', HEC-2 Water Surface Profiles, a detailed 100-year floodplain delineation was attempted for both washes. In addition, the hydraulics of the reported levees in Section 13 and 14 and the ponding effects of the Southern Pacific Railroad were investigated.

6.1 Queen Creek Floodplain

The hydraulic conveyance of Queen Creek was investigated using the HEC-2 computer model. Cross-sections were selected at an average interval of 500 feet. Starting computations for the water surface profiles were based on assuming critical depth at the confluence of the EMF bank with Queen Creek.

Bridges and culverts were field surveyed to obtain elevation data and structural geometry for use in the HEC-2 detailed hydraulic analysis. The analysis was based on unobstructed flow. Water surface elevations are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Channel and overbank roughness factors (Manning's "n") were chosen using engineering judgment based on field observation and investigation. Table C-1 (see Appendix C) summarizes peak discharges used as input in the HEC-2 computer model.

Several methods were attempted in application of HEC-2 to accurately delineate the 100-year floodplain. The downstream study reach is characteristic of a perched riverine with inadequate levees at some locations and in other locations no levees exist at all. In addition, the levees were constructed for agricultural purposes and have not been properly designed and maintained. These levees have been observed to have no structural integrity. Numerous attempts were made to determine flow characteristics of the levees using the specification of ineffective flow areas option and the encroachment method option of the HEC-2 computer model. The analyses resulted in water surface elevations overtopping the levees. Computer modeling was inconsistent from cross-section to cross-section. It was concluded that exact floodplain boundaries could not be delineated using the HEC-2 computer model and the chance of the floodplain being at one location as compared to another was considered to be the same. Therefore, the entire area has the same chance of flooding even though there may not

6.1 Queen Creek Floodplain (Continued)

be enough runoff volume in a single storm event to inundate the entire area. It was agreed that a new study approach would be undertaken.

Using the HEC-2 computer model as a tool, the Queen Creek floodplain was evaluated by first applying encroachment method 1 using the levee stations as the target. The water surface profile was then analyzed to determine the location where water surfaces were below the existing overbank ground elevations. This location occurred approximately 2000 feet east of Sossamon Road. From this analysis it was apparent that floodwaters were capable of breaking out of the Queen Creek's banks and continuing downstream to the East Maricopa Floodway in an overland flow pattern. This overland flow pattern is northwesterly rather than along the designated westerly Queen Creek alignment as shown on current FEMA published Flood Insurance Rate Maps.

The next step taken in delineation of the approximate floodplain boundary was to use an iterative trial and error procedure. The encroachment method 1 procedure was used with target stations selected where the water surface profile depth was computed to be one foot or less above the existing overbank ground elevation. Once calibrated, a streamline 100-year floodplain boundary was delineated. Results of this approach are shown on topographic mapping submitted under separate cover (see Preliminary Design Concept dated September, 1990).

6.2 Sanoqui Wash Floodplain

The hydraulic conveyance of Sanoqui Wash was investigated using the HEC-2 computer model. Cross-sections were selected at an average interval of 500-feet. Starting computations for the water surface profiles were based on assuming critical depth at the confluence of the Queen Creek bank with Sanoqui Wash.

Bridges and culverts were field surveyed to obtain elevation data and structural geometry for use in the HEC-2 detailed hydraulic analysis. The analysis was based on unobstructed flow. The water surface elevations are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Channel and overbank roughness factors (Manning's "n") were chosen using engineering judgment based on field observation and investigation.

Since Sanoqui Wash has numerous defined channels in the vicinity of the County limits, the alignment chosen in the hydraulic analysis corresponds to the largest Pinal County contributing watershed.

6.2 Sanoqui Wash Floodplain (Continued)

During preparation of the hydrologic computer model, no intermingling of surface water runoff was taken into consideration. Hydraulic analysis of Sanoqui Wash resulted in an intermingling of surface water runoff between Higley Road and Hawes Road. Peak discharges summarized in Table B-16 (see Appendix B) for HEC-1 I.D. Nos. CO 472 and RO 497 were added together and used in the hydraulic analysis. It should be noted that the HEC-1 model was not revised to model the intermingling of runoff. Table C-2 (see Appendix C) summarizes peak discharges used as input in the HEC-2 computer model.

Sanoqui Wash has different floodplain characteristics than Queen Creek. A portion of the downstream study reach has an inadequate one-sided levee. The upstream portion near the county line has no well defined channel and is characteristic of alluvial avulsions.

The first step in evaluation of the Sanoqui Wash floodplain was to have a thorough understanding of the watershed's overland flow characteristics. Using the HEC-2 computer model as a tool, the Sanoqui Wash floodplain was delineated by applying encroachment method 1 with target stations selected at the location where the water surface profile depth was computed to be one foot or less above the existing overbank ground elevation. The 100-year floodplain delineated was primarily controlled by existing road crossings. Many of these road crossings are dip sections with flood depth gauges. Results of this approach are shown on topographic mapping submitted under separate cover (see Preliminary Design Concept dated September, 1990).

6.3 Southern Pacific Railroad Floodplain

The Southern Pacific Railroad (SPRR) was investigated for the potential of ponded stormwater runoff along its upstream alignment. The railroad traverses the Queen Creek area in a northwesterly-southeasterly direction. Results of field investigation and topographic mapping show the railroad track to be above adjacent ground. Intermittent flows collect along the upstream side of the track and are conveyed northwesterly to the East Maricopa Floodway (EMF).

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.

6.3 Southern Pacific Railroad Floodplain (Continued)

Under separate contract, 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 East Maricopa Floodway (EMF). In addition, an interim hydraulic analysis was completed for the EMF, by the Flood Control District of Maricopa County staff as discussed in detail under the heading 5.3 Results and Conclusions. Results of this floodplain delineation were used to start the HEC-2 backwater analysis (See Reference 15) 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 within the Queen Creek Wash. 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).

A Zone AH was delineated on the Floodplain Work Maps 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 HEC-2 computer model, was used to establish the Zone AH limit where flooding depths are one foot or less. A Zone A was delineated on the Floodplain Work Maps for the above described approximate study areas. It is important to note that the Federal Emergency Management Agency approved this study in September of 1990.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were based on field observations of the floodplain areas. The channel "n" values for the Southern Pacific Railroad delineation ranged form 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. Flood elevations are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Table C-3 (see Appendix C) summarizes peak discharges used in the HEC-2 computer model.

7.0 ALTERNATIVE DRAINAGE SYSTEMS

7.1 Community Participation

Due to results of hydrologic and hydraulic analyses, discussions with major land owners within the Town of Queen Creek were initiated to communicate the existing flood problems and flood control measures needed to reduce these problems. These discussions with the major land owners in the Queen Creek community took place on October 18, 1988, and the following ideas and plans were addressed to be considered in completion of this study:

A. The open space, as defined on the Queen Creek Land Use Plan (see Reference No. 13), should be utilized to its potential for the conveyance of flow.

B. The Queen Creek community would like to have the existing floodplain problems resolved prior to redelineation of the flood hazard area.

C. The Queen Creek community requested that the District, as a lead agency, start to take measures at this time rather than waiting for the completion of the study, to help alleviate the current situation. They also suggested that this could be part of a solution that could be implemented in phases.

D. The District's participation in the funding of a solution should be maximized.

E. The District should take the lead role in communication and coordination with Pinal County.

F. The existing levees should be knocked down, the existing washes should be groomed, and the developers should be responsible for expanding the washes through their development.

G. The community of Queen Creek wants to participate in the development of a solution to the flooding problem.

During the completion of this study, the Town of Queen Creek was incorporated by voters on July 25, 1989.

7.2 Components

Results of the community's concerns initiated investigation of several considerations for development of stormwater management in the Queen Creek area. The following summarizes each component that was investigated:

Component A: Regional detention basins. A total of seven basins were initially proposed, which soley served the purpose to protect the design integrity of the EMF for existing hydrologic conditions.

7.2 Components

Component B: San Tan structures in Pinal County. This component was previously investigated in 1962 for the District. It consisted of two flood and sediment retaining basins and approximately 11 miles of floodway. One basin and a portion of the floodway is located on Indian Reservation land. These structures were considered necessary in order to provide flood control protection to downstream properties.

Component C: Channel improvements to Queen Creek and Sanoqui Wash. Channelize Queen Creek and Sanoqui Wash to be capable of conveying the current 100-year rainfall-runoff event for Pinal County offsite flood waters as established in the hydrologic analysis.

Component D: Drainageways for Pinal County offsite floodwaters entering Maricopa County strategically located in a major grid pattern. Collect and convey Pinal County offsite flood waters, as established in the hydrologic analysis, to the East Maricopa Floodway (EMF), Queen Creek, Sanoqui Wash and the upstream side of the Southern Pacific Railroad.

Component E: Onsite retention in accordance with Maricopa County's adopted ordinance of 1988. This component does not provide immediate benefits to the study area, but potentially decreases the size of regional detention basins once development begins and provides onsite retention in accordance with the ordinance. Implementation of this component will reduce peak discharges in the study area.

Component F: A system of collector channels that accounts for onsite and offsite flows. It was agreed that once development occurs and provides onsite retention, the channel system would be overdesigned. An offsite channel provides a positive outfall that until development occurs will serve to convey onsite and offsite flows, but will be sized for offsite peak discharges.

7.2 Components

Component G: Grade and place compacted fill in large areas of land in order to allow the shortest gravity drain of runoff to Queen Creek and Sanoqui Wash. This idea was rejected because of the extent of land involved, the costs of grading and placing compacted fill, and the numerous miscellaneous problems associated with this concept (property owners, utility adjustments, etc.).

Component H: A retention ordinance in Pinal County. Pinal County has recently adopted a retention ordinance which requires development to retain the 100-year, 1-hour storm as of August 1990 and was implemented in September 1990.

Component I: Do nothing at this time. This alternative does not encourage development within the Queen Creek Area. In addition, it places the community of Gilbert at risk should the Roosevelt Water Conservation District Canal breach at any given location. The Town of Gilbert presently has no outfall for overland flood waters.

7.3 Recommendations

Review of the components generated the following alternatives:

Alternative #1 - Components A, B, C, D, and E

Alternative #2 - Components A, B, and C

Alternative #3 - Components A and B

Alternative #4 - Components A and C

Alternative #5 - Component A

Comments:

Alternative #1 is the minimum drainage infrastructure necessary for management of potential flooding problems within the Queen Creek Area (see Figure 10). It addresses existing flood hazard areas, maintains the design integrity of the East Maricopa Floodway (EMF), provides a positive outfall for development within Maricopa and Pinal Counties, and decreases peak discharges once development provides retention.

7.3 Recommendations (Continued)

Alternative #2 is the minimum drainage infrastructure necessary to encourage all development within the Queen Creek Area Components B and C minimize flood hazard areas (see Figure 10). Component A maintains the design integrity of the EMF. It should be noted that components D and E is anticipated to be implemented as development occurs and land developers should be made responsible for onsite retention and offsite drainageways.

Alternative #3 is a solution which will minimize the flood hazards associated with the San Tan Mountains (see Figure 10), i.e. sediment, debris, and high velocities. It should be noted that the potential of shallow sheet flooding may occur along Queen Creek and Sanoqui Wash at any given location. Therefore, prior to channelization of Queen Creek and Sanoqui Wash, development constraints should be considered.

Alternative #4 is a solution which will minimize the flood hazards associated with Queen Creek and Sanoqui Wash (see Figure 10). However, development constraints should be considered for the flood hazard area affected by the San Tan Mountains.

Alternative #5 is the solution which protects existing drainage structures (see Figure 10). The purpose of the Queen Creek ADMS was to identify potential flooding problems and protect the design integrity of the East Maricopa Floodway.

The District agreed that Alternative #1 should be developed as the selected alternative (see Figure 10).

8.0 EVALUATE ALTERNATIVES

Five components agreed by the District in development of the selected alternative were evaluated in terms of construction costs, flood protection effectiveness, environmental factors, recreation/mixed uses and compatibility with other projects. These components are defined as follows:

Component A: Regional Detention Basins

Component B: San Tan Structures in Pinal County

Component C: Queen Creek and Sanoqui Wash Channel Improvements

Component D: Drainageways for Pinal County Offsite Floodwaters

Component E: Onsite Retention Policy

8.1 Construction Costs

Component A-Regional Detention Basins

1.	Excavation	14,200,000 CY	@ $1.50/CY = $21,300,000.00
2.	Outlet Structures (Pipes)	7 EA	@ $20,000/EA = $ 140,000.00
3.	Land Acquisition	1,200 AC	@ $22,000/AC = $26,400,000.00
		Total*	= $47,840,000.00

*Irrigation and Landscaping are not included.

Component B-San Tan Structures*

1.	Embankment	1,258,000 CY	@ $2.00/CY = $ 2,516,000.00
2.	Excavation	72,000 CY	@ $1.50/CY = $ 108,000.00
3.	Outlet Structures (Pipes)	4 EA	@ $22,000/EA = $ 80,000.00
4.	Land Acquisition	850 AC	@ $22,000/AC = $18,700,000.00
		Total	= $21,404,000.00

*Quantities Taken From Comprehensive Flood Control Program Report, 1963. Project is situated on portions of Indian Land.

Component C-Queen Creek & Sanoqui Wash Channel Improvements*

1.	Excavation	6,000,000 CY @	$1.50/CY
			= $ 9,000,000.00
2.	Bank Protection	20 MI @	$100,000/MI
			= $ 2,000,000.00
3.	Land Acquisition	400 AC @	$ 22,000/AC
			= $ 8,800,000.00
		Total	= $19,800,000.00

*Road Crossings and Utility Conflict Relocations are not included.

Component D-Drainageways for Pinal County Offsite Floodwaters*

1.	Excavation	654,000 CY @	$1.50/CY
			= $ 981,000.00
2.	Land Acquisition	270 AC @	$22,000/AC
			= $ 5,940,000.00
		Total	= $ 6,921,000.00

*Based on V-notch channel (50 feet wide, 3 feet deep).

Component E-Onsite Retention Policy

Private developers will be responsible for construction costs.

Total	$	0.00
GRAND TOTAL	=	$95,965,000.00

These costs were generated at a preliminary level without benefit of engineering plans. It was noted that further attention should be given to the San Tan Structures component. It was also discussed that the Hunt Highway alignment be relocated in order to avoid land designated as Indian Reservation. This factor will be addressed under the heading 11.0 Development of Selected Alternative.

8.2 Flood Protection Effectiveness

The following areas are within Maricopa County and derive benefits from individual components:

Component A	57 Square Miles	(5)
Component B	16 Square Miles	(2)
Component C	29 Square Miles	(4)
Component D	26 Square Miles	(3)
Component E	1 Square Mile	(1)

8.2 Flood Protection Effectiveness (Continued)

Component A - The 57 square miles represents the area between the East Maricopa Floodway within the Queen Creek area and State Highway 87 (Arizona Avenue). This statement is based on interpretation of past Soil Conservation Service's reports.

Component B - The 16 square miles represents the area downstream of the proposed San Tan Structures (as outlined in the Comprehensive Flood Control Program Report, 1963) to the proposed Sanoqui Wash alignment in accordance with the Queen Creek ADMS. This component may also provide some level of protection to the East Maricopa County Floodway.

Component C - The 29 square miles represents the area along both Queen Creek and Sanoqui Wash that appears to be capable of draining to the washes.

Component D - The 26 square miles represents the area between the Williams Field Road (Chandler Blvd.) alignment to the upstream (northeast) side of the Southern Pacific Railroad.

Component E - The 1 square mile represents the ill defined nature of the timing for implementation of onsite retention for the hundreds of individual landowners making up the watershed within Maricopa County. It should be noted that if this component is implemented there could be potentially approximately 61 square miles providing onsite retention, which would indeed benefit the entire watershed (i.e. volume requirements for regional detention basins could be greatly reduced if not eliminated).

8.3 Environmental Factors

Three environmental factors were identified in comparison of each component and are listed as follows:

(a) Capable of recharging the ground water system.
(b) Disrupts and displaces the least amount of plant and wildlife habitat.
(c) Capable of reducing sediment and erosion damage.

Each component was compared in terms of these factors and assigned a rank. The three factors were then averaged to produce a final rank.

	(a)	(b)	(c)	Avg.
Component A	3	3	2	2.67 (3)
Component B	2	2	3	2.33 (2)
Component C	5	5	5	5.00 (5)
Component D	4	4	4	4.00 (4)
Component E	1	1	1	1.00 (1)

8.4 Recreation/Mixed Uses

Each component was evaluated in terms of its compatibility with land uses as shown on the Queen Creek Land Use Plan.

Component A has an excellent potential for recreational uses. In addition, once onsite retention is constructed within the Queen Creek Area, other uses can be implemented. (4)

Component B has no potential for recreational/mixed uses since it provides protection from extreme flood hazards. (1)

Component C has been designated in the Queen Creek Land Use Plan for recreational/mixed use purposes. (5)

Component D will be too limited in open space requirements and does not provide an opportunity for other uses. (2)

Component E has a potential for recreational/mixed uses. (3)

8.5 Compatibility With Other Projects

Each component was evaluated taking into consideration the East Maricopa Floodway project and the Queen Creek Land Use Plan.

Component A	(5)
Component B	(3)
Component C	(4)
Component D	(1)
Component E	(2)

EVALUATION MATRIX

COMPARISON OF THE ALTERNATIVE DRAINAGE PLANS

COMPONENT	A	B	C	D	E
Construction Costs	1	2	3	4	5
Flood Protection Effectiveness	5	2	4	3	1
Environmental Factors	3	2	5	4	1
Recreation/Mixed Use	4	1	5	2	3
Compatibility with other Projects	5	3	4	1	2
Total	18	10	21	14	12
Rank	(4)	(1)	(5)	(3)	(2)

Ranking Criteria - Most Desirable (5)
More Desirable (4)
Desirable (3)
Less Desirable (2)
Least Desirable (1)

Component A: Regional Retention/Detention Basins
Component B: San Tan Structures in Pinal County
Component C: Queen Creek and Sanoqui Wash Channel Improvements
Component D: Drainageways for Pinal County Offsite Floodwaters
Component E: Onsite Retention Policy

9.0 PRESENTATION

The selected alternative (see Figure 3) was presented to the Town of Queen Creek at their April 18, 1990 Town Council Meeting. Mr. Lonnie Frost, Town of Gilbert Floodplain Manager, was also in attendance.

The existing stormwater problems identified in this study were presented to the Council and discussed. The selected alternative and its evaluation was then presented and discussed. The District's general policies concerning the allocation of fiscal resources to accomplish implementation of the Queen Creek Area Drainage Master Plan was the final topic presented and discussed. The Council agreed that they would recognize the District's goals and policies in future planning and development of the Town of Queen Creek.

10.0 DESIGN CRITERIA

The following criteria has been established as a guideline for both public works and private development within the Queen Creek area. Deviations from these criteria will require technical documentation for approval by the District.

10.1 Street Design Criteria

- Design 10-year frequency storm to be conveyed within top of curb for all streets.
- Maintain one (1) 12 foot dry driving lane in each direction for all arterial and collector streets.
- Maximum gutter velocity shall not exceed 10 fps for all streets and all frequency storm events.
- Maximum flowrate to be conveyed within all streets shall not exceed 100 cfs at a maximum one (1) foot of water depth. Should flowrate exceed 100 cfs, storm drains or open channels will be required as outlined under separate headings.
- No new inverted crown streets shall be allowed.
- Dip road crossings shall have proper signage provided to identify potential hazards of flooding.
- Maximum depth of cross drainage for "all-weather" crossings shall be 0.5 feet for the 100-year storm event.
- Superelevated street cross sections will be required for street cross drainage.
- Arterial roads crossing Queen Creek and Sanoqui Wash shall be designed as "all-weather" crossings.
- Arterial roads crossing drainageways shall be reviewed on a case by case basis by the District for "all-weather" crossing requirements.

10.2 Storm Sewer and Culvert Design Criteria

- Minimum 15-inch diameter storm drain pipe shall be used in public right-of-way.
- Cross road culverts shall be designed to pass the 50-year peak discharge.
- Inlet and outlet protection will be required for storm sewers and culverts.
- Minimum design velocity shall be 3 fps.

10.3 Open Channel Design Criteria

- Open channels, where possible, shall follow a similar alignment as the natural stream.
- Minimum channel properties shall be used for design as follows:

TYPE OF CHANNEL BOTTOM	MAX DEPTH (Ft)	SIDE SLOPES (H:V)	MAX VELOCITY (fps)	MIN FREEBOARD (Ft)	MAX FROUDE NO.
SMALL CHANNELS Q < 1,000 cfs					
Concrete/Shotcrete	3.0	2:1	10	1.0	0.95
Soil Cement	3.0	2:1	10	1.0	0.95
Riprap	3.0	3:1	10	1.0	0.80
Grass	3.0	4:1	7	1.0	0.80
Earth	2.5	4:1	5	1.0	0.60
MEDIUM CHANNELS 1,000 cfs < Q < 4,000 cfs					
Concrete/Shotcrete	8.0	2:1	12	2.0	0.95
Soil Cement	8.0	2:1	12	2.0	0.95
Riprap	6.0	3:1	12	2.0	0.80
Grass	4.0	4:1	7	1.0	0.80
Earth	3.0	4:1	5	1.0	0.60
LARGE CHANNELS Q > 4,000 cfs					
Concrete/Shotcrete	10.0	2:1	15	3.5	0.95
Riprap	10.0	3:1	14	3.0	0.80
Grass	10.0	10:1	7	3.0	0.80
Earth	10.0	10:1	5	3.0	0.60

10.4 Drop Structure Design Criteria

- Drop structures having loose riprap on a sloping face are not permitted.
- Drop structures shall be designed for a maximum 100-year storm event and a minimum 10-year storm event.
- Design of drop structures constructed in Maricopa County must address the issue of safety. Drop structures shall have proper signage provided to identify potential hazards of flooding and must be inaccessible to the general public.

10.5 Regional Detention Basin Design Criteria

- Maximum depth of basin shall not exceed 15 feet.
- All basins shall be completely dewatered within 36 hours using outlet pipes.
- For water depths below six (6) feet, basin side slopes shall be a maximum 4:1 (H:V). For water depths six (6) feet and greater, basin side slopes shall be a maximum 10:1 (H:V).

11.0 DEVELOPMENT OF SELECTED ALTERNATIVE

The preliminary design concept was prepared and is shown on topographic mapping (see Preliminary Design Concept dated September, 1990 under separate cover). This information should be used as a guideline for preparation of construction drawings. The mapping exhibits general requirements for proposed rights of way, critical utility interferences, channel and drainageways minimum widths, and locations for bridges or culvert crossings. The following elaborates the procedures, assumptions and methods used in development of the selected alternative.

11.1 Regional Detention Basins

Detention basins were conceived for the purpose of providing immediate protection to the design integrity of the East Maricopa Floodway (EMF). The District provided a hydrologic analysis of the Queen Creek area modified for a rainfall event used to design the EMF by the Soil Conservation Services. It is our understanding, this rainfall pattern was based on the isohyetal method with a storm centered over the northern portion of the EMF. It was believed that seven large basins would be necessary to protect the design integrity of the EMF. Therefore, it was agreed to size the temporary basins based on floodwaters with full bank capacity in the EMF. This resulted in the need for one basin located at the confluence of the EMF with the Powerline Floodway.

Development of the selected alternative has resulted in the need for two additional regional detention basins (see Figure 11). One is located at the confluence of the Southern Pacific Railroad with the EMF, the other is located at the confluence of Queen Creek with the EMF. The purpose of these basins address the decrease in time for floodwaters to enter into the EMF. The regional detention basin located at the confluence of Queen Creek and the East Maricopa Floodway may provide immediate relief to the local floodplain hydraulics of the Higley Road bridge and may provide protections to the design integrity (not capacity) of the EMF.

11.2 Queen Creek and Sanoqui Wash Channel Improvements

The first phase in development of the selected alternative was to establish a proposed floodplain for Queen Creek and Sanoqui Wash (see Figure 11). Major land owners in the area expressed concern for proposing hydraulically efficient channel cross-sections. They preferred channel improvements which have a potential mixed land use purpose. In order to complete this study and project development trends in the future, Queen Creek and Sanoqui Wash channel improvements were prepared for the most hydraulically efficient cross-sections. The logic for this decision was based on providing minimum floodplain widths in accordance with the design criteria previously explained in this report.

11.2 Queen Creek and Sanoqui Wash Channel Improvements (Continued)

Aesthetically pleasing channel sections which provide mixed land uses are possible. Should developments along Queen Creek and Sanoqui Wash prefer the mixed use floodplain, it will be the developer's responsibility to modify the selected alternative hydraulic model. Modifications to the hydraulic model must document no adverse affects both downstream and upstream of the development.

Local participation is encouraged for channel improvements throughout the entire area. It is believed that without participation, piecemeal improvements will be penalizing for upstream and downstream properties. The proposed channel improvements impacts approximately 29 square miles of land within the Queen Creek area. Should Queen Creek and Sanoqui Wash channel improvements be constructed, this approximate 29 square mile area would be capable of draining by gravity to the washes. Presently, the area drains by wide overland flow with low velocities and shallow depths.

11.3 San Tan Structures

The San Tan Structures in Pinal County were first introduced to the District in 1962 (see Figure 11). A benefit/cost analysis prepared at that time, resulted in the rejection of this flood control alternative. A portion of the structures is located on Gila River Indian Reservation land. The District's previous dealings with Indian land is believed to be not feasible. The District suggested that relocation of Hunt Highway and the proposed San Tan Structures be further investigated.

The alignments and locations of the San Tan Structures recommended in 1962 are based on natural topography with minimal environmental impact to the area. As a result, we are recommending this component be developed as it was initially recommended. These structures will provide long term solutions for sediment laden floodwaters generated from the San Tan and Goldmine Mountains. In addition, the downstream flood hazard area, approximately 16 square miles, could benefit from development constraints.

11.4 Drainageways

This component provides a controlled release for Pinal County's surface water runoff through the Queen Creek area to the East Maricopa Floodway (see Figure 11). Initially it was anticipated that floodwaters could be conveyed through development of open space, buffer areas in Maricopa County. However, results produced runoff greater than shallow concentrated flooding. The drainageways component was developed as collector channels in accordance with guidelines established in Section 10.0 Design Criteria.

11.4 Drainageways (Continued)

Alignments and locations of drainageways provide a system of gravity drainage for approximately 26 square miles within Maricopa County. Channel cross-sections were designed for the most hydraulically efficient method to convey existing 100-year peak discharges from Pinal County land through Maricopa County land to the EMF. It is possible to integrate these drainageways in the design of roadway improvements. Several existing residences are affected and will need to be relocated for this component to provide benefits (see Preliminary Design Concept dated September, 1990 under separate cover).

11.5 Onsite Retention

In September of 1988, the Board of Supervisors of Maricopa County adopted a drainage regulation which requires private development to provide a retention system designed for the volume generated from the 2-hour, 100-year runoff event. This component will reduce local drainage problems in the area.

As previously discussed, Pinal County adopted a retention ordinance in August of 1990 which was implemented in September of 1990. The retention ordinance requires development to retain the 100-year, 1-hour storm. In development of the selected alternative, future land use retention for Pinal County was based on the volume generated from the 2-hour, 100-year runoff event, although current ordinances require new development to retain the 100-year, 1-hour storm.

The constraint associated with this component is that it does not provide benefit from flooding until it is 100% developed. Table D-1 (see Appendix D) shows runoff coefficients used for calculation of onsite retention. The runoff coefficients were based on typical lots for each land use. Retention calculations were tabulated and are shown in Table D-2 (see Appendix D).

12.0 SELECTED ALTERNATIVE HYDROLOGY

The HEC-1 computer model was used to establish peak discharges for the 2, 5, 10, 25, 50 and 100-year rainfall-runoff event. Table D-3 and D-4 (see Appendix D) lists the input parameters used to model the watershed. The following assumptions were used as the basis for development of the selected alternative hydrology (see Figure 9):

- The District supplied Wood & Associates with a hydrologic analysis for the Queen Creek area modified for a 100-year rainfall event centered at the northern portion of the East Maricopa Floodway (EMF). In addition, the hydraulic analysis for the EMF within the Queen Creek area was supplied. Results of these analyses documented inadequate capacity within the EMF banks. It was agreed regional detention basins would be sized for 100-year floodwaters conveyed within the EMF banks and not the design capacity (with freeboard). This resulted in the need for one basin located at the confluence with the Powerline Floodway with the providing a volume which will reduce the peak discharge entering the Queen Creek watershed. Once completed, this volume was used as input in the selected alternative HEC-1 computer model.

- Selection of Muskingham routing coefficients were chosen as follows:

  0.45 for concrete lined channels
  0.40 for paved roads
  0.25 - 0.30 for earthen channels
  0.20 for concentrated flow patterns

- Onsite retention was modeled using the diversion option of HEC-1. A volume of water was diverted for each subbasin based on 75 percent effective retention of the 100-year, 2-hour rainfall depth. Runoff coefficients were selected for each subbasin using the Projected Land Use Map (see Figure 6) prepared as a task for this study. The portions of watershed within the San Tan Mountains area and the area within Williams Air Force Base were assumed to have no onsite retention in the selected alternative hydrology.

- The curve numbers used in the existing condition hydrologic model were chosen to be the same in the selected alternative hydrologic model. In addition, the selected alternative hydrologic model includes percent of impervious connected drainage basin. The percent used was based on maximum allowable lot coverage for each projected land use.

- In order to project time of concentrations in the selected alternative hydrologic model, time of concentration for each subbasin were based on 25 percent reduction of the value used in the existing condition hydrologic model. The portions of the watershed within the San Tan Mountains area and the area within Williams Air Force Base were assumed to have no change in time of concentration in development of the selected alternative hydrology.

12.0 SELECTED ALTERNATIVE HYDROLOGY (Continued)

- Since channel improvements to Queen Creek and Sanoqui Wash resulted in a decrease of time for floodwaters to enter into the EMF, a regional detention basin was included in development of the selected alternative to address this decreased time. In addition, the drainageway along the upstream side of the SPRR also resulted in decreased time for floodwaters to enter into the EMF and a regional detention basin was also included at this location.

Table D-5 (see Appendix D) summarizes peak discharges for the 2, 5, 10, 25, 50, and 100-year rainfall event for each subbasin within the watershed. Table D-6 (see Appendix D) includes descriptions of HEC-1 reach number locations.

13.0 SELECTED ALTERNATIVE HYDRAULICS

In developing the selected alternative hydraulics, several decisions were made in order to delineate a proposed floodplain. They are summarized as follows:

- The average floodplain boundary was based on the minimum hydraulically efficient width.
- The channel improvement option (CHIMP) of the HEC-2 computer model was used in specifying bottom widths with 10:1 side slopes.
- The earthen-lined channel improvements maintain velocities below five feet per second with a minimum three feet of freeboard.
- The concrete-lined channel improvements maintain velocities below 15 feet per second with a minimum 3.5 feet of freeboard.
- Drop structures were chosen at locations where freeboard ranged between four and six feet.
- The special bridge routine option of the HEC-2 computer model was used for arterial road crossings. Many of the proposed bridges resulted in class A, low flow characteristics. It should be noted that this study does not attempt to provide drop structures and bridge details for construction but does identify locations, both vertical and horizontal, where they are needed.

The proposed floodplain delineations with water surface elevations were prepared and are shown on the topographic mapping generated for this study (see Preliminary Design Concept dated September, 1990 under separate cover).

14.0 IMPLEMENTATION PLAN

The Queen Creek Area Drainage Master Plan, with its five components addresses solutions to immediate, intermediate and future flooding conditions. Each component can be implemented in phases. With the addition of each component, an interconnected system of drainage infrastructure will be established. The following elaborates the features of each phase:

Phase I - Regional Detention Basins

Detention Basin No. STO 154 is an immediate solution for conveyance of 100-year floodwaters within the banks of the East Maricopa Floodway (EMF). Detention Basin Nos. STO 275 and STO 463 are District-owned properties which will address the increased peak discharges and the decreased times to peak once this component is implemented. It should be noted that construction of Detention Basin No. STO 463 may provide an immediate solution to Higley Road's exposed bridge piers in Queen Creek. The primary purpose of the basin component is to protect the integrity of the EMF from massive volumes of water which drain from the natural contributing watershed.

Estimated Program Cost $ 19,600,000.00

Phase II-Queen Creek and Sanoqui Wash Channel Improvements

This component is an immediate solution to shallow sheet flooding in the area and provides the potential for removing land out of current floodplains. The Town of Queen Creek has reacted most favorably to this component and they are interested in a mixed floodplain/recreational land use concept during the time of its development. This component can be considered to provide intermediate and future solutions to flooding conditions, as well. Once constructed, adjacent properties will have a more efficient means to gravity drain localized stormwater. It will also maintain riparian waterways within the area. Bridge locations have been proposed to provide emergency access to areas susceptible to flooding. Drop structures have been proposed to reduce erosive velocities and minimize bank protection requirements.

Estimated Program Cost $ 30,400,000.00

Phase III-San Tan Structures

The San Tan Structures will provide a future solution to flood hazards in the southern portion of the area. Prior to construction of this component, developments in this area will need to address these hazards. Once this component is implemented, development constraints will be significantly reduced.

Estimated Program Cost $ 26,800,000.00

14.0 IMPLEMENTATION PLAN (Continued)

Phase IV-Drainageways

This component will establish a future solution to the upstream portion of the area within Pinal County. It provides a grid system for an efficient means to gravity drain local flooding. This system will provide a tool for management of future development and will establish minimum open space areas required in the intermediate phase of development within the area. Once fully implemented, the opportunity exists for developing an underground storm drain system and reassessing required open space areas.

Estimated Program Cost $ 37,300,000.00

Phase V-Onsite Retention

This component addresses solutions to the immediate, intermediate and future stormwater problems in the area. Implementation of this component is dynamic and must begin immediately, but benefits will not be fully realized until the entire watershed has been fully developed. Once these benefits are fully realized, the study area can be reassessed. There is the potential in reduction of other components when evaluating future flooding conditions within the Queen Creek area.

Estimated Program Cost $ 0.00

Grand Total $114,100,000.00

15.0 PRELIMINARY COST ESTIMATES

The following is a preliminary cost breakdown to implement the Queen Creek Area Drainage Master Plan. These costs represent the 100-year frequency drainage infrastructure.

Phase I - Component A: Regional Detention Basin

	STO154	STO275	STO463
Land Acquisition	100 AC.	-	-
@ $20,000/AC.	$2,000,000.00	-	-
Excavation	1,452,000 C.Y.	1,694.000 C.Y.	2,259,000 C.Y.
@ $1.50/C.Y.	$2,178,000.00	$2,541.000.00	$3,388.500.00
Outlet Structures	1 EA.	1 EA.	1 EA.
@ $125,000 EA.	$ 125,000.00	$ 125,000.00	$ 125,000.00
Bank Stability	-	162,500 S.F.	-
@ $2.00/S.F.	-	$ 325,000.00	-
Landscaping	98 AC.	137 AC.	192 AC.
@ $3,000/AC.	$ 294,000.00	$ 411,000.00	$ 576,000.00
Irrigation	98 AC.	137 AC.	192 AC.
@ $7,000/AC.	$ 686,000.00	$ 959,000.00	$1,344,000.00
Contingencies @ 30%	$1,584,900.00	$1,308,300.00	$1,630,050.00
Total	$6,867.900.00	$6,669,300.00	$7,063,550.00

Estimated Program Cost $19,600,750.00

Phase II - Component C: Queen Creek and Sanoqui Wash Channel Improvements

	Queen Creek	Sanoqui Wash
Land Acquisition	AC.	___ AC.
@ $20,000/AC.	$_____	$_____
Excavation	4,200,000 C.Y.	2,100,000 C.Y.
@ $2.00/C.Y.	$8,400,000.00	$4,200,000.00
Bridges	80,000 S.F.	80,000 C.Y.
@ $50.00/s.f.	$3,923,750.00	$3,923,750.00
Drop Structures	1 EA.	3 EA.
@ $200,000 EA.	$ 200,000.00	$ 600,000.00
Concrete Lining	-	500,000 S.F.
@ $4.00/S.F.	-	$2,000,000.00
Bank Stability	50,000 S.F.	-
@ $2.00/S.F.	$ 100,000.00	-
Contingencies @ 30%	$3,787,125.00	$3,217,125.00
Total	$16,410,875.00	$13,940,875.00

Estimated Program Cost $30,351,750.00

15.0 PRELIMINARY COST ESTIMATES (Continued)

Phase III - Component B: San Tan Structures
Note: Quantities taken from Comprehensive Flood Control Program Report, 1963.

Land Acquisition		850 AC.
@ $20,000/AC.		$17,000,000.00
Embankment		1,258,000 C.Y.
@ $2.00/C.Y.		$ 2,516,000.00
Excavation		72,000 C.Y.
@ $1.50/C.Y.		$ 108,000.00
Outlet Structures		232,200 S.F.
@ $22,000/EA.		$ 928,800.00
Contingencies		
@ 30%		$ 6,192,240.00
Total	**Estimated Program Cost**	**$ 26,833,040.00**

Phase IV - Component D: Drainageways

Excavation		10,560,000 C.Y.
@ $2.00/C.Y.		$ 21,120,000.00
Drop Structures		14 EA.
@ $200,000/EA.		$ 2,800,00.00
Concrete Lining		1,188,000 S.F.
@ $4.00/S.F.		$ 4,752,000.00
Contingencies		
@ 30%		$ 8,601,600.00
Total	**Estimated Program Cost**	**$ 37,273,600.00**

Phase V - Component E: Onsite Retention/Detention

Estimated Program Cost $ 0.00

Total Estimated Program Cost $114,059,140.00

Preliminary cost estimates for the Queen Creek Area Drainage Plan were also developed for the 2, 5, -10, -25 and 50-year rainfall-runoff event. These estimates were developed based on the following assumptions:

Frequency	Percent of 100-year Frequency
2	25
5	50
10	60
25	70
50	80
100	100

15.0 PRELIMINARY COST ESTIMATES (Continued)

Preliminary Cost Estimates

COMPONENTS

Frequency	A	B	C	D	E	TOTAL
2	$ 4,900,000.00	$ 6,700,000.00	$ 7,600,000.00	$ 9,300,000.00	N/A	$ 28,500,000.00
5	$ 9,800,000.00	$ 13,400,000.00	$ 15,200,000.00	$ 18,700,000.00	N/A	$ 57,100,000.00
10	$ 11,800,000.00	$ 16,100,000.00	$ 18,200,000.00	$ 22,400,000.00	N/A	$ 68,500,000.00
25	$ 13,700,000.00	$ 18,800,000.00	$ 21,300,000.00	$ 26,100,000.00	N/A	$ 79,900,000.00
50	$ 15,000,000.00	$ 21,400,000.00	$ 24,300,000.00	$ 29,800,000.00	N/A	$ 90,500,000.00
100	$ 19,600,000.00	$ 26,800,000.00	$ 30,400,000.00	$ 37,300,000.00	N/A	$114,100,000.00

16.0 MAPS

The following maps were prepared for the Queen Creek ADMS and are described as follows:

A. A 24" x 36" sketch map of Queen Creek Area Drainage Master Study for inclusion in the report (see Figure 2).

B. A 24" x 36" sketch map of Queen Creek's alternative drainage system including the selected alternative (see Figure 3).

C. A map of the study area, one (1) inch equals 2000 feet, showing major current and proposed streets (as shown on Maricopa County Highway maps) section lines, major drainage features, railroads, presently delineated floodplains and city limits. This map serves as the base map (see Figure 4).

D. A map displaying current land use, current zoning district and government-owned land as established by Maricopa County Planning Department. Work will be shown on a reproducible map of the base map (see Figure 5).

E. A map displaying projected land use for the year 2000 as established by Maricopa County Planning Department. Work was shown on a reproducible map of the base map (see Figure 6).

F. A map displaying soil features using the Unified Soil Classification System (ASTM D2487-66T) prepared on a reproducible map of the base map (see Figure 7).

G. A map displaying the existing drainage subwatersheds as modeled by the HEC-1 computer analysis and a map for the future (selected alternative) showing the proposed drainage subwatersheds as modeled by HEC-1 (see Figures 8 and 9).

H. A map displaying project features of the final two investigated alternative drainage systems. Work was shown on a reproducible map of the base map (see Figure 10).

I. A reproducible map [one (1) inch equals 2000 feet] of the Queen Creek Area Drainage Master Plan (see Figure 11).

J. A reproducible set of drawings for Queen Creek and Sanoqui Wash showing the existing 100-year floodplain delineation. Drawings will be based on one (1) inch equals 200 feet mapping. Approximately 20 miles will be delineated (see Preliminary Design Concept dated September, 1990 under separate cover).

K. A map displaying land ownership within and adjacent to Queen Creek and Sanoqui Wash was prepared at a scale of one (1) inch equals 2000 feet. Land ownership was determined from information collected from the Maricopa County Assessor's records (see Figure 12).

17.0 RESULTS AND CONCLUSIONS

The Queen Creek Area Drainage Master Study has identified existing stormwater problems in the area. These problems are summarized as follows:

- East Maricopa Floodway does not provide adequate capacity for the 100-year rainfall-runoff event.
- Flood hazard areas associated with Queen Creek, Sanoqui Wash, the Southern Pacific Railroad, and the San Tan Mountain foothills do not promote the public health, safety and general welfare of its citizenry.
- Existing levees along Queen Creek and Sanoqui Wash in the downstream portion of the watershed have put this area in risk of greater than normal flood damage.
- Numerous areas have been identified to have serious local flooding problems.

As a result, an alternative solution to mitigate stormwater problems has been recommended in the Queen Creek area. This alternative solution includes the following components:

- Regional Detention Basins
- Queen Creek and Sanoqui Wash Channel Improvements
- San Tan Structures
- Drainageways
- Onsite Retention

These components in development of a drainage master plan will provide a solution to immediate, intermediate, and future flooding conditions in the Queen Creek area.

The Queen Creek Area Drainage Master Plan was designed at a conceptual level to develop the drainage infrastructure required to mitigate stormwater problems within the area. It attempts to maintain the integrity of existing regional flood control facilities, to maintain continuity of drainage across political boundaries, and to serve as a guideline for use in future planning and development. This plan has been developed as a dynamic tool intended to provide maximum flexibility in its acceptance, implementation and regulation.

18.0 REFERENCES

1. Federal Emergency Management Agency, Flood Insurance Rate Map, Map Numbers 040037 1600A and 040037 1825A, Effective July 2, 1979.

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); Chandler Heights, 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.

18.0 REFERENCES (Continued)

15. Wood & Associates, Inc., Flood Insurance Study for Southern Pacific Railroad, Queen Creek Area, August 1990.

16. Maricopa County Department of Planning & Development, Military Airport Zoning Ordinance for the Unincorporated Area of Maricopa County, 1978.

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

APPENDIX A

RAINFALL DOCUMENTATION

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

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

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

Return Period (Years)			Precipitation Values (inches)			
			6 hour duration		24 hour duration	
	DURATION		Map Value	Corrected Value	Map Value	Corrected Value
	1 HOUR	2 HOURS				
2	0.91	0.99	1.15	1.15	1.35	1.35
5	1.30	1.41	1.60	1.62	1.90	1.90
10	1.57	1.69	1.90	1.93	2.30	2.29
25	1.90	2.05	2.35	2.35	2.85	2.75
50	2.20	2.37	2.70	2.71	3.20	3.19
100	2.49	2.69	3.10	3.09	3.60	3.62

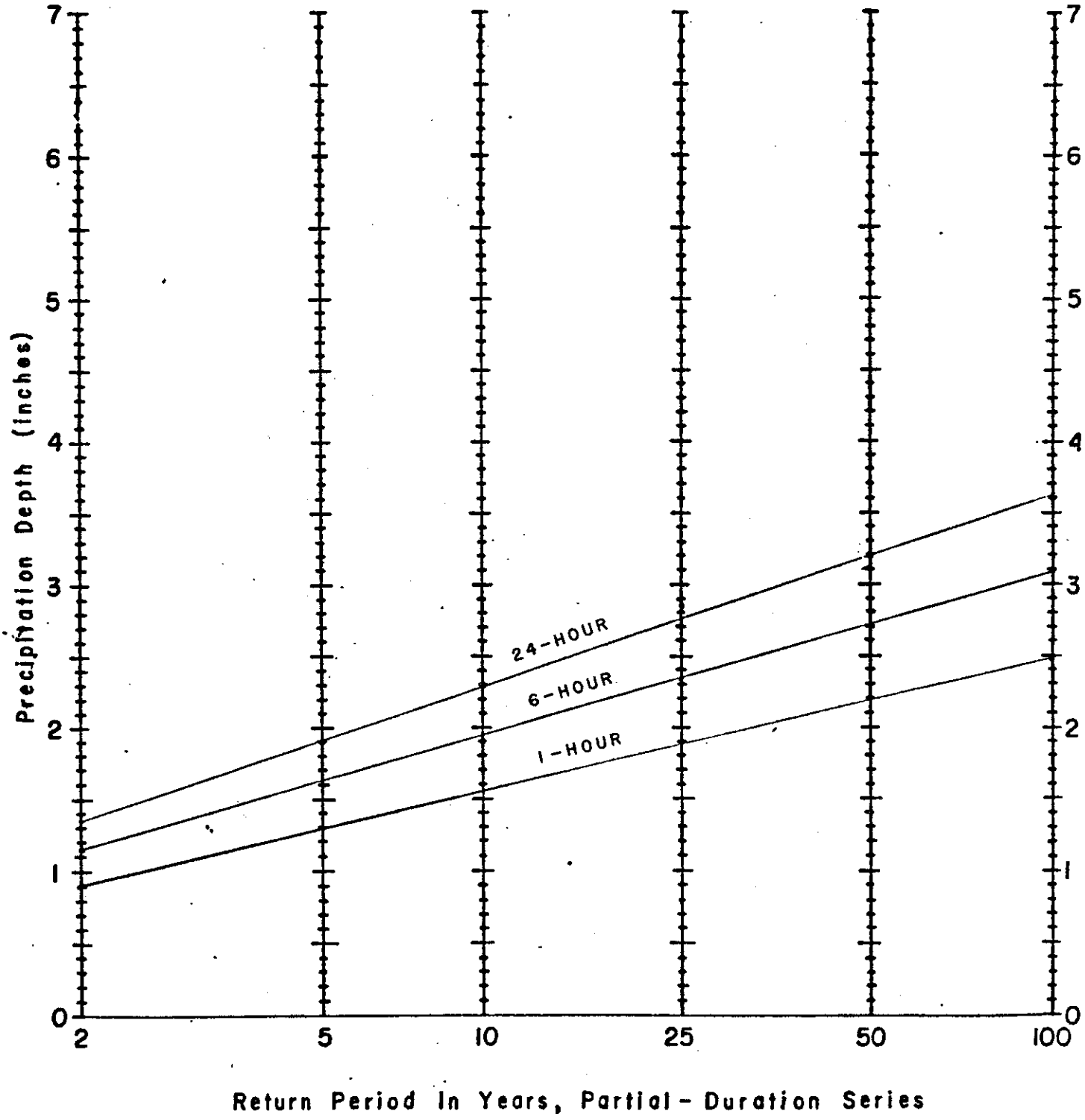
NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors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

PRECIPITATION VALUES

TABLE A-1

Project No. WA Job No. 86328

Station Queen Creek A.D.M.S.
September 11, 1986



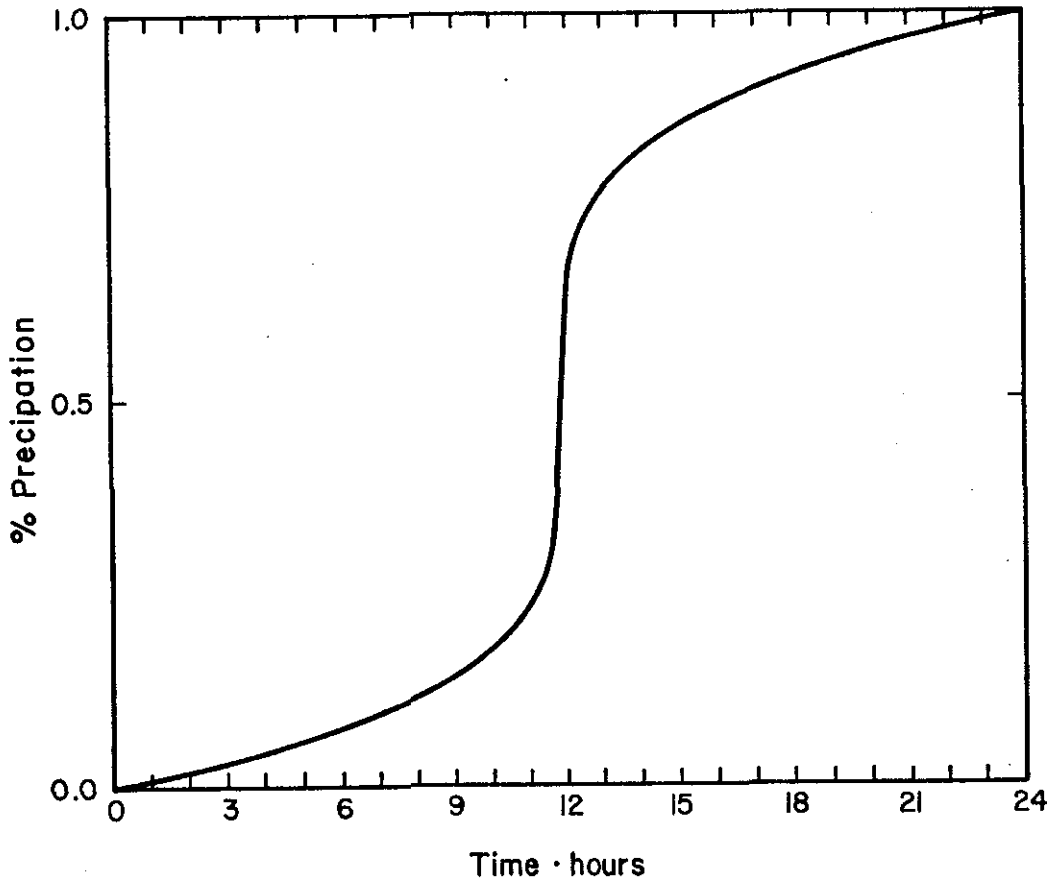
Precipitation Depth Versus Return Period for Partial-Duration Series

PRECIPITATION CURVES
FIGURE A-2

TABLE A-3

PRECIPITATION DEPTH-AREA SIMULATION DATA

TRANSPOSITION AREA (SQ. MI.)	24-HOUR PERCENT POINT PRECIPITATION	100-YEAR RAINFALL DEPTH (in.)
0	100.0	3.62
18	97.6	3.53
38	96.0	3.48
72	94.3	3.41
160	92.4	3.34
310	91.2	3.30
400	90.9	3.29



SCS TYPE II RAINFALL DISTRIBUTION

FIGURE A-4

Table A-5

SCS TYPE II CUMULATIVE RAINFALL DISTRIBUTION

100-YEAR, 24-HOUR, 15 MINUTE TIME INCREMENTS

TIME	CUMULATIVE % PRECIPITATION	TIME	CUMULATIVE % PRECIPITATION	TIME	CUMULATIVE % PRECIPITATION
0:00	0.00	8:15	0.13	16:15	0.89
0:15	0.00	8:30	0.13	16:30	0.89
0:30	0.00	8:45	0.14	16:45	0.90
0:45	0.01	9:00	0.15	17:00	0.90
1:00	0.01	9:15	0.15	17:15	0.91
1:15	0.01	9:30	0.16	17:30	0.91
1:30	0.02	9:45	0.17	17:45	0.92
1:45	0.02	10:00	0.18	18:00	0.92
2:00	0.02	10:15	0.19	18:15	0.93
2:15	0.03	10:30	0.20	18:30	0.93
2:30	0.03	10:45	0.22	18:45	0.93
2:45	0.03	11:00	0.24	19:00	0.94
3:00	0.04	11:15	0.26	19:15	0.94
3:15	0.04	11:30	0.28	19:30	0.95
3:30	0.04	11:45	0.39	19:45	0.95
3:45	0.04	12:00	0.66	20:00	0.95
4:00	0.05	12:15	0.71	20:15	0.96
4:15	0.05	12:30	0.74	20:30	0.96
4:30	0.06	12:45	0.76	20:45	0.96
4:45	0.06	13:00	0.78	21:00	0.96
5:00	0.06	13:15	0.79	21:15	0.97
5:15	0.07	13:30	0.80	21:30	0.97
5:30	0.07	13:45	0.81	21:45	0.97
5:45	0.08	14:00	0.82	22:00	0.98
6:00	0.08	14:15	0.83	22:15	0.98
6:15	0.08	14:30	0.84	22:30	0.98
6:30	0.09	14:45	0.85	22:45	0.99
6:45	0.10	15:00	0.86	23:00	0.99
7:00	0.10	15:15	0.86	23:15	0.99
7:15	0.11	15:30	0.87	23:30	1.00
7:30	0.11	15:45	0.88	23:45	1.00
7:45	0.12	16:00	0.88	24:00	1.00
8:00	0.12				

APPENDIX B

EXISTING CONDITIONS HYDROLOGY DOCUMENTATION

TABLE B-1

SCS CURVE NUMBERS BY ZONING AND SOIL TYPE

ZONING	LOT COVERAGE %	TYPE A SOIL	TYPE B SOIL	TYPE C SOIL	TYPE D SOIL
RURAL-190	5	65	78	86	89
RURAL-70	10	67	79	86	89
RURAL-43	15	68	80	87	90
R1-35	20	74	82	88	90
R1-18	25	75	84	88	91
R1-10	30	77	84	89	91
R1-8	35	78	85	89	91
R1-7	35	78	86	90	92
R1-6	40	80	86	90	92
R-2	50	83	88	92	93
R-3	50	83	88	92	93
R-4	50	83	88	92	93
R-5	50	83	88	92	93
C-S	25	98	98	98	98
C-0	35	98	98	98	98
C-1	60	98	98	98	98
C-2	60	98	98	98	98
C-3	60	98	98	98	98
IND-1	60	98	98	98	98
IND-2	60	98	98	98	98
IND-3	60	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	-	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

Source: Urban Hydrology for Small watersheds, Revised June, 1986, SCS Technical Release No. 55 (2nd Edition).

Maricopa County Zoning Ordinance, September 10, 1985.

The 1978 Military Airport Zoning Ordinance for the Unincorporated Area of Maricopa County.

TABLE B-2

SUBBASIN PARAMETERS

Existing Condition Hydrology

ID	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	Tc (hr)	Tlag (hr)	V (fps)
100	0.23	1568	1520	7600	0.63	77	2.09	1.25	1.28
102	0.43	1515	1440	12500	0.60	77	3.22	1.93	1.25
104	0.20	1492	1440	8900	0.58	77	2.45	1.47	1.23
108	1.16	1565	1490	12800	0.59	77	3.31	1.99	1.24
110	1.37	1492	1437	11500	0.48	77	3.29	1.97	1.12
116	0.68	1493	1423	17000	0.41	79	5.02	3.01	1.03
120	0.55	1423	1387	5500	0.65	79	1.43	0.86	1.30
124	1.85	1567	1468	16800	0.59	77	4.20	2.52	1.24
126	0.63	1472	1429	7500	0.57	78	2.15	1.29	1.22
130	2.28	1568	1454	18800	0.61	77	4.58	2.75	1.26
132	0.78	1465	1426	7500	0.52	83	2.24	1.34	1.16
140	0.75	1438	1407	6000	0.52	84	1.88	1.13	1.16
144	1.02	1420	1383	7600	0.49	81	2.31	1.39	1.13
148	2.02	1567	1452	20000	0.58	77	4.96	2.98	1.23
150	2.33	1560	1448	19500	0.57	77	4.88	2.93	1.22
154	2.62	1566	1445	19500	0.62	77	4.71	2.83	1.27
156	1.01	1453	1424	6000	0.48	80	1.93	1.16	1.12
160	1.02	1588	1560	9000	0.31	77	3.22	1.93	0.90
162	2.75	1563	1445	22000	0.54	77	5.58	3.35	1.19
166	1.82	1575	1520	15000	0.37	77	4.69	2.81	0.98
168	1.52	1550	1445	18400	0.57	77	4.19	2.51	1.22
172	1.01	1550	1446	18000	0.58	78	4.17	2.50	1.23
180	1.09	1430	1405	9000	0.28	81	3.38	2.03	0.85
184	1.02	1407	1384	5800	0.40	83	2.02	1.21	1.02
190	0.45	1387	1363	6000	0.40	77	2.07	1.24	1.02
196	1.91	1388	1345	14300	0.30	88	3.72	2.23	1.11
200	0.30	1392	1345	10000	0.47	77	2.60	1.56	1.11
206	0.87	1362	1327	10000	0.35	90	2.45	1.47	1.20
210	1.46	1350	1325	8500	0.29	88	2.83	1.70	1.09
222	0.93	1446	1424	6200	0.35	76	2.32	1.39	0.95
226	1.01	1428	1405	7100	0.32	78	2.65	1.59	0.92
230	1.00	1416	1389	7100	0.38	75	2.48	1.49	1.00
234	1.02	1401	1372	7200	0.40	76	2.47	1.48	1.02
238	1.32	1380	1336	12000	0.37	75	3.91	2.35	0.98
240	1.86	1550	1447	18000	0.57	77	4.54	2.72	1.22
242	0.98	1460	1430	7000	0.43	76	2.27	1.36	1.06
246	0.98	1440	1417	7000	0.33	75	2.62	1.57	0.92
250	1.00	1423	1401	7000	0.31	75	2.67	1.60	0.90
254	1.28	1401	1363	12300	0.31	77	3.93	2.36	0.90
258	3.68	1573	1460	24000	0.47	78	6.45	3.87	1.11
260	0.98	1462	1439	5600	0.41	75	2.02	1.21	1.03
264	0.99	1442	1422	6500	0.31	76	2.45	1.47	0.90
268	0.96	1420	1393	9900	0.27	76	3.78	2.27	0.84
272	0.59	1500	1463	8700	0.43	75	2.30	1.38	1.05

TABLE B-2

SUBBASIN PARAMETERS

Existing Condition Hydrology

ID	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	Tc (hr)	Tlag (hr)	V (fps)
274	1.45	1531	1461	16500	0.42	76	4.37	2.62	1.05
278	1.40	1462	1420	11500	0.37	75	3.77	2.26	0.98
290	1.17	1390	1350	11900	0.34	79	2.94	1.76	1.18
292	0.64	1350	1320	10200	0.29	77	3.66	2.20	0.88
338	1.04	1588	1559	9000	0.32	75	3.19	1.91	0.91
342	0.50	1574	1550	7900	0.30	71	2.91	1.75	0.89
346	3.19	1560	1475	22000	0.39	71	6.55	3.93	1.00
354	1.38	1570	1520	15600	0.32	80	5.20	3.12	0.91
356	4.57	1570	1511	23000	0.26	75	8.23	4.94	0.82
360	4.87	1570	1494	22000	0.35	79	6.87	4.12	0.95
364	5.79	1570	1480	28000	0.32	76	8.99	5.39	0.91
368	3.48	1570	1475	24000	0.40	75	6.98	4.19	1.02
372	3.77	1570	1452	27600	0.43	75	7.67	4.60	1.06
378	2.23	1517	1450	18700	0.36	75	5.36	3.22	0.97
394	5.28	1726	1507	13300	1.65	84	1.82	1.09	2.07
396	2.25	2130	1600	15000	3.53	87	1.41	0.85	3.03
398	2.07	1743	1505	16300	1.46	78	2.36	1.42	1.95
404	1.81	1524	1505	13600	0.14	77	6.48	3.89	0.60
408	1.34	1520	1487	16500	0.20	78	6.37	3.82	0.72
412	5.79	2130	1482	29600	2.19	80	3.48	2.09	2.39
416	5.28	2025	1472	18300	3.02	81	3.10	1.86	1.70
420	2.31	2130	1462	25300	2.64	78	2.72	1.63	2.62
424	2.36	1510	1462	23000	0.21	78	8.63	5.18	0.74
304	0.72	1450	1418	8300	0.39	82	2.31	1.39	1.00
306	0.95	1427	1403	8100	0.30	80	3.40	2.04	0.88
310	1.16	1403	1385	8000	0.23	77	4.09	2.45	0.76
314	1.14	1386	1361	11000	0.23	75	5.14	3.08	0.77
318	1.50	1371	1338	8500	0.39	77	3.51	2.11	1.01
322	1.32	1343	1319	9000	0.27	75	4.18	2.51	0.83
328	1.03	1356	1328	7500	0.37	75	2.54	1.52	0.99
330	1.14	1333	1316	10560	0.16	77	5.68	3.41	0.65
428	1.98	2362	1464	26400	3.40	80	2.49	1.49	2.98
432	1.60	1641	1467	15300	1.14	77	2.51	1.51	1.72
436	1.11	1472	1427	11500	0.39	75	4.33	2.60	1.01
440	0.79	1464	1427	9500	0.39	75	3.78	2.27	1.01
444	1.26	1461	1427	11000	0.31	77	4.57	2.74	0.90
448	1.19	1427	1405	7500	0.29	77	3.56	2.14	0.87
452	2.58	2463	1458	21300	4.72	92	1.72	1.03	3.50
454	1.02	2372	1452	10300	8.93	88	0.62	0.37	4.82
458	0.98	1467	1413	7900	0.68	75	2.82	1.69	1.33
464	1.72	1413	1384	12500	0.23	77	4.89	2.93	0.78
470	1.29	1394	1371	8100	0.28	78	3.06	1.84	0.86
474	0.86	1384	1351	11300	0.30	77	3.60	2.16	0.88
478	0.71	1382	1344	8500	0.45	77	3.36	2.02	1.08

TABLE B-2

SUBBASIN PARAMETERS

Existing Condition Hydrology

ID	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	Tc (hr)	Tlag (hr)	V (fps)
482	1.01	1351	1322	10500	0.28	77	4.60	2.76	0.85
488	1.58	2463	1450	11300	8.96	85	0.67	0.40	4.83
494	0.99	1450	1400	6500	0.77	77	1.71	1.03	1.42
500	0.46	1379	1353	6500	0.40	76	2.94	1.76	1.02
504	1.08	1353	1317	11100	0.32	78	4.52	2.71	0.92
506	0.46	1320	1310	9900	0.10	77	5.83	3.50	0.51
516	0.73	1400	1379	8300	0.25	78	3.29	1.97	0.81
520	2.66	2374	1448	10000	9.26	86	0.59	0.35	4.91
522	1.02	1448	1395	6800	0.78	77	1.77	1.06	1.42
528	2.75	2030	1452	23800	2.43	83	2.66	1.60	2.52
530	1.86	1470	1371	9000	1.10	76	2.65	1.59	1.69
536	0.99	1383	1354	9100	0.32	79	3.22	1.93	0.91
540	1.01	1360	1335	7800	0.32	76	2.64	1.58	1.07
550	1.42	1460	1342	12000	0.98	76	2.52	1.51	1.60
556	1.60	1343	1310	11500	0.29	79	4.88	2.93	0.86
544	2.21	2445	1470	17600	5.54	82	1.31	0.79	3.80
546	1.22	2920	1450	15300	9.61	83	0.87	0.52	5.00
568	1.23	1387	1326	9000	0.68	75	3.05	1.83	1.33
570	1.48	1431	1349	9500	0.86	76	2.93	1.76	1.50
574	0.91	1349	1304	6500	0.69	76	1.79	1.07	1.34
580	0.58	1360	1302	8000	0.73	80	2.06	1.24	1.37
584	0.96	1509	1300	11300	1.85	76	1.48	0.89	2.19
588	0.59	2181	1442	10300	7.17	81	0.68	0.41	4.32
590	0.77	3104	1428	13800	12.14	85	0.71	0.43	5.62
594	0.69	2665	1400	13000	9.73	85	0.74	0.44	5.03
598	0.58	2582	1380	8300	14.48	84	0.39	0.23	6.14
602	0.69	2582	1346	9300	13.29	86	0.47	0.28	5.88
606	0.63	2582	1335	11300	11.04	85	0.61	0.37	5.36
610	0.79	1600	1300	13800	2.17	78	1.65	0.99	2.38

TABLE B-3

ROUTING PARAMETERS

Existing Condition Hydrology

REACH NO.	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
101	13000	1520	1440	0.57*	17.24	0.21	0.45
107	1000	1440	1437	0.36*	15.34	0.02	0.45
109	10800	1490	1437	0.49	1.13	2.65	0.20
115	3000	1437	1423	0.56*	20.00	0.04	0.45
119	6800	1423	1387	0.56*	20.00	0.09	0.45
123	7000	1387	1363	0.45*	18.31	0.11	0.45
125	7300	1468	1429	0.53	1.18	1.72	0.20
131	6600	1454	1426	0.42	1.05	1.75	0.20
139	4600	1426	1407	0.41	1.04	1.23	0.20
143	5300	1407	1383	0.45	1.09	1.35	0.20
149	6300	1452	1424	0.44	1.08	1.62	0.20
151	5300	1448	1424	0.45	1.08	1.36	0.20
155	5300	1445	1424	0.40	1.02	1.44	0.20
161	21000	1560	1445	0.55	1.19	4.90	0.20
165	800	1445	1441	0.50	1.14	0.19	0.20
167	16500	1520	1445	0.45	1.09	4.20	0.20
175	3800	1445	1441	0.11	0.52	2.03	0.40
177	6200	1441	1424	0.27	0.84	2.05	0.40
179	5500	1424	1405	0.35	0.90	1.61	0.20
183	9900	1405	1384	0.21	0.74	3.72	0.20
187	2000	1384	1383	0.05	0.36	1.54	0.40
191	8000	1383	1363	0.25	0.81	2.74	0.40
195	4000	1363	1345	0.29*	6.68	0.17	0.45
203	4000	1345	1328	0.29*	6.68	0.17	0.45
205	3000	1328	1327	0.07*	8.44	0.10	0.45
209	3400	1327	1325	0.12*	8.84	0.11	0.45
213	4800	1325	1320	0.12	8.84	0.15	0.45
225	5400	1424	1405	0.35	0.96	1.56	0.20
229	5300	1405	1389	0.30	0.89	1.65	0.20
233	5300	1389	1372	0.32	0.91	1.62	0.20
237	10500	1372	1336	0.34	0.94	3.10	0.20
241	5300	1447	1430	0.32	0.91	1.62	0.20
245	5300	1430	1417	0.25	0.80	1.84	0.20
249	5300	1417	1401	0.30	0.89	1.65	0.20
253	10500	1401	1363	0.36	0.97	3.01	0.20
259	5600	1462	1441	0.38	0.99	1.57	0.20
263	5400	1439	1420	0.35	0.96	1.56	0.20
267	10000	1420	1393	0.27	0.84	3.31	0.20
273	10700	1463	1420	0.40	1.02	2.91	0.20
275	10600	1461	1420	0.39	1.00	2.94	0.20
281	10200	1420	1393	0.26	0.83	3.41	0.20

*Slope taken from "As-Built" drawings.

TABLE B-3

ROUTING PARAMETERS

Existing Condition Hydrology

REACH NO.	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
283	9200	1393	1363	0.33	0.92	2.78	0.20
285	6600	1363	1336	0.41	1.03	1.78	0.20
289	3800	1336	1320	0.42	1.05	1.01	0.20
291	8300	1350	1320	0.36	0.97	2.38	0.20
339	1900	1570	1559	0.58	6.53	0.08	0.25
341	2600	1559	1550	0.35	5.07	0.14	0.25
345	18000	1550	1475	0.42	3.14	1.59	0.25
349	6400	1475	1450	0.39	5.35	0.33	0.25
355	13000	1520	1511	0.07	0.42	8.60	0.20
359	7800	1511	1494	0.22	0.75	2.89	0.20
363	11600	1494	1480	0.12	0.56	5.75	0.20
367	3000	1480	1475	0.17	0.66	1.26	0.20
371	6800	1475	1452	0.34	0.94	2.01	0.20
375	1500	1452	1450	0.13	0.59	0.71	0.20
395	2500	1507	1505	0.08	0.46	1.51	0.20
397	14400	1600	1505	0.66	1.31	3.05	0.20
407	12500	1505	1487	0.15	0.63	5.51	0.20
411	3800	1487	1482	0.13	0.59	1.79	0.20
415	8400	1482	1472	0.12	0.56	4.17	0.20
419	4000	1472	1462	0.25	0.81	1.37	0.20
303	6300	1320	1319	0.02	3.61	0.48	0.30
305	6100	1418	1403	0.25	0.81	2.09	0.20
309	6900	1403	1385	0.26	0.82	2.34	0.20
313	6500	1385	1361	0.37	0.98	1.84	0.20
317	6100	1361	1338	0.38	0.99	1.71	0.20
321	8000	1338	1319	0.25	0.81	2.74	0.20
327	3000	1319	1316	0.10	8.07	0.10	0.30
329	3000	1328	1319	0.30	0.88	0.95	0.30
333	9000	1319	1316	0.03	4.42	0.57	0.30
335	9400	1316	1310	0.06	6.25	0.42	0.30
381	7600	1450	1427	0.30	7.24	0.29	0.30
383	5800	1427	1405	0.38	7.05	0.23	0.30
385	6200	1405	1384	0.34	6.54	0.26	0.30
387	7400	1384	1368	0.22	4.75	0.43	0.30
389	5400	1368	1344	0.44	6.38	0.24	0.30
391	5300	1344	1334	0.19	4.19	0.35	0.30
393	7200	1334	1322	0.17	4.45	0.45	0.30
427	9800	1462	1427	0.36	0.96	2.84	0.20
429	8000	1464	1427	0.46	1.10	2.02	0.20
433	6000	1467	1427	0.67	1.32	1.26	0.20
447	7300	1420	1405	0.21	0.92	2.20	0.20
453	6700	1458	1413	0.67	1.32	1.41	0.20
455	5300	1452	1413	0.74	1.38	1.07	0.20
461	5300	1413	1405	0.15	0.79	1.86	0.20

TABLE B-3

ROUTING PARAMETERS

Existing Condition Hydrology

REACH NO.	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
463	6400	1405	1384	0.33	0.92	1.93	0.20
469	6200	1384	1371	0.21	0.74	2.33	0.20
473	6000	1371	1351	0.33	0.93	1.79	0.20
477	3500	1351	1340	0.31	0.90	1.08	0.20
479	3700	1344	1340	0.11	0.53	1.94	0.20
481	8000	1340	1322	0.23	0.77	2.89	0.20
487	3000	1322	1317	0.17	4.45	0.19	0.30
489	5500	1450	1400	0.91	1.54	0.99	0.20
497	9200	1400	1379	0.23	1.90	1.35	0.30
499	7000	1379	1353	0.37	5.28	0.37	0.30
503	11900	1353	1317	0.30	0.89	3.71	0.20
509	7000	1317	1310	0.10	2.14	0.91	0.30
521	6800	1448	1395	0.78	1.42	1.33	0.20
525	7500	1398	1379	0.25	0.81	2.57	0.20
527	7000	1379	1354	0.36	0.96	2.03	0.20
529	11000	1452	1379	0.66	1.31	2.33	0.20
533	7500	1371	1354	0.23	0.97	2.15	0.40
539	5400	1354	1335	0.35	0.96	1.56	0.20
543	12000	1335	1310	0.21	0.74	4.50	0.20
553	10500	1342	1310	0.30	1.12	2.60	0.40
545	2000	1470	1450	1.00	1.61	0.35	0.20
549	2500	1450	1442	0.32	0.91	0.76	0.20
567	4200	1310	1306	0.10	1.56	0.75	0.30
569	6700	1326	1306	0.30	0.88	2.11	0.20
571	6000	1349	1306	0.72	1.37	1.22	0.20
579	1200	1306	1305	0.08	4.20	0.08	0.30
583	6800	1305	1300	0.07	1.25	1.51	0.30
589	1500	1442	1428	0.93	1.56	0.27	0.20
593	4000	1428	1397	0.78	1.42	0.78	0.20
597	1500	1397	1380	1.13	1.72	0.24	0.20
601	3800	1380	1346	0.89	1.53	0.69	0.20
605	2000	1346	1334	0.60	1.25	0.44	0.20
609	5000	1334	1300	0.68	1.33	1.04	0.20

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 100	604	614	624	637	652	666
RO 101	604	614	624	637	651	666
SUB 102	6	20	33	51	70	90
SUB 104	3	11	19	29	40	52
CO 106	613	643	672	712	754	799
RO 107	613	643	672	712	755	799
SUB 108	16	51	86	132	182	235
RO 109	16	51	86	132	182	235
SUB 110	19	61	102	157	217	280
CO 112	34	111	187	287	397	513
STO 113	0	10	52	155	276	430
CO 114	613	643	672	802	961	1152
RO 115	613	642	672	801	957	1164
SUB 116	10	28	44	66	89	113
CO 118	620	662	702	862	1044	1273
RO 119	620	661	702	864	1049	1262
SUB 120	18	53	86	130	176	224
CO 122	628	685	741	884	1083	1306
RO 123	628	686	742	883	1083	1303
SUB 124	22	69	115	177	244	314
RO 125	21	64	106	163	224	289
SUB 126	13	42	69	106	145	185
CO 128	26	76	124	187	255	327
SUB 130	26	80	133	204	281	362
RO 131	25	75	124	190	261	336
SUB 132	35	82	123	175	229	283
CO 134	35	93	149	224	303	387
CO 136	58	167	271	408	556	710
STO 137	0	0	0	117	297	549
RO 139	0	0	0	115	276	498
SUB 140	43	97	143	201	260	319
CO 142	42	96	141	198	293	522
RO 143	35	80	118	165	278	486
SUB 144	33	88	136	197	261	326
CO 146	59	142	215	307	401	514
SUB 148	22	67	111	171	235	302
RO 149	21	64	106	162	222	285
SUB 150	26	78	130	199	274	352
RO 151	25	76	125	191	263	338
CO 152	46	139	229	350	481	619
SUB 154	29	90	150	229	316	407
RO 155	28	86	143	219	301	387
SUB 156	32	89	141	208	277	349
CO 158	37	105	171	257	349	446
SUB 160	14	46	77	120	165	213
RO 161	12	36	59	90	124	159

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 162	28	84	139	212	292	375
CO 164	32	89	145	219	299	384
RO 165	32	89	145	219	299	384
SUB 166	21	63	105	161	221	285
RO 167	19	58	96	146	201	257
SUB 168	18	57	95	146	201	259
CO 170	28	79	128	191	260	331
SUB 172	14	42	69	105	142	182
CO 174	35	98	163	249	341	438
RO 175	35	97	160	244	335	430
CO 176	62	184	303	460	631	810
RO 177	62	183	300	455	623	801
CO 178	129	371	607	915	1251	1603
RO 179	126	362	591	891	1215	1556
SUB 180	28	71	110	160	212	266
CO 182	134	378	613	921	1254	1603
RO 183	131	367	593	889	1210	1545
SUB 184	48	117	175	247	321	396
CO 186	136	377	607	906	1230	1569
RO 187	136	375	604	902	1225	1563
CO 188	139	382	612	1006	1442	1821
STO 189	127	325	593	997	1431	1821
RO 191	126	324	588	989	1420	1808
SUB 190	8	28	47	73	101	130
CO 192	126	324	588	989	1420	1808
CO 194	726	927	1194	1594	2042	2443
RO 195	726	927	1194	1595	2041	2443
SUB 196	107	210	292	390	489	586
CO 198	736	927	1195	1596	2046	2454
SUB 200	5	16	27	41	57	73
CO 202	740	927	1195	1596	2046	2454
RO 203	740	926	1195	1595	2047	2453
HY 111	456	569	3098	5964	8938	9000
CO 204	1101	1347	4024	7184	10369	10635
RO 205	1101	1347	4037	7337	10411	10737
SUB 206	83	152	205	268	329	390
CO 208	1110	1363	4097	7466	10596	11079
RO 209	1109	1365	4146	7475	10574	11157
SUB 210	101	197	274	365	457	547
CO 212	1122	1393	4279	7674	10949	11665
RO 213	1123	1392	4314	7692	11181	11794
SUB 222	13	47	81	128	179	232
RO 225	11	40	68	107	149	194
SUB 226	19	58	96	146	199	253
CO 228	25	79	132	204	281	362
RO 229	24	74	123	188	258	333

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 230	11	43	75	121	172	226
CO 232	31	93	153	233	319	410
RO 233	29	89	147	223	305	392
SUB 234	14	49	85	135	188	245
CO 236	35	103	167	253	345	441
RO 237	34	100	163	246	336	430
SUB 238	12	41	72	115	162	213
CO 286	40	113	183	275	374	477
SUB 240	21	66	109	168	231	297
RO 241	20	62	103	158	217	278
SUB 242	14	50	87	137	191	247
CO 244	26	78	127	193	263	336
RO 245	25	75	121	184	251	321
SUB 246	10	40	72	115	162	211
CO 248	30	85	138	207	282	360
RO 249	29	84	135	203	276	353
SUB 250	11	41	72	116	163	213
CO 252	33	93	149	223	302	384
RO 253	33	91	147	220	298	380
SUB 254	16	50	84	129	178	229
CO 256	38	102	163	244	334	430
SUB 258	40	113	182	273	371	473
RO 259	40	111	179	269	365	465
SUB 260	12	48	86	138	196	257
CO 262	44	121	195	290	393	500
RO 263	43	119	190	283	383	487
SUB 264	13	48	83	131	184	239
CO 266	47	128	204	302	408	518
RO 267	46	125	199	294	396	503
SUB 268	10	35	59	93	129	167
CO 270	49	132	209	309	415	525
SUB 272	7	27	47	76	107	140
RO 273	6	22	39	62	88	114
SUB 274	14	47	81	125	175	227
RO 275	14	45	75	117	162	210
CO 276	18	61	103	161	224	291
SUB 278	12	45	79	126	177	231
CO 280	26	84	142	219	304	393
RO 281	26	81	136	209	289	374
CO 282	72	199	320	479	649	828
RO 283	71	196	315	471	639	815
CO 284	103	284	456	679	920	1172
RO 285	103	282	452	674	914	1165
CO 288	120	325	519	772	1056	1358
RO 289	120	325	518	771	1053	1353
SUB 290	24	69	112	168	227	288

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RO 291	21	58	93	139	188	239
CO 294	124	333	530	790	1078	1385
SUB 292	8	26	44	68	94	121
CO 296	124	335	533	798	1088	1398
CO 300	1197	1596	4489	7881	11410	11997
RO 303	1197	1595	4378	7563	10794	11598
SUB 304	27	68	104	148	195	242
RO 305	21	52	79	113	148	184
SUB 306	21	56	89	130	174	220
CO 308	38	95	147	213	281	351
RO 309	33	83	128	184	244	306
SUB 310	14	44	74	113	156	201
CO 312	43	108	167	244	324	406
RO 313	41	104	160	234	311	390
SUB 314	9	30	52	82	115	150
CO 316	47	121	189	276	369	466
RO 317	46	118	184	270	361	456
SUB 318	20	63	106	164	226	292
CO 320	53	134	208	303	405	511
RO 321	52	131	203	297	397	501
SUB 322	11	40	69	110	154	202
CO 324	56	140	218	317	424	535
CO 326	1239	1700	4496	7722	10987	11823
RO 327	1239	1700	4489	7707	11057	11839
SUB 328	11	43	77	123	174	228
RO 329	11	41	72	115	163	214
CO 332	1241	1707	4520	7785	11180	12025
RO 333	1241	1707	4485	7637	10797	11868
SUB 330	12	35	57	88	120	154
CO 334	1246	1719	4528	7712	10902	12004
RO 335	1246	1719	4507	7652	10760	11938
HY 337	1695	1695	1695	1695	1695	1695
RO 339	1695	1695	1695	1695	1695	1695
SUB 338	10	38	66	106	150	196
CO 340	1698	1703	1707	1712	1717	1722
RO 341	1698	1703	1707	1712	1717	1722
SUB 342	2	11	23	39	58	79
CO 344	1699	1706	1712	1719	1726	1733
RO 345	1698	1705	1710	1717	1724	1732
SUB 346	10	45	84	140	205	275
CO 348	1706	1728	1750	1779	1817	1913
RO 349	1706	1728	1749	1778	1817	1912
SUB 354	23	60	94	138	184	232
RO 355	20	52	80	117	156	196
SUB 356	27	88	148	231	321	417
CO 358	38	98	152	230	320	417

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RO 359	38	96	149	225	313	406
SUB 360	59	157	248	367	495	627
CO 362	69	193	310	464	630	804
RO 363	67	188	302	451	612	780
SUB 364	38	116	192	293	404	521
CO 366	95	256	408	604	814	1034
RO 367	94	255	406	600	810	1028
SUB 368	23	74	127	198	277	360
CO 370	106	283	448	662	890	1128
RO 371	105	280	443	654	880	1117
SUB 372	23	76	129	201	279	364
CO 374	115	305	482	710	953	1208
RO 375	115	305	481	709	952	1207
CO 376	1803	2005	2193	2438	2697	2970
SUB 378	17	57	98	154	216	282
CO 380	1810	2019	2212	2464	2730	3011
RO 381	1810	2018	2211	2464	2729	3010
RO 383	1810	2018	2211	2463	2729	3010
RO 385	1809	2018	2211	2463	2728	3009
RO 387	1809	2018	2211	2462	2728	3008
RO 389	1809	2018	2210	2462	2727	3008
RO 391	1809	2017	2210	2462	2727	3007
RO 393	1809	2017	2210	2461	2726	3006
SUB 394	302	691	1027	1439	1860	2285
RO 395	242	548	808	1133	1466	1801
SUB 396	221	452	638	861	1084	1306
RO 397	127	257	363	490	618	745
SUB 398	41	128	212	323	442	564
CO 400	149	310	443	603	765	930
CO 402	350	780	1149	1606	2704	2547
SUB 404	17	50	83	126	172	221
CO 406	361	817	1208	1696	2202	2715
RO 407	309	691	1021	1432	1857	2288
SUB 408	15	42	67	101	137	175
CO 410	318	713	1055	1480	1920	2365
RO 411	308	689	1020	1427	1852	2284
SUB 412	123	331	525	774	1036	1305
CO 414	334	740	1090	1524	1973	2429
RO 415	313	689	1014	1416	1833	2256
SUB 416	196	518	806	1178	1568	1967
CO 418	313	689	1014	1416	1833	2256
RO 419	303	669	987	1381	1785	2202
SUB 420	42	129	214	326	445	569
CO 422	303	669	987	1381	1785	2202
SUB 424	22	59	95	141	191	244
CO 426	309	682	1005	1408	1823	2250

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RO 427	300	661	973	1365	1765	2177
SUB 428	53	145	231	342	459	579
RO 429	43	115	181	267	358	452
CO 430	300	661	973	1365	1765	2177
SUB 432	26	85	143	222	308	397
RO 433	24	77	129	199	274	353
CO 434	300	661	973	1365	1785	2251
SUB 436	9	33	57	90	127	166
CO 438	300	661	973	1388	1851	2335
SUB 440	7	26	45	71	100	131
CO 442	300	661	973	1420	1894	2388
SUB 444	14	45	74	114	156	201
CO 446	300	661	1009	1484	1979	2492
RO 447	284	626	922	1329	1781	2258
SUB 448	16	50	83	129	178	230
CO 450	284	626	922	1360	1818	2304
SUB 452	384	659	866	1106	1341	1571
RO 453	303	520	683	876	1064	1248
SUB 454	188	368	509	678	846	1012
RO 455	119	231	322	430	538	644
CO 456	360	627	832	1074	1313	1547
SUB 458	10	38	68	109	154	202
CO 460	369	664	898	1179	1461	1741
RO 461	307	559	758	994	1230	1465
CO 462	353	736	1117	1618	2141	2690
RO 463	327	722	1097	1584	2092	2626
SUB 464	19	58	96	147	202	260
CO 468	338	743	1126	1626	2147	2693
RO 469	322	732	1104	1588	2092	2621
SUB 470	22	67	110	167	228	291
CO 472	327	741	1116	1604	2112	2645
RO 473	322	732	1101	1579	2079	2602
SUB 474	11	36	60	93	128	165
CO 476	324	738	1108	1590	2092	2617
RO 477	323	735	1102	1581	2079	2601
SUB 478	10	31	52	80	111	142
RO 479	9	27	45	69	95	123
CO 480	325	739	1109	1589	2091	2614
RO 481	319	726	1088	1558	2048	2559
SUB 482	12	36	59	91	125	161
CO 484	320	727	1089	1559	2050	2561
CO 486	2102	2704	3237	3936	4682	5436
RO 487	2102	2703	3237	3936	4682	5435
SUB 488	188	423	617	854	1093	1332
RO 489	131	289	421	582	745	908
SUB 494	20	67	116	181	251	324

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
CO 496	150	354	532	753	980	1210
RO 497	125	292	435	613	800	991
RO 499	118	280	420	594	774	956
SUB 500	6	20	34	54	75	97
CO 502	123	294	444	631	824	1020
RO 503	95	225	340	485	634	787
SUB 504	15	43	70	105	143	183
CO 505	104	244	369	525	688	853
CO 508	2115	2728	3270	3979	4734	5497
RO 509	2114	2726	3266	3974	4727	5489
SUB 506	5	14	23	35	48	62
CO 510	2115	2727	3267	3975	4729	5491
STO 513	2115	2726	3267	3975	4721	5481
CO 564	3266	4229	6013	8788	11910	13075
SUB 520	397	840	1199	1630	2064	2497
RO 521	264	552	785	1064	1345	1624
SUB 522	20	69	116	182	252	326
CO 524	281	604	870	1191	1516	1846
RO 525	184	402	585	808	1035	1265
SUB 514	12	36	59	90	123	158
SUB 528	107	255	382	539	703	870
RO 529	95	222	334	473	616	762
CO 526	285	640	943	1316	1705	2098
RO 527	253	571	844	1178	1522	1869
SUB 530	24	85	147	232	323	419
RO 533	23	81	140	219	306	398
SUB 536	19	55	89	133	180	229
CO 538	276	627	929	1300	1690	2084
RO 539	253	575	855	1199	1557	1923
SUB 540	13	47	81	127	177	229
CO 542	257	584	869	1218	1582	1954
RO 543	227	516	768	1080	1406	1739
SUB 550	19	67	116	183	257	334
RO 553	18	63	109	171	239	310
SUB 556	24	66	105	157	211	268
CO 558	239	540	803	1127	1467	1812
CO 566	3383	4448	6184	9052	12295	13580
RO 567	3380	4447	6175	8890	11868	13313
SUB 570	18	63	109	171	239	311
RO 571	17	59	101	158	220	286
SUB 568	12	46	81	129	182	238
RO 569	11	41	73	116	163	212
SUB 574	15	54	94	149	210	273
CO 578	3384	4457	6230	9034	12099	13635
RO 579	3384	4457	6231	9022	12109	13619
SUB 580	18	49	78	116	155	195

TABLE B-4

EXISTING CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
CO 582	3384	4457	6239	9037	12128	13645
RO 583	3380	4453	6217	8839	11646	13184
SUB 584	17	64	112	177	247	322
CO 586	3380	4453	6224	8854	11664	13210
SUB 544	118	305	468	671	881	1094
RO 545	108	271	417	601	792	986
CO 546	98	238	356	502	650	800
SUB 548	164	410	628	900	1181	1465
RO 549	147	359	544	780	1023	1271
SUB 588	39	107	169	248	329	412
CO 587	156	380	580	828	1085	1346
RO 589	152	370	564	806	1057	1311
SUB 590	86	196	287	397	509	621
CO 592	168	402	608	864	1128	1396
RO 593	159	379	573	814	1063	1315
SUB 594	77	172	252	349	448	547
CO 596	171	401	602	852	1108	1369
SUB 598	74	166	241	340	441	542
RO 597	63	142	210	295	382	469
CO 600	180	418	625	881	1145	1411
RO 601	176	408	609	858	1117	1379
SUB 602	113	234	331	448	565	681
CO 604	186	426	636	895	1162	1432
RO 605	183	418	623	875	1136	1399
SUB 606	80	179	260	359	459	558
CO 608	191	430	640	899	1167	1438
RO 609	188	424	628	881	1143	1409
SUB 610	20	63	105	160	218	279
CO 612	194	437	648	909	1178	1451
CO 614	3386	4471	6358	9124	12073	13807

TABLE B-5

EXISTING CONDITION HEC-1 ROUTING DESCRIPTION

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 101	Powerline Floodway from CAP Canal to Signal Butte Road
RO 107	Powerline Floodway from Signal Butte Road to 1/4 mile west of Signal Butte Road
RO 109	Concentrated flow through Subbasin 110
RO 115	Powerline Floodway from 1/4 mile west of Signal Butte Road to 1/8 mile east of Crismon Road
RO 119	Powerline Floodway from 1/8 mile east of Crismon Road to Ellsworth Road
RO 123	Powerline Floodway from Ellsworth Road to confluence of Williams Air Force Base diversion ditch inlet
RO 125	Concentrated flow through Subbasin 126
RO 131	Concentrated flow through Subbasin 132
RO 139	Concentrated flow through Subbasin 140
RO 143	Concentrated flow through Subbasin 144
RO 149	Concentrated flow through Subbasin 156
RO 151	Concentrated flow through Subbasin 156
RO 155	Concentrated flow through Subbasin 156
RO 161	Concentrated flow through Subbasin 162
RO 165	Concentrated flow from Subbasins 160 and 162 to diversion dike 1/4 mile west of Meridian Road
RO 167	Concentrated flow through Subbasin 168
RO 175	Concentrated flow from Subbasins 166, 168 and 172 along diversion dike 1/4 mile west of Meridian Road
RO 177	Concentrated flow from diversion dike 1/4 mile west of Meridian Road to Signal Butte Road
RO 179	Concentrated flow through Subbasin 180
RO 183	Concentrated flow along Pecos Road from Crismon Road to 1/2 mile north of Pecos Road along Ellsworth Road
RO 187	Concentrated flow from 1/2 mile north of Pecos Road along Ellsworth Road to 1/4 mile north of Chandler Boulevard
RO 191	Concentrated flow in Williams Air Force Base diversion ditch from Ellsworth Road to confluence with Powerline Floodway
RO 195	Powerline Floodway from confluence of Williams Air Force Base diversion ditch to Sossaman Road
RO 203	Powerline Floodway from Sossaman Road to confluence with East Maricopa Floodway
RO 205	East Maricopa Floodway from confluence with Powerline Floodway to 1/2 mile south of Ray Road
RO 209	East Maricopa Floodway from 1/2 mile south of Ray Road to Chandler Boulevard

TABLE B-5

EXISTING CONDITION HEC-1 ROUTING DESCRIPTION

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 213	East Maricopa Floodway from Chandler Boulevard to Southern Pacific Railroad
RO 225	Concentrated flow through Subbasin 226
RO 229	Concentrated flow through Subbasin 230
RO 233	Concentrated flow through Subbasin 234
RO 237	Concentrated flow through Subbasin 238
RO 241	Concentrated flow through Subbasin 242
RO 245	Concentrated flow through Subbasin 246
RO 249	Concentrated flow through Subbasin 250
RO 253	Concentrated flow from Ellsworth Road to Southern Pacific Railroad
RO 259	Concentrated flow through Subbasin 260
RO 263	Concentrated flow through Subbasin 264
RO 267	Concentrated flow through Subbasin 268
RO 273	Concentrated flow through Subbasin 272 to Southern Pacific Railroad
RO 275	Concentrated flow through Subbasin 274 to Southern Pacific Railroad
RO 281	Concentrated flow along Southern Pacific Railroad from Crismon Road to Queen Creek Road
RO 283	Concentrated flow along Southern Pacific Railroad from Queen Creek Road to Germann Road
RO 285	Concentrated flow along Southern Pacific Railroad from Germann Road to 1/4 mile south of Pecos Road
RO 289	Concentrated flow along Southern Pacific Railroad from 1/4 mile south of Pecos Road to Pecos Road
RO 291	Concentrated flow from the southern area of Williams Air Force Base runway to Southern Pacific Railroad and Pecos Road
RO 303	East Maricopa Floodway from Southern Pacific Railroad to Germann Road
RO 305	Concentrated flow through Subbasin 306
RO 309	Concentrated flow through Subbasin 310
RO 313	Concentrated flow through Subbasin 314
RO 317	Concentrated flow through Subbasin 318
RO 321	Concentrated flow through Subbasin 322 to the East Maricopa Floodway 1/4 mile north of Germann Road
RO 327	East Maricopa Floodway from 1/4 mile north of Germann Road to 1/2 mile north of Queen Creek Road
RO 329	Concentrated flow from Subbasin 328 to East Maricopa Floodway 1/2 mile north of Queen Creek Road
RO 333	East Maricopa Floodway from 1/2 mile north of Queen Creek Road to /14 mile south of Queen Creek Road

TABLE B-5

EXISTING CONDITION HEC-1 ROUTING DESCRIPTION

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 335	East Maricopa Floodway from 1/4 mile south of Queen Creek Road to the Queen Creek and Sanoqui Wash confluence
RO 339	Queen Creek from Rittenhouse Flood Retarding structure to the Central Arizona Project Canal
RO 341	Queen Creek from Central Arizona Project Canal to 1/4 mile west of Goldfield Road
RO 345	Queen Creek from 1/4 mile west of Goldfield Road to 1/2 mile east of Meridian Road
RO 349	Queen Creek from Meridian Road to Southern Pacific Railroad Bridge
RO 355	Concentrated flow through Subbasin 356
RO 359	Concentrated flow through Subbasin 360
RO 363	Concentrated flow through Subbasin 364
RO 367	Concentrated flow through Subbasin 368
RO 371	Concentrated flow through Subbasin 372
RO 375	Concentrated flow along Southern Pacific Railroad from 1/2 mile south of Chandler Heights Road to Queen Creek
RO 381	Queen Creek from Southern Pacific Railroad to Crismon Road
RO 383	Queen Creek from Crismon Road to Ellsworth Road
RO 385	Queen Creek from Ellsworth Road to Hawes Road
RO 387	Queen Creek from Hawes Road to Sossaman Road
RO 389	Queen Creek from Sossaman Road to Power Road
RO 391	Queen Creek from Power Road to Recker Road
RO 393	Queen Creek from Recker Road to 1/2 mile south of Queen Creek Road
RO 395	Concentrated flow from Subbasin 394
RO 397	Concentrated flow from Subbasin 396
RO 407	Concentrated flow path west of the Southern Pacific Railroad in Pinal County from Judd Road to Roberts Road
RO 411	Concentrated flow path west of the Southern Pacific Railroad in Pinal County from Roberts Road to 1/2 mile north of Roberts Road
RO 415	Concentrated flow path west of the Southern Pacific Railroad in Pinal County from 1/2 mile north of Roberts Road to 1/2 mile south of county line
RO 419	Concentrated flow path west of the Southern Pacific Railroad in Pinal County from 1/2 mile south of county line to county line
RO 427	Concentrated flow path from county line to Riggs Road

TABLE B-5

EXISTING CONDITION HEC-1 ROUTING DESCRIPTION

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 429	Concentrated flow from Subbasin 428 to Riggs Road
RO 433	Concentrated flow from Subbasin 432 to Riggs Road
RO 447	Concentrated flow from Riggs Road to Ellsworth Road
RO 453	Concentrated flow from Subbasin 452 to Riggs Road
RO 455	Concentrated flow from Subbasin 454 to Riggs Road
RO 461	Concentrated flow from Riggs Road to Ellsworth Road
RO 463	Concentrated flow from Ellsworth Road to Hawes Road
RO 469	Concentrated flow from Hawes Road to Sossaman Road
RO 473	Concentrated flow from Sossaman Road to Power Road
RO 477	Concentrated flow from Power Road to 1/4 mile south of Queen Creek Road
RO 479	Concentrated flow from Subbasin 478 to 1/4 mile south of Queen Creek Road
RO 481	Concentrated flow from 1/4 mile south of Queen Creek Road to 1/2 south of Queen Creek Road
RO 487	Concentrated flow from 1/2 mile south of Queen Creek Road to confluence with Sanoqui Wash
RO 489	Concentrated flow from Subbasin 488 to Riggs Road
RO 497	Sanoqui Wash from Riggs Road to Sossaman Road
RO 499	Sanoqui Wash from Sossaman Road to Power Road
RO 503	Sanoqui Wash from Power Road to confluence with Queen Creek
RO 509	Queen Creek and Sanoqui Wash from Ocotillo Road to East Maricopa Floodway confluence
RO 521	Concentrated flow from Subbasin 521 to Riggs Road
RO 525	Concentrated flow from Riggs Road to Chandler Heights Road
RO 527	Concentrated flow from Chandler Heights Road to Power Road
RO 529	Concentrated flow from Subbasin 528 to Chandler Heights Road
RO 533	Concentrated flow from Subbasin 530 to Power Road
RO 539	Concentrated flow from Power Road to Recker Road

TABLE B-5

EXISTING CONDITION HEC-1 ROUTING DESCRIPTION

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 543	Concentrated flow from Recker Road to confluence of East Maricopa Floodway with Queen Creek and Sanoqui Wash
RO 553	Concentrated flow from Subbasin 550 to confluence of East Maricopa Floodway with Queen Creek and Sanoqui Wash
RO 567	East Maricopa Floodway from Chandler Heights Road to 1/4 mile north of Riggs Road
RO 569	Concentrated flow from Subbasin 568 to 1/4 mile north of Riggs Road
RO 571	Concentrated flow from Subbasin 570 to 1/4 mile north of Riggs Road
RO 579	East Maricopa Floodway from 1/4 mile north of Riggs Road to north of Riggs Road
RO 583	East Maricopa Floodway from north of Riggs Road to county line
RO 545	Concentrated flow along diversion ditch from Subbasin 544 to Subbasin 546
RO 549	Concentrated flow along diversion ditch from Subbasin 546 to Subbasin 588
RO 589	Concentrated flow from Subbasin 588 to Subbasin 590
RO 593	Concentrated flow from Subbasin 590 to Subbasin 594
RO 597	Concentrated flow from Subbasin 594 to Subbasin 598
RO 601	Concentrated flow from Subbasin 598 to Subbasin 602
RO 605	Concentrated flow from Subbasin 602 to Subbasin 606
RO 609	Concentrated flow from Subbasin 606 to East Maricopa Floodway at county line

APPENDIX C

EXISTING CONDITIONS HYDRAULIC DOCUMENTATION

TABLE C-1

Flooding Source and Location	Peak Discharge (cfs) 10-year	50-year	100-year
Queen Creek from East Maricopa Floodway to Sanoqui Wash Confluence	3300	4750	5500
Queen Creek from Sanoqui Wash Confluence to County Line	2250	2750	3010

TABLE C-2

SUMMARY OF DISCHARGES

Flooding Source and Location	Peak Discharge (cfs) 10-year	50-year	100-year
Sanoqui Wash from Queen Creek Confluence to Hawes Road	1550	2950	3700
Sanoqui Wash from Hawes Road to County Line	1150	2150	2700

TABLE C-3

SUMMARY OF DISCHARGES

Flooding Source and Location	Peak Discharge (cfs) 100-year
Northeast side of Southern Pacific Railroad	
From Maricopa/Pinal County Line to South Bank of Queen Creek	1208
From North Bank of Queen Creek to Ocotillo Road	393
From Ocotillo Road to Queen Creek Road	828
From Queen Creek Road to South of Germann Road	1172
From South of Germann Road to Germann Road	1358
From Germann Road to Confluence of East Maricopa Floodway	1085
Southwest side of Southern Pacific Railroad	
From Germann Road to Confluence of East Maricopa Floodway	313

APPENDIX D

SELECTED ALTERNATIVE HYDROLOGY DOCUMENTATION

TABLE D-1

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RUNOFF COEFFICIENTS FOR USE WITH RETENTION CALCULATIONS

LAND USE	"C" VALVE
PAVED STREET OR PARKING LOT	0.95
BUILDING (ROOF AREA)	1.00
LANDSCAPED AREAS	0.70
GRASSED AREAS (SIDE & REAR YARDS)	0.35
AGRICULTURAL AREAS	0.30
PUBLIC/SEMI PUBLIC (WILLIAMS AFB)	0.00
INDUSTRIAL AREAS	0.90
LDR (P)	0.59
RR/H & GR	0.55
U & UR/L	0.72
UR/VL & MDR & MIR	0.66
SR & LDR(M)	0.64
CC	0.96
MUC	0.95
NC & MNC	0.95

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO. NEW	ID NO. OLD	*LAND USE	C	CW	AREA ACRES	AREA SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME = (CwdA)/12 (Ac.Ft.) VOLUME	75% EFFECTIVE
100	100	GR	-	0.55	147.2	0.23	2.69	15	18.1485	13.61
102	108	GR	-	0.55	742.4	1.16	"	15	91.5317	68.65
104	102									
	104	GR	-	0.55	160.0	0.25	"	15	19.7267	14.80
108	102									
	104	LDR (M)	-	0.64	243.2	0.38	"	25	34.8910	26.17
112	110	21% GI	0.90							
		50% MDR	0.66							
		29% LDR (M)	0.64	0.70	876.8	1.37	"	35	137.5845	103.19
116	116	76% GI	0.90							
		24% MDR	0.66	0.84	435.2	0.68	"	53	81.9481	61.46
120	120	GI	-	0.90	352.0	0.55	"	60	71.0160	53.26
124	126	83% LDR (M)	0.64							
		17% GI	0.90	0.68	403.2	0.63	"	31	61.4611	46.09
126	132	60% LDR (M)	0.64							
		40% GI	0.90	0.74	499.2	0.78	"	39	82.8089	62.11
130	140	GI	-	0.90	480.0	0.75	"	60	96.8400	72.63
134	180	92% GI	0.90							
		8% LDR (M)	0.64	0.88	697.6	1.09	"	57	137.6132	103.21
136	184	GI	-	0.90	652.8	1.02	"	60	131.7024	98.77
140	144	GI	-	0.90	652.8	1.02	"	60	131.7024	98.77
144	190	P/SP	-	0.00	288.0	0.45	"	--	0.00	0.00
148	200	GI	-	0.90	192.0	0.30	"	60	38.7360	29.05
150	196	P/SP	-	0.00	1222.4	1.91	"	--	0.00	0.00
158	206	P/SP	-	0.00	556.8	0.87	"	--	0.00	0.00
162	210	P/SP	-	0.00	934.4	1.46	"	--	0.00	0.00
166	272	A	-	0.30	377.6	0.59	"	10	25.3936	19.04
168	274	65% A	0.30							
		35% LDR (P)	0.59	0.40	928.0	1.45	"	14	83.5227	62.64

* See Projected Land Use Map - Exhibit E

** Source: Maricopa County Zoning Ordinance, Published by Maricopa County Department of Planning and Development as of September 10, 1985.

(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO.					AREA				VOLUME = (CwdA)/12 (Ac.Ft.)	
NEW	OLD	*LAND USE	C	CW	ACRES	SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME	75% EFFECTIVE
172	278	SR	-	0.64	896.0	1.40	2.69	25	128.5461	96.41
176	258	55% A	0.30							
		25% GR	0.55							
		20% LDR (P)	0.59	0.42	2355.2	3.68	"	13	222.0061	166.50
178	260	SR	-	0.64	627.2	0.98	"	25	89.9823	67.49
182	264	SR	-	0.64	633.6	0.99	"	25	90.9005	68.18
186	268	SR	-	0.64	614.4	0.96	"	25	88.1459	66.11
190	240	60% A	0.30							
		30% LDR (P)	0.59							
		10% GR	0.55	0.41	1190.4	1.86	"	14	109.9414	82.46
192	172	55% A	0.30							
		30% LDR (P)	0.59							
		10% GR	0.55							
		5% U	0.72	0.43	646.4	1.01	"	15	62.7423	47.06
196	242	SR	-	0.64	627.2	0.98	"	25	89.9823	67.49
200	246	MUC	-	0.95	627.2	0.98	"	35	133.5675	100.18
204	250	75% MUC	0.95							
		25% SR	0.64	0.87	640.0	1.00	"	33	124.8160	93.61
208	254	64% RR/H	0.55							
		36% SR	0.64	0.58	819.2	1.28	"	19	106.5097	79.88
212	166	GR	-	0.55	1164.8	1.82	"	15	143.6101	107.71
214	168	75% GR	0.55							
		20% A	0.30							
		10% LDR (P)	0.59							
		5% U	0.72	0.57	972.8	1.52	"	17	123.7543	92.82
218	160	GR	-	0.55	652.8	1.02	"	15	80.4848	60.36
220	162	GR	-	0.55	1760.0	2.75	"	15	216.9933	162.74
222	124	GR	-	0.55	1184.0	1.85	"	15	145.9773	109.48
224	130	GR	-	0.55	1459.2	2.28	"	15	179.9072	134.93
228	148	GR	-	0.55	1292.8	2.02	"	15	159.3914	119.54
232	150	GR	-	0.55	1491.2	2.33	"	15	183.8525	137.89

* See Projected Land Use Map - Exhibit E

** Source: Maricopa County Zoning Ordinance, Published by Maricopa County Department of Planning and Development as of September 10, 1985.

(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO. NEW	ID NO. OLD	*LAND USE	C	CW	AREA ACRES	AREA SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME = (CwdA)/12 (Ac.Ft.) VOLUME	75% EFFECTIVE
236	154	GR	-	0.55	1676.8	2.62	2.69	15	206.7354	155.05
244	156	11% SR	0.64							
		89% LDR (M)	0.64	0.64	646.4	1.01	"	25	92.7369	69.55
246	222	SR	-	0.64	595.2	0.93	"	25	85.3914	64.04
250	226	12% MUC	0.95							
		50% SR	0.64							
		38% RR/H	0.55	0.64	646.4	1.01	"	23	92.7369	69.55
254	230	88% MUC	0.95							
		12% RR/H	0.55	0.90	640.0	1.00	"	33	129.1200	96.84
258	234	MUC	-	0.95	652.8	1.02	"	35	139.0192	104.26
262	238	95% MUC	0.95							
		5% P/SP	0.00	0.90	844.8	1.32	"	36	170.4384	127.83
266	290	P/SP	-	0.00	748.8	1.17	"	--	0.00	0.00
270	290	79% MIR	0.66							
	292	21% P/SP	0.00	0.52	211.2	0.33	"	36	24.6189	18.46
274	290									
	292	MIR	-	0.66	198.4	0.31	"	30	29.3532	22.01
278	304	UR/L	-	0.72	460.8	0.72	"	35	74.3731	55.78
280	306	95% UR/L	0.72							
		5% MNC	0.95	0.73	608.0	0.95	"	35	99.4941	74.62
284	310	97% UR/L	0.72							
		3% MNC	0.95	0.73	742.4	1.16	"	35	121.4876	91.12
288	314	99% UR/L	0.72							
		1% NC	0.95	0.72	729.6	1.14	"	35	117.7574	88.32
292	318	82% UR/L	0.72							
		17% UR/VL	0.66							
		1% NC	0.95	0.71	960.0	1.50	"	34	152.7920	114.59
296	322	MIR	-	0.66	844.8	1.32	"	30	124.9882	93.74
300	328	MIR	-	0.66	659.2	1.03	"	30	97.5286	73.15
802	330	86% MIR	0.66							
		14% UR/L	0.72	0.67	620.8	0.97	"	31	93.2390	69.93

* See Projected Land Use Map - Exhibit E

** Source: Maricopa County Zoning Ordinance, Published by Maricopa County Department of Planning and Development as of September 10, 1985.

(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO. NEW	ID NO. OLD	*LAND USE	C	CW	AREA ACRES	AREA SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME = (CwdA)/12 (Ac.Ft.) VOLUME	75% EFFECTIVE
304	338	GR	-	0.55	665.6	1.04	2.69	15	82.0629	61.55
306	342	GR	-	0.55	320.0	0.50	"	15	39.4533	29.59
310	346	95% A	0.30							
		5% I	0.90	0.33	2041.6	3.19	"	13	151.0274	113.27
314	378	65% A	0.30							
		35% LDR (P)	0.59	0.40	1139.2	1.78	"	14	102.5313	76.90
318	354	85% A	0.30							
		15% GR	0.55	0.34	883.2	1.38	"	11	67.3145	50.48
320	356	65% A	0.30							
		35% GR	0.55	0.39	2924.8	4.57	"	23	255.7006	191.77
324	360	GR	-	0.55	3116.8	4.87	"	15	384.2755	288.21
328	364	60% A	0.30							
		30% GR	0.55							
		10% LDR (P)	0.59	0.40	3705.6	5.79	"	13	335.5915	251.69
332	368	A	-	0.30	2227.2	3.48	"	10	149.7792	112.33
336	372	A	-	0.30	2265.6	3.54	"	10	152.3616	114.27
340	378	58% SR	0.64							
		42% MUC	0.95	0.77	435.2	0.68	"	29	75.1191	56.34
344	444	UR/L	-	0.72	243.2	0.38	"	35	39.2525	29.44
348	448	UR/L	-	0.72	441.6	0.69	"	35	71.2742	53.46
352	464	UR/L	-	0.72	480.0	0.75	"	35	77.4720	58.10
356	470	23% RR/H	0.55							
	474	23% SR	0.64							
	478	54% UR/L	0.72	0.66	691.2	1.08	"	28	102.2630	76.70
360	470									
	474	85% UR/L	0.72							
	478	15% UR/VL	0.66	0.71	633.6	0.99	"	34	100.8427	75.63
364	482	MIR	-	0.66	646.4	1.01	"	30	95.6349	71.73
368	394	80% GR	0.55							
		20% A	0.30	0.50	3379.2	5.28	"	14	378.7520	284.06
370	396	GR	-	0.55	1440.0	2.25	"	15	177.5400	133.16

* See Projected Land Use Map - Exhibit E

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(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO. NEW	ID NO. OLD	*LAND USE	C	CW	AREA ACRES	AREA SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME = (CwdA)/12 (Ac.Ft.) VOLUME	VOLUME = (CwdA)/12 (Ac.Ft.) 75% EFFECTIVE
372	398	70% GR	0.55							
		30% A	0.30	0.48	1324.8	2.07	2.69	14	142.5484	106.91
872	404	A	-	0.30	1158.4	1.81	"	10	77.9024	58.43
376	408	70% A	0.30							
		30% GR	0.55	0.38	857.6	1.34	"	12	73.0532	54.79
380	412	70% A	0.30							
		30% GR	0.55	0.38	2393.6	3.74	"	12	203.8948	152.92
384	416	80% A	0.30							
		20% GR	0.55	0.35	1267.2	1.98	"	11	99.4224	74.57
388	424	40% GR	0.55							
		35% A	0.30							
		25% I	0.90	0.55	1292.8	2.02	"	25	159.3915	119.54
390	420	A	-	0.30	460.8	0.72	"	10	30.9888	23.24
392	428	A	-	0.30	288.0	0.45	"	10	19.3680	14.53
396	440	RR/H	-	0.55	492.8	0.77	"	15	60.7581	45.57
398	436	RR/H	-	0.55	723.2	1.13	"	15	89.1645	66.87
402	458	RR/H	-	0.55	627.2	0.98	"	15	77.3285	58.00
404	424	A	-	0.30	217.6	0.34	"	10	14.6336	10.97
406	444	78% UR/L	0.72							
		22% MUC	0.95	0.77	563.2	0.88	"	35	97.2130	72.91
410	448	UR/L		0.72	320.0	0.50	"	35	51.6480	38.74
412	432	75% A	0.30							
		25% GR	0.55	0.36	390.4	0.61	"	11	31.5053	23.63
414	452	75% GR	0.55							
		25% A	0.30	0.49	115.2	0.18	"	11	12.6537	9.49
418	454	GR	-	0.55	76.8	0.12	"	15	9.4688	7.10
424	488	GR	-	0.55	83.2	0.13	"	15	10.2578	7.69
426	488									
	520	GR	-	0.55	38.4	0.06	"	15	4.7344	3.55
430	494	RR/H	-	0.55	633.6	0.99	"	15	78.1176	58.59
434	464	SR	-	0.64	620.8	0.97	"	25	89.0641	66.80

* See Projected Land Use Map - Exhibit E

** Source: Maricopa County Zoning Ordinance, Published by Maricopa County Department of Planning and Development as of September 10, 1985.

(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO. NEW	ID NO. OLD	*LAND USE	C	CW	AREA ACRES	AREA SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME = (CwdA)/12 (Ac.Ft.) VOLUME	75% EFFECTIVE
838	516	RR/H	-	0.55	467.2	0.73	2.69	15	57.6019	43.20
438	522	RR/H	-	0.55	652.8	1.02	"	15	80.4848	60.36
440	470									
	474	76% SR	0.64							
	478	24% RR/H	0.55	0.62	505.6	0.79	"	23	70.2700	52.70
444	530	27% RR/H	0.55							
		65% UR/VL	0.66							
		8% NC	0.95	0.65	1049.6	1.64	"	26	152.9355	114.70
446	536	85% RR/H	0.55							
		15% UR/L	0.72	0.58	633.6	0.99	"	18	82.3786	61.78
448	500	5% MNC	0.95							
		61% UR/L	0.72							
		34% RR/H	0.55	0.67	294.4	0.46	"	28	44.2164	33.16
452	550	5% NC	0.95							
		65% SR	0.64							
		30% UR/VL	0.66	0.66	876.8	1.37	"	27	129.7225	97.29
454	540	1% CC	0.96							
		3% MNC	0.95							
		72% UR/L	0.72							
		24% RR/H	0.55	0.69	646.4	1.01	"	30	99.9819	74.99
458	504	2% MNC	0.95							
		75% MIR	0.66							
		23% UR/L	0.72	0.68	691.2	1.08	"	31	105.3619	79.02
462	330									
	506	UR/L	-	0.72	294.4	0.46	"	35	47.5162	35.64
466	556	UR/L	-	0.72	1024.0	1.60	"	35	165.2736	123.96
468	330									
	506	UR/L	-	0.72	108.8	0.17	"	35	17.5603	13.17
472	568	SR	-	0.64	787.2	1.23	"	25	112.9370	84.70
474	574	SR	-	0.64	582.4	0.91	"	25	83.5550	62.67

* See Projected Land Use Map - Exhibit E

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(M) Maricopa County (P) Pinal County

TABLE D-2

HYDROLOGY SELECTED (ALTERNATIVE) CONDITIONS

RETENTIONS CALCULATIONS

ID NO.					AREA				VOLUME = (CwdA)/12 (Ac.Ft.)	
NEW	OLD	*LAND USE	C	CW	ACRES	SQ. MILES	d (inches)	% (Percent) **COVERAGE	VOLUME	75% EFFECTIVE
478	570	66% UR/VL	0.66							
		34% SR	0.64	0.65	947.2	1.48	2.69	28	138.0149	103.51
480	580	SR	-	0.64	396.8	0.62	"	25	56.9276	42.70
486	584	SR	-	0.64	665.6	1.04	"	25	99.3111	74.48

* See Projected Land Use Map - Exhibit E

** Source: Maricopa County Zoning Ordinance, Published by Maricopa County Department of Planning and Development as of September 10, 1985.

(M) Maricopa County (P) Pinal County

TABLE D-3

SUBBASIN PARAMETERS

Selected Alternative Hydrology

I.D. NEW	NO. OLD	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	EXISTING CONDITION Tc (hr)	Tlag (hr)	V (fps)	% IMPERVIOUS	SELECTED ALTERNATIVE Tc (hr)	Tlag (hr)
100	100	0.23	1568	1520	7600	0.63	77	2.09	1.25	1.28	0.15	1.57	0.94
102	108	1.16	1565	1490	12800	0.59	77	3.31	1.99	1.24	0.15	2.48	1.49
104	102												
	104	0.25	1515	1472	6000	0.72	77	1.66	1.00	1.37	0.15	1.25	0.75
108	102												
	104	0.38	1482	1440	7200	0.58	77	1.86	1.12	1.41	0.25	1.40	0.84
112	110	1.37	1492	1437	11500	0.48	77	3.29	1.97	1.12	0.35	2.47	1.48
116	116	0.68	1493	1423	17000	0.41	79	5.02	3.01	1.03	0.60	3.77	2.26
120	120	0.55	1423	1387	5500	0.65	79	1.43	0.86	1.30	0.60	1.07	0.64
124	126	0.63	1472	1429	7500	0.57	78	2.15	1.29	1.22	0.31	1.61	0.97
126	132	0.78	1465	1426	7500	0.52	83	2.24	1.34	1.16	0.39	1.68	1.01
130	140	0.75	1438	1407	6000	0.52	84	1.88	1.13	1.16	0.60	1.41	0.85
134	180	1.09	1430	1405	9000	0.28	81	3.38	2.03	0.85	0.58	2.54	1.52
136	184	1.02	1407	1384	5800	0.40	83	2.02	1.21	1.02	0.60	1.52	0.91
140	144	1.02	1420	1383	7600	0.49	81	2.31	1.39	1.13	0.60	1.73	1.04
144	190	0.45	1387	1363	6000	0.40	77	2.07	1.24	1.02	--	2.07	1.24
148	200	0.30	1392	1345	10000	0.47	77	2.60	1.56	1.11	0.60	1.95	1.17
150	196	1.91	1388	1345	14300	0.30	88	3.72	2.23	1.11	--	3.72	2.23
158	206	0.87	1362	1327	10000	0.35	90	2.45	1.47	1.20	--	2.45	1.47
162	210	1.46	1350	1325	8500	0.29	88	2.83	1.70	1.09	--	2.83	1.70
166	272	0.59	1500	1463	8700	0.43	75	2.30	1.38	1.05	0.10	1.73	1.04
168	274	1.45	1531	1461	16500	0.42	76	4.37	2.62	1.05	0.14	3.28	1.97
172	278	1.40	1462	1420	11500	0.37	75	3.77	2.26	0.98	0.25	2.83	1.70
176	258	3.68	1573	1460	24000	0.47	78	6.45	3.87	1.11	0.13	4.84	2.90
178	260	0.98	1462	1439	5600	0.41	75	2.02	1.21	1.03	0.25	1.52	0.91
182	264	0.99	1442	1422	6500	0.31	76	2.45	1.47	0.90	0.25	1.84	1.10
186	268	0.96	1420	1393	9900	0.27	76	3.78	2.27	0.84	0.25	2.84	1.70
190	240	1.86	1550	1446	18200	0.57	77	4.54	2.72	1.22	0.14	3.41	2.04
192	172	1.01	1550	1446	18000	0.58	78	4.17	2.50	1.23	0.15	3.13	1.88
196	242	0.98	1460	1430	7000	0.43	76	2.27	1.36	1.06	0.25	1.70	1.02

TABLE D-3

SUBBASIN PARAMETERS

Selected Alternative Hydrology

I.D. NEW	NO. OLD	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	EXISTING CONDITION Tc (hr)	Tlag (hr)	V (fps)	% IMPERVIOUS	SELECTED ALTERNATIVE Tc (hr)	Tlag (hr)
200	246	0.98	1440	1417	7000	0.33	75	2.62	1.57	0.92	0.35	1.97	1.18
204	250	1.00	1423	1401	7000	0.31	75	2.67	1.60	0.90	0.33	2.00	1.20
208	254	1.28	1401	1363	12300	0.31	77	3.93	2.36	0.90	0.19	2.95	1.77
212	166	1.82	1575	1520	15000	0.37	77	4.69	2.81	0.98	0.15	3.52	2.11
214	168	1.52	1550	1445	18400	0.57	77	4.19	2.51	1.22	0.17	3.14	1.89
218	160	1.02	1588	1560	9000	0.31	77	3.22	1.93	0.90	0.15	2.42	1.45
220	162	2.75	1563	1445	22000	0.54	77	5.58	3.35	1.19	0.15	4.19	2.51
222	124	1.85	1567	1468	16800	0.59	77	4.20	2.52	1.24	0.15	3.15	1.89
224	130	2.28	1568	1454	18800	0.61	77	4.58	2.75	1.26	0.15	3.44	2.06
228	148	2.02	1567	1452	20000	0.58	77	4.96	2.98	1.23	0.15	3.72	2.23
232	150	2.33	1560	1448	19500	0.57	77	4.88	2.93	1.22	0.15	3.66	2.20
236	154	2.62	1566	1445	19500	0.62	77	4.71	2.83	1.27	0.15	3.53	2.12
244	156	1.01	1453	1424	6000	0.48	80	1.93	1.16	1.12	0.25	1.45	0.87
246	222	0.93	1446	1424	6200	0.35	76	2.32	1.39	0.95	0.25	1.74	1.04
250	226	1.01	1428	1405	7100	0.32	78	2.65	1.59	0.92	0.23	1.99	1.19
254	230	1.00	1416	1389	7100	0.38	75	2.48	1.49	1.00	0.33	1.86	1.12
258	234	1.02	1401	1372	7200	0.40	76	2.47	1.48	1.02	0.35	1.85	1.11
262	238	1.32	1380	1336	12000	0.37	75	3.91	2.35	0.98	0.36	2.93	1.76
266	290	1.17	1390	1350	11900	0.34	79	2.94	1.76	1.18	--	2.94	1.76
270	292	0.33	1350	1330	6800	0.29	77	2.59	1.55	0.88	0.36	1.94	1.16
274	292	0.31	1332	1320	4700	0.26	77	2.03	1.22	0.82	0.30	1.52	0.91
278	304	0.72	1450	1418	8300	0.39	82	2.31	1.39	1.00	0.35	1.73	1.04
280	306	0.95	1427	1403	8100	0.30	80	3.40	2.04	0.88	0.35	2.55	1.53
284	310	1.16	1403	1385	8000	0.23	77	4.09	2.45	0.76	0.35	3.07	1.84
288	314	1.14	1386	1361	11000	0.23	75	5.14	3.08	0.77	0.35	3.86	2.31
292	318	1.50	1371	1338	8500	0.39	77	3.51	2.11	1.01	0.34	2.63	1.58
296	322	1.32	1343	1319	9000	0.27	75	4.18	2.51	0.83	0.30	3.14	1.88
300	328	1.03	1356	1328	7500	0.37	75	2.54	1.52	0.99	0.30	1.91	1.14
802	330	0.97	1333	1317	8600	0.19	77	3.47	2.08	0.70	0.31	2.60	1.56
304	338	1.04	1588	1559	9000	0.32	75	3.19	1.91	0.91	0.15	2.39	1.44

TABLE D-3

SUBBASIN PARAMETERS

Selected Alternative Hydrology

I.D. NEW	NO. OLD	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	EXISTING CONDITION Tc (hr)	Tlag (hr)	V (fps)	% IMPERVIOUS	SELECTED ALTERNATIVE Tc (hr)	Tlag (hr)
306	342	0.50	1574	1550	7900	0.30	71	2.91	1.75	0.89	0.15	2.18	1.31
310	346	3.19	1560	1475	22000	0.39	71	6.55	3.93	1.00	0.13	4.91	2.95
314	378	1.78	1517	1465	15000	0.35	75	4.39	2.63	0.95	0.14	3.29	1.97
318	354	1.38	1570	1520	15600	0.32	80	5.20	3.12	0.91	0.11	3.90	2.34
320	356	4.57	1570	1511	23000	0.26	75	8.23	4.94	0.82	0.23	6.17	3.70
324	360	4.87	1570	1494	22000	0.35	79	6.87	4.12	0.95	0.15	5.15	3.09
328	364	5.79	1570	1480	28000	0.32	76	8.99	5.39	0.91	0.13	6.74	4.05
332	368	3.48	1570	1475	24000	0.40	75	6.98	4.19	1.02	0.10	5.24	3.14
336	372	3.54	1570	1465	24600	0.43	75	6.89	4.13	1.06	0.10	5.17	3.10
340	378	0.68	1465	1450	5200	0.29	75	1.66	1.00	0.87	0.29	1.25	0.75
344	444	0.38	1454	1427	8500	0.32	77	3.76	2.26	0.91	0.35	2.82	1.69
348	448	0.69	1431	1405	7300	0.36	77	3.26	1.96	0.97	0.35	2.45	1.47
352	464	0.75	1408	1384	7600	0.32	77	2.76	1.66	0.91	0.35	2.07	1.24
356	470												
	474												
	478	1.08	1388	1371	9400	0.18	77	4.28	2.57	0.68	0.28	3.21	1.93
360	474												
	478	0.99	1371	1344	7600	0.36	77	3.37	2.02	0.96	0.34	2.53	1.52
364	482	1.01	1351	1322	10500	0.28	77	4.60	2.76	0.85	0.30	3.45	2.07
368	394	5.28	1726	1507	13300	1.65	84	1.82	1.09	2.07	0.14	1.37	0.82
370	396	2.25	2130	1600	15000	3.53	87	1.41	0.85	3.03	0.15	1.06	0.63
372	398	2.07	1739	1505	16300	1.46	78	2.36	1.42	1.95	0.14	1.77	1.06
872	404	1.81	1524	1505	13600	0.14	77	6.48	3.89	0.60	0.10	4.86	2.92
376	408	1.34	1520	1487	16500	0.20	78	6.37	3.82	0.72	0.12	4.78	2.87
380	412	3.74	1610	1482	18500	0.69	80	3.83	2.30	1.34	0.12	2.87	1.72
384	416	1.98	1525	1472	11000	0.48	81	2.73	1.64	1.12	0.11	2.05	1.23
388	424	2.02	1510	1462	23000	0.21	78	8.63	5.18	0.74	0.25	6.47	3.88
390	420	0.72	1505	1462	6700	0.64	78	1.44	0.86	1.29	0.10	1.08	0.65
392	428	0.45	1505	1464	5500	0.75	80	1.10	0.66	1.39	0.10	0.83	0.50

TABLE D-3

SUBBASIN PARAMETERS

Selected Alternative Hydrology

I.D. NEW	NO. OLD	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	EXISTING CONDITION Tc (hr)	Tlag (hr)	V (fps)	% IMPERVIOUS	SELECTED ALTERNATIVE Tc (hr)	Tlag (hr)
396	440	0.77	1464	1427	9000	0.41	75	3.60	2.16	1.03	0.15	2.70	1.62
398	436	1.13	1472	1427	11500	0.39	75	4.33	2.60	1.01	0.15	3.25	1.95
402	458	0.98	1467	1413	7900	0.68	75	2.82	1.69	1.33	0.15	2.12	1.27
404	424	0.34	1480	1462	6000	0.30	78	2.15	1.29	0.88	0.10	1.61	0.97
406	444	0.88	1461	1431	10500	0.29	77	4.52	2.71	0.87	0.35	3.39	2.03
410	448	0.50	1427	1412	5800	0.26	77	3.13	1.88	0.82	0.35	2.35	1.41
412	432	0.61	1505	1467	6200	0.61	77	1.37	0.82	1.26	0.11	1.03	0.62
414	452	0.18	1484	1458	3500	0.74	92	0.70	0.52	1.39	0.11	0.52	0.31
418	454	0.12	1478	1452	3400	0.76	88	0.67	0.40	1.41	0.15	0.50	0.30
424	488	0.13	1467	1440	3900	0.69	85	0.81	0.49	1.34	0.15	0.61	0.36
426	488												
	520	0.06	1450	1440	4600	0.22	85	1.70	1.02	0.75	0.15	1.28	0.77
430	494	0.99	1450	1400	6500	0.77	77	1.71	1.03	1.42	0.15	1.28	0.77
434	464	0.97	1413	1394	7400	0.26	77	2.95	1.77	0.82	0.25	2.21	1.33
438	522	1.02	1448	1395	6800	0.78	77	1.77	1.06	1.42	0.15	1.33	0.80
838	516	0.73	1400	1379	8300	0.25	78	3.29	1.97	0.81	0.15	2.47	1.48
440	470	0.79	1394	1379	7200	0.21	78	3.14	1.89	0.74	0.23	2.36	1.41
444	530	1.64	1452	1371	9500	0.85	76	2.94	1.76	1.49	0.26	2.21	1.32
446	536	0.99	1383	1354	9100	0.32	79	3.22	1.93	0.91	0.18	2.42	1.45
448	500	0.46	1379	1353	6500	0.40	76	2.94	1.76	1.02	0.28	2.21	1.32
452	550	1.37	1445	1342	12000	0.86	76	2.66	1.60	1.50	0.27	2.00	1.20
454	540	1.01	1360	1335	7800	0.32	76	2.64	1.58	1.07	0.30	1.98	1.19
458	504	1.08	1353	1317	11100	0.32	78	4.52	2.71	0.92	0.31	3.39	2.03
462	330												
	506	0.46	1323	1312	6000	0.18	77	2.89	1.73	0.68	0.35	2.17	1.30
466	556	1.60	1343	1310	11500	0.29	79	4.88	2.93	0.86	0.35	3.66	2.20
468	506	0.17	1316	1310	6200	0.10	77	3.82	2.29	0.51	0.35	2.87	1.72
472	568	1.23	1387	1326	9000	0.68	75	3.05	1.83	1.33	0.25	2.29	1.37
474	574	0.91	1349	1304	6500	0.69	76	1.79	1.07	1.34	0.25	1.34	0.81

TABLE D-3

SUBBASIN PARAMETERS

Selected Alternative Hydrology

I.D. NEW	NO. OLD	BASIN AREA (sq mi)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	LENGTH (ft)	SLOPE %	CN	EXISTING CONDITION Tc (hr)	Tlag (hr)	V (fps)	% IMPERVIOUS	SELECTED ALTERNATIVE Tc (hr)	Tlag (hr)
478	570	1.48	1431	1349	9500	0.86	76	2.93	1.76	1.50	0.28	2.20	1.32
480	580	0.62	1509	1305	9800	2.08	80	1.20	0.72	2.33	0.25	0.90	0.54
486	584	1.04	1509	1300	11000	1.90	76	1.42	0.85	2.22	0.25	1.07	0.64
700	412	2.05	2130	1525	20900	2.89	80	2.15	1.29	2.74	-	-	-
702	416	3.30	2025	1505	12300	4.23	81	1.06	0.64	3.32	-	-	-
704	420	1.59	2130	1504	17400	3.60	78	1.61	0.97	3.06	-	-	-
706	428	1.53	2362	1504	20500	4.19	80	1.76	1.06	3.30	-	-	-
708	432	0.99	1641	1488	11200	1.37	77	1.69	1.01	1.89	-	-	-
710	452	2.40	2463	1478	10400	9.47	92	0.60	0.36	4.97	-	-	-
712	454	0.90	2372	1467	7600	11.91	88	0.40	0.24	5.57	-	-	-
714	488	1.42	2463	1445	9700	10.49	85	0.54	0.32	5.23	-	-	-
716	520	2.63	2374	1445	9800	9.48	86	0.57	0.34	4.97	-	-	-
718	528	2.86	2030	1446	23800	2.45	83	2.65	1.59	2.53	-	-	-
720	544	2.32	2445	1445	17700	5.65	82	1.31	0.79	3.84	-	-	-
722	546	1.26	2920	1444	17300	8.53	83	1.04	0.62	4.71	-	-	-
726	588	0.60	2181	1442	10300	7.17	81	0.69	0.41	4.32	-	-	-
730	590	0.77	3104	1428	13800	12.14	85	0.71	0.43	5.62	-	-	-
734	594	0.69	2665	1400	13000	9.73	85	0.74	0.44	5.03	-	-	-
738	598	0.58	2582	1380	8300	14.48	84	0.39	0.23	6.14	-	-	-
742	602	0.57	2582	1346	9300	13.29	86	0.47	0.28	5.88	-	-	-
746	606	0.63	2582	1335	11300	11.04	85	0.61	0.37	5.36	-	-	-
750	610	0.79	1600	1300	13800	2.17	78	1.65	0.99	2.38	-	-	-

TABLE D-4

ROUTING PARAMETERS

Selected Alternative Hydrology

REACH NO. NEW	REACH NO. OLD	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
101	101	6500	1520	1472	0.57	17.24	0.10	0.45
103	109	4500	1490	1472	0.31*	3.39	0.37	0.30
107	101	6500	1472	1440	0.57	17.24	0.10	0.45
111	107	1000	1440	1437	0.36	15.34	0.02	0.45
115	115	3000	1437	1423	0.56	20.00	0.04	0.45
119	119	6800	1423	1387	0.56	20.00	0.09	0.45
123	123	7000	1387	1363	0.45	18.31	0.11	0.45
125	125	1500	1429	1426	0.20*	0.91	0.46	0.40
131	139	4900	1426	1407	0.39	1.27	1.07	0.40
133	143	5300	1407	1383	0.45	1.37	1.07	0.40
135	183	10600	1405	1384	0.20	0.90	3.27	0.40
139	187	1200	1384	1383	0.08	0.59	0.56	0.40
145	191	8000	1383	1363	0.25	1.02	2.18	0.40
147	195	4000	1363	1345	0.29	6.68	0.17	0.45
153	203	4000	1345	1328	0.29	6.68	0.17	0.45
157	205	3000	1328	1327	0.03	12.00**	0.07	0.30
161	209	3400	1327	1325	0.06	12.00**	0.08	0.30
165	213	4800	1325	1320	0.10	5.00**	0.27	0.30
167	-	2800	1463	1461	0.10*	2.23	0.36	0.30
171	275	8500	1461	1420	0.25*	3.48	0.68	0.30
175	281	10300	1420	1393	0.30*	3.81	0.75	0.30
177	259	5300	1460	1439	0.27*	3.31	0.44	0.30
181	263	5300	1439	1422	0.40*	3.77	0.39	0.30
185	267	8400	1422	1393	0.34*	3.59	0.65	0.30
189	283	9200	1393	1363	0.34*	4.75	0.54	0.30
195	241	5300	1446	1430	0.34*	3.95	0.37	0.30
199	245	5300	1430	1417	0.28*	3.68	0.40	0.30
203	249	5300	1417	1401	0.28*	3.68	0.40	0.30
207	253	10500	1401	1363	0.33*	3.89	0.75	0.30
211	285	6500	1363	1336	0.32*	4.64	0.39	0.30
213	167	18000	1520	1445	0.42	1.31	3.82	0.40
217	165	2400	1445	1445	0.09*	2.35	0.28	0.30
219	161	21000	1560	1445	0.55	1.50	3.89	0.40
223	-	6700	1468	1454	0.21*	2.86	0.65	0.30
227	-	2200	1454	1454	0.27*	3.68	0.17	0.30
231	-	1200	1454	1452	0.27*	4.07	0.08	0.30
235	-	1500	1452	1445	0.27*	3.55	0.12	0.30
243	155	5300	1445	1424	0.32*	4.80	0.31	0.30
249	179	5300	1424	1405	0.32*	4.80	0.31	0.30
253	183	5300	1405	1389	0.14*	12.14	0.12	0.45

*Slopes taken from design of "Drainageways".
**Velocity taken from HEC-2 computer model.

TABLE D-4

ROUTING PARAMETERS

Selected Alternative Hydrology

REACH NO. NEW	REACH NO. OLD	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
257	233	5300	1389	1372	0.14*	12.14	0.12	0.45
261	237	5300	1372	1350	0.14*	12.14	0.12	0.45
265	289	2400	1336	1330	0.32*	4.64	0.14	0.30
269	291	6800	1350	1330	0.32*	4.80	0.39	0.30
273	-	1600	1330	1320	0.16*	4.69	0.09	0.30
277	303	6300	1320	1319	0.02	5.50**	0.32	0.30
279	305	6500	1418	1403	0.23	0.98	1.84	0.40
283	309	6700	1403	1385	0.27	1.05	1.77	0.40
287	313	6600	1385	1361	0.36	1.23	1.49	0.40
291	317	6500	1361	1338	0.35	1.21	1.49	0.40
295	321	11500	1338	1319	0.17	0.83	3.85	0.40
299	327	3000	1319	1317	0.07	4.50**	0.19	0.30
301	329	9400	1328	1317	0.12	0.70	3.73	0.40
305	339							
	341	4500	1570	1550	0.44	5.68	0.22	0.30
309	345	18000	1550	1475	0.42	3.14	1.59	0.30
313	349	3180	1475	1465	0.31	5.35	0.17	0.30
317	349	3265	1465	1450	0.46	5.79	0.16	0.30
319	355	13000	1520	1511	0.07	0.53	6.81	0.40
323	359	7800	1511	1494	0.22	0.95	2.28	0.40
327	363	11600	1494	1480	0.12	0.71	4.54	0.40
331	367	3000	1480	1475	0.17	0.83	1.00	0.40
335	371	3200	1475	1465	0.31	1.14	0.78	0.40
339	371	5200	1465	1450	0.13*	2.94	0.49	0.30
343	381	7750	1450	1427	0.30	5.99**	0.36	0.30
347	383	5995	1427	1405	0.37	4.55**	0.37	0.30
351	385	6345	1405	1384	0.33	4.45**	0.40	0.30
355	387	7120	1384	1371	0.18	4.95**	0.40	0.30
359	389	5198	1371	1344	0.52	4.98**	0.29	0.30
363	391							
	393	12505	1344	1322	0.18	4.15**	0.84	0.30
367	487	3005	1322	1317	0.17	3.14**	0.26	0.30
369	395	2500	1507	1505	0.08	0.57	1.22	0.40
371	397	14400	1600	1505	0.66	1.65	2.42	0.40
375	407	12500	1505	1487	0.14	0.77	4.51	0.40
379	411	3800	1487	1482	0.13	0.74	1.43	0.40
383	415	8400	1482	1472	0.12	0.70	3.33	0.40
387	419	4800	1472	1462	0.21	0.93	1.43	0.40
393	-	800	1464	1462	0.25*	3.11	0.07	0.30
395	427	10115	1462	1427	0.35	4.96**	0.57	0.30

*Slopes taken from design of "Drainageways".
**Velocity taken from HEC-2 computer model.

TABLE D-4

ROUTING PARAMETERS

Selected Alternative Hydrology

REACH NO. NEW	REACH NO. OLD	LENGTH OF REACH (ft)	TOP OF DRAINAGE (ft)	BOTTOM OF DRAINAGE (ft)	SLOPE %	VELOCITY (fps)	Tt (K) (hr)	X
401	-	5170	1427	1412	0.29	4.96**	0.29	0.30
405	-	11800	1462	1427	0.32*	2.70	1.21	0.30
413	-	3100	1467	1458	0.32*	3.73	0.23	0.30
417	-	2100	1458	1452	0.32*	3.89	0.15	0.30
421	455	5300	1452	1413	0.45*	4.56	0.32	0.30
423	-	4130	1413	1400	0.31	4.85	0.24	0.30
429	489	5300	1440	1400	0.56*	3.68	0.40	0.30
433	497	1600	1400	1394	0.38	4.95**	0.09	0.30
437	497	7875	1394	1379	0.19	4.97**	0.44	0.30
439	525	5800	1395	1379	0.28	1.07	1.51	0.40
443	499	6600	1379	1353	0.39	7.90**	0.23	0.37
445	533	7600	1371	1354	0.22	0.96	2.20	0.40
451	503	5475	1354	1335	0.35	5.00**	0.30	0.30
453	-	5300	1342	1335	0.13	0.74	1.99	0.40
457	503	6735	1335	1317	0.27	4.94	0.38	0.30
465	335	6000	1312	1310	0.03	5.25**	0.32	0.30
471	567	4200	1310	1304	0.14	4.75**	0.25	0.30
473	569	7400	1326	1304	0.30	1.11	1.85	0.40
479	571	4200	1349	1305	1.05	2.08	0.56	0.40
485	583	6800	1304	1300	0.06	4.75**	0.40	0.30
701	-	6700	1525	1482	0.64	1.29	1.44	0.20
703	-	5900	1505	1472	0.56	1.21	1.35	0.20
705	-	5800	1504	1462	0.71	1.36	1.18	0.20
707	-	6800	1504	1462	0.62	1.27	1.49	0.20
709	-	2100	1488	1458	1.43	1.93	0.30	0.20
711	-	1900	1478	1458	1.05	1.66	0.32	0.20
713	-	1200	1467	1452	1.25	1.80	0.19	0.20
715	-	1800	1445	1440	0.28	0.85	0.59	0.20
717	-	1800	1445	1440	0.28	0.85	0.59	0.20
719	-	1500	1446	1445	0.07	0.43	0.97	0.20
721	549	1500	1445	1444	0.07	0.43	0.97	0.20
725	549	1200	1444	1442	0.17	0.67	0.50	0.20
729	589	1600	1442	1428	0.88	1.51	0.29	0.20
733	593	3900	1428	1400	0.72	1.43	0.76	0.20
737	597	1700	1400	1380	1.18	1.75	0.27	0.20
741	601	4000	1380	1346	0.85	1.49	0.75	0.20
745	605	1900	1346	1335	0.58	1.23	0.43	0.20
749	609	5000	1335	1300	0.70	1.35	1.03	0.20

*Slope taken from design of "Drainageways".
**Velocity taken from HEC-2 computer model.

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 100	605	618	630	646	664	682
DR 100	5	18	30	46	64	82
RET 100	600	600	600	600	605	610
RO 101	600	600	600	600	605	611
SUB 102	20	64	108	167	231	298
DR 102	20	64	108	167	231	298
RET 102	0	0	0	0	20	52
RO 103	0	0	0	0	20	50
SUB 104	6	22	37	59	81	104
DR 104	6	22	37	59	81	104
RET 104	0	0	0	0	5	11
CO 106	600	600	600	600	624	666
RO 107	600	600	600	600	624	666
SUB 108	9	31	53	83	114	147
DR 108	9	31	53	83	114	147
RET 108	0	0	0	0	0	11
CO 110	600	600	600	600	624	666
RO 111	600	600	600	600	624	666
SUB 112	24	77	129	199	275	354
DR 112	24	77	129	199	275	354
RET 112	0	0	0	0	0	29
CO 114	600	600	600	600	624	670
RO 115	600	600	600	600	623	671
SUB 116	13	35	56	83	112	142
DR 116	13	35	56	83	112	142
RET 116	0	0	0	0	0	0
CO 118	600	600	600	600	623	671
RO 119	600	600	600	600	624	671
SUB 120	23	68	109	162	220	279
DR 120	23	68	109	162	220	279
RET 120	0	0	0	0	0	0
CO 122	600	600	600	600	624	671
RO 123	600	600	600	600	624	670
SUB 124	17	53	88	133	182	231
DR 124	17	53	88	133	182	231
RET 124	0	0	0	0	0	16
RO 125	0	0	0	0	0	16
SUB 126	43	104	156	220	286	352
DR 126	43	104	156	220	286	352
RET 126	0	0	0	0	17	39
CO 128	0	0	0	0	17	39
STO 129	0	0	0	0	0	0
RO 131	0	0	0	0	0	0
SUB 130	54	123	181	252	324	397
DR 130	54	123	181	252	324	397
RET 130	0	0	0	0	0	20

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
CO 132	0	0	0	0	0	20
RO 133	0	0	0	0	0	20
SUB 134	35	91	140	203	270	337
DR 134	35	91	140	203	270	337
RET 134	0	0	0	0	0	9
RO 135	0	0	0	0	0	6
SUB 136	61	146	219	309	402	496
DR 136	61	146	219	309	402	496
RET 136	0	0	0	0	0	27
CO 138	0	0	0	0	0	27
RO 139	0	0	0	0	0	27
SUB 140	43	110	172	250	331	414
DR 140	43	110	172	250	331	414
RET 140	0	0	0	0	0	1
CO 142	0	0	0	0	0	46
STO 143	0	0	0	0	0	1
RO 145	0	0	0	0	0	1
SUB 144	8	28	48	74	102	132
CO 146	608	627	647	673	700	729
RO 147	608	627	647	672	700	729
SUB 148	6	20	34	52	72	93
DR 148	6	20	34	52	72	93
RET 148	0	0	0	0	0	0
SUB 150	109	213	296	395	494	593
CO 152	715	831	928	1044	1164	1284
RO 153	714	831	928	1044	1163	1283
HY 154	456	569	3091	5964	8876	9000
DR 154	0	0	0	0	1876	2000
DT 154	456	569	3091	5964	7000	7000
DR 154	0	0	0	0	1876	2000
STO 154	0	0	0	0	58	87
CO 156	1079	1222	3912	6976	8177	8302
RO 157	1079	1220	3917	7011	8202	8303
SUB 158	85	154	208	272	335	397
CO 160	1089	1237	3979	7148	8467	8608
RO 161	1089	1238	3974	7103	8500	8609
SUB 162	103	200	278	371	464	556
CO 164	1103	1266	4084	7341	8895	9121
DR 164	0	0	0	341	1895	2121
DT 164	1103	1266	4084	7000	7000	8642
RO 165	1102	1262	4062	6978	7000	8453
SUB 166	8	33	59	94	134	176
DR 166	8	33	59	94	134	176
RET 166	0	0	0	12	43	98
RO 167	0	0	0	12	40	93
SUB 168	17	59	101	158	220	285

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
DR 168	17	59	101	158	220	285
RET 168	0	0	0	7	55	138
CO 170	0	0	0	14	71	173
RO 171	0	0	0	12	65	155
SUB 172	15	56	99	158	223	292
DR 172	15	56	99	158	223	292
RET 172	0	0	0	0	0	25
CO 174	0	0	0	12	65	155
RO 175	0	0	0	11	63	145
SUB 176	48	140	227	343	467	596
DR 176	48	140	227	343	467	596
RET 176	0	0	0	56	185	378
RO 177	0	0	0	53	172	346
SUB 178	15	60	107	172	243	319
DR 178	15	60	107	172	243	319
RET 178	0	0	0	0	0	22
CO 180	0	0	0	53	172	345
RO 181	0	0	0	52	168	335
SUB 182	17	60	105	165	231	299
DR 182	17	60	105	165	231	299
RET 182	0	0	0	0	0	22
CO 184	0	0	0	52	168	335
RO 185	0	0	0	50	162	324
SUB 186	13	44	75	117	163	212
DR 186	13	44	75	117	163	212
RET 186	0	0	0	0	0	21
CO 188	0	0	0	54	219	428
RO 189	0	0	0	52	213	413
SUB 190	26	82	137	212	292	376
DR 190	26	82	137	212	292	376
RET 190	0	0	0	20	82	190
SUB 192	18	53	87	132	180	230
DR 192	18	53	87	132	180	230
RET 192	0	0	0	14	47	114
CO 194	0	0	0	31	124	288
RO 195	0	0	0	29	119	281
SUB 196	17	63	108	172	241	313
DR 196	17	63	108	172	241	313
RET 196	0	0	0	0	0	22
CO 198	0	0	0	29	119	280
RO 199	0	0	0	27	115	270
SUB 200	13	51	90	144	204	268
DR 200	13	51	90	144	204	268
RET 200	0	0	0	0	0	0
CO 202	0	0	0	27	115	270
RO 203	0	0	0	26	112	262

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 204	13	51	91	145	206	270
DR 204	13	51	91	145	206	270
RET 204	0	0	0	0	0	0
CO 206	0	0	0	26	112	262
RO 207	0	0	0	25	109	251
SUB 208	19	63	105	163	224	289
DR 208	19	63	105	163	224	289
RET 208	0	0	0	0	7	49
CO 210	0	0	0	75	300	626
RO 211	0	0	0	73	296	615
SUB 262	14	52	91	146	206	269
DR 262	14	52	91	146	206	269
RET 262	0	0	0	0	0	0
CO 264	0	0	0	74	296	615
RO 265	0	0	0	70	293	610
SUB 212	25	78	131	202	278	358
DR 212	25	78	131	202	278	358
RET 212	0	0	0	0	27	86
RO 213	0	0	0	0	22	75
SUB 214	22	71	119	184	254	327
DR 214	22	71	119	184	254	327
RET 214	0	0	0	0	9	63
CO 216	0	0	0	0	23	108
RO 217	0	0	0	0	23	107
SUB 218	18	58	97	150	208	267
DR 218	18	58	97	150	208	267
RET 218	0	0	0	0	19	47
RO 219	0	0	0	0	15	40
SUB 220	34	104	174	267	368	474
DR 220	34	104	174	267	368	474
RET 220	0	0	0	0	39	131
CO 240	0	0	0	0	42	206
SUB 222	27	86	145	223	308	397
DR 222	27	86	145	223	308	397
RET 222	0	0	0	0	30	86
RO 223	0	0	0	0	26	77
SUB 224	31	100	167	257	355	457
DR 224	31	100	167	257	355	457
RET 224	0	0	0	0	36	105
CO 226	0	0	0	0	54	170
RO 227	0	0	0	0	53	169
SUB 228	27	83	140	215	296	381
DR 228	27	83	140	215	296	381
RET 228	0	0	0	0	30	97
CO 230	0	0	0	0	79	255
RO 231	0	0	0	0	79	255

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SUB 232	31	97	162	250	345	444
DR 232	31	97	162	250	345	444
RET 232	0	0	0	0	36	110
CO 234	0	0	0	0	108	353
RO 235	0	0	0	0	108	352
SUB 236	35	112	188	289	397	513
DR 236	35	112	188	289	397	513
RET 236	0	0	0	0	40	124
CO 238	0	0	0	0	139	461
CO 242	0	0	0	0	173	638
RO 243	0	0	0	0	165	624
SUB 244	40	111	177	262	350	440
DR 244	40	111	177	262	350	440
RET 244	0	0	0	0	21	46
SUB 246	16	59	102	161	225	293
DR 246	16	59	102	161	225	293
RET 246	0	0	0	0	0	21
CO 248	0	0	0	0	165	634
RO 249	0	0	0	0	139	628
SUB 250	24	73	120	184	252	322
DR 250	24	73	120	184	252	322
RET 250	0	0	0	0	0	32
CO 252	0	0	0	0	139	651
RO 253	0	0	0	0	129	650
SUB 254	14	54	95	154	217	283
DR 254	14	54	95	154	217	283
RET 254	0	0	0	0	0	0
CO 256	0	0	0	0	129	650
RO 257	0	0	0	0	119	645
SUB 258	17	62	108	170	237	307
DR 258	17	62	108	170	237	307
RET 258	0	0	0	0	0	0
CO 260	0	0	0	0	119	645
RO 261	0	0	0	0	108	640
SUB 266	25	71	114	171	231	293
CO 268	23	68	110	166	224	671
RO 269	23	67	109	163	221	661
SUB 270	7	22	37	58	80	103
DR 270	7	22	37	58	80	103
RET 270	0	0	0	0	6	19
CO 272	23	67	109	163	297	1033
RO 273	22	64	105	159	282	1034
SUB 274	7	24	41	64	88	114
DR 274	7	24	41	64	88	114
RET 274	0	0	0	0	0	7
CO 276	22	64	105	159	282	1030

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
DR 276	0	0	0	0	0	19
DT 276	22	64	105	159	282	1026
DR 164	0	0	0	341	1895	2121
DR 276	0	0	0	0	0	19
CO 275	0	0	0	341	1895	2121
STO 275	0	0	0	7	92	100
CO 876	1108	1276	4112	7097	7230	8684
RO 277	1108	1274	4100	7075	7226	8600
SUB 278	34	86	131	188	246	306
DR 278	34	86	131	188	246	306
RET 278	0	0	0	0	11	31
RO 279	0	0	0	0	8	29
SUB 280	26	71	112	165	221	279
DR 280	26	71	112	165	221	279
RET 280	0	0	0	0	0	28
CO 282	0	0	0	0	8	54
RO 283	0	0	0	0	7	50
SUB 284	18	56	93	144	198	254
DR 284	18	56	93	144	198	254
RET 284	0	0	0	0	0	9
CO 286	0	0	0	0	7	50
RO 287	0	0	0	0	6	49
SUB 288	11	37	65	103	145	189
DR 288	11	37	65	103	145	189
RET 288	0	0	0	0	0	0
CO 290	0	0	0	0	6	49
RO 291	0	0	0	0	6	48
SUB 292	25	80	135	208	287	369
DR 292	25	80	135	208	287	369
RET 292	0	0	0	0	0	21
CO 294	0	0	0	0	6	64
RO 295	0	0	0	0	5	60
SUB 296	14	50	87	139	196	256
DR 296	14	50	87	139	196	256
RET 296	0	0	0	0	0	10
CO 298	1108	1274	4100	7075	7226	8600
RO 299	1108	1273	4089	7048	7223	8543
SUB 300	14	54	97	156	221	289
DR 300	14	54	97	156	221	289
RET 300	0	0	0	0	0	9
RO 301	0	0	0	0	0	8
SUB 802	16	52	88	136	187	241
DR 802	16	52	88	136	187	241
RET 802	0	0	0	0	0	22
CO 302	1108	1273	4089	7048	7223	8543

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
DR 302	0	0	0	48	223	1542
DT 302	1107	1273	4089	7000	7000	7000
HY 303	1695	1695	1695	1695	1695	1695
SUB 304	12	47	83	133	188	246
DR 304	12	47	83	133	188	246
RET 304	0	0	0	0	0	31
CO 806	1695	1695	1695	1695	1695	1720
RO 305	1695	1695	1695	1695	1695	1719
SUB 306	2	14	28	49	73	100
DR 306	2	14	28	49	73	100
RET 306	0	0	0	0	0	4
CO 308	1695	1695	1695	1695	1695	1719
RO 309	1694	1694	1694	1694	1694	1718
SUB 310	11	54	103	173	255	344
DR 310	11	54	103	173	255	344
RET 310	0	0	0	0	72	179
CO 312	1694	1694	1694	1694	1756	1801
RO 313	1694	1694	1694	1694	1755	1801
SUB 314	17	64	113	180	253	331
DR 314	17	64	113	180	253	331
RET 314	0	0	0	0	53	144
CO 316	1694	1694	1694	1694	1787	1841
RO 317	1694	1694	1694	1694	1787	1841
SUB 318	28	75	118	174	233	293
DR 318	28	75	118	174	233	293
RET 318	0	0	14	65	154	250
RO 319	0	0	11	53	117	188
SUB 320	33	108	184	288	403	525
DR 320	33	108	184	288	403	525
RET 320	0	0	0	4	151	328
CO 322	0	0	11	53	229	344
RO 323	0	0	10	50	224	336
SUB 324	71	194	310	462	623	790
DR 324	71	194	310	462	623	790
RET 324	0	0	0	0	124	335
CO 326	0	0	10	50	316	482
RO 327	0	0	9	48	307	451
SUB 328	46	142	237	365	505	653
DR 328	46	142	237	365	505	653
RET 328	0	0	0	8	210	418
CO 330	0	0	9	48	339	583
RO 331	0	0	9	47	338	578
SUB 332	27	91	157	247	346	452
DR 332	27	91	157	247	346	452
RET 332	0	0	0	74	202	370
CO 334	0	0	9	66	340	614

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RO 335	0	0	7	64	339	610
SUB 336	27	93	161	254	356	465
DR 336	27	93	161	254	356	465
RET 336	0	0	0	77	203	372
CO 338	0	0	7	121	339	630
RO 339	0	0	5	120	336	625
SUB 340	11	47	84	136	193	254
DR 340	11	47	84	136	193	254
RET 340	0	0	0	0	0	0
CO 342	1694	1694	1694	1811	2074	2432
RO 343	1694	1694	1694	1810	2071	2426
SUB 344	6	20	33	51	70	89
DR 344	6	20	33	51	70	89
RET 344	0	0	0	0	0	4
CO 346	1694	1694	1694	1810	2071	2426
RO 347	1694	1694	1694	1809	2067	2419
SUB 348	12	39	65	101	140	180
DR 348	12	39	65	101	140	180
RET 348	0	0	0	0	0	7
CO 350	1694	1694	1694	1809	2067	2418
RO 351	1694	1694	1694	1807	2063	2411
SUB 352	15	48	80	124	171	220
DR 352	15	48	80	124	171	220
RET 352	0	0	0	0	0	7
CO 354	1694	1694	1694	1807	2063	2411
RO 355	1694	1694	1694	1806	2058	2405
SUB 356	16	50	84	129	178	229
DR 356	16	50	84	129	178	229
RET 356	0	0	0	0	0	24
CO 358	1694	1694	1694	1806	2058	2426
RO 359	1694	1694	1694	1805	2056	2423
SUB 360	17	55	92	141	194	251
DR 360	17	55	92	141	194	251
RET 360	0	0	0	0	0	15
CO 362	1694	1694	1694	1805	2056	2423
RO 363	1694	1694	1694	1803	2050	2410
SUB 364	14	45	74	115	158	203
DR 364	14	45	74	115	158	203
RET 364	0	0	0	0	0	23
CO 366	1694	1694	1694	1803	2050	2428
SUB 368	379	870	1281	1782	2298	2824
DR 368	379	870	1281	1782	2298	2824
RET 368	0	0	0	154	561	1525
RO 369	0	0	0	146	489	1117
SUB 370	275	563	795	1072	1349	1625
DR 370	275	563	795	1072	1349	1625

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RET 370	0	0	11	106	369	831
RO 371	0	0	9	92	283	584
SUB 372	51	160	266	405	555	710
DR 372	51	160	266	405	555	710
RET 372	0	0	0	0	61	195
SUB 872	20	62	103	157	216	278
DR 872	20	62	103	157	216	278
RET 872	0	0	2	61	143	245
CO 374	0	0	9	271	684	1359
RO 375	0	0	2	253	618	1288
SUB 376	18	52	84	127	172	220
DR 376	18	52	84	127	172	220
RET 376	0	0	0	28	83	161
CO 378	0	0	2	275	663	1350
RO 379	0	0	1	272	650	1330
SUB 380	93	253	401	590	789	994
DR 380	93	253	401	590	789	994
RET 380	0	0	0	124	373	694
CO 382	0	0	1	308	720	1423
RO 383	0	0	0	303	702	1376
SUB 384	72	189	293	426	565	708
DR 384	72	189	293	426	565	708
RET 384	0	0	26	115	299	545
CO 386	0	0	25	303	710	1404
RO 387	0	0	25	299	703	1385
SUB 388	23	63	102	152	206	263
DR 388	23	63	102	152	206	263
RET 388	0	0	0	0	42	110
SUB 390	23	77	129	195	266	341
DR 390	23	77	129	195	266	341
RET 390	0	0	9	31	108	233
SUB 392	25	70	111	163	219	276
DR 392	25	70	111	163	219	276
RET 392	0	0	8	30	108	205
RO 393	0	0	8	29	103	216
CO 394	0	0	27	299	721	1412
RO 395	0	0	25	289	714	1394
SUB 396	8	32	56	90	128	167
DR 396	8	32	56	90	128	167
RET 396	0	0	0	0	0	23
SUB 398	11	41	72	115	162	213
DR 398	11	41	72	115	162	213
RET 398	0	0	0	0	0	35
CO 400	0	0	25	289	714	1394
SUB 404	9	28	47	72	98	125
DR 404	9	28	47	72	98	125

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
RET 404	0	0	4	15	46	92
RO 405	0	0	3	12	31	55
SUB 406	13	40	66	102	140	180
DR 406	13	40	66	102	140	180
RET 406	0	0	0	0	0	0
CO 408	0	0	24	288	715	1394
RO 401	0	0	23	282	704	1387
SUB 402	12	48	85	137	194	254
DR 402	12	48	85	137	194	254
RET 402	0	0	0	0	0	28
SUB 410	9	29	49	76	105	134
DR 410	9	29	49	76	105	134
RET 410	0	0	0	0	0	5
SUB 412	17	60	102	159	221	285
DR 412	17	60	102	159	221	285
RET 412	0	0	0	13	37	127
RO 413	0	0	0	12	34	92
SUB 414	57	98	129	164	199	232
DR 414	57	98	129	164	199	174
RET 414	0	4	14	65	114	197
CO 416	0	4	13	65	113	195
RO 417	0	4	13	58	104	170
SUB 418	26	51	70	93	116	138
DR 418	26	51	70	93	116	138
RET 418	0	0	3	7	32	75
CO 420	0	4	13	58	117	242
RO 421	0	4	12	50	106	191
CO 422	0	3	23	281	704	1386
RO 423	0	3	22	277	693	1372
SUB 424	18	38	55	75	96	118
DR 424	18	38	55	75	96	118
RET 424	0	0	0	4	11	44
SUB 426	5	12	17	23	29	36
DR 426	5	12	17	23	29	36
RET 426	0	0	0	2	6	17
CO 428	0	0	0	5	15	44
RO 429	0	0	0	5	14	32
SUB 430	24	85	145	224	311	401
DR 430	24	85	145	224	311	401
RET 430	0	0	0	0	20	42
CO 432	0	3	22	276	693	1372
RO 433	0	3	22	275	690	1364
SUB 434	18	58	98	152	210	271
DR 434	18	58	98	152	210	271
RET 434	0	0	0	0	0	26

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
CO 436	0	3	22	275	690	1362
RO 437	0	3	21	273	682	1349
SUB 438	25	86	146	226	312	401
DR 438	25	86	146	226	312	401
RET 438	0	0	0	0	20	44
RO 439	0	0	0	0	19	39
SUB 440	17	51	84	128	174	222
DR 440	17	51	84	128	174	222
RET 440	0	0	0	0	4	28
SUB 838	15	45	75	114	156	199
DR 838	15	45	75	114	156	199
RET 838	0	0	0	0	14	43
CO 442	0	3	21	273	682	1349
RO 443	0	3	20	269	674	1336
SUB 444	25	88	152	240	335	435
DR 444	25	88	152	240	335	435
RET 444	0	0	0	0	0	36
RO 445	0	0	0	0	0	35
SUB 446	24	69	112	168	227	287
DR 446	24	69	112	168	227	287
RET 446	0	0	0	0	19	60
SUB 448	7	25	43	68	95	123
DR 448	7	25	43	68	95	123
RET 448	0	0	0	0	0	10
CO 450	0	3	20	269	673	1336
RO 451	0	3	20	266	665	1328
SUB 452	22	79	136	214	299	389
DR 452	22	79	136	214	299	389
RET 452	0	0	0	0	0	30
RO 453	0	0	0	0	0	29
SUB 454	16	59	101	159	223	290
DR 454	16	59	101	159	223	290
RET 454	0	0	0	0	0	9
CO 456	0	3	20	266	665	1328
RO 457	0	3	19	263	657	1316
SUB 458	18	54	88	133	182	232
DR 458	18	54	88	133	182	232
RET 458	0	0	0	0	0	27
SUB 462	9	28	48	74	102	131
DR 462	9	28	48	74	102	131
RET 462	0	0	0	0	0	5
DR 302	0	0	0	48	223	1542
CO 460	1694	1695	1700	1895	2483	3367
STO 463	1691	1692	1696	1877	2437	3268

TABLE D-5

SELECTED ALTERNATIVE CONDITIONS PEAK DISCHARGES (cfs)

HEC-1 I.D.	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
CO 464	2708	2794	4173	7050	7094	8278
RO 465	2708	2794	4170	7026	7087	8211
SUB 466	30	83	133	198	268	339
DR 466	30	83	133	198	268	339
RET 466	0	0	0	0	0	39
SUB 468	3	9	15	23	31	40
DR 468	3	9	15	23	31	40
RET 468	0	0	0	0	0	2
CO 470	2708	2794	4170	7026	7087	8211
RO 471	2708	2794	4166	6990	7084	8168
SUB 472	15	57	102	163	229	300
DR 472	15	57	102	163	229	300
RET 472	0	0	0	0	0	24
RO 473	0	0	0	0	0	20
SUB 474	18	68	119	187	261	338
DR 474	18	68	119	187	261	338
RET 474	0	0	0	0	0	21
CO 476	0	0	0	0	0	21
SUB 478	23	80	137	216	303	393
DR 478	23	80	137	216	303	393
RET 478	0	0	0	0	0	32
RO 479	0	0	0	0	0	32
SUB 480	32	93	148	218	291	364
DR 480	32	93	148	218	291	364
RET 480	0	0	0	0	15	29
CO 482	0	0	0	0	14	68
CO 484	2708	2794	4166	6990	7084	8168
RO 485	2707	2794	4160	6930	7080	8105
SUB 486	23	89	157	247	343	448
DR 486	23	89	157	247	343	448
RET 486	0	0	0	0	0	25
CO 488	2707	2794	4160	6930	7080	8105

TABLE D-6

SELECTED ALTERNATIVE HEC-1 ROUTING DESCRIPTIONS

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 101	Powerline Floodway from CAP Canal to county line
RO 103	Drainageway F located along county line from Subbasin 102 to Powerline Floodway
RO 107	Powerline Floodway from county line to Signal Butte Road
RO 111	Powerline Floodway from Signal Butte Road to 1/4 mile west of Signal Butte Road
RO 115	Powerline Floodway from 1/4 mile west of Signal Butte Road to 1/4 mile east of Crismon Road
RO 119	Powerline Floodway from 1/4 mile east of Crismon Road to Ellsworth Road
RO 123	Powerline Floodway from Ellsworth Road to Williams Air Force Base diversion ditch inlet
RO 125	Concentrated flow through Subbasin 124
RO 131	Concentrated flow from 1/4 mile west of Signal Butte Road to Crismon Road
RO 133	Concentrated flow from Crismon Road to Williams Air Force Base diversion ditch at Ellsworth Road
RO 135	Concentrated flow from Subbasin 134 to Chandler Boulevard
RO 139	Concentrated flow from Chandler Boulevard to Williams Air Force Base diversion ditch at Ellsworth Road
RO 145	Concentrated flow along Williams Air Force Base diversion ditch at Ellsworth Road to Powerline Floodway
RO 147	Powerline Floodway from Williams Air Force Base diversion ditch inlet to Sossaman Road
RO 153	Powerline Floodway from Sossaman Road to confluence with East Maricopa Floodway
RO 157	East Maricopa Floodway from confluence with Powerline Floodway to 1/2 mile south of Ray Road
RO 161	East Maricopa Floodway from 1/2 mile south of Ray Road to Chandler Boulevard
RO 165	East Maricopa Floodway from Chandler Boulevard to Southern Pacific Railroad
RO 167	Drainageway F from Subbasin 166 along county line to Drainageway D
RO 171	Drainageway D from county line to Southern Pacific Railroad
RO 175	Drainageway E from Drainageway D to Drainageway C
RO 177	Drainageway C from county line to Signal Butte Road

TABLE D-6

SELECTED ALTERNATIVE HEC-1 ROUTING DESCRIPTIONS

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 181	Drainageway C from Signal Butte Road to Crismon Road
RO 185	Drainageway C from Crismon Road to Southern Pacific Railroad
RO 189	Drainageway E from Drainageway C to Drainageway B
RO 195	Drainageway B from county line to Signal Butte Road
RO 199	Drainageway B from Signal Butte Road to Crismon Road
RO 203	Drainageway B from Crismon Road to Ellsworth Road
RO 207	Drainageway B from Ellsworth Road to Southern Pacific Railroad
RO 211	Drainageway E from Drainageway B to 1/4 mile south of Pecos Road
RO 265	Drainageway E from 1/4 mile south of Pecos Road to Drainageway A
RO 213	Concentrated flow from Subbasin 212 to Drainageway F 1/4 mile north of Germann Road
RO 217	Drainageway F 1/4 mile north of Germann Road to Drainageway A
RO 219	Concentrated flow from Subbasin 218 to Drainageway A at county line
RO 223	Drainageway F from 1/4 mile north of Ray Road to 3/8 mile north of Chandler Boulevard
RO 227	Drainageway F from 3/8 mile north of Chandler Boulevard to 1/4 mile south of Chandler Boulevard
RO 231	Drainageway F from 1/4 mile south of Chandler Boulevard to 1/2 mile south of Chandler Boulevard
RO 235	Drainageway F from 1/2 mile south of Chandler Boulevard to Drainageway A
RO 243	Drainageway A from county line to Signal Butte Road
RO 249	Drainageway A from Signal Butte Road to Crismon Road
RO 253	Drainageway A from Crismon Road to Ellsworth Road
RO 257	Drainageway A from Ellsworth Road to Hawes Road
RO 261	Drainageway A from Hawes Road to Sossaman Road
RO 269	Drainageway A from Sossaman Road to Southern Pacific Railroad at Pecos Road
RO 273	Drainageway C from Drainageway A to East Maricopa Floodway at Southern Pacific Railroad

TABLE D-6

SELECTED ALTERNATIVE HEC-1 ROUTING DESCRIPTIONS

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 277	East Maricopa Floodway from Southern Pacific Railroad to Germann Road
RO 279	Concentrated flow from Subbasin 278 at Crismon Road to Ellsworth Road
RO 283	Concentrated flow from Ellsworth Road to Hawes Road
RO 287	Concentrated flow from Hawes Road to Sossaman Road
RO 291	Concentrated flow from Sossaman Road to Power Road
RO 295	Concentrated flow from Power Road to East Maricopa Floodway at Germann Road
RO 299	East Maricopa Floodway from Germann Road to Queen Creek Road
RO 301	Concentrated flow from Subbasin 300 to East Maricopa Floodway at Queen Creek Road
RO 305	Queen Creek from Rittenhouse Flood Retarding Structure to 1/4 mile west of Goldfield Road
RO 309	Queen Creek from 1/4 mile west of Goldfield Road to 1/2 mile east of county line
RO 313	Queen Creek from 1/2 mile east of county line to county line
RO 317	Queen Creek from county line to Southern Pacific Railroad
RO 319	Concentrated flow from Subbasin 318 to Subbasin 320
RO 323	Concentrated flow from Subbasin 320 to Subbasin 324
RO 327	Concentrated flow from Subbasin 324 to Subbasin 328
RO 331	Concentrated flow from Subbasin 328 to Subbasin 332
RO 335	Concentrated flow from Subbasin 332 to county line at Riggs Road
RO 339	Drainageway E from county line to Queen Creek
RO 343	Queen Creek from Southern Pacific Railroad to Crismon Road
RO 347	Queen Creek from Crismon Road to Ellsworth Road
RO 351	Queen Creek from Ellsworth Road to Hawes Road
RO 355	Queen Creek from Hawes Road to Sossaman Road
RO 359	Queen Creek from Sossaman Road to Power Road
RO 363	Queen Creek from Power Road to 1/2 mile south of Queen Creek Road
RO 369	Concentrated flow from Subbasin 368 to Judd Road

TABLE D-6

SELECTED ALTERNATIVE HEC-1 ROUTING DESCRIPTIONS

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 371	Concentrated flow from Subbasin 370 to Judd Road
RO 375	Concentrated flow from Judd Road to Roberts Road
RO 379	Concentrated flow from Roberts Road to 1/2 mile north of Roberts Road
RO 701	Concentrated flow from Subbasin 700 to 1/2 mile north of Roberts Road
RO 383	Concentrated flow from 1/2 mile north of Roberts Road to 1/2 mile north of Skyline Drive
RO 703	Concentrated flow from Subbasin 702 to 1/2 mile north of Skyline Drive
RO 387	Concentrated flow from 1/2 mile north of Skyline Drive to county line at Sanoqui Wash realignment
RO 393	Drainageway G from Subbasin 392 to county line at Sanoqui Wash realignment
RO 705	Concentrated flow from Subbasin 704 to county line at Sanoqui Wash realignment
RO 707	Concentrated flow from Subbasin 706 to county line at Sanoqui Wash realignment
RO 395	Sanoqui Wash realignment from county line to Riggs Road
RO 401	Sanoqui Wash realignment along Riggs Road from Crismon Road to Ellsworth Road
RO 405	Drainageway J from county line to Sanoqui Wash realignment at Riggs Road
RO 413	Drainageway G from Subbasin 412 to 1/2 mile east of Ellsworth Road
RO 709	Concentrated flow from Subbasin 708 to 1/2 mile east of Ellsworth Road
RO 711	Concentrated flow from Subbasin 710 to 1/2 mile east of Ellsworth Road
RO 417	Drainageway G from 1/2 mile east of Ellsworth Road to Drainageway I at Ellsworth Road
RO 713	Concentrated flow from Subbasin 712 to Drainageway I at Ellsworth Road
RO 421	Drainageway I along Ellsworth Road from county line to Sanoqui Wash realignment
RO 423	Sanoqui Wash realignment from Ellsworth Road to 1/4 mile east of Hawes Road
RO 715	Concentrated flow from Subbasin 714 to Drainageway H
RO 717	Drainageway G from Subbasin 716 to Drainageway H
RO 429	Drainageway H from county line to Sanoqui Wash realignment at Riggs Road
RO 433	Sanoqui Wash from Riggs Road to Hawes Road
RO 437	Sanoqui Wash from Hawes Road to Sossaman Road

TABLE D-6

SELECTED ALTERNATIVE HEC-1 ROUTING DESCRIPTIONS

HEC-1 I.D. NO.	REACH NUMBER DESCRIPTION AND LOCATION
RO 439	Concentrated flow from Riggs Road to Sanoqui Wash at Sossaman Road
RO 443	Sanoqui Wash from Sossaman Road to Power Road
RO 445	Concentrated flow from Subbasin 444 to Sanoqui Wash at Power Road
RO 451	Sanoqui Wash from Power Road to Recker Road
RO 453	Concentrated flow from Subbasin 452 to Sanoqui Wash at Recker Road
RO 457	Sanoqui Wash from Recker Road to confluence of queen Creek 1/4 mile west of Higley Road
RO 465	East Maricopa Floodway from Ocotillo Road to Chandler Heights Road
RO 471	East Maricopa Floodway at Chandler Heights Road to north of Riggs Road
RO 473	Concentrated flow from Subbasin 472 to north of Riggs Road
RO 479	Concentrated flow from Subbasin 478 to East Maricopa Floodway north of Riggs Road
RO 485	East Maricopa Floodway from north of Riggs Road to county line
RO 719	Concentrated flow along county line from Subbasin 718 to Subbasin 720
RO 721	Concentrated flow along county line from Subbasin 720 to Subbasin 722
RO 725	Concentrated flow along county line from Subbasin 722 to Subbasin 726
RO 729	Concentrated flow from Subbasin 726 to Subbasin 730
RO 733	Concentrated flow from Subbasin 730 to Subbasin 734
RO 737	Concentrated flow from Subbasin 734 to Subbasin 738
RO 741	Concentrated flow from Subbasin 738 to Subbasin 742
RO 745	Concentrated flow from Subbasin 742 to Subbasin 746
RO 749	Concentrated flow from Subbasin 746 to East Maricopa Floodway at county line

APPENDIX E

CORRESPONDENCES REGARDING EAST MARICOPA FLOODWAY

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE Room 6029 Federal Bldg., Phoenix, AZ 85025

RECEIVED
FLOOD CONTROL
DISTRICT

Herbert P. Donald
Chief Engineer and General Manager
Flood Control District of Maricopa Co.
3325 West Durango Street
Phoenix, Arizona 85009

September 20, 1974

Dear Herb:

We have completed our re-analysis of the hydrology for the RWCD Floodway, within the Buckhorn Mesa, Williams Chandler and Apache Junction Watershed Projects. As you may recall from our previous discussions, the re-analysis was necessary in order to

1. Update current projections for urbanization of areas contributing to RWCD Floodway.

2. Include a factor for on-site storage within the contributing urbanized areas.

3. Revise precipitation values.

4. Revise time of concentration values.

5. Revise reach routing coefficients.

Three alternatives were considered resulting from the revised hydrology. They are

Alternate 1.

1975 land use (current) with Maricopa Association of Government's (MAG) population density figures.

Alternate 2.

The year 2000 land use as projected by MAG. Includes 1/2-inch storage on areas projected as urbanized.

Alternate 3.

The year 2000 land use as projected by MAG. Includes 1-inch storage on areas projected as urbanized.

All alternatives include the 100-year level of protection.

The following table gives the 100-year peak discharge in cfs for the three alternatives at points along the RWCD Floodway.

Location	Alt. #1	Alt. #2	Alt. #3
Brown Road	550	1380	1160
Apache Trail	1290	2340	1965
Southern	2430	3955	3440
Baseline	3110	5450	4700
Ray Road	4830	6605	5890
Powerline Floodway	6180	7175	6470
Above Queen Creek	6425	7380	6730
Below Queen Creek	7925	8705	8070
Reservation	8270	9270	8640

We believe the 1-inch storage requirement for the projected urban area is a reasonable and practical value. However, this requirement will need enforcement by statute or ordinance of Maricopa County.

We recommend that Alternate #3 values be used for final design of the RWCD Floodway and we request your concurrence in this recommendation. We also ask that you actively pursue enactment and enforcement of the required ordinance.

If there are further questions regarding any of the above, please call.

Sincerely,

George C Marks

George C. Marks
State Conservationist

cc: Walter White, Chairman, East Maricopa NRCD
Chris Williams, DC, Chandler Field Office
Dennie Burns, Party Leader, RB-WS
Paul Monville, Design Unit

561.1

✓	Chief Engr.		O & M
	Deputy		Drafting
RW	[illegible]		Admin.
	[illegible]		File
	[illegible]		

Remarks:

Flood Control District
of
Maricopa County
3325 WEST DURANGO STREET
PHOENIX, ARIZONA 85009

October 7, 1974

United States Department of Agriculture
Soil Conservation Service
230 North First Avenue
Phoenix, Arizona 85025

ATTENTION: Mr. George C. Marks

Dear Mr. Marks:

We are writing in reply to your letter of September 20, 1974, regarding your re-analysis of the hydrology for the RWCD Floodway.

Our office agrees that Alternate #3 values should be used for final design of the RWCD Floodway.

We are drafting an ordinance which will require detention of the 100-year, 2 hour storm runoff on each site. This represents approximately 1" runoff detention on residential lots and more than 2" on commercial tracts.

We will keep your office informed of our progress in drafting the new ordinance.

Sincerely,

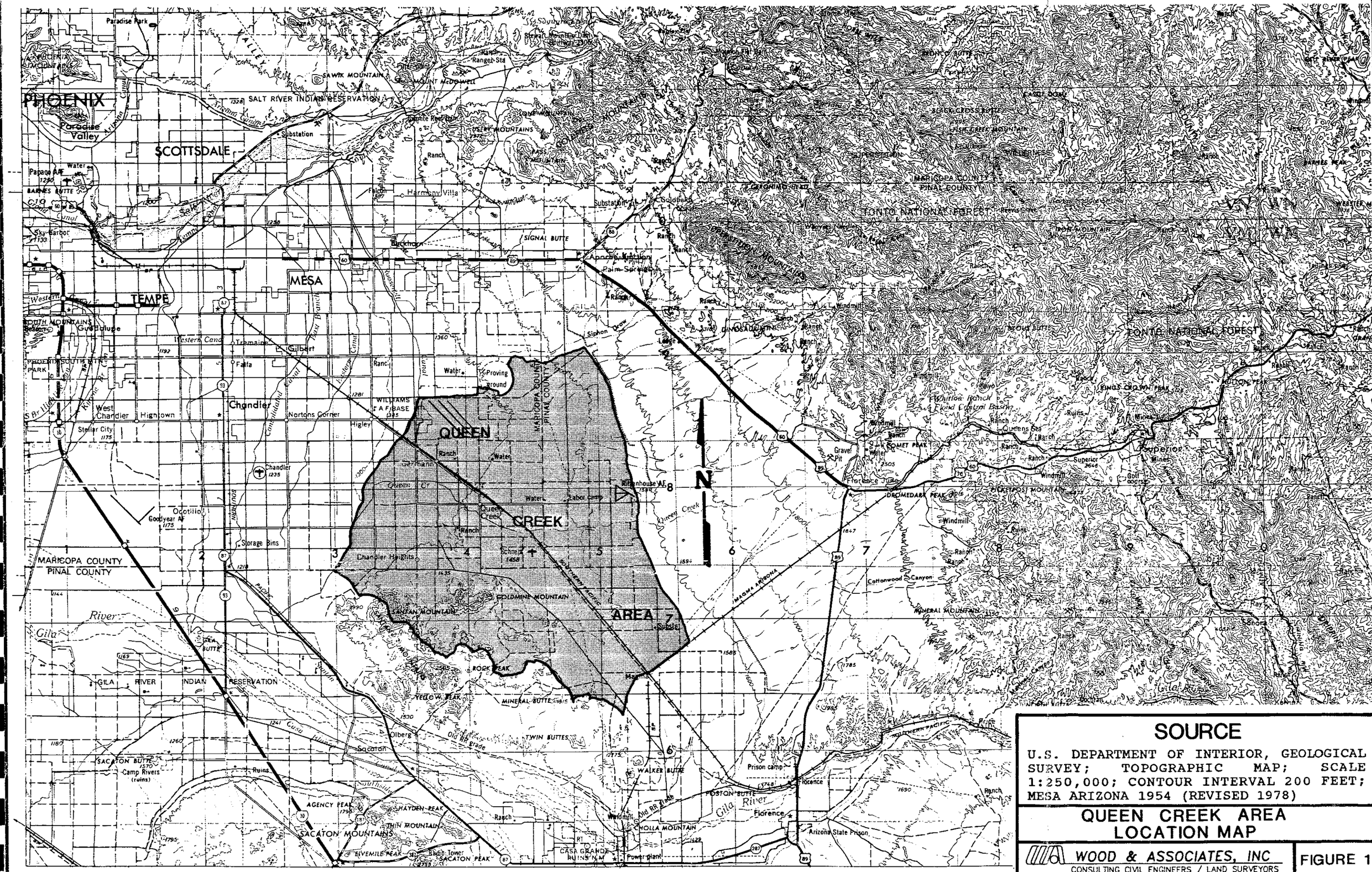
Herbert P. Donald, P.E.
Chief Engineer and General Manager

SL 1.1

HPD/RLW/ly

[illegible]	Engr.		O & M
	Deputy		Drafting
RLW	Engrn.		Admin.
	Hydro	11.4.4	[illegible]
	Hydro		

Remarks:



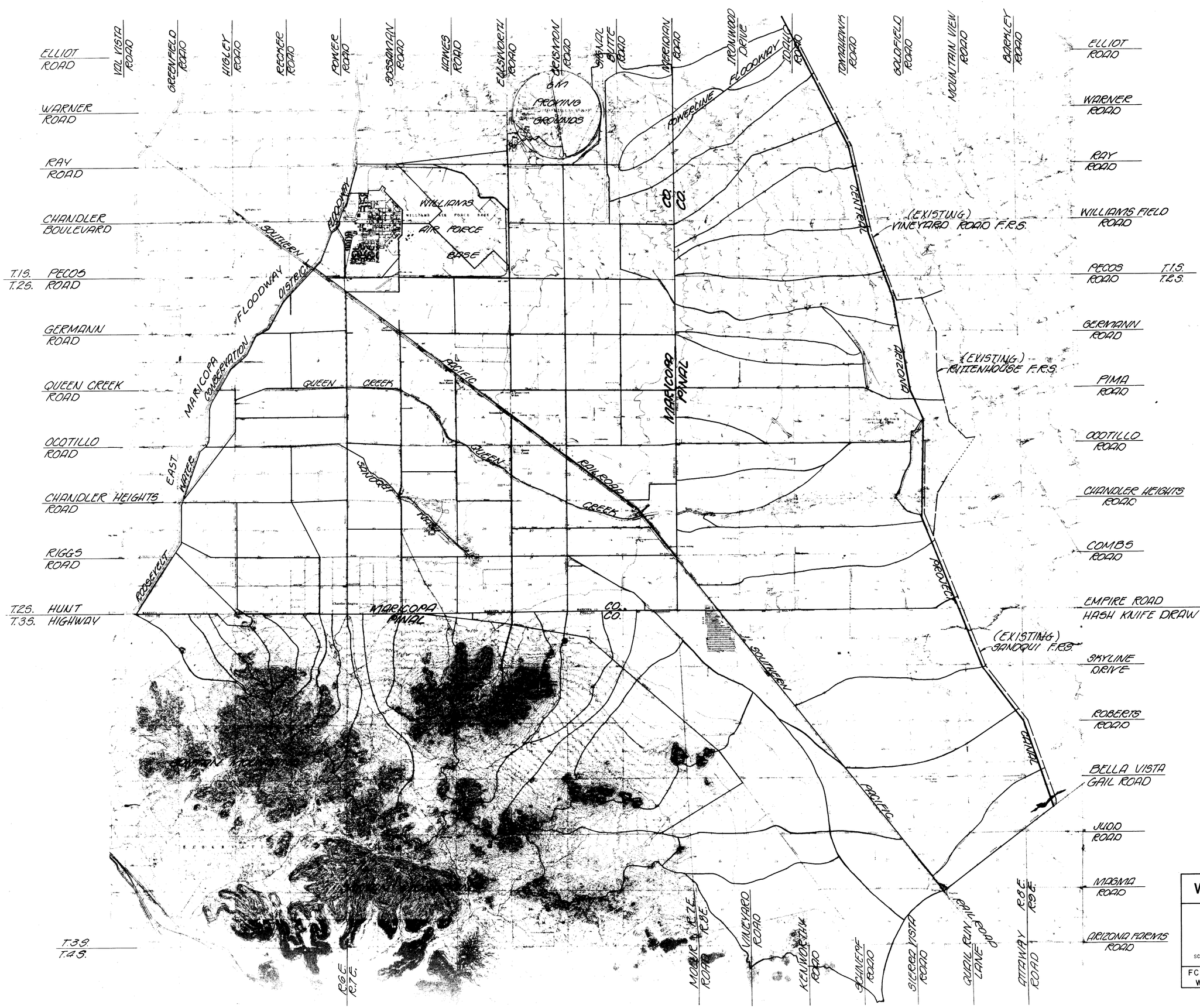
SOURCE

U.S. DEPARTMENT OF INTERIOR, GEOLOGICAL SURVEY; TOPOGRAPHIC MAP; SCALE 1:250,000; CONTOUR INTERVAL 200 FEET; MESA ARIZONA 1954 (REVISED 1978)

QUEEN CREEK AREA LOCATION MAP

WOOD & ASSOCIATES, INC
CONSULTING CIVIL ENGINEERS / LAND SURVEYORS

FIGURE 1



BASE MAP SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
SUPERSTITION MTS. SW, ARIZONA - 1956 (PHOTOREVISED 1981)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)
MAGMA, ARIZONA - 1956
SACATON, ARIZONA - 1966 (PHOTOREVISED 1971)
BLACKWATER, ARIZONA - 1966 (PHOTOREVISED 1981)
FLORENCE, ARIZONA - 1965

STREET NAME SOURCE:
MARICOPA & PINAL COUNTY PLANNING DEPARTMENTS

JUL 31 1991

Date Prepared: December 29, 1989

WATERSHED SUB-BASIN BOUNDARIES

SCALE 0 1/4 1/2 1 IN MILES

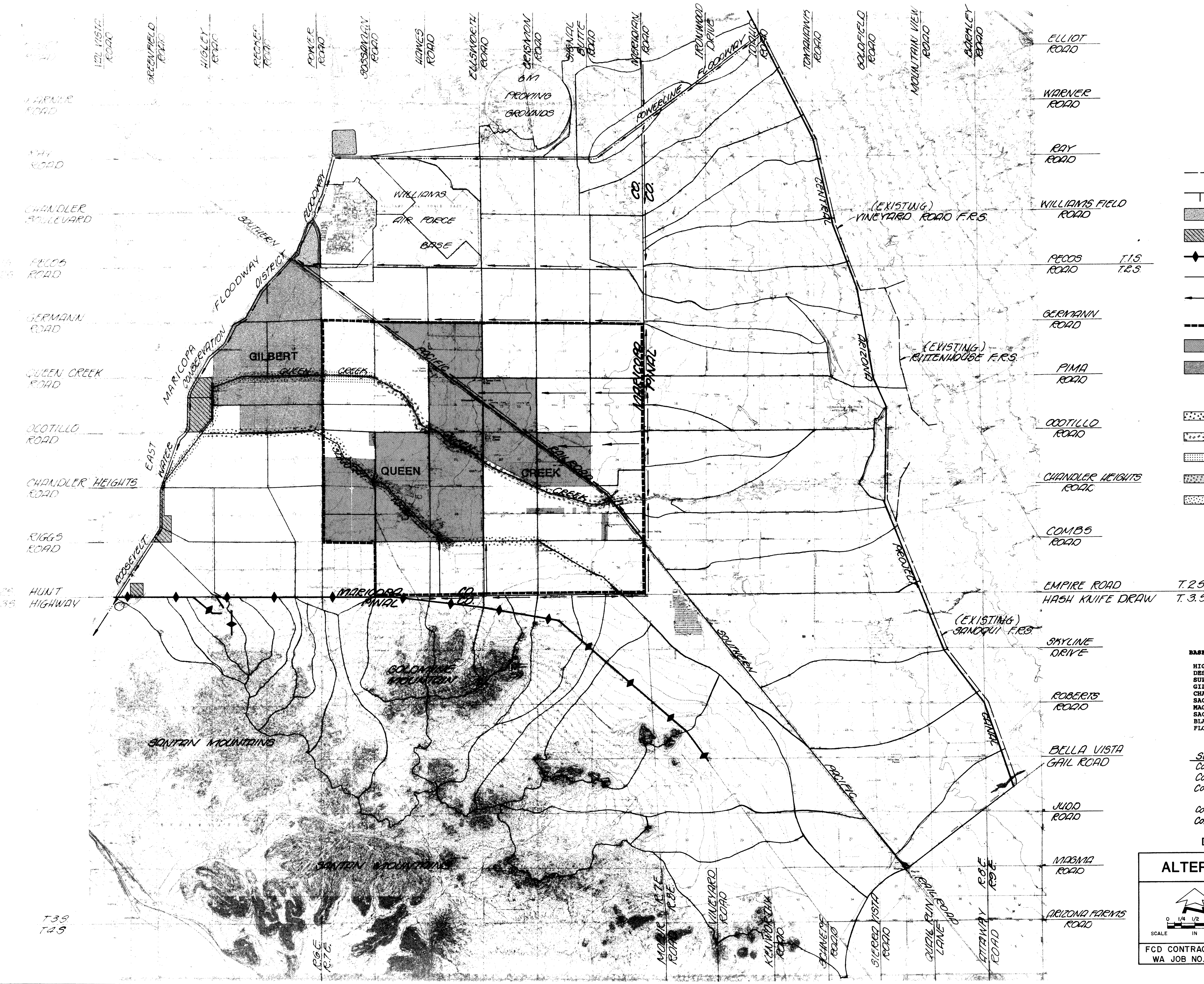
QUEEN CREEK
AREA DRAINAGE MASTER STUDY

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



LEGEND

- EXISTING FLOOD RETARDING STRUCTURE (F.R.S.)
- SUB-BASIN BOUNDARY LINE
- DETENTION BASIN
- DETENTION BASIN (FLOOD CONTROL LAND)
- PROPOSED LEVEE
- EXISTING FLOODWAYS
- DRAINAGE WAY FOR PINAL COUNTY OFFSITE FLOODWATER
- QUEEN CREEK STRIP ANNEX
- QUEEN CREEK INCORPORATED LIMITS
- TOWN OF GILBERT

TOP WIDTH OF CHANNEL IMPROVEMENTS FOR QUEEN CREEK AND SANOQUI WASH

- TOP WIDTH = 125'
- TOP WIDTH = 150'
- TOP WIDTH = 175'
- TOP WIDTH = 300'
- TOP WIDTH = 375'

BASE MAP SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
SUPERSTITION MTS. SW, ARIZONA - 1956 (PHOTOREVISED 1981)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)
MAGMA, ARIZONA - 1956
SACATON, ARIZONA - 1966 (PHOTOREVISED 1971)
BLACKWATER, ARIZONA - 1966 (PHOTOREVISED 1981)
FLORENCE, ARIZONA - 1965

SELECTED ALTERNATIVE
Component A - Regional Detention Basins
Component B - Santan Structures
Component C - Queen Creek and Sanoqui Wash Channel Improvements
Component D - Drainageways
Component E - Onsite Retention

JUL 31 1991

Date Prepared: November 1, 1989

ALTERNATIVE DRAINAGE SYSTEM

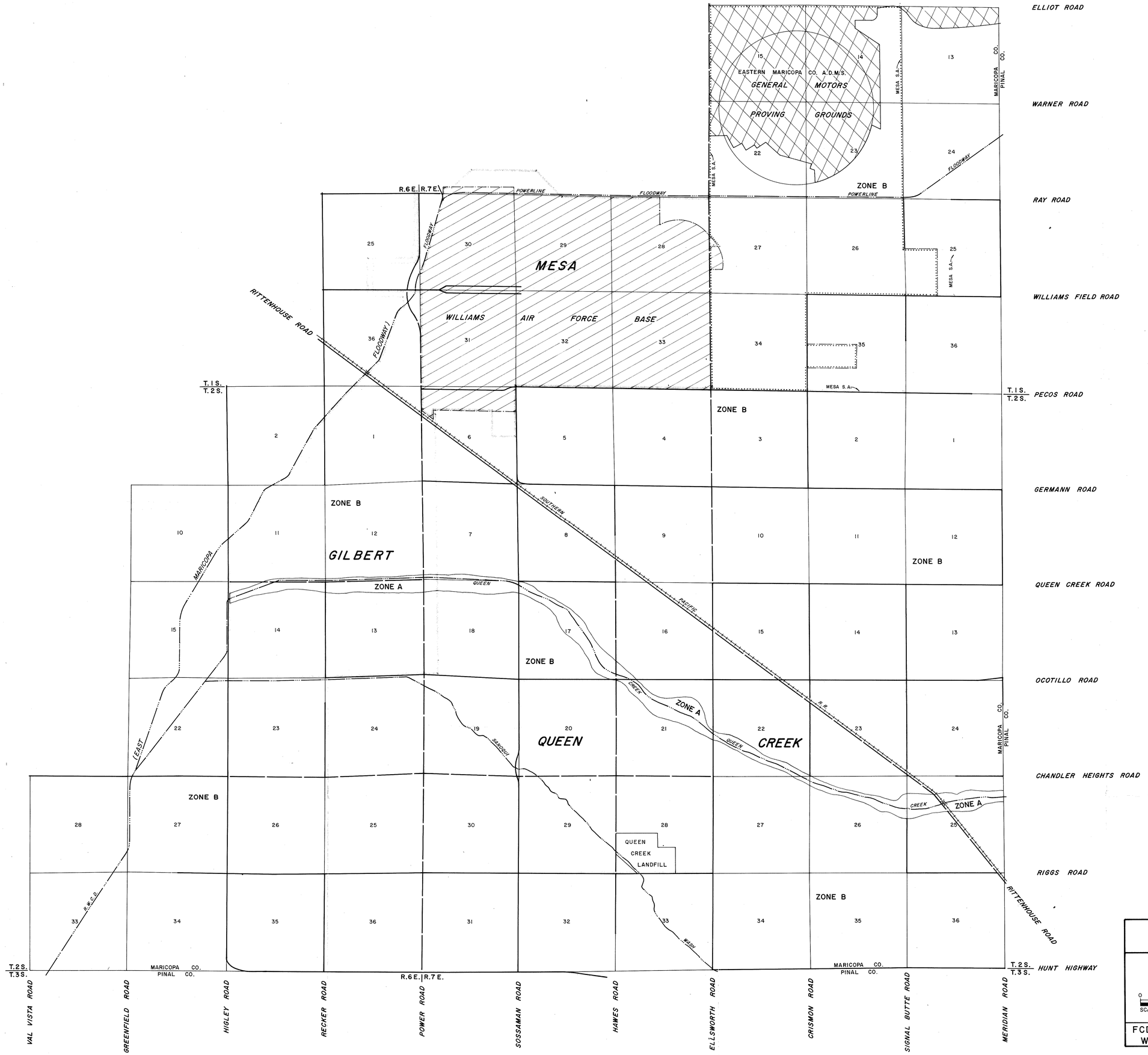
QUEEN CREEK
AREA DRAINAGE MASTER STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

0 1/4 1/2 1
SCALE IN MILES

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 3



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
S.A.	STRIP ANNEX
ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.
	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS

REFERENCE

MAJOR CURRENT AND PROPOSED STREETS. SOURCE: MARICOPA ASSOCIATION OF GOVERNMENTS TRANSPORTATION AND PLANNING OFFICE SEPTEMBER 24, 1986.

SECTION LINES, MAJOR DRAINAGE FEATURES AND RAILROADS. SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS.

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA - 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)

CITY LIMITS. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

PRESENTLY DELINEATED FLOODPLAINS. SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). MAP NUMBER 040037 1600 A, AND MAP NUMBER 040037 1825 A, FOR MARICOPA COUNTY, ARIZONA UNINCORPORATED AREAS. EFFECTIVE DATE: JULY 2, 1979.

JUL 31 1991

Base Map Prepared: August 6, 1987

STUDY AREA - BASE MAP

SCALE 0 1/8 1/4 1/2 1 IN MILES

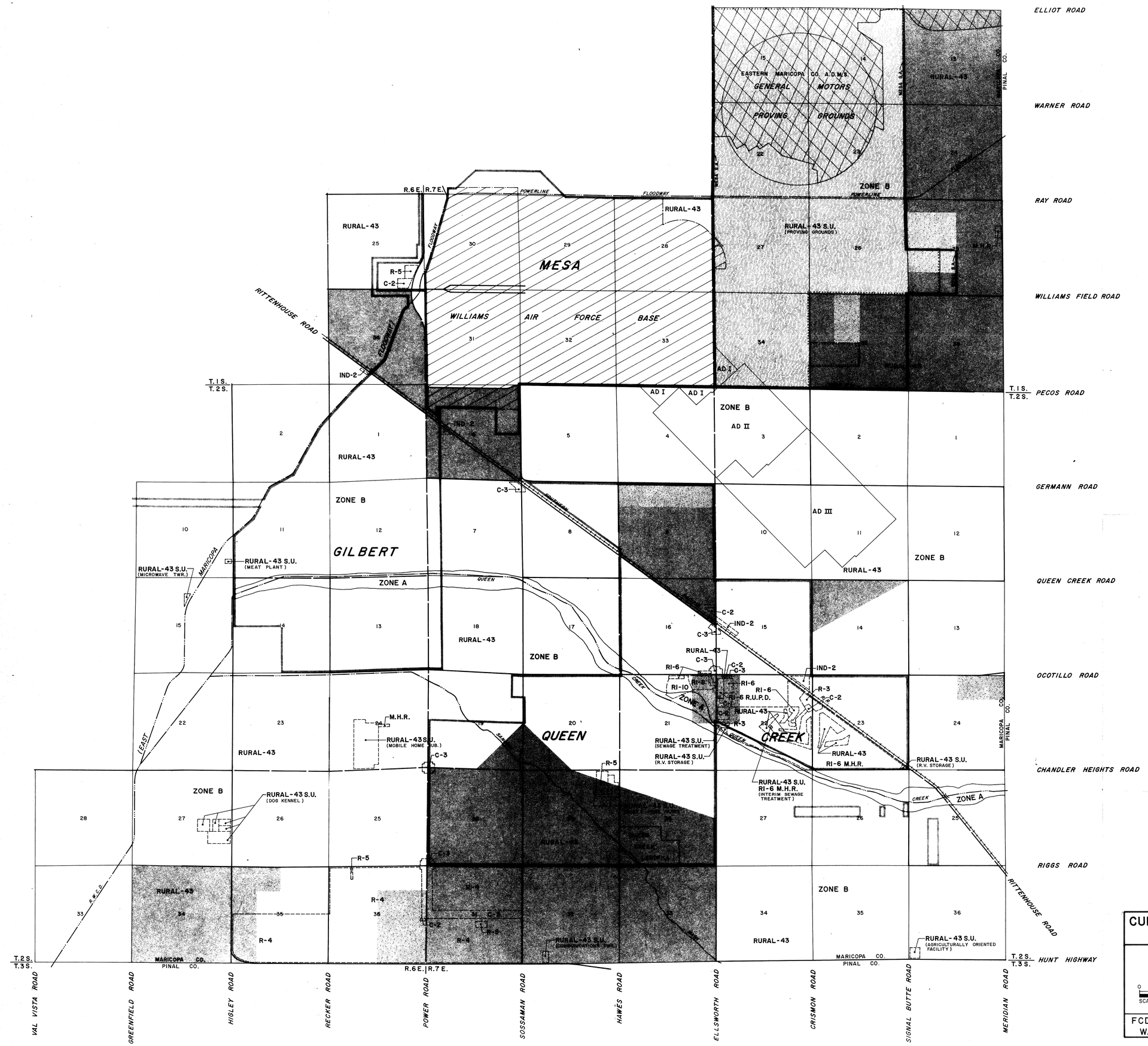
QUEEN CREEK
AREA DRAINAGE MASTER STUDY

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 4



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
S.A.	STRIP ANNEX
ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.
	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS
	INDUSTRIAL LAND USE
	VACANT LAND
	GOVERNMENT-OWNED LAND
	AGRICULTURAL LAND USE
	RESIDENTIAL LAND USE
RI-10, RI-8, RI-6	SINGLE-FAMILY RESIDENTIAL ZONING
R-3, R-4, R-5	MULTIPLE-FAMILY RESIDENTIAL ZONING
M.H.R.	MANUFACTURED HOUSE RESIDENTIAL ZONING
R.U.P.D.	RESIDENTIAL UNIT PLAN OF DEVELOPMENT
S.U.	SPECIAL USE
C-1	NEIGHBORHOOD COMMERCIAL ZONING
C-2	INTERMEDIATE COMMERCIAL ZONING
C-3	GENERAL COMMERCIAL ZONING
IND-2	LIGHT INDUSTRIAL ZONING
AD I, AD II, AD III	AIRPORT DISTRICT ONE, TWO, THREE
RURAL-43	RURAL ZONING

REFERENCE

MAJOR CURRENT AND PROPOSED STREETS. SOURCE: MARICOPA ASSOCIATION OF GOVERNMENTS TRANSPORTATION AND PLANNING OFFICE SEPTEMBER 24, 1986.

SECTION LINES, MAJOR DRAINAGE FEATURES AND RAILROADS. SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS.

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA - 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)

CITY LIMITS. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

PRESENTLY DELINEATED FLOODPLAINS. SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). MAP NUMBER 040037 1600 A, AND MAP NUMBER 040037 1825 A, FOR MARICOPA COUNTY, ARIZONA UNINCORPORATED AREAS. EFFECTIVE DATE: JULY 2, 1979.

CURRENT LAND USE AND GOVERNMENT OWNED LAND. SOURCE: MARICOPA COUNTY, ARIZONA GENERALIZED LAND USE MAP PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, 1982.

CURRENT ZONING DISTRICT. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

Base Map Prepared: August 6, 1987 JUL 31 1991

CURRENT LAND USE, CURRENT ZONING DISTRICT, GOVERNMENT-OWNED LAND

SCALE 0 1/8 1/4 1/2 1 IN MILES

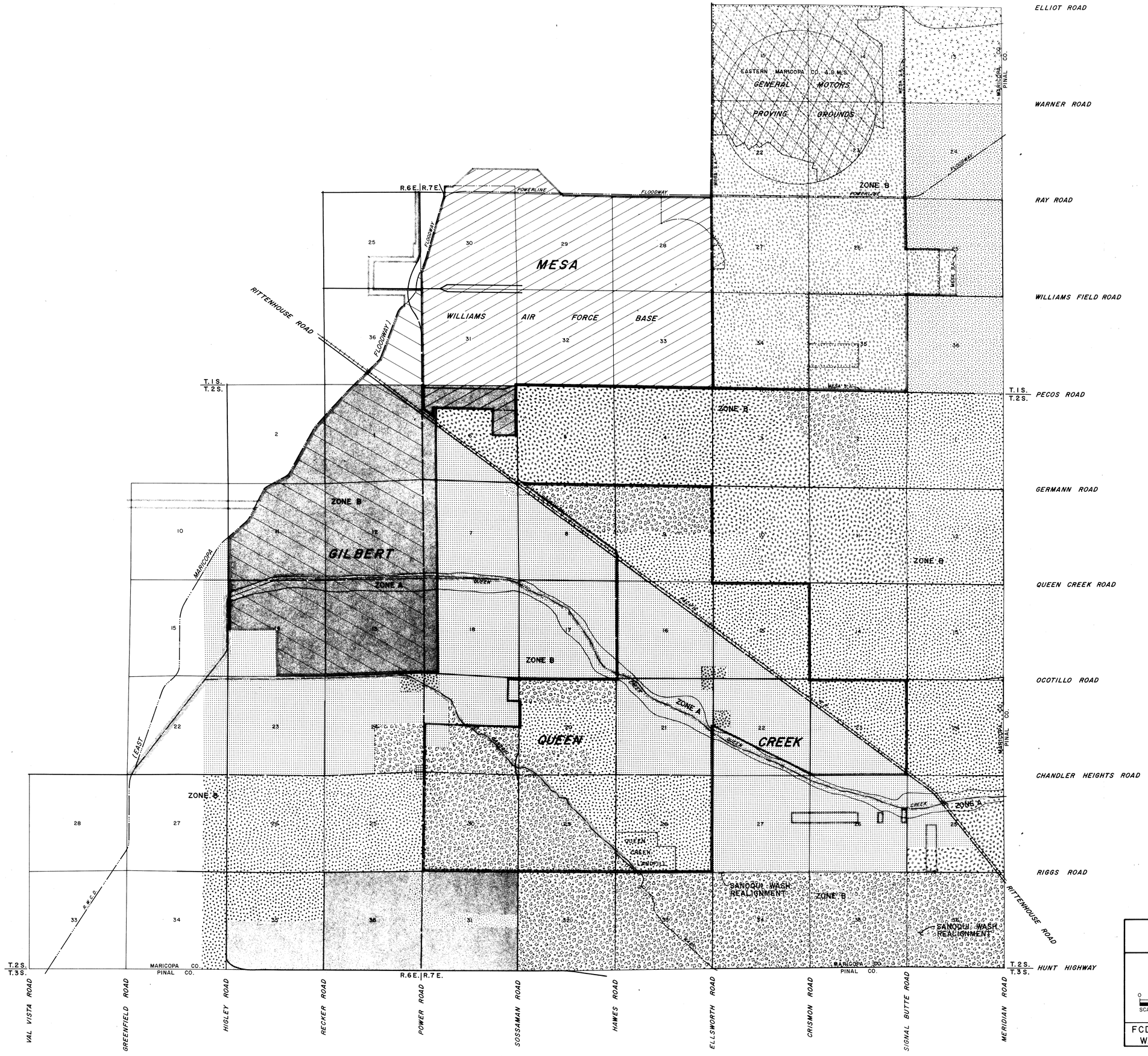
QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FCD CONTRACT 86-23
WA JOB NO. 86328

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

FIGURE 5



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
S.A.	STRIP ANNEX
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ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.
	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS
OS	OPEN SPACE (1)
RR/H	RURAL RESIDENTIAL/HIGH (1)
SR	SUBURBAN RESIDENTIAL (1)
UR/L	URBAN RESIDENTIAL/LOW (1)
UR/VL	URBAN RESIDENTIAL/VERY LOW (1)
CC	CONVENIENCE COMMERCIAL (1)
NC	NEIGHBORHOOD COMMERCIAL (1)
MNC	MULTI-NEIGHBORHOOD COMMERCIAL (1)
MUC	MIXED USE CENTER (1)
UR/VL (1) MIR (2)	URBAN RESIDENTIAL / VERY LOW (1) MEDIUM INTENSITY RESIDENTIAL (2) [NOTE: OVERLAPPING LAND USE]
UR/VL (1) P/SP (3)	URBAN RESIDENTIAL / VERY LOW (1) PUBLIC / SEMI-PUBLIC (3) [NOTE: OVERLAPPING LAND USE]
GI	GENERAL INDUSTRIAL (3)
MDR	MEDIUM DENSITY RESIDENTIAL (3)
LDR	LOW DENSITY RESIDENTIAL (3)
NOT SHOWN A	AGRICULTURAL (4)
NOT SHOWN I	INDUSTRIAL (4)
NOT SHOWN LDR	LOW DENSITY RESIDENTIAL (4)
NOT SHOWN GR	GENERAL RURAL (4)
NOT SHOWN U	URBAN (4)

REFERENCE

MAJOR CURRENT AND PROPOSED STREETS. SOURCE: MARICOPA ASSOCIATION OF GOVERNMENTS TRANSPORTATION AND PLANNING OFFICE SEPTEMBER 24, 1986.

SECTION LINES, MAJOR DRAINAGE FEATURES AND RAILROADS. SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS.

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SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)

CITY LIMITS. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

PRESENTLY DELINEATED FLOODPLAINS. SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). MAP NUMBER 040037 1600 A, AND MAP NUMBER 040037 1825 A, FOR MARICOPA COUNTY, ARIZONA UNINCORPORATED AREAS. EFFECTIVE DATE: JULY 2, 1979.

(1) MARICOPA COUNTY LAND USE PLAN FOR QUEEN CREEK-CHANDLER HEIGHTS PROJECTED THROUGH THE YEAR 2005. ADOPTED ON APRIL 18, 1988 BY THE MARICOPA COUNTY BOARD OF SUPERVISORS.

(2) TOWN OF GILBERT GENERAL PLAN LAND USE MAP. ADOPTED ON MAY 23, 1989 BY THE TOWN COUNCIL OF GILBERT.

(3) CITY OF MESA GENERAL PLAN LAND USE MAP. ADOPTED ON DECEMBER 19, 1988 BY THE CITY COUNCIL OF MESA.

(4) PINAL COUNTY COMPREHENSIVE PLAN. APACHE JUNCTION, QUEEN CREEK AND SANTAN AREA GENERALIZED LAND USE MAP. RECEIVED MAY 4, 1990 FROM PINAL COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT SERVICES.

Base Map Prepared: August 6, 1987

JUL 31 1991

PROJECTED LAND USE

SCALE 0 1/8 1/4 1/2 1 IN MILES

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
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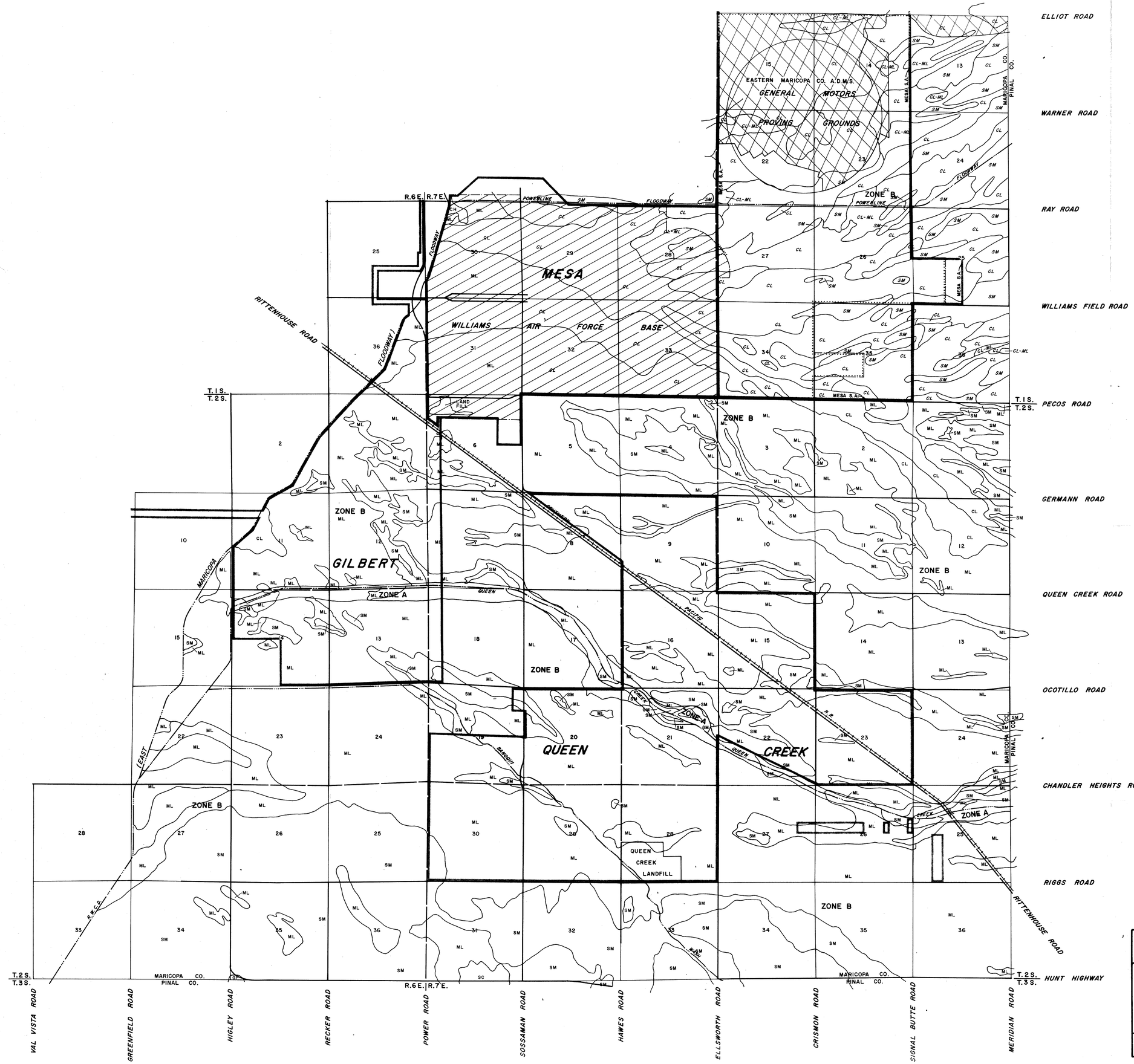
FCD CONTRACT 86-23
WA JOB NO. 86328

FIGURE 6



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
S.A.	STRIP ANNEX
ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.
	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS
(1) CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS, SANDY CLAYS OF HIGH PLASTICITY.
(1) CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
(1) ML	INORGANIC SILTS, CLAYEY SILTS WITH SLIGHT PLASTICITY.
(1) GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.
(1) GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, OR SAND-GRAVEL-COBBLE MIXTURES.
(1) SC	CLAYEY SANDS, SAND-CLAY MIXTURES.
(1) SM	SILTY SANDS, SAND-SILT MIXTURES.
(2) *CL*	*INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.*
(2) *ML*	*INORGANIC SILTS, CLAYEY SILTS WITH SLIGHT PLASTICITY.*
(2) *SM*	*SILTY SANDS, SAND-SILT MIXTURES.*

REFERENCE

MAJOR CURRENT AND PROPOSED STREETS. SOURCE: MARICOPA ASSOCIATION OF GOVERNMENTS TRANSPORTATION AND PLANNING OFFICE SEPTEMBER 24, 1986.

SECTION LINES, MAJOR DRAINAGE FEATURES AND RAILROADS. SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS.

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SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)

CITY LIMITS. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

PRESENTLY DELINEATED FLOODPLAINS. SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). MAP NUMBER 040037 1600 A, AND MAP NUMBER 040037 1825 A, FOR MARICOPA COUNTY, ARIZONA UNINCORPORATED AREAS. EFFECTIVE DATE: JULY 2, 1979.

(1) SOIL SURVEY OF EASTERN MARICOPA AND NORTHERN PINAL COUNTIES AREA, ARIZONA. PREPARED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE, ISSUED NOVEMBER 1974.

(2) SOIL SURVEY OF AGUILA-CAREFREE AREA, PARTS OF MARICOPA AND PINAL COUNTIES, ARIZONA. PREPARED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE, ISSUED APRIL 1986.

Base Map Prepared: August 6, 1987

JUL 31 1991

UNIFIED SOIL CLASSIFICATION SYSTEM

SCALE 0 1/8 1/4 1/2 1 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
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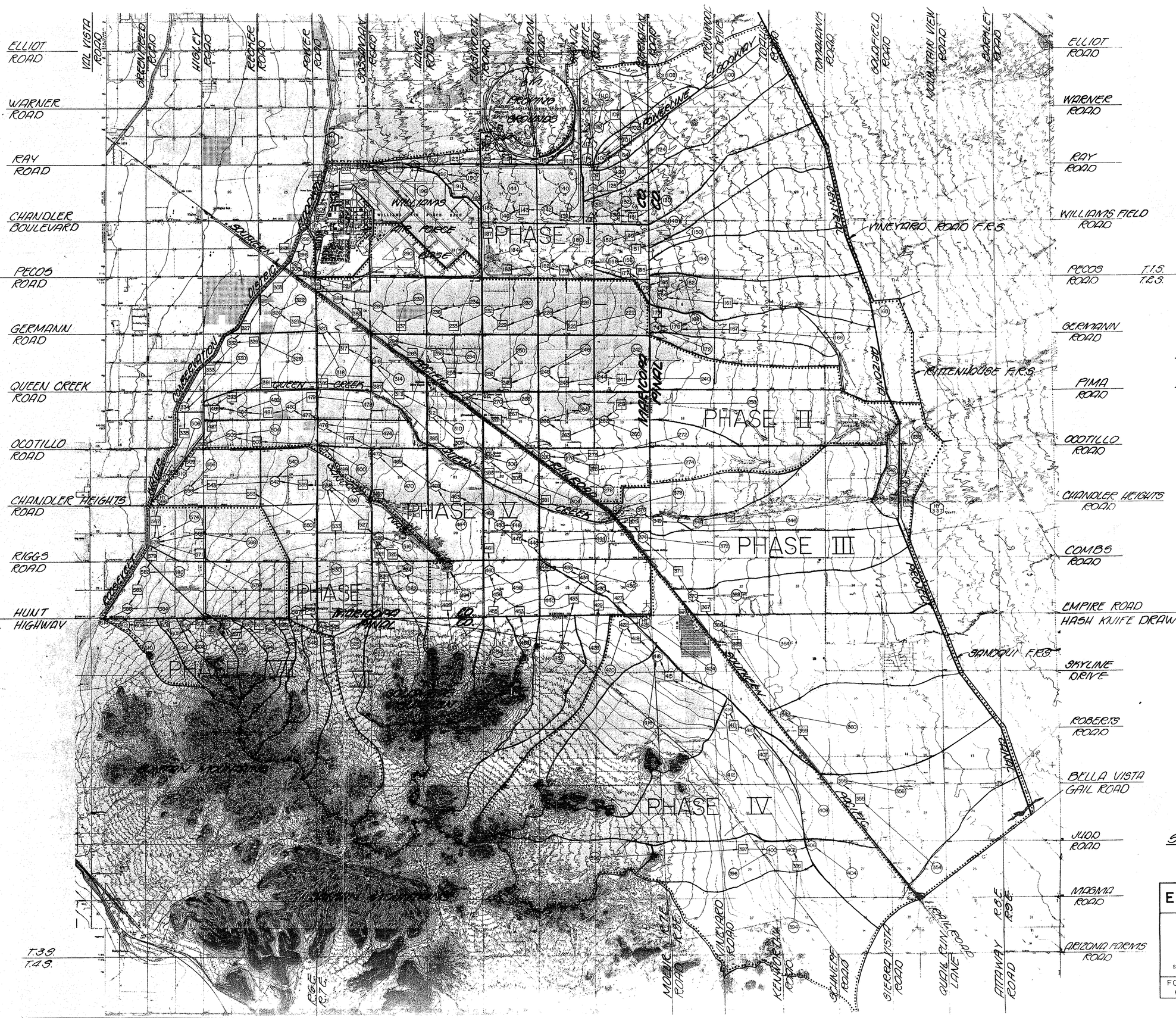
FIGURE 7



LEGEND

- (923) COMPUTE HYDROGRAPH FOR DRAINAGE AREA
- [198] REACH HYDROGRAPH
- (722) COMBINE HYDROGRAPH
- (IN 933) INPUT HYDROGRAPH
- △ 871 RESERVOIR HYDROGRAPH
- F.R.S. FLOOD RETARDING STRUCTURE
- ····· PHASE LINE
- ——— EXISTING FLOOD RETARDING STRUCTURE (F.R.S.)
- T.S. SUB-BASIN BOUNDARY LINE

JUL 31 1991

Street Name Source:
Maricopa & Pinal County Planning and Development

Date Prepared: January, 1989

EXISTING CONDITIONS HEC-I SCHEMATIC

SCALE 0 1/4 1/2 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
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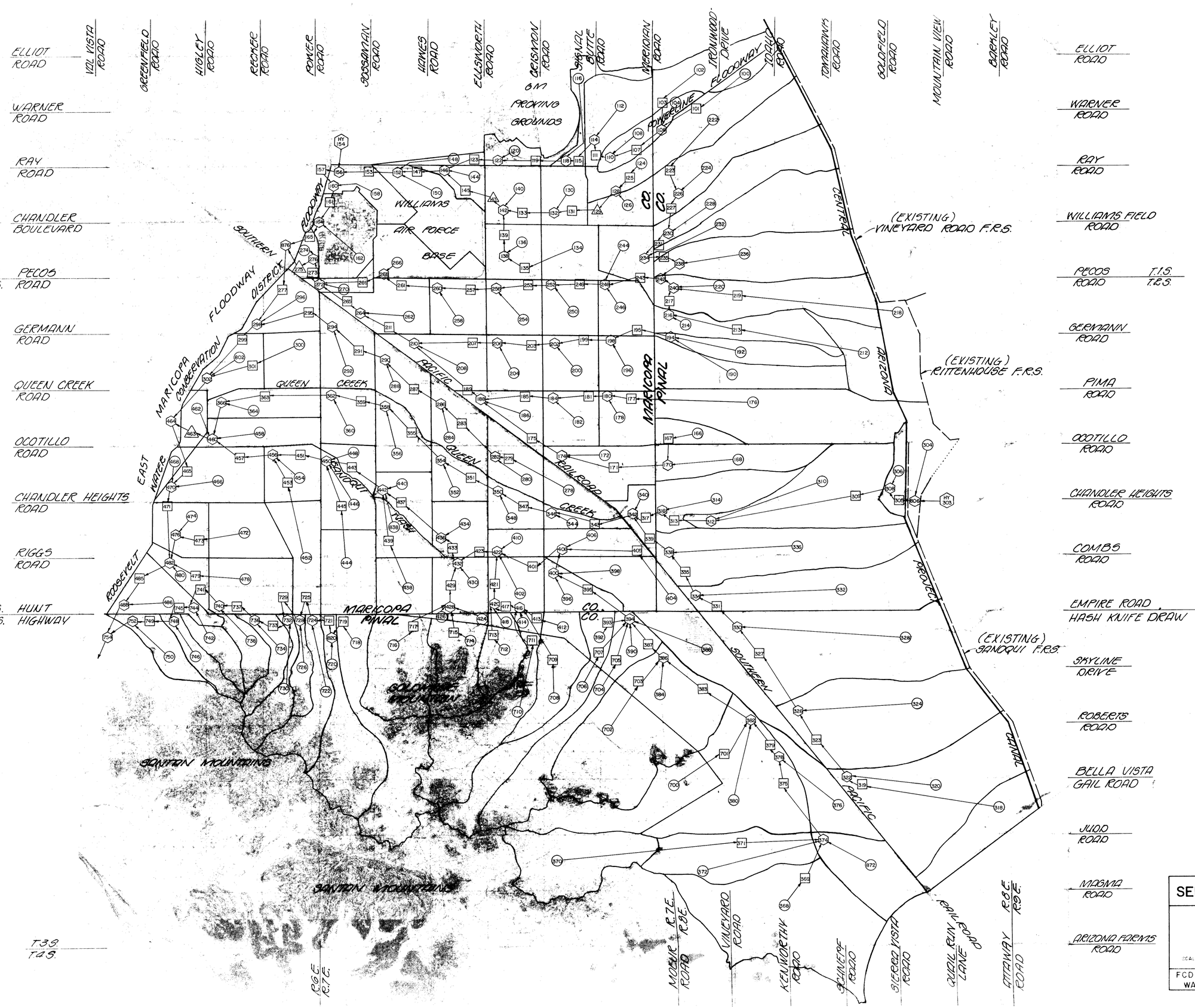
FIGURE 8



I.D. NUMBER CROSS REFERENCE

NEW	OLD	NEW	OLD	NEW	OLD
100	100	254	230	402	458
101	101	257	233	404	424
102	108	258	234	405	-
103	109	261	237	406	444
104	102/104	262	238	409	-
107	101	265	289	410	448
108	102/104	266	290	412	432
111	107	269	291	413	-
112	110	270	290/292	414	452
211	285	273	-	417	-
115	115	274	290/292	418	454
116	116	277	303	421	455
119	119	278	304	423	-
120	120	279	305	424	488
123	123	280	306	426	488/520
124	126	283	309	429	489
125	125	284	310	430	494
126	132	287	313	433	497
130	140	288	314	434	464
131	139	291	317	437	497
133	143	292	318	838	516
134	180	295	321	438	522
136	184	296	322	439	525
135	183	299	327	440	470/474/478
139	187	300	328	443	499
140	144	301	329	444	530
144	190	802	330	445	533
145	191	304	338	446	536
147	195	305	339/341	448	500
148	200	306	342	451	503
150	196	309	345	452	550
153	203	310	346	453	-
157	205	313	349	454	540
158	206	314	378	457	503
161	209	317	349	458	504
162	210	318	354	462	330/506
165	213	319	355	465	395
166	272	320	356	466	556
167	-	323	359	468	330/506
168	274	324	360	471	567
171	275	327	363	472	568
172	278	328	364	473	569
175	281	331	367	478	570
176	258	332	368	479	571
177	259	335	371	480	580
178	260	336	372	485	583
181	263	339	371	486	584
182	264	340	378	700	412
185	267	343	381	701	-
186	268	344	444	702	416
189	283	347	383	703	-
190	240	348	448	704	420
192	172	351	385	705	-
195	241	352	464	706	428
196	242	355	387	707	-
199	245	356	470/474/478	708	432
200	246	359	389	709	-
203	249	360	470/474/478	710	452
204	250	363	391/393	711	-
207	253	364	482	712	454
208	254	367	487	713	-
212	169	368	394	714	488
213	167	369	395	715	-
214	168	370	396	716	520
217	165	371	397	717	-
218	160	372	398	718	528
219	161	375	407	719	-
220	162	872	404	720	544
222	124	376	408	721	549
223	-	379	411	722	546
224	130	380	412	725	549
227	-	383	415	726	588
228	148	384	416	729	589
231	-	387	419	730	590
232	150	388	424	733	593
235	-	390	420	734	594
236	154	392	428	737	597
243	155	393	-	738	598
244	156	395	427	742	602
246	222	396	440	745	605
249	175	398	436	746	606
250	226	401	-	749	609
253	183			750	610

LEGEND

426	COMPUTE HYDROGRAPH FOR DRAINAGE AREA
417	REACH HYDROGRAPH
410	COMBINE HYDROGRAPH
HY 172	INPUT HYDROGRAPH
395	RESERVOIR HYDROGRAPH
F.R.S.	FLOOD RETARDING STRUCTURE

BASE MAP SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
SUPERSTITION MTS. SW, ARIZONA - 1956 (PHOTOREVISED 1981)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)
MAGMA, ARIZONA - 1956
SACATON, ARIZONA - 1966 (PHOTOREVISED 1971)
BLACKWATER, ARIZONA - 1966 (PHOTOREVISED 1981)
FLORENCE, ARIZONA - 1965

STREET NAME SOURCE:
MARICOPA & PINAL COUNTY PLANNING DEPARTMENTS

Date Prepared: September, 1990

JUL 31 1991

SELECTED ALTERNATIVE HEC-I SCHEMATIC

SCALE 0 1/4 1/2 1 IN MILES

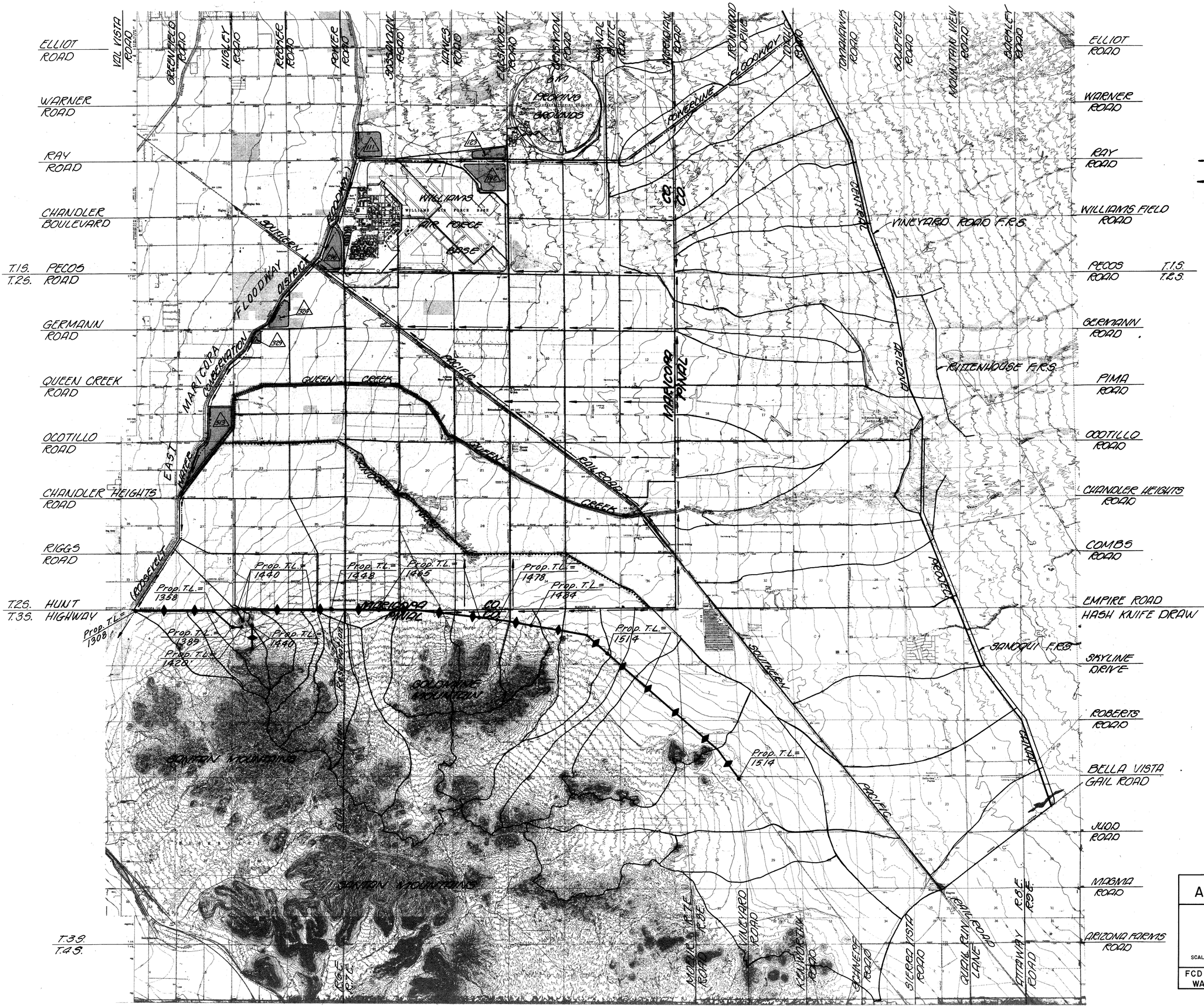
FCD CONTRACT 86-23
WA JOB NO. 86328

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

FIGURE 9



LEGEND

- Detention Basin
- Proposed Levee
- Prop.T.L. Proposed Top Of Levee
- Existing Floodways
- Drainageway For Pinal County Offsite Floodwater

ALTERNATIVE DRAINAGE SYSTEM # 1

Component A - Regional Detention Basins
Component B - Santan Structures
Component C - Queen Creek and Sanoqui Wash Channel Improvements
Component D - Drainageways
Component E - Onsite Retention

QUEEN CREEK AND SANOQUI WASH CHANNEL IMPROVEMENTS

- Top Width = 375'
- Top Width = 300'
- Top Width = 175'
- Top Width = 150'
- Top Width = 125'

BASE MAP SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS

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GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)
MAGMA, ARIZONA - 1956
SACATON, ARIZONA - 1966 (PHOTOREVISED 1971)
BLACKWATER, ARIZONA - 1966 (PHOTOREVISED 1981)
FLORENCE, ARIZONA - 1965

DETENTION BASIN	STORAGE VOLUME (Acre Ft.)
192	1245
123	335
111	2025
296	1605
328	435
329	35
513	3100

JUL 31 1991

Date Prepared: September, 1989

ALTERNATIVE DRAINAGE SYSTEM # 1

SCALE 0 1/4 1/2 1 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
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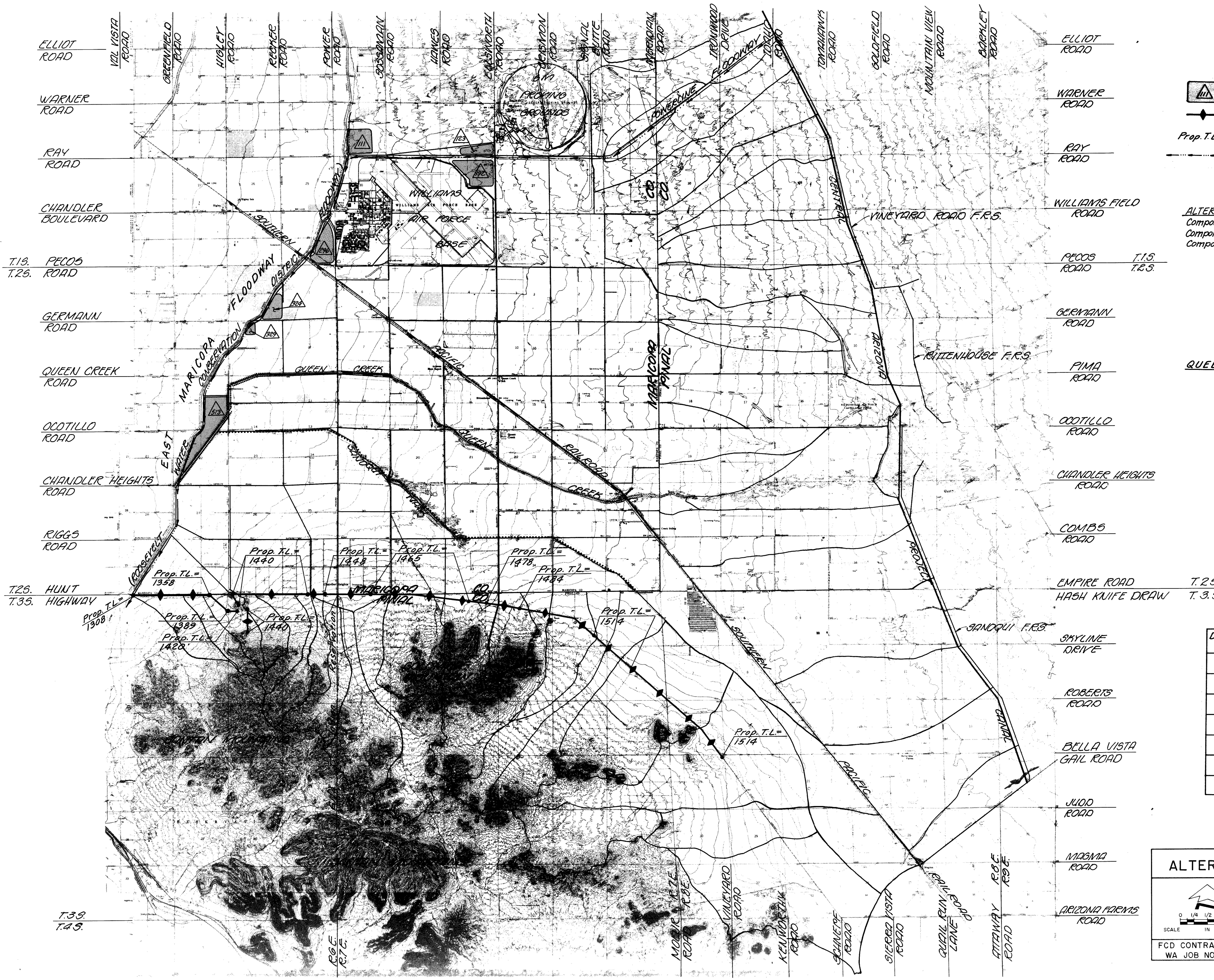
FIGURE 10 SHEET 1 OF 6



LEGEND

- Detention Basin
- Proposed Levee
- Prop.T.L. Proposed Top Of Levee
- Existing Floodways

ALTERNATIVE DRAINAGE SYSTEM #2

Component A- Regional Detention Basins
Component B-Santan Structures
Component C-Queen Creek and Sanoqui Wash Channel Improvements

QUEEN CREEK AND SANOQUI WASH CHANNEL IMPROVEMENTS

- Top Width = 375'
- Top Width = 300'
- Top Width = 175'
- Top Width = 150'
- Top Width = 125'

DETENTION BASIN	STORAGE VOLUME (Acre Ft.)
192	1245
123	335
111	2025
296	1605
324	435
329	35
513	3100

JUL 31 1991

Date Prepared: September, 1989

ALTERNATIVE DRAINAGE SYSTEM # 2

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SCALE 0 1/4 1/2 1 IN MILES

WOOD & ASSOCIATES, INC. CONSULTING CIVIL ENGINEERS
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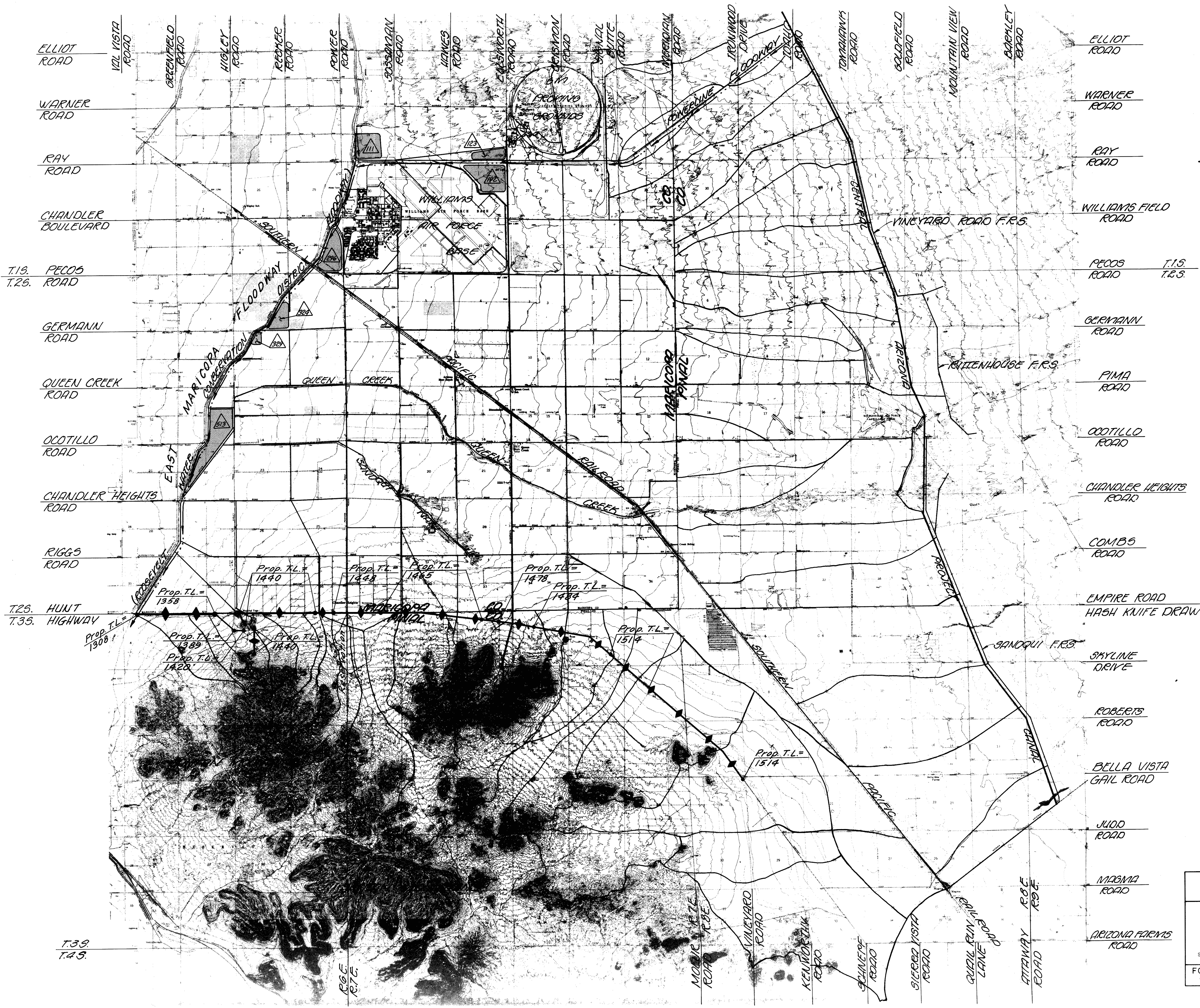
FCD CONTRACT 86-23
WA JOB NO. 86328

FIGURE 10 SHEET 2 OF 6



LEGEND

- Detention Basin
- Proposed Levee
- Prop. T.L. Proposed Top Of Levee
- Existing Floodways

ALTERNATIVE DRAINAGE SYSTEM #3
Component A-Regional Detention Basins
Component B-Santan Structures

DETENTION BASIN	STORAGE VOLUME (Acre Ft.)
192	1245
123	335
111	2025
296	1605
324	435
329	35
513	3100

JUL 31 1991

Date Prepared: September, 1989

ALTERNATIVE DRAINAGE SYSTEM # 3

SCALE 0 1/4 1/2 1 IN MILES

QUEEN CREEK

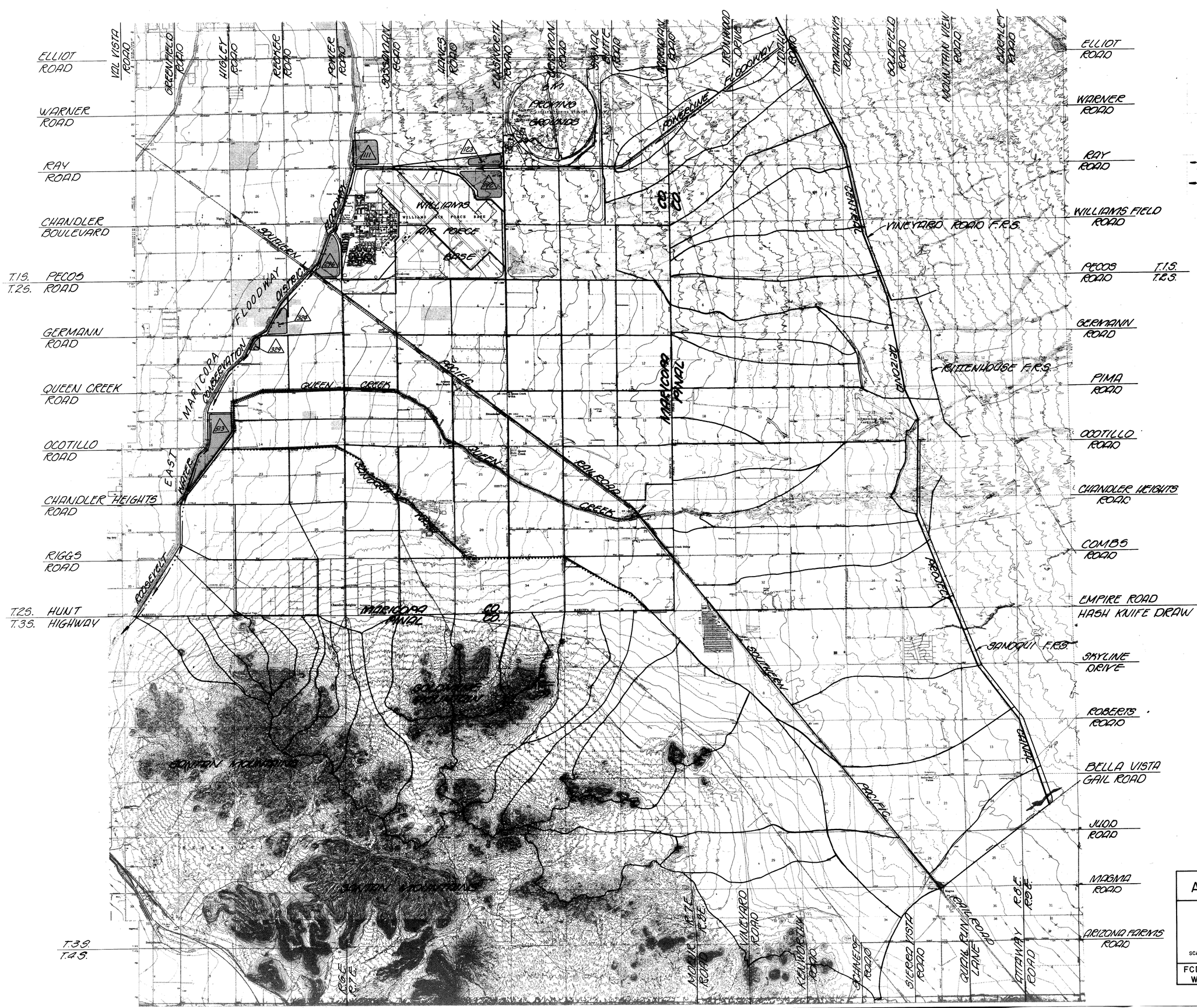
AREA DRAINAGE MASTER STUDY

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 10 SHEET 3 OF 6



LEGEND

Detention Basin

Existing Floodways

Drainageway For Pinal County Offsite Floodwater

ALTERNATIVE DRAINAGE SYSTEM #4

Component A- Regional Detention Basins
Component C- Queen Creek and Sanoqui Wash Channel Improvements

QUEEN CREEK AND SANOQUI WASH CHANNEL IMPROVEMENTS

- Top Width = 375'
- Top Width = 300'
- Top Width = 175'
- Top Width = 150'
- Top Width = 125'

DETENTION BASIN	STORAGE VOLUME (Acre Ft.)
192	1245
123	335
111	2025
296	1605
328	435
329	35
513	3100

JUL 31 1991

Date Prepared: September, 1989

ALTERNATIVE DRAINAGE SYSTEM # 4

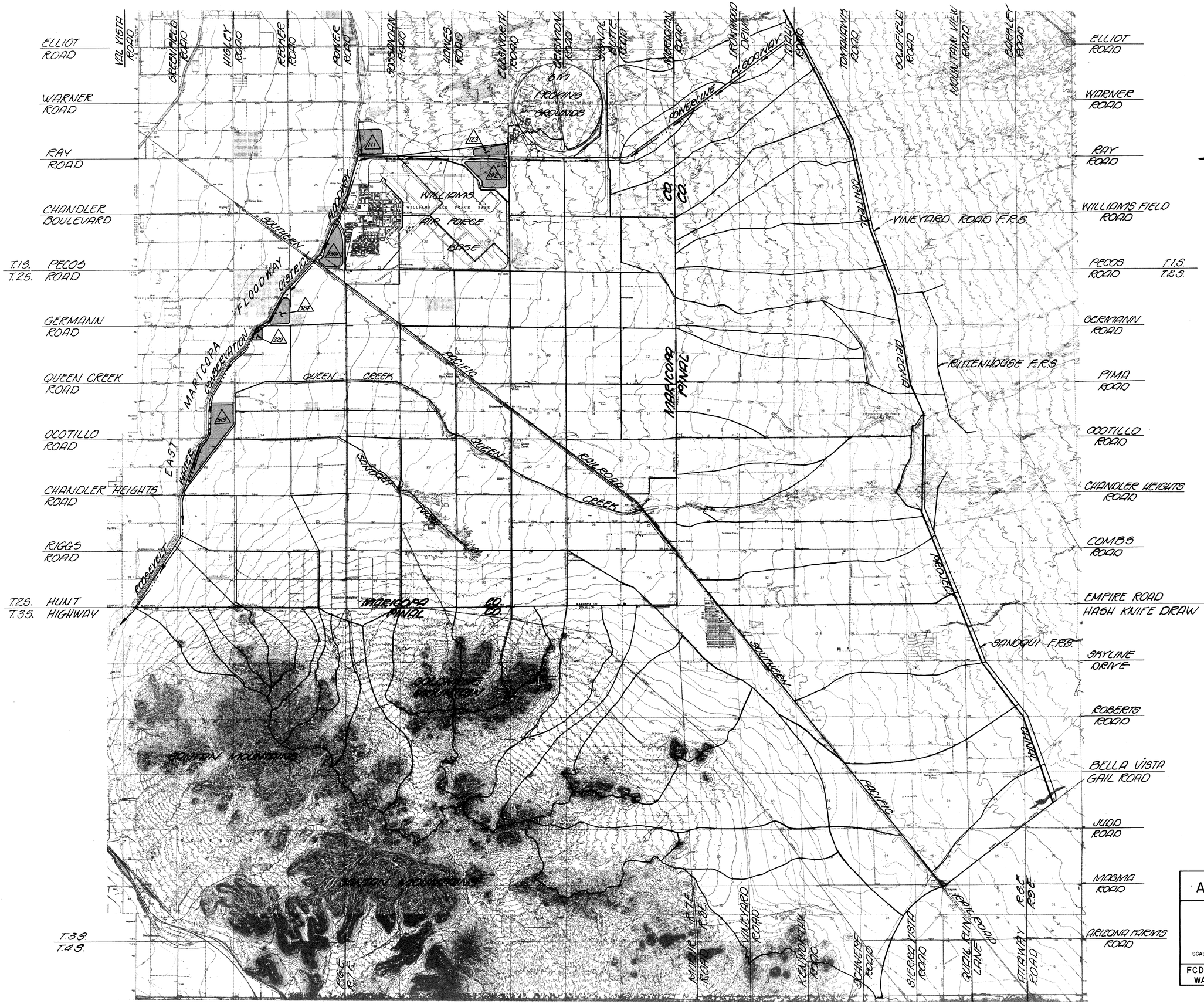
SCALE 0 1/4 1/2 1 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

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

FIGURE 10 SHEET 4 OF 6



LEGEND

Detention Basin

Existing Floodways

ALTERNATIVE DRAINAGE SYSTEM #5
Component A- Regional Detention Basins

DETENTION BASIN	STORAGE VOLUME (Acre Ft.)
192	1245
123	335
111	2025
296	1605
304	435
309	35
513	3100

JUL 31 1991

Date Prepared: September, 1989

ALTERNATIVE DRAINAGE SYSTEM # 5

SCALE 0 1/4 1/2 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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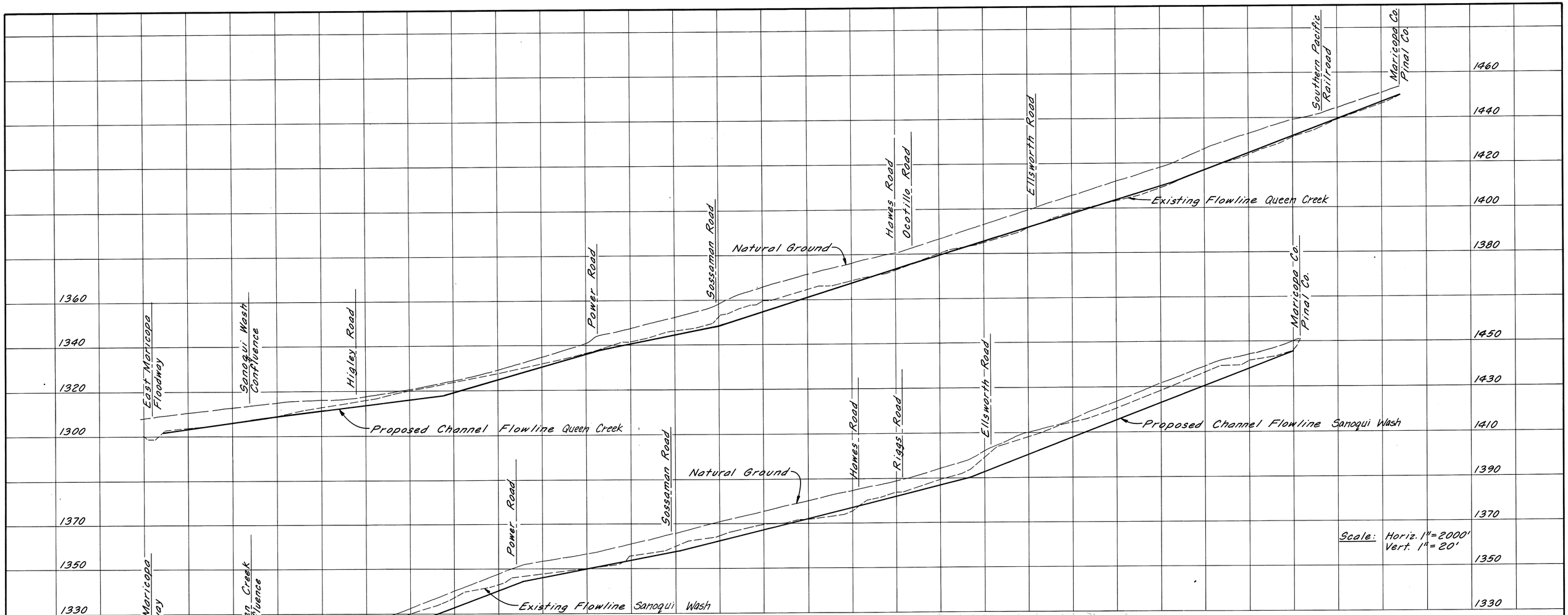
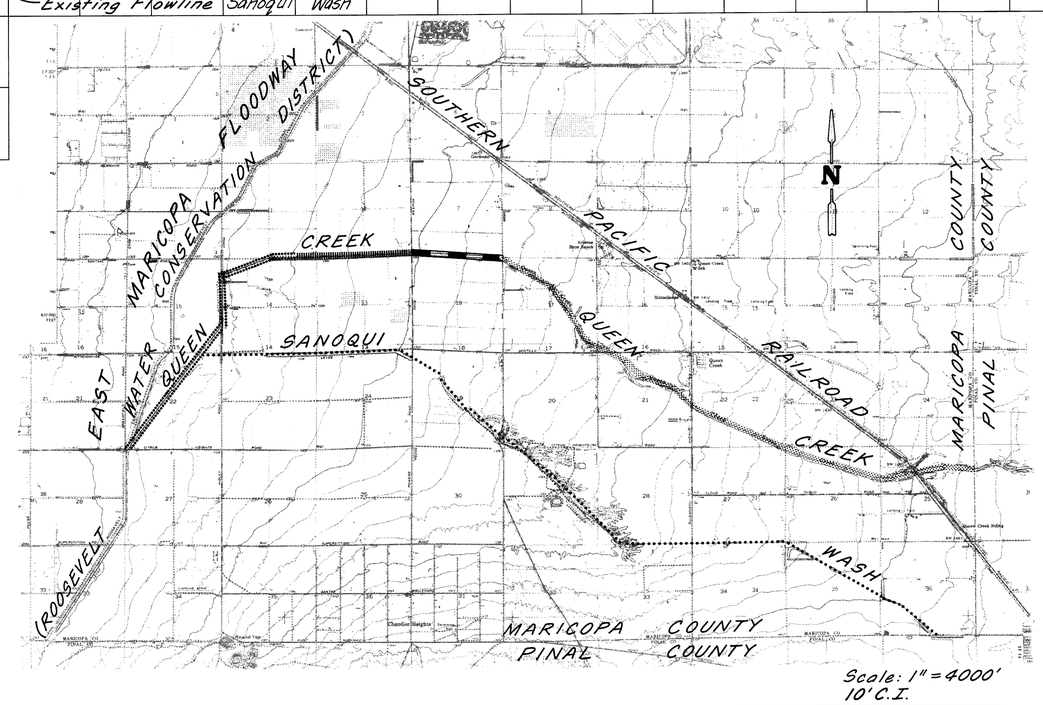
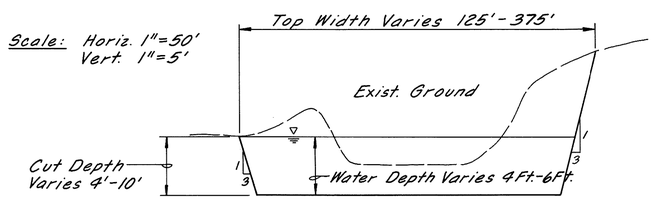
FIGURE 10 SHEET 5 OF 6





LEGEND

- Top Width = 375'
- Top Width = 300'
- Top Width = 175'
- Top Width = 150'
- Top Width = 125'



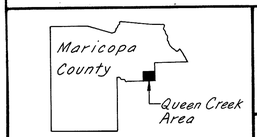
QUEEN CREEK AND SANOQUI WASH
PROPOSED CHANNEL IMPROVEMENTS

JUL 31 1991

Date Prepared: September, 1989

COMPONENT C

QUEEN CREEK & SANOQUI WASH CHANNEL IMPROVEMENTS



QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FCD CONTRACT 86-23
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WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

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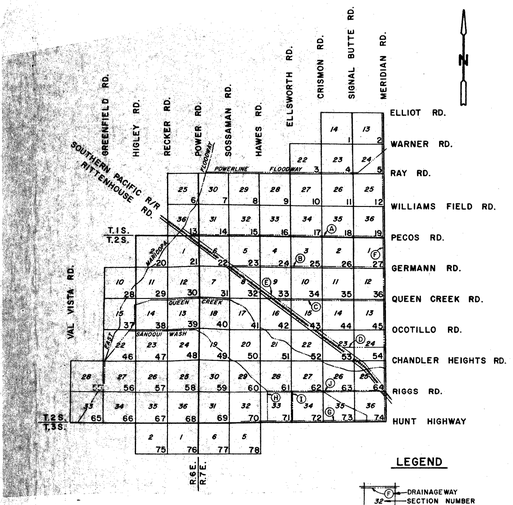
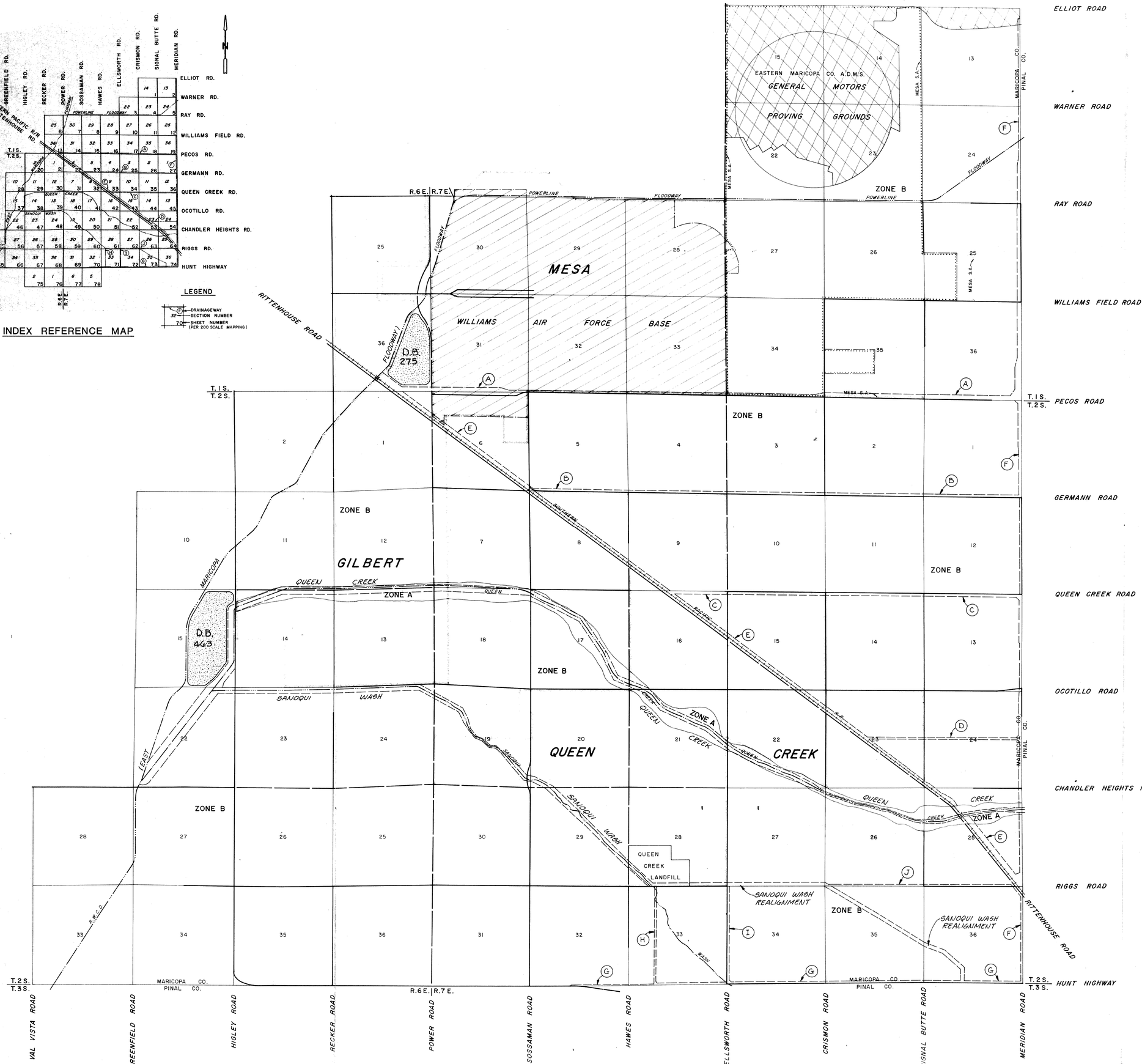
FIGURE 10 SHEET 6 OF 6



LEGEND

- 6 — DRAINAGEWAY
- 32 — SECTION NUMBER
- 70 — SHEET NUMBER (PER 200 SCALE MAPPING)

INDEX REFERENCE MAP



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
S.A.	STRIP ANNEX
ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD.
	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS
D.B. 275	INDICATES REGIONAL DETENTION BASIN
(F)	INDICATES DRAINAGEWAY
	INDICATES QUEEN CREEK, SANOQUI WASH, & DRAINAGEWAY CHANNELIZATION
	SANTAN STRUCTURES
	GILA RIVER INDIAN RESERVATION BOUNDARY

IMPLEMENTATION PLAN

PHASE 1 - REGIONAL DETENTION BASINS

PHASE 2 - CHANNEL IMPROVEMENTS TO QUEEN CREEK AND SANOQUI WASH

PHASE 3 - SANTAN STRUCTURES IN PINAL COUNTY

PHASE 4 - DRAINAGEWAYS TO COLLECT AND CONVEY PINAL COUNTY OFFSITE FLOODWATERS

PHASE 5 - ONSITE RETENTION (100-YEAR, 2-HOUR) IN ACCORDANCE WITH MARICOPA COUNTY'S UNIFORM DRAINAGE POLICY

REFERENCE

MAJOR CURRENT AND PROPOSED STREETS. SOURCE: MARICOPA ASSOCIATION OF GOVERNMENTS TRANSPORTATION AND PLANNING OFFICE SEPTEMBER 24, 1986.

SECTION LINES, MAJOR DRAINAGE FEATURES AND RAILROADS. SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS.

HIGLEY, ARIZONA - 1956 (PHOTOREVISED 1981)
DESERT WELL, ARIZONA - 1956 (PHOTOREVISED 1973)
GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA - 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)

CITY LIMITS. SOURCE: ZONING DISTRICT MAPS PREPARED BY MARICOPA COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT, ISSUED SEPTEMBER 16, 1986.

PRESENTLY DELINEATED FLOODPLAINS. SOURCE: FLOOD INSURANCE RATE MAP PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). MAP NUMBER 040037 1600 A, AND MAP NUMBER 040037 1825 A, FOR MARICOPA COUNTY, ARIZONA UNINCORPORATED AREAS. EFFECTIVE DATE: JULY 2, 1979.

QUEEN CREEK LANDFILL. SOURCE: MARICOPA COUNTY LANDFILL DEPARTMENT APRIL, 1990.

QUEEN CREEK COMMUNITY LIMITS. SOURCE: MARICOPA COUNTY HIGHWAY DEPARTMENT APRIL, 1990.

SANTAN STRUCTURES. SOURCE: FLOOD CONTROL SURVEY AND REPORT - STUDY AREA I - SOUTHEASTERN MARICOPA COUNTY, PREPARED JUNE 1962.

NOTE: This Map Depicts The Portion of the Queen Creek Area Drainage Master Plan Located North of Hunt Highway in Maricopa County. This Part of the Plan Shows Regional Detention Basins, Queen Creek and Sanoqui Wash Channel Improvements and Drainageways.

JUL 31 1991

Base Map Prepared: August 6, 1987

QUEEN CREEK AREA DRAINAGE MASTER PLAN

0 1/8 1/4 1/2 1 SCALE IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
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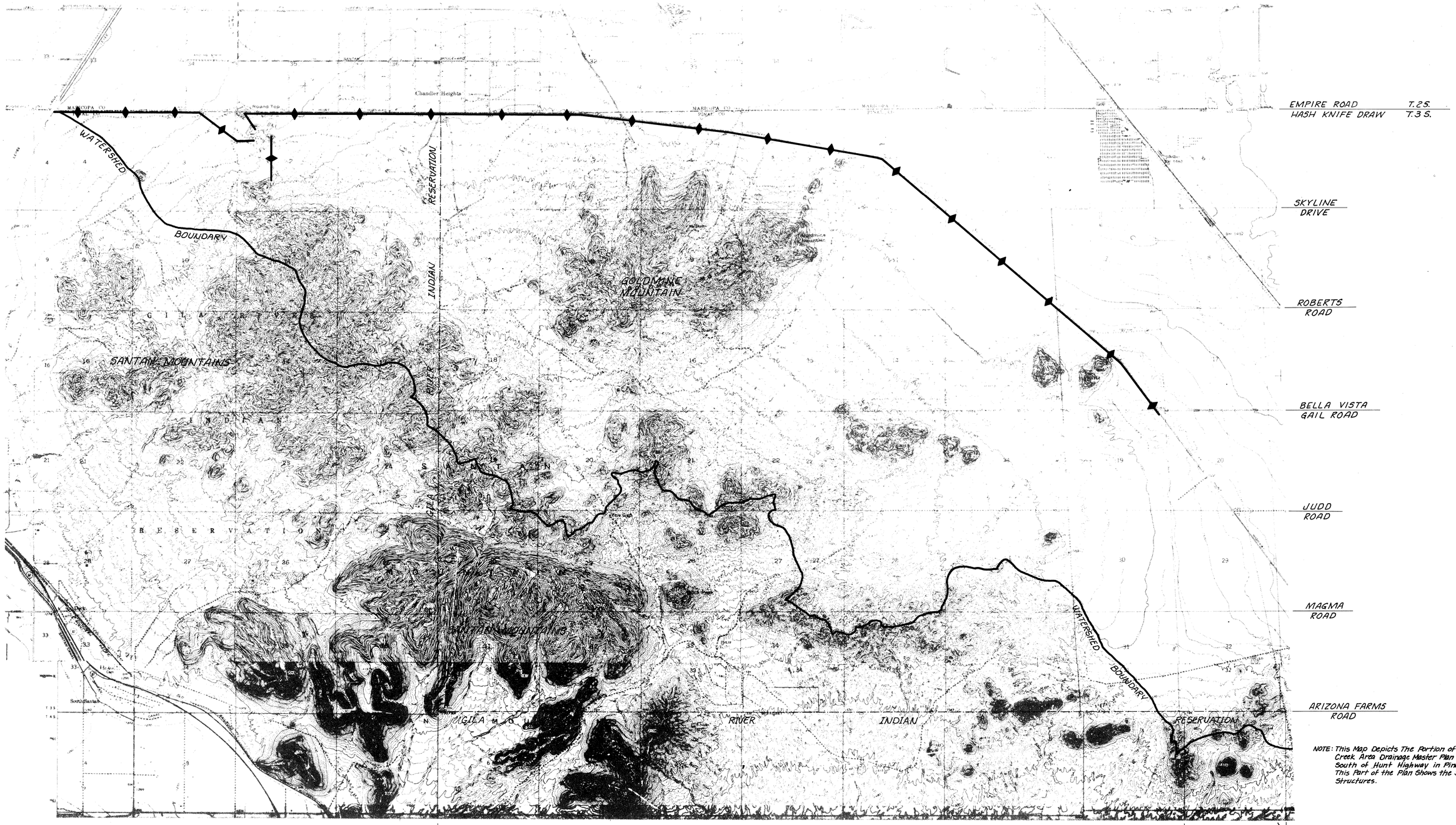

NOTE: This Map Depicts The Portion of the Queen Creek Area Drainage Master Plan Located South of Hunt Highway in Pinal County. This Part of the Plan Shows the Santan Structures.

JUL 31 1991

Base Map Prepared: October 4, 1990

BASE MAP SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLE MAPS

GILA BUTTE, ARIZONA - 1952 (PHOTOREVISED 1981)
CHANDLER HEIGHTS, ARIZONA 1956 (PHOTOREVISED 1973)
SACATON NE, ARIZONA - 1956 (PHOTOREVISED 1973)
MAGMA, ARIZONA - 1956
SACATON, ARIZONA - 1966 (PHOTOREVISED 1971)
BLACKWATER, ARIZONA - 1966 (PHOTOREVISED 1981)
FLORENCE, ARIZONA - 1965

QUEEN CREEK AREA DRAINAGE MASTER PLAN

SCALE 0 1/8 1/4 1/2 1 IN MILES

FCD CONTRACT 86-23
WA JOB NO. 86328

QUEEN CREEK
AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

WOOD & ASSOCIATES, INC.
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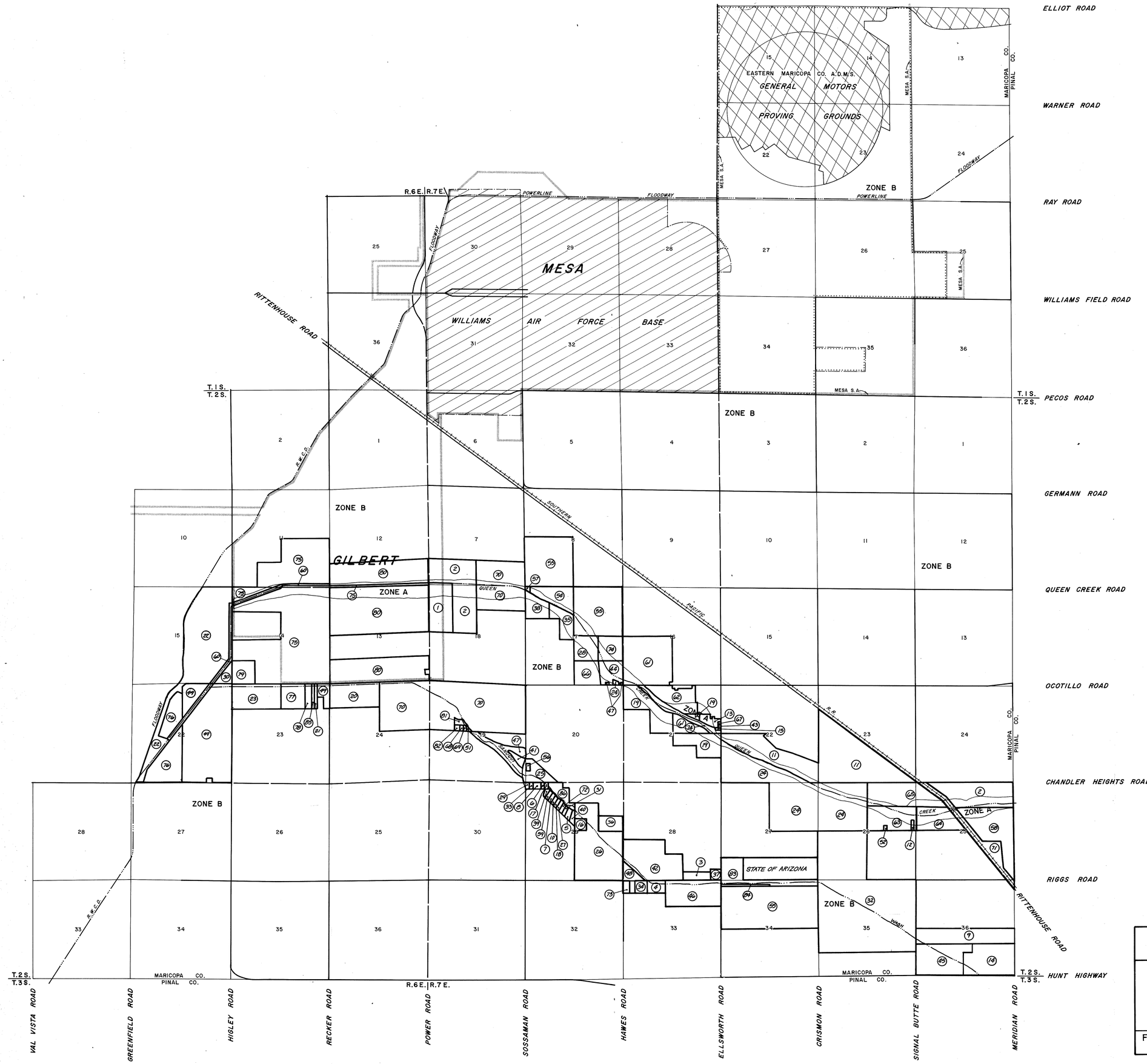
FIGURE 11 SHEET 2 OF 2



LEGEND

	SECTION LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	RAILROAD
	FLOWLINE
	CORPORATION LIMITS
	BOUNDARY DELINEATING SPECIAL USE
R.W.C.D.	ROOSEVELT WATER CONSERVATION DISTRICT
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	EASTERN MARICOPA COUNTY A.D.M.S. LIMITS
12	SECTION NUMBER
(11)	LAND OWNERSHIP IDENTIFICATION

REFERENCE

MARICOPA COUNTY ASSESSOR'S RECORDS - JUNE 23, 1989

1. Andersen, Dale E. 6553 E. University Road Mesa, Arizona 85205
2. Andersen, Zola P.O. Box 716 Chandler, Arizona 85224
3. Arizona Pecan Properties 48 West McDonald Mesa, Arizona 85201
4. Aye, Khin & Christine 1320 E. San Miguel Phoenix, Arizona 85014
5. Baldwin, Brian & Bonnie 19510 E. Via De Los Olivos Queen Creek, Arizona 85242
6. Belden, Larry & Cynthia D. 825 West Monterey Place Chandler, Arizona 85224
7. Breschini Verle & Guadalupe 19402 Via De Olivos Queen Creek, Arizona 85242
8. Bonilla, Celina C. P.O. Box 782 Mesa, Arizona 85201
9. Century Plaza Investment Corp. 1707 East Southern Avenue Tempe, Arizona 85282
10. Coleman, Thomas & Sharon R. 649 North Date Street Mesa, Arizona 85201
11. Commonwealth Title 1255 W. Baseline Rd. #189 Mesa, Arizona 85202
12. Cowling, Scott H. Route 2, Box 42A Queen Creek, Arizona 85242
13. Crewse, Kenneth Dale & Irene 22432 South Ellsworth Road Queen Creek, Arizona 85242
14. Denco Orchards Meridian Farms Associates 2222 S. Dobson Rd., Ste. 6-A Mesa, Arizona 85202
15. Dobson, Dwayne E. & Carol M. 1200 Queen Creek Road Chandler, Arizona 85224
16. Dougherty, John & Barbara A. 19536 Via De Olivos Queen Creek, Arizona 85242
17. Dvorak, Rudolph & Patricia M. 19321 Chandler Heights Road Queen Creek, Arizona 85242
18. Eberle Robert G. & JoAnne 19422 Via De Olivos Queen Creek, Arizona 85242
19. Ellsworth, Duane & Etta Mae P.O. Box 369 Queen Creek, Arizona 85242
20. Emerald Investments Inc. 5353 North 7th Street, Ste. 310 Phoenix, Arizona 85014
21. Eyler, Janet S. P.O. Box 299 Queen Creek, Arizona 85242
22. Flood Control District of Maricopa County 3335 West Durango Street Phoenix, Arizona 85009
23. GB Investment Co. P.O. Box 488 Chandler, Arizona 85224
24. Hastings Farms LTD M & W Enterprises Route 1, Box 44 Queen Creek, Arizona 85242
25. Hawes, E. E. 4250 East Camelback Road #150K Phoenix, Arizona 85018
26. Hawes, Ernest E. Jr. & Marjs 5314 South Marine Tempe, Arizona 85283
27. Hawkins, Kenneth & Cheryl A. 518 South Barkley Mesa, Arizona 85204
28. Healy, John P. & Ora R. 1115 West Fairway Drive Mesa, Arizona 85201
29. Heimburg, Craig & Carole 6309 E. Hillview Mesa, Arizona 85205
30. Higley 11.21 General Partnership 5351 N. 16th Street, Suite 200-D Phoenix, Arizona 85016
31. Hones, Stephen W. & Lori L. 512 North Meadow Chandler, Arizona 85224
32. Jorde Farms Inc. Queen Creek Ten Inc. P.O. Box 1191 Hereford, Texas 79045
33. Kowlsen, Dean & Barbara Ann 19211 E. Chandler Heights Road Gilbert, Arizona 85234
34. Kumar, Prem C. & Raj K. 1124 West Meseto Avenue Mesa, Arizona 85202
35. L & W Investors 7801 North Dreamy Draw Phoenix, Arizona 85020
36. Larsen, Tom c/o Francis Cooper 3634 Civic Center Plaza Scottsdale, Arizona 85251
37. Lawyers Title of Arizona P.O. Box 7238 Phoenix, Arizona 85011
38. Lewis, Linda E. 156 North Fraser Drive West Mesa, Arizona 85201
39. Lindley, Russell A. & Mary Beth 2418 E. Balboa Dr. Tempe, Arizona 85282
40. Malone, Robert W. & Betty Jean 3730 S. Mill Ave.-Apt. H103 Tempe, Arizona 85282
41. Marathon A&C-Larry Titsworth c/o Jim Males P.O. Box 142 Queen Creek, Arizona 85242
42. Maricopa County Highway Dept. 3325 West Durango St. Phoenix, Arizona 85009
43. Martin, Thomas W. & Maggie Lee 541 South Kachina Mesa, Arizona 85204
44. McDaniel, N. Lawrence & Valerie J Route 1, Box 46 Queen Creek, Arizona 85242
45. MCL Properties LTD Partnership 10020 N. 25th Avenue #160 Phoenix, Arizona 85021
46. Miller, Michael Paul & Connie Lee 11211 S. 154th Pl. Gilbert, Arizona 85234
47. Minnesota Title Co. 2600 N. Central Avenue Phoenix, Arizona 85004
48. Mormino, Anthony Executet Realty 5010 E. Shea Blvd. - B222 Scottsdale, Arizona 85254
49. Ocotillo Corner Partnership Stephen R. Smith 943 E. Evening Star Ln. Tempe, Arizona 85283
50. Parker Dairy Farms 10836 E. Ocotillo Sun Lakes, Arizona 85248
51. Perez, Louis E. & Anita 18716 Via Del Jardine Higley, Arizona 85236
52. Pomeroy, Ralph & Dolores 22128 E. Cloud Road Queen Creek, Arizona 85236
53. Pulling, Joseph & Mickey 19002 Via De Olivos Queen Creek, Arizona 85242
54. Queen Creek 46 7373 N. Scottsdale Rd. Ste. D-203 Scottsdale, Arizona 85255
55. Queen Creek Investment 2715 N. 32nd St. #103 Phoenix, Arizona 85018
56. Rancho Jardines Development Co. 6532 E. Doubletree Scottsdale, Arizona 85253
57. Rhein, Norman B. & Cherie L. 20401 S. 192nd St. Queen Creek, Arizona 85242
58. Rittenhouse Ranch II 1819 E. Southern SE 10 Mesa, Arizona 85204
59. Roer, David W. & Joann K. 19330 E. Via De Olivos Queen Creek, Arizona 85242
60. Roosevelt Water Conservation Dist. P.O. Box 168 Higley, Arizona 85238
61. SY Inc. 2150 E. Brown Road Mesa, Arizona 85203
62. Schirmer, W. Scott 1300 N. McClintock Dr. Chandler, Arizona 85224
63. Schnepf, Mark E. Route 2, Box 42 Queen Creek, Arizona 85242
64. Schnepf, Raymond D. & Thora I. Route 1, Box 42 Queen Creek, Arizona 85242
65. Security Title 3620 N. 3rd Avenue Phoenix, Arizona 85013
66. Silvestri, L. Anthony P.O. Box 35132 Phoenix, Arizona 85069
67. Singleton, Barbara 22616 S. Ellsworth Queen Creek, Arizona 85242
68. Sossaman, Faith 19105 E. Ocotillo Rd. Higley, Arizona 85236
69. Sossaman, Jasper Jane & Carolyn S 19105 E. Ocotillo Rd. Higley, Arizona 85236
70. Sossamon Land Co. LTD Partnership 22200 E. Sossaman Road Higley, Arizona 85236
71. Southern Pacific Trans. Co. One Market Plaza San Francisco, California 94105
72. Stanfield, Edwin J. & Wanda R. 1729 W. Milagro Mesa, Arizona 85202
73. Steele, Miller Simonte & LaVonne P.O. Box 198 Chandler Heights, Arizona 85227
74. Stewart Title & Trust of Phoenix 244 W. Osborn Rd. Phoenix, Arizona 85013
75. Sun State Savings & Loan Assoc. 4250 E. Camelback, Ste. 240 Phoenix, Arizona 85018
76. TIC Ranch 5536 E. Solano Dr. Paradise Valley, Arizona 85253
77. Takahashi, Tamae 2331 Ivernese Ave. Los Angeles, CA 90027
78. Tankersley, Jim P.O. Box 420 Higley, Arizona 85236
79. Taruile, Vytas A. & John E. Groh 10024 E. Sagauro Scottsdale, Arizona 85260
80. UNIFIE Title Co. Of Az. 3030 N. Central Avenue Phoenix, Arizona 85012
81. Wheeler, Lee R. & Emma L. P.O. Box 430 Higley, Arizona 85236
82. Wheeler, Orvil T. Sr. & Vera Marie 18734 Via Del Jardin Higley, Arizona 85236
83. Willis, Roy W. & Lora M. 399 N. Apache Dr. Chandler, Arizona 85224
84. Wolfe, Kip James & Cynthia Sue 2227 West Naranja Mesa, Arizona 85202
85. Wood, Robert D. & Ellen E. 18025 S. McQueen Road Chandler, Arizona 85249
86. Zatkin, Howard S. & Christy Hawes 6246 Via Maria La Jolla, CA 92037

JUL 31 1991

Base Map Prepared: August 6, 1987

LAND OWNERSHIP MAP

SCALE 0 1/8 1/4 1/2 1 IN MILES

QUEEN CREEK
AREA DRAINAGE MASTER STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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FCD CONTRACT 86-23
WA JOB NO. 86328

FIGURE 12