KARAN

Floodwater Study

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East Maricopa County
Arizona

U. S. Department of Agriculture
Soil Conservation Service

July 1972

A report of the effect of planned and proposed developments in eastern Maricopa County on the flood problems of that area. Prepared by the Soil Conservation Service, U.S.D.A. in response to a request by the East Maricopa Natural Resource Conservation District.

July 1972

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INTRODUCTION

Drainage problems in eastern Maricopa County and northwestern Pinal County have been increasing in both severity and complexity during recent years. Solution of these problems is difficult because of the lack of an outlet to the Gila River. Historically runoff reached the river east through the Queen Creek drainage or south through a low area which parallels Rural Road. Floodwaters could spread over the undeveloped land and little damage was done.

The introduction of irrigated farming and the construction of the associated Salt River Project canals and later smaller systems such as the Roosevelt Water Conservation District canal altered the course of the floodwaters. Subsequent improvements installed on the land such as farm ditches and land leveling obliterated the washes. Floodwaters can no longer follow their natural courses and are forced to follow artificial floodways, irrigation ditches, and farm roads.

As development continues and property values increase, failure of the man-made waterways creates ever increasing damages. Inundation of the area which historically served as the flood plain can no longer be tolerated.

Several agencies and organizations have responded, for the most part independently, to the need for providing flood protection to the area. These include the Army Corps of Engineers, the Soil Conservation Service, the Bureau of Indian Affairs, the Flood Control District of Maricopa County and the Maricopa County Planning and Zoning Commission.

Other agencies or units of government have an interest in the solution of storm water drainage problems where those problems occur within their areas of interest. These agencies or units of government include the Arizona Highway Department, the Maricopa County Road Department, the cities of Tempe, Mesa and Chandler, the Salt River Project, the Roosevelt Water Conservation District, and the Gila River Indian Community.

Early in 1972 the East Maricopa Natural Resource Conservation District requested that the Soil Conservation Service study the impact of land use changes and the installation of structures and facilities associated with those changes on the flood problems in the area of Mesa, Apache Junction, Gilbert and Chandler. The request was an outgrowth of a flood control meeting held on November 3, 1971, attended by representatives of the Gila River Indian Community, Bureau of Indian Affairs, Arizona Highway Department, Maricopa County, East Maricopa Natural Resource Conservation District, and Soil Conservation Service.

This report attempts to reflect the effect of urbanization with its associated construction of homes, streets, parking lots, retail stores, etc. on the flood problem. It attempts to predict the potential effect of construction of the Superstition Freeway and Central Arizona Project Aqueduct and presents recommendations for consideration by land administering and land-use planning agencies.

Description of the Study Area

The study area is bounded on the north by the Salt River and the Usery and Goldfield mountains; on the east by the Superstition Mountains; on the south by the San Tan Mountains and the Gila River; and on the west by the Roosevelt Water Conservation District Canal. The total area within the study is 759 square miles. Essentially all of the area within the study drains into the Gila River through the Gila River Indian Reservation. (See map No. 1.)

The study boundaries encompass one of the most rapidly growing areas in the State of Arizona. While population trends have not been defined for the East Mesa-Apache Junction area, all indications are that the rate of growth exceeds that of Maricopa County as a whole. The population of Maricopa County has increased from 20,457 in 1900, to 663,510 in 1960, and 967,552 in 1972. Surface water resources problems in the study area are typical of those in areas where explosive development is taking place. A total of 38 floods have been reported during the period 1910 through 1971.

Land values in the area have increased from approximately $43 per acre in 1900, to $1000 per acre in 1960, and $7,000-$10,000 per acre in 1972. The monetary value of damages caused by flooding has increased in proportion to property value and the rate of conversion of land to urban uses.

Previous Studies

Flood problems in the area have been recognized for many years. In 1959 the voters of Maricopa County approved the establishment of a county-wide flood control district and authorized annual taxation to produce revenues for the purpose of studying flood problems in the county and participating in the construction of measures to alleviate flooding.

In 1962 the Flood Control District of Maricopa County published a comprehensive flood control program report.[1/] In recent years the Maricopa County Planning & Zoning Commission has published general land use plans for study areas within the county. Both the U.S. Army Corps of Engineers and the Soil Conservation Service have published reports which outline flood control projects. In 1954 the Corps of Engineers received authorization for construction of Whitlow Ranch Dam located on Queen Creek approximately 10 miles west of Superior. Construction of the dam was completed in 1960. In 1963 the Soil Conservation Service published three watershed work plans which proposed a comprehensive flood control program for the area east of Mesa and Chandler, between the Salt River and Queen Creek. These reports were prepared under the authority of

1/ Flood Control Survey & Report
Study Area One
Southeastern Maricopa County, Arizona
Prepared by Bengham Engineering Co., Inc., 1962

P.L. 83-566. The Buckhorn-Mesa Work Plan covered the area between the Salt River and Apache Trail. The Apache Junction-Gilbert Work Plan covered the area between the Apache Trail and Ray Road. The Williams-Chandler Work Plan covered the area between Ray Road and Queen Creek. Construction of seven floodwater retarding structures and a floodway along the east side of the RWCD Canal was proposed. Three of the floodwater retarding structures -- the Powerline Dam, the Vineyard Road Dam, and the Rittenhouse Dam, were constructed during the period 1966 to 1969 by the Flood Control District of Maricopa County. Construction of the other four dams and the RWCD Floodway has been delayed because of the inability of the sponsoring organizations to raise funds for acquisition of rights-of-way.

Flood control dams now control 312 square miles of the 759 square miles in the study area. Construction of the four remaining dams that have been authorized would control an additional 35 square miles.

Studies in Progress

In 1970 the East Maricopa NRCD, the Gila River Indian Community Tribal Council, Roosevelt Water Conservation District, Pinal County Board of Supervisors, Florence-Coolidge NRCD, and the Flood Control District of Maricopa County submitted an application to the Soil Conservation Service for completion of the work plan for the area below Whitlow Ranch Dam between Queen Creek and San Tan Mountains to the Gila River. This study was partially funded by the Gila River Indian Community under the Model

Cities program. Preliminary proposals are for the construction of a dam across Queen Creek, about seven miles east of the community of Queen Creek. The sponsoring organizations have also proposed an extension of the floodway from the north boundary of the Gila River Indian Reservation across the reservation to outlet the entire area into the Gila River.

Construction of the Lower Queen Creek dam would control 128 square miles. This would bring the total area controlled to 475 square miles or about 63 percent of the total 759 square miles. Completion of the authorized RWCD Floodway and the proposed extension to the Gila River will provide a controlled outlet for the entire area.

Future Development Planned for the Area

Major developments within the study area which affect and will be affected by programs for flood control include major subdivisions, the Superstition Freeway, the Central Arizona Project Aqueduct, and the development program of the Gila River Indian community.

Typical of the major subdivision developments is the Leisure World development which encompasses an area of approximately 1,500 acres and is located in the western part of the study area. Leisure World is planned to include streets, homes, stores, golf courses, and other features that make a complete subdivision.

Present plans for construction of the Superstition Freeway propose an east-west route between Southern Avenue and Baseline Road. The freeway design and construction are being slowed because of problems associated with disposal of floodwater.

The CAP Aqueduct will cross the study area in a general northwest-southeast direction. The aqueduct will cross all of the major drainages within the area. Those features of aqueduct construction used for bypassing of the floodwater are critical to land use and flood control plans for the study area.

Hydrologic Characteristics of Watershed

The upper watershed area is characterized by steep mountains with slopes of 50 percent or greater in the higher elevations. Typical of this area are the Goldfield and Superstition Mountains. Soils are very shallow and the desert vegetation is very sparse. Runoff rates are high. The steep slopes break out onto a large fan varying in slope from four percent to one percent near the farmland. The channels change from a southerly to a southwesterly direction and then to a westerly direction as they progress farther down the slope. The incised channels prevalent in the upper watersheds become shallower and less defined. This is the classic fan channel morphology common in Arizona. As flows are generated and collected on the steep mountain slopes, high velocities are created and sediment is easily transported in the steep channels. The channel bottoms are characterized by coarse sandy materials. Infiltration rates are high. As the water volume decreases through infiltration and temporary storage in the stream bed (transmission losses), sediment is dropped and the channels fill up and become shallower. Overflow occurs and floods

once more become sheet flow. When this occurs minor obstructions can easily change the direction and depth of flow.

As land use changes occur such as farming, home building, industrial development or road construction, the land is reshaped for best utilization. All of these can change the flow direction and depth as sheet flows are once again collected and concentrated.

Hydrology Study

Several assumptions were made regarding the characteristics of floods in the area. These are:

1. Channel locations are as shown on Map No. 3.
2. Water that is unable to pass under the Apache Trail in culverts will pass over the highway without significant alteration of the hydrograph shapes.
3. From Brown Road to Broadway Road, flows will pass over the RWCD Canal without altering the hydrograph shape.
4. A channel will be constructed to intercept floods along the north side of the Superstition Freeway from the crossing east to the intersection of the Freeway and Highways 60-70-80-89 which pass over the RWCD Canal.
5. Flood flows will collect along the Superstition Freeway west of the canal to the intersection with Cooper Road.

The SCS computer program, TR-20, Hydrology for Project Formulation, was used to evaluate runoff in the study area. Three watershed models were developed.

The first model was developed in 1970 to evaluate runoff from the entire 759 square mile drainage area. Hydrographs were computed at 149 locations and serve as the basis for planning and design of the Lower Queen Creek project and the RWCD Floodway to the Gila River.

A very detailed study was made of an area of 192 acres that has been converted from desert to housing. This study was used to estimate the magnitude of increases in peak flows and runoff volumes associated with urbanizations.

A detailed model was developed for the area north of the proposed Superstition Freeway. Hydrographs were developed for 148 locations. Two alternatives were routed for five flood events, the 5-year, 10-year, 25-year, 50-year and 100-year.

Alternate number one is an evaluation of existing conditions. Alternate number two assumes the Buckhorn-Mesa project is installed and the RWCD Floodway is constructed to handle the 100-year flood. This alternate also includes construction of a floodway along the RWCD Canal between Brown Road and the Apache Trail. An adequate culvert under the Apache Trail would be required.

Effect of Major Developments

RWCD Canal. The Roosevelt Water Conservation District Canal crosses the study in a north-south direction and serves as the western boundary for

most of the study area. It intersects most of the washes in the study area. An existing floodway on the east side of the canal protects it from washing out or filling with sediment during minor flood events. The floodway has been increasing in capacity over many years as deposited sediments were removed from the floodway and placed on the east bank of the canal. In 1970 the Roosevelt Water Conservation District lined the canal and constructed outlet structures and head gates. The improvements cost over $1,000,000. The District is currently engaged in purchasing additional rights-of-way along the east bank to construct a larger floodway. Unfortunately, if the floodway is increased in size now it could induce additional damages downstream in unimproved sections, particularly on the Gila Indian Reservation.

Apache Trail. Apache Trail presents a major barrier to the sheet flow since the road bed is three to six feet above the natural ground even though many culverts were provided in locations where existing small channels remained. Water outside of these channels is collected into concentrated locations to get the water under the highway.

Immediately after construction of the highway more and more people were able to move into the area and more of the land was taken from native vegetation and transferred into home sites, stores, schools, etc. The development of the land above the highway increased the area sealed to infiltration of rainfall and eliminated many of the channels that

absorbed water in transmission. Urban development also moved many of the channels or put them entirely into roads. Moving, shifting and filling in of the channels and concentrating of sheet flow increased runoff volumes and peak rates of runoff, and pushed water into locations where it did not occur before.

Superstition Freeway. The Superstition Freeway construction midway between Baseline Road and Southern Avenue running east-west could present a major barrier to the flow of water throughout the study area. The concentration of flows could cause extensive damages both north and south of the freeway if the road bed is raised above ground level. Normal flow depths for a major storm are around one foot under conditions that now exist. Construction practices used in other parts of the state would involve raising the road bed four to six feet and providing box culverts under the road with minimum depths of four feet. A six foot depth of water at the intersection of Cooper Road and the proposed freeway would back water up 3,420 ft. east and 5,020 ft. north, inundating an area of about 331 acres. The present value of this acreage is about $8,000 per acre or $6,620,000 prior to construction of homes, and over $100,000 per acre or $33,100,000 after construction of homes. Property owners both above and below the freeway could sustain damages from concentrated water to greater depths than normally occur at this location. The computed 50-year peak discharge under the assumptions made in this study is

3,945 cfs. If the RWCD and Buckhorn-Mesa structures are constructed, the peak flow will be reduced to 2,064 cfs.

This type of analysis can be repeated for many locations all the way from the present ending of the freeway to the Florence Highway.

The 50-year peaks at the Superstition Freeway crossing of the RWCD canal would be 9,863 cfs. without the Buckhorn-Mesa Project and 6,339 cfs. with the Buckhorn-Mesa dams in place. However, without a complete disposal system to the Gila River it will not be feasible to divert water along the freeway because the existing floodway on the east side of the Roosevelt canal does not have enough capacity now.

An alternate design to avoid ponding and concentrating flows is to viaduct the area. Cost for this type of construction has been estimated by the Highway Department at approximately $10,000,000 per mile.

Central Arizona Project Aqueduct. The proposed alignment for the CAP Aqueduct traverses the study area from the northwest corner to the southeast side. Since it is planned to follow very nearly a level contour across the study area, it will cross all of the washes in the area. The passing of floodwater over the canal is a very important aspect of the design of the aqueduct. The Bureau of Reclamation and the SCS have cooperated in the development of flood control plans for the area and have coordinated proposals for the location of structural measures. The Powerline, Vineyard Road, and Rittenhouse dams were moved after

planning had been completed but before construction to an alignment above the proposed aqueduct. The dams are now completed and will protect over 10 miles of the aqueduct. The proposed Spook Hill Dam and Lower Queen Creek Dam will also provide protection for the aqueduct. The Bureau of Reclamation has indicated a willingness to assist in purchase of land rights for the Spook Hill Dam. The Bureau has provided survey data and aerial mapping for Spook Hill and Lower Queen Creek damsites.

Subdivisions. Changing land use from desert or irrigated agricultural land to subdivisions, shopping centers and streets increases runoff volumes and peak rates of runoff. The TR-20 program analysis on 192 acres converted from desert to housing shows a 50-year peak runoff of 88 cfs. prior to subdividing and 280 cfs. after subdividing.

The last two years are an indication of the rapid pace being set for converting desert and agricultural land (See aerial mosaic, map #9 taken in March 1972.). The yellow areas on the mosaic are new developments since December 1969 and cover 16,000 acres.

This type of development is occurring at an ever-increasing rate. Uncontrolled expansion and rapid urbanization without provision for handling runoff water from the entire area instead of on a subdivision by subdivision basis would increase damages to the already overtaxed drainage system and would increase erosion and sediment damages on the Gila River Indian Reservation.

Gila River Indian Reservation. Water is being diverted onto the Gila River Reservation from an area in excess of 700 square miles. This water would not normally flow onto the reservation at the present location. Photo Nos. 7, 8, and 9 show the condition of the floodway on the reservation. The letter from Governor Alexander Lewis of the Gila River Indian Community which is shown in the appendix to this report indicates that the diversion of water onto the reservation has curtailed development and has caused significant amounts of damage. The letter from Governor Lewis names specific development projects that have been delayed or completely stopped because of floodwater on the Indian land. Photo Nos. 4 and 6 show the contrast between the improved floodway north of the reservation compared to 7, 8 and 9 on the reservation.

The Gila River Indian Tribe has shown willingness to cooperate with the flood control planning to alleviate problems on their lands. They have furnished surveys for extension of the floodway across their land, offered to donate rights-of-way for construction of a floodway, and provided $15,000 to support SCS planning activities on the Lower Queen Creek watershed project during the 1971-72 fiscal year.

Tribal representatives have discussed the possibility of litigation to halt induced damages that are occurring on the reservation.

Present Situation

Despite the fact that planning agencies have attempted to coordinate their work so as to provide orderly disposal of floodwaters, progress has been slow and recently construction progress has come to a halt.

The Buckhorn-Mesa Project is approved for construction under P.L. 566. The RWCD Floodway is approved for construction under the same law. However, under this law, land easements and rights-of-way, bridges and operation and maintenance must be provided by local sponsors. The Flood Control District of Maricopa County has accepted those responsibilities but has a limited budget and funds have not been available to date for these projects.

An idea of the total cost to the sponsors for a comprehensive flood control program can be gained from the following figures. Approximately $2,152,500 is needed for land rights on the Buckhorn-Mesa Project. Approximately $1,986,000 is needed for rights-of-way along the RWCD Floodway. Approximately $1,289,000 is needed for bridge construction along the RWCD Floodway and approximately $1,986,000 will be needed for land rights in the Lower Queen Creek Project.

2
2
1
2
7

The initial phase of construction of a coordinated flood control system must be the completion of the RWCD Floodway from the north reservation boundary to the Gila River. Land rights have been acquired. This phase is held up by lack of funds for construction of two highway bridges on the reservation. The estimated cost of these bridges is $450,000.

Conclusions

Land use changes are having a tremendous effect on runoff resulting from storms in this area. The trend is toward increased urbanization.

No outlet system exists for the disposal of floodwater in the area. As further urbanization takes place more runoff volume and higher peak rates will be experienced. This will result in increased damages to an increasing number of people and improvements.

The key to orderly development within the study area is the construction of a complete floodwater disposal system including floodwater retarding structures and an outlet channel to the Gila River. Construction progress has been halted until the land necessary for the structures can be set aside or purchased and until funds for modification and construction of bridges can be committed to that purpose.

Any system of passing water under roadways will result in some concentration of flows unless the roadway is built on stilts or submerged completely below grade and covered without changing elevations of the original ground.

Systematic development of this area should start with a land utilization plan that includes flood control and a flood outlet system. Such a plan should include the Buckhorn-Mesa Watershed Project dams outletting into the Salt River and a floodway along the east side of the RWCD Canal to convey water falling below the dams on Buckhorn-Mesa, Williams-Chandler, and Apache Junction-Gilbert, and Lower Queen Creek watershed to the Gila River. The plan should also provide for and be coordinated with drainage of water intercepted by the Superstition Freeway. Subdivision development in the area should be planned to utilize the disposal system.

Construction of parts of a flood control system without the reservation section of the RWCD floodway will not suffice because there is no existing outlet to the Gila or Salt rivers. Any improvements of the floodway capacity along the RWCD Canal will result in increased amounts of water downstream and on the Gila River Indian Reservation.

Recommendations

It is essential that the full capabilities of all agencies and groups with responsibilities in the study area be fully coordinated under the leadership of the Flood Control District of Maricopa County to implement the installation of a complete flood control system. This system should include those structures which are authorized for construction but for which land rights have not been acquired, and those structures for which plans are being developed. The development of the area should proceed in a direction that will utilize the overall system.

The following suggests the types of contributions that various groups and agencies could make toward the installation of the system:

1) The SCS could participate in flood control planning and construction under P.L. 83-566, the Watershed Protection Act.
2) The State of Arizona could participate by furnishing rights-of-way bridge engineering and bridge construction. Water intercepted by the Superstition Freeway and Apache Trail could outlet into the planned system.

3) Maricopa County could furnish rights-of-way, operation and maintenance, construct bridges and waterways, coordinate land utilization through the Planning and Zoning Commission and improve county road drainage in coordination with the overall drainage system.

4) Landowners and subdivision developers could furnish rights-of-way and plan land developments that utilize the coordinated drainage system. They could participate in financing land rights acquisition.

5) The Gila River Indian Community could furnish rights-of-way and operate and maintain flood channels on reservation land.

6) The Bureau of Reclamation could provide rights-of-way and operate and maintain those structures that benefit the CAP Aqueduct.

SUPPORTING APPENDIX

Map Descriptions

Map #1 - Base Topographic Map (North Portion). This map is a reproduction of USGS 7½ min. quad sheets. Drainage areas, time of concentration and reach lengths were determined from this base map.

Map #2 - Drainage areas. This map shows the drainage area boundaries and sizes in square miles.

Map #3 - Flow chart of channel network in the study area. The values shown as 788 represent the peak discharge of the hydrograph at locations, 114 represent cross section numbers. These are 50-year peaks in cubic feet per second. This map represents Alternate No. 1 for existing conditions.

Map #4 - Flow chart of channel network in the study area. This represents Alternate #2 - Future conditions with Buckhorn-Mesa and RWCD Floodway improvements completed. These are 50-year peaks in cubic feet per second.

Hydrology

Basic Data Sources:

a. Drainage Areas - From USGS 7½ min. quads.

b. Time of Concentration - From Graph #1 and Table #1.

c. Curve numbers from Generalized Soils Map of Maricopa County (SCS). See Table #2, and Graph #2 (See Table #3).

Curve numbers were adjusted to 24 hour base as outlined in SCS Hydrologic Design Manual for Drainage Areas under 25 square miles, 1971. See Table #4.

Precipitation - Precipitation amounts for 10, 50, and 100-year storms were taken from the Revised TP-40 U.S. Weather Bureau maps as published by the Arizona Highway Department.

Storm Distribution - The 24-hour precipitation amounts were distributed at varying intensities by the dimensionless storm distribution of Table #5.

Computer Program

The SCS computer program TR-20 Hydrology for Project Formulation was used to compute hydrographs, reach route through the channel reaches, add hydrographs and divide hydrographs (as at section #89).

Table #6 is a listing of the standard control instructions. This can be thought of as a sequence of commands to compute hydrographs (runoff routine), flood route through channel reaches (reach routing), add hydrographs together (addhyd routine) and divide hydrographs (divert routine). These commands are used to build a model of the watershed in the computer and pass any size storm through the model.

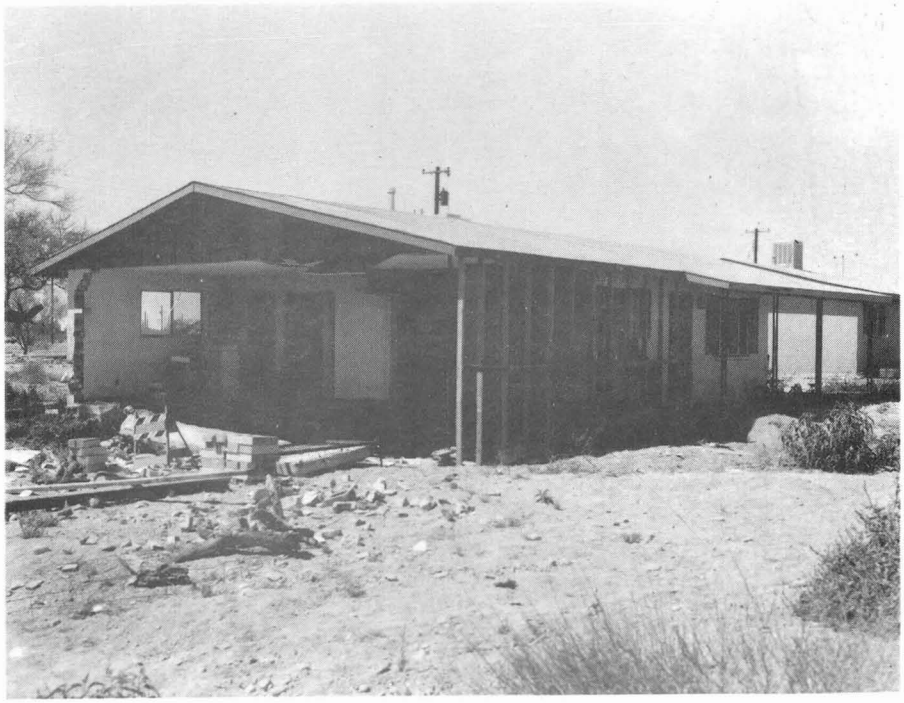
Table #2 is a summary table showing the results of passing 5 storms over the watershed model for Alternate No. 1. This is listing of the peak discharges for the 100-year (Q1), 50-year (Q2), 25-year (Q3),

10-year (Q4) and 5-year (Q5) storms. Table #8 is a summary table of Alternate #2 for the 100-year (Q1), 50-year (Q2), 25-year (Q3), 10-year (Q4), and 5-year (Q5) storms.

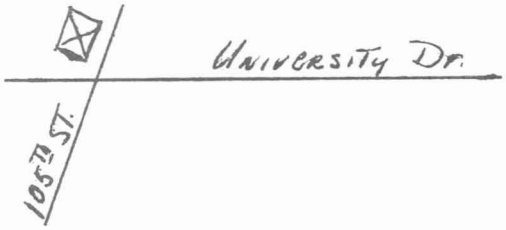
Map #8 is a flow chart for the entire drainage area contributing to flood flows intersected by the RWCD Floodway. The results of this watershed model indicate 100-year design values of 30,000 cfs. at the reservation boundary. This is computed assuming that the Buckhorn-Mesa and Queen Creek dams will not be constructed. This could be reduced to 22,832 cfs. if the Buckhorn-Mesa and Queen Creek dams are constructed. Since this study was made using the same watershed model (TR-20) technique described earlier the supporting data are not included in this report.

Higley Road 1/2 mile North of Apache Trail
after 1963 storm.
Photographer James Malone

PHOTO No. 1



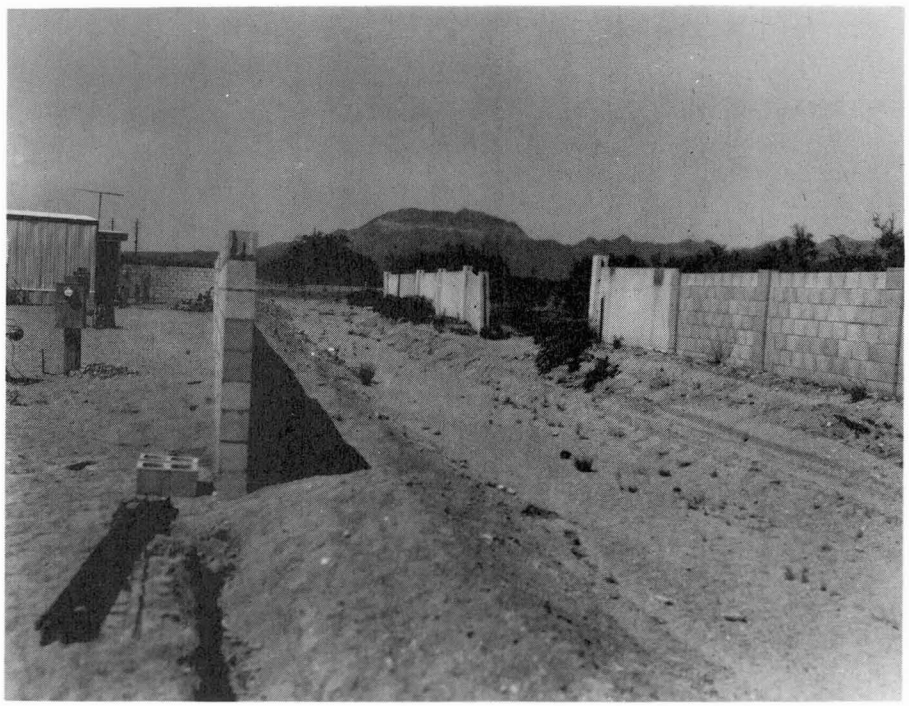
Jim Smith House



House damaged September 1971

Photo by: J. Malone 4-10-72

PHOTO No.2



Pacific Mobile Manor

Note right wall knocked down by September 1971 flood.
New wall being constructed. See aerial photo.

Photo by: J. Malone 4-10-72

PHOTO No.3

Bridge at Southern Avenue crossing of RWCD Floodway, looking north. Fields are soon to be subdivided for Leisure World Community.

Photo by: J. Malone 4-10-72

PHOTO No. 4

New homes on east side of Eastern Canal will be flooded by backup water on east side of canal. Estimated 3.5' depth before canal is overtopped.

Photo by: J. Malone 4-10-72

PHOTO No. 5

RWCD Floodway improved section looking north at Gila Reservation boundary. Approximate depth = 10 ft.

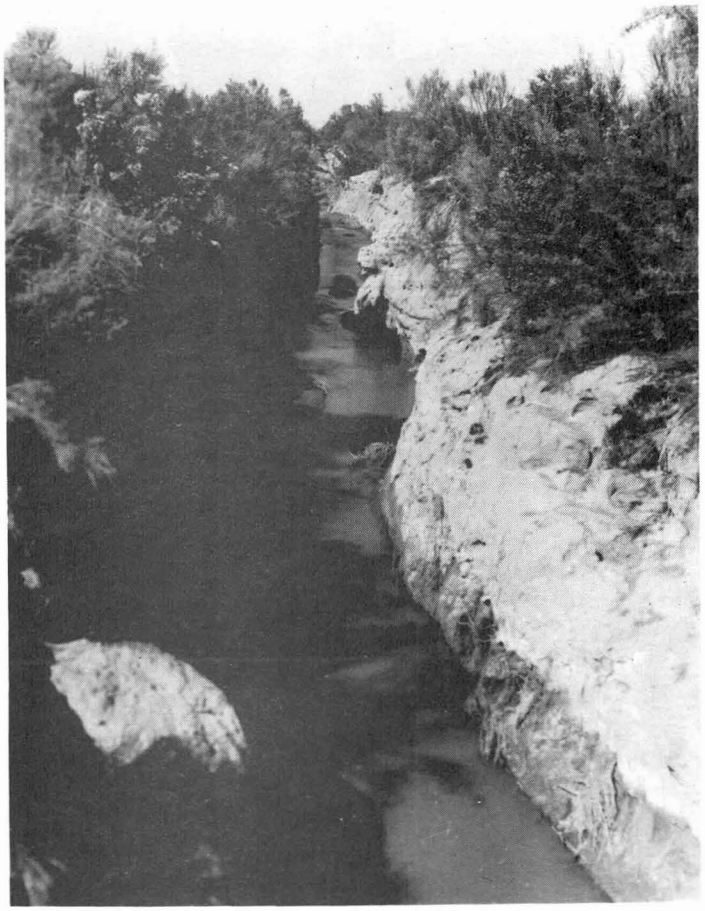
Photo by: J. Malone 4-10-72

PHOTO No.6

RWCD Floodway looking South at Gila Reservation boundary.
Note erosion on left side of photo.

Photo by: J. Malone 4-10-72

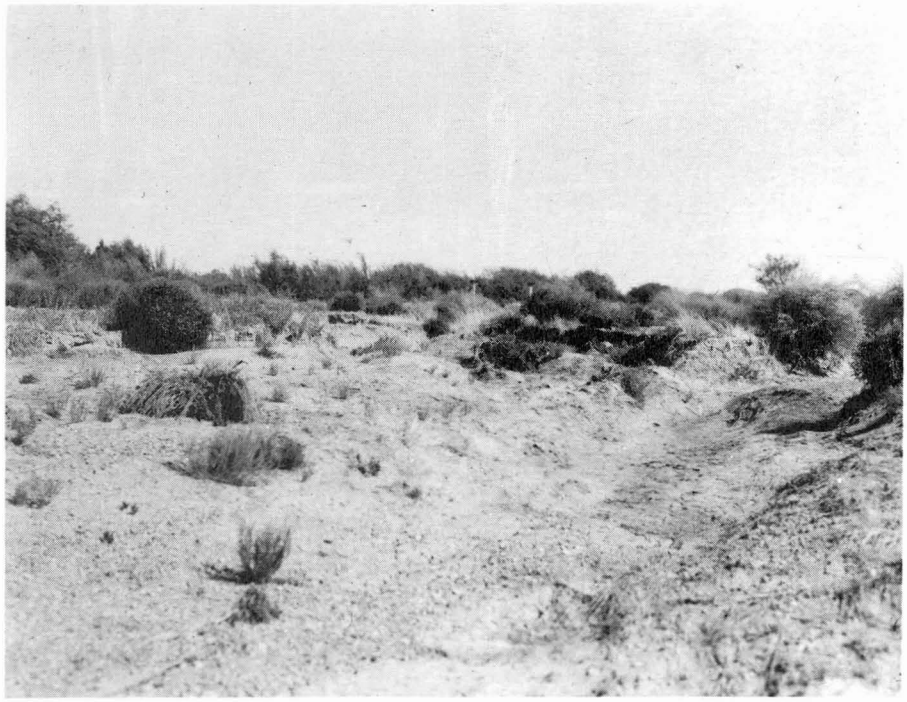
PHOTO No. 7



RWCD Floodway 1 mile south of Gila Riversation north boundary. Headcutting and eroding - unimproved, unstable channel.

Photo by: J. Malone 4-10-72

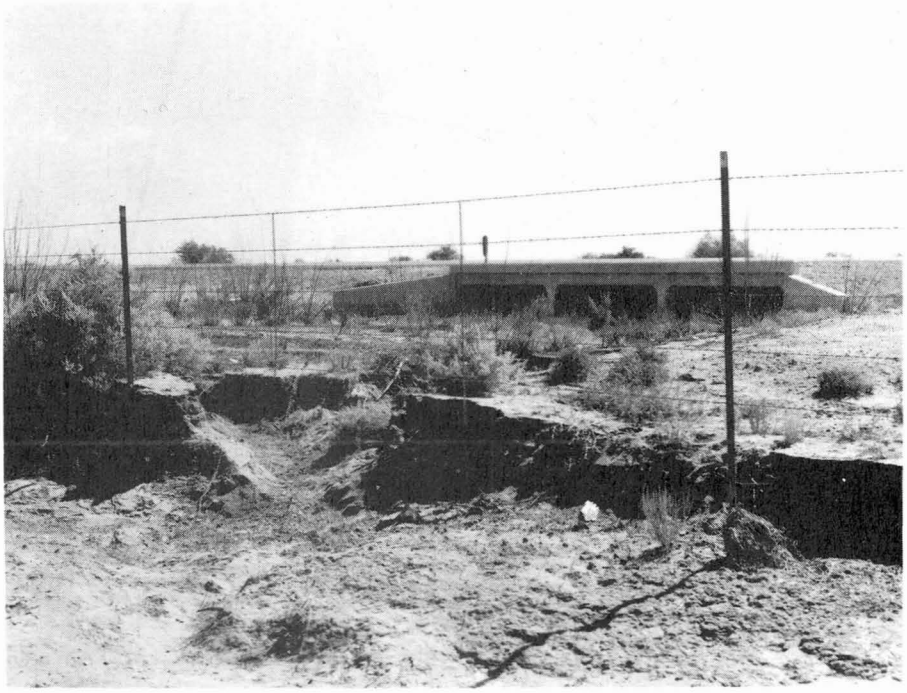
PHOTO No. 8



Erosion in Queen Creek channel Gila Reservation 500' above I-10 crossing.

Photo by: J. Malone 4-10-72

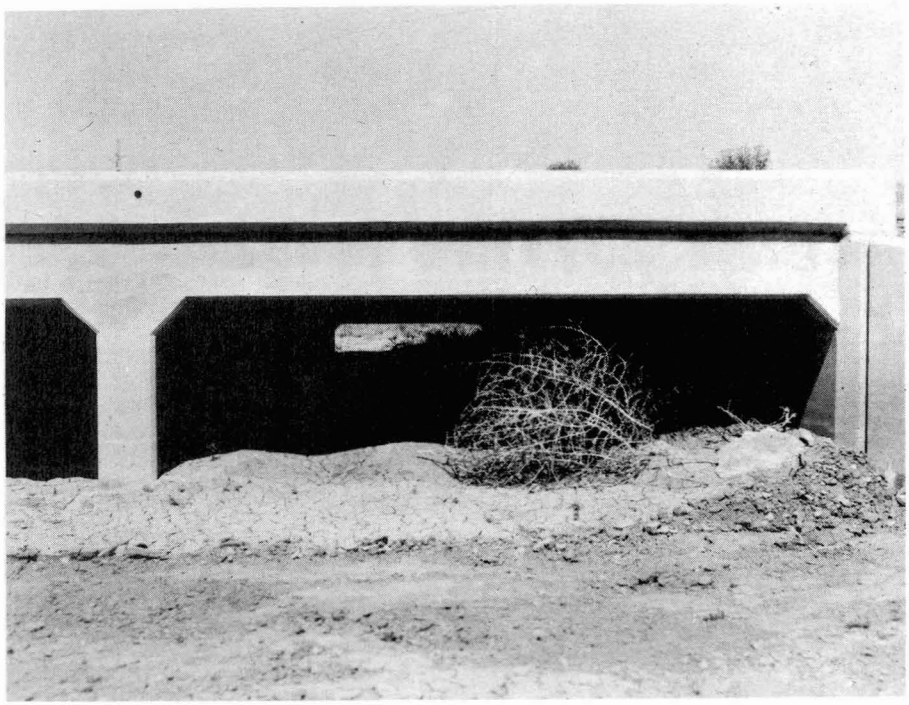
PHOTO No. 9



Queen Creek crossing of I-10 - entrance to box culvert. Plugged condition of outlet caused water to be diverted to west causing erosion on entrance side.

Photo by: J. Malone 4-10-72

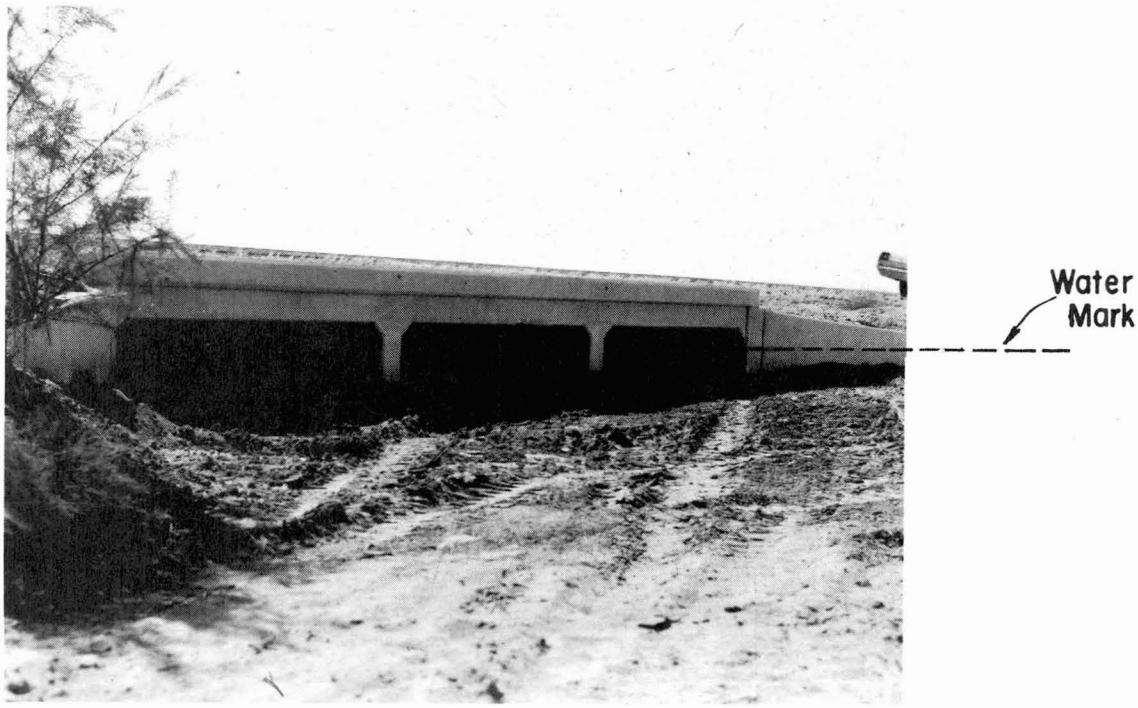
PHOTO No. 10



Queen Creek Crossing - Box Culvert on I-10
Note plugged condition.

Photo by: J. Malone 4-10-72

PHOTO No.11



Queen Creek box culvert on I-10. Note water mark on headwall due to plugged condition.

Photo by: J. Malone 4-10-72

PHOTO No. 12

Queen Creek Crossing of I-10 at Riggs
Road Interchange. Small flow on 8-12-71.
Photograph by Bill Valikai 8-12-71

PHOTO No.13

Table 1

TIME OF CONCENTRATION

W/Shed #	Length ft.	Max. H ft.	Min. H ft.	S ft/ft	V ft/sec	Tc hr
001	9,000	1,780	1,680	.011	5.32	0.47
003	18,000	1,870	1,670	.011	4.55	1.10
007	9,000	1,720	1,630	.0100	4.55	0.55
011	15,000	1,770	1,600	.011	4.79	0.87
006	7,000	5,024	2,600	.346	9.72	0.20
-	6,000	2,600	2,110	.0816	7.58	0.22
-	38,000	2,110	1,650	.0121	5.03	2.10
006	(TOTAL Tc)					
014	8,000	1,610	1,550	.0075	2.58	0.86
017	3,600	2,400	2,090	.022	5.00	0.20
	16,000	2,090	1,820	.0168	5.49	0.81
017	TOTAL (Tc)					1.01
019	11,500	1,850	1,720	.011	4.91	.65
022	3,000	2,685	2,100	.1950	4.17	.20
	18,500	2,100	1,925	.0217	18.35	.28
	8,500	1,925	1,800	.0147	5.90	.40
022	TOTAL Tc					.88
024	10,500	1,800	1,680	.0114	4.86	.60
029	15,500	1,720	1,560	.0103	4.68	.92
030	3,000	2,300	2,000	.100	4.17	.20
	3,500	2,000	1,900	.0285	8.84	.11
	6,000	1,900	1,800	.0166	5.56	.30
030	TOTAL Tc					.61
032	13,500	1,800	1,630	.0125	5.36	.70
035	12,000	1,750	1,630	.0100	4.76	.70
135	18,000	1,630	1,480	.0083	2.63	1.90
044	5,000	1,510	1,470	.0080	2.57	.54
047	3,000	2,350	2,000	.1166	4.17	.20
	11,000	2,000	1,740	.0236	8.73	.35
	TOTAL Tc					.55
049	14,000	1,740	1,600	.0010	4.58	.85
052	17,000	1,600	1,450	.0088	2.78	1.70
056	11,000	1,530	1,440	.0081	2.66	1.15
059	6,000	3,000	1,900	.0166	5.56	.30
	10,000	1,900	1,700	.0100	4.63	.60
	TOTAL					.90
061	1,4000	1,740	1,580	.011	4.86	.80
063	5,000	3,300	2,050	.0500	6.94	.20
	10,000	2,050	1,770	.0280	8.96	.31
	TOTAL					.51

Table 1

TIME OF CONCENTRATION
(continued)

W/Shed #	Length ft.	Max. H ft.	Min. H ft.	S ft/ft	V ft/sec	Tc Hr
073	5,000	1,770	1,680	.0180	5.79	.24
066	9,000	1,680	1,580	.0111	4.81	.52
070	12,000	1,580	1,460	.0100	4.76	.70
072	2,000	3,300	2,400	.450	2.78	.20
	4,000	2,400	2,000	.100	18.52	.06
	9,000	2,000	1,770	.0255	8.33	.30
	TOTAL					
076	6,000	1,770	1,670	.0166	5.56	.30
079	9,000	1,670	1,530	.0155	5.00	0.50
084	16,000	1,470	1,355	.0071	2.61	1.70
150	2,600	2,600	2,050	.211	3.61	.20
	3,000	2,050	1,850	.0667	13.89	.06
	11,000	2,050	1,575	.0431	11.32	.27
	TOTAL Tc					.53
152	19,000	1,575	1,350	.0118	5.03	1.05
173	29,000	1,350	1,225	.0043	2.12	3.80
170	28,000	1,345	1,225	.0042	2.07	3.75
165	18,000	1,340	1,245	.0052	2.08	2.40
160	13,000	1,335	1,265	.0054	2.26	1.60
100	3,000	2,600	2,000	.2000	4.16	.20
	2,000	2,000	1,900	.0500	11.10	.05
	12,000	1,900	1,575	.0354	9.80	.34
	TOTAL					.59
102	20,000	1,575	1,345	.0115	4.96	1.12
105	21,000	1,575	1,340	.0111	4.49	1.30
108	5,000	2,050	1,850	.0400	6.94	.20
	12,000	1,850	1,575	.0229	8.33	.40
	TOTAL					.60
110	14,500	1,575	1,400	.0121	4.79	.84
113	7,000	1,400	1,335	.0092	2.78	.70
117	1,000	3,000	2,450	.1833	1.39	.20
	4,000	2,450	2,150	.0750	12.35	.09
	4,500	2,150	1,950	.0444	11.36	.11
	15,000	1,950	1,575	.0250	8.33	.500
	TOTAL					.90

Table 1

TIME OF CONCENTRATION
(Continued)

W/Shed #	Length ft.	Max. H ft.	Min. H. ft.	S ft/ft	V ft/sec	Tc hr
119	11,000	1,575	1,425	.0136	5.09	.60
122	17,000	1,700	1,430	.0158	5.56	.85
126	12,000	1,430	1,335	.0079	2.66	1.25
129	12,000	1,850	1,575	.0229	8.33	.40
131	9,000	1,575	1,450	.0138	5.21	.48
134	14,500	1,450	1,335	.0079	2.59	1.55
138	19,000	2,000	1,575	.0223	8.12	0.65
140	9,000	1,575	1,460	.0127	5.00	0.50
143	16,000	1,460	1,335	.0078	2.61	1.70
93	11,000	1,620	1,520	.0091	2.91	1.05
37	9,000	1,560	1,480	.0089	2.78	.90

Table 2

Runoff Curve Numbers For Hydrologic Soil-cover Complexes

(Antecedent moisture condition II, and $I_a = 0.2\ S$)

Land Use	Treatment or Practice	Hydrologic Condition	Hydrologic Soil Group A	B	C	D
Fallow	Straight row	----	77	86	91	94
Row crops	"	Poor	72	81	88	91
	"	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	"	Good	65	75	82	86
	" and terraced	Poor	66	74	80	82
	" " "	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
	" "	Good	63	75	83	87
	Contoured	Poor	63	74	82	85
	"	Good	61	73	81	84
	" and terraced	Poor	61	72	79	82
	" " "	Good	59	70	78	81
Close-seeded legumes 1/ or rotation meadow	Straight row	Poor	66	77	85	89
	" "	Good	58	72	81	85
	Contoured	Poor	64	75	83	85
	"	Good	55	69	78	83
	" and terraced	Poor	63	73	80	83
	" " "	Good	51	67	76	80
Irrigated pasture		Good	35	49	65	70
Urban areas:						
Low density (15 to 18 percent impervious surfaces)			63	77	84	88
Medium density (21 to 27 percent impervious surfaces)			67	79	86	89
High density (50 to 75 percent impervious surfaces)			70	81	87	90

1/ Close-drilled or broadcast.

Definition of Terms in Table 2

Fallow	-	No vegetation
Row crops	-	Cotton, vegetables, corn, etc.
Small grain	-	Wheat, barley, maize, etc.
Close-seeded legumes	-	Alfalfa, clover, etc.
Irrigated pasture	-	Bermuda grass, fescue, etc. These grasses form a sod covering the ground completely.

Table 3

BASIC DATA

Cross Section #	Drainage Area Sq. Mi.	Curve Number	Time of Concentration Hours
01	0.85	79	0.47
03	1.95	79	1.10
06	12.32	79	2.10
07	0.66	79	0.55
011	1.40	79	0.87
014	0.48	79	0.86
017	2.16	82	1.01
019	1.05	79	.65
022	3.60	81	.88
024	1.71	79	.60
030	1.63	80	.61
032	.67	79	.70
093	1.34	79	1.05
037	.46	79	.90
035	1.57	79	.70
135	1.03	79	1.90
044	0.28	79	.54
047	1.55	81	.55
049	1.06	79	.85
052	1.32	79	1.70
056	1.10	79	1.15
059	3.99	81	.90
061	1.20	79	.80
063	3.19	84	.51
073	0.74	79	.24
066	1.27	79	.52
076	1.02	79	.30
079	1.48	79	.50
084	3.12	79	1.70
138	1.57	77	.65
140	1.13	79	.50
143	.81	78	1.70
129	.91	79	.40
131	.63	79	.48
134	.63	79	1.55
122	.81	79	.85
117	3.78	79	.90
119	0.75	78	.60
126	0.85	79	1.25
108	1.25	79	.60
110	1.42	77	.84

Table 3

BASIC DATA
(continued)

Cross Section #	Drainage Area Sq. Mi.	Curve Number	Time of Concentration Hours
113	1.32	79	.70
105	1.58	78	1.30
100	1.42	80	.59
102	2.58	79	1.12
150	0.45	79	.53
152	3.00	79	1.05
173	7.08	79	3.80
170	3.01	79	3.75
165	2.20	79	2.40
160	2.18	79	1.60

TABLE 4

CURVE NUMBER--STORM DURATION
ADJUSTMENT*

This table is to be used on curve numbers obtained from Figure 10 for Desert Brush, Herbaceous, Mountain Brush and Juniper grass cover types.

SHORT DURATION	24 HR
100.0	100.0
99.0	99.0
98.0	97.0
97.0	96.0
96.0	94.0
95.0	92.0
94.0	91.0
93.0	89.0
92.0	88.0
91.0	86.0
90.0	84.0
89.0	83.0
88.0	82.0
87.0	80.0
86.0	79.0
85.0	77.0
84.0	76.0
83.0	75.0
82.0	74.0
81.0	72.0
80.0	71.0
79.0	70.0
78.0	69.0
77.0	67.0
76.0	66.0
75.0	65.0

*The curve numbers in the Short Duration column were developed from experimental watershed data. Most recorded runoff events were from 1 to 2 hour storms. The 24 hour curve numbers are preliminary and subject to revision.

TABLE 5

10-65

CUMULATIVE RAINFALL TABLE, ONE-DAY WATERSHED EVALUATION STORM-TYPE 2

Watershed _____ Hydrologist _____ Date _____

DATA CODE	TABLE ID NAME	TABLE ID NO.	DATA FIELD #1	DATA FIELD #2	DATA FIELD #3	DATA FIELD #4	DATA FIELD #5	CARD NO. / IDENTIFICATION
			IMPORTANT: Line out unused cards. Data fields require decimal points. KEYPUNCHER: Left justify data fields.					
		TABLE NO.		TIME INCREMENT*				
5	RAINFL	1		0.5				
8			.000	.005	.011	.016	.022	
8			.028	.035	.041	.048	.056	
8			.063	.071	.080	.089	.098	
8			.109	.120	.133	.147	.163	
8			.181	.204	.235	.283	.663	
8			.735	.772	.799	.820	.838	
8			.854	.868	.880	.891	.902	
8			.912	.921	.929	.937	.945	
8			.952	.959	.965	.972	.978	
8			.984	.989	.995	1.000	1.000	
9	ENDTBL		NOTE: This card must be the last card of this table.					

Watershed Program, Soil Conservation Service, Sept. 30, 1963

* Time increment is 0.5 hour. On "Executive Control for Watershed" (SCS-274) form set DATA FIELD #2 to actual rainfall depth and DATA FIELD #3 to 1.0.

USDA-SCS-HYATTSVILLE, MD. 1965

3/23/72
1/5
ALT #1

```
// JOB
// XEQ SWAP
// XEQ TR20
JOB
TITLE        RWCD FLOODWAY-SPECIAL STUDY (J.MALONE) 3/03/72
 5 RAINFL 1              0.5                                                  1
 8          .000         .005        .011        .016        .022
 8          .028         .035        .041        .048        .056
 8          .063         .071        .080        .089        .098
 8          .109         .120        .133        .147        .163
 8          .181         .204        .235        .283        .663
 8          .735         .772        .799        .820        .838
 8          .854         .868        .880        .891        .902
 8          .912         .921        .929        .937        .945
 8          .952         .959        .965        .972        .978
 8          .984         .989        .995        1.000       1.000
 9 ENDTBL
 2 XSECTN   089          1.0                                                 13
 8                       100.0       0.0         0.0                         14
 8                       101.0       200.0       400.0                       15
 8                       102.0       600.0       1200.0                      16
 8                       103.0       1000.0      2000.0                      17
 8                       104.0       2000.0      4000.0                      18
 9 ENDTBL
 6 RUNOFF 1 001        6 0.85        79.0        0.47                  1     20
 6 REACH  3 002   6    5 3700.       .79                               1     21
 6 RUNOFF 1 003        6 1.95        79.0        1.10                  1     22
 6 ADDHYD 4 004   5 6 7                                                 1     23
 6 REACH  3 005   7    5 3600.       .79                               1     24
 6 RUNOFF 1 006        6 12.32       79.0        2.10                  1     25
 6 ADDHYD 4 007   5 6 7                                                 1     26
 6 REACH  3 008   7    5 4600.       .79                               1     27
 6 RUNOFF 1 007   7    6 0.66        79.0        0.55                  1     28
 6 ADDHYD 4 009   5 6 7                                                 1     29
 6 REACH  3 010   7    5 4000.       .79                               1     30
 6 RUNOFF 1 011        6 1.40        79.0        0.87                  1     31
 6 ADDHYD 4 012   5 6 7                                                 1     32
 6 REACH  3 013   7    5 7600.       .79                               1     33
 6 RUNOFF 1 014        6 0.48        79.0        0.86                  1     34
 6 ADDHYD 4 015   5 6 7                                                 1     35
 6 REACH  3 016   7    1 6000.       .79                               1     36
 6 RUNOFF 1 017        6 2.16        82.0        1.01                  1     37
 6 REACH  3 018   6    5 9300.       .71                               1     38
 6 RUNOFF 1 019        6 1.05        79.0        0.65                  1     39
 6 ADDHYD 4 020   5 6 7                                                 1     40
 6 REACH  3 021   7    2 7400.       .69                               1     41
 6 RUNOFF 1 022        6 3.60        81.0        0.50                  1     42
 6 REACH  3 023   6    5 9000.       .71                               1     43
 6 RUNOFF 1 024        6 1.71        79.0        0.60                  1     44
 6 ADDHYD 4 025   5 6 7                                                 1     45
 6 REACH  3 026   7    5 5000.       .69                               1     46
 6 ADDHYD 4 027   5 2 7                                                 1     47
 6 REACH  3 028   7    5 8000.       .66                               1     48
 6 RUNOFF 1 029        6 3.60        79.0        0.92                  1     49
 6 ADDHYD 4 088   5 6 2                                                 1     50
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6	RUNOFF	1	030		6	1.63	80.0	0.25	1	51
6	REACH	3	031	6	5	12600.	.69		1	52
6	RUNOFF	1	032		6	0.67	79.0	0.70	1	53
6	ADDHYD	4	033	5 6 7					1	54
6	DIVERT	6	089	7 5 3					1	55
6	REACH	3	090	5	6	8500.	.65		1	56
6	ADDHYD	4	091	6 2 7					1	57
6	REACH	3	092	7	5	5300.	.65		1	58
6	RUNOFF	1	093		6	1.34	79.0	1.05	1	59
6	ADDHYD	4	094	5 6 7					1	60
6	ADDHYD	4	095	7 1 6					1	61
6	REACH	3	039	6	5	5200.	.79		1	62
6	RUNOFF	1	037		6	0.46	79.0	0.90	1	63
6	ADDHYD	4	040	5 6 7					1	64
6	REACH	3	041	7	1	2100.	.79		1	65
6	RUNOFF	1	035		6	1.57	79.0	0.70	1	66
6	ADDHYD	4	036	6 3 7					1	67
6	REACH	3	038	7	5	17800.	.65		1	68
6	RUNOFF	1	135		6	1.03	79.0	1.90	1	69
6	ADDHYD	4	042	5 6 7					1	70
6	ADDHYD	4	096	7 1 6					1	71
6	REACH	3	043	6	5	1100.	.79		1	72
6	RUNOFF	1	044		6	0.28	79.0	0.55	1	73
6	ADDHYD	4	045	5 6 7					1	74
6	REACH	3	046	7	1	2900.	.79		1	75
6	RUNOFF	1	047		6	1.55	81.0	0.22	1	76
6	REACH	3	048	6	5	14000.	.71		1	77
6	RUNOFF	1	049		6	1.06	79.0	0.85	1	78
6	ADDHYD	4	050	5 6 7					1	79
6	REACH	3	051	7	5	16500.	.65		1	80
6	RUNOFF	1	052		6	1.32	79.0	1.70	1	81
6	ADDHYD	4	053	5 6 7					1	82
6	ADDHYD	4	054	7 1 6					1	83
6	REACH	3	055	6	5	2600.	.79		1	84
6	RUNOFF	1	056		6	1.10	79.0	1.15	1	85
6	ADDHYD	4	057	5 6 7					1	86
6	REACH	3	058	7	1	11700.	.79		1	87
6	RUNOFF	1	059		6	3.99	81.0	0.75	1	88
6	REACH	3	060	6	5	13200.	.71		1	89
6	RUNOFF	1	061		6	1.20	79.0	0.80	1	90
6	ADDHYD	4	062	5 6 2					1	91
6	RUNOFF	1	063		6	3.19	85.0	0.28	1	92
6	REACH	3	064	6	5	5000.	.71		1	93
6	RUNOFF	1	073		6	0.74	79.0	0.20	1	94
6	ADDHYD	4	074	5 6 7					1	95
6	REACH	3	065	7	5	9500.	.71		1	96
6	RUNOFF	1	066		6	1.27	79.0	0.53	1	97
6	ADDHYD	4	067	5 6 7					1	98
6	ADDHYD	4	068	7 2 6					1	99
6	REACH	3	069	6	2	12000.	.65		1	100
6	RUNOFF	1	072		6	1.08	79.0	0.29	1	101
6	REACH	3	075	6	5	6000.	.71		1	102
6	RUNOFF	1	076		6	1.02	79.0	0.22	1	103
6	ADDHYD	4	077	5 6 7					1	104
6	REACH	3	078	7	5	9000.	.65		1	105

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6 RUNOFF 1 079        6 1.48        79.0        0.50                1   106
6 ADDHYD 4 080   5 6 7                                               1   107
6 REACH  3 081   7    5 7500.       .65                             1   108
6 RUNOFF 1 070        6 1.56        79.0        0.70                1   109
6 ADDHYD 4 071   6 2 7                                               1   110
6 ADDHYD 4 082   7 5 6                                               1   111
6 REACH  3 083   6    5 13000.      .65                             1   112
6 RUNOFF 1 084        6 3.12        79.0        1.70                1   113
6 ADDHYD 4 085   5 6 7                                               1   114
6 ADDHYD 4 086   1 7 6                                               1   115
6 REACH  3 087   6    1 3000.       .79                             1   116
6 RUNOFF 1 150        6 0.45        79.0        0.31                1   117
6 REACH  3 151   6    5 19000.      0.71                            1   118
6 RUNOFF 1 152        6 3.00        79.0        1.10                1   119
6 ADDHYD 4 153   5 6 7                                               1   120
6 REACH  3 172   7    5 33000.      0.65                            1   121
6 RUNOFF 1 173        6 7.08        79.0        3.60                1   122
6 ADDHYD 4 174   5 6 4                                               1   123
6 RUNOFF 1 100        6 1.42        80.0        0.37                1   124
6 REACH  3 101   6    5 19800.      .71                             1   125
6 RUNOFF 1 102        6 2.58        79.0        1.12                1   126
6 ADDHYD 4 103   5 6 7                                               1   127
6 REACH  3 169   7    5 28000.      0.65                            1   128
6 RUNOFF 1 170        6 3.01        79.0        3.75                1   129
6 ADDHYD 4 171   5 6 7                                               1   130
6 ADDHYD 4 176   7 4 3                                               1   131
6 RUNOFF 1 105        6 1.58        78.0        1.30                1   132
6 REACH  3 164   6    5 18000.      0.65                            1   133
6 RUNOFF 1 165        6 2.20        79.0        2.40                1   134
6 ADDHYD 4 166   5 6 4                                               1   135
6 RUNOFF 1 108        6 1.25        79.0        0.49                1   136
6 REACH  3 109   6    5 14000.      .71                             1   137
6 RUNOFF 1 110        6 1.42        77.0        0.84                1   138
6 ADDHYD 4 111   5 6 7                                               1   139
6 REACH  3 112   7    5 7000.       0.65                            1   140
6 RUNOFF 1 113        6 1.32        79.0        0.70                1   141
6 ADDHYD 4 114   5 6 7                                               1   142
6 DIVERT 6 115   7 6 2 1500.                                         1   143
6 REACH  3 159   6    5 13500.      0.65                            1   144
6 RUNOFF 1 160        6 2.18        79.0        1.60                1   145
6 ADDHYD 4 161   5 6 7                                               1   146
6 REACH  3 167   7    5 5500.       0.65                            1   147
6 ADDHYD 4 168   5 4 6                                               1   148
6 REACH  3 175   6    5 12000.      0.65                            1   149
6 ADDHYD 4 176   5 3 4                                     1 1       1   150
6 RUNOFF 1 117        6 3.78        79.0        0.73                1   151
6 REACH  3 118   6    5 11500.      .71                             1   152
6 RUNOFF 1 119        6 0.75        78.0        0.60                1   153
6 ADDHYD 4 120   5 6 7                                               1   154
6 REACH  3 121   7    3 2700.       0.65                            1   155
6 RUNOFF 1 122        6 0.81        79.0        0.77                1   156
6 REACH  3 123   6    5 3500.       .65                             1   157
6 ADDHYD 4 124   5 3 7                                               1   158
6 REACH  3 125   7    5 8500.       .65                             1   159
6 RUNOFF 1 126        6 0.85        79.0        1.25                1   160
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6 ADDHYD 4 127    5 6 7                                                  1      161
6 ADDHYD 4 128    7 2 6                                                  1      162
6 REACH  3 136    6   2 1000.      .79                                   1      163
6 RUNOFF 1 129        6 0.91       79.0        0.34                      1      164
6 REACH  3 130    6   5 9000.      .71         0.48                      1      165
6 RUNOFF 1 131        6 0.63       79.0        0.55                      1      166
6 ADDHYD 4 132    5 6 7                                                  1      167
6 REACH  3 133    7   5 14500.     .71                                   1      168
6 RUNOFF 1 134        6 0.63       79.0        1.55                      1      169
6 ADDHYD 4 150    5 6 7                                                  1      170
6 ADDHYD 4 136    7 2 6                                                  1      171
6 REACH  3 145    6   2 600.       .79                                   1      172
6 RUNOFF 1 138        6 1.57       77.0        0.62                      1      173
6 REACH  3 139    6   5 8400.      .71                                   1      174
6 RUNOFF 1 140        6 1.13       79.0        0.50                      1      175
6 ADDHYD 4 141    5 6 7                                                  1      176
6 RUNOFF 1 143        6 0.81       78.0        1.70                      1      177
6 REACH  3 142    7   5 16000.     .65                                   1      178
6 ADDHYD 4 144    5 6 7                                                  1      179
6 ADDHYD 4 146    7 2 6                                                  1      180
6 REACH  3 147    6   5 1300.      .79                                   1      181
6 ADDHYD 4 148    5 1 6                                   1 1            1      182
  ENDATA                                                                         183
7 LIST                                                                           184
7 INCREM 6            0.50                                                       185
7 COMPUT 7 001    148 0.0          3.39        1.0         1 2  01  01        186
  ENDCMP 1                                                                       187
7 COMPUT 7 001    148 0.0          2.95        1.0         1 2  01  02        188
  ENDCMP 1                                                                       189
7 COMPUT 7 001    148 0.0          2.61        1.0         1 2  01  03        190
  ENDCMP 1                                                                       191
7 COMPUT 7 001    148 0.0          2.09        1.0         1 2  01  04        192
  ENDCMP 1                                                                       193
7 COMPUT 7 001    148 0.0          1.74        1.0         1 2  01  05        194
  ENDCMP 1
  ENDJOB 2

$STOP
```

SUMMARY TABLE 3

	DISCHARGE, CFS									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
X-SECTION NO. 1 ALTERNATE 1	505.36	380.00	288.99	163.11	91.44	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 2 ALTERNATE 1	408.41	307.99	224.95	132.53	79.92	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 3 ALTERNATE 1	832.18	634.73	490.44	289.31	173.26	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 4 ALTERNATE 1	1174.83	897.81	695.28	412.44	248.68	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 5 ALTERNATE 1	1070.15	815.10	628.96	370.09	221.81	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 6 ALTERNATE 1	3221.29	2456.32	1900.13	1131.96	692.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 7 ALTERNATE 1	4057.91	3093.44	2391.54	1419.38	847.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 8 ALTERNATE 1	3828.71	2921.76	2262.08	1349.63	827.11	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 9 ALTERNATE 1	3909.11	2984.06	2311.13	1380.31	847.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 10 ALTERNATE 1	3821.66	2918.18	2260.21	1348.96	827.04	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 11 ALTERNATE 1	660.01	506.93	394.71	237.02	144.80	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 12 ALTERNATE 1	4045.87	3090.46	2394.64	1431.32	879.47	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 13 ALTERNATE 1	3913.74	2987.13	2298.17	1374.55	846.68	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 14 ALTERNATE 1	228.13	175.36	136.63	82.20	50.30	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 15 ALTERNATE 1	3971.13	3031.56	2347.96	1397.26	861.26	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 16 ALTERNATE 1	3857.81	2947.51	2284.40	1367.95	843.02	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 17										

ALTERNATE 1	1124.01	881.57	701.41	443.72	287.71	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 18 ALTERNATE 1	927.89	726.02	576.28	362.72	234.13	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 19 ALTERNATE 1	490.59	377.44	294.78	179.19	111.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 20 ALTERNATE 1	1126.16	879.96	697.77	438.54	283.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 21 ALTERNATE 1	1013.31	790.47	625.57	391.82	252.35	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 22 ALTERNATE 1	2289.52	1753.43	1361.00	810.18	486.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 23 ALTERNATE 1	1762.14	1353.73	1054.35	634.29	378.54	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 24 ALTERNATE 1	835.01	607.69	471.72	284.47	176.95	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 25 ALTERNATE 1	2433.84	1873.89	1463.02	883.99	542.94	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 26 ALTERNATE 1	2016.55	1557.60	1219.98	744.51	464.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 27 ALTERNATE 1	2895.65	2237.75	1754.17	1073.63	673.49	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 28 ALTERNATE 1	2559.15	1975.63	1522.70	936.05	593.21	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 29 ALTERNATE 1	1683.67	1291.59	1003.95	600.68	365.03	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 30 ALTERNATE 1	1457.32	1131.56	890.16	547.22	340.62	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 31 ALTERNATE 1	807.47	624.87	490.10	283.38	178.78	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 32 ALTERNATE 1	316.11	243.62	190.46	115.81	71.99	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 33 ALTERNATE 1	1085.91	840.45	659.54	403.40	252.24	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 35 ALTERNATE 1	740.83	570.81	446.33	271.37	168.69	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 36 ALTERNATE 1	1430.15	1106.32	867.79	530.78	331.72	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 37 ALTERNATE 1	216.53	166.19	129.25	77.45	47.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 38 ALTERNATE 1	930.11	714.95	557.39	337.61	210.22	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 39 ALTERNATE 1	7004.27	5373.29	4183.66	2530.81	1575.39	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 40 ALTERNATE 1	7046.26	5406.50	4210.38	2547.70	1586.69	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 41 ALTERNATE 1	6979.67	5355.34	4170.21	2517.78	1574.35	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 42 ALTERNATE 1	1140.43	875.81	682.52	413.23	257.53	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 43 ALTERNATE 1	8033.97	6163.12	4796.97	2886.40	1802.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 44 ALTERNATE 1	146.13	109.69	83.39	46.14	28.45	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 45 ALTERNATE 1	8052.74	6177.32	4808.79	2894.45	1807.91	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 46 ALTERNATE 1	7948.89	6069.13	4726.27	2864.13	1789.74	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 47 ALTERNATE 1	1502.37	1179.90	939.75	595.08	384.76	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 48 ALTERNATE 1	774.96	607.93	483.87	306.43	199.13	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 49 ALTERNATE 1	502.44	386.29	300.94	181.16	110.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 50 ALTERNATE 1	1275.89	992.56	783.06	485.54	307.76	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 51 ALTERNATE 1	854.78	664.54	524.17	325.63	208.15	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 52 ALTERNATE 1	409.04	312.31	241.76	143.75	87.39	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 53 ALTERNATE 1	1091.33	847.04	667.19	413.66	264.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 54 ALTERNATE 1	8992.81	6905.04	5379.46	3240.18	2027.74	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 55										

ALTERNATE 1	8827.19	6779.93	5284.93	3208.90	2008.87	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 56 ALTERNATE 1	452.62	344.65	265.86	156.17	93.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 57 ALTERNATE 1	8988.46	6867.73	5355.42	3252.34	2037.69	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 58 ALTERNATE 1	8697.92	6682.44	5212.05	3167.37	1986.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 59 ALTERNATE 1	2085.42	1632.03	1296.12	817.05	528.44	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 60 ALTERNATE 1	1620.84	1256.65	988.43	609.01	384.17	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 61 ALTERNATE 1	572.21	440.49	343.77	207.73	127.84	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 62 ALTERNATE 1	1882.31	1459.17	1147.42	707.05	446.49	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 63 ALTERNATE 1	3422.93	2751.08	2244.06	1501.35	1036.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 64 ALTERNATE 1	2132.77	1717.29	1403.68	944.20	655.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 65 ALTERNATE 1	2084.81	1668.29	1355.39	900.47	617.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 66 ALTERNATE 1	684.08	513.47	389.83	220.10	127.31	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 67 ALTERNATE 1	2481.30	1971.41	1590.64	1015.89	689.90	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 68 ALTERNATE 1	4181.99	3290.77	2628.12	1681.06	1108.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 69 ALTERNATE 1	3355.01	2632.81	2097.81	1335.20	877.86	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 70 ALTERNATE 1	736.04	567.20	443.49	269.64	167.61	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 71 ALTERNATE 1	3500.20	2747.65	2189.95	1395.26	918.02	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 72 ALTERNATE 1	866.97	663.84	514.55	304.66	180.39	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 73 ALTERNATE 1	670.67	519.82	408.39	250.14	154.89	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 74 ALTERNATE 1	2607.76	2076.70	1678.80	1058.75	725.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 75 ALTERNATE 1	567.87	436.25	339.60	203.46	123.27	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 76 ALTERNATE 1	902.20	697.39	546.16	331.96	203.47	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 77 ALTERNATE 1	1282.02	985.55	767.33	459.92	279.57	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 78 ALTERNATE 1	899.40	644.18	501.17	301.19	185.32	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 79 ALTERNATE 1	839.94	630.53	478.66	269.30	146.98	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 80 ALTERNATE 1	1373.63	1060.19	829.79	505.96	316.57	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 81 ALTERNATE 1	1152.74	885.52	689.63	416.02	257.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 82 ALTERNATE 1	4464.12	3485.43	2761.95	1720.74	1120.37	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 83 ALTERNATE 1	3898.33	3023.75	2395.88	1508.32	982.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 84 ALTERNATE 1	966.82	738.29	571.47	339.76	206.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 85 ALTERNATE 1	4246.12	3310.69	2621.13	1643.12	1069.70	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 86 ALTERNATE 1	12971.94	9972.84	7817.06	4806.53	3053.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 87 ALTERNATE 1	12773.39	9863.11	7732.58	4755.95	3020.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 88 ALTERNATE 1	3044.36	2350.98	1842.13	1128.64	710.79	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 90 ALTERNATE 1	275.80	213.43	167.51	102.86	64.87	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 91 ALTERNATE 1	3314.85	2559.31	2005.19	1227.43	773.22	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 92 ALTERNATE 1	3128.09	2414.42	1891.70	1158.83	731.60	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 93										

ALTERNATE 1	588.01	448.98	347.42	205.47	123.32	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 94 ALTERNATE 1	3293.01	2541.81	1991.57	1220.58	771.20	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 95 ALTERNATE 1	7148.85	5488.03	4275.35	2588.24	1613.91	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 96 ALTERNATE 1	8078.14	6196.32	4823.49	2916.40	1810.31	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 100 ALTERNATE 1	1060.44	812.05	629.62	373.12	221.36	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 101 ALTERNATE 1	614.09	469.88	364.31	203.32	125.23	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 102 ALTERNATE 1	1083.47	825.77	637.46	375.06	224.07	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 103 ALTERNATE 1	1386.75	1064.94	829.10	499.07	307.00	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 105 ALTERNATE 1	559.63	421.27	321.18	177.87	106.38	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 108 ALTERNATE 1	719.81	540.60	410.57	231.27	124.64	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 109 ALTERNATE 1	479.78	365.14	281.49	165.18	98.61	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 110 ALTERNATE 1	606.51	458.07	350.22	201.30	116.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 111 ALTERNATE 1	979.11	737.95	562.88	321.52	176.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 112 ALTERNATE 1	778.16	587.60	449.80	261.01	155.20	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 113 ALTERNATE 1	622.93	480.01	375.27	228.15	141.83	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 114 ALTERNATE 1	1042.03	788.08	603.95	351.24	209.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 117 ALTERNATE 1	1790.79	1380.02	1078.42	654.51	405.59	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 118 ALTERNATE 1	1480.16	1131.73	876.92	521.47	316.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 119 ALTERNATE 1	345.29	250.68	193.07	114.29	69.63	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 120 ALTERNATE 1	1607.87	1230.08	953.94	568.78	346.37	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 121 ALTERNATE 1	1460.16	1112.57	859.00	496.71	303.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 122 ALTERNATE 1	385.39	296.76	231.69	140.27	86.57	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 123 ALTERNATE 1	317.37	241.85	186.76	107.00	65.45	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 124 ALTERNATE 1	1712.01	1305.64	1009.14	597.21	361.72	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 125 ALTERNATE 1	1473.32	1123.62	869.22	517.27	316.18	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 126 ALTERNATE 1	334.62	254.39	195.90	114.66	65.01	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 127 ALTERNATE 1	1632.65	1244.27	952.48	567.63	347.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 128 ALTERNATE 1	1632.65	1244.27	952.48	567.63	347.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 129 ALTERNATE 1	676.30	514.59	396.22	230.56	133.42	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 130 ALTERNATE 1	490.69	373.28	287.64	167.89	98.45	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 131 ALTERNATE 1	328.81	246.84	187.61	103.83	64.02	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 132 ALTERNATE 1	740.94	568.00	441.17	263.16	159.07	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 133 ALTERNATE 1	525.20	401.71	311.41	185.67	113.17	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 134 ALTERNATE 1	204.60	156.42	121.28	72.38	44.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 135 ALTERNATE 1	295.53	225.31	174.17	103.31	61.18	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 136 ALTERNATE 1	2237.82	1705.70	1318.18	781.75	470.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 138 ALTERNATE 1	657.23	495.97	379.86	221.23	131.77	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 139										

ALTERNATE 1	550.57	414.08	315.56	181.18	106.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 140 ALTERNATE 1	641.17	481.38	365.48	205.69	112.21	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 141 ALTERNATE 1	906.01	680.68	517.81	295.61	173.20	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 142 ALTERNATE 1	690.54	520.22	397.22	229.55	135.89	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 143 ALTERNATE 1	237.99	180.08	138.07	80.30	47.62	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 144 ALTERNATE 1	858.77	646.68	489.41	283.73	168.83	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 145 ALTERNATE 1	2225.13	1695.68	1310.17	776.88	467.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 146 ALTERNATE 1	3081.06	2339.97	1802.04	1061.11	636.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 147 ALTERNATE 1	3044.32	2311.91	1780.22	1038.64	630.81	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 148 ALTERNATE 1	14770.60	11379.50	8877.38	5441.09	3447.52	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 150 ALTERNATE 1	714.13	531.89	411.93	245.46	149.91	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 151 ALTERNATE 1	197.54	150.66	116.38	68.38	40.92	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 152 ALTERNATE 1	1280.30	976.34	754.56	445.07	266.53	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 153 ALTERNATE 1	1357.06	1035.11	799.96	472.15	284.35	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 159 ALTERNATE 1	908.14	687.90	528.40	307.72	185.99	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 160 ALTERNATE 1	700.86	535.72	415.17	247.47	150.78	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 161 ALTERNATE 1	1306.95	992.59	765.08	450.72	274.71	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 164 ALTERNATE 1	398.27	300.74	225.68	131.71	79.01	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 165 ALTERNATE 1	532.20	406.26	314.57	187.63	114.82	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 166 ALTERNATE 1	853.50	649.22	500.95	296.82	180.81	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 167 ALTERNATE 1	1257.32	955.33	736.60	434.49	265.52	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 168 ALTERNATE 1	2100.09	1596.30	1230.92	728.97	444.45	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 169 ALTERNATE 1	953.97	723.61	562.58	339.38	210.96	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 170 ALTERNATE 1	522.70	398.51	308.54	184.58	113.79	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 171 ALTERNATE 1	1414.16	1082.90	841.75	507.28	313.13	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 172 ALTERNATE 1	788.66	602.46	467.01	279.49	172.31	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 173 ALTERNATE 1	1264.08	956.57	740.65	442.98	273.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 174 ALTERNATE 1	1828.85	1398.75	1086.19	654.14	405.34	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 175 ALTERNATE 1	1925.01	1463.81	1129.98	667.52	409.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 176 ALTERNATE 1	5167.71	3945.65	3057.72	1832.40	1127.47	0.00	0.00	0.00	0.00	0.00

ALT # 2

SUMMARY TABLE 3

	DISCHARGE,CFS									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
X-SECTION NO. 1 ALTERNATE 2	505.36	380.00	288.99	163.11	91.44	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 2 ALTERNATE 2	408.41	307.99	224.95	132.53	79.92	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 3 ALTERNATE 2	832.18	634.73	490.44	289.31	173.26	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 4 ALTERNATE 2	1174.83	897.81	695.28	412.44	248.68	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 5 ALTERNATE 2	1070.15	815.10	628.96	370.09	221.81	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 6 ALTERNATE 2	3221.29	2456.32	1900.13	1131.96	692.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 7 ALTERNATE 2	4057.91	3093.44	2391.54	1419.38	847.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 8 ALTERNATE 2	3828.71	2921.76	2262.08	1349.63	827.11	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 9 ALTERNATE 2	3909.11	2984.06	2311.13	1380.31	847.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 10 ALTERNATE 2	3821.66	2918.18	2260.21	1348.96	827.04	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 11 ALTERNATE 2	660.01	506.93	394.71	237.02	144.80	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 12 ALTERNATE 2	4045.87	3090.46	2394.64	1431.32	879.47	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 13 ALTERNATE 2	3913.74	2987.13	2298.17	1374.55	846.68	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 14 ALTERNATE 2	228.13	175.36	136.63	82.20	50.30	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 15 ALTERNATE 2	3971.13	3031.56	2347.96	1397.26	861.26	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 16 ALTERNATE 2	3857.81	2947.51	2284.40	1367.95	843.02	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 19										

ALTERNATE 2	490.59	377.44	294.78	179.19	111.66	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 21 ALTERNATE 2	403.37	309.02	240.20	144.19	88.61	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 24 ALTERNATE 2	835.01	607.69	471.72	284.47	176.95	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 26 ALTERNATE 2	736.62	562.25	434.92	257.16	154.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 27 ALTERNATE 2	1098.94	835.69	643.87	377.31	225.21	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 28 ALTERNATE 2	918.71	698.11	525.18	311.58	190.15	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 29 ALTERNATE 2	1694.62	1300.67	1011.52	606.09	369.02	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 32 ALTERNATE 2	316.11	243.62	190.46	115.81	71.99	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 34 ALTERNATE 2	197.37	151.38	117.70	70.55	43.08	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 35 ALTERNATE 2	740.83	570.81	446.33	271.37	168.69	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 36 ALTERNATE 2	905.47	695.63	541.77	325.99	200.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 37 ALTERNATE 2	216.53	166.19	129.25	77.45	47.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 38 ALTERNATE 2	626.08	477.19	368.62	218.08	128.64	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 39 ALTERNATE 2	5536.06	4224.87	3272.34	1957.01	1206.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 40 ALTERNATE 2	5590.38	4266.43	3304.83	1977.46	1219.27	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 41 ALTERNATE 2	5540.90	4230.61	3277.79	1961.99	1209.87	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 42 ALTERNATE 2	880.22	671.92	520.01	309.24	188.52	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 43 ALTERNATE 2	6311.39	4816.49	3730.77	2230.93	1374.83	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 44 ALTERNATE 2	146.13	109.69	83.39	46.14	28.45	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 45 ALTERNATE 2	6333.75	4834.48	3744.80	2240.40	1380.84	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 46 ALTERNATE 2	6262.37	4780.79	3704.12	2216.71	1366.27	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 49 ALTERNATE 2	502.44	386.29	300.94	181.16	110.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 51 ALTERNATE 2	327.15	240.50	185.91	110.54	67.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 52 ALTERNATE 2	409.04	312.31	241.76	143.75	87.39	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 53 ALTERNATE 2	635.28	485.47	376.16	224.54	137.59	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 54 ALTERNATE 2	6815.77	5203.05	4031.50	2411.79	1486.41	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 55 ALTERNATE 2	6746.09	5150.79	3990.11	2387.13	1471.13	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 56 ALTERNATE 2	452.62	344.65	265.86	156.17	93.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 57 ALTERNATE 2	6884.17	5256.95	4073.70	2439.10	1504.60	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 58 ALTERNATE 2	6692.95	5111.54	3962.65	2374.26	1466.48	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 61 ALTERNATE 2	572.21	440.49	343.77	207.73	127.84	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 66 ALTERNATE 2	697.06	522.90	396.81	223.58	126.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 68 ALTERNATE 2	1119.10	857.83	667.71	403.54	250.43	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 69 ALTERNATE 2	828.17	629.38	471.61	279.70	170.53	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 70 ALTERNATE 2	1153.87	876.98	675.60	397.82	240.49	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 79 ALTERNATE 2	839.94	630.53	478.66	269.30	146.98	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 81 ALTERNATE 2	613.08	462.14	335.51	197.65	119.88	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 82										

ALTERNATE 2	1809.38	1372.73	1010.43	595.17	360.15	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 83 ALTERNATE 2	1420.04	1082.24	836.46	496.57	302.80	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 84 ALTERNATE 2	966.82	738.29	571.47	339.76	206.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 85 ALTERNATE 2	2086.65	1590.26	1228.74	729.70	442.48	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 86 ALTERNATE 2	8386.16	6403.91	4963.07	2975.77	1839.55	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 87 ALTERNATE 2	8301.59	6339.51	4915.14	2946.87	1821.40	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 88 ALTERNATE 2	2244.36	1708.48	1317.50	774.59	464.17	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 90 ALTERNATE 2	86.10	65.89	51.13	30.50	18.58	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 91 ALTERNATE 2	2310.62	1757.68	1354.93	795.59	476.05	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 92 ALTERNATE 2	1965.06	1496.11	1154.27	680.50	399.45	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 93 ALTERNATE 2	588.01	448.98	347.42	205.47	123.32	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 94 ALTERNATE 2	2327.83	1774.92	1371.66	812.57	493.24	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 95 ALTERNATE 2	5674.70	4328.60	3350.91	2000.33	1225.27	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 96 ALTERNATE 2	6346.42	4842.06	3749.45	2241.85	1381.12	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 102 ALTERNATE 2	1083.47	825.77	637.46	375.06	224.07	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 104 ALTERNATE 2	1924.41	1471.59	1140.86	680.71	415.67	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 105 ALTERNATE 2	566.64	426.61	325.26	180.12	107.72	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 106 ALTERNATE 2	2449.25	1868.74	1445.92	859.07	522.70	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 107 ALTERNATE 2	2340.11	1784.41	1378.86	815.52	493.25	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 110 ALTERNATE 2	606.51	458.07	350.22	201.30	116.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 112 ALTERNATE 2	475.78	357.37	271.73	154.59	89.21	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 113 ALTERNATE 2	622.93	480.01	375.27	228.15	141.83	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 114 ALTERNATE 2	912.70	691.38	530.73	309.91	185.50	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 115 ALTERNATE 2	3102.68	2361.33	1821.79	1074.15	647.93	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 116 ALTERNATE 2	3020.91	2297.77	1771.33	1043.00	628.76	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 119 ALTERNATE 2	345.29	250.68	193.07	114.29	69.63	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 121 ALTERNATE 2	301.70	228.28	174.88	101.07	59.33	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 122 ALTERNATE 2	279.67	214.99	167.53	100.84	61.74	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 124 ALTERNATE 2	581.36	443.28	342.44	201.86	120.95	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 125 ALTERNATE 2	471.41	357.32	274.34	159.70	94.71	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 126 ALTERNATE 2	334.62	254.39	195.90	114.66	65.01	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 127 ALTERNATE 2	738.87	562.40	433.88	255.64	153.87	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 128 ALTERNATE 2	3758.17	2858.99	2204.02	1298.14	782.18	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 131 ALTERNATE 2	368.29	276.75	210.39	118.62	66.58	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 133 ALTERNATE 2	241.40	183.59	141.43	82.80	49.29	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 134 ALTERNATE 2	204.60	156.42	121.28	72.38	44.19	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 135 ALTERNATE 2	295.53	225.31	174.17	103.31	61.18	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 136										

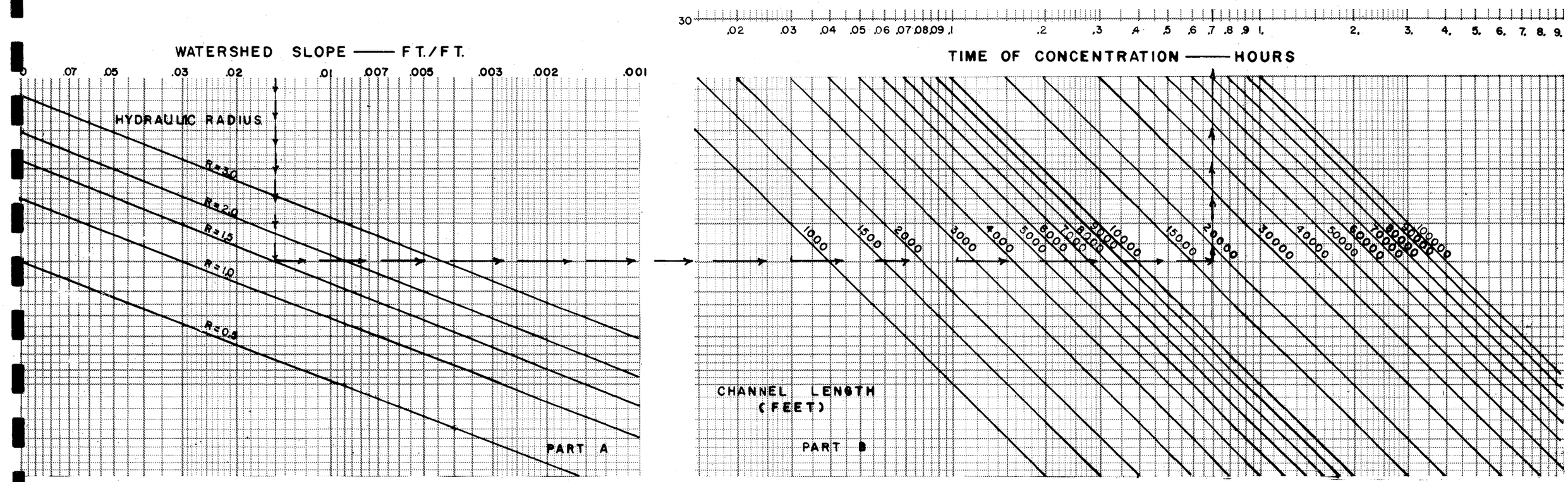
ALTERNATE 2	3709.46	2820.92	2173.77	1279.30	770.49	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 137 ALTERNATE 2	4152.68	3158.64	2435.01	1433.48	863.14	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 140 ALTERNATE 2	641.17	481.38	365.48	205.69	112.21	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 142 ALTERNATE 2	370.96	282.52	218.08	128.72	77.75	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 143 ALTERNATE 2	237.99	180.08	138.07	80.30	47.62	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 144 ALTERNATE 2	574.63	436.22	335.85	197.54	119.20	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 145 ALTERNATE 2	4117.42	3131.73	2413.56	1420.22	855.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 146 ALTERNATE 2	4689.41	3563.40	2743.69	1610.89	967.43	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 147 ALTERNATE 2	4600.92	3494.59	2690.20	1578.65	931.94	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 148 ALTERNATE 2	10910.86	8318.61	6438.05	3850.11	2368.64	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 152 ALTERNATE 2	1316.50	1005.38	777.74	459.94	276.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 156 ALTERNATE 2	1086.41	831.80	645.58	385.54	235.06	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 157 ALTERNATE 2	2083.07	1585.41	1177.76	700.93	428.05	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 160 ALTERNATE 2	700.86	535.72	415.17	247.47	150.78	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 165 ALTERNATE 2	532.20	406.26	314.57	187.63	114.82	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 167 ALTERNATE 2	613.23	468.53	363.02	216.51	132.31	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 168 ALTERNATE 2	1145.05	874.63	677.31	404.00	247.07	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 170 ALTERNATE 2	522.70	398.51	308.54	184.58	113.79	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 173 ALTERNATE 2	1197.35	915.14	710.37	427.69	265.61	0.00	0.00	0.00	0.00	0.00

X-SECTION NO. 174 ALTERNATE 2	1718.81	1313.09	1018.35	612.01	379.20	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 175 ALTERNATE 2	984.98	752.09	582.66	348.24	214.09	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 176 ALTERNATE 2	2702.85	2064.32	1600.58	960.15	593.32	0.00	0.00	0.00	0.00	0.00
X-SECTION NO. 190 ALTERNATE 2	444.76	339.07	262.09	154.81	93.23	0.00	0.00	0.00	0.00	0.00

PROBLEM: The peak discharge for a 25 year frequency storm for a diversion channel near Phoenix, Ariz. is desired.

Drainage Area = 5 sq. miles
Average Watershed Slope is 1.5%
Average Channel Hydraulic Radius is 1.5 ft.
Cover is Herbaceous with 5% Ground Cover
Soil is in the "C" Hydrologic Soil Group
Channel Length - 18,000 ft.

SOLUTION: Curve Number = 90, 24 Hr. CN = 84.4
Precipitation (Partial) = 3.0"
P_a = (1.00)(3.0) = 3.0"
Q_p = 1.50
Q = 330 CSM/Inch
Q = (330 $\frac{CSM}{In}$)(5.0 sq. mi.)(1.50 in.) = 2475 CFS



GRAPH 1

MAPS INDEX

Map #1 Study Area Boundary

Map #2 USGS Quad Sheet Base

Map #3 Drainage Area Map

Map #4 50-Year Flood Peaks without Buckhorn-Mesa

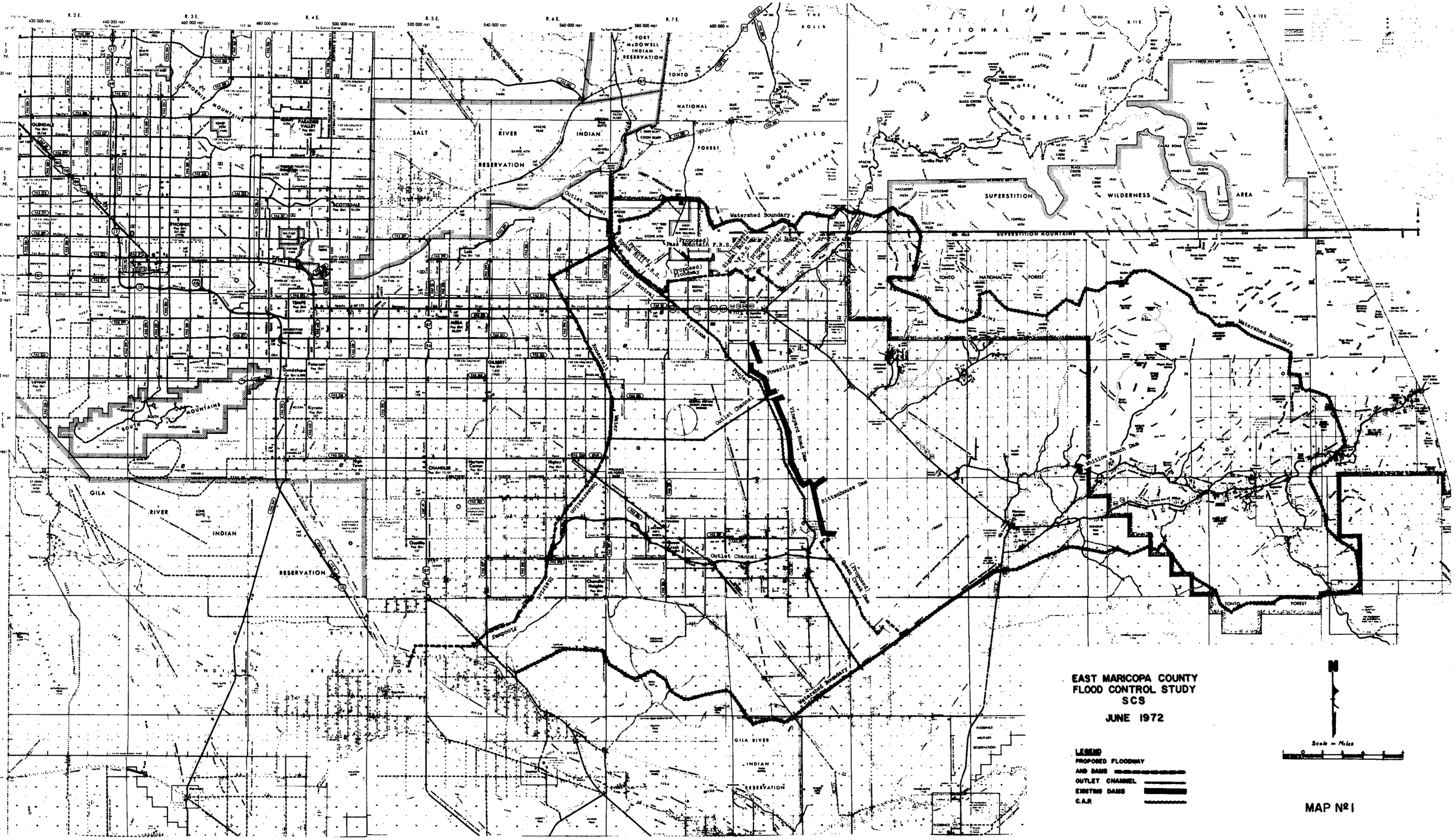
Map #5 50-Year Flood Peaks with Buckhorn-Mesa

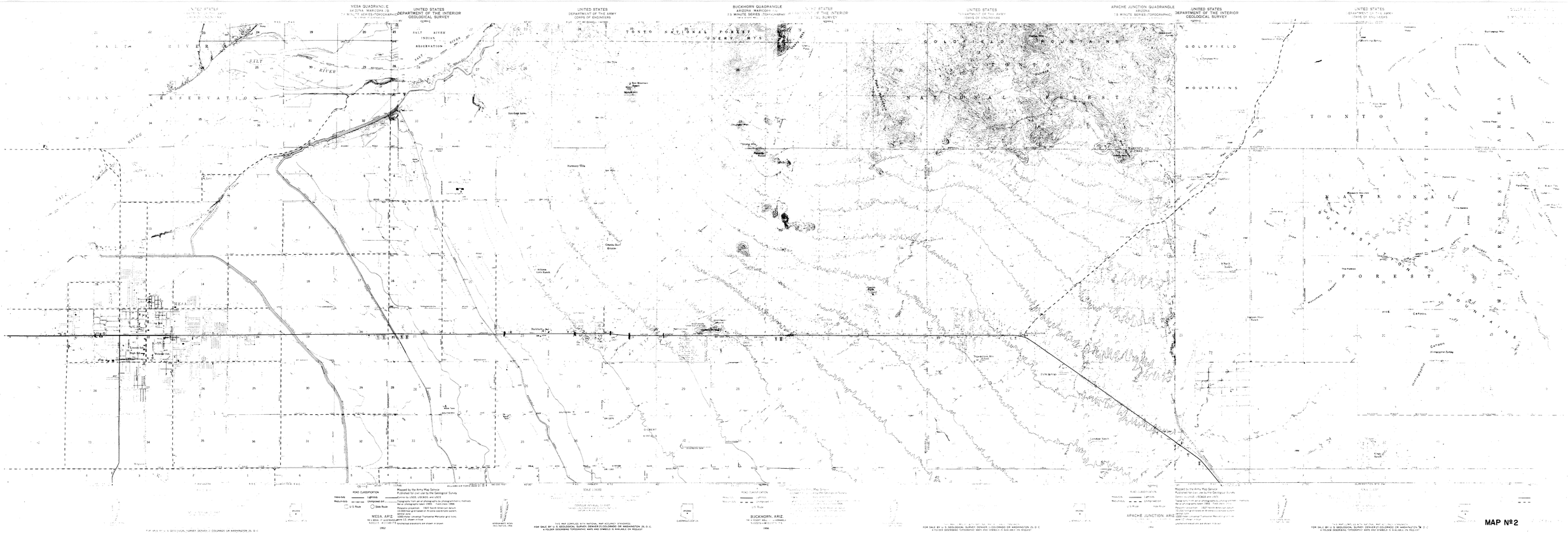
Map #6 Land Rights Map - Buckhorn-Mesa

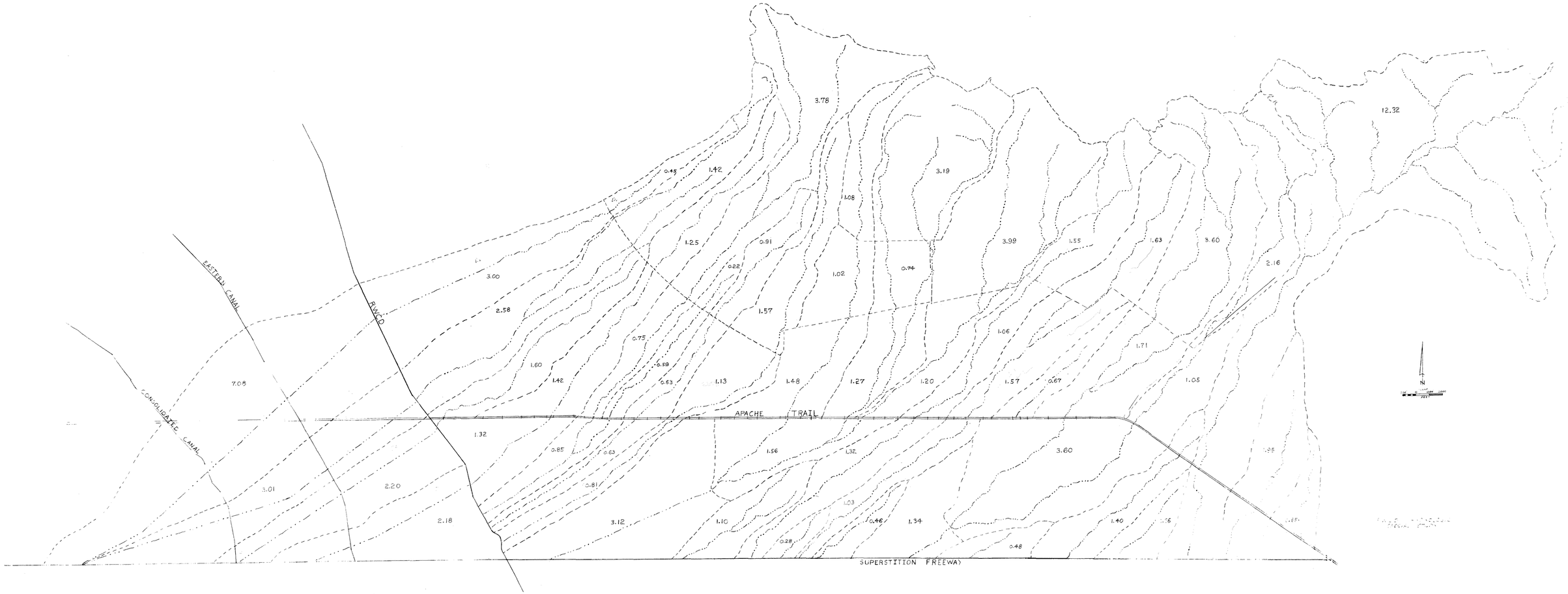
Map #7 Sample Subdivision

Map #8 RWCD - Queen Creek-Sonoquie Wash TR-20 Flow Chart

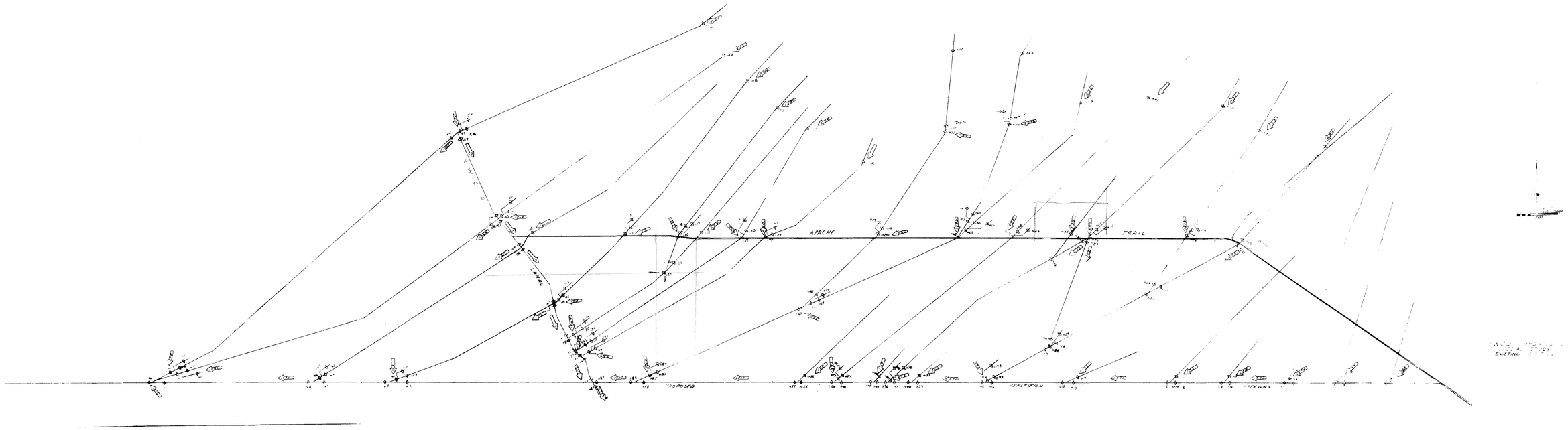
Map #9 Aerial Mosaic


EAST MARICOPA COUNTY
FLOOD CONTROL STUDY
SCS
JUNE 1972
LEGEND
PROPOSED FLOODWAY AND DAMS
OUTLET CHANNEL
EXISTING DAMS
C.A.R.
Scale in Miles
MAP Nº 1
Watershed Boundary
Powerline Dam
Riverhouse Dam
Willow Ranch Dam
Vineyard Road Dam
Outlet Channel
SALT RIVER INDIAN RESERVATION
GILA RIVER INDIAN RESERVATION
TONTO NATIONAL FOREST
SUPERSTITION WILDERNESS AREA
SUPERSTITION MOUNTAINS
FORT McDOWELL INDIAN RESERVATION
PHOENIX
TEMPE
MESA
CHANDLER
GLOBE
MARICOPA COUNTY

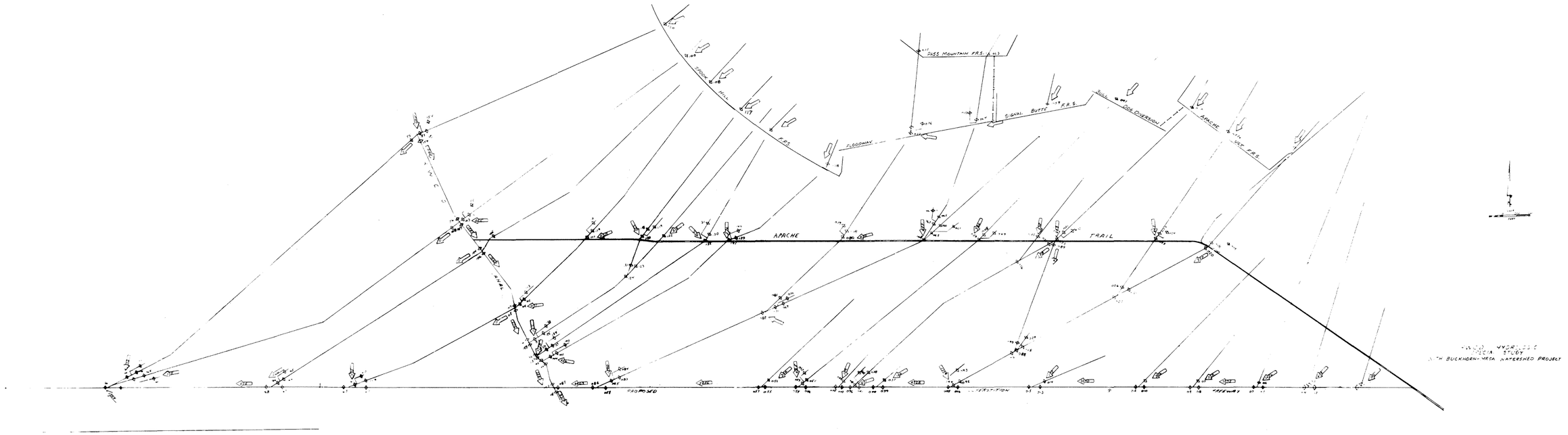

MESA QUADRANGLE
ARIZONA-MARICOPA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BUCKHORN QUADRANGLE
ARIZONA-MARICOPA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
APACHE JUNCTION QUADRANGLE
ARIZONA
7.5 MINUTE SERIES (TOPOGRAPHIC)
UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SALT RIVER INDIAN RESERVATION
TONTO NATIONAL FOREST
USERY MTS.
GOLDFIELD MOUNTAINS
MESA
SUPERSTITION MTS.
ROAD CLASSIFICATION
Hard-Surface
Medium-Duty
Light-Duty
Unimproved dirt
U S Route
State Route
MESA, ARIZ.
1952
BUCKHORN, ARIZ.
1956
APACHE JUNCTION, ARIZ.
1956
MAP Nº2


EASTERN CANAL
CONSOLIDATED CANAL
RWCD
APACHE TRAIL
SUPERSTITION FREEWAY
N
3.78
12.32
0.45
1.42
3.19
1.08
1.25
0.91
3.99
1.55
1.63
3.60
2.16
3.00
0.22
1.02
0.74
2.58
1.57
1.06
0.75
1.71
1.60
0.59
1.42
0.63
1.13
1.48
1.27
1.20
1.57
0.67
1.05
7.08
1.32
0.85
0.63
1.56
1.32
3.60
1.95
3.01
2.20
0.81
1.03
2.18
3.12
1.10
0.46
1.34
1.40
1.26
0.28
0.48

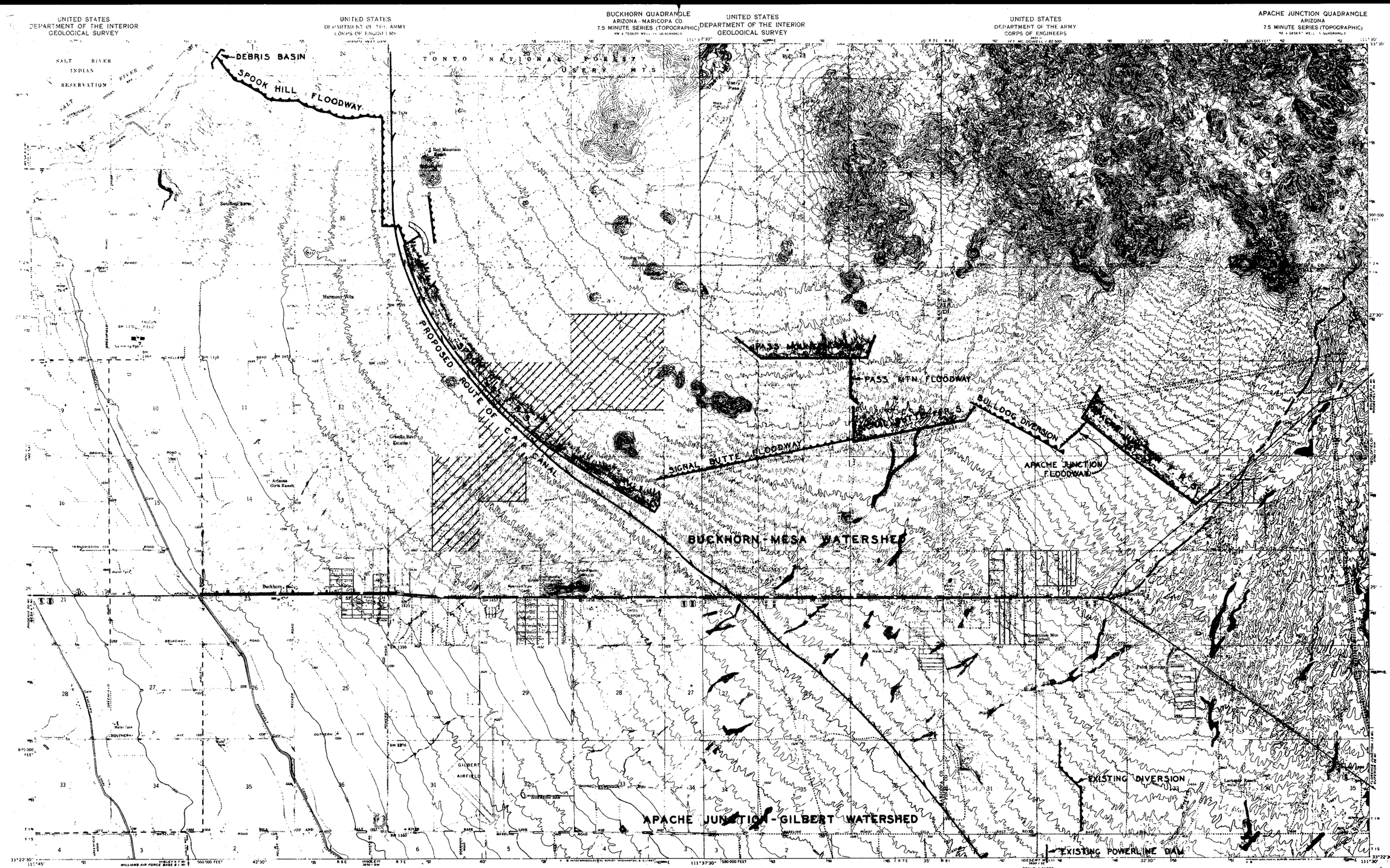
MAP Nº 3



MAP Nº 4


PASS MOUNTAIN F.R.S.
SIGNAL BUTTE F.R.S.
FLOODWAY
APACHE
TRAIL
PROPOSED
VEGETATION

MAP Nº 5


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
BUCKHORN QUADRANGLE
ARIZONA - MARICOPA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
UNITED STATES
DEPARTMENT OF THE INTERIOR
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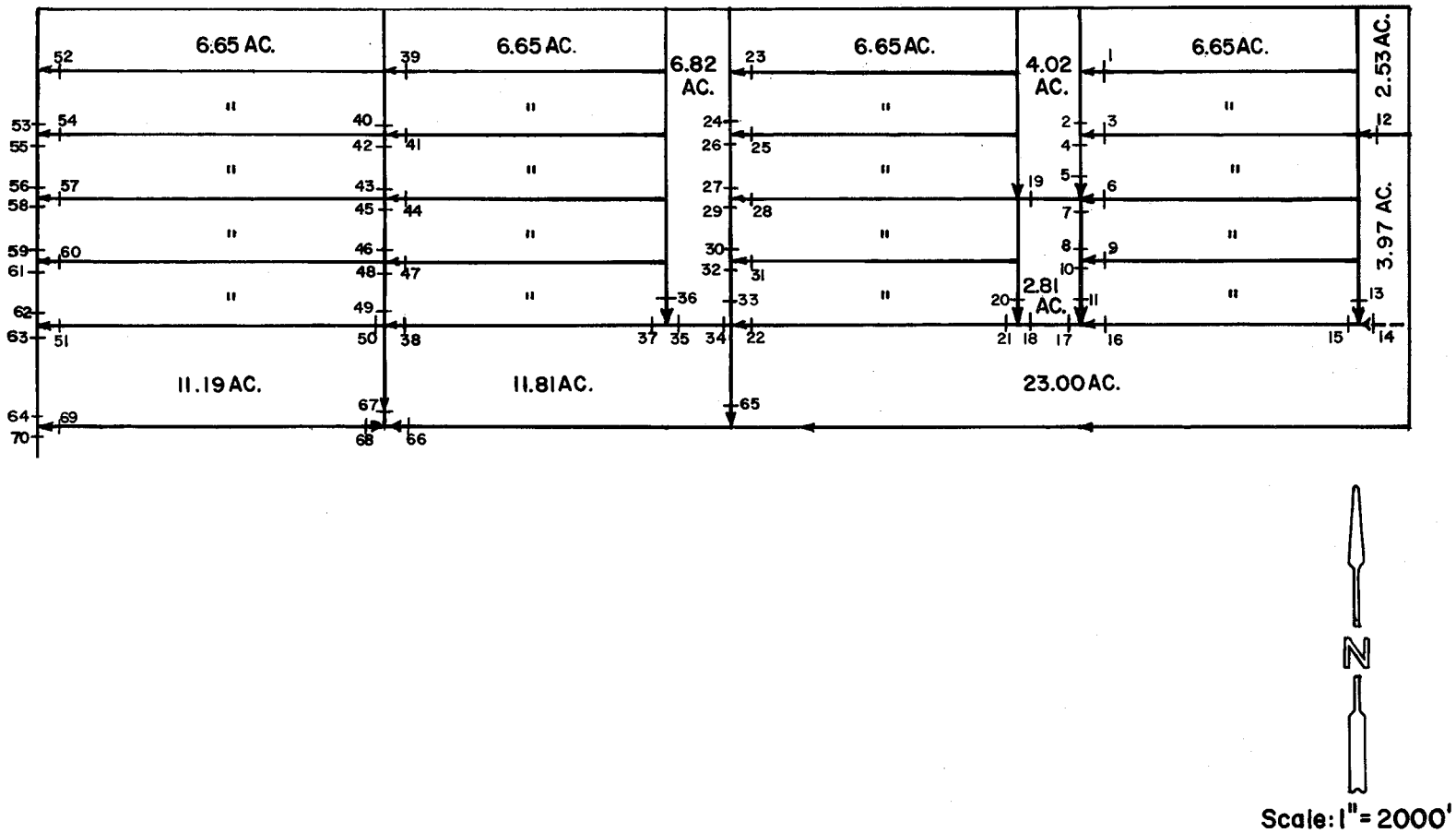
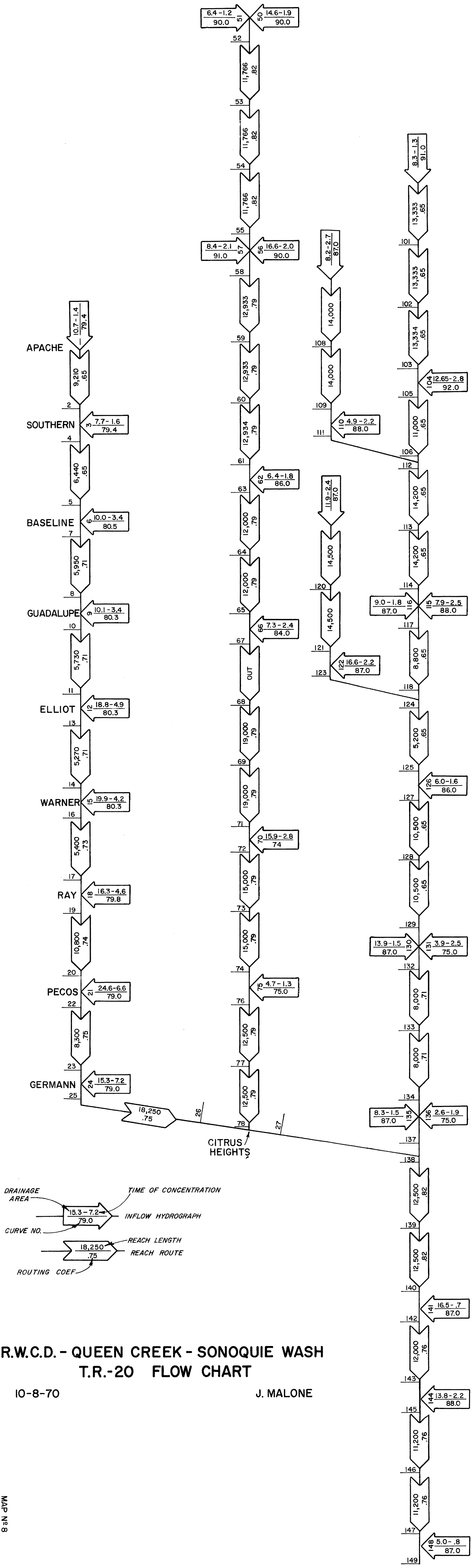
APACHE JUNCTION QUADRANGLE
ARIZONA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SALT RIVER INDIAN RESERVATION
TONTO NATIONAL FOREST
USERY MTS
DEBRIS BASIN
SPOOK HILL FLOODWAY
PROPOSED ROUTE OF CAP CANAL
PASS MTN. FLOODWAY
BULLDOG DIVERSION
SIGNAL BUTTE FLOODWAY
APACHE JUNCTION FLOODWAY
BUCKHORN-MESA WATERSHED
EXISTING DIVERSION
APACHE JUNCTION-GILBERT WATERSHED
EXISTING POWERLINE DAM
Buckhorn
GILBERT AIRFIELD
Apache Junction
Mapped by the Army Map Service
Published for civil use by the Geological Survey
Control by USGS, USC&GS, and USCE
Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1955. Field check 1956
Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue
Unchecked elevations are shown in brown
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DASHED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U.S. Route
State Route
QUADRANGLE LOCATION
ARIZONA
BUCKHORN, ARIZ.
NW/4 DESERT WELL 15' QUADRANGLE
N3322.5—W11137.5/7.5
1956
AMS 3850 I NW—SERIES V897
APACHE JUNCTION, ARIZ.
NE/4 DESERT WELL 15' QUADRANGLE
N3322.5—W11130/7.5
1956
AMS 3850 I NE—SERIES V896
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MAP № 6



SAMPLE SUBDIVISION
MARICOPA COUNTY

MAP Nº 7

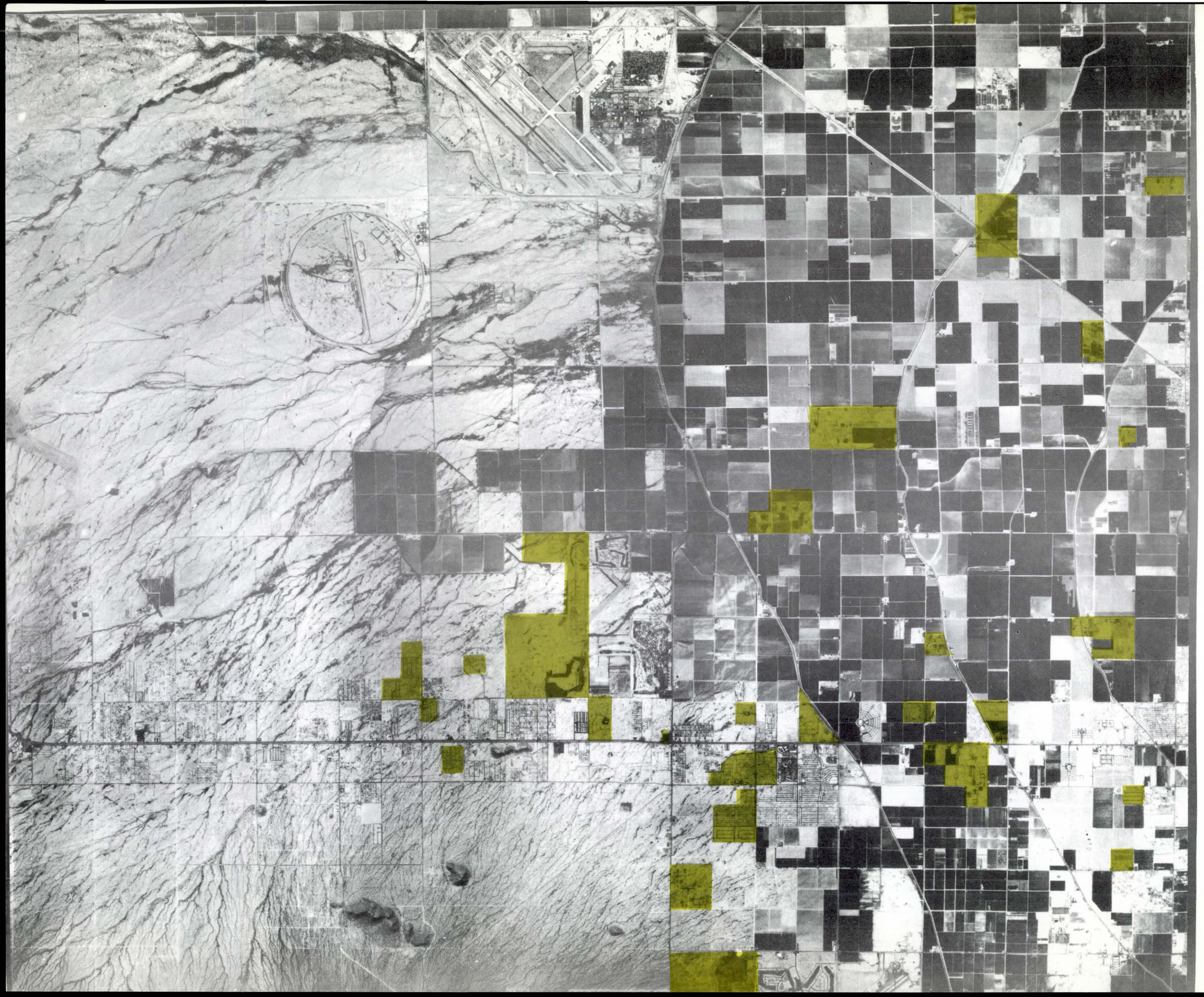


R.W.C.D. - QUEEN CREEK - SONOQUIE WASH
T.R.-20 FLOW CHART

10-8-70

J. MALONE

MAP No 8



GILA RIVER INDIAN COMMUNITY
SACATON, AZ. 85247

ADMINISTRATIVE OFFICES
P. O. BOX 97 — (602) 562 3311

May 16, 1972

Mr. D. G. Burns
Watershed Planning Staff Leader
River Basin-Watershed Planning Staff
Soil Conservation Service
Suite 326 Arizona Title Building
111 West Monroe Street
Phoenix, Arizona 85003

Dear Mr. Burns:

In response to your letter dated May 11, 1972, concerning the effects of the lack of flood prevention on the Gila River Reservation.

Here is a summary of the past conditions and present effects of the lack of proper flood control prevention.

Due to its location along the Gila River, the Gila River Indian Reservation is subject to destructive flooding from sources of runoff originating outside of the reservation boundary and flowing towards the Gila River. The Queen Creek drain which enters the reservation north of Sacaton, dumps its runoff on the reservation and has been one of two principal contributors to flooding. Queen Creek was diverted into its present alignment near the turn of the century.

During flood stage, Queen Creek flows 26 miles across the reservation's most valuable land, inundating thousands of acres of allotted and tribal lands. These lands lie adjacent to highly developed privately owned urban, industrial and agriculture lands. As private lands which lie just to the north of the reservation increase in value, so will the Indian lands increase in value. Frequent flooding, however, decreases the potential for development of Indian lands.

Highly developed lands boardering the reservation to the north also have flooding problems and these flood waters enter the reservation at Pima-Chandler Industrial Park and flow into the present Queen Creek Flood Plain. This floodway is called the Gila Drain.

Historically, floods have damaged agricultural lands, irrigation canals, residential homes, commercial property, roads and highways. Damage in the past few years have been over $500,000.00.

During the last local major storm, 958 individual Indian allottments (9,580 acres) and 11,636 acres of tribal lands were flooded. The San Tan Ranches received $110,000.00 in flood damage. Interstate Highway #10 received 1.3 miles of road-bed damage. Several homes were flooded.

Several industrial firms interested in locating in the Gila River Indian Community, Pima-Chandler Industrial Park were not funded by EDA (Economic Development Administration) due to the flood hazard.

Other examples of flood damage on the reservation are:

1. State Highway #87 and #93
2. Goodyear area of the San Carlos Irrigation Project
3. 870 acres of San Carlos Project Class II lands (These lands have a water right but are not feasible for irrigation subjugation until flood control has been developed. All this land is Indian owned).
4. Pima-Chandler Industrial Parks (flooding prevented EDA funding)
5. Gila River Marina
6. Goodyear Airport
7. Air-Research
8. Pima-Chandler Sewage Plant
9. Maricopa Road
10. Homes and farmland in the Gila Crossing Project (80 HUD Public Housing units are scheduled to be built in the Gila Crossing Project within the next fiscal year)
11. Approximately 60,000 acres of land with a high potential for industrial and urban development in the near future.

These are but a few examples of the present areas affected by flooding on the reservation.

Unless an effective, comprehensive flood control plan is devised and implemented, the community and economic development potential of these areas as well as the reservation as a whole cannot be fully realized.

Not only would an established flood control plan allow tribal and allotted lands to be developed but would also protect present and future development throughout the north central area of the reservation.

This reservation area has the greatest potential growth, because it lies adjacent to the population center of Arizona.

I hope this letter has sufficiently answered your letter. Although, there is more information that could have been included, I felt that the information contained in this letter would suffice for your purposes.

I appreciate this chance to voice our concern on the lack of proper flood control prevention on the reservation as the emphasis on flood control prevention cannot be stressed enough for our needs on the reservation.

Sincerely yours,

Alexander Lewis, Sr.
Governor

cc:

Burdette Morago
Walter White, Chandler EMSCD
Dale Blackwater, Tribal Planning Department