

**FINAL REPORT OF THE
HOLLY ACRES FLOOD RELIEF COMMISSION
JULY, 1980**

**PUBLISHED BY
HOLLY ACRES FLOOD RELIEF COMMISSION**

FINAL REPORT

of the

HOLLY ACRES FLOOD RELIEF COMMISSION

JULY, 1980



DIVISION OF EMERGENCY SERVICES

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August 15, 1980

The Honorable Bruce Babbitt, Governor
State of Arizona
1700 West Washington
Phoenix, Arizona 85007

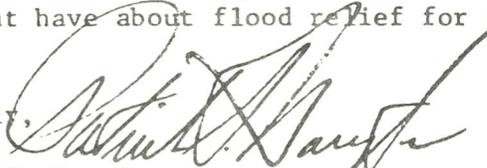
Dear Governor Babbitt:

Attached please find the final report of the Holly Acres Flood Relief Commission. The members of the commission have several recommendations for relief from flooding in the Holly Acres area; the most significant are summarized below:

- We believe a large scale relocation program is probably not practical for the Holly Acres area and should not be attempted in any case until complete engineering studies rule out structural flood control protection.
- The studies which have been conducted concerning Holly Acres have primarily been aimed at the possibility of a project with partial federal funding. The area has not been studied under the special requirements of the state's Alternative Flood Control Assistance Program. The commission has entered into an intergovernmental agreement with the Flood Control District of Maricopa County for the performance of such a study and has transferred \$49,000 from our appropriation to the Flood Control District for the performance of this study. Its results should be available for your inspection by April 1. The requirements of the alternative program are less stringent than those of the federal program and a project under this program may be possible.
- We believe a successor entity to the Holly Acres Flood Relief Commission should be appointed to receive the results of this study and to serve as an intermediary between the residents of this twelve square mile area and the various levels of government.

The members of the commission feel a responsibility to complete the processes which have begun during our study. We would be happy to answer any questions you might have about flood relief for the Holly Acres area.

Sincerely,


Patrick F. Harrington
Chairman, Holly Acres Flood
Relief Commission

HOLLY ACRES FLOOD RELIEF COMMISSION

MEMBERSHIP

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Representative, Arizona Division of Emergency Services,
Department of Emergency and Military Affairs*
- FRANK M. BARRIOS
Representative, Arizona Department of Water Resources*
- ROBERT L. BRUNTON
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I. INTRODUCTION

The Holly Acres Flood Relief Commission was authorized by the Arizona Legislature in Laws of Arizona 1980, Chapter 193, (S.B. 1163), and appointed by Governor Bruce Babbitt on May 23, 1980. The enabling legislation mandates that the Commission will:

"Review and evaluate the feasibility and cost of channelling, stabilizing and diking the Salt and Gila rivers from ninety-first avenue to the confluence of the Agua Fria river to contain a one-hundred year flood and of buying the land and improvements of property owners within the one-hundred year floodplain of the river at fair prices and under equitable conditions. The Commission shall explore all options and alternatives regarding these issues including land exchanges."

In the accomplishment of this mandate, the Commission has held six meetings (two of these scheduled in the community and organized as public hearings), and has sought expert advice on possible flood relief programs when the Commission members did not already possess complete information.

The following report is a discussion of the programs available for flood relief in the Holly Acres area, the findings and recommendations of the Commission regarding those programs, and a recommended course of action initiated by the Commission. The Appendix contains supporting information. The members of the Holly Acres Flood Relief Commission present this Final Report as an evaluation of possible flood relief measures for Holly Acres and as an initiation of one possible course of action; we do not represent that this report contains the final flood control solution for Holly Acres. It is our hope that the County, State and Federal Governments will use the information presented here as the basis for their further actions.

The findings and recommendations contained herein are the responsibility of the Holly Acres Flood Relief Commission and are not necessarily shared by the various agencies represented on the Commission.

II. HOLLY ACRES FLOOD RELIEF COMMISSION STUDY AREA

Description of Study Area

Holly Acres is an agricultural and residential area located twenty miles Southwest of downtown Phoenix, in Maricopa County, Arizona. The general study area is bounded on the north by Broadway Road, on the south by Baseline Road, on the east by 91st Avenue and on the west by the Agua Fria River (see map Appendix A.)

Located within this area are the Salt and Gila Rivers with their confluence at 115th Avenue. The Gila River extends westward to the confluence with the Agua Fria River drainage basin.

The study area covers approximately twelve square miles with approximately 7,680 acres of irrigated farmlands. The main crops consist of cotton, alfalfa, silage and pasture. Dairy operations also exist. The balance of the area is in irrigated residential acreage including five major subdivisions. These are Holly Acres, Green Valley Ranches, Hacienda del Oeste, Sierra Estrella Ranchos, and Estrella Country Estates. There are also other residences on two-to-twenty acre parcels whose occupants raise horses, cattle and other livestock. There are approximately 400 total residential units with a population of approximately 1,500 people.

Also located in the area are commercial operations such as a convenience market, feed mill, feed lot, contractors and trucking.

Approximately 2,000 acres were inundated by flood waters from the Salt, Gila, and Agua Fria Rivers three times in the past two years - March, 1978, December, 1978 and February, 1980.

The study area mandated by this legislation lies within the 100-year floodplain as defined by the Insurance and Mitigation Division of the Federal Emergency Management Agency. It should be noted that flood problems are not limited to areas within the boundaries of the 100-year floodplain (refer to map Appendix A.) Under present conditions there is the continuing potential for more flooding.

Flood Related Problems of Study area

The 91st Avenue Wastewater Treatment Plant is directly East of the study area. The plant presently discharges approximately 84 million gallons per day (126 cubic feet per second). The plant is presently being enlarged to a capacity of 120 million gallons

daily with an ultimate master plan design of 135 million gallons a day. In 1983 or 1984 a substantial portion of the effluent will be diverted into an already constructed pipeline to provide water to the Arizona Nuclear Power Project, the Rio Salado Plant and to the Buckeye Irrigation Company.

A small earthen dike was constructed by the Arizona Game and Fish Department and located on State land just east of 115th Avenue and captured the effluent water. Phreatophytes (salt cedar) grow abundantly adjacent to the effluent water. The dike also created silt deposits which raised the elevation of the river bed. The dike was destroyed in the March, 1978 flood.

Two road crossings, 115th Avenue and El Mirage Road are elevated above the grade of the River bed. These roads were destroyed during the past floods, and 115th Avenue is being rebuilt at the present time.

A landfill, located on State land at El Mirage Road and the Gila River, was operated by Maricopa County and the City of Avondale from the early 1970's until just prior to the March, 1978 flood.

Debris from landfills upstream of the study area created a damming effect when carried into the salt cedars during the March, 1978 flood.

It is felt that the above-mentioned items have had a definite impact on the flooding problems and some attention should be given to these items to reduce the flooding problems in the study area.

III. HISTORICAL DAMAGE AT HOLLY ACRES

The Holly Acres subdivision is located at the intersection of El Mirage Road and Southern. On a broader scale, the area below Broadway to the Gila River and between 91st Avenue and the Agua Fria River is considered to be the Holly Acres area. A good portion of this area is located within the 100-year floodplain as defined by the Insurance and Mitigation Division of the Federal Emergency Management Agency.

Since 1965, portions of this area have been inundated by floods - December/January, 1965/1966; March, 1978; December, 1978; January, 1979 and February, 1980. The following are excerpts from Corps of Engineers' Flood Damage Reports for the March, 1978 and December, 1978 floods describing damages in this area. Damages which occurred outside the study area are also discussed in the following material:

MARCH, 1978 FLOOD

SALT RIVER - 35th AVENUE to 115th AVENUE: Rural housing and agriculture, both crop and dairy farming, are the most prevalent forms of land use in this area. The 91st Avenue effluent treatment plant, the central processing facility for Phoenix, is located within the floodplain.

Flows along the Salt River first affected large areas of residential property in this reach. Over 30 homes and one apartment building experienced a total of \$298,000 in damages. Railroad loss was \$13,000 and industrial losses totalled \$109,000.

Approximately 500 acres of agricultural land was damaged requiring releveling or debris removal along this section of the Salt River. A total of \$373,000 in damages were reported, of which \$265,000 represented damages to the land (cost for releveling and clearing); \$35,000 was crop loss; equipment damages were \$59,000; and \$19,000 were business and emergency losses.

GILA RIVER AREA: The Gila River floodplain is a rural area with some commerce and gravel mining. There are two residential areas within this floodplain; Holly Acres and Allenville. The major commercial use within this section is related to cock gaming. The Arlington Wildlife Area, administered by the Arizona Game and Fish Department, lies to the north of Gillespie Dam.

There were two major tributaries other than the Salt River which added to the flow on the Gila River during the flood. The Agua Fria River enters the Gila below the Agua Fria's confluence with the New River. The peak inflow from the Agua Fria was approximately 41,000 cfs. The Hassayampa River added 20,000 cfs at its peak on March 2nd. The flow went almost directly into the Arlington Wildlife Area. A ranch, located at the confluence of the Agua Fria River and the Gila River, suffered the largest commercial loss, \$250,000. Metallic recycling centers suffered most of the remaining \$115,000 in commercial damages. Industrial damage was limited to two sand and gravel mining operations.

This section of the Gila River suffered extensive agricultural damage. Damages to farms totalled over \$3 million: \$1,331,000 in crops; \$916,000 to land; equipment losses of \$686,000; \$32,000 in livestock; and business losses of \$102,000. Approximately 4,400 acres of farm and ranch land were damaged, of which 3,800 were planted.

Residential damages exceeded \$2 million. Nearly all of this damage occurred in the Holly Acres subdivision and Allenville. The Holly Acres subdivision is located at the intersection of El Mirage Road and Southern Avenue. During the flooding of the Gila River, the water rose to about 5 feet above ground level throughout this 70 acre community. All 55 of the homes were affected. Most filled to about 4 feet with mud and debris. Many had walls torn apart by the river. Most of the residents stayed with relatives in the Phoenix area during the flood, while others were given shelter by the Red Cross and the Federal Disaster Assistance Administration.

The residents of Holly Acres are planning to remain there. About 96 percent have received SBA loans to rebuild and clear their homes and property. One resident is completely rebuilding his home. Others (about 9) are repairing existing structures damaged by the flood. Many are planning to rebuild, but are waiting for financial aid; those who have not qualified for SBA loans have received federal grants and others had flood insurance.

The residents are aware that they live in a floodplain, and have been given waiver permits by the County to rebuild. The permit states that the County will not be responsible for any future flood Damages.

(From March, 1978 Flood Damage Report, pages 20 & 21, published February, 1979)

DECEMBER, 1978 FLOOD

GILA RIVER - PERRYVILLE ROAD to 115th AVENUE: This area contains the confluence of the Salt and Gila Rivers at 115th Avenue and the confluence of the Gila and Agua Fria Rivers at Litchfield Road. Damages totalled \$3.7 million.

Agricultural damages totalled \$1.8 million, nearly half of all the damages reported. Most agricultural damage was from land erosion, damaged irrigation structures, and crop losses. Residential damages exceeded \$1.2 million. Most of this loss was in the Holly Acres subdivision and other residential units located between 115th and 122nd Avenues. Holly Acres is a 5 to 10 year old subdivision with an average home value of \$55,000. Local residents had just completed repair work from the February-March, 1978 flood. They planned to spend the holiday season in their homes after many families had spent nine months in other housing. The December, 1978 flood occurred shortly before Christmas, and largely destroyed the repair work completed after the February-March, 1978 flood. Flood-proofing and construction of flood control structures are alternatives under consideration to reduce the flood hazard in Holly Acres. Physical damage and revenues foregone at the Phoenix International Raceway and cock gaming establishment represent all of the \$326,000 in commercial losses reported. There are no sand and gravel operations in this area.

SALT RIVER - 115th AVENUE to 35th AVENUE: This area experienced the most extensive agricultural damage on the Salt River. Agricultural losses were \$938,000, 34% of the total \$2.8 million in damages reported for this area. Ninety-eight percent of the damages to agricultural acreage on the Salt River occurred here. The primary crop in this area is upland cotton, followed by alfalfa and barley. Losses to the single sand and gravel operation in this reach totalled \$232,000. Conveyor belt damage, pit flooding, and revenues foregone were the major losses. Damages to commercial establishments were \$514,000. A tire recycling establishment had the most commercial losses. Emergency costs and physical damages to public roads and bridges totalled \$434,000. Most of the other public losses were to three sites: The 91st Avenue Sewage Treatment Plant, where a culvert and an effluent channel were damaged; a Bureau of Reclamation transmission tower where original footings were shifted by rushing water; and the water pipeline feeding into the Palo Verde Nuclear Power

Plant now under construction. Residences, generally consisting of 5 acre ranchettes, had losses of \$182,000. These residential units sustained the only residential damage which occurred on the Salt River.

(From December, 1978 Flood Damage Report, Page 32, published in November, 1979)

Also included are a photograph showing the December, 1965/January, 1966 flood at the Salt-Gila confluence (Appendix B.) and a tabulation of historic peak flows including the most recent flood events (Appendix C.).

IV. POSSIBLE SOLUTIONS TO HOLLY ACRES FLOODING

A. STRUCTURAL PROGRAMS AVAILABLE

1. Corps of Engineers

Central Arizona Water Control Study (CAWCS)

The United States Army Corps of Engineers in conjunction with the United States Department of Interior Water and Power Resources Service (formerly United States Bureau of Land Reclamation) is conducting the Central Arizona Water Control Study. This comprehensive water resources study is looking at two major problems in Central Arizona:

1) provide regulatory storage for Central Arizona Project, currently under construction; and 2) provide flood damage reduction along the Salt and Gila Rivers from Granite Reef Dam to Painted Rock Dam.

Many different alternative measures are being investigated for flood damage reduction. Structural measures include: additional upstream reservoir storage on the Salt and Verde Rivers, a reservoir at the confluence of the Salt and Verde Rivers; downstream channelization and levees on the Salt River through metropolitan Phoenix; levees along the north side of the Gila River. Non-structural solutions include: floodproofing, flood insurance, relocation, new bridges and flood preparedness planning. There is the possibility that some combinations of the above-mentioned measures might obtain the most

effective solution.

The greatest potential for long-term/permanent flood relief to the Holly Acres area appears to be with, 1) a levee along the north side of the Salt/Gila River extending from 91st Avenue to the Agua Fria River, Agua Fria River to the Hassayampa River, and the Hassayampa River to Gillespie Dam; 2) relocation or; 3) a ring dike around the Holly Acres subdivision.

It must be understood that this Federal study is a feasibility study to determine if any of the above measures are technically, economically, environmentally, socially and politically acceptable. The Corps would have to obtain Congressional authorization under its Gila River and Tributaries authority for construction of any recommended flood control plan. Once this is obtained, further detailed design is undertaken of the recommended plan before it is finally constructed.

Small Projects

Section 205 (PL 80-858) of the Flood Control Act of 1948 states:

"The Secretary of the Army is hereby authorized to allot from any appropriations heretofore or hereafter made for flood control....for the construction of small flood-control projects not specifically authorized by Congress, and not within areas intended to be protected by projects so authorized, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable....."

This legislation has since been amended to increase the amount of money available to the Secretary of the Army for small flood control projects. The two most recent amendments that would directly affect Holly Acres:

PL 93-251, in revising the provisions, increased fiscal year allotment to \$30,000,000 and required allotment of \$2,000,000 for a project at a single locality if such locality protects and area declared to be a major disaster area pursuant to Disaster Relief Act of 1966 or Disaster Relief Act of 1970; and PL 94-587 increased limitation on allotment for a project at a single locality from \$1,000,000 to \$2,000,000 and for such a project protecting a major disaster area from \$1,000,000 to \$3,000,000.

Since President Carter declared Maricopa County a major disaster area in February, 1980, Holly Acres would be eligible for the \$3,000,000 limit.

Work done under the Small Project authority would follow the same planning steps that are used for the feasibility studies. An important consideration for the Small Projects authority is the \$2,000,000 to \$3,000,000 limitation. To provide flood damage reduction for the Holly Acres study area would most likely exceed that amount as relocation probably would. A ring dike around Holly Acres subdivision might fall under the \$3,000,000. These options are currently under study by the Corps as part of the Central Arizona Water Control Study. Results on costs are expected in mid to late August.

2. Flood Control District of Maricopa County - Salt-Gila River Clearing

The Salt-Gila River Clearing Project is undertaken as a locally sponsored project by the Flood Control District. It consists of clearing a 1,000 foot wide strip in the stream bed of the Salt and Gila Rivers between 91st Avenue and 123rd Avenue (El Mirage Road) with the option of extending the clearing an additional three miles to Bullard Road (construction is anticipated to start on this segment in August, 1980).

Segment 2 of the Clearing Project cleared a 300 foot wide channel from Powers Butte approximately six miles downstream to Gillespie Dam (construction was completed in January, 1980).

Channelization of the Gila River between Sarival Road and Tuthill Road in the vicinity of Liberty is now under study (construction anticipated to start in the spring of 1981).

Channeling, clearing and stabilizing the north bank of the Salt River, in the vicinity of 91st Avenue to 101st Avenue is under consideration at the present time (construction anticipated for spring, 1981).

Engineering studies are underway or being contemplated for: a) environmental impacts of the 1,000 foot wide clearing between 91st Avenue and Gillespie Dam; b) modifications to Gillespie Dam which would eliminate the impacts of flooding in the Arlington Valley; c) preliminary design concepts for clearing or channelization of the Gila River in the vicinity of State Route 85 bridge west of Buckeye; d) development of preliminary design concepts for diking of the Gila River at the bend in the vicinity of Powers Butte in Arlington Valley; e) pre-

liminary design and engineering studies for channelizing, clearing, stabilizing and diking of the Gila River and other priority areas between 91st Avenue and Gillespie Dam, all studies to be underway or completed prior to July, 1981.

3. Arizona Department of Water Resources Alternative Flood Control Assistance Program

In order to expedite the installation of flood control projects throughout the State, the Legislature approved the Alternative Assistance Program in 1978. In conjunction with the creation of this program, the Legislature mandated the establishment of County Flood Control Districts in each county and authorized the districts to apply to the Department of Water Resources for technical assistance necessary to investigate solutions to specific flooding problems within the boundaries of a district. In 1979, the scope of the program was expanded to provide financial assistance to special flood control districts organized pursuant to ARS 45-2351 through 45-2370, such as the Flood Control District of Maricopa County. Special districts were not, however, authorized to apply to the Department for technical planning assistance, i.e., project planning must be provided by the District. Special districts were additionally restricted to receiving financial assistance for only those flood control projects which had been approved in advance of planning by the Department.

Application of the program to the Holly Acres area would require the Flood Control District of Maricopa County to conduct a planning study of the flood control problem after coordinating and receiving approval for such a study from the Department. The planning study would require two distinct levels of investigation consisting of a reconnaissance and a feasibility evaluation.

The reconnaissance would identify several flood control plans that could be implemented to eliminate the flooding problem. Each plan would be studied in sufficient detail to evaluate its effectiveness and estimated installation cost. Additionally, an economic study would be completed in order to permit a comparison of the cost effectiveness of each plan based on a benefit/cost analysis. This analysis will utilize a 3% amortization rate and a period of project life that would maximize the cost effectiveness of a specific plan, i.e., there is no requirement to plan a project on the basis of a fixed level of protection such as a Standard Project or 100-year flood.

The feasibility evaluation would consist of a review of the reconnaissance investigation with the objective of identifying the most effective flood control plan from

both an engineering and economic standpoint, and conducting a detailed evaluation of that plan as a preparatory step to the final design stage. This evaluation would refine the engineering details, installation cost, and economic benefits of the selected plan.

If the results of the reconnaissance and feasibility studies identify a feasible solution to the flooding problem, the Department would, upon approval of the plan, agree to fund 50% of the installation cost of the project.

Of the \$6,000,000 appropriated to the Alternative Flood Control Assistance Program since its creation in 1978, \$3,000,000 (1978 appropriation) was reserved for the exclusive use of county flood control districts, while the remaining \$3,000,000 (1979 appropriation) was available for use by both county and special flood control districts. However, in 1980, the Legislature re-appropriated \$2,900,000 of the 1979 appropriation that was available to special flood control districts. Thus, at the present time, the Flood Control District of Maricopa County has access to only \$100,000 of Alternative Assistance funds for use in any flood control project proposed for Holly Acres.

B. NON-STRUCTURAL PROGRAMS

The Corps of Engineers and the Water and Power Resources Service are studying several non-structural flood control measures as part of the Central Arizona Water Control Study.

Non-structural measures include floodproofing, flood warning, flood insurance, floodplain regulation, preparedness planning, gravel mine guidelines, land acquisition, relocation, and reorganization of the operation of the Salt River Project (the conclusions of this phase of the study can be expected late in 1980). Non-structural measures affect activities in the floodplain whereas structural solutions affect the flow.

Relocation programs administered by the State government are coordinated by the Arizona Division of Emergency Services. These programs are composed of several component parts:

1. The State Floodplain Land Exchange Law: provides that communities of five or more residences can petition the State for an exchange of land necessary to support a residential or retail business use. Differences in value between floodplain property and the land to be traded are compensated by the Floodplain Land Exchange Fund. The land for trade

can be State Trust Land, public land, or private land. The Director of Emergency Services may purchase land for use in Floodplain Land Exchanges.

2. Housing Element- generally funded by a Federal government source. This element provides either for the acquisition of structures, or for the movement of existing structures to the new site.

3. The site development element- funded either through Federal or State sources, which provides streets, waste disposal, water and utilities to the new site.

C. APPLICABILITY OF PROGRAMS TO THE HOLLY ACRES AREA

1. CAWCS (A.1.)

All the flood control measures mentioned previously would have some effect on the Holly Acres area. Upstream measures on the Salt/Verde Rivers would reduce the peak flows through the area, although flood flows emanating from the Gila River above the confluence could be just as damaging even with control on the Salt. Levee construction would have significant impact on reducing flood damages on the area by keeping floodwaters out of the area entirely up to the design flow. Relocation would provide a solution to the Holly Acres subdivision flood problem. Floodproofing would reduce flood damages to some degree depending on the design level chosen. A ring dike around the Holly Acres subdivision would reduce flood damages up to the design level, but the ring dike has serious design constraints that limit its implementation, such as emergency access if the area were surrounded by water, interior drainage, catastrophic failure of the dike, and aesthetics.

The authority and associated funding for construction is dependent on the CAWCS recommended plan of action. The three potential sources of Federal funding are the Central Arizona Project (CAP), Gila River and Tributaries, or the Small Projects Authority. The CAP (PL 90-537) is currently funded and is an ongoing construction project. The Gila River Tributary Authority (PL 75-761) would require specific Congressional action for project authorization and funding. The authorization and funding for Section 205 (PL 80-858) requires approval by the Chief of the U. S. Army Corps of Engineers (A.1. Small Projects). Depending on the authorization and funding, implementation of a project could take anywhere from 2 to 10 years. At the present time, until the CAWCS study makes its findings, the final affect on the Holly Acres area of any of the flood control measures cannot be determined.

2. Alternative Flood Control Assistance Program (A.3.)

The Flood Control District of Maricopa County would be responsible for the preparation of Reconnaissance and Feasibility flood control studies for the Holly Acres area. The reconnaissance study would require about three months to complete.

Assuming the District would contract with a consultant to prepare these studies and that the decision to proceed would be made on or about September 1, 1980, the finalized requirements could be completed by April 1, 1981. This schedule would allow two months for normal review and contract negotiations. The potential feasibility and economic justification of providing adequate flood control to Holly Acres would tentatively be identified after completion of the reconnaissance report which could be finalized prior to January 1, 1981.

The District studies would investigate the most cost-effective structural solutions to the Holly Acres flood problem. The economic evaluations are extremely liberal in that they maximize the effect of the justifiable benefits. These study results provide the best potential for governmental program assistance; if a structural project cannot be economically justified under the Alternative Flood Control Assistance Program, it cannot be justified under any existing program.

V. FINDINGS AND RECOMMENDATIONS

A. Possible Structural Protection

Structural flood control protection of all reaches of the Salt and Gila Rivers is being studied by the CAWCS; however, this study is concentrated on possible Federal involvement, and has an information delivery date of between one and two years. The Commission believes the specific study area defined (91st Avenue to Bullard Avenue, Broadway Road to the river) should be studied with particular reference to the Arizona Alternative Flood Control Assistance Program. Under the Arizona Alternative Flood Control Assistance Program statutes, this study must be performed by the Flood Control District of Maricopa County. The Commission has entered into an inter-governmental agreement with the Flood Control District of Maricopa County (see Appendix D.) to provide \$49,000 for such a study, the results of which will be forwarded to the Governor and the Legislature within six months. At such time, the Flood Control District of Maricopa County, the Arizona Department of Water Resources and the Legislature should evaluate the results of the study and take appropriate action.

B. Relocation

The residents of the Holly Acres area chose that location because of the particular style of life available there. The rural setting, the large acreages, and the irrigated land all were qualities which attracted Holly Acres residents to the area. Those same factors present the greatest impediment to a large-scale relocation program: such an area is nearly impossible to duplicate, and it is clear that the residents of Holly Acres would insist upon a relatively equal new site as a condition of participation in a relocation program; this is not an unusual or unreasonable requirement, it is simply a very difficult one to fulfill in this case.

Another factor which is necessary for the success of a relocation strategy is a determination, both by area residents and by public officials, that there is no possibility of structural protection in the area. Such a determination cannot now be made with regard to Holly Acres.

In view of these findings, the Commission concludes that a large-scale relocation project in the Holly Acres area is not appropriate at this time. There are several scattered individuals who, because of the losses they incurred, may be interested in and benefitted by the relocation programs offered through the Division of Emergency Services, and the Commission recommends that the D.O.E.S. evaluate the feasibility of assistance to such individuals identified by the Holly Acres Flood Control Association.

C. The National Flood Insurance Program

Testimony presented to the Commission indicates a serious lack of understanding of the specific provisions of the National Flood Insurance Program on the part of residents of Holly Acres. Policy holders indicated that information about Flood Insurance is sometimes difficult to obtain, and that incomplete, inaccurate and contradictory information is sometimes provided. The Commission recommends that the Insurance and Mitigation Division of the Federal Emergency Management Agency (FEMA), in cooperation with the Arizona Department of Water Resources, schedule special seminars on the flood insurance program for insurance agents, adjustors and policy holders in the Holly Acres area.

D. Traffic Control and Property Protection

Testimony presented to the Commission indicates that the Holly Acres area is subject to severe traffic and looting problems during flooding periods. These problems typically begin immediately after flood warnings are issued, and can continue for weeks after an incident. The Commission recommends that the Dept. of Public Safety and the Maricopa County Sherrif's Department investigate the possibility of a plan to limit access to the Holly Acres area during and after flooding periods.

E. Possible changes in Salt River Project Operation

It is general knowledge that water conservation is the primary purpose of the Salt River Project. However, questions are frequently asked about the potential for reducing damage from major floods either through early releases of smaller flows or a change in SRP operation which attempts to balance water conservation and flood control.

The Commission review was directed primarily at the early release question, though other issues related to SRP were also discussed. The following is a summary of information presented:

Though based on the best data and technology available, weather forecasts cannot predict far enough in advance, nor predict precipitation intensity, location and areal coverage with sufficient accuracy, to justify substantial early releases.

SRP does make precautionary releases when hydrologic conditions indicate a high probability that some releases will be required.

The quantities which can be released from the existing SRP system are dependent to a large extent on reservoir contents. (e.g., there is a maximum release of 4,750 cfs* from Roosevelt until the reservoir is 80.8% full, over 1,100,000 acre feet, see Appendix E)

Every release large enough to have real impact on reservoir storage will be detrimental to some and may cause damage and inconvenience which later prove to have been unnecessary (1,000 cfs closes all dip crossings, e.g., Gilbert, Stapley, Country Club, McKellips, Mill Avenue underpass, 48th Street, 16th Street, 19th Avenue; 10,000 cfs also closes 24th Street and 51st Avenue).

*1 cubic foot/second (cfs) = 7.5. Gal/Sec = 450 Gal/Min
1 cfs for 12 hours = 1 Acre Foot = 325,850 Gal.

Heavy inflows such as those of 1978-80 produce high volumes of runoff over short periods of time. Therefore, the effect of early releases is of little real benefit in reducing large inflows (the storage capacity made available by releasing 10,000 cfs for a week will be filled in 12 hours of 140,000 cfs inflow).

There are approximately two years of below normal runoff for every year of average or above. Consequently, releases which may become needless because of changing conditions may have substantial effects on future surface water availability (maximum release in February, 1980, was 180,000 cfs; discharge of 24 hours at that rate is approximately same volume as total runoff from Salt and Verde Rivers in 1977).

All water stored in Salt River Project reservoirs is not reserved for lands within SRP. For the period 1968-79, the average amount in storage for City of Phoenix, Salt River Indians, Phelps Dodge, Buckeye Irrigation District and Roosevelt Water Conservation District was 290,000 Acre Feet.

It is the conclusion of the Commission that there is wide-spread misunderstanding of the Salt River Project's role and capability in flood events.

At the present time the Corps of Engineers is conducting a study of the reoperation of the Salt River Project as part of the Central Arizona Water Control Study. This study will be addressing the potential flood control capability provided by modifying and operating the existing Salt River Project system to include flood control responsibility. Target date for completion of this study is September, 1980.

The Commission recommends that Salt River Project management, State Legislators and other interested parties carefully review the study results and that SRP evaluate its operating policy and procedures in light of these results.

F. Game and Fish Department Water Appropriation Application

The Arizona Game and Fish Department has requested the appropriation by the Department of Water Resources of water owed to Game and Fish by the City of Phoenix. Testimony from the Game and Fish Department indicates that the Department wants to allow the water applied for to pass over land which it owns in the Salt River bed, but that the Department plans no impoundment of the water.

The Department has also agreed to maintain the integrity of the Flood Control District's 1,000 foot wide clearing through the Department's property. The Commission is encouraged by the assurances from Game and Fish. To maintain the protection provided by the clearing, it is essential that the Department adhere to these guidelines.

G. Successor Entity to the Holly Acres Flood Relief Commission

The members of the Commission feel a responsibility to follow the progress of the engineering study to be performed by the Flood Control District of Maricopa County under the inter-governmental agreement as outlined in section V.A. of this report, to review the findings and to recommend a course of action for the Holly Acres area based on the study.

We respectfully request that the Governor designate the members of this Commission, and such other individuals as he may designate, to serve as an ad hoc advisory committee until this function has been completed. We think such a successor entity devoted specifically to the problems in the Holly Acres area will provide an important link between the community and the County, State and Federal governments.

A P P E N D I X

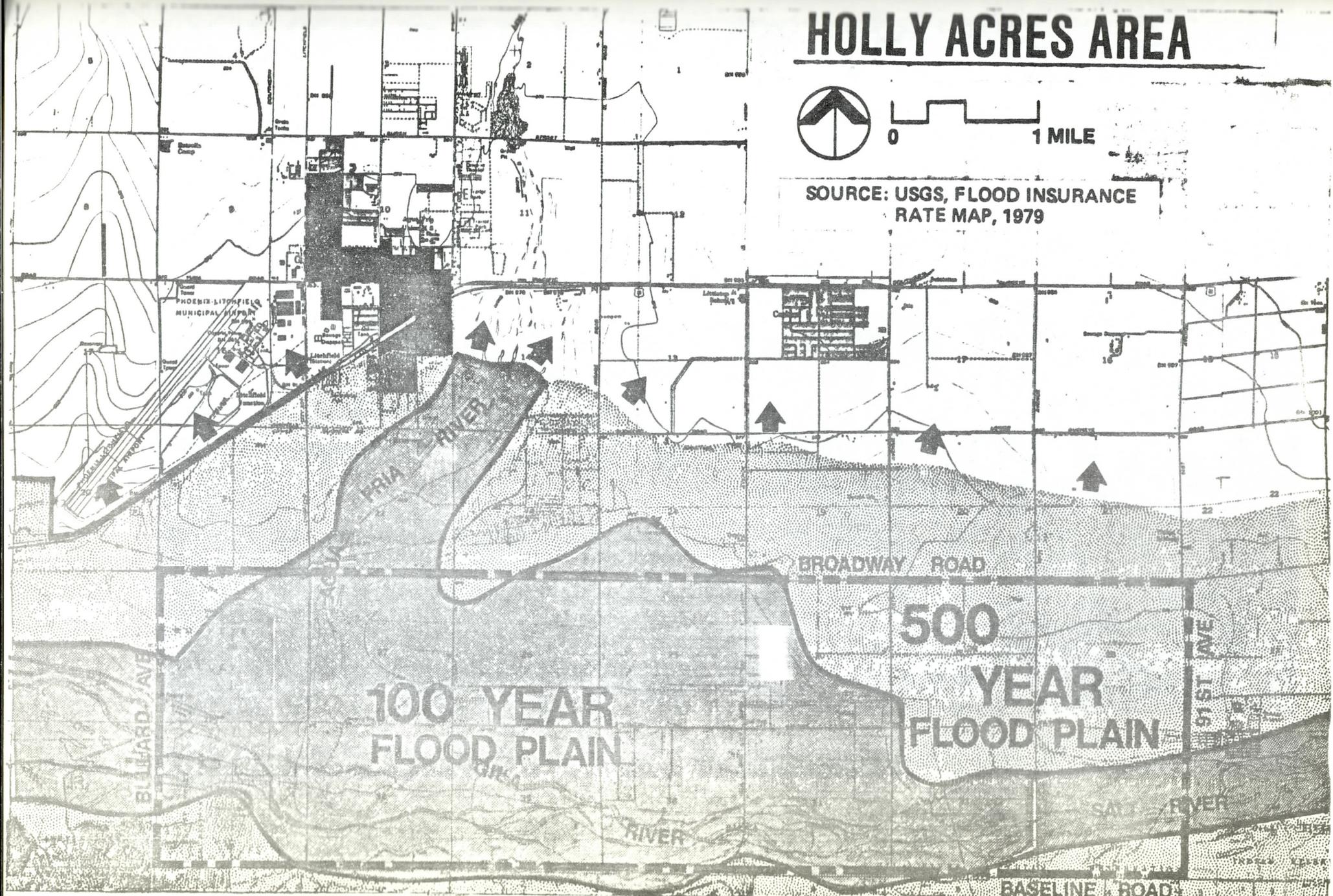
- A. Map of Holly Acres Area
- B. Pictures:
 - Page 1. Gila and Salt River Confluence
 - Page 2. Top - Holly Acres Subdivision
Bottom - Holly Acres Subdivision
(122 Avenue and Southern)
 - Page 3. Top left - 119th Avenue south of Southern
Top right - home in Holly Acres Subdivision
Bottom left - 115 Avenue south of Southern
Bottom right - Morgan Farm
(115 Avenue and Southern)
 - Page 3. Top left - East of 115 Avenue on Southern
Top right - Home at 107 Avenue and Vineyard
Bottom left - Home on El Mirage Road and
Southern
Bottom right - Home 1/2 mile west of Dysart
Road on Southern
- C. Tabulation of Historic Peak Flows
- D. Inter-governmental Agreement between the Holly Acres Flood Relief Commission and the Flood Control District of Maricopa County.
- E. Salt River Project -- Reservoir Release Depiction
- F. List of meetings and invited attendees
- G. Holly Acres Flood Control Association Survey Results

HOLLY ACRES AREA



0 1 MILE

SOURCE: USGS, FLOOD INSURANCE RATE MAP, 1979



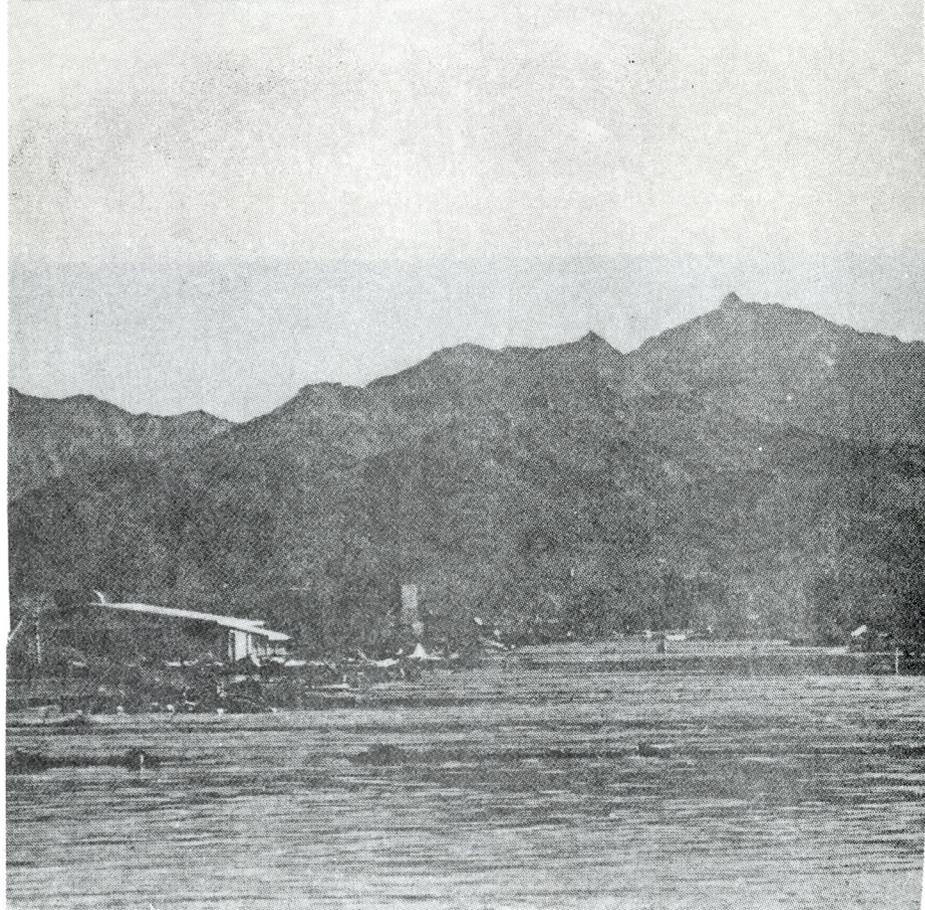
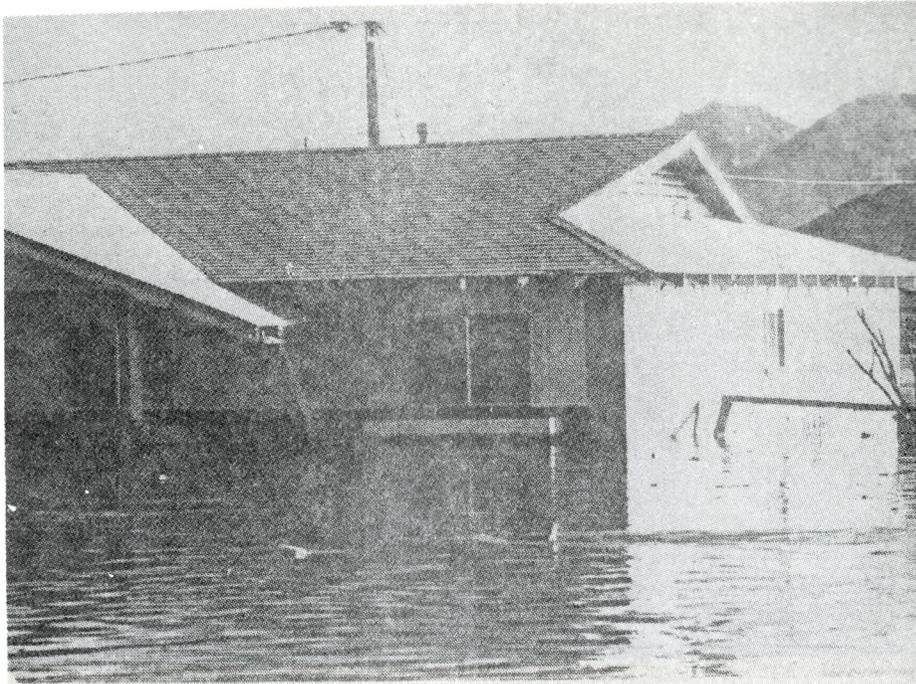
PREPARED BY THE ARIZONA OFFICE OF ECONOMIC PLANNING & DEVELOPMENT
The preparation of this document was financed in part through a 701 Comprehensive Planning Assistance Grant from the U.S.

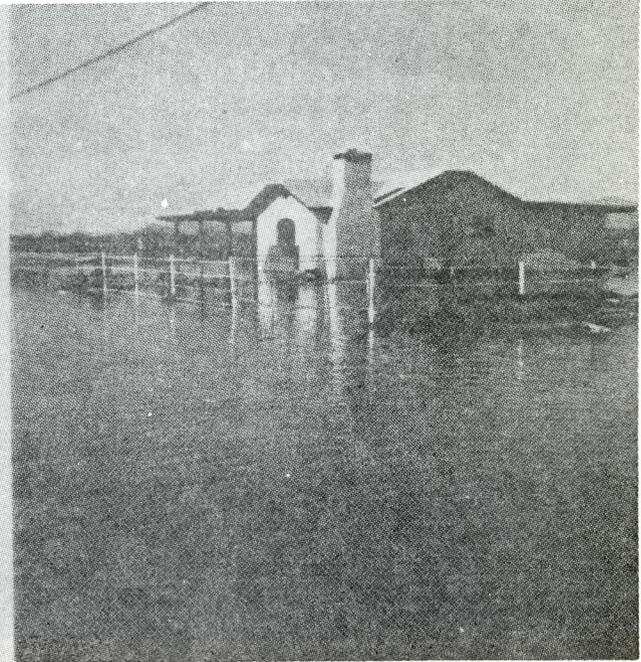
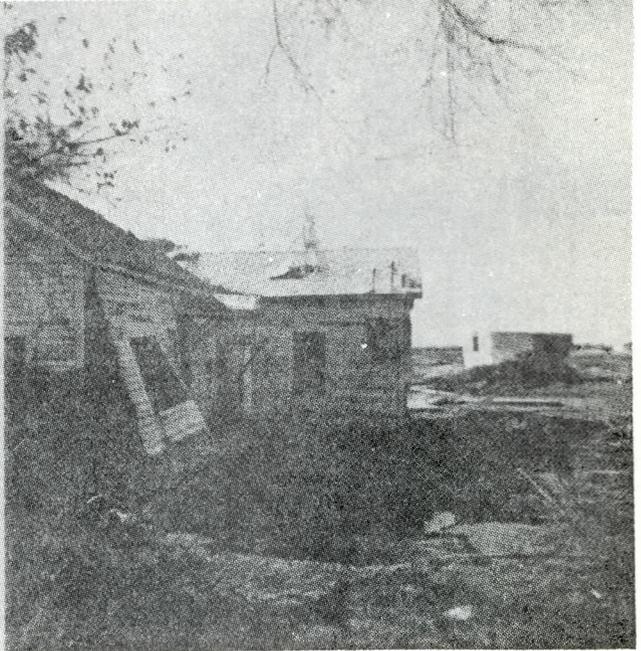
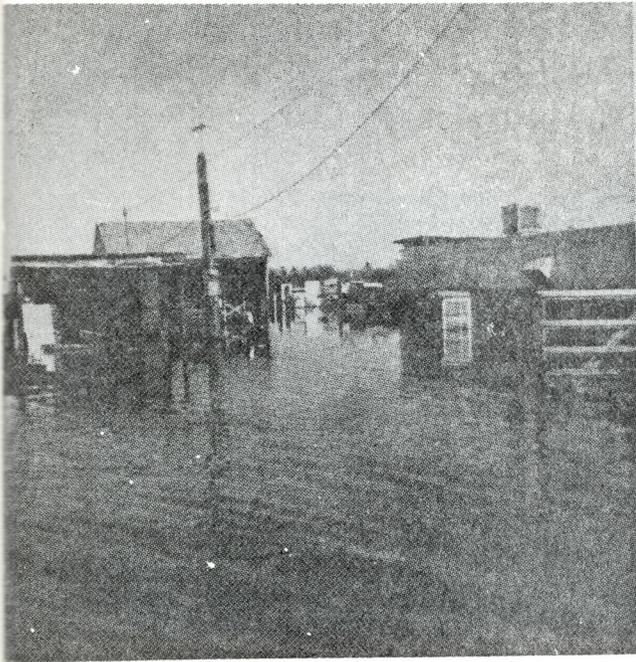
112° 15' 400 000 FEET





GILA RIVER - Looking downstream from the Salt and Gila River confluence. Photograph - courtesy of Arizona Game and Fish Department.





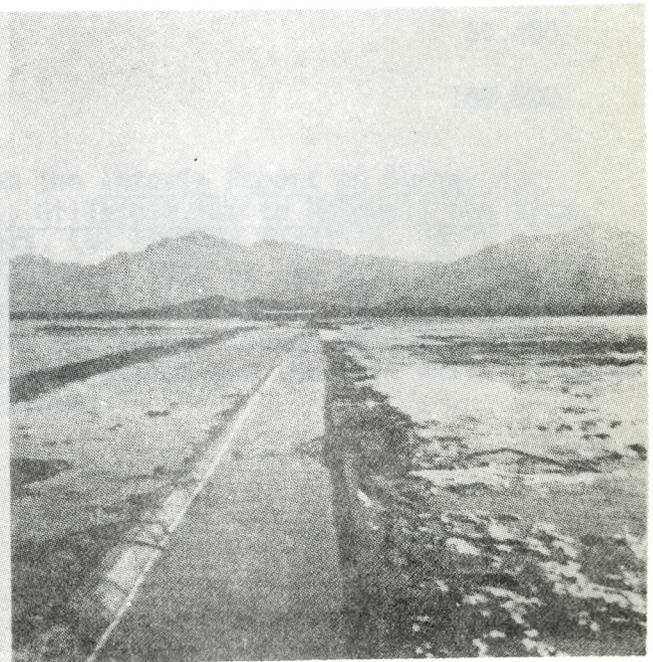
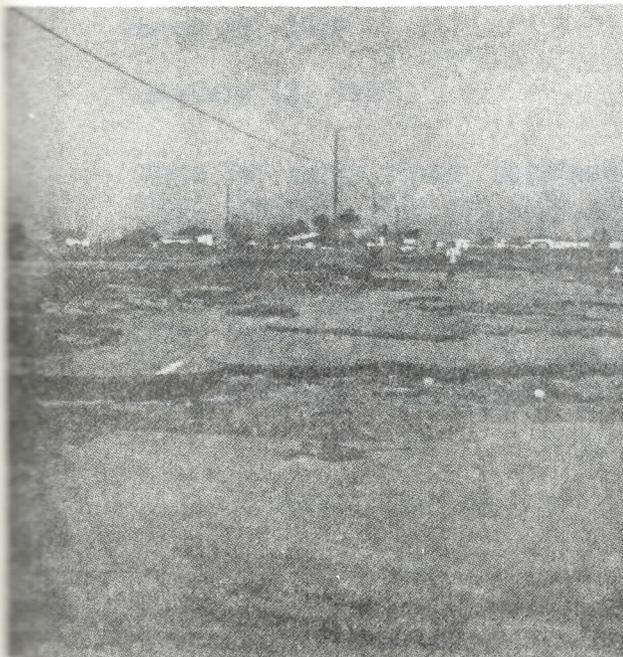
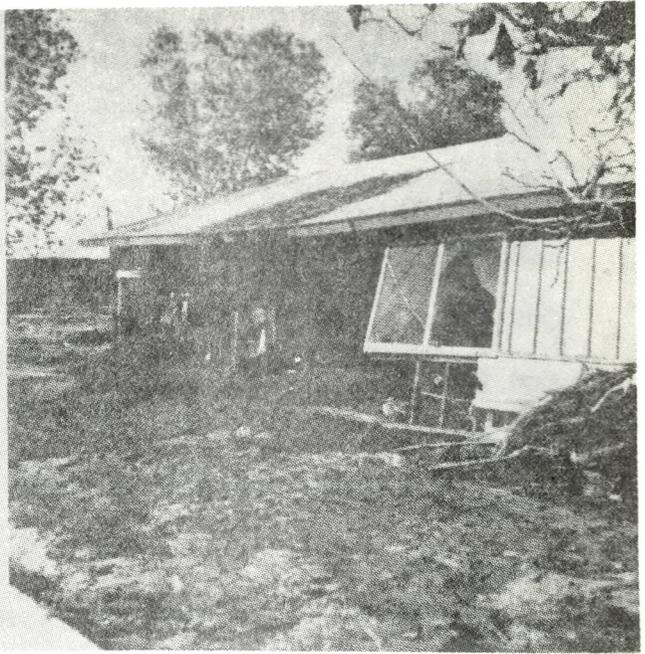


Table 5
Historic Flows on the Salt River¹

<u>Date</u>	<u>Peak Flow (ft³/s)</u>
February 1891	300,000
April 1905	115,000
November 27, 1905	200,000
January 19-20, 1916	120,000
January 29-30, 1916	102,000
February 1920	130,000
March 1938	95,000
March 1941	40,000
December 1965 - January 1966	67,000
February 21 - May 29, 1973	22,000
March 2, 1978	122,000
December 19, 1978	140,000
January 19, 1979	100,600
March 29, 1979	67,400
February 15, 1980	180,000

¹Data for early floods obtained from the Interim Report on Survey for flood Control, Gila and Salt Rivers, Gillespie Dam to McDowell Dam Site, Arizona, U.S. Army Corps of Engineers, Los Angeles District, 1957, and from "Floods of November, 1965/January, 1966 in the Gila River Basin, Arizona and New Mexico, and Adjacent Basins in Arizona, "U S. Geological Survey, Water Supply Paper 1850C, 1970. Data for recent floods obtained from the U.S. Geological Survey, measured at 48th Street and the Salt River (figures are preliminary and subject to revision).

INTERGOVERNMENTAL AGREEMENT BETWEEN
THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
AND
THE HOLLY ACRES FLOOD RELIEF COMMISSION

- I. This is an intergovernmental agreement between the Flood Control District of Maricopa County, a municipal corporation and subdivision of the State of Arizona, hereinafter referred to as the District, organized pursuant to A.R.S. 45-2351 et seq., and the Holly Acres Flood Relief Commission, hereinafter referred to as the Commission, organized pursuant to Laws of Arizona, 1980, Chapter 193.
- II. This agreement shall become effective on the date of filing with the Secretary of State. The duration of this agreement shall be 180 days from that date of filing.
- III. The purpose of this agreement is to enable the District to provide for and supervise the accomplishment of a feasibility/engineering study in the Holly Acres area, defined as that portion of the Salt and Gila River floodplains located between 91st Avenue and Bullard Road. This study shall specifically assess the practicality for structural containment of a 100-year flood and the feasibility of implementing such a project under the specifications of the State of Arizona Alternative Flood Control Assistance Program, pursuant to A.R.S. 45-2721.
- IV. The Commission shall provide the District with funding for this project in the amount of \$49,000. Any funds not used by the District for the specific purposes contained in Item III, shall be returned by the District to the State of Arizona, Department of Administration, Division of Finance, for placement in the state's general fund.

6521
DATE
7-23-80
Jose Profant

INTERGOVERNMENTAL AGREEMENT BETWEEN
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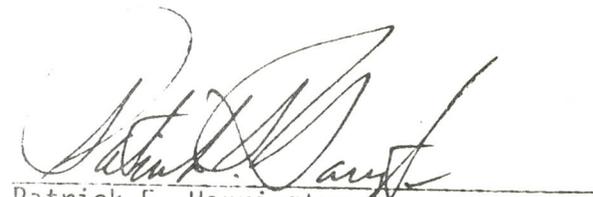
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STATE
7-23-80
Jose P. [Signature]

- V. The District may at its option terminate this agreement upon just cause up to the time of contractual commitment of funds for an engineering study. In the event District elects to terminate, the full amount of \$49,000 shall be returned to the state's general fund as provided in Item IV.
- VI. The results of the study, along with any materials developed pursuant to it, described in Item III, shall be submitted to the members of the Commission and to the Governor of the State of Arizona, the President of the Arizona State Senate, the Speaker of the Arizona House of Representatives and the Chairman of the Maricopa County Board of Supervisors.
- VII. This agreement may be cancelled pursuant to the Governor's Cancellation Clause, A.R.S. 38-511.


William D. Mathews
Chief Engineer and General Manager
Flood Control District
of Maricopa County


Patrick F. Harrington
Chairman
Holly Acres Flood Relief Commission

July 21, 1980
Date

July 22, 1980
Date

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GENERAL COUNSEL

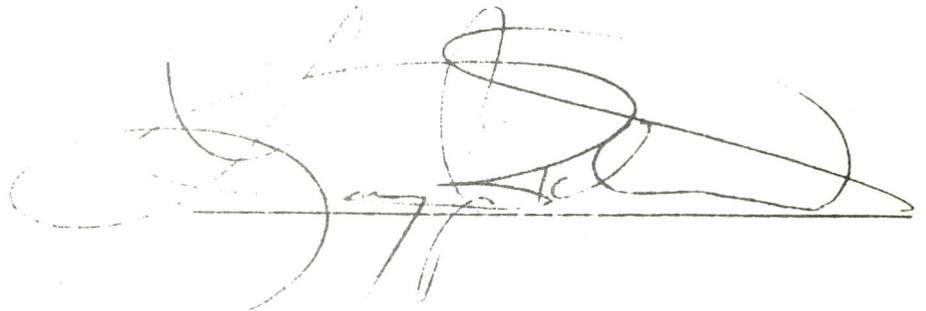
INTERGOVERNMENTAL AGREEMENT

DETERMINATION

The Flood Control District of Maricopa County Agreement No. 653 which is an agreement between public agencies has been reviewed pursuant to A. R. S. §11-952, as amended, by the undersigned General Counsel who has determined that it is in proper form and is within the powers and authority granted to the Flood Control District of Maricopa County under the laws of the State of Arizona.

DATED this 21 day of July, 1980.

LARRY J. RICHMOND
General Counsel

A handwritten signature in black ink, appearing to read "Larry J. Richmond", is written over a horizontal line. The signature is stylized and somewhat cursive.

INTERGOVERNMENTAL AGREEMENT

DETERMINATION

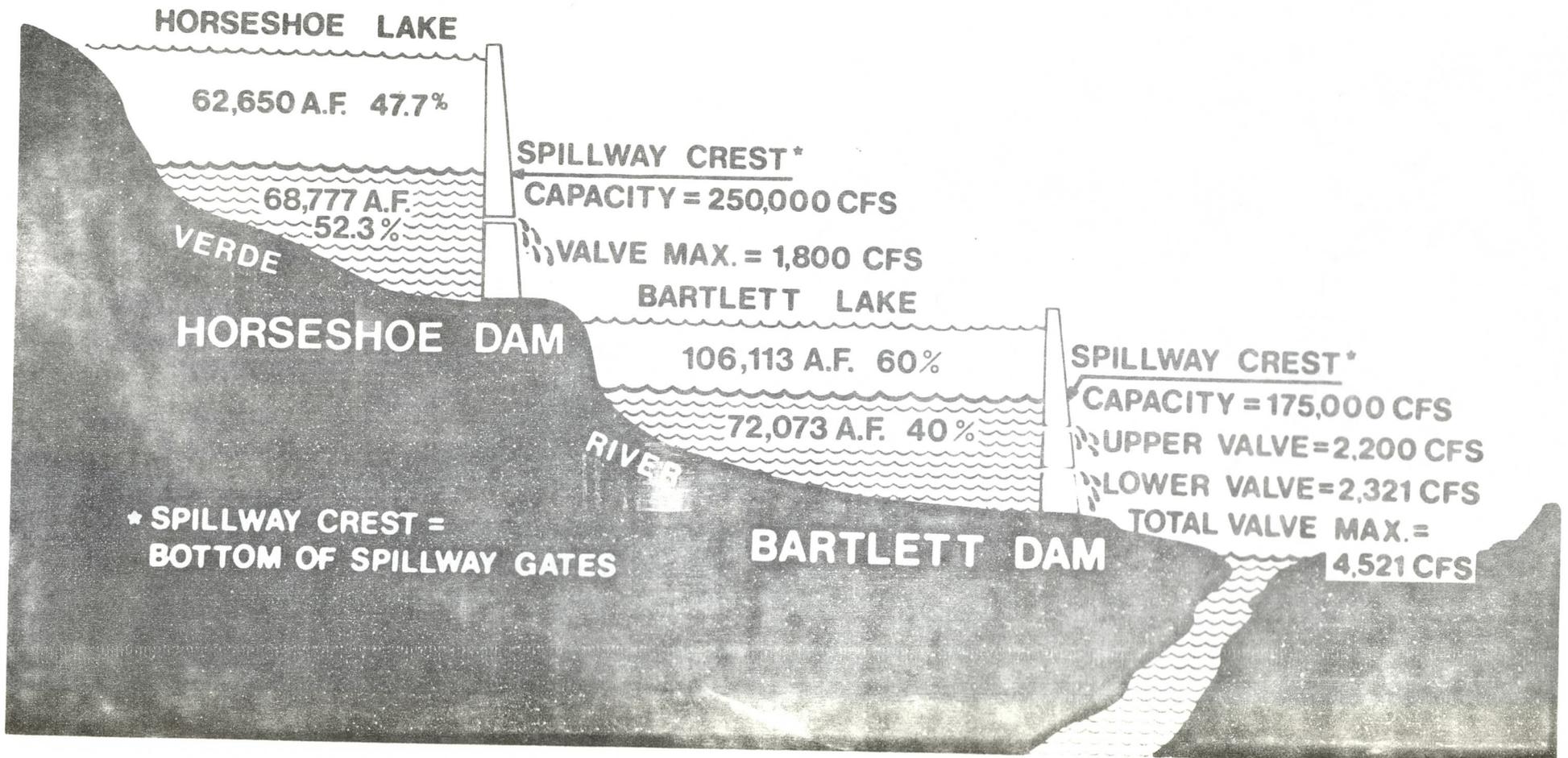
Attorney General Contract No. 653 which is an agreement between public agencies has been reviewed pursuant to A.R.S. § 11-952 by the undersigned Assistant Attorney General who has determined that it is in proper form and is within the powers and authority granted under the laws of the State of Arizona.

DATED this 17th day of July, 1980.

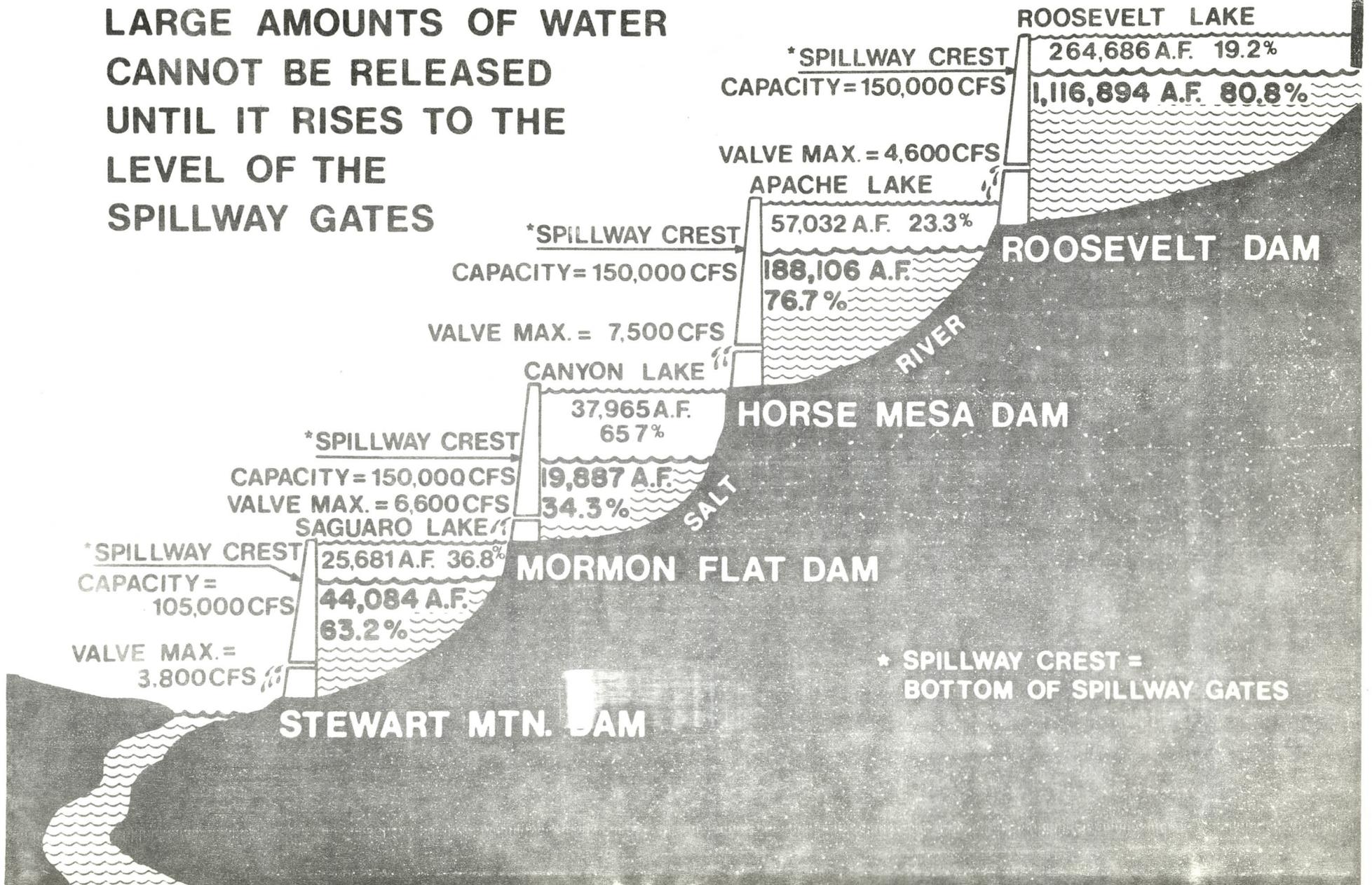
BOB CORBIN
Attorney General


Assistant Attorney General

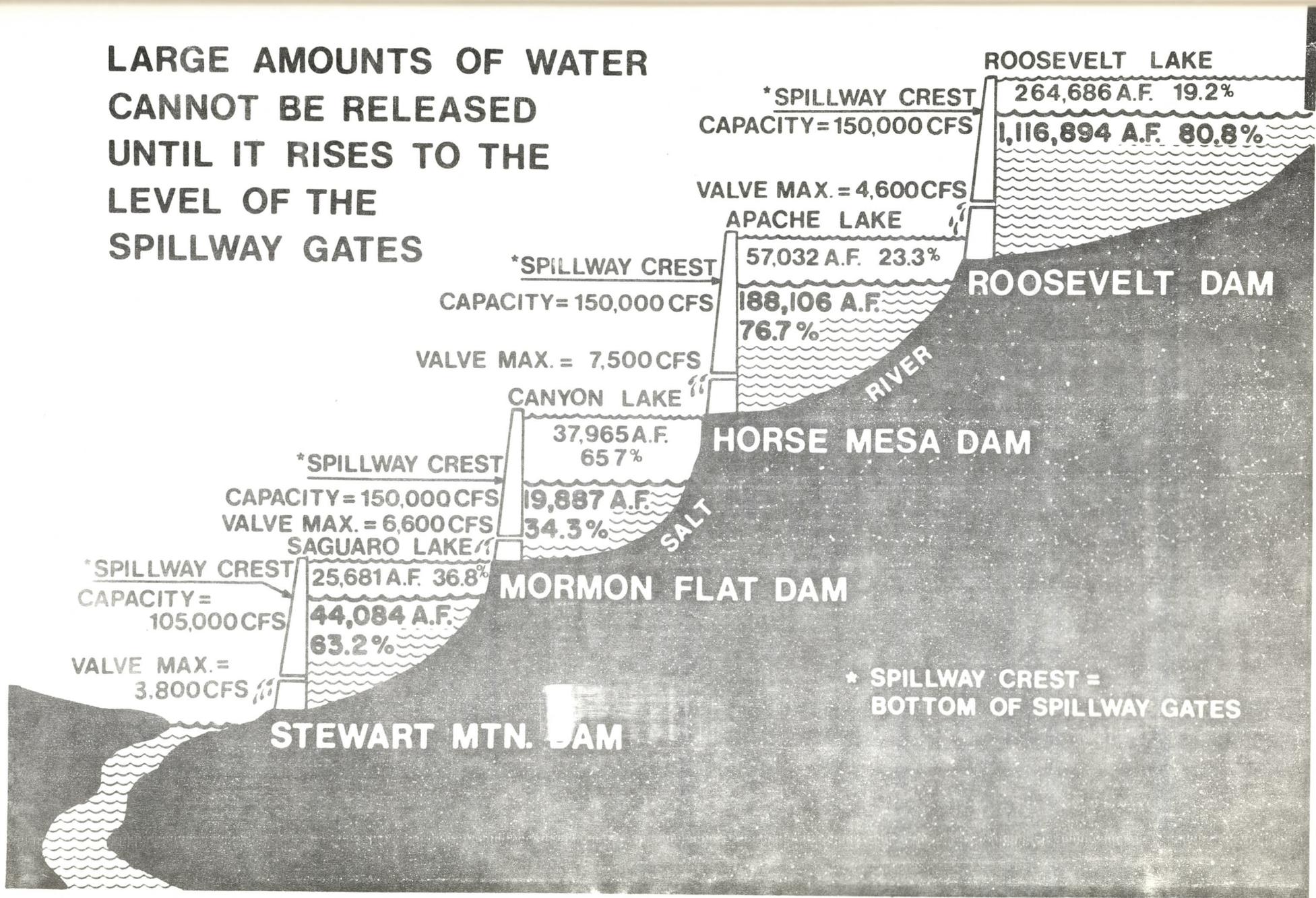
**LARGE AMOUNTS OF WATER
CANNOT BE RELEASED UNTIL
IT RISES TO THE LEVEL OF
THE SPILLWAY GATES**



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* SPILLWAY CREST =
BOTTOM OF SPILLWAY GATES

RESULTS OF SURVEY TAKEN BY HOLLY ACRES FLOOD CONTROL ASSOCIATION

JUNE 1980

The Holly Acres Flood Control Association surveyed its membership during June, 1980 regarding the community's attitudes toward particular flood control alternatives. While the survey is not scientific and did not reach all households, it is indicative of the views of many of the residents of the study area. The commission accepted this information at its June 17th meeting and provides the following summary:

Most respondents list some sort of structural solution as their first choice for flood relief:

70%	channelization
12%	upstream control
7%	dam at confluence
5%	levees
4%	relocation
2%	green belt

The same respondents listed relocation as their least preferred choice for flood relief action:

58%	relocation
20%	dam at confluence
13%	green belt
8%	levees
1%	upstream control

Detailed results of this survey are available upon request.

APPENDIX F.

MEETINGS OF THE COMMISSION AND INVITED ATTENDEES:*

The State Legislators in the area were invited to all meetings of the Commission.

June 4, 1980 - 9:00 A.M. State Capitol. Organization; planning.

June 17, 1980 - 7:00 P.M. Littleton School. The meeting was in the format of a Town Meeting. Approximately 235 area residents were present. Mr. Ray Lenaburg, Civil Engineer, Insurance and Mitigation Division, Federal Emergency Management Agency spoke on Constructive Total Loss and 1362 Programs; Representative Renz Jennings presented his views of the mandate of S.B. 1123 which created the Commission; Mr. Smith and Mr. Harrington presented the Arizona Floodplain Land Exchange Program and other nonstructural methods of flood control were discussed. A question and answer period followed.

July 8, 1980 - 7:30 P.M. - Littleton School. This meeting served as a continuation of the June 17th meeting. The report of the subcommittee on Structural Flood Control was given by Mr. Barrios; Don Gross, Corps of Engineers, discussed the structural programs possible under the Corps; Alan Chin discussed floodproofing; and Mr. Dixon outlined the specific Holly Acres possibilities. Mr. Lewis explained the role of the Maricopa County Flood Control District; Mr. Barrios described the workings of the Arizona Department of Water Resources; Mr. Womack discussed the operation of the Salt River Project, its purpose and limitations. A question and answer period followed.

July 14, 1980 - 9:00 A.M. Department of Water Resources Conference Room, Phoenix. John Carr, Game and Fish Department, discussed their pending application for water storage. The remainder of the meeting was devoted to discussion of the final report of the Commission.

July 16, 1980 - 9:00 A.M. Department of Water Resources Conference Room. Drafting and preparation of the final report resulted in a rough draft to be typed and presented at the next meeting.

July 25, 1980 - 9:00 A.M. Department of Water Resources Conference Room. Editing, changing and adoption of final report.

*Minutes of the meetings are available upon request