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LOS ANGELES DISTRICT

REPORT ON FLOOD OF 19 AUGUST 1954

QUEEN CREEK AND VICINITY, ARIZONA

24 SEPTEMBER 1954

FLOOD CONTROL DISTRICT
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REMARKS		

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES DISTRICT
751 SOUTH FIGUEROA STREET
LOS ANGELES 17, CALIFORNIA

24 September 1954

REPORT ON FLOOD OF 19 AUGUST 1954
QUEEN CREEK AND VICINITY, ARIZONA

AUTHORITY

1. This report is submitted pursuant to instructions in subparagraphs 4223.05 b and d, Chapter IV, Operations, Part II, Civil Works, Orders and Regulations, Corps of Engineers, U. S. Army.

GENERAL

2. This report describes the storm, flood, and flood damages that occurred 19 August 1954 in the Queen Creek Basin and the Superstition Mountain area. Also included is a description of the relatively minor storm and flood of 20 August 1954 in the same general area. Queen Creek is a tributary of the Gila River.

DESCRIPTION

3. Location and extent.--The Queen Creek drainage area and the Superstition Mountain area lie east of the confluence of the Salt and Gila Rivers and extend roughly from Superior, Arizona to Chandler, Arizona. The combined area of the drainages is approximately 880 square miles including irrigated agricultural lands in the lower portion of the basins.

4. Queen Creek Basin is composed of a drainage area of about 426 square miles. The basin is bounded on the east by the Pinal Mountains. On the south, a poorly defined ridge in the area due east of Santan Mountain separates the Queen Creek drainage area from that of the Gila River. Adjacent to and north and west of the basin is what is known locally as the Superstition Mountain area. The Superstition Mountain area, which is composed of a series of independent washes, is bounded on the north by the Superstition Mountains. These

drainages are independent of each other in the mountains and foothills, but during periods of high runoff some of the flows intermingle on the desert plain in the vicinity of the Roosevelt Water Conservation District canal.

5. Economy.--The area of principal flood damage consists of irrigated farmland in and adjacent to the Queen Creek Irrigation District, Roosevelt Water Conservation District, and the Salt River Project. Cotton is the leading crop in this area. Next in importance are alfalfa and feed grains. The towns of Gilbert, Higley, and Queen Creek and Williams Air Force Base are located in the area.

STORM AND FLOOD

6. The headwaters of Queen Creek originate in the Pinal Mountains at elevations varying from 4,000 to about 5,500 feet. The elevation of the streambed at the Whitlow Ranch dam site is about 2,050 feet. Several of the headwater streams have gradients in excess of 1,000 feet per mile. Streambeds throughout the foothills and plains generally have streambed gradients less than 100 feet per mile. The heavy rains of the storm of 19 August 1954 centered over the mountains and foothills and covered the upper Queen Creek drainage area. Heavy rains were reported in the Superstition Mountain area. Very light sprinkles to zero precipitation were reported in the plains area west and south of the Superstition and Pinal Mountains. On 20 August 1954 moderate amounts of rain were reported in the vicinity of Apache Junction in the Superstition Mountain area and at Granite Reef Dam and Mormon Flat in the Salt River area, which is adjacent to and northwest of the Superstition Mountains.

7. Rainfall.--Rain began about 1:00 a.m. on the 19th of August and continued until 8:00 or 9:00 a.m. An intensity of 2.01 inches per hour was reported at Ray (station 15, appendixes 1 and 2). Another intensity reported at Florence Junction, was 1.75 inches per hour. By applying a correction to the hourly amounts of the tipping-bucket gage located at Superior, an hourly intensity of 1.13 inches was estimated. Intensities at other stations ranged from 1/2 to 3/4 inch per hour. Another storm, more local in character and with lower precipitation intensities, began about 2:00 a.m. on the 20th and continued until 5:00 a.m. Time between the two storms ranged from 13 to 20 hours. The Queen Creek recorder at Whitlow Ranch dam site did not record properly for these storms. Table 1 shows pertinent data for 18 precipitation stations. Appendixes 1 and 2 show location of stations and isohyets for the storms of the 19th and 20th respectively.

Table 1

Pertinent data, storms of 19 and 20 August 1954, Queen Creek and vicinity, Arizona

No.	Precipitation station name and location	Precipitation		Duration	Reliability of record	Remarks
		Date	Amount			
			Inches	Hours		
1	Mesa Experiment Farm - west of Mesa.	19	0.02	2	Excellent	Light rain from 8 to 10 a.m.
		20	0	(*)		
2	Falcon Field 1½ miles southwest...	19	.46	2	...do.....	Located at Mr. Armstead's citrus grove.
		20	0	(*)		
3	Granite Reef Dam - at dam.....	19	0	(*)	...do.....	Data obtained from U.S.W.B. at Phoenix.
		20	1.35	(**)		
4	Stewart Mountain - at dam.....	19	0	(*)	...do.....	Do.
		20	.41	(**)		
5	Mormon Flat - at dam.....	19	0	(*)	...do.....	Do.
		20	1.55	(**)		
6	Chas. Weeks Ranch - 4 miles east of Apache Jct.	19	4.5	6	Good	Heavy rains - 16½ hours between storms.
		20	1.5	4		
7	King's Ranch - 7 miles east and south of Apache Jct.	19	4.93	7	Excellent	2 storms 13 hours apart.
		20	.17	4		
8	Barkley Ranch #1 - 10 miles east of Apache Jct.	19	3.5	6½	Good	2 storms 19 hours apart.
		20	2.6	2		
9	Barkley Ranch #2 - 12 miles east of Apache Jct.	19	4.5	6	...do.....	2 storms 20 hours apart.
		20	.4	2		
10	Florence Jct. - at junction of Highways 60, 70, 80, and 89.	19	4.25	6	Excellent	Heavy rains - from 3 to 7 a.m. = 2.50 in.; from 8 to 9 a.m. = 1.75 in.
		20	0	(*)		

See footnotes at end of table.

Table 1--Continued

Pertinent data, storms of 19 and 20 August 1954, Queen Creek and vicinity, Arizona

No.	Precipitation station name and location	Precipitation		Duration	Reliability of record	Remarks
		Date	Amount			
			Inches	Hours		
11	Boyce Thompson Arboretum.....	19	5.30	6½	Good	Very heavy rain from 5 to 8 a.m. of the 19th.
		20	.07	During night		
12	Superior Smelter - southwest end of town.	19	2.68	4½	Excellent	A tipping-bucket recorder at same location registered 0.95 inch of rain.
		20	0	(*)		
13	Superior Smelter office - east end of town.	19	2.47	4¼	...do.....	
		20	0	(*)		
14	Pinal Ranch - approx. 6 miles east of Superior on Highways 60-70.	19	1.64	4½	...do.....	2 storms 16½ hours apart.
		20	1.00	2		
15	Ray - at smelter office.....	19	4.05	2	Good	2 storms 14 hours apart.
		20	.42	During night		
16	Florence - southwest side of town	19	.01	(**)	Excellent	
		20	0	(*)		
17	Queen Creek - Town of Queen Creek.	19	0	(*)	.....	No record. Several residents claim there was no rain.
		20	0	(*)		
18	Williams Air Force Base - at headquarters on base.	19	.62	7	Excellent	Observations made every 6 hr.
		20	Trace	(**)		

* Not applicable.
** No data available.

8. Runoff.--The U. S. Geological Survey estimated a peak of 40,000 cubic feet per second at 10:00 a.m. on the 19th on Queen Creek at Whitlow Ranch dam site (drainage area 143 square miles). This was much greater than the previous maximum peak of record (13,200 cubic feet per second). At 9:05 a.m. a peak of 27,500 cubic feet per second was recorded at this site and at 9:45 a.m. the recording-gage station was washed out and was not recovered until a few days later. In the areas of greatest damage (Queen Creek Irrigation District, Williams Air Force Base, and Roosevelt Water Conservation District), the flood peak came at approximately 2:00 p.m. on the 19th. The flood peak continued through the irrigated area reaching the town of Gilbert between midnight and 2:00 a.m. on the 20th. The residents of Apache Junction reported two flood peaks, one between 7:00 and 10:00 a.m. on the 19th and a second, a larger peak, about 6:00 or 7:00 a.m. on the 20th. Apache Junction was the only place that reported damaging flood flow from the storm of the 20th. All floodwaters had subsided by the afternoon of the 20th.

9. Overflow area.--The runoff came down the washes from the Pinal and Superstition Mountains, crossed the desert as sheet flow and spread out over the irrigated farmland. The damaging flows from Queen Creek covered approximately 17,000 acres of farmland, from Williams Air Force Base on the north to Chandler Heights Irrigation District on the south, and from the Maricopa-Pinal county line on the east to the Roosevelt Water Conservation District canal on the west. The runoff from the Superstition Mountain area flooded irrigated agricultural land adjacent to and east of the Roosevelt Water Conservation District's dike and canal, overtopped and broke through the dike in many places, and flooded farmland from the dike to the town of Gilbert on the west. The damaging overflow inundated approximately 13,000 acres and extended from Williams Air Force Base and the Southern Pacific Railroad on the south to the vicinity of Gila and Salt River Base Line on the north. The total farmland flooded by flow from both drainage areas was about 30,000 acres.

10. The source of damaging floodwaters was easily determined except for a few areas, such as Williams Air Force Base, where runoff from both the Queen Creek drainage area and the Superstition Mountain area appeared to join and cause overflow and damage. The overflow areas of principal damage are outlined on the attached map, appendix 3. This map indicates the extent of the flood in Maricopa County where most of the damaged farmland is located. Within the outline there are areas, such as Williams Air Force Base, which were not completely inundated. To the north and east of the area shown on this map, the floodwaters were poorly defined, coming across the desert as sheet flow with occasional islands of dry land. To the south and east of the area shown on this map, severe damage from the flood occurred on a considerable acreage of cultivated farmland along Queen Creek in Pinal County.

FLOOD DAMAGE ESTIMATES

11. Field work.--Los Angeles District personnel arrived in the flooded area on Wednesday, 25 August 1954, to investigate and gather data on rainfall, runoff, and resultant flood damage. The overflow area was determined, and owners and operators of farms were interviewed. District personnel were assisted in this work by the U. S. Soil Conservation Service officials in the area. Damage reports were obtained from officials of the State of Arizona, Maricopa County, Pinal County, the town of Gilbert, and local irrigation districts. Owners of damaged business and residential property were interviewed. The field survey extended from 25 August 1954 through 30 August 1954.

12. General nature of flood damage.--All types of property were damaged by the floodwaters. As this area is principally agricultural, the highest monetary damage was to crops and irrigation facilities. Crops were completely ruined in some areas, being flattened on the ground and covered with debris. A large portion of the cotton was partially damaged as water reached the lower bolls, causing a lowering of the quality and increased harvesting costs. There was also considerable erosion, especially in fallow fields. Concrete irrigation ditches were torn out and scattered across the fields. Dikes and major irrigation canals were overtopped and breached. Residences and businesses were damaged by water and mud in the rural areas and in the towns of Apache Junction, Gilbert, and Queen Creek.

13. Roads and highways suffered heavy damage in Pinal and Maricopa Counties as floodwaters concentrated in the roads and caused considerable erosion. Major damage to public facilities was at Williams Air Force Base where a dike was overtopped and mud and debris were deposited on parts of the field. An auxiliary field was covered with mud and debris. Comparatively minor damages to railroads and utilities were noted.

14. Emergency work.--Several hundred men were at work for several hours in an attempt to protect dikes and irrigation works. Residents and businessmen in Gilbert were able to prevent considerable damage by sandbagging and moving damageable goods prior to inundation.

15. Estimates of flood damages.--Detailed estimates of damage were made on the basis of information gathered in the field. The total estimated damages amounted to $2,100,000. A summary of the estimated damages resulting from the flood of 19 August 1954 in Queen Creek and vicinity, Arizona, is given in table 2.

Table 2

Estimated damages, flood of 19 August 1954
Queen Creek and vicinity, Arizona

Type of property	Damages		
	Direct	Indirect	Total
Residential	$25,000	$2,000	$27,000
Business and industrial	90,000	15,000	105,000
Public	7,700	200	7,900
Agricultural	1,400,000	210,000	1,610,000
Irrigation works	53,500	2,000	55,500
Highways and roads	265,000	1,600	266,600
Railroads	3,000	3,000	6,000
Utilities	1,500	200	1,700
Total	1,845,700	234,000	2,079,700
			Say 2,100,000

16. Photographs.--Photographs of damaged property were taken by local photographers and by the district office representatives. Photographs selected to show the nature, extent, and severity of the flood damages are included in appendix 4 of this report.

LOSS OF LIFE

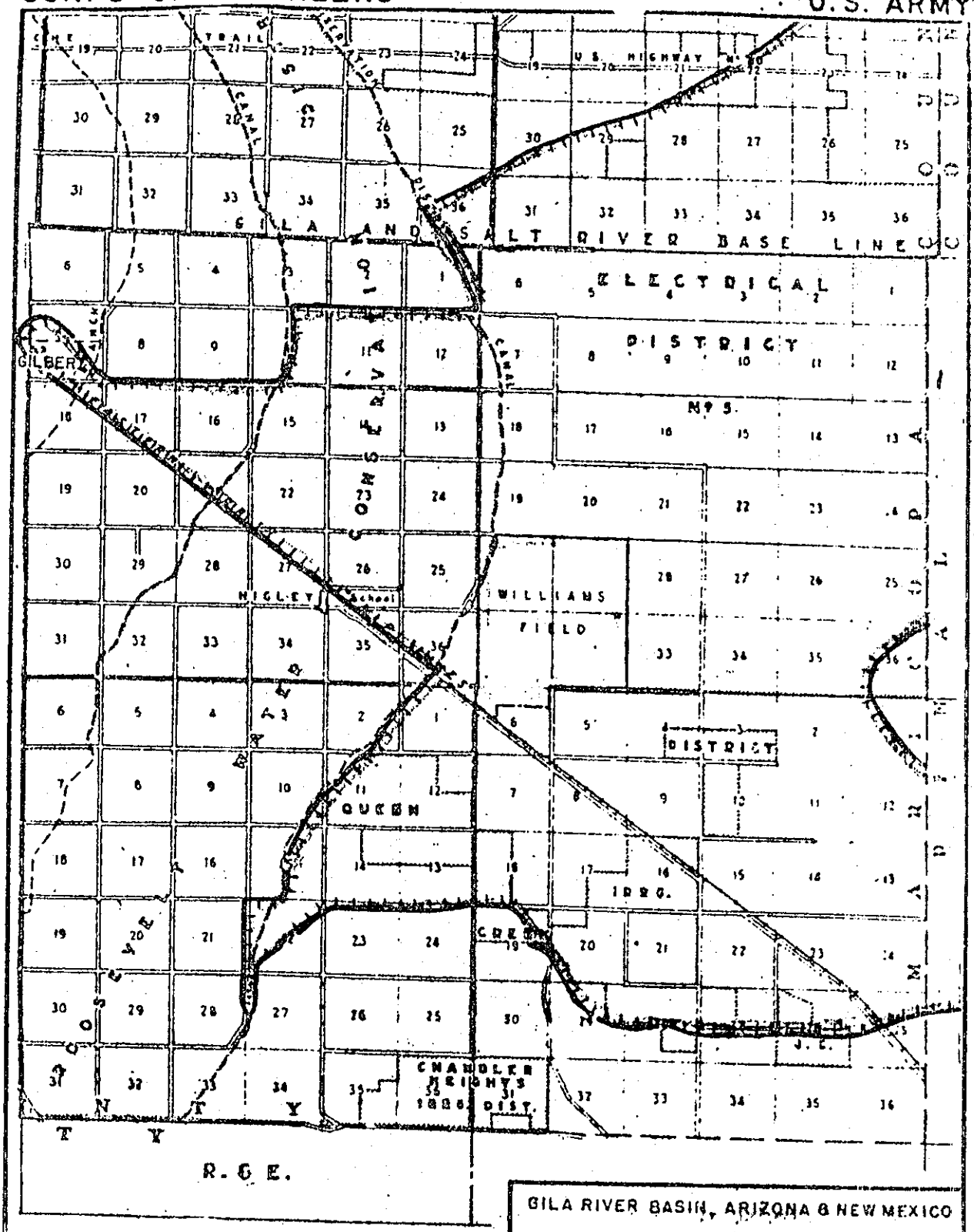
17. No loss of life occurred. Depths were not excessive in most areas and fortunately no one was caught in the washes or low spots.

DAMAGES PREVENTABLE BY AUTHORIZED CORPS OF ENGINEERS IMPROVEMENTS

18. Whitlow Ranch Reservoir.--The project for the Whitlow Ranch Reservoir was authorized by Congress in the Flood Control Act approved 24 July 1946. The recommended plan provides for a dam on Queen Creek at the Whitlow Ranch site, located 5.2 miles above the U. S. 60-70 highway bridge near Florence Junction and 2.3 miles above the mouth of Whitlow Canyon. This dam would reduce the reservoir design peak flow of 59,000 cubic feet per second to an outflow peak of 1,400 cubic feet per second. Since this dam site is above the mouth of Whitlow Canyon, floods from this canyon would not be controlled.

19. Preventable damages.--Most of the damages were easily separable into those caused by flows from Queen Creek and those caused by runoff from the Superstition Mountain area. However, in a few areas damages were caused by a combination of the Queen Creek floodwater and floodwater from other washes. In these areas, an arbitrary division of damages was made. The estimated damages from Queen Creek floodwaters below Whitlow Ranch dam site are $1,200,000. Flow from Whitlow Canyon would not be controlled and therefore it is probable that there would have been some damage even with a dam at Whitlow Ranch site. It is estimated that at least $1,000,000 in damages would have been prevented had this dam been built.

CORPS OF ENGINEERS U.S. ARMY



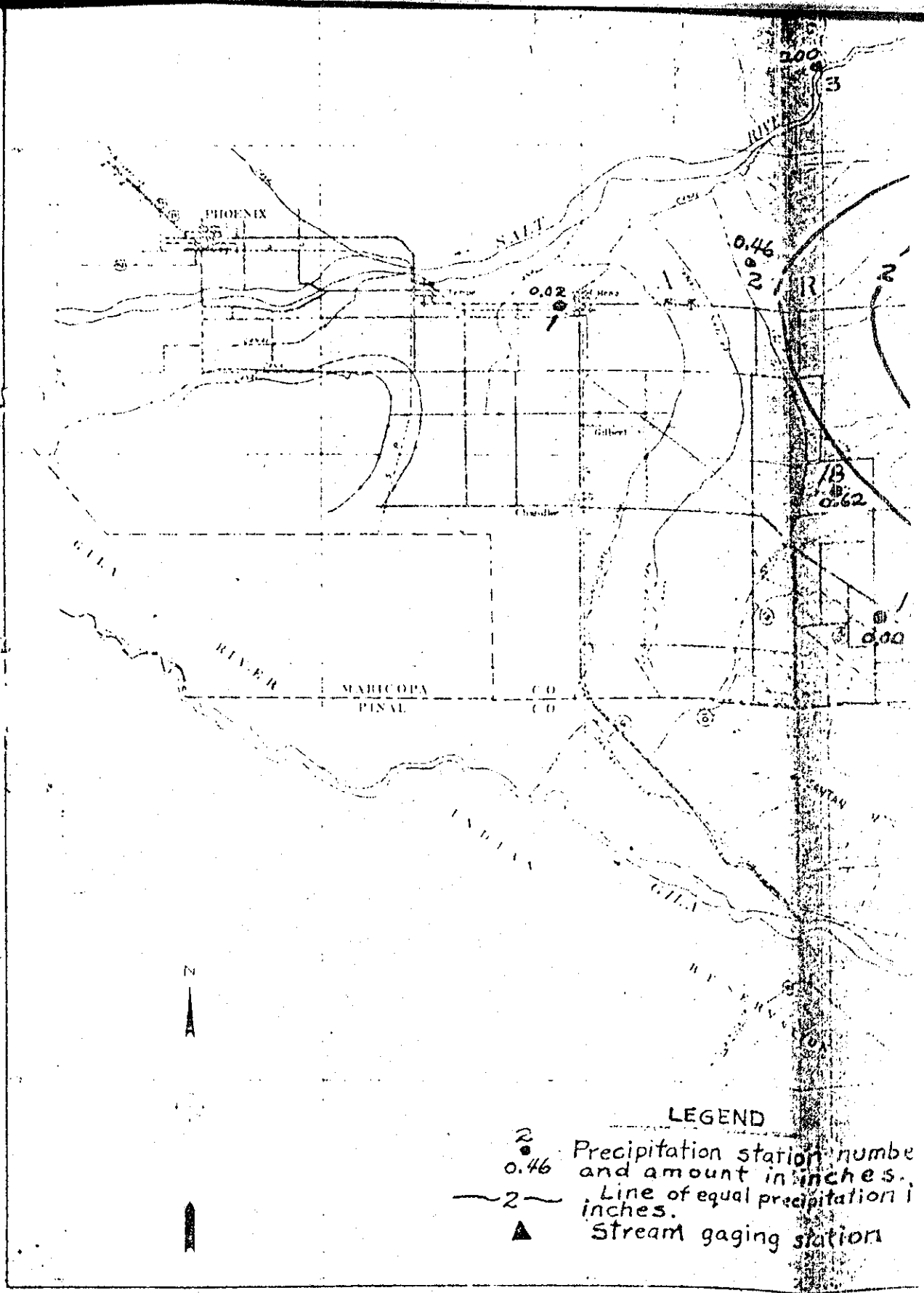
LEGEND

AREA DAMAGED BY FLOOD OF 19 AUGUST, 1954.

GILA RIVER BASIN, ARIZONA & NEW MEXICO

DAMAGED AREAS
FLOOD OF 19 AUGUST, 1954
QUEEN CREEK, ARIZONA
AND VICINITY

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA


PHOENIX
SALT
RIVER
Gilbert
Chandler
GILA
RIVER
MARICOPA CO
PINAL CO
INDIAN
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RESERVATION
0.02
1
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and amount in inches.
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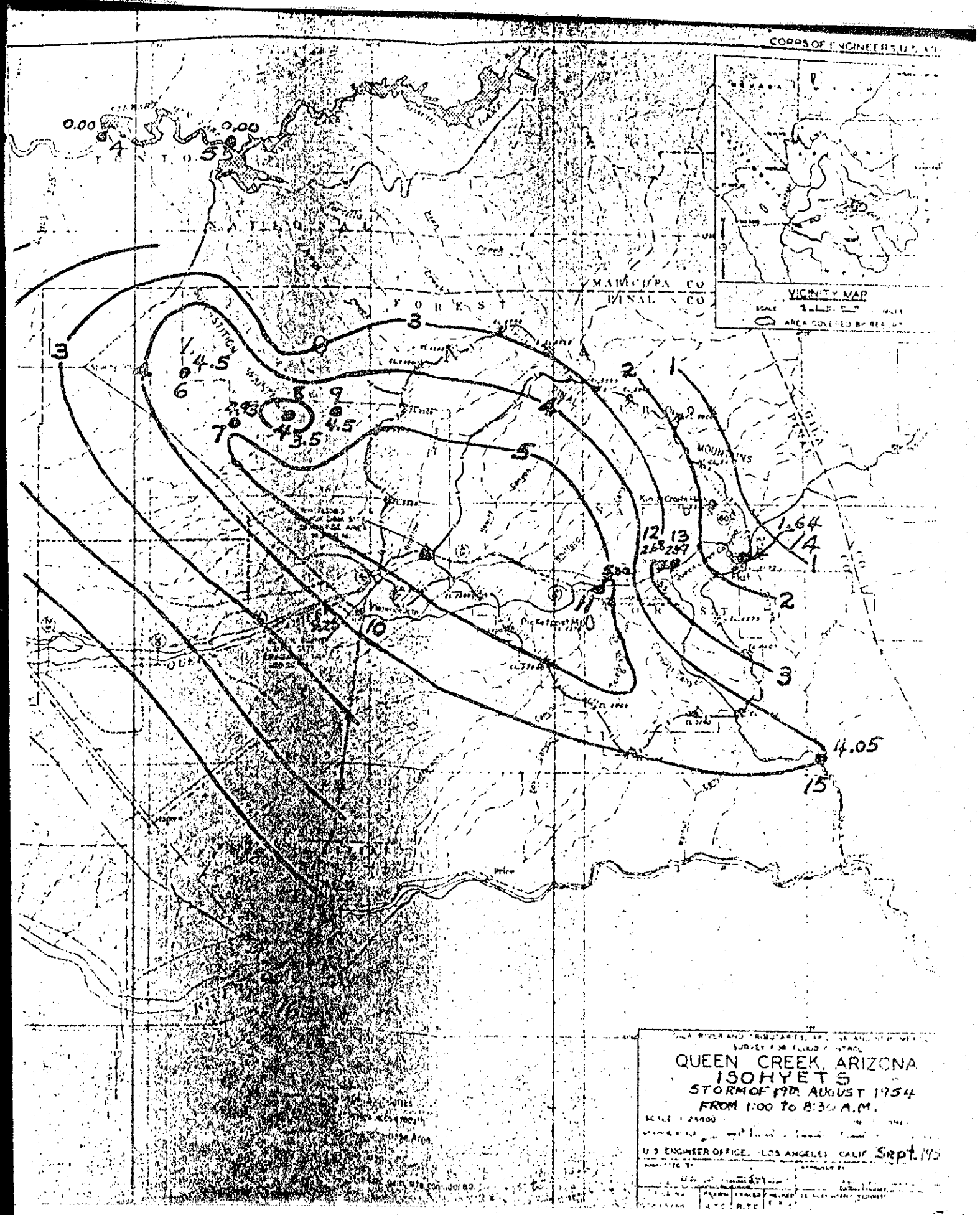
Stream gaging station


CORPS OF ENGINEERS U.S.A.
VICINITY MAP
MARICOPA CO
PINAL CO
FOREST
MOUNTAINS
QUEEN CREEK, ARIZONA
ISOHYETS
STORM OF 19th AUGUST 1954
FROM 1:00 TO 8:30 A.M.
U.S. ENGINEER OFFICE, LOS ANGELES, CALIF.
Sept. 195

Report Of

WHITLOW RANCH DAM FLOOD CONTROL COMMITTEE

1. NAME OF PROJECT:

Whitlow Ranch Reservoir

2. LOCATION:

a. Arizona

b. First Congressional District
Second Congressional District

c. South Pacific Division, Los Angeles District Corps of Engineers, U. S. Army

3. GENERAL NATURE AND PURPOSE:

This is primarily a flood control project. The stream upon which the improvement is proposed is non-navigable. Floods in the Queen Creek basin, Arizona, cause direct and indirect damage to cultivated lands, irrigation works, urban property, highways, railroads and other utilities including an important U. S. Air Force installation at Williams Field, and constitute a menace to the lives and health of the residents.

The plan provides for the construction of a dam and basin for flood control. The dam would be of concrete, gravity type, with a maximum height of 130 feet above stream bed, and a crest length of 535 feet. An uncontrolled spillway 200 feet in length and outlet works would be an integral part of the dam. The reservoir would have a total capacity at spillway crest of 24,000 acre-feet, of which 17,000 acre-feet would be reserved for flood control, and 7,000 acre-feet for sedimentation and conservation purposes.

The operation of the reservoir would regulate the run-off from 143 square miles, reducing the maximum flow from 59,000 to 1,400 cubic feet per second. The project would provide flood protection to an area of 84,000 acres, of which 59,000 acres are highly developed irrigated lands in Queen Creek Irrigation District, the Roosevelt Water Conservation District, the Salt River Project, and the San Carlos Project.

The reservoir would be operated solely for flood control. Retardation of flood flows, however, would permit the percolation of all run-off from most floods into the underground storage basins along the channel.

4. LEGISLATIVE STATUS:

Authority from State Legislature has been obtained. (Section 75-2039 and 75-2310, Arizona Code, 1939). Survey authorized by U. S. Congress (Public Law 738, 74th Congress, H.R. 8455) approved June 22, 1936, and the Act (Public Law 761, 75th Congress, H.R. 10618) approved June 28, 1938. This project was authorized by Congress in the Flood Control Act approved July 24, 1946. It is believed that all legislative requirements have been complied with. Initiation of construction awaits only an appropriation by Congress.

5. PHYSICAL STATUS:

The project has been surveyed and transmitted by the Secretary of War, (House Document No. 220, 80th Congress, 1st Session), referred to Commitee on Public Works. No construction work has been done. Project is inactive, awaiting appropriation of funds.

6. DEPARTMENTAL STATUS:

Project has been submitted by the War Department to Congress, and received Congressional authorization, and now awaits appropriation.

7. ESTIMATED ANNUAL ECONOMIC BENEFITS:

Value of the average annual benefits estimated to accrue from the construction of a dam and basin for flood control at Whitlow Ranch site on Queen Creek amounts to $226,600.* based on 1952 price levels, compiled by the Army Engineers for this project.

8. ESTIMATED ANNUAL REVENUE:

This Project is not revenue producing.

*This figure represents annual benefits estimated by Army at 1939 price levels ($96,000.) converted to June, 1952 price levels, using factor of 2.766.

9. OTHER CREDITS TO THE PROJECT:

Other credits accruing to this project in addition to the tangible benefits reported in Item 7, are intangible benefits which are considerable but not susceptible of monetary evaluation.

a. Water released from the flood control basin at reduced rate and extended over longer period would, in large measure, recharge ground water and thus materially increase usable water supplies.

b. Soil conservation and silt control will result. These will accrue without any additional cost to the United States.

c. The protection of the tax base and the general welfare over an immediate area of 84,000 acres, some 60,000 acres of which are highly developed.

d. The protection of Williams Field Air Force Base and a substantial part of the Government's liability to other property caused by the necessity of constructing separate protecting works for the Air Base.

e. Investments and improvements within the area liable to floods are now almost at a standstill. With the hazard removed by Whitlow Dam, development can be resumed and new taxable wealth created. The annual benefits will then be correspondingly more than the $266,600. now estimated.

10. ESTIMATED COST:

Cost is estimated at $4,550,000. Note: Army estimate in House Doc. No. 220, $1,645,000. based on 1939 price levels. Army now estimates cost at $4,550,000. as at June, 1952. (See Report on Water-Resources Development by the Corps of Engineers in Arizona, dated: 1, January, 1953.)

11. ESTIMATED ANNUAL OPERATING AND MAINTENANCE EXPENSE:

Expense estimated at $21,575. Note: Army estimates of $7,800. increased by application of factor of 2.766.

12. LENGTH OF TIME ESTIMATED TO COMPLETE:

Two years, not more than three years. (Army Engineers).

13. OBJECTORS:

Hearings and publicity on this Project have developed no single objection.

14. PROPONENTS:

Queen Creek Irrigation District, Queen Creek, Arizona.
Roosevelt Water Conservation Dist., Higley, Arizona.
Salt River Valley Water Users' Assn., Phoenix, Arizona.
Maricopa County Board of Supervisors, Phoenix, Arizona.
Mesa Chamber of Commerce, Mesa, Arizona.
Gilbert Chamber of Commerce, Gilbert, Arizona.
Chandler Chamber of Commerce, Chandler, Arizona.
Sacaton Indian Tribunal Council, Sacaton, Arizona.
Maricopa Farm Bureau, Phoenix, Arizona.
Mesa Farm Bureau, Mesa, Arizona.
Chandler Farm Bureau, Chandler, Arizona.
Queen Creek Farm Bureau, Queen Creek, Arizona.

15. SPONSORS:

Maricopa County Board of Supervisors,
County Court House, Phoenix, Arizona.
Queen Creek Irrigation District,
Queen Creek, Arizona.
Roosevelt Water Conservation District,
Higley, Arizona.
Salt River Valley Water Users' Association,
Phoenix, Arizona.
Pinal County Board of Supervisors,
Florence, Arizona.