

**GILA RIVER AND TRIBUTARIES IN
ARIZONA AND NEW MEXICO
FLOOD DAMAGE REPORT
STORM AND FLOOD OF AUGUST 16-17, 1963**

**GLENDALE - MARYVALE AREA
NEAR PHOENIX, ARIZONA**

**PUBLISHED BY
U. S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
JUNE 1964**

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GILA RIVER AND TRIBUTARIES, ARIZONA AND NEW MEXICO

FLOOD-DAMAGE REPORT

ON

STORM AND FLOOD OF 16-17 AUGUST 1963

GLENDALE - MARYVALE AREA

NEAR PHOENIX, ARIZONA



U. S. ARMY ENGINEER DISTRICT, LOS ANGELES
CORPS OF ENGINEERS

JUNE 1964

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Storm and damage data were collected and evaluated with the cooperation of the city of Phoenix, the city of Glendale, the Maricopa County Flood Control District, the Mountain States Tel & Tel Co., the Salt River Project, The Glendale News, The Arizona Republic, and local school officials, residents, and businessmen.

Photographs are used in this report by courtesy of the Arizona Republic, Mr. Voyle Petri, Public Works Director of the city of Glendale, and the Salt River Project.

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FLOOD DAMAGE REPORT
STORM AND FLOOD OF 16-17 AUGUST 1963, GLENDALE-MARYVALE AREA, ARIZ.
GILA RIVER AND TRIBUTARIES, ARIZONA AND NEW MEXICO

AUTHORITY

1. This report is submitted under the authority of Public Law 99, Eighty-fourth Congress, and pursuant to instruction in the Corps of Engineers manual entitled "Emergency Employment of Army Resources, Domestic Emergency Operations" (EM 500-1-1).

SCOPE

2. This report describes the storm, flood, and resultant flood damages that occurred on 16-17 August 1963 in the vicinity of Glendale and Maryvale, Ariz.

GENERAL DESCRIPTION

3. The city of Glendale adjoins the city of Phoenix on the north and west. It is located on U.S. Highway 60-70-89 which passes along Grand Avenue in Glendale and Phoenix, and leads westward to Wickenburg, Ariz., and Los Angeles, Calif. Glendale has a present population of about 27,000. Its origin is agricultural, but more recently it is becoming a residential satellite of Phoenix and has acquired some manufacturing. Maryvale, south of Glendale, is a planned, relatively new community within the city limits of Phoenix, with typical neighborhood shopping centers, schools, and other public facilities. Luke Air Force Base, the American Institute for Foreign Trade, and the Reynolds Metals plant are important facilities in the vicinity of Glendale and Maryvale.

4. The drainage area is located just west of the Cave Creek drainage area, which is in and north of Phoenix. All streams in the area are tributary to the Gila River. Geographically, the area may be described as a desert plain. Local precipitation is generally very light, the average annual rainfall being about 8 inches. Most of this falls in the summer months, generally in July through September, when numerous intense thunderstorms may occur throughout the state. Some rainfall occurs in the winter from cold fronts which come from the north Pacific area, but much of the moisture is lost by the time these fronts reach Arizona.

STORM AND FLOOD

5. Meteorology.--A typical weather situation in the months of July through September is the location of a high pressure center to the northeast of Arizona. Clockwise circulation around this "high" can bring moist, unstable air from the Gulf of Mexico. Such a condition occurred on 16 through 19 August, bringing a surge of moist air that touched off violent thunderstorms throughout Arizona. From local accounts, this particular storm resulted when two separate thunderstorm cells merged directly above the center of Glendale.

6. Rainfall.--Rain began falling in Glendale on 16 August at about 2215 hours and continued until 0215 hours on 17 August. After a 15-minute interruption, it resumed and continued until 0420 hours. A recording station near the center of town registered a maximum of 5.25 inches in a 6-hour period of rainfall. This was supported by another reading nearby. According to the U.S. Weather Bureau Technical Bulletins No. 28 and 40, the point rainfall in Glendale had a frequency

of greater than 100 years. The areal extent of the storm was difficult to define because a series of thunderstorms occurred in the general vicinity during the same period. Therefore, it was felt that it would not be possible to define the boundary of the storm beyond the .5 inch isohyet. The amount of rainfall and other pertinent data are given in table 1. The isohyets are shown in plate 1 and the mass precipitation curves in plate 2.

7. Runoff.--Measurement of runoff was difficult, because no defined channels exist in the flood area. The only estimate of runoff was made for the water passing under the railroad trestle located about 1,000 feet southeast of the 67th Avenue railroad crossing. Estimates made by the city of Glendale indicate that this trestle passed about 2,600 cubic feet per second for about 9 hours. The total area covered by the .5 inch storm isohyet was about 440 square miles, with an average rainfall of about 1.65 inches and a total rainfall volume of about 38,500 acre-feet within this area.

FLOODED AREA

8. The entire flooded area is situated on an alluvial cone built by deposition from Cave Creek, whose present course lies about 5 miles to the east in Phoenix. Sheet flow, running generally from northeast to southwest, occurred throughout the city of Glendale. Glendale Avenue and a railroad spur between Glendale Avenue and Lamar Road diverted water westward through the center of town to Grand Avenue (see photographs No. 1 and 2). Along the south side of Grand Avenue, the Santa Fe railroad tracks form an effective barrier

against the water, with the exception of two small trestles and a few drains. Water ponded against these tracks and then flowed northwestward and southeastward from Glendale Avenue, flooding almost all businesses along Grand Avenue from 27th Avenue in Phoenix to the U.S. Highway 60 underpass between Glendale and Peoria (see photograph No. 9). South of the tracks, water from the small trestles combined with the rainfall to flow southwestward to the Grand Canal. Here it backed up on the north side of the Grand Canal from about 43rd Avenue to the New River (see photographs No. 3, 4, 7, and 8). Weirs and bridges in the canal caused overflow in a number of places. Breaks occurred in the north bank of the canal near Indian School Road (see photograph No. 5) and near 75th Avenue, and in the south bank at 43rd Avenue, 64th Drive (see photograph No. 6), 83rd Avenue, and 95th Avenue. Generally, damages south of the canal occurred only in the immediate area of the canal breaks. The total flooded area amounted to about 6,500 acres, of which 1,800 acres are developed for urban uses. Much of the area was flooded only by sheet flow, in which case the streets carried the water. Only in depressions and behind obstructions did sufficient ponding occur to cause large damages. A map of the flooded area appears on plate 3.

Table 1

Pertinent data, precipitation survey, storm of 16-17 August 1963, Glendale and vicinity, Ariz.

Number*	Precipitation station name or location	Precipitation		Reliability of record	Remarks**
		Amount	Beginning and ending time		
		Inches	Hours		
1.....	5961 Glendale Ave., Glendale.	5.21	2230-0215	Excellent...	P.O. - Rain gage - 1-inch glass tube 6-inch high.
2.....	5712 W. Maryland, Glendale.	5.25	2215-0215 0230-0420	....do.....	P.O. - Rain gage - type unknown.
3.....	59th Ave. and Thomas Road, (Maryvale).	3.50	(#)	....do.....	Do.
4.....	75th Ave. and Indian School Road.	3.45	(#)	Good.....	Do.
5.....	33rd Ave. & Montebello..	3.12	(#)	....do.....	Do.
6.....	83rd Ave. & Thunderbird Road.	2.50	(#)	....do.....	Do.
7.....	83rd Ave. & Cactus Road..	2.25	(#)	....do.....	P.O. - Rain gage - 1-inch glass tube 5-inch high.
8.....	91st Ave. and Indian School Road.	2.20	(#)	Poor.....	LAD - Measured in plastic mop bucket - Adjusted for area.
9.....	Deer Valley.....	1.92	(#)	Excellent...	USWB - Rain gage - 5-inch standard.
10.....	7th St. & Ironwood Dr...	1.90	(#)	Good.....	P.O. - Rain gage - type unknown.
11.....	10th Ave. & Northern....	1.75	(#)	....do.....	Do.
12.....	32nd Ave. & Camelback...	1.68	(#)	....do.....	Do.
13.....	Tolleson.....	1.61	(#)	Excellent...	USWB - Rain gage - 8-inch standard.
:	:	:	:	:	:
:	:	:	:	:	:

See footnotes at end of table.

Table 1--Continued

Pertinent data, precipitation survey, storm of 16-17 August 1963, Glendale and vicinity, Ariz.

Number*	Precipitation station name or location	Precipitation		Reliability of record	Remarks**
		Amount	Beginning and ending time		
		Inches	Hours (#)		
14.....	Goodyear Farms, Litchfield.	1.33	(#)	Excellent...	P.O. - Rain gage - 8-inch standard.
15.....	59th Ave. & Bell Rd.....	1.30	2245-(#)	....do.....	P.O. - Rain gage - 1-inch glass tube 5-inch high.
16.....	Phoenix Indian School...	1.15	(#)	Good.....	P.O. - Rain gage - type unknown.
17.....	Lafayette Blvd. & Invergordon Rd.	1.05	(#)	....do.....	Do.
18.....	Phoenix P.O.....	.80	(#)	Excellent...	USWB - Rain gage - recording.
19.....	Youngtown (Sun City)....	.75	(#)	....do.....	USGS - Rain gage-recording
20.....	El Mirage.....	.63	(#)	....do.....	USWB - Rain gage - 8-inch standard.
21.....	35 W. McDowell.....	.59	(#)	Good.....	P.O. - Rain gage - type unknown.
22.....	Paradise Valley.....	.53	(#)	Excellent...	USWB - Rain gage - 8-inch standard.
23.....	Tempe Citrus.....	.46	(#)	....do.....	Do.
24.....	Phoenix (Sky Harbor)....	.42	(#)	....do.....	USWB - Rain gage - recording.
25.....	52nd St. & Van Buren St.	.35	(#)	Good.....	P.O. - Rain gage - type unknown.
26.....	Luke AFB.....	.33	(#)	Excellent...	USAF - Rain gage - 8-inch standard.

Table 1--Continued

Pertinent data, precipitation survey, storm of 16-17 August 1963, Glendale and vicinity, Ariz.

Number*	Precipitation station name or location	Precipitation		Reliability of record	Remarks**
		Amount	Beginning and ending time		
		<u>Inches</u>	<u>Hours</u>		
27.....	Navy Test Station, Litchfield.	.24	(#)	Excellent....	USN - Rain gage - 8-inch standard.
28.....	West Valley Farms.....	.20	(#)	Fair.....	P.O. - Estimate in tin can.
29.....	Laveen.....	.03	(#)	Excellent....	USWB - Rain gage - 8-inch standard.

* See pl. 1 for location.

** Source of data: P.O. - Private observer.

USWB - U. S. Weather Bureau personnel.

LAD - Los Angeles District personnel.

USGS - U. S. Geological Survey personnel.

USAF - U. S. Air Force personnel.

USN - U. S. Navy personnel.

Data not available.

FLOOD DAMAGE ESTIMATE

9. Field work.--Los Angeles District personnel arrived in Glendale on Wednesday morning, 21 August 1963, to investigate flood damages and obtain general storm information. Local government officials were interviewed, including Mr. Tom Neiswander of the Maricopa County Flood Control District and Mr. Voyle Petri, Director of Public Works of the city of Glendale. Damage estimates were made in the field where possible, and various local persons were interviewed who supplied additional damage information. A subsequent field trip was made in March 1964 to verify original damage estimates and to allow time for other damages to become evident. A reinspection of the residential area north of the Grand Canal disclosed that many families had moved out of the flooded homes and that some of the deserted homes had been vandalized. A new tract of apartments had been built north of the canal and adjacent to the homes which had been badly damaged.

10. Description of damages.--A description of damages by property type is given in the following subparagraphs:

(a) Residential damages.--The average value of the homes in Maryvale was about \$12,000, and the average age, about two years. All the damaged houses had slab floors. Almost all damages were due to simple inundation, because velocities were low. Silt deposition was generally not excessive, and damage to lawns was small; most lawns were flourishing after the flood as a result of the extra watering. Considerable variation in damages occurred because of difference in elevation of floor levels, even in

adjoining homes in homogeneous housing tracts. No home owners had flood damage insurance. Some homes had basements that were filled with water and mud and had to be pumped out. Physical damage occurred to carpets, furniture, baseboards, dry walls, floor tiles, paint, automobiles, and appliances. Emergency costs included the cost of spraying because of the insect invasion after flooding, continuing charges on vacated homes, vandalism to these homes, and the additional cost of emergency food and lodging of persons whose homes were flooded. The Red Cross estimated expenditures of about \$10,000 for disaster relief to families in Maryvale.

(b) Commercial and industrial damages.--Damages varied widely in the case of businesses, because of difference in flood-level elevation and the variation in susceptibility to damage of stock, fixtures, equipment, and structures. Filling stations had damages from pits filling with water and oil stock floating away, and from electrical-equipment flooding. Stores had damages to stock and fixtures. Only minor physical damage occurred to stores if the water was less than 6 inches deep; in these cases, cleanup and business loss were the major part of the damages. Loss of business was substantial in many cases, because ponding lasted for about a day and cleanup lasted for as long as two weeks. In some cases, flood damages were difficult to obtain from proprietors because roof-leak damages were insured but flood damages were not.

(c) Damages to utilities, streets, and highways.--The city of Glendale estimated from \$100,000 to \$150,000 damage to their streets, sewers, irrigation system, water-supply system, and other public

utilities, not counting damage to the irrigation works of the Salt River Project. The city of Phoenix reported less severe damages. Much private business exchange (PBX) telephone equipment was flooded, requiring minor repairs and cleanup.

(d) Public property damages.--School damages were obtained from local officials. Public schools sustained inundation damages and wash-outs of irrigation berms. The basement of one school was flooded, damaging the furnace. Classes were not interrupted because the flooding occurred on Friday night.

(e) Irrigation facilities.--The Salt River project reported \$40,000 in damages to the Grand Canal. Many of their laterals and other city irrigation facilities also required repairs.

(f) Agriculture.--Damages occurred as a result of the inundation of silage pits and destruction of crops, insecticides, and farm machinery. Crop damages were somewhat offset by the benefits of extra irrigation provided by the floodwaters in areas of shallow flooding.

11. Summary of flood damages.--Estimates of damages were made by actual records from individuals, or by noting the nature of damages in the field and by applying unit costs later. Some damages may not be evident for years. Many damages were avoided because of radio and television flood warnings broadcasted shortly before midnight, and telephone calls to private businessmen warning them of the situation. People were then able to set their belongings and business stock up out of reach of the floodwaters and to sandbag their homes and businesses. It should be noted that had this storm

occurred a few miles to the northeast in the Cave Creek drainage area, the resulting flood might have been far more severe. The total estimated damages for Glendale and Maryvale amounted to \$2,900,000. A summary of estimated damages appears in table 2.

LOSS OF LIFE

12. No drownings or fatal traffic accidents occurred as a result of the flood. However, one 16-year old youth was electrocuted when he touched an electric utility pole during the storm.

Table 2

Summary of damages from the flood of 16-17 August 1963 in Glendale
and Phoenix (Maryvale), Ariz.

Type of property	Damages			Total
	Physical damages	Emergency costs and business losses		
Glendale:				
Residential.....	\$87,000	\$9,000		\$96,000
Commercial and industrial..	138,000	32,000		170,000
Public.....	1,000	0		1,000
Railroad.....	1,000	0		1,000
Utilities.....				
Highways and streets.....	133,000	16,000		149,000
Irrigation works.....				
Agriculture.....	38,000	4,000		42,000
Subtotal.....	<u>398,000</u>	<u>61,000</u>		<u>459,000</u>
Phoenix (Maryvale):				
Residential.....	1,910,000	190,000		2,100,000
Commercial and industrial..	24,000	7,000		31,000
Public.....	10,000	2,000		12,000
Railroad.....	1,000	0		1,000
Utilities.....	21,000	3,000		24,000
Highways and streets.....	25,000	5,000		30,000
Irrigation works.....	92,000	5,000		97,000
Agriculture.....	124,000	12,000		136,000
Subtotal.....	<u>2,207,000</u>	<u>224,000</u>		<u>2,431,000</u>
Grand total.....	2,605,000	285,000		2,890,000
Say.....	<u>2,600,000</u>	<u>300,000</u>		<u>2,900,000</u>



Photo 1 - Glendale Ave. facing city park



Photo 2 - 58th Drive facing city park

Glendale city park area



ARIZONA REPUBLIC - PHOENIX, ARIZ.

Photo 3 - Sunset Drive at 6300 block just north of Grand Canal, Maryvale



ARIZONA REPUBLIC - PHOENIX, ARIZ.

Photo 4 - West Campbell at 70th Avenue, Maryvale



ARIZONA REPUBLIC - PHOENIX, ARIZ.

Photo 5 - Looking southeast along Grand Canal just south of Indian School Road,
Maryvale (north bank break)



ARIZONA REPUBLIC - PHOENIX, ARIZ.

Photo 6 - Looking southeast along Grand Canal just south of Indian School Road,
Maryvale (south bank break)



ARIZONA REPUBLIC - PHOENIX, ARIZ.

Photo 7 - Sunset Drive at 6300 block just north of Grand Canal, Maryvale



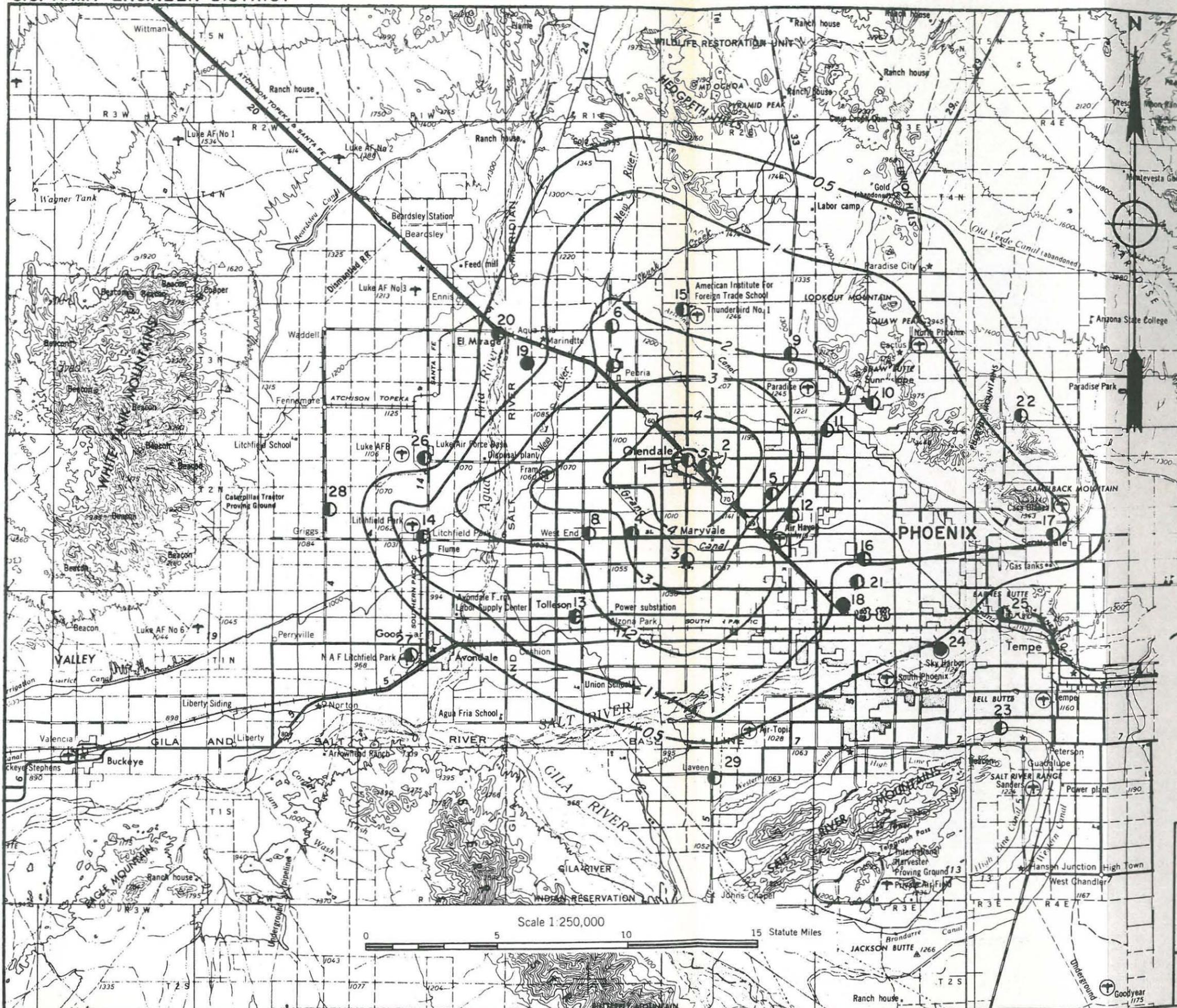
SALT RIVER PROJECT - TEMPE, ARIZ.

Photo 8 - Receding floodwaters on the 6300 block of Sunset Drive, Maryvale



Photo 9 - Receding floodwaters on Grand Avenue, Glendale

SALT RIVER PROJECT - TEMPE, ARIZ.



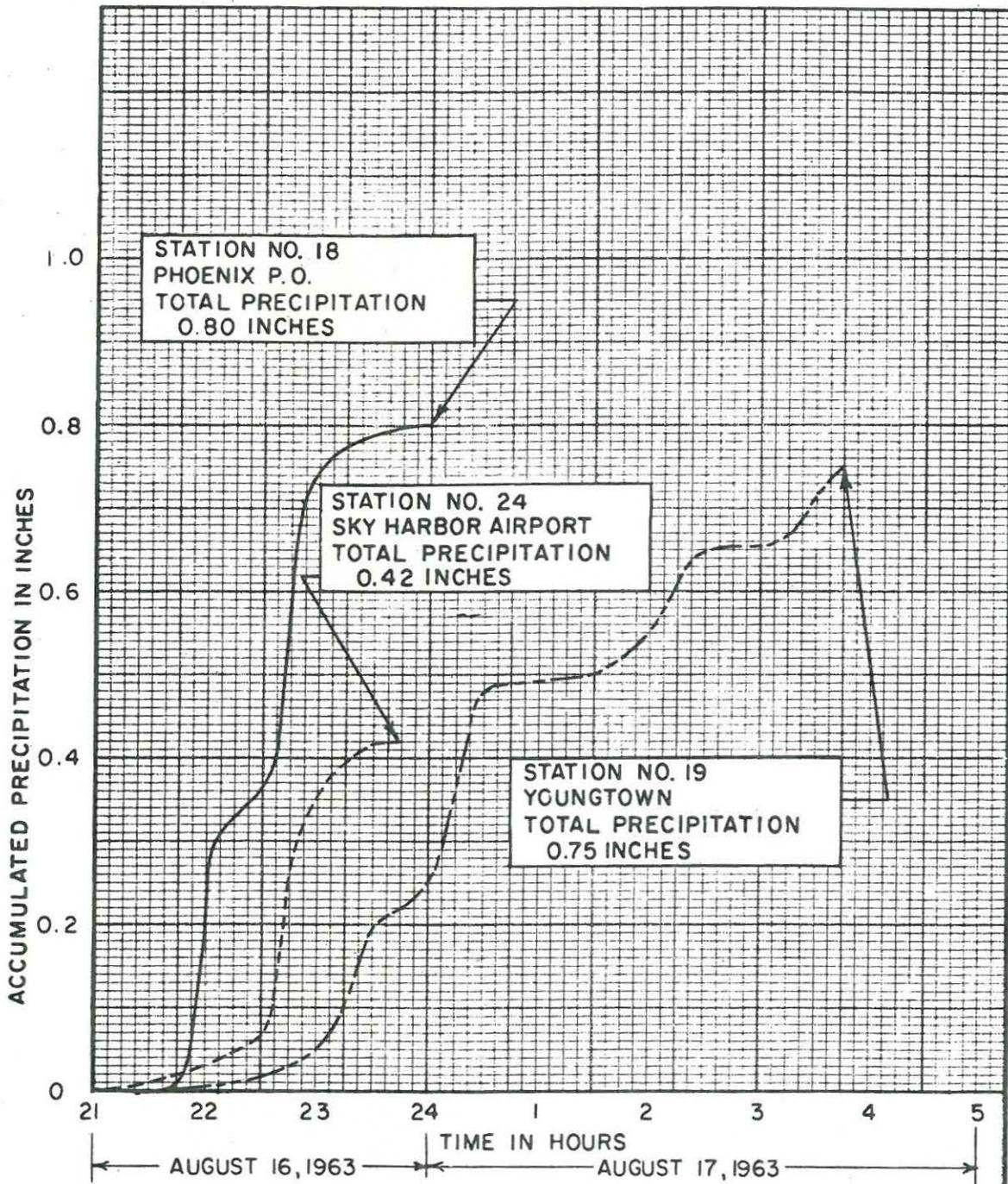
LEGEND

- 0.5 - LINE OF EQUAL TOTAL-STORM PRECIPITATION IN INCHES. STORM OF 16-17 AUGUST 1963
- 18 PRECIPITATION STATION AND NUMBER (RECORDING)
- 16 PRECIPITATION STATION AND NUMBER (NONRECORDING)

Note:
For precipitation amount at each station see table 1

GLENDALE-MARYVALE AREA, ARIZONA
STORM OF 16-17 AUGUST 1963
HYDROLOGIC MAP

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
JUNE 1964

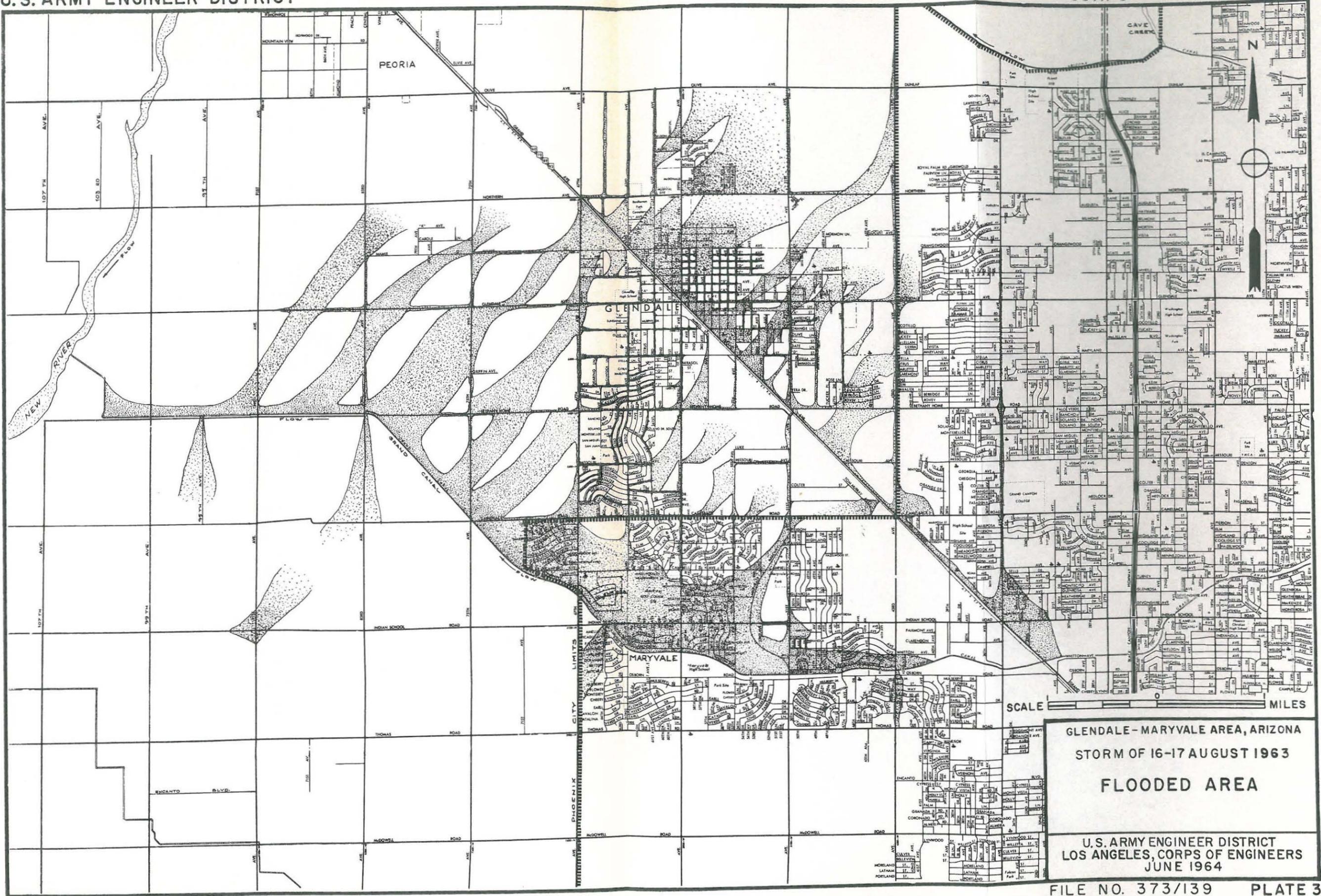


NOTE:

SEE PLATE I FOR LOCATION OF PRECIPITATION STATIONS.

GLENDALE-MARYVALE AREA, ARIZONA
STORM OF 16-17 AUGUST 1963
MASS CURVES OF PRECIPITATION

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
JUNE 1964



GLENDALE-MARYVALE AREA, ARIZONA
 STORM OF 16-17 AUGUST 1963
 FLOODED AREA
 U.S. ARMY ENGINEER DISTRICT
 LOS ANGELES, CORPS OF ENGINEERS
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