

22

Return to: Flood Control District
3325 W. Durango St.
Phx. Az. 85009

report on flood of

22 june 1972



phoenix metropolitan area arizona

october 1972



U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

REPORT ON FLOOD OF 22 JUNE 1972
IN
PHOENIX METROPOLITAN AREA, ARIZONA

OCTOBER 1972

REPORT ON THE FLOOD OF 22 JUNE 1972
IN
PHOENIX METROPOLITAN AREA

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REPORT ON FLOOD OF 22 JUNE 1972
IN PHOENIX METROPOLITAN AREA, ARIZONA

INTRODUCTION

1. **AUTHORITY.** This report is submitted under the authority of Public Law 99, 84th Congress, 1st session, and in accordance with Corps of Engineers Regulation ER 500-1-1 titled "Emergency Employment of Army and Other Resources -- Natural Disaster Procedures."

2. **SCOPE.** This report describes the storm and flood in the Phoenix Metropolitan Area, Arizona, during the period 21-22 June 1972 and presents the resultant flood damage in the cities of Phoenix, Scottsdale, Tempe, and in the unincorporated area surrounding Paradise Valley. Hydrologic data collected during the storm and flood are presented; local conditions created by the flood are discussed; damages to various types of property are tabulated; and estimates of damages that would have been prevented by Corps of Engineers projects authorized but not yet constructed are presented. Flood damages considered in this report include physical damages, emergency costs, and business losses to public and private property as a result of inundation or erosion by floodwaters and flood-transported debris, but do not include damages caused by rainfall or wind.

GENERAL DESCRIPTION OF DISASTER AREA

3. **DISASTER DECLARATION.** Governor Jack R. Williams of Arizona declared a state of emergency on 27 June 1972. The President declared Maricopa, Pima, and Pinal Counties, Arizona, major disaster areas on 3 July 1972.

4. **LOCATION.** The flood-damaged cities of Phoenix, Scottsdale, Tempe, and Paradise Valley are in the south-central part of Arizona. (See pl. 1.) The flooded areas lie in the Gila River Basin, a drainage area of 58,200 square miles -- 5,600 in New Mexico, 51,500 in Arizona, and 1,100 in Sonora, Mexico.

5. **CLIMATE.** The drainage area has an arid, subtropical climate, characterized by hot summers, mild winters, and infrequent rainfalls. Summer thunderstorms of high intensity, but short duration, account for most of the annual rainfall.

6. **TOPOGRAPHY.** Part of the drainage area is mountainous; the remainder is a rolling, desert plain. Mountains near the flood-damaged areas include the McDowell Mountains northeast of Scottsdale, the Phoenix Mountains north and northeast of Phoenix, and the Salt River Mountains southwest of Phoenix and Tempe. Elevations in the flooded area range from about 1,000 feet at the Salt River to about 3,000 feet in the mountains north of Phoenix.

7. **VEGETATION.** Natural vegetation in the area is sparse, with cactus, creosote bush, sagebrush, and paloverde being the dominant desert plants. Irrigation has resulted in the transformation of the desert plain to productive farmland and urban communities.

8. STREAMS. Indian Bend Wash, a tributary to the Salt River upstream from Phoenix, drains an area of 224 square miles. (See pl. 1.) A small part of the Gila River Basin, the Indian Bend Wash Basin is about 10 miles east and northeast of Phoenix. The basin is 26 miles long and about 15 miles wide. Numerous streams drain the south side of the Phoenix Mountains. The principal drainage courses include Dreamy Draw Wash, which drains an area of 1.62 square miles and Cudia City Wash, which drains an area of 2.16.

9. CANALS. The Arizona and Grand Canals, units of the Salt River Project, deliver irrigation water to lands on the north bank of the Salt River. (See pl. 1.)

STORMS AND FLOOD

10. METEOROLOGY. Heavy thunderstorms hit northeastern Phoenix on the evening of 21 June and the morning of 22 June 1972. These storms were part of a series of moderate to heavy early summer thunderstorms affecting Arizona, Nevada, and Utah during 20-23 June 1972. The cause of these disturbances was a deep flow of very moist, unstable tropical air that invaded the southwestern United States from the Gulf of California and the Pacific Ocean west of Baja California.

11. PRECIPITATION. The storms' rainfall occurred between 6 a.m. and 12 a.m. on 22 June in the northeast part of Phoenix, with the greatest intensities recorded during a 1.5 to 2-hour period. The maximum unofficial intensity reported was 5.25 inches during an estimated 2 hours in the vicinity of 24th Street and Camelback Road in Phoenix. Amounts of 4.87 inches at 24th Street and Indianola Avenue and 4.45 inches at 3430 East Coolidge Street were reported by unofficial stations of the National Weather Service. The maximum recording-gage intensity measured was 3.85 inches in 1 hour and 20 minutes at 18th Street and Turney Avenue.

12. The intense part of the thunderstorm affected a rather small area, as indicated by the areas inclosed within the various isohyets shown on pl. 2. The tabulation below summarizes the depth-area relationship for the 6-hour duration of the storm.

Isohyet	Area
5 inch	1.37 sq. mi.
4.5 inch	7.78 sq. mi.
4 inch	17.93 sq. mi.
3.5 inch	36.61 sq. mi.
3 inch	51.13 sq. mi.
2.5 inch	68.30 sq. mi.
2 inch	93.39 sq. mi.
1.5 inch	162.64 sq. mi.
1 inch	258.84 sq. mi.
0.5 inch	310.61 sq. mi.

Rainfall readings for various official and unofficial gages are shown in table 1, and the gage locations are shown on pl. 3. Mass rainfall readings for four recording gages are shown on pl. 4.

13. **RUNOFF.** The heavy precipitation that occurred during the period 21-22 June 1972 caused relatively high discharges on the small drainage areas on the south slopes of the Phoenix Mountains and a record discharge on Indian Bend Wash.

14. A U.S. Geological Survey recording stream gage on Indian Bend Wash at Indian Bend Road indicated a peak discharge at this location of 17,000 cubic feet per second (c.f.s.). The flood hydrograph at this gage is shown on pl. 5, and the location of the gage is shown on pl. 3. In addition, 3,000 c.f.s. that was not measured by the stream gage flowed across Indian Bend Road. This would constitute a peak discharge of 20,000 c.f.s. at Indian Bend Road. This flood is estimated to have a frequency of occurrence of once every 70 years.

15. The USGS also made several slope-area measurements from high-water marks at various locations shown on pl. 2. The peak discharge at each of these points is listed in table 2. A comparison of peak discharges per square mile for recorded major floods in the Phoenix area with those of the 22 June 1972 flood is shown in table 3. An enveloping curve for these peak discharges is shown on pl. 6.

16. **OVERFLOW AREA.** Flooding occurred along Indian Bend Wash in Paradise Valley and in the unincorporated area surrounding Paradise Valley, Scottsdale, and Tempe. Other parts of the Paradise Valley area was subjected to sheet flow. Flooding occurred along the upstream sides of the Arizona Canal in Scottsdale and Phoenix and the Grand Canal in Phoenix. Flooding occurred below both canals in Phoenix due to spills and overtopping of the canals. A schematic drawing of the flooded area is shown on pl. 1.

TABLE 1

PRECIPITATION DATA, STORM OF JUNE 21-22, 1972
PHOENIX, SCOTTSDALE AND PARADISE VALLEY AREAS, ARIZONA

Gage No.	Name	Gage Location or Name of station	PRECIPITATION				Storm Total (in)	Footnote references
			June 21		June 22			
			Amount	Period	Amount	Period		
1	Lew Carrifee	4936 W. Verde Ln.	.16	—	.28	—	.44	(1),(7)
2	Robert Ingram	63rd St. & Earll	.31	—	.53	—	.84	(1)
3	Ray Kistler	36th St. & Pickadilly	.44	—	3.31	—	3.75	(1)
4	Louis R. Jurwitz	25th St. & Bellview	.54	—	3.05	—	3.59	(1)
5	Melvin Ruth	9832 N. 7th Place	0	—	—	—	1.60	(1)
6	Goldsmith	28th St. & Highland	.41	—	4.23	—	4.64	(1)
7	Bill Erichson	4511 N. 31st. St.	.35	—	4.15	—	4.50	(1)
8	A.B. Clark	741 E. Ocotillo	.06	—	2.65	—	2.71	(1)
9	Frank Peddie	67th St. & Horseshoe Ln.	1.66	—	—	—	—	(1)
10	USGS	1648 E. Meadowbrook	—	—	—	—	4.20	(1)
11	Paul C. Kangieser	9020 S. 17th Place	0	—	.33	—	.33	(1),(7)
12	Ted Wilson	42nd St. & Indian School	.30	—	3.10	—	3.40	(1)
13	Bruce A. Cain	18th St. & Turney	.43	1 hr.	3.85	1 hr. 20 min.	4.28	(1),(8)
14	Salt River Project	McClintock & Southern	.06	—	.03	—	.09	(1),(7)
15	Do.	2200 E. McDowell	.31	—	2.84	—	3.15	(1)
16	Do.	39th Ave & Dunlap	.05	—	.10	—	.15	(1)
17	Do.	20th St. & Oak	.24	—	3.66	—	3.90	(1)
18	Do.	11th Ave & Culver	.04	—	3.10	—	3.14	(1)
19	Do.	Country Club & Southern	.43	—	.15	—	.58	(1)
20	Do.	Lawrence Ln. & 13th St.	Trace	—	2.19	—	2.19	(1)
21	Do.	7th St. & Roosevelt	.20	—	3.25	—	3.45	(1)
22	Do.	Mesa Dr. & Ramble Rd.	.43	—	Trace	—	.43	(1)
23	Do.	56th St. & Southern	.36	—	.08	—	.44	(1)
24	Do.	87th St. & Oak	.11	—	.34	—	.45	(1)

TABLE 1 (continued)

Gage No.	Name	Gage Location or Name of station	PRECIPITATION				Storm Total (in)	Footnote references
			June 21 Amount	June 21 Period	June 22 Amount	June 22 Period		
25	Do.	Stapley & Brown	.25	—	.34	—	.59	(1)
26	Do.	17th St. & Farmers	.08	—	.09	—	.17	(1)
27	Do.	Indian Wash & Ariz Canal	.90	—	1.36	—	2.26	(1)
28	Do.	38th Dr. & Puget	.07	—	.08	—	.15	(1)
29	John Pritchard	42nd St. & McDonald	.55	—	3.87	—	4.42	(1)
30	Mr. Stark	32nd St. & Shea	—	—	3.77	—	—	(1)
31	Salt River Project	3900 E. Thomas	—	—	—	—	3.10	(1)
32	Ben Burke	24th St. & Indianola	—	—	4.87	—	—	(1),(9)
33	Paul E. Griffin	Alhambra 2NE	Trace	—	1.11	—	1.11	(2)
34	USBIA	Phoenix Indian School	.15	—	1.91	—	2.06	(2)
35	Scottsdale Fire Dept	Miller & Thomas	0	—	.20	—	.20	(2)
36	Olus Barnes	Tempe	0	—	.37	—	.37	(2)
37	Harold Orcutt	South Phoenix	.23	—	1.22	—	1.45	(2)
38	Univ of Ariz	Tempe Citrus	0	—	.45	—	.45	(2)
39	Do.	Mesa Exp. Farm	—	—	.43	—	—	(2)
40	USWB	Phoenix WSFO	.27	—	1.37	4 hrs.	1.64	(2),(8)
41	Bruce A. Cain	Deer Valley	.14	30 min.	.73	2 hrs.	.87	(2)
42	Willard Groene	Mummy Mountain	1.00	—	3.24	—	4.24	(2)
43	Earle Stewart	Laveen	0	—	.86	—	.86	(2),(7)
44	—	Black Canyon No. 13	0	—	.50	4 hr. 30 min.	.50	(3),(10)
45	—	Carefree No. 19	.05	30 min.	.81	3 hrs.	.86	(3)
46	—	Fort McDowell No. 23	.18	1 hr. 15 min.	.86	5 hrs.	1.04	(3)
47	—	Rock Springs No. 46	.01	—	.39	4 hr. 30 min.	.40	(3)
48	—	Skunk Creek No. N/A	0	—	.51	2 hrs.	.51	(3)
49	—	So. Mountain Park No. 53	0	—	.62	3 hrs.	.62	(3)
50	—	Thunderbird Academy No. 59	.91	1 hr.	1.46	3 hrs.	2.37	(3)

TABLE 1 (continued)

Gage No.	Name	Gage Location or Name of station	PRECIPITATION				Storm Total (in)	Footnote references
			June 21 Amount	June 21 Period	June 22 Amount	June 22 Period		
51	Jeffery Carqueville	110 W. McNeil St. No. 38	.10	—	.60	—	.70	(3),(11)
52	V.V. Higginbotham	7514 E. Taylor No. 51	.15	—	.31	—	.46	(3)
53	Yettie M. Ferguson	11202 Nebraska Ave Youngtown No. 79	0	—	0	—	0	(3)
54	K.C. Schabinger	1-3/4 mi. N.E. Apache Junction No. 5	Trace	—	.20	—	.20	(3)
55	George M. Duren	11102 Iowa Ave Youngtown No. 69	0	—	0	—	0	(3)
56	Mrs. R. Morrow	Wenden No. 61	.01	—	0	—	.01	(3)
57	R.E. Bellinoff	3430 E. Coolidge St. No 39	.46	—	4.45	—	4.91	(3)
58	Martin Nerad	3 mi. NW of Hassayampa No. 26	0	—	0	—	0	(3)
59	R.G. Coker	11 mi. W of Arlington No. 36	0	—	0	—	0	(3)
60	J.W. Rogers	318 4th Ave West Valencia No. 14	0	—	0	—	0	(3)
61	Ollie Leppanen	541 W. Palm Lane No. 33	0	—	3.35	—	3.35	(3)
62	Harry Cram	Apache Junction No. 78	0	—	.17	—	.17	(3)
63	M.F. Currier	11325 Duluth Ave Youngtown No. N/A	0	—	0	—	0	(3)
64	Jim Terry	Ox Wash No. 80	0	—	0	—	0	(3)
65	Mrs. George Potts	12819 N. 22nd St. No. 53	.01	—	2.20	—	2.21	(3)
66	Tom Anderson	5250 N. 15th St. No. N/A	.22	—	3.44	—	3.66	(3)
67	Jay Vander Wall	529 S. Hobson No. 57	.50	—	.10	—	.60	(3)
68	Win Green	4920 N. 85th St.	.30	6 hrs.	.71	6 hrs.	1.01	(4)
69	Bob Gale	2902 E. Voltaire	.31	Do.	1.67	Do.	1.98	(4)
70	Glen Reagan	13823 N. 37th Pl.	.21	Do.	2.95	Do.	3.16	(4)

TABLE 1 (continued)

Gage No.	Name	Gage Location or Name of station	PRECIPITATION				Storm Total (in)	Footnote references
			June 21 Amount	June 21 Period	June 22 Amount	June 22 Period		
71	Allan Hibbert	1442 E. Bishop Dr., Tempe	.11	Do.	.06	Do.	.17	(4)
72	Ross Watkins	1627 W. Geneva Dr., Tempe	†		†		.21	(4)
73	Bill McElvain	1867 E. Loma Vista Dr., Tempe	†		†		.25	(4)
74	Wendell Tolkerts	1315 E. Georgia	.10		4.00	4 hrs.	4.10	(5)
75	Maurice Bradford	24th St. & Camelback	.38	—	5.25	2 hrs.	5.63	(5),(12)
76	Ken Mullins	4007 N. 34th St.	.30		4.02		4.32	(6)
77	Do.	4218 N. 35th Way	.35	—	4.04	—	4.39	(6)
78	Lee Reagan	757 E. Montecito	.20	4 hrs.	2.95	4 hrs.	3.15	(5)

† Included in 12-hour total.

- 1 National Weather Service, unofficial stations.
- 2 National Weather Service, official stations.
- 3 USGS stations.
- 4 US Forest Service Data, private observers.
- 5 Response to newspaper request for data, private observers.
- 6 US Water Conservation Lab, private observers.
- 7 Gage - type unknown.
- 8 Recording Gage - type unknown.
- 9 CAN.
- 10 Recording Gage - Universal.
- 11 Nonrecording plastic rain gage.
- 12 Straight-sided jar, approx. 4 in. Dia.

TABLE 2

FLOOD STAGES AND DISCHARGES FOR 22 JUNE 1972
PHOENIX, SCOTTSDALE AND PARADISE VALLEY AREAS, ARIZONA

	Stream and place of station determination	Drainage area (sq. mi.)	Gage height (ft.)	Peak discharge (cfs)	Unit runoff (csm)
1	Shea Wash, SE 1/4 sec.23, T. 3N., R. 5E., at Shea Blvd nr Scottsdale	1.79	—	945	528
2	Shea Wash trib No. 3, SE 1/4 sec.23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	0.09	—	86	956
3	Shea Wash trib No. 2, SW 1/4 sec.23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	0.14	—	103	736
4	Shea Wash trib No. 1, SW 1/4 sec.23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	0.12	—	80	667
5	Indian Bend Wash trib No. 1, NW 1/4 SW 1/4 sec. 32, T. 3 N., R. 4 E., at Tatum Blvd in Paradise Valley	0.026	—	88	3,400
6	Indian Bend Wash trib No. 2, SE 1/4 SW 1/4 sec. 32, T. 3 N., R. 4 E., at Tatum Blvd in Paradise Valley	0.075	—	144	1,920
7	Indian Bend Wash, SW 1/4 sec. 34, T. 3 N., R. 4 E., at Camelback Country Club in Paradise Valley	83.0	—	14,500	175
8	Indian Bend Wash (at Indian Bend Rd) nr Scottsdale (gaging station)	142.0	4.93	20,000	141
††9	Indian Bend Wash at Thomas Road in Scottsdale		7.98	14,300	—
10	Cudia City Wash nr Phoenix, SE 1/4 SE 1/4 sec. 7, T. 3 N., R. 4 E., 1,000 ft upstream from McDonald Drive	2.16	—	4,200	1,940
11	Cudia City Wash trib at 40th St and Rancho Drive, NE 1/4 NE 1/4 sec. 13, T. 2 N., R. 3 E.	0.08	—	219	2,750
12	Dreamy Draw (at 16th St) at Phoenix, SW 1/4 SW 1/4 sec. 34, T. 3 N., R. 3 E.	1.62	—	860	530
††	Slope-area survey run at Roosevelt St.	8			

TABLE 3

COMPARISON OF PEAK DISCHARGES FOR
MAJOR RECORDED FLOODS IN THE PHOENIX, ARIZONA AREA

Number	Location	Date	Drainage area (sq. mi.)	Peak discharge (cfs)	Discharge (cfs/sq. mi.)
1	Shea Wash, SE 1/4 sec. 23, T. 3 N. R. 5 E., at Shea Blvd nr Scottsdale	* June 1972	1.79	945	528
2	Shea Wash trib No. 3, SE 1/4 sec. 23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	* June 1972	.09	86	956
3	Shea Wash trib No. 2, SW 1/4 sec. 23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	* June 1972	.14	103	736
4	Shea Wash trib No. 1, SW 1/4 sec. 23, T. 3 N., R. 5 E., at Shea Blvd nr Scottsdale	* June 1972	.12	80	667
5	Indian Bend Wash trib No. 1, NW 1/4 SW 1/4 sec. 32, T. 3 N., R. 4 E., at Tatum Blvd in Paradise Valley	* June 1972	.026	88	3,400
6	Indian Bend Wash trib No. 2, SE 1/4 SW 1/4 sec. 32, T. 3 N., R. 4 E., at Tatum Blvd in Paradise Valley	* June 1972	.075	144	1,920
7	Indian Bend Wash, SW 1/4 sec. 34, T. 3 N., R. 4 E., at Camelback Country Club in Paradise Valley	* June 1972	83.	14,500	175
8	Indian Bend Wash (at Indian Bend Rd) nr Scottsdale (gaging station)	* June 1972	142.	20,000	141
9	Cudia City Wash nr Phoenix SE 1/4 SE 1/4 sec. 7, T. 3 N., R. 4 E., 1,000 ft. upstream from McDonald Drive	* June 1972	2.16	4,200	1,940
10	Cudia City Wash trib at 40th St and Rancho Drive, NE 1/4 NE 1/4 sec. 13, T. 2 N., R. 3 E.	* June 1972	.08	219	2,750
11	Dreamy Draw (at 16th St) at Phoenix, SW 1/4 SW 1/4 sec. 34, T. 3 N., R. 3 E.	* June 1972	1.62	860	530

TABLE 3 (Continued)

COMPARISON OF PEAK DISCHARGES FOR
MAJOR RECORDED FLOODS IN THE PHOENIX, ARIZONA AREA

	Date	Drainage area (sq. mi.)	Peak discharge (cfs)	Discharge (cfs/sq. mi.)
12 Hassayampa R. @ Box Damsite (nr Wickenburg) SE 1/4 sec. 7, T. 8 N., R. 4 W.	Sept. 1970	417.	58,000	139.09
13 New R. nr Glendale NE 1/4 NW 1/4, sec. 8, T. 2 N., R. 1 E.	Sept. 1970	323.	19,200	59.44
14 New R. nr. Rock Springs SW 1/4 SW 1/4, sec. 6, T. 7 N., R. 3 E.	Sept. 1970	67.3	18,600	276.37
15 New R. at Glendale	Dec. 1967	323.	19,800	61.30
16 Skunk Cr. nr Phoenix SE 1/4, sec. 35, T. 5 N., R. 2 E.	Dec. 1964	64.6	11,500	178.02
17 New R. @ New R. SE 1/4 NW 1/4, T. 7 N., R. 2 E.	Dec. 1970	85.7	19,500	227.54
18 IBW nr Scottsdale SE 1/4, sec. 2, T. 2 N., R. 4 E.	June 1972	142.	20,000	140.84
19 Cave Cr. nr Cave Cr. SW 1/4, sec. 12, T. 5 N., R. 3 E.	Dec. 1967	121.	12,400	102.48
20 New R. nr Rock Springs	Dec. 1967	67.3	10,600	157.50
21 New River at Peoria NE 1/4 NE 1/4, sec. 3, T. 3 N., R. 1 E.	Aug. 1943	187.	38,000	203.21
22 Agua Fria R. @ Avondale NW 1/4, sec. 14, T. 1 N., R. 1 W.	Jan. 1916	2,013	105,000	52.16
23 Agua Fria R. @ Avondale	Nov. 1919	2,013.	105,000	52.16
24 Sycamore Cr. nr Ft. McDowell sec. 16, T. 4 N., R. 8 E.	Sept. 1970	165.	24,200	146.67
25 Queen Cr. Superior @ Whitlow Ranch Dam site.	Aug. 1954	144.	42,900	297.92

* June 22, 1972

FLOOD DAMAGES

17. GENERAL. Damage data were collected and evaluated by personnel of the Los Angeles District in cooperation with many Federal, State, County, City and local agencies - including the U. S. Soil Conservation Service; the U. S. Geological Survey; the U. S. Forest Service; the U. S. Air Force; the Arizona State Highway Department; the Arizona State National Guard; the Arizona State Civil Defense; the Maricopa County Flood Control District and the Maricopa County Highway Department; the Engineering, Water and Sewers, Sanitation, Parks, Playgrounds and Recreation, and Street Maintenance Departments of the City of Phoenix; the Scottsdale City Public Works and Park and Recreation Departments; the Salt River Project; the American Red Cross; and the Mountain Bell Telephone Company. Local business establishments and local residents also supplied valuable data on flood damages.

18. The principal areas of flood damage are shown on pl. 7 through 19. These areas were along a 14-mile-long reach of Indian Bend Wash; along 16 miles of the Arizona Canal from Cave Creek to Indian Bend Wash; along breaks in the Arizona Canal at 23d Avenue, Central Avenue, 7th Street, 12th Street, 16th Street, 20th Street, 32d Street, and 40th Street; along 8 miles of Grand Canal, from 15th Avenue to 44th Street; and along breaks in the Grand Canal at 12th Avenue, Central Avenue, 7th Street, and Longview Avenue.

19. The principal population centers affected by overflow from Indian Bend Wash and the Arizona and Grand Canals are: Phoenix along Indian Bend Wash, the Arizona Canal, and the Grand Canal; Scottsdale and Tempe along Indian Bend Wash and the Arizona Canal; and Paradise Valley along Indian Bend Wash.

20. Flood damages consisted of physical damages; emergency costs resulting from evacuation, flood fighting, relief, and use of alternative facilities; and business losses due to delays, increased costs of operation, and lost income.

21. The flooded areas and the extent of damages are described in the following paragraphs.

22. INDIAN BEND WASH. This report considers only that part of Indian Bend Wash extending from Hearn Road in Paradise Valley to the Salt River. Indian Bend Wash, for the purposes of this report, has been divided into two reaches - Upper Indian Bend Wash, which lies above the Arizona Canal, and Lower Indian Bend Wash, which lies below the Arizona Canal. Upper Indian Bend Wash extending from Hearn Road to the Arizona Canal, a distance of 8 miles, has a drainage area of 142 square miles. Lower Indian Bend Wash extending from the Arizona Canal to the Salt River, a distance of 7 miles, drains an additional area of 59 square miles. Each of these reaches has been further divided into two subreaches, all of which are discussed in the following subparagraphs.



Silt deposit was a major problem along Indian Bend Wash as is evident from this view of homes north of Thomas Road in Scottsdale.



Silt was also deposited on properties along Indian Bend Wash near McKellips Road in the City of Tempe.

23. UPPER INDIAN BEND WASH (HEARN ROAD TO SCOTTSDALE ROAD IN PARADISE VALLEY). The flooded area along this reach of Indian Bend Wash and the tributaries to the wash in the vicinity of wash amounted to 2,350 acres. The flooded area along this reach is shown on pl. 7 and 8. In addition minor flooding occurred outside this area. Although winds caused the most severe damage in Paradise Valley, sheetflow with a depth ranging from 1 to 2 feet throughout the valley caused total flood damages estimated at about \$250,000.



A street sign is the only evidence of the intersection as sheetflow covers Shea Blvd. and 50th Street in Paradise Valley.

A summary of estimated damages appears in table 4. The following subparagraphs give pertinent information on damages along this reach.

a. Damages to residential property. Sheetflow in the area north of Indian Bend Wash between 64th Street and Scottsdale Road caused flood damages to about 66 homes. Most of the damage occurred to landscaping, but floodwaters entered some homes causing extensive damage to their contents. Sheetflow inundated about 37 homes south of Shea Boulevard between 56th and 64th Streets. Again, most of the damage occurred to the landscaping; floodwaters damaged the contents of only a few of these homes. About 57 additional homes, scattered over the area, were damaged by the flood. In summary, about 160 homes sustained flood damages estimated at about \$184,000.



Floodwater from a tributary of Indian Bend Wash converted landscaping into an island near these homes at 58th place in Paradise Valley.

3



b. Damages to public property. Costs incurred by the Town of Paradise Valley for floodfighting and for the removal of debris and silt in the valley are included under this category. Public property damage is estimated at \$4,000.

c. Damages to parks and recreation areas. Floodwaters with a depth of about 3 feet and a velocity of 4 feet per second (f.p.s.) inundated a golf course in the wash west of Scottsdale Road. A few trees were washed out and silt was deposited on the turf. Pondered water remained on the course for about a week and a half resulting, in loss of revenue. Total estimated damages are \$15,000.

d. Damages to agricultural property. Agricultural property in Paradise Valley incurred minor damages estimated at \$3,000.

e. Damages to streets, roads, and bridges. The streets most severely damaged during the flood were Shea Boulevard and Double Tree Ranch Road. Segments of pavement were washed out and silt was deposited on the streets. The total damages to streets were about \$4,000.

f. Damages to utilities. The only damages to utilities consisted of damages to the telephone system. The total damages were about \$40,000.

24. UPPER INDIAN BEND WASH (SCOTTSDALE ROAD TO THE ARIZONA CANAL IN THE CITY OF SCOTTSDALE). Flooding occurred in an area east of Scottsdale Road to the Arizona Canal south of Indian Bend Road in the City of Scottsdale. The flooded area, amounting to 850 acres, is shown on pl. 8 and 9. The discharge at the gaging station on Indian Bend Road was about 20,000 c.f.s. Also, at Indian Bend Road, floodwaters with a discharge of about 3,000 c.f.s. flowed along the Arizona Canal and remained above the canal, damaging private property. The damages that were sustained in that area are described under the section covering the Arizona Canal in the City of Scottsdale. The total flood damages on Upper Indian Bend Wash in the City of Scottsdale were about \$231,000. A summary of estimated damages appears in table 4. The following subparagraphs give pertinent information on damages along this reach.

a. Damages to residential property. About six homes above the Arizona Canal were flooded. The water depth ranged from 1 to 2 feet. Muddy waters with a depth of a few inches flooded the inside of some homes damaging carpets and contents. Residential damages were about \$29,000.

b. Damages to public property. Damages in this category was the cost of the removal of debris and silt by the City of Scottsdale. The flood damages to public property were about \$1,000.

c. Damages to parks and recreation areas. A golf course in the wash north of Indian Bend Road was flooded by muddy waters ranging from 1 to 4 feet in depth. The turf in the fairway was damaged and silt was deposited in the lakes on the course. Total estimated damages are \$152,000.



Floodwaters inundated the golf course above the Arizona Canal and overtopped the flood gates and spillway on the canal.

d. Damages to agricultural property. Five ranches above the Arizona Canal were damaged when floodwaters ranging in depth from 1 to 2 feet deposited silt and debris on the land. A horse-riding ranch south of Indian Bend Road was covered with silt and debris. The total damages to agricultural property were about \$29,000.



Horses wade through knee-deep floodwaters on a farm near Arizona Canal and Pima Road.

③ ✓

e. Damages to streets, roads, and bridges. Roads damaged during the flood were Scottsdale and Indian Bend Roads. Silt had to be removed and the pavement repaired. The total damages, including loss caused by delay and extra traveling, were about \$20,000.

25. LOWER INDIAN BEND WASH (ARIZONA CANAL TO McKELLIPS ROAD IN THE CITY OF SCOTTSDALE). The flooded area in this reach, amounting to 1,000 acres, is depicted on pl. 9 and 10. Flooding occurred when the floodwaters overtopped the spillway of the Arizona Canal and the canal banks, causing numerous breaks in the southern part of the canal.



Floodwaters escaping through breaks in the south bank of the Arizona Canal damaged a farm below the canal.

(6) ✓

The average depth of water in the flooded areas ranged from 3 to 5 feet with velocities ranging from 4 to 7 f.p.s. The damages to a greenbelt area, two parks, and three golf courses were about \$135,000. The total damages were about \$1,087,000. A summary of estimated damages appears in table 4. In addition, the floodwaters claimed a life when a 30-year-old man drowned while swimming in the wash south of Chaparral Road. The following subparagraphs give pertinent information on damages along this reach.

a. Damages to residential property. Damages to residential property occurred when the floodwaters exceeded the capacity of the wash at 78th Street and inundated areas north of Osborn Road and Thomas Road. Floodwaters in this area damaged 128 homes ranging in value from \$25,000 to \$35,000. The water depth in the homes ranged from a few inches to over 2 feet. About 30 homes south of McDowell Road were also inundated. Although these homes had been condemned and relocation was in progress, many of the homes were still occupied. When the flood occurred, these residents had to be rescued. A few other houses scattered along the wash sustained damages. In summary, about 160 homes sustained flood damages. Included under this category also are the funds expended by the American Red Cross and the Arizona National Guard for the care and rescue of the flood victims during the flood, particularly the flood victims south of McDowell Road. The total damages to residential property were about \$211,000.

⑦ ✓



Persons on Osborn Rd. view the damages caused by floodwaters from Indian Bend Wash which inundated a farm and several homes in the area.



⑧ ✓

Floodwaters from Indian Bend Wash inundated homes, yards, and streets to the left of Thomas Road.



Roofs of these condemned homes became islands when Indian Bend Wash flooded west of McDowell Road.

b. Damages to commercial property. Floodwaters exceeded the capacity of the wash and inundated and deposited debris and silt on the grounds of two gas stations, a pizza parlor, and a drive-in on the corner of Hayden Road and Indian School Road. Water depths at the above location ranged from 6 inches to 2 feet. Floodwaters also exceeded the capacity of the wash at McDowell Road, damaging landscaping and contents of a used car dealership, an electrical contractor shop, a cocktail bar, and a trailer sales establishment. Also a gas station on McDowell Road has silt deposited on the grounds. Water depths here ranged from 8 inches to 1-1/2 feet. Above McKellips Road at Pierce Street, a plating business was physically damaged and a restaurant suffered business losses. In summary, 11 commercial establishments were damaged in the amount of about \$186,000, of which \$169,000 were business losses and emergency costs.



Commercial establishments on McDowell Road in Indian Bend Wash were flooded.

(a)

c. Damages to public property. Public property in this reach sustained more damage than any other type of property. Saguaro High School and Pueblo Elementary School sustained damages to landscaping and contents in the amount of \$85,000. The outside water depth was about 1- 1/2 feet; the water depth inside the buildings ranged from 4 to 8 inches.



These breaks in the Arizona Canal enabled floodwaters to damage an elementary school, a high school, and some farmland.

10 ✓

d. Damages to parks and recreation areas. A subdivision golf course on Indian School Road was inundated. In a greenbelt area, the flood damaged one golf course on Chaparral Road, two golf courses south of Thomas Road, a park on Oak Street, and another park on Roosevelt Road; damages consisted of silt deposition on the grounds and damages to the landscape. Water depth ranged from 3 to 5 feet with velocities ranging from 4 to 7 f.p.s. Total estimated damages to the greenbelt area were \$135,000.



Floodwaters in Indian Bend Wash forced these residents below McDowell Rd. to seek safety on the car and the roof of the house.

(Handwritten signature)

Two water wells on Indian School Road and on Thomas Road were also damaged. As a result of the deposition of debris and silt, the City of Scottsdale was required to undertake a cleanup program, resulting in expenditures of \$20,000. The special floodfighting efforts and rescue mission by the City of Scottsdale, the U.S. Air Force Rescue Squad, and Luke Air Force Base minimized the flood damages. The total damages to public property were about \$192,000.



Floodwaters over 4 feet deep make the trees in El Dorado Park at Oak Street look like shrubs.

12 ✓



Another view of El Dorado Park looking north from Mc Dowell Road.

e. Damages to agricultural property. Several farms were flooded. At the intersection of the Arizona Canal and Indian Bend Wash, dairy farm equipment and contents downstream from the south bank of the canal were inundated to a depth of about 3-1/2 feet. Floodwaters ranging in depth from 2 to 4 feet also damaged the contents of two farms east of the Arizona Canal between Indian School Road and McDonald Road. Other flooded farms include three farms east of the canal near McDonald Road (cleanup of silt deposition); a farm south of the canal next to the Pueblo Elementary School (damage to contents); one at Camelback Road (cleanup of silt deposition); one at Indian School Road (damage to contents); and two farms near Thomas Road (cleanup of silt deposition). The estimated flood damages for these 11 farms amounted to \$87,000.



At the intersection of the Arizona Canal and Indian Bend Wash floodwaters damaged agricultural property and a dairy farm.

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f. Damages to streets, roads, and bridges. Floodwaters damaged the pavement and deposited silt in following streets and roads that cross Indian Bend Wash: Camelback Road, Indian School Road, Osborn Road, Thomas Road, Oak Street, McDowell Road, Roosevelt Street, and McKellips Road. Other roads damaged were Hayden and Miller Roads. Many people experienced delays and extra traveling as a result of such physical damage. The total damages to streets, roads, and bridges were about \$180,000.

g. Damages to utilities. Damage occurred to the contents of an electrical installation plant between Chaparral Road and McDonald Drive, the electrical distribution system, and the telephone system. Interruption in services was slight due to the flood-preventive efforts of utility companies. The total damages to utilities were about \$29,000.

h. Damages to stream channels. Silt and debris were deposited along the lower Indian Bend Wash. Land along the banks was lost due to the erosive velocity of floodwaters within the wash. The total damages to stream channels were about \$32,000.

i. Damages to irrigation works. The floodwaters overtopped the Arizona Canal where it intersects Indian Bend Wash, causing numerous breaks east of the wash on the south bank of the canal. The spillway at this intersection was also overtopped. Repairs to the Arizona Canal consisted of restoring the various washouts; rebuilding the roads and bank; and redigging and leveling the pump ditch. The total damages to the irrigation works were about \$35,000.

26. LOWER INDIAN BEND WASH (McKELLIPS ROAD TO THE SALT RIVER IN THE CITY OF TEMPE). The flooded area in this reach is shown on pl. 10 and amounts to 450 acres. The floodwaters exceeded the capacity of the wash, damaging properties along and adjacent to the wash. The water depth ranged from 1/2 to 3 feet outside and from a few inches to 2 feet inside the structures. Commercial property sustained the most severe damages -- about \$247,000. The total damages in all categories were about \$372,000. A summary of estimated damages appears in table 4. The following subparagraphs give pertinent information on the damages in this reach.

a. Damages to residential property. Residential property was damaged when floodwaters exceeded the capacity of the wash in the general area bounded on the north by McKellips Road, on the south by Princess Drive, on the west by Scottsdale Road, and on the east by Miller Road. Damages occurred to 52 homes when floodwaters ranging in depth from a few inches to 2 feet entered the homes and damaged carpets and contents. The depth of the floodwater inside the homes ranged from a few inches to a foot. Many houses whose foundations were about 1 foot above ground level suffered only yard damages. The value of the houses ranged from \$10,000 to \$20,000. Included in the damages in this category are the funds expended by the Arizona National Guard for the care and rescue of the flood victims during the flood. The total damages to residential property were about \$48,000.



These homes near Princess Drive in Tempe were inundated.

14 ✓

b. Damages to commercial property. Floodwaters damaged numerous commercial businesses on Princess Drive, Scottsdale Road, and Hayden Road. Some businesses sustained damages to contents but most of the drainages resulted from cleanup operation. The businesses included auto shops, boating shops, printing shops, a welding shop, a supply store, a paving company, a concrete supply company, a nightclub, a radio station, a race track, a salvage yard, and the Big Surf, a recreation center for surfers. The floodwater depth ranged from 1/2 to 2 feet outside and from a few inches to 1 foot inside the structures. A total of 39 commercial businesses were affected by the floodwaters in this reach. The total damages to commercial property were about \$247,000.

c. Damages to industrial property. Most of the flood-damaged industrial property was along Scottsdale Road and Princess Drive north of the Salt River. The industrial properties included construction companies and manufacturers of plastics, springs, sheet metals, stakes, and electronic parts. The floodwater depth ranged from 1/2 to 2 feet. The depth of floodwaters in the structures ranged from a few inches to 1 foot. A total of 14 industrial businesses sustained flood damages to equipment and yards in the amount of about \$68,000.

d. Damages to public property. Flood damages in this category were relatively minor. The property damaged consisted of a pet mortuary that had damages to contents and an animal shelter on Scottsdale Road that had silt and debris deposited on the parking lot. The total damages to public property were about \$4,000.

e. Damages to agricultural property. Floodwaters inundated two ranches next to the wash south of McKellips Road, damaging corrals, pens, and storage areas and depositing silt and debris. The fence and yard of a greyhound ranch on Scottsdale Road south of Princess Drive were also damaged. These three agricultural units had flood damages of about \$2,000.



Indian Bend Wash was converted into a smooth plain of water damaging a farm near McKellips Road.

152

f. Damages to stream channels. Damages in this category included the deposition of silt and debris along the wash and the loss of land due to erosion. The total damages to stream channels were about \$3,000.

TABLE 4

SUMMARY OF FLOOD DAMAGES FROM THE 22 JUNE 1972 FLOOD ALONG

INDIAN BEND WASH

Area of flooding Type of property	Upper Indian Bend Wash		Lower Indian Bend Wash	
	Paradise Valley (2,350 ac.)	City of Scottsdale (850 ac.)	City of Scottsdale (1,000 ac.)	City of Tempe (450 ac.)
Residential:				
Physical damage	\$167,000	\$ 26,000	\$ 174,000	\$ 37,000
Business loss and emergency cost	17,000	3,000	37,000	11,000
Commercial:				
Physical damage	—	—	17,000	148,000
Business loss and emergency cost	—	—	169,000	99,000
Industrial:				
Physical damage	—	—	—	53,000
Business loss and emergency cost	—	—	—	15,000
Public:				
Physical damage	1,000	1,000	125,000	3,000
Business loss and emergency cost	3,000	0	67,000	1,000
Parks and recreation areas:				
Physical damage	1,000	150,000	84,000	—
Business loss and emergency cost	14,000	2,000	51,000	—
Agricultural:				
Physical damage	2,000	17,000	73,000	1,000
Business loss and emergency cost	1,000	12,000	14,000	1,000
Streets, roads, and bridges:				
Physical damage	3,000	4,000	36,000	—
Business loss and emergency cost	1,000	16,000	144,000	—
Utilities:				
Physical damage	32,000	—	26,000	—
Business loss and emergency cost	8,000	—	3,000	—
Stream channels:				
Physical damage	—	—	30,000	2,000
Business loss and emergency cost	—	—	2,000	1,000
Irrigation works:				
Physical damage	—	—	32,000	—
Business loss and emergency cost	—	—	3,000	—
Subtotal, physical damage	206,000	198,000	597,000	244,000
Subtotal, business loss and emergency cost	44,000	33,000	490,000	128,000
Total	\$250,000	\$231,000	\$1,087,000	\$372,000
Grand Total - Upper and Lower Indian Bend Wash - \$1,940,000		28		

27. ARIZONA CANAL. Flooding occurred along and below the Arizona Canal. For the purposes of this report, the area above the Arizona Canal is divided into two reaches the Scottsdale area, from the Indian Bend Wash intersection to 64th Street, and the Phoenix area, from 64th Street to Cave Creek. The area below the canal is discussed in the section titled "Breaks in the Arizona Canal."

28. ARIZONA CANAL (Indian Bend Wash intersection to 64th Street in Scottsdale). This reach is about 4 miles long. Floodwaters from Indian Bend Wash flowed towards and alongside the Arizona Canal causing flood damages above the canal. Water ponded along the canal with depths of 1-1/2 to 3-1/2 feet. The flooded area, amounting to 300 acres, is shown on pl. 11 and 12. The major damages along the Arizona Canal in the City of Scottsdale accrued to (\$804,000) residential property and commercial property (\$365,000). Minor flood damages occurred to agricultural property (\$6,000); public property (\$4,000); utilities (\$5,000); and to streets, roads, and bridges (\$3,000). A summary of the total damages, estimated at \$1,187,000, is shown in table 5. The following subparagraphs give pertinent flood damage information for the major damages in this reach.



Residential property above the Arizona Canal in the vicinity of 68th Street in Scottsdale also was damaged by silt deposits.



Commercial property above the Arizona Canal at Scottsdale and Camelback Roads in Scottsdale was inundated by floodwaters, silt, and debris.

a. Damages to residential property. Residential market values ranged from \$30,000 to \$60,000. Floodwaters from Indian Bend Wash, which carried large quantities of debris and silt, damaged carpets and furniture. Outside water depths ranged from 1-1/2 to 3-1/2 feet. The depths of floodwaters inside the damaged properties varied according to the efforts of the residents to keep the water out. Business losses of about \$96,000 consisted of time loss from work and the cost of temporary lodging. Total residential damages amounted to about \$804,000.



Rowboat navigates Woodmere Fairway when floodwaters 4-feet deep inundated a residential area above the Arizona Canal north of Camelback Road in Scottsdale.

(17) ✓



Muddy waters inundated these homes above the Arizona Canal along La Fayette Blvd. in Scottsdale.

b. Damages to commercial property. A car agency at Camelback and Scottsdale Roads was inundated with 2 feet of water.



Car agency at Camelback and Scottsdale Roads in Scottsdale is surrounded by debris and silt-carrying waters that ponded above the Arizona Canal.

About 19 commercial establishments sustained flood damages east of Scottsdale Road and north of Camelback Road. The shopping center at Camelback and Scottsdale Roads also sustained flood damages.



Residents waded through hip-high floodwaters that swamped businesses on Scottsdale Road north of Camelback Road in Scottsdale.

19✓

The largest commercial establishment damaged by floodwaters was the Safari Hotel complex, also at Scottsdale and Camelback Roads. Waters up to 3 feet were reported in the parking lots. Patrons in the hotel restaurant were in waters up to their knees. The estimated damages to commercial property totaled \$365,000.



Patrons resort to floating their luggage when floodwaters engulfed this hotel on Scottsdale Road north of Camelback Road in Scottsdale.

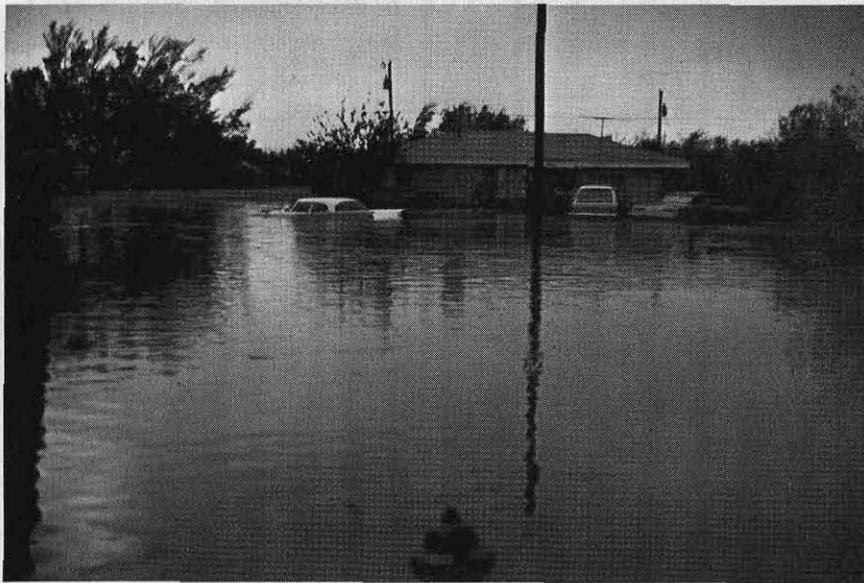
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Automobiles are almost submerged in floodwaters that filled the interior patio of the same hotel in Scottsdale.

29. ARIZONA CANAL (64th Street to Cave Creek in Phoenix). This reach, is about 12 miles long, was flooded mostly by the backwater from local runoff ponded along and above the canal bank. The flooded area along this reach of the Arizona Canal amounting to 500 acres, is shown on pl. 13 through 16. Flood damages in this part of the City of Phoenix totaled about \$608,000. The major damages occurred to residential, commercial, and public properties as well as irrigation works. Such sustained damages totaled \$584,000. Minor damages occurred to park and recreation areas (\$9,000); to streets, roads, and bridges (\$6,000); and to utilities (\$9,000). A summary of damages sustained by various types of property is shown in table 5. The following subparagraphs give pertinent information on the major flood damages along this part of the canal.

a. Damages to residential property. Homes and properties directly above the canal were the hardest hit by the flood. Damages occurred mostly to contents and landscaping. Because local drainage facilities were not sufficient to carry the floodwaters across the canal, ponding occurred. Outside water depths in the flooded area ranged from 1 to 3 feet. Business losses of about \$60,000 consisted of loss of time, the cost of temporary lodging and the costs of the American Red Cross for emergency aid to the residents. Damages to residential properties totaled about \$478,000.



Residents wade in and out of home above the Arizona Canal at 13th Street and Orangewood Avenue in Phoenix.

21(a)



Another inundated home at 13th Street and Orangewood Avenue in Phoenix.

21

b. Damages to commercial property. Water inundated the basement and the ground floor of the Arizona Biltmore Hotel north of the Biltmore Golf Course, damaging much of the operating equipment. In general, flood damages to commercial establishments were minimal because few commercial areas exist above the canal. Total commercial damages were estimated at \$29,000.

c. Damages to public property. Included in this category are the emergency costs of the police department. The total estimated public damages were \$15,000.

d. Damages to parks and recreation area. Floodwaters flooded the Granada Park on 20th Street above the Arizona Canal. About 1,000 yards of grass was destroyed and 10 trees were washed out. The park was closed for about 1 week. Total damages were estimated at \$9,000.

e. Damages to streets, roads, and bridges. Floodwaters in streets and roads caused delays to motorists, and deposited silt in the roadways. The cost of delays, cleanup, and traffic control was estimated at \$6,000.

f. Damages to utilities. Damages to utility facilities consisted of flood damages to the electrical and telephone systems along the canal. Total damages to utilities were about \$9,000.

g. Damages to irrigation works. Floodwaters overtopped the canal banks at various locations and destroyed levees. Trash accumulated at trash grates and the debris had to be removed. Damages and emergency cost totaled about \$62,000.

TABLE 5

SUMMARY OF FLOOD DAMAGES ABOVE THE ARIZONA CANAL
FROM THE 22 JUNE 1972 FLOOD

Area of flooding Type of property	City of Scottsdale (300 ac.)	City of Phoenix (500 ac.)
Residential:		
Physical damage	\$708,000	\$418,000
Business loss and emergency cost	96,000	60,000
Commercial:		
Physical damage	288,000	22,000
Business loss and emergency cost	77,000	7,000
Public:		
Physical damage	2,000	0
Business loss and emergency cost	2,000	15,000
Parks and recreation areas:		
Physical damage	--	4,000
Business loss and emergency cost	--	5,000
Agricultural:		
Physical damage	5,000	--
Business loss and emergency cost	1,000	--
Streets, roads, and bridges:		
Physical damage	1,000	4,000
Business loss and emergency cost	2,000	2,000
Utilities:		
Physical damage	1,000	8,000
Business loss and emergency cost	4,000	1,000
Irrigation works:		
Physical damage	--	56,000
Business loss and emergency cost	--	6,000
Subtotal, physical damage	1,005,000	512,000
Subtotal, business loss and emergency cost	182,000	96,000
Total	1,187,000	608,000
Grand Total	\$1,795,000	

30. BREAKS IN THE ARIZONA CANAL. Pertinent information on damages due to breaks on the south bank of the Arizona Canal is given in the following subparagraphs. A summary of damages is shown in table 6.

a. 23rd Avenue. At the junction of Cave Creek and the Arizona Canal near 23rd Avenue the floodwaters were confined in the creek. Floodwaters went over the spillway south of the canal, but caused no reported damage to a citrus grove below the spillway. The waters then flowed to Dunlap Avenue and were diverted into side streets and storm drains. Very little flooding occurred in this area because it was on the western fringe of the storm.



A view of the junction of Cave Creek and the Arizona Canal near 23rd Avenue in Phoenix.

22

b. Central Avenue. The Arizona Canal was breached at the southeast corner of the Central Avenue crossing. (See pl. 15.) The water depth was about 4 feet immediately below the canal.



Repairs are started on the break in the Arizona Canal's south bank east of Central Avenue in Phoenix.

The total damages resulting from this break were estimated at \$315,000, the flooded area, amounting to 12 acres, is shown on pl. 15.

(1) Damages to commercial property. A restaurant on Central Avenue was flooded. The floodwaters, which were about 4 feet deep inside this building, caused total damages to contents estimated at \$99,000. The floodwaters were then channeled into Central Avenue and diverted into side streets and storm drains. No damages were reported to commercial facilities or residences south of the restaurant.

(2) Damages to public property. The flood damaged a riding trail along Central Avenue between Northern Avenue and Bethany Home Road. Also included as damages under this category are the costs incurred by the fire and police departments for their assistance to flood victims. Total public damages were estimated at \$16,000.

(3) Damages to streets, roads, and bridges. Floodwaters in streets and roads caused delays to motorists, but only minor physical damages to streets were reported. The costs of delays detours, and traffic control were estimated at \$200,000.

b. Central Avenue. The Arizona Canal was breached at the southeast corner of the Central Avenue crossing. (See pl. 15.) The water depth was about 4 feet immediately below the canal.



Repairs are started on the break in the Arizona Canal's south bank east of Central Avenue in Phoenix.

The total damages resulting from this break were estimated at \$315,000, the flooded area, amounting to 12 acres, is shown on pl. 15.

(1) Damages to commercial property. A restaurant on Central Avenue was flooded. The floodwaters, which were about 4 feet deep inside this building, caused total damages to contents estimated at \$99,000. The floodwaters were then channeled into Central Avenue and diverted into side streets and storm drains. No damages were reported to commercial facilities or residences south of the restaurant.

(2) Damages to public property. The flood damaged a riding trail along Central Avenue between Northern Avenue and Bethany Home Road. Also included as damages under this category are the costs incurred by the fire and police departments for their assistance to flood victims. Total public damages were estimated at \$16,000.

(3) Damages to streets, roads, and bridges. Floodwaters in streets and roads caused delays to motorists, but only minor physical damages to streets were reported. The costs of delays detours, and traffic control were estimated at \$200,000.

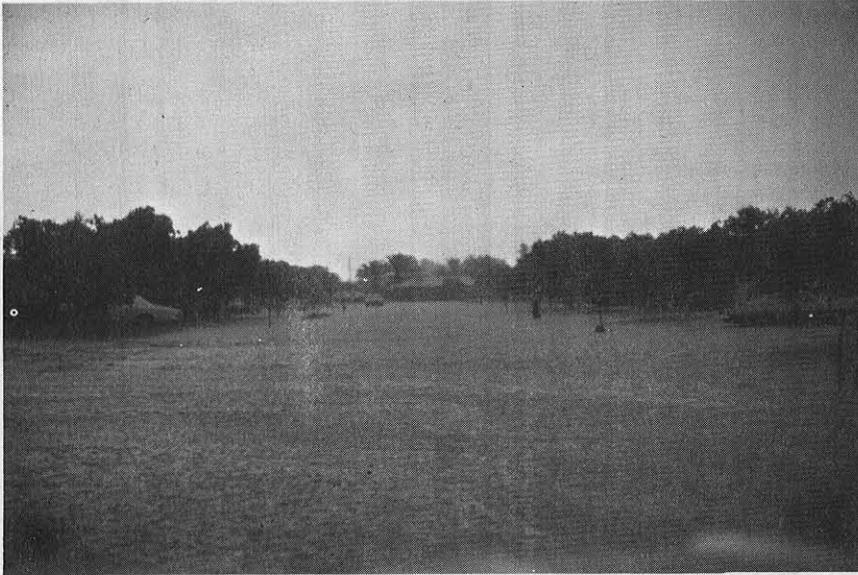
e. 16th Street and 18th Place. Overtopping of the Arizona Canal at 16th Street was the major cause of the flood damages south of Glendale Avenue. Floodwaters with an estimated velocity ranging from 3 to 5 f.p.s. flowed across Lamar and Ocotillo Roads to Bethany Home Road before spreading out southward to the Grand Canal. Another break occurred near 18th Place, releasing floodflows that flowed along Ocotillo Road before crossing 16th Street. Outside water depths ranged from 6 inches to 1-1/2 feet. The flooded area, amounting to 115 acres, is shown on pl. 14. Flood damages resulting from these breaks were estimated at \$82,000.



Floodwaters and debris gush over the top of the southern bank of the Arizona Canal east of 16th Street in Phoenix.

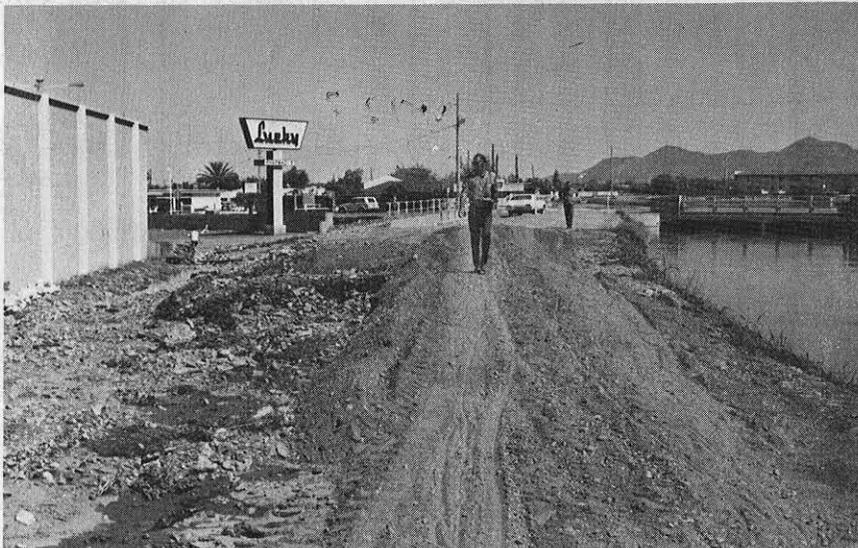
25

(1) Damages to residential property. Home values in the flooded area ranged from \$12,000 to \$20,000. The flood inundated about 56 homes causing damages estimated at \$52,000 to contents and landscaping.



Residences below the Arizona Canal west of 16th Street in Phoenix were inundated when floodwaters overtopped the south bank.

(2) Damages to commercial property. A food market on Glendale Avenue south of the Arizona Canal sustained damages when floodwaters 4 feet deep partially destroyed its retaining wall and parking lot. A pizza parlor on 16th Street sustained damages to contents. The total damages to commercial property were about \$20,000.



A Corps of Engineers employee reviews damages resulting from the 16th Street break in the Arizona Canal near Glendale Ave. in Phoenix.

(3) Damages to streets, roads, and bridges. Floodwaters in streets and roads caused delays to motorists, and deposited silt in the roadways. The cost of delays, cleanup, and traffic control was estimated at \$5,000.

(4) Damages to utilities. Damages to utility facilities consisted of flood damages to the telephone system below the canal. Total damages to utilities were about \$5,000.

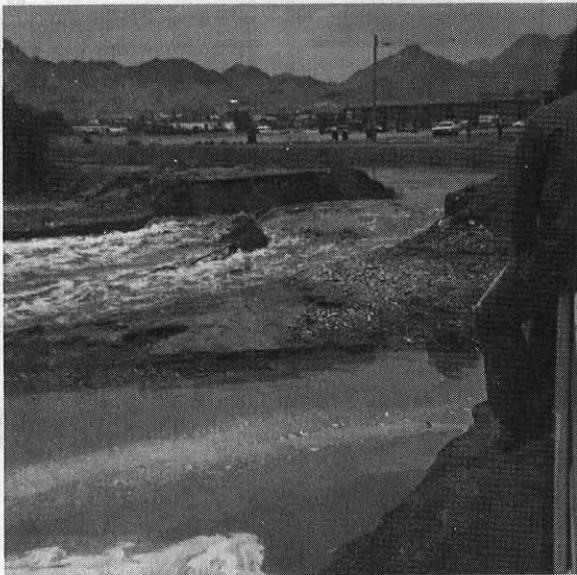
f. 20th Street. The Arizona Canal overflowed its south bank near 20th Street in Phoenix. The overtopping which started about 400 feet southeast of Maryland Avenue extended for about 400 feet along the canal. The floodwaters flowed southwestward and rapidly spread out and diminished in depth. The flooded area amounting to 2 acres is shown on pl. 14. Outside water depths averaged about 6 inches. Total damages in this area accruing to 10 residences, were about \$6,000.

g. 32nd Street and 40th Street. The flooding in this area, amounting to 2,800 acres, resulted from local runoff caused by the thunderstorms centered at 24th Street and Camelback Road and from floodwaters gushing from spillways and breaks in the canal. Floodwaters caused breaks in the south bank of the canal at 30th Street and 40th Street and overtopped the spillways at 30th Street, 32nd Street, and 40th Street. (See pl. 19)



Children play in floodwaters that overtopped the Arizona Canal spillway on the south bank west of 40th Street in Phoenix.

27



Floodwaters escape through a break in the Arizona Canal west of 40th Street in Phoenix.

29

The floodwaters combined near 28th Street and Indian School Road, then spread out until the waters ponded along the Grand Canal. The overflow area of about 5 square miles, extended from the Arizona Canal on the north to the Grand Canal on the south, and from 40th Street on the east to 12th Street on the west. Camelback Road from 40th Street to 16th Street resembled a river. Outside water depths ranged from 4 feet near the breaks to 1-1/2 to 2 feet near the Grand Canal. The floodwaters wiped out block-wall fences and caused serious structural damages. Total damages in this area were estimated at \$3,768,000, 85 percent of which accrued to residential property.



Floodwaters inundate residences along 38th Place as shown in this view looking northwest from Camelback Road in Phoenix.

(1) Damages to residential property. The market values of homes in the overflow area ranged from \$10,000 to \$60,000 and up. Outside water depths, which varied according to the local terrain, averaged 2 to 4 feet. About 2,600 homes and 15 apartment complexes were flooded. Water depths inside the homes ranged from 1 inch to 2 feet and resulted in damages to carpets and contents. The apartment complex at 28th Street and Camelback Road, which had inside water depths of about 4 feet, incurred substantial damages. About 70 automobiles were damaged in the parking lot of the Cascades Apartments at 35th Street and Campbell Avenue. The damages ranged from \$500 to \$4,000 per home. The total residential damages resulting from the combined breaks amounted to about \$3.2 million.



This house east of 32nd Street was severely damaged when floodwaters overtopped the spillway on the south bank of the Arizona Canal in Phoenix.

29



Homeowner on 38th Street and Camelback Road in Phoenix surveys damage from floodwaters and debris.



This family stands disconsolate in knee-deep floodwaters that entered their home at 38th Place and Camelback Road in Phoenix.

130

(2) Damages to commercial property. Commercial damages occurred throughout the overflow area. Large commercial complexes are along Camelback Road between 20th Street and 24th Street. Floodwaters estimated at 2,500 c.f.s. with a velocity of 5 f.p.s. swept through the Biltmore Shopping Center at 24th Street and Camelback Road that included some of the largest department stores in Phoenix. Outside water depths in the shopping areas ranged from 6 inches to 2 feet. Damages to contents and landscaping in the shopping center totaled about \$265,000. In addition about 20 stores between 20th to 24th Street on Camelback Road also sustained damages in the amount of about \$51,000. Total commercial damages resulting from the breaks were estimated at \$316,000.

(3) Damages to public property. The Camelback High School at 28th Street and Campbell Avenue was damaged when floodwaters 5 inches to 1-1/2 feet deep entered the buildings and damaged carpets and contents. Also included in this category are the costs incurred by the fire and police departments for their assistance to flood victims. The total damages to public property were about \$17,000.

(4) Damages to parks and recreation areas. The park department lost about 12,000 square feet of plantings along 20th Street above Camelback Road. The total estimated damages are \$4,000.

(5) Damages to streets, roads and bridges. Physical damages to streets and roads were negligible. Included in this category are damages for loss of time due to the additional traveling and delays experienced by residents. The total damages to streets and roads were about \$200,000.



Young girl experiences difficulty crossing the intersection of 32nd Street and Campbell Avenue in Phoenix.

31

(6) Damages to utilities. Damages to utility facilities consisted of flood damages to the electrical and telephone systems below the canal. Total damages to utilities were about \$28,000.

TABLE 6

SUMMARY OF FLOOD DAMAGES FROM BREAKS IN THE
ARIZONA CANAL, PHOENIX
DURING THE 22 JUNE 1972 FLOOD

Area of flooding Type of property	Central Ave. (12 ac.)	7th St. (75 ac.)	12th St. (15 ac.)	16th St. & 18th Pl. (115 ac.)	20th St. (2 ac.)	32nd St. 40th St. (2,800 ac.)
Residential:						
Physical damage	---	\$4,000	\$14,000	\$47,000	\$5,000	\$2,755,000
Business loss and emergency cost	---	2,000	2,000	5,000	1,000	448,000
Commercial:						
Physical damage	\$90,000	---	---	15,000	---	216,000
Business loss and emergency cost	9,000	---	---	5,000	---	100,000
Public:						
Physical damage	8,000	---	4,000	---	---	3,000
Business loss and emergency cost	8,000	---	1,000	---	---	14,000
Parks and recreation areas:						
Physical damage	---	---	---	---	---	3,000
Business loss and emergency cost	---	---	---	---	---	1,000
Agricultural:						
Physical damage	---	1,000	---	---	---	---
Business loss and emergency cost	---	0	---	---	---	---
Streets, roads, and bridges:						
Physical damage	0	0	---	4,000	---	0
Business loss and emergency cost	200,000	51,000	---	1,000	---	200,000
Utilities:						
Physical damage	---	---	4,000	4,000	---	24,000
Business loss and emergency cost	---	---	1,000	1,000	---	4,000
Subtotal, physical damage	98,000	5,000	22,000	70,000	5,000	3,001,000
Subtotal, business loss and emergency cost	217,000	53,000	4,000	12,000	1,000	767,000
Total	315,000	58,000	26,000	82,000	6,000	3,768,000
Grand Total	\$4,255,000					

31. GRAND CANAL. The 22 June 1972 flood inundated areas above and below the Grand Canal in the City of Phoenix. This section discusses the flooded area above the canal. The flood-damaged area below the canal is described in the section titled "Breaks in the Grand Canal."

32. GRAND CANAL (15th Avenue to 44th Street in Phoenix). This flooded reach, 8 miles long covered 350 acres, as shown on pl. 17 and 18.

Flooding was caused by ponding of local runoff behind the canal levee. The floodwaters, which had a velocity of less than 5 f.p.s., ranged from 2 to 5 feet directly behind the canal bank to 2 to 3 inches two blocks north of the canal. Total damages in this area are estimated at \$1,717,000. A summary of damages to the various types of property is shown in table 7.

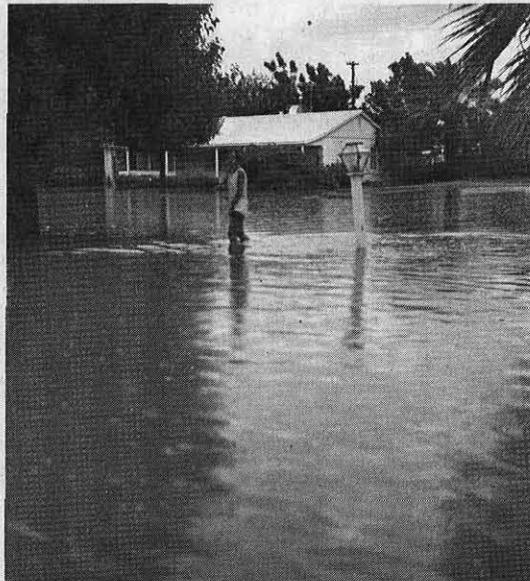
a. Damages to residential property. The flooded area is predominantly residential, characterized by single-family homes ranging in value from \$7,000 to \$25,000. Small 10- to 20-unit apartments are scattered throughout the flooded area, with two major apartment complexes on 12th Street. There were extensive flood damages to residential properties throughout the area. The damages ranged from \$500 to \$2,000 per home. The major items damaged were carpets, drapes, furniture, and the flooring. In two houses constructed with plaster-covered adobe bricks, the walls completely disintegrated. Damages to 510 residential units in the area extending from 15th Avenue to Indian School Road were about \$1,043,000. Damage to 90 units in the area extending from 24th to 44th Streets amounted to \$111,000. Also included in this category are the costs incurred by the American Red Cross. Flood damages to residential property, totaled about \$1,154,000.



Muddy waters almost reach the windows of homes above the Grand Canal east of 7th Street in Phoenix.

Resident wades in knee-deep water covering front yards of homes east of 24th Street above the Grand Canal in Phoenix.

32



b. Damages to commercial property. Businesses, which predominate along 7th Avenue and Central Avenue, were subjected to flooding. Floodwaters inundated 30 commercial stores resulting in damages to contents and business losses totaling about \$441,000.



38

An upholstering business above the Grand Canal at Cambridge Avenue and 24th Street in Phoenix is flooded.

c. Damages to public property. Floodwaters, overtopping the north bank of the Grand Canal, caused extensive damages to the contents and landscape of two parochial schools on Central Avenue. Water depths of 2 feet occurred in the area.



The Brophy College gymnasium building above the Grand Canal east of Central Avenue in Phoenix is engulfed by floodwaters.

Included as damages under this category are the costs incurred by the Phoenix police department for assisting people during the flood. The total flood damages to public property were about \$28,000. In addition, although the Phoenix Indian Hospital at Indian School Road and 16th Street sustained negligible physical damages, the hospital's functioning was impaired. The flood prevented 50 staff members from getting to work and also prevented the transportation to the hospital of patients who had been flown into the airport from outlying areas.

d. Damages to parks and recreation areas. The Madison Park on 16th Street above the Grand Canal sustained flood damages when 6,000 yards of grass was damaged, one mile of berm was eroded, and the swimming pool silted. The total damages are estimated at \$8,000.

e. Damages to utilities. Although electrical services along the canal were interrupted, utilities in this reach were not extensively damaged. The total damages to utilities were about \$5,000.

f. Damages to irrigation works. The Salt River Project had to repair the following: cuts made in the Grand Canal by property owners to permit waters from the north to drain into the canal; seven breaks in the south bank of the canal; and eroded banks along the canal. Silt deposits in the canal also had to be removed. Total damages to the irrigation works were about \$81,000.

33. Breaks in the Grand Canal. Pertinent information on damages due to breaks on the south bank of the Grand Canal is given in the following subparagraphs. A summary of damages is shown in table 7. The flooded area is shown on pl. 18.

a. 12th Avenue. Flooding occurred in the City of Phoenix when floodwaters overtopped the Grand Canal between 11th and 15th Avenues. The flooded area amounted to 60 acres. The floodwaters flowed southward and dispersed into the city streets. Water depths ranged from 1 to 3 feet. Total flood damages which were estimated at \$142,000 occurred to residential property only. About 100 residential units sustained damages to contents and landscaping.

b. Central Avenue. Flooding extended from the south bank of the Grand Canal to Osborn Road and amounted to 140 acres. The floodwaters were generally confined between Central Avenue and 3rd Street. The velocity of the flow below Indian School Road was under 5 f.p.s. Outside water depths ranged from 1 to 4 feet. Total damages in this area were about \$461,000.

(1) Damages to residential property. Residential damages were confined to an area south of Indian School Road, east of Central Avenue, west of 3rd Street, and north of Weldon Avenue. Landscaping and contents were damaged in 117 residential units. Because the residences south of Clarendon Avenue are built on high foundations, they were not damaged by the flood. Total residential damages were about \$140,000.

(2) Damages to commercial property. The flood damaged a restaurant at Central and Turney Avenues and 13 commercial establishments east of Central Avenue and south of Indian School Road. Commercial damages totaled about \$13,000.

(3) Damages to public property. Floodwaters gushed through the south bank of the Grand Canal east of Central Avenue. Central High School below the canal sustained flood damages when muddy water about 3 inches deep entered the rooms. Although the grounds of both the U.S. Indian School and the U.S. Veterans Hospital were flooded, water actually entered only the basement of the Indian School. The outside water depth was about 1-1/2 feet. Also included as public damages are the costs incurred by the police and fire departments for their assistance to flood victims. The total damages to public property were about \$107,000.

(4) Damages to streets, roads, and bridges. No major physical damage occurred to Central Avenue below the Grand Canal. Traffic control and delays to numerous motorists were problems in this heavily trafficked avenue. Included as emergency cost is the cost of the delays and the traffic control. The total damages to streets, roads, and bridges were about \$201,000.



Motorists endure stalled automobiles and traffic delays on Central Avenue near Indian School Road in Phoenix.

341

c. 7th Street. Floodwaters overtopped the Grand Canal eastward about a quarter of a mile from 7th Street. The flood dug many small trenches ranging from 1/2 to 1 foot in depth in the bank of the canal. Water depths ranged from 5 feet immediately below the canal bank to 1/2 foot at 7th Street and Renonshire Avenue. The flooded area amounted to 50 acres. The velocity of the floodflow which was high — over 5 f.p.s. — just below the bank decreased as the water flowed southward. Total damages in this area were about \$233,000.

(1) Damages to residential property. The flood damaged the contents of 117 ground floor apartments along Roma and Turney Avenues. Total damages were about \$162,000.

(2) Damages to commercial property. Fourteen stores on the east side of 7th Street were damaged by floodwaters. Building stones from a quarry below the canal were carried down 7th Street by the flood and posed a hazard to people trying to evacuate. Fortunately no one was injured. The total damages to commercial property were about \$13,000.

(3) Damages to public property. No public property in this reach was damaged. Included in emergency cost under this category is the cost incurred by the police and fire department for their assistance to flood victims. Damages in this category totaled about \$7,000.

(4) Damages to streets, roads, and bridges. No physical damages occurred to streets, although the flood did deposit silt on the roadways. Included in emergency cost is the cost for traffic control and for traffic delays. Total damages were \$51,000.

d. Longview Avenue. Damages totaling about \$15,000 occurred when floodwaters overtopped the bank of the Grand Canal between Longview Avenue and 13th Place. The depth of the water averaged about 1 foot and covered an area of 70 acres.

(1) Damages to residential property. Five residences accrued damages estimated at \$7,000.

(2) Damages to public property. The North Phoenix High School was damaged when water 1 inch deep entered one of the buildings and damaged the carpet. The outside water depth was about 1-1/2 feet. Total damages to public property were about \$8,000.

34. SUMMARY OF DAMAGES FROM 22 JUNE 1972 FLOOD. The flooding along Indian Bend Wash, the Arizona Canal, and the Grand Canal and resulting from breaks in the Arizona and Grand Canals caused damages in the Phoenix metropolitan area totaling an estimated \$10,558,000. The greatest damage resulted from the breaks in the Arizona Canal. Of these breaks, the ones at 32nd Street and 40th Street were responsible for the most damages - \$3,768,000. Although the flood imperiled hundreds of lives and inconvenienced thousands of people, only one life was lost. The following table summarizes the flood damages to the various types of property in the Phoenix metropolitan area:

TABLE 8

SUMMARY OF FLOOD DAMAGES FROM 22 JUNE 1972 FLOOD
IN THE PHOENIX METROPOLITAN AREA, ARIZONA

Type of property	Physical damages	Damages Business Loss and emergency cost	Total
Residential	\$5,808,000	\$834,000	\$6,642,000
Commercial	1,183,000	546,000	1,729,000
Industrial	53,000	15,000	68,000
Public	233,000	175,000	408,000
Parks and recreation areas	249,000	74,000	323,000
Agricultural	99,000	29,000	128,000
Streets, roads, and bridges	52,000	869,000	921,000
Utilities	103,000	23,000	126,000
Stream channels	32,000	3,000	35,000
Irrigation works	163,000	15,000	178,000
TOTAL	\$7,975,000	\$2,583,000	\$10,558,000

36. DAMAGES THAT WOULD HAVE BEEN PREVENTED BY GRANITE REEF AQUEDUCT (PARADISE REACH) ON THE CENTRAL ARIZONA PROJECT. The project would extend across Paradise Valley (see pl. 2) and provide for a detention levee to collect and hold floodwaters from the above drainage area. During the 21-22 June 1972 storm, the project if completed, would have collected the runoff from rainfall that averaged about 1-inch in intensity. This rainfall had little influence on the peak discharge along Indian Bend Wash at the Arizona Canal. This project, therefore, would have done little to prevent the flood drainage that occurred. The project would have had lesser influence on the flood situation — resulting from flows along and downstream from the Arizona and Grand Canals.

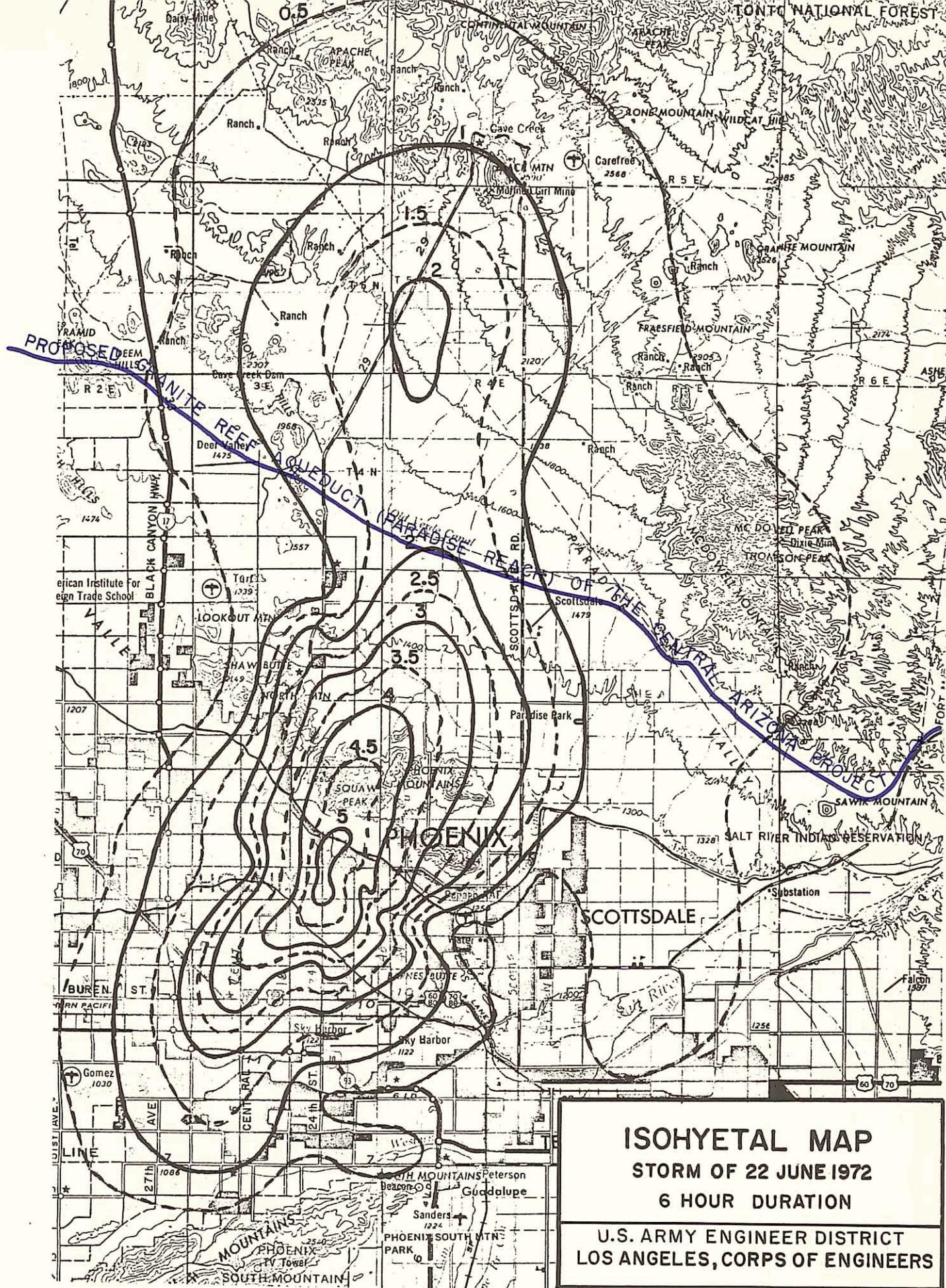
BIBLIOGRAPHY

37. The following data have been collected and are on file at the Corps of Engineers, Los Angeles District Office: newspaper accounts of the floods; plates and tables concerning high-water marks, and flood outlines; a U.S. Geological Survey report on the flood; a Channel 12 TV news film of the flood; and a photographic record of all areas of major flood damage.



LEGEND
 FLOODED AREA

INDEX MAP
 PHOENIX, ARIZONA AND VICINITY
 SCALE 1 2 3 4 5 MILES

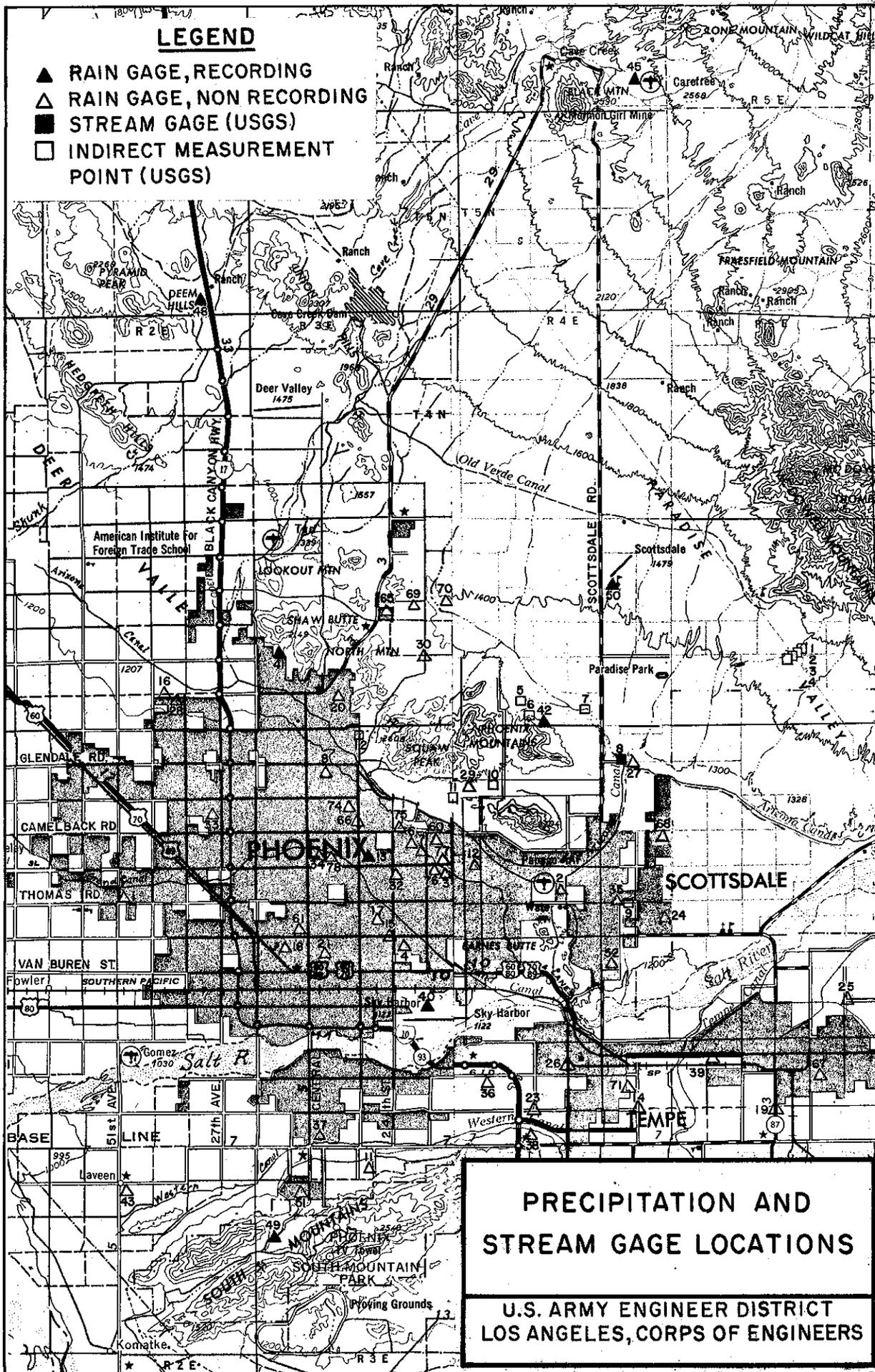


ISOHYETAL MAP
STORM OF 22 JUNE 1972
6 HOUR DURATION

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

LEGEND

- ▲ RAIN GAGE, RECORDING
- △ RAIN GAGE, NON RECORDING
- STREAM GAGE (USGS)
- INDIRECT MEASUREMENT POINT (USGS)



PRECIPITATION AND STREAM GAGE LOCATIONS

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

MASS RAINFALL CURVE

STORM OF JUNE 21-22 1972

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

LEGEND

- #13, 18th ST. & TURNEY
- #41, DEER VALLEY
- #42, MUMMY MOUNTAIN
- #50, THUNDERBIRD ACADEMY
(Numbers Correspond To Those in Table 1)

ACCUMULATED RAINFALL (INCHES)

5
4
3
2
1
0

#50
#41
#13
#42

6-21-72

0000

6-22-72

0000

TIME (HOURS)

0000

INDIAN BEND WASH

FLOOD HYDROGRAPH
AT STREAMGAGE
AT INDIAN BEND ROAD

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

NOTE: FLOOD HYDROGRAPH SHOWN WAS
BASED ON DEPTH-DISCHARGE RATING
CURVE FOR INDIAN BEND WASH AT
INDIAN BEND ROAD AND A CHART OF
GAGE HEIGHT VS. TIME FOR THE
STREAMGAGE AT INDIAN BEND ROAD
SUPPLIED BY THE USGS.

DISCHARGE (CFS X 10³)

16
14
12
10
8
6
4
2
0

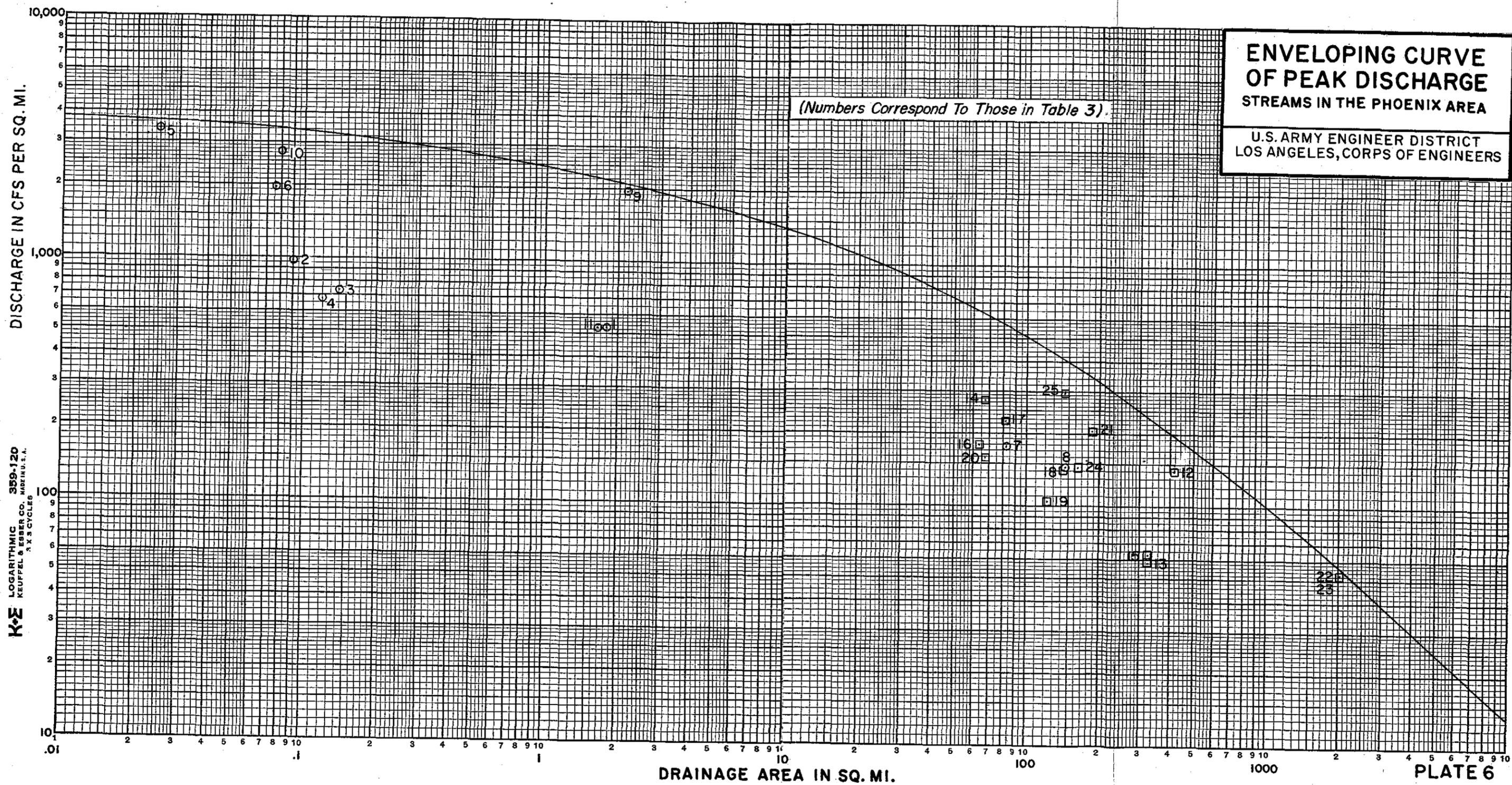
1600 1800 2400 0600 1200 1800 2400 0600 1200 1800 2400 0600 1200 1800

6-21-72

6-22-72

6-23-72

K&E LOGARITHMIC 359-120
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 X 3 CYCLES



**ENVELOPING CURVE
OF PEAK DISCHARGE
STREAMS IN THE PHOENIX AREA**

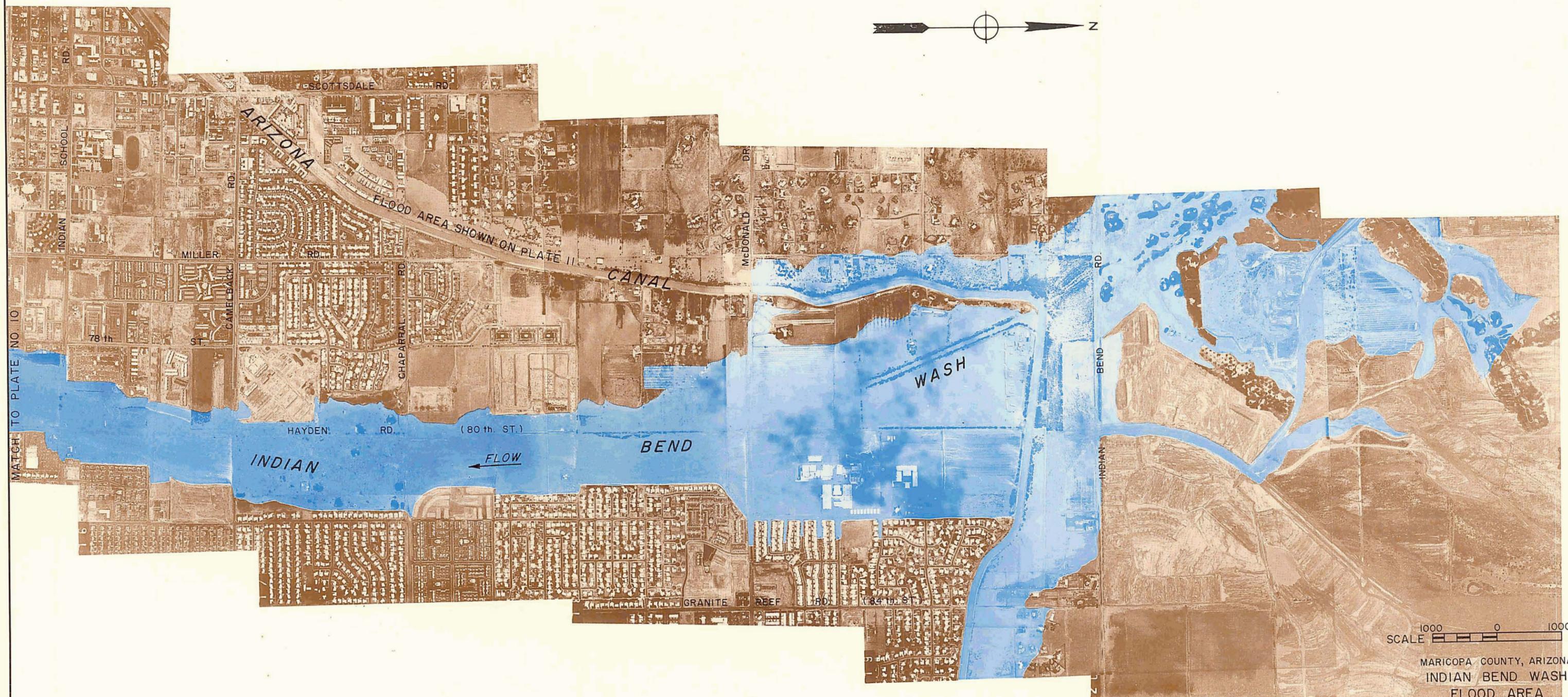
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS



MATCH TO PLATE 8

1000 0 1000
SCALE FEET

MARICOPA COUNTY, ARIZONA
 UPPER INDIAN BEND WASH
 FLOOD AREA
 HEARN RD TO INDIAN BEND RD.
 FLOOD OF 22 JUNE 1972



MATCH TO PLATE NO. 10

ARIZONA

FLOOD AREA SHOWN ON PLATE II
CANAL

INDIAN

FLOW

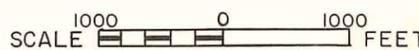
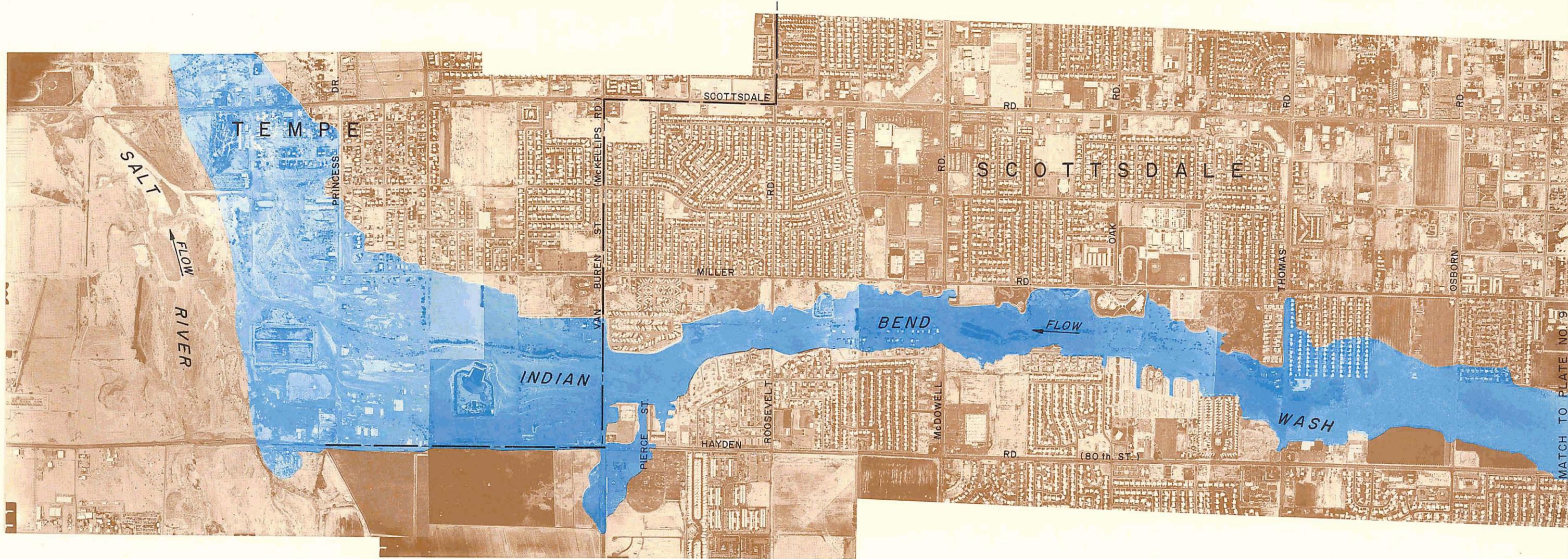
BEND

WASH

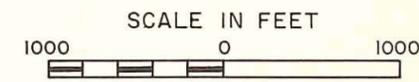
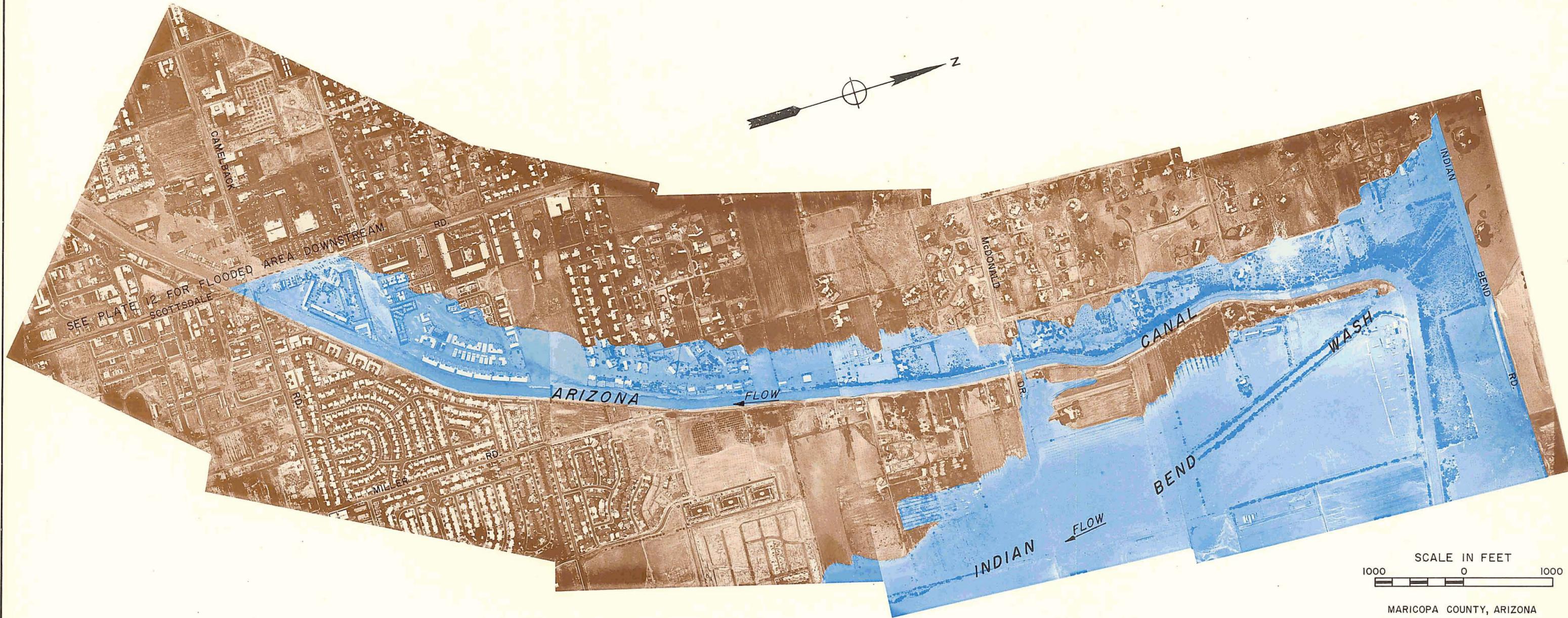
INDIAN BEND RD.

1000 0 1000
SCALE FEET

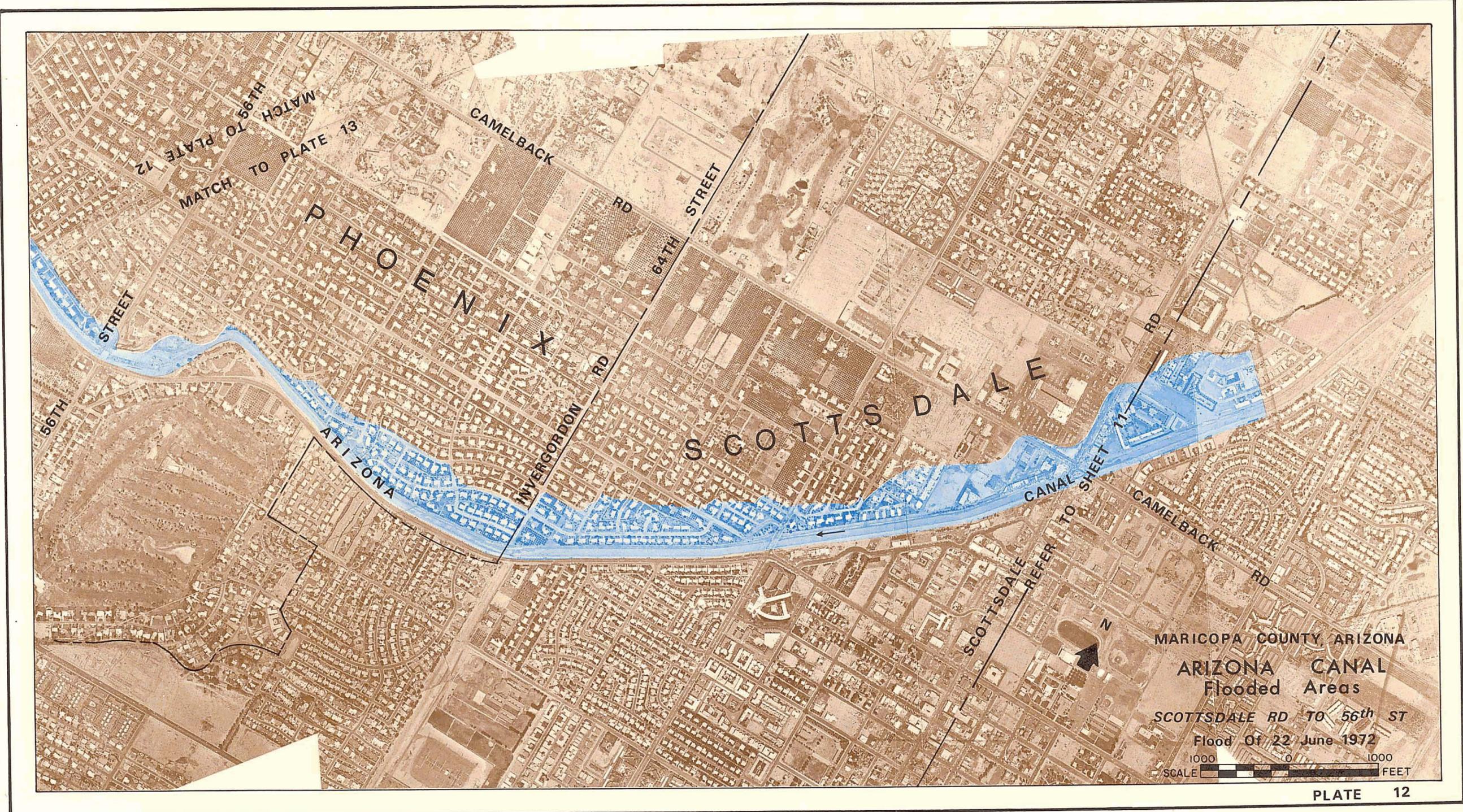
MARICOPA COUNTY, ARIZONA
INDIAN BEND WASH
FLOOD AREA
INDIAN BEND RD. TO SALT RIVER
FLOOD OF 22 JUNE 1972



MARICOPA COUNTY, ARIZONA
 INDIAN BEND WASH
 FLOOD AREA
 INDIAN BEND RD. TO SALT RIVER
 FLOOD OF 22 JUNE 1972



MARICOPA COUNTY, ARIZONA
 INDIAN BEND WASH
 FLOOD AREA
 ALONG ARIZONA CANAL FROM
 INDIAN BEND RD. TO SCOTTSDALE RD.
 FLOOD OF 22 JUNE 1972



MARICOPA COUNTY ARIZONA
ARIZONA CANAL
Flooded Areas
SCOTTSDALE RD TO 56th ST
Flood Of 22 June 1972



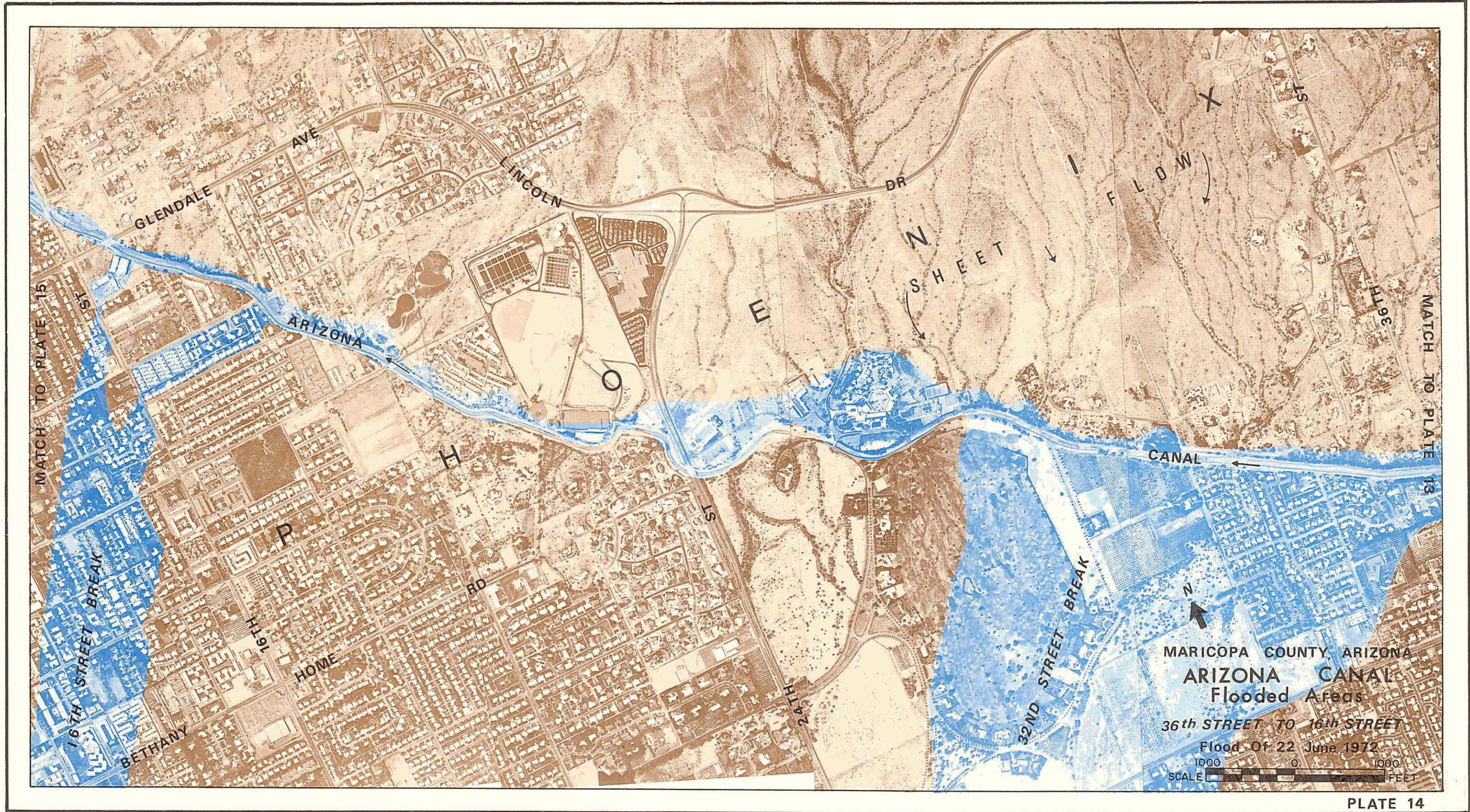


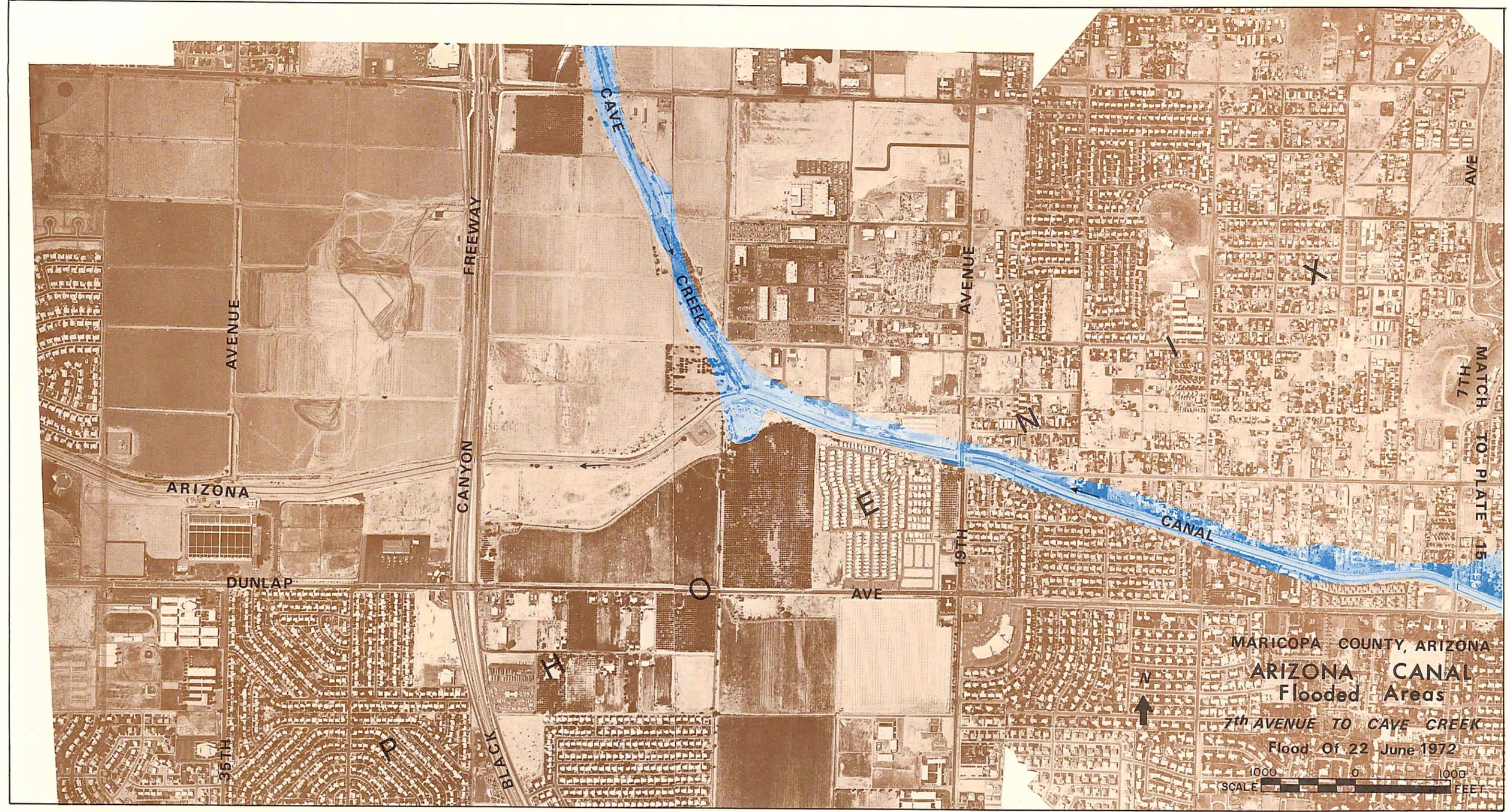
PLATE 14



MARICOPA COUNTY, ARIZONA
ARIZONA CANAL
Flooded Areas

16th STREET TO 7th AVENUE
Flood Of 22 June 1972

1000 0 1000
SCALE FEET



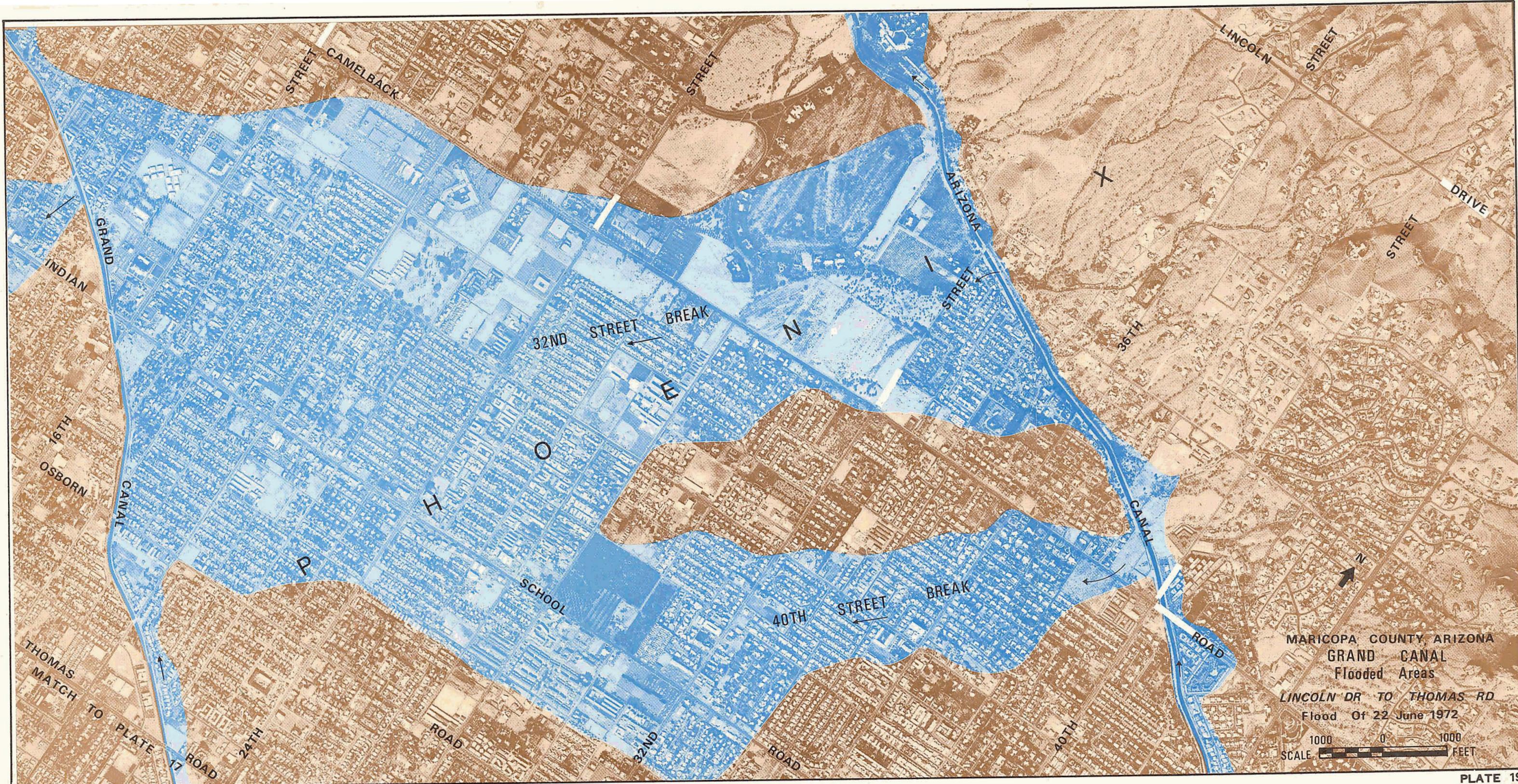
MARICOPA COUNTY, ARIZONA
ARIZONA CANAL
Flooded Areas
7th AVENUE TO CAVE CREEK
Flood Of 22 June 1972





MATCH TO PLATE 19

MARICOPA COUNTY, ARIZONA
GRAND CANAL
Flooded Areas
20th STREET TO 19th AVENUE
Flood Of 22 June 1972
1000 0 1000
SCALE FEET



MARICOPA COUNTY ARIZONA
GRAND CANAL
Flooded Areas
LINCOLN DR TO THOMAS RD
Flood Of 22 June 1972
SCALE 1000 0 1000 FEET