

**DESERT FLOOD OF  
AUGUST 3, 1943**

**PREPARED BY  
L. L. LEE**

**FCD COPY**

L. L. Lee

To: Mr. H. J. Lawson

Aug. 28, 1943

DESERT FLOOD OF AUGUST 3, 1943

Rain began falling Monday morning August 2nd and by afternoon some desert flood had reached the canals. Indian Bend waste gates were opened for a time during the evening but were closed again after inflow had diminished. Evergreen wasteway was opened and the Arizona Canal dried up at 5:50 PM., and gates closed again at 7:00 Pm. Some inflow was reported from Cave Creek during the night of August 2nd.

Rain started falling again about 3:00 AM of August 3, increasing in intensity until 7:00 AM, and finally abating at 11:00 AM. A total of 2.12 inches of rainfall was recorded during this period by the U. S. Weather Bureau Station at Phoenix and much heavier rains reported in the desert areas.

Upon suggestion of Mr. C. L. Williams, Mr. L. E. Estes and myself left the Phoenix Office at 9:30 AM with instructions to proceed westward from Lateral 6 on the Arizona Canal and ascertain if all checks and lateral gates were open.

The entire day was spent checking on and reporting conditions on the Arizona and Grand Canals and the flooded areas. August 4th and August 5th was spent checking on damage done by the flood and taking pictures of some of the damage.

To facilitate explanations of conditions this report has been divided into eight areas as indicated on the accompanying map. Locations of pictures are indicated on area maps with the direction of flow of flood waters shown in green and breaks in canal banks shown in red.

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PHOENIX OFFICE

WEATHER BUREAU

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August 2, 1943

<u>Period</u>	<u>Precipitation In Inches</u>
11-12 AM	T
12-1 PM	O
1-2 PM	O
2-3 PM	T
3-4 PM	.04
4-5 PM	.01
	<hr/>
Total. . . . .	.05

August 3, 1943

3-4 AM	.01
4-5 AM	O
5-6 AM	.20
6-7 AM	1.10
7-8 AM	.60
8-9 AM	.14
9-10 AM	.05
10-11 AM	.02
	<hr/>
Total. . . . .	2.12

RAINFALL REPORT  
U.S. WEATHER BUREAU

<u>1943</u>	<u>Wartime</u>	<u>Inches</u>
<u>TEMPE DATE ORCHARD</u>		
Sunday, August 1	1:00 AM	.25
Monday, August 2	3:15 PM to 3:45 PM	2.11
Tuesday, August 3	7:00 AM to 8:00 AM	1.42
	8:30 AM to 10:00 AM	.18
	Total	3.96

GRANITE REEF

Monday, August 2	6:00 PM	2.50
Tuesday, August 3	3:30 PM	2.62
	Total	5.12

PHOENIX AIR PORT

Sunday, August 1	12:30 AM	.25
	6:30 AM	.17
Monday, August 2	6:30 PM	.08
Tuesday, August 3	6:30 AM	.81
	12:30 PM	2.18
	Total	3.49

CAPACITY OF ARIZONA CANAL

Granite Reef to Arizona Falls . . . . .	2000 c.f.s.
Arizona Falls to Lateral 6. . . . .	1400 c.f.s.
Lateral 6 to Lateral 12 . . . . .	800 c.f.s.
Lateral 12 to Lateral 17. . . . .	600 c.f.s.
Lateral 17 to Lateral 20. . . . .	400 c.f.s.

CAPACITY OF CROSS CUT

New Cross Cut . . . . .	750 c.f.s.
Old Cross Cut . . . . .	450 c.f.s.

CAPACITY OF LATERALS

No. 1 . . . . .	75 c.f.s.
No. 2 1/2 . . . . .	7 c.f.s.
No. 3 . . . . .	25 c.f.s.
No. 6 . . . . .	88 c.f.s.
No. 7 . . . . .	30 c.f.s.
No. 9 . . . . .	10 c.f.s.
No. 10 . . . . .	33 c.f.s.
No. 11 . . . . .	25 c.f.s.
No. 11 1/2 . . . . .	20 c.f.s.
No. 12 . . . . .	33 c.f.s.
No. 12 1/2 . . . . .	10 c.f.s.
No. 13 . . . . .	40 c.f.s.
No. 13 1/2 . . . . .	38 c.f.s.
No. 14 . . . . .	40 c.f.s.
No. 14 1/2 . . . . .	38 c.f.s.
No. 15 . . . . .	75 c.f.s.
No. 15 1/2 . . . . .	13 c.f.s.
No. 16 . . . . .	93 c.f.s.
No. 17. . . . .	95 c.f.s.
No. 17 1/2 . . . . .	13 c.f.s.
No. 18. . . . .	73 c.f.s.
No. 19. . . . .	100 c.f.s.
No. 20. . . . .	200 c.f.s.

MAXIMUM CAPACITY OF GATES IN C. F. S.

<u>Location</u>	<u>C. F. S.</u>
Evergreen Wasteway	2000+
(Gates	2000
Indian Bend Wasteway (Spillway)	8000
Cross Cut	625
Old Cross Cut	750

ARIZONA CANAL RECORDER GAGE READING

Location	August 3, 1943		Maximum Operating State
	Max. Reading	Time	
Lateral 1	9.00	8:00 AM	6.70
Arizona Falls	6.37	11:30 AM	4.00
Old Cross Cut Lateral 6	4.15	12:00 Noon	3.25
Lateral 9 1/4	5.98	9:25 AM	3.65
Lateral 10	5.84	9:30AM	2.95
Lateral 11	7.35	9:00 AM	3.75
Tail Waste	4.27	2:30 PM	0.0

**DESERT FLOOD OF AUGUST 3, 1943**  
**Reported Gage Heights, Inflow**  
**and Canal Conditions**

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<u>GRANITE REEF</u>	<u>Time</u>	<u>Gage Height</u>
Rain reported	8:30 AM	---
Ordered to waste all water from Arizona Canal	8:30 AM	---
 <u>EVERGREEN WASTEWAY</u>		
Rain reached Evergreen -	7:05 AM	---
Waste Gates opened -	7:05 AM	---
Wasteway full & water going over gates & spillway into Arizona Canal -	10:50 AM	---
 <u>INDIAN BEND</u>		
Started Raining	6:00 AM	6.5
Desert Runoff reached canal	7:05 AM	---
5 c.f.s. desert inflow	7:15 AM	---
Ordered to hold maximum of 8.0' gage	7:50 AM	---
150 c.f.s. desert inflow	8:00 AM	6.8
Sacks removed from spillway	8:30 AM	---
1 spillway gate opened	9:15 AM	---
(wasting approximately 625 c.f.s.)		
All gates opened	9:30 AM	8.5
" " "	9:50 AM	9.6
Started spilling over spillway	10:05 AM	11.0
3 to 4 ft. going over spillway	10:30 AM	13.0 to 14.0
Canal reported breaking	11:00 AM	---
 <u>LATERAL 6</u>		
Ordered to open gates (Old Cross Cut) (25 c.f.s. in canal below 6)	7:35 AM	---
Indian Bend water reached Lateral 6	10:00 AM	---
Peak (450 c.f.s. to Old Cross-cut)	12:00 AM	4.20
Dropping fast	12:30 AM	3.95
 <u>LATERAL 7</u>		
Desert Inflow between Lats. 7 & 8 - 25 cfs	7:00 AM	---
Desert Inflow at Biltmore Bridge	7:15 AM	---
 <u>LATERAL 9</u>		
Desert Inflow reached canal	6:00 AM	---
25 c.f.s. desert inflow	7:20 AM	---
South bank overflowed at Lateral 9 3/4	9:00 AM	---

LATERAL 10

Gates raised and trash cleared prior to  
South bank of canal broke Lat. 10 1/8  
Inflow covered North bank for several  
hundred feet above and below check  
Canal started dropping  
Filled to overflowing again when Indian  
Bend water arrived

<u>Time</u>	<u>Gage Height</u>
10:00 AM	---
10:05 AM	---
10:30 AM	---
10:30 AM	---

LATERAL 11

All check gates raised  
South bank broke South of Northern Ave.  
Inflow covered North bank from Lateral 10 1/2  
to Lateral 10 3/4

7:30 AM	---
9:15 AM	---

LATERAL 12

Canal within six inches of top of South  
Bank (North Bank overflowing)  
Overflowed South bank above Lateral 13

8:00 AM	---
9:30 AM	---

LATERAL 13

Overflowed South bank below Lateral 13  
Check gates Lateral 13 not raised because  
Cave Creek was backing canal against  
gates.

9:00 AM	---
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CAVE CREEK

Inflow started  
175 c. f. s. inflow  
Sudden rise  
Break in South canal bank

9:00 PM 8/2/43	---
6:00 AM 8/3/43	---
6:15 AM "	---
12:00-1:00PM	---

LATERAL 14 1/2

Check gates raised  
Overflowed South bank below Lateral 14 1/2

6:15 AM	---
8:10 AM	---

LATERAL 16

All gates but one up

9:00 AM	---
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LATERAL 17

One check clear out  
Raised North gate clear out

8:30 AM	---
9:45 AM	6.2

LATERAL 18

	<u>Time</u>	<u>Gage Height</u>
Raised center check	7:15 AM	---
Desert inflow started	8:00 AM	---
All gates clear out & Lateral opened	9:45 AM	---

LATERAL 19

Check gates raised and 60 c.f.s. taken out through Lateral (inflow covered north bank)	9:45 AM	6.3
South bank below 19 broke	1:30 PM	---
South bank above 19 broke	2:00 PM	---

LATERAL 20

Tail gates raised	9:30 AM	---
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GRAND CANAL

JOINT HEAD

125 c.f.s. surface water inflow Old Cross Cut	6:00 AM	---
Wasteway to river opened	6:15 AM	---
Checks put in Grand Canal at Old Cross-Cut	8:30 AM	---
New Cross cut ordered to take 500 c.f.s.	8:30 AM	---

LATERAL 14

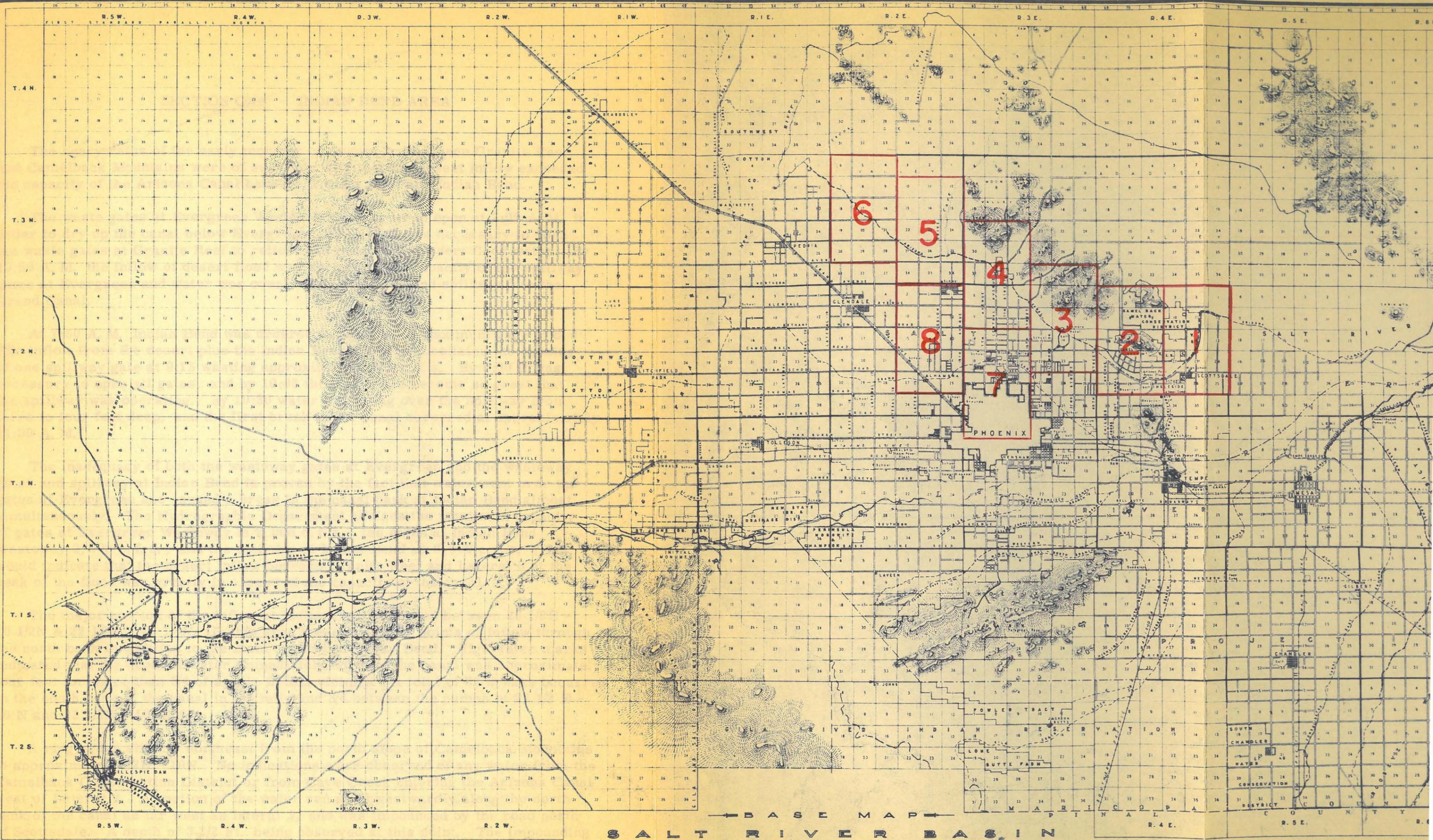
Break in South bank east of Lateral 14	5:30 PM	---
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LATERAL 13

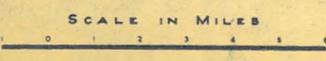
Break in South bank east of Lateral 13	5:35 PM	---
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LATERAL 23

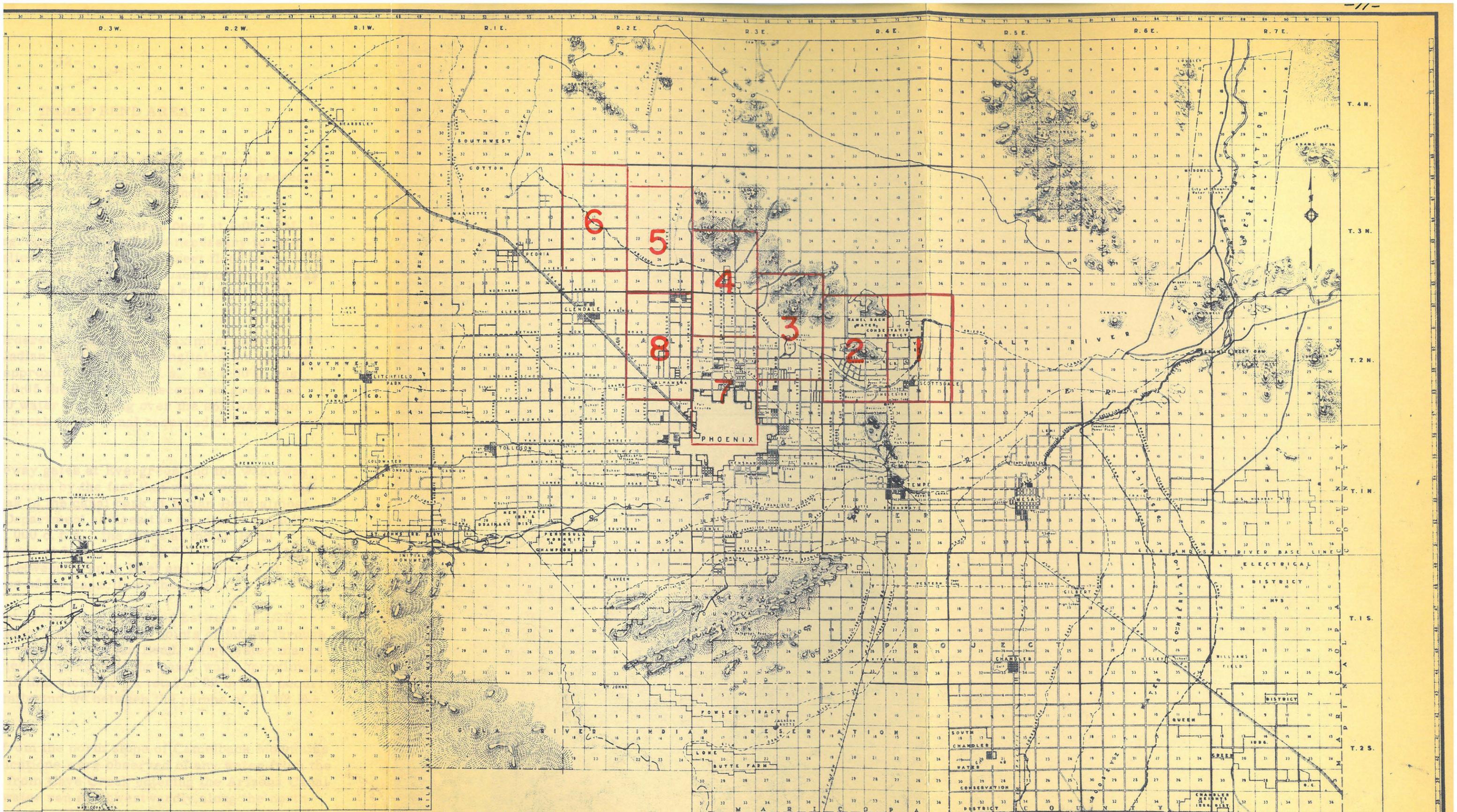
Tail gate raised	7:00 AM	---
Forebay dry	9:00 AM	---



BASE MAP  
SALT RIVER BASIN  
MARICOPA COUNTY, ARIZONA



JUNE 1934  
REVISED NOV. 1946



BASE MAP  
SALT RIVER BASIN  
MARICOPA COUNTY, ARIZONA



JUNE 1934  
REVISED NOV. 1946

SECTION ONE - INDIAN BEND AREA

The heavy rains of the early morning of August 3rd between Granite Reef and Camelback Mountains were of such intensity that the desert inflow exceeded the capacity of the Arizona Canal between Granite Reef and Indian Bend.

The waste gates at Evergreen Wasteway were ordered open at 7:05 A. M. in order to dry up the canal below Evergreen. By 8:30 it was necessary to open the waste gates at Granite Reef to relieve the canal from desert flood water. By 10:50 A. M. the inflow of desert flood was exceeding the capacity of the spillway gates at Evergreen and water was overflowing the gates and spillway into the Grand Canal.

At 7:50 A. M. Indian Bend was ordered to maintain a maximum gage of 8.0'. The inflow from the desert plus the Indian Bend water necessitated the opening of one spillway gate at 9:15 wasting approximately 625 c. f. s. By 9:30 it was necessary to open all gates, and by 10:05 the inflow had become so great that the spillway was operating. By 10:30 water was going over the spillway from three to four feet deep, and the first break in the canal occurred at approximately 11:00 A. M.

The inadequacy of both the wasteway gates at Evergreen and the wasteway gates and spillway at Indian Bend is proven by the fact that water went over the gates at Evergreen and caused a break in the canal bank at Indian Bend almost simultaneously. The Hydrographic Department advises the maximum capacity of gates at Evergreen Wasteway is 2,000 c. f. s., the gates at Indian Bend Wasteway 2,000 c. f. s., and the spillway at Indian Bend as 8,000 c. f. s. This would indicate that the desert inflow between Granite Reef and Lateral 3 at the peak of the flood was greatly in excess of the capacity of the canal.

The major portion of the inflow at Indian Bend occurred between 23 1/2E - 10 1/2N & 22 1/2E - 10 1/4N. In this area there are many points of inflow through the north bank in addition to the main channel of Indian Bend. High water marks indicated that the depth of water immediately north of the canal was approximately four feet for more than 3/4 of a mile in this vicinity. A total of 22 breaks occurred in the south bank of the canal in the mile and 3/4 between the pumps of 22 1/2 E - 10 N and 23 1/2E - 10 1/2N.

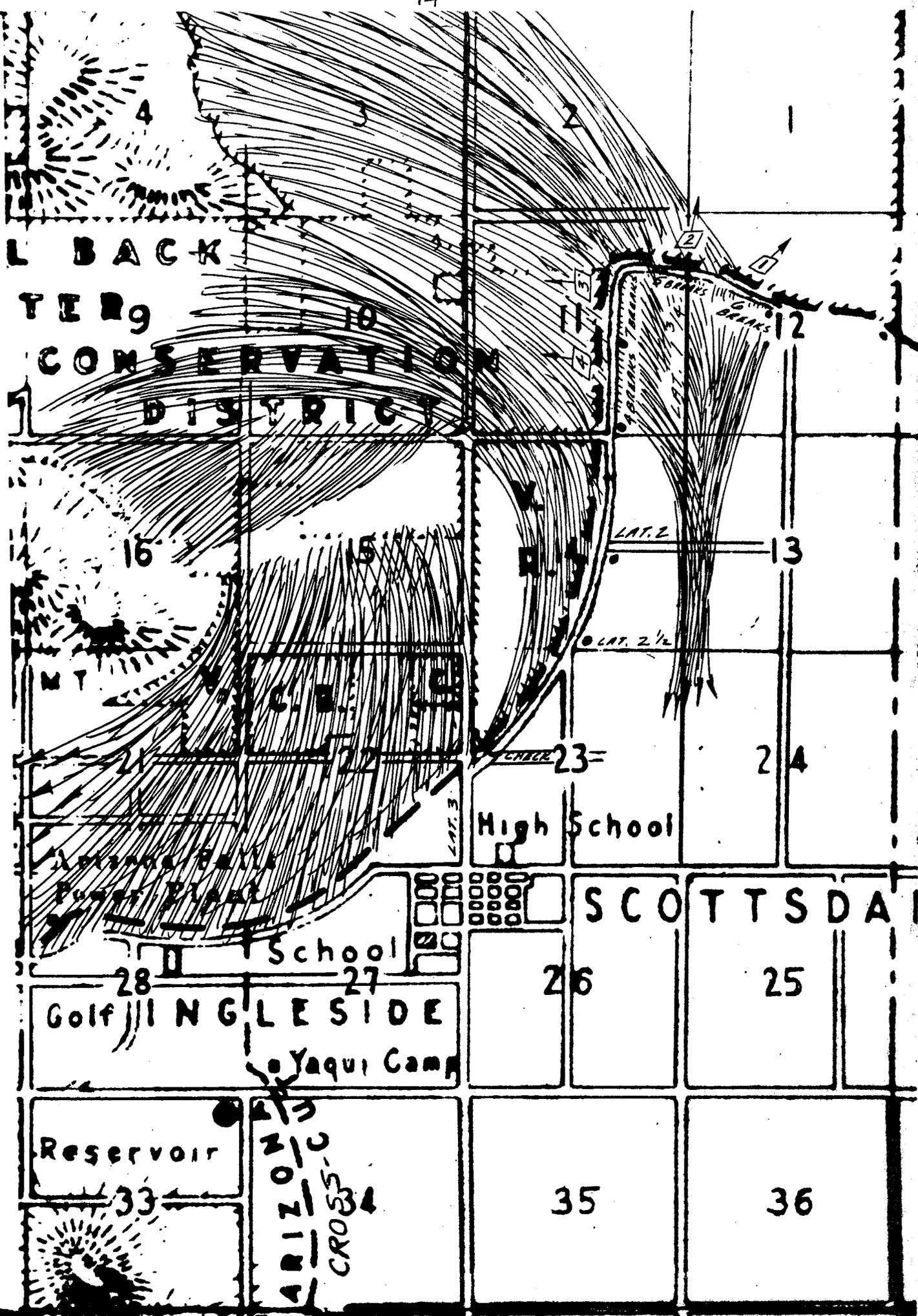
A ridge runs slightly northeast from the north slope of Camelback Mountains to approximately 22E - 10N. No indications were observed of any water from the Camelback Conservation District or from Cave Creek entering the Arizona Canal west of Lateral 3. A portion of the water ran southwestwardly along the north bank of the canal as far west as lateral 3, and was impounded by the road north of Scottsdale. A depth of 3 1/2 Ft. being observed at this point. The impounding of this water caused two breaks in the north bank in Section 23.

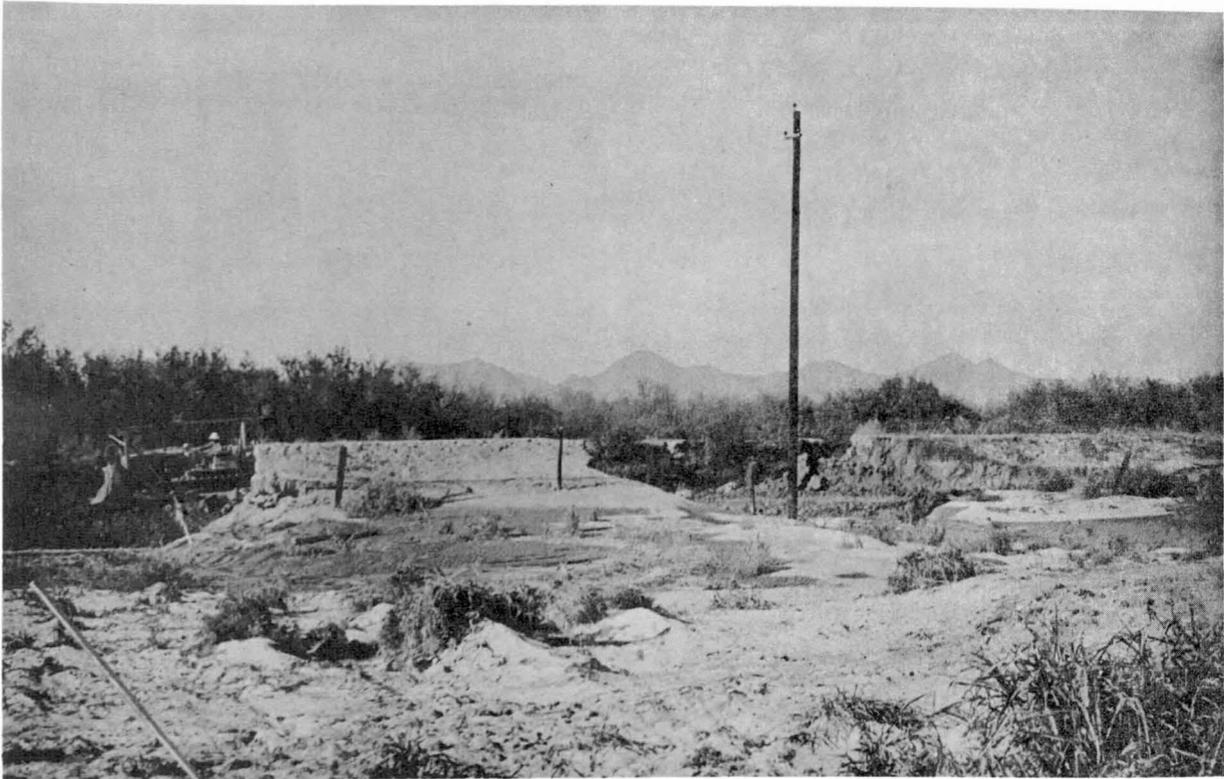
Section one - Indian Bend Area (Continued)

Both the north and south banks of the canal remained intact from Lateral 3 to the Arizona Falls. Flood waters from the drainage area north and west of Scottsdale flowed westwardly, north of the canal.

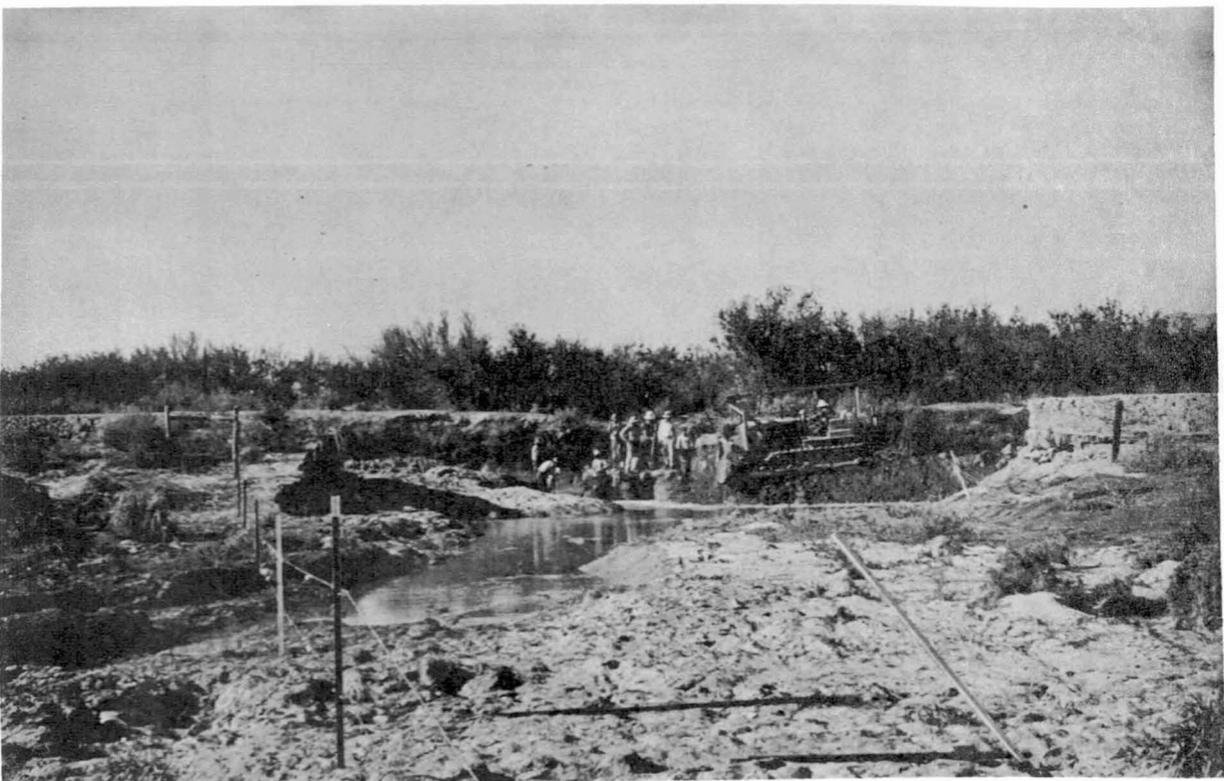
Reports on canal conditions of August 3rd and observations made after the water had subsided indicate that the capacity of the wasteway gates at Evergreen should be increased, and that a longer spillway and greater waste gate capacity should be installed at Indian Bend. It is suggested that a check be placed in the canal at a point immediately north of 22 1/2E - 10N with which to govern the amount of water which can be released to Arizona Canal with safety. Corrugated metal pipe equipped with automatic flood gates should be placed through the north bank of the canal in the vicinity of Later 2 1/2, and the Lateral enlarged to be used as a wasteway in case of flood.

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(1) Breaks in canal bank east of Indian Bend (8/5/43)



(2) Sand bagging and bulldozer repairing canal bank east of Indian Bend (8/5/43)



(3) Result of a gopher hole - West of Indian Bend 8/5/43



(4) Sand bagging break East of Indian Bend 8/5/43

SECTION TWO - ARIZONA FALLS AREA

Orders were given to open the gates at the Old Cross-Cut Canal at 7:35 A. M. The Watermaster reported that approximately 25 c. f. s. of water remained in the canal below Lateral 6, due to the Old Cross-Cut not being able to carry all of the water in the canal at that time. By 10:00 o'clock water from Indian Bend had reached Lateral 6, and a peak was reported at 12:00 Noon.

Both north and south banks in this section were intact with exception of a heavy inflow approximately 100 ft. east of Lateral 7, which was the accumulation of the runoff from the south side of Camelback Mountains which followed the course of the canal in a northwesterly direction until intercepted by Camelback Road. The inflow to the Arizona Canal was at a point where the north bank was very low and appeared to be a natural waterway. Inflow at this point was very heavy.

The flow in the channel of the Old Cross-Cut Canal is retarded by vegetation and bank sloughing to a great extent, and the gate capacity was inadequate to furnish sufficient relief to the canal at this point. Although no breaks in the canal bank happened in this section, undoubtedly the large amount of water going down the canal below Lateral 6 was a contributing factor to the breaks in the vicinity of Lateral 10.

Water was impounded north of the north bank all along this section and it is suggested that culverts with flood gates be placed in the north of canal at several points to relieve the pressure on the north bank.

If the Old Cross-Cut were to be enlarged a check in the Arizona Canal below Lateral 6 would assist in controlling the amount of flow in the canal below Lateral 6.

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CAMEL BACK  
 WATER  
 CONSERVAT  
 DISTRICT

CAMEL  
 BACK MT. V.  
 C. B.

Arizona Falls  
 Power Plant

Reservoir

Golf IN GRESI

Schoo

Yaqui

Reservoir

STREET

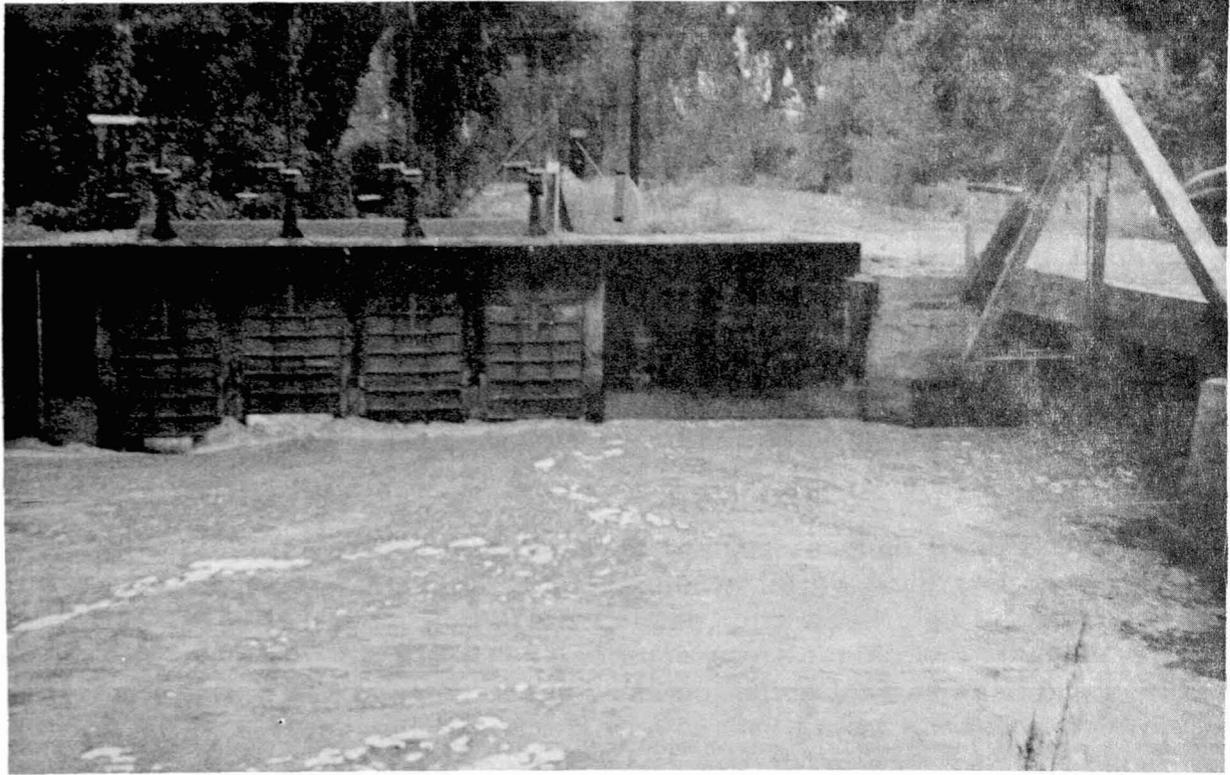
AVENUE

CAMEL

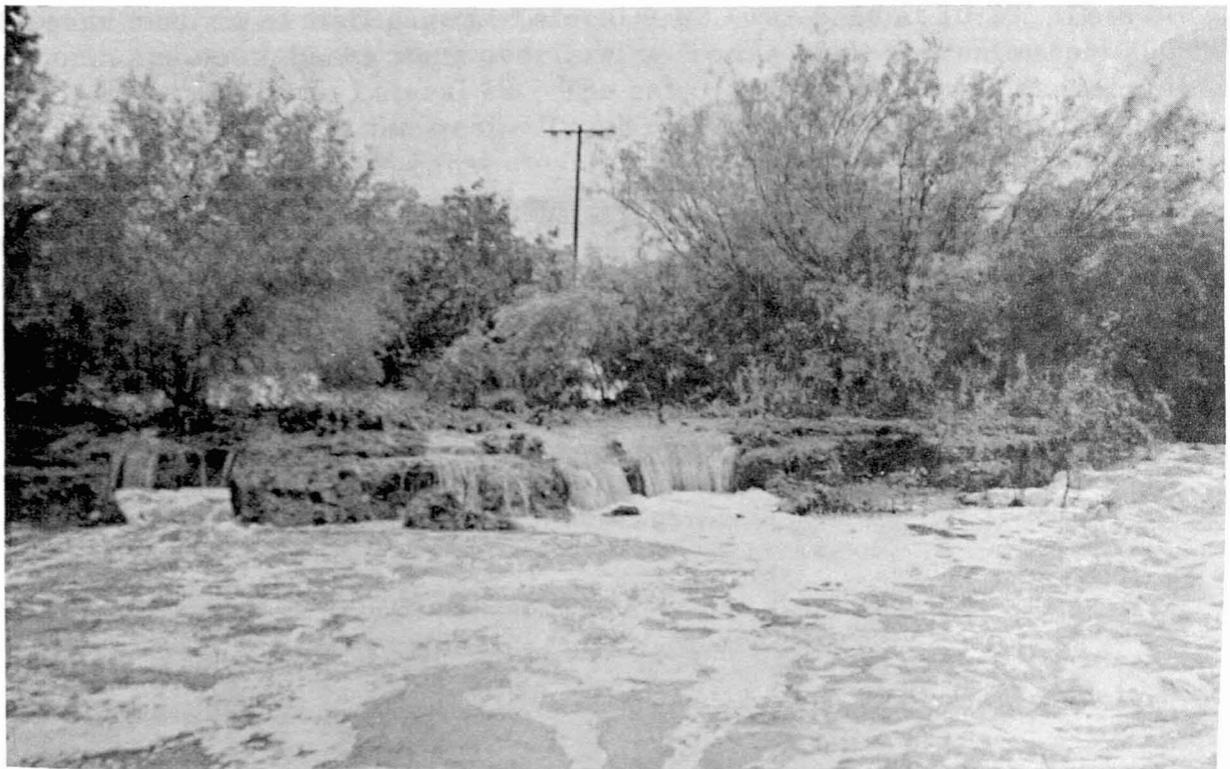
OTH

CROSSING  
 CANAL

213  
 210  
 213



(5) Head Gates old Cross Cut 10:00 A.M. 8/3/43  
48TH ST. & ARIZ. CANAL



(6) Inflow 100' East of Camelback Road  
JUST EAST OF 40TH ST. & CAMELBACK RD.

SECTION THREE - BILTMORE HOTEL AREA

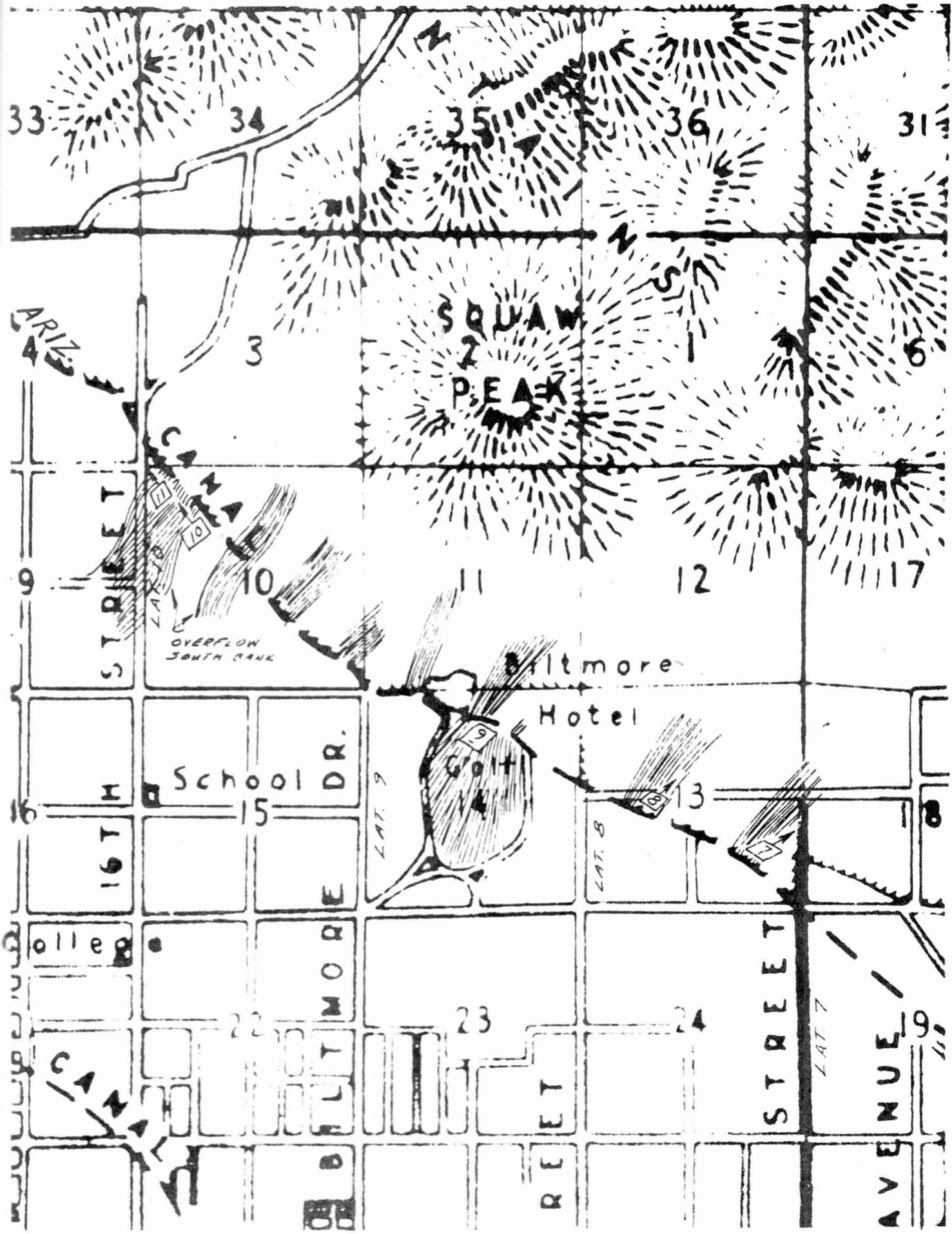
A heavy inflow of flood water from the Squaw Peak-Camelback area occurred approximately 1/10 of a mile west of Lateral 7. The north bank overflowed for approximately 1500 ft. in this vicinity. The spillway in south bank at Lateral 7 1/4 was not flowing at 10:15 A. M. , and showed no indications of having been in operation previous to that time. A very heavy inflow occurred opposite the spillway at Lateral 7 3/4. This spillway was not flowing at 10:17 A. M. , and showed no indication of having operated prior to that time.

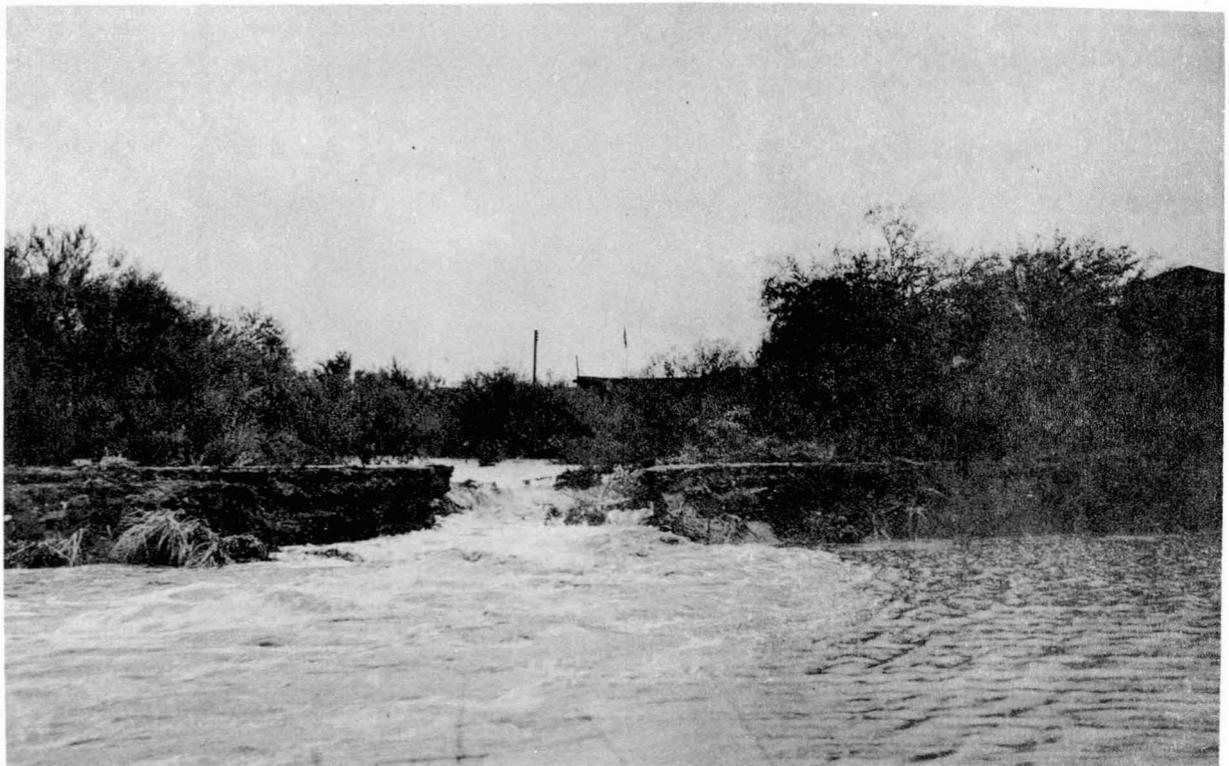
The flow from the desert was reported to have reached Lateral 9 at 6:00 A. M. and Lateral 7 and 7:00 A. M. A heavy inflow occurred opposite the spillway at the Biltmore Hotel Golf Course, and water was flowing over this spillway at 10:19. This spillway was operating perfectly and when inspected after flow had ceased, there were no indications of wash or erosion below the spillway. The Arizona Canal was banked full at the Biltmore Hotel, and water standing on the lawn approximately 2/3 of the way from the canal to the hotel. There were two points of definite inflow in the vicinity of the hotel, one approximately 300 ft. east and the other 300 ft. west.

There is a very definite original waterway at Lateral 9 1/4 which if equipped with a spillway would afford relief for the canal between this point and Lateral 10. Heavy inflow occurred immediately west of Lateral 9 1/2. The gage reading of staff gage at Lateral 9 1/2, was 5.56 at 10:26. Both the north and south banks were overflowing from a point approximately 200 ft. east of Lateral 9 3/4 to Lateral 10. The canal at Lateral 10 was banked full with a strong current to the west. Trash crews encountered some difficulty in keeping the check in the canal clear of trash. At 10:40 A. M. trash was cleared, all check gates up, and canal discharging through check gates at full capacity.

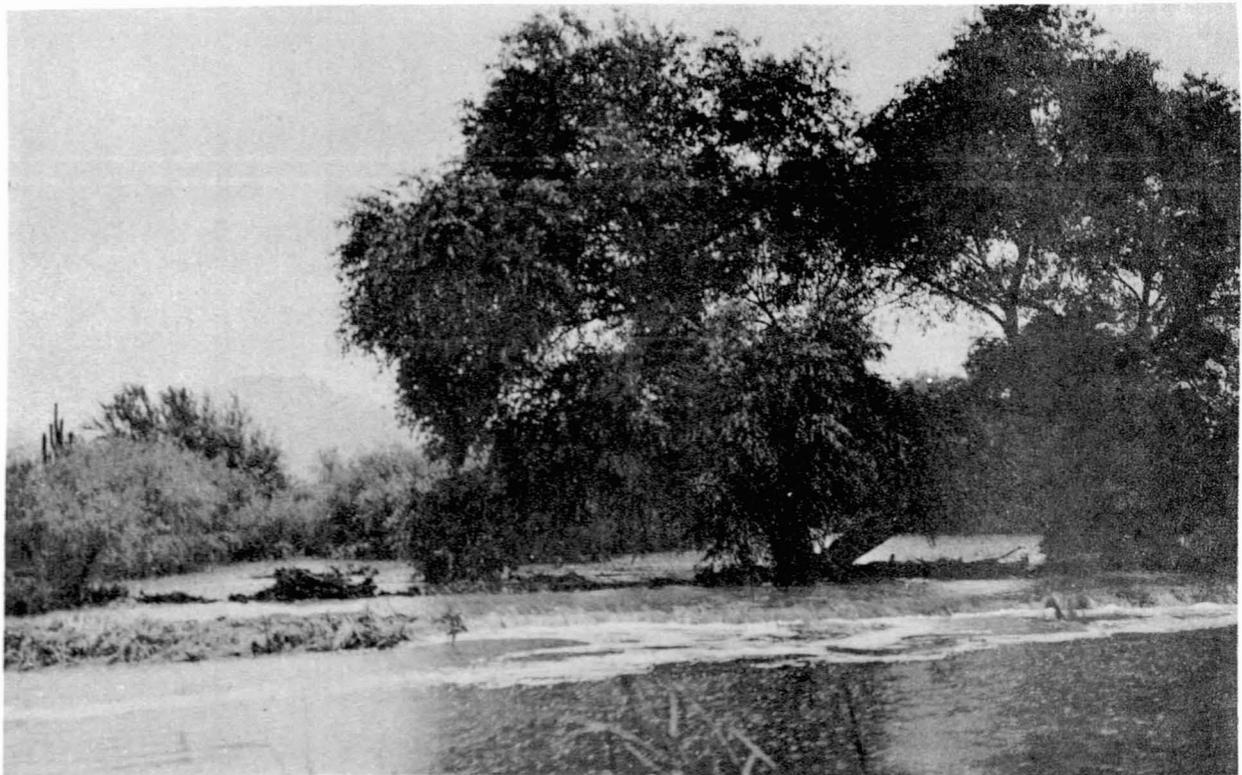
All Laterals were found to be open in this section, and the desert inflow was in excess of the capacity of the canal. Additional spillways should be constructed at various points in this section.

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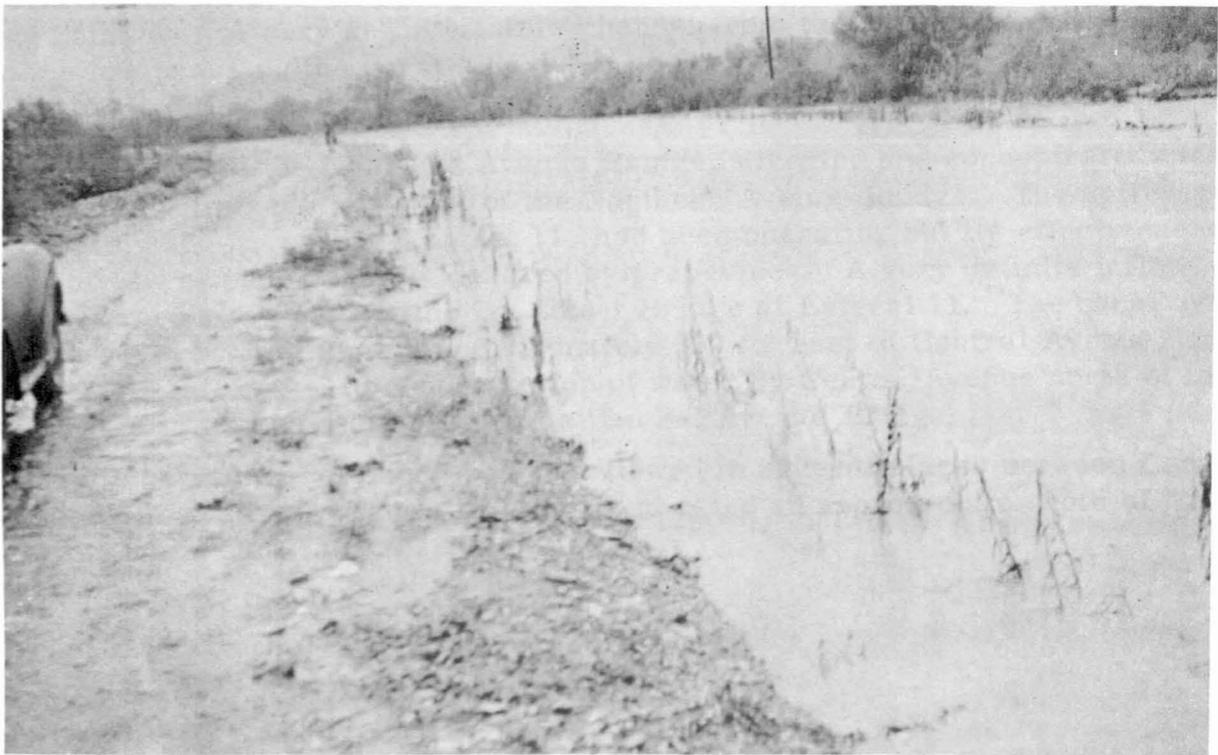
(7) Inflow west of Lateral 7 10:15 AM (8/3/43)  
ABOVE 500 FT. WEST OF 40TH ST. NORTHSIDE OF ARIZONA CANAL  
PRESENT CUDIA LOCATION



(8) Inflow opposite spillway at 17 1/4E - 9 1/2N 10:17 AM  
(8/3/43) ABOVE 30TH ST. ARIZ CANAL



(9) Spillway at Biltmore Golf Course Lateral 8 1/2 10:20 AM  
(8/3/43) 36TH ST. & ARIZONA CANAL OVER SOUTH BANK



(10) Looking west from Lateral 9 3/4 10:28 AM (8/3/43)  
ABOUT MARYLAND AVE & ARIZ CANAL PRESENT FILTERING PLANT AREA

SECTION FOUR - PHOENIX AREA

The inflow to that portion of the Arizona from Lateral 10, to Lateral 13 is from a very definitely mountainous terrain with a short, sharp runoff. Many points of definite confined inflow were found on the north bank of the canal, and it is the addition of this water on top of the water in the canal, which caused the breaks between 7th Street and 16th Street.

A very heavy inflow to the canal occurred immediately west of Lateral 10 from flood waters intersected by 16th Street, north of the Arizona Canal. The second inflow channel was opposite the Clausen Spillway east of Lateral 10 1/8. This spillway was spilling prior to 11:10 A. M. , and an inspection below the spillway after the water had subsided indicated that no damage had occurred to the orchard and no indications of wash were found.

The first break west of Scottsdale occurred at 10:05 A. M. approximately 500 ft. east of Lateral 10 1/4. The Power Conway Spillway, approximately 300 ft. west of Lateral 10 1/2, had operated prior to 11:48 A. M. , but was not spilling at that time. There are cottonwood trees immediately below Power Conway Spillway, which should be removed for its most efficient operation. This spillway apparently had operated effectively prior to the break at Lateral 10 1/8. Indications of drift in the Conway Orchard showed a maximum of 8 inches depth immediately below the spillway. Although a slight amount of top soil was washed by flood water from the spillway, no damage was apparent to the orchard or property below the spillway.

A very definite inflow channel was washed through the north bank and the north bank overflowed for approximately 1,000 ft. , beginning 500 ft. west of the Power Conway Spillway. A very definite inflow channel from the north at Lateral 10 3/4, due to the low banks on the north side, with no floodway in the south bank, was evidently the major cause of the break at Lateral 10 5/8.

The road, east of the Northern Avenue Bridge, diverted and concentrated the inflow at a point immediately west of the Northern Avenue Bridge. The spillway approximately 250 ft. east of Lateral 11, had been operating but its effectiveness was reduced by a fence, heavily covered by grapevines. A very definite inflow occurred immediately west of the 7th Street Bridge at Lateral 11. The canal overflowed the south bank at a point approximately 300 ft. east of Central Avenue, and a very definite inflow due to concentration of water by Central Avenue north of the Arizona came in immediately east of the Central Avenue Bridge.

The north bank of the Arizona was overflowed in several places between Central Avenue and 7th Avenue. Highwater marks indicated an approximate depth of 3 feet north of the north bank in this section.

Section Four - Phoenix Area (Continued)

The south bank overflowed for about 500 ft. west of Lateral 11 1/2. A large break occurred in the south bank immediately east of 7th Avenue.

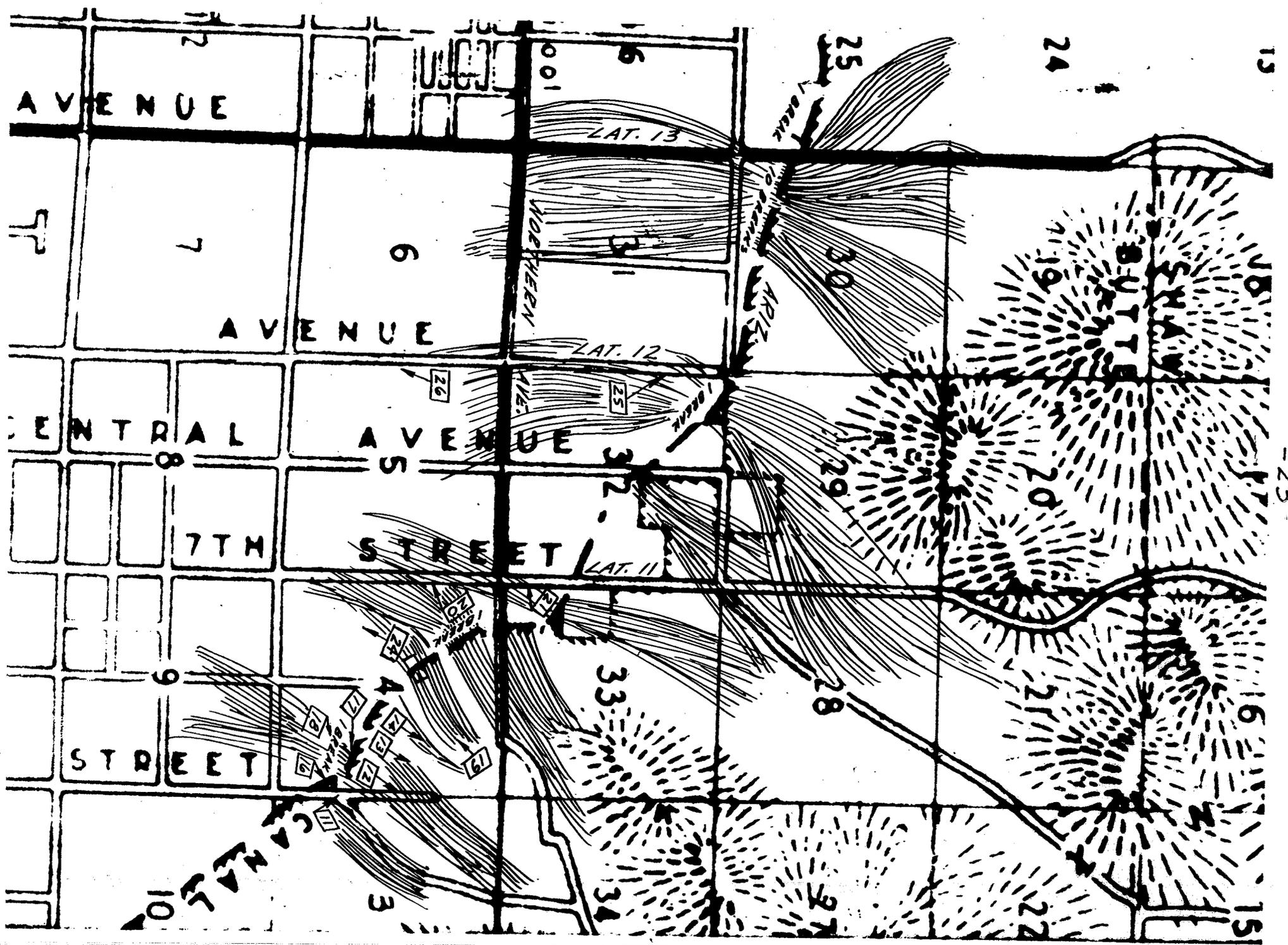
From 7th Avenue to 19th Avenue the north bank was low and considerable desert flood entered the Arizona from this section. An 800 ft. section of the south bank overflowed for a short time during the peak of the flood in the vicinity of Lateral 12 1/4. 7 breaks occurred in the south bank immediately west of Lateral 12 1/2 and 3 more from 200 to 500 ft. east of Lateral 13 or 19th Avenue.

A heavy inflow from Cave Creek broke the north bank just east of the 19th Avenue Bridge. A break occurred in the south bank immediately west of 19th Avenue. Drift indications on the 19th Avenue Bridge showed that after the breaks occurred east of 19th Avenue, there was a very strong current flowing eastward in the canal due to overflow water from Cave Creek east of the main channel.

The water from the break at Lateral 10 1/8 flowed in a southwesterly direction and combined with the water from the break at Lateral 10 5/8 in the vicinity of the Grand Canal and Central Avenue. The break at Lateral 10 5/8 inundated 7th Street but not sufficiently to entirely stop traffic. Central Avenue and 7th Avenue were inundated from the combined flow of the breaks at 10 5/8, and the one just east of Lateral 12. At 1:00 P. M. it was impossible to travel south of Northern Avenue on either 7th Avenue or Central Avenue.

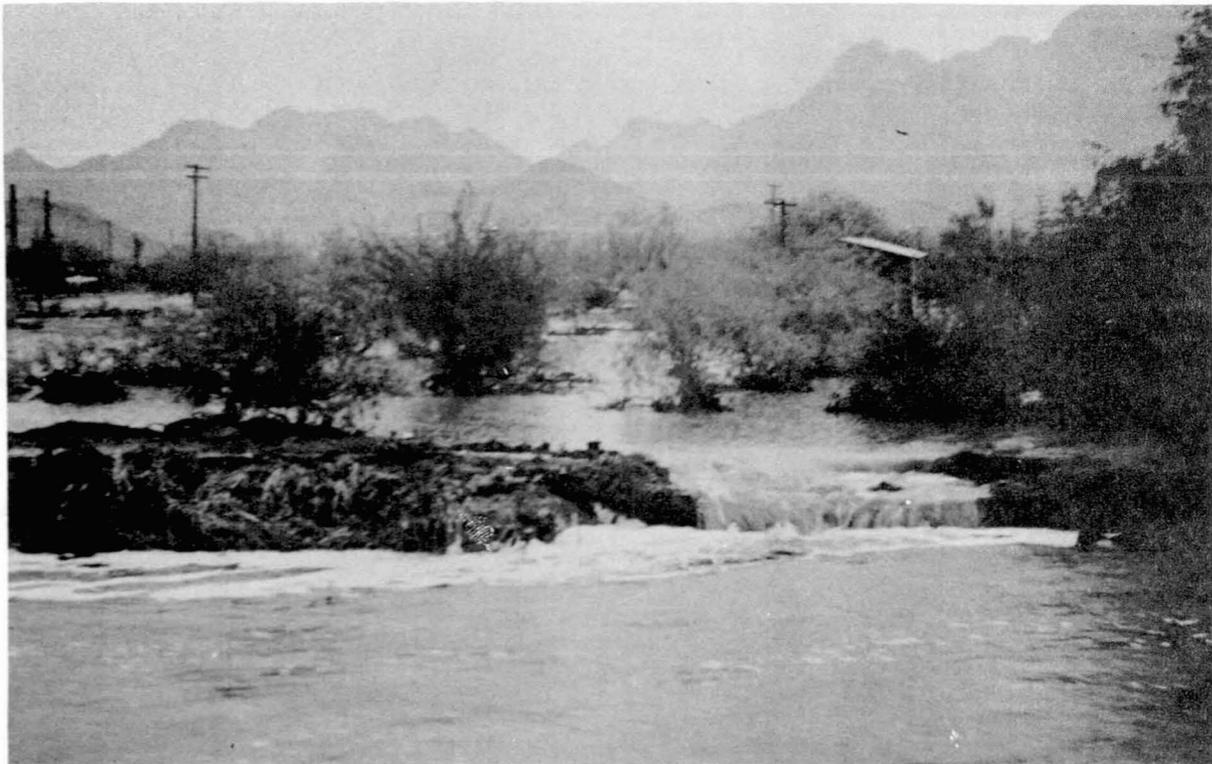
All lateral gates were open in this section when observed between 11:00 A. M. and 12:00 noon, and the canal check at Lateral 13 was closed to eliminate any additional flow from Cave Creek. If the check at Lateral 13 had been raised, additional damage would have occurred in the vicinity of 19th Avenue and 7th Avenue.

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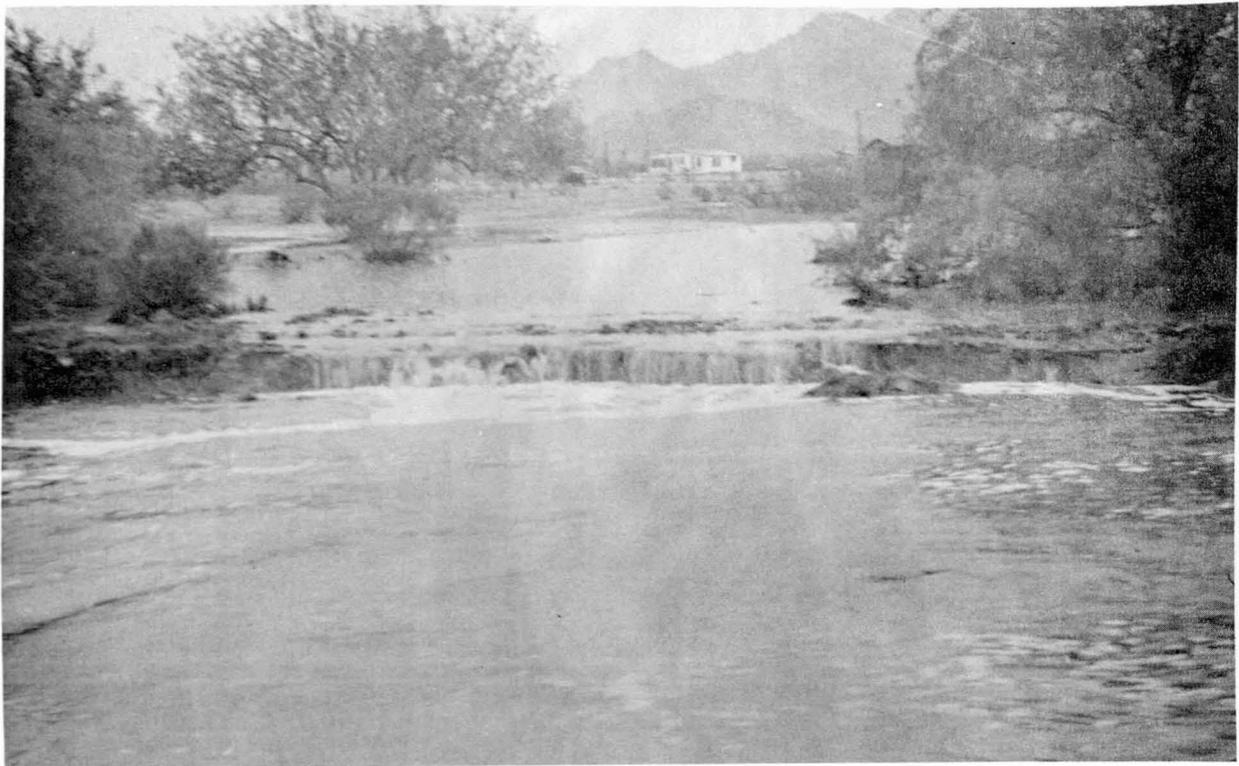




(11) Trash crew working on check at Lateral 10 10:32 AM  
(8/3/43) 16TH ST & ARIZONA CANAL



(12) Inflow 1/8 mile west of Lateral 10 10:35 AM (8/3/43)  
ARIZONA CANAL



(13) Inflow opposite Clausen Spillway 10:30 AM (8/3/43)  
*ABOUT 11TH ST. & ARIZ. CANAL*



(14) Gopher hole in north bank northwest of Clausen Spillway  
*ABOUT 11TH ST. & ARIZ. CANAL*



(15) Clausen Spillway 10:50 AM (8/3/43)  
*ABOUT 11TH ST. & ARIZ. CANAL*



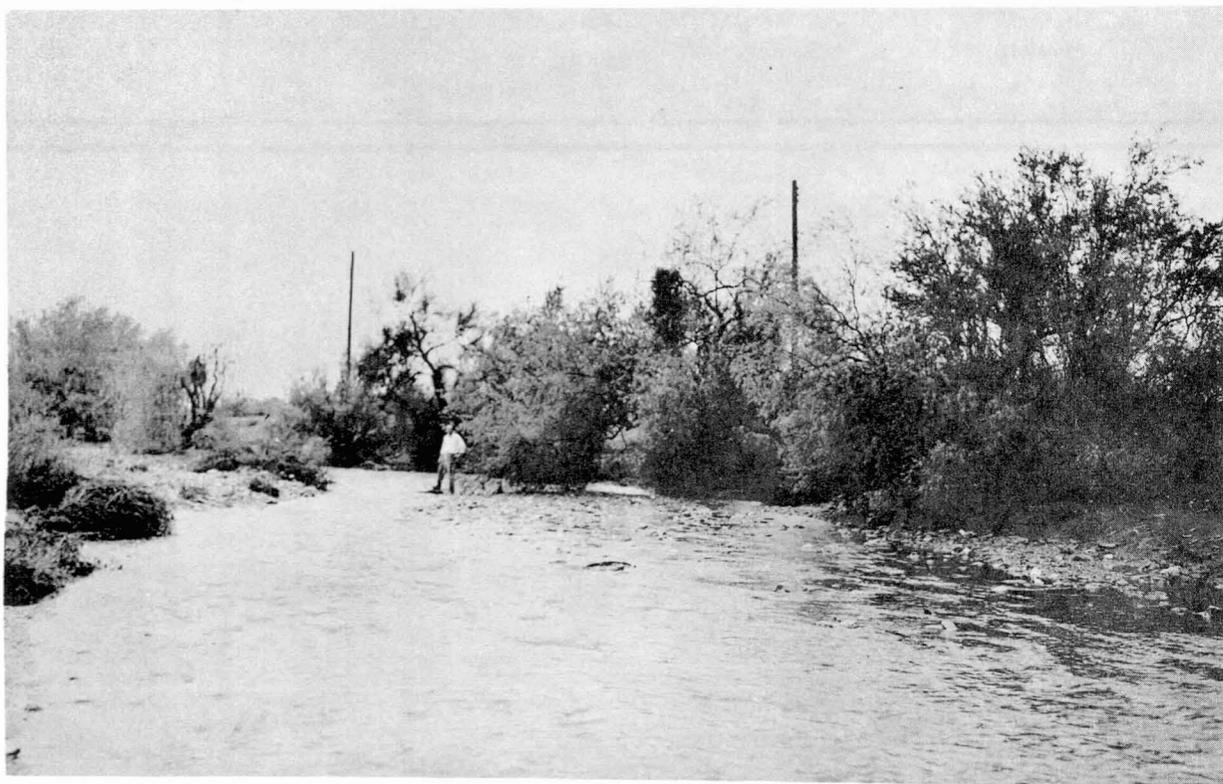
(16) Looking southwest from Clausen Spillway  
*ABOUT 11TH ST. & ARIZ. CANAL*



(17) Break at Lateral 10 1/8 10:37 (8/3/43)  
*ABOUT 15TH ST. & ARIZ. CANAL*



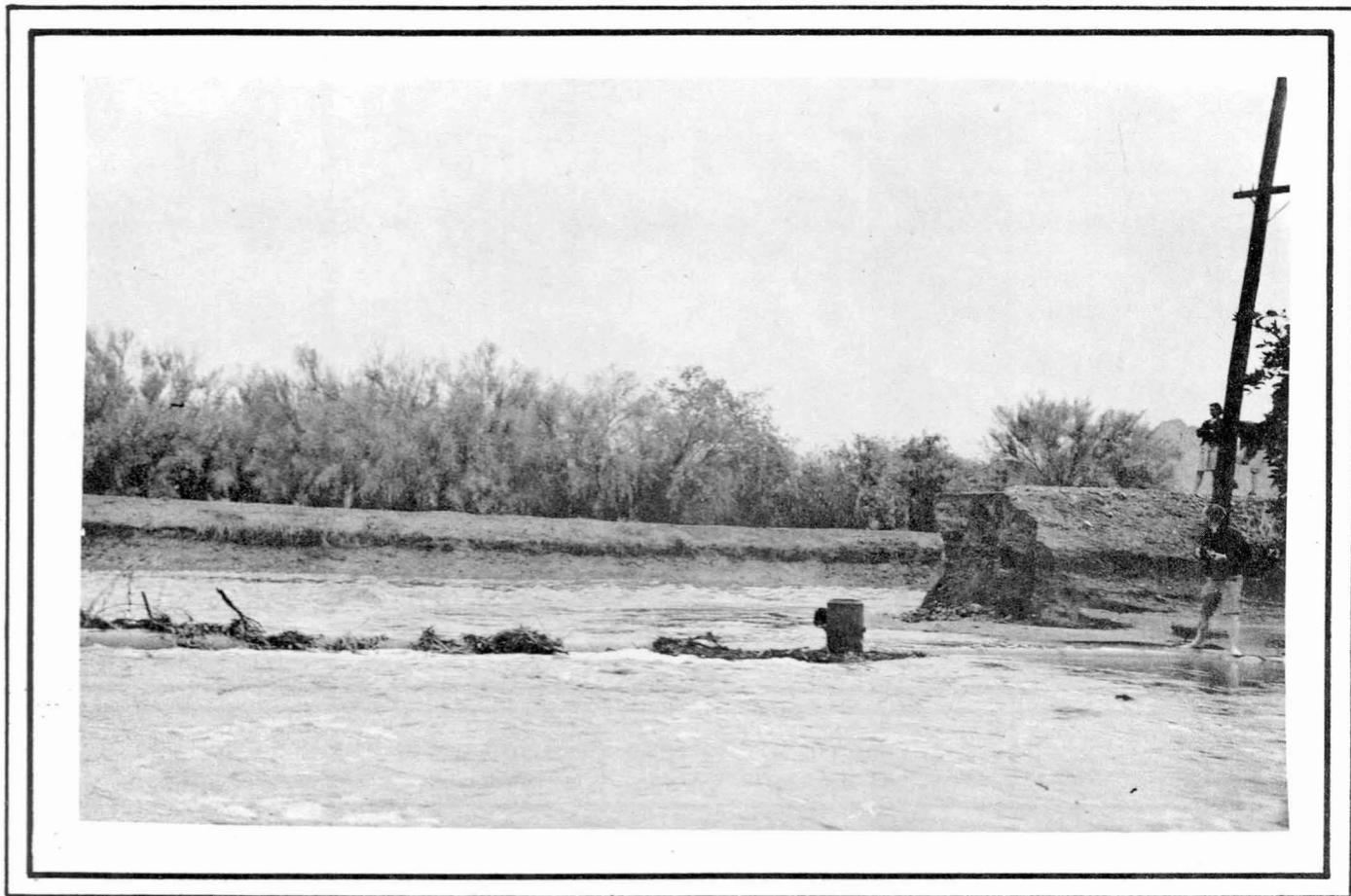
(18) Looking towards break at Lateral 10 1/8 10:45 AM (8/3/43)  
*ABOUT 15TH ST. & ARIZ. CANAL*



(19) Dreamy Draw opposite Fransen House-one mile north  
of Arizona Canal 11:30 AM (8/3/43) ~~FIRST WASH S. OF NORTHERN AVE.~~  
~~CROSSES 16TH ST.~~



(20) Break in canal 350 ft. south of Northern Ave. 11:35 AM  
(8/3/43) ~~ABOUT 9TH ST. & ARIZ. CANAL~~



(20a) Break in canal 350 ft. south of Northern Avenue  
ABOUT 9TH ST. & ARIZ. CANAL



(21) Looking south from Spillway east of 7th Street  
*ABOUT 400 FT. E. OF 7TH ST. SOUTH BANK OF ARIZ. CANAL*



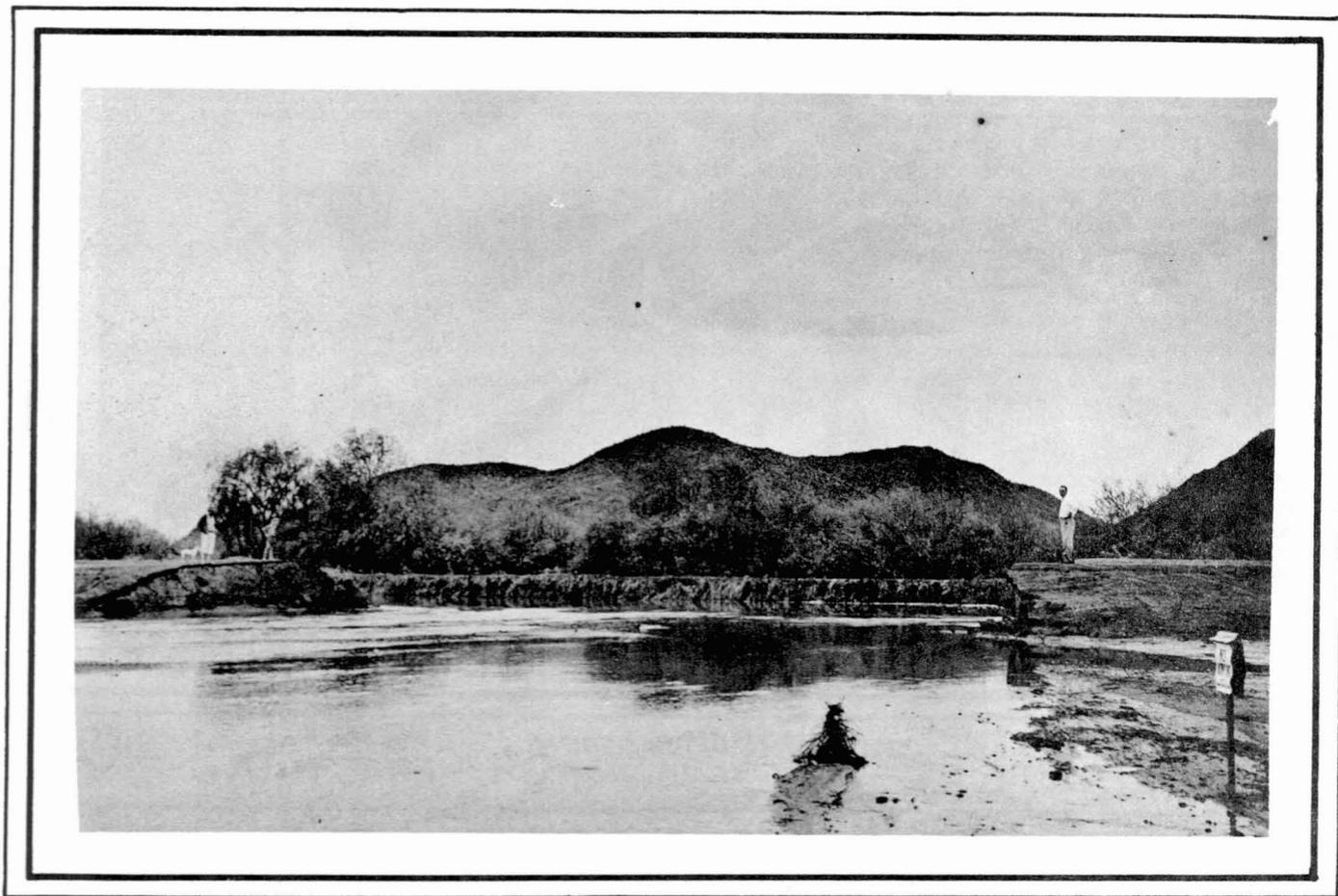
(22) Looking north along Conway Spillway 12:04 PM (8/3/43)  
*ABOUT 1/2 MI. E. OF ARIZONA CANAL*



(23) Looking west at Conway Orchard below Spillway 12:08 PM  
(8/3/43) ABOVE 11<sup>TH</sup> ST & ARIZ. CANAL



(24) Orchard north of Conway. Water from break near Northern Ave.  
12:20 PM (8/3/43) ORCHARD NORTH OF 11<sup>TH</sup> ST & ARIZ. CANAL



(24a) Break east of Lateral 12.

*JUST EAST OF 7TH AVE. & ARIZ. CANAL*



(25) Looking north on 7th Avenue north of Northern 12:54 PM  
(8/3/43)



(26) Looking southwest from 7th Avenue south of Northern - Lateral 12 Spillway -  
flood waters from break east of Lat. 12 - 1:00 PM (8/3/43)

SECTION FIVE - CAVE CREEK AREA

Two breaks occurred in this section; the first, immediately west of Lateral 13, and the second, the large break opposite the main channel of Cave Creek.

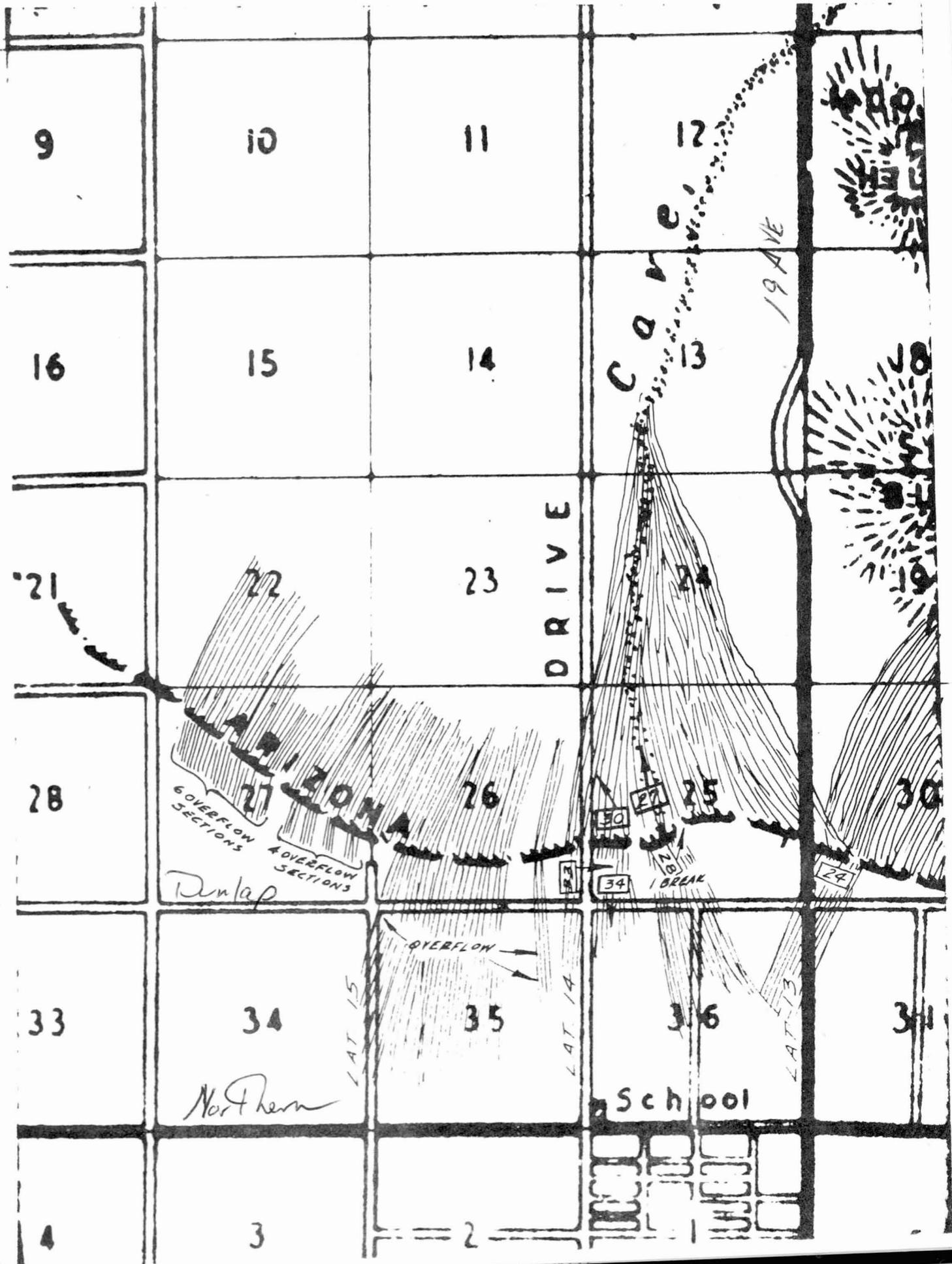
The inflow from Cave Creek extended eastwardly from a point approximately 700 ft. west of the main channel to east of 19th. Avenue. Highwater marks north of the canal indicated that a sheet of water averaging over 3 1/2 ft. in depth, inundating the area north of the canal.

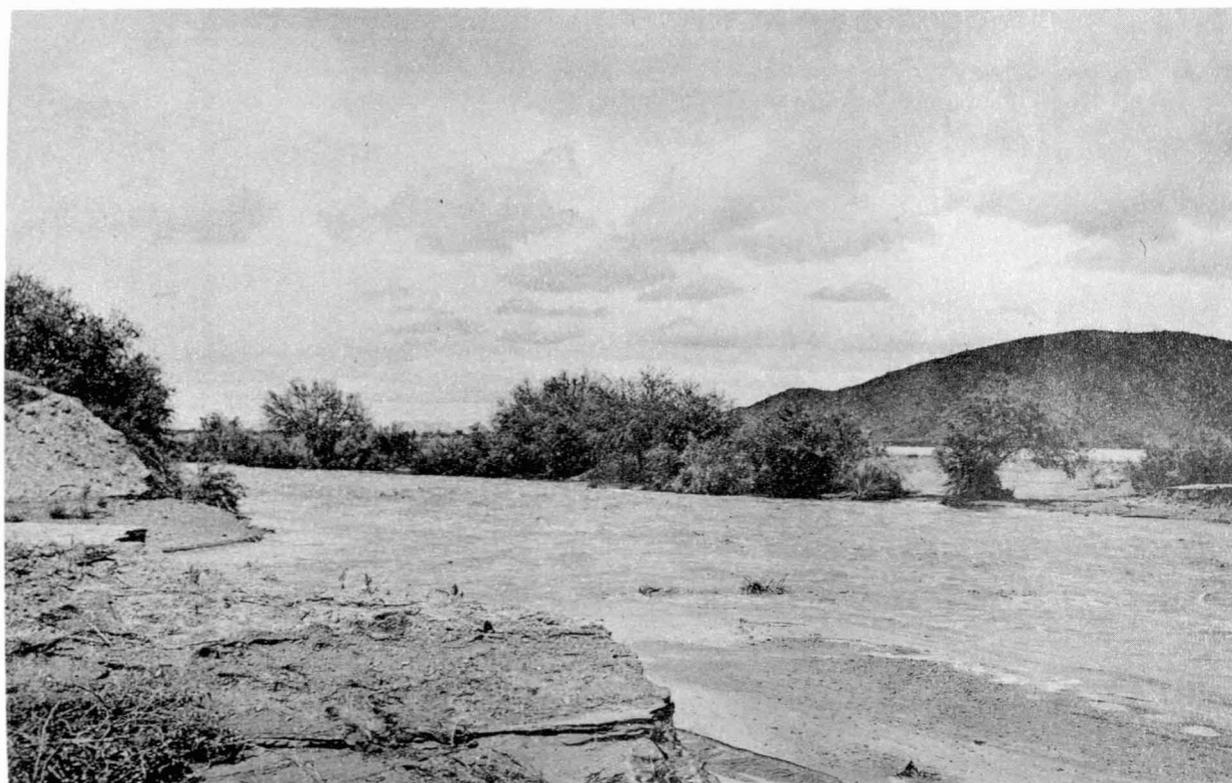
From indications of highwater on the canal banks at the Cave Creek break, large volumes of water which had been impounded north of the canal was released immediately after the break, and within 1 1/2 to 2 hours the water level at the Cave Creek break had lowered about 4 ft. (See illustrations #27 & #28).

At 3:17 P. M. water was still overflowing in low spots in the south canal banks at Lateral 13 3/4 and 13 7/8. From Lateral 14 to Lateral 15, there were eight definite overflowed sections in the south bank and almost a continuous inflow of the low banks on the north side. From Lateral 15 to Lateral 16, there were nine definite overflow sections on the south bank and almost continuous inflow off flat fields from the north.

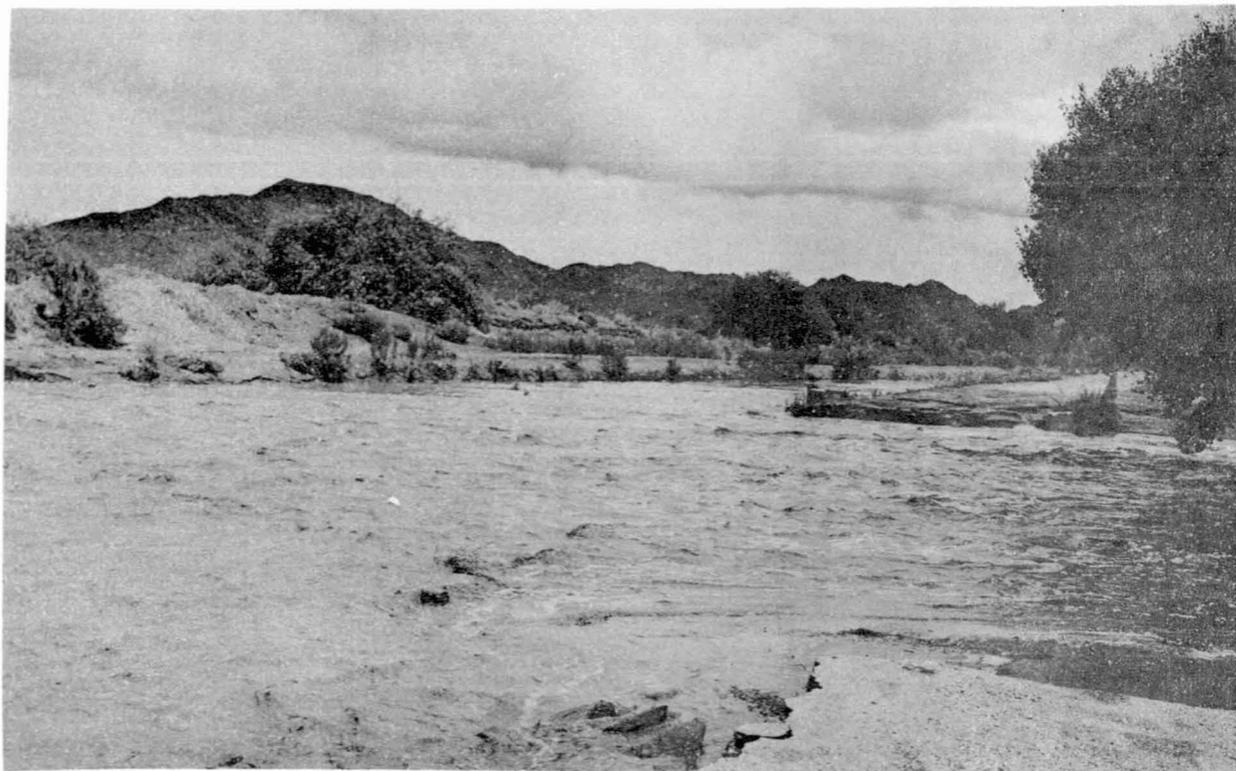
Water from the Cave Creek break continued southwardly causing considerable damage and averaged 2 1/2 ft. deep from 19th to 23rd. Avenue on Glendale Avenue. Highwater marks showed a maximum depth of 4 ft. at the N. G. Hill equipment yard. At the Bethany Home Road, (10N) the water was split by a slight ridge at 11 1/2E. The major portion of the Cave Creek flood crossed 19th Avenue and continued southwestwardly between 12 and 13 east. The heaviest flow apparently being between 12 1/4 and 12 1/2 east at Bethany Home Road, continuing southwestwardly and striking the Grand Canal immediately east of 19th Avenue. The west branch of the flood waters crossed the Bethany Home Road between 11 1/2 and 11 3/4E, continuing almost directly southwardly and entering the Grand Canal immediately east of the Indian School crossing at 23rd Avenue.

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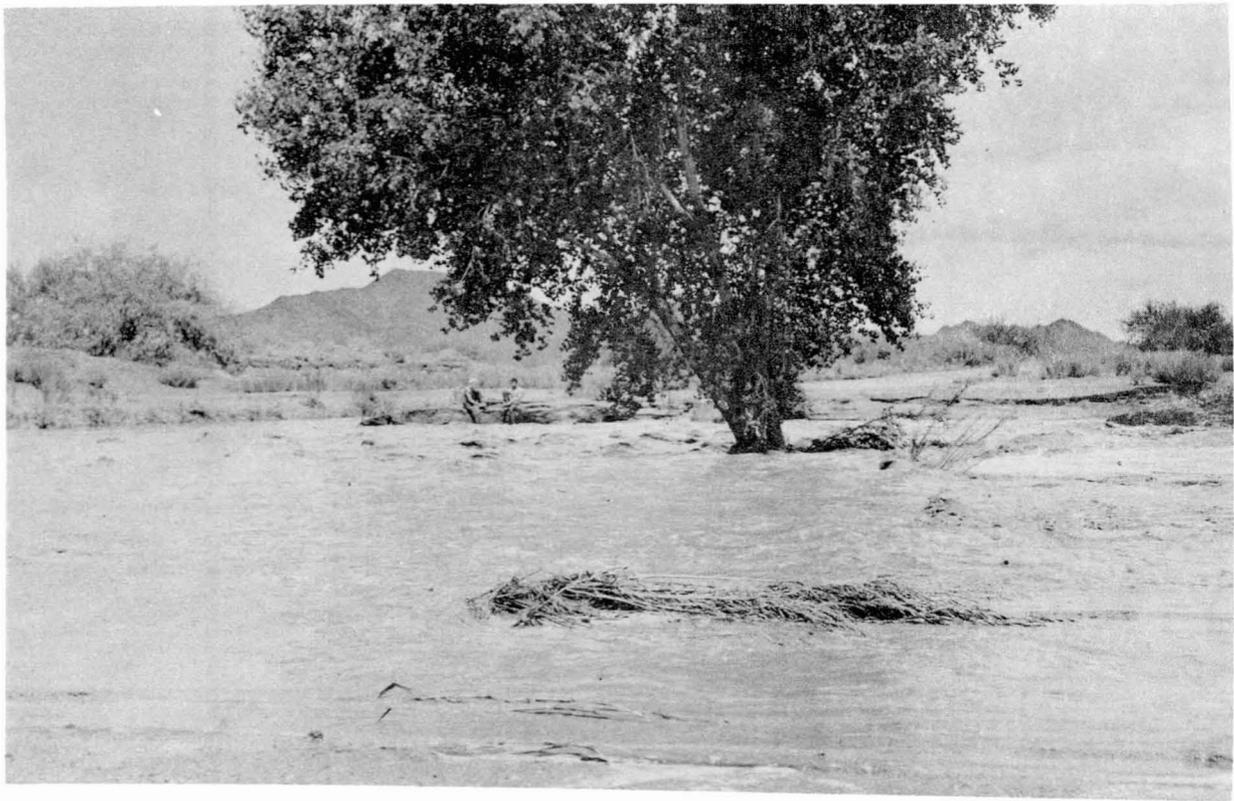




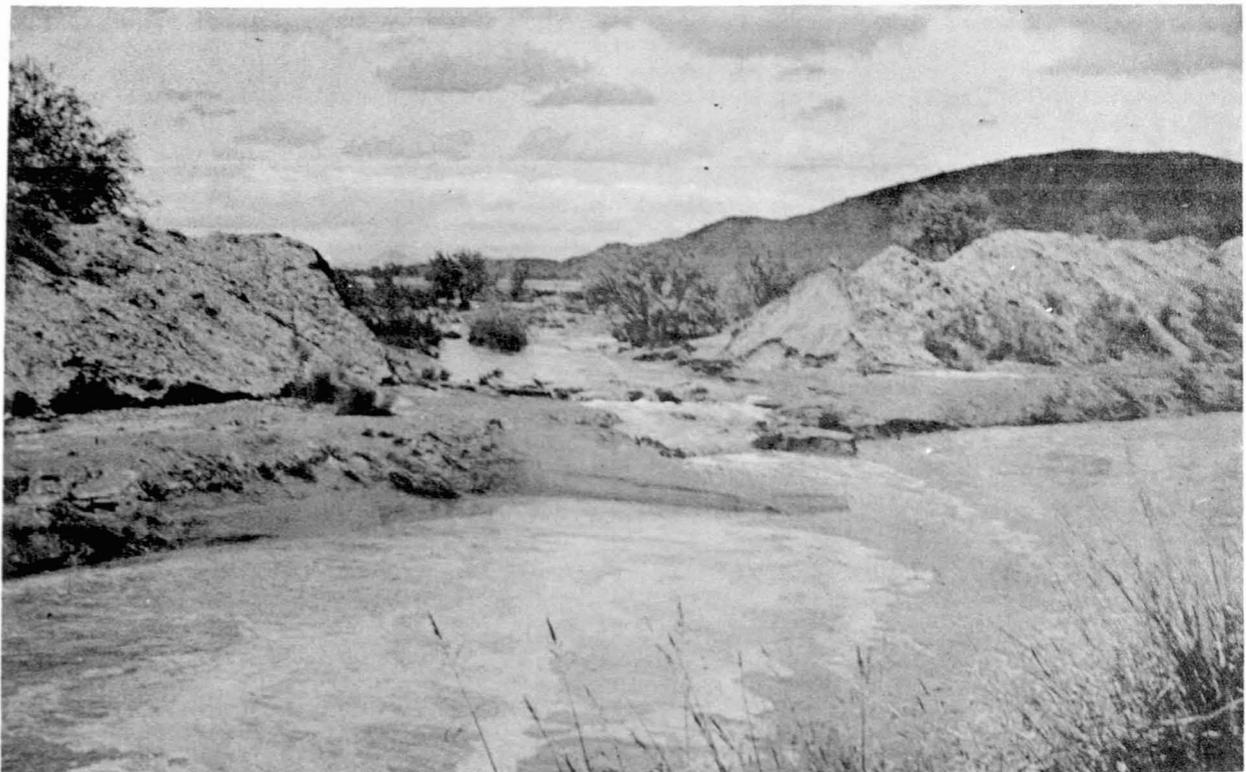
(27) Looking up Main Channel of Cave Creek from west  
bank of break 3:20 PM (8/3/43) 23RD AVE. & ARIZ. CANAL



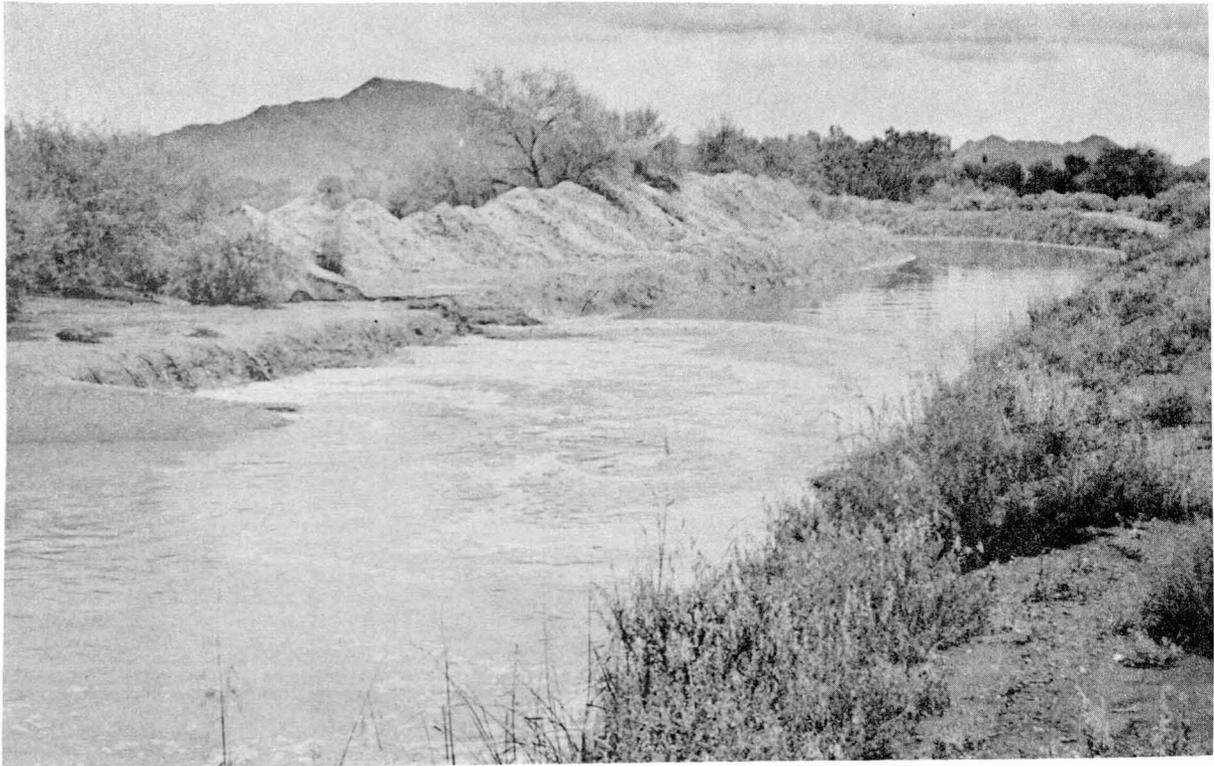
(28) Looking east across Cave Creek break (8/3/43) 23RD AVE. & ARIZ. CANAL



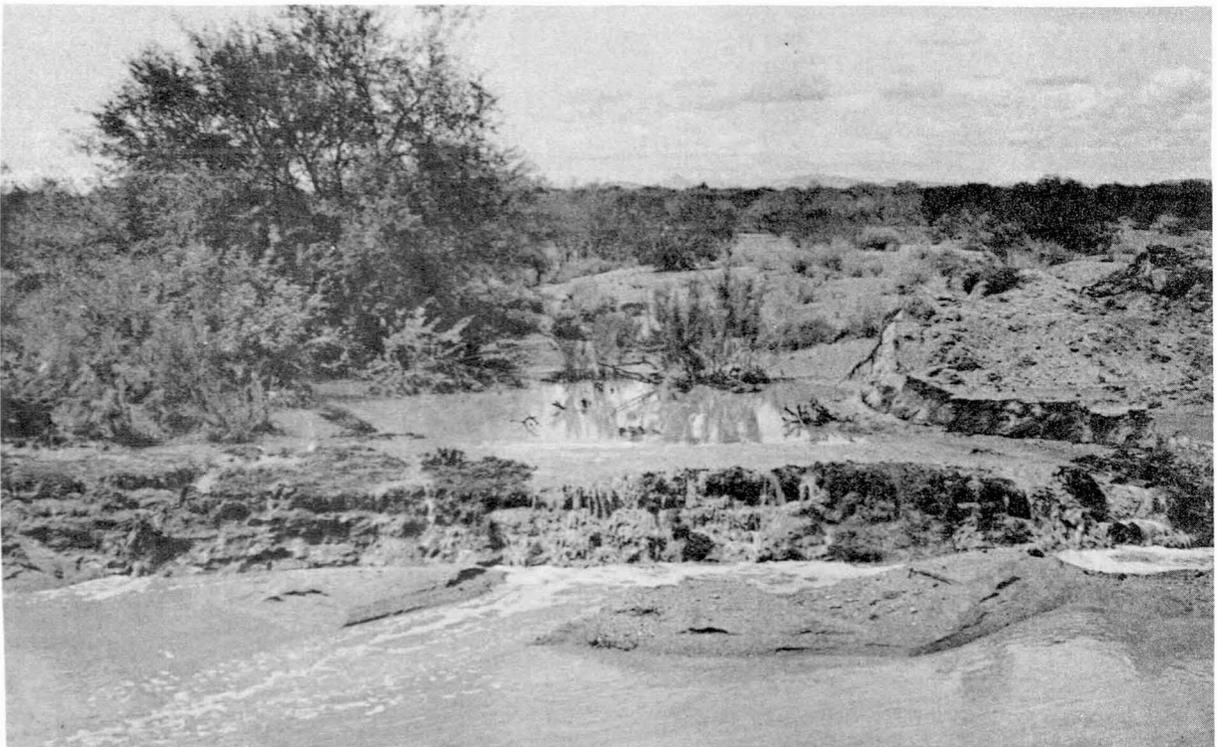
(29) Looking across Cave Creek break 3:25 PM (8/3/43)  
*23 RD. AVE. & ARIZ. CANAL*



(30) Inflow from west branch of Cave Creek 3:40 PM (8/3/43)  
*NEAR 23 RD. AVE. & ARIZ. CANAL*



(31) Inflow from Cave Creek east of Lateral 14 3:45 PM (8/3/43)  
*27<sup>TH</sup> AVE. & ARIZ. CANAL*



(32) Inflow east of Lateral 14 3:47 PM (8/3/43)  
*27<sup>TH</sup> AVE. & ARIZ. CANAL*



(33) East of Lateral 14. Looking east at damage to canal banks by overflow 3:47 PM (8/3/43) EAST OF 27 TH AVE.  $\frac{1}{2}$  ARIZ. CANAL



(34) Looking south from Arizona Canal east of Lateral 14. Frank Kinnley land below breaks (8/3/43) 27 TH AVE.  $\frac{1}{2}$  ARIZ. CANAL

SECTION 6 - GLENDALE AREA

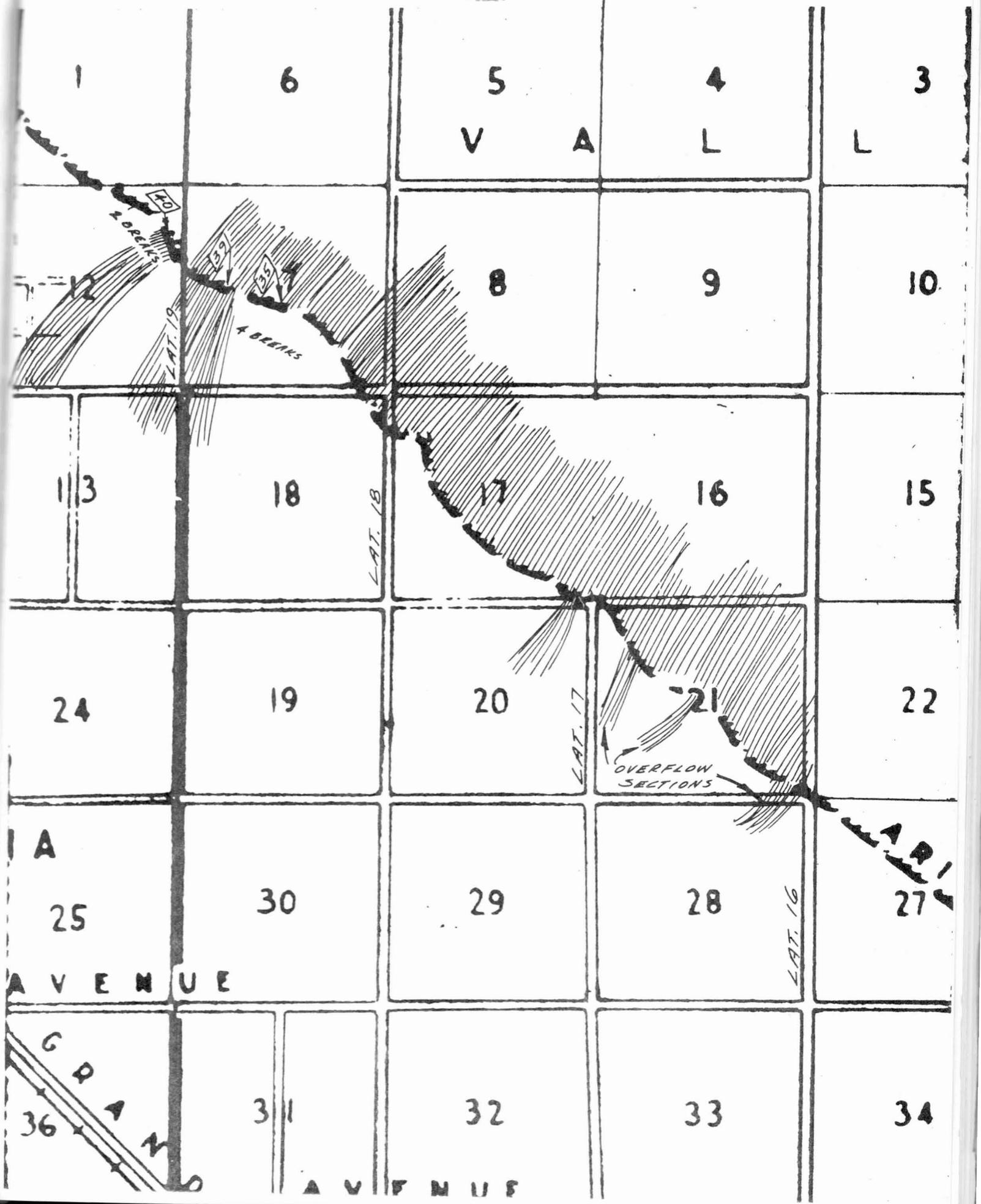
From Lateral 16 to Lateral 17, there were 3 overflow sections of the south bank. First, being 500 ft. west of Lateral 16. Second, Lateral 16 1/2. Third, 800 ft. east of Lateral 17.

The north bank in this section showed numerous inflow points and breaks in the low bank. A considerable inflow from the Deer Valley drainage area appeared to enter the canal from Lateral 16 to Lateral 17.

4 breaks occurred in the south bank from Lateral 18 3/4 to Lateral 18 7/8, and the south bank showed indications of having overflowed from Lateral 18 7/8 to Lateral 19.

2 breaks occurred in the south bank between Lateral 19 and Lateral 20. The first being approximately 50 ft. west of Lateral 19, and the other 600 ft. west. Indications of overflow of the south bank were found at Lateral 19 1/8 and Lateral 19 1/4. The inflow between Lateral 18 and Lateral 20 appeared to contain some overflow from the Skunk Creek drainage areas.

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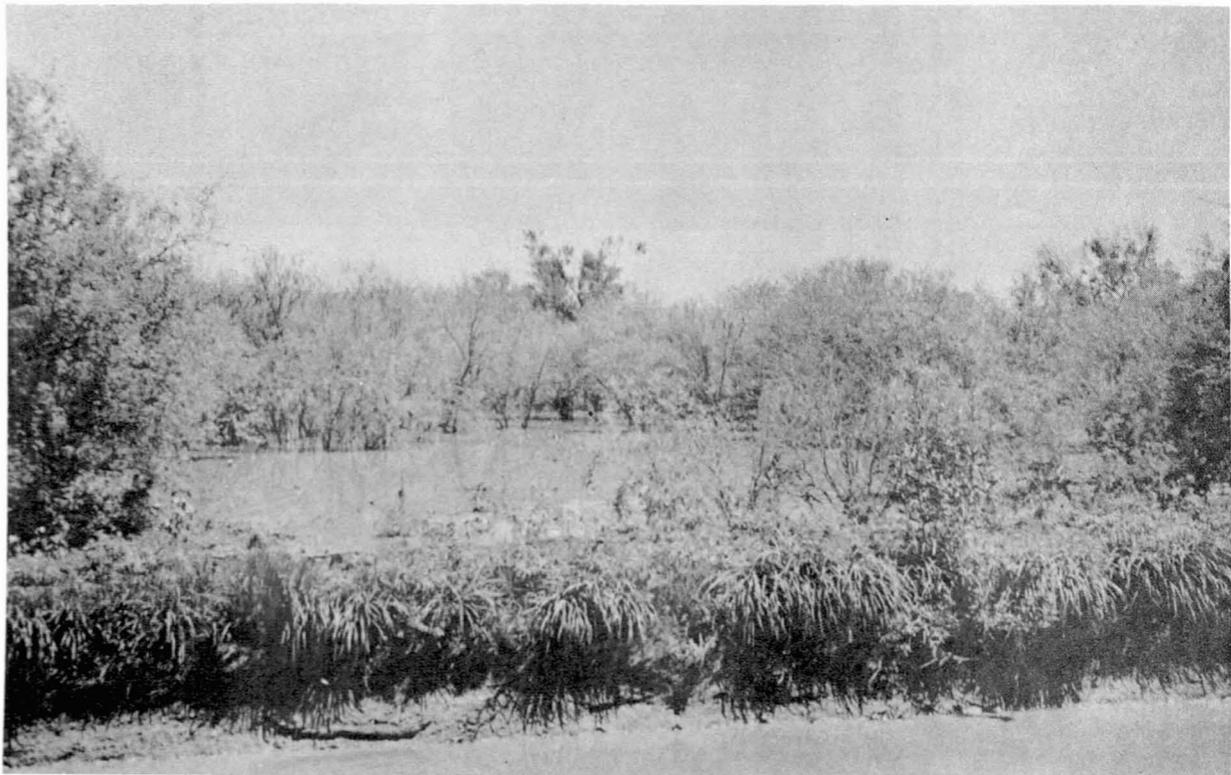
(35) Fourth break east of Lateral 19 1:30 PM (8/5/43)  
*JUST EAST OF 67TH AVE. & ARIZ. CANAL*



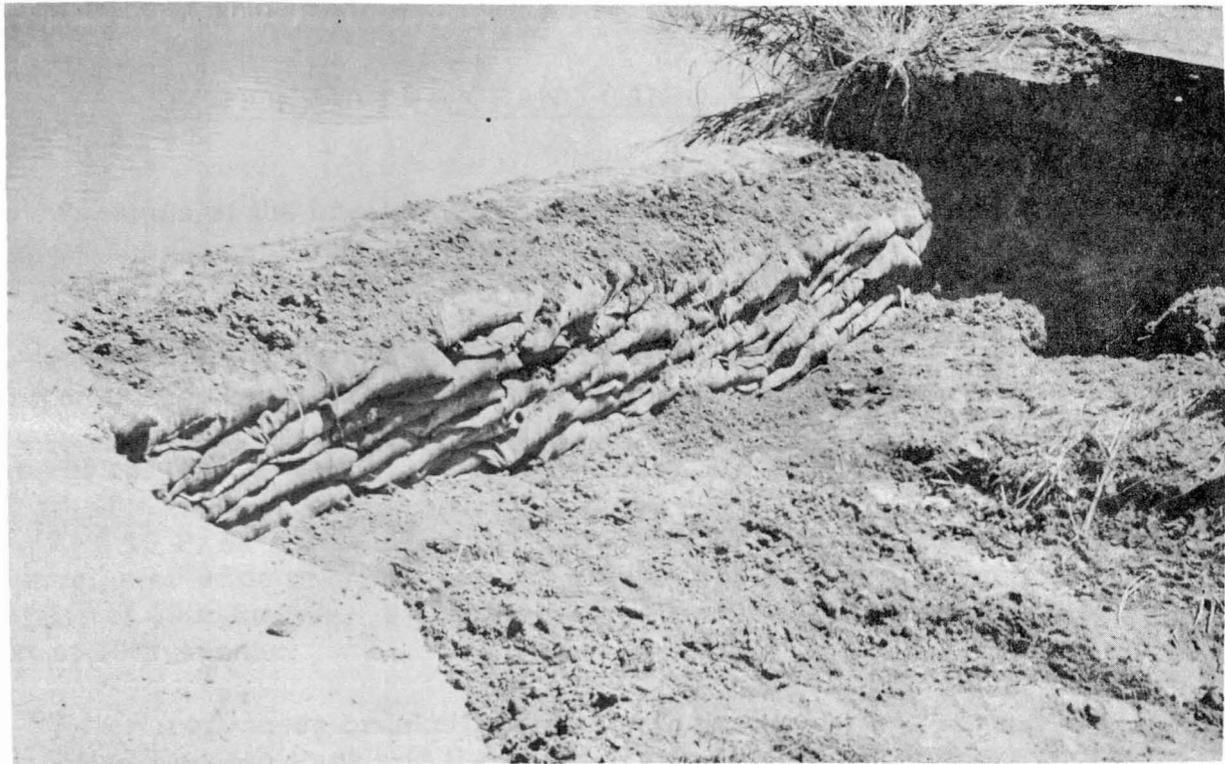
(36) Looking north from fourth break east of Lateral 19 (8/5/43)  
*JUST EAST OF 67TH AVE. & ARIZ. CANAL*



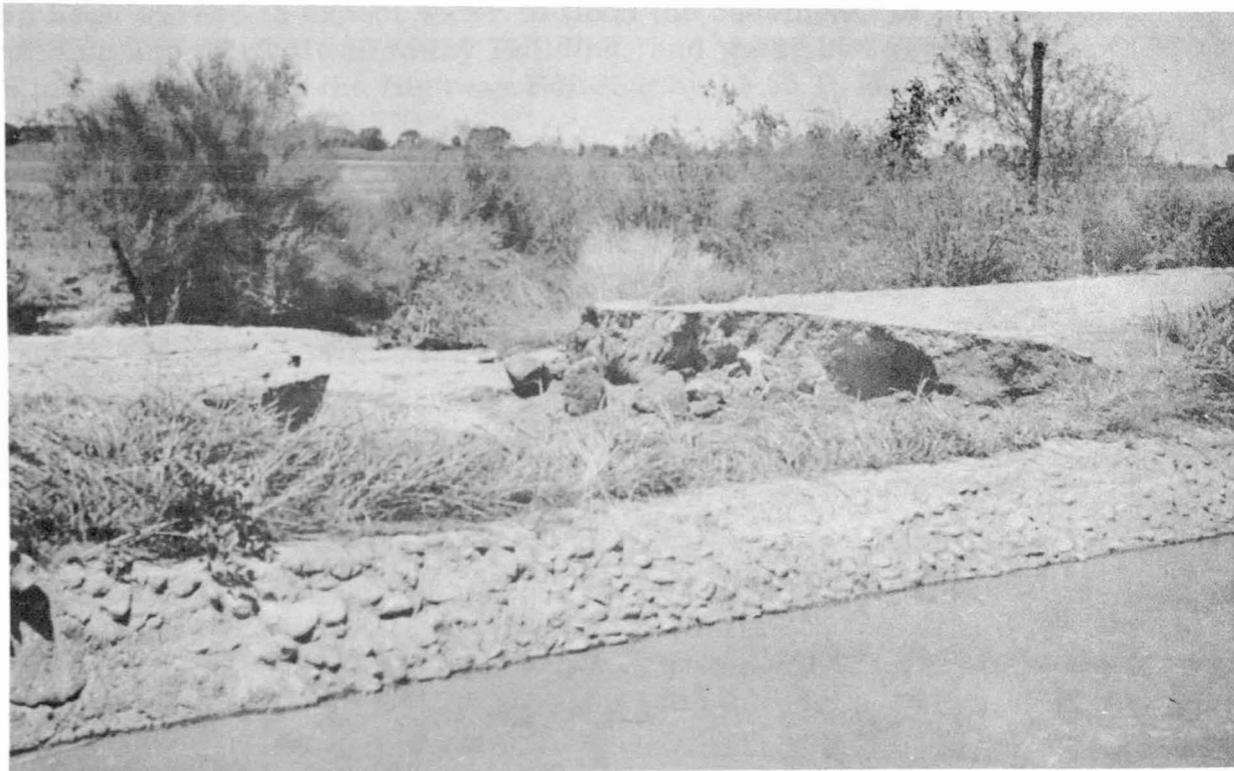
(37) Third break east of Lateral 19 (8/5/43)  
*JUST EAST OF 67TH AVE. & ARIZ. CANAL*



(38) Looking north from Lateral 18 3/4 (8/5/43)  
*ABOUT 65TH AVE. & ARIZ. CANAL*



(39) First break east of Lateral 19 (8/5/43)  
*EAST OF 67TH AVE. & ARIZ CANAL*



(40) One of two breaks west of Lateral 19 (8/5/43)  
*WEST OF 67TH AVE. & ARIZ CANAL*

SECTION SEVEN - GRAND CANAL - PHOENIX AREA

Warnings of the breaks in the Arizona Canal were received in time to prepare the Grand Canal to receive the flood. All checks were reported out and Laterals opened by 3 P. M.

Between 4 and 5 P. M. the water from the breaks in the Arizona arrived at the Grand Canal. The canal was picking up water from Central Avenue, westwardly with the heaviest inflow occurring just east of Lateral 13.

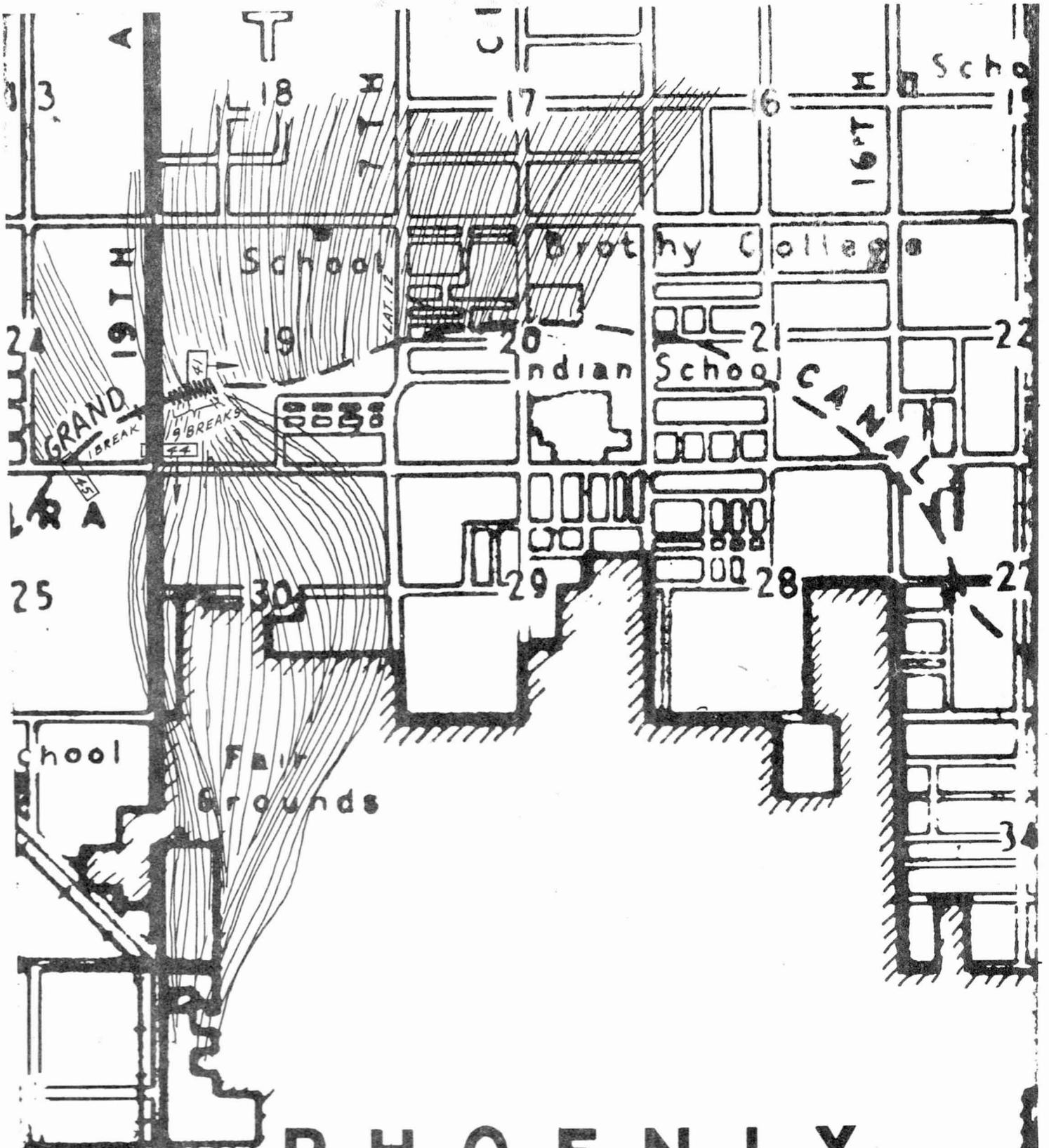
At 5:15 P. M. the canal at the Indian School Road crossing at 23rd Avenue, started to overflow but was relieved by breaks occurring in the vicinity of 19th Avenue. 9 breaks occurred within a quarter of a mile east of 19th Avenue.

Water from these breaks flowed slightly southeast and spread out inundating Encanto Park and the areas west of 7th Avenue. The water had reached 17th Avenue and Encanto at 7:55 P. M., Roosevelt and Grand Avenue at 10:02 P. M., and 15th Avenue and Van Buren at 11:50 P. M.

The major portion of the flood waters took a southwestwardly course crossing 19th Avenue south of the Grand Canal and followed the Santa Fe Railway tracks to 19th Avenue and Jackson. The State Highway Department had been warned to expect water to flood the basements of the Capitol Building and the State Highway Building, and water had reached a depth of 18 inches in front of the Highway Building by 11:55 P. M.

Traffic was shut off on Grand Avenue and Van Buren Streets west of 17th Avenue by 10:00 P. M.

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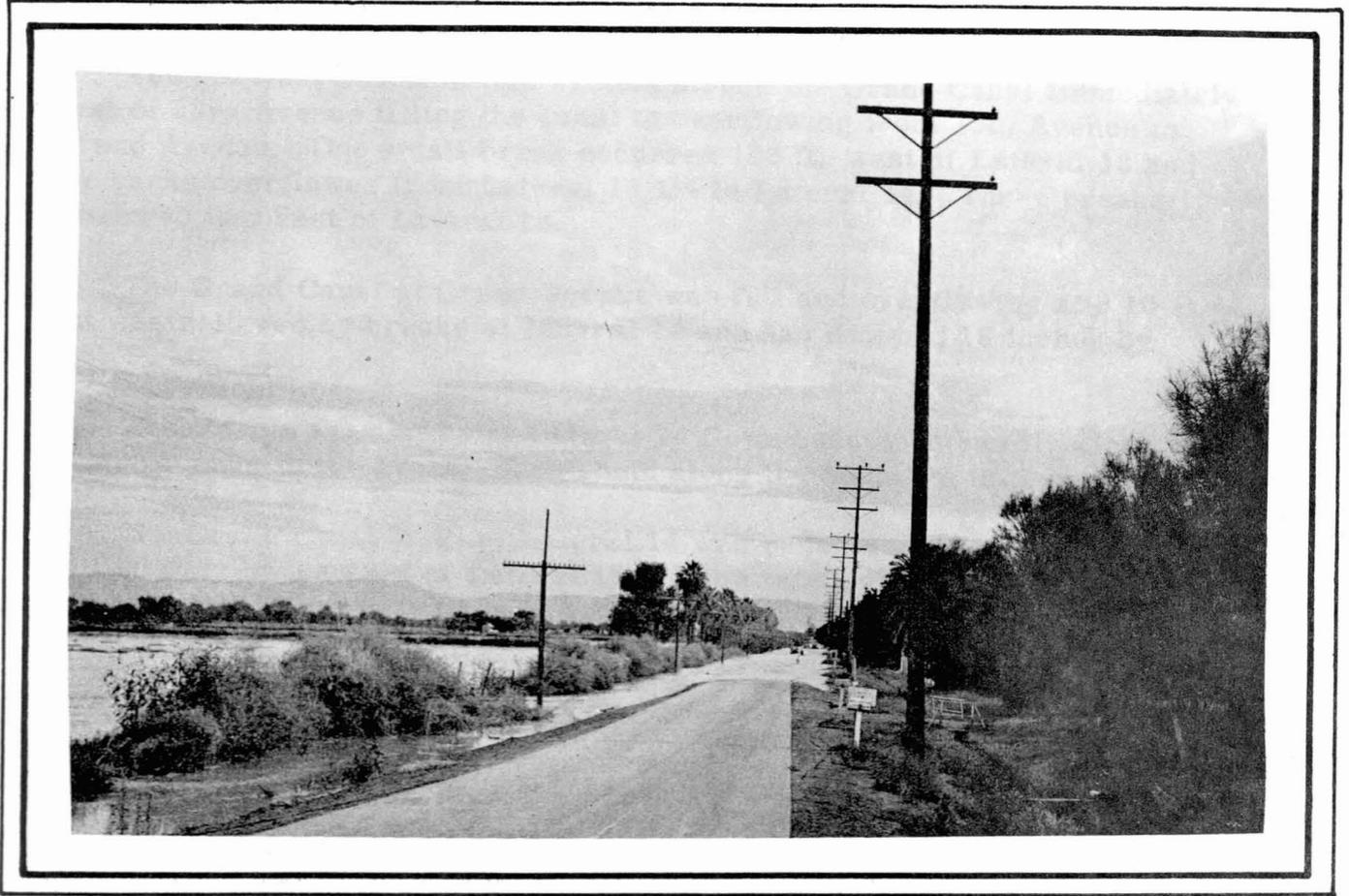
# PHOENIX



(41) Inflow east of Lateral 13 on Grand Canal 6:00PM (8/3/43)  
*19<sup>th</sup> AVE & GRAND CANAL*



(42) Lateral 13 on Grand Canal 6:05 PM (8/3/43)  
*19<sup>th</sup> AVE & GRAND CANAL*



(44) Looking south on 19th 6:25 PM (8/3/43)

SECTION EIGHT - GRAND CANAL - ALHAMBRA AREA

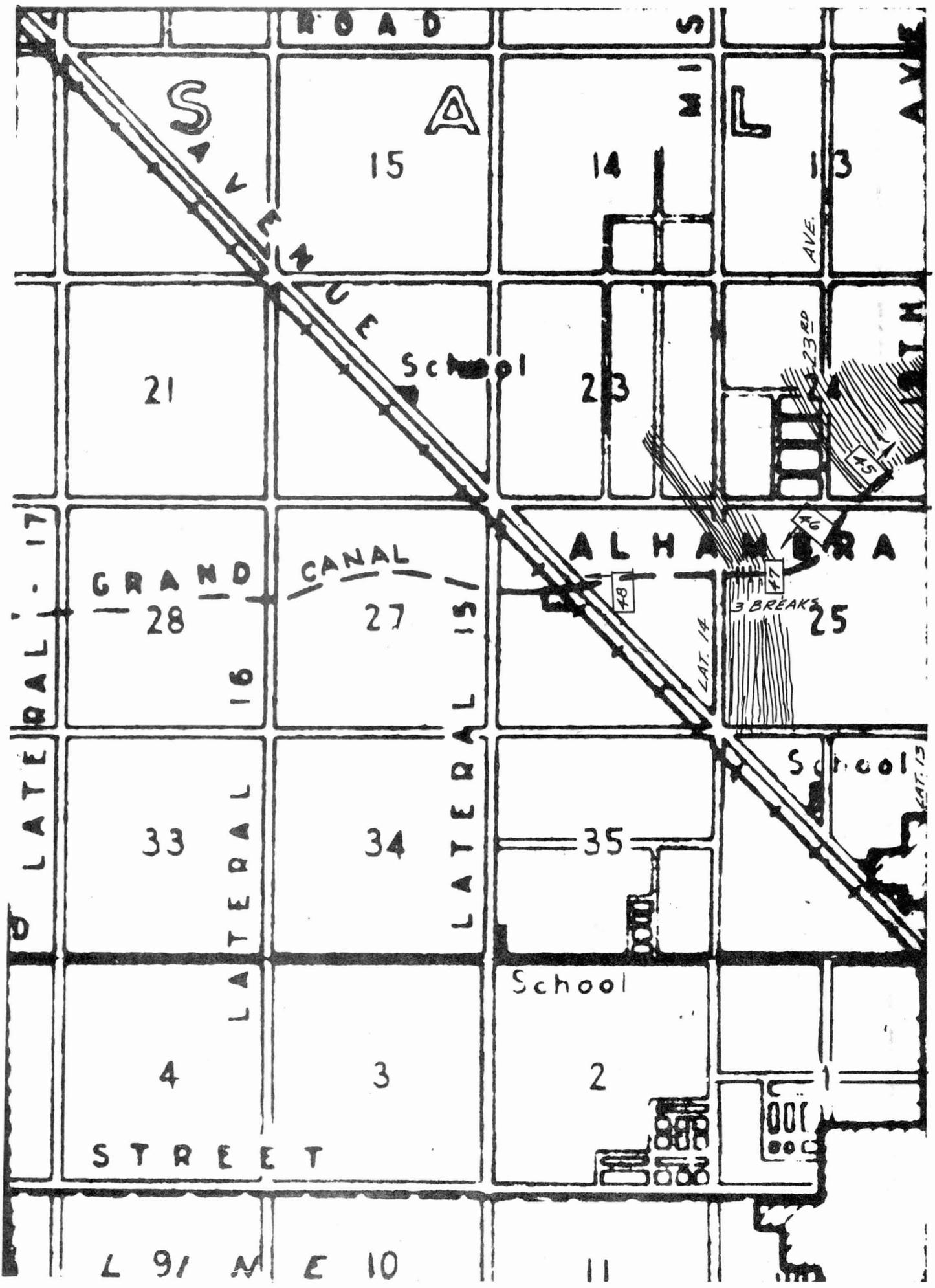
The heaviest inflow in this section struck the Grand Canal immediately east of 23rd Avenue filling the canal to overflowing from 19th Avenue to Grand Avenue. One small break occurred 100 ft. west of Lateral 13 and the banks overflowed from Lateral 13 1/4 to Lateral 14. Three breaks occurred just east of Lateral 14.

The Grand Canal at Grand Avenue was full and overflowing at 5:10 P. M. but was relieved by breaks at Lateral 14 and had dropped 18 inches by 7:55 P. M.

Water from the breaks at Lateral 14 flowed southeastwardly along Grand Avenue to Six Points, then south along the Santa Fe Railway.

The Grand Canal West of Lateral 14 was running at full capacity and spilled over banks East of Lateral 16. Some inflow to the Grand occurred at Lateral 20 apparently from breaks and lateral discharge on the lower end of the Arizona.

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GRAND

CANAL

ALHAMBRA

STREET

School

School

School

3 BREAKS

LAT. 14

LATERAL 15

LATERAL 17

LATERAL 16

LAT. 13

L 91 M E 10

11

S

A

M I S

A V E

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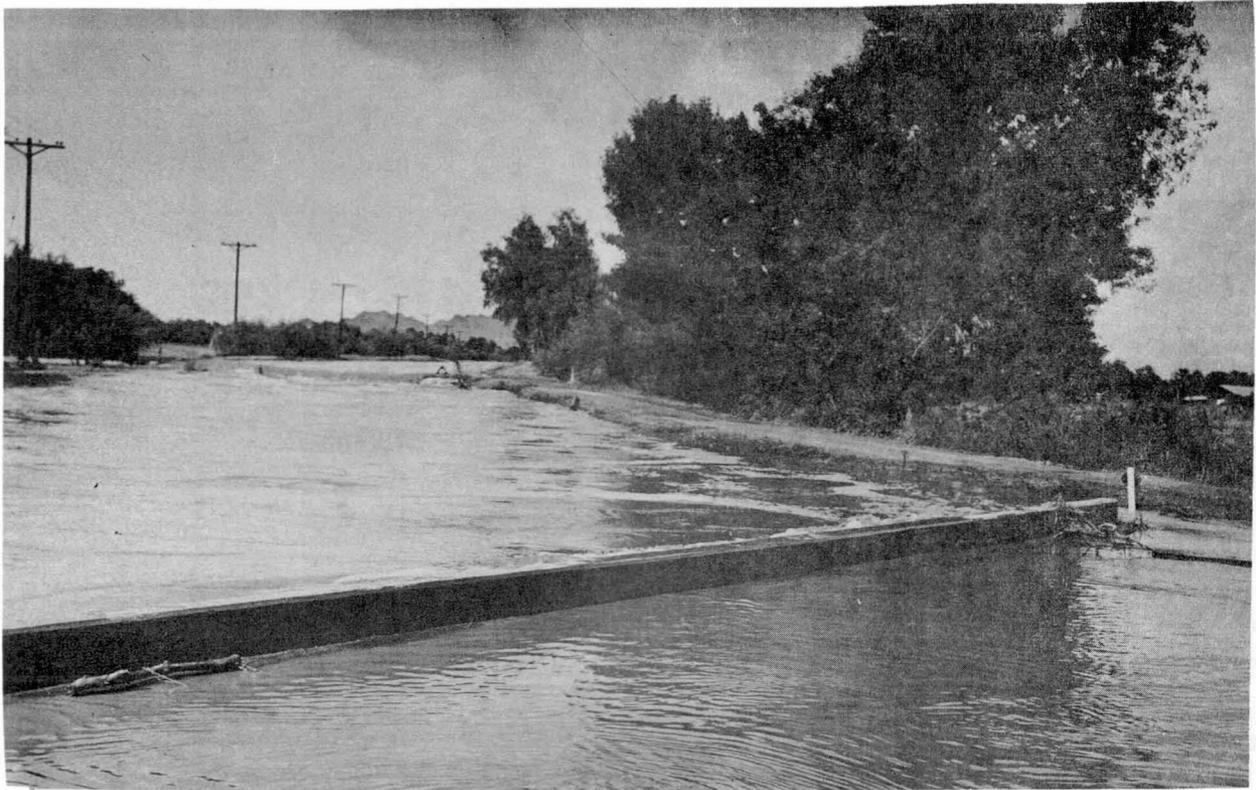
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48

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(45) Looking east from Indian School Road east  
of 23rd Avenue 5:15 PM (8/3/43)



(46) Looking west from same point



(47) Break east of Lateral 14 on Grand 5:30 PM (8/3/43)  
*27TH AVE. & GRAND CANAL*



(48) Grand Canal at Grand Ave. 5:35 PM (8/3/43)  
*27TH AVE. & GRAND CANAL*

## CONCLUSION

Desert floods of sufficient magnitude to cause breaks in the Arizona Canal have occurred periodically, and it can be expected that they will do so in the future.

Each flood has characteristics of its own depending on the location and the intensity of the rainfall rather than the total amount of precipitation for a days period. The rapid runoff from the nearby foothills tends to fill the canal before the heavy floods from the larger drainage areas arrive, thus leaving no space in the canals to break the peak of the flood by carrying it down the canal from the point of ingress.

The flood control effect of the Cave Creek Dam evidently saved some damage as it impounded water to a gage height of 29.4 at the peak. One gate was open which regulated the flow to a maximum of 400 c. f. s. The larger portion of the flood water arriving at the Arizona Canal was runoff from the area below Cave Creek Dam.

The cost of enlarging the Arizona Canal to carry occasional large floods off the project would be prohibitive and would not be a sound investment as far as the Association is concerned. It appears from the action of this particular flood that certain expenditures by the Association to increase the capacity of the Evergreen and Indian Bend Wasteways and the installing of sufficient spillways to control flood water from Granite Reef to Lateral 13 might be justified.

In order to prevent damage to personal property laying in the path of floods from Cave Creek breaks in the Arizona, it is suggested that a portion of the water below the Arizona Canal might be diverted by large waste ditches connected with Laterals 16, 17, 18, thus diverting the flood waters west of the A. T. & S. F. Railway and relieving the Grand Canal of a portion of the flood waters. Also, if the old Maricopa Canal were opened up from 7th Avenue to west of the railroad, flood waters below the Grand Canal could be disposed of to a certain extent.

It is probable that any and all steps toward flood control should be taken by the organization of a flood control district in order to eliminate the possibility of future litigation from individuals who might be caused real or imaginary damages in order to benefit the whole.

One of the outstanding weaknesses of the operation of the canal system during the emergency was the almost total lack of means of communication between the Superintendent of Irrigation and the Watermasters and Zanjeros. Both the Association's and the Mountain States telephone systems were rendered almost totally inoperative by the rain and a close supervision of the

Conclusion (Continued)

system was impossible. A two-way radio system installed at critical points would be invaluable during a crisis of this kind.

Some breaks originated from gopher holes or muskrat holes in the canal banks, and as it is impossible to patrol the many miles of canals during a flood of this nature, it is suggested that a permanent plan of rodent control be established in which canal banks are periodically treated for rodent control. A department has been set up by the Government to instruct and assist in such cases, and is under the supervision of the Fish and Wild Life Department of the Department of Interior, with offices in the new postoffice building in Phoenix.

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