

Salt River Project Report of
North Mountain Flood of
August, 1943

ARIZONA CANAL

80.8.00-1-08/43

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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.

*
*

Just West of
Indian Bend

Just East of
Indian Bend

+4

Cal -

The sections of Benham's report pertaining to Suadalupe have been marked with slips of paper, or unfolded.

No statement is made, but it looks to me as if the studies were based on USGS quad sheets. A call to them may ascertain this.

I have marked roughly in pencil on the Suadalupe quad sheet the general plans proposed by Gost & Gardner and Benham. There is some overlapping opposite Suadalupe.

Lee

PHOENIX OFFICE

WEATHER BUREAU

**

August 2, 1943

<u>Period</u>	<u>Precipitation In Inches</u>
11-12 AM	T
12-1 PM	0
1-2 PM	0
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	0
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	
	8:30 AM to 10:00 AM	<u>.18</u>
	Total	3.96

GRANITE REEF

Monday, August 2	6:00 PM	2.50
Tuesday, August 3	3:30 PM	<u>2.62</u>
	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	<u>2.18</u>
	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 Cut750 c.f.s.
Old Cross Cut450 c.f.s.

CAPACITY OF LATERALS

No. 1	W. SIDE INDIAN RESERVATION (PIHA RD)	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	24TH	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+
Indian Bend Wasteway	(Gates (Spillway)	2000 8000
Cross Cut		625
Old Cross Cut		750

ARIZONA CANAL RECORDER GAGE READING

Location	<u>August 3, 1943</u>		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	9:30 AM	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

GRANITE REEF

	<u>Time</u>	<u>Gage Height</u>
Rain reported	8:30 AM	---
Ordered to waste all water from Arizona Canal	8:30 AM	---

EVERGREEN WASTEWAY

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	---

INDIAN BEND

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 (wasting approximately 625 cfs)	9:15 AM	---
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	---

LATERAL 6

Ordered to open gates (Old Cross Cut)	7:35 AM	---
(25 c.f.s. in canal below 6)		
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

LATERAL 7

Desert Inflow between Lats. 7&8 - 25cfs	7:00 AM	---
Desert Inflow at Biltmore Bridge	7:15 AM	---

LATERAL 9

	<u>Time</u>	<u>Gage Height</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	10:00 AM	----
South bank of canal broke Lat. 10 1/8	10:05 AM	----
Inflow covered North bank for several hundred feet above and below check	10:30 AM	----
Canal started dropping	10:30 AM	----
Filled to overflowing again when Indian Bend water arrived		

LATERAL 11

All check gates raised	7:30 AM	----
South bank broke South of Northern Ave.	9:15 AM	----
Inflow covered North bank from Lateral 10 1/2 to Lateral 10 3/4		

LATERAL 12

Canal within six inches of top of South Bank (North Bank overflowing)	8:00 AM	----
Overflowed South bank above Lateral 13	9:30 AM	----

LATERAL 13

Overflowed South bank below Lateral 13	9:00 AM	---
Check gates Lateral 13 not raised because Cave Creek was backing canal against gates.		

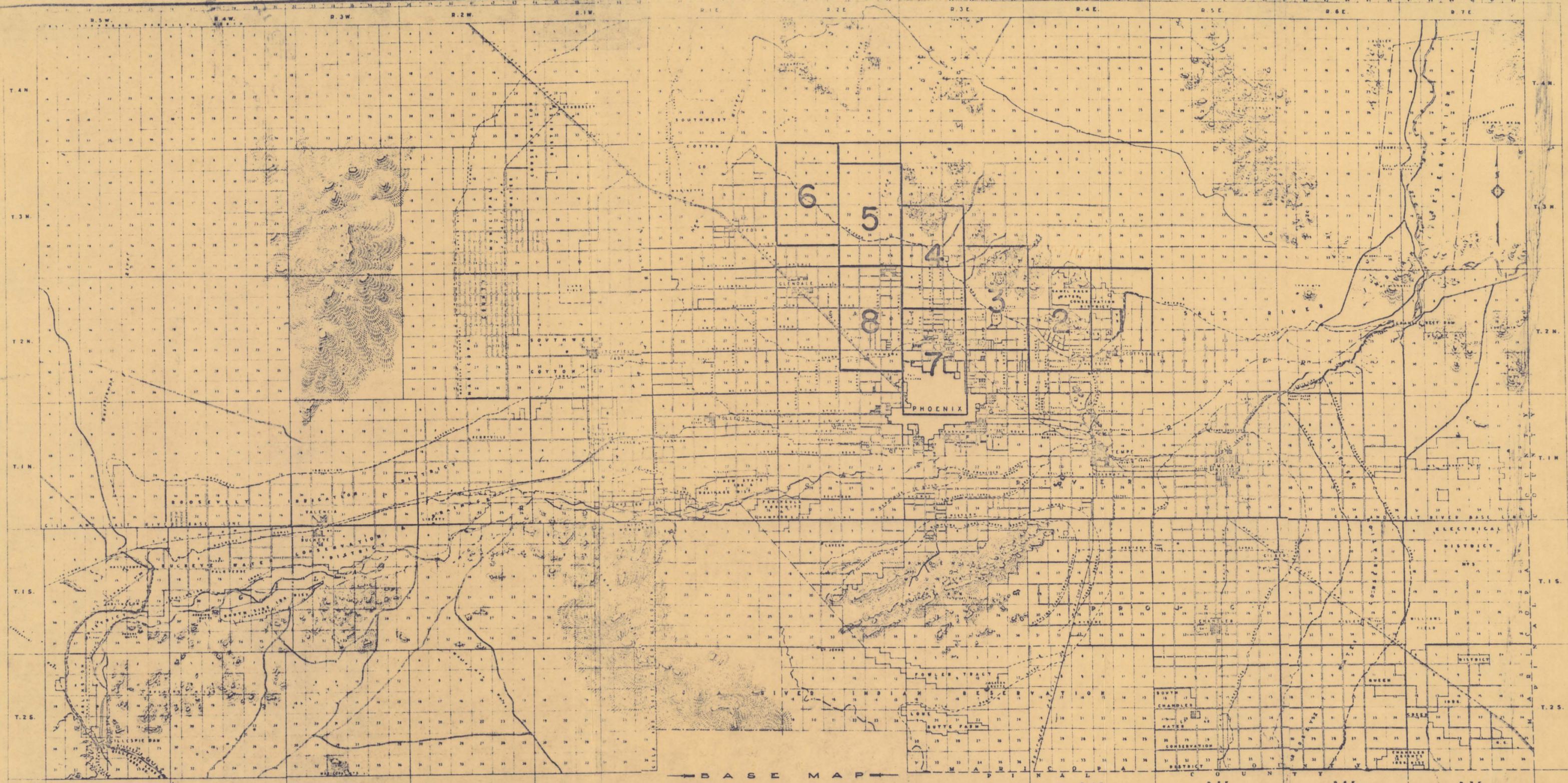
CAVE CREEK

Inflow started	9:00PM 8/2/43	----
175 c.f.s. inflow	6:00AM 8/3/43	----
Sudden rise	6:15AM "	
Break in South canal bank	12:00-1:00PM	----

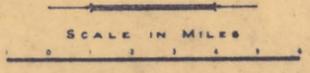
LATERAL 14 1/2

Check gates raised	6:15 AM	----
Overflowed South bank below Lateral 14 1/2	8:10 AM	----

<u>LATERAL 16</u>	<u>Time</u>	<u>Gage Height</u>
All gates but one up	9:00 AM	---
<u>LATERAL 17</u>		
One check clear out	8:30 AM	---
Raised North gate clear out	9:45 AM	6.2
<u>LATERAL 18</u>		
Raised center check	7:15 AM	---
Desert inflow started	8:00AM	---
All gates clear out & Lateral opened	9:45 AM	---
<u>LATERAL 19</u>		
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	---
<u>LATERAL 20</u>		
Tail gates raised	9:30 Am	---
<u>GRAND CANAL</u>		
<u>JOINT HEAD</u>		
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	---
<u>LATERAL 14</u>		
Break in South bank east of Lateral 14	5:30 PM	---
<u>Lateral 13</u>		
Break in South bank east of Lateral 13	5:35 PM	---
<u>Lateral 23</u>		
Tail gate raised	7:00 AM	---
Forebay dry	9:00 AM	---



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 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.

800' East of
Indian Bend

500' E of
Indian Bend

40

#2

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.

L BACK
TER, 9
CONSERVATION
DISTRICT

16

MT

High School

SCOTTSDALE

School
28
27
GOLF INGLE SIDE

Yaqui Camp

Reservoir

ARIZONA
CROSS

33

26

25

35

36

23

24

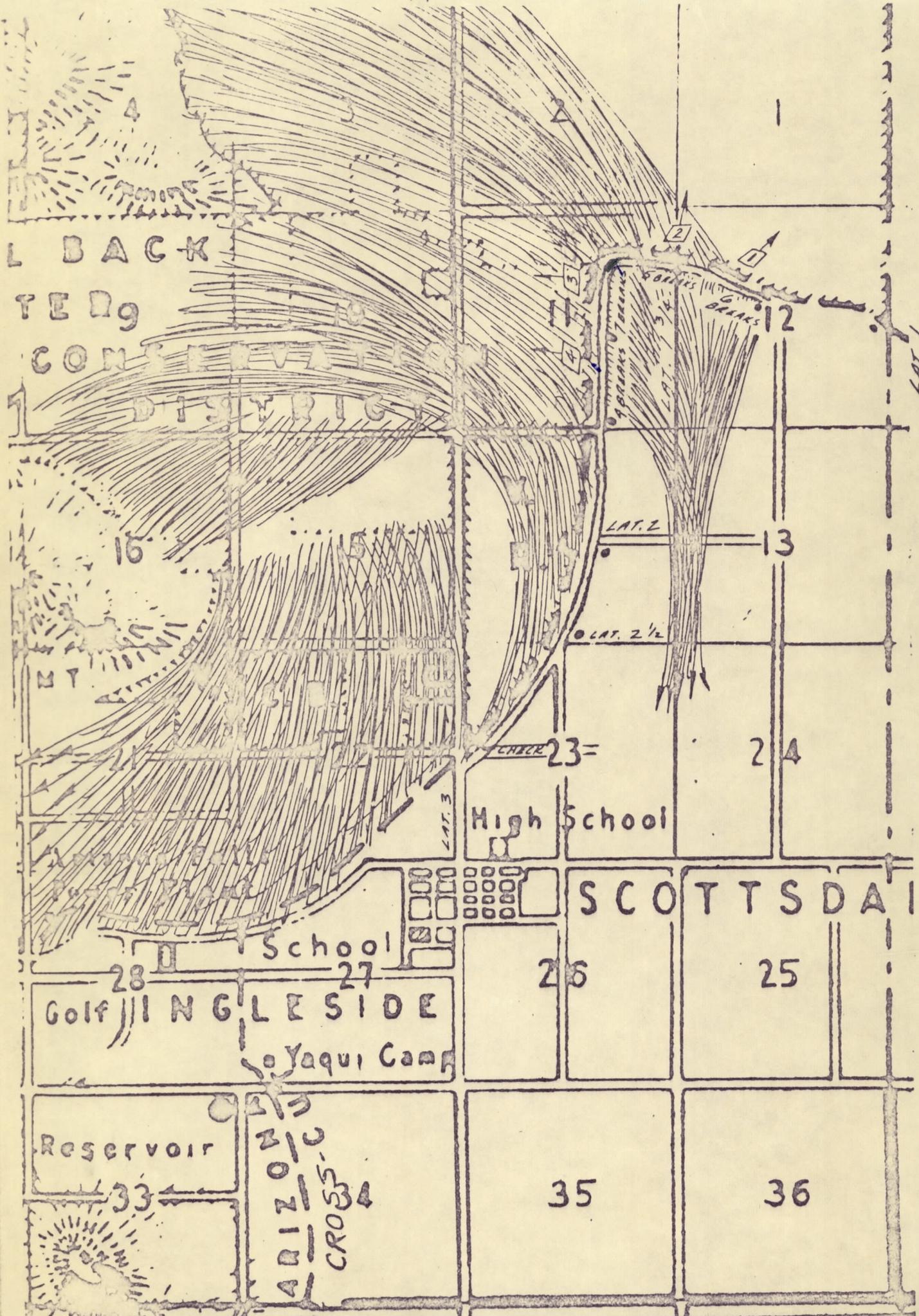
12

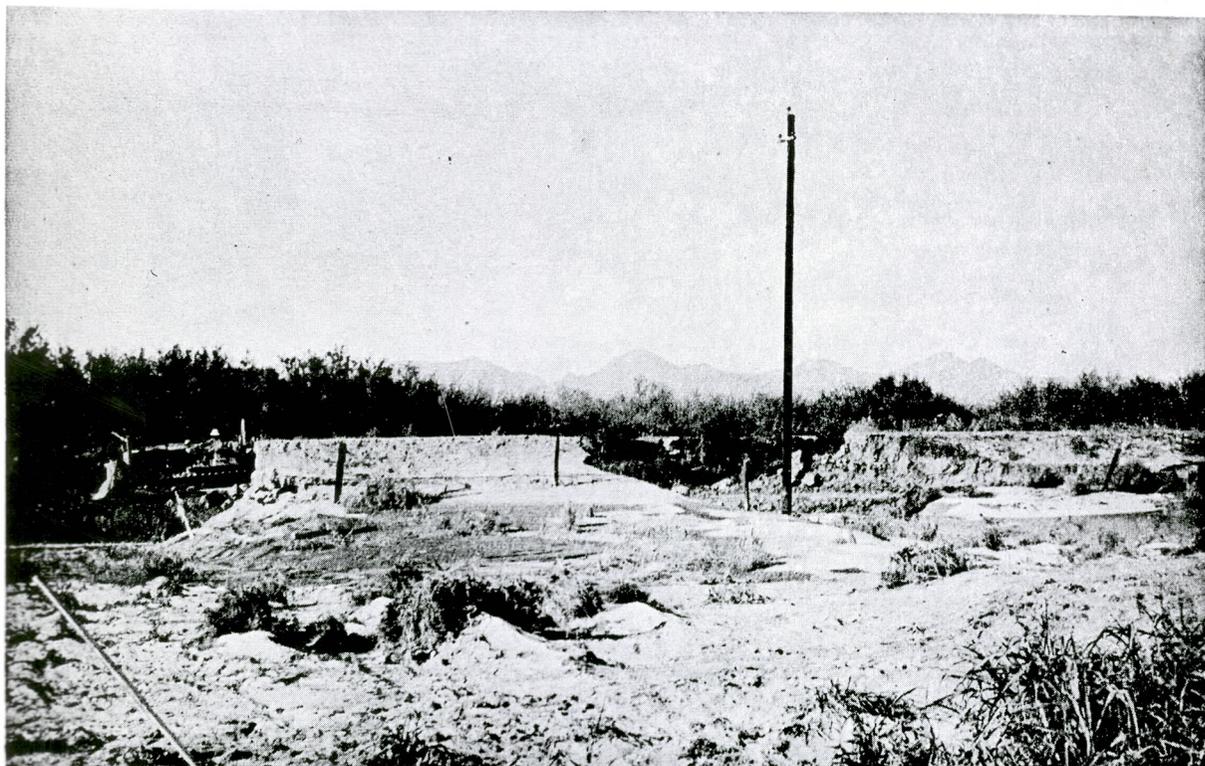
13

LAT. 2

LAT. 2 1/2

LAT. 1





(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 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.

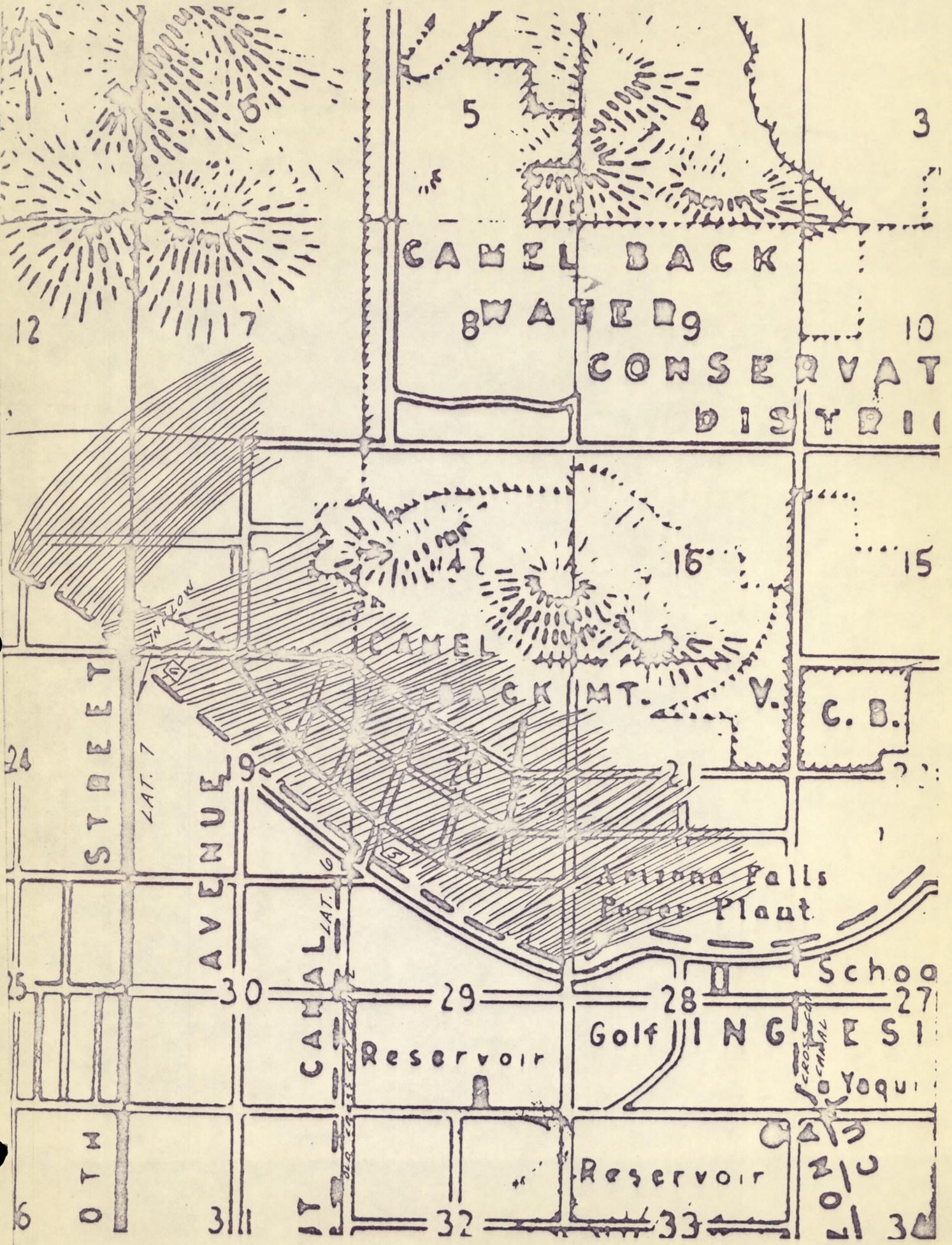
Both north and south banks in this section were intact with exception of a heavy inflow approximately 100 ft. east of Lateral 7, which was the accumulation of the runoff from the south side of Camelback Mountains which followed the course of the canal in a northwesterly direction until intercepted by 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.

CAMEL BACK
WATER
CONSERVAT
DISTRICT



STREET

AVENUE

CANAL

CAMEL BACK MT.

Arizona Falls Power Plant

Reservoir

GOLF COURSE

School

Reservoir

CROSS-FEED CANAL

Yoqui

LAT. 7

LAT. 6

12

17

5

4

3

10

CONSERVAT

DISTRICT

15

15

C. B.

24

9

20

21

25

30

29

28

School

GOLF COURSE

Yoqui

6

OTW

31

32

33

Reservoir

20

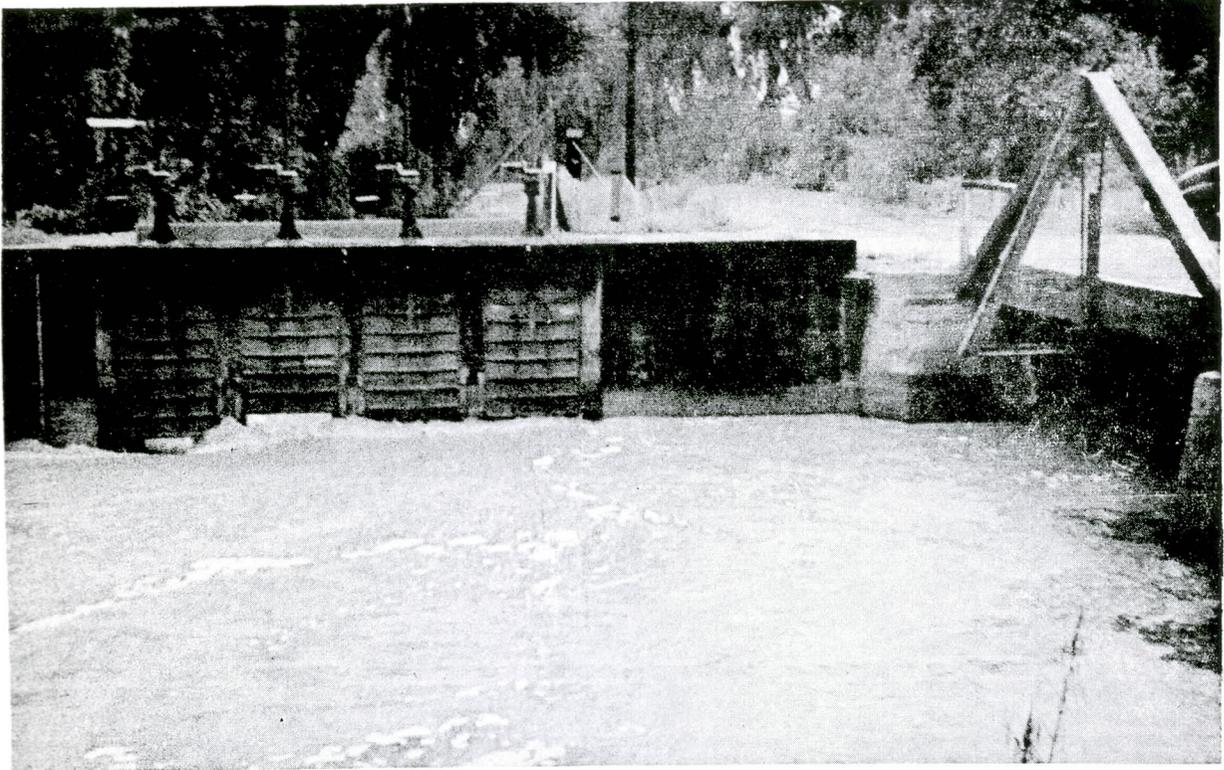
21

34

45th street
and Ariz. Canal.

100' - East of
40th street
& Ariz. Canal

#6



(5) Head Gates old Cross Cut 10:00 A.M. 8/3/43



(6) Inflow 100' East of Camelback Road

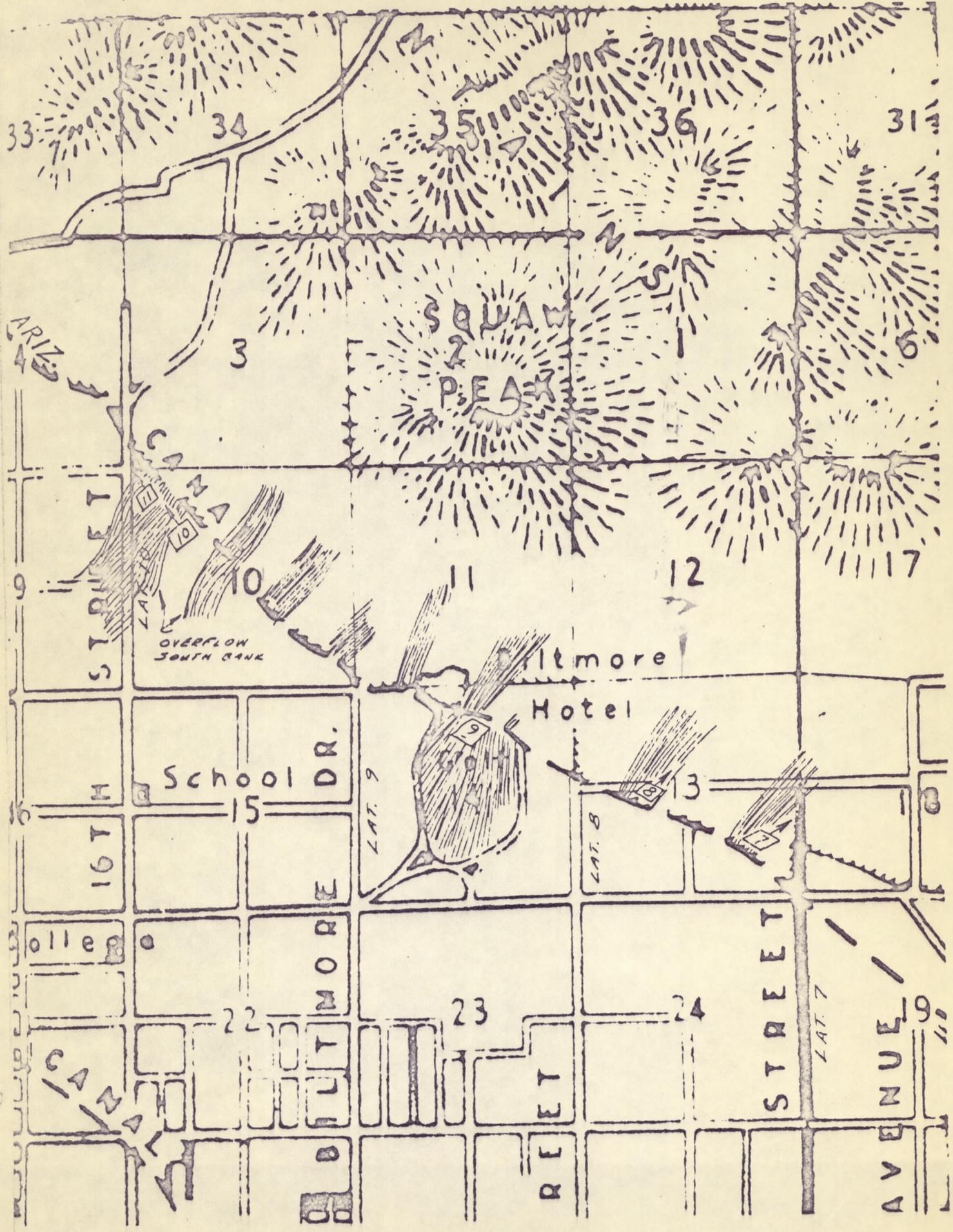
SECTION THREE - BILTMORE HOTEL AREA

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 at 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.

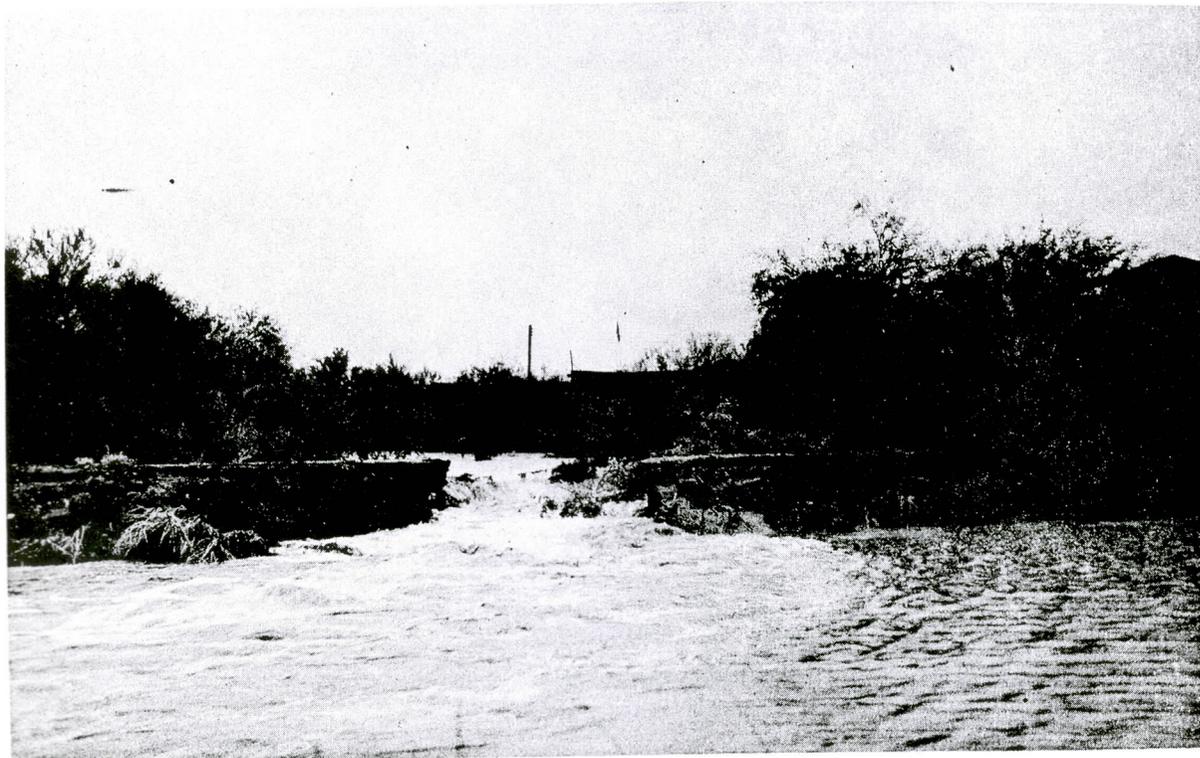
There is a very definite original waterway at Lateral 9 1/4 which if equipped with a spillway would afford relief for the canal between this point and Lateral 10. Heavy inflow occurred immediately west of Lateral 9 1/2. The gage reading of staff gage at Lateral 9 1/2, was 5.56 at 10:26. Both the north 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.



Echo Canyon
Wash 1000' West of
40th St.

1320' East of
32nd St + Ariz Canal.



(7) Inflow west of Lateral 7 10:15 AM (8/3/43)



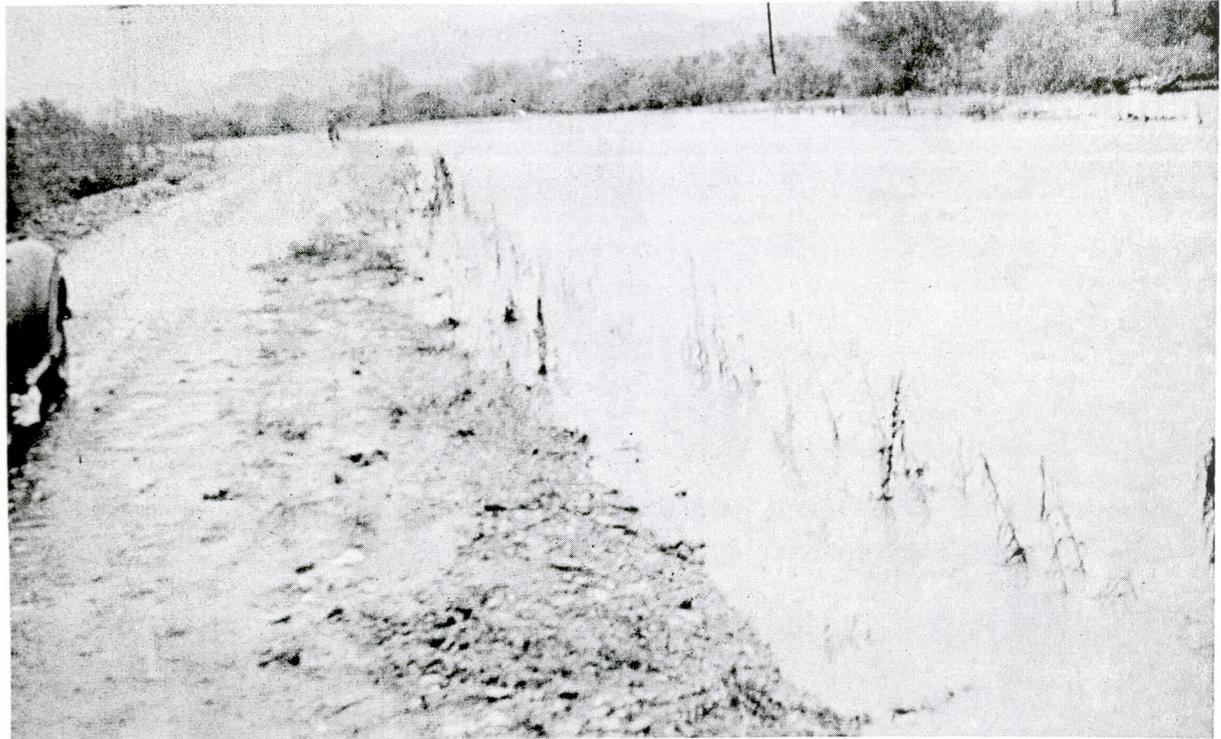
(8) Inflow opposite spillway at 17 1/4E - 9 1/2N 10:17 AM
(8/3/43)

$\frac{1}{2}$ Mile West
of 32nd street
& Ariz. Canal

$\frac{1}{4}$ Mile East of
16th street &
Ariz Canal



(9) Spillway at Biltmore Golf Course Lateral 8 1/2 10:20 AM
(8/3/43)



(10) Looking west from Lateral 9 3/4 10:28 AM (8/3/43)

SECTION FOUR - PHOENIX AREA

The inflow to that portion of the Arizona from Lateral 10, to Lateral 13 is from 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 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)

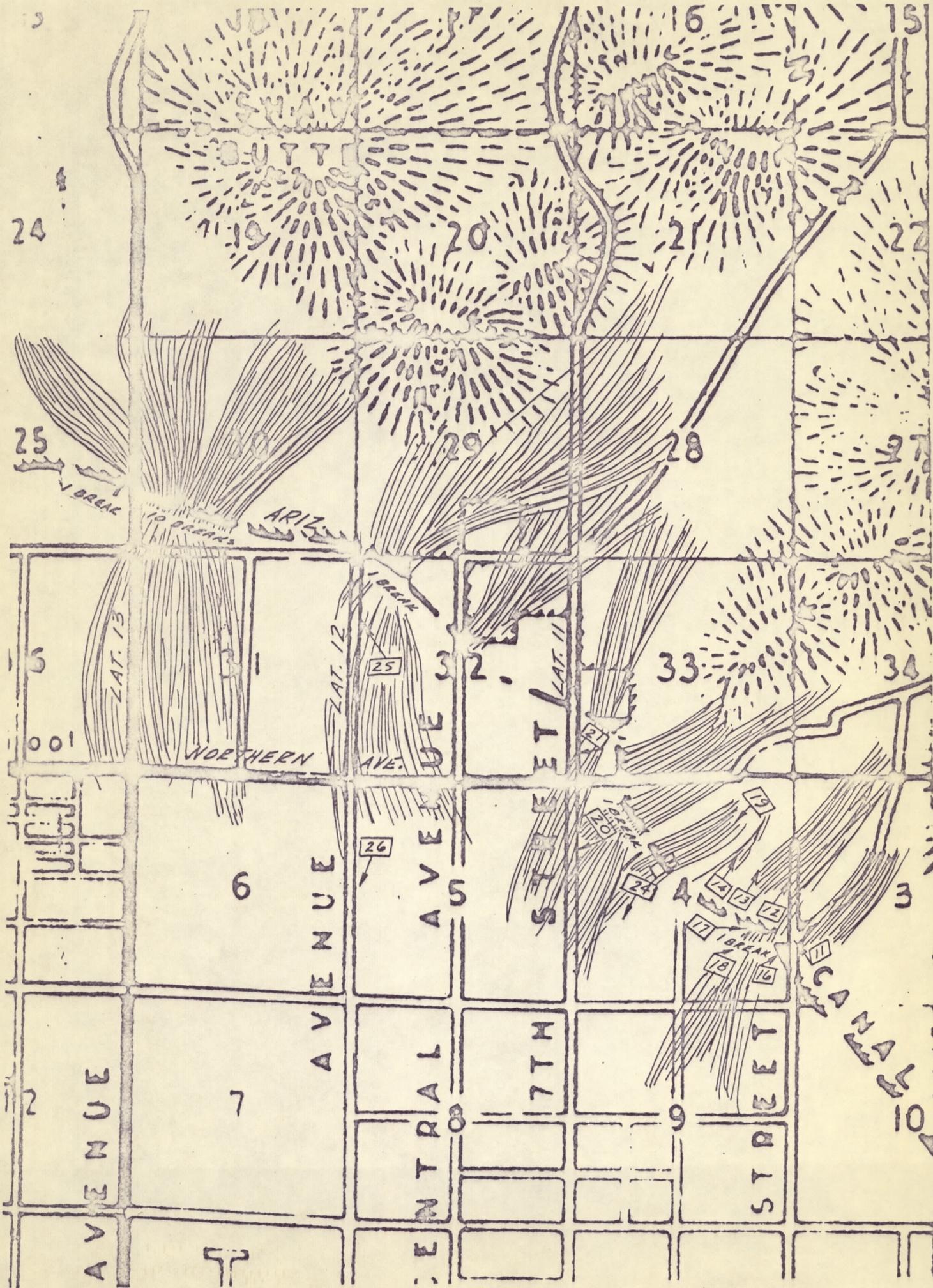
The south bank overflowed for about 500 ft. west of Lateral 11 1/2. A large break occurred in the south bank immediately east of 7th Avenue.

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.

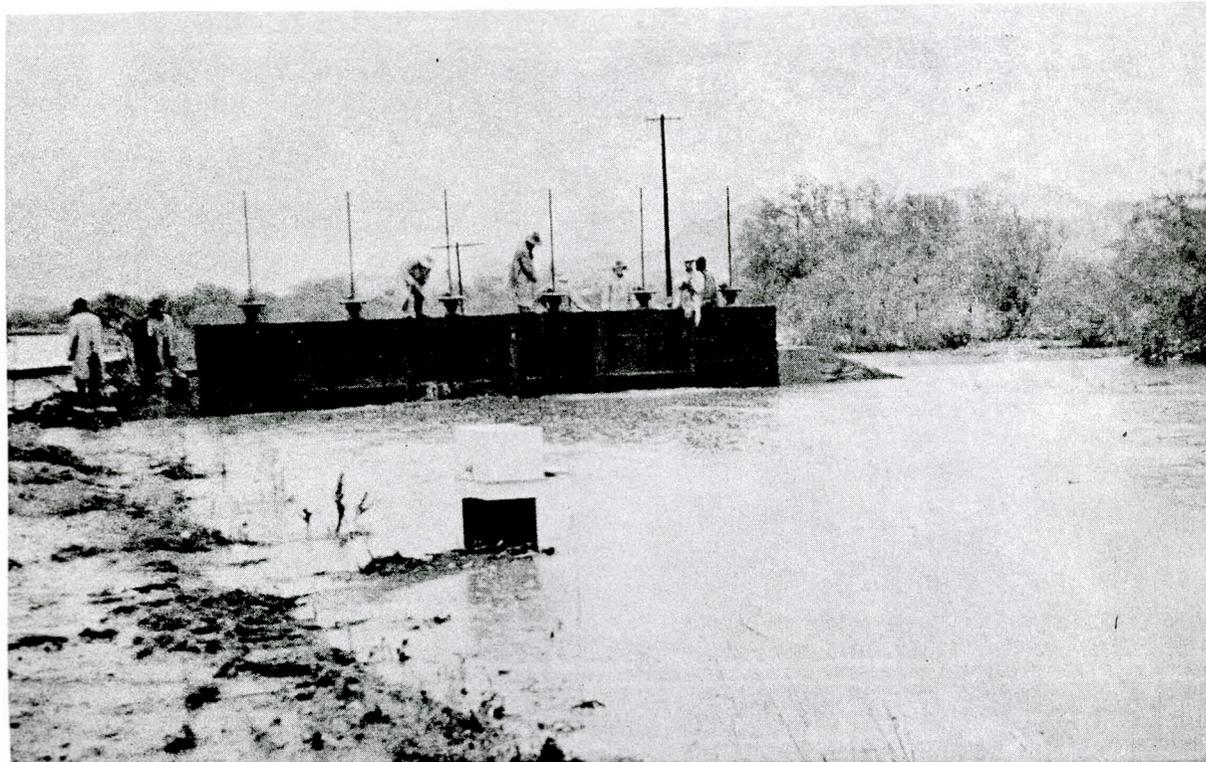
The water from the break at Lateral 10 1/8 flowed in a south-westerly direction and combined with the water from the break at Lateral 10 5/8 in the vicinity of the Grand Canal and Central Avenue. The break at Lateral 10 5/8 inundated 7th Street but not sufficiently to entirely stop traffic. Central Avenue 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.

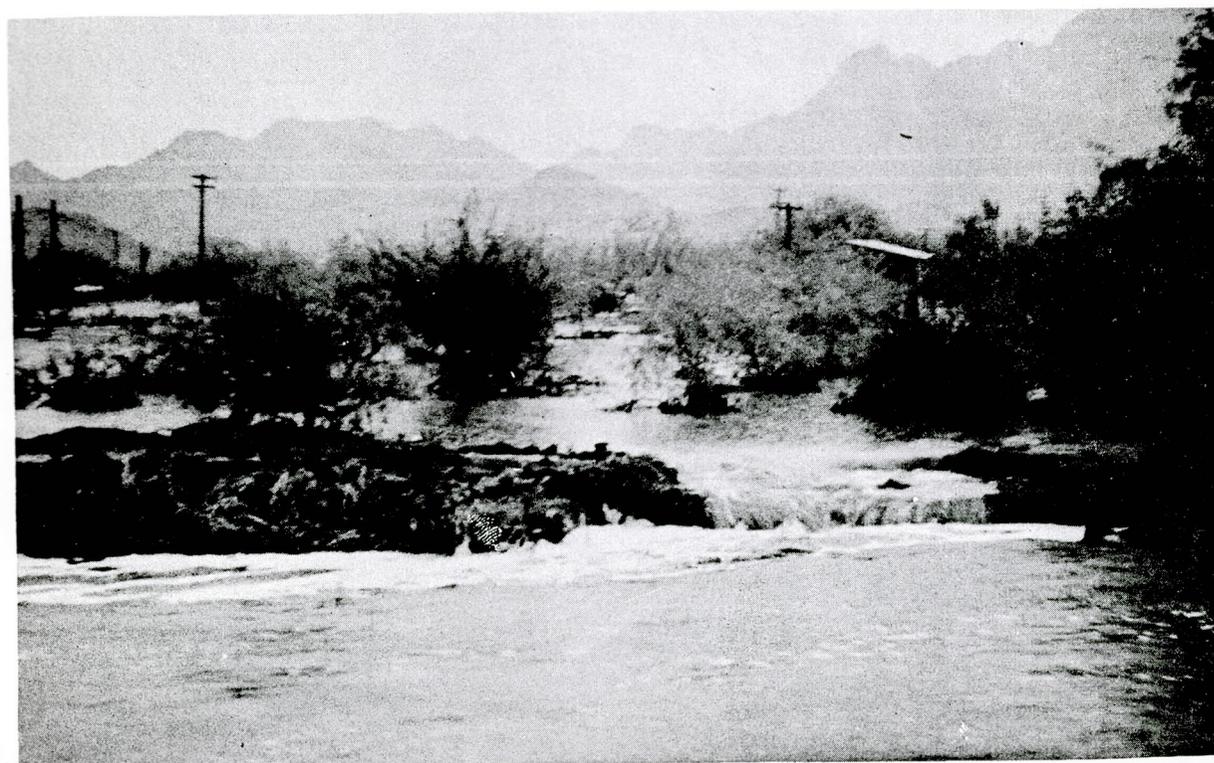


16th Street
and Arizona
Canal

1/8 mile West
of 16th Street
& Ariz Canal



(11) Trash crew working on check at Lateral 10 10:32 AM
(8/3/43)

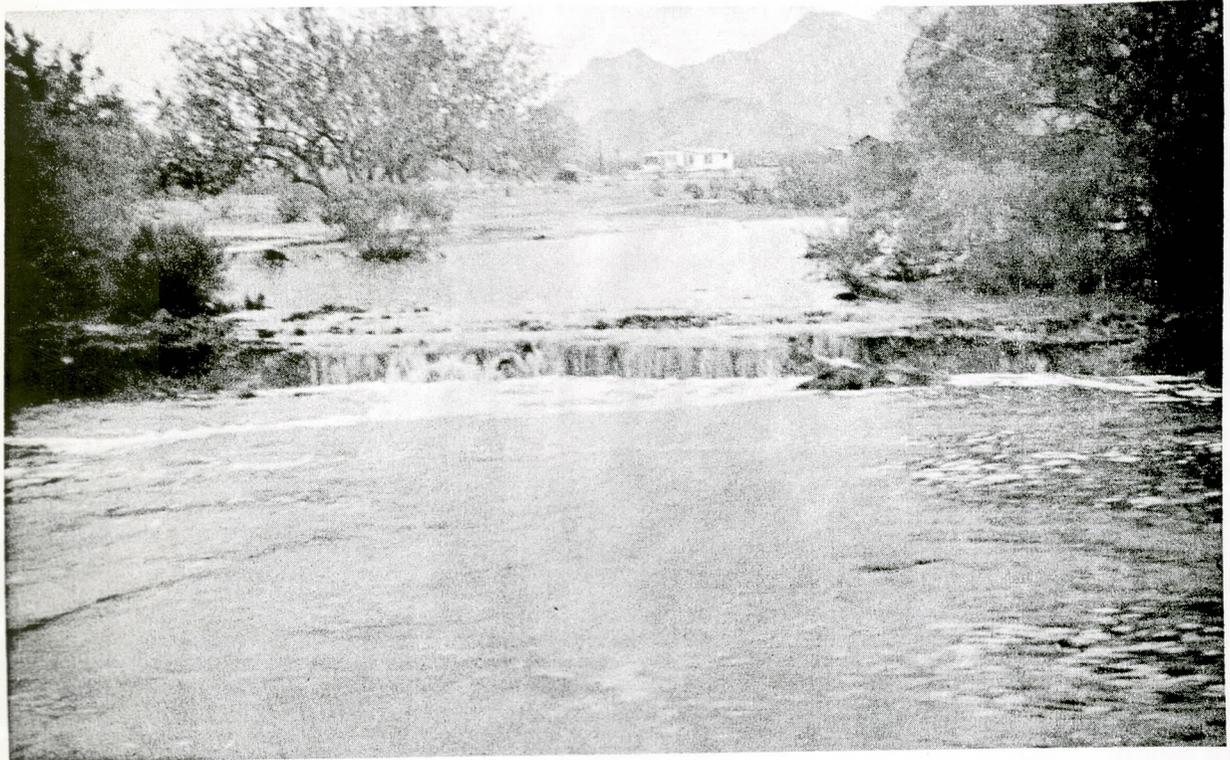


(12) Inflow 1/8 mile west of Lateral 10 10:35 AM (8/3/43)

$\frac{1}{4}$ mile west
of 16th street
& Ariz Canal

$\frac{1}{4}$ mile
west of 16th
st & Ariz Canal

#13



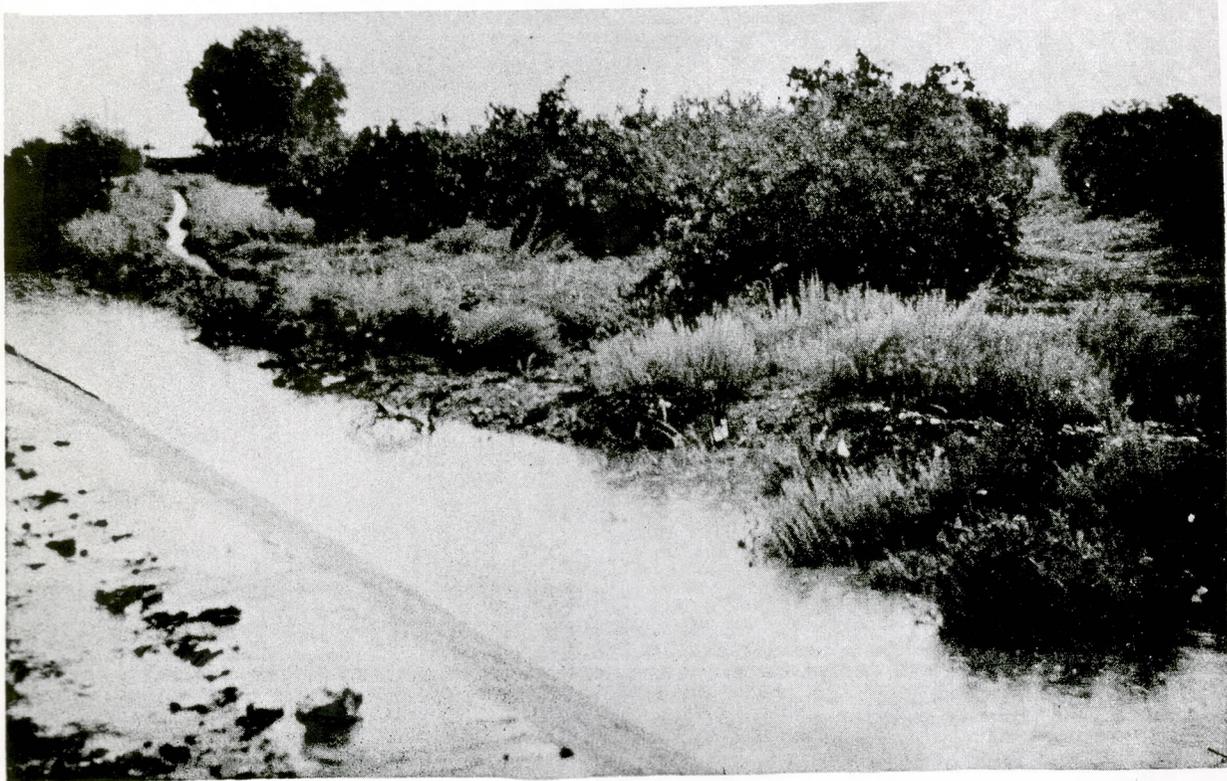
(13) Inflow opposite Clausen Spillway 10:30 AM (8/3/43)



(14) Gopher hole in north bank northwest of Clausen Spillway

$\frac{1}{4}$ mile west
of 16th street
& Friz Canal

same



(15) Clausen Spillway 10:50 AM (8/3/43)



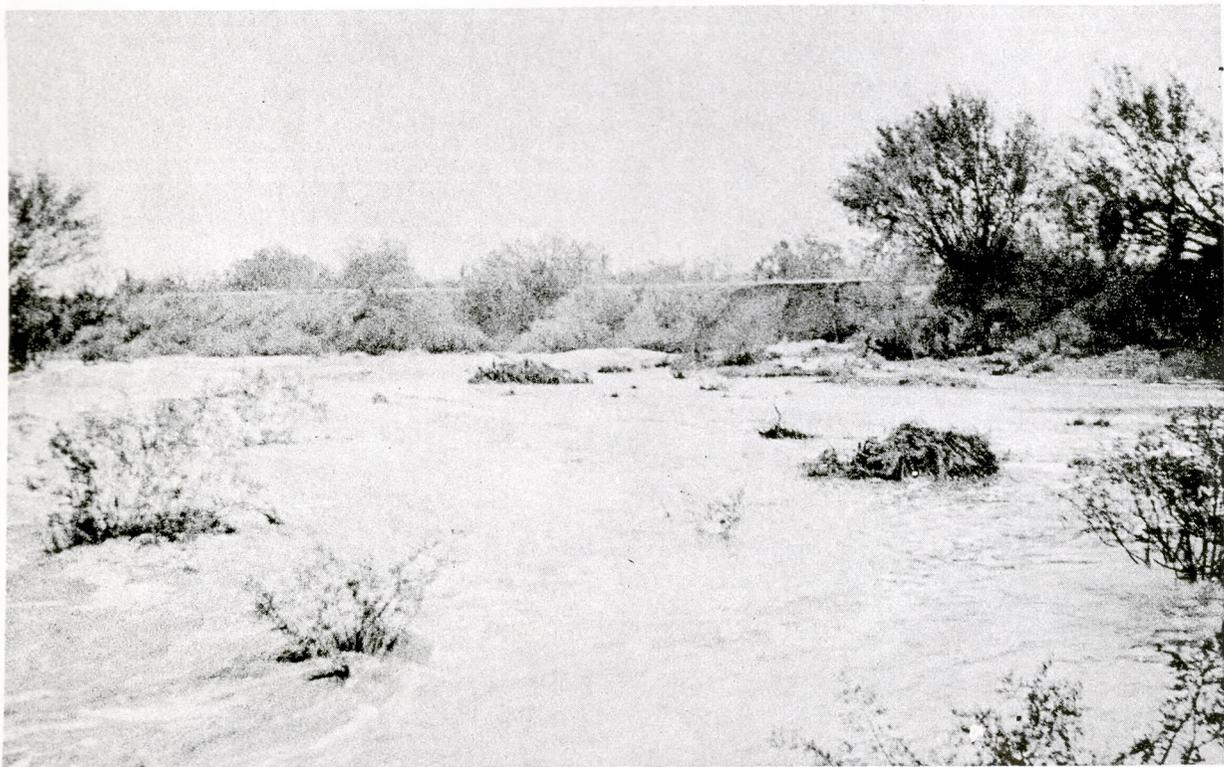
(16) Looking southwest from Clausen Spillway

1/8 mi west
of 16th st.
of Ariz Card

Same



(17) Break at Lateral 10 1/8 10:37 (8/3/43)

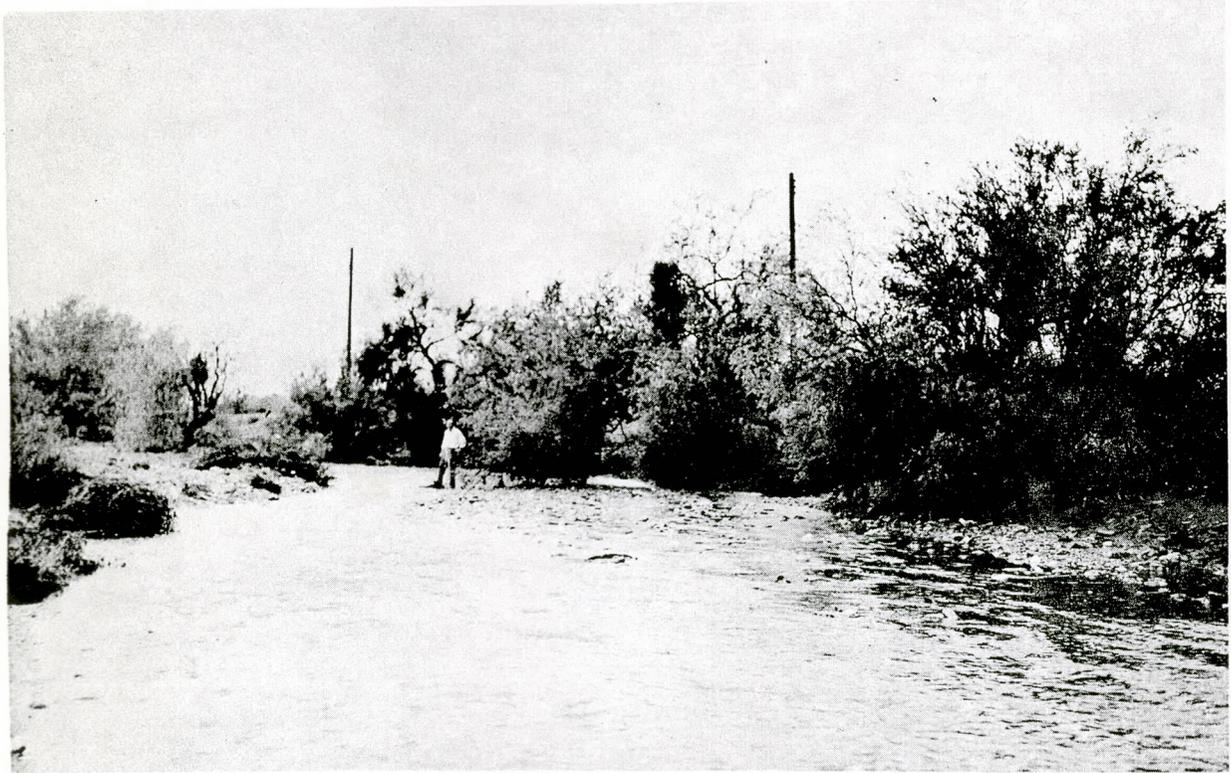


(18) Looking towards break at Lateral 10 1/8 10:45 AM (8/3/43)

Near NE Corner
Sec 4 - 2N 3E

350 S. of
Northern +
+ East of
7th street

20



(19) Dreamy Draw opposite Fransen House-one mile north
of Arizona Canal 11:30 AM (8/3/43)



(20) Break in canal 350 ft. south of Northern Ave. 11:35 AM
(8/3/43)

350 so. of
Northern of
E of 7th St



(20a) Break in canal 350 ft. south of Northern Avenue

East
7th Street &
& Ariz Canal

Just West
of 12th St &
North of
Orangewood



(21) Looking south from Spillway east of 7th Street



(22) Looking north along Conway Spillway 12:04 PM (8/3/43)

Just N of
Orangewood &
& west of
Arizona Canal

Same

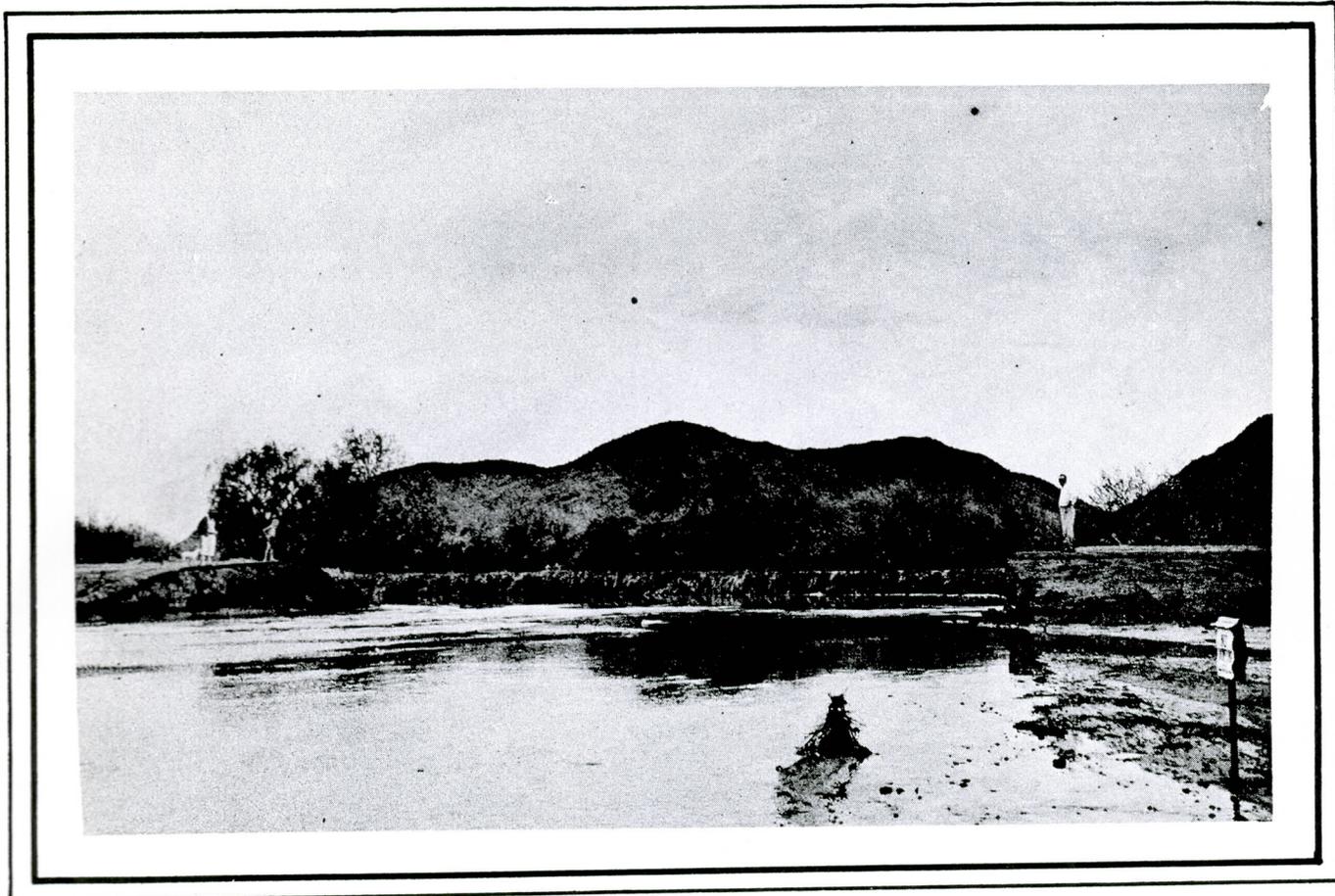


(23) Looking west at Conway Orchard below Spillway 12:08 PM
(8/3/43)



(24) Orchard north of Conway. Water from break near Northern Ave.
12:20 PM (8/3/43)

7th Ave
and 41st
Cand

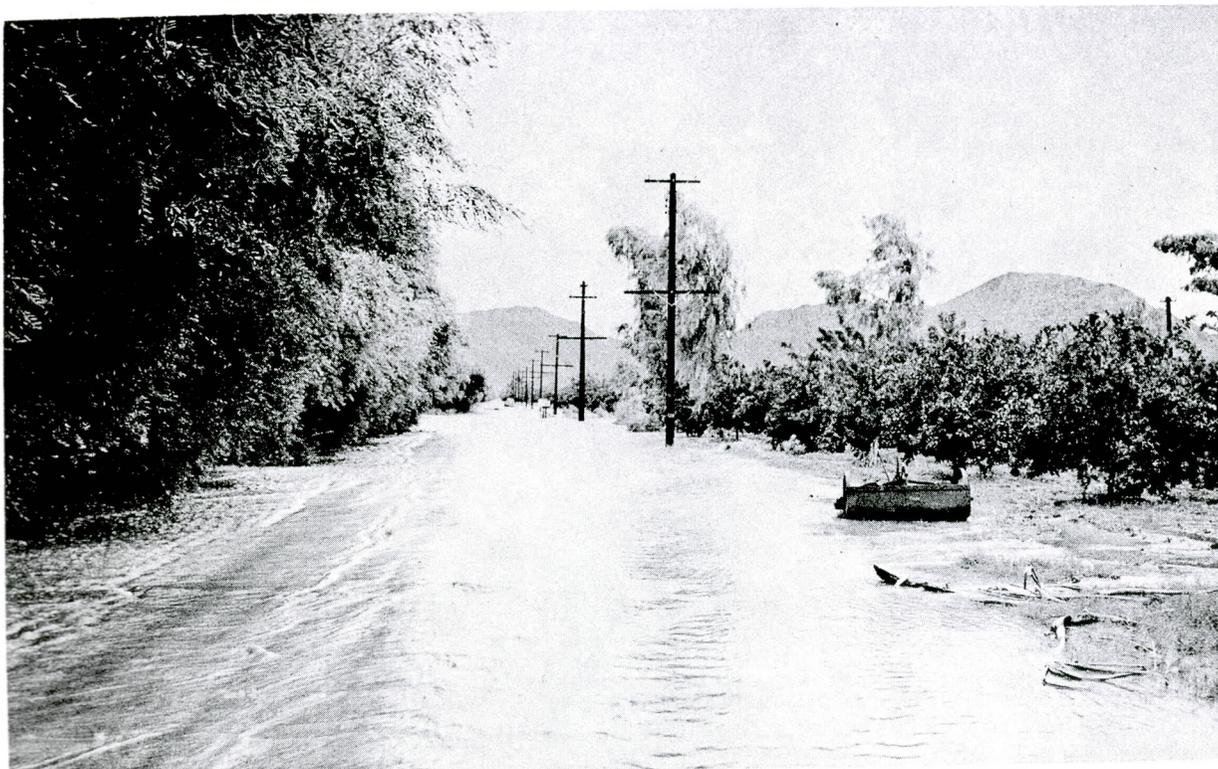


(24a) Break east of Lateral 12.

Just South
of Arizona

Canal on
7th Ave.

7th Ave of
Northern of
to SW #25
#26



(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

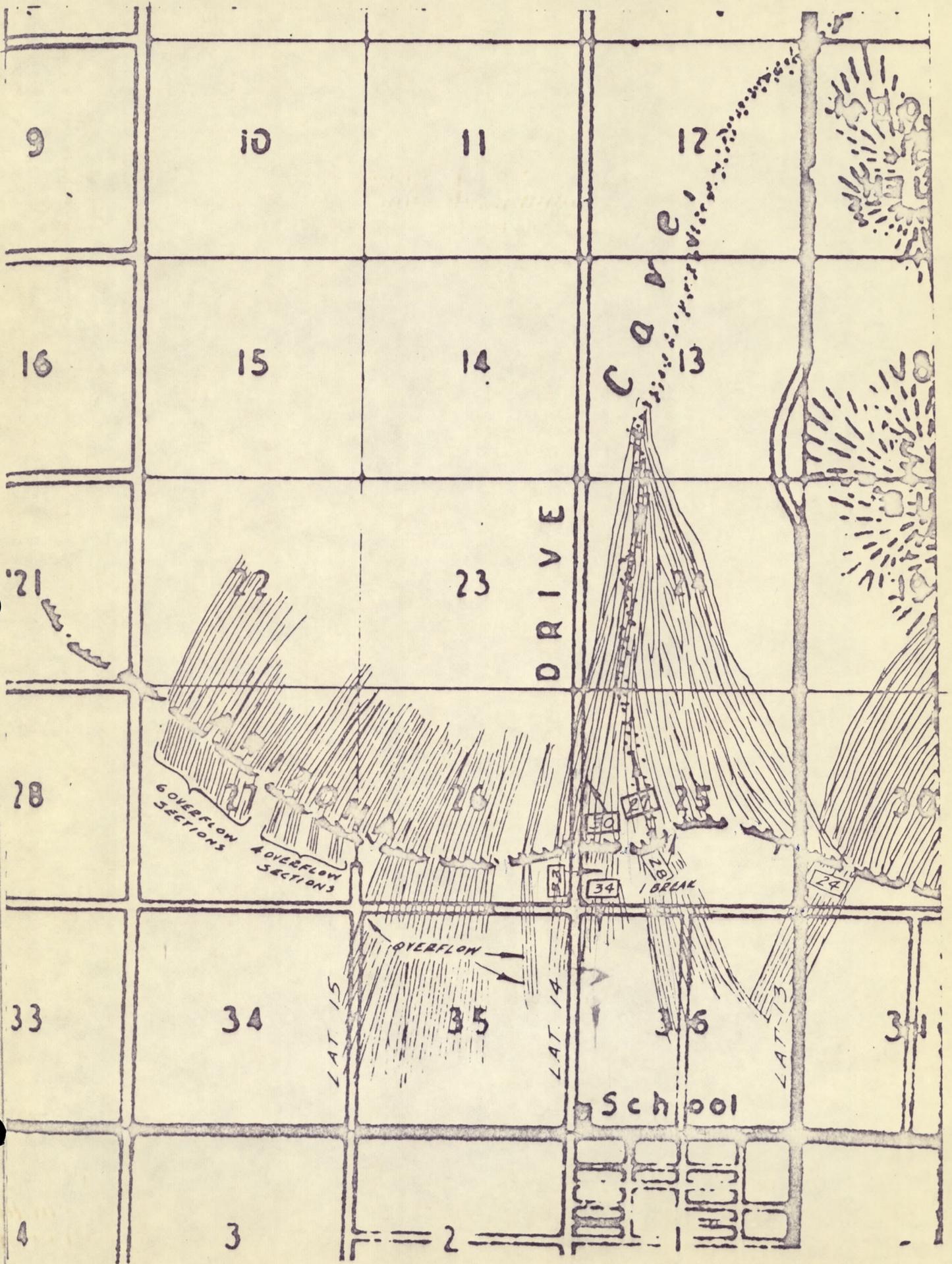
Two breaks occurred in this section; the first, immediately west of Lateral 13, and the second, the large break opposite the main channel of Cave Creek.

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 dept, 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.

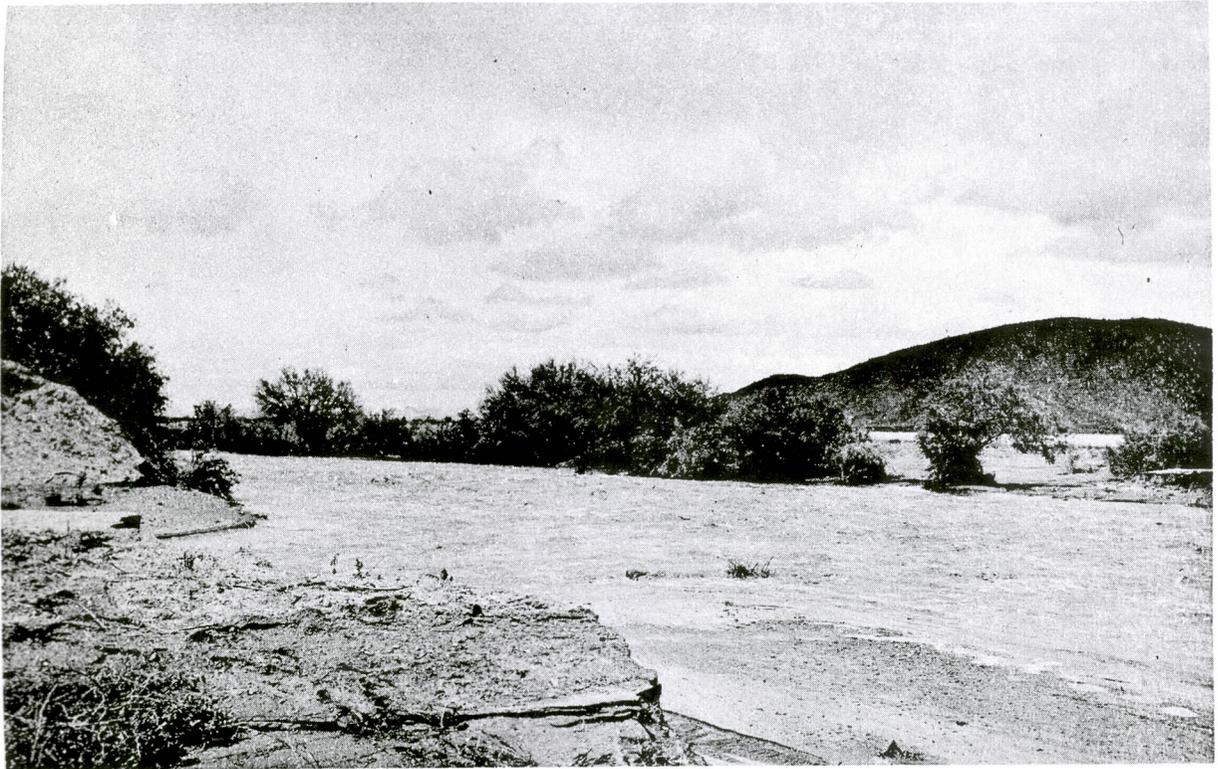


23rd Ave
and King
Canal.

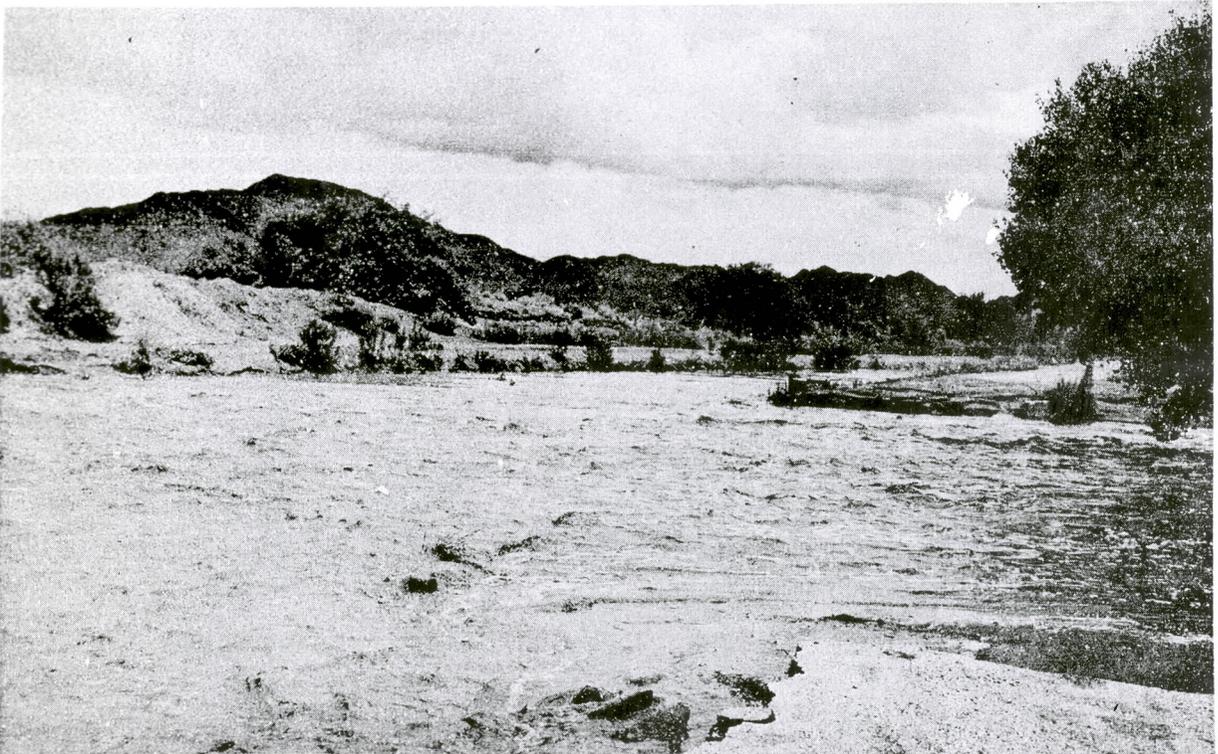
Same

#27

#28



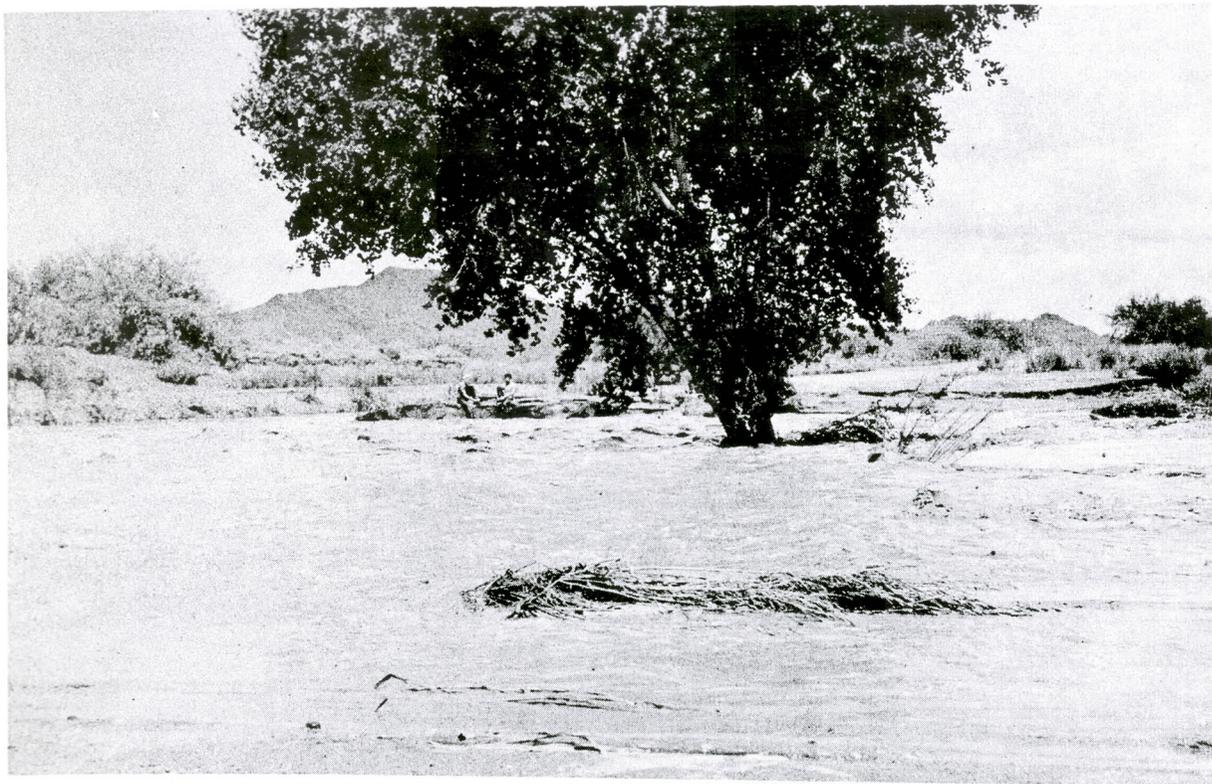
(27) Looking up Main Channel of Cave Creek from west bank of break 3:20 PM (8/3/43)



(28) Looking east across Cave Creek break (8/3/43)

23rd Ave
and City Canal.

West of 23rd
Ave & City
Canal



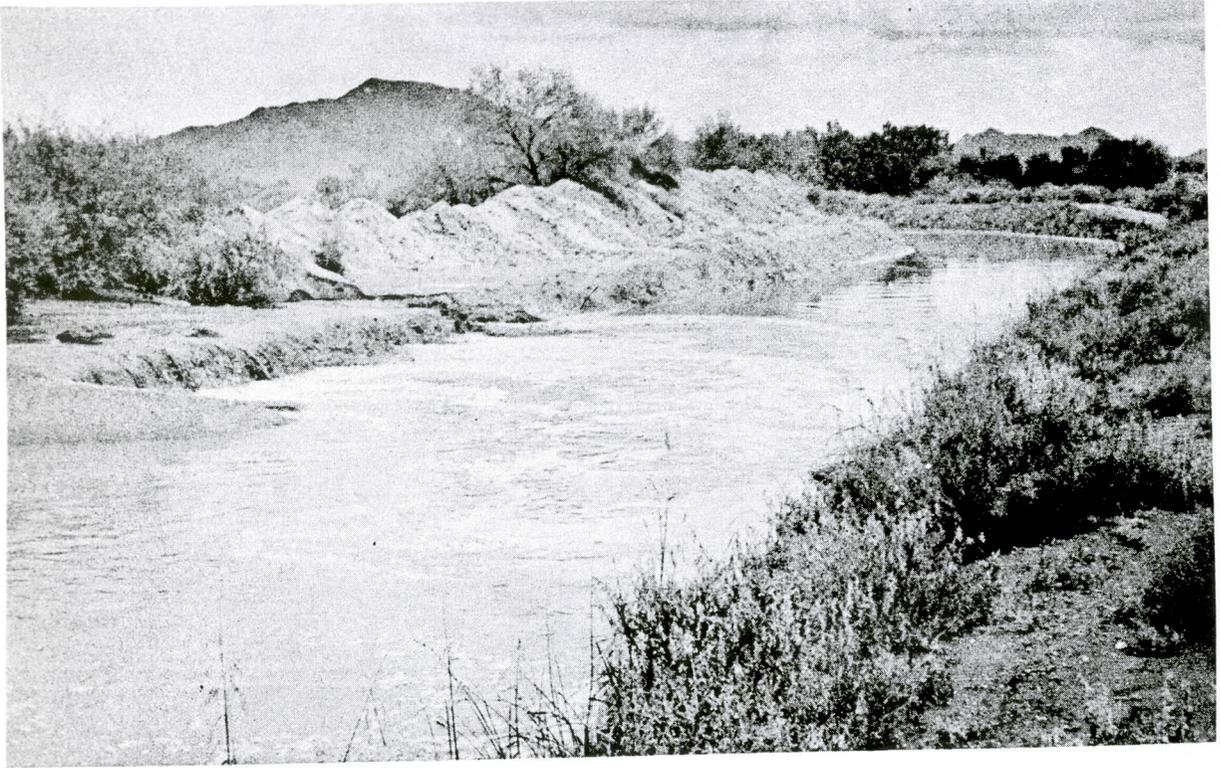
(29) Looking across Cave Creek break 3:25 PM (8/3/43)



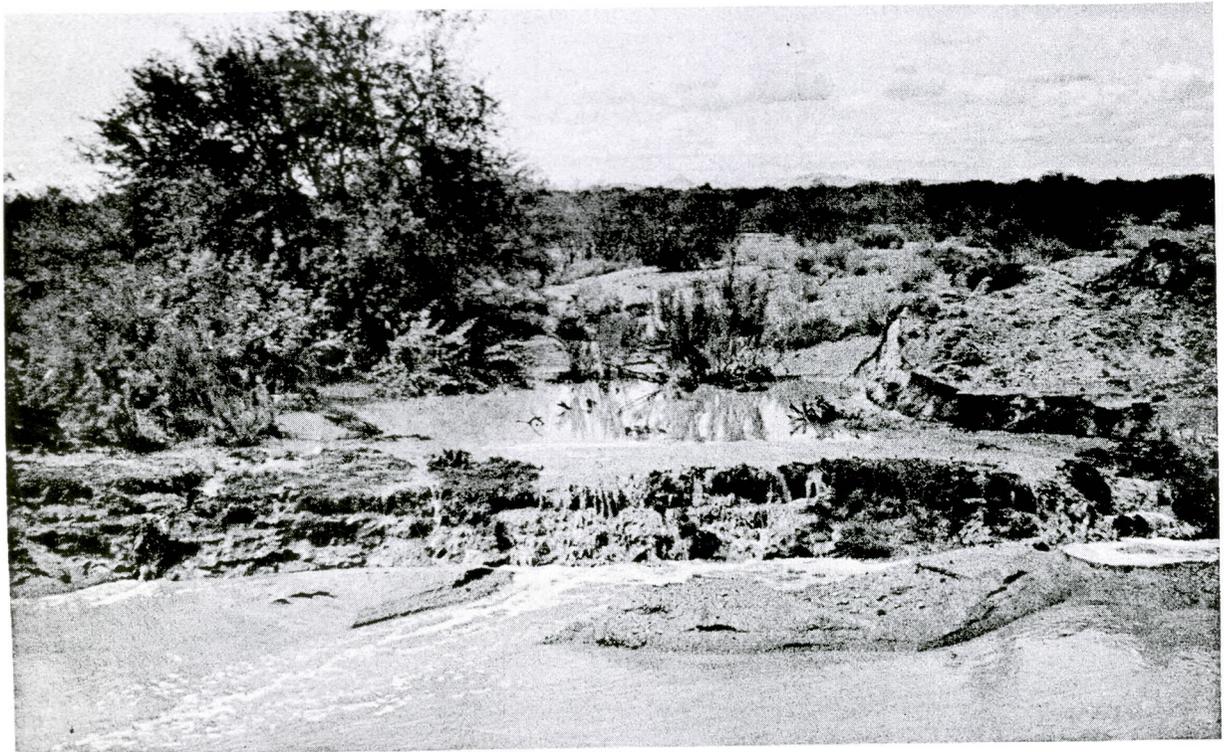
(30) Inflow from west branch of Cave Creek 3:40 PM (8/3/43)

West 8 23
Ave and
Arizona
Canal.

27th Ave
and Arizona
Canal.



(31) Inflow from Cave Creek east of Lateral 14 3:45 PM (8/3/43)



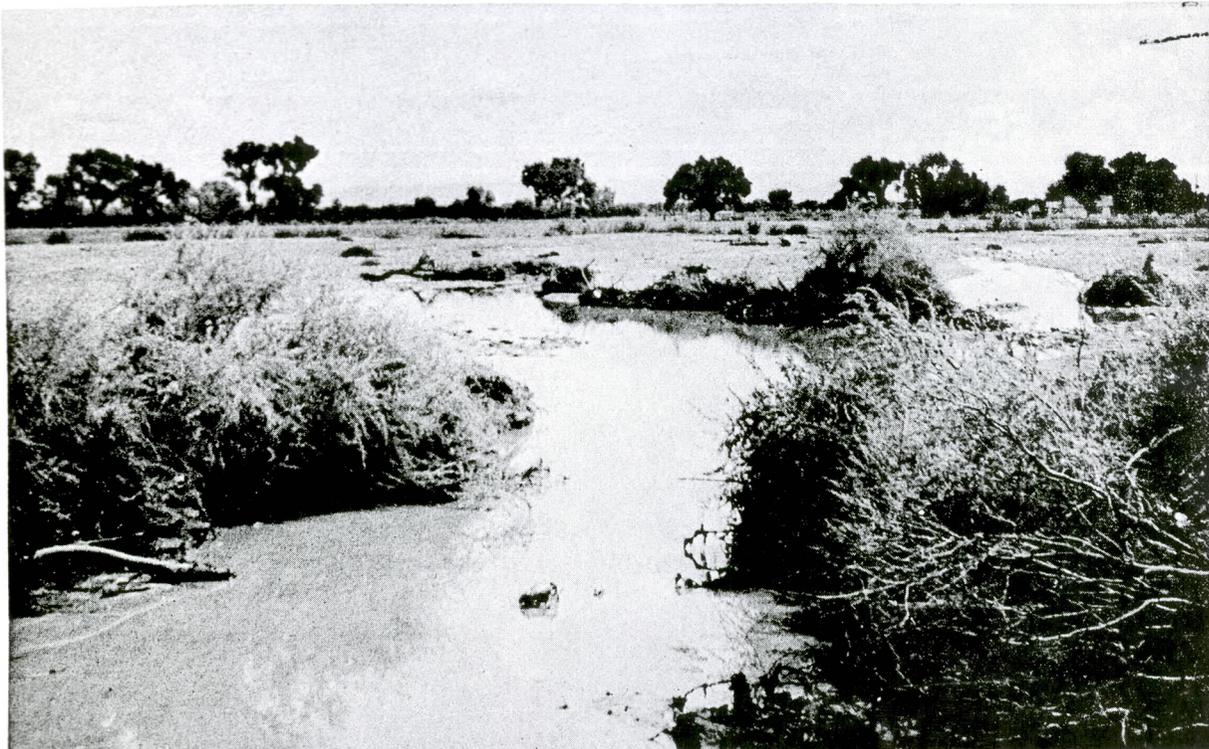
(32) Inflow east of Lateral 14 3:47 PM (8/3/43)

East of
27th Ave
and King,
Canal.

Same



(33) East of Lateral 14. Looking east at damage to canal banks by overflow 3:47 PM (8/3/43)



(34) Looking south from Arizona Canal east of Lateral 14. Frank Kinnley land below breaks (8/3/43)

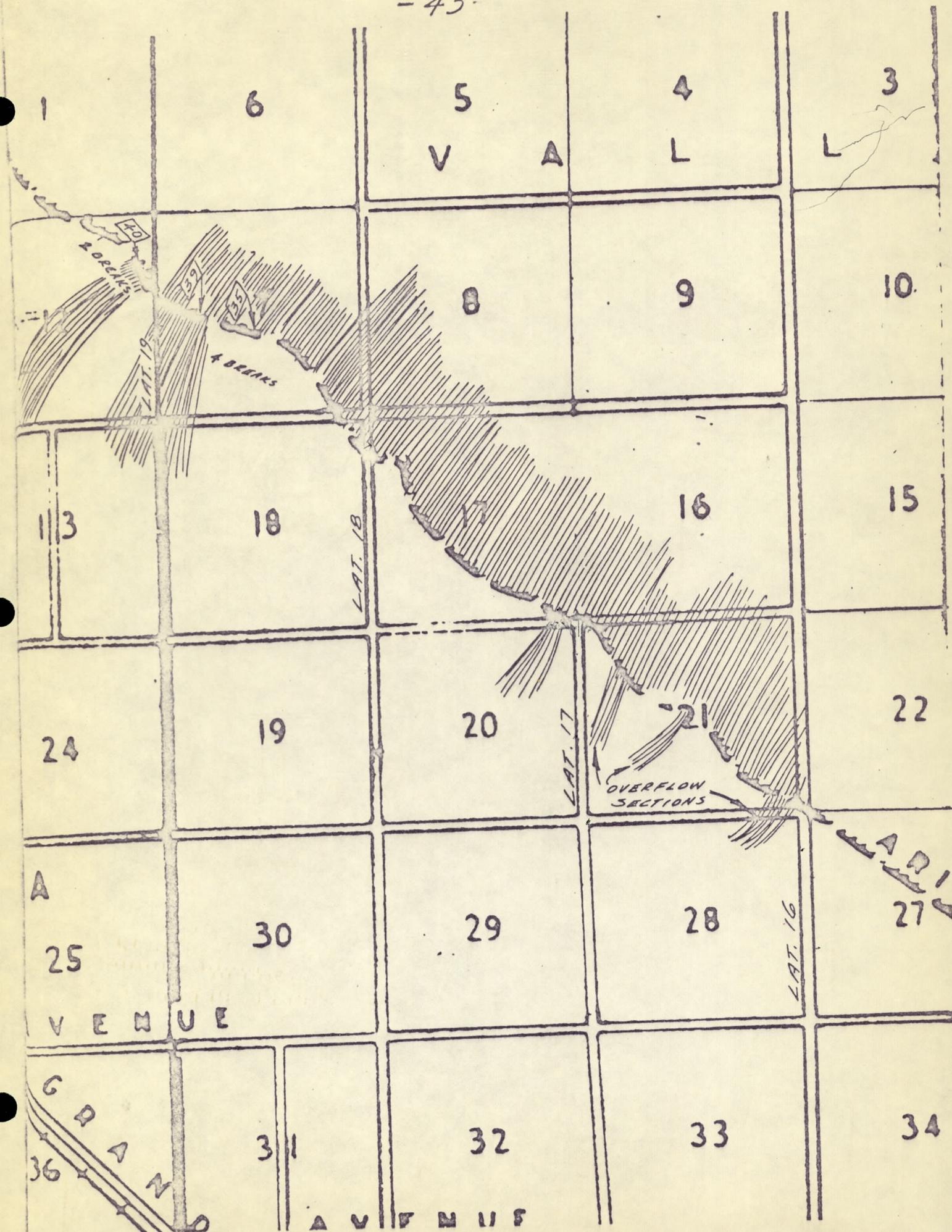
SECTION 6 - GLENDALE AREA

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.

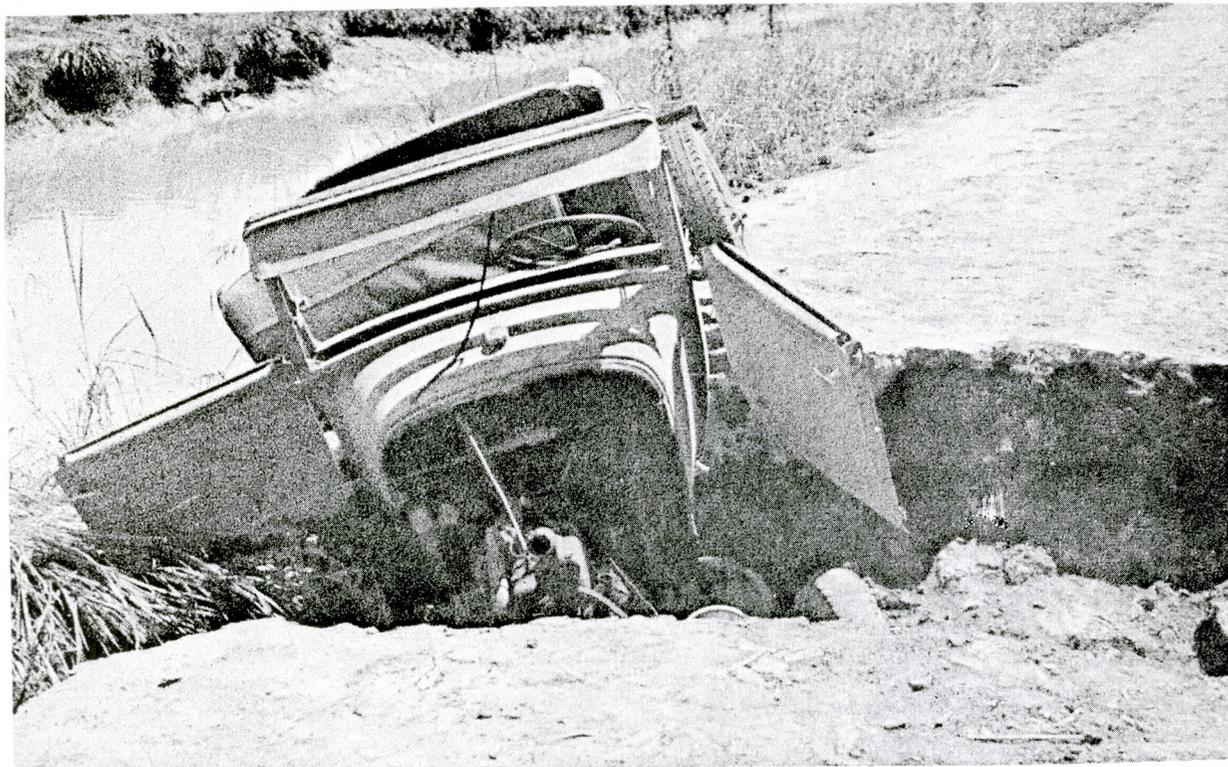
4 breaks occurred in the south bank from Lateral 18 3/4 to Lateral 18 7/8, and the south bank showed indications of having overflowed from Lateral 18 7/8 to Lateral 19.

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.



East of 67
Ave & Friz
Cand.

East of 67
Ave &
Friz Cand



(35) Fourth break east of Lateral 19 1:30 PM (8/5/43)



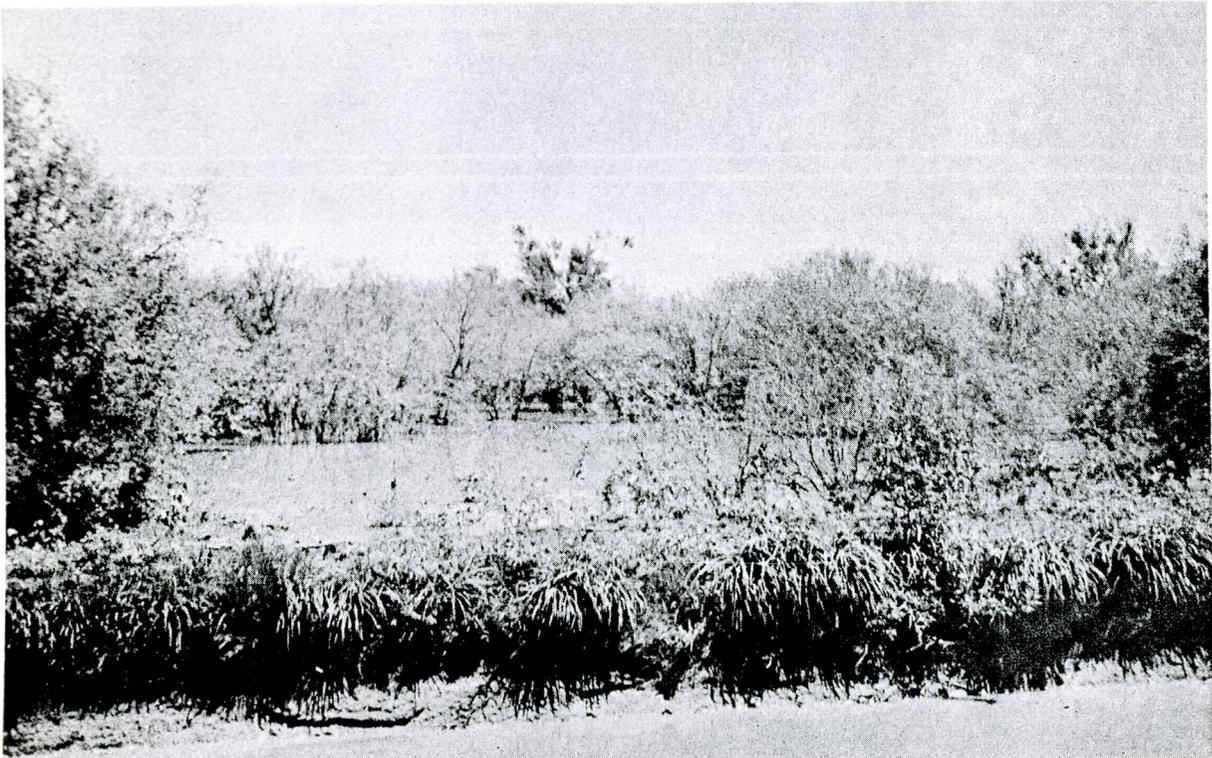
(36) Looking north from fourth break east of Lateral 19 (8/5/43)

East of 67th
Ave +
Army Canal

1/4 mi East
of 67th Ave
of Army Canal



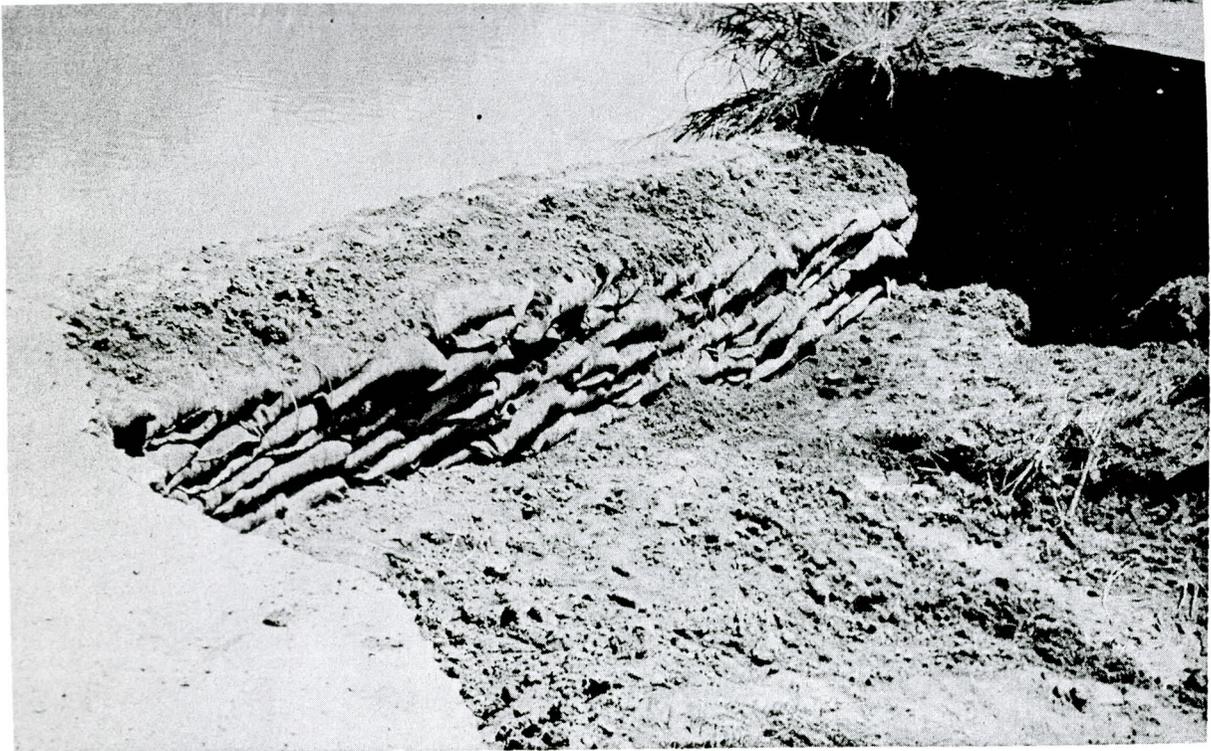
(37) Third break east of Lateral 19 (8/5/43)



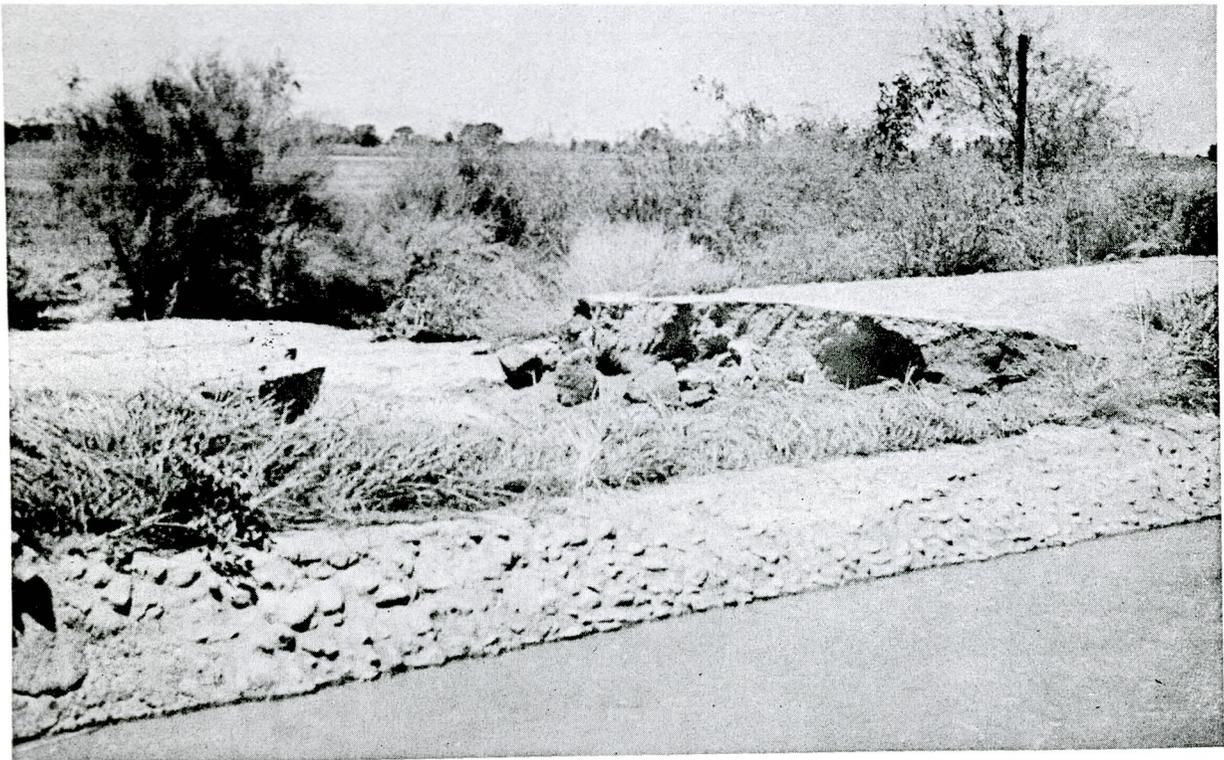
(38) Looking north from Lateral 18 3/4 (8/5/43)

East of 67th
The of King
Canal

Source



(39) First break east of Lateral 19 (8/5/43)



(40) One of two breaks west of Lateral 19 (8/5/43)

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.

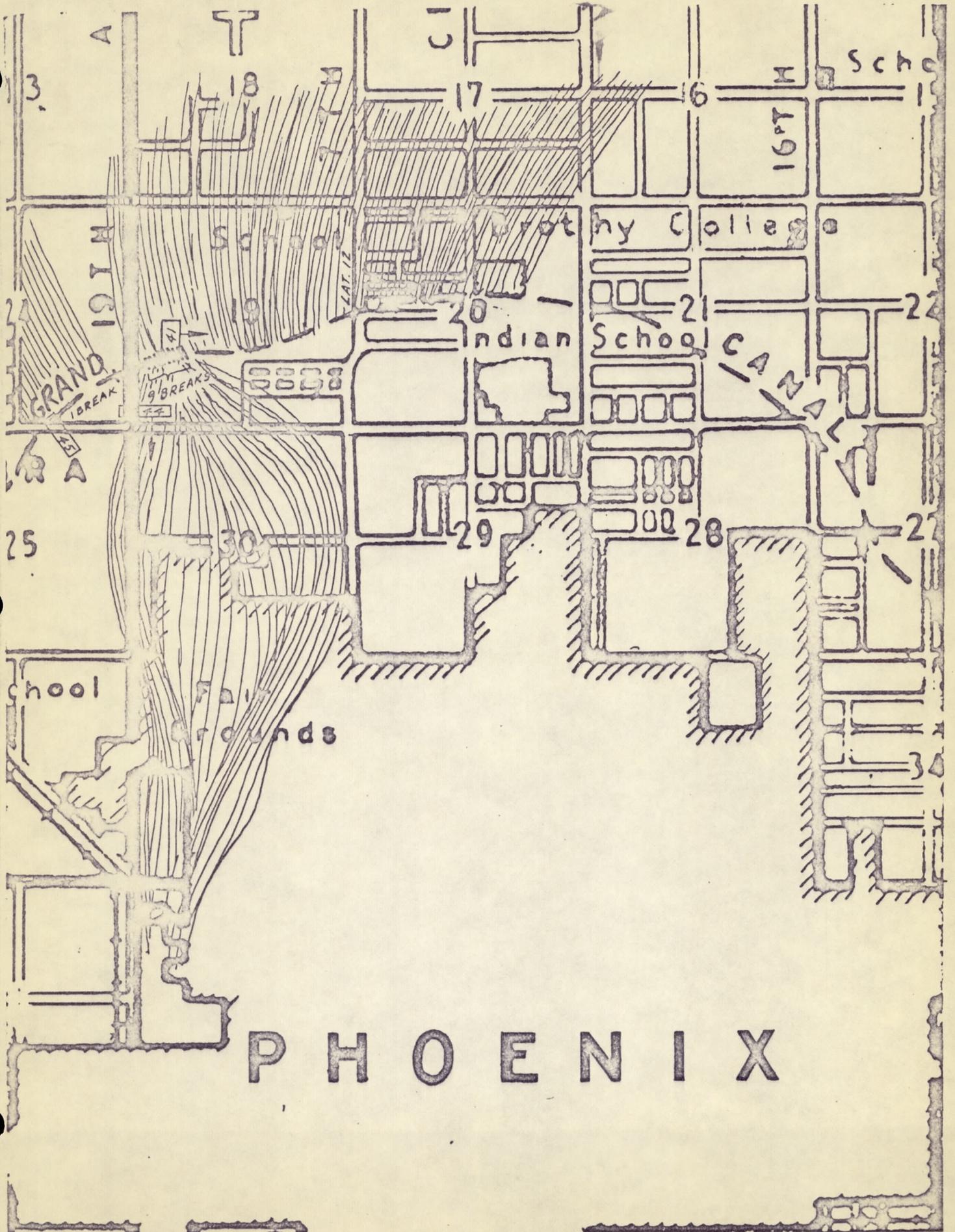
Between 4 and 5 P.M. the water from the breaks in the Arizona arrived at the Grand Canal. The canal was picking up water from Central Avenue, westwardly with the heaviest inflow occurring just east of Lateral 13.

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.



PHOENIX

19 Ave and
Grand
Canal

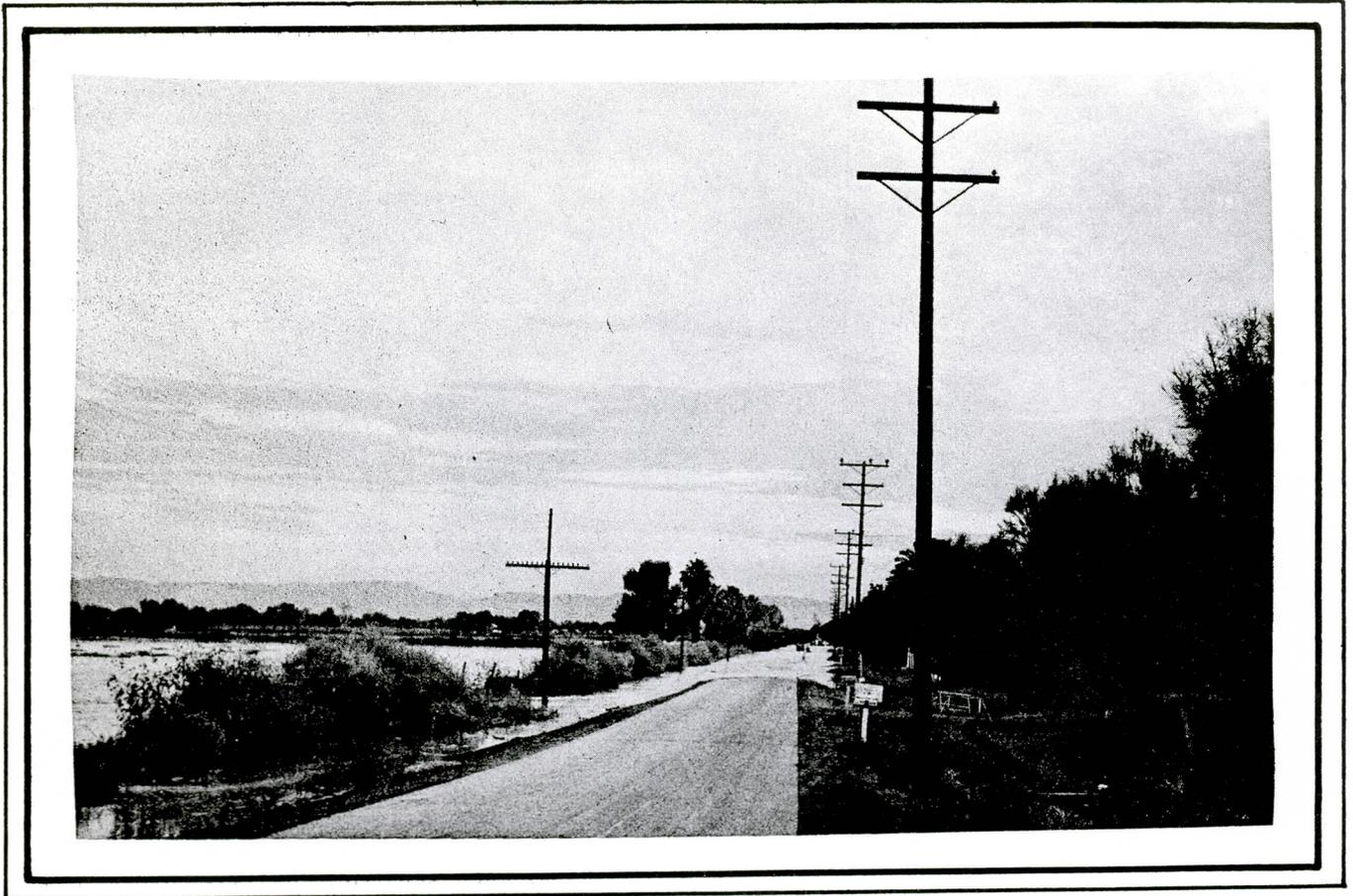
Same



(41) Inflow east of Lateral 13 on Grand Canal 6:00PM (8/3/43)



(42) Lateral 13 on Grand Canal 6:05 PM (8/3/43)



(44) Looking south on 19th? 6:25 PM (8/3/43)
27th Ave.

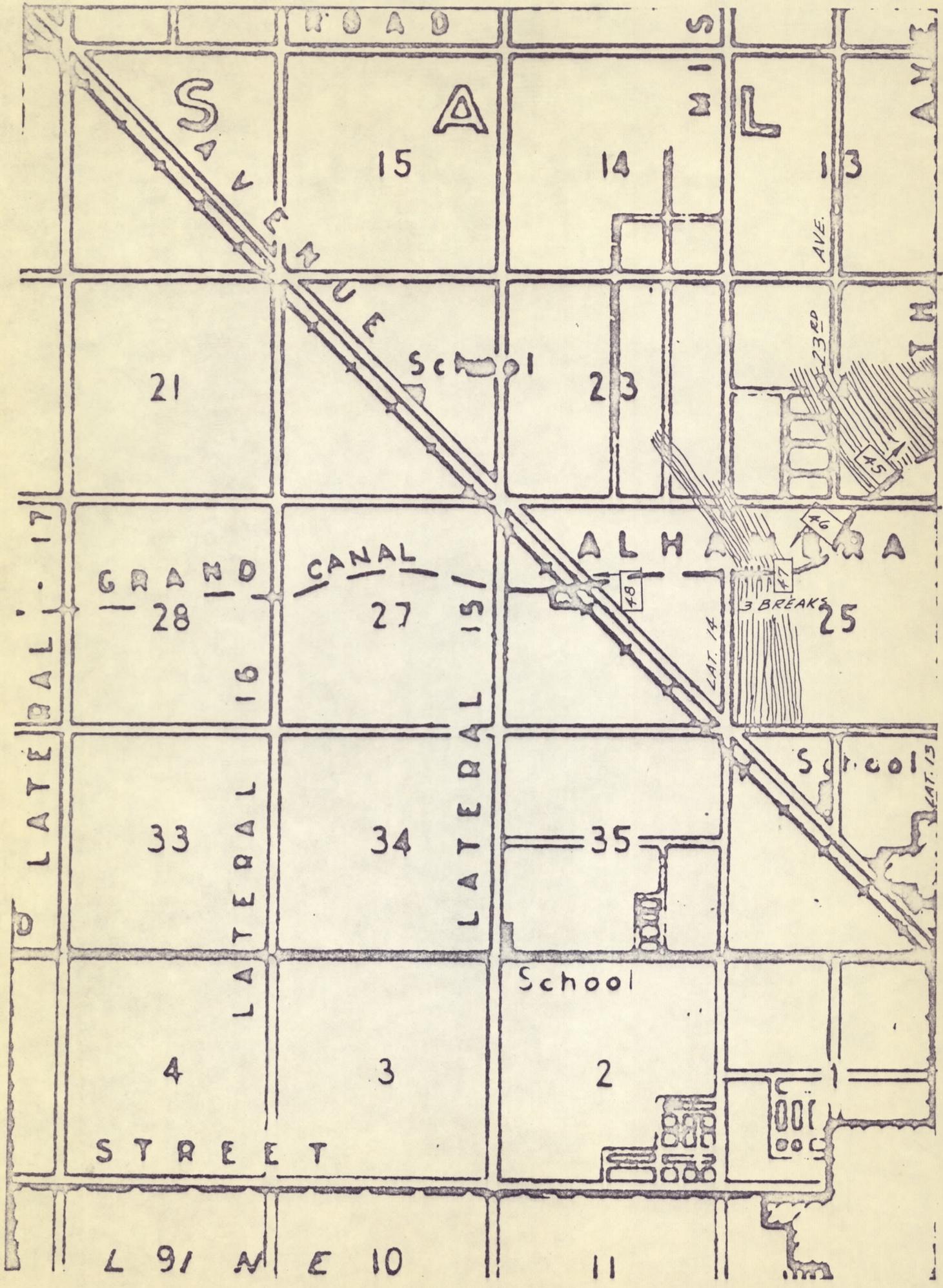
SECTION EIGHT - GRAND CANAL - ALHAMBRA AREA

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 15. Some inflow to the Grand occurred at Lateral 20 apparently from breaks and lateral discharge on the lower end of the Arizona.



ROAD S

SAVING

MISL

AVE.

TH

ALHAMBRA

CANAL

GRAND

LATERAL 17

LATERAL 16

LATERAL 15

LATERAL 14

LATERAL 13

LATERAL 12

LATERAL 11

LATERAL 10

LATERAL 9

LATERAL 8

LATERAL 7

LATERAL 6

LATERAL 5

LATERAL 4

LATERAL 3

LATERAL 2

LATERAL 1

STREET

SCHOOL

3 BREAKS

LAT. 14

LAT. 15

LAT. 16

LAT. 17

LAT. 18

LAT. 19

LAT. 20

LAT. 21

LAT. 22

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LAT. 100

15

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21

23

28

27

25

33

34

35

4

3

2

SCHOOL

SCHOOL

23 EP

45

46

47

48

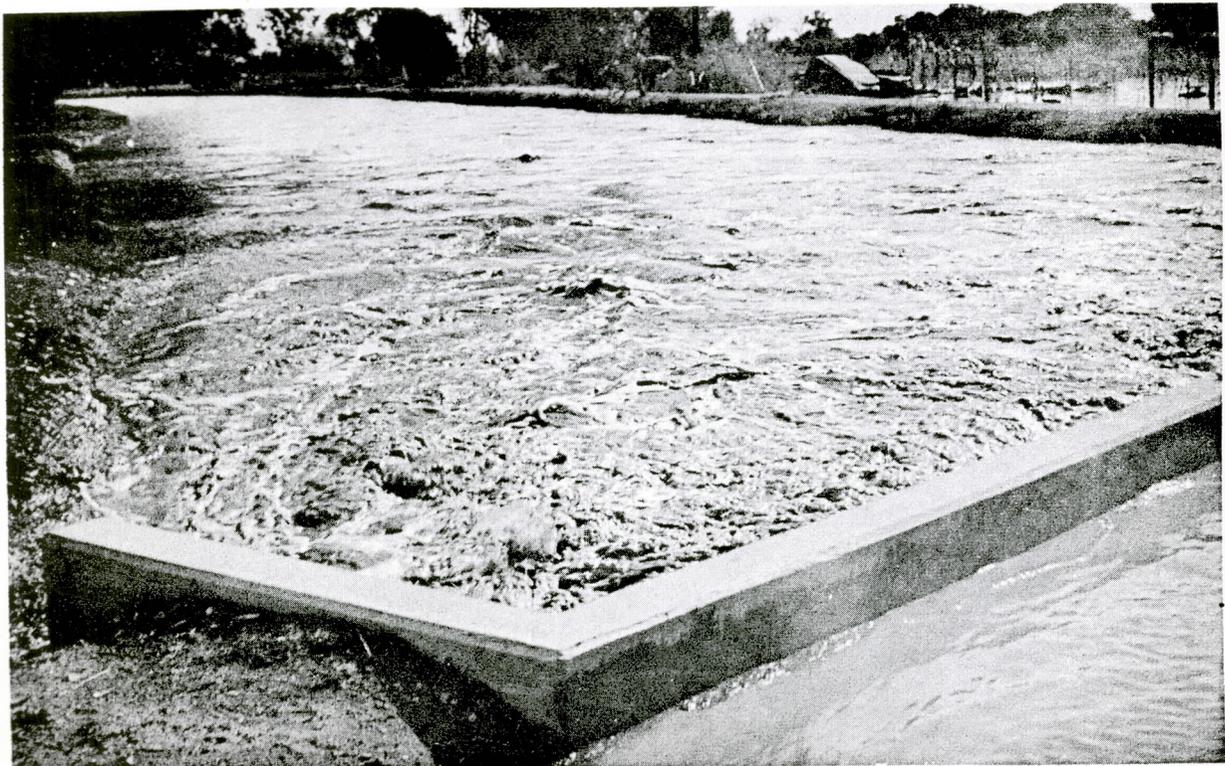
Indian School
and Grant
Fund

Fund

#45



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



(46) Looking west from same point

East of 27th
The Grand
Canal

Grand Canal
of Grand Ave



(47) Break east of Lateral 14 on Grand 5:30 PM (8/3/43)



(48) Grand Canal at Grand Ave. 5:35 PM (8/3/43)

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 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

Reith felt in Maricopa Co Flood

Salt River Valley Water Users

AVOID VERBAL ORDERS

Date March 26, 1959

FROM H. Shipley, Assistant General Manager
TO Fred Glendening, County Engineer
SUBJECT: Cave Creek - Flood Data

RECEIVED
MAR 27 1959
M.C.H.D.

Fred, the following report was made up by Goldsmith of our Hydrographic Department:

"August 3, 1943 flood - 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.

"During this flood, 9,000 cfs was estimated by Yost and Gardner (Phoenix Storm Drain Report) as being the peak flow of Cave Creek.

"We have a report by John Bailhache, the then Chief Hydrographer of a 1921 flood. In this flood, the peak flow in Cave Creek was computed as 30,000 cfs."

Hope this helps you, Fred.

Shipley
H. SHIPLEY

HS/rf

Hills yard

$$5.6'' = 15,000'$$

$$\frac{5.6}{15,000 \times 12} = \frac{5.6}{180,000} = \frac{1}{32,142}$$

Conclusion (Continued)

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 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.
