

PRELIMINARY *R*

FLOOD INSURANCE STUDY

SCOTTSDALE, ARIZONA

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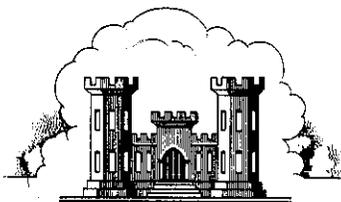


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LOS ANGELES, CALIFORNIA



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JUNE 1972

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FLOOD INSURANCE STUDY.

SCOTTSDALE, ARIZONA

1. AUTHORITY FOR STUDY. This Type 15 Flood Insurance Study was prepared by the Corps of Engineers for the Federal Insurance Administration, U. S. Department of Housing and Urban Development, in accordance with the 1968 National Flood Insurance Act, as amended. Authority for its preparation was provided by letter from the Office of the Chief of Engineers, ENG CW-PF, dated 8 June 1971, subject: "Type 15 Flood Insurance Studies."

2. FINANCING OF STUDY. Pursuant to Project Order No. 4, Inter-Agency Agreement (IAA)-H-15-72, funds have been fully obligated by the Department of Housing and Urban Development to cover Corps of Engineers' expenditures in preparing this study.

3. DESCRIPTION OF AREA AND STUDY LIMITS. Scottsdale, a city of about 68,000 population (census of 1970) is east of, and adjacent to the City of Phoenix, in Maricopa County, Arizona. The city limits encompass an area of about 69 square miles. The terrain descends from an elevation of about 4070 feet in the McDowell Mountains in the north east to about 1190 feet in the south.

The study area can be subdivided into three major types: The mountain, desert and urban areas. The mountain area is in the northeastern part of the city and is characterized by steep rugged terrain, intercepted by narrow canyons. These canyons are subject to extremely hazardous flooding, characterized by high velocities. The desert area is characterized by moderate slopes and many natural channels, too small to contain major floods. The urban area is essentially a developed desert area.

About 5.6 miles of the Arizona Canal and 1.8 miles of the Arizona Cross Cut Canal are within Scottsdale city limits. The Arizona Canal levees have been breached at several locations by large floods. A major wash, Indian Bend Wash, is within the city limits for about 7.3 miles.

4. DESCRIPTION OF WORK.

a. General. The work performed in developing this study and its informational contents was governed by the Corps of Engineers publication "Guidelines for Type 15 Flood Insurance Studies, September 1971," and other applicable guidance directives.

b. Hydrologic Studies. Flood frequency data for the study area was developed from discharge-frequency relationships of historic floods and hydrologic study analyses accomplished by the Corps of Engineers. Various modifying factors were applied in developing the discharge-frequency curves to allow for the effects of the existing levees and other obstructions. Additionally, allowance was made for the obstructive effects of floodborne debris.

c. Reaches. The floodplain along Indian Bend Wash is subdivided into three reaches. Water surface profiles of reaches 1 and 3 are similar and therefore, only one elevation-frequency curve is given for both with an index station at cross section 315, about 1/4 mile downstream from McDonald Drive. The index station for Reach No. 2 is selected at cross section 130, about 0.8 miles upstream of McDowell Road. Reach No. 1 is about 1/2 mile long, extending upstream from Van Buren Street (the southern boundary of Scottsdale) to Roosevelt Street. Reach No. 2 is between Roosevelt Street and Indian School Road while reach No. 3 comprises

the rest of the wash within the city limits.

d. Elevation-Frequency Data. Elevation-frequency data for the index stations are listed in the tabulation below; the frequency curves are shown on Exhibits 1 to 4.

e. Flood Hazard Factors (FHF). The flood hazard factors for the frequency curves on exhibits 1 to 4 are 025C, 040C, 005I, 005I, respectively.

ELEVATION-FREQUENCY DATA

	<u>Frequency in years</u>	<u>Elevation in Feet (mean sea level)</u>
Reaches 1 & 3 Representative Cross Section 315	10	1259.8
	25	1260.3
	50	1261.2
	100	1262.0
	500	1264.0
Feet Difference 10 and 100 years		2.2
Reach 2 Representative Cross Section 130	10	1210.7
	25	1212.1
	50	1213.3
	100	1214.8
	500	1218.2
Feet Difference 10 and 100 years		4.1

f. Zones. The study area was divided into zones which reflect varying degrees of flood risk deriving from probable flooding of specified magnitude. Zone boundary lines were generally established along the centerline of streets or other identifiable limits. As shown on the Flood Insurance Study Zone Maps, Plates 2 through 8, the zone designations include (1) Zone A-Areas vulnerable to floods up to and including the base flood (100-year-frequency flood); (2) Zone B-Areas vulnerable to floods greater than the base flood, up to and including the 500-year-frequency flood,

and sheet-flow-type flooding from base flood and lesser flood flows; and

(3) Zone C-Areas outside of the blocked out above-mentioned limits, where flood risk is relatively low. In some areas Zone B associated with the A Zone is not shown because it is either too narrow or already included within the A-Zone limits which usually are extended to the next identifiable line or street. Certain areas south of Old Verde Canal Levee can be flood free but because of uncertainty about the levee strength and the existing openings in it, the whole area is designated as a Sheet-Flow Zone. Local areas, designated as Sheet-Flow Zone (B-4) directly south and east of the Arizona Canal may have extensive damage in the locality of levee failure; but these areas cannot be prelocated. In general, the data given is based on average conditions. Local small areas, difficult to delineate using the available topographical maps, may be subject to more severe flooding or flooding at higher frequencies than depicted. It is not recommended that the data given in B-4 and B-5 Zones be used for construction purposes. The Zone maps also show base flood elevation lines, representing water surface contours at 5 foot intervals. Plate 1 is a Zone Map Index which shows the relationship of the Flood Insurance Zone Maps within the study area's overall limits.

g. Profiles. High water profiles for the study reach, representing the 10-year, 100-year, and 500-year-frequency flood, are shown on Plates 9 and 10.

5. FLOODWAY DATA. By definition, a "floodway" is the channel of a water-course and that portion of the adjoining flood plain required to provide for the passage of the 100-year frequency discharge (discharge having a 1-percent chance of occurrence in any given year) with an insignificant

increase in the water surface above that of the pre-floodway condition. Unless State or local requirements indicate a specific allowable increase, an insignificant increase is considered not more than 1 foot at any location. As a further definition, the "floodway fringe" is the portion of the 100-year flood plain located between the floodway boundary and the outline of the 100-year flood. On Plates 12 to 18, the baseline for floodway measurements is Centerline of Hayden Road between Van Buren Street and Indian School Road, centerline of 82nd Street between Indian School Road and Arizona Canal and Scottsdale Road north of the Canal.

a. Area Considered. The study reach considered for purposes of floodway delineation extends along the Indian Bend Wash within Scottsdale City limits. The reach is about 7.3 miles long.

b. Local Coordination. In selecting the preliminary floodway, the encroachment limits as suggested by the City of Scottsdale were utilized except south of Roosevelt Street where the increase in depth within the suggested limits would be more than 1 foot, and north of the Arizona Canal where no limits were suggested by the City.

c. Assumptions and Consideration. The floodway data developed for this study is to be considered preliminary and further refinements should be expected. For purposes of hydraulic computations, it was assumed that the floodway fringe area was filled solid and had neither overbank storage nor floodflow capacity.

d. Design Criteria. The preliminary floodway, to be reserved by zoning or encroachment lines, is designed to pass the 100-year-frequency discharge of 30,000 cubic feet per second. Floodway limits were determined by using encroachments on each bank so that the cross section, as modified,

would have the discharge carrying capacity of the natural cross section, with an increase in water surface elevation of not more than 1 foot. The encroachment limits were developed, in general, by removing an equal amount of conveyance capacity from each side of the channel. The flood plain of the 100-year-frequency flood under existing conditions, the preliminary floodway, the floodway fringe areas, and the location of each cross section used in the floodway determination are shown on Plates 12 and 18. In general, floodflow velocities in the floodway are higher than 5 feet per second and therefore, protection against erosion is recommended. The actual limits of the 100-year flood plain on the ground may vary slightly from those shown on the plates because of map scale limitations which do not permit precise plotting of the flooded area boundaries.

e. Water Surface Elevations. The 100-year-frequency-base flood's water surface elevations, under existing and allowable encroachment conditions (with floodway), are shown for each cross section in the tabulation on the following page.

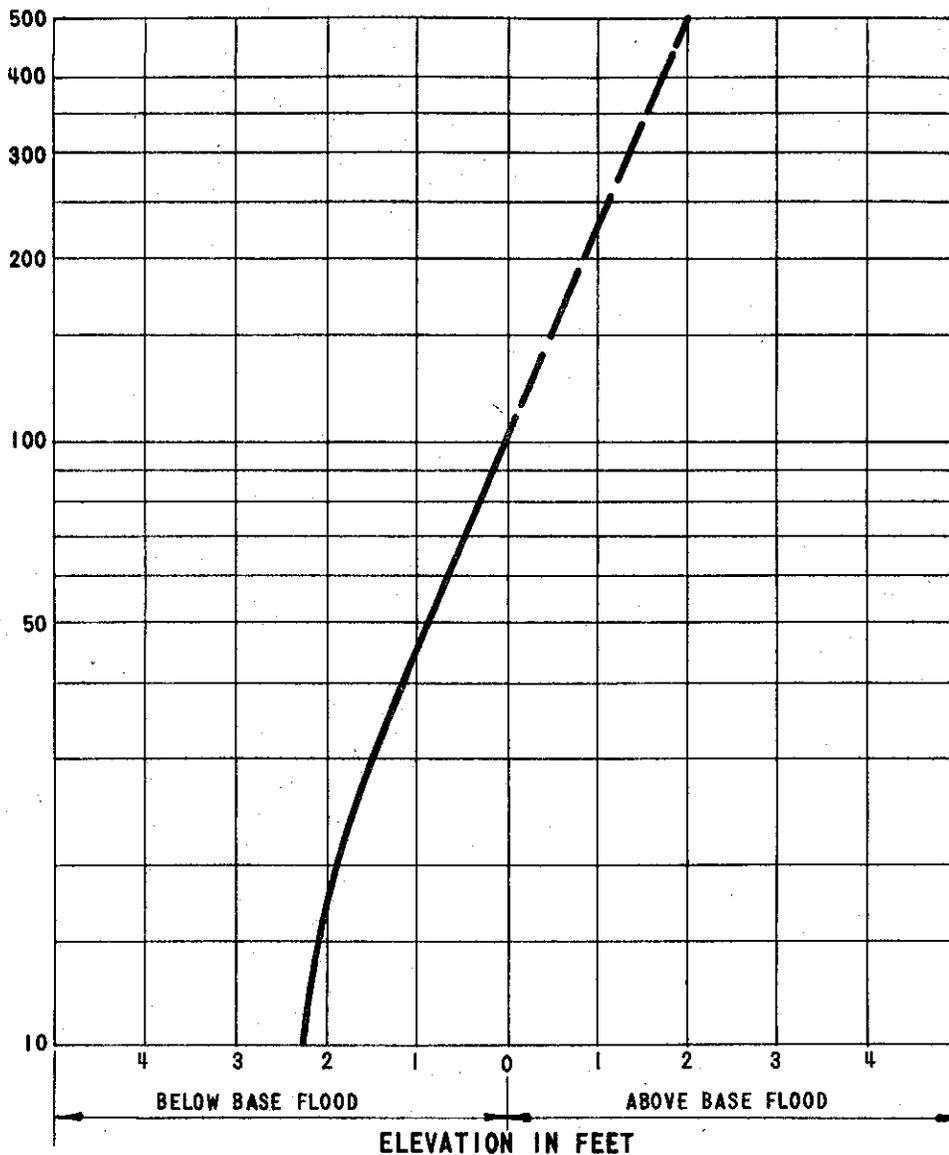
6. DATA RETAINED ON FILE. Although not presented herein, the survey, hydrologic, hydraulic, and other backup data and computations compiled in preparing this study are considered an integral part thereof. This information is retained on file in the Office of the Los Angeles District, Corps of Engineers.

7. ACKNOWLEDGEMENTS. The assistance and cooperation of the City of Scottsdale in providing the base map for zoning used for the study are gratefully acknowledged.

BASE FLOOD WATER SURFACE ELEVATION

<u>Cross Section Number</u>	<u>Elevation in Feet (Mean Sea Level)</u>	
	<u>Existing Conditions</u>	<u>With Allowance Encroachments</u>
65	1193.3	1194.3
80	1199.2	1200.2
100	1207.4	1207.4
120	1212.3	1212.5
130	1214.8	1215.0
175	1226.2	1226.2
215	1235.8	1236.1
235	1239.7	1240.6
260	1244.5	1245.0
280	1250.6	1251.0
300	1256.6	1257.0
315	1262.0	1262.2
355	1274.5	1274.5
365	1277.0	1277.0
385	1283.2	1283.7
410	1287.0	1287.4
440	1292.4	1292.4

FLOOD FREQUENCY - YEARS



NOTES:

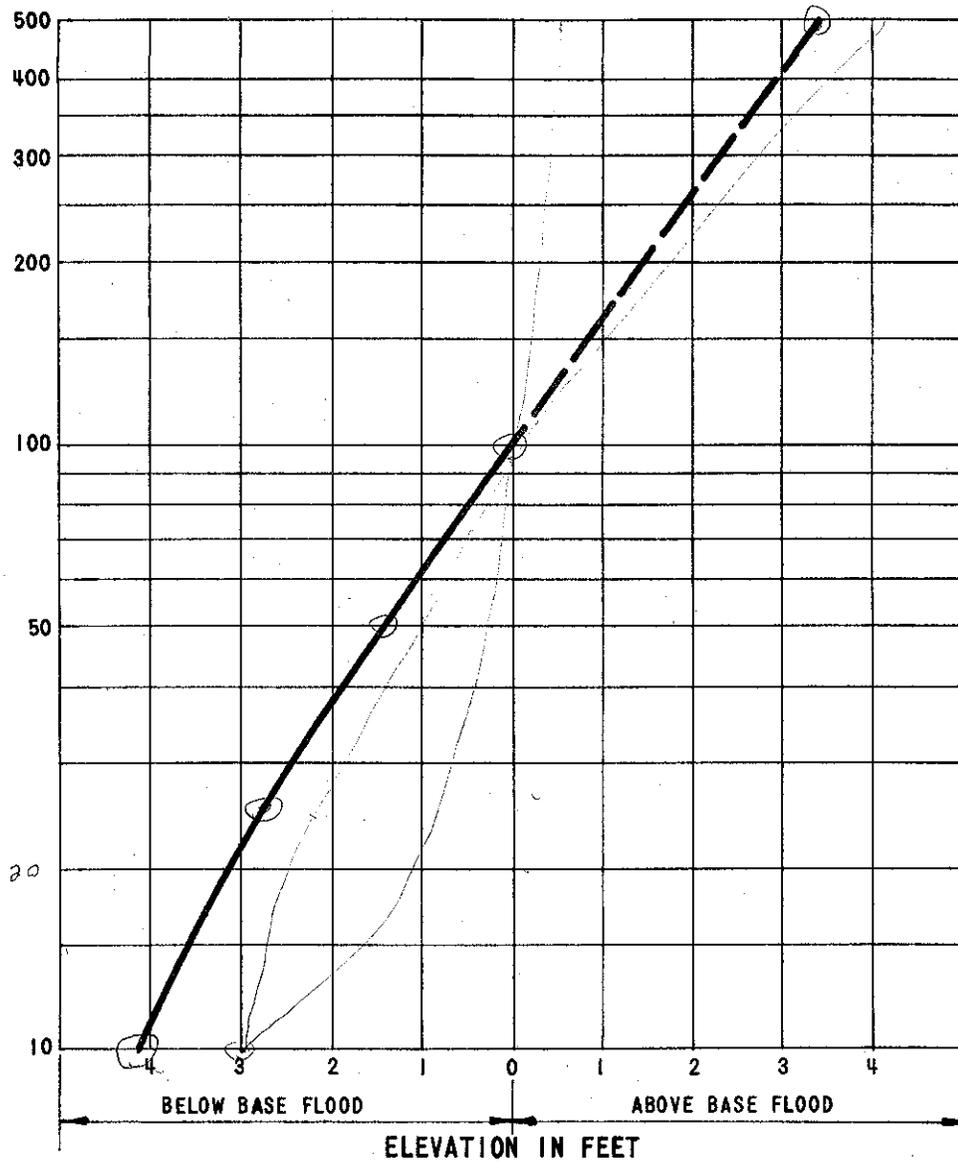
1. CURVE CORRESPONDS TO FLOOD HAZARD FACTOR NO. 025D.

PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD ELEVATION
500	1264.0
250	1263.1
100	1262.0
50	1261.2
25	1260.3
10	1259.8

REACHES NO. 1 & 3
INDIAN BEND WASH

FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
ELEVATION FREQUENCY
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FLOOD FREQUENCY - YEARS



NOTES:

1. CURVE CORRESPONDS TO FLOOD HAZARD FACTOR NO. 040C.
2. DATA TAKEN FOR 1991 1.79

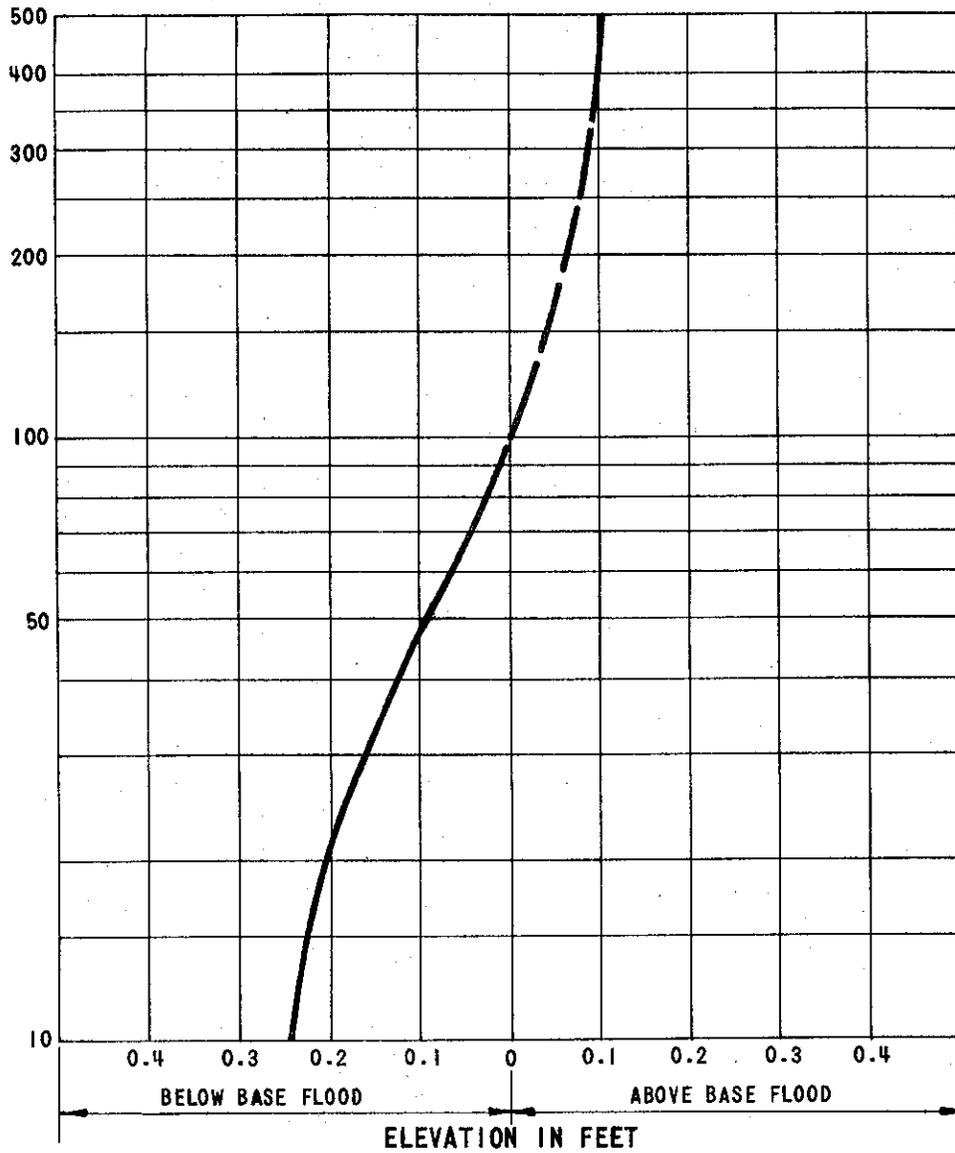
PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD ELEVATION
500	1218.2
250	1216.7
100	1214.8
50	1213.3
25	1212.1
10	1210.7

REACH NO. 2
INDIAN BEND WASH

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SCOTTSDALE, ARIZONA
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RELATIONSHIP

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FLOOD FREQUENCY-YEARS



NOTES:

1. CURVE CORRESPONDS TO FLOOD HAZARD FACTOR NO. 005I.
2. FLOOD DEPTH BASED ON AVERAGE GROUND SURFACE.
3. MOST OF THE AREA IS FREE FROM DAMAGE BY FLOODS SMALLER THAN 50-YEAR-FREQUENCY FLOOD.

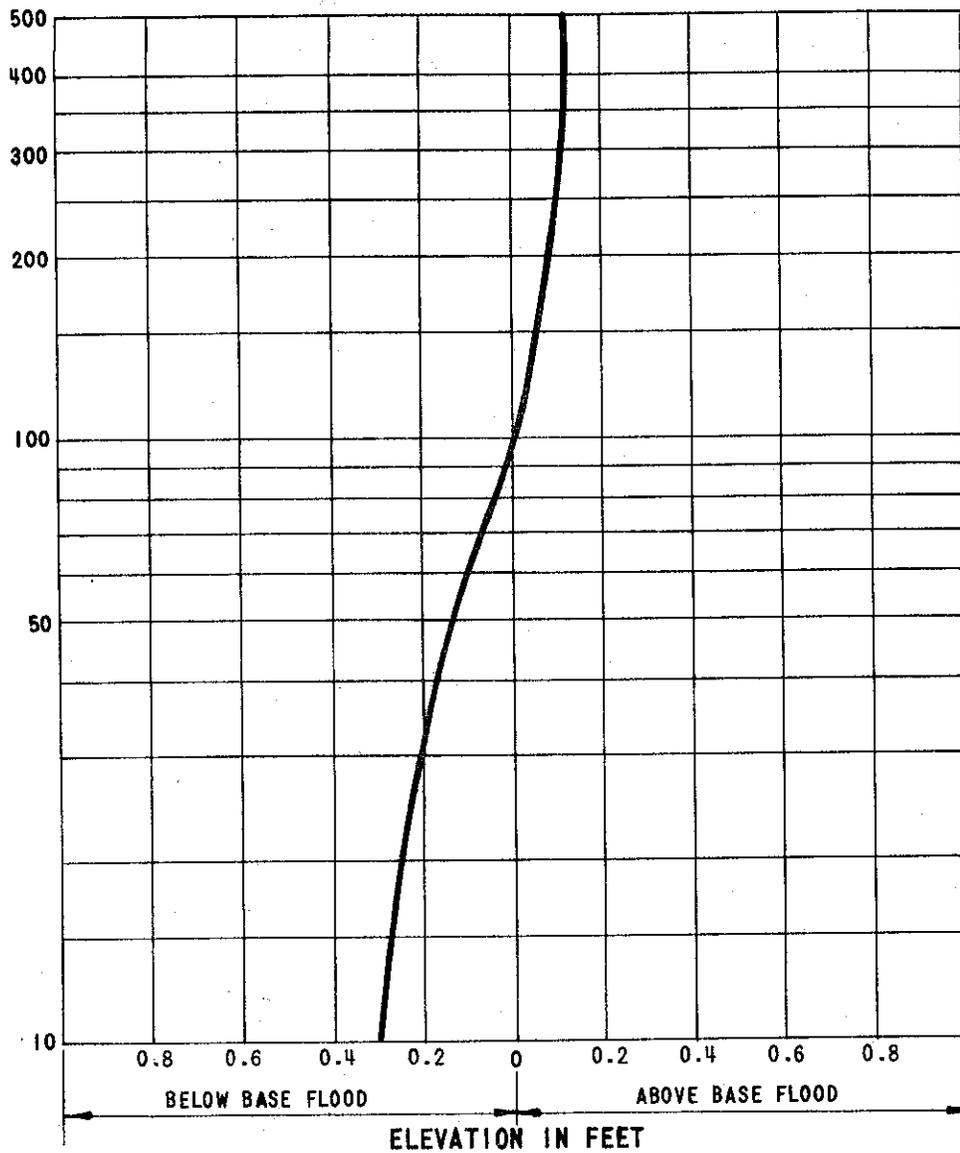
PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD DEPTH
500	0.8
250	0.8
100	0.7
50	0.6
25	0.5
10	0.4

SHEET FLOW ZONE
B-4

**FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
ELEVATION FREQUENCY
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FLOOD FREQUENCY-YEARS



NOTES:

1. CURVE CORRESPONDS TO FLOOD HAZARD FACTOR NO. 005 I.
2. FLOOD DEPTH BASED ON AVERAGE GROUND SURFACE.

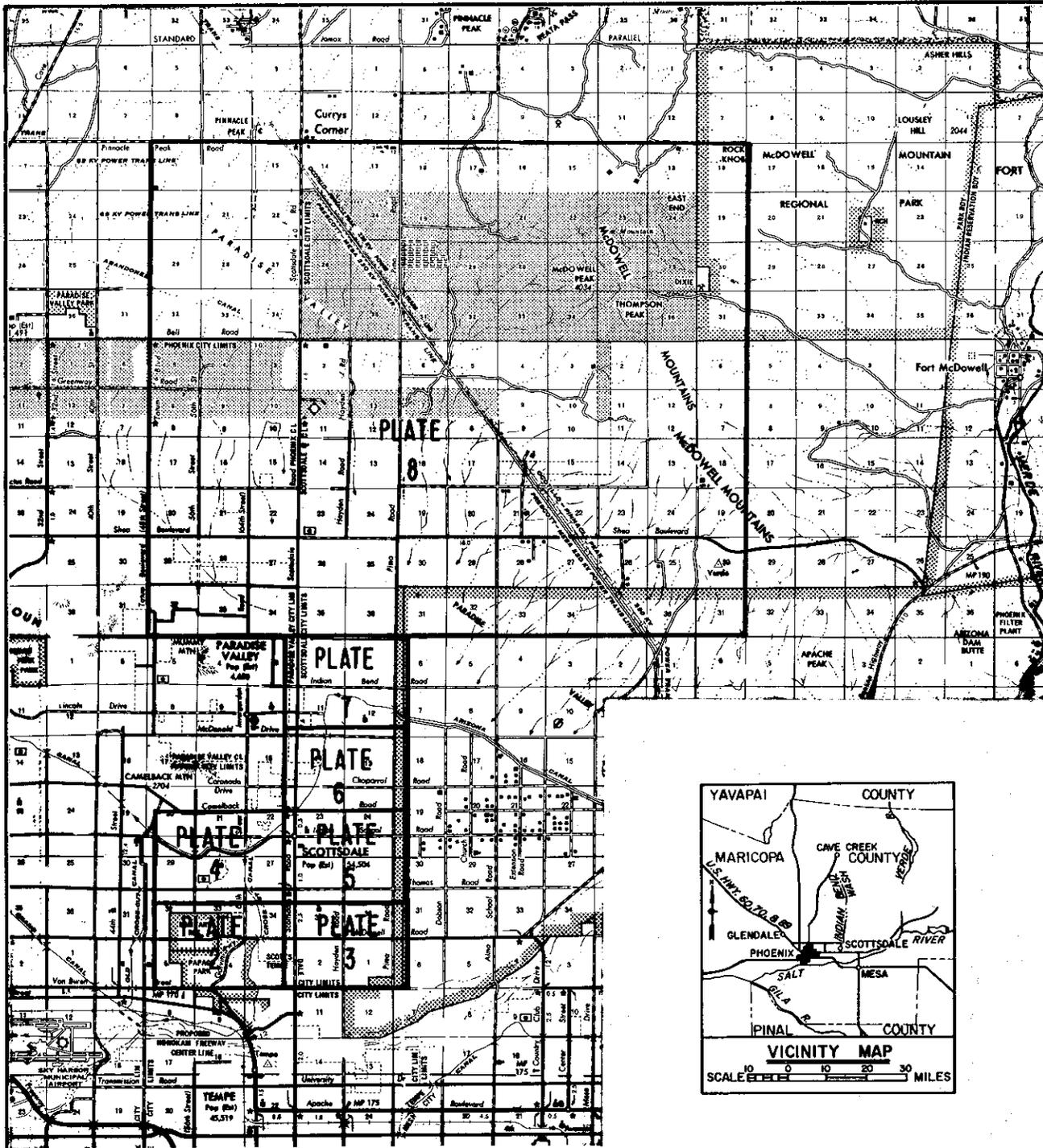
PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD DEPTH
500	2.6
250	2.6
100	2.5
50	2.4
25	2.3
10	2.2

SHEET FLOW ZONE
B-5

**FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
ELEVATION FREQUENCY
RELATIONSHIP**

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ZONE MAP INDEX
SCALE IN FEET



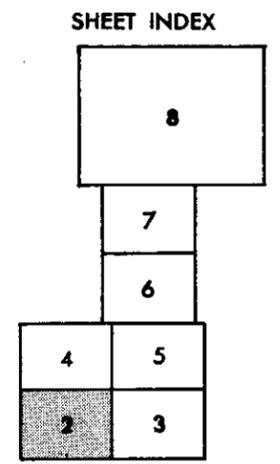
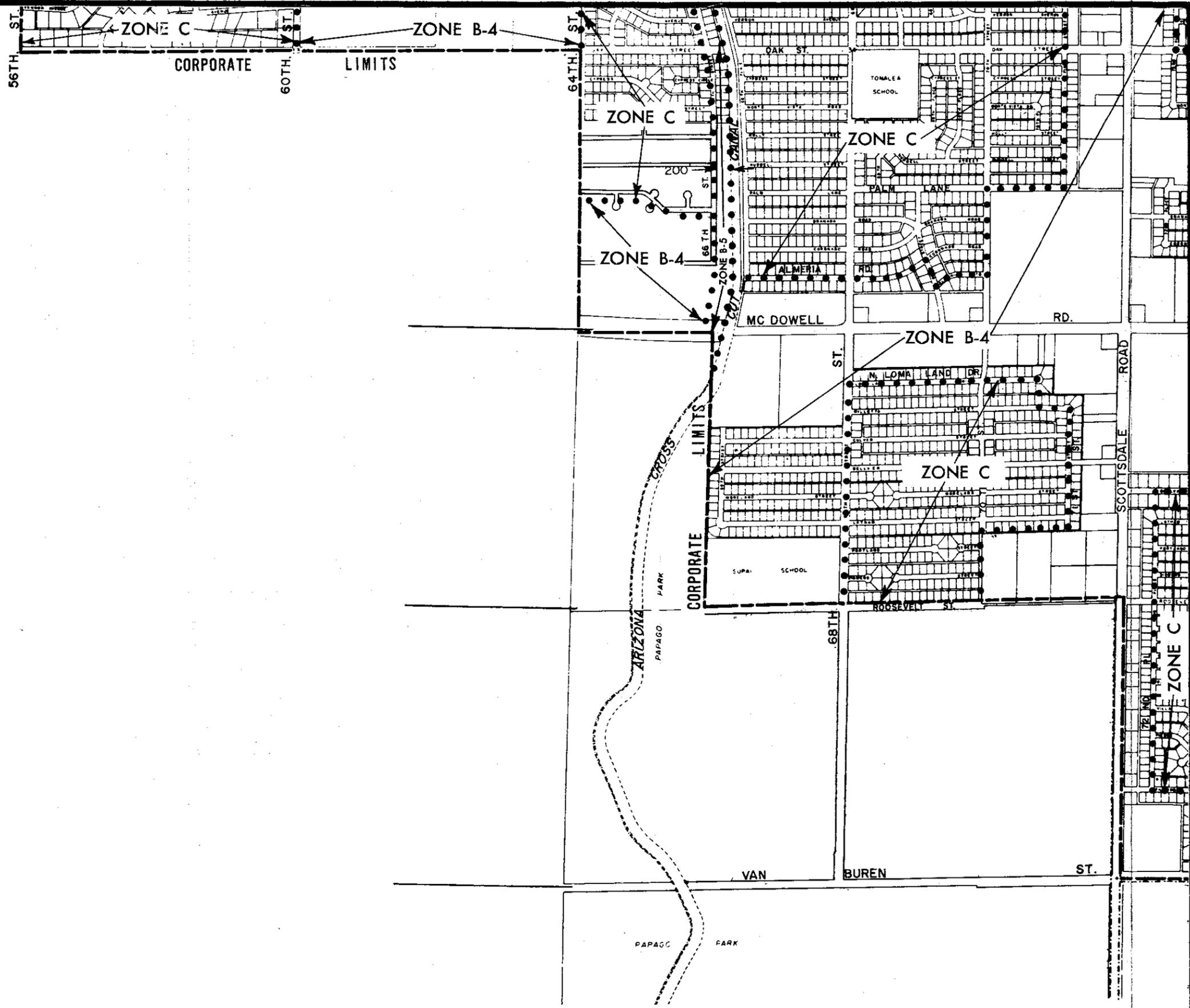
LEGEND

2 PLATE NUMBER OF
DETAIL MAP.

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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
VICINITY MAP AND
ZONE MAP INDEX

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NOTES

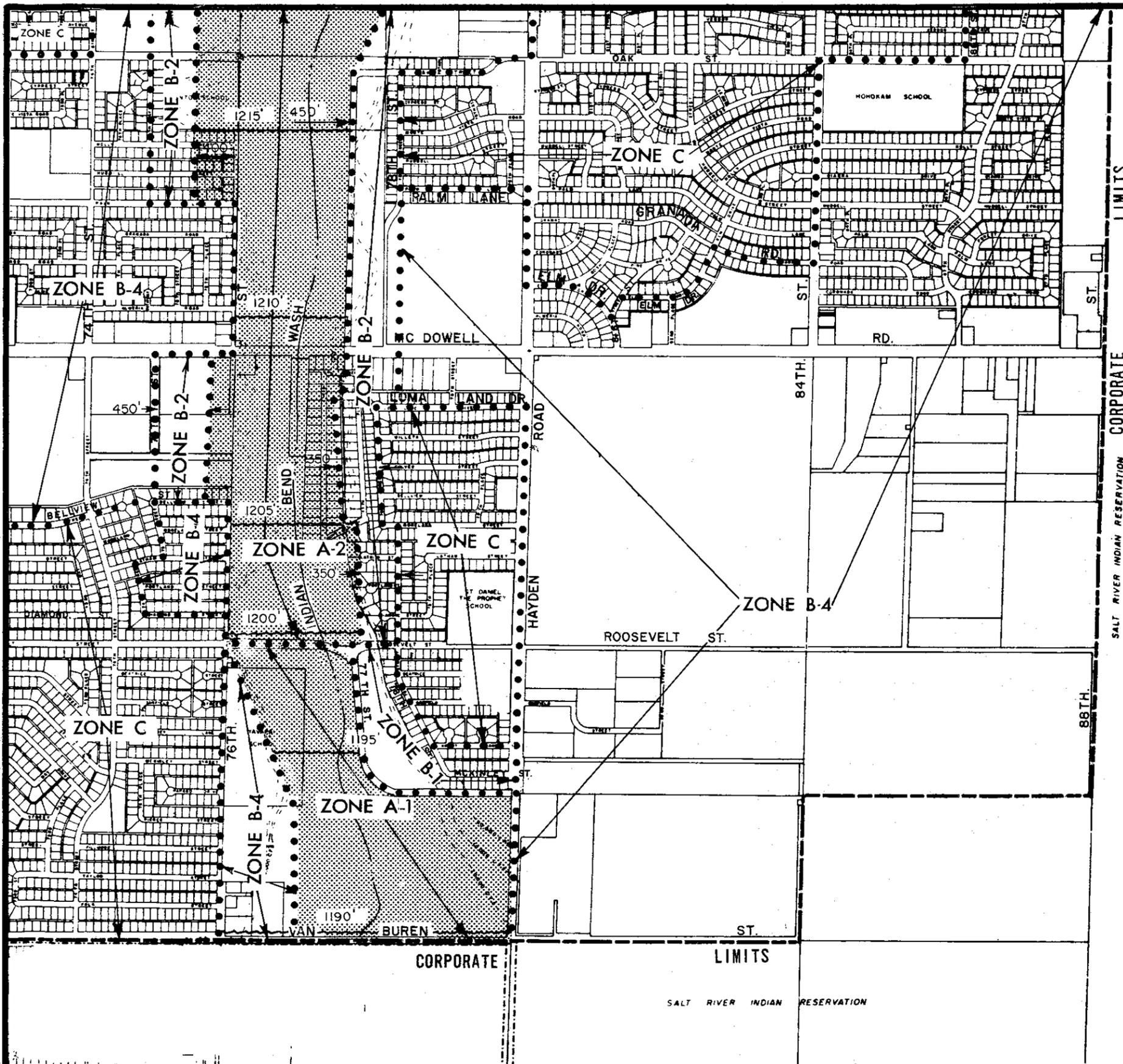
1. Base Flood Elevation Line
1215'
(See map for specific elevation.)
2. Flood Insurance Zone
3. Corporate Limits
4. Base map prepared from data furnished by the city of Scottsdale.



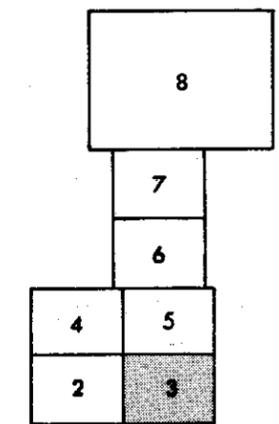
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SCOTTSDALE, ARIZONA
ZONE MAP

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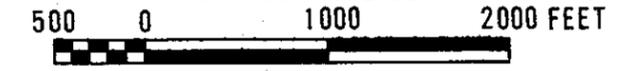
SHEET INDEX



NOTES

1. Base Flood Elevation Line
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3. ——— Corporate Limits
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APPROXIMATE SCALE

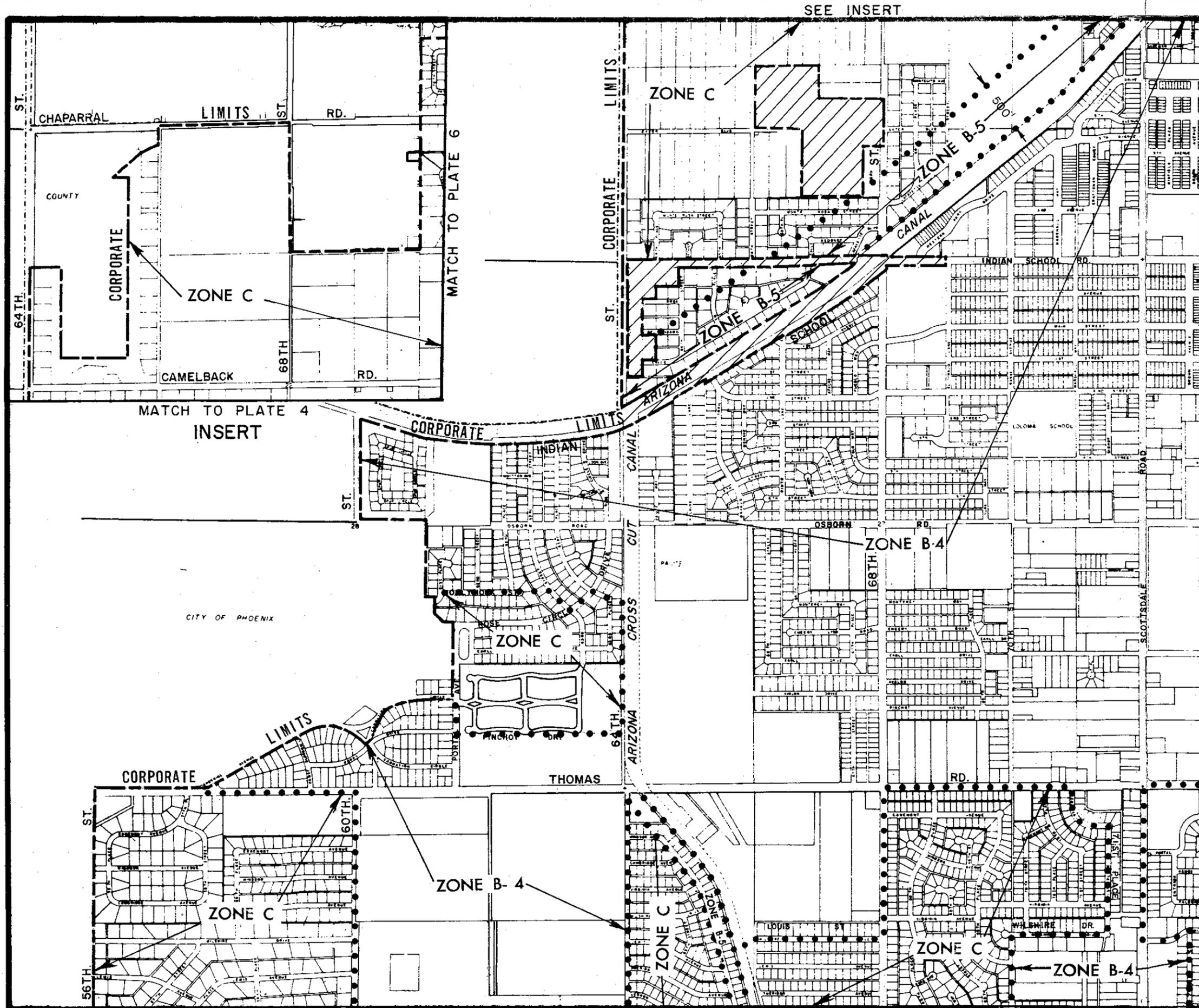


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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA

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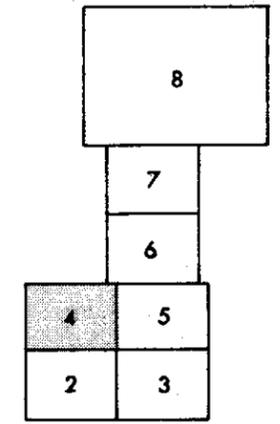
JUNE 1972



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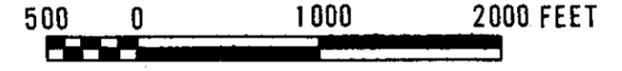
SHEET INDEX



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APPROXIMATE SCALE

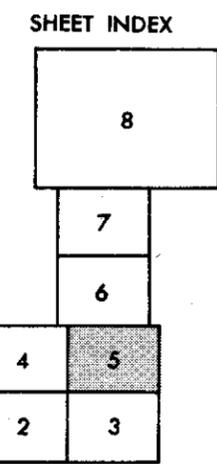
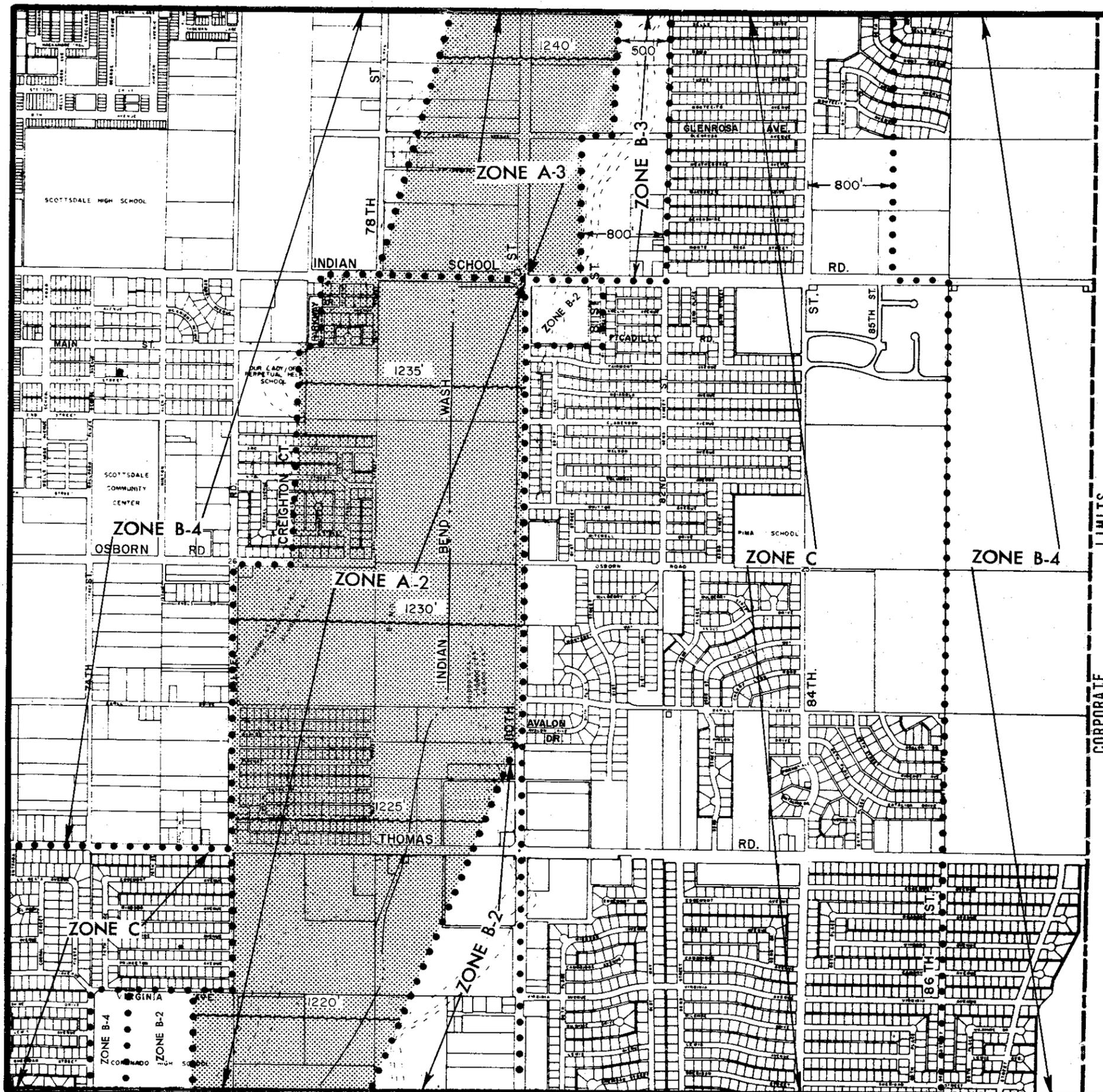


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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA

ZONE MAP

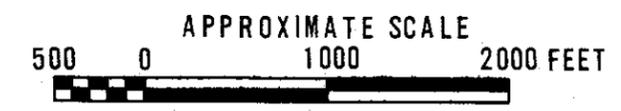
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NOTES

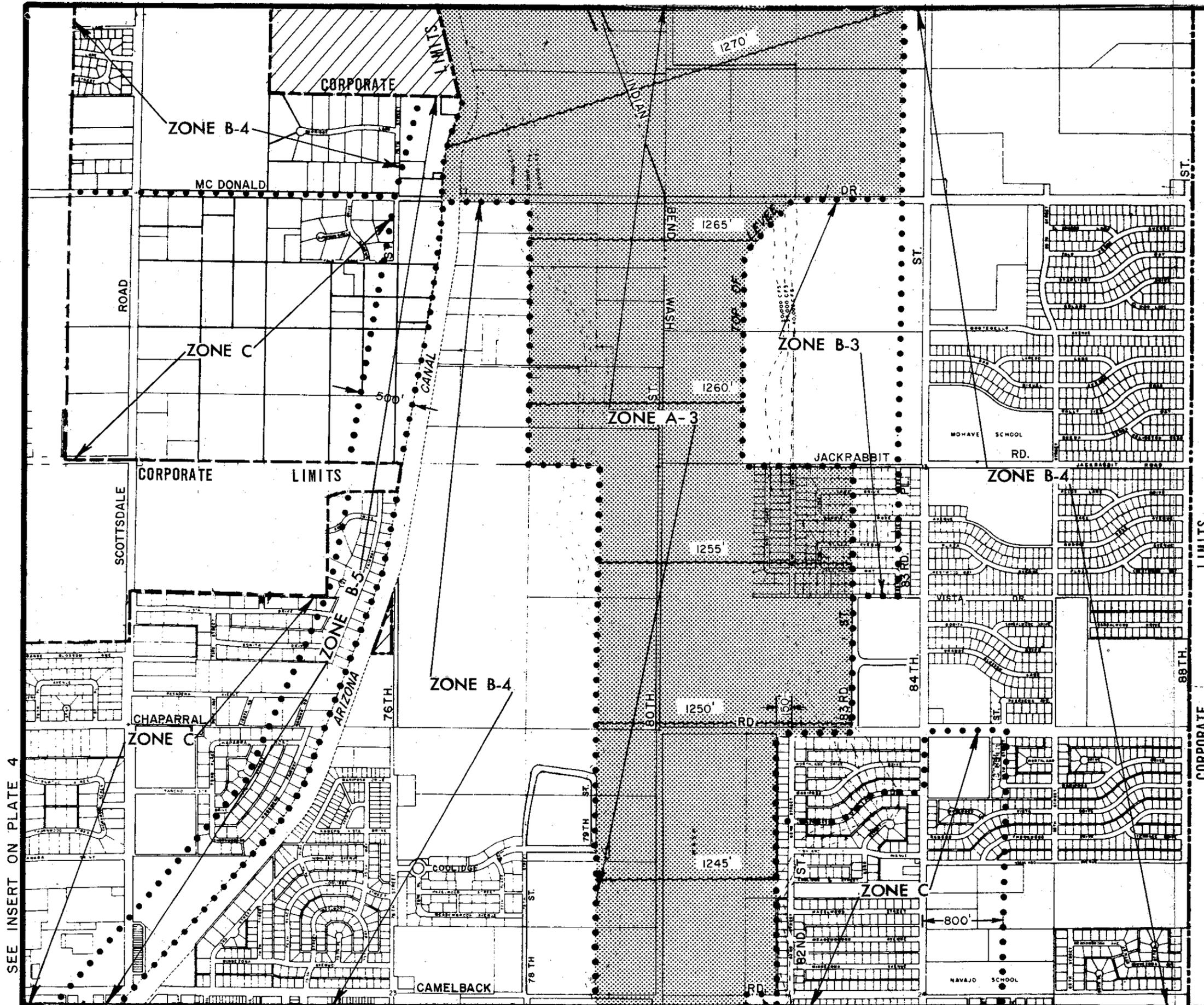
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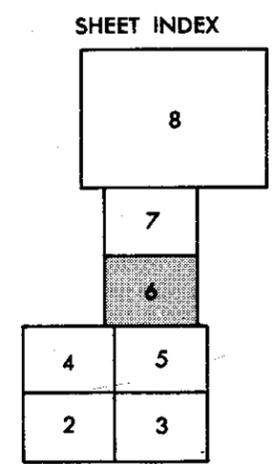
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SCOTTSDALE, ARIZONA
ZONE MAP

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SEE INSERT ON PLATE 4



- NOTES
1. Base Flood Elevation Line
1215'
(See map for specific elevation.)
 2. Flood Insurance Zone
 3. Corporate Limits
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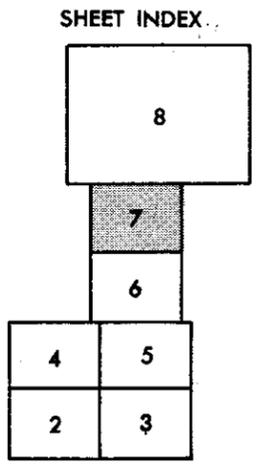
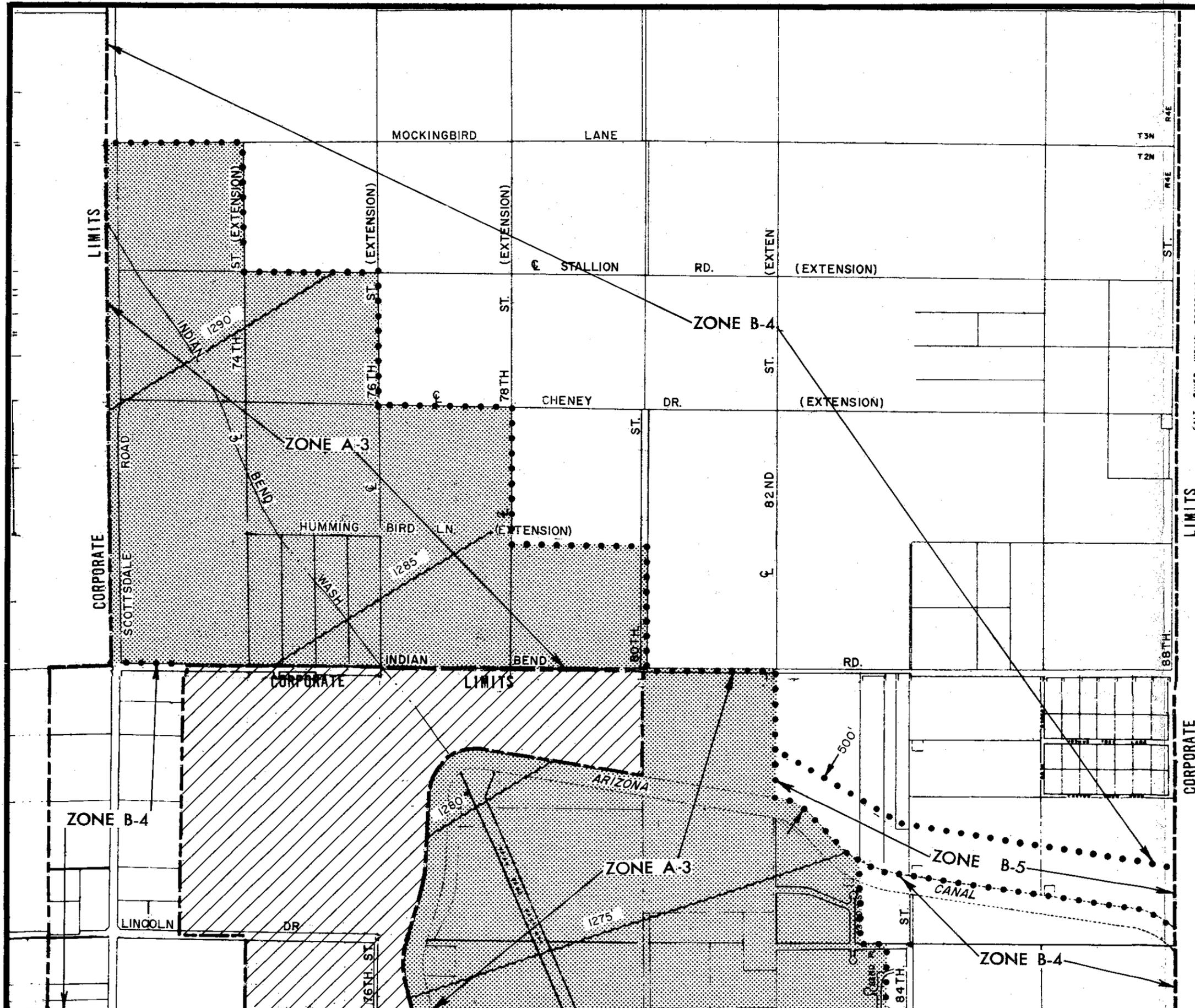


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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA

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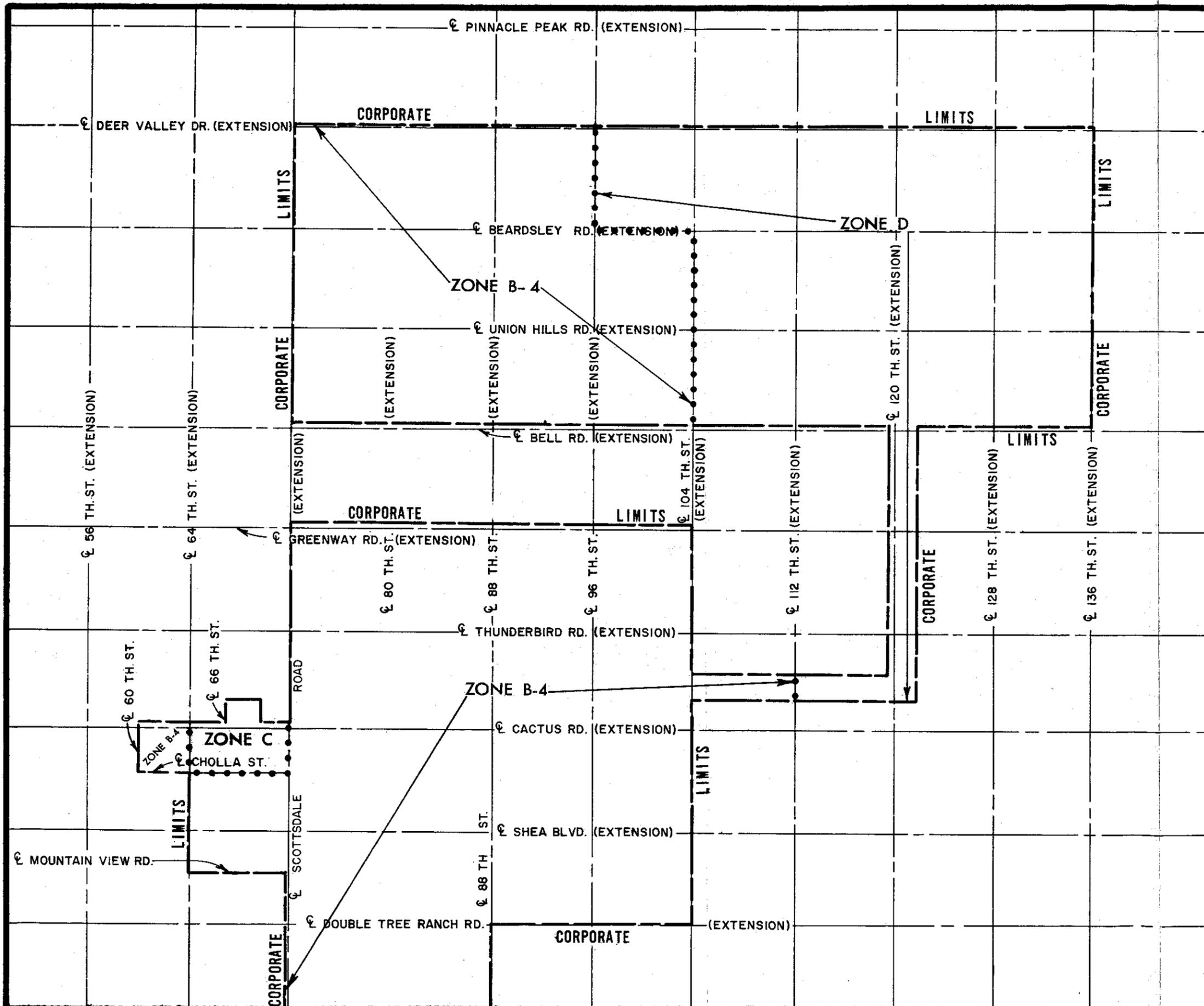
NOTES

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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
ZONE MAP

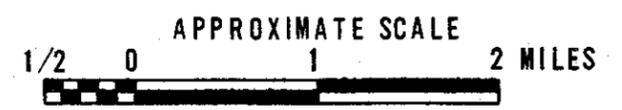
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SHEET INDEX

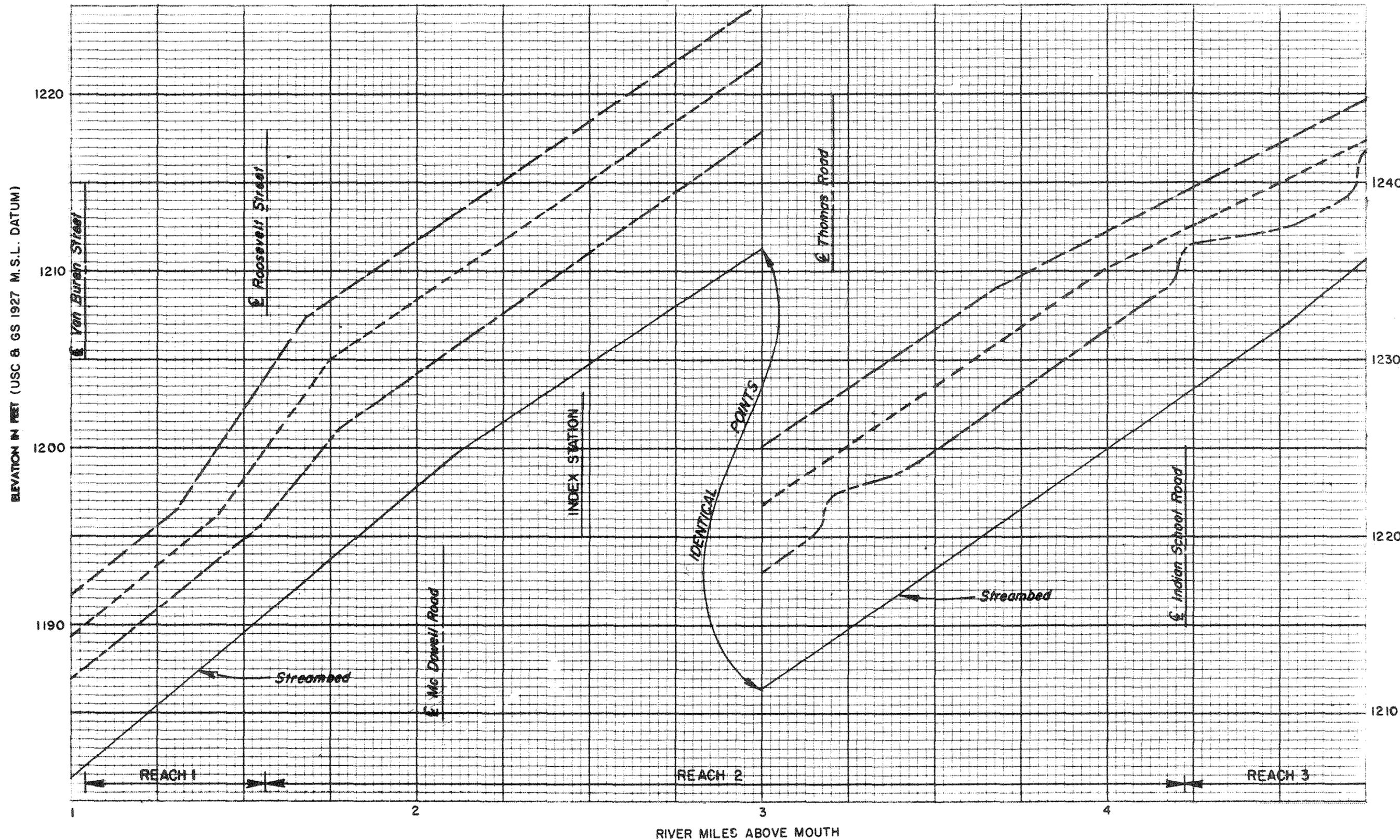
8	
7	
6	
4	5
2	3

- NOTES
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1215'
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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA
ZONE MAP

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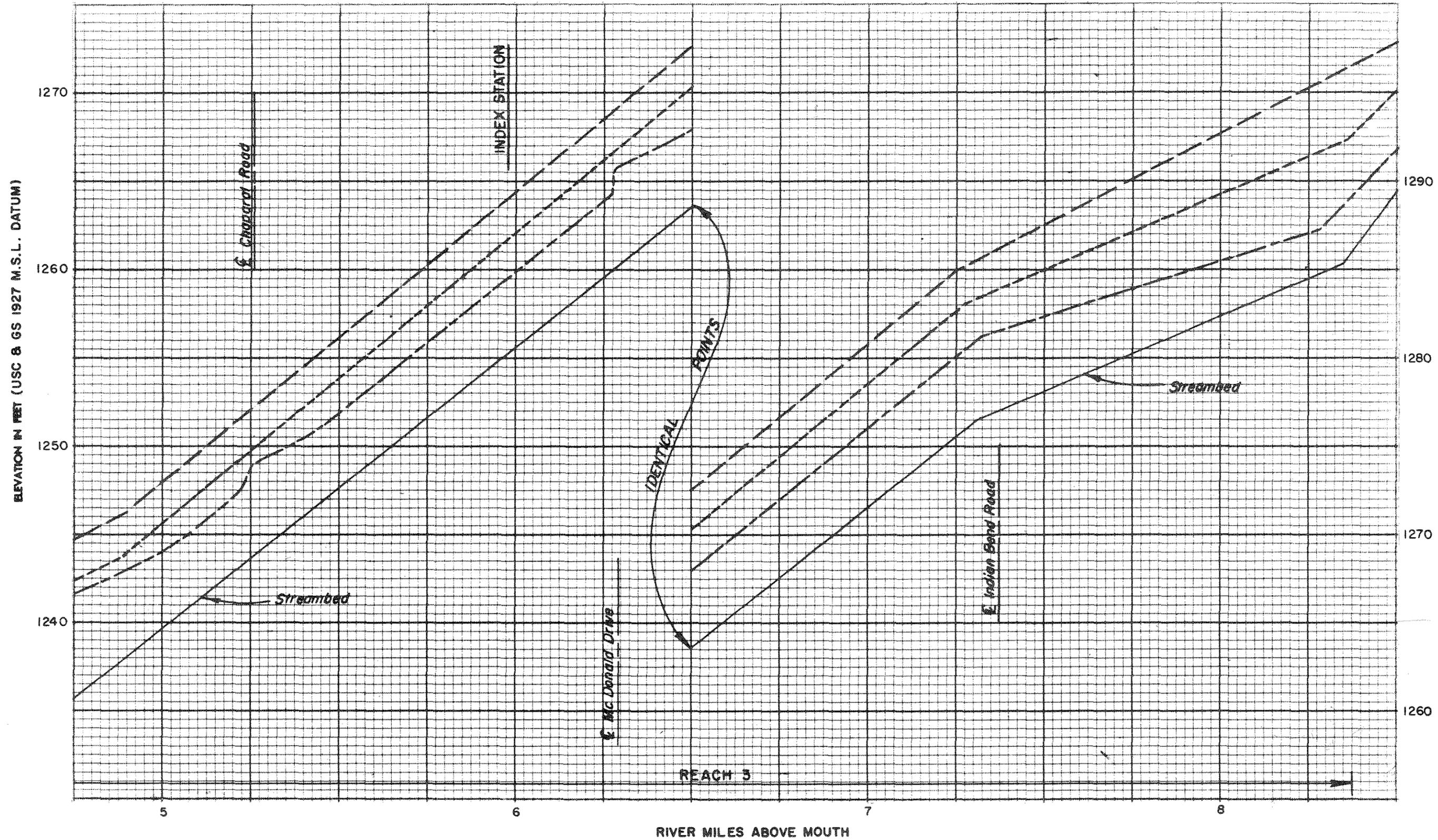


LEGEND

500-Year Flood	—————
100-Year Flood	- - - - -
10-Year Flood	- · - · -

- NOTES:**
1. The water surface profile shown downstream of river mile 1.75 is based on a natural diversion of flood flows to the east.
 2. Roadway crossings are assumed to have been washed out by the 100 and 500-year floods.

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 FLOOD INSURANCE STUDY
 SCOTTSDALE, ARIZONA
 FLOOD PROFILES
 INDIAN BEND WASH
 PREPARED FOR
 FEDERAL INSURANCE ADMINISTRATION
 JUNE 1972



LEGEND

- 500-Year Flood
- 100-Year Flood
- 10-Year Flood

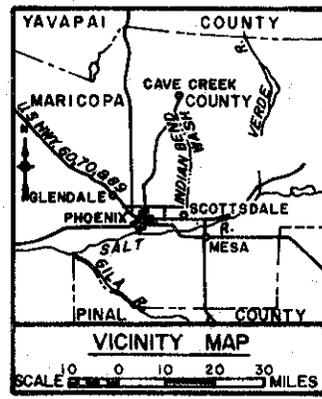
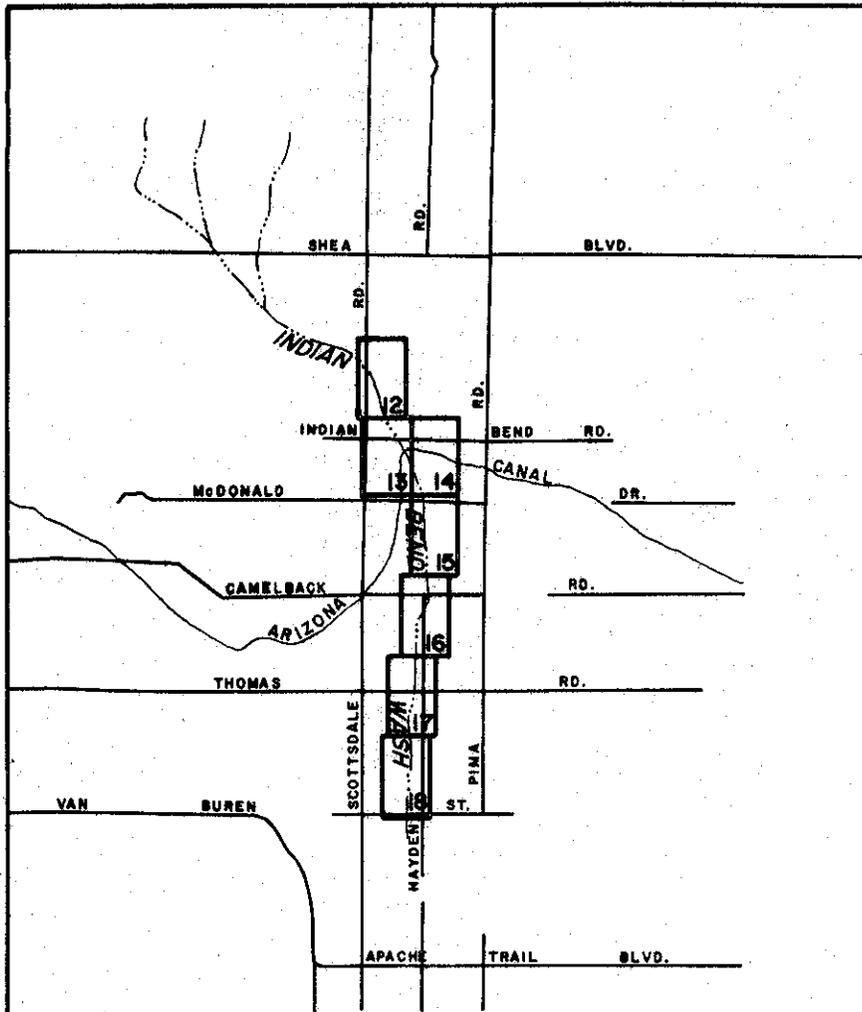
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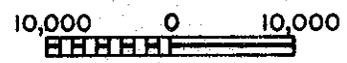
**FLOOD INSURANCE STUDY
 SCOTTSDALE, ARIZONA
 FLOOD PROFILES
 INDIAN BEND WASH**

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FLOODWAY MAP INDEX

SCALE IN FEET



LEGEND

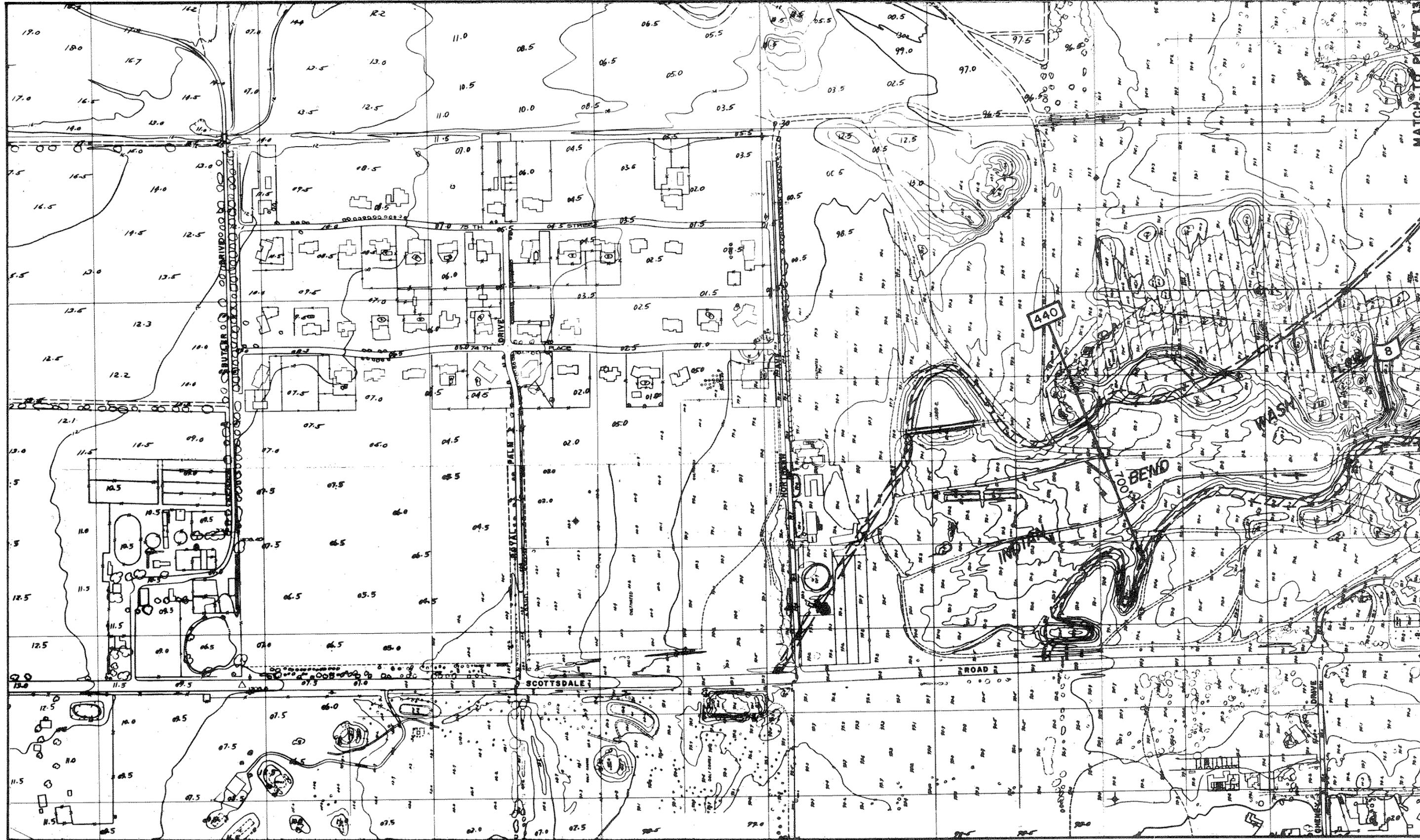
12 PLATE NUMBER OF
DETAIL MAP.

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FLOOD INSURANCE STUDY
SCOTTSDALE, ARIZONA

**VICINITY MAP AND
FLOODWAY MAP INDEX**

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JUNE 1972



LEGEND

OVERFLOW LIMITS

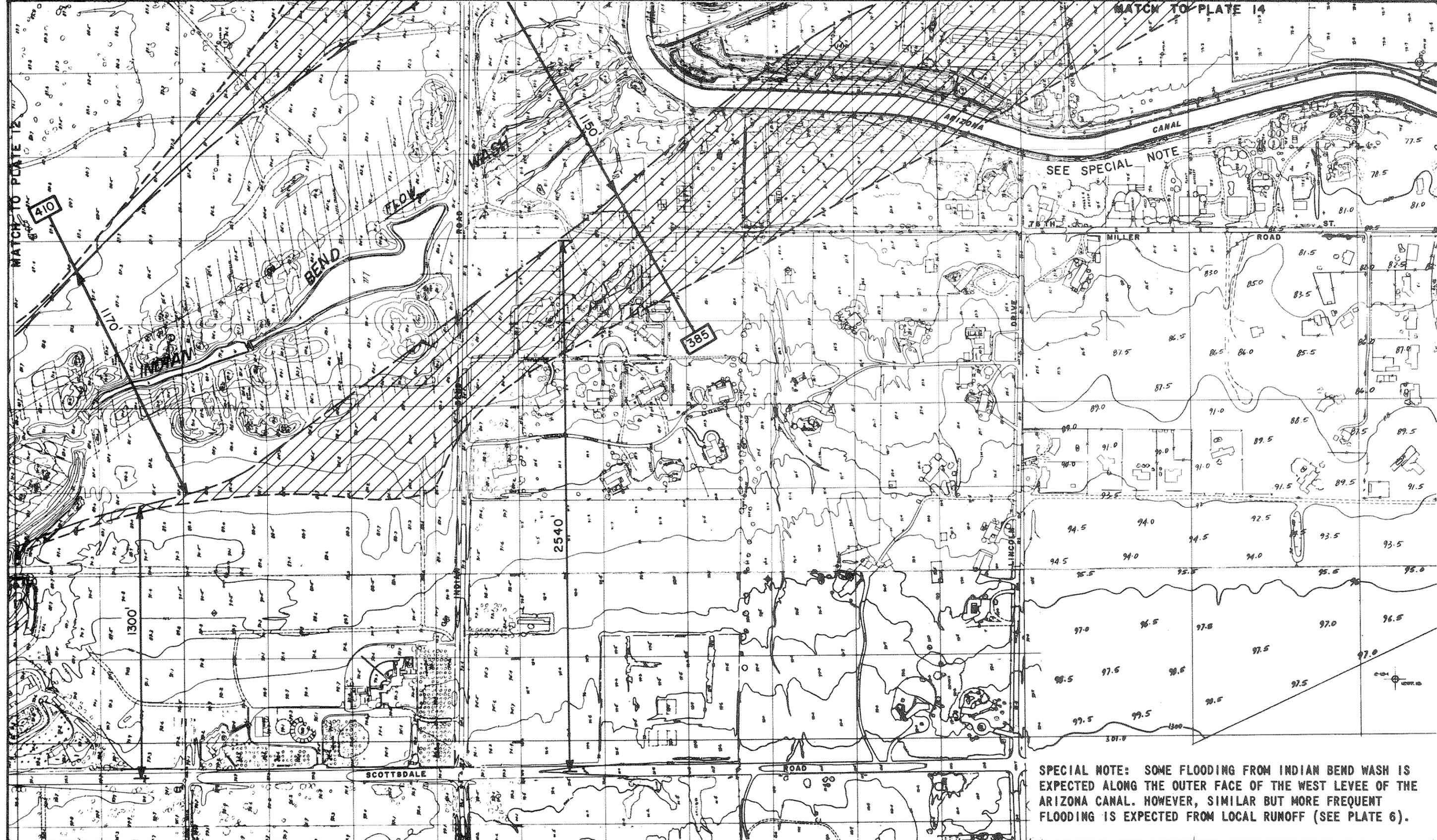
FLOODWAY FRINGE
 PRELIMINARY FLOODWAY
 FLOODWAY FRINGE

10 — CROSS SECTION NUMBER.
 102 — RIVER MILE.
 2840 — GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

- NOTES**
1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
 2. ELEVATION DATUM IS MEAN SEA LEVEL.

SCALE IN FEET

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 LOS ANGELES, CALIFORNIA
 FLOOD INSURANCE STUDY
 SCOTTSDALE, ARIZONA
 PRELIMINARY FLOODWAY
 INDIAN BEND WASH
 PREPARED FOR
 FEDERAL INSURANCE ADMINISTRATION
 JUNE 1972



MATCH TO PLATE 14

MATCH TO PLATE 12

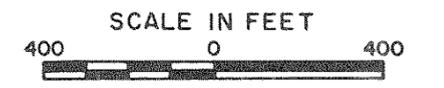
LEGEND

- OVERFLOW LIMITS**
- FLOODWAY FRINGE
 - PRELIMINARY FLOODWAY
 - FLOODWAY FRINGE
- 100 YEAR FLOOD

- CROSS SECTION NUMBER,
- RIVER MILE.
- 2840 GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

NOTES

1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
2. ELEVATION DATUM IS MEAN SEA LEVEL.
3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF SCOTTSDALE ROAD

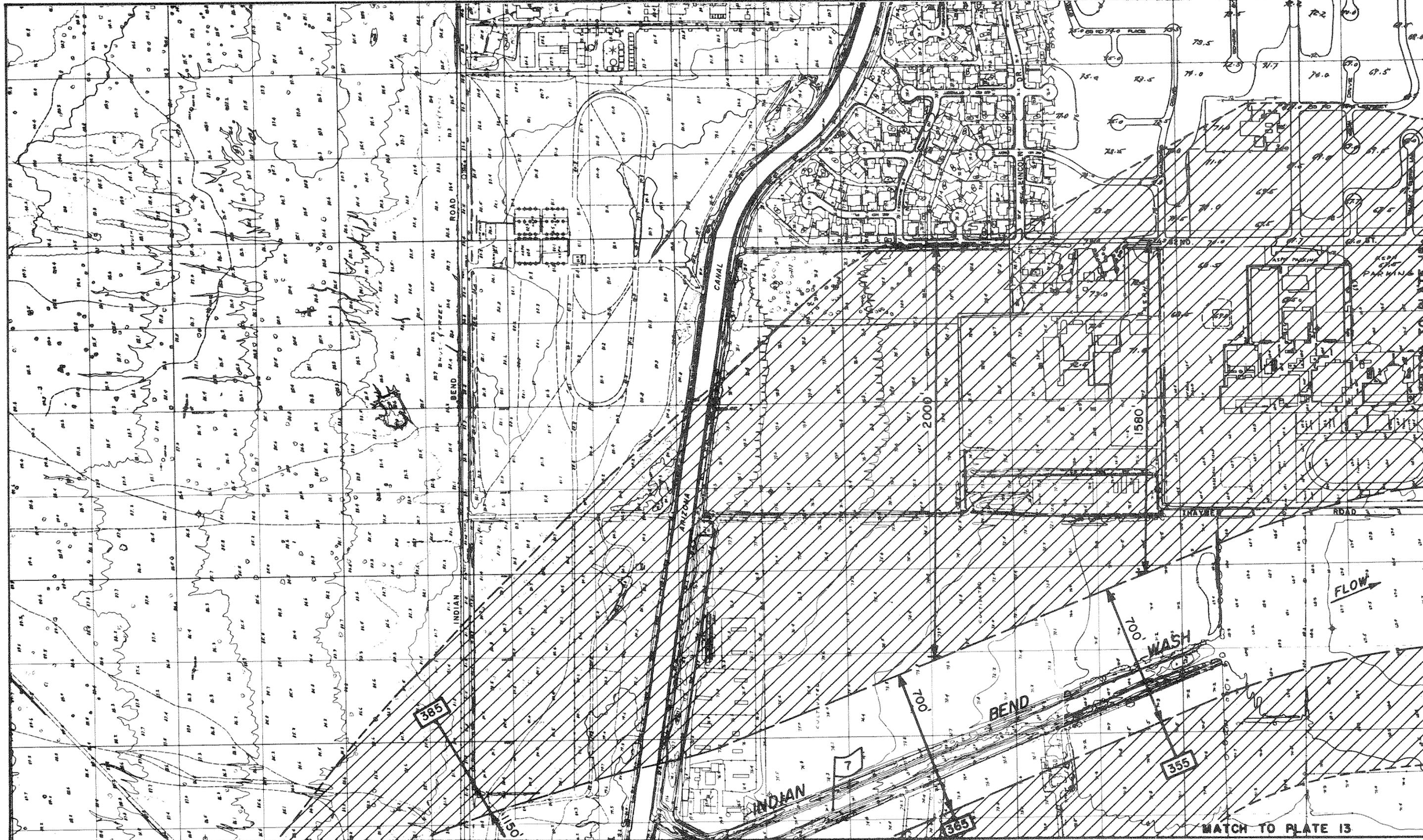


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 PRELIMINARY FLOODWAY
 INDIAN BEND WASH

SPECIAL NOTE: SOME FLOODING FROM INDIAN BEND WASH IS EXPECTED ALONG THE OUTER FACE OF THE WEST LEVEE OF THE ARIZONA CANAL. HOWEVER, SIMILAR BUT MORE FREQUENT FLOODING IS EXPECTED FROM LOCAL RUNOFF (SEE PLATE 6).

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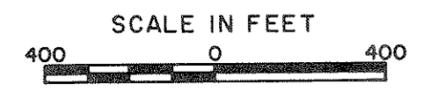


LEGEND

- OVERFLOW LIMITS**
-  FLOODWAY FRINGE
 -  PRELIMINARY FLOODWAY
 -  FLOODWAY FRINGE
- 100 YEAR FLOOD
-  CROSS SECTION NUMBER.
 -  RIVER MILE.
 -  GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

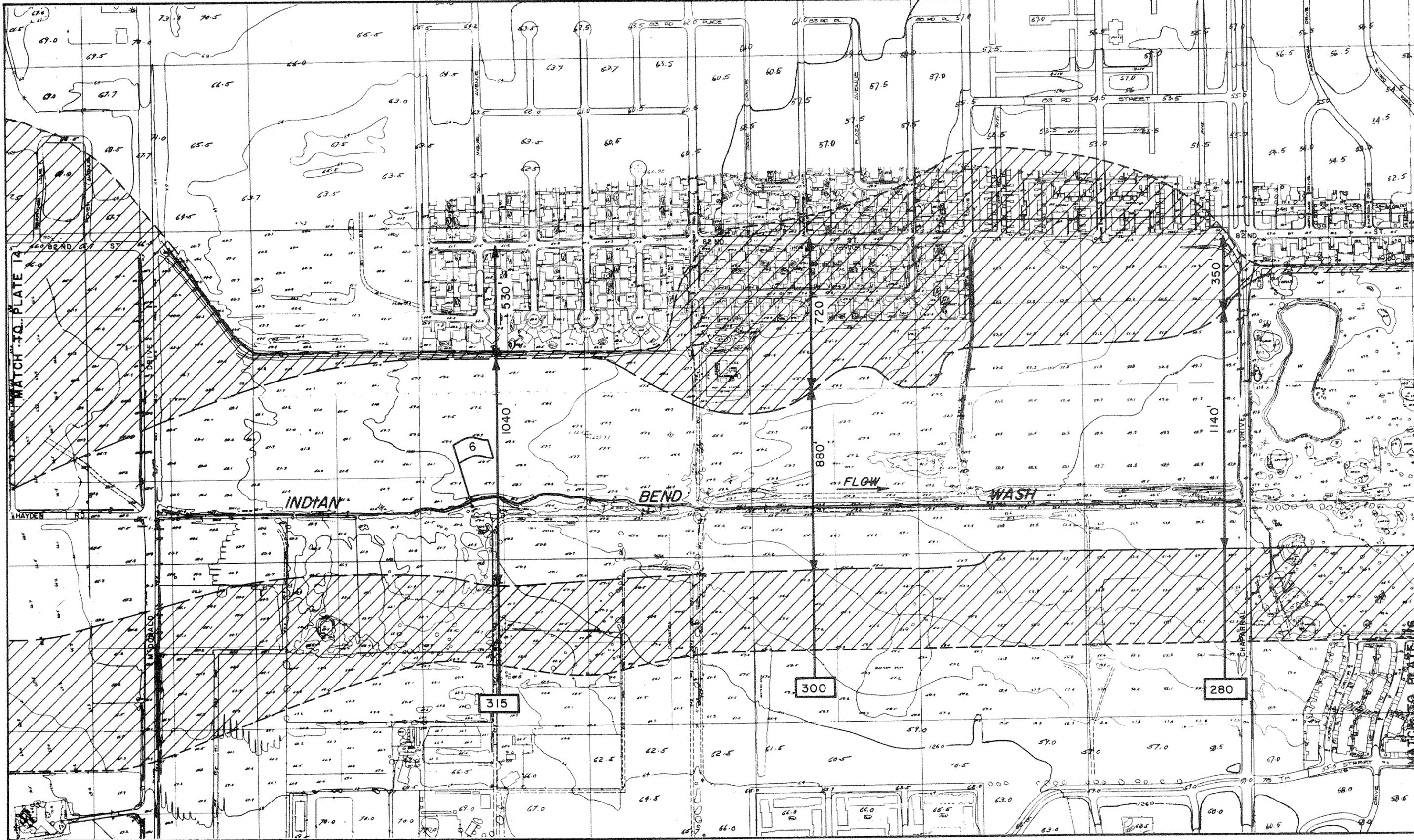
NOTES

1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
2. ELEVATION DATUM IS MEAN SEA LEVEL.
3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF 82ND. STREET.

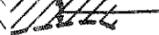


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 PRELIMINARY FLOODWAY
 INDIAN BEND WASH
 PREPARED FOR
 FEDERAL INSURANCE ADMINISTRATION
 JUNE 1972

MATCH TO PLATE 13

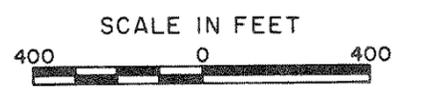


LEGEND

- OVERFLOW LIMITS**
-  FLOODWAY FRINGE
 -  PRELIMINARY FLOODWAY
 -  FLOODWAY FRINGE
- 100 YEAR FLOOD
-  CROSS SECTION NUMBER
 -  RIVER MILE.
 -  GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

NOTES

1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
2. ELEVATION DATUM IS MEAN SEA LEVEL.
3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF 82ND STREET

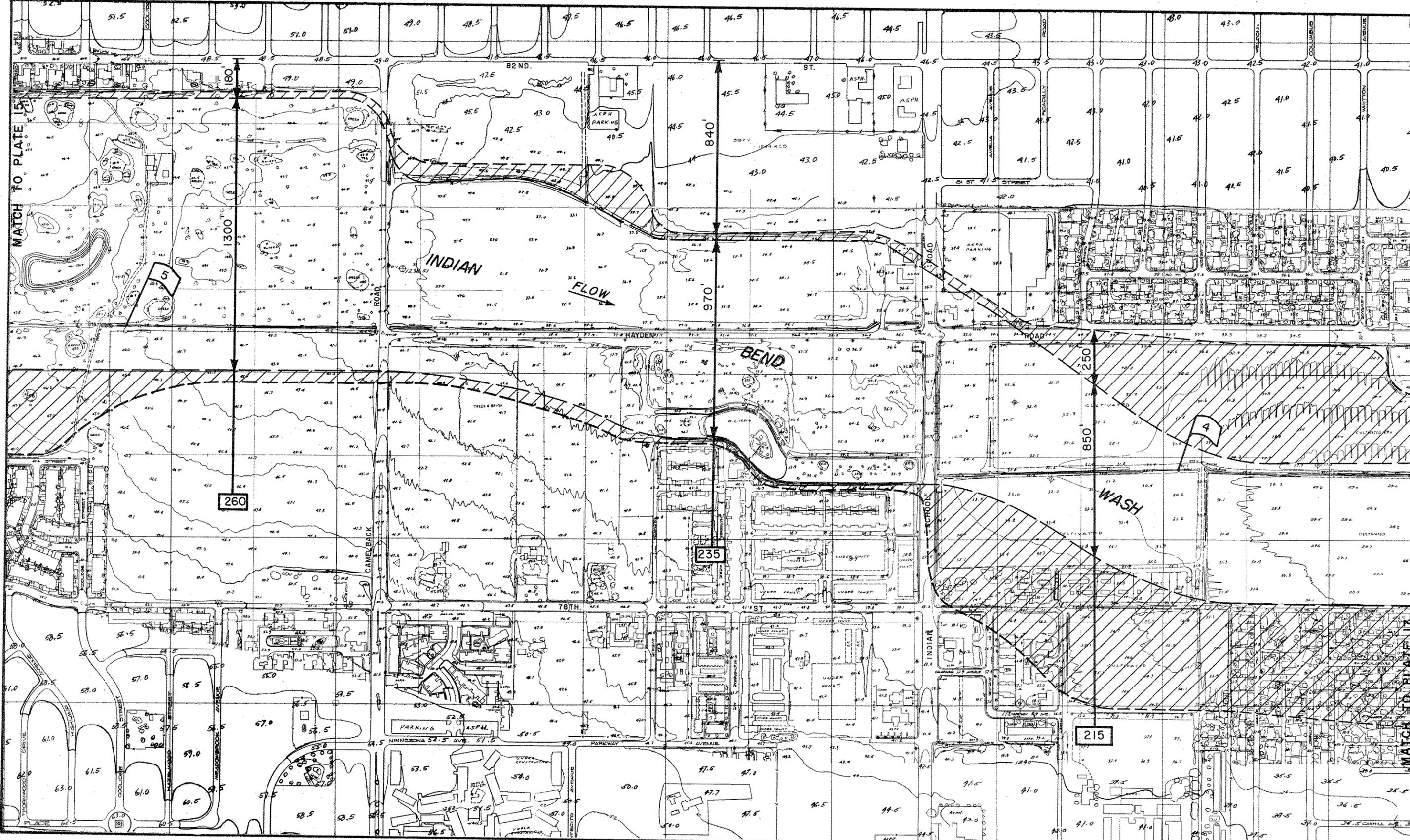


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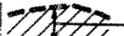
FLOOD INSURANCE STUDY
 SCOTTSDALE, ARIZONA
 PRELIMINARY FLOODWAY
 INDIAN BEND WASH

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JUNE 1972

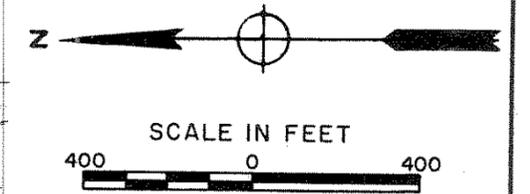


LEGEND

- OVERFLOW LIMITS**
-  FLOODWAY FRINGE
 -  PRELIMINARY FLOODWAY
 -  FLOODWAY FRINGE
- 100 YEAR FLOOD
-  CROSS SECTION NUMBER.
 -  RIVER MILE.
 -  GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

NOTES

1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
2. ELEVATION DATUM IS MEAN SEA LEVEL.
3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF HAYDEN ROAD AT CROSS SECTION 215 AND CENTERLINE OF 82ND. STREET AT CROSS SECTIONS 235 & 260.



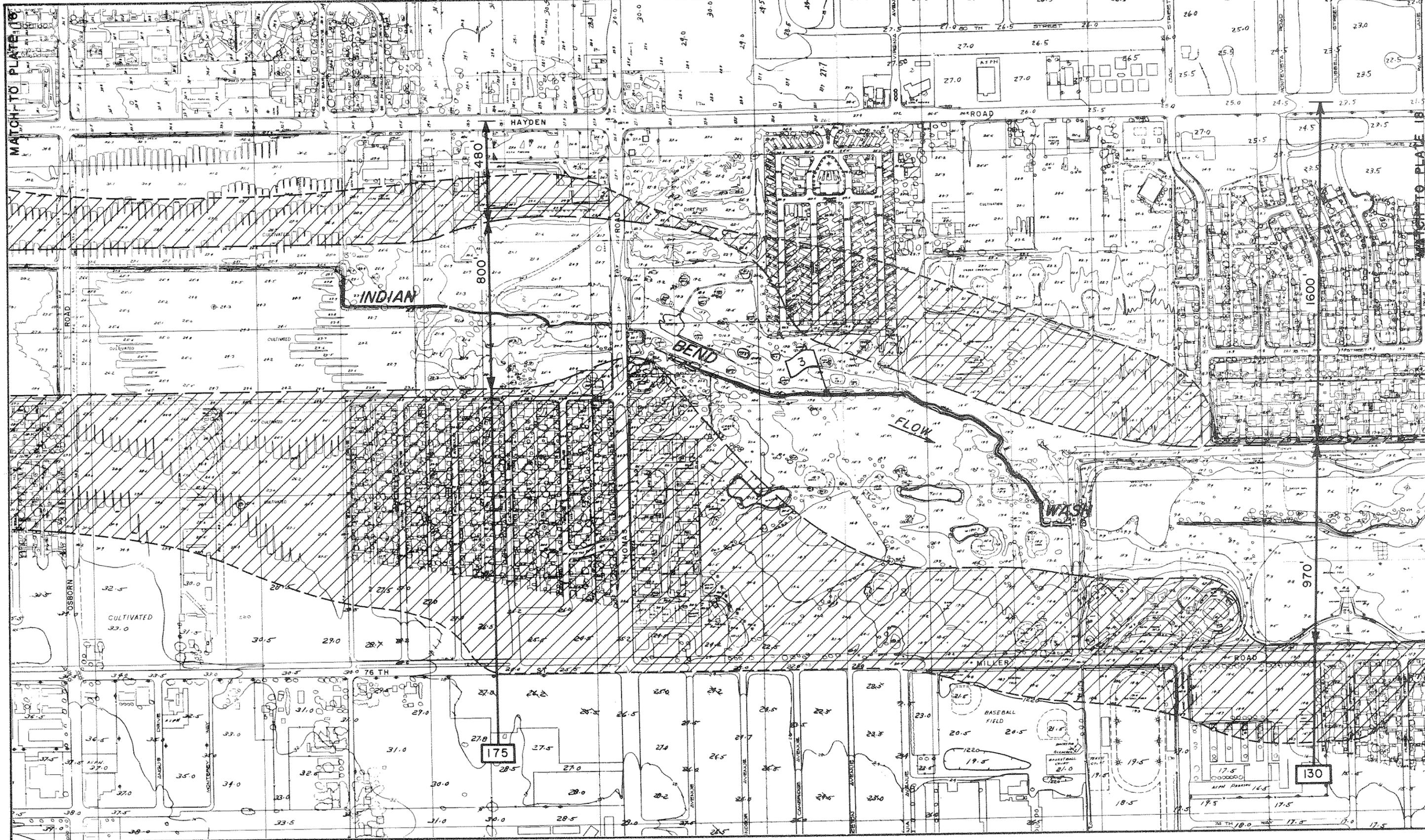
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FLOOD INSURANCE STUDY
 SCOTTSDALE, ARIZONA

PRELIMINARY FLOODWAY
 INDIAN BEND WASH

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JUNE 1972



LEGEND

 FLOODWAY FRINGE
 PRELIMINARY FLOODWAY
 FLOODWAY FRINGE

 CROSS SECTION NUMBER.
 RIVER MILE.
 GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

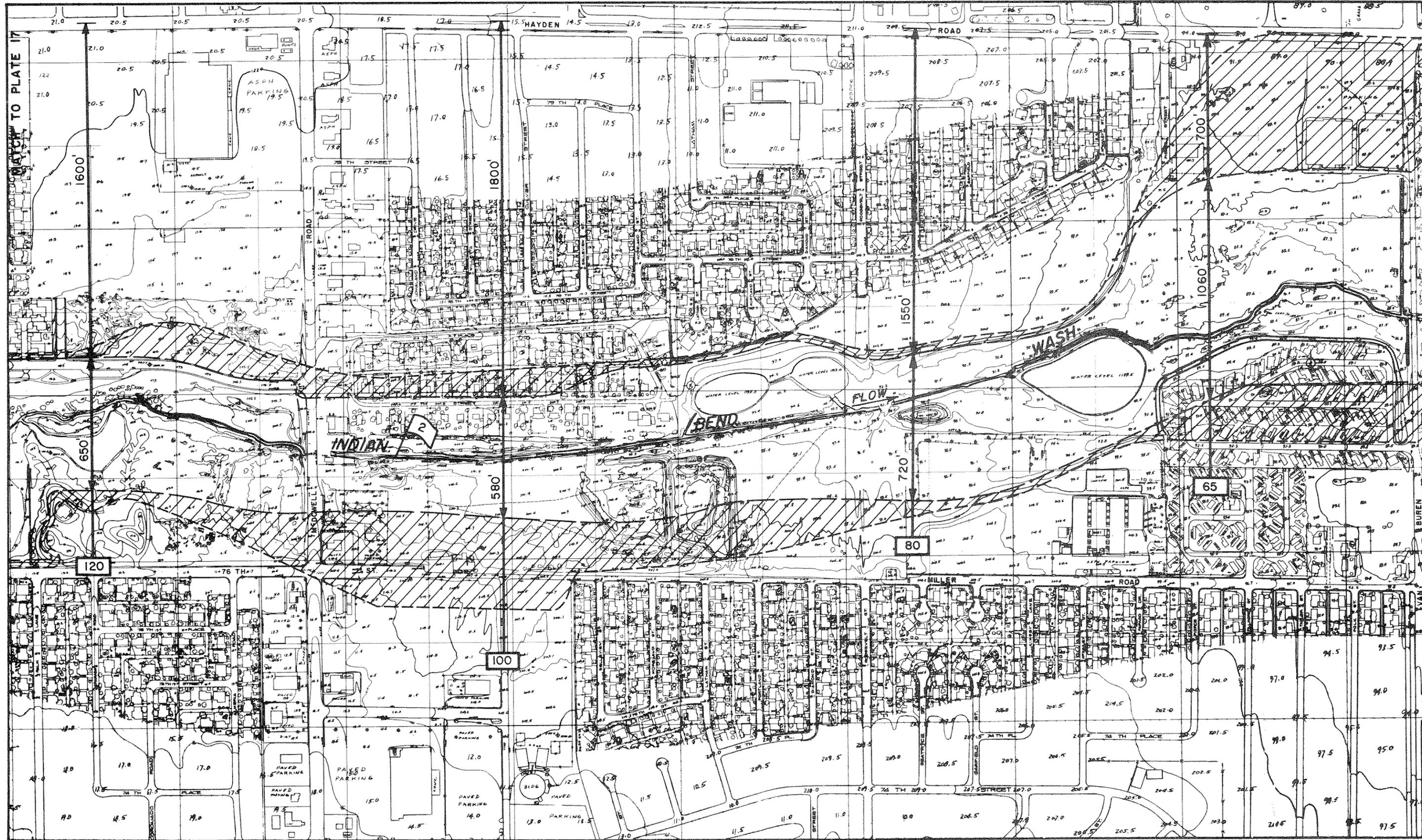
- NOTES**
1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
 2. ELEVATION DATUM IS MEAN SEA LEVEL.
 3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF HAYDEN ROAD



SCALE IN FEET



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LEGEND

OVERFLOW LIMITS

- FLOODWAY FRINGE
- PRELIMINARY FLOODWAY
- FLOODWAY FRINGE

100 YEAR FLOOD

- 10 CROSS SECTION NUMBER
- 102 RIVER MILE.
- 20.0 GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

- NOTES**
1. LIMITS OF OVERFLOW MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND, AS EXPLAINED IN THE REPORT.
 2. ELEVATION DATUM IS MEAN SEA LEVEL.
 3. THE BASELINE FOR FLOODWAY MEASUREMENTS IS CENTERLINE OF HAYDEN ROAD.

N

SCALE IN FEET

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