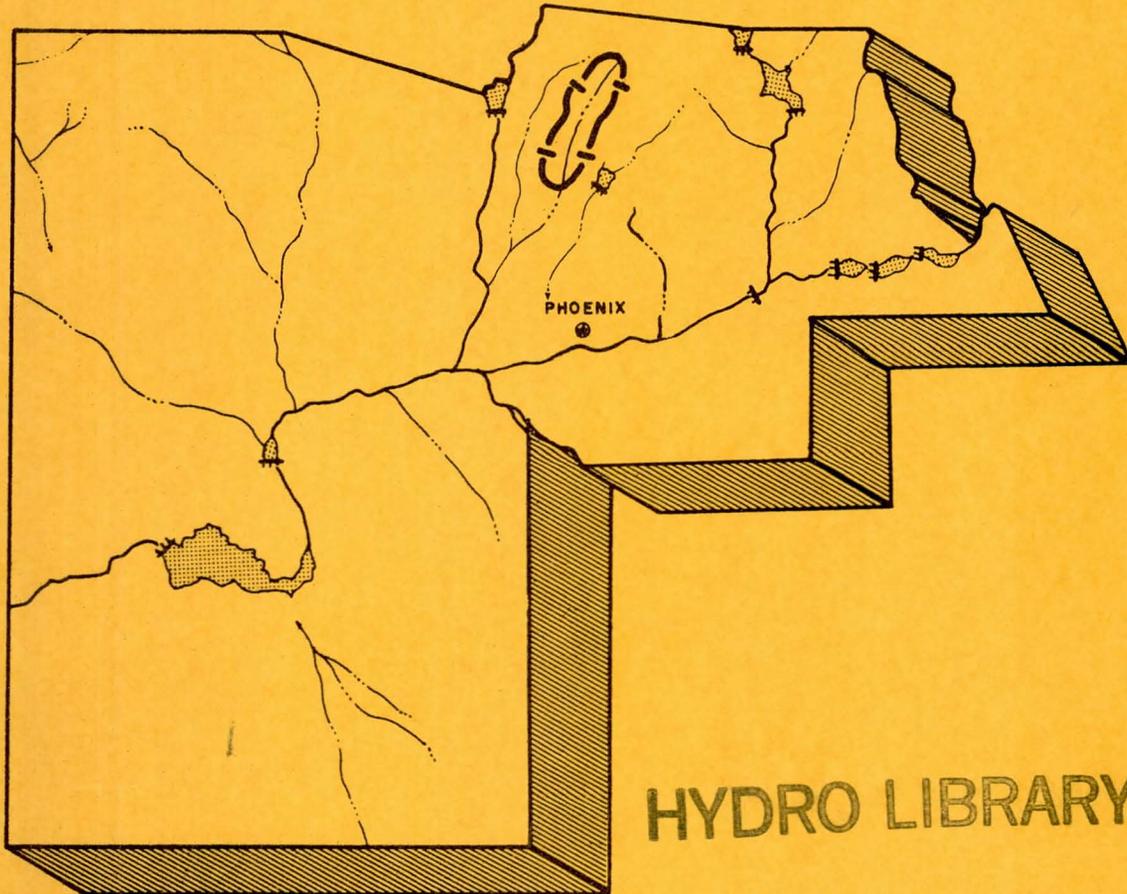


FOR

MARICOPA COUNTY, ARIZONA



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VOLUME III  
SKUNK CREEK REPORT

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

MARCH 1965

A400.014.001

FLOOD-PLAIN INFORMATION STUDY  
FOR  
MARICOPA COUNTY, ARIZONA

VOLUME III

SKUNK CREEK REPORT

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FLOOD-PLAIN INFORMATION STUDY  
FOR  
MARICOPA COUNTY, ARIZONA

VOLUME III

SKUNK CREEK REPORT

SUMMARY

General

1. The Flood Control District of Maricopa County requested the U. S. Army Corps of Engineers to provide information about the flood hazards in flood plains along several streams in the county. An index map of the study areas is shown on plate 1. This report, the third in the series on Maricopa County, presents the results of the study made on a reach of the Skunk Creek flood plain.

Authorization

2. This report was prepared under the authority granted in section 206, Public Law 86-645, approved 14 July 1960. That section is quoted in appendix 1.

3. The authority of the Flood Control District of Maricopa County to participate in flood-control planning is derived from article 5, sections 45-2351 to 45-2370, inclusive, title 45, chapter 10, Arizona Revised Statutes - and from a resolution of the Board of Supervisors of Maricopa County dated 3 August 1959, which established the flood-control district pursuant to the cited statutes.

4. Furthermore, Arizona has adopted State statutes enabling counties and cities to zone through the use of properly adopted

resolutions and ordinances. Such zoning laws must be in the interest of promoting health, safety, morals, or general welfare, and are generally placed on referendum in a public election. Maricopa County has adopted zoning laws, but not in regard to flood hazards. However, flood-plain zoning could be adopted by the county because it would be in the interest of promoting health, safety, and general welfare.

5. On 26 September 1960 and 11 December 1961, the Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County adopted resolutions requesting the U.S. Army Corps of Engineers to make a flood-plain information study for Maricopa County - and giving assurances that the information in this report would be made available to all interested persons and organizations, and that the availability of the report would be adequately publicized. Those resolutions are quoted in appendix 1. On 14 April 1961 the Chief of Engineers, Department of the Army, Washington, D.C., approved the request for these Maricopa County studies.

6. The Arizona State Land Commissioner has been designated by the Governor of Arizona to coordinate and to assign priority to applications for flood-plain information studies. Upon approval for release of this report by the Arizona State Land Commissioner on 23 December 1964, the Chief of Engineers, Department of the Army, Washington, D.C., approved release of this report for publication on 30 December 1964.

#### Purpose of Study

7. The purpose of the study presented in this report is to provide information on flood hazards in the flood plain on a reach

of Skunk Creek for the guidance of the State of Arizona and the Flood Control District of Maricopa County in (a) advising county and city planning organizations and private land developers about those hazards and (b) setting up appropriate controls to insure optimum and prudent use of the flood plain. The purpose of this report is not to discourage the use of the flood plain - but rather to encourage development that will insure an optimum balance between the needs of man for use of the flood plain and the needs of nature for the discharge of floodwaters.

#### Scope

8. The original request for the study from the Flood Control District of Maricopa County indicated an interest in flood-plain information along Skunk Creek from the Black Canyon Highway (Arizona State Highway 69) downstream to the confluence of Skunk Creek with the New River. Subsequently, some flood-plain information for Skunk Creek downstream from Hedgpeth Hills (about 4.6 miles downstream from the Black Canyon Highway) was included in the interim flood-control survey report for Phoenix, Arizona, and vicinity (including New River) being prepared by the U. S. Army Corps of Engineers for submittal to Congress.

9. The flood plain that local interests finally selected for this study extends upstream along Skunk Creek for about 5.1 miles from the foot of Hedgpeth Hills to approximately 2,000 feet beyond the Black Canyon Highway Bridge crossing (see pl. 2).

10. The study included consideration of past floods and of future floods in whose overflow areas methods of regulating development or construction of flood-control facilities might be warranted.

#### Use of the Report

11. The information in this report is presented for consideration and use by the State of Arizona, Maricopa County, and other local agencies for planning the use and regulation of selected flood plains in the Skunk Creek drainage area between Hedgpeth Hills and a point about 2,000 feet upstream from the Black Canyon Highway. The State and county will make this information available to any responsible local interest. Further information on the use or availability of this report should be requested from the Flood Control District of Maricopa County, in Phoenix, Arizona.

12. Any regulation for flood-plain use resulting from this report would be undertaken by the State, the county, or some other local agency. This report is not intended to extend any Federal authority over zoning or other regulation of flood-plain use, and the information study and report are not to be construed as committing the Federal Government to investigating, planning, designing, constructing, operating, or maintaining any facilities discussed, or to imply any intent to undertake such activities unless specifically authorized by Congress.

### Acknowledgment

13. The cooperation of the Flood Control District of Maricopa County and individuals who directly or indirectly aided in the preparation of this report is gratefully acknowledged. Topographic maps prepared by Earle V. Miller, Engineers, and by Johanessen & Girand, Engineers, were the basic maps used for the study. A mosaic, prepared from an aerial survey flown by Aerial Mapping Company, was used for the delineation of flood areas (see pls. 5, 6, 7, and 8). General highway maps prepared by the Arizona Highway Department were used in preparing a map of the report area along Skunk Creek (see pl. 2).

### Glossary of Selected Terms

14. A glossary of selected terms used in this report is included as appendix 2.

### Bibliography

15. A bibliography of references used in preparing this report is included as appendix 3.

## DESCRIPTION OF PROBLEM

### General Description of Problem Area

16. Skunk Creek, which is the principal tributary of the New River, rises in the New River Mountains, about 35 miles north of Phoenix and flows southwestward, crossing the Black Canyon Highway approximately one mile east of the Deem Hills and joining the New River about 15 miles northwest of Phoenix. The total length of the stream is approximately 30 miles with a total drainage area of about 140 square miles (including 101 square miles upstream from the Hedgpeth Hills). The reach considered in this study extends upstream for about 5.1 miles from the foot of Hedgpeth Hills to a point about 2,000 feet above the Black Canyon Highway. Invert elevations along Skunk Creek in the report area range from 1,323 at the Hedgpeth Hills to 1,467 at the Black Canyon Highway. In the report area, an unnamed tributary enters Skunk Creek from the northwest about a mile downstream from Black Canyon Highway.

17. The stream flows through an area that is typically desert in character and, at the present time, is sparsely populated. In the report area, the natural channel of Skunk Creek is shallow and not well-defined, and the width of the flood plain is as much as 4,000 feet in some places (see pls. 5, 6, 7, 8, and 9), with a depth in some places of 11 feet (see pls. 10, 11, 12, and 13).

### Prospective Developments Affecting the Flood Plain

18. At the present time, Skunk Creek from the Hedgpeth Hills upstream, flows through an area that is desertland with some agricultural use. The area has not yet experienced the expanding development that

has occurred to the south and east. However, now that the improvement of Black Canyon Highway is nearing completion, roadside business expansion is expected to extend northward across Skunk Creek - with resultant residential expansion in and adjacent to the flood plain in the report area. Already, many semi-improved roads are in and adjacent to the flood plain (see pls. 5, 6, and 7). Residential growth may be expected to move into the area.

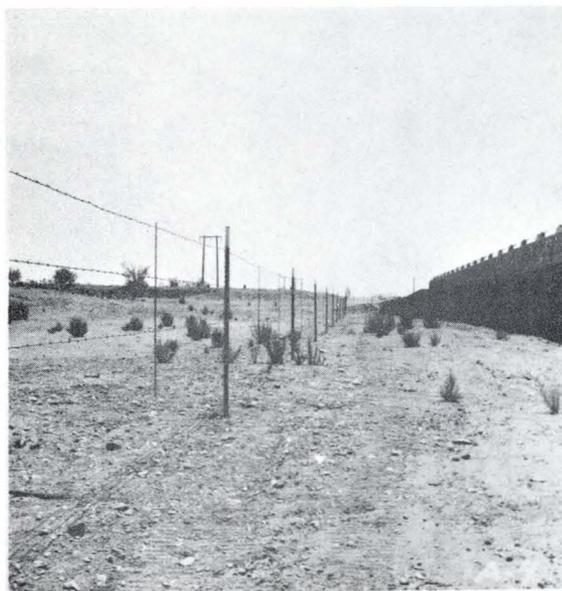
#### Nature and Extent of Flood Problem

19. Maricopa County (including the drainage area of Skunk Creek) is experiencing a rapid increase in population and in urban development, particularly in the farmlands and desertlands around Phoenix. This increase has sometimes led to the development on the flood plains of streams without due regard to the existence of flood hazards. The hazard that exists in the flood plain of Skunk Creek is not always apparent to the layman because the land is semiarid and because recent urban developments have not as yet experienced damaging floods. However, storms in this area have caused - and will continue to cause - floods resulting in the inundation of extensive flood plains. (See pictures on following pages for typical views of the flood plain in the report area.)

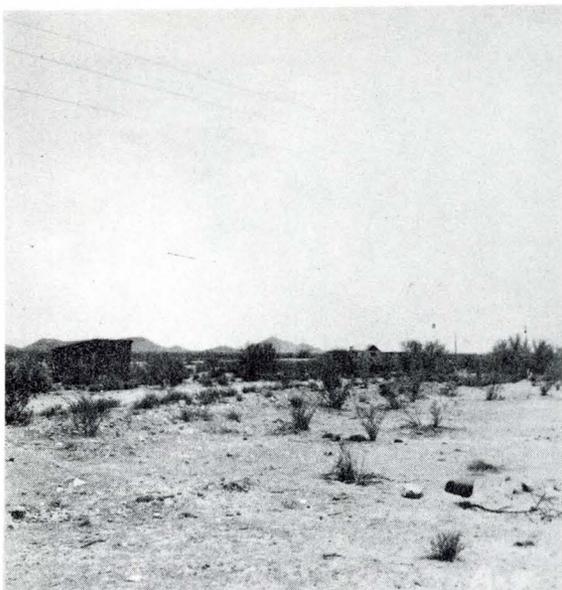
20. No flood-control works are in the area, and no flood-plain zoning regulations are in existence. However, the left (south) embankment of Skunk Creek upstream from the Black Canyon Highway bridge has been riprapped to protect the bridge abutment (see picture on page 8).



Looking upstream through the four bridges of the Black Canyon Highway crossing. Bridge height from ground averages 10 feet.



Looking southward at upstream edge of East Frontage Road Bridge of Black Canyon Highway. Riprap protects the south embankment.



Typical view of Skunk Creek flood plain. Shed in left foreground and house in center background are within the flood plain.



Looking northward from foot of Hedgpeth Hills near confluence of Scatter Wash and Skunk Creek. Evidence of dumping shows that encroachments in the existing floodway are already under way.

## RAINFALL AND FLOODS

### General

21. Types of storms.--Three types of storms produce precipitation in the Skunk Creek basin: general winter storms, general summer storms, and local thunderstorms. Pertinent information on these storms is given in the following subparagraphs.

(a) General winter storms, usually occurring during the months of December to March, originate over the Pacific Ocean as a result of the interaction between cool polar Pacific and warm tropical Pacific airmasses and move eastward over the basin. These storms often last for several days and are accompanied by widespread rainfall.

(b) General summer storms, which occur during the months of July to September, are associated with the influx of moist tropical air originating over the Gulf of Mexico or the South Pacific Ocean, and are often accompanied by relatively heavy rainfall over large areas for periods up to 24 hours, with light showers continuing for as long as 3 days.

(c) Local thunderstorms can occur at any time of the year, even during a general storm. However, they are most common from July to September, covering relatively small areas and resulting in high-intensity rainfall for durations of 3 hours or less.

22. Past storms and floods.--Severe local storms and floods have occurred in the Phoenix area in the following years: 1921, 1935, 1936, 1939, 1943, 1951, 1954, 1956, 1957, and 1963. The most severe storm of record occurred over the Queen Creek drainage area on 19 August 1954. This was a thunderstorm with high rainfall

intensities during the first 3 hours of the storm and light rainfall during the next 3 hours. An estimated area of 100 square miles had over 5 inches of rain, and about 1,000 square miles had over 1 inch of rainfall. The peak discharge at Whitlow Ranch damsite (in the Queen Creek drainage area near Florence Junction on U.S. Highways Nos. 60 and 70 in Pinal County) was estimated at 42,000 cubic feet per second. If the storm had been centered to produce the standard project flood (with suitable ground conditions) the peak discharge would have been 110,000 cubic feet per second. The drainage area upstream from the damsite is about 143 square miles.

23. Standard project flood.--A flood resulting from a thunderstorm of the magnitude described in the preceding paragraph would have a high peak discharge and a relatively short duration. If such a storm were centered over the Skunk Creek drainage area upstream from Hedgpeth Hills, at a time when ground conditions were reasonable conducive to runoff, the peak discharge of the resulting flood at the Hedgpeth Hills would be 55,000 cubic feet per second from the tributary drainage area of 101 square miles (see pl. 3). That flood was selected as the standard project flood (see definition in appendix 2).

#### Flood Frequency

24. Information on the frequency of floods of various magnitudes is essential in planning for optimum use of the flood plain. The development of such information depends on rainfall and streamflow data. Although Maricopa County has a well-established system of precipitation and gaging stations, no such stations are in the drainage area

contributing to the reach of Skunk Creek covered by this report (see pl. 3). However, sufficient rainfall and streamflow data are available for areas near the Skunk Creek drainage area to permit reasonable estimates of the frequency of occurrence of floods of various magnitudes at three concentration points in the drainage area upstream from Hedgpeth Hills. A table giving the size of the standard project flood for those three concentration points, together with the size of the 50- and 100-year floods at those points, is shown on plate 4.

#### Flood Limits Delineated in This Report

25. General.--Actual areas inundated by past major floods in the report area are unavailable because no records of streamflow in the area are in existence. From information developed in this study, it is apparent that the natural channel of Skunk Creek is generally shallow and not well-defined. Where the natural channel is shallow, the maximum width of overflow for the standard project flood would be about 4,000 feet; and where the natural channel is narrow, the maximum depth of overflow for the standard project flood would be about 11 feet. Estimates of depth and extent of overflow areas were made of the following future floods:

(a) Standard project flood.--For this study, the limits of the overflow area of the standard project flood were selected as the upper limits of the flood plain. The limits of that overflow area are shown on aerial maps (pls. 5, 6, 7, and 8).

(b) 100-year flood.--At the request of the Flood Control District of Maricopa County, the 100-year flood was selected as the largest flood to be used for regulation purposes. It was also used as a basis for establishing encroachment lines.

(c) 50-year flood.--The 50-year flood is delineated in order to show the size of its overflow area in comparison to the size of the overflow area of the 100-year flood.

(d) Flood profiles and cross sections.--Flood profiles showing the water-surface elevations for the standard project flood, the 100-year flood, and the 50-year flood, as well as typical cross sections (pl. 9) showing the shape of the floodway and the depth of flow for those floods, were used in determining the flood limits. The flood profiles are shown on plates 10, 11, 12, and 13. For convenience in reference on the aerial topography flood areas (pls. 5, 6, 7, and 8), the locations of the cross sections are indicated by capital letters in a hexagon.

26. Floodway encroachment lines.--The floodway encroachment lines represent the limits of maximum occupancy or encroachment that can be allowed on the Skunk Creek flood plain without increasing the depth of flooding more than 6 inches in the area immediately upstream of any section constricted to encroachment width. Buildings and construction in the flood plain would not necessarily have much adverse effect on the capacity of the natural floodway outside encroachment limits. Such construction could be floodproofed either by filling the area to raise the ground elevation, or by locating the floor level of buildings above the expected floodflow elevation. However, if the floodway is constricted within encroachment limits, a general rise in the upstream water surface

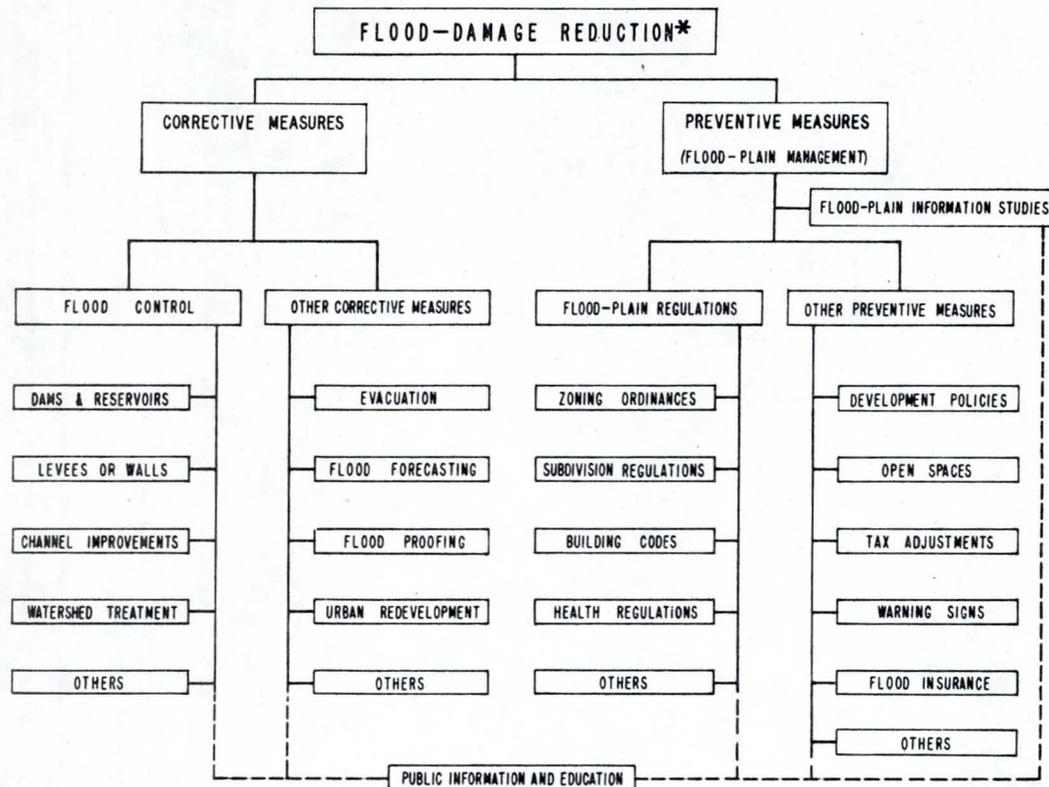
would occur over and above the flood levels shown on the flood profile with a resultant increase in the flood hazard to the buildings, construction, and adjoining property. The area between the encroachment lines should be kept clear of further development until such time that flood-control improvements can be constructed to reduce flooding. These encroachment lines, which were delineated on the flood areas shown in this report (pls. 5, 6, 7, 8, and 9), were determined on the basis of the 100-year flood on Skunk Creek. Encroachment lines for tributaries are beyond the scope of this report. The location of the encroachment lines are shown on the flood-area plates by distances to full-section, quarter-section, and eighth-section corners.

## GUIDELINES FOR REDUCING FUTURE FLOOD DAMAGES

### General

27. The two broad categories of methods to reduce flood damages are corrective measures and preventive measures. Corrective measures are primarily the construction of dams and channel improvements. By comparison, preventive measures are primarily flood-plain management methods, such as zoning ordinances that will preserve or establish floodways and therefore provide partial protection. Also, flood-plain management is necessary after completion of corrective measures to preclude developments that would decrease the flood-carrying capacity of channels and floodways as well as to permit the development of these flood plains to the highest uses compatible with floodway needs.

28. In general, flood-plain information studies such as those discussed in this report, are concerned with developing a basis for preventive measures. However, the relationship of flood-plain information studies to both preventive and corrective measures is shown on the following chart:



\* Adapted from chart shown in bibliography item No. 2 (see appendix 3).

#### Corrective Measures

29. Flood control.--Flood-control works, one of the means of reducing flood damage, include dams, channel improvements, levees and floodwalls, and upstream watershed treatment. Dams and reservoirs store floodwaters and release them at rates that will not cause damage. Channel improvements include deepening, widening, or

straightening existing stream channels, and constructing new channels to carry floodwaters without damage. Levees and floodwalls restrain floodwaters so that they do not overflow onto adjacent land. Upstream watershed treatment reduces flooding by permitting more of the rainfall to soak into the ground.

30. Consideration should be given to early planning for possible future corrective measures involving flood-control works. For example, if an improved channel is expected, the land required for rights-of-way should be reserved or acquired as soon as practicable. The early establishment of the alignment, the rights-of-way limits, and the required grades permit a better sequence of development - and at less cost. Once the type, size, and location of future channel improvement is determined, minor channel improvement might be undertaken to reduce the hazard from small floods. The earth excavated during such improvement could be used as land fill where it is required to raise the ground level in areas otherwise suitable for building.

31. Other corrective measures.--Among the other corrective measures that can be taken are: (a) flood forecasting to provide warning of impending floods (however, in the Skunk Creek drainage area, which is subject to flash floods, this measure is not considered feasible), (b) permanent evacuation of flood plain to preclude loss of life, and (c) flood-proofing of structures to reduce damage from overflow. Corrective measures may also be possible in connection with programs for urban redevelopment. This concludes the discussion of those corrective measures for flood-damage reduction that are charted on page 16.

## Preventive Measures

32. General.--Preventive measures for reducing flood damages require management of the flood plain. Flood-plain management involves controlling the use of the flood plain by legal and logical measures. Such management should be the means of realizing maximum community benefits, taking into account the most profitable or beneficial use to which the flood plain can be put and the flood damages to which these uses would be subject. Some uses would be subject to very little damage; for example, recreational use for parks and playgrounds. Pertinent information on flood-plain regulations and other preventive measures is given in the following paragraphs.

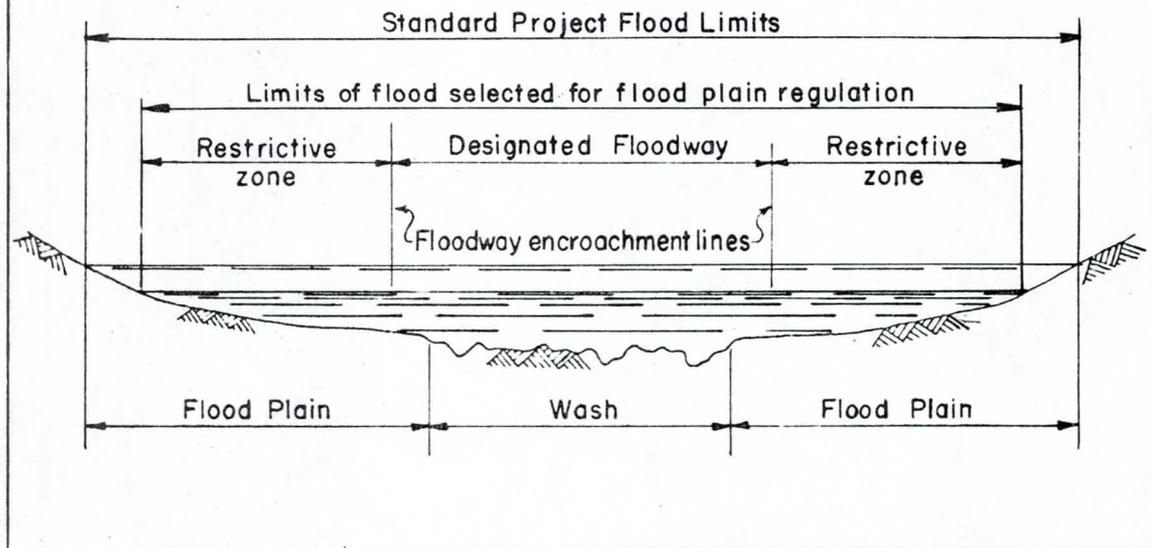
33. Flood-plain regulations.--When plans have been developed for use of the flood plain, the establishment of flood-plain regulations may be necessary to accomplish the desired results. Flood-plain regulations are established by State statutes, county resolutions, and city ordinances. Such regulations include zoning ordinances (including those setting up floodway-encroachment lines), subdivision regulations, building and housing codes, and other similar regulations. The type of measures necessary to regulate use of the flood plain depends on the nature of the hazard. The more restrictive measures would be used where the flood hazard might include loss of life, property damage, or floodway obstruction. Information on the relationship of some of those regulations to flood-plain zoning along upper Skunk Creek is given in following subparagraphs.

(a) Zoning ordinances.--The most universally accepted tool used by States, counties, and municipalities to regulate the use and development of land within their political boundaries are zoning ordinances. Arizona has adopted State statutes enabling counties and cities to zone through the use of properly adopted resolutions and ordinances. Such zoning resolutions and ordinances (i.e., zoning laws) must be in the interest of promoting health, safety, morals, or general welfare - and are customarily placed on referendum in a public election. Maricopa County has adopted zoning laws - but not in regard to flood hazards. Flood-plain zoning laws could be adopted by the county because such zoning would be in the interest of promoting health, safety, and general welfare.

(b) Flood-plain zoning laws may provide for the establishment of a designated floodway but usually provide also for the establishment of restrictive zones in which the degree of restriction would depend upon the flood hazard. Pertinent information about the establishment of a designated floodway and of restrictive zones, together with pertinent information about selecting the flood to be used as the basis for flood-plain regulation, is given in the following subparagraphs.

- (1) Designated floodway.--By establishing floodway-encroachment lines (see sketch on next page), a local zoning or regulatory agency could prohibit the building of permanent structures that would obstruct the natural flow of floodwaters within a designated

## SUGGESTED FLOOD ZONES



floodway on the flood plain. That agency would determine the criteria for specifying the flood magnitude considered as the basis of flood-plain regulation: The floodway required for passage of the designated flood could then be determined, and the encroachment lines established.

- (2) Restrictive zones.--By establishing restrictive zones (see sketch on this page), a local zoning or regulatory agency could control the elevation of floors, land-fill, and other improvements so as to permit the most

effective use of land without undue risk of damage from flooding. The storage of large quantities of floatable material should be prohibited in the restrictive zones, because such material could cause damage to downstream improvements, could cause obstruction to floodflows at bridges, and could result in widening the overflow area.

- (3) Selecting the designated flood.--Flood damage in the flood plain can be reduced effectively only if the flood magnitude adopted in determining the width of the designated floodway is of infrequent occurrence, and only if the designated floodway results in raising the flood level in the restrictive zones by less than 6 inches. For the study area covered in this report, the Flood Control District of Maricopa County advised this office by letter dated 17 October 1964, that the designated floodway should be of sufficient size to accommodate a flood with an occurrence frequency of about once in a hundred years. Under the criteria discussed on this page and on the two preceding pages, the floodway-encroachment lines and restrictive-zone limits (both of which are indicated on the sketch on page 20) are shown on the flood-area plates (pls. 5, 6, 7, and 8) as encroachment lines and 100-year flood limits, respectively.

(c) Subdivision regulations.--The regulation of subdivisions provides one of the most immediately effective means of reducing flood damages in generally undeveloped areas. Cities and counties should proceed early and rapidly to establish regulations because of the opportunity of producing ideal developments not hampered by nonconforming existing uses. Designated floodways and restrictive zones can be established by subdivision regulations in the same manner as with zoning ordinances.

(d) Building codes.--Building codes could be developed to provide for the safety of buildings by requiring minimum elevations for floors and installed equipment, such as furnaces, in the restrictive zones of the flood plain.

34. Other preventive measures.--Reduction of future flood damage could also be accomplished by setting aside flood-plain land for parks and recreational areas on the basis of the future needs of the city and county for these uses. Any existing buildings in those parts of such recreational areas that are within the designated floodway should be relocated outside the designated floodway. Tax adjustments could be used to encourage flood-plain use that would not add a burden on the community by increasing the need for flood fighting, relief, and expenditures for repair of flood damages to service facilities. Preventive measures that could be used to alert potential builders to the threat of flood damage include (a) the placing of warning signs in the flood-plain areas and (b) the entering of flood-hazard information on the county land-title record for each land parcel subject to flooding.

This concludes the discussion of those preventive measures for flood-damage reduction that are charted on page 16.

#### Need for Continuing Observation

35. Because quantitative records of precipitation and quantitative information on streamflow characteristics for the upper Skunk Creek drainage area were inadequate, the flood-magnitude estimates used in this report were based on available information on precipitation and streamflow for comparable drainage areas. Additional precipitation and stream-gaging stations properly located would provide information needed by engineers to improve the evaluation of present conditions and the prediction of future conditions.

#### Continuing Assistance of the Corps of Engineers

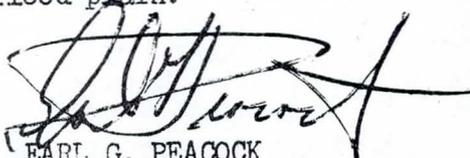
36. The technical assistance of the Corps of Engineers will be available, upon request of the State and local governmental agencies concerned, to interpret and explain information in this report and to provide any other flood data that becomes available for the use of the local planning agencies.

## CONCLUSIONS

37. A potential flood hazard exists in the flood plain of Skunk Creek upstream from the Hedgpeth Hills to the vicinity of the Black Canyon Highway bridge crossing. Immediately upstream from Black Canyon Highway, the study indicates that the standard project flood would overflow the south bank (levee) and would flow down the east side of the highway, crossing the highway as sheet flow. Using 10 feet as height of bridge clearance at Black Canyon Highway crossing, the 100-year flood, however, would flow within the capacity limit of all four bridges and - except for a flood-level rise of less than 6 inches in the restrictive zones - would be accommodated in the designated floodway.

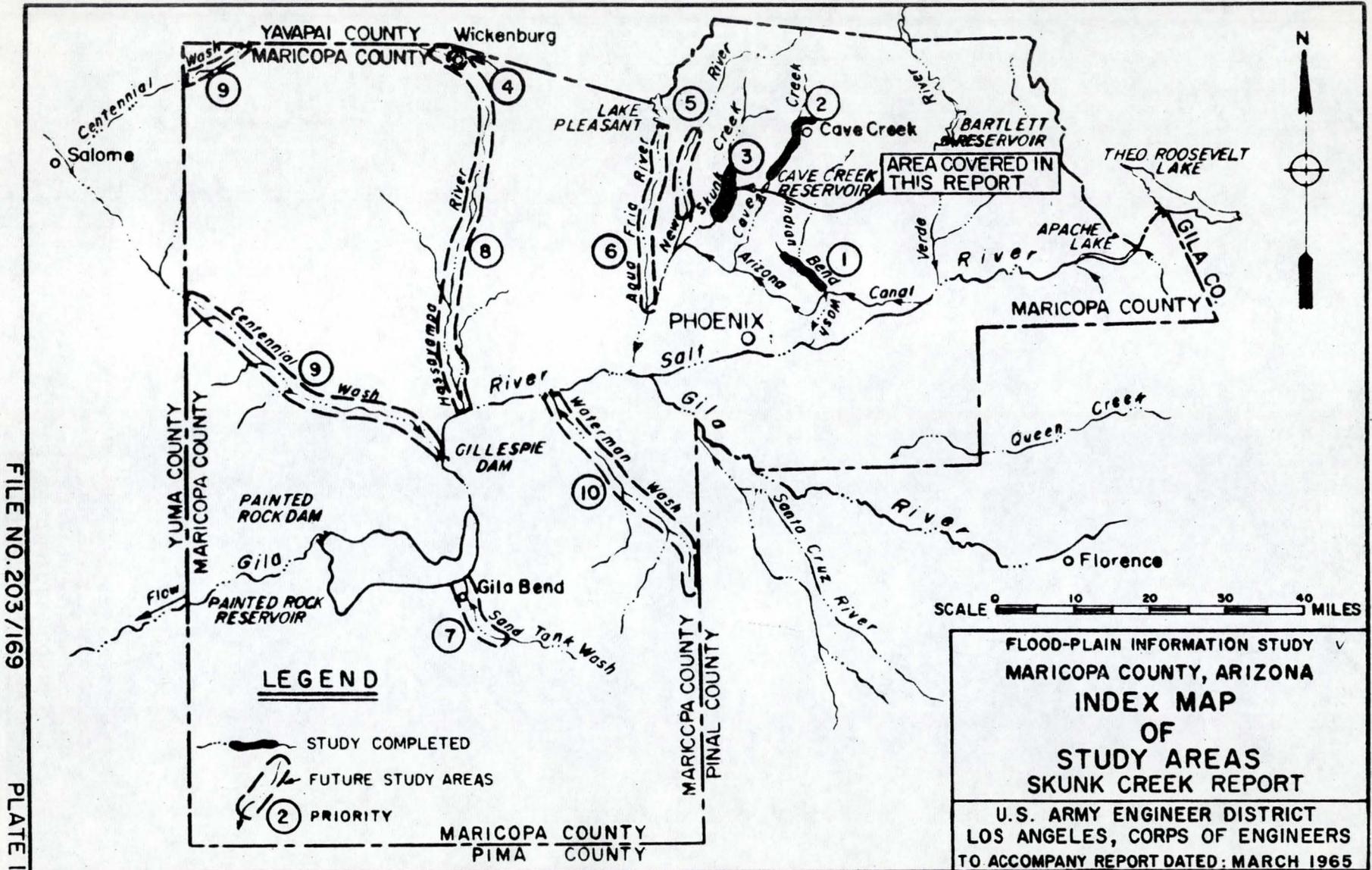
38. Although encroachment of development on the flood plain has not yet presented an acute problem, the need for increased development will grow with the population and preventive measures should be taken as soon as possible to forestall any encroachment in the floodway that might lessen its flood-carrying capacity.

39. The information in this report is intended to provide a factual basis for local governmental agencies in formulating appropriate regulations, measures to control development in the flood plain of upper Skunk Creek - and to provide information for the guidance of real estate developers or private individuals in acquiring or developing land in this flood plain.

  
EARL G. PEACOCK  
Colonel, Corps of Engineers  
District Engineer

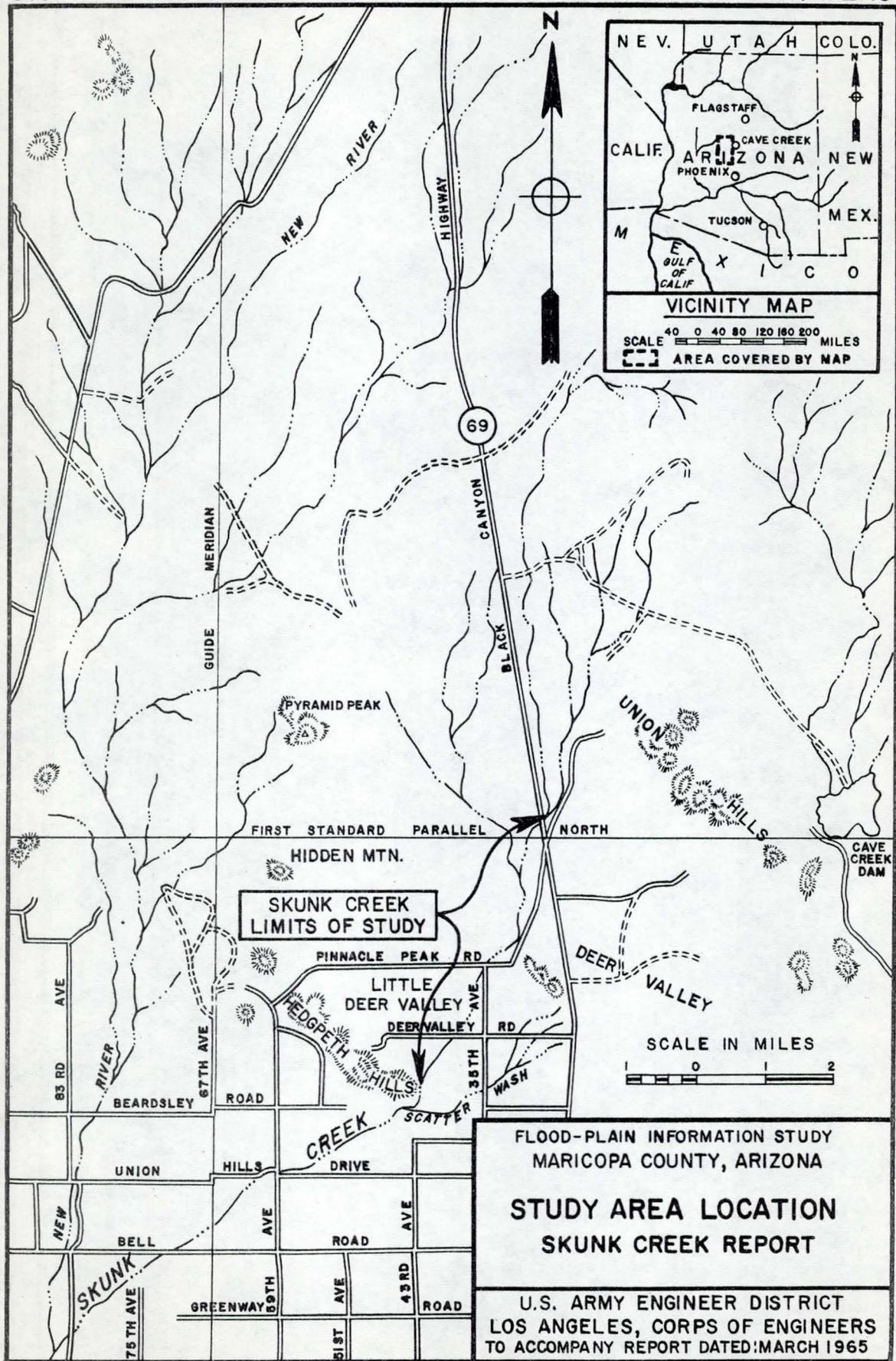
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CORPS OF ENGINEERS



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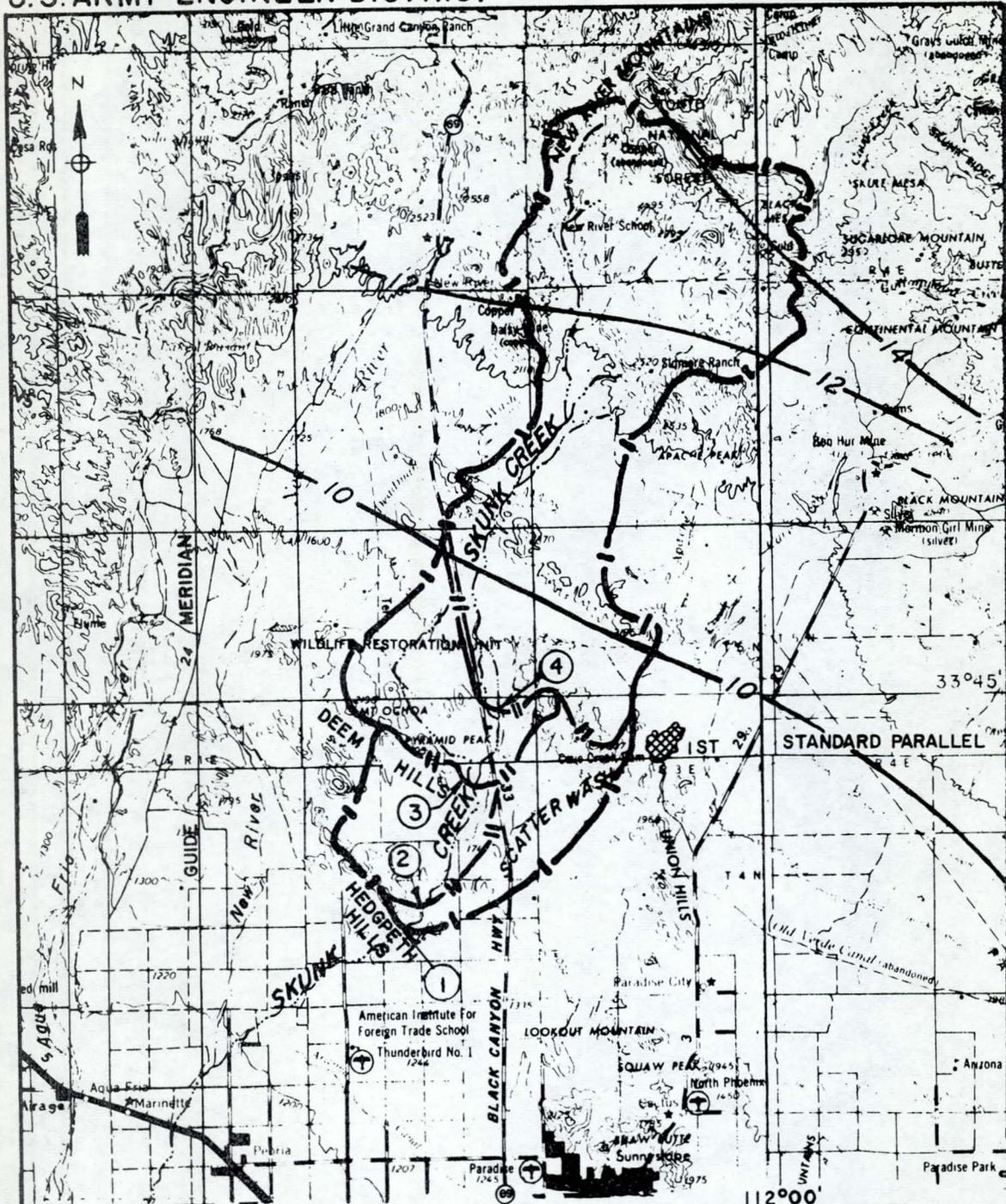
PLATE I

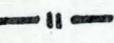
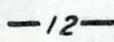
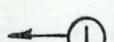


FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA

**STUDY AREA LOCATION**  
**SKUNK CREEK REPORT**

U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED: MARCH 1965

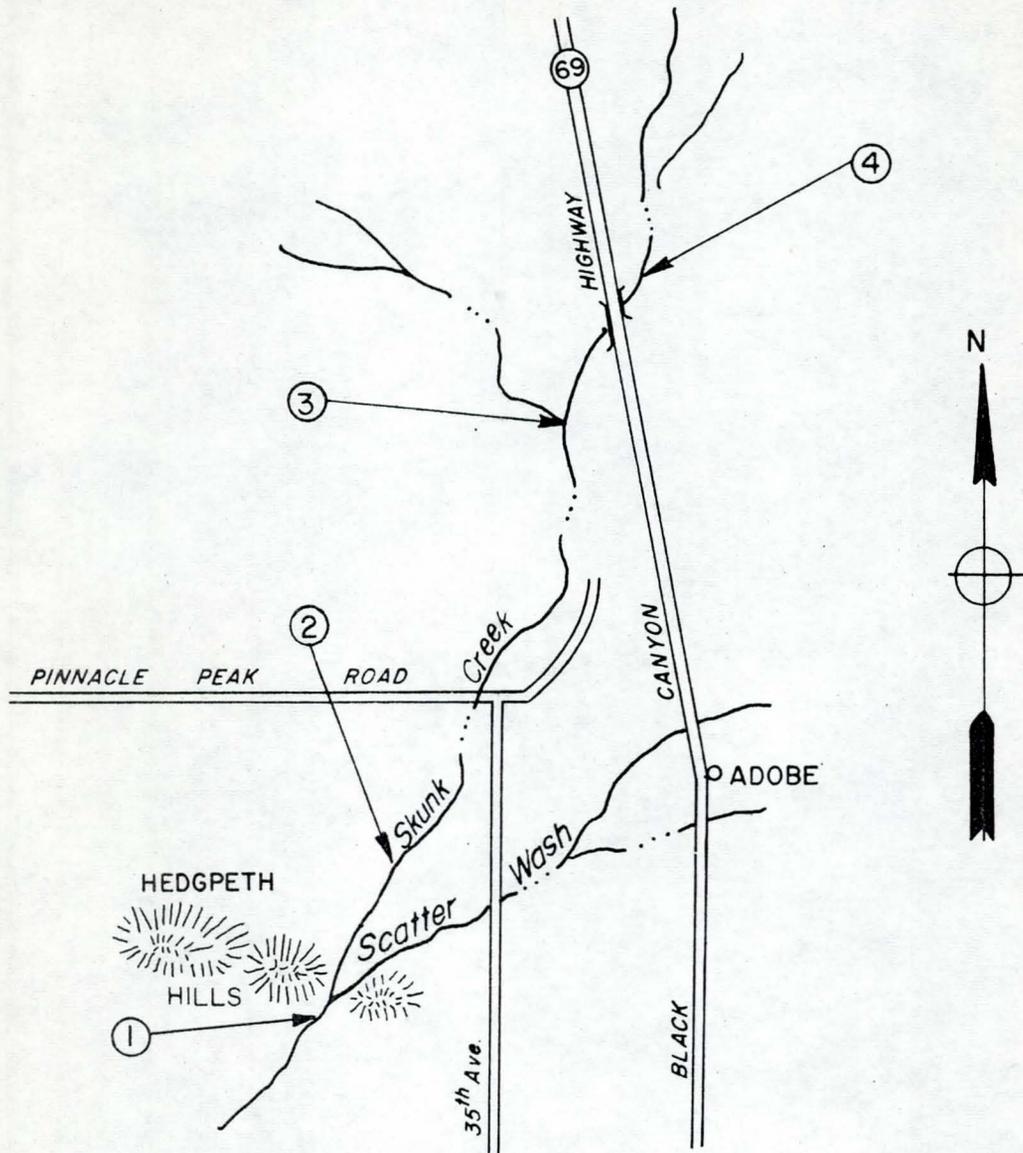


- LEGEND**
-  BOUNDARY OF DRAINAGE AREA
  -  BOUNDARY OF DRAINAGE SUBAREA
  -  LINE OF EQUAL 90-YEAR MEAN ANNUAL PRECIPITATION IN INCHES
  -  POINT OF CONCENTRATION
  -  EXISTING FLOOD CONTROL RESERVOIR

SCALE 1 0 1 2 3 4 5 MILES  
 DATUM IS MEAN SEA LEVEL

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA  
**HYDROLOGIC MAP**  
**SKUNK CREEK REPORT**

U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED: MARCH 1965



D.A. NO.	DRAINAGE AREA-SQ MI.	SPF c.f.s.	100-YR c.f.s.	50-YR c.f.s.
1	112	58,000	26,000	17,000
2	101	55,000	24,000	15,500
3	89	55,000	24,000	15,500
4	75	44,000	19,000	12,500

NOT TO SCALE

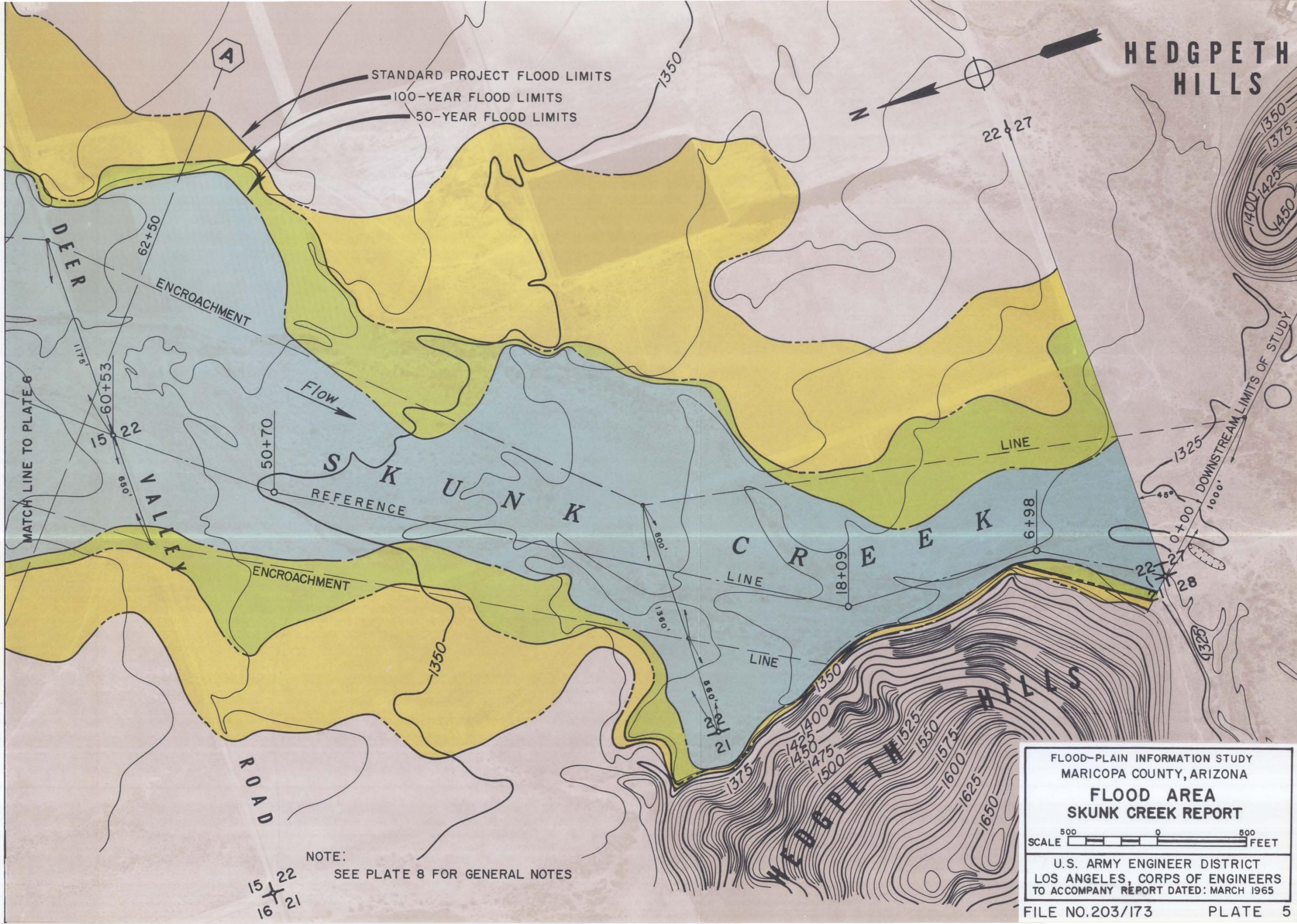
LEGEND

① POINT OF CONCENTRATION  
 c.f.s. - CUBIC FEET PER SECOND FLOOD FLOW

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA  
 FLOOD MAGNITUDES & FREQUENCIES  
 POINTS OF CONCENTRATION  
 SKUNK CREEK REPORT

U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED: MARCH 1965

# HEDGPETH HILLS



A

STANDARD PROJECT FLOOD LIMITS  
100-YEAR FLOOD LIMITS  
50-YEAR FLOOD LIMITS

DEER VALLEY

MATCH LINE TO PLATE 6

ROAD

NOTE:  
SEE PLATE 8 FOR GENERAL NOTES

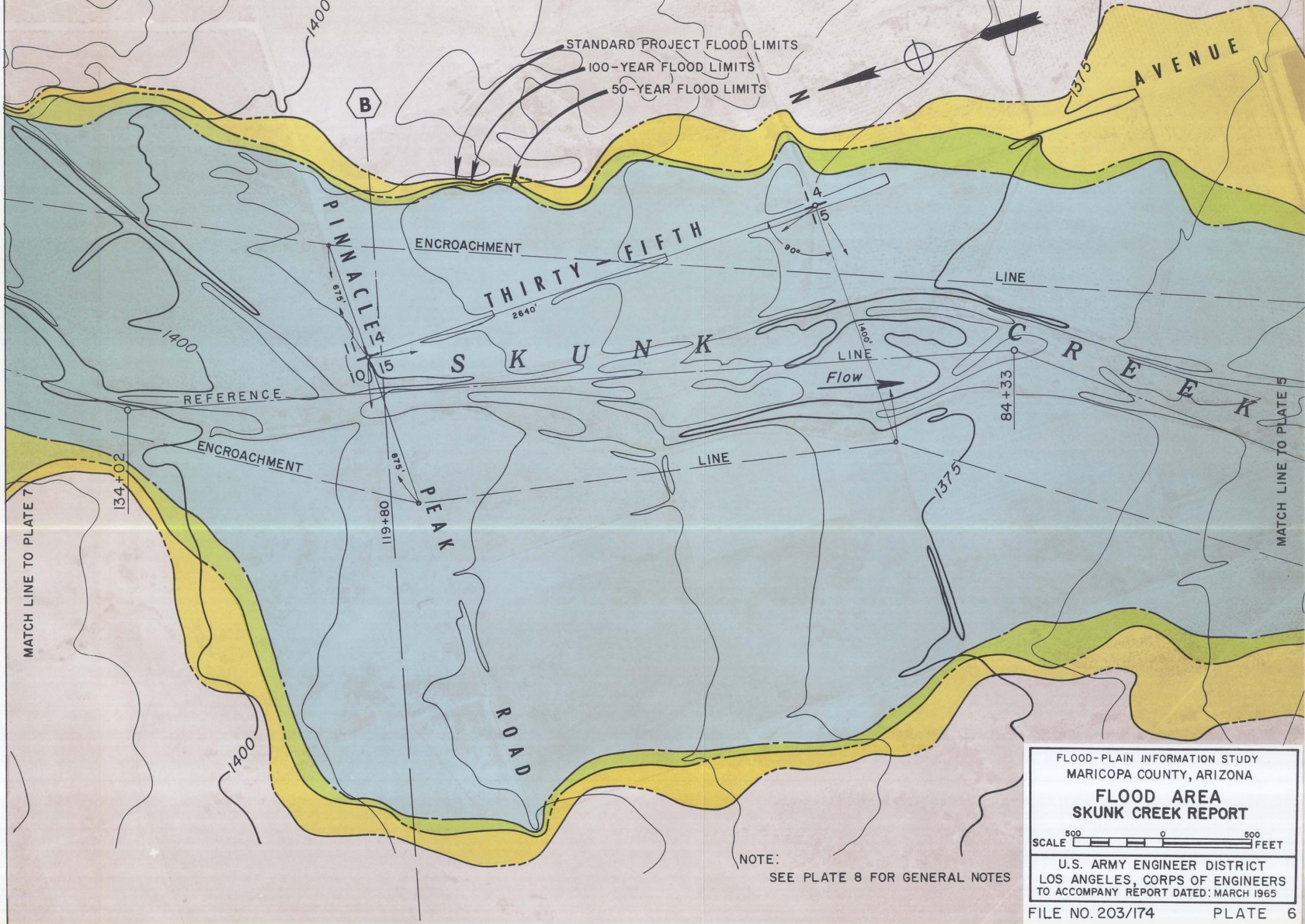
15+22  
16+21

FLOOD-PLAIN INFORMATION STUDY  
MARICOPA COUNTY, ARIZONA  
**FLOOD AREA  
SKUNK CREEK REPORT**

SCALE 500 0 500 FEET

U.S. ARMY ENGINEER DISTRICT  
LOS ANGELES, CORPS OF ENGINEERS  
TO ACCOMPANY REPORT DATED: MARCH 1965

FILE NO. 203/173 PLATE 5

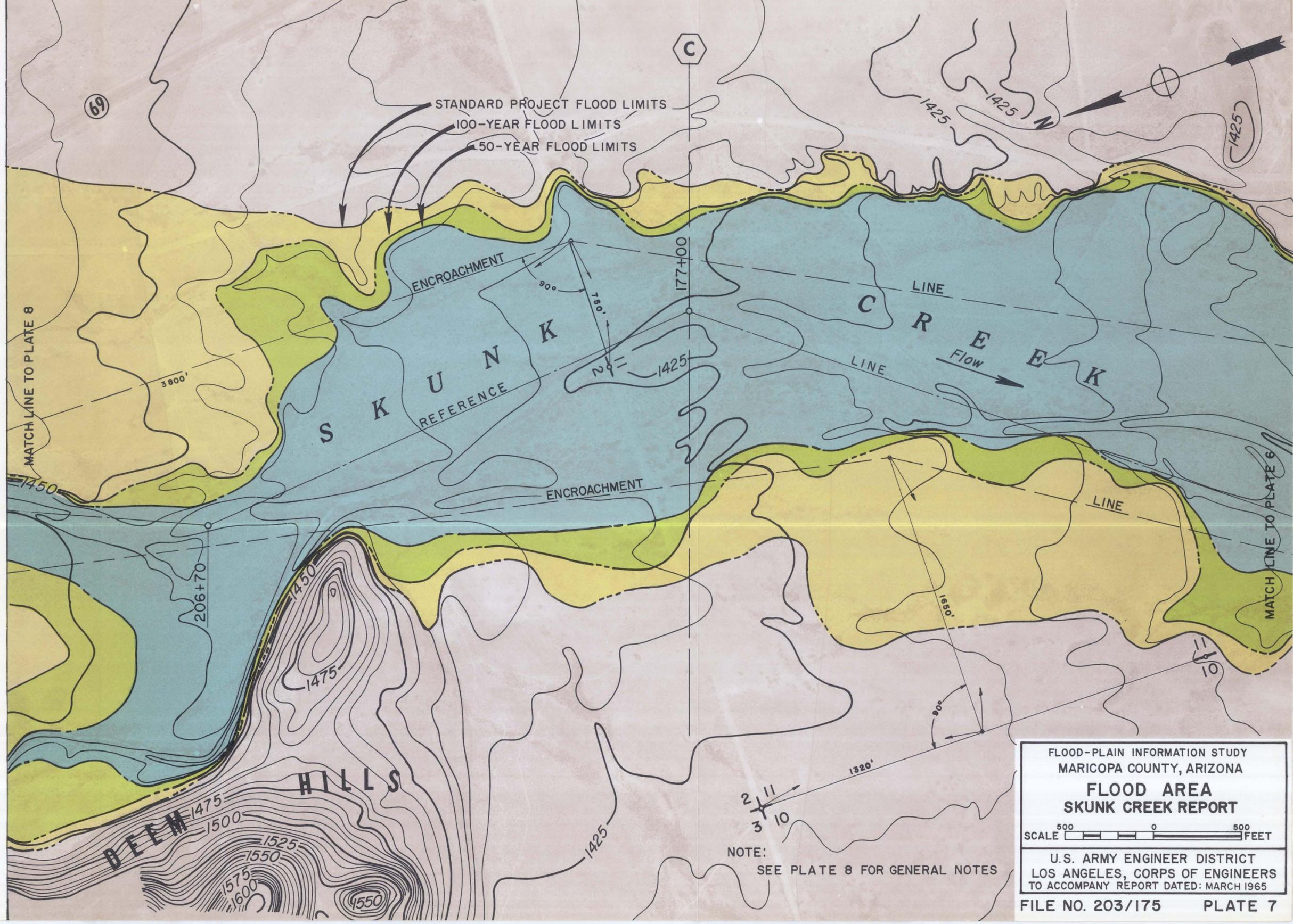


NOTE:  
SEE PLATE 8 FOR GENERAL NOTES

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA  
**FLOOD AREA  
 SKUNK CREEK REPORT**

SCALE  $\frac{1}{2}$  INCH = 500 FEET

U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED: MARCH 1965



69

STANDARD PROJECT FLOOD LIMITS  
 100-YEAR FLOOD LIMITS  
 50-YEAR FLOOD LIMITS

ENCROACHMENT

SKUNK  
 REFERENCE

SKUNK  
 CREEK  
 LINE  
 LINE  
 Flow

ENCROACHMENT

LINE

HILLS

DEEM

2 11  
 3 10

NOTE:  
 SEE PLATE 8 FOR GENERAL NOTES

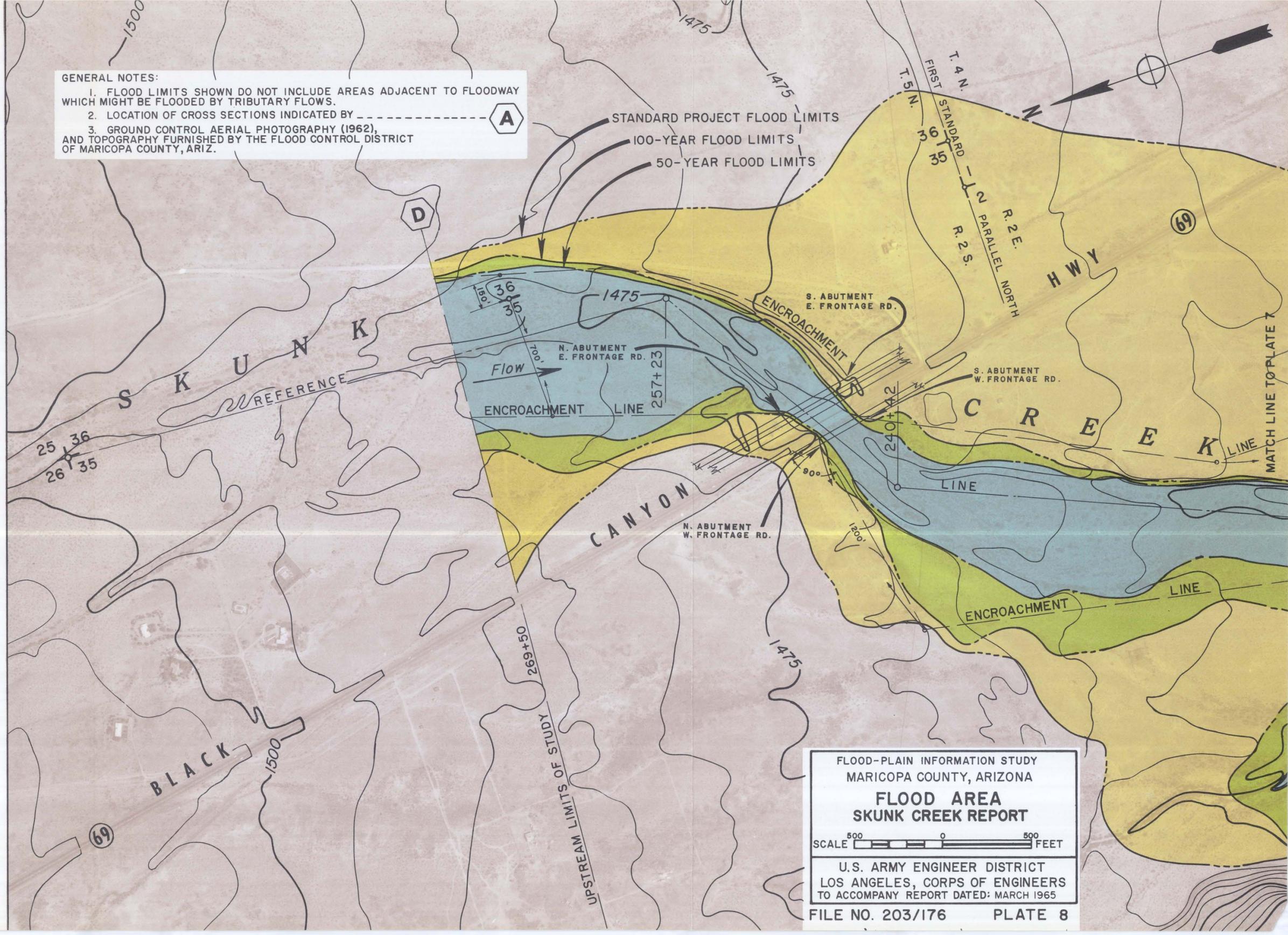
FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA  
**FLOOD AREA**  
**SKUNK CREEK REPORT**  
 SCALE 500 0 500 FEET

U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED: MARCH 1965

FILE NO. 203/175 PLATE 7

GENERAL NOTES:

1. FLOOD LIMITS SHOWN DO NOT INCLUDE AREAS ADJACENT TO FLOODWAY WHICH MIGHT BE FLOODED BY TRIBUTARY FLOWS.
2. LOCATION OF CROSS SECTIONS INDICATED BY ----- A
3. GROUND CONTROL AERIAL PHOTOGRAPHY (1962), AND TOPOGRAPHY FURNISHED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, ARIZ.

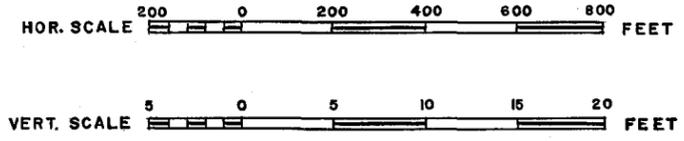
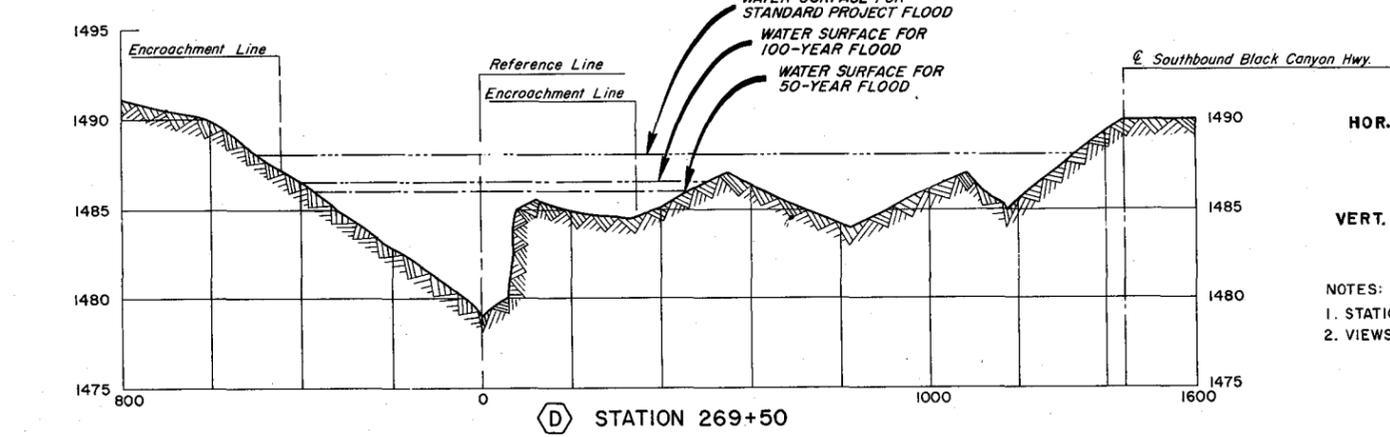
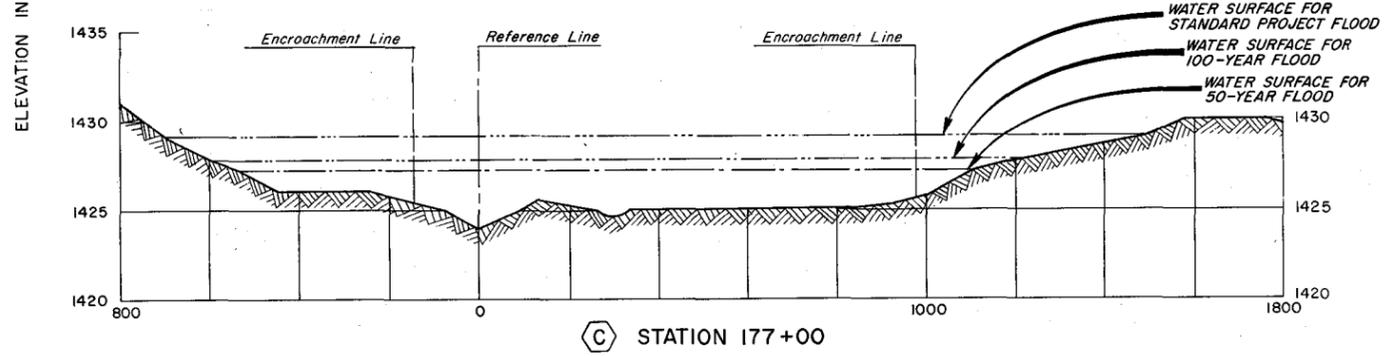
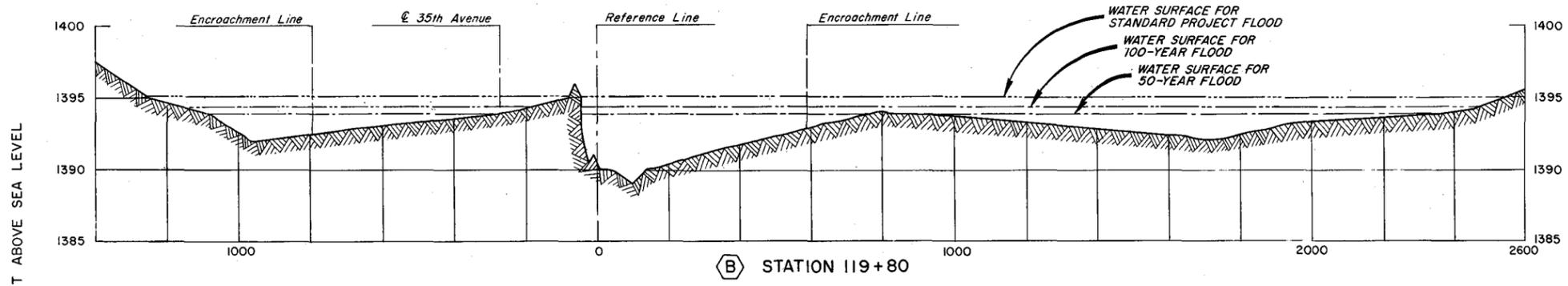
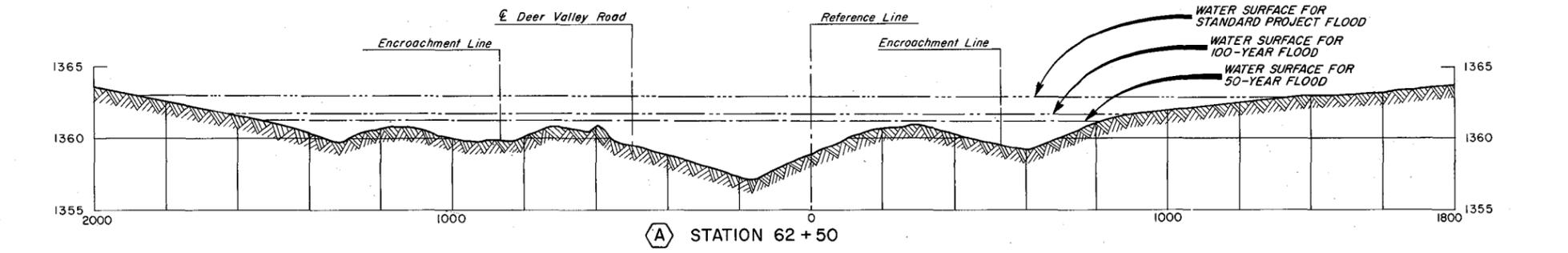


FLOOD-PLAIN INFORMATION STUDY  
MARICOPA COUNTY, ARIZONA  
**FLOOD AREA  
SKUNK CREEK REPORT**

SCALE 500 0 500 FEET

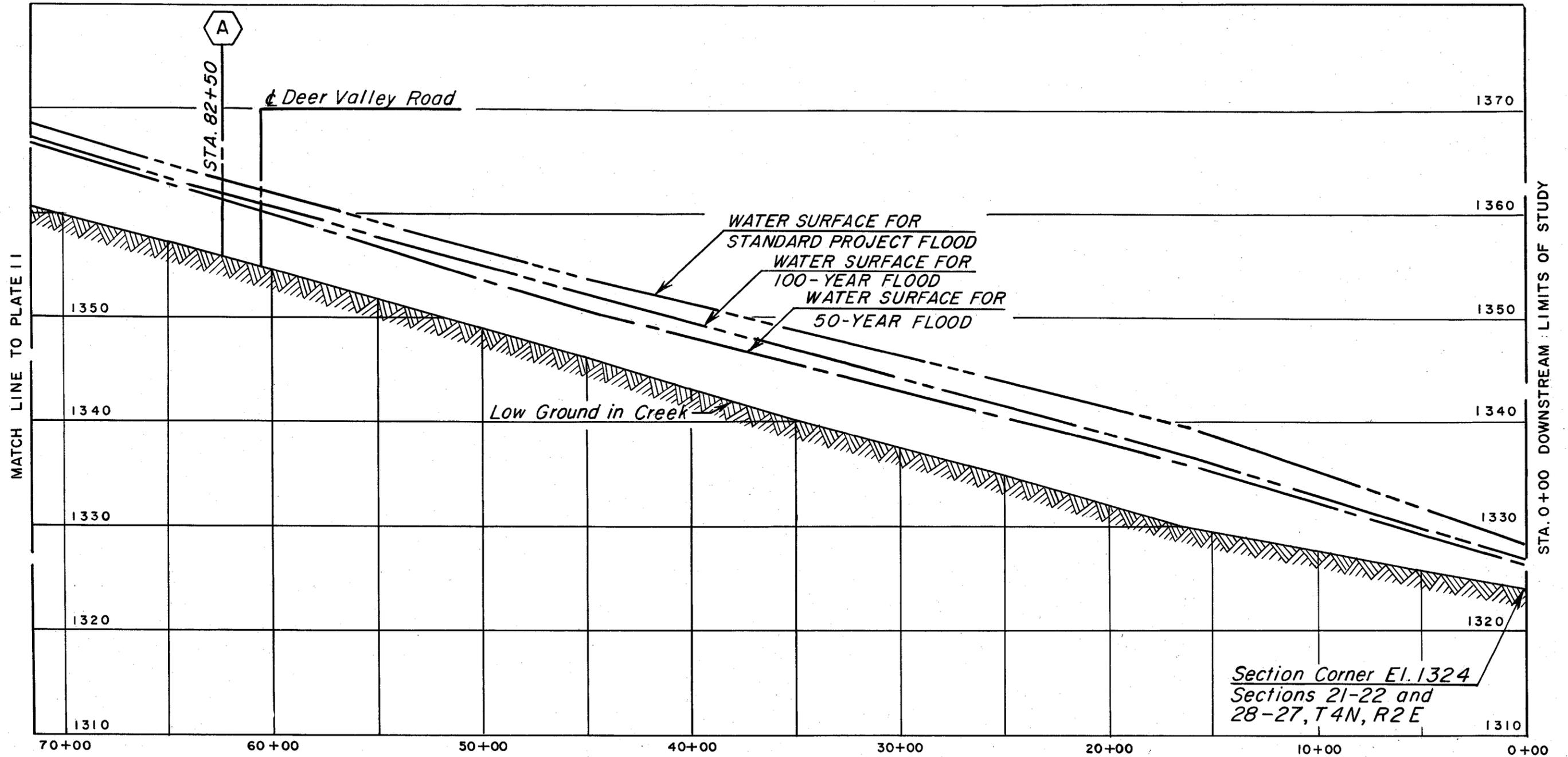
U.S. ARMY ENGINEER DISTRICT  
LOS ANGELES, CORPS OF ENGINEERS  
TO ACCOMPANY REPORT DATED: MARCH 1965

FILE NO. 203/176 PLATE 8



NOTES:  
 1. STATIONING IS ALONG THE REFERENCE LINE FROM DOWNSTREAM TO UPSTREAM.  
 2. VIEWS ARE LOOKING DOWNSTREAM.

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA  
**CROSS SECTIONS**  
**SKUNK CREEK REPORT**  
 DATUM IS MEAN SEA LEVEL SCALE AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED:

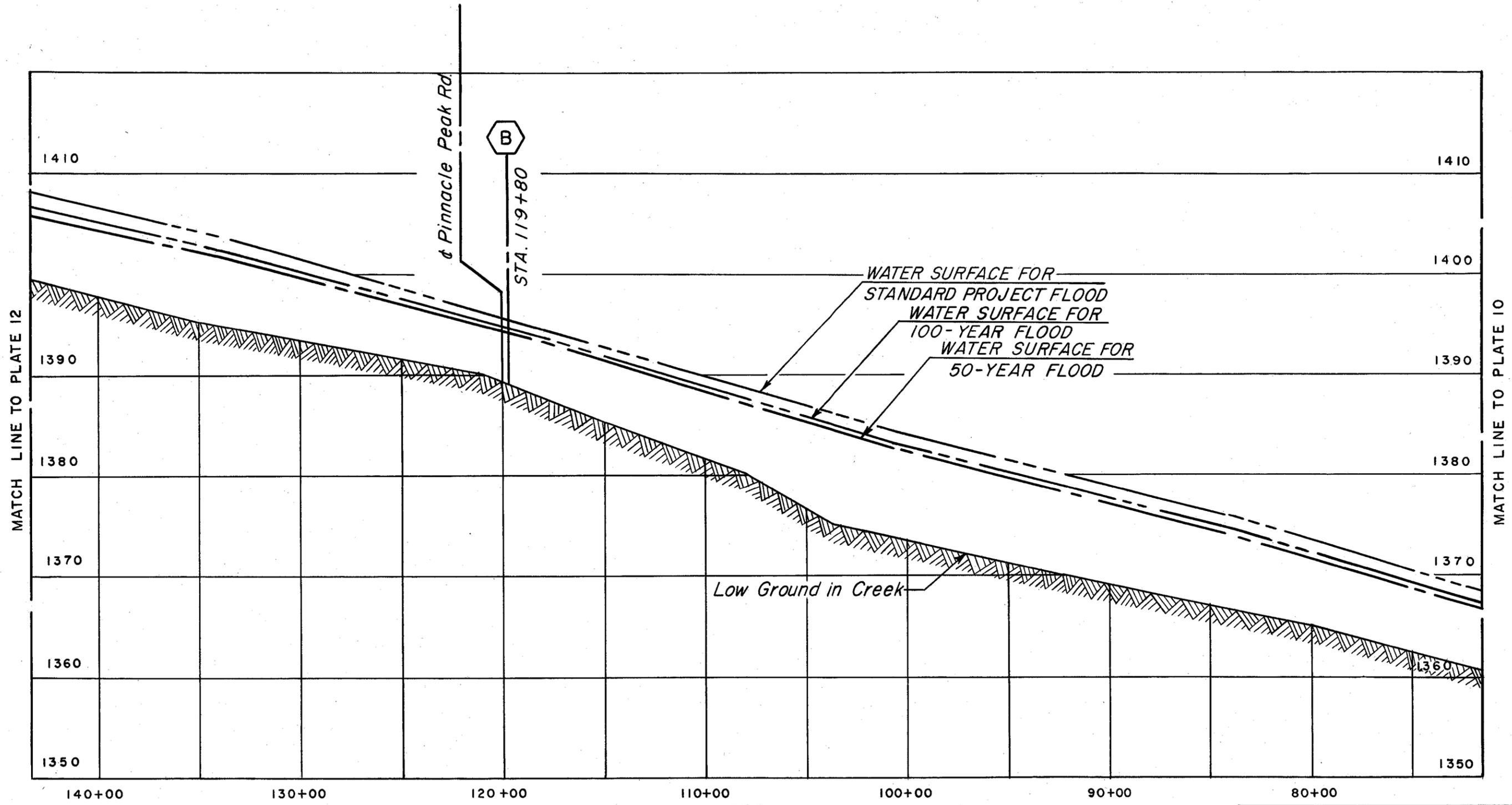


Section Corner El. 1324  
 Sections 21-22 and  
 28-27, T4N, R2E

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA

**FLOOD PROFILE  
 SKUNK CREEK REPORT**

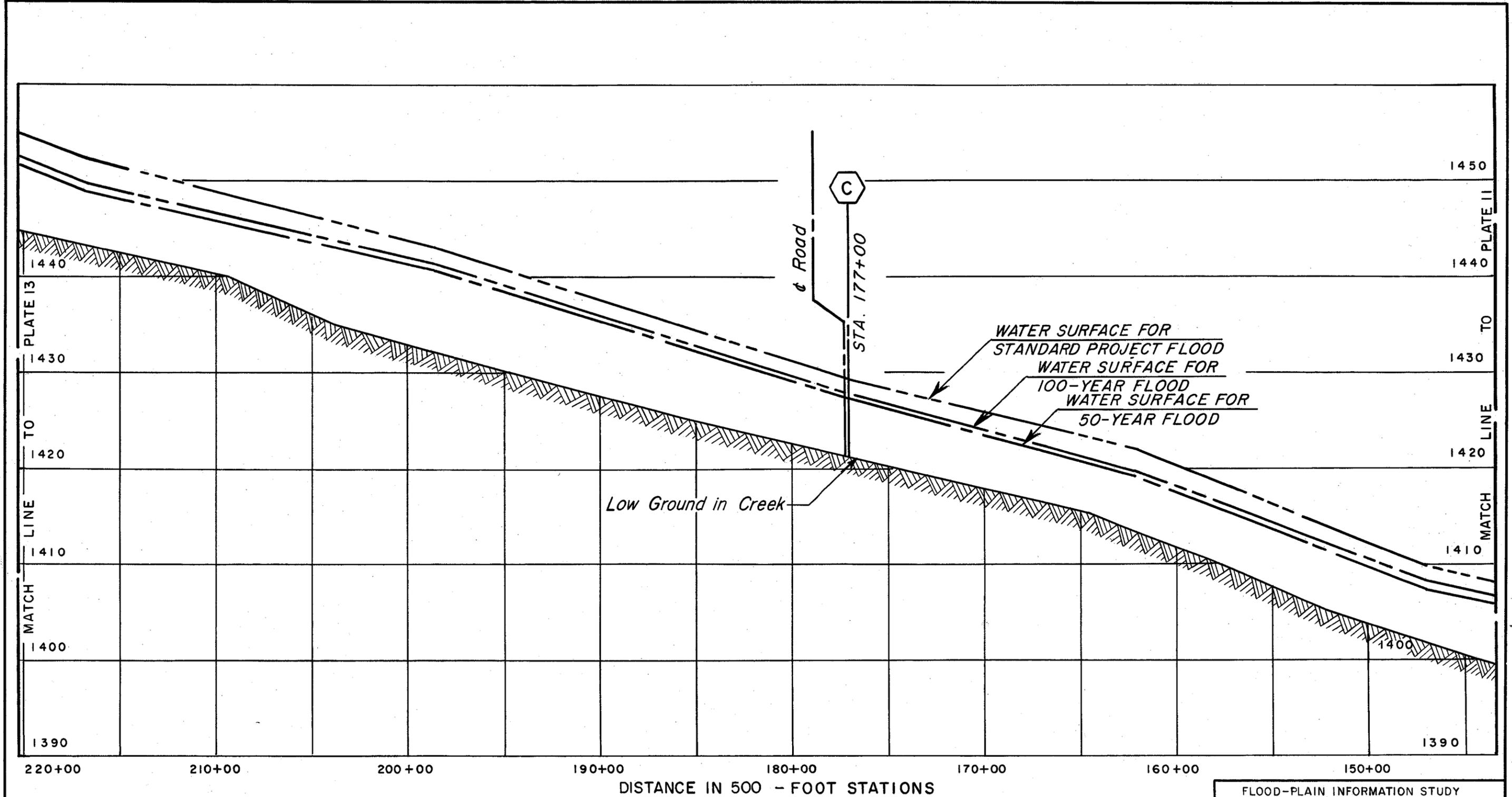
DATUM IS MEAN SEA LEVEL SCALE AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED:



FLOOD-PLAIN INFORMATION STUDY  
MARICOPA COUNTY, ARIZONA

**FLOOD PROFILE  
SKUNK CREEK REPORT**

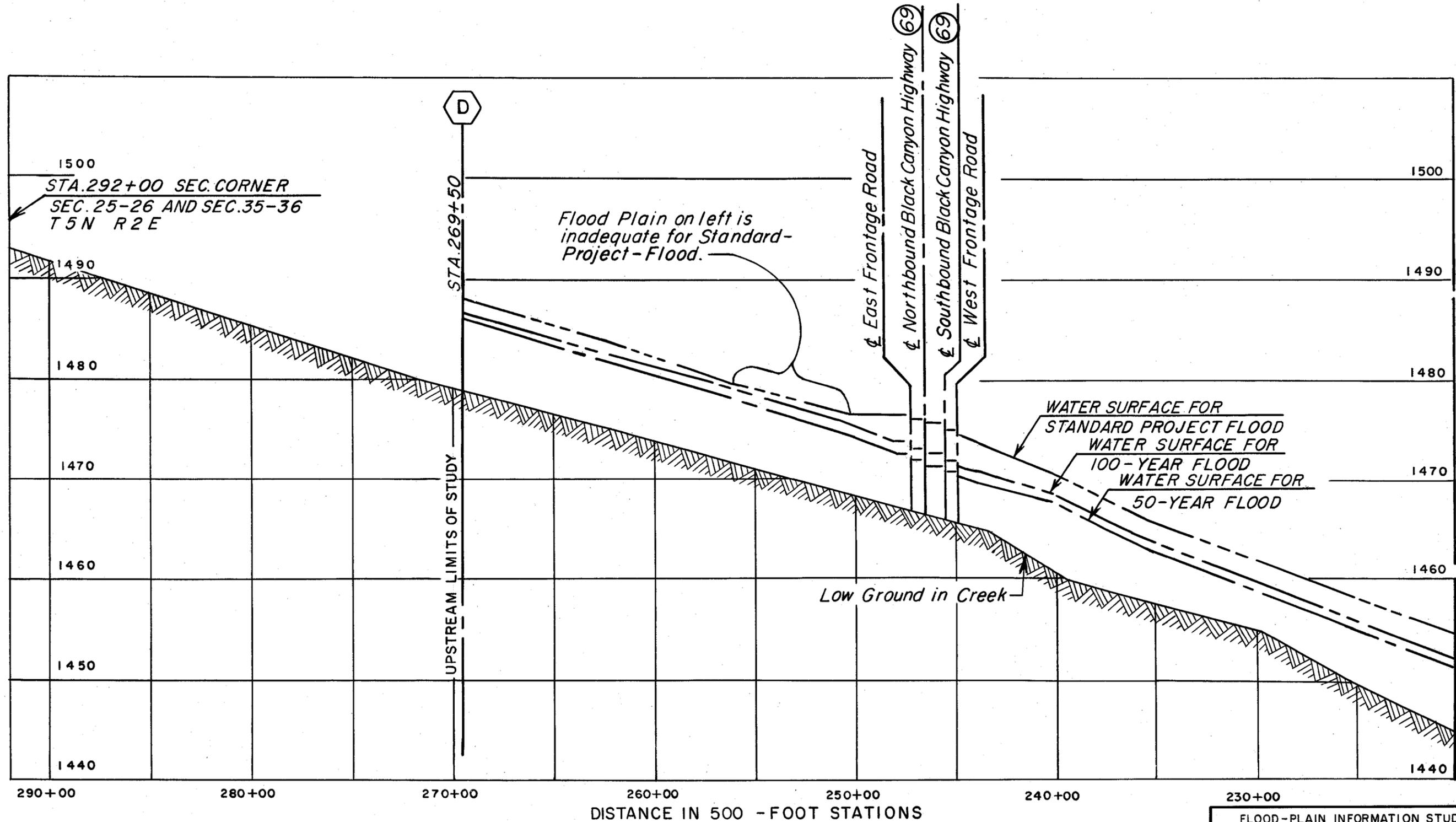
DATUM IS MEAN SEA LEVEL SCALE AS SHOWN  
U.S. ARMY ENGINEER DISTRICT  
LOS ANGELES, CORPS OF ENGINEERS  
TO ACCOMPANY REPORT DATED:



FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA

**FLOOD PROFILE  
 SKUNK CREEK REPORT**

DATUM IS MEAN SEA LEVEL SCALE AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED:



1500  
 STA. 292+00 SEC. CORNER  
 SEC. 25-26 AND SEC. 35-36  
 T 5 N R 2 E

D

STA. 269+50

Flood Plain on left is  
 inadequate for Standard-  
 Project-Flood.

UPSTREAM LIMITS OF STUDY

Low Ground in Creek

WATER SURFACE FOR  
 STANDARD PROJECT FLOOD  
 WATER SURFACE FOR  
 100-YEAR FLOOD  
 WATER SURFACE FOR  
 50-YEAR FLOOD

MATCH LINE TO PLATE 12

290+00 280+00 270+00 260+00 250+00 240+00 230+00  
 DISTANCE IN 500 - FOOT STATIONS

FLOOD-PLAIN INFORMATION STUDY  
 MARICOPA COUNTY, ARIZONA

**FLOOD PROFILE  
 SKUNK CREEK REPORT**

DATUM IS MEAN SEA LEVEL SCALE AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT  
 LOS ANGELES, CORPS OF ENGINEERS  
 TO ACCOMPANY REPORT DATED:

APPENDIX 1 - AUTHORIZATION  
FLOOD-PLAIN INFORMATION STUDY  
FOR  
MARICOPA COUNTY, ARIZONA

VOLUME III

SKUNK CREEK REPORT

1. Scope.--This appendix presents supplemental material on (a) the congressional authorization providing authority for the U.S. Army Corps of Engineers to conduct flood-plain information studies and (b) the Maricopa County resolutions requesting the Corps to make such studies in Maricopa County and providing assurances that information in the completed report will be disseminated and publicized.

2. Congressional authorization.--This report is prepared pursuant to act of Congress, Public Law 86-645, Eighty-sixth Congress, approved 14 July 1960, which reads in part as follows:

SEC. 206. (a) That, in recognition of the increasing use and development of the flood plains of the rivers of the United States and of the need for information on flood hazards to serve as a guide to such development, and as a basis for avoiding future flood hazards by regulation of use by States and municipalities, the Secretary of the Army, through the Chief of Engineers, Department of the Army, is hereby authorized to compile and disseminate information on floods and flood damages, including identification of areas subject to inundation by floods of various magnitudes and frequencies, and general criteria for guidance in the use of flood plain areas; and to provide engineering advice to local interests for their use in planning to ameliorate the flood hazard: Provided, That the necessary surveys and studies will be made and such information and advice will be provided for specific localities only upon the request of a State or a responsible local governmental agency and upon approval by the Chief of Engineers.

(b) The Secretary of the Army is hereby authorized to allot, from any appropriations hereafter made for flood control, sums not to exceed \$1,000,000 in any one fiscal year for the compilation and dissemination of such information.

\* \* \* \* \*

3. Maricopa County resolutions.---The Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County adopted resolutions on 26 September 1960 and 11 December 1961.

4. In the resolution of 26 September 1960, Maricopa County requested that the U.S. Army Corps of Engineers make a flood-plain information study for Maricopa County. The resolutions reads as follows:

#### R E S O L U T I O N

WHEREAS, the Flood Control District of Maricopa County is charged with responsibility for preparation of a comprehensive program of flood control within the county, and

WHEREAS, information on floods and flood damages, including identification of areas subject to inundation by floods of various frequencies, criteria for guidance in the use of flood plain areas and engineering advice for use in planning to ameliorate flood hazard are essential to the preparation of a comprehensive program of flood control, and

WHEREAS, the United States Army Corps of Engineers is authorized under Section 206 of the Flood Control Act of 1960 to furnish such information and advice

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County that the Corps of Engineers is requested to provide the assistance which it is authorized to furnish by the above cited Act, and

BE IT FURTHERMORE RESOLVED that the Flood Control District of Maricopa County will assist the Corps of Engineers in obtaining basic hydrologic and topographic data required for its studies and

BE IT FURTHERMORE RESOLVED that the County of Maricopa and the Flood Control District of Maricopa County intend to use the information provided for the purpose of developing flood plain zoning plans and a comprehensive program of flood control and

BE IT FURTHERMORE RESOLVED that information and assistance will be furnished municipalities within the county for their use in implementing such flood plain zoning plans as may be recommended within their boundaries.

BE IT FURTHERMORE RESOLVED, that this resolution be entered on the minutes of the Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County.

Passed and approved this 26 day of Sept., 1960.

/s/ Ruth A. O'Neil  
Chairman of the Board  
of Supervisors of  
Maricopa County  
ATTEST:  
/s/ Rhea Averill  
Clerk of the Board

/s/ Ruth A. O'Neil  
Chairman of the Board  
of Directors of the  
Flood Control District  
of Maricopa County

5. In the resolution of 11 December 1961, Maricopa County added more specific assurances that the flood-plain information report will be made available to all interested organizations and individuals and that the availability of the report will be adequately publicized.

The resolution reads as follows:

#### R E S O L U T I O N

WHEREAS, the Flood Control District of Maricopa County is charged with responsibility for preparation of a comprehensive program of flood control within the county, and

WHEREAS, information on floods and flood damages, including identification of areas subject to inundation by floods of various frequencies, criteria for guidance in the use of flood plain areas and engineering advice for use in planning to ameliorate flood hazard are essential to the preparation of a comprehensive program of flood control, and

WHEREAS, the United States Army Corps of Engineers is authorized under Section 206 of the Flood Control Act of 1960 to furnish such information and advice, and

WHEREAS, the United States Army Corps of Engineers has authorized a flood plain information study of Maricopa County, Arizona, in accordance with the application of the Maricopa County Flood Control District dated July 26, 1960; project allocations covering Indian Bend Wash, Cave Creek, Skunk Creek, New River, Agua Fria River and Wickenburg area, and

WHEREAS, the United States Army Corps of Engineers require certain assurances from the Maricopa County Flood Control District before work can be initiated

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County that the applicant will publicize the information report in the community and area concerned, and make copies available for use or inspection by responsible interested parties and individuals, and

BE IT FURTHERMORE RESOLVED that zoning and other regulatory, development and planning agencies, and public information media, will be provided with the flood plain information for their guidance and appropriate action, and

BE IT FURTHERMORE RESOLVED that survey markers, monuments, etc., established in any Federal surveys undertaken for Sec. 206 studies, or in regular surveys in the area concerned will be preserved and safeguarded, and

BE IT FURTHERMORE RESOLVED, that this resolution be entered on the minutes of the Board of Supervisors of Maricopa County and the Board of Directors of the Flood Control District of Maricopa County, and that the Chief Engineer and General Manager of said Flood Control District be and he is hereby directed to forward a certified copy of this resolution to the District Engineer, U. S. Army Engineer District, Los Angeles, Corps of Engineers, P. O. Box 17277 Foy Station, Los Angeles 17, California.

PASSED AND APPROVED this 11 day of December, 1961.

/s/ B.W. Burns  
Chairman of the Board of  
Supervisors of Maricopa  
County

ATTEST:

/s/ Rhea Averill  
Clerk of the Board

/s/ B.W. Burns  
Chairman of the Board of  
Directors of the Flood  
Control District of  
Maricopa County  
APPROVED:  
Board of Supervisors

by /s/ Charles W. Miller  
Charles W. Miller  
County Manager

APPENDIX 2 - GLOSSARY OF SELECTED TERMS

FLOOD-PLAIN INFORMATION STUDY  
FOR  
MARICOPA COUNTY, ARIZONA

VOLUME III

SKUNK CREEK REPORT

The definitions in this appendix are provided for consistency of use in flood-plain information studies and for clarification of terms for nontechnical readers. The definitions are based on definitions of terms in general technical usage.

**BASIN** - The region drained by a stream and its tributaries. A basin is separated from adjacent basins by ridges or mountain ranges.

**CUBIC FEET PER SECOND (C.F.S.)** - A measure of the magnitude of streamflow (i.e., the number of cubic feet of water passing a point each second).

**DESIGNATED FLOODWAY** - The channel of a stream and that part of the adjoining flood plain designated by a regulatory agency to reasonably provide for passage of a selected flood. (See also definition of "floodway.")

**FLOOD** - As used in this report, any temporary rise in streamflow or water-surface level that results in significant adverse effects in the area under study. Adverse effects of floods may include damages from overflow of land areas, effects of temporary backwater on sewers and local drainage channels, bank erosion or channel shifts, unsanitary conditions or other unfavorable conditions resulting from deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and interruption of traffic at bridge crossings.

**FLOOD FREQUENCY** - The frequency of occurrence of a flood of some stated magnitude in terms of years. Based on statistical analysis of past flood records, a determination may be made of the probable number of times that a flood of some stated magnitude will be equaled or exceeded during some future period of time, say 100 years. A 25-year flood with a magnitude of 8,000 cubic feet per second is a flood that during a 100-year period probably will be equaled or exceeded four times. The term "25-year flood" does not mean that such a flood can occur only once in 25 years and that once it occurs the flood will not happen again for another 25 years. Because floods occur randomly, they may be grouped or spread out unevenly with respect to time.

**FLOOD PEAK** - The maximum instantaneous discharge of a flood at a given location. The discharge generally is expressed in cubic feet per second.

**FLOOD PLAIN** - The relatively flat area or lowlands adjoining the channel of a stream or watercourse and subject to overflow by floodwaters.

**FLOOD-PLAIN REGULATIONS** - A general term applied to the full range of codes, ordinances, and other regulations pertaining to land use and to construction within the channel and flood-plain areas. The term encompasses zoning ordinances, subdivision regulations, building and housing codes, floodway-encroachment laws, open-area regulations, and similar controls affecting the use and development of the flood-plain areas.

**FLOOD PROFILE** - A graph showing the relationship of water-surface elevation to location for a stream of water flowing in an open channel. The location generally is expressed as the distance upstream from the channel mouth. The graph generally is drawn to show the water-surface elevation for the crest of a specific flood, but may be prepared for conditions at any given time or stage.

**FLOODPROOFING** - A combination of measures taken to render structures, property, and lands less vulnerable to flood losses.

**FLOODWAY** - The channel of a stream and that part of the flood plain inundated by a flood and, therefore, used to carry floodflow. (See also definitions of "designated floodway.")

**FLOODWAY-ENCROACHMENT LINES** - Those lateral lines along streams that mark the limits of the designated floodway. (See also definition of "designated floodway.") No structure or fill may be placed in the area between these lines without reducing the flood-carrying capacity of that floodway. The locations of the lines should be such that the floodway between the lines will accommodate a designated floodflow except for minor overflow into the restrictive zone.

**GAGING STATION** - A facility on a stream or reservoir where systematic observations of stage (water-surface level) or discharge are made.

**PRECIPITATION STATION** - A facility where systematic observations of the depth of rainfall are made.

**RESTRICTIVE ZONE** - That part of the floodway within the overflow limits of a selected flood and outside the designated floodway. (See also definitions of "floodway" and "designated floodway.") The restrictive zone is established by a zoning ordinance for the

purpose of reducing the flood hazard to life and property by regulating development within the zone. (See also definition of "zoning ordinance.")

STANDARD PROJECT FLOOD - A flood that would result from a storm with the most severe flood-producing rainfall pattern of any storm that is considered reasonably characteristic of the region in which the drainage area is located, giving consideration to the runoff characteristics of the drainage area and excluding extremely rare combinations of meteorologic and hydrologic conditions. Such a flood provides a reasonable upper limit to be considered in designing flood-control improvements.

ZONING ORDINANCE - An ordinance adopted by a local governing body, with authority from a State zoning enabling law, which under the police power divides an entire local governmental area into districts and - within each district - regulates the use of land; the height, bulk, type, and use of buildings or other structures; and the density of population.

APPENDIX 3 - BIBLIOGRAPHY  
FLOOD-PLAIN INFORMATION STUDY  
FOR  
MARICOPA COUNTY, ARIZONA

VOLUME III

SKUNK CREEK REPORT

The following is a sampling of published work, mostly recent, on flood-plain regulations and flood-plain development problems.

1. Dunham, Allison, Flood control via the police power\*: University of Pennsylvania Law Review, Philadelphia, Pa., vol. 107, No. 8, June 1959, pp. 1098-1132.
2. Goddard, James E., Flood plain management improves man's environment\*: Journal of the Waterways and Harbors Division, Proceedings of the American Society of Civil Engineers, vol. 89, No. WW4, Ann Arbor, Mich., November 1963, pp. 67-84.
3. Kates, Robert William, Hazard and choice perception in flood plain management\*: University of Chicago Department of Geography Research Paper No. 78, Chicago, Ill., 1962.
4. Miller, Harold V., Flood damage prevention for Tennessee\*: Tennessee State Planning Commission Publication No. 309, Nashville, Tenn., November 1960.
5. Morse, Henry F., Role of the states in guiding land use in flood plains\*: Special Report No. 38 of Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Ga., June 1962.
6. Murphy, Francis C., Regulating flood-plain development\*: University of Chicago Department of Geography Research Paper No. 56, Chicago, Ill., November 1958.
7. Sheaffer, John R., Flood proofing: an element in a flood damage reduction program\*: University of Chicago Department of Geography Research Paper No. 65, Chicago, Ill., 1960.
8. Task Force on Flood Plain Regulations established by Flood Control Committee of Hydraulics Division of American Society of Civil Engineers, Guide for the development of flood plain regulations\*: Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, vol. 88, No. HY5, part 1, Ann Arbor, Mich., September 1962, pp. 73-119.
9. White, Gilbert F., and others, Papers on flood problems\*: University of Chicago Department of Geography Research Paper No. 70, Chicago, Ill., 1961.
10. Wiitala, Sulo W., and others, Hydraulic and hydrologic aspects of flood-plain planning\*: U.S. Geological Survey Water-Supply Paper 1526, 1961.

\* Includes bibliographies and references useful for more extensive reading on the subject of flood-plain studies and related studies.