LADM 1130-2-45

QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

RESERVOIR REGULATION MANUAL

APPENDIX 2

GILA RIVER BASIN MASTER MANUAL

U. S. ARMY ENGINEER DISTRICT, LOS ANGELES

CORPS OF ENGINEERS

OCTOBER 1975

REVISED NOVEMBER 1984

WHITLOW RANCH DAM, ARIZONA

PERTINENT DATA

Drainage Basin	Queen Creek
Drainage Area, sq. miles	143
Reservoir:	
Elevation -	
Flood-control pool (spillway crest), ft., m.s.l.	2,166
Spillway design surcharge level, ft., m.s.l.	2,194
Area*	
Spillway crest, acres	822
Spillway design surcharge level, acres	1,256
Top of dam, acres	1,335
Capacity (gross)*	
Allowance for sediment, ac.-ft.	6,700**
Spillway crest, ac.-ft.	35,593
Spillway design surcharge level, ac.-ft.	64,556
Top of dam, ac.-ft.	71,032
Dam:	
Type	Earthfill
Top elevation, ft., m.s.l.	2,199
Height above original streambed, ft.	149
Top length, ft.	837
Top width, ft.	20
Freeboard, ft.	5
Dike:	
Type	Earthfill
Maximum height at top of dam, ft.	25
Crest length, ft.	978
Crest width, ft.	20
Spillway (Ungated):	
Type	Detached, broad-crested
Control section	concrete sill
Crest length, ft.	355
Crest elevation, ft., m.s.l.	2,166
Design surcharge, ft.	28
Discharge (reservoir at design surcharge level), c.f.s.	147,000
Outlet works (Ungated):	
Invert elevation (Inlet portal), ft., m.s.l.	2,056
Conduit length, ft.	700
Conduit inside diameter, ft.	5.5
Outlet-and-diversion structure-	
Length, ft.	28
Width, ft.	5.5
Floor elevation (exit), ft., m.s.l.	2,050
Discharge (reservoir at spillway crest), c.f.s.	1,007
Reservoir design flood:	
Duration, hours	21
Total volume, ac.-ft.	30,000
Inflow peak, c.f.s.	110,000
Outflow peak, c.f.s.	1,004
Reduction in peak, c.f.s.	108,996
Spillway design flood:	
Duration, hours	19
Total volume, ac.-ft.	74,000
Inflow peak, c.f.s.	230,000
Outflow peak, c.f.s.	147,000
Reduction in peak, c.f.s.	83,000

* Based on surveys of May 1957 and June 1975.

** Original allowance for sediment was 7000 ac.-ft.

Revised November 1984

EEE

DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS
630 Sansome Street, Room 720
San Francisco, California 94111-2206

REPLY TO
ATTENTION OF:

17 OCT 1985

SPDED-W

SUBJECT: Reservoir Regulation Manual for Whitlow Ranch Dam, Queen Creek, Arizona

CDR USACE (DAEN-CWE-HW)
20 Mass. Ave., N.W.
WASH DC 20314-1000

As per ER 1110-2-240, forwarded herewith is a copy of revised and approved subject reservoir regulation manual for your files.

FOR THE COMMANDER:

Encl

A. E. WANKET
Chief, Engineering Division

LADM 1130-2-45

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

WHITLOW RANCH DAM
ARIZONA
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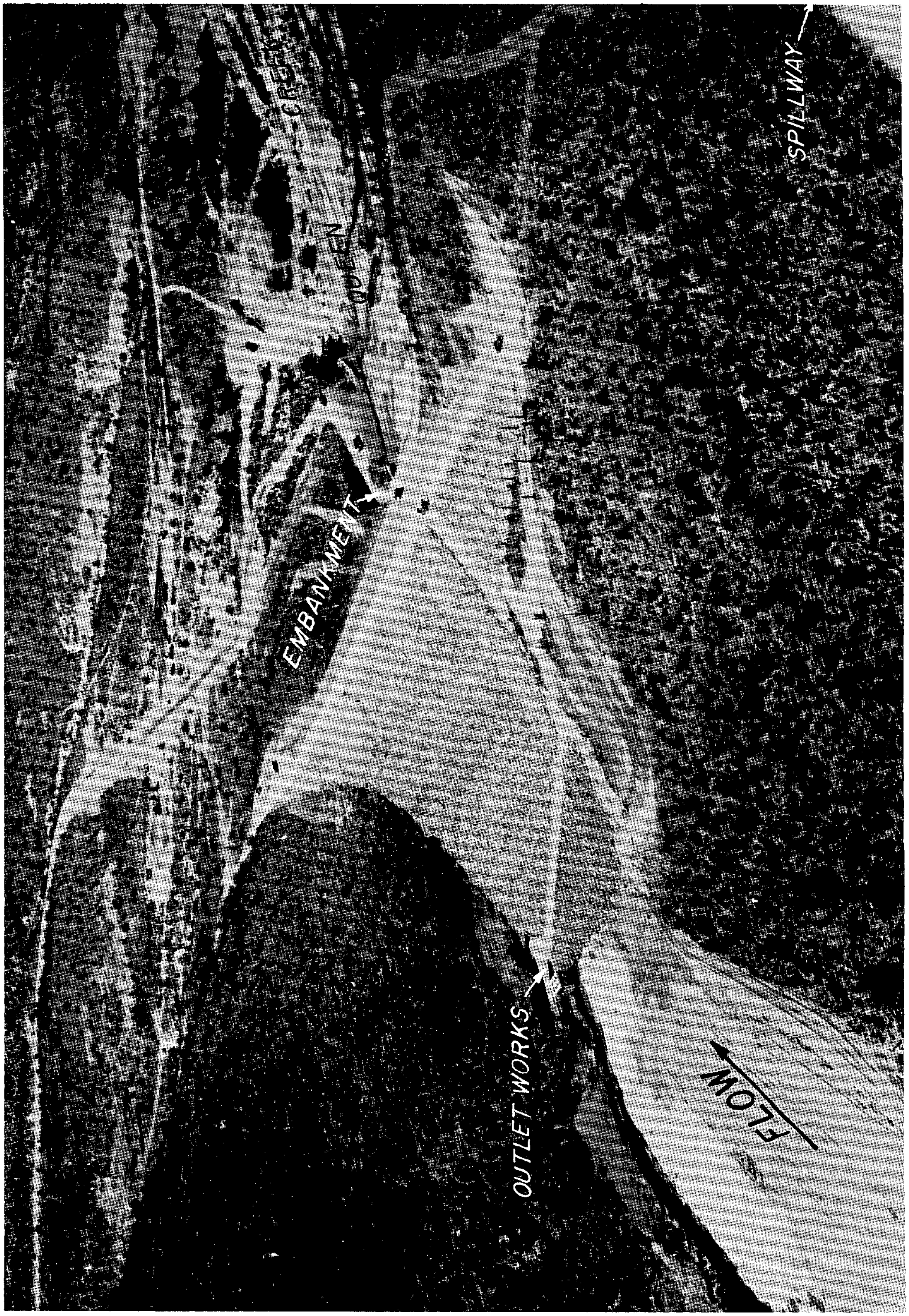
OCTOBER 1975



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CHAPTER 1 - GENERAL INFORMATION

1. AUTHORIZATION OF MANUAL. The authority for preparation of this manual is contained in ER 1110-2-240. Instructions pertaining to the contents of the manual are contained in EM 1110-2-3600.

2. SCOPE OF MANUAL. This manual describes (a) the project; (b) the associated drainage basins; (c) the plan of operation; (d) the facilities used for the collection of hydrologic data; and (e) coordination with significant agencies.

3. PROJECT AUTHORIZATION. Whitlow Ranch Dam was authorized by Act of Congress, Public Law 526, 79th Congress, Second Session, approved 24 July 1946, in accordance with the plan published in Document No. 220, 80th Congress, First Session.

4. PROJECT PURPOSE. The purpose of the project is to provide flood protection to the 142,000 acre flood plain of Queen Creek in Pinal and Maricopa counties.

CHAPTER 2 - BASIN INFORMATION

5. PROJECT LOCATION. Whitlow Ranch Dam is on Queen Creek in Pinal County, Arizona. The dam is located about 50 miles southeast of the city of Phoenix and about 7 miles northeast of the town of Florence Junction. Location of the project is shown on Plate 1.

6. DRAINAGE AREA. The drainage area tributary to the Whitlow Ranch Dam reservoir comprises 143 square miles. About 2/3 of the drainage area is mountainous; the remainder consists of foothills and valleys. The mountains contain numerous canyons with steep rock walls, several hundred feet high. Elevations in the basin vary from 2,056 feet m.s.l. (above mean sea level) at the dam to about 5,500 feet m.s.l. in the Pinal Mountains. The basin is bounded on the west by streams that are tributary to Queen Creek below the dam; on the north by an area tributary to the Salt River; on the east by the Pinal Mountains; and on the south by a low ridge. Plate 2 illustrates the drainage area. The main stream of Queen Creek has its source in the rugged Pinal Mountains. The stream flows westerly down a steep canyon to the town of Superior. The average gradient of Queen Creek in the mountains is 230 feet per mile. Between Superior and Whitlow Ranch Dam, 10 miles

to the west, Queen Creek flows through a bowl-like basin in the foothill area. The average gradient between Superior and the dam is 60 feet per mile.

7. SOILS AND VEGETAL COVER. The soils of the Queen Creek area are typical of desert and semi-desert regions. They are mostly shallow, rocky and poorly developed. The soils in the higher mountainous zone are residual. Soils in the lower foothill zone are alluvial and, in some places, fairly well developed. Vegetation, in general, is sparse and has no appreciable effect on retardation of runoff. Cacti, in great variety, grow throughout the drainage area. Desert shrubs are dominant in the lower elevations with a scattering of a few stunted trees, including junipers, paloverde, mesquite, ironwood, and scrub oak. Conditions along the streams favor growths of oaks, mesquites, cottonwoods, and willows. Perennial grasses form a neligible part of the present vegetation, but good covers of annual grasses occur after the winter rains. The winter floods normally occur before the annual grasses are up, and the summer floods occur after this cover had disappeared.

8. ECONOMIC JUSTIFICATION OF PROJECT. Prior to construction of the dam, the downstream area subject to inundation by the Standard Project (Reservoir Design) Flood comprised 142,000 acres (see Plate 3). In 1958 about 2/3 of this overflow area was farmland. About 5,000 acres had improvements, including the City of Chandler; part of Williams Air Force Base; part of the town of Gilbert; the town of Queen Creek; important irrigation facilities; several highways; and a mainline and a branch line of the Southern Pacific Railroad. Potential flood damage decreased progressively to the west (downstream) because floodwaters would spread over a wide area. In general, potential agricultural damages were anticipated to be greater during the summer growing season than during the winter. A single flood of standard project magnitude from the dam's drainage area would have overflowed only about 50,000 acres; however, such a flood could have occurred anywhere within the 142,000 acre overflow area. Floods originating in the drainage area of Queen Creek downstream from the Whitlow Ranch Reservoir site would also cause damage in the overflow area. The total value of property in the overflow area was calculated to be $126,000,000 in 1958. The average annual flood damages were estimated to be $295,000. Whitlow Ranch Dam was expected to prevent $222,000 worth of these damages, while $73,000 would not be prevented. The economic analysis presented in "Design Menorandum No. 3, General Design For Whitlow Ranch Reservoir, Queen Creek, Arizona," dated June 1958 indicated the project was justified with a benefit-cost ratio of 1.5 to 1.

9. EXISTING STRUCTURES AFFECTING RUNOFF. No major flood-control structures exist within the basin above Whitlow Ranch Dam. Various small detention dams and diversion dams have been constructed in the basin; however, none of these have any appreciable regulating effect on large floods.

10. CLIMATOLOGY. The climate of the drainage area is semiarid. The

summers are long and hot and the winters are short and mild. The average annual temperature measured at Superior, Arizona is 68.8°F (with extremes of 20° and 111°F). The 72-year mean (1868-1939) seasonal precipitation ranges from about 15 inches at the dam to about 24 inches in the northeastern part of the drainage area (see Plate 2). Precipitation in the basin is associated with (a) general winter storms of low-intensity rainfall over wide areas, often continuing for several days during the winter months; (b) general summer storms that result from convergence, orographic lift, or frontal lift; and (c) local storms, including sporadic showers, thunderstorms, and cloudbursts of small-areal extent, that result from isolational heating of tropical maritime air invading the region from the Gulf of California and the South Pacific or the Gulf of Mexico. Thunderstorms may or may not be associated with general summer storms. Rainfall is divided about equally between summer and winter. Snow falls sporadically during the winter months at the higher elevations of the basin. Climatological data is given in Tables 1 through 3. Locations of climatological stations are shown on Plate 2.

11. RUNOFF CHARACTERISTICS. Continuous low flows (less than 10 cubic feet per second) pass through the Whitlow Ranch Dam's outlet works. Large discharges occur only immediately after heavy rains. Hydrographic records show that streamflow increases rapidly in response to rainfall. High-intensity rainfall combined with the effects of impervious soil, sparse vegetation and steep gradients, result in intense debris-laden floods above the dam. The heavier part of the debris is deposited in the foothill region because of a sudden decrease in the streambed gradient exists there. The remainder of the debris is deposited in the Whitlow Ranch Dam reservoir. Small discharges on Queen Creek infiltrate and disappear on the alluvial plane below the dam.

12. PAST FLOODS. Historical accounts indicate that many damaging floods occurred on Queen Creek prior to construction of the dam. Flooding has occurred on the average of about once a year. As many as six floods have occurred during a single year and several occurrences have been noted within a single month. Large uncontrolled floods have occurred in 1884, 1891, 1896, 1916, 1919, 1925 and 1954. A summary of peak annual discharges and maximum mean daily discharges for 1917 and 1948-1959 are included in Table 4. Both the storms of December 1965 and December 1967 produced heavy rain over the watershed. The dam controlled runoff from both of these storms and prevented downstream damage.

13. STORMS AND FLOODS OF JANUARY 1916. Two general winter storms occurred over the Gila River Basin in January 1916; one from the 14th to the 21st, and the other from the 25th to the 30th. The first storm was of broader areal extent than the second and produced the larger flood. The average precipitation over the drainage area upstream from the dam was about 6.5 inches for the first storm and 4.0 inches for the second. Ground conditions in the Gila River Basin were conducive to

runoff owing to the occurrence of light rain on 10-12 January. The peak discharge was estimated at about 10,000 cubic feet per second (cfs) for Queen Creek near Florence Junction on 28 January 1916. A discharge estimate was not made to the first flood.

14. STORM AND FLOOD OF 19 AUGUST 1954. The storm and flood of 19 August 1954 were, according to available reports, the most severe within the drainage area. Unpublished rainfall data were collected at several locations in or near the drainage area by local residents. Two observers made partial storm-rainfall observations. The observer at Boyce Thompson Arboretum reported a total of 5.3 inches with very heavy rain for three hours. The maximum rainfall amounts at Florence Junction for 1- and 6-hour periods were reported as 1.8 and 4.2 inches, respectively. Plate 4 illustrates the overflow area and the storm isohyetals. Peak discharge and total volume at the damsite were estimated at 42,900 cfs and about 5,300 acre-feet, respectively. The flood-caused-damages were estimated at $2,100,000. About $1,000,000 of these damages could have been prevented by Whitlow Ranch Dam.

15. STORM AND FLOOD OF 12-20 DECEMBER 1967. The storm precipitation of 12-20 December 1967 occurred during two distinct storm periods, 12-16 and 17-20 December. A storm system, which originated off the coast of Washington, resulted in extensive precipitation in the form of rain and snow. In the Gila River Basin, moderate to heavy precipitation brought record-breaking snows to the higher elevations. Mild temperatures, accompanied by warm rains on 19 December, caused considerable snowmelt below 5,500 feet, resulting in heavy runoff. Total storm precipitations reported for Pinal Ranch, Superior, and Whitlow Ranch, were 11.42, 6.94, and 5.19 inches, respectively. On 20 December, a record water surface elevation of 2,105.86 feet m.s.l. was recorded in the reservoir. The peak outflow was 678 cfs.

16. DOWNSTREAM CHANNEL. Water from the outlet works flows directly into the natural channel of Queen Creek. The channel is well defined in the 38-mile reach across the desert plain between the dam and State Highway 87. Within this reach heavy vegetation has overgrown the channel. Man induced trash has also been deposited within the channel. Most of the reach is leveed; however, the levees are not structurally sound. The discharge capacity is limited to about 1,000 cfs at various dip and culvert road crossings. Between the road crossings, the channel has a much greater capacity, provided that the levees do not fail. The discharge capacity is unstable though, because of continuous fluctuations in sediment deposits in the streambed. Queen Creek flows into the Gila River about 4 miles downstream of State Highway 87. In this reach the channel is poorly defined and the discharge capacity is virtually nil. Here, numerous braided channels, caused by erosion, exist. These channels are typically less than one-foot deep and are only several feet wide. Floodwaters will spread across the desert plain in an unpredictable

pattern. Recent construction on Interstate Highway 10 has diverted Queen Creek, so that it now traverses the south side of Gila Butte instead of the north side as it did previously. Flow from the dam usually percolates into the alluvial fan and rarely travels more than a few miles downstream. Only flow from very large and infrequent storms will travel from the dam to the Gila River. Tributaries downstream of the dam can cause Queen Creek flooding. Whitlow Ranch Dam spillway discharges will also overflow the downstream channel. Plate 1 locates the downstream channel and identifies its capacity. The Maricopa and Pinal County Boards of Supervisors have each agreed to keep free from manmade encroachment the portions of Queen Creek below the dam and within their respective counties. However, neither county has created a formal inspection program. The Maricopa County Flood Control District has the regulatory authority to prevent development in flood prone areas. Likewise, Pinal County Planning and Zoning Department in cooperation with the County Highway Department has a flood zoning program that is enforced by active inspectors. Both of these county flood plain management programs essentially prevent encroachment into Queen Creek.

CHAPTER 3 - PROJECT INFORMATION

17. CONSTRUCTION HISTORY. Construction of the dam began in April 1959. Work was completed on 18 August 1960. The cost of the project through 1 September 1960, not including maintenance and operation costs, totalled $1,867,963.

18. RELATIONSHIP TO COORDINATED PLAN OF DEVELOPMENT FOR THE BASIN. Whitlow Ranch Dam functions independently of other water-control structures in the Queen Creek and Gila River Basins. The dam enhances percolation into the ground water zone because it lengthens the duration of flows. Therefore, the dam incidentally contributes to water conservation in the Queen Creek Basin.

19. DESCRIPTION OF FACILITY. The general plan of the project is shown on Plate 5. A detailed description is contained in the following paragraphs, 20 through 24.

20. DAM. The dam is a compacted-earthfill, zoned structure with a crest length of 837 feet, a crest width of 20 feet, and a crest elevation of 2,199 feet m.s.l. which is 149 feet above the Queen Creek streambed. The downstream slope of the embankment is one vertical on two horizontal. The upstream embankment slope is one vertical on 2.75 horizontal below elevation 2,125 and one vertical on 2.25 horizontal above elevation 2,125 feet m.s.l. A service road traverses the upstream face of the dam and provides access into the reservoir area. The embankment consists of a central impervious core and pervious outer zones. The upstream slope of the dam is covered with a 1.5 foot thick stone facing. A

general plan of the embankment is shown on Plate 6. The profile and sections are shown on Plate 7.

21. DIKE. The dike is located along the southern edge of the reservoir and is about one mile southeast of the dam. The dike consists of a compacted earthfill embankment constructed of pervious material. The dike's crest is at elevation 2,199 feet m.s.l., has a maximum height of 25 feet, and is 978 feet long. The upstream slope of the dike is one vertical on 2.25 horizontal; and the downstream slope is one vertical on two horizontal. A road providing access into the reservoir was constructed as part of the dike. Details of the dike are shown on Plate 8.

22. OUTLET WORKS. The outlet works, founded on sound rock at the left abutment, consists of an intake structure, an ungated outlet conduit and an outlet-and-diversion structure. The outlet discharge curve is shown on Plate 9. A general description of the outlet works is contained in the following subparagraphs and is shown on Plate 10.

a. INTAKE STRUCTURE. The reinforced-concrete intake structure is rectangular, 22 feet wide, 16 feet long and 20 feet high (see plate 11). Two rows of openings are provided on three sides and the top of the structure. One row of openings is provided on the downstream side of the structure. The total area of the intake openings is 337 square feet. This structure was specifically designed to prevent floating debris and sediment from accumulating in the openings. A sluiceway and two weirs are integral parts of the intake structure.

b. OUTLET CONDUIT. The outlet conduit is a reinforced-concrete circular section, 5.5 feet in diameter and 700 feet long. The conduit lies directly under the dam. Invert elevations of the conduit are 2,056 feet m.s.l. at the intake sill and 2,050 feet m.s.l. at the exit portal. Plan, profile and conduit sections are shown on Plate 10.

c. OUTLET-AND-DIVERSION STRUCTURE. The reinforced-concrete outlet-and-diversion structure immediately follows the exit portal of the outlet conduit. The outlet-and-diversion structure includes a 7 foot high and 5.5 foot wide rectangular channel which receives high velocity discharges leaving the outlet conduit. From the rectangular channel, floodflows enter the natural channel of Queen Creek. A 7 foot deep cutoff wall prevents discharges from undercutting the structure. A diversion outlet is provided in a wet well in the right wall of the outlet-and-diversion structure. The diversion outlet consists of a 30 inch reinforced-concrete pipe with a handcrank slide gate. The outlet is used to divert water into an irrigation ditch. Plate 12 illustrates the outlet-and-diversion structure.

23. SPILLWAY. The spillway and the 1,080-foot-long channel approaching it are unlined and cut through rock. These features are located in a saddle, about 4,000 feet north of the right abutment. Discharge from the spillway enters a draw leading into Queen Creek at a point about 1/2 mile below the dam. The spillway is a broad-crested weir with a 355 foot crest length and a crest elevation of 2,166 feet m.s.l. The cross section is trapezoidal with side slopes of 1 vertical on 0.5 horizontal. A 3 foot wide reinforced-concrete sill fills an entrenchment running across the crest. The top of the sill is flush with the spillway profile. Plate 13 illustrates the spillway. Plate 14 shows the spillway discharge rating curve.

24. RESERVOIR. The flood control pool i.e., when the reservoir water surface is at spillway crest (elevation 2,166 feet m.s.l), has an area and gross capacity of 822 acres and 35,593 acre-feet respectively. At the top of the dam (elevation 2,199 feet m.s.l.) the area is 1,335 acres and the gross capacity is 71,032 acre-feet. The flood control pool has a 6,700 acre-feet design allowance for sedimentation. Gross capacity is the total volume in the reservoir below a particular elevation, at the time of the survey. Net capacity equals the gross capacity minus the quantity of sediment expected to be deposited below the particular elevation. Surveys made in 1939, 1956, 1957, and 1975 were used to establish area and capacity curves and tabulations (see Plate 15 and Table 5). Visual inspection has revealed that extensive sedimentation has occurred in the reservoir's lower elevations. Large mathematical discrepancies in routing computations, used to establish inflow from reservoir water surface elevation records, also indicate sediment has accumulated in the reservoir. Heavy vegetation has grown in the reservoir since construction of the dam. The current amount of sedimentation is not known. The area and capacity data in this report are based on the most recent survey information available.

25. BASIS FOR DESIGN. Whitlow Ranch and appurtenances were designed to: control the reservoir design flood, provide storage for sedimentation and effectively convey the spillway design flood without endangering the dam. The following subparagraphs briefly describe the design criteria.

a. RESERVOIR DESIGN FLOOD. The reservoir design flood is expected from the most severe combination of meteorologic and hydrologic conditions that are reasonably characteristic of the geographic area. The occurrence of a design storm assumed centered over the basin and equal to magnitude to the thunderstorm of 19 August 1954 was used to synthesize the reservoir design flood. The design storm produced 6 hours of rainfall, which included 3 hours of intense rainfall. Rainfall loss rates were variable, ranging from .65 to .2 inches per hour. The effective average rainfall over the basin was 3.95 inches. The resultant reservoir

design flood had a peak discharge of 110,000 cfs and a total volume of 30,000 acre-feet.

b. SEDIMENT VOLUME. Establishment of the quantity of sediment expected to deposit in the flood control pool during a 50-year period was based on data collected from existing reservoirs and streams in the southwestern United States. The quantity of sediment was calculated to be 7,000 acre-feet. The volume represents 49 years of average sedimentation plus the deposition from one reservoir design flood.

c. SPILLWAY DESIGN FLOOD. The spillway design flood represents a discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. An estimate of probable maximum precipitation was established by the Hydrometeorologic Section of the United States Weather Bureau in the memorandum titled, "Maximum Possible Precipitation Whitlow Ranch Reservoir, Queen Creek, Gila River Basin, Arizona" and dated 26 April 1955. The spillway design flood is based upon a synthetic 6-hour storm having a total precipitation of 11.5 inches. Intense rainfall occurred during the last 3 hours of the storm and produced 10.4 inches of rainfall. Rainfall loss rates were considered variable, ranging from .5 to .15 inch per hour. The spillway design flood had a peak discharge of 230,000 cfs and a volume of 74,000 acre-feet.

d. RESERVOIR DESIGN FLOOD ROUTING. The reservoir design flood was routed through the reservoir assuming the reservoir was dry initially and the allotted sediment storage space in the flood control pool had silted in, i.e., net storage was used. The peak inflow of 110,000 cfs was reduced to a peak outflow of 1,004 cfs. The maximum reservoir water surface was calculated to reach elevation 2,165.5 feet m.s.l. The spillway crest was accordingly established at elevation 2,166 m.s.l. Plate 16 shows the reservoir design flood routing.

e. SPILLWAY DESIGN FLOOD ROUTING. The spillway design flood routing was based on net capacity, an initial reservoir pool elevation of 2.166 feet m.s.l. and the outlet works blocked. The peak inflow of 230,000 cfs was reduced to a peak outflow of 147,000 cfs. A maximum reservoir water surface elevation was calculated to be 2,194 feet m.s.l. A freeboard of 5 feet was selected to prevent waves from overtopping the dam. The top of the dam was thus established at elevation 2,199 feet m.s.l. Plate 17 shows the spillway design flood routing.

26. STUDIES IN PROGRESS. A study to review the hydrologic and hydraulic design features of Whitlow Ranch Dam is scheduled for FY 1986.

CHAPTER 4 - OPERATION

27. RESPONSIBILITY FOR OPERATION. The operation of Whitlow Ranch Dam is the responsibility of the Los Angeles District of the Corps of Engineers. The District Engineer has delegated authority for this function through the Chief, Engineering Division, Chief, Hydrology and Hydraulics Branch and Chief, Hydrologic Engineering Section to the Chief, Reservoir Regulation Unit. The chain of command for reservoir operations decisions is given on plate 18.

28. FLOOD-CONTROL OPERATION PLAN. Inflows of magnitudes up to and including the reservoir design flood will be controlled by the project, such that peak outflows from the reservoir will be safely carried in the downstream reach of Queen Creek. Inflow will be released from the reservoir through the outlet tunnel. The ungated outlet works does not include any mechanical equipment that will permit significant adjustment to large outflows, e.g., the project operates automatically. Operation of the slide gate on the outlet-and-diversion structure will divert a negligible portion of the flood flows into a small irrigation ditch.

29. OPERATION OF OUTLET-AND-DIVERSION STRUCTURE. Mr. Hart Mullins acquired water rights for 250 miner's inches (6.25 cfs) of Queen Creek on 25 May 1916. The outlet-and-diversion structure was designed to divert water and thus satisfy this water claim. Ownership of the claim has changed since 1916. The local interests, who have acquired the water rights, operate the slide gate within the outlet-and-diversion structure to divert outflow from the reservoir into an irrigation ditch.

30. REPORTING CRITERIA. A data collection platform was installed during FY 1985 in the recording house at the top of the dam, that measures reservoir water surface elevation and precipitation once per hour. This information is transmitted via the Geostationary Operational Environmental Satellites (GOES) Data Collection System every three hours, and is monitored at the District (LAD) Office as necessary. This gives the LAD the ability to monitor conditions at the reservoir directly, without depending on local observers.

31. COMMUNICATION FACILITIES. No communication facilities, such as radios or telephones, exist at the dam.

32. EMERGENCY NOTIFICATION. During the event of heavy rains or high discharge from Whitlow Ranch Dam, personnel at the Los Angeles District would be in communication with Pinal County and Maricopa County agencies. If high outflows from the reservoir pose a threat to people along the

downstream channel, the Maricopa County Department of Civil Defense and Emergency Service (602-273-1411) and the Pinal County Department of Emergency Service (602-868-5801, EXT 255) will each direct emergency operations in their respective counties. At their discretion, each agency could warn and if need be evacuate people located in hazardous areas, by the use of local law enforcement agencies.

33. OPERATION RECORD. Flow in Queen Creek is intermittent and lasts for short periods of time subsequent to runoff producing storms. Consquently, Queen Creek and the reservoir are normally dry. Low flows of 10 cfs or less are diverted for irrigation. Periods of project operation with significant storage are presented on Plate 22-1 to 22-6. Plate 23 is a sample form for reporting monthly reservoir operation to the Chief of Engineers.

CHAPTER 5 - COLLECTION OF HYDROLOGIC DATA

34. HYDROLOGIC FACILITIES. Hydrologic data are collected for evaluating effectiveness of Whitlow Ranch Dam. Facilities used to monitor hydrologic data include the reservoir staff gage, a water surface elevation recorder, rain gages, and an outflow gaging station.

a. RESERVOIR STAFF GAGE. The reservoir staff gage consists of 27 adjustable 5-foot sections on the upstream face of the dam. Two of these sections are located near the intake structure. The staff gage sections indicate reservoir water surface elevations from 2,060 to 2,195 feet m.s.l.

b. RESERVOIR WATER SURFACE RECORDER. Reservoir water surface elevations are continuously recorded. The U.S. Geological Survey collects recorded water surface data and transmits the data to the Corps of Engineers once a month for evaluation. The water surface recorder (an A-35 Stevens Recorder) is housed in a 48-inch diameter corregated-metal pipe that projects from the top of the dam. The instrument is mechanically connected to a float and records the reservoir water surface in an 18-inch diameter float well. The float well rises at the center of the dam and is hydraulically connected to the reservoir by a 6-inch diameter communication pipe (see Plate 6). The communication pipe follows the alinement of the outlet conduit and terminates at the outlet-and-diversion structure. The downstream end of the communication pipe has a valve that can be opened to flush the system. The valve is normally closed.

c. PRECIPITATION GAGES. Five precipitation gages are operated in or adjacent to the drainage area. The Corps of Engineers operates one recording gage and 3 long term storage gages. The recording gage is located about 1/2 mile downstream from the dam. The U.S. Geological

Survey collects recorded precipitation data and transmits this data to the Corps of Engineers once a month for evaluation. The Corps collects data every 4 months at the 3 long term storage gages, located at Hewitt, Arnett Canyon and in the recorder house atop the dam. The Magma Copper Company operates a precipitation gage at Superior. A local resident serviced the Pinal Ranch precipitation gage which closed in 1973. Precipitation gage locations are shown on Plate 2.

d. STREAM GAGES. The U.S. Geological Survey operated stream gaging stations called Queen Creek at Whitlow damsite near Superior, Arizona and Queen Creek near Florence Junction, Arizona. The first was operated during the periods of 1896-1897, 1916-1920 and 1948-1957. The other was operated between 1939 and 1941. Both stations are now discontinued. Their locations are shown on Plate 2. The Corps of Engineers services a crest-stage gage on Queen Creek. The gage is located on the right side of the outlet-and-diversion structure. Gage readings are taken every 4 months or after a major storm, whichever comes first. A theoretical discharge-rating curve is presented on Plate 24. A new recording stream gaging station will eventually replace the crest-stage gage.

35. MEASUREMENT OF SEDIMENTATION. There are no sediment ranges in the reservoir. Significant sedimentation can only be detected from visual inspection of the reservoir or from large mathematical discrepancies in routing computations, used to establish inflow from reservoir water surface elevation records. Category "A" index ranges are planned for the future. Each index range will be a surveyed cross-section of the reservoir. Subsequent resurveys of the index ranges will be used to determine if appreciable sediment has accumulated.

CHAPTER 6 - COORDINATION WITH OTHER AGENCIES

36. A list of agencies together with a brief explanation of their functions related to the dam are given in the following subparagraphs.

a. NATIONAL WEATHER SERVICE. The National Weather Service office at Phoenix, Arizona provides the Corps of Engineers, upon request, with weather forecasts and climatological reports for the Queen Creek Basin.

b. MARICOPA COUNTY BOARD OF SUPERVISORS. The Maricopa County Board of Supervisors is one of the two agencies responsible for local cooperation. This agency has agreed with the Corps of Engineers to keep the Queen Creek channels in Maricopa County free from manmade encroachments. They have also agreed to adjust all claims concerning water rights arising from the operation of the dam.

c. PINAL COUNTY BOARD OF SUPERVISORS. The Pinal County Board of Supervisors is one of the two agencies responsible for local cooperation. This agency has given assurances to the Corps of Engineers to keep that portion of the Queen Creek flood channel in Pinal County downstream from the dam free from manmade encroachment. They have also agreed to adjust all claims concerning water rights arising from the operation of the dam.

d. U. S. GEOLOGICAL SURVEY. This agency has agreed to collect reservoir water surface data at the dam and furnish it to the Corps of Engineers.

37. COORDINATION FOR RECREATIONAL DEVELOPMENT OF RESERVOIR AREA. Currently, there are no definite plans for any recreational use of the reservoir area.

Table 1

CLIMATOLOGICAL DATA AT PINAL RANCH, ARIZONA

MONTH	PRECIPITATION (INCHES)			SNOWFALL (INCHES)		
	MEAN	MAXIMUM	MINIMUM	MEAN	MAXIMUM	MINIMUM
Jan.....	2.93	14.95	0.0	5.0	20.5	0.0
Feb.....	2.62	13.38	0.0	3.8	12.5	0.0
Mar.....	2.48	10.03	0.0	3.1	29.0	0.0
Apr.....	0.98	5.48	0.0	1.2	8.0	0.0
May.....	0.37	4.12	0.0	0.1	0.5	0.0
Jun.....	0.39	2.42	0.0	0.0	0.0	0.0
Jul.....	2.55	6.00	0.14	0.0	0.0	0.0
Aug.....	3.43	8.38	0.20	0.0	0.0	0.0
Sep.....	1.96	6.77	0.0	0.0	0.0	0.0
Oct.....	1.54	11.88	0.0	0.0	T	0.0
Nov.....	1.93	9.75	0.0	1.4	24.0	0.0
Dec.....	3.24	13.59	0.0	4.5	26.0	0.0
Period of record	24.42*	14.95	0.0	19.1*	29.0	0.0

* Mean annual.

NOTES:

1. Station is located at latitude 33°21'N, longitude 111°00'W; elevation 4,520; (see plate 2 for location).

2. Period of record for precipitation is 80 years (January 1893 to December 1972).

3. Period of record for snowfall is discontinuous and extends from January 1893 to December 1972.

4. All values based on the number of full months of record available.

5. Data is from "Climatological Data, Arizona," National Oceanic and Atmospheric Administration.

6. Station discontinued April 1973.

Table 2

CLIMATOLOGICAL DATA AT SUPERIOR, ARIZONA

MONTH	PRECIPITATION (INCHES)			TEMPERATURE (DEGREES FAHRENHEIT)		
	MEAN	MAXIMUM	MINIMUN	MEAN	MAXIMUM	MINIMUM
Jan.....	1.81	5.37	0.0	52	81	20
Feb.....	1.72	5.81	0.0	54	87	20
Mar.....	1.78	6.45	0.0	58	90	24
Apr.....	0.79	3.89	0.0	65	94	31
May.....	0.28	1.87	0.0	74	104	41
Jun.....	0.29	2.06	0.0	83	111	51
Jul.....	1.89	7.16	0.0	87	111	53
Aug.....	2.75	11.03	0.0	84	110	61
Sep.....	1.38	4.81	0.0	81	103	51
Oct.....	1.22	8.08	0.0	72	110	37
Nov.....	1.31	5.85	0.0	61	89	29
Dec.....	2.26	10.43	0.0	54	82	23
Period of record	*17.47	11.03	0.0	*69	111	20

*Mean annual.

NOTES:

1. Station is located at latitude 33°18'N, longitude 111°06'W, elevation 2,995 feet (see plate 2 for location).

2. Period of record for precipitation is discontinuous and extends from January 1920 to December 1973.

3. Period of record for temperature is discontinuous and extends from October 1952 to December 1973.

4. All values based on the number of full months of record available.

5. Data is from "Climatological Data, Arizona," National Oceanic and Atmospheric Administration.

Table 3

PRECIPITATION DATA AT WHITLOW RANCH DAM, ARIZONA

MONTH	PRECIPITATION (INCHES)		
	MEAN	MAXIMUM	MINIMUM
January.....	0.98	2.80	0
February.....	1.13	2.54	0
March.....	1.16	3.48	0
April.....	0.31	1.41	0
May.....	0.13	0.58	0
June.....	0.16	1.57	0
July.....	0.81	4.26	0
August.....	1.74	4.94	0
September.....	1.08	2.97	0
October.....	1.14	7.03	0
November.....	0.98	1.98	0
December.....	2.00	8.95	0.02
Period of record	11.62*	8.95	0

* Mean annual

NOTES:

1. Station is located at latitude 33°18'N, longitude 111°17'W; elevation 2,056 (see plate 2 for location).

2. Period of record is discontinuous and extends from October 1959 to December 1973.

3. All values based on the number of full months of record available.

4. Data is from the files of the Los Angeles District, Corps of Engineers.

Table 4

RUNOFF DATA, QUEEN CREEK AT WHITLOW DAMSITE NEAR SUPERIOR, ARIZONA*

Year**	Maximum peak discharge	Date	Maximum mean daily discharge	Date
	Cubic feet per second		Cubic feet per second	
1917-18....	5,000	6 Aug	247	6 Aug
1948-49....	2,630	22 Jul	111	22 Jul
1949-50....	2,690	22 Jul	455	18 Jul
1950-51....	1,510	3 Aug	136	26 Aug
1951-52....	1,170	18 Jan	388	31 Dec
1952-53....	1,780	29 Jul	547	2 Mar
1953-54....	42,900	19 Aug	2,690	19 Aug
1954-55....	5,430	3 Aug	481	25 Jul
1955-56....	4,100	17 Aug	153	17 Aug
1956-57....	8,260	19 Aug	276	19 Aug
1957-58....	3,970	22 Mar	292	22 Mar
1958-59....	480	6 Oct	61	6 Oct

* Latitude 33°17'55", longitude 111°16'25", in NE 1/4 - SE 1/4 Section 36, T.1S., R10E, on left bank of Whitlow Ranch Damsite. Data is from U.S. Geological Survey water records. Station was discontinued in January 1959.

**1 October to 30 September.

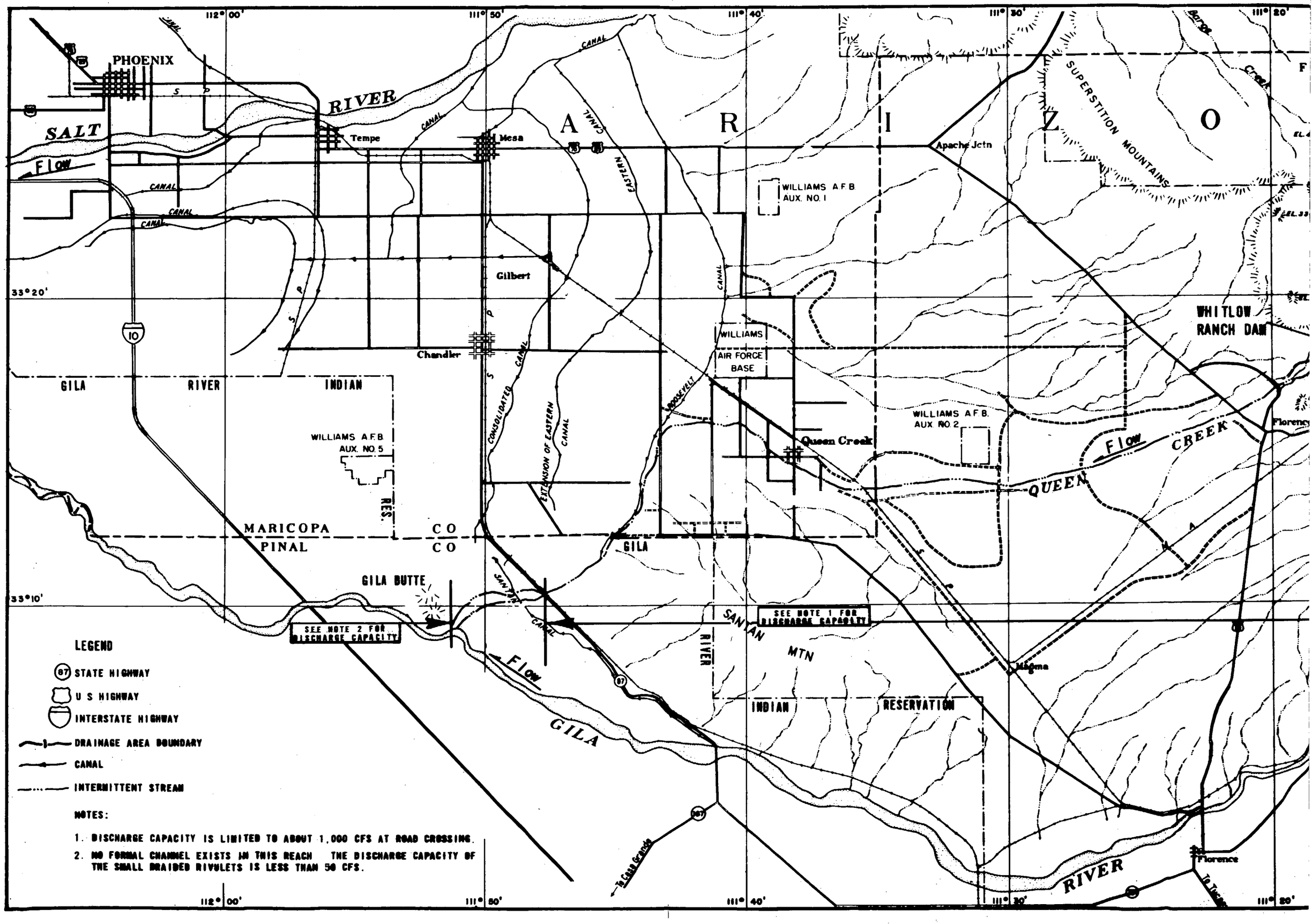
Table 5

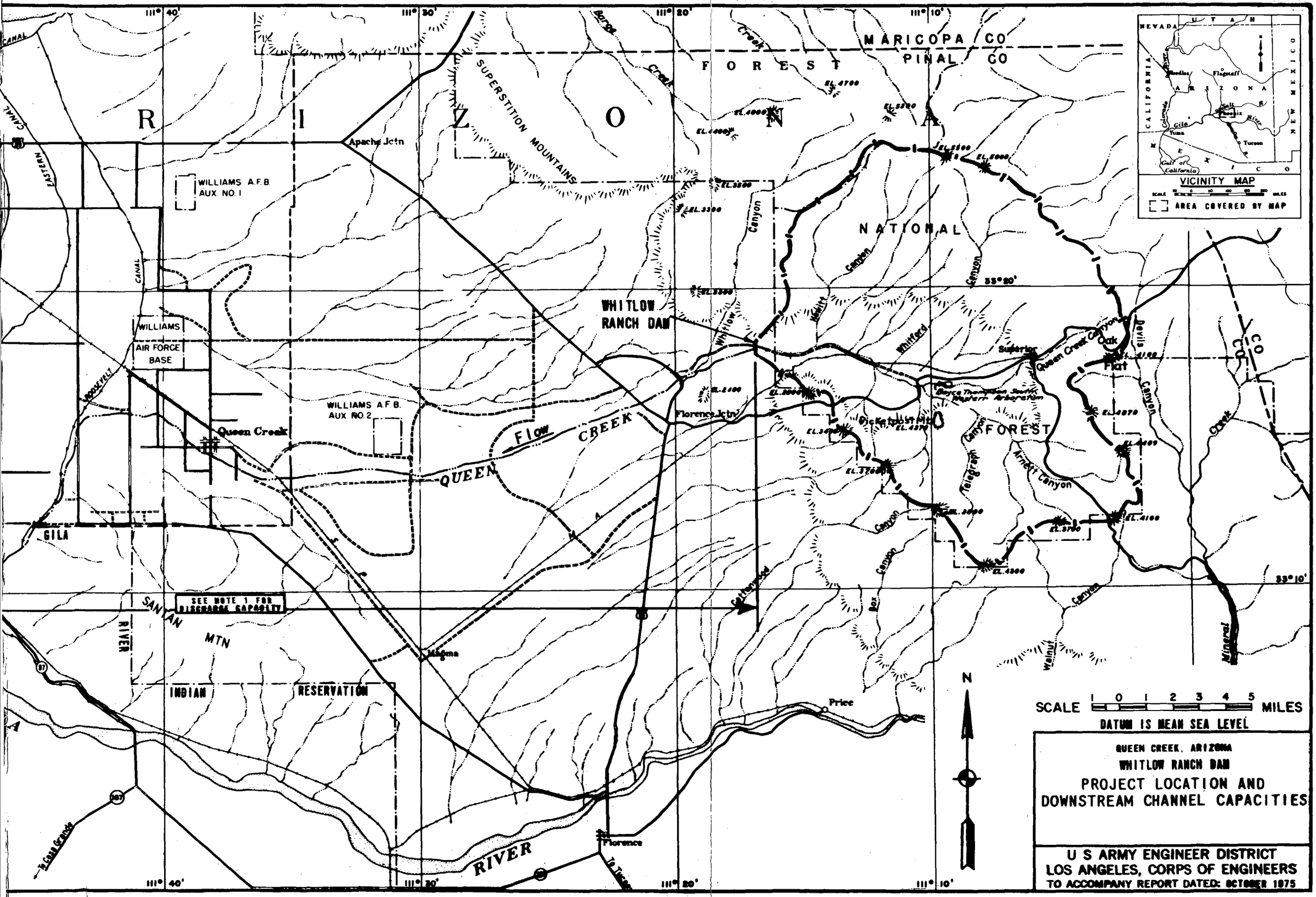
AREA AND GROSS CAPACITY - WHITLOW RANCH DAM

Elevation	Capacity	Area	Elevation	Capacity	Area
Feet above mean sea level	Acre-feet	Acres	Feet above mean sea level	Acre-feet	Acres
2,056	0	0	2,128	12,157	445
2,057	.01	.01	2,129	12,606	454
2,058	.03	.02	2,130	13,064	462
2,059	.05	.04	2,131	13,530	470
2,060	.1	.08	2,132	14,004	479
2,061	.2	.15	2,133	14,487	487
2,062	.4	.2	2,134	14,977	495
2,063	.6	.22	2,135	15,479	503
2,064	.8	.3	2,136	15,983	512
2,065	1.2	.5	2,137	16,499	520
2,066	1.8	1	2,138	17,022	528
2,067	3.2	3	2,139	17,554	536
2,068	7.3	6	2,140	18,094	544
2,069	16	11	2,141	18,642	553
2,070	29	15	2,142	19,200	562
2,071	46	21	2,143	19,766	571
2,072	70	26	2,144	20,341	580
2,073	98	31	2,145	20,925	589
2,074	132	37	2,146	21,518	598
2,075	172	43	2,147	22,120	607
2,076	218	48	2,148	22,731	615
2,077	268	54	2,149	23,350	624
2,078	325	59	2,150	23,979	634
2,079	386	65	2,151	24,617	645
2,080	454	71	2,152	25,268	656
2,081	527	76	2,153	25,929	668
2,082	606	82	2,154	26,603	679
2,083	691	88	2,155	27,287	691
2,084	782	94	2,156	27,984	702
2,085	879	100	2,157	28,691	714
2,086	982	106	2,158	29,411	725
2,087	1,091	112	2,159	30,141	737
2,088	1,206	118	2,160	30,884	749
2,089	1,327	124	2,161	31,638	760
2,090	1,454	130	2,162	32,404	773
2,091	1,587	138	2,163	33,183	785
2,092	1,729	145	2,164	33,974	797
2,093	1,877	153	2,165	34,777	810
2,094	2,034	160	*2,166	35,593	822
2,095	2,197	168	2,167	36,421	834
2,096	2,369	175	2,168	37,261	847
2,097	2,547	183	2,169	38,114	859
2,098	2,734	190	2,170	38,979	872
2,099	2,927	198	2,171	39,858	888
2,100	3,129	206	2,172	40,754	904
2,101	3,338	213	2,173	41,666	921
2,102	3,555	221	2,174	42,595	937
2,103	3,780	229	2,175	43,540	954
2,104	4,013	237	2,176	44,502	970
2,105	4,254	245	2,177	45,480	987
2,106	4,503	253	2,178	46,475	1,003
2,107	4,760	261	2,179	47,486	1,020
2,108	5,025	269	2,180	48,514	1,036
2,109	5,298	277	2,181	49,558	1,052
2,110	5,579	285	2,182	50,617	1,067
2,111	5,868	294	2,183	51,692	1,083
2,112	6,167	303	2,184	52,783	1,099
2,113	6,474	312	2,185	53,890	1,115
2,114	6,791	321	2,186	55,012	1,130
2,115	7,116	330	2,187	56,150	1,146
2,116	7,451	339	2,188	57,304	1,162
2,117	7,794	348	2,189	58,474	1,178
2,118	8,147	357	2,190	59,659	1,193
2,119	8,508	366	2,191	60,860	1,209
2,120	8,879	375	2,192	62,076	1,224
2,121	9,258	384	2,193	63,308	1,240
2,122	9,646	393	2,194	64,556	1,256
2,123	10,043	401	2,195	65,820	1,272
2,124	10,448	410	2,196	67,099	1,287
2,125	10,862	419	2,197	68,394	1,303
2,126	11,285	428	2,198	69,705	1,319
2,127	11,717	436	**2,199	71,032	1,335

NOTE: Table from computed elevation vs. storage tables. based on surveys of May 1957 and June 1975.

* Spillway crest
** Top of dam


112° 00'
111° 50'
111° 40'
111° 30'
111° 20'
PHOENIX
SALT
RIVER
Tempe
Mesa
Gilbert
Chandler
CANAL
EASTERN CANAL
CONSOLIDATED CANAL
EXTENSION OF EASTERN CANAL
ROOSEVELT
33° 20'
10
GILA RIVER INDIAN
WILLIAMS A.F.B. AUX. NO. 5
RES.
MARICOPA CO
PINAL CO
GILA BUTTE
33° 10'
SEE NOTE 2 FOR DISCHARGE CAPACITY
SANTAN CANAL
Flow
GILA
87
To Casa Grande
A R I Z O
SUPERSTITION MOUNTAINS
Apache Jctn
WILLIAMS A.F.B. AUX. NO. 1
WILLIAMS AIR FORCE BASE
WILLIAMS A.F.B. AUX. NO. 2
Queen Creek
WHITLOW RANCH DAM
Florence
QUEEN CREEK
GILA
SANTAN MTN
RIVER
SEE NOTE 1 FOR DISCHARGE CAPACITY
Magma
INDIAN RESERVATION
Florence
To Tucson
RIVER
LEGEND
67 STATE HIGHWAY
U S HIGHWAY
INTERSTATE HIGHWAY
DRAINAGE AREA BOUNDARY
CANAL
INTERMITTENT STREAM
NOTES:
1. DISCHARGE CAPACITY IS LIMITED TO ABOUT 1,000 CFS AT ROAD CROSSING.
2. NO FORMAL CHANNEL EXISTS IN THIS REACH THE DISCHARGE CAPACITY OF THE SMALL BRAIDED RIVULETS IS LESS THAN 50 CFS.



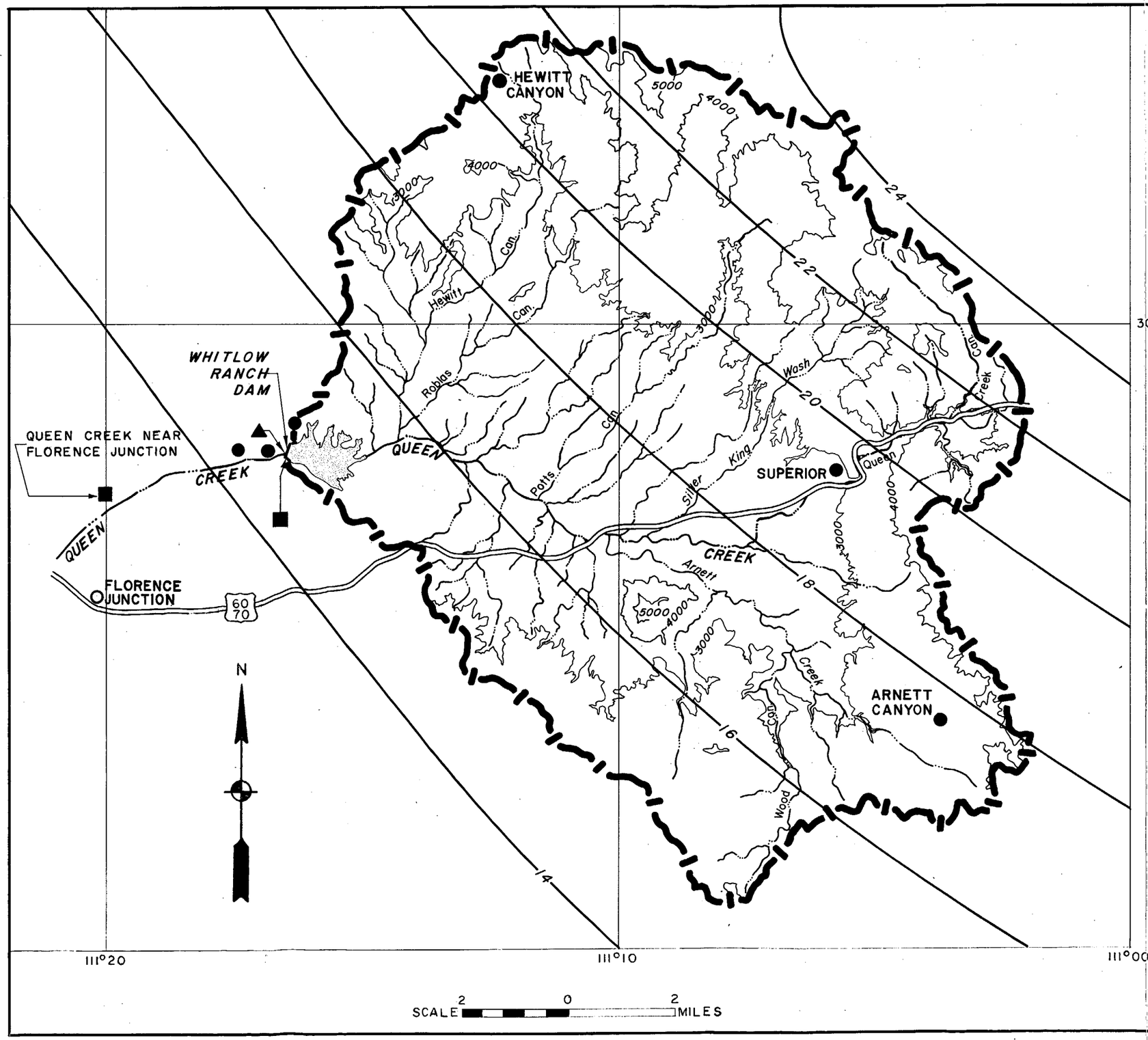
QUEEN CREEK, ARIZONA

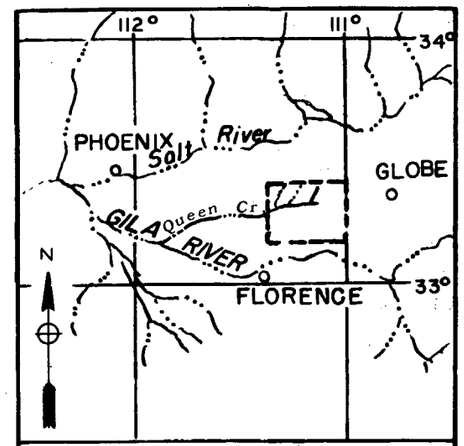
WHITLOW RANCH DAM

PROJECT LOCATION AND DOWNSTREAM CHANNEL CAPACITIES

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 1





VICINITY MAP

SCALE 0 10 20 30 40 50 MILES

AREA COVERED BY MAP

LEGEND

- BOUNDARY OF DRAINAGE AREA
- FLOOD-CONTROL DAM & RESERVOIR
- 20 — ISOHYET: LINE OF EQUAL MEAN SEASONAL PRECIPITATION IN INCHES
- PRECIPITATION GAGE
- STREAM GAGING
- DISCONTINUED STREAM GAGE

NOTES:

1. ISOHYETS BASED ON GILA RIVER BASIN PRECIPITATION RECORDS (1868-1939).
2. CONTOUR INTERVAL: 1000 FEET.
3. DATUM IS MEAN SEA LEVEL.

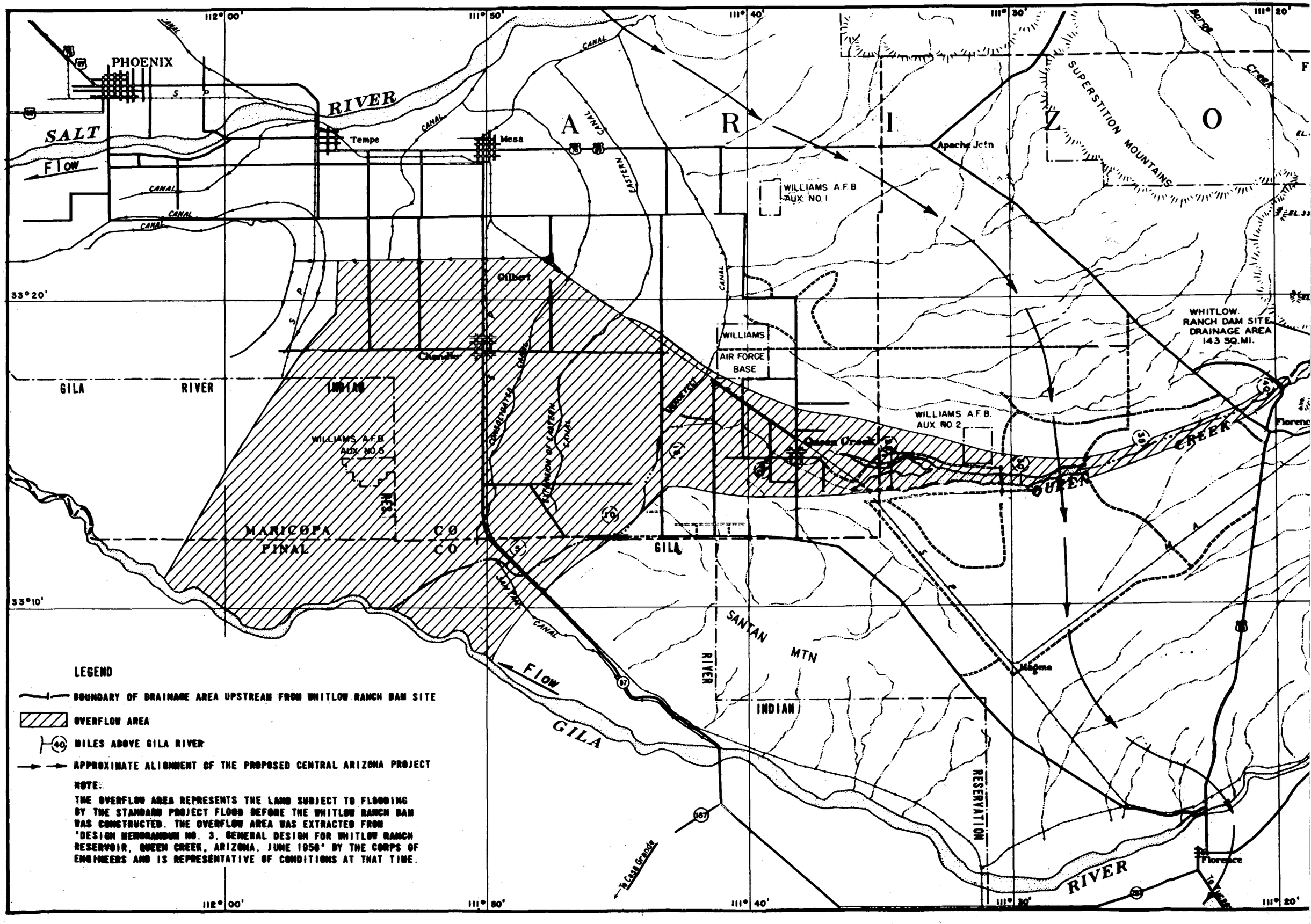
QUEEN CREEK, ARIZONA

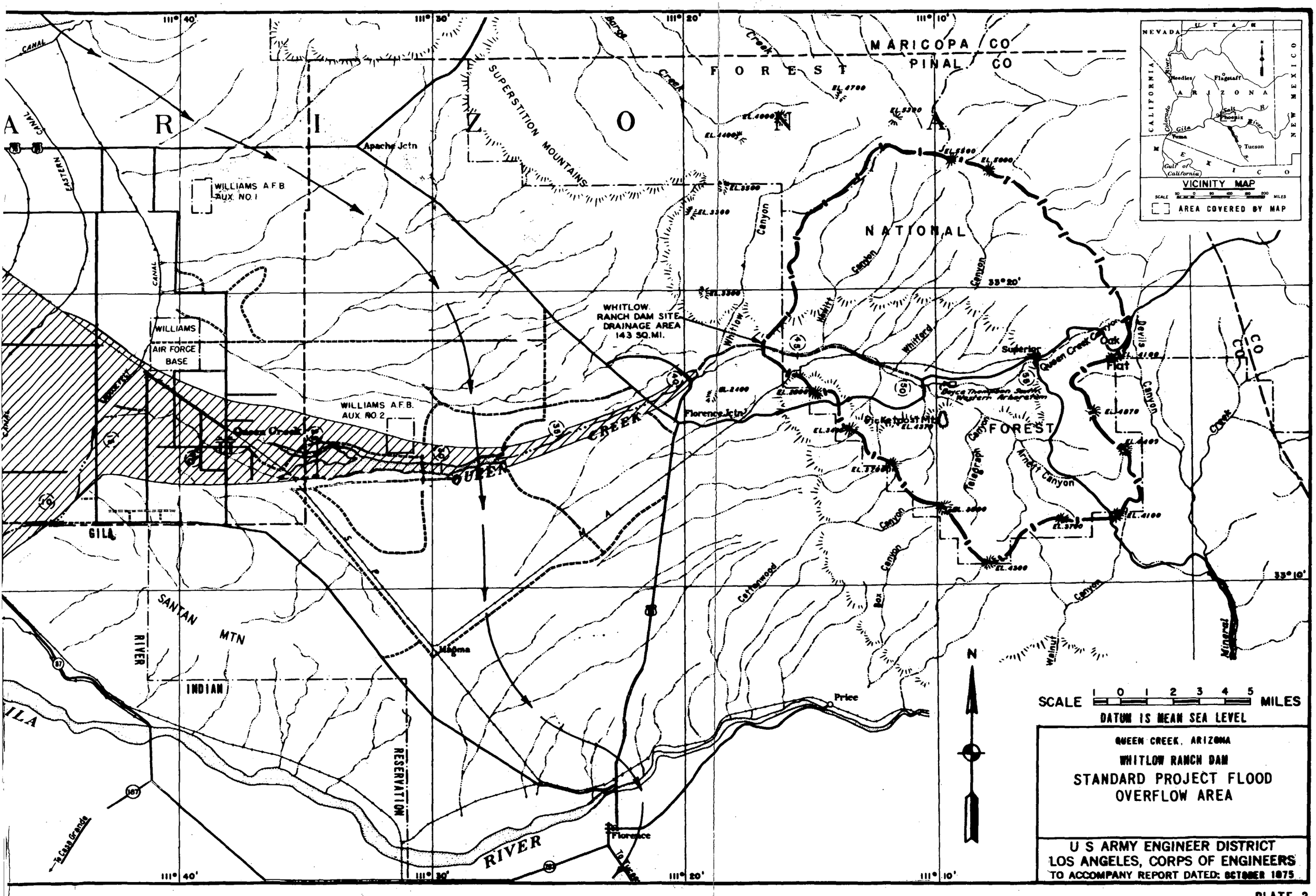
WHITLOW RANCH DAM

TOPOGRAPHY, DRAINAGE AREA AND HYDROLOGIC MAP

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 2


112° 00'
111° 50'
111° 40'
111° 30'
111° 20'
33°20'
33°10'
PHOENIX
SALT
RIVER
FLOW
Tempe
Mesa
Gilbert
Chandler
CANAL
EASTERN
WILLIAMS A.F.B AUX. NO. 1
Apache Jctn
SUPERSTITION MOUNTAINS
Barnes Creek
WHITLOW RANCH DAM SITE DRAINAGE AREA 143 SQ.MI.
WILLIAMS AIR FORCE BASE
GILA RIVER INDIAN RESERVATION
WILLIAMS A.F.B. AUX. NO. 5
WILLIAMS A.F.B. AUX. NO. 2
Queen Creek
QUEEN CREEK
MARICOPA CO
PINAL CO
GILA
SANTAN MTN
Magma
Florence
To Casa Grande
LEGEND
BOUNDARY OF DRAINAGE AREA UPSTREAM FROM WHITLOW RANCH DAM SITE
OVERFLOW AREA
40 MILES ABOVE GILA RIVER
APPROXIMATE ALIGNMENT OF THE PROPOSED CENTRAL ARIZONA PROJECT
NOTE:
THE OVERFLOW AREA REPRESENTS THE LAND SUBJECT TO FLOODING BY THE STANDARD PROJECT FLOOD BEFORE THE WHITLOW RANCH DAM WAS CONSTRUCTED. THE OVERFLOW AREA WAS EXTRACTED FROM 'DESIGN MEMORANDUM NO. 3, GENERAL DESIGN FOR WHITLOW RANCH RESERVOIR, QUEEN CREEK, ARIZONA, JUNE 1958' BY THE CORPS OF ENGINEERS AND IS REPRESENTATIVE OF CONDITIONS AT THAT TIME.



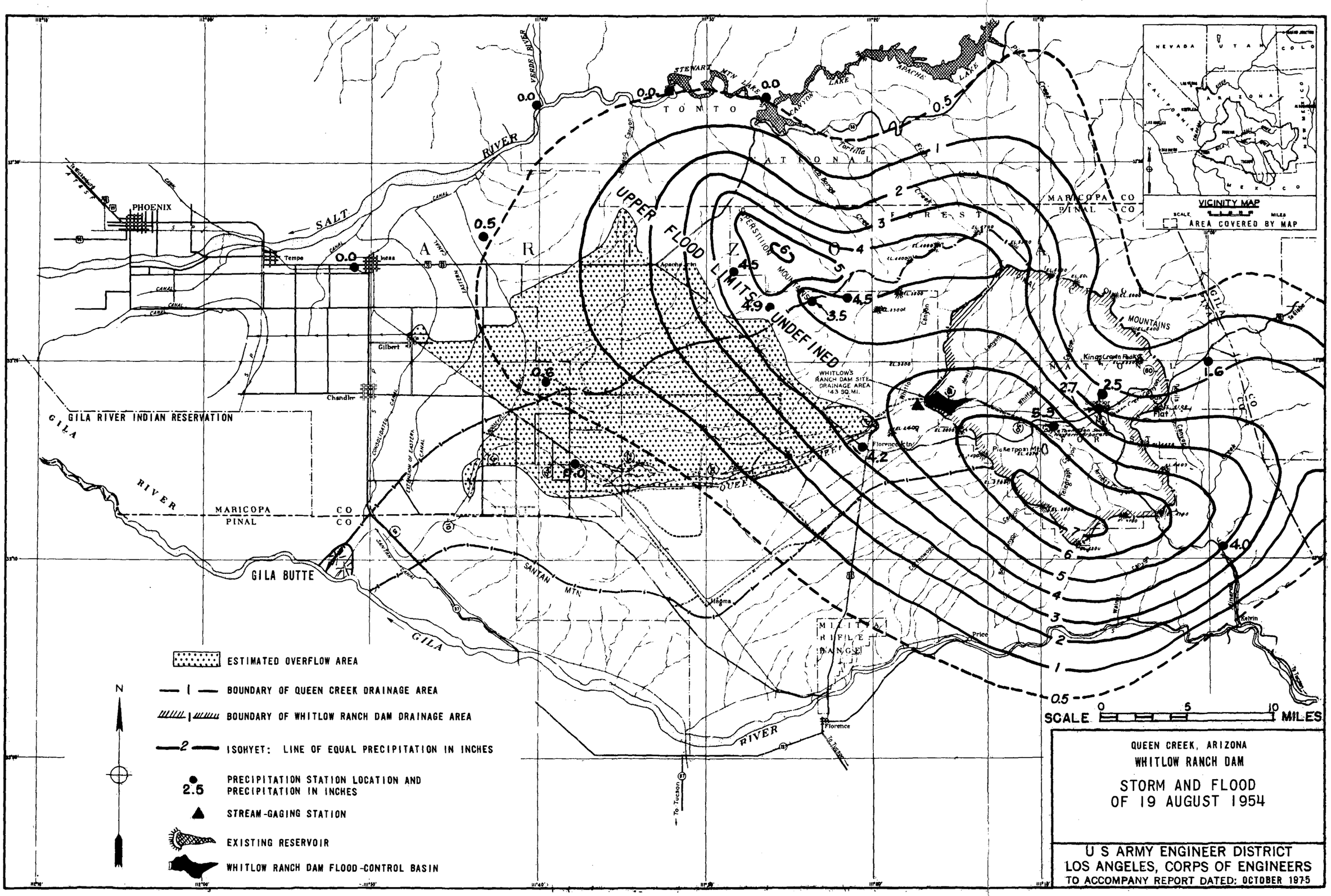
QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

STANDARD PROJECT FLOOD OVERFLOW AREA

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 3



QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

STORM AND FLOOD OF 19 AUGUST 1954

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 4

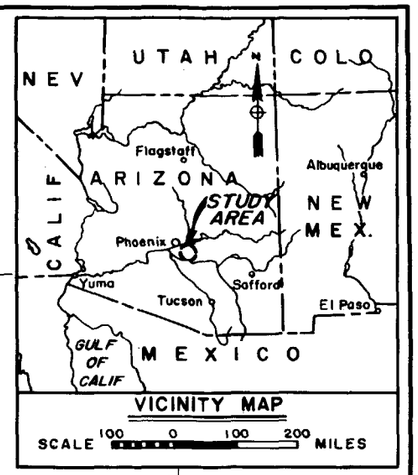
E. 693,000
E. 697,000
E. 701,000
E. 705,000
E. 709,000
E. 713,000
E. 717,000
N. 846,000
N. 842,000
N. 838,000
N. 834,000
N. 830,000

N

Maximum Water Surface El. 2194
Maximum Water Surface El. 2194
Maximum Water Surface El. 2194
Maximum Water Surface El. 2194
Maximum Water Surface El. 2194
Maximum Water Surface El. 2194

Flow
Spillway
Flow
QUEEN CREEK
60 Cycle-12 KV
Arizona Public Service Co
Spillway Crest El 2166
Flow
Flow
Spillway Crest El 2166
Intake
Top of Dam El 2199
WHITLOW RANCH DAM
Access Road
Salt River Power District-25 Cycle-110 KV
Comel Mountains El 2694
Dike
Magma Arizona R.R.
Salt River Power District-Tejabenea Line
Salt River Power District 60 Cycle 115 KV.
To Hwy 60-70
To Hwy 60-70
Magma Arizona R.R.
To Hwy 60-70 Superior

SCALE 500 0 500 1000 1500 2000 2500 FEET



VICINITY MAP

SCALE 100 0 100 200 MILES

ARIZONA CENTRAL ZONE
TRANSVERSE MERCATOR PROJECTION
N A 1927 DATUM

REFERENCE
TOPOGRAPHY TAKEN FROM FAIRCHILD AERIAL SURVEYS SEPT. 1939

CONTOUR INTERVAL IS 20 FEET

DATUM IS MEAN SEA LEVEL

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

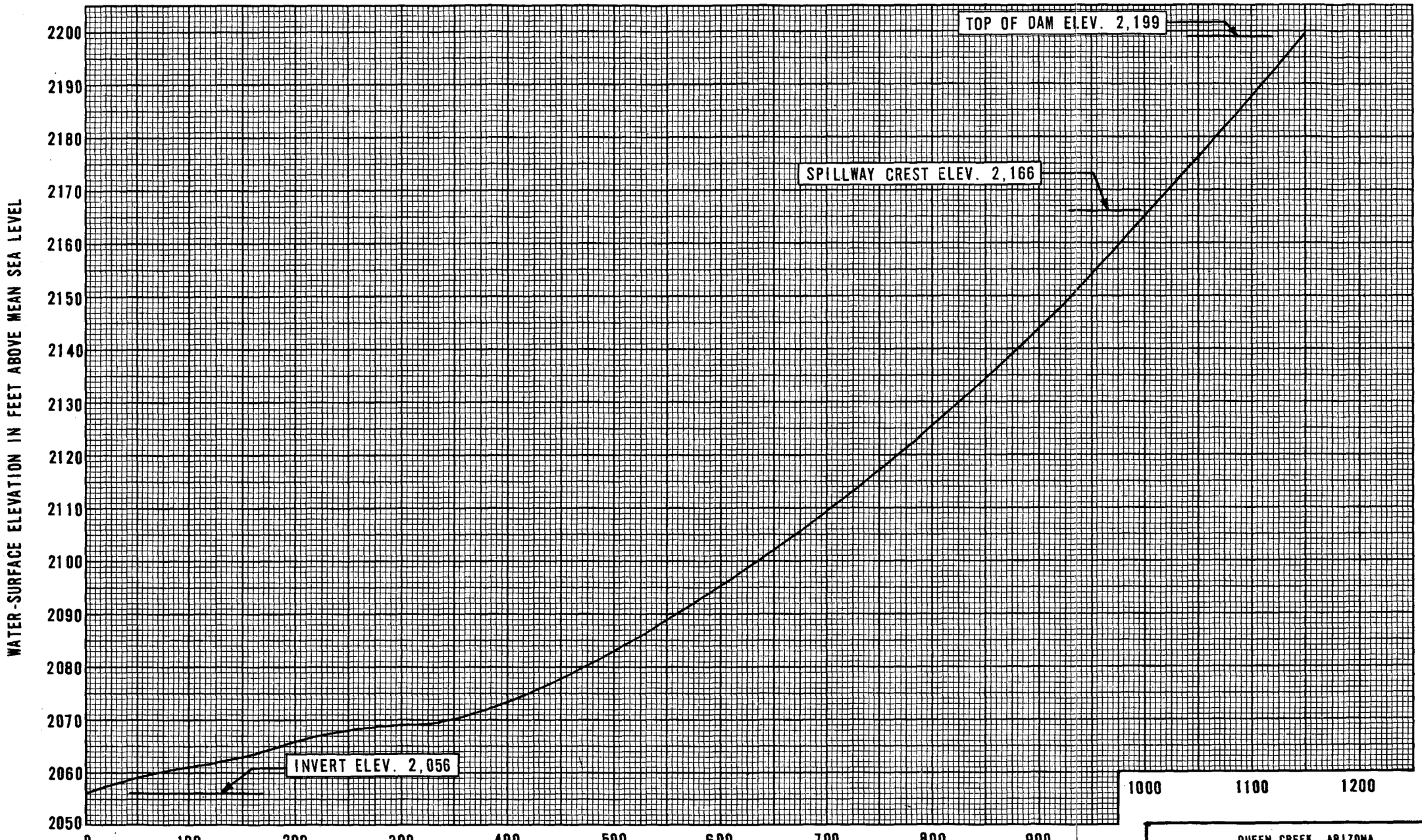
GENERAL PLAN OF RESERVOIR

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 5

Plates 6-8 are not currently available.

For additional information, please contact the Los Angeles District Public Affairs Office at (213) 452-3908.



QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

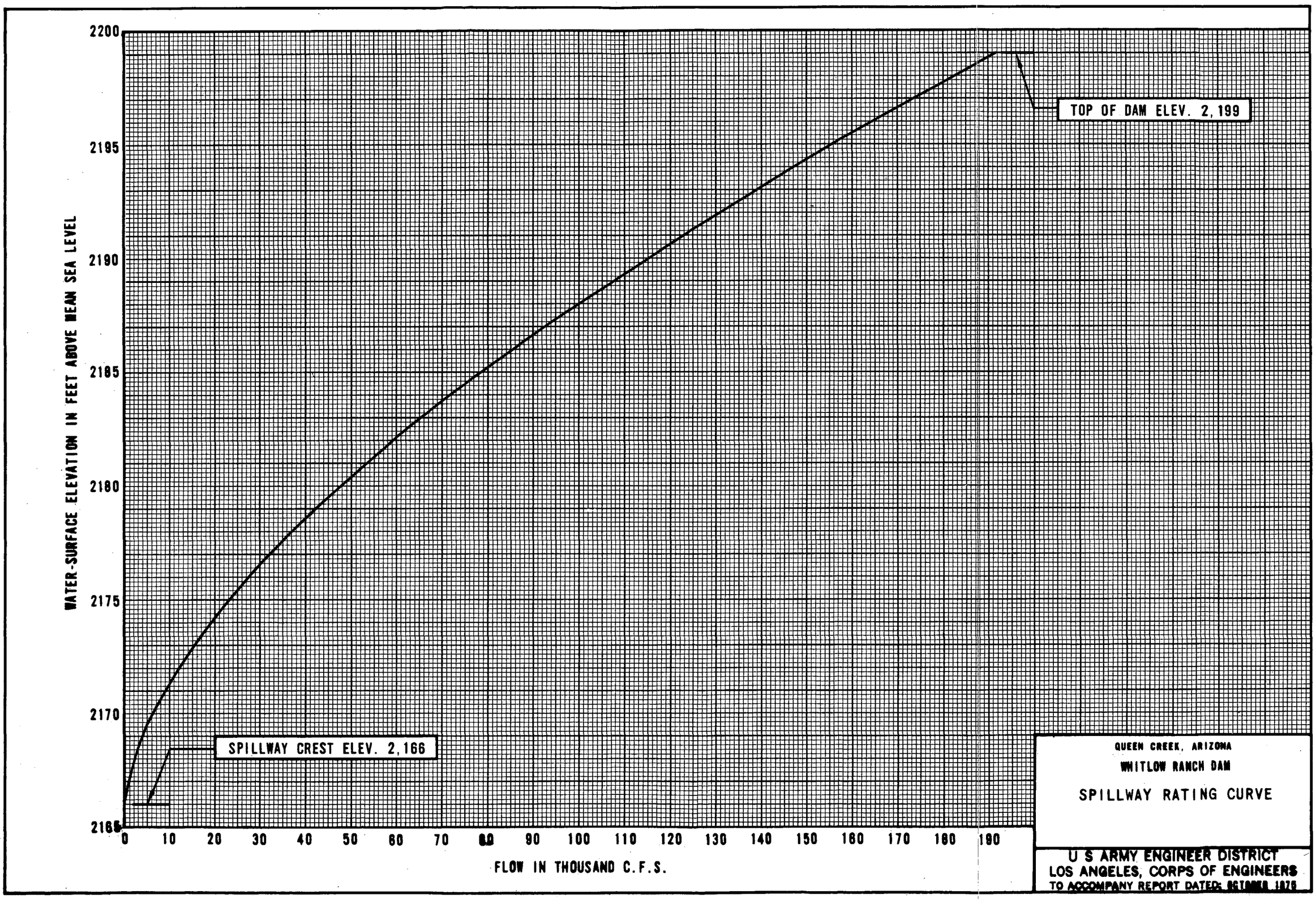
OUTLET RATING CURVE
5.5-FT.-DIA. UNGATED CONDUIT

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 9

Plates 10-13 are not currently available.

For additional information, please contact the Los Angeles District Public Affairs Office at (213) 452-3908.



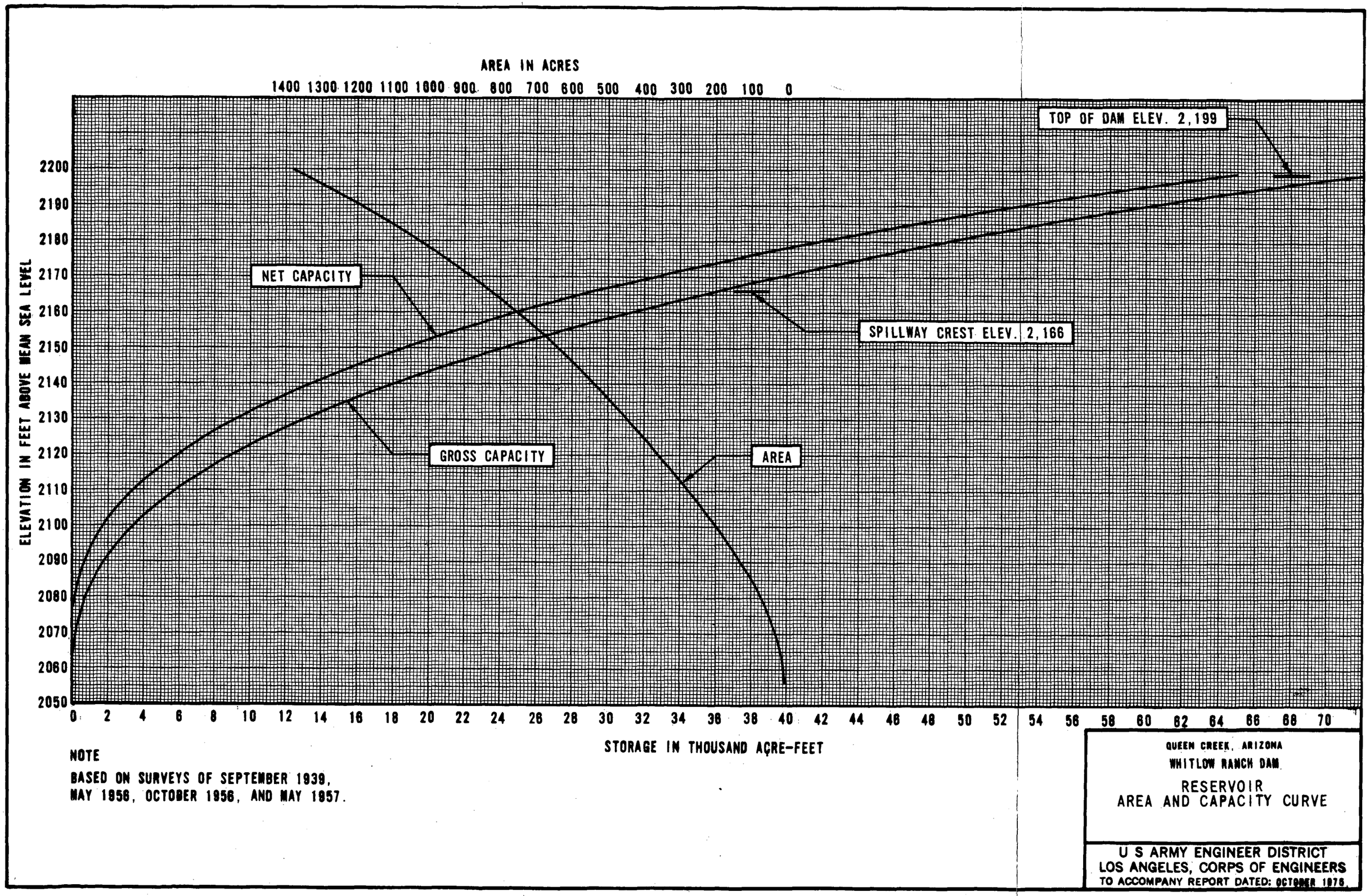
QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

SPILLWAY RATING CURVE

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1978

PLATE 14



NOTE

BASED ON SURVEYS OF SEPTEMBER 1939, MAY 1956, OCTOBER 1956, AND MAY 1957.

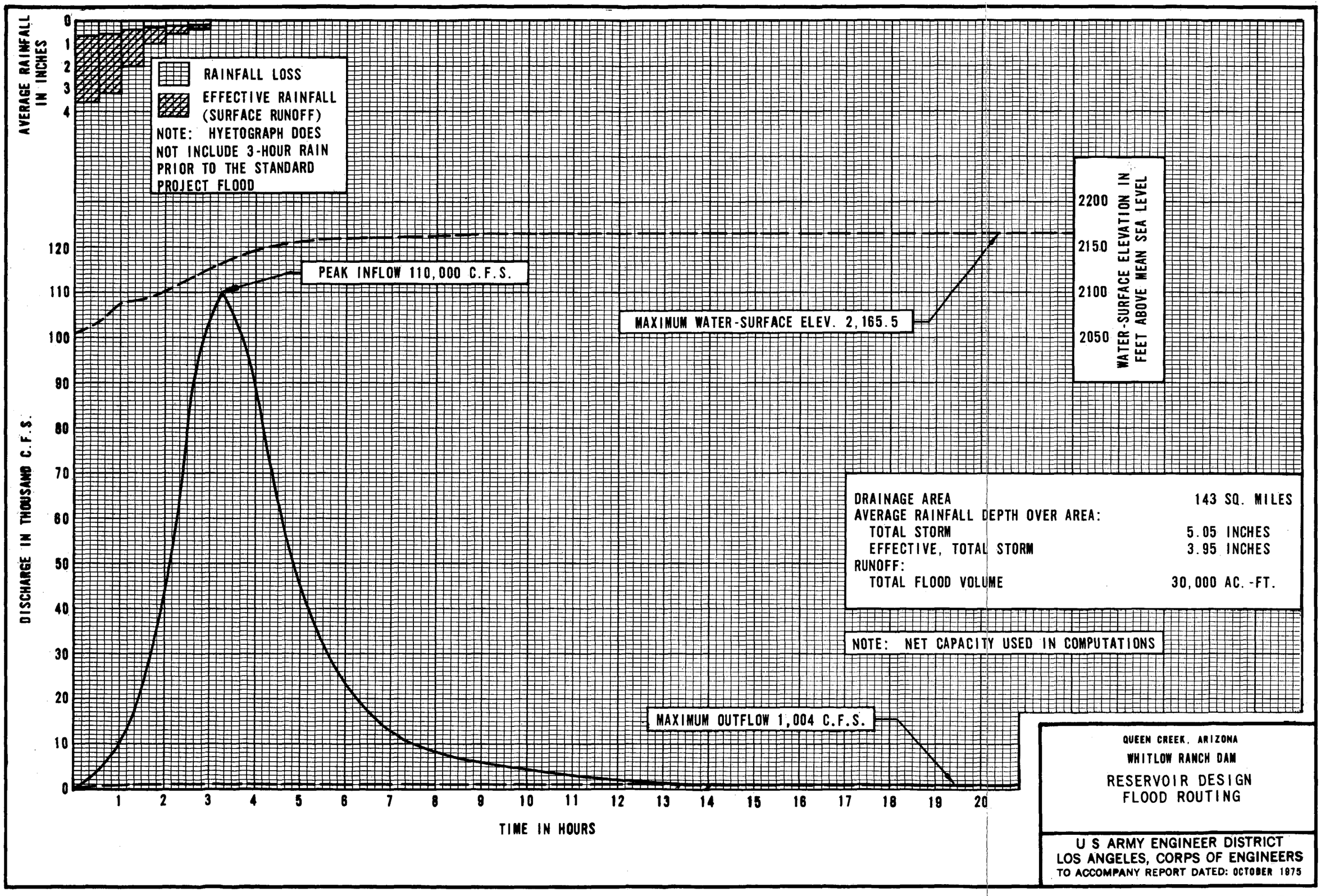
QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

RESERVOIR
AREA AND CAPACITY CURVE

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1976

PLATE 15



DRAINAGE AREA	143 SQ. MILES
AVERAGE RAINFALL DEPTH OVER AREA:	
TOTAL STORM	5.05 INCHES
EFFECTIVE, TOTAL STORM	3.95 INCHES
RUNOFF:	
TOTAL FLOOD VOLUME	30,000 AC.-FT.

NOTE: NET CAPACITY USED IN COMPUTATIONS

QUEEN CREEK, ARIZONA

WHITLOW RANCH DAM

RESERVOIR DESIGN
FLOOD ROUTING

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 16

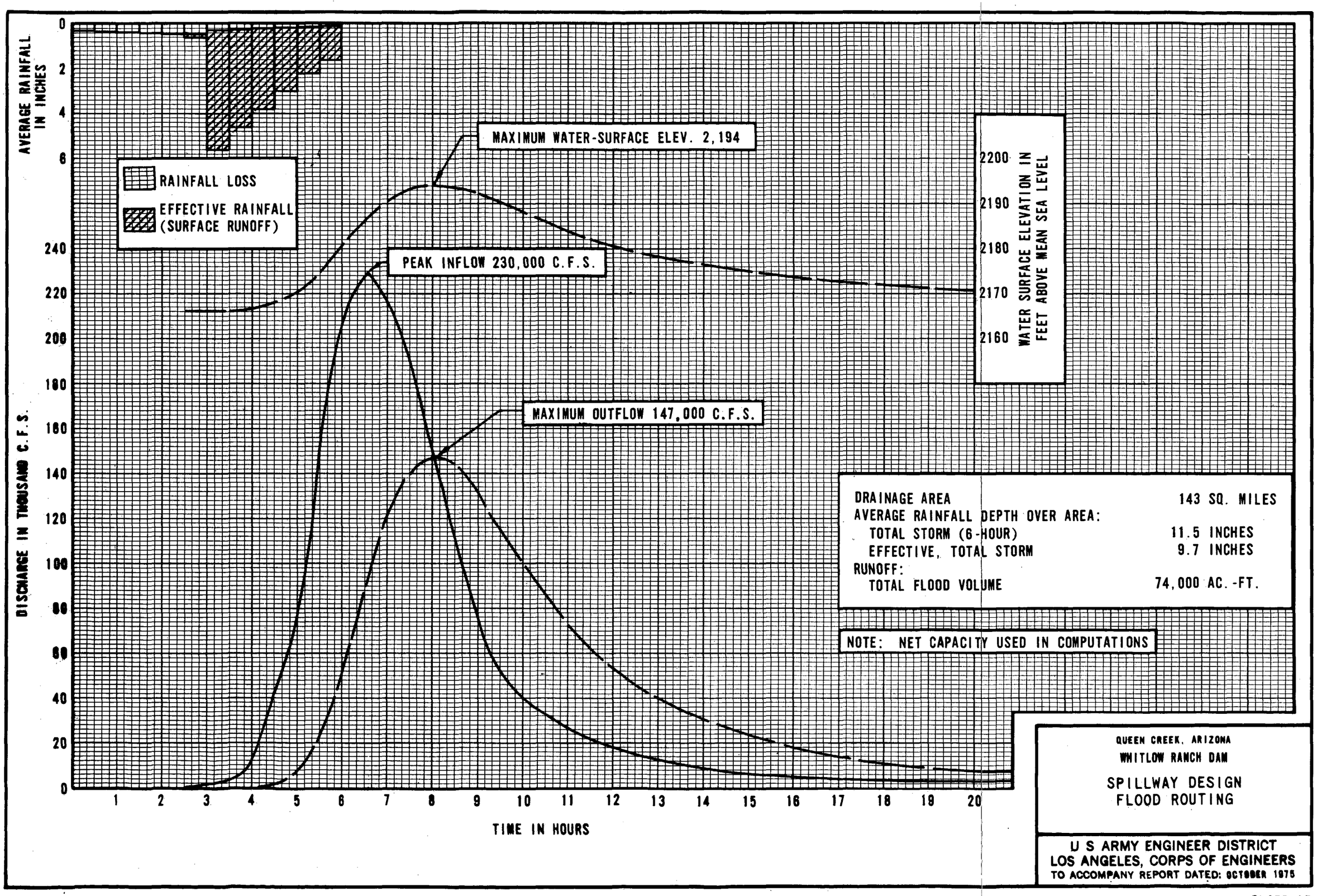

AVERAGE RAINFALL IN INCHES
0
2
4
6
RAINFALL LOSS
EFFECTIVE RAINFALL (SURFACE RUNOFF)
MAXIMUM WATER-SURFACE ELEV. 2,194
PEAK INFLOW 230,000 C.F.S.
MAXIMUM OUTFLOW 147,000 C.F.S.
DISCHARGE IN THOUSAND C.F.S.
240
220
200
180
160
140
120
100
80
60
40
20
0
2200
2190
2180
2170
2160
WATER SURFACE ELEVATION IN FEET ABOVE MEAN SEA LEVEL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
TIME IN HOURS
DRAINAGE AREA 143 SQ. MILES
AVERAGE RAINFALL DEPTH OVER AREA:
TOTAL STORM (6-HOUR) 11.5 INCHES
EFFECTIVE, TOTAL STORM 9.7 INCHES
RUNOFF:
TOTAL FLOOD VOLUME 74,000 AC.-FT.
NOTE: NET CAPACITY USED IN COMPUTATIONS
QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM
SPILLWAY DESIGN
FLOOD ROUTING
U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 17

CHAIN OF COMMAND FOR RESERVOIR OPERATIONS DECISIONS

Corps of Engineers
Los Angeles District

Title	Office Phone Number
District Engineer	(213) 894-5300 FTS 798-5300
Chief, Engineering Division	(213) 894-5470 FTS 798-5470
Chief, Hydrology & Hydraulic Branch	(213) 894-5520 FTS 798-5520
Chief, Hydrologic Engineering Section	(213) 894-4753 FTS 798-4753
Chief, Reservoir Regulation Unit	(213) 894-4756 FTS 798-4756

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

CHAIN OF COMMAND FOR
RESERVOIR OPERATIONS DECISIONS

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

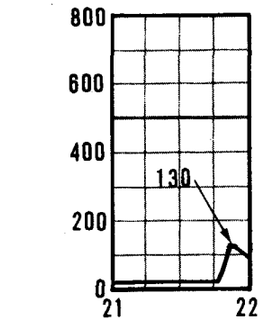
PLATE 18

Revised July 1985

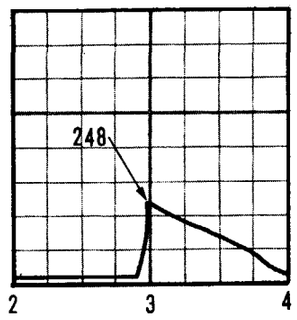
NOTE

Plates 19, 20 and 21 are deleted. The information on these plates is outdated and has been revised, consolidated and included on plate 18.

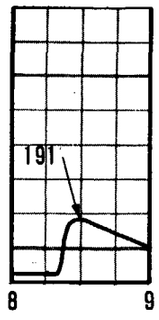
Revised July 1985



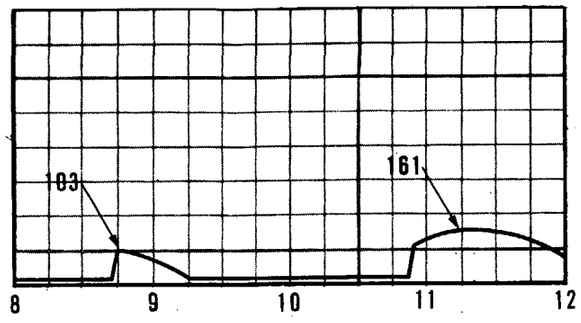
JUL 1961



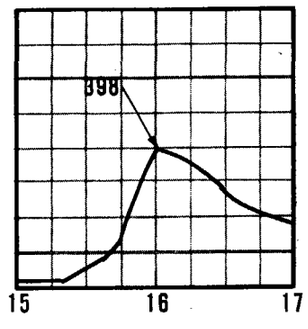
AUG 1961



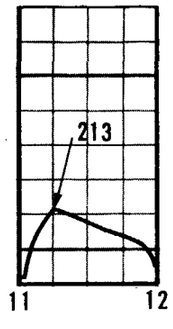
SEP 1961



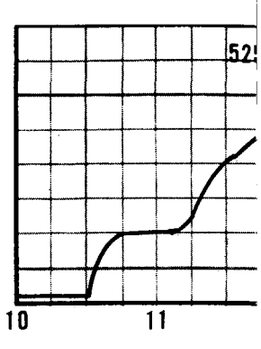
DEC 1961



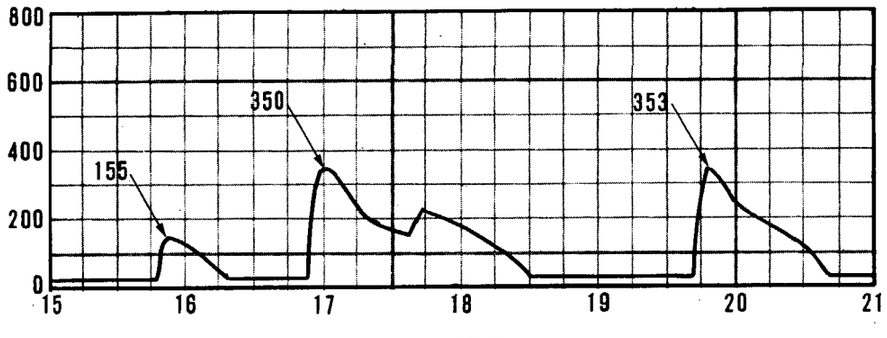
DEC 1961



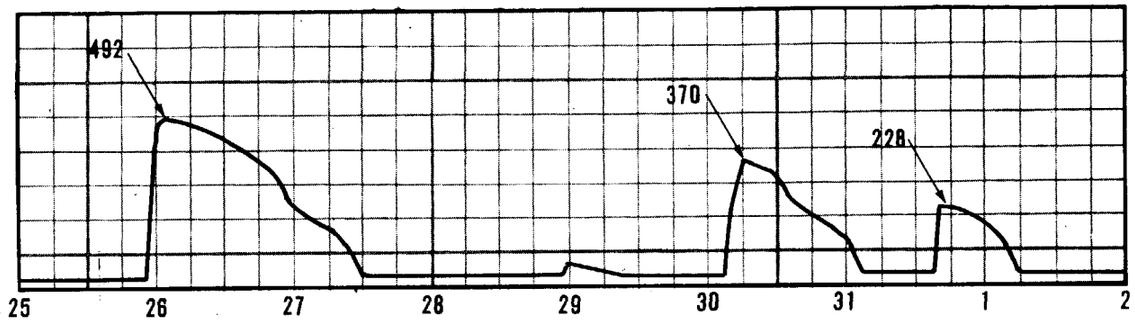
JAN 1963



OUTFLOW IN CFS



AUG 1963



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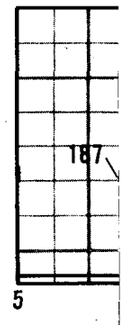

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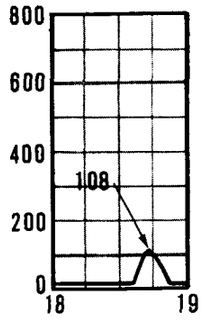
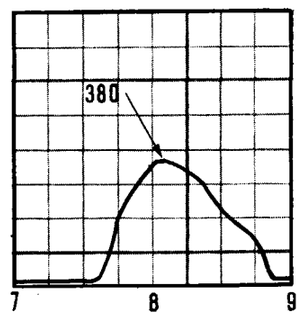
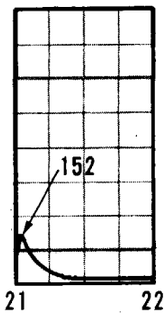


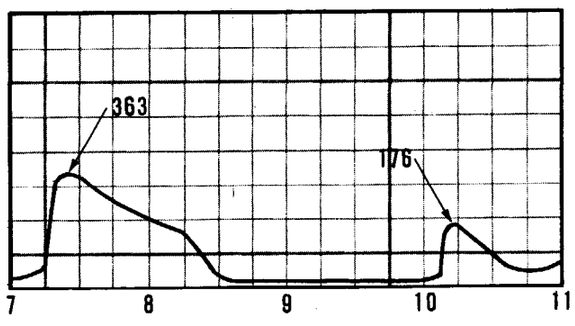
DEC 1964



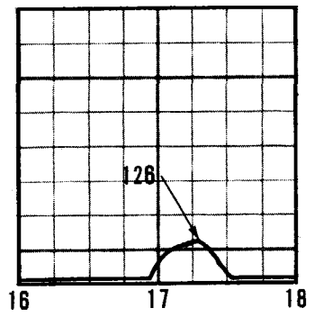
JAN 1964



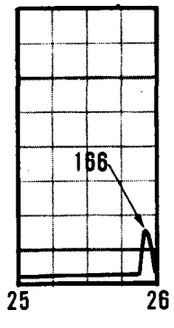
JAN 1965



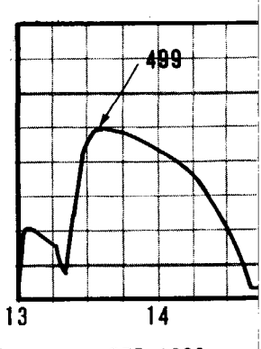
FEB 1965



MAR 1965



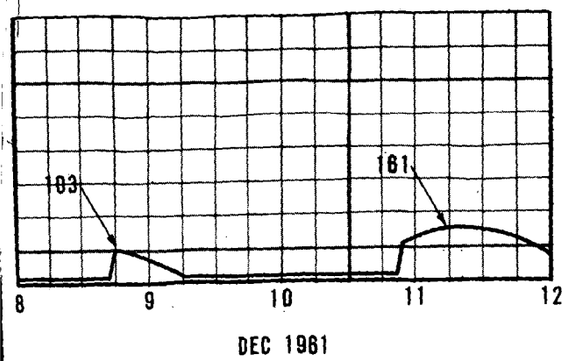
AUG 1966



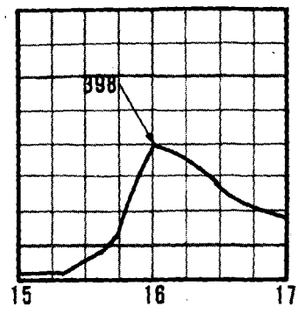
SEP 1966

NOTES:

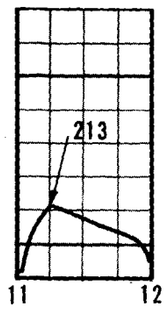
1. ONLY PERIODS WITH OUTFLOW GREATER THAN 100 CFS SHOWN.
2. CONTINUOUS OUTFLOW IS LESS THAN 10 CFS.
3. OUTFLOW RECORD IS FROM RESERVOIR WATER SURFACE RECORDS.
4. PERIOD OF RECORD IS FROM 5 JUNE 1958 TO 31 DEC 1973.
5. PEAK OUTFLOW IS INDICATED BY NUMERICAL VALUE FOR EACH FLOW PERIOD.
6. OUTFLOW RECORD IS NOT AVAILABLE FOR THE PERIOD OF 9 NOV 1965 TO 23 MARCH 1966.



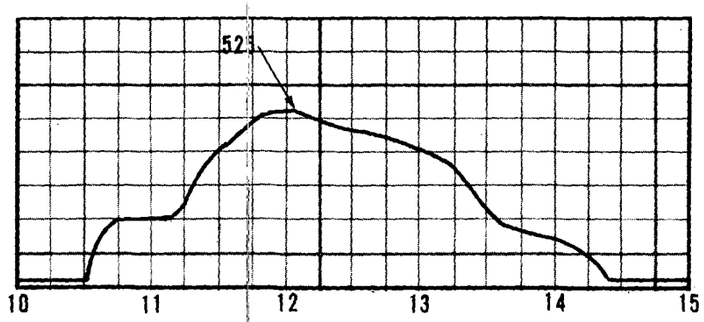
DEC 1961



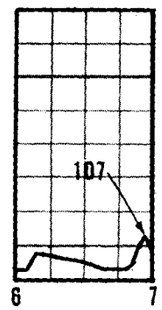
DEC 1961



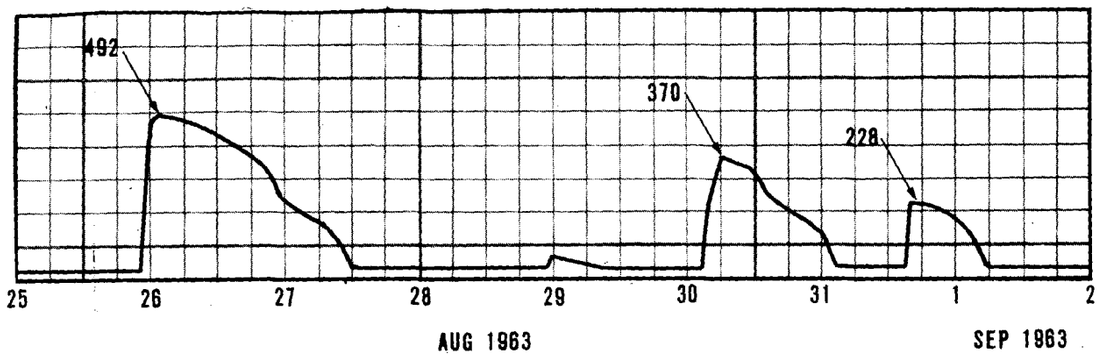
JAN 1963



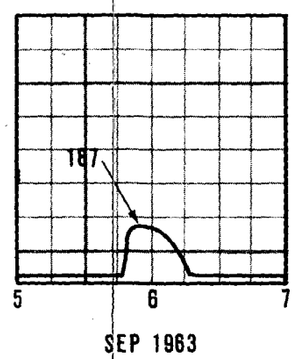
FEB 1963



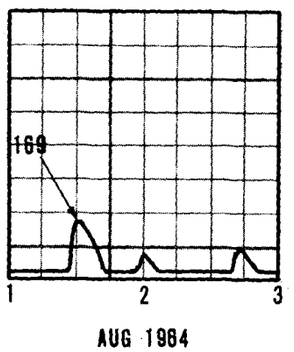
AUG 1963



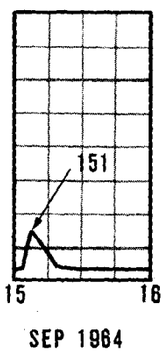
AUG 1963 — SEP 1963



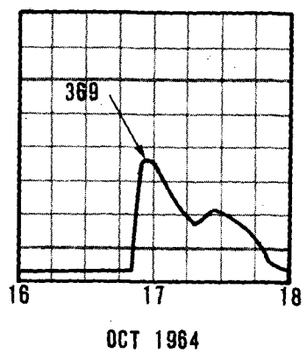
SEP 1963



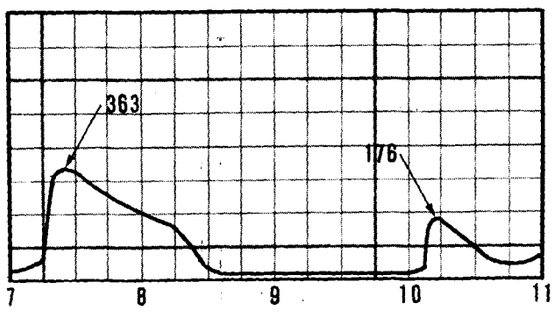
AUG 1964



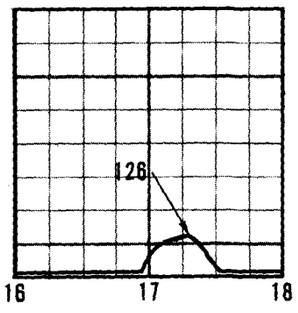
SEP 1964



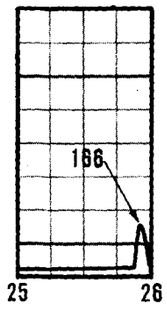
OCT 1964



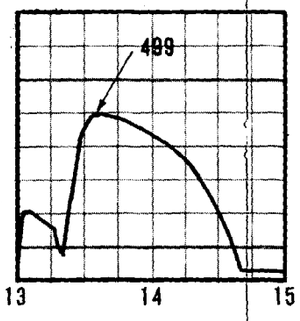
FEB 1965



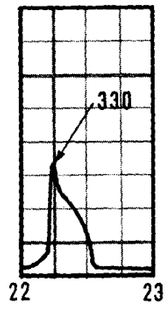
MAR 1965



AUG 1966



SEP 1966



JUL 1967

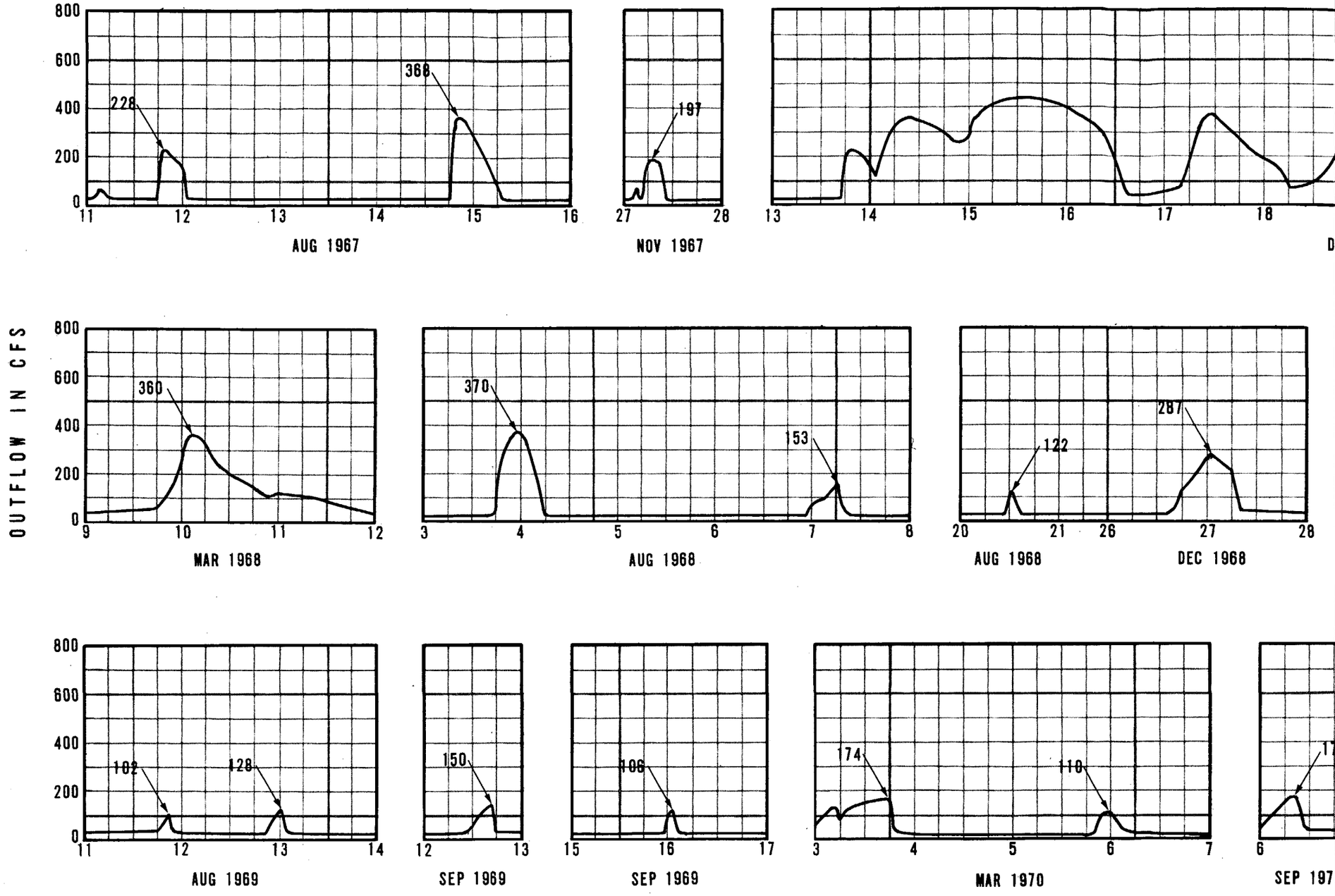
ERIOD.
TO 23 MARCH 1966.

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

HISTORICAL OPERATION

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 22-1



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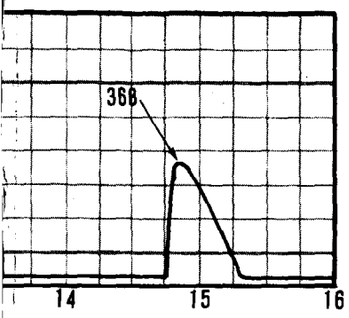
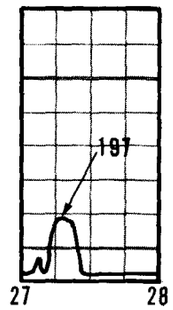
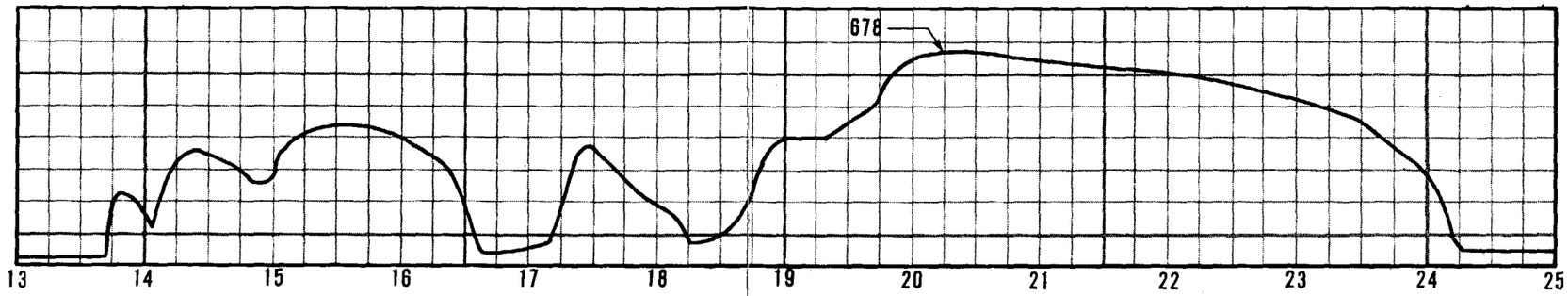


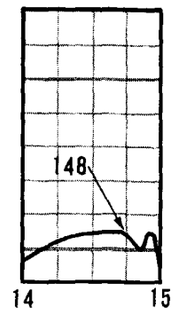
967



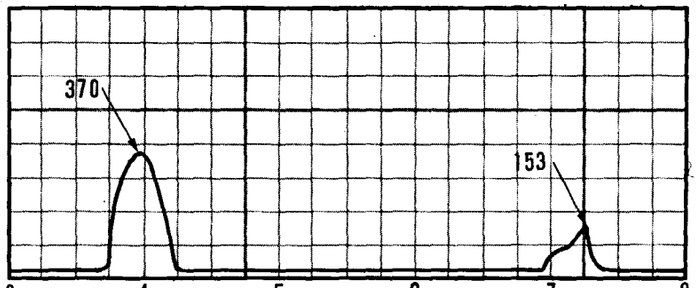
NOV 1967



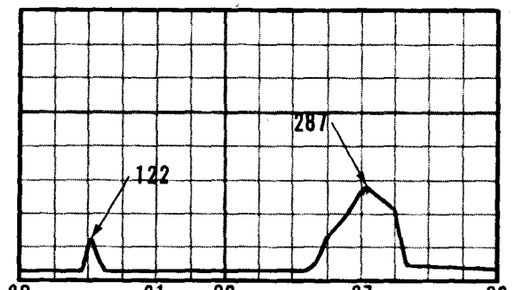
DEC 1967



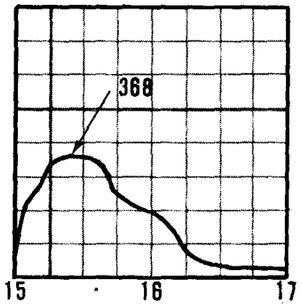
FEB 1968



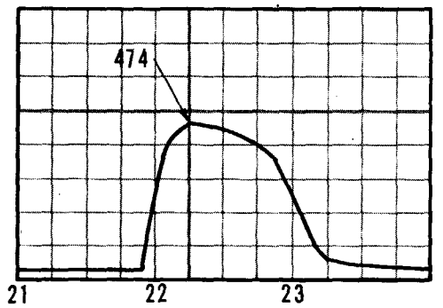
AUG 1968



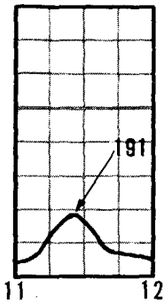
AUG 1968 DEC 1968



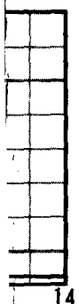
JAN 1969

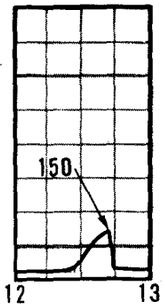


JAN 1969

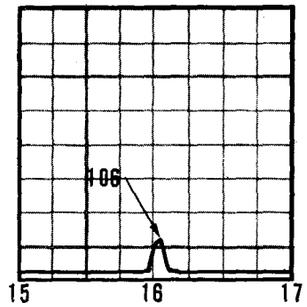


MAR 1969

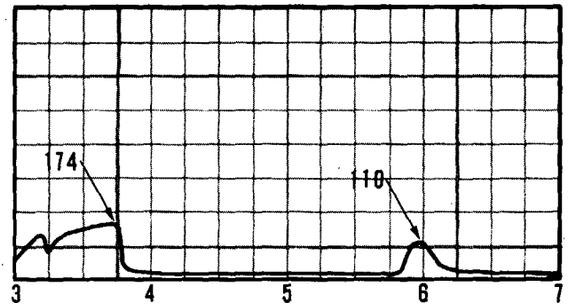




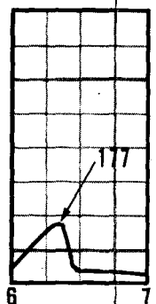
SEP 1969



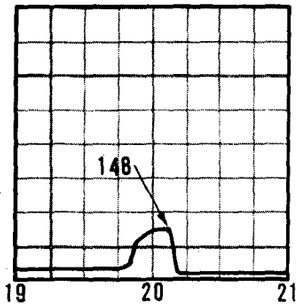
SEP 1969



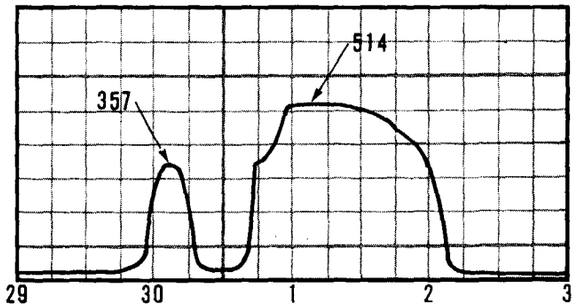
MAR 1970



SEP 1970



AUG 1971



SEP 1971 OCT 1971

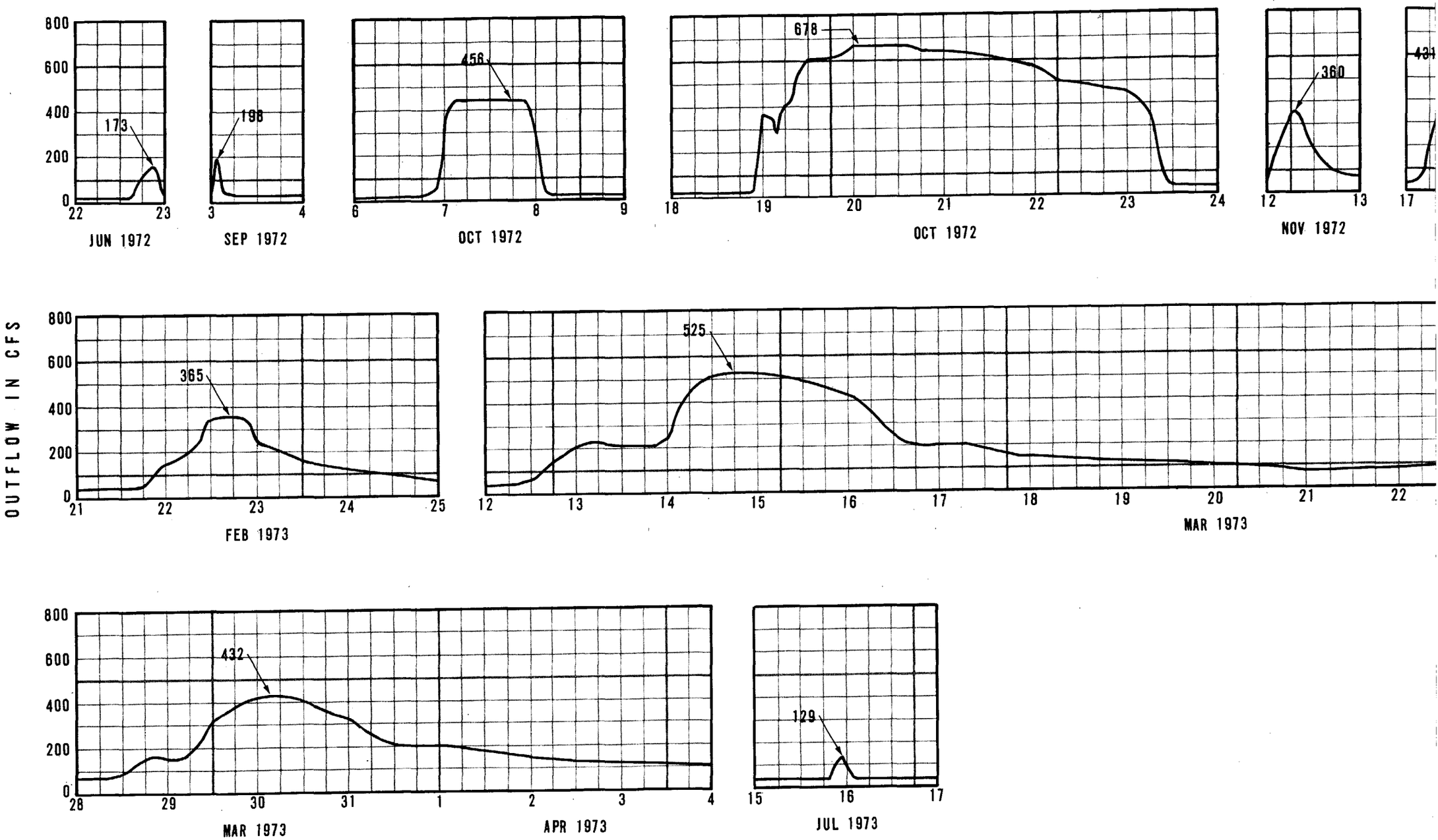
GREATER THAN 100 CFS SHOWN.
THAN 10 CFS.
ERVOIR WATER SURFACE RECORDS.
JUNE 1958 TO 31 DEC 1973.
BY NUMERICAL VALUE FOR EACH FLOW PERIOD.

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

HISTORICAL OPERATION

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 22-2



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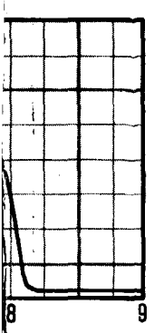
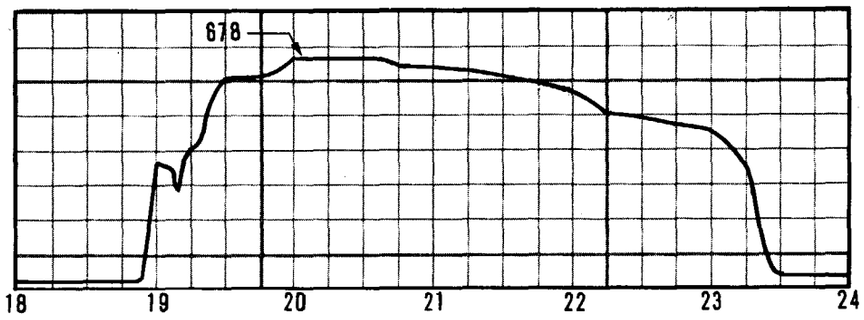
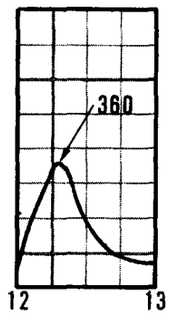
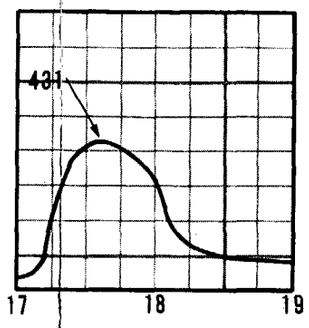




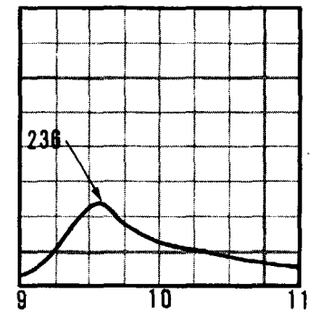
OCT 1972



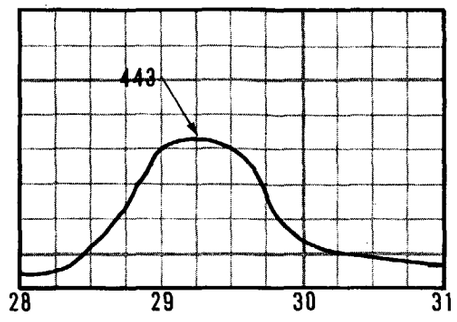
NOV 1972



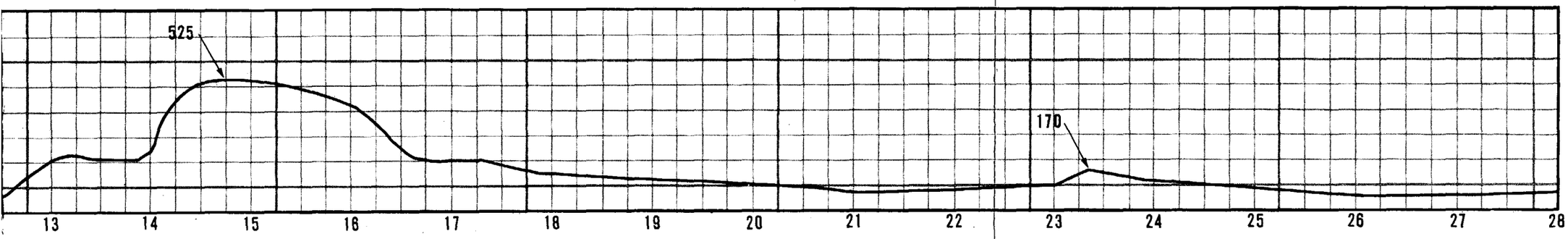
NOV 1972



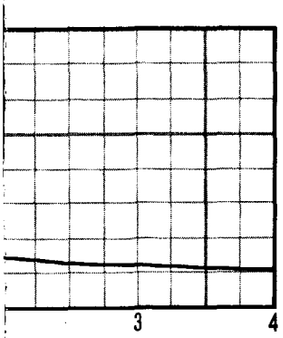
DEC 1972



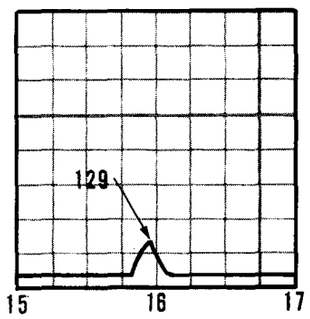
DEC 1972



MAR 1973



APR 1973



JUL 1973

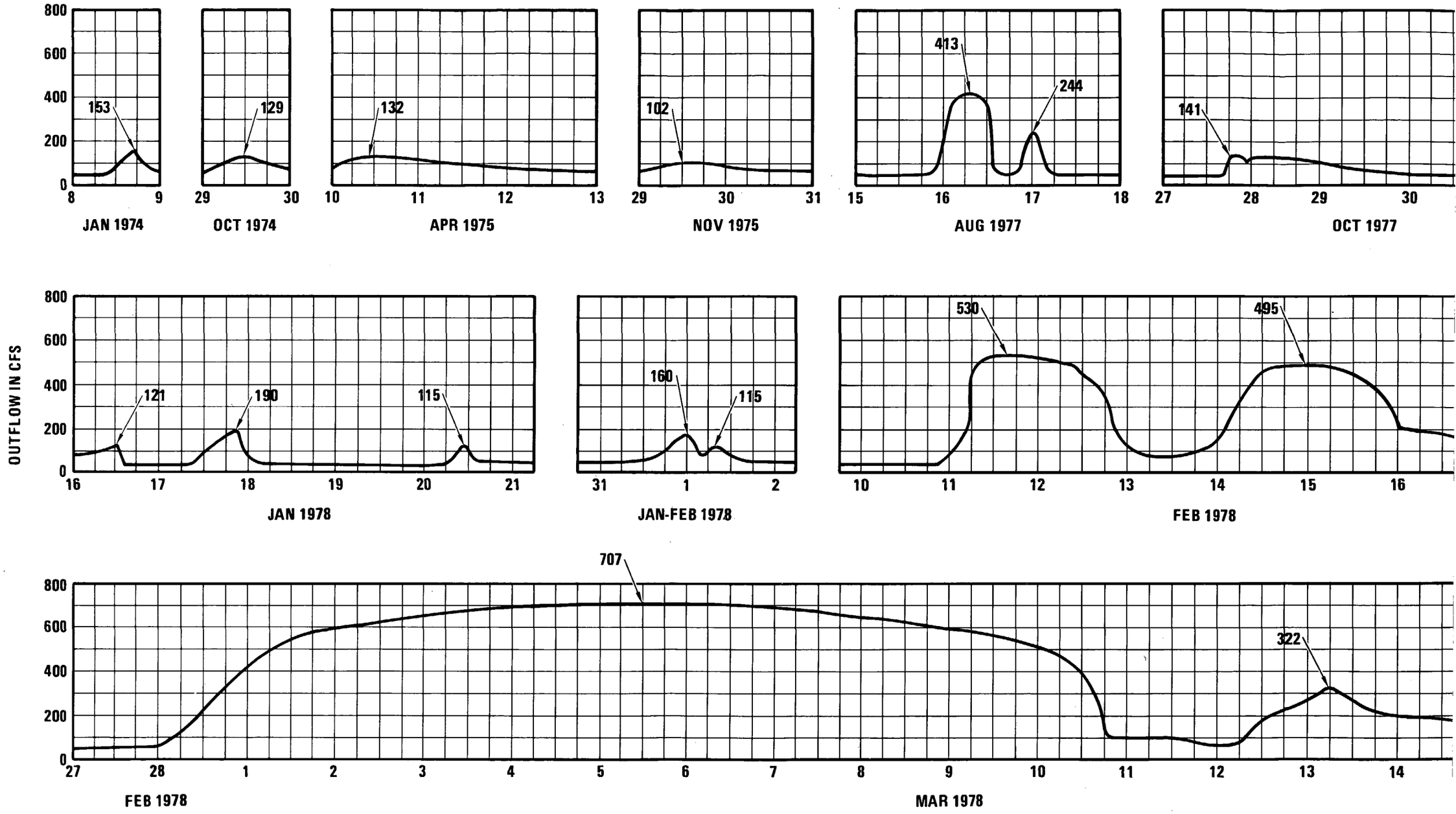
FLOW PERIOD.

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

HISTORICAL OPERATION

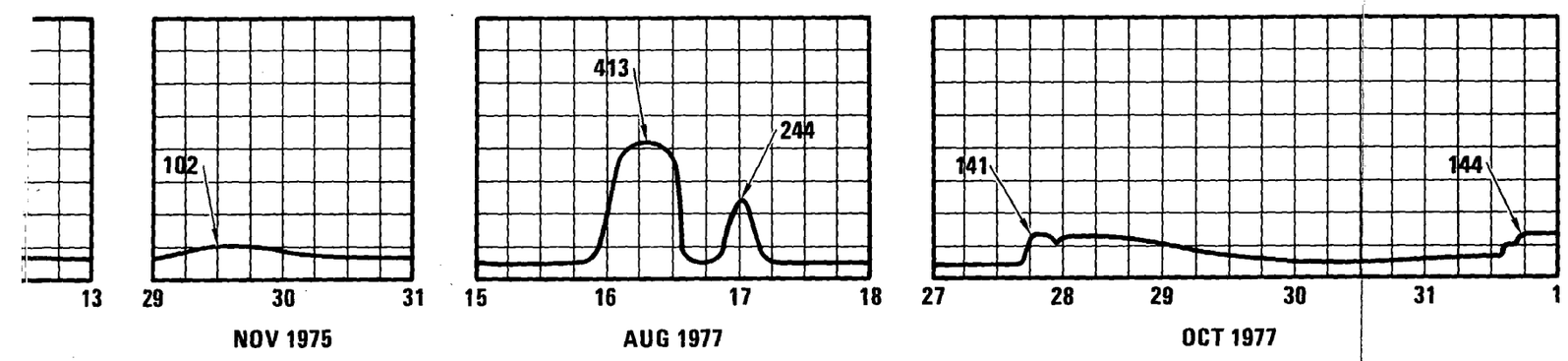
U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

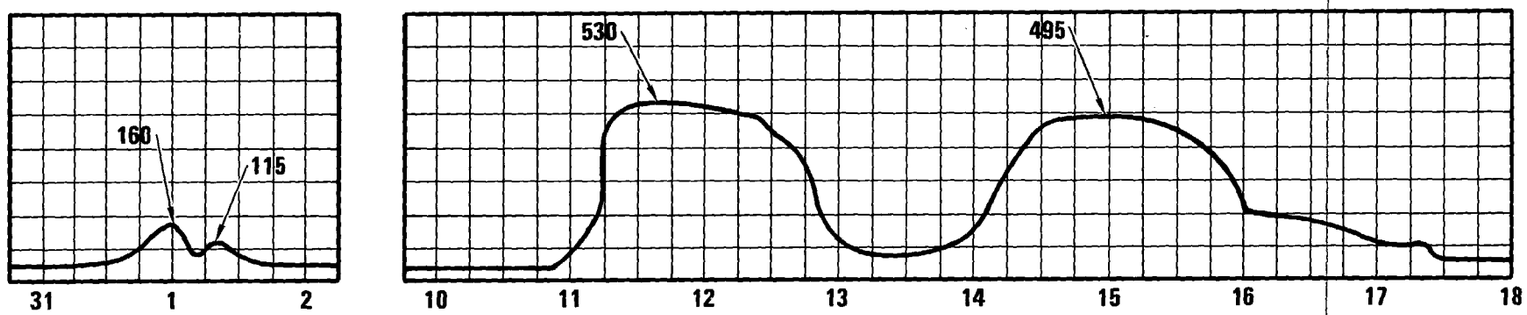
PLATE 22-3

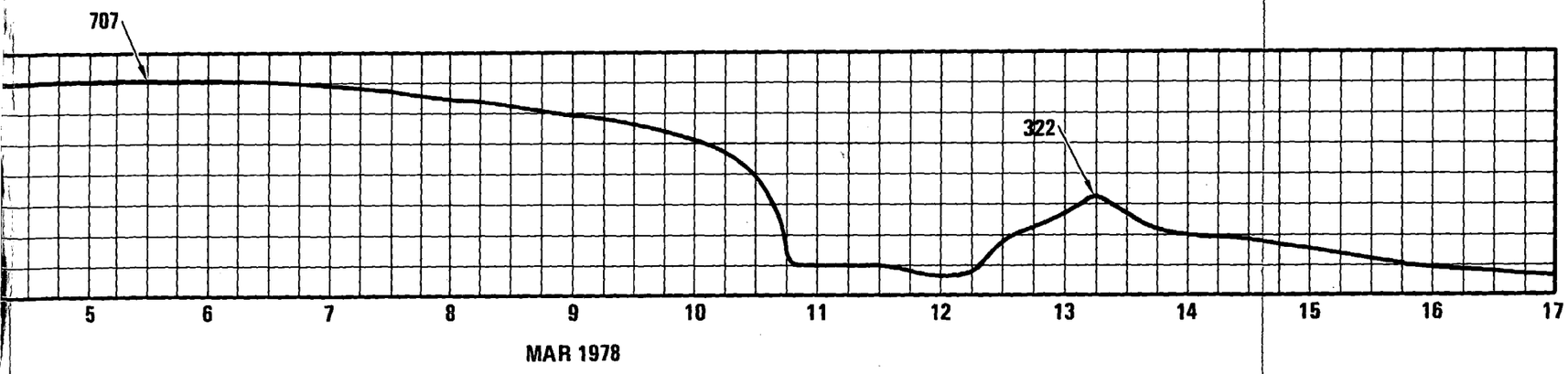


NOTES:

1. ONLY PERIODS WITH OUTFLOW GREATER THAN 100 CFS SHOWN.
2. CONTINUOUS OUTFLOW IS LESS THAN 10 CFS.
3. OUTFLOW RECORD IS FROM RESERVOIR WATER SURFACE RECORDS.
4. PERIOD OF RECORD IS FROM 5 JUNE 1958 TO 30 SEPTEMBER 1984.
5. PEAK OUTFLOW IS INDICATED BY NUMERICAL VALUE FOR EACH FLOW PERIOD.







) CFS SHOWN.

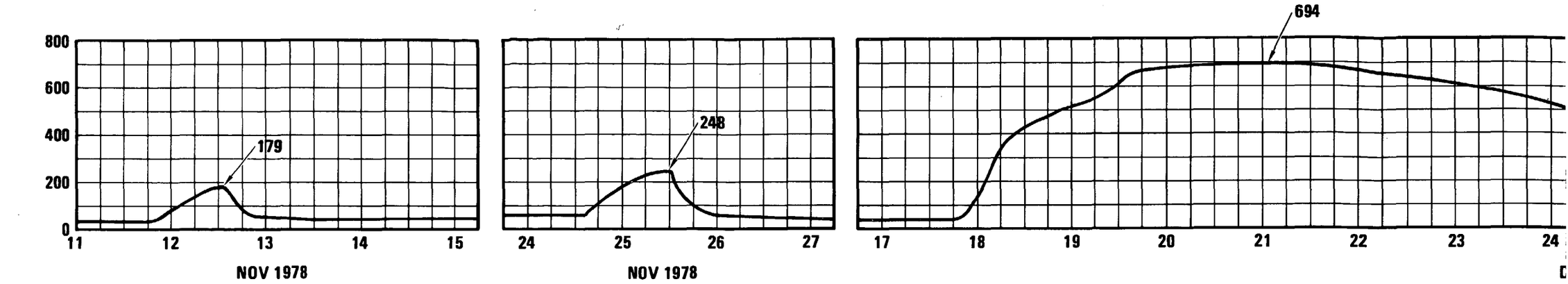
RFACE RECORDS.
PTEMBER 1984.
JE FOR EACH FLOW PERIOD.

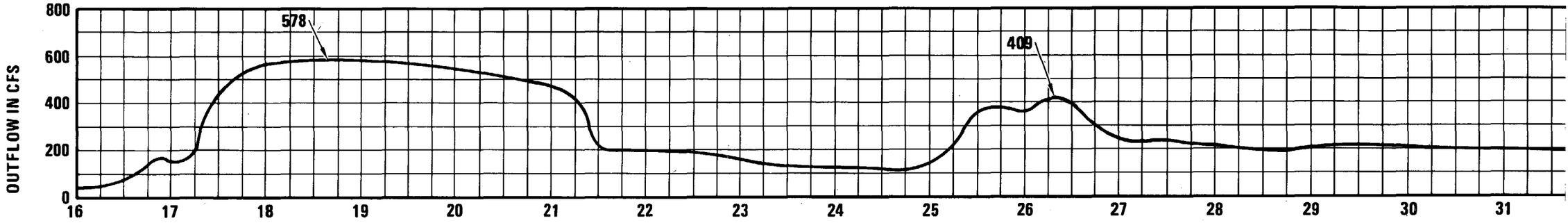
QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

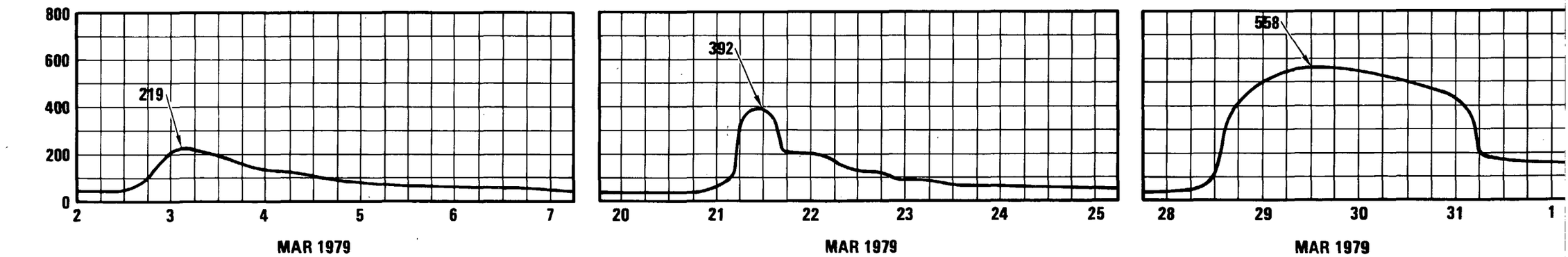
HISTORICAL OPERATION

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 22-4







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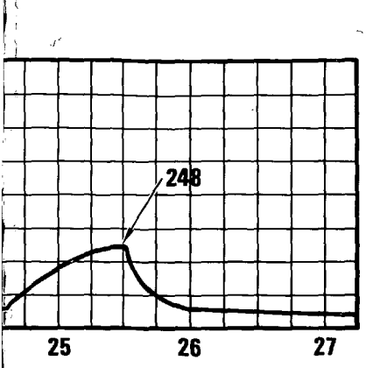
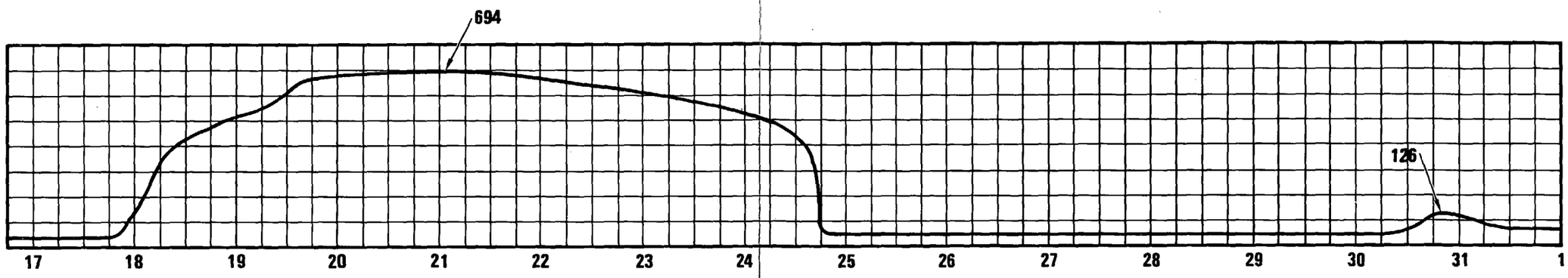
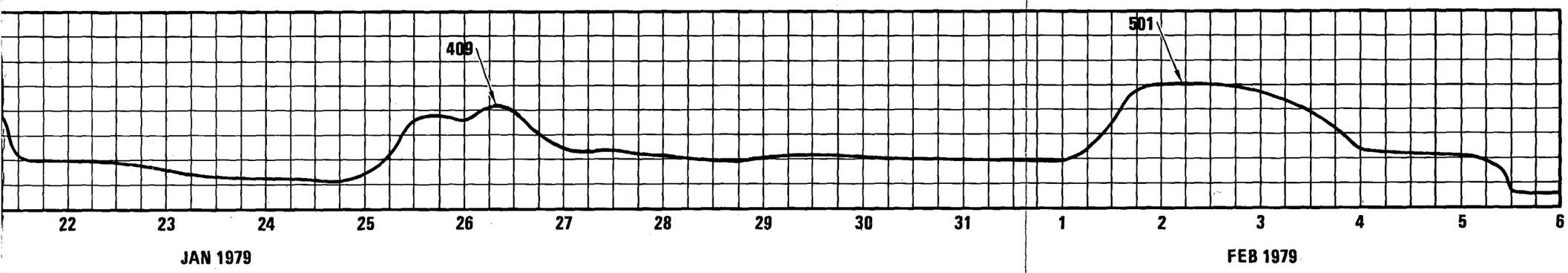


NOV 1978

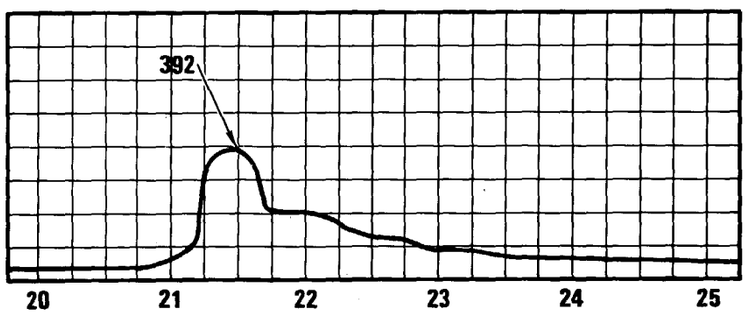


DEC 1978

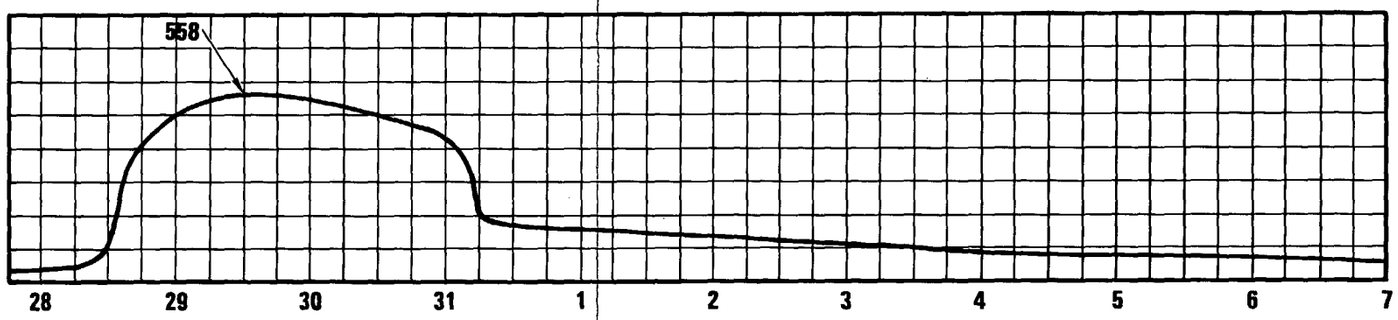


JAN 1979

FEB 1979

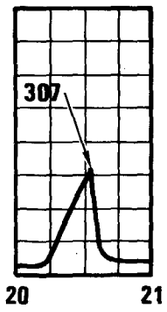


MAR 1979



MAR 1979

APR 1979



MAY 1979

FS SHOWN.

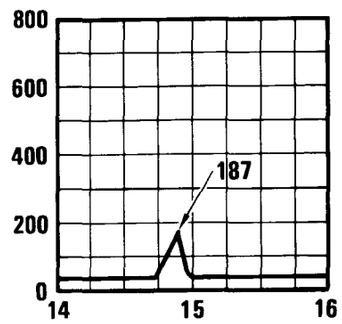
ICE RECORDS.
EMBER 1984.
FOR EACH FLOW PERIOD.

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

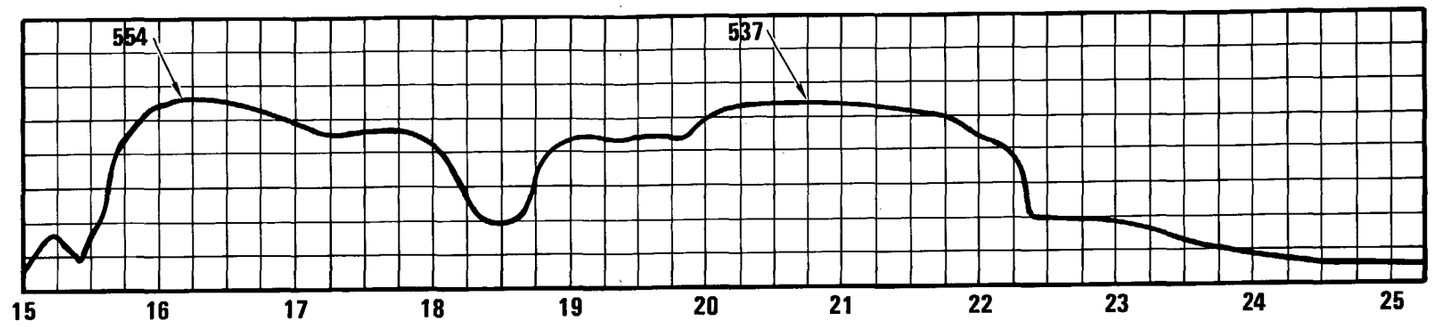
HISTORICAL OPERATION

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

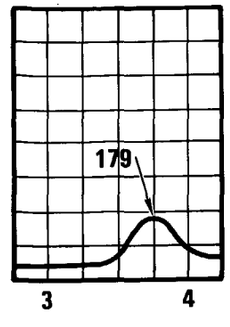
PLATE 22-5



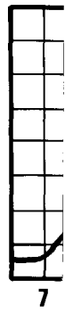
AUG 1979



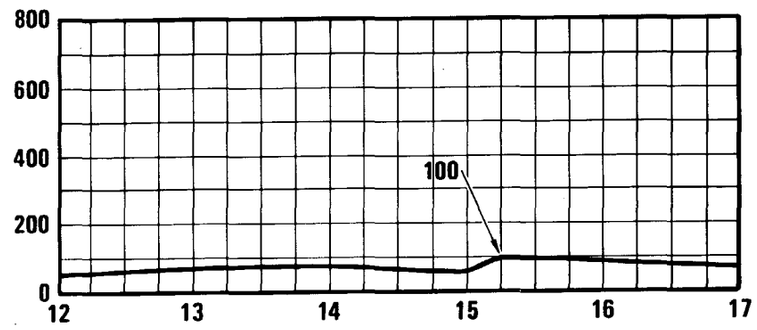
FEB 1980



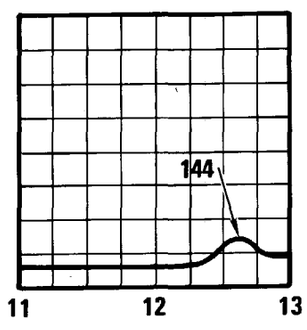
MAR 1980



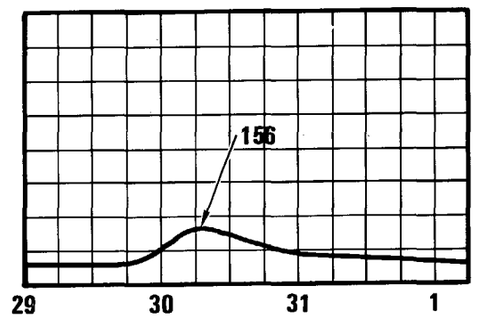
OUTFLOW IN CFS



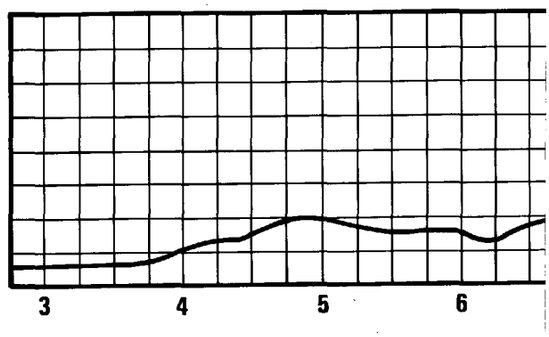
MAR 1982

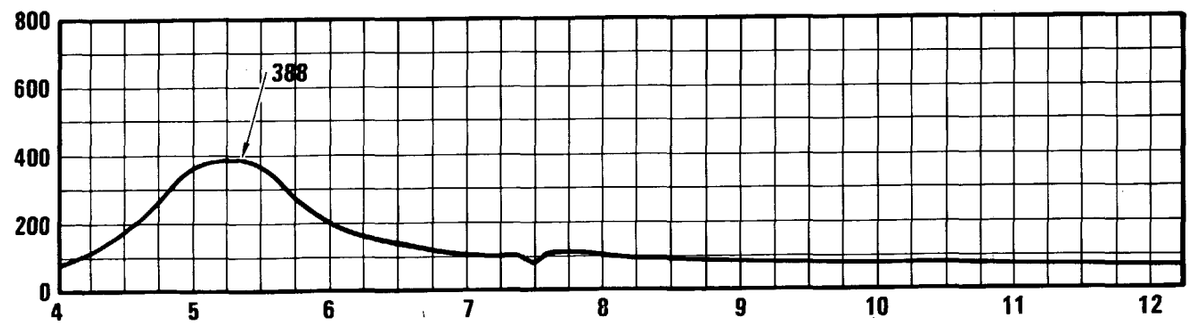


AUG 1982

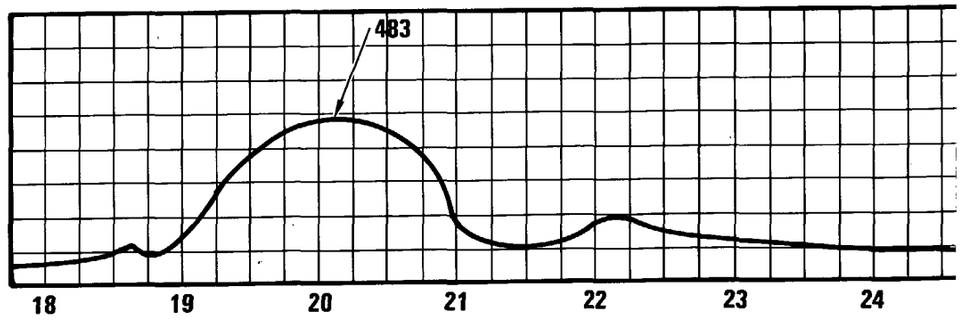


JAN 1983





MAR 1983



MAR 1983

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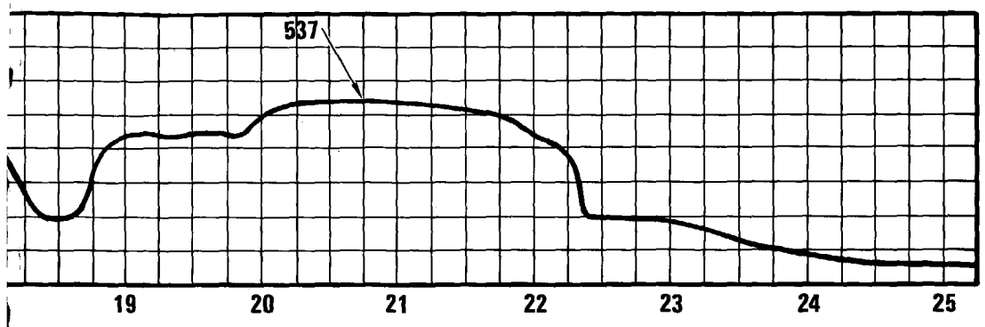
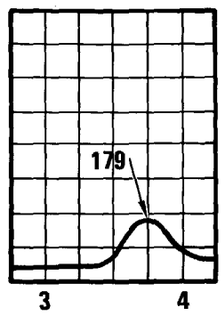
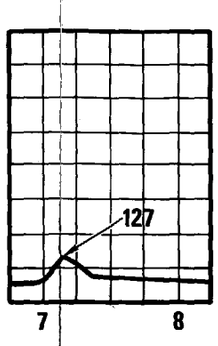


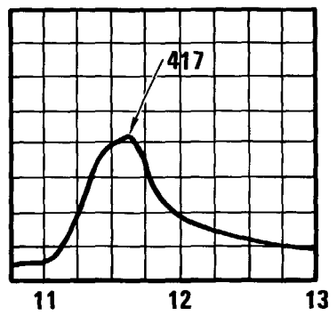
FEB 1980



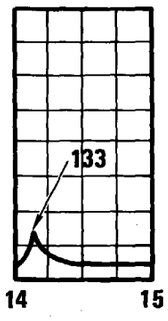
MAR 1980



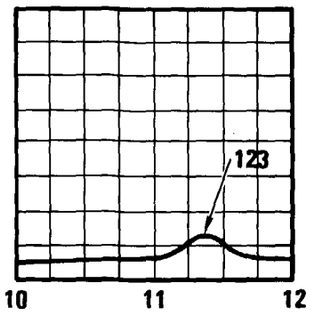
MAR 1980



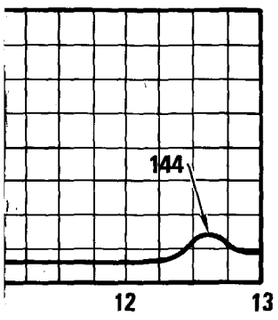
MAR 1980



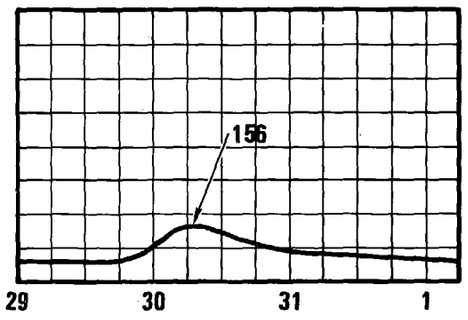
AUG 1980



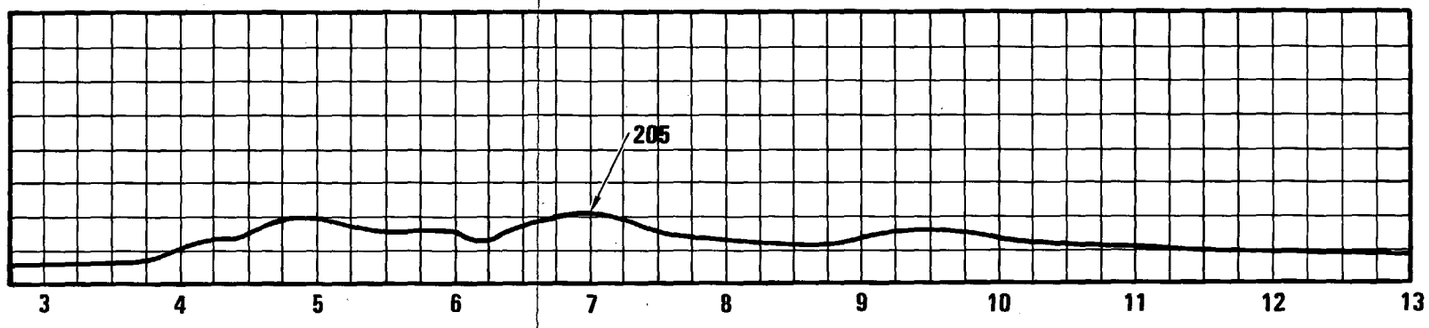
FEB 1982



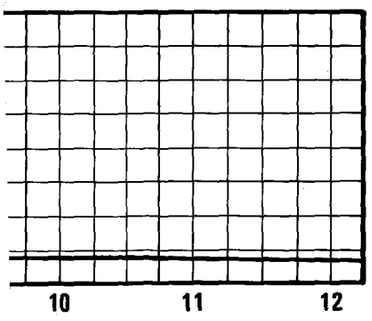
AUG 1982

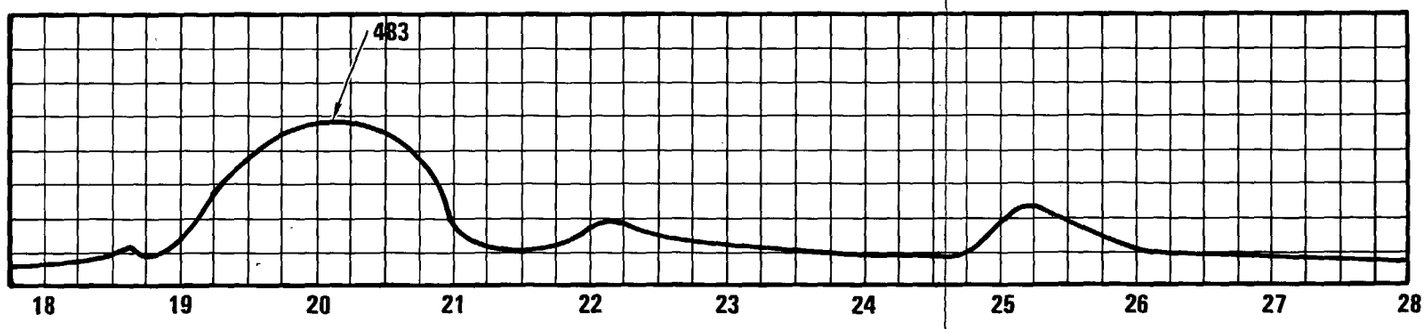


JAN 1983



FEB 1983





MAR 1983

SHOWN.

RECORDS.
BER 1984.
I EACH FLOW PERIOD.

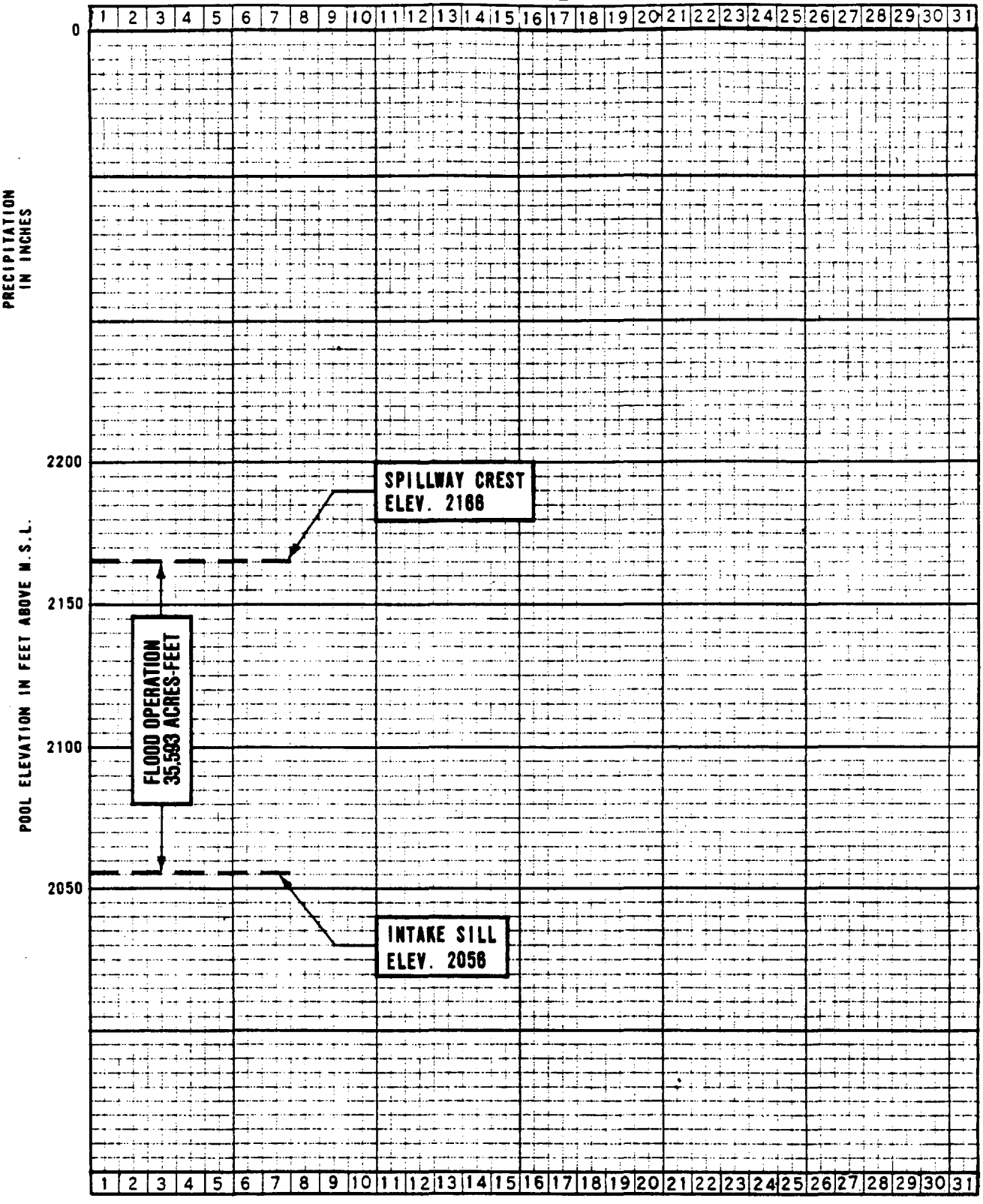
QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

HISTORICAL OPERATION

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 22-6

ENGCW-E-6



RESERVOIR STORAGE BASED ON SURVEY DATED JUNE 1975

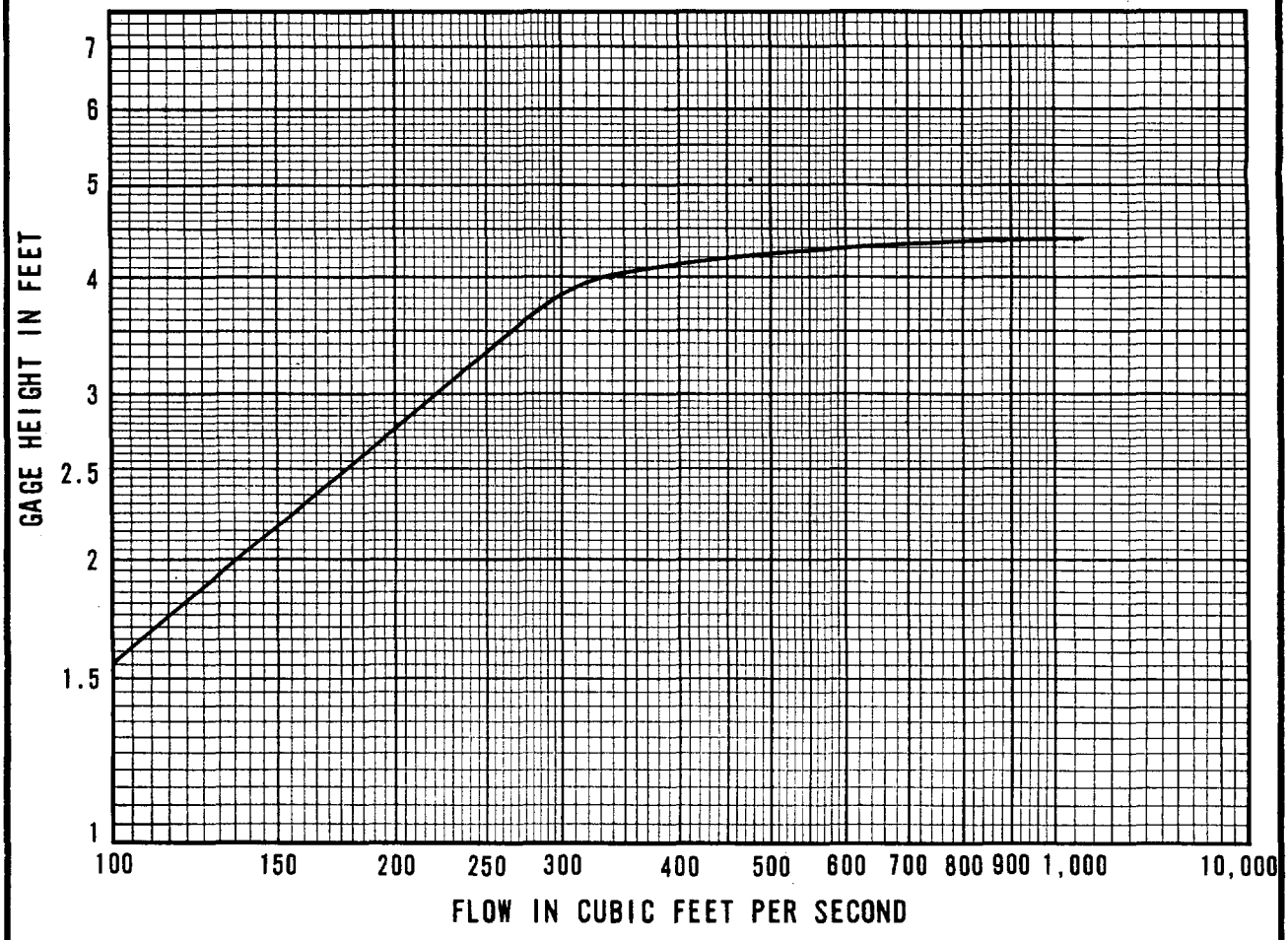
MONTH OF 19

	ELEV.	GROSS STORAGE (ACRE-FT.)
CONSERVATION POOL		NONE
FLOOD CONTROL POOL	2,166	35,593

OUTLET CAPACITY AT FULL POOL 1,007 C.F.S.

MONTHLY RESERVOIR OPERATION
WHITLOW RANCH FLOOD-CONTROL BASIN
GILA RIVER BASIN, ARIZ. AND NEW MEXICO
DRAINAGE AREA 143 SQ. MILES
SOUTH PACIFIC DIVISION
LOS ANGELES DISTRICT

PLATE 23
Revised November 1984



NOTE:

DISCHARGE RATING CURVE IS BASED ON THEORETICAL COMPUTATIONS.

QUEEN CREEK, ARIZONA
WHITLOW RANCH DAM

DISCHARGE RATING CURVE
FOR OUTFLOW GAGE

U S ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: OCTOBER 1975

PLATE 24