



US Army Corps  
of Engineers  
Los Angeles District

---

# WATER CONTROL MANUAL

HANSEN DAM  
TUJUNGA WASH  
LOS ANGELES COUNTY, CALIFORNIA



Date of photo: March 5, 1941

NOVEMBER 1990

HANSEN DAM  
TUJUNGA WASH, LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA

|   |                                       |
|---|---------------------------------------|
| Completion date.....  | September 1940                        |
| Stream system.....  | Tujunga Wash                          |
| Drainage area.....mi <sup>2</sup> .....                       | 151.9                                 |
| Reservoir:  |                                       |
| Elevation   |                                       |
| Debris pool.....ft, NGVD..                                    | 1,010.5                               |
| Flood control pool (spillway crest).....ft, NGVD..            | 1,060                                 |
| Spillway design surcharge level.....ft, NGVD..                | 1,081.8                               |
| Probable maximum flood surcharge level.....ft, NGVD..         | 1,081.2                               |
| Top of dam.....ft, NGVD..                                     | 1,087                                 |
| Area  |                                       |
| Debris pool.....ac..  | 142.4                                 |
| Spillway crest.....ac..                                       | 781.4                                 |
| Spillway design surcharge level.....ac..                      | 1,090                                 |
| Probable maximum flood surcharge level.....ac..               | 1,061.5                               |
| Top of Dam.....ac..   | 1,136.0                               |
| Capacity, gross (based on 1983 sediment survey)               |                                       |
| Debris pool.....ac-ft..                                       | 1,329 (0.17*)                         |
| Spillway crest.....ac-ft..                                    | 25,446 (3.24*)                        |
| Spillway design surcharge level.....ac-ft..                   | 48,100                                |
| Probable maximum flood surcharge level.....ac-ft..            | 44,990 (5.72*)                        |
| Top of dam.....ac-ft..  | 51,360 (6.53*)                        |
| Allowance for sediment (50-year).....ac-ft..                  | 10,500 (1.34*)                        |
| Allowance for sediment (100-year).....ac-ft..                 | 21,000 (2.67*)                        |
| Dam:  |                                       |
| Type.....   | Earthfill                             |
| Height above original streambed.....ft..                      | 97                                    |
| Top length.....ft..   | 10,475                                |
| Top width.....ft..  | 30                                    |
| Freeboard (Revised).....ft..                                  | 5.8                                   |
| Spillway:   |                                       |
| Type.....   | Ungated ogee                          |
| Crest length.....ft..   | 284                                   |
| Probable maximum flood surcharge.....ft..                     | 21.2                                  |
| Design surcharge (Original).....ft..                          | 21.8                                  |
| Probable maximum flood discharge.....ft <sup>3</sup> /s..     | 99,700                                |
| Design discharge (Original).....ft <sup>3</sup> /s..          | 101,000                               |
| Outlets:  |                                       |
| Uncontrolled  |                                       |
| Number and size.....  | 2 - 8' <sup>W</sup> x 6' <sup>H</sup> |
| Entrance invert elevation.....ft, NGVD..                      | 1,011                                 |
| Conduit Length.....ft..                                       | 265                                   |
| Controlled  |                                       |
| Gates - Type.....   | Vertical lift                         |
| Number and size.....  | 8 - 5' <sup>W</sup> x 8' <sup>H</sup> |
| Entrance invert elevation.....ft, NGVD..                      | 990                                   |
| Conduit length.....ft..                                       | 265                                   |
| Maximum capacity at spillway crest.....ft <sup>3</sup> /s..   | 22,000                                |
| Regulated capacity at spillway crest.....ft <sup>3</sup> /s.. | 20,800                                |
| Reservoir Design Flood (Original):                            |                                       |
| Total volume (5-day).....ac-ft..                              | 70,700                                |
| Inflow peak.....ft <sup>3</sup> /s..                          | 64,800                                |
| Standard Project Flood (Current):                             |                                       |
| Total Volume (4-day), excluding baseflow.....ac-ft..          | 57,200                                |
| Inflow peak.....ft <sup>3</sup> /s..                          | 53,000                                |
| Spillway Design Flood (Original):                             |                                       |
| Maximum 24-hour volume.....ac-ft..                            | 76,800                                |
| Inflow peak.....ft <sup>3</sup> /s..                          | 129,600                               |
| Probable Maximum Flood (Current):                             |                                       |
| Total volume (5-day).....ac-ft..                              | 246,000                               |
| Inflow peak.....ft <sup>3</sup> /s..                          | 105,000                               |
| Historic maximums:  |                                       |
| Maximum release.....ft <sup>3</sup> /s..                      | 18,104                                |
| Date.....   | 3-2-83                                |
| Maximum water surface elevation.....ft, NGVD..                | 1,039.70                              |
| Date.....   | 3-2-83                                |

\* inches of runoff



DEPARTMENT OF THE ARMY  
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS

630 Sansome Street, Room 720  
San Francisco, California 94111-2206

REPLY TO  
ATTENTION OF:

DEC 28 1990

CESPD-ED-W (1110-2-240)

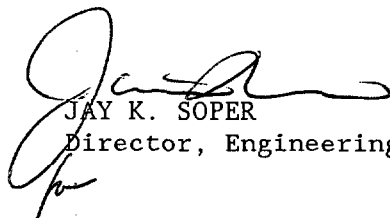
MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, ATTN: CECW-EH-W,  
20 Massachusetts Avenue, NW, Washington DC 20314-1000

SUBJECT: Updating Hansen Dam Water Control Manual

1. Enclosed is the updated Hansen Dam Water Control Manual for file purposes.
2. If you have any questions on the above, please contact Mr. Jack Hsu at FTS 465-1550 or commercial (415) 705-1550.

FOR THE COMMANDER:

Encl

  
JAY K. SOPER  
Director, Engineering

WATER CONTROL MANUAL

HANSEN DAM

TUJUNGA WASH, LOS ANGELES COUNTY, CALIFORNIA

NOVEMBER 1990

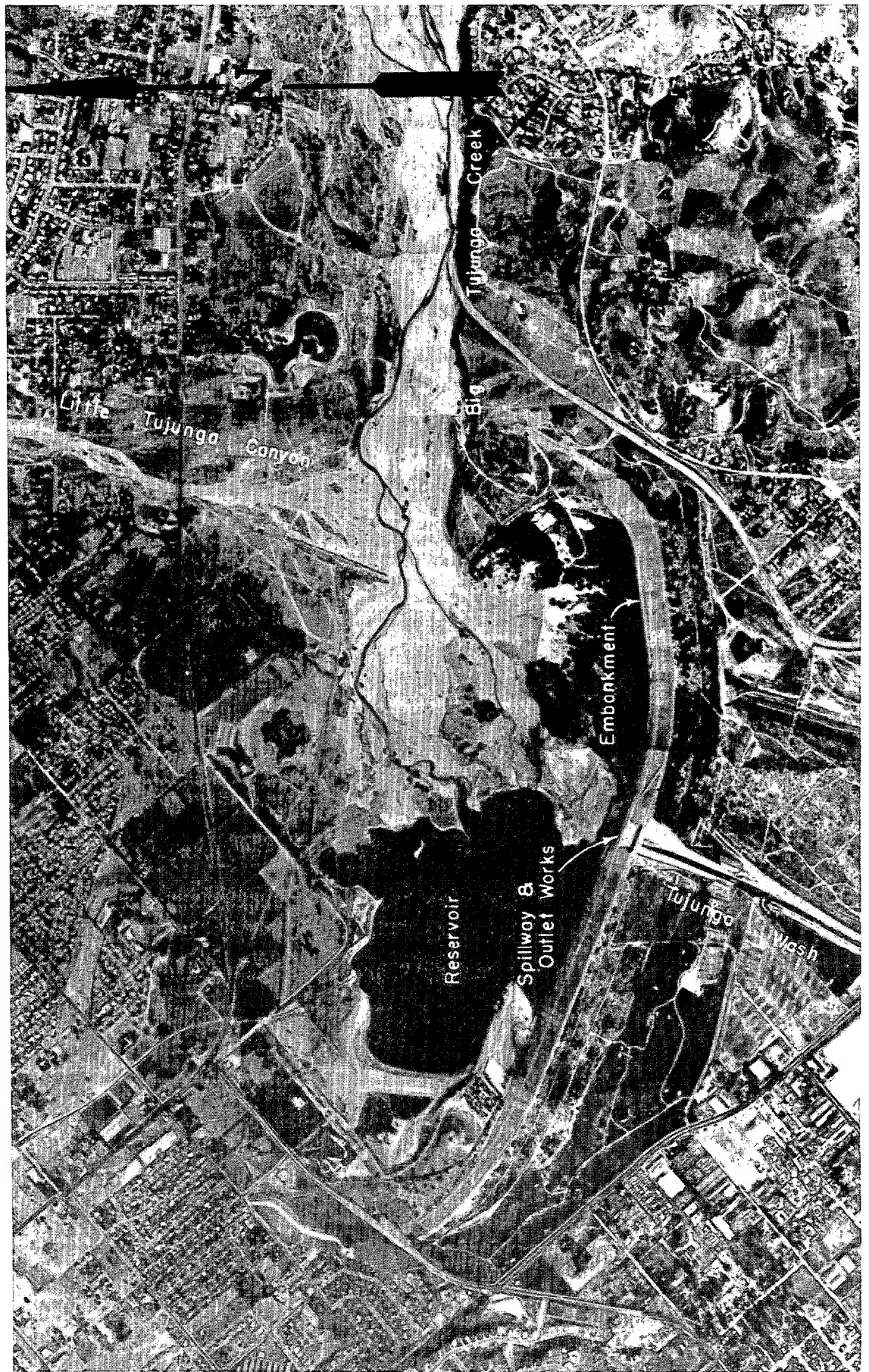
Prepared

by

U.S. Army Corps of Engineers

Los Angeles District

Reservoir Regulation Section



HANSEN FLOOD CONTROL DAM AND RESERVOIR (JAN 1969)

## NOTICE TO USERS OF MANUAL

Regulations specify that this Water Control Manual be published in loose leaf form, and only those sections, or parts thereof, requiring changes will be revised and printed. Therefore, this copy should be preserved in good condition so that inserts can be made to keep the manual current.

## EMERGENCY REGULATION ASSISTANCE PROCEDURES

In the event that unusual conditions arise, the Reservoir Regulation Section, Los Angeles District Office can be contacted by telephone at 213-894-4756. See plate 9-1 for other important telephone numbers for reservoir regulation assistance.

## ORGANIZATION OF MANUAL

Indicated by Roman Numerals, this manual is divided into chapters. Within each chapter are numbered paragraphs, which are major topics discussed in the chapter. Figures cited in the text of each chapter are presented at the end of that chapter. Plates cited are located in the back of the manual. Exhibits are included in the back as appendices.

WATER CONTROL MANUAL

HANSEN DAM  
TUJUNGA WASH, LOS ANGELES COUNTY, CALIFORNIA

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| E                            | Streamflow Data for Tujunga Creek Stations                      |
| F                            | Environmental Evaluation  |
| G                            | Chain of Correspondence For Approval of Water Control Manual    |

ABBREVIATIONS USED

|                    |   |
|--------------------|---|
| ac-ft              | acre-feet   |
| ALERT              | Automatic Local Evaluation in Real-Time               |
| COE                | U.S. Army Corps of Engineers                          |
| DWP                | Department of Water and Power, City of Los Angeles    |
| EM                 | Engineering Manual                                    |
| ER                 | Engineering Regulation                                |
| ETL                | Engineering Technical Letter                          |
| ft <sup>3</sup> /s | cubic feet per second                                 |
| ft.                | feet  |
| LACDA              | Los Angeles County Drainage Area                      |
| LACDPW             | Los Angeles County Department of Public Works         |
| LACFCD             | Los Angeles County Flood Control District             |
| LAD                | Los Angeles District, U.S. Army Corps of Engineers    |
| LATS               | Los Angeles Telemetry System                          |
| NGVD               | National Geodetic Vertical Datum of 1929              |
| NOAA               | National Oceanographic and Atmospheric Administration |
| NWS                | National Weather Service                              |
| PMF                | Probable Maximum Flood                                |
| ppm                | parts per million                                     |
| QPF                | Quantitative Precipitation Forecast                   |
| RDF                | Reservoir Design Flood                                |
| ROC                | Reservoir Operations Center                           |
| SPF                | Standard Project Flood                                |
| SPS                | Standard Project Storm                                |
| USGS               | U.S. Geological Survey                                |
| VHF                | Very High Frequency                                   |
| WSE                | Water Surface Elevation                               |

## I - INTRODUCTION

### 1-01 AUTHORIZATION

This Hansen Dam Water Control Manual was prepared in compliance with the following directives: Engineering Regulation (ER) 1110-2-240, "Engineering & Design, Water Control Management", dated 08 October 1982, Engineering Manual (EM) 1110-2-3600, "Engineering and Design, Management of Water Control Systems," dated 30 November 1987, Engineering Technical Letter (ETL) 1110-2-251, and "Engineering and Design, Guide For Preparing Water Control Manuals", dated 14 March 1980.

### 1-02 PURPOSE AND SCOPE

This water control manual provides a detailed plan for regulation of Hansen Dam and Reservoir on Tujunga Wash for the purpose of flood control. Hansen Dam is located approximately 4 miles southeast of the town of San Fernando, California, just below the confluence of Big and Little Tujunga Creeks. Major topics in this manual include: authorization, history, and description of the project; watershed characteristics; hydrometeorology; data collection and communication networks; hydrologic forecasting; the water control plan; and responsibilities and coordination for water control management.

### 1-03 RELATED MANUALS AND REPORTS

Manuals and reports with data and information relevant to the information in this manual are listed chronologically on plate 1-1.

### 1-04 PROJECT OWNER

Hansen Dam and Reservoir was constructed and is owned and operated by the U.S. Army Corps of Engineers, Los Angeles District (LAD).

### 1-05 OPERATING AGENCIES

a. The LAD is responsible for the operation and maintenance of the dam, reservoir, and outlet works. The outlet gates are operated manually, as needed.

b. The Los Angeles County Department of Public Works (LACDPW) is responsible for the operation and maintenance of the diversion works for the Hansen Spreading Grounds (1,500 ft. downstream of the dam). The Department of Water and Power, City of Los Angeles (DWP) is responsible for the operation and maintenance of the Tujunga Spreading Grounds, 3 miles downstream of the dam.

### 1-06 REGULATING AGENCIES

a. The LAD is responsible for developing the flood control regulation plan for Hansen Dam and Reservoir. The LAD is responsible for the flood control regulations and operation of the dam.

b. The LACDPW is responsible for the regulation of the diversion works for the downstream Hansen Spreading Grounds, which are used for groundwater replenishment.

## II - DESCRIPTION OF PROJECT

### 2-01 LOCATION

Hansen Dam is located near the northern edge of the San Fernando Valley on Tujunga Wash, about one mile below the confluence of the Big Tujunga and Little Tujunga Washes, and about four miles southeast of the town of San Fernando. The boundary of the drainage area is formed by the San Gabriel Mountains on the north and west, and by the Verdugo Mountains and a secondary range of the San Gabriel Mountains on the south and east. The location of the project is shown on plate 2-1A. The drainage area is shown on plate 2-1B.

### 2-02 PURPOSE

Hansen Dam is an essential element for flood control in the Los Angeles River drainage basin. In conjunction with Sepulveda and Lopez Dams, Hansen Dam is vital for the flood protection of lower portions of the San Fernando Valley and the City of Los Angeles. Storage regulation given by the flood control basins permits efficient use of the Los Angeles River Channel. The storage allocation for Hansen Dam is shown on plate 2-2.

Currently, no facilities for the generation of hydroelectric power at Hansen Dam exist, nor are any contemplated. Furthermore, no navigation of any sort is possible or allowed in Hansen Reservoir or in Tujunga Wash, either upstream or downstream of Hansen Dam.

### 2-03 PHYSICAL COMPONENTS

a. Embankment. The dam is a compacted impervious earth-fill structure. It is 10,475 ft. long at the crest (elev. 1,087.0 ft. NGVD, i.e., National Geodetic Vertical Datum of 1929). The maximum height above streambed is 97 ft. It extends in a general east and west direction at right angles to Tujunga Wash. The axis of the dam follows a gentle curve in order to connect the abutments of the dam with a prominent rock outcrop located near the center of the dam. At the east end, the dam abuts against a range of small hills and on the west end, the dam terminates on a gentle sloping hill. Rock is exposed on the hillside at the east abutment and is found at shallow depths on the west abutment. Between the ends of the dam and the central rock outcrop, the axis of the dam crosses the lower end of a typical debris cone. The upstream face of the dam has a slope of 1V on 3H and is covered with a 2-ft. 6-inch layer of riprap over a 6-inch spall blanket. The downstream face has a slope of 1V on 6H from the rock toe to elevation 1,020, a slope of 1V on 5H from elevation 1,020 to 1,050, and a slope of 1V on 3H to the dam crest. Three berms, each 20 ft. wide, run parallel to the axis of the dam, one on the upstream face at elevation 1,040 and two on the downstream face at elevations 1,020 and 1,050 ft.

The general plan, typical sections, and real estate limits are shown on plates 2-3, 2-4, and 2-5, respectively. Photographs of the embankment are shown in figure 2-1A and B.

b. Spillway. The spillway structure, with a crest elevation of 1,060 ft., is located near the center of the dam on a prominent rock outcrop just west of the Tujunga Wash channel. The approach channel, leading to the crest, is a 302-foot wide rectangular section with invert sloping from the earth berm at elevation 1,040 ft. to the point of intersection with the concrete crest section at elevation 1,060 ft. The crest is a Creager and Justin ogee section with an overall length of 302 ft. and six 3-foot wide crest piers, making a net length of 284 ft. A concrete lined rectangular spillway channel, which includes the outlet channel at its center, is designed to carry the spillway discharge beyond the earth embankment. The spillway channel consists of a 302-foot constant width section to the toe of the ogee section, and an 897-foot transition to a width of 180 ft. at the end of the channel. The spillway channel invert extends 233 ft. from the toe of the ogee section on a slope of 0.08584 and then 664 ft. on a slope of 0.02681, being parallel to the outlet channel invert, and terminating at elevation 964.0 and connects with the improved channel.

Details, dimensions, and other information related to the spillway are shown on plates 2-6, 2-7, and 2-8. Figures 2-2 and 2-3 show photographs of the spillway.

c. Outlet Works. The outlet structures and spillway are located west of the Tujunga Wash Channel in Hansen Knob, which is on the axis of the dam and approximately bisects it. The outlet structures include an approach channel, an intake structure with operating house and vent house, eight gated and two ungated outlet conduits, and an outlet channel. The outlet conduits are installed through the overflow spillway section (see fig. 2-3), located symmetrically with respect to the spillway center line and aligned to discharge into Tujunga Wash. The gated conduits are located in the center of the outlet section in two groups of four. All conduit entrances are elliptical in shape and have been provided with a semicircular trash rack structure. The throat entrances to the ungated conduits are 8 ft. by 8 ft. in order to allow larger discharges through these conduits. A 60-foot long section, dropping to the approximate elevation of the gated conduits, is used as the transition from the 8 ft. by 8 ft. entrance throat to the 8 ft. wide by 6 ft. high outlet section. The combined maximum capacity of the outlets is 22,000 ft<sup>3</sup>/s at a reservoir water surface elevation of 1,060 ft. (i.e., at the spillway crest), of which 4,900 ft<sup>3</sup>/s passes through the ungated openings and 17,100 ft<sup>3</sup>/s passes through the gated openings. Plates 2-9, 2-10, and 2-11 show pertinent information pertaining to the reservoir outlet works. Figure 2-3 is a photograph of the Hansen Dam outlet works.

d. Water Supply Facilities. Hansen Dam's regulation objectives are to maximize flood protection and enhance recreational usage. These objectives are to be accomplished by operating Hansen Dam to release all flood waters as rapidly and safely possible. In the past, Hansen Dam has also been operated in the interest of water conservation by utilizing the storage allocated for sediment. Runoff would be temporarily stored for groundwater recharge downstream. However, due to the large accumulation of sediment in Hansen Dam, it is no longer possible to impound water for conservation without infringing on flood control capability and recreation facilities. The large sediment accumulation has created a situation in which even relatively small

impoundments for conservation adversely impact on usage and maintenance of recreation facilities located within the basin. Operation for water conservation also tends to increase the rate of sediment deposition, thereby shortening the usable life of the project. Maintenance costs, including reservoir cleanout, are being borne by the agencies responsible for flood control and recreation, without participation from the beneficiaries of water conservation operation. The Corps has a strong interest in water conservation, but until a solution is found to the sedimentation problems, LAD will not be able to operate for water conservation.

#### 2-04 RELATED CONTROL FACILITIES

There are three related control facilities: (a) Big Tujunga Dam, which is upstream from Hansen Dam, is operated by LACDPW as a flood control reservoir, in addition to its water conservation purpose; (b) the Hansen Spreading Grounds, which are owned and operated by the LACDPW; and (c) Lopez Canyon Diversion Channel which diverts runoff from a 2.4 square mile areas into Hansen flood control basin.

#### 2-05 REAL ESTATE ACQUISITION

Hansen Dam and Reservoir project lands comprise 1468 acres as shown on plate 2-5.

#### 2-06 PUBLIC FACILITIES

The recreation conditions at Hansen Dam have changed considerably during the past 48 years. The once expansive (Holiday) lake has all but disappeared, equestrian trails have expanded, and new facilities have been constructed within the basin.

Adjacent to the downstream face of the dam embankment is an 18-hole golf course with clubhouse, parking area, and driving range. An overlook area is located just north of the intersection of Osborne Street with Glenoaks Boulevard. The overlook has a paved parking area and provides nonvehicular, public access to the crest service road. Within the basin, the existing facilities include: six ballfields, an outdoor theatre, restrooms, two parking areas, an equestrian center, and several picnic areas. Prior to 1983 there was a lake used for swimming and boating, but due to sedimentation, the lake no longer exists. There were two large parking lots near the lake, one for the swimming area, and the other for the boat launching area. The boat trailer lot has been virtually eradicated by the deposition of large amounts of sediment in the area and a large portion of the swimming area lot has also been impacted by sediment inundation. See plates 2-12A, B, and plate 2-13 for current and proposed facilities in the reservoir with their respective elevations.



Figure 2-1a. Upstream View of Hansen Dam Embankment, Looking Northeast



Figure 2-1b. Upstream View of Hansen Dam Embankment, Looking Northwest

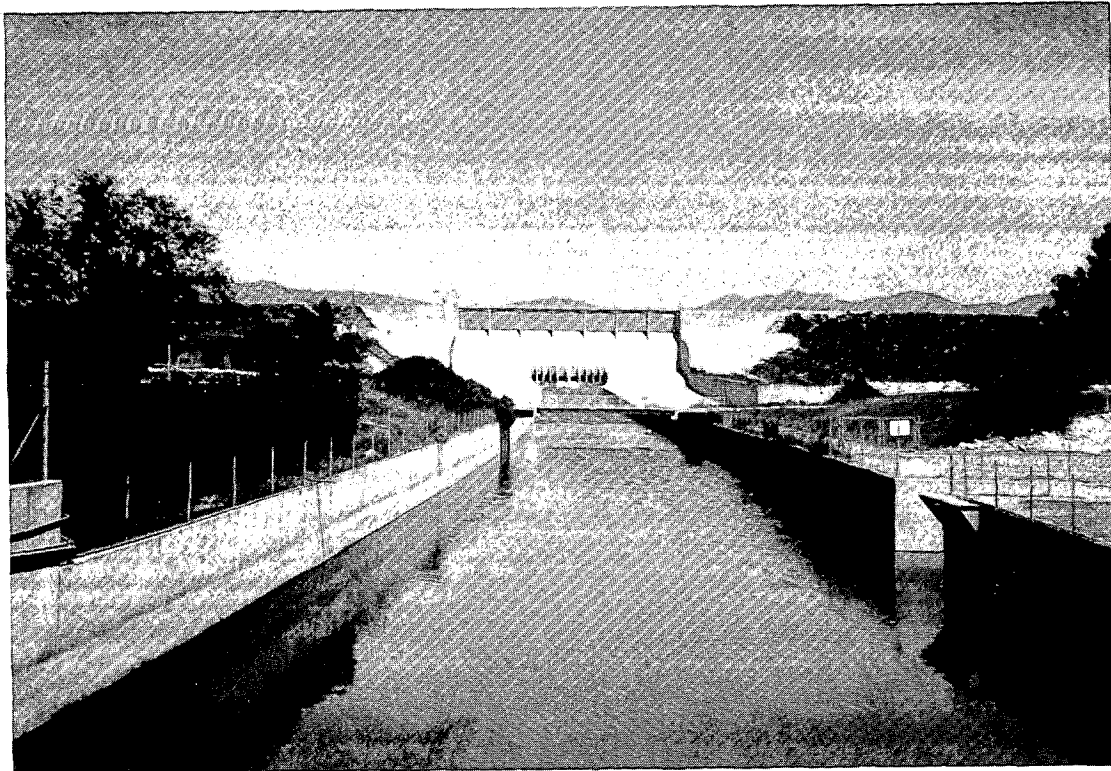


Figure 2-3. Hansen Dam Spillway and Outlet Channel.

### III - HISTORY OF PROJECT

#### 3-01 AUTHORIZATION

Hansen Dam was authorized by the Flood Control Act, approved 22 June 1936 (Public Law 738, 74th Congress) and extended and amended by subsequent Flood Control Acts of 1937, 1938, 1941, 1944, and 1946. The plan for construction, in accordance with the recommendations contained in the report dated 11 April 1940 by the Chief of Engineers, and submitted in House Document 838, 76th Congress, 3rd session, was authorized by the Flood Control Act, approved 18 August 1941.

#### 3-02 PLANNING AND DESIGN

In 1935 and 1936, LAD and the Los Angeles County Flood Control District (LACFCD) became partners in a large Works Progress Administration contract to design a comprehensive flood control plan for Los Angeles County. During the next three years, a comprehensive flood control system was designed for the Santa Ana, San Gabriel, and Los Angeles Rivers (of which Hansen Dam is a part). This included a Definite Project Report for the control of the Los Angeles River, submitted in December 1936, which was revised in 1939 to include the influence and data of the March 1938 flood. Other design reports include: "Analysis of Design of Tujunga Wash Improvement - Hansen Dam" - Volume I and II, dated 2 May 1939, superseded by Volume III, dated 1 June 1940; "Analysis of Design of 5 ft. by 8 ft. Service Gates for Hansen Dam," issued January 1939; "Analysis of Hydraulic Design for Hansen Flood Control Basin", issued 18 March 1940.

#### 3-03 CONSTRUCTION

Construction for Hansen Dam started on 20 September 1939, with work completed and accepted by the U.S. Army Corps of Engineers on 5 September 1940. The project was constructed by Guy F. Atkinson Company, and copies of the construction contract (Contract No. W-509-Eng-689) and construction drawings (File Nos. 424/66 through 424/104 and 425/1) are on file in the LAD Office, in the Design Section.

#### 3-04 RELATED PROJECTS

Plate 2-1 shows related projects for the entire Los Angeles County drainage area (LACDA).

a. Big Tujunga Dam. Big Tujunga Dam is located on Big Tujunga Creek, approximately 15 miles upstream of Hansen Dam. The concrete arch structure, completed in 1931, is operated and maintained by the LACDPW for flood control and water conservation. Big Tujunga Dam has a storage capacity at spillway crest of 6,240 ac-ft with a maximum outflow of 24,250 ft<sup>3</sup>/s. Information pertaining to Big Tujunga Dam and Reservoir is given in Exhibit A.

b. Hansen Spreading Grounds. Hansen Spreading Grounds is owned and operated by the LACDPW. The facility is located approximately 1,500 ft. downstream of Hansen Dam. A radial gate across Tujunga Wash can divert flow

into the spreading grounds. Photographs of the diversion structure and the spreading facility are shown in figures 3-1 and 3-2. pertinent information concerning Hansen Spreading Grounds is listed below:

|  |                        |
|--|------------------------|
| Maximum basin intake capacity          | 400 ft <sup>3</sup> /s |
| Maximum basin outlet discharge         | 150 ft <sup>3</sup> /s |
| Allowable water quality sediment limit | 400 ppm                |
| Storage capacity                       | 330 ac-ft              |
| Maximum percolation rate               | 250 ft <sup>3</sup> /s |
| Basin gauge height limits*             | 4-5 ft                 |

\*Basin gauge height limit refers to the depth of water in the basin during spreading operations.

c. Tujunga Wash Channel. The Tujunga Wash channel, for Hansen Dam to the Los Angeles River, was constructed in 1952. The channel capacities and configuration are shown on plate 3-1. The channel capacities and configurations for the Los Angeles River from Sepulveda Dam to the Pacific Ocean are shown on plate 3-2, A, B, and C. The original capacity of the unimproved channel immediately downstream of the dam was 12,000 ft<sup>3</sup>/s. Flowing improvement of the channel in 1952, the capacity rose to 22,000 ft<sup>3</sup>/s. The channel capacity was revised in 1988 during LACDA review studies to 20,800 ft<sup>3</sup>/s to reflect current freeboard criteria. The rectangular channel is lined with reinforced concrete.

d. Tujunga Spreading Grounds. Tujunga Spreading Grounds is owned and operated by the Department of Water and Power, City of Los Angeles (DWP). It is located approximately 3 miles downstream of Hansen Dam. Although DWP is capable of spreading water from Tujunga Wash, it does not, and has not since 1983, due to the high sediment concentration of flood control release. If DWP were to spread water, the water's origin would be surplus water from DWP's reservoirs via the California Aqueduct.

e. Pacoima Diversion Channel. Pacoima Wash is an improved channel from Lopez Dam to Paxton Street where it is diverted to Tujunga Wash by the Pacoima Diversion Channel. The channel capacities and configuration are shown on plate 3-3. This channel was constructed in 1954 as a part of the LAD Lopez Dam Project. The channel capacity is 17,000 ft<sup>3</sup>/s at the confluence of Tujunga Wash.

f. Branford Spreading Grounds. Branford spreading Grounds are owned and operated by the LACDPW. The facility is located near the Pacoima Diversion Channel/Tujunga Wash confluence. Branford Spreading Grounds obtains its water from a local storm drain system. The facility discharges water into the Pacoima Diversion Channel and has no capability of diverting water from the channel. The facility's maximum inflow and outflow is 1,540 ft<sup>3</sup>/s and the outlet invert elevation is 835 ft. NGVD. Its location is shown on plate 3-3.

g. Lopez Canyon Diversion Channel. The Lopez Canyon Diversion Channel drainage area, located between Lopez Dam and Hansen dam, is about 2.4 square miles. About 80 percent of the area is on the southern slope of the

San Gabriel Mountains. The gradient of the stream ranges from approximately 1,700 ft/mi (0.32) in the headwaters to 250 ft/mi (0.05) near the outlet into Hansen flood control basin. Its location is shown on plate 2-1.

### 3-05. MODIFICATIONS TO REGULATIONS

For the 1940-1951 period, Hansen Reservoir was operated to completely regulate minor floods by utilizing the nearly 4,00 ac-ft available for debris pool storage. The stored water of minor floods was released to the spreading grounds downstream, operated by the LACDPW and the DWP. For large floods that raised the reservoir water surface above the ungated outlets (elev. 1,011 ft. NGVD), the gates were to be operated to maintain a maximum outflow of 12,000 ft<sup>3</sup>/s, required to prevent the spillway from going into operation for the reservoir design flood prior to 1952. As indicated in the preceding section, after the improvement of Tujunga Wash downstream of the dam in 1952, the regulation schedule was modified to provide for a maximum release of 22,000 ft<sup>3</sup>/s. The current reservoir operation schedule was revised in 1988 to limit the maximum release to 20,800 ft<sup>3</sup>/s. This schedule, in the form of water surface elevation versus outlet discharge, is based exclusively on operation for flood control and is shown in plate 3-4.

### 3-06. PRINCIPAL REGULATION PROBLEMS

Hansen Dam has performed adequately since its construction. The dam has never spilled, and there have never been any structural deficiencies or major hydraulic malfunctions.

However, based on the results of the April 1983 reservoir sedimentation survey, current storage capacity below the spillway crest elevation of 1,000 ft. is approximately 25,500 ac-ft, which is about 23 percent less than the initially allocated net flood control storage capacity of 33,100 ac-ft. Figures presented on plates 4-1A, 4-1B are indicative of the fact that sediment has accumulated behind the dam at an average rate of 255 ac-ft per year during the 1940-1978 period. Beginning in 1981 and continuing through 1983, the date of the most recent survey, excavation to remove sediment started. Total sediment removed during this period is estimated to be 333 ac-ft. Excavation has continued since 1983; the estimated annual sediment removals are given on plate 3-5. Excavation is continuing and since excavation began in 1981 it is projected to remove 7,320 ac-ft through 1990 thereby returning Hansen Reservoir close to original flood control capacity. Because of the uncertainties of sediment removed and the inconsistency of the 1982 survey with these figures, no sedimentation rate was determined since 1978. For this manual, the sedimentation rate of 255 ac-ft/yr, for the period 1940-1978, is indicative of the long term sedimentation rate. The results of the 1983 reservoir sedimentation survey are graphically presented on plate 3-6. This plate shows the relationships between water surface elevation, surface area, and storage capacity based on this survey. It is evident that sediment has accumulated behind the dam at a rate much faster than the 100-ac-ft per year initially anticipated during the dam's design, and that current flood control storage capacity of the reservoir is barely adequate to control the Standard Project Flood (SPF) event without exceeding downstream channel capacity. Consequently, in recent years the reservoir regulation plan has

been altered. No storage will be used for water conservation until local interests formally agree to participate in the removal of sediment deposits accumulated in the reservoir that are attributable to water conservation operation.

Another regulation problem is the repetitive blocking of the trash rack by floatable debris. The debris problem at Hansen Dam has threatened the water control regulation of the project on at least two occasions in the past. During the flood of 1980, while all gates were fully open, inflow (up to 11,350ft<sup>3</sup>/s) transported floatable debris into the trash rack, nearly sealing off the outlet works. The debris problem at the project can be described as follows: Hansen Dam has the heaviest sediment load (255 ac-ft/yr) of COE dams in LAD. Figure 3-3 shows debris being removed with a crane on February 18, 1980 after the storm of February 17, 1980. A significant amount of debris is evident. Phone poles and large trees were observed to be included in the debris. During large flood events, debris has to be cleared from in front of the trash racks in order to prevent a "dam" being formed in front of the outlets. Very little flow was coming through the intakes works in spite of the fact that water level in the reservoir was up to the top of the trash racks (elev. 1,031). A crane was positioned at elevation 1,040 to remove debris which again had blocked the intakes. Eventually, a huge plug was released downstream causing bankfull flow when it finally flushed loose as the result of openings and closings of the gates in an effort to release the debris piled against the trash racks.

The tops of the trash racks are adjacent to a berm at elevation 1,040 ft. Just beyond the berm is the concrete approach to the spillway ogee (elev. 1,060 ft.) The field crew was working between the rising water and the spillway, with the crane positioned on the berm in the last accessible space from which to clear the outlets of debris. If the water had been allowed to rise further, with the outlets still plugged, the water could have flowed over the berm, and the crew would have had to evacuate. The crane cable was attached to the top 10-foot sections of the trash racks, which were pulled out as a last resort. The water and debris plunged downward into the ungated outlets and soon the system was able to discharge water again. During this same flood, the clamshell bucket got caught in debris and was tipping the crane. It had to be cut loose and was swept into the outlet works down through the ungated outlet.

The March 1, 1983 flood again required use of a crane to remove debris from in front of the trash racks. Figure 3-4 shows debris being removed with cranes on March 4, 1983 after that storm.

Suggested solutions to the debris problem have included: remove the trash racks all together; remove the upper and lower 10-foot sections of each trash rack tier similar to what was done at Sepulveda and Santa Fe Dams; remove the upper 10-foot sections of trash racks while making the lower 10-foot sections hinged, to allow cleaning of outlet works with heavy equipment in summer season; allow reservoir vegetation to grow to build a "natural" trash rack in the reservoir.

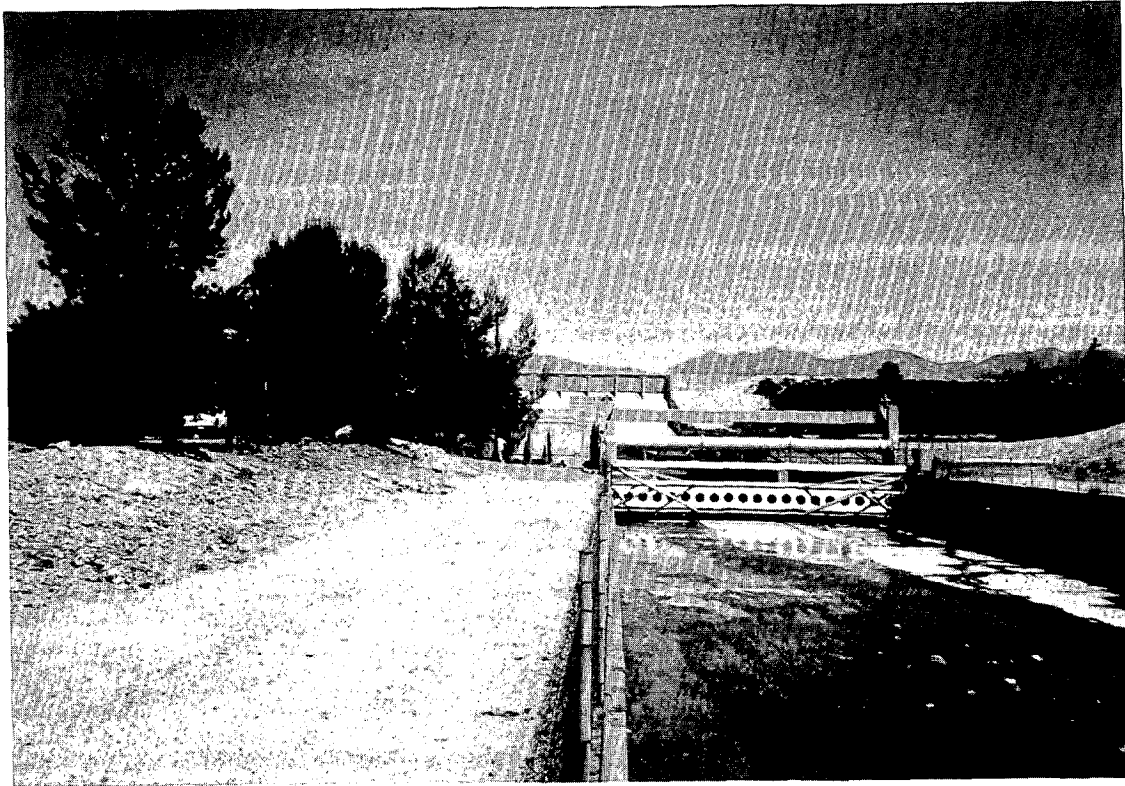


Figure 3-1. Hansen Spreading Grounds Diversion Structure.

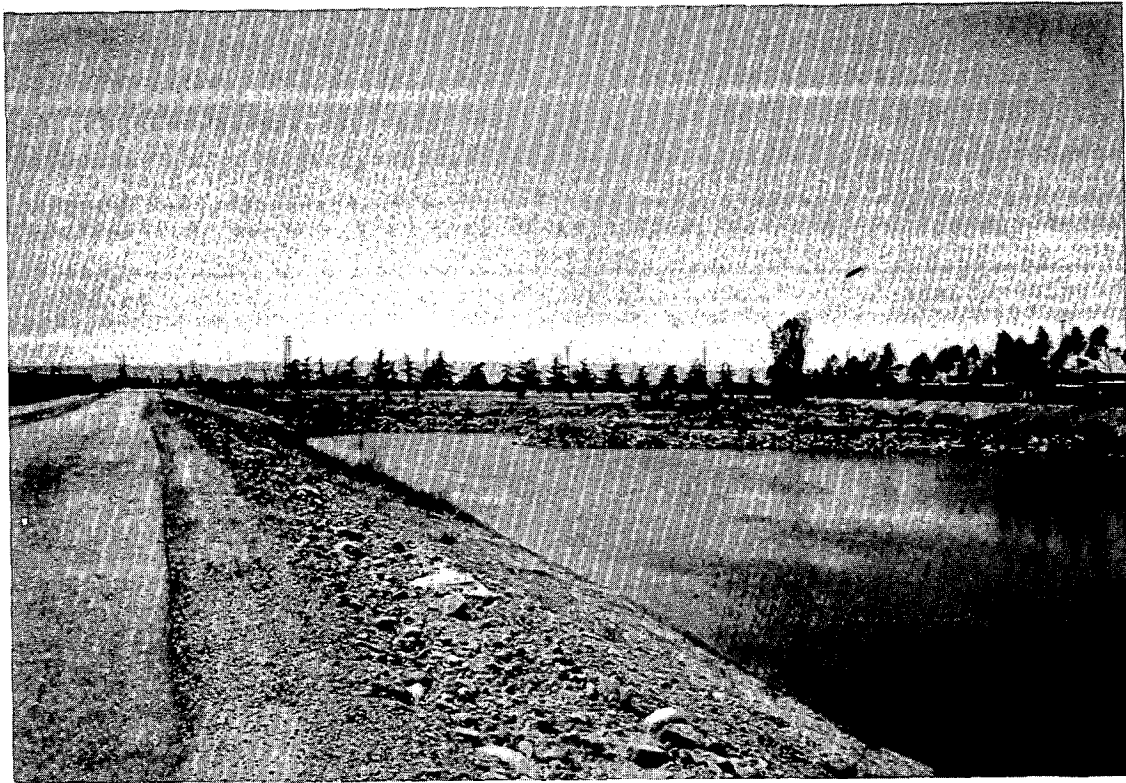


Figure 3-2. Hansen Spreading Grounds' Infiltration Pond.



Figure 3-3. Debris at Hansen Dam after February 17, 1980 storm.



Figure 3-4. Debris at Hansen Dam after March 1, 1983 storm.

## IV - WATERSHED CHARACTERISTICS

### 4-01 GENERAL CHARACTERISTICS

Hansen Dam is located on the edge of San Fernando Valley on Tujunga Wash, a principal tributary of the Los Angeles River system. The San Gabriel Mountain Range forms the northern drainage divide of the watershed and reaches an elevation of over 7,124 ft. NGVD upstream of Big Tujunga Dam, the largest structure in the Hansen Dam watershed. The drainage divide on the west is formed by the ridge between the Lopez Dam and Hansen Dam watersheds. On the east, the drainage divide is the high ridge between the Hansen Dam watershed and that of the upper San Gabriel River watershed. To the south Tujunga Wash flows across a broad alluvial fan and urbanized valley area before emptying into the Los Angeles River downstream of the dam. Little Tujunga Creek, the other major tributary in the watershed, joins Big Tujunga Creek within Hansen Reservoir. The longest watercourse in the watershed is the Big Tujunga Creek mainstem. It has a length of 31.5 miles, and an average slope of 148 ft. per mile (0.028).

### 4-02 TOPOGRAPHY

Approximately 140 square miles of the 152 square mile drainage area above Hansen Dam consists of steep, mountainous terrain, dissected by deep, narrow ravines containing the numerous watercourses tributary to this watershed. The remainder of the watershed consists of a relatively flat alluvial fan surface and valley fill area, much of which is occupied by urban development. Elevations in the mountains vary from 7,124 ft. at Pacifica Mountain (the highest point in the watershed) to 990 ft. at the dam site.

### 4-03 GEOLOGY

Hansen Dam is located in a basin formed by a series of tiered bluffs descending from the San Gabriel Mountains in the north to the dam site in the south. The Hansen Dam Basin foundation is comprised of alluvium consisting of sand, gravel, and boulders. Overbank areas tend to consist of the same material with somewhat larger amounts of silt and clay in the matrix. The dam itself is tied into two outcrops of Modelo sandstone. Soils at the dam tend to be well-graded alluvial materials receptive to the growth of vegetative cover. Soils in the mountains tend to be shallow, stony, and poorly developed.

### 4-04 SEDIMENT

Sediment production within the Hansen Dam watershed varies considerably, depending primarily on the terrain. In the urbanized valley areas, sediment production is at a minimum, and may be expected to decline even further with a continued increase in areas devoted to urban uses. In the steep mountainous segment of the watershed, sediment production can be quite high, particularly following periods in which wildfire impacts the watershed, and also following periods of high-intensity rainfall. The fire history of Hansen Dam watershed was computed to have burned 95 percent of the watershed over a period from 1878 through 1975. On September 9-12, 1968, the Limerock Fire burned 2,846

acres which included the entire western side of Little Tujunga Creek. This burn contributed sediment and debris to the January 24-28, 1969 storm runoff. Subsequent small fires in the watershed also occurred along the Little Tujunga Creek and Lopez Canyon drainages making the northwest edge of the Hansen Dam watershed the most likely source of much of the debris problems within Hansen Reservoir. On November 23-27, 1975 the Mill Fire burned 6,370 acres along a stretch from Hansen Dam watershed to Pasadena. This fire burned 95 percent of the area between Hansen Dam and Big Tujunga Dam as well as acreage behind Big Tujunga Dam. Subsequent runoff events in 1978, 1980, and 1983 have carried excess debris and sediment due to fire damage. Big Tujunga Dam and Reservoir initially intercepts much of the sediment produced by the 82.3 square miles drainage area upstream of Hansen Dam. Sluicing of this sediment has not been permitted by the Corps because no agreement for sediment removal from Hansen Reservoir has been made with Los Angeles County Flood Control District.

Reservoir surveys for Hansen Dam were performed in September 1940, July 1941, October 1943, November 1945, January 1962, August 1969, October 1978, July 1982 and April 1983. Pertinent parts of Eng Form 1787, Reservoir Sediment Data Summary for Hansen Dam, are given on plates 4-1A, B. The plates show an average sedimentation rate of 255 ac-ft per year for the period 1940-1978. An average sedimentation rate has not been determined after 1978 because of the approximations of sediment removal and the inconsistencies with the 1982 survey. See section 3-06.

The loss in storage capacity due to sediment deposition within Hansen Reservoir amounts to 28.9 percent of total gross (1940) storage capacity as of April 1983. This figure would exceed 31 percent had it not been for excavation performed since 1982 to restore capacity.

#### 4-05 CLIMATE

The climate of the drainage area above Hansen Dam is generally temperate and semi-arid, with warm, dry summers and cool, moist winters.

a. Temperature. Average daily minimum/maximum winter temperatures (in degrees Fahrenheit) range from about 40/65 near the dam to about 20/45 in the higher mountains. The corresponding summer temperatures are about 65/95 and 55/80, respectively. All-time low/high extremes in temperature are about 15/120 near the dam, and about -15/105 in the highest mountain valleys.

Plate 4-2 shows average and extreme temperature data for Burbank, California (located about 8 miles south of Hansen Dam), the nearest station with complete climatological data. The regular U.S. Weather Bureau station at Burbank was closed in 1965, so the climatological data on plate 4-2 extends only through 1964.

b. Precipitation. Plate 4-3 (from LACDPW) shows the mean annual precipitation over the Hansen Dam drainage area. Within the drainage area, mean annual precipitation ranges from slightly more than 15 inches near the dam to more than 36 inches in the San Gabriel Mountains southeast of Big Tujunga Dam.

Plate 4-2 lists the mean and maximum observed monthly precipitation for Burbank, California. Plate 4-4 lists the same for Hansen Dam and for 3 stations within the Hansen drainage basin. These plates indicate that there can be great year-to-year variability in monthly, as well as annual precipitation. Not listed on these plates are the minimum observed monthly precipitation values, which for most stations are at most 0.01 or 0.02 inches for every month of the year.

Plate 4-5 is a precipitation depth-duration-frequency tabulation for the centroid of the watershed above Hansen Dam. In it are listed the computed point-value precipitation depths for durations of from 5 minutes to 24 hours, and for return periods of from 2 to 100 years. Data for this table were obtained from National Oceanographic and Atmospheric Administration (NOAA) Atlas 2.

1. Winter Storms. Most precipitation in southern California coastal drainages occurs during the winter season, primarily from November through early April, as mid-latitude cyclones from the northern Pacific Ocean move inland over the area. Most of these storms are the general winter type, characterized by hours of light-to-moderate precipitation, but with many heavy showers and thunderstorms within the storm system.

2. Summer Storms. Two types of summer storms can affect southern California, although they are relatively rare.

(a) Local Thunderstorms. During humid periods between July and September, the deserts and eastern mountains of southern California experience occasional thunderstorms. On a few occasions, these may drift westward into the coastal drainages, including the Hansen Dam watershed. These thunderstorms can at times result in very heavy rain for short periods of time over small areas.

(b) General Storms. General summer storms in southern California are quite rare, but on occasion a tropical storm from off the west coast of Mexico can drift far enough northward to bring rain, occasionally heavy, to southern California, sometimes with very heavy thunderstorms embedded. The season in which these storms are most likely to occur is mid-August through early October, although there have been some effects in southern California from tropical storms as early as late June and as late as early November.

On rare occasions, southern California has received light rain from non-tropical general summer storms, some of which have exhibited some characteristics of general winter storms.

3. Snow. Snow in southern California is relatively uncommon at elevations below 4,000 ft. and is extremely rare below 2,000 ft. Although even the valley floor has experienced light snow on isolated occasions, snowfall and snowmelt are not considered to be a significant hydrologic factor in the Hansen Dam drainage.

c. Evaporation. Few formal studies of evaporation have been made in the San Fernando Valley. Because Hansen Reservoir is normally dry, with any impoundments generally lasting less than 24 hours, evaporation is not a major

consideration at this site. Studies for nearby locations indicate that mean daily evaporation ranges from about one-tenth inch in winter to about one-third inch in summer. On days of very strong, dry Santa Ana winds, evaporation can be considerably greater than one inch.

d. Wind. The prevailing wind in the San Fernando Valley is the sea breeze. This gentle onshore wind is normally strongest during late spring and summer afternoons, with speeds in the western San Fernando Valley typically 10 to 15 miles per hour.

The Santa Ana is a dry desert wind that blows from out of the northeast, most frequently during late fall and winter. This type of wind does not normally occur when water is impounded behind Hansen Dam. The characteristic low humidities and strong gusts of Santa Ana winds (which can exceed 70 miles per hour at times) usually create very high fire hazards, but can also be instrumental in drying a saturated watershed, thus reducing the flood hazard from later events.

Rainstorm-related winds are the next most common type in southern California. Winds from the southeast that are ahead of an approaching storm average 20-30 mph, with occasional gusts to more than 40 mph. West to northwest winds that are behind storms can sometimes exceed 35 mph, with higher gusts.

#### 4-06 STORMS AND FLOODS

All of the major inflow and impoundment events in the history of Hansen Dam have been the result of general winter storms.

Prior to the construction of the dam, there were a number of major storms and floods on Tujunga Wash and the Los Angeles River, including those of January 1862 (commonly referred to as the greatest storm in southern California history since records began in the late 1700's), February and March 1884, January and February 1914, January 1916, December 1921, February 1927, December 1933-January 1934, and February and March 1938. There was also one significant summer tropical storm that occurred in September 1939, but no widespread flooding in this area was caused by this event.

a. Storm and Flood of February-March 1938. The flood of 27 February-3 March 1938 was the most destructive of record on the Los Angeles River, Tujunga Wash, and many other streams in southern California. Its occurrence played a major role in the justification for the construction of Hansen Dam.

The storm developed as a series of low-latitude north Pacific disturbances, bringing several bands of intense rainfall to southern California during a 5-day period. The intense band of 1-2 March produced an estimated peak flow of 54,000 ft<sup>3</sup>/s on Tujunga Wash, approximately 2,000 ft. below Hansen Dam (U.S.G.S. Gauge No. 11097000). This flow, combined with heavy runoff from the upper Los Angeles River and other tributaries, produced a very destructive flood on the Los Angeles River throughout the southeastern San Fernando Valley, downtown Los Angeles, and downstream locations.

b. Storms and Floods since 1941. Several of the major storms and floods that have occurred on Tujunga Wash since the completion of Hansen Dam in 1940 are discussed in section 8-02 of this manual.

#### 4-07 RUNOFF CHARACTERISTICS

Runoff from the watershed is characterized by high flood peaks of short duration that result from high-intensity rainfall on the watershed. Flood hydrographs are typically of less than 12 hours duration and are usually less than 48 hours duration. Inflow rates drop rapidly between storms, and inflow during the dry summer season is usually less than  $10 \text{ ft}^3/\text{s}$ . Long-term average inflow to Hansen Dam for the period 1946 through 1988 is 27,450 acre-feet per year. Plate 4-6 lists the annual maximum of inflows, outflows, and contents at Hansen Dam from 1941 through 1986. Plates 4-7A and 4-7B display maximum peak inflow while plates 4-7C and 4-7D display the annual outflow for Big Tujunga Dam.

The greater Los Angeles area has historically experienced long-term wet and dry periods. Plate 4-8 illustrates the historic regional response of flood peaks from the 1870's to the 1970's.

In general, antecedent precipitation is required as a prerequisite for the occurrence of large floods from this watershed. With substantial antecedent precipitation resulting from a series of winter storms, precipitation loss rates may decrease to as low as 0.15 inch per hour by the end of a major storm. The basin unit hydrograph for the watershed between Hansen Dam and Big Tujunga Dam is shown on plate 4-9A; the unit hydrograph for the watershed above Big Tujunga Dam is shown on plate 4-9B.

#### 4-08 WATER QUALITY

Because Hansen Reservoir is strictly a flood control project that rarely impounds water for more than 24 hours, it has no appreciable effect on water quality. The water quality of the runoff entering the reservoir is generally of poor quality. The water is characterized as hard with iron and manganese concentrations high. Routine base flow (usually less than  $10 \text{ ft}^3/\text{s}$ ) is typically high in salinity content, whereas storm runoff is generally low in salinity content.

Two diversions exist for ground water recharge facilities. Hansen spreading grounds are used to recharge local base flow and captured storm runoff. Tujunga spreading grounds are used to recharge imported water.

#### 4-09 CHANNEL AND FLOODWAY CHARACTERISTICS

The Tujunga Wash channel downstream from Hansen Dam is a rectangular concrete lined open channel. Channel capacities increase from  $20,800 \text{ ft}^3/\text{s}$  just below Hansen Dam to  $28,200 \text{ ft}^3/\text{s}$  at the confluence of the Los Angeles River (pl. 3-1). Travel times for significant flows are also shown on plate 3-1, and include a total time of 0.4 hours from Hansen Dam to the Los Angeles River. Plates 4-10 and 4-11 show the Big Tujunga Channel profile from Hansen Dam to the Los Angeles River.

#### 4-10 UPSTREAM STRUCTURES

Big Tujunga Dam. The project is a water conservation and flood control facility of the LACDPW and is on Big Tujunga Creek, 15 miles above Hansen Dam. Exhibit C contains pertinent data on Big Tujunga Dam.

#### 4-11 DOWNSTREAM STRUCTURES

a. Whittier Narrows Dam. This unique flood control facility was built by the COE in 1957 at the narrows of the San Gabriel River and Rio Hondo in Los Angeles County, just north of Pico Rivera (see pl. 2-1). The facility is Federally owned and is operated and maintained by the COE. Pertinent data for Whittier Narrows Dam are included in Exhibit D.

This dam has the capability of diverting San Gabriel River inflow westward for discharge into Rio Hondo. During moderate and high reservoir impoundment behind the dam, the waters from the two rivers combine within the reservoir, and can be let out into either of the two downstream channels. Thus a major portion of, and at times the total inflow from the entire upper Rio Hondo and San Gabriel River drainages can, when necessary or desired, be passed into the lower Rio Hondo, and ultimately into the lower Los Angeles River. During significant flows, however, the outflow from Whittier Narrows Dam is normally discharged into both the Rio Hondo and the San Gabriel River. Thus, along with Hansen Dam, Whittier Narrows, and Sepulveda Dam are regulated to control floods on the lower reaches of the Los Angeles River.

b. Santa Fe Dam. This Federally owned, COE operated flood control facility is on the San Gabriel River upstream of Whittier Narrows Dam. It is regulated in conjunction with Whittier Narrows Dam, and thus, at times, indirectly in conjunction with Hansen and Sepulveda Dams.

c. Other Projects. There are numerous other water supply reservoirs upstream of Whittier Narrows and Santa Fe Dams on Rio Hondo, San Gabriel River, and their tributaries. These can be seen on plate 2-1, and pertinent data for these reservoirs are included in Exhibit D, page D-5.

#### 4-12 RELATED STRUCTURES

a. Sepulveda Dam. Sepulveda Dam is a major flood control dam owned, operated, and maintained by the LAD. It was constructed in 1941. It is located on the Los Angeles River, 43 miles above the mouth of the river, and 6 miles above the confluence of Tujunga Wash and Los Angeles River. The dam is in the south central portion of the San Fernando Valley, just northwest of the junction of the Ventura Freeway (U.S. Hwy. 101) and the San Diego Freeway (I-405) (see pl. 2-1). Pertinent data for Sepulveda Dam is included in Exhibit D. There are other water supply reservoirs upstream of Sepulveda Dam. These can be seen on plate 2-1, and pertinent data for these reservoirs are included in Exhibit D.

b. Pacoima Dam. This project is a water supply and flood control facility of DPW and is located on Pacomia Wash upstream of Lopez Dam. Pertinent data for Pacomia Dam is included in Exhibit D. It was constructed in 1929.

c. Lopez Dam. This dam was constructed on Pacoima Wash in 1954 in the far northeastern San Fernando Valley, 6.4 miles above the confluence of Pacoima Wash with Tujunga Wash. This gated facility is owned by the Federal Government and maintained by the LAD as part of the overall Los Angeles County Drainage Area (LACDA) flood control project. Pertinent data for Lopez Dam is included in Exhibit D.

#### 4-13 ECONOMIC DATA

a. Population. No population figures are tabulated specifically for the watersheds above or below Hansen Dam. The San Fernando Valley is estimated to have a population of approximately 1,081,000, according to the 1980 Census, with the 1987 population of the 500-year flood overflow area of 11 square miles along Tujunga Wash between Hansen Dam and the Los Angeles River estimated at 54,000. Portions of the following towns and cities are within this 500-year flood overflow area; Arleta, Pacoima, Panorama City, Sun Valley, Tujunga, and Los Angeles. The population of the greater San Fernando Valley, including Sunland, Tujunga, and Lakeview Terrace, is approximately 1,133,000.

b. Agriculture. Agriculture was at one time a major activity in the San Fernando Valley, but declined sharply between 1946 and the early 1970's, as urban growth in the valley displaced the existing farmland. There remains a very small amount of commercial agriculture in the far western valley, along with many small private orchards, vineyards, and vegetable gardens. There are a few remaining small private horse ranches in the northwestern San Fernando Valley.

c. Industry. Industry has increased dramatically in the San Fernando Valley since World War II and is scattered throughout all portions of the valley. There is little heavy industry concentrated in any portion of the San Fernando Valley. There are a number of moderate-sized factories in the central and northeastern portions of the valley, and a large amount of light industry (especially electronics and related fields) is scattered throughout all portions of the valley.

d. Flood Damages. Since completion of the dam in 1941, there has been relatively little in the way of damaging flows on Tujunga Wash. As of FY 86, approximately \$176,384,000 in damages has been prevented, primarily to single family and multi family residential structures. Within the 500-year flood plain below Hansen Dam are; 355 light industrial structures, 886 commercial structures, and 122 public buildings. The value (1987) of these light industrial, commercial, and public buildings is \$421,000,000.

## V - DATA COLLECTION AND COMMUNICATION NETWORKS

### 5-01 HYDROMETEOROLOGICAL STATIONS

a. Facilities. Plates 5-1A, B show the precipitation, reservoir (water surface elevation), and stream gages in and near the watershed above Hansen Dam. These gages, along with their latitudes, longitudes, and elevations, are listed on plate 5-1B. Many of the stations consist of more than one type of gage, such as a recording and a non-recording precipitation gage.

b. Reporting. Hydrologic data from Hansen Dam and the upstream and downstream watersheds are observed and reported in 4 different ways as illustrated on plates 5-2 and 5-3.

(1) Manual. The Hansen Dam Tender observes precipitation, water surface elevation, and gate settings, and reports these to the District Office, as described in section 5-06.a.

(2) Recording Instruments. The recording instruments store data on paper tape, which is removed at predetermined intervals (once each month, October-April, plus once during the summer) and maintained on file by the District.

(3) Telemetry System. Hydrologic data measured at the dam and other gages are transmitted to the Los Angeles District Office (LAD) by the Los Angeles Telemetry System (LATS). These gages automatically transmit reports at predetermined 24-hour intervals. The event mode is the primary data sources for the telemetry system. As a gage registers an event, current data are radio-transmitted to a repeater from which it is sent via microwave to the LAD Office. Each gage is programmed to trigger whenever 0.04 inches of precipitation, or a 0.25-foot change in water surface elevation is recorded. All gages can also be interrogated at any time for current data via polled mode.

(4) ALERT System. There is also an event-reporting gage system throughout southern California sponsored by the National Weather Service. This system is referred to as the ALERT (Automatic Local Evaluation in Real Time) System. Access to this information can be obtained through the REPORT program on the Water Control Data System computer.

c. Maintenance. Each operating agency is responsible for the maintenance of its own gages and/or telemetry radio equipment. In many cases, the gage is owned by the U.S. Geological Survey, and the telemetry attachments are owned by the LAD or LACDPW. Plates 5-4 and 5-5 show stage/discharge relationships for Big Tujunga Creek below Hansen Dam.

### 5-02 WATER QUALITY

There are no water quality stations in the watershed above Hansen Dam.

### 5-03 SEDIMENT STATIONS

There are no sediment stations in the watershed above Hansen Dam. There are sediment ranges in Hansen Reservoir. Variations in minimum water level elevation (pls. 4-1A, B) have occurred because of rapid sedimentation and because the lake which existed inside the reservoir (until it completely filled in with sediment in the 1970's) was read with a staff gage extending lower than the invert elevation 990 ft. The high sedimentation rate and lake readings cause difficulty in relating area capacity curves from year to year within the reservoir.

### 5-04 RECORDING HYDROLOGIC DATA

Each agency maintains records of its own data (sec. 5-01 above). The NWS data are placed in archives at the National Climatic Center in Asheville, North Carolina. Precipitation and other data are published monthly by the National Climatic Center in Climatological Data and Hourly Precipitation Data.

The State of California, Department of Water Resources, publishes the data from the ALERT telemetry gage network on a monthly basis. The LACDPW maintains their recording and non-recording data bases, and furnishes data to other agencies upon request. The LAD maintains a data base from its recording and telemetry gages and provides selected data to the NWS for publication. Real Time Reports received from the ALERT gages and the LATS gages are stored in a database on the LAD Water Control Data System Computer. The LAD also enters data from its manual observations on various forms, which are maintained on file in the Reservoir Regulation Section of the LAD Office. These forms are discussed further in section 9-05 and illustrated in figures 9-1 through 9-7.

### 5-05 COMMUNICATION NETWORK

The LAD maintains a voice radio communication network for its entire operation activities. This routinely includes communications between the District Office and the various dam tenders, as well as vehicles in the field.

During periods of significant runoff, communication with the dam tenders becomes vital. The existing radio network, which has proven itself reliable, is backed up by a second radio network; both of these are backed up by the local telephone system.

Power at the District Office is backed up by an emergency generator system; and if all fails at the District Office, there is a complete radio system at the LAD Base Yard. The Base Yard is located a few miles east of the District Office.

### 5-06 COMMUNICATION WITH PROJECT

a. Regulating Office With Project Office. During the flood season (15 November through 15 April), a routine radio call is made at least once each weekday from the LAD District Office to the dam tender at Hansen Dam.

The Hansen Dam operator is also the operator for Lopez Dam. This "Morning Report" is usually made at 0810 hours, Monday through Friday. Other routine or non-routine radio or telephone calls are made as needed. Since Lopez Dam is an ungated facility, there are no telephone or electrical services at the site. Direct communication with the operator while he or she is at Lopez Dam is possible by calling the Mobile Radio (WUK 4121) assigned to this operator.

In the event that all communications with the LAD office, including the LAD Base Yard, should be interrupted, a set of "Standing Instructions to Project Operator for Water Control" has been compiled for Hansen Dam and a copy of these instructions is included in this manual as Exhibit A. The LAD organization chart and important phone numbers for reservoir operations decisions at Hansen and Lopez Dams are given on plate 9-1.

b. Between Project Office and Others. The Hansen Dam Tender is required to notify personnel at the Los Angeles County DWP spreading grounds downstream of Hansen Dam prior to making each gate change. The dam tender is instructed not to increase releases until confirmation is received that their diversion gate has been adjusted. In case of flood releases it is imperative that the diversion gate be raised prior to initiation of flood control releases.

c. Between Regulating Office and Others. Before and during the early stages of any reservoir impoundment, the LAD notifies other agencies and selected private interests of the impending rises in the reservoir water surface elevation and corresponding outflow. A list of the agencies to notify, with applicable office and home telephone numbers, is published annually in the LAD's Instructions for Reservoir Operations Center Personnel (the so-called "Orange Book") and is shown on plate 5-6. During major runoff events, the LAD Reservoir Operations Center (ROC) is in constant contact with the LACDPW Hydraulics Branch to fully coordinate the operations of both agencies. The LACDPW is directly tied into the LAD radio and telephone system. The LAD ROC is also in direct radio contact with channel observers dispatched to patrol the Los Angeles River during large floods. Channel observers are the eyes and ears of the ROC. It is their responsibility to observe the effects of floodwater and debris action and to keep the District Office informed so that proper decisions can be made relative to the operation of the reservoirs. Based on their report, decisions can also be made relative to sending crews out to repair vulnerable points in a channel or levee system, or to initiate evacuation of a surrounding neighborhood.

#### 5-07 PROJECT REPORTING INSTRUCTIONS

During periods of water operations, communications between the LAD office and each affected dam tender are made on a frequent basis. Normal communications occur once each hour, and more frequent communications are sometimes required. If a gate change is required, the ROC staff broadcast the gate change instructions to the dam tender. When the gate change is completed, the dam tender calls back to the ROC with information on the change. The dam tender records pertinent information associated with the gate change on the form shown in figure 9-1. This report form is subsequently

submitted to the LAD Baseyard Office, Water Control Data Unit, Reservoir Regulation Section.

Other special instructions to dam tenders are conducted in a similar manner. This network of radio communications is also used by the dam tender to report any failure of machinery or other equipment, or any other unusual conditions at the dam.

#### 5-08 WARNINGS

The responsibility for issuing all weather watches and warnings, and all flood and flash flood watches and warnings, rests with the NWS. Local emergency officials of cities and counties are responsible for issuing any other public safety warnings, including unusual overflows, evacuations, unsafe roads or bridges, and toxic spills. The LAD is responsible for providing these officials with up-to-date information, and forecasts where possible, of water rises within Hansen/Lopez Reservoirs and release rates into the channel downstream of Hansen Dam. The LAD ROC would notify the Emergency Management Branch, Los Angeles Police Department to initiate evacuation if a dam break is imminent.

## VI - HYDROLOGIC FORECASTS

### 6-01 GENERAL

a. Role of LAD. The LAD does not make any formal hydrologic forecasts, published or unpublished, for Hansen Dam. Despite the lack of formal hydrologic forecasts, the LAD does carefully monitor the reservoir water surface elevation in Hansen Reservoir, and does notify other agencies of any significant changes or anticipated changes as described in section 5-06.

The LAD continues to improve its monitoring capabilities of conditions not only at Hansen Dam, but in adjacent watersheds. Improved and increased numbers of automatic telemetry rain and stream gauges help in this manner not only directly, but also in the development of computerized rainfall-runoff forecast models. The long-term goal of the LAD is to be able to provide relatively accurate predictions of inflows and reservoir water surface elevations as far in advance as possible. It is intended that these predictions will become accurate and reliable enough that they can be shared with the NWS, the LACDPW, city and county emergency officials, and others, to be used as basis for reservoir systems operations during the upcoming years.

The LAD Meteorologist prepares special quantitative precipitation forecasts (QPF's) for Los Angeles River drainages and other watersheds, including the Hansen Dam watershed. These are used in determining the potential for significant runoff into Hansen and other reservoirs.

b. Role of Other Agencies. No agency has any specific forecast responsibility for water surface elevations in Hansen Reservoir or for discharges in Tujunga Wash, either upstream or downstream of Hansen Dam. The NWS issues Flash Flood Warnings for rivers and other watercourses in the San Fernando Valley.

The LAD does receive real-time weather reports and forecasts, as well as historical weather data, from the NWS. This is accomplished by means of weather facsimile pictures and teletype data and forecasts transmitted by the NWS and received by a LAD facsimile recorder and teletype printer. Close coordination is maintained with the NWS forecast office located in Los Angeles.

Historical precipitation and streamflow data are available from the LACDPW. These data, while not of use in real-time, are important to studies of historical storms and floods which aid in the development and refinement of computerized rainfall-runoff forecast models.

### 6-02 FLOOD CONDITIONS FORECASTS

Forecasts of flood hydrographs are currently not made. However, routine evaluation of precipitation, resulting inflow, and forecast precipitation provide valuable subjective predictions of flood situations. Using such information, the LAD Reservoir Operations Center (ROC) can predict if an on-going flood will increase or decrease over the next 24 hours.

### 6-03 CONSERVATION PURPOSE FORECASTS

Because Hansen Dam is strictly a flood control facility, forecasts for other purposes including water conservation are not made.

### 6-04 LONG-RANGE FORECASTS

Because the watershed above Hansen Dam is relatively small, and because water is impounded behind Hansen Dam for short time periods, there is little direct need for long-range forecasts in the operation of Hansen Dam. Only in the event of major impoundment at Hansen Reservoir, as well as simultaneously at other reservoirs affecting the downstream channel and Los Angeles River, would a forecast of more than one day be of immediate significance to the regulation of Hansen Dam. In such a case, the forecast of another impending major storm or lack of such a storm might influence the release rate of water from Hansen Dam. The primary consideration of the release rates from all of the dams in the Los Angeles River system is to prevent or minimize downstream damages.

## VII - WATER CONTROL PLAN

### 7-01 GENERAL OBJECTIVES

The primary objective of Hansen Dam is flood control, specifically, the minimization of flood damages for portions of the San Fernando Valley along Tujunga Wash and the Los Angeles River. In this regard, water is temporarily stored behind Hansen Dam during periods of high inflows and is released more slowly through the downstream Tujunga Wash Channel.

There is no objective to operate the dam to reduce inundation damages to its improved reservoir lands. All usage of reservoir land is intended to have a purpose secondary to its role as the bottom of the flood control reservoir. All costs associated with reservoir inundation are intended to be routine maintenance costs associated with a clear understanding of risk and subsequent willingness to locate within the flood control reservoir.

### 7-02 MAJOR CONSTRAINTS

Significant problems have arisen at the project over recent years, including:

a. Loss of storage space due to sedimentation. Based on the results of the April 1983 reservoir sediment survey, current flood storage capacity below the spillway crest elevation of 1,060 ft. is approximately 25,500 ac-ft which is 23 percent less than the initially allocated flood control storage capacity (33,100 ac-ft). See plate 3-6 for the area-capacity curve reflecting 1983 conditions. Under 1983 conditions the SPF would reach a maximum water surface elevation of 1.057.25 ft., a maximum storage of 23,600 ac-ft, and a peak outflow of 20,640 ft<sup>3</sup>/s.

b. Repetitive clogging of the outlet conduits with dense silt. Due to a 10-month impoundment period following the major flood of 1978, an 18-ft. deep cohesive silt deposit completely clogged the gated outlet conduits. In 1982, following a 1-1/2 month impoundment, some conduits were observed to be 80 percent clogged with material.

c. Repetitive blocking of the trash rack by floatable debris. During the flood of 1980, while all gates were fully open, inflow (up to 11,350 ft<sup>3</sup>/s) transported floatable debris into the trash rack, nearly sealing off the outlet works. This occurrence is described in detail in section 3-06. During 1982, inflow as low as 500 ft<sup>3</sup>/s carried floatable debris, clogging the lower 10 ft. of the trash rack.

d. A variety of downstream difficulties associated with the dam's sediment outflow. In 1980, a policy of leaving all gates in the fully open position was adopted to minimize reservoir siltation, including silt packing in the outlet conduits. Subsequently, the problem of debris clogging the trash rack due to the direct impingement of fast-moving inflow was experienced. Local agencies also complained that the free-flowing stream picked up sediment from the reservoir bottom and transported the sediment into the downstream channel. Several downstream problems were noted. Groundwater

recharge basins silted in. Water that would have previously been diverted for recharge was bypassed to the ocean because of its high suspended sediment content and because it was released at rates exceeding diversion capability (up to 400 cfs). Low flow in the downstream concrete channels silted in. Abrasion to the downstream concrete channel inverters was accelerated.

#### 7-03 OVERALL PLAN FOR WATER CONTROL

Hansen Dam is regulated for flood control on Tujunga Wash and in the Los Angeles River. Plate 2-2, which depicts the storage allocations for Hansen Reservoir, shows that the entire space of the reservoir below the elevation 1,060 ft. (the spillway crest) is devoted to flood control. It is also the maximum water surface elevation for a Standard Project Flood (SPF). Between elevation 1,060 and 1,081.2 ft. (the maximum surface elevation for a Probable Maximum Flood (PMF)) is the spillway design surcharge pool. Here flood control is no longer the prime objective in deference to passing as much water out of the reservoir as is required to assure the safety of the dam. The 5.8 ft. between elevation 1,081.2 and 1,087 ft. is reserved for freeboard.

Hansen Dam is regulated in coordination with other projects protecting Tujunga Wash and the middle Los Angeles River. These projects include Pacoima, Big Tujunga, Lopez, and Devil's Gate Dams. Their locations are shown on plate 2-1A.

There may be instances where some reduction in releases may be considered necessary from a systems perspective. These conditions are discussed in section 7-13.

#### 7-04 STANDING INSTRUCTIONS TO THE PROJECT OPERATOR

In the event that all communication with the District Office, including the Base Yard, should be interrupted, a set of Standing Instructions to the Project Operator for Water Control have been compiled for each dam. A copy of these instructions for Hansen Dam is included in Exhibit A of this manual.

#### 7-05 FLOOD CONTROL

The plan for controlling floods on Tujunga Wash below Hansen Dam is presented in this section. The objective of the operating water control plan is to minimize flow damages. Project releases will be regulated to protect downstream communities. An attempt should be made to inform LACDPW and the Los Angeles City DWP of the release and of possible impacts to these agencies' spreading grounds downstream.

The project should be operated according to the Reservoir Regulation Schedule in Exhibit B. This is achieved by allowing the reservoir to build a pool by keeping the eight gates open at 1.0 ft. until the water surface elevation reaches 1,010.5 ft. After the water surface elevation reaches 1,010.5 ft., all gates are opened fully to 8.0 ft. until the downstream channel capacity of 20,800 ft<sup>3</sup>/s is reached at a pool elevation of 1053.0 ft. The gates are progressively closed as the water surface elevation rises until, at elevation 1,066, the gates are fully closed. At this point, spillway flow

plus ungated outflow approximately equal to downstream channel capacity occurs. On the falling limb of the inflow hydrograph, the same gate schedule is followed as the rising limb down to a pool elevation of 1,053.0 ft. All gates are left fully open at 8.0 ft below a water surface elevation of 1,053.0 until the reservoir is empty. Exhibit B provides a schedule that achieves this regulation. The schedule was revised in 1988 to reflect the following: to conform to a revised downstream channel capacity of 20,800 ft<sup>3</sup>/s; to have no more than four gates operated at a time; and to prevent debris and sediment from building up and clogging the outlet works. Keeping the gates open at 1.0 ft. until the water surface elevation reaches 1.010.5 is intended to minimize the floating debris problem, and keeping the gates fully open as the reservoir empties is intended to minimize the conduit sedimentation problem.

Hansen Reservoir should be drained as rapidly as possible, consistent with the achievement of downstream flood control. If runoff conditions are expected to cause flow to exceed the downstream channel capacity based on downstream channel observers and anticipated side inflow, releases should be reduced, so as not to contribute to the flooding. The objective is to safely empty the reservoir in preparation for the next flood and to prevent the outlet works from becoming clogged from sediment deposition.

A forecast to make regulation decisions may be either a series of computer generated inflow hydrographs (expected in the future) or a reasonable judgmental assessment of on-going rainfall and runoff, based upon available information. In either case, the ROC of the LAD would be responsible for developing the forecast and for determining confidence in it toward its application to reservoir water control decisions. The intent is to consider all appropriate information in implementing the water control plan described above.

#### 7-06 RECREATION

Approximately 1,450 acres are under lease to the City of Los Angeles for recreation development. Existing recreation development consists of an 18-hole golf course, two parks, a recreation center with ballfields, an amphitheater, and a miniature trail concession. There is significant equestrian use adjacent to the basin, and many trails meander through the reservoir. Some of the trails run through existing quarry operations and are often relocated by the City of Los Angeles to prevent conflicts.

As mentioned previously, the sole purpose of Hansen Dam is flood control. No water is impounded behind the dam for the purpose of recreation. A 130-acre recreational lake was maintained behind the dam up until the 1970's when it succumbed to sedimentation. The Water Resources Development Act of 1986, Report 99-1013, Section 847, provides for the sale of dredged material at Hansen Dam to be appropriated by Congress to the Secretary of the Army to construct, operate, and maintain recreational facilities at the Hansen Dam project. A proposal to excavate another lake in the basin is in process at this time. Other facilities proposed at this time are individual and group picnic areas and primitive camping areas. Plans are currently in preparation for a bike path and an equestrian trail which will run from one end of the dam to the other.

The channel of Tujunga Wash downstream of Hansen Dam is strictly a flood control channel, and provides no water oriented recreation use. Thus no releases are made for recreational purposes.

#### 7-07 WATER QUALITY

Because Hansen Dam has two ungated outlets, it cannot be operated to contain contaminant spills, unless the water surface elevation remains below 1,011 ft. (invert of the two ungated outlets). Hansen Dam is not operated for water quality objectives.

#### 7-08 FISH AND WILDLIFE

No Hansen Dam water control objectives exist for fish and wildlife, either within the reservoir, or within the channel of Tujunga Wash downstream. The Environmental Assessment that accompanies this water control manual contains detailed information on species types found within the Hansen Dam project area.

#### 7-09 DROUGHT CONTINGENCY PLAN

Hansen Dam does not contain any storage allocation for water supply, however, the Water Resources Development Act of 1986, Report 99-1013, Section 847 authorizes the Secretary of the Army to facilitate water conservation and groundwater recharge measures at Hansen Dam project in coordination with the City of Los Angeles, California and the Los Angeles County Flood Control District, to the extent consistent with other project purposes. Tujunga Wash downstream of the dam is concrete-lined but diversion possibilities exist at the Hansen and the Tujunga Spreading Grounds (see secs. 3-04 b. and d.). Currently, no storage is used for water conservation until local interests formally agree to participate in the removal of sediment deposits accumulated in the reservoir that are directly attributable to water conservation operation. However, in the event of a drought, the possibility of impounding water for water conservation would be considered. Any such plan would be evaluated to ensure that the flood control purpose of the project would not be compromised.

#### 7-10 HYDROELECTRIC POWER

No facilities for the generation of hydroelectric power at Hansen Dam exist, nor are any contemplated.

#### 7-11 NAVIGATION

No navigation of any sort is possible or allowed in Hansen Reservoir or in Tujunga Wash, either upstream or downstream of Hansen Dam.

## 7-12 OTHER

Maintenance and construction on the downstream channel of Tujunga Wash normally occur during the dry season of late spring and summer. During such periods, the eight Hansen Dam gates may be closed in order to reduce releases in support of such downstream activities.

## 7-13 DEVIATION FROM NORMAL OPERATION

The regulation schedule for Hansen Dam is outlined in Exhibit B and discussed in section 7-05.b. However, it is possible, and would be desirable, under certain limited circumstances, for the release rate from Hansen Dam to be decreased below what is called for in Exhibit B.

In addition to the prevention of downstream damages, there are other possible reasons for deviation from the normal release plan at Hansen Dam:

a. Emergencies. In the event of a potential drowning, toxic spill, or other accident in which high flows on Tujunga Wash downstream of Hansen Dam could prevent rescue or could cause further injury, the eight gates at Hansen Dam could temporarily be partially or totally closed. This would reduce, but not eliminate, the flow to the downstream channel if the reservoir water surface were above an elevation of 1,011, the elevation of the ungated outlets. Such emergency action should be taken immediately, unless such action would likely result in worse conditions. Notifications to all concerned agencies of emergency actions must be made as soon as possible.

b. Unplanned Minor Deviations. Unplanned events that could create a temporary need for minor deviations from the schedule published in Exhibit B include emergency bridge repairs, the restoration of utility lines across Tujunga Wash, and certain unplanned necessary maintenance and inspection. Hansen Dam may be operated to support these activities, provided that flood protection is not jeopardized, and provided that no significant threat is made to endangered wildlife species in the reservoir (see sec. 8-05).

c. Planned Deviations. The same arguments apply to planned construction, maintenance, inspections, etc., as described in section 7-13.b. Such planned activities should be scheduled for the dry season, whenever possible. The dry season is normally May through October, although on a rare occasion, a tropical storm with heavy rain and high runoff potential can occur during the late summer or early fall.

## 7-14 RATE OF RELEASE CHANGE

The eight hydraulic gates at Hansen Dam move at a rate of 0.8 ft/min. The dam tender can safely operate one gate at a time in succession, operating controls on one until the desired setting is reached, then operating the adjacent gate. When the water elevation in the reservoir has reached 1010.5 ft, this physical limitation on speed of operation prevents a sudden jump in downstream releases from 1,260 cfs to 7,920 cfs. In a major flood, with all gates open to 8.0 feet, the two ungated outlets will begin to discharge at elevation 1011.0 feet as inflow increases. The concrete lining

of the downstream channel precludes concern over bank erosion or sloughing due to sudden gate changes, however the downstream channel capacity of 20,800 cfs maximum must not be exceeded and may be influenced by side inflow. Therefore gradual decreases in gate openings at Hansen Dam, based upon downstream reports by channel observers, may be desired even prior to gate closings scheduled when elevation 1053.0 feet is reached.

#### 7-15 WATER CONTROL PLANNING TOOLS

Specific planning tools have been utilized in the development of the flood control plan. These tools are also used to evaluate and regulate rules planned deviations and also facilitate operation of the dam during emergencies and unplanned deviations. Water control planning tools used for Hansen Dam include:

- a. Outlet Rating Curves (pl. 7-1 and 7-2).
- b. Spillway Discharge Curve (pl. 7-3).
- c. Area-Capacity Curves (pl. 3-6).
- d. Downstream Channel Capacity Plate (pl. 3-1).

## VIII - EFFECT OF WATER CONTROL PLAN

### 8-01 GENERAL

The sole purpose of Hansen Dam is flood control, and by far the greatest effect and benefit of the dam is the protection of life and property downstream of the facility. The major aspects of flood control at Hansen Dam for both the reservoir and spillway design floods, as well as several major historical floods, are discussed in section 8-02. Any other effects or benefits of Hansen Dam are decidedly secondary to those of flood control, but they are briefly described in sections 8-03 through 8-08.

### 8-02 FLOOD CONTROL

a. Original Reservoir Design Flood. The design of Hansen Flood Control Basin was based upon what was called, in those days, a "maximum probable flood". The hydrologic bases used in the development of the original reservoir design flood is briefly summarized as follows:

1. The design flood was computed from a four-day design storm, with the volume and intensity at their maximum on the fourth day.
2. The design storm had an average maximum 24-hour rainfall of 10.57 inches over the drainage area.
3. The rainfall for the 3 days preceding the maximum (fourth) rainfall day was based on a statistical analysis of rainfall data which indicated percentages of 20, 30, and 50 percent of the maximum day. To represent the most adverse conditions, these percentages were appraised in the order of increasing magnitudes, culminating in the fourth (100 percent) day.
4. Runoff coefficients for the modified rational procedure used were based on the rainfall to runoff relations computed for the adjacent drainage area above San Gabriel Dam No. 2, which indicated the highest runoff coefficients for the March 1938 flood.
5. Base flows on the fourth day of 40 ft<sup>3</sup>/s/square mile for the drainage area above Big Tujunga Dam and 20 ft<sup>3</sup>/s/square mile for the drainage area below Big Tujunga Dam were assumed.
6. The Big Tujunga Dam was assumed full (to spillway crest) at the start of the storm, and the flood was routed over the spillway.

The original reservoir design flood was routed through Hansen Flood Control Basin using the adopted method of operation as follows:

- (a) At the beginning of the flood, all gates were open;
- (b) When the water surface elevation (WSE) reached 1,024.5, the gates would be operated to maintain a constant outflow of 12,000 ft<sup>3</sup>/s, including the ungated outlets;

(c) After the reservoir receded below WSE 1,024.5, all gates would be fully opened. Using this method of operation, the maximum WSE reached was 1,059.7.

b. Standard Project Flood. When Hansen Dam was originally designed, the SPF concept had not yet been developed. Sometime later, probably in about 1946, before the improvements to Tujunga Wash downstream from Hansen Dam were designed, a SPF was determined for Hansen Dam.

The standard project storm (SPS) selected was the 21-25 January 1943 storm which was centered in the mountains and foothills a few miles east - northeast of Hansen Dam. The storm was transposed to the drainage area above Hansen Dam using mean annual precipitation as a transposition factor.

Unit hydrographs, shown on plates 4-9A and 4-9B, were determined using the average Mountain S-graph and basin n-values of 0.055 above Big Tujunga Dam and 0.050 above Hansen Dam below Big Tujunga Dam. The Big Tujunga Dam subarea hydrograph was routed through Big Tujunga Reservoir assuming the reservoir was full to spillway crest at the beginning of the flood. The outflow hydrograph was then channel routed using the Modified Puls Method to Hansen Dam Reservoir and combined with the hydrograph for the intervening subarea. The resulting Hansen Reservoir inflow hydrograph has a peak inflow of 53,000 ft<sup>3</sup>/s and a direct runoff (excludes baseflow) 4-day volume of 57,200 ac-ft. With baseflow, the total 4-day volume is 92,500 ac-ft. This inflow hydrograph is still considered appropriate.

With the improvement of Tujunga Wash below Hansen Dam, the maximum release could be increased from 12,000 ft<sup>3</sup>/s to 22,000 ft<sup>3</sup>/s. A reservoir routing performed with a maximum release of 22,000 ft<sup>3</sup>/s, assuming the original 50-year sediment allocation of 5,000 ac-ft, would yield a maximum WSE of less than 1,057. However, the 1969 survey revealed that sediment accumulation had already exceeded 5,000 ac-ft. Therefore, a new sediment yield estimate based on the survey data was used to revise the 50-year sediment allowance to 10,500 ac-ft and calculate a 100-year sediment allowance of 21,000 ac-ft. Routing the SPF through Hansen Reservoir with the revised sediment allocations yield maximum WSEs of 1,057.7 and 1,064.76 for the 50-year sediment and 100-year sediment allowances, respectively.

The regulation schedule for Hansen Dam was revised in 1988 to conform to a revised downstream channel capacity of 20,800 ft<sup>3</sup>/s.

Plate 8-1 depicts the results of routing the SPF at Hansen Dam for the 50- and 100-year sediment distributions, using the 1988 revised regulation schedule and the revised sediment allowances. The maximum inflow to the dam is still 53,000 ft<sup>3</sup>/s on the second day of the flood, with a maximum discharge through the outlet works now controlled to 20,800 ft<sup>3</sup>/s. For a 50-year sediment allowance, the maximum WSE is 1,057.38, or 2.6 ft. below the spillway crest. For a 100-year sediment allowance, the maximum WSE is 1,065.50 ft., having a spillway discharge of 12,000 ft<sup>3</sup>/s, but a combined discharge of 20,800 ft<sup>3</sup>/s, equal to the downstream channel capacity. Using the 1983 survey results to determine the elevation-storage relationship and the 1988 revised Regulation Schedule, the maximum WSE is 1057.38. Note on plate 8-1 that for a

50-year sediment allowance, the water surface reaches an elevation of 1,010.5 and then begins to recede prior to the peak. This occurs in accordance with the Regulation Schedule shown on plate 3-4, which requires all gates to be at 8.0 ft. at a water surface elevation of 1,010.5. Following the Regulation Schedule, the gates would remain open until the water surface rises to the point requiring a gate change or the reservoir is drained. In this case, the Schedule causes outflow to exceed inflow for a short period and a dip in the curve results.

c. Spillway Design Flood. The spillway at Hansen Dam was designed in 1939 for a peak outflow of 101,000 ft<sup>3</sup>/s, having a surcharge of 21.8 ft. on the ogee crest. An additional 5.2 ft. of freeboard to account for wave runoff and wind setup set the top of the dam at elevation 1,087 ft.

1. Original Criteria. The original spillway design flood was based on a "computed spillway flood," determined from rainfall 25 percent greater than the Reservoir Design Storm. The "computed spillway flood," resulted from a hypothetical four-day storm that had a basin average of 13.2 inches of rain during the maximum 24 hours. The adopted spillway design flood was determined by increasing the "computed spillway flood" by 50 percent, resulting in a peak inflow of 129,600 ft<sup>3</sup>/s and a maximum one-day volume of 76,800 ac-ft.

In recent times, spillways have been designed using the PMF concept, with the National Weather Service (NWS) providing the Probable Maximum Precipitation. In a 1978 study, the adequacy of the Hansen Dam spillway was reviewed under modern criteria. This led to the development of a PMF for Hansen Dam.

2. PMF Criteria. Plate 8-2 depicts the hydrograph of the computed inflow for the Probable Maximum Flood over the drainage area above Hansen Dam, reservoir water surface elevation, and outflow that results when the PMF is routed through Hansen Reservoir.

The probable maximum precipitation was based upon a hypothetical 72-hour rain storm developed from the criteria published by the NWS in Hydrometeorological Report No. 36, entitled "Interim Report - Probable Maximum Precipitation in California" (1961, revised 1969). This storm was critically centered over the drainage above Hansen Dam.

The unit hydrograph was the same as for SPF except that lag times were reduced by 15 percent.

For the PMF routing, the reservoir was assumed initially full to elevation 1,060.0 ft. (spillway crest) and the flood control outlet works were considered completely blocked by debris.

The PMF generates a maximum inflow to Hansen Reservoir of 105,000 ft<sup>3</sup>/s late on the third day of the storm (see pl. 8-2) and a total volume of 246,000 ac-ft. The maximum water surface elevation in the reservoir rises to 1,081.2 ft., storing 44,990 ac-ft behind the dam. The maximum outflow over the spillway is 99,700 ft<sup>3</sup>/s.

d. Other Floods.

1. 22-26 January 1943. The storm of 22-26 January 1943 was in many respects the most severe of record in the coastal drainages of southern California. It occurred when a series of warm Pacific cyclones from Hawaii collided with a cold storm moving south from British Columbia, Canada producing strong winds and heavy rain over most of California.

Plate 8-3 depicts the runoff of this storm. The total 21-23 January precipitation ranged from less than 11 inches in the northern and central San Fernando Valley to more than 25 inches in the Santa Monica Mountains of Sepulveda Dam. Rainfall was heaviest during the first few hours of 23 January, with a less intense but longer-lasting period of generally heavy rain during the last 6 hours of that day.

Because of unseasonably dry antecedent conditions, infiltration rates were high at the beginning of the storm. This is reflected in a relatively moderate peak inflow rate to Hansen Dam following the intense burst of rain early on 22 January. Progressive saturation of the ground, brought on by prolonged and increasingly heavy rain on 22 January, resulted in an increasing rate of inflow late in the day. The maximum of the computed mean hourly inflow values was 18,900 ft<sup>3</sup>/s during the third hour of 23 January.

The maximum water surface elevation of 1,036.5 ft. was reached at noon on the 24th, when 18,743 ac-ft of water was stored behind the dam. The outflow released to the channel downstream was regulated to 1,600 ft<sup>3</sup>/s until the pool was drained.

2. 23-26 January 1969. The period of 18-27 January 1969 was exceptionally wet throughout southern California, as a series of warm storms from south of Hawaii were funneled into this area. After moderate to heavy rain 18-22 January, (followed by a one-day break), rain resumed 23 January, with several moderate rain bands and one long-lasting, heavy band that climaxed early 25 January. The flood hydrographs are shown on plate 8-4. The total precipitation for the period of 23-26 January in southern California ranged from just over 6 inches at Hansen Dam to more than 23 inches in the San Gabriel Mountains southeast of Big Tujunga Dam, according to an isohyetal map prepared by Los Angeles County Flood Control District.

By the time of the 24-25 January rain, the ground throughout the Hansen Basin and elsewhere was heavily saturated, with a high runoff potential. Hansen basin runoff potential was high due to the heavily saturated ground when the 24-25 January storm began. Big Tujunga Dam measured a peak inflow rate of 19,500 ft<sup>3</sup>/s from 1000 to 1100 hours on the 25th, and inflow at Hansen peaked three hours later, averaging 17,970 ft<sup>3</sup>/s from 1300 to 1400 hours (pl. 8-4). At 1700 hours the Hansen Reservoir water surface peaked at 1,018.3 ft. NGVD, with 9,015 ac-ft of water stored; the maximum outflow of 11,040 ft<sup>3</sup>/s occurred at 1800 hours 25 January.

3. 23-25 February 1969. In late February 1969 several back-to-back storms moved into southern California from the west, with the rainfall of early 25 February by far the heaviest. The total precipitation for 23-25

February ranged from less than 5 inches at Hansen Dam to 20 inches along Angeles Crest Highway southeast of Big Tujunga Dam.

The combination of a thoroughly saturated watershed from the heavy January 1969 rains and continued moderate rain and snow during February 1969 resulted in a very high runoff potential when the very heavy rain burst occurred on the morning of 25 February. The flood down Big Tujunga Canyon pushed the water surface level behind Big Tujunga Dam to a height of 2,301.4 ft., 11.4 ft. above its spillway. Outflow there reached an average of 17,200 ft<sup>3</sup>/s from 0500 to 0600 hours. Mean hourly inflow at Hansen peaked at 26,012 ft<sup>3</sup>/s from 0700 to 0800 (pl. 8-5), and its highest water surface elevation was 1,030.8 ft. NGVD at 1100 hours. Maximum storage was 14,872 ac-ft at 1100 hours, and maximum outflow from Hansen was 16,000 ft<sup>3</sup>/s at noon on 25 February.

4. 9-11 February 1978. After several moderately heavy storms during January and early February 1978, one low-latitude Pacific storm developed west of southern California and moved into the area during the night of 9-10 February. After a day of heavy rain in the San Gabriel Mountains on 9 February, in which Opid's Camp (near the San Gabriel-Big Tujunga watershed divide) received 10.8 inches, a major cloudburst struck the Hansen and adjacent watersheds during the first two hours of 10 February, with generally 1.0 to 1.5 inches of rain. Some stations measured up to 1.4 inches in 30 minutes. Total precipitation in and around the Hansen watershed ranges from 5-6 inches at the dam to 14 inches in the higher mountains southeast of Big Tujunga Dam.

As the result of the 10 February cloudburst, which occurred on saturated ground just beginning to recover from a major burn in November 1975, several streams in the Hansen watershed experienced severe flash floods and mud flows. Some campgrounds were totally washed away, with several fatalities. Inflow to Hansen Dam averaged 40,220 ft<sup>3</sup>/s from 0300 to 0345 hours on 10 February (pl. 8-6), and the mean of 35,050 ft<sup>3</sup>/s for the hour ending at 0400 is the greatest on record. The maximum water surface elevation for this flood event reached 1,023.9 ft. NGVD at 0630 hours on 10 February. At this time, 8,211 ac-ft of water was stored behind the dam, according to the storage/elevation survey of August 1969. The maximum outflow from the dam increased to 13,540 ft<sup>3</sup>/s at 0600 hours on 10 February.

5. March 1978 - February 1980. Four more significant storm and flood periods occurred in southern California during the following two years. These occurred 28 February - 5 March 1978, 5 January 1979, 30 January - 2 February 1979, and 13-21 February 1980. The Hansen watershed experienced heavy rain, and the inflow to Hansen Dam was significant in each of these events.

6. Storm and Flood of 28 February - 3 March 1983. A low-latitude Pacific storm, reminiscent of those of 1938 and 1978, moved into southern California at the end of February and first of March 1983, with generally 10-20 inches of rain over the Hansen watershed. Big Tujunga Dam recorded 18.40 inches for the period. The heaviest rainfall occurred with the passage of a strong occluded cold front during the morning of 1 March, with peak intensities well in excess of 1 inch per hour.

The inflow to Hansen Reservoir consisted of three peaks between 2000 hours 1 March and 0500 hours 2 March (pl. 8-7). The middle peak, which occurred at midnight 1-2 March, was the greatest, with an estimated maximum inflow of 27,900 ft<sup>3</sup>/s. The maximum water surface elevation of 1,039.7 ft. NGVD at 0700 hours, 2 March is the highest yet observed for Hansen Reservoir. The storage of 13,261 ac-ft is the third greatest amount of water ever impounded Hansen Dam. The maximum outflow from the reservoir was 18,100 ft<sup>3</sup>/s at the time of the maximum water surface elevation.

### 8-03 RECREATION AND AGRICULTURE

a. Recreation. None of the recreational facilities in Hansen Reservoir depend upon runoff water impounded behind the dam, though there is a proposal to excavate a small lake in the basin at this time. Thus there are no direct recreational benefits that result from the dam or its operation at present. The recreational facilities were constructed because the land within the reservoir could not be used for other purposes. Thus there is an indirect recreation benefit accruing to the project.

The effects of the dam and its operation upon the recreational facilities within the reservoir are by necessity all negative; that is, some of these facilities are occasionally flooded by the impoundment of water behind the dam for flood control. These recreational facilities, however, were constructed and are operated with this understanding.

b. Agriculture. The same arguments cited above regarding recreation also apply to the agricultural products that are cultivated on Hansen Reservoir lands. Because the overall acreage of agriculture within the reservoir basin is small compared to the needs of the local populations, the impact of Hansen Dam and its operation upon the overall food production and consumption in the region is negligible.

### 8-04 WATER QUALITY

There are no benefits of Hansen Dam to water quality of Tujunga Wash. On the other hand, Hansen Dam and its operation should not in any way contribute to the degradation of the water quality of the river.

### 8-05 FISH AND WILDLIFE

The reservoir lands that constitute the Hansen Flood Control Basin are characterized by natural vegetation which survive in the environment of a flood control basin where there is no objective to operate the dam to reduce inundation damages to improved reservoir or recreational lands. The flood control basin contains several vegetational associations including willow riparian woodland, riparian scrub, alluvial wash, coastal sage scrub, oak woodland and oil field grassland. Additionally, established areas of vegetation occur at landscaped areas and in places on the dam face itself.

Associated wildlife include the side-blotched lizard, cottontail rabbit, jackrabbit, California ground squirrel, gopher, coyote and mule deer. About 24 resident bird species have been identified along with numerous migrant

species. There are no fish within the flood control basin, though Big Tujunga wash is a perennial stream and supports the small native fish species; arroyo chub, Santa Ana sucker and speckled dace.

Inundation will have the potential to kill or displace ground dwelling animals or may result in the temporary loss of willow canopy, the prime habitat of several bird species. The only listed or threatened species that can be potentially affected within Hansen reservoir is the least Bell's vireo. However, the habitat in question is not proposed critical or designated critical habitat by the U.S. Fish and Wildlife Service. Also, there is no permanent loss of habitat since some of the wildlife is migrating, many species in the basin are adapted to flooding and habitat regeneration is relatively quick.

#### 8-06 WATER SUPPLY

Because Hansen Dam is not operated for water supply, there are no direct effects or benefits of the dam or its operation upon the water supply of the San Fernando Valley or other parts of the greater Los Angeles Basin. The District will attempt to inform LACDPW and other downstream entities when flood control releases are to be made. However, there will be no restrictions in scheduled releases to mitigate for possible adverse impacts downstream. When conditions are favorable, low releases from below the debris pool can be coordinated with Los Angeles LACDPW and Los Angeles County DWP to facilitate use of their spreading grounds.

#### 8-07 HYDROELECTRIC POWER

There is no existing or contemplated hydroelectric power generation at Hansen Dam.

#### 8-08 NAVIGATION

There is no navigation on Tujunga Wash or in Hansen Reservoir at any time.

#### 8-09 FREQUENCIES

a. Peak Inflow and Outflow Probabilities. Plate 8-8 is a graph of the peak inflow and outflow frequencies at Hansen Dam, computed from 1985 Los Angeles County Drainage Area (LACDA) review study. Plate 8-9 is a graph of the peak inflow and outflow frequencies at Big Tujunga Dam, computed from a 1985 LACDA Review Study. The values of these curves at specific return periods are listed on plates 8-10 and 8-11, respectively. Comparison of historical and design floods at Hansen Reservoir are presented on plates 8-14 and 8-15. Exhibit E contains stream flow data for stations on Tujunga Creek.

Due to the newly determined downstream channel capacity of 20,800 cfs, decreased from 22,000 cfs, the elevation frequency curve using the new regulation plan would be slightly higher for events with a frequency of occurrence (exceedence interval) of less than once in 400 years.

b. Pool Elevation Duration and Frequency. Plate 8-12 is the computed elevation frequency curve for Hansen Dam. Plate 8-13 is the computed elevation frequency curve for the Big Tujunga Dam. The values of the curves at specific return periods are listed on plates 8-10 and 8-11, respectively.

c. Key Control Points. Exhibit E shows a stage/discharge rating table for the USGS stream gauge on Tujunga Wash below Hansen Dam.

#### 8-10 OTHER STUDIES

a. Examples of Regulation. Discharge-frequency values presented in this manual were derived from on-going (1985) investigations in the U.S. Army Corps of Engineers Los Angeles County Drainage Area Study. The "Interim Report on hydrology and Hydraulic Review of Design Features of Existing Dams for Los Angeles County Drainage Area Dams," dated June 1978, presents the derivation of the PMF and SPF used in this manual. The "Los Angeles County Drainage Area (LACDA) Review" dated February 1988, revised 1989, assesses current adequacy of channel capacities in the entire LACDA system. The Corps' "LACDA Review Feasibility Study", which was commissioned by Los Angeles County to study ways to improve the flood control capabilities of the LACDA system in view of increased urbanization, is anticipated to be available in FY 1991. Alternative solutions studied included reregulation of corps reservoirs as a system, deepening channels, widening channels and increasing levee heights. There is also a mini-report being prepared which studies in greater detail reregulation of the Corps reservoir projects to improve the flood control capability of the LACDA system.

b. Channel and Floodway Improvement. No floodplain management studies addressing the downstream channel have been conducted by the U.S. Army Corps of Engineers since the downstream channel was constructed. Several Flood Insurance Studies have been completed to date by the Corps of Engineers and Los Angeles County Flood Control District (now part of the Department of Public Works) for the Federal Emergency Management Agency (FEMA). FEMA is also preparing Flood Insurance Rate Maps (FIRM Maps) to consider specific flood depths for flooded areas. The maps will have a scale of 1" = 500' and will be used as part of the National Flood Insurance Program (NFIP).

## IX - WATER CONTROL MANAGEMENT

### 9-01 RESPONSIBILITIES AND ORGANIZATION

a. Corps of Engineers. Hansen Dam is owned, operated, and maintained by the LAD, which has complete regulatory responsibility for the dam and the reservoir.

Reservoir regulation and water control decisions at Hansen Dam and other COE facilities in the LAD are conducted by the Reservoir Regulation Section. Plate 9-1 shows an organizational chart depicting the chain of command for Reservoir Regulation.

Gate operation instructions to the dam tender are issued by the Reservoir Operations Center (see secs. 5-06 and 5-07). In the event that communications between the Reservoir Operations Center and Hansen Dam are interrupted, a set of Standing Instructions to the Project Operator for Water Control are included in Exhibit A. The Hansen Dam Reservoir Regulation Schedule is presented in Exhibit B. Dam tenders are part of the Operation Branch, Construction-Operations Division.

b. Other Federal Agencies. The COE has complete responsibility for the operation of Hansen Dam. Although the COE receives data and information from other Federal and local agencies and informs these agencies of major decisions affecting Hansen Dam, no other agency has any responsibility in the operation of Hansen Dam. The U.S. Geological Survey (U.S.G.S.) operates stream gauges in the LACDA.

c. State and County Agencies. LACDPW has maintenance responsibility for the Tujunga Channel downstream of Hansen Dam and maintains and operates a number of projects in the drainage area, including Hansen Spreading Grounds. Exhibits C and D show pertinent data related to LACDPW projects.

d. City of Los Angeles. A large portion of the Hansen Reservoir lands, owned by the Federal Government and operated by the COE, is leased to the City of Los Angeles for recreational purposes. The Corps reserves the right to inundate this land. Also, the DWP maintains and operates Tujunga Spreading Grounds.

e. Private Organizations. There is no involvement of private organizations in the regulation of Hansen Dam.

### 9-02 INTERAGENCY COORDINATION

The LAD coordinates with other Federal, State, County, and local organizations, as well as with the press (media), concerning the water control for Hansen Reservoir.

a. Local Press and Corps of Engineers Bulletins. The Public Affairs Office of the LAD is responsible for interfacing with the press regarding operations at Hansen Dam and flows in the channel downstream of the dam. This is accomplished through interviews and the occasional issuance of press releases. The LAD does not issue flood watches, warnings or other status reports or forecasts to the general public. These are the responsibility of the NWS.

b. National Weather Service. The LAD utilizes NWS data and forecasts in the operation of Hansen Dam, including the real-time telemetry data from gauges installed in the watershed by the LACDPW in cooperation with the NWS. The LAD shares data with the NWS and other agencies both on a real-time basis and after the fact.

c. U.S. Geological Survey. The LAD receives streamflow data from the U.S.G.S., primarily on a historical basis in southern California. The LAD coordinates with the U.S.G.S. in many different ways, and shares its data with the U.S.G.S.

d. Los Angeles County Department of Public Works. The LAD and LACDPW closely coordinate the operation of their reservoir projects and the maintenance and patrolling of their channels in the LACDA. The LAD informs the City of Los Angeles of any anticipated and actual impoundments.

#### 9-03 INTERAGENCY AGREEMENTS

No interagency agreements exist with the exception of the land leased to the City of Los Angeles for recreational purposes.

#### 9-04 COMMISSIONS, RIVER AUTHORITIES, COMPACTS, AND COMMITTEES

Hansen Dam is not involved in any commissions, compacts, or other formal multi-agency agreements.

#### 9-05 REPORTS

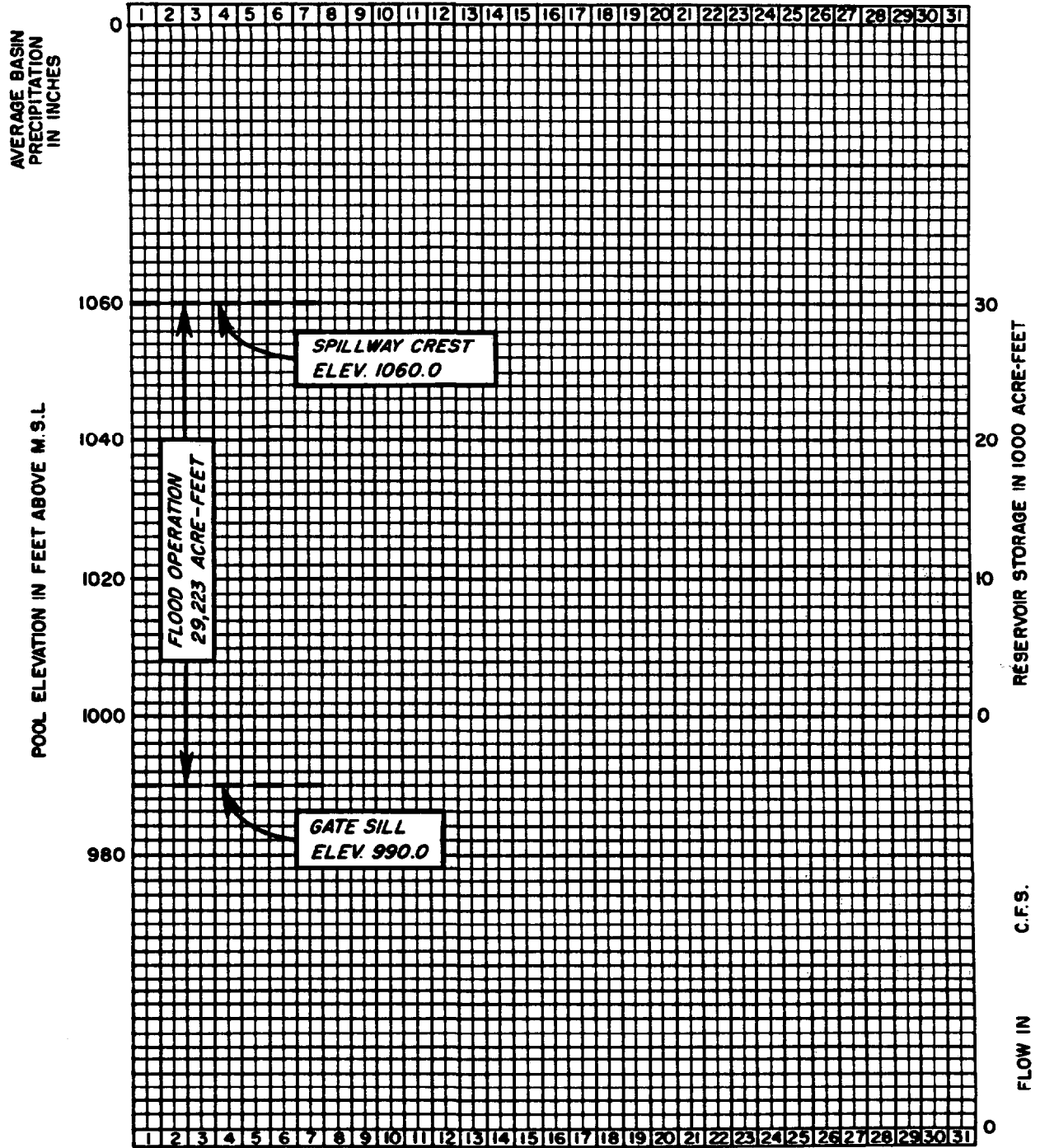
The LAD prepares and files several types of reports. Each month during the runoff season, November through April, a flood situation and runoff potential report is prepared and sent to the South Pacific Division (SPD) of the COE.

Seven specific forms are also prepared in conjunction with the LAD's reservoir operation at Hansen Dam. A copy of each of these forms is included in figures 9-01 through 9-07. These include: Flood Control Basin Operation Report (prepared by each dam tender), Monthly Reservoir Operation (operational hydrographs), Rainfall Records (from manual readings of glass tube rain gauges), Record of Data from Digital Recorders, Reservoir Computations, Reservoir Operation Reports, and Record of Calls (both radio and telephone).

The LAD also collects and files charts from recording instruments at Hansen Dam (and other dams), including precipitation, reservoir surface elevation, and gauge height. Daily precipitation totals and, as needed, other data (such as unusually high intensities) are manually extracted from the precipitation charts, and the charts are sent to the National Climatic Data Center of NOAA. The other charts are maintained on file at the LAD District Office in the Reservoir Regulation Section.



ENGW - E - 6



RESERVOIR STORAGE BASED ON SURVEY DATED OCT 1978

|                              |         |                          |
|------------------------------|---------|--------------------------|
| MONTH OF                     | 19      | GROSS STORAGE (ACRE-FT.) |
|                              | ELEV.   | NONE                     |
| Conservation Pool            |         | 26,090                   |
| Flood Control Pool           | 1,060.0 |                          |
| Outlet Capacity at Full Pool |         | 22,000 c. f. s.          |

MONTHLY RESERVOIR OPERATION  
 HANSEN FLOOD-CONTROL BASIN  
 LOS ANGELES RIVER BASIN  
 DRAINAGE AREA 151.9 SQ. MILES  
 SOUTH PACIFIC DIVISION  
 LOS ANGELES DISTRICT

## RAINFALL RECORD

| STATION      |    |                 |              |             | <input type="checkbox"/> HOURLY <input type="checkbox"/> DAILY |          | DATE                        |
|--------------|----|-----------------|--------------|-------------|--|----------|-----------------------------|
| HR           | DA | TIME OF READING | GAGE READING | STORM TOTAL | SEASON TOTAL   | OBSERVER | REMARKS (SNOW, TEMP., ETC.) |
| 0000         | 1  |                 |              |             |  |          |                             |
| 0100         | 2  |                 |              |             |  |          |                             |
| 0200         | 3  |                 |              |             |  |          |                             |
| 0300         | 4  |                 |              |             |  |          |                             |
| 0400         | 5  |                 |              |             |  |          |                             |
| 0500         | 6  |                 |              |             |  |          |                             |
| 0600         | 7  |                 |              |             |  |          |                             |
| 0700         | 8  |                 |              |             |  |          |                             |
| 0800         | 9  |                 |              |             |  |          |                             |
| 0900         | 10 |                 |              |             |  |          |                             |
| 1000         | 11 |                 |              |             |  |          |                             |
| 1100         | 12 |                 |              |             |  |          |                             |
| 1200         | 13 |                 |              |             |  |          |                             |
| 1300         | 14 |                 |              |             |  |          |                             |
| 1400         | 15 |                 |              |             |  |          |                             |
| 1500         | 16 |                 |              |             |  |          |                             |
| 1600         | 17 |                 |              |             |  |          |                             |
| 1700         | 18 |                 |              |             |  |          |                             |
| 1800         | 19 |                 |              |             |  |          |                             |
| 1900         | 20 |                 |              |             |  |          |                             |
| 2000         | 21 |                 |              |             |  |          |                             |
| 2100         | 22 |                 |              |             |  |          |                             |
| 2200         | 23 |                 |              |             |  |          |                             |
| 2300         | 24 |                 |              |             |  |          |                             |
| 2400         | 25 |                 |              |             |  |          |                             |
|              | 26 |                 |              |             |  |          |                             |
|              | 27 |                 |              |             |  |          |                             |
|              | 28 |                 |              |             |  |          |                             |
|              | 29 |                 |              |             |  |          |                             |
|              | 30 |                 |              |             |  |          |                             |
|              | 31 |                 |              |             |  |          |                             |
| <b>TOTAL</b> |    |                 |              |             |  |          |                             |



# RESERVOIR COMPUTATIONS

HOURLY       DAILY

| DAM             |     |                         |                 |               | TIME OF READING (IF DAILY) |            |             | DATE           |     |                 |                |                   |
|-----------------|-----|-------------------------|-----------------|---------------|----------------------------|------------|-------------|----------------|-----|-----------------|----------------|-------------------|
| COMPUTED BY     |     |                         |                 | CHECKED BY    |                            |            | DATA SOURCE |                |     |                 |                |                   |
| MR.             | DA. | WATER SURFACE ELEV. FT. | STORAGE AC. FT. | GATE STEP NO. | INST. OUTFLOW              |            | HRS.        | STORAGE CHANGE |     | AV. OUTFLOW CFS | AV. INFLOW CFS | GATE SETTINGS FT. |
|                 |     |                         |                 |               | OUT-LETS CFS               | DOWNSTREAM |             | ACRE- FEET     | CFS |                 |                |                   |
| PREVIOUS REPORT |     |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 1   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 2   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 3   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 4   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 5   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 6   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 7   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 8   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 9   |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 10  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 11  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 12  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 13  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 14  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 15  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 16  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 17  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 18  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 19  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 20  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 21  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 22  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 23  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 24  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 25  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 26  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 27  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 28  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 29  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 30  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
|                 | 31  |                         |                 |               |                            |            |             |                |     |                 |                |                   |
| REMARKS         |     |                         |                 |               |                            |            |             | TOTAL          |     |                 |                |                   |
|                 |     |                         |                 |               |                            |            |             | MEAN           |     |                 |                |                   |

# RESERVOIR OPERATION REPORT

DATE:

TIME:

| RADIO<br>CALL<br>SIGN<br>WUK | DAM              | WATER SURFACE<br>ELEVATION<br>(FT. MSL) | DIGITAL<br>RECORDER<br>READINGS | RAINFALL            |                                  |                            | GATE SETTINGS<br><i>(Printed values show initial settings<br/>of gates prior to flood runoff)</i>                                    |
|------------------------------|------------------|---|---------------------------------|---------------------|----------------------------------|----------------------------|--|
|                              |                  |   |                                 | DIGITAL<br>RECORDER | GLASS TUBE                       |                            |  |
|                              |                  |   |                                 |                     | SINCE LAST<br>REPORT<br>(INCHES) | STORM<br>TOTAL<br>(INCHES) |  |
| 411                          | SEPULVEDA        |   | WS<br>GH                        |                     |                                  |                            | GATES OPEN 9.0 FT. <input type="checkbox"/>  |
| 412                          | HANSEN           |   | WS<br>GH                        |                     |                                  |                            | GATES OPEN 8.0 FT. <input type="checkbox"/>  |
| 419                          | SANTA FE         |   | WS<br>GH                        |                     |                                  |                            | # 14 OPEN 0.5 FT. <input type="checkbox"/>   |
| 416                          | BREA             |   | WS<br>GH                        |                     |                                  |                            | GATES OPEN 2.0 FT. <input type="checkbox"/>  |
| 417                          | FULLERTON        |   | WS<br>GH                        |                     |                                  |                            | GATES OPEN 1.1 FT. <input type="checkbox"/>  |
| 418                          | CARBON CANYON    |   | WS<br>GH                        |                     |                                  |                            | # 1 OPEN 0.5 FT. <input type="checkbox"/>  |
| 421                          | PRADO            |   | WS<br>GH                        |                     |                                  |                            | GATES 1 & 6 OPEN 1.0 FT.<br>REM. GATES CLOSED <input type="checkbox"/>   |
| 420                          | SAN ANTONIO      |   | WS<br>GH                        |                     |                                  |                            | GATES CLOSED <input type="checkbox"/>  |
| 415                          | RIO HONDO POOL   | W. PIT                                  | GH                              |                     |                                  |                            | LACFCD DIVERSION GATE OPEN      FT.<br>GATE 1 OPEN      FT.<br>GATES 2, 3, & 4 OPEN FT.      FT. <input type="checkbox"/>            |
|                              |                  | E. PIT                                  |                                 |                     |                                  |                            |  |
|                              |                  | COMB.                                   |                                 |                     |                                  |                            |  |
|                              | SAN GABRIEL POOL | TELEMARK                                | GH                              |                     |                                  |                            | GATE # 8 OPEN 0.30 FT. <input type="checkbox"/>  |
|                              |                  | W. STAFF                                |                                 |                     |                                  |                            |  |
|                              |                  | E. STAFF                                |                                 |                     |                                  |                            |  |
|                              |                  | COMB.                                   |                                 |                     |                                  |                            |  |
|                              | 429              | PAINTED ROCK                            | RES: S                          | XXXX                | XXXX                             |                            |  |
| T                            |                  |   |                                 |                     |                                  |                            |  |
|                              |                  | B. PIT                                  |                                 |                     |                                  |                            |  |
| 437                          | ALAMO            | RES: S                                  | XXXX                            | XXXX                |                                  |                            | GATES CLOSED <input type="checkbox"/><br>GATE NO. 3 BYPASS      CFS <input type="checkbox"/><br>HOOK:<br>ANEMOMETER:<br>TEMPERATURE: |
|                              |                  | T                                       |                                 |                     |                                  |                            |  |

IX-8

FIGURE 9-6



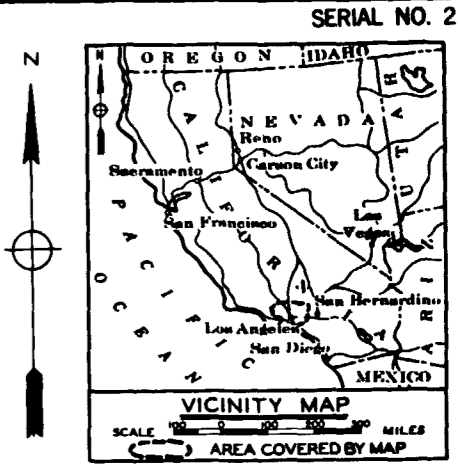
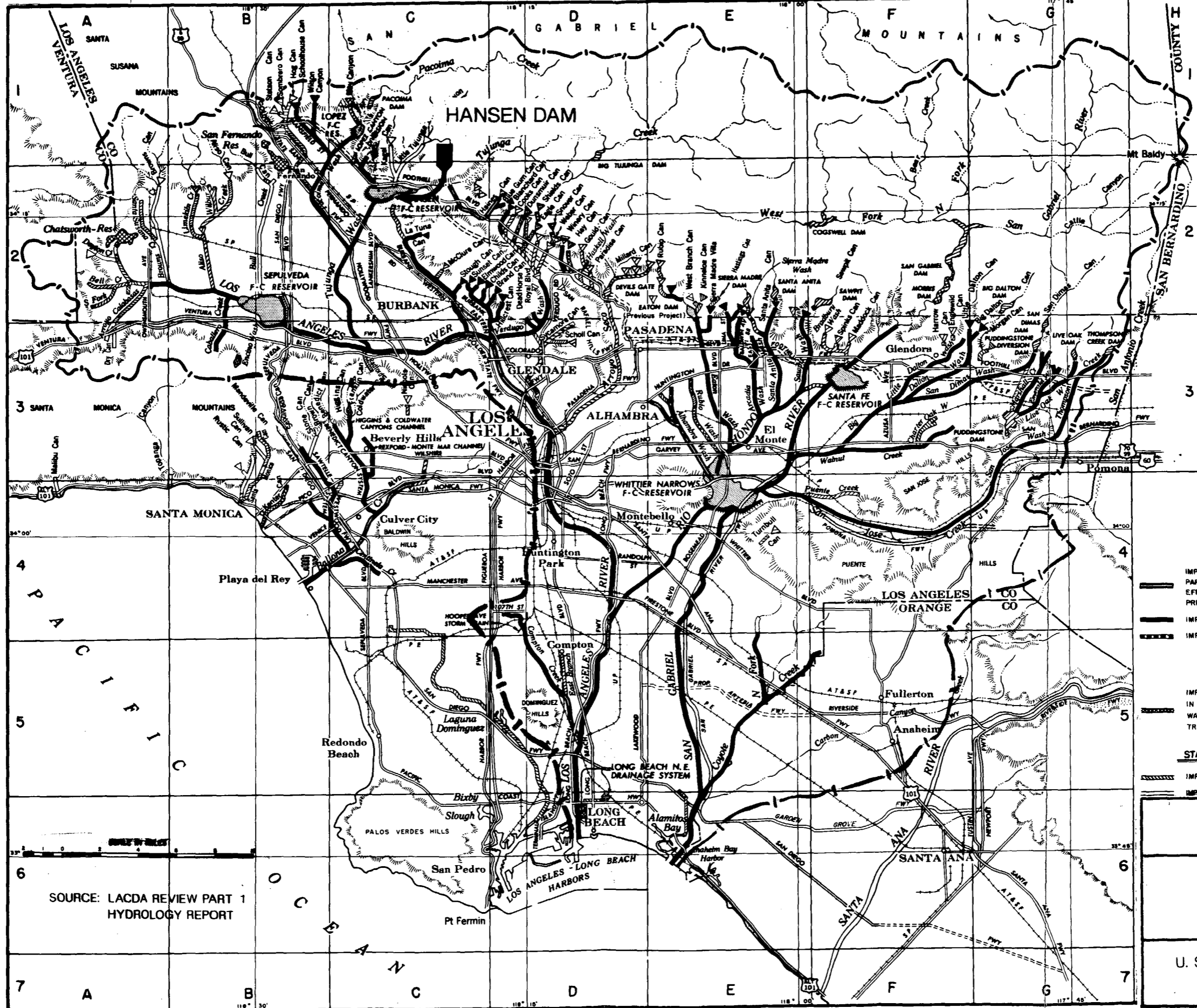
Related Manuals and Reports.

1. U.S. Army Corps of Engineers, Los Angeles District, "Analysis of Design of Tujunga Wash Improvement - Hansen Dam " - Volumes I and II, 2 May 1938.
2. U.S. Army Corps of Engineers, Los Angeles District, "Analysis of Design of 5 feet by 8 feet Service Gates for Hansen Dam," January 1939.
3. U.S. Army Corps of Engineers, Los Angeles District, "Hydrology in the Los Angeles County Drainage Area," March 1939.
4. U.S. Army Corps of Engineers, Los Angeles District, "LACDA, Tujunga Wash Improvement; Specifications to Accompany Change Order No. 7 (Revised 10-23-39), Hansen Dam Contract No. W-509-Eng-689," October 1939.
5. U.S. Army Corps of Engineers, Los Angeles District, "Analysis of Hydraulic Design for Hansen Flood Control Basin," 18 March 1940.
6. U.S. Army Corps of Engineers, Los Angeles District, "Tujunga Wash Improvement, Hansen Dam, Analysis of Design," June 1940.
7. U.S. Army Corps of Engineers, Los Angeles District, "Hydrology, Upper Los Angeles River and Tributaries, Burbank-Western Channel to Sepulveda Dam," December 1946.
8. U.S. Army Corps of Engineers, Los Angeles District, "Specifications for Tujunga Wash Improvement, Los Angeles River to Hansen Dam; Gates, Footbridge, and Appurtenances at Hansen Spreading Ground Headworks," February 1952.
9. U.S. Army Corps of Engineers, Los Angeles District, "Los Angeles County Drainage Area, California, Flood Control, Design Memorandum No. 1, Hydrology for Lopez Canyon Diversion Channel," March 1959.
10. U.S. Army Corps of Engineers, Los Angeles District, "Operation and Maintenance Manual for Hansen Dam Flood Control Basin, Tujunga Wash Improvement," April 1963.
11. U.S. Army Corps of Engineers, Los Angeles District, "LACDA, CA, Hansen Dam Master Plan," February 1975.
12. U.S. Army Corps of Engineers, Los Angeles District, "Interim Report on Hydrology and Hydraulic Review of Design Features of Existing Dams for LACDA Dams," June 1978.
13. U.S. Army Corps of Engineers, Los Angeles District, "Los Angeles River Improvement, Los Angeles County, CA, Hansen Dam, Seismic Evaluation, Phase I Report," January 1982.
14. U.S. Army Corps of Engineers, Los Angeles District, "Hansen Dam Modeling Study; Impact of Water Supply vs Flood Control Operational Modes on Sediment Deposition in the Reservoir Area," June 1983.
15. U.S. Army Corps of Engineers, Los Angeles District, "LACDA, CA, Hansen Dam, Preliminary Formulation Report," September 1984.
16. U.S. Army Corps of Engineers, Los Angeles District, "Hansen Dam, LACDA, CA, Dam, Outlet, and Spillway, Periodic Inspection Report No. 4," May 1985.
17. U.S. Army Corps of Engineers, "Los Angeles County Drainage Area, California, Review - Part 1 Hydrology Report," February, 1988.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

RELATED MANUALS AND REPORTS

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



NOTE: FOR DESIGN AND CONSTRUCTION INFORMATION ON UNITS IN THE EXISTING PROJECT, SEE MAPS, SERIAL NOS. 2-1 TO 2-63 INCLUSIVE.

- LEGEND**
- BOUNDARY OF DRAINAGE AREA.
  - FLOOD-CONTROL CHANNEL.
  - FLOOD-CONTROL DAM AND RESERVOIR.
  - DEBRIS BASIN.
  - WATER SUPPLY RESERVOIR.

- STATUS OF EXISTING PROJECT**
- IMPROVEMENT COMPLETED BY C.O.F.E. PARTLY WITH E.R.A. FUNDS AND PARTLY WITH REGULAR FUNDS. PART OF THE IMPROVEMENT WAS EFFECTED UNDER THE PREVIOUS PROJECT. (SEE UNDER "STATUS OF PREVIOUS PROJECT")
  - IMPROVEMENT COMPLETED BY C.O.F.E. - WITH REGULAR FUNDS.
  - IMPROVEMENT TO BE CONSTRUCTED BY C.O.F.E. - WITH REGULAR FUNDS.

- STATUS OF PREVIOUS PROJECT**
- IMPROVEMENT COMPLETED BY C.O.F.E. - WITH E.R.A. FUNDS. IN ADDITION, ALL EXISTING-PROJECT IMPROVEMENT MARKED WITH THIS SYMBOL WAS STARTED UNDER THE PREVIOUS PROJECT AND THEN WAS TRANSFERRED TO THE EXISTING PROJECT FOR COMPLETION.

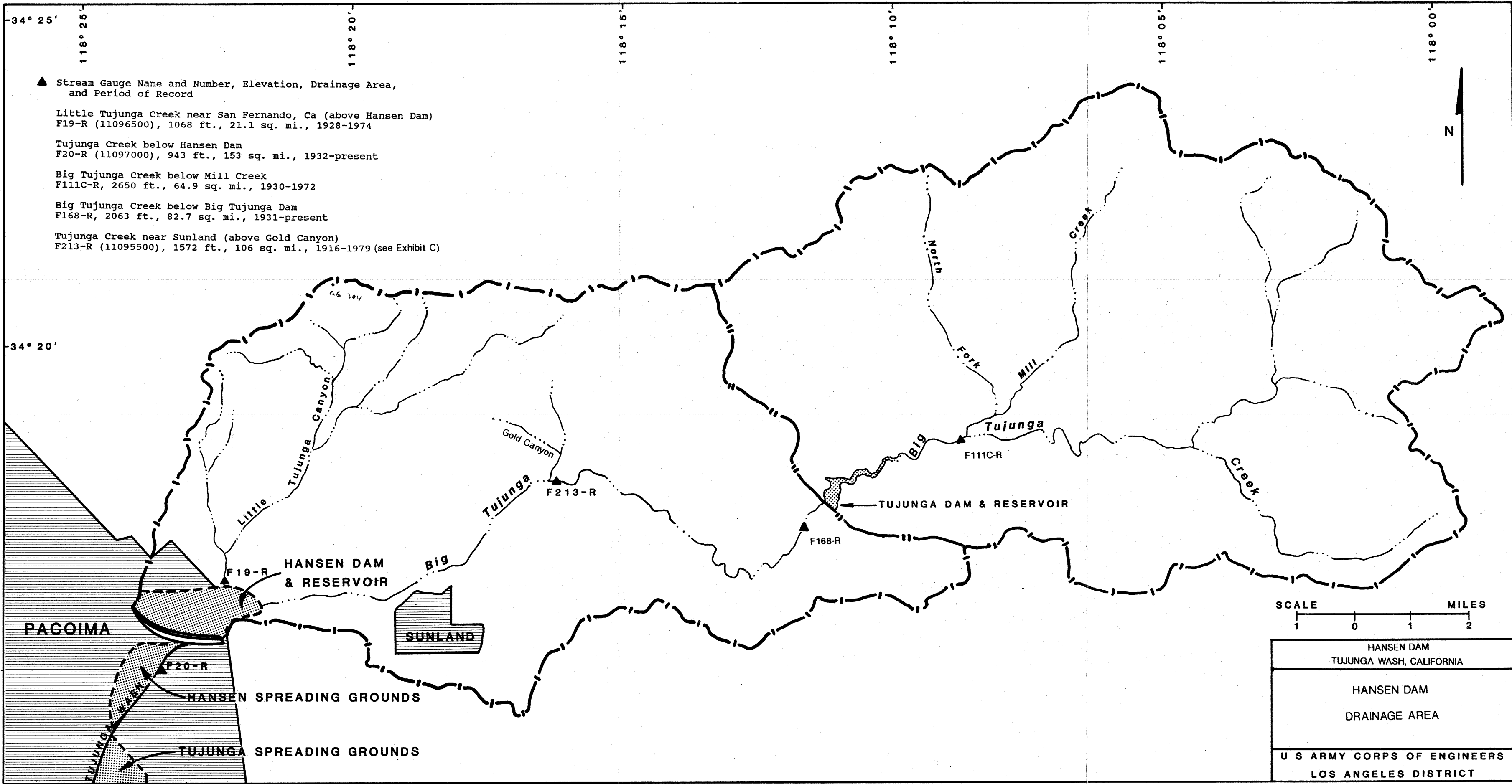
- STATUS OF NON-FEDERAL CONSTRUCTION**
- IMPROVEMENT COMPLETED BY LOCAL INTERESTS.
  - IMPROVEMENT TO BE CONSTRUCTED BY LOCAL INTERESTS.

SOURCE: LACDA REVIEW PART 1 HYDROLOGY REPORT

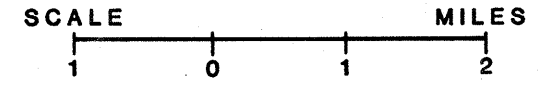
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

LOCATION MAP  
(LOS ANGELES COUNTY DRAINAGE AREA)

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

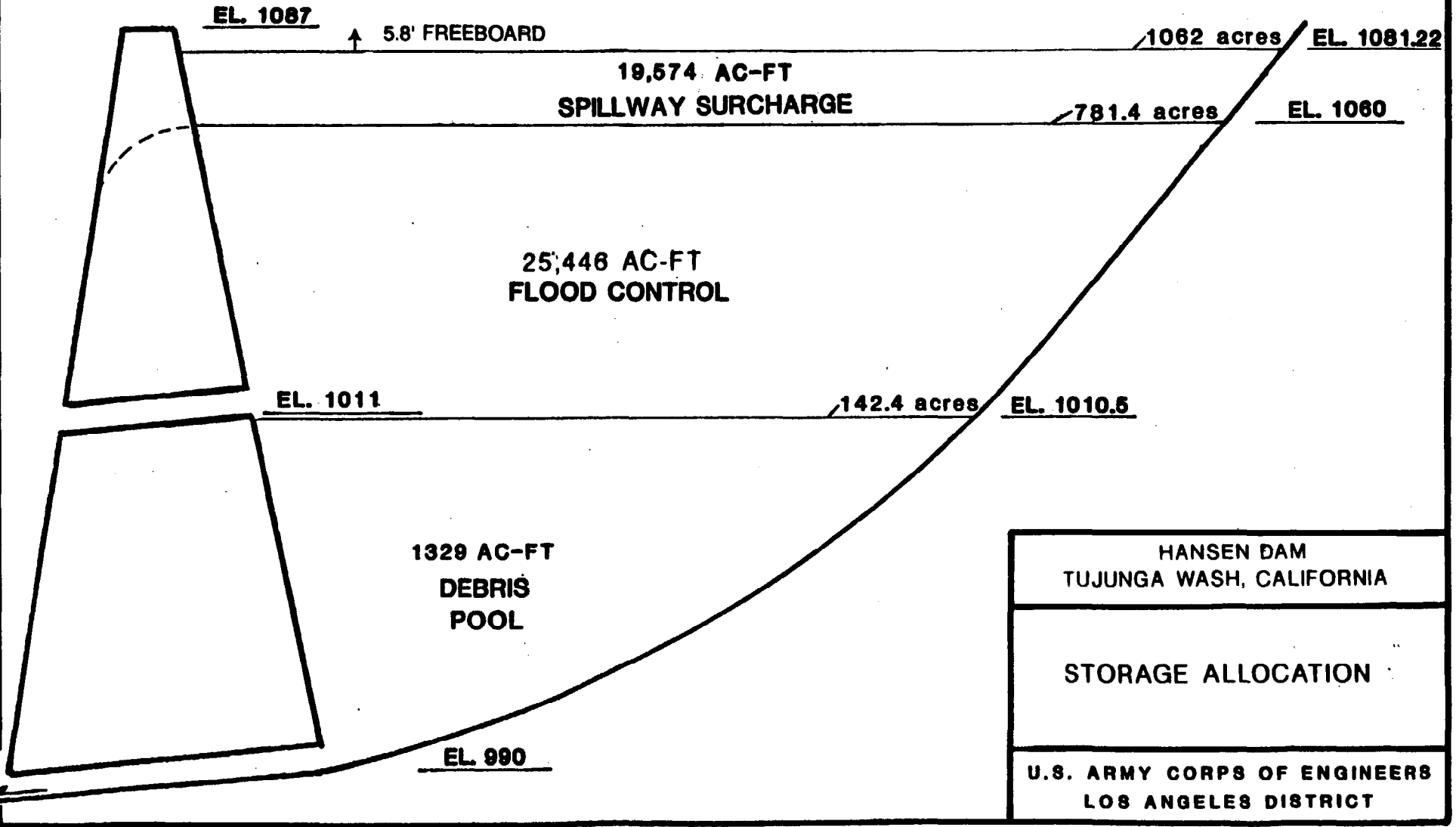


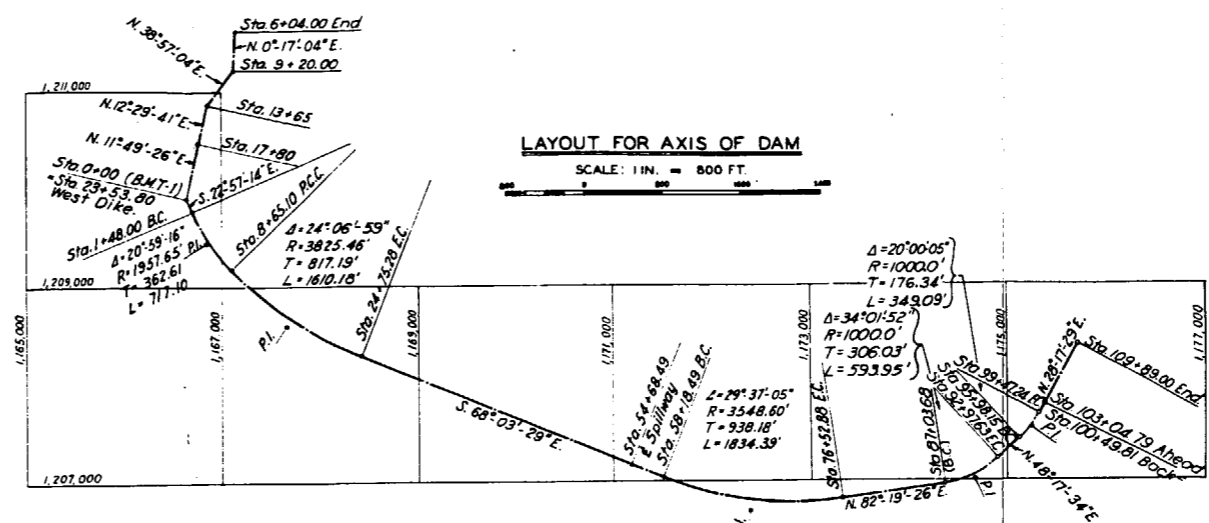
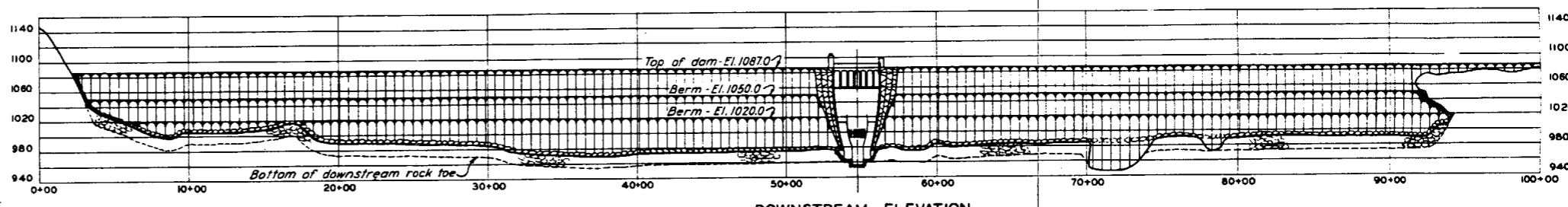
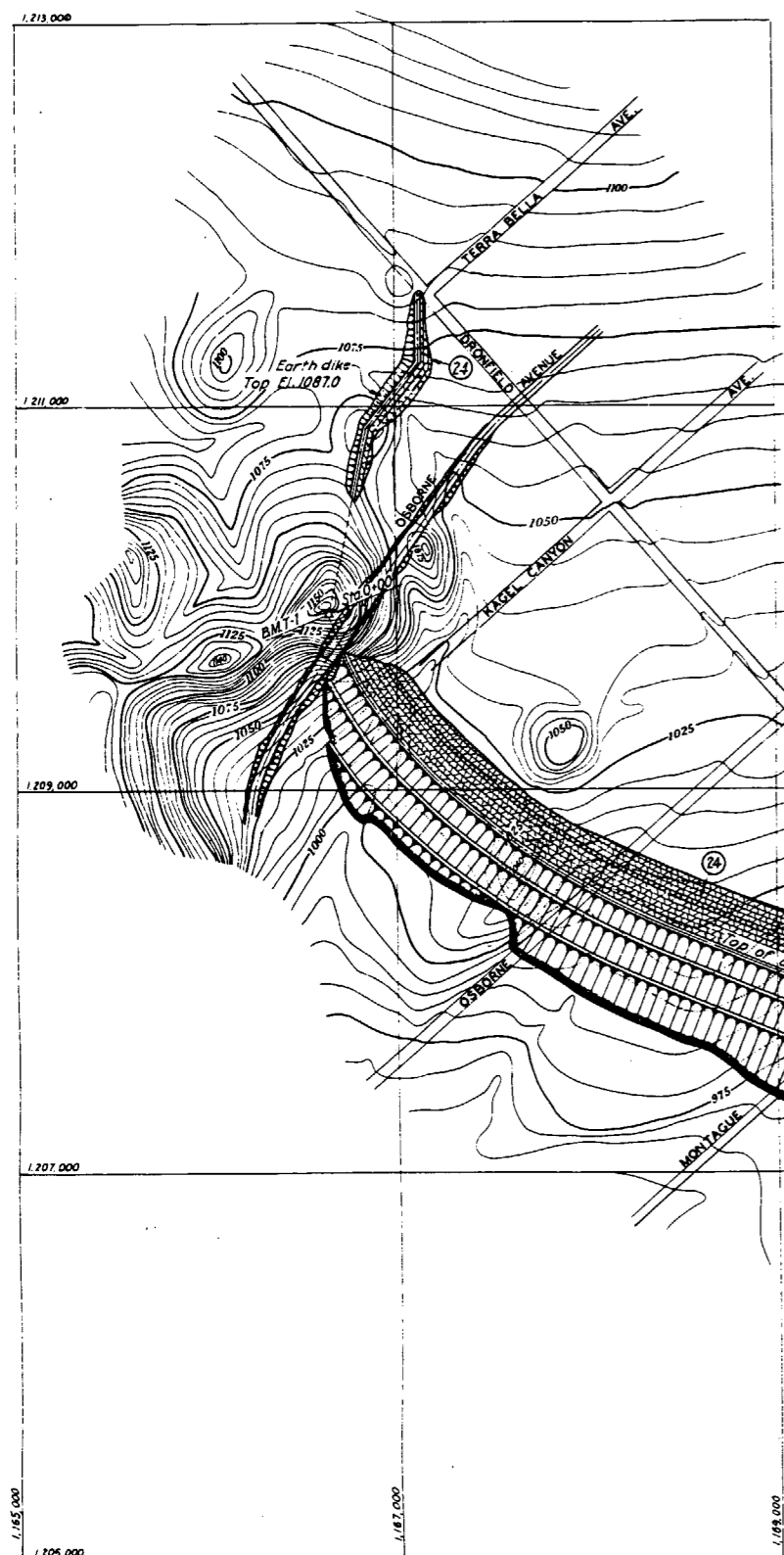
- ▲ Stream Gauge Name and Number, Elevation, Drainage Area, and Period of Record
- Little Tujunga Creek near San Fernando, Ca (above Hansen Dam)  
F19-R (11096500), 1068 ft., 21.1 sq. mi., 1928-1974
  - Tujunga Creek below Hansen Dam  
F20-R (11097000), 943 ft., 153 sq. mi., 1932-present
  - Big Tujunga Creek below Mill Creek  
F111C-R, 2650 ft., 64.9 sq. mi., 1930-1972
  - Big Tujunga Creek below Big Tujunga Dam  
F168-R, 2063 ft., 82.7 sq. mi., 1931-present
  - Tujunga Creek near Sunland (above Gold Canyon)  
F213-R (11095500), 1572 ft., 106 sq. mi., 1916-1979 (see Exhibit C)



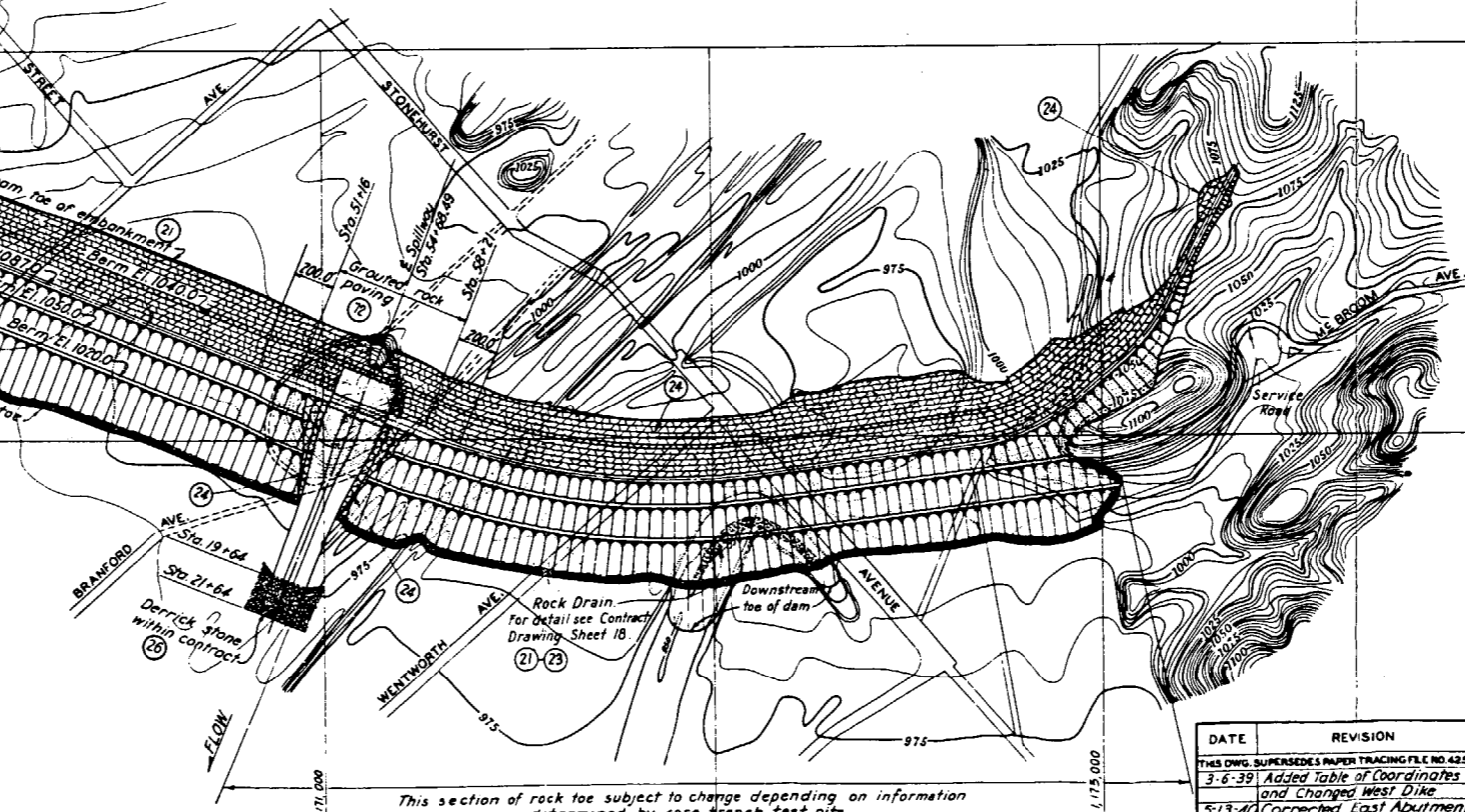
|   |
|---|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA              |
| HANSEN DAM<br>DRAINAGE AREA                         |
| U S ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT |

# HANSEN RESERVOIR, CALIFORNIA





| TIES TO LOS ANGELES COUNTY PLANE COORDINATES |              |              |
|--|--------------|--------------|
| Station                                      | Latitude     | Departure    |
| 0+00 (B.M. T-1)                              | 1,209,916.26 | 1,166,637.26 |
| 1+48 (B.C.)                                  | 1,209,779.98 | 1,166,694.98 |
| P.I.   | 1,209,446.08 | 1,166,836.39 |
| 8+65.10 (P.C.C.)                             | 1,209,184.98 | 1,167,088.01 |
| P.I.   | 1,208,596.57 | 1,167,653.06 |
| 24+75.28 (E.C.)                              | 1,208,291.21 | 1,168,413.07 |
| 34+68.49 (E. Spillway)                       | 1,207,172.75 | 1,171,189.46 |
| 58+18.49 (B.C.)                              | 1,207,041.97 | 1,171,514.17 |
| P.I.   | 1,206,691.40 | 1,172,384.33 |
| 76+52.88 (E.C.)                              | 1,206,816.71 | 1,173,314.10 |
| 87+03.68 (B.C.)                              | 1,206,957.07 | 1,174,358.48 |
| P.I.   | 1,206,997.95 | 1,174,687.24 |
| 92+91.63 (E.C.)                              | 1,207,201.56 | 1,174,887.24 |
| 95+98.15 (B.C.)                              | 1,207,401.50 | 1,175,111.59 |
| P.I.   | 1,207,518.83 | 1,175,243.24 |
| 99+47.24 (E.C.)                              | 1,207,674.10 | 1,175,326.82 |
| 100+49.81 Back =                             |              |              |
| 103+04.79 Ahead                              | 1,207,764.42 | 1,175,375.43 |
| 109+89.00 (End)                              | 1,208,366.90 | 1,175,699.72 |
| 0+00 (B.M. T-1) =                            |              |              |
| 23+53.80 (West Dike)                         | 1,209,916.26 | 1,166,637.26 |
| 17+80 (West Dike) (P.I.)                     | 1,210,477.89 | 1,166,754.83 |
| 13+65 (West Dike) (P.I.)                     | 1,210,883.06 | 1,166,844.62 |
| 9+20 (West Dike) (P.I.)                      | 1,211,229.13 | 1,167,123.97 |
| 6+04 (West Dike) (End)                       | 1,211,545.13 | 1,167,125.94 |



| DATE   | REVISION  | REV. CHK. | APP.       |
|--|---|-----------|------------|
| THIS DWG. SUPERSEDES PAPER TRACING FILE NO. 425/1, DATED DEC. 1938 |   |           |            |
| 3-6-39   | Added Table of Coordinates and Changed West Dike                            | E.K.      | DM, S.A.G. |
| 5-13-40  | Corrected East Abutment, West Dike and Downstream Elevation                 |           |            |
|  | Added relocated Osborne Avenue  |           |            |
|  | Deleted obsolete coordinates  | SDS       | MM, S.A.G. |
| 11-15-40   | Corrected alignment and coordinates to agree with field data as constructed | SDS       | OK         |

Note:  
Figures in circles indicate item number under which payment will be made.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

GENERAL PLAN

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

SOURCE: HANSEN DAM ANALYSIS  
OF DESIGN JUNE 1940

PLAN  
SCALE: 1 IN. = 400 FT.



OUTGRANT

PROJECT MAP

DIPT. OF THE \_\_\_\_\_  
 USING SERVICE \_\_\_\_\_

LOCATION OF PROJECT

STATE CALIFORNIA  
 COUNTY LOS ANGELES  
 DIVISION SOUTH PACIFIC  
 DISTRICT LOS ANGELES  
 ARMY AREA 6th  
 7 MILES NW OF BURBANK  
 16 MILES NW OF LOS ANGELES

TRANSPORTATION FACILITIES

RAILROADS S.P.  
 STATE ROADS 7 B 118  
 FEDERAL ROADS 6 B 99  
 AIR LINES \_\_\_\_\_

ACQUISITION

TOTAL ACRES ACQUIRED

FEE \_\_\_\_\_  
 PUBLIC DOMAIN PERM. WITHDRAWAL  
 TEMP. WITHDRAWAL \_\_\_\_\_  
 USE PERMIT \_\_\_\_\_  
 TRANSFER \_\_\_\_\_  
 LEASE \_\_\_\_\_  
 LESSER INTERESTS \_\_\_\_\_

DISPOSAL

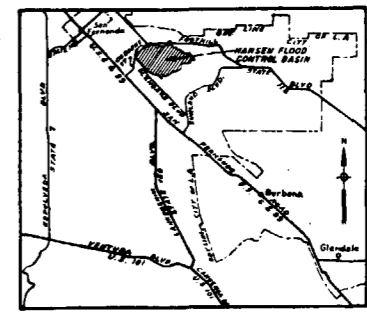
TOTAL ACRES DISPOSED OF

SOLD \_\_\_\_\_  
 PUBLIC DOMAIN PERM. WITHDRAWAL  
 TEMP. WITHDRAWAL \_\_\_\_\_  
 USE PERMIT \_\_\_\_\_  
 TRANSFERRED \_\_\_\_\_  
 LEASES TERMINATED \_\_\_\_\_  
 LESSER INTERESTS TERM. \_\_\_\_\_  
 REASSIGNED \_\_\_\_\_  
 OTHER \_\_\_\_\_

LEGEND

EXCEPT FOR THE SPECIAL SYMBOLS SHOWN BELOW MAP SYMBOLS ARE STANDARD IN ARMY MAP SERVICE TECHNICAL MANUAL NO. 33.

- RESERVATION LINE \_\_\_\_\_
- RESERVATION LINE (Actual Survey) \_\_\_\_\_
- TRACT BOUNDARY LINE \_\_\_\_\_
- TRACT NUMBER \_\_\_\_\_
- CONTOUR LINE \_\_\_\_\_
- DISPOSAL \_\_\_\_\_



SOURCE: REAL ESTATE SECTION - INDEX TO OUT GRANTS (1977)  
 "EASEMENTS, PERMITS, AND LICENSES" INDEX LIST UPDATED IN 1989 (see PLATE 2-5B)

| DATE       | REVISIONS         | E. J. B.M.H. |
|------------|-------------------|--------------|
| 2 MAY 1984 | UPDATED           |              |
| 7 MAR 1977 | UPDATED ALL UNITS |              |

**HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA**

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**REAL ESTATE LIMITS**

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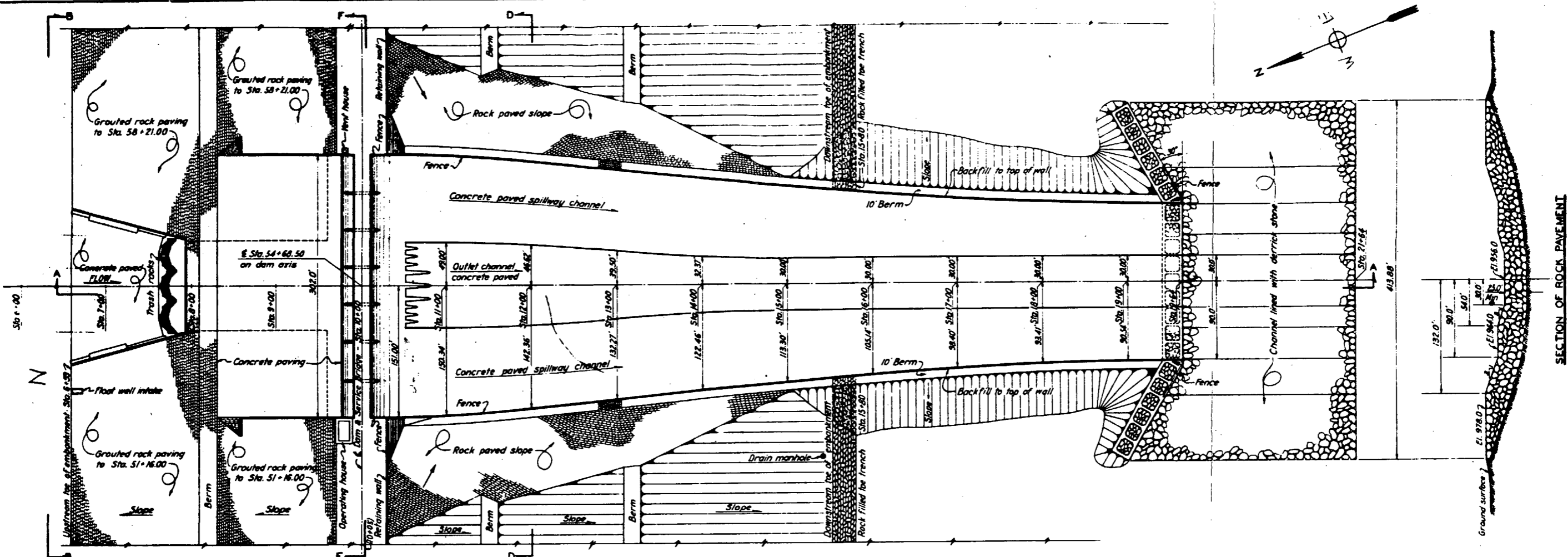
**U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT**

| EASEMENTS, PERMITS & LICENSES |  |   |                       |              |            |
|-------------------------------|--|---|-----------------------|--------------|------------|
| UNIT                          | GRANTEE  | GRANT   | TERM                  | ACRES        | MAP REF.   |
| B-1                           | SOUTHERN CALIFORNIA EDISON CO.   | EASEMENT FOR TELEPHONE LINES UNNUMBERED   | 6/11/46 - 06-10-96    | 1.01         | UNK        |
| B-2                           | CITY OF LOS ANGELES<br>DEPT. OF WATER & POWER                                | LETTER PERMIT FOR POWER LINE FOR GOLF COURSE FACILITIES DA-04-353-CIVENG-64-109 | 2/26/64 - Indefinite  | Undetermined | UNK        |
| L                             | CITY OF LOS ANGELES  | EASEMENT-PUBLIC ROAD OR STREET UNNUMBERED                                       | 7/15/48 - Indefinite  | 0.27         | 219-K-13   |
| M                             | WALTER E. LINN, ALMA L.  | EASEMENT FOR ACCESS ROAD & WATER PIPELINE UNNUMBERED                            | 12/7/48 - 12-06-98    | 0.34         | 219-K-14   |
| R                             | CITY OF LOS ANGELES  | EASEMENT FOR EXTENSION OF WENTWORTH ST. DA-04-353-CIVENG-60-56                  | 09-08-58 - Indefinite | 14.84        | 219-K-20   |
| T                             | CITY OF LOS ANGELES  | EASEMENT FOR STORM DRAIN OUTLET STRUCTURE DA-04-353-CIVENG-62-56                | 7/6/61 - Permanent    | 0.01         | 219-K-22   |
| U                             | CITY OF LOS ANGELES  | EASEMENT FOR 24" SANITARY SEWER LINE DA-04-353-CIVENG-62-131                    | 7/8/60 - Permanent    | 0.73         | 219-K-23   |
| V                             | SOUTHERN CALIFORNIA GAS CO.  | EASEMENT FOR 4" GAS PIPELINE DA-04-353-CIVENG-61-184                            | 3/28/61 - 03-27-01    | 0.35         | 219-K-24   |
|                               | CITY OF LOS ANGELES  | EASEMENT FOR STORM DRAIN DA-04-353-CIVENG-65-128                                | 2/5/65 - Permanent    | 0.08         | 219-K-25   |
| F                             | CITY OF LOS ANGELES  | EASEMENT FOR PUBLIC STREET DA-04-353-CIVENG-62-141                              | 8/28/62 - Permanent   | 0.01         | 219-K-27   |
| Z                             | CITY OF LOS ANGELES  | EASEMENT FOR STORM DRAIN DA-04-353-CIVENG-65-129                                | 2/10/65 - Permanent   | 0.01         | 219-K-28   |
| A-1                           | CITY OF LOS ANGELES  | EASEMENT FOR SEWER LINE /SANITARY INTERCEPTOR DA04-353-CIVENG-65-110            | 12/21/64 - Permanent  | 1.30         | 219-K-29   |
| A-4                           | CITY OF LOS ANGELES  | EASEMENT FOR STREET PURPOSES DA-04-353-CIVENG-66-95                             | 12/1/65 - Permanent   | 0.27         | 219-K-31   |
| A-7                           | VALLEY CREST TREE CO.  | LEASE FOR AGRICULTURE /HORTICULTURE DACW09-1-86-19                              | 12-01-86/10-31-90     | 9.59         | 219-K-34.4 |
| A-9                           | HOMER ENDO   | LEASE FOR AGRICULTURE HORTICULTURE DACW09-1-85-28                               | 05-01-85/04-30-90     | 13.93        | 219-K-36.4 |
| A-10                          | VALLEY CREST TREE CO.  | LEASE FOR AGRICULTURE /NURSERY DACW09-1-88-16                                   | 11-20-87/11-19-92     | 6.51         | 219-K-37.3 |
| A-12                          | CITY OF LOS ANGELES<br>DEPT OF PARKS & RECREATION                            | LEASE FOR RECREATIONAL FACILITIES DACW09-1-69-45                                | 01-05-67/01-04-17     | 1355.43      | 219-K-40.1 |
| A-13                          | LOS ANGELES COUNTY<br>FLOOD CONTROL DISTRICT                                 | EASEMENT FOR STORM DRAIN DACW09-2-70-40   | 2/24/70 - Indefinite  | 0.57         | 219-K-41   |
| A-14                          | GENERAL TELEPHONE COMPANY  | EASEMENT FOR COMMUNICATION FACILITIES DACW09-1-89-12                            | 10-08-88/10-07-93     | 0.26         | 219-K-42   |
| A-15                          | STATE OF CALIFORNIA<br>DEPT. OF TRANSPORTATION                               | EASEMENT FOR CONTROLLED ACCESS HIGHWAY (ST. RTE. 210) DACW09-2-75-8             | 9/10/74 - Indefinite  | 22.11        | 219-K-43.1 |
| P                             | CITY OF LOS ANGELES<br>DEPT. OF WATER AND POWER                              | EASEMENT FOR WATER PUMPING STATION UNNUMBERED                                   | 07-09-51/07-08-01     | 0.09         | UNK        |
| A-19                          | CITY OF LOS ANGELES  | EASEMENT FOR STORM DRAIN DACW09-2-72-51   | 4/13/72 - Permanent   | 0.164        | 219-K-47   |
| A-20                          | CITY OF LOS ANGELES<br>DEPARTMENT OF WATER & POWER                           | EASEMENT FOR WATER MAIN DACW09-2-76-64  | 7/27/76 - 1/07-26-26  | 0.301        | 219-K-48   |
| A-21                          | CITY OF LOS ANGELES<br>DEPARTMENT OF WATER & POWER                           | EASEMENT FOR POWER LINE DACW09-3-82-31  | 11-01-86/10-31-91     | 0.076        | 219-K-49   |
| A-22                          | CITY OF LOS ANGELES  | EASEMENT FOR SUBSURFACE SEWER STRUCTURE DACW09-2-84-7                           | 10-12-83/10-11-2033   | 0.024        | 219-K-52   |
| A-23                          | JH DEVELOPMENT INC. &<br>ORANGE GROVE ENTERPRISES<br>INC. HECTOR J. AQUILINO | DACW092-84-45<br>EASEMENT FOR DRAINAGE STRUCTURE                                | 4-6-84/ 4-5-2034      | 0.024        | 219-K-53   |
| A-24                          | GEORGE R. BROWN  | DACW09-1-88-26<br>EASEMENT FOR TRAILER SPACE<br>DAM TENDER                      | 02-05-89/02-06-90     | UNK          | NO DRWG.   |
| A-25                          | SHEILA U. MEARS  | UNK   | UNK                   | 0.42         | 219-K-55   |
| U-1                           | CITY OF LOS ANGELES  | POWERLINE DACW09-2-88-33  | 11-03-88/11-02-13     | UNK          | 219-K-56   |

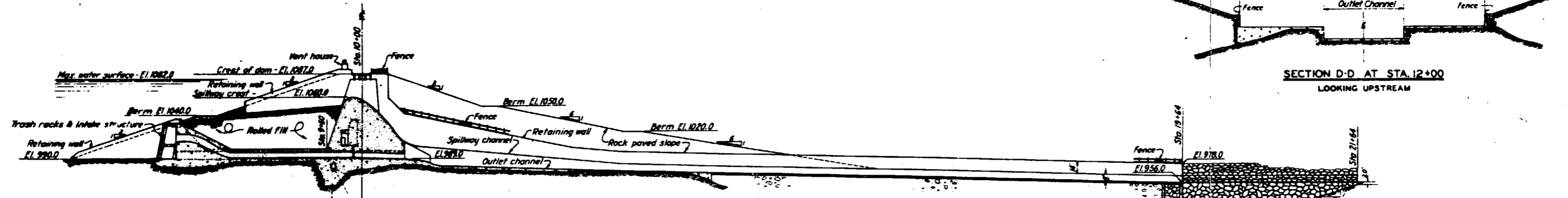
U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

EASEMENTS, PERMITS,  
AND LICENSES (1989)  
(for PLATE 2-5A)

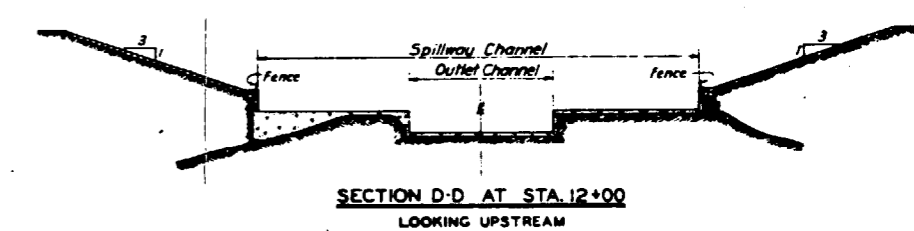
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA



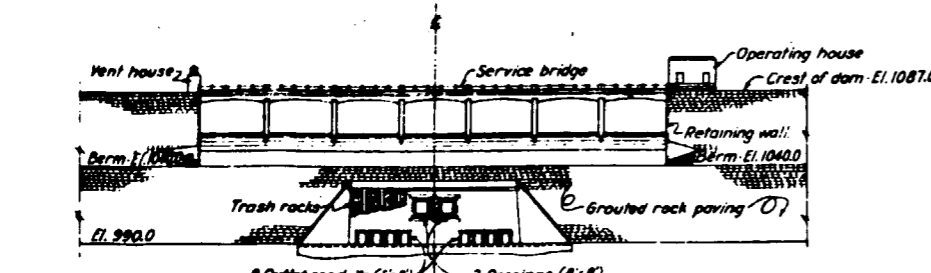
GENERAL PLAN



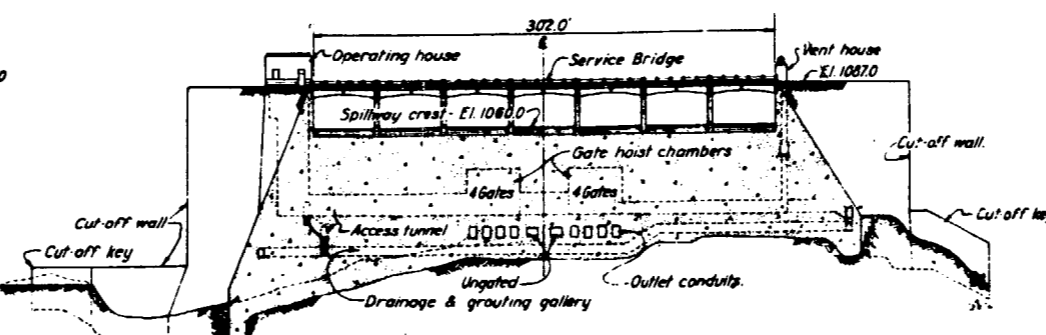
LONGITUDINAL SECTION A-A



SECTION D-D AT STA. 12+00  
LOOKING UPSTREAM



ELEVATION B-B  
LOOKING DOWNSTREAM



SECTION F-F AT STA. 10+05  
LOOKING UPSTREAM

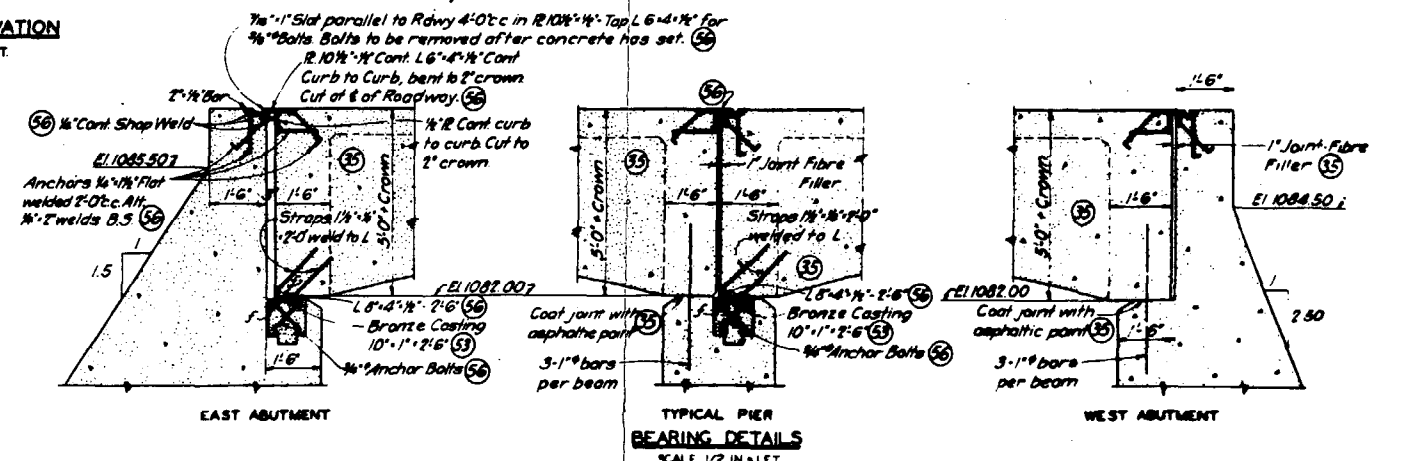
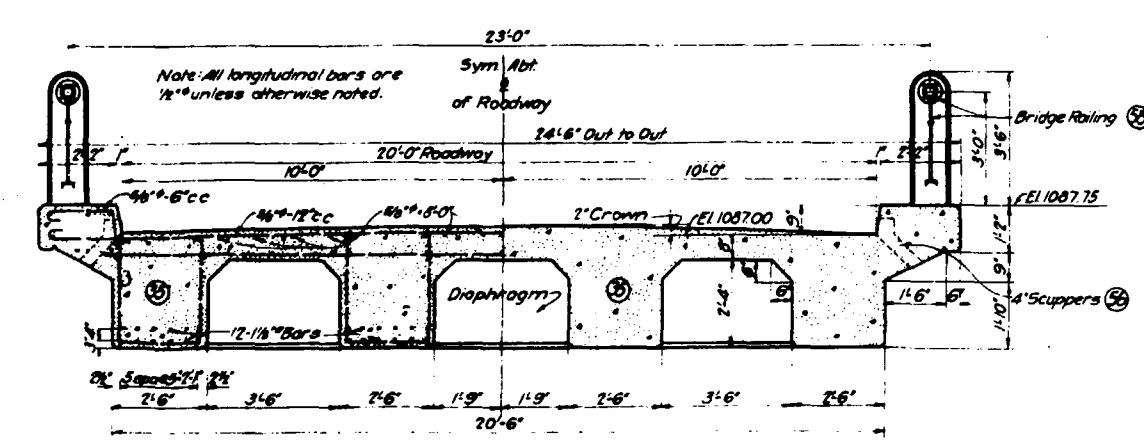
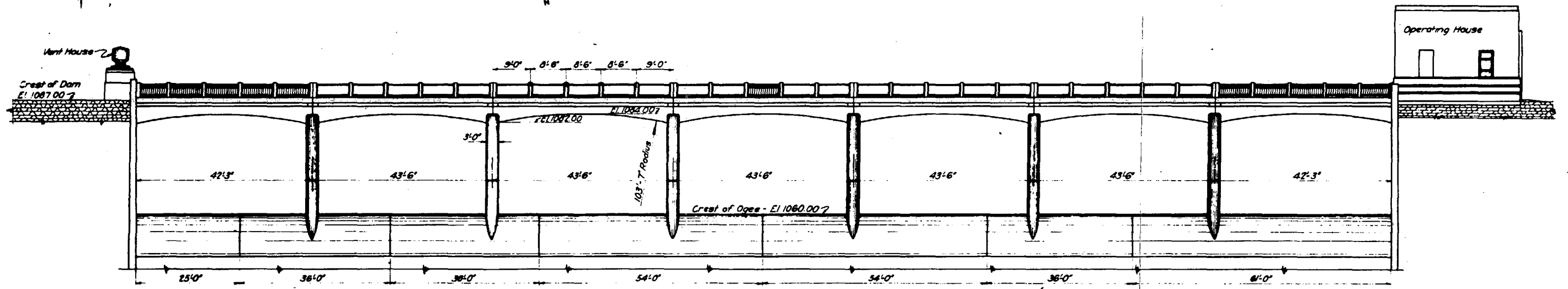
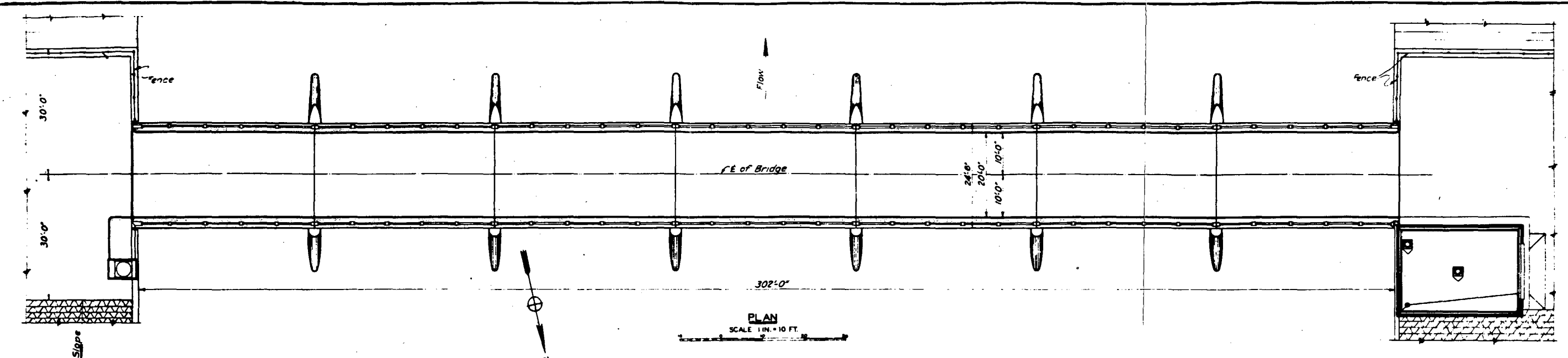
| DATE   | REVISION                                      | REV. | CHK. | APP. |
|--------|---|------|------|------|
| 3-3-59 | Extended cutoff wall and revised General Plan | H.C. |      |      |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

SPILLWAY AND OUTLET WORKS  
GENERAL PLAN

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT





GENERAL NOTES  
 Figures in circles indicate item number under which payment will be made.  
 All steel reinforcing to be paid for at contract price, item 56.  
 All concrete in bridge superstructure to be paid for at contract price, item 57.

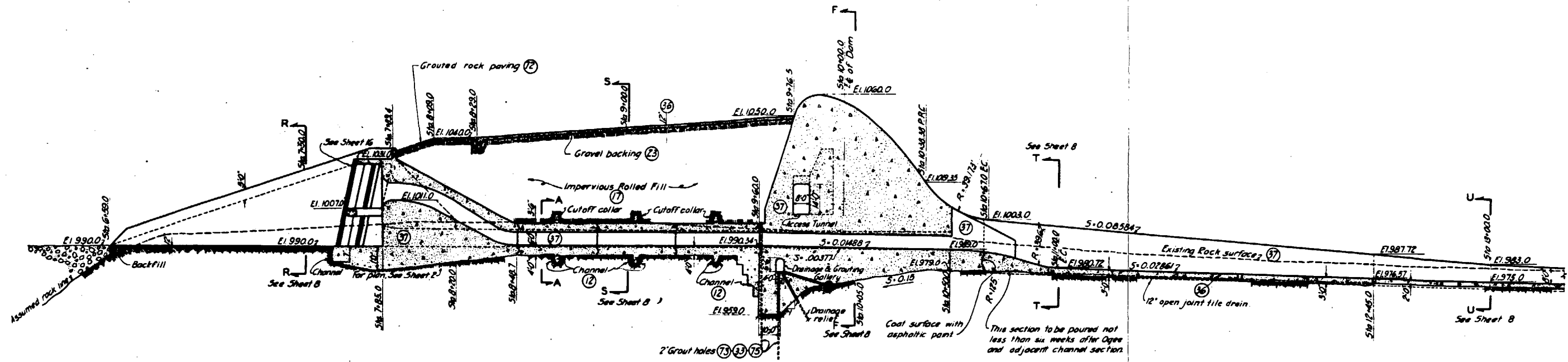
| DATE | REVISION | REV | CHK | APP |
|------|----------|-----|-----|-----|
|      |          |     |     |     |
|      |          |     |     |     |
|      |          |     |     |     |
|      |          |     |     |     |

HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA

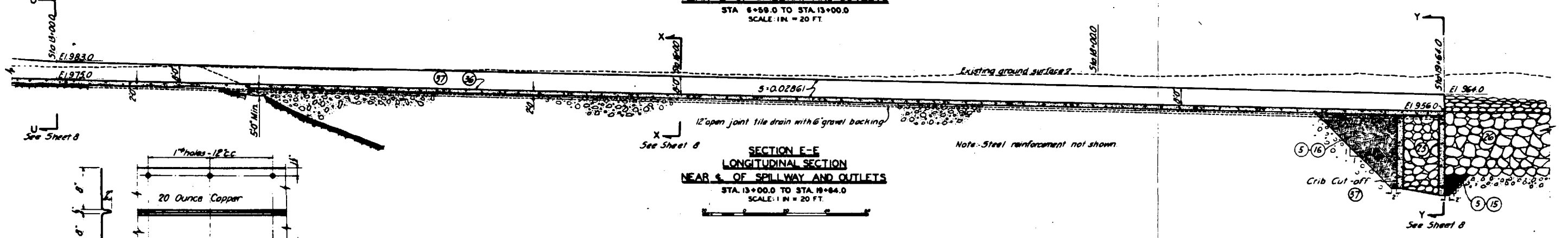
SPILLWAY BRIDGE-PLAN  
 AND ELEVATION

U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT

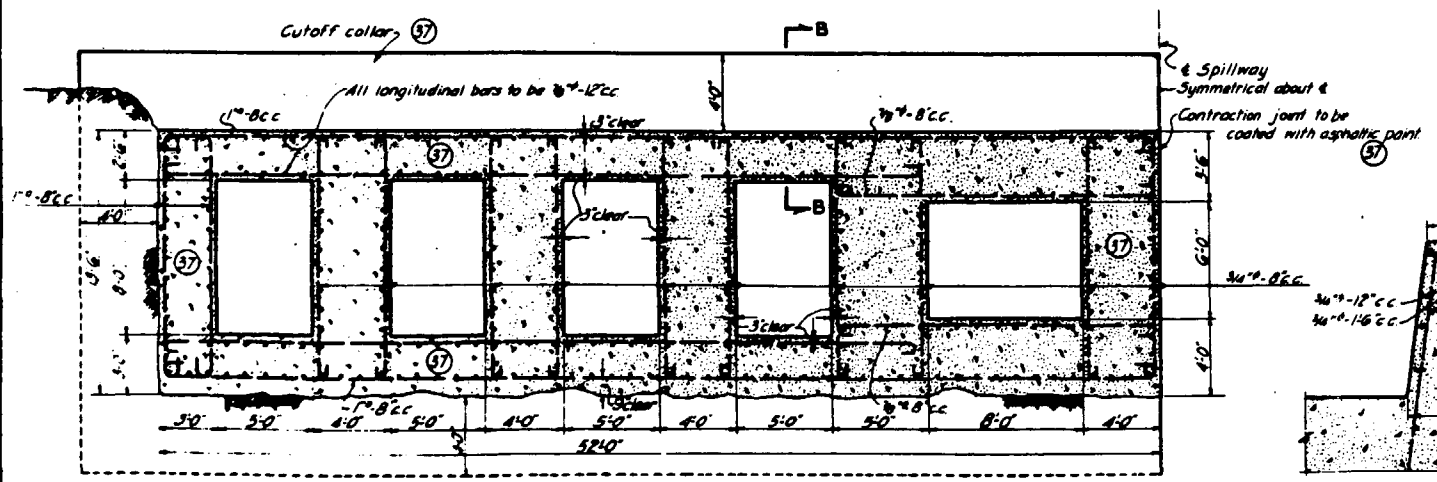
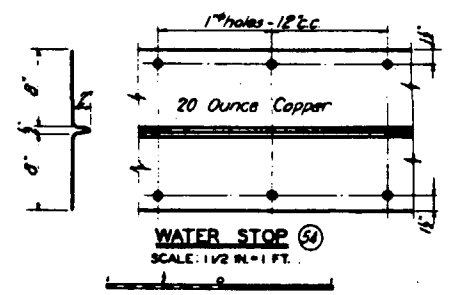
SOURCE: HANSEN DAM ANALYSIS  
 OF DESIGN JUNE 1940



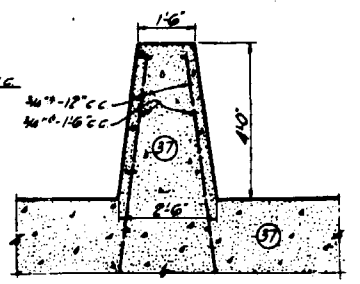
**SECTION E-E  
LONGITUDINAL SECTION  
NEAR S OF SPILLWAY AND OUTLETS**  
STA 6+59.0 TO STA 13+00.0  
SCALE: 1 IN = 20 FT.



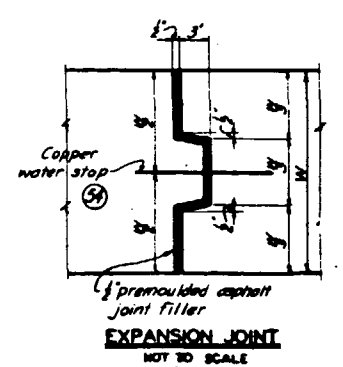
**SECTION E-E  
LONGITUDINAL SECTION  
NEAR S OF SPILLWAY AND OUTLETS**  
STA 13+00.0 TO STA 19+84.0  
SCALE: 1 IN = 20 FT.



**HALF SECTION A-A**  
SCALE: 1/8 IN = 1 FT.



**SECTION B-B**  
SCALE: 1/2 IN = 1 FT.



**GENERAL NOTES**  
Figures in circles indicate item numbers under which payment will be made.  
All reinforcing steel shown on this sheet to be paid for at contract price - Item (24)  
For Sections R-R, S-S, T-T, U-U, X-X, Y-Y, see sheet B.  
For Section F-F, see sheets 3 and 8.

| DATE   | REVISION   | REV | CHK | APP |
|--------|--|-----|-----|-----|
| 3-3-39 | Added notations and deleted drain below cut-off P.C. |     |     |     |
|        |  |     |     |     |
|        |  |     |     |     |
|        |  |     |     |     |
|        |  |     |     |     |
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|        |  |     |     |     |
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**HANSEN DAM  
TUJUNGA WASH, CALIFORNIA**

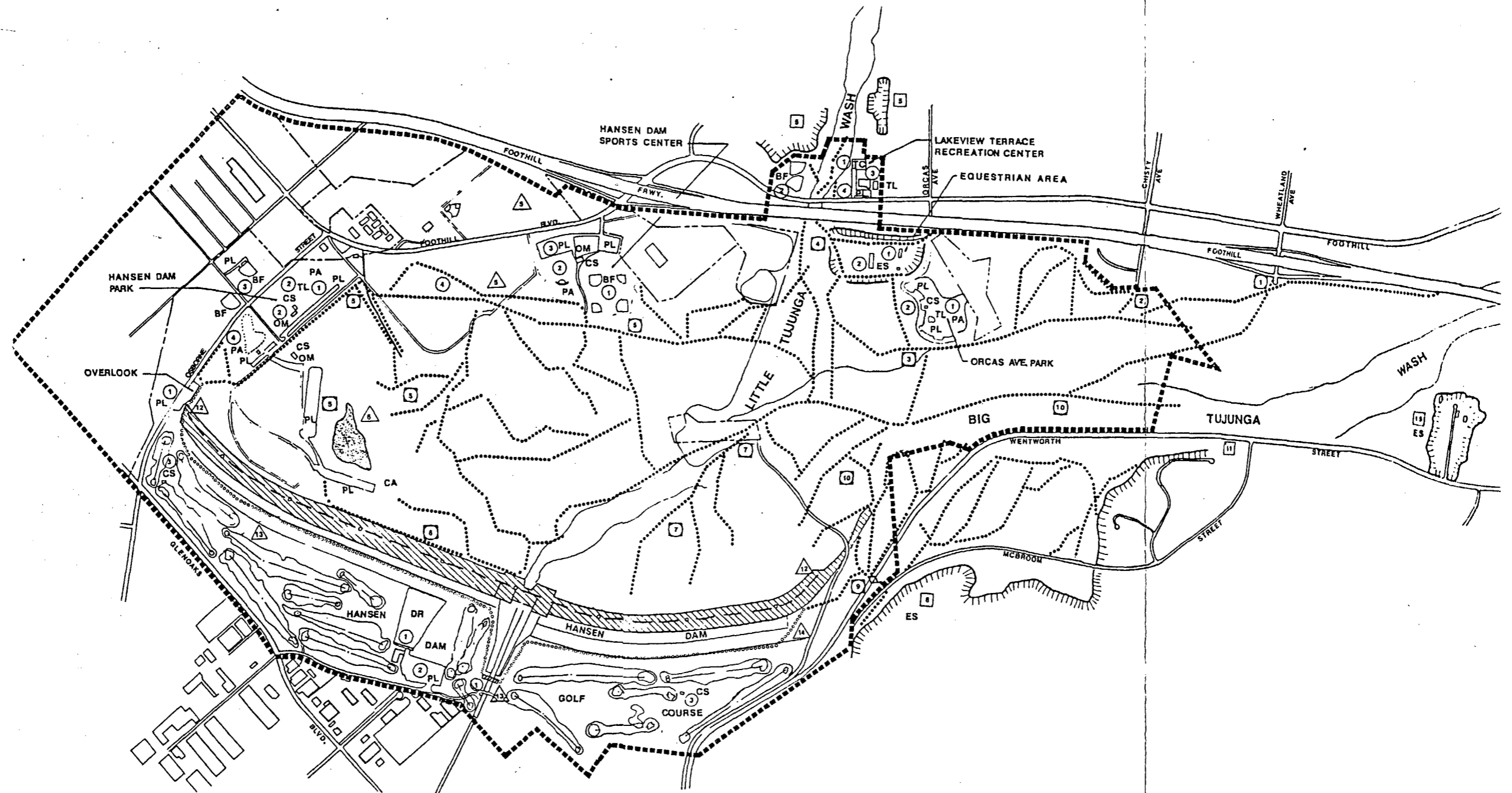
**LONGITUDINAL SECTION  
THROUGH OUTLETS**

**U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT**

SOURCE: HANSEN DAM ANALYSIS  
OF DESIGN JUNE 1940







SEE PLATE 2-12B FOR KEY TO SYMBOLS

SOURCE: LACDA RECREATION REVIEW 1988

|   |
|---|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA                |
| RECREATIONAL FACILITIES MAP                           |
| U. S. ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT |

INVENTORY MAP KEY

|      |   |
|------|---|
| ◻    | Notes concerning trail systems in basins            |
| ○    | Notes concerning right of way                       |
| ◻    | Notes concerning adjacent use                       |
| △    | Notes concerning proposed right-of-way use          |
| ◡    | Notes concerning proposed adjacent use              |
| ---  | Existing Bike Path                                  |
| ---○ | Proposed Bike Path                                  |
| ●●●● | Existing Equestrian Trail                           |
| ○○○○ | Proposed Equestrian Trail                           |
| ---  | Existing Foot Trail                                 |
| ▶    | Beginning of Reach                                  |
| *    | Access into Right-of-way                            |
| ∨    | Undercrossing                                       |
| ≡    | Direction of Undercrossing (inside/outside levee)   |
| ◇    | Tunnel  |
| ▨    | Bridge  |
| ▤    | Park or Golf Course                                 |
| ▥    | Equestrian Facility                                 |
| ■    | Boundary of Recreation Area                         |
| ▬    | Boundary of Study Area within Flood Control Basin   |
| NP   | Neighborhood Park                                   |
| CP   | Community Park                                      |
| RP   | Regional Park                                       |
| GC   | Golf Course   |
| BF   | Ballfield (Baseball, football, etc.)                |
| HC   | Hardcourt (Handball, basketball, etc.)              |
| TC   | Tennis Court  |
| CS   | Comfort Station                                     |
| PL   | Parking Lot   |
| PA   | Picnic Area   |
| CA   | Camping Area  |
| OM   | Operations and Maintenance (within recreation area) |
| AR   | Archery Range                                       |
| MF   | Model Field   |
| HS   | High School   |
| COL  | College   |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

RECREATIONAL MAP SYMBOLS

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

SOURCE: LACDA RECREATION REVIEW 1988

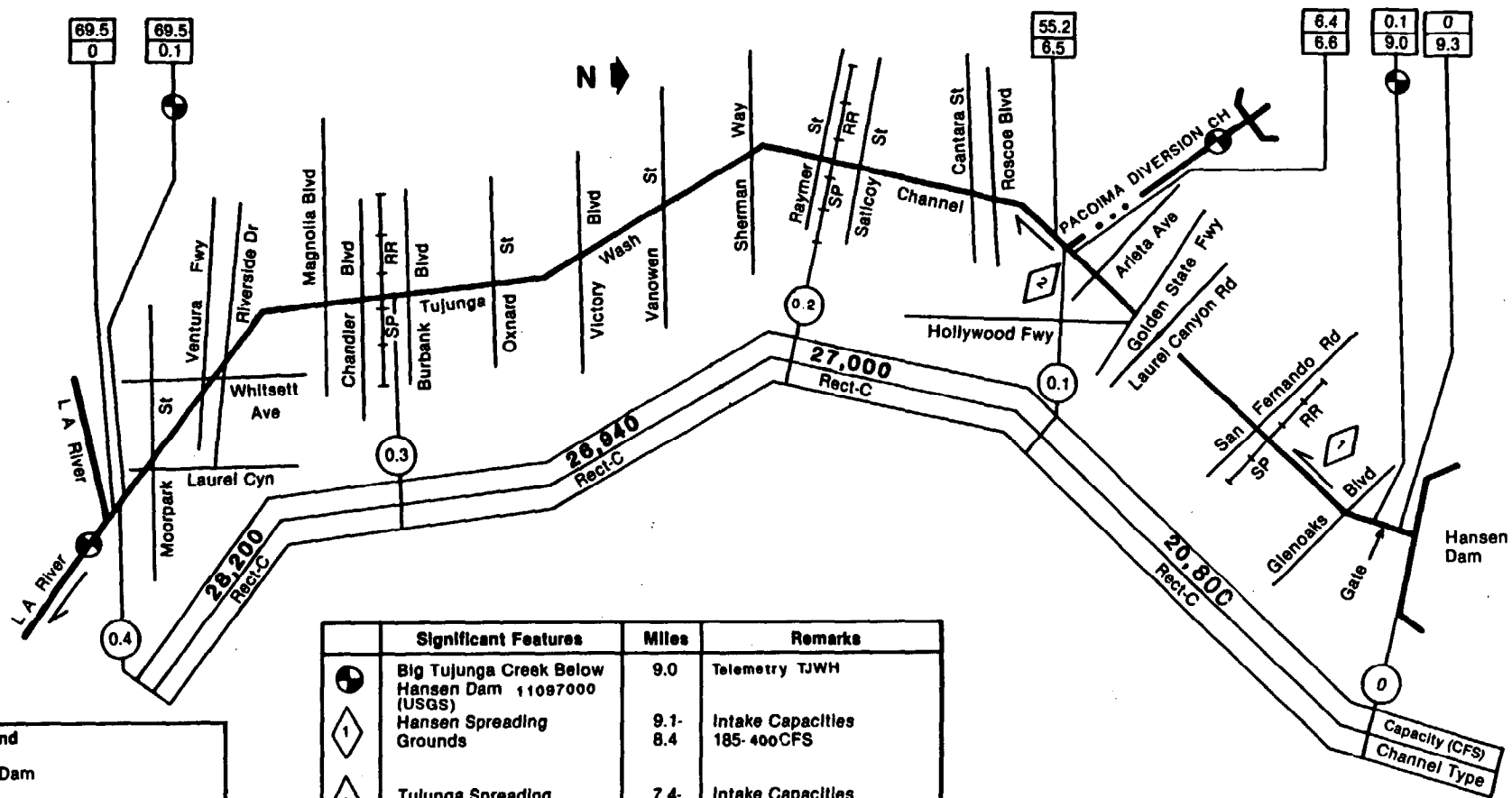
**Elevations Of Recreational And Other Facilities  
In Hansen Reservoir**

| Elev. (Ft. M.S.L.) | Structure In Basin  |
|--------------------|---|
| 990.0              | Invert Outlet Works   |
| 997-1030           | Trails Within Lake Area   |
| 1000               | Beach From Former Lake  |
| 1011               | Ungated Outlets   |
| 1012-1017          | Trails East Of Spillway   |
| 1012-1072          | Hiking & Equestrian Access To Basin   |
| 1040-1080          | Natural Area Orcas Ave. Park  |
| 1044-1088          | Picnic & Day Camp Area  |
| 1055-1070          | Paved Parking - Day Use Only  |
| 1060               | Spillway Crest  |
| 1060-1070          | Hansen Dam Sports Center<br>Outdoor Theater<br>Athletic Field<br>Football Field |
| 1061-1108          | Equestrian Area   |
| 1062-1067          | West Lake Development<br>Maintenance Yard - Admin. Bldg.                        |
| 1065-1070          | Picnic Areas  |
| 1075-1080          | 2 Little League Fields  |
| 1087               | Top Of Dam  |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

ELEVATIONS OF FACILITIES  
IN HANSEN RESERVOIR

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



|   | Significant Features                                    | Miles   | Remarks                                       |
|---|---|---------|---|
| ● | Big Tujunga Creek Below Hansen Dam 11097000 (USGS)      | 9.0     | Telemetry TJWH                                |
| ◇ | Hansen Spreading Grounds                                | 9.1-8.4 | Intake Capacities 185-400CFS                  |
| ◇ | Tujunga Spreading Grounds                               | 7.4-6.5 | Intake Capacities 390-400 CFS                 |
| — | Upstream Dams on Pacoima Wash<br>1. Lopez<br>2. Pacoima |         | Flows on Pacoima Wash Regulated by These Dams |
| ● | Pacoima Diversion at Branford St. F305-R (LACDPW)       |         |   |
| ● | Los Angeles River at Tujunga Ave. F300-R (LACDPW)       | 0       | Telemetry LART                                |
| ● | Tujunga Wash below Moorpark St. F105B-R (LACDPW)        | 0.1     |   |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

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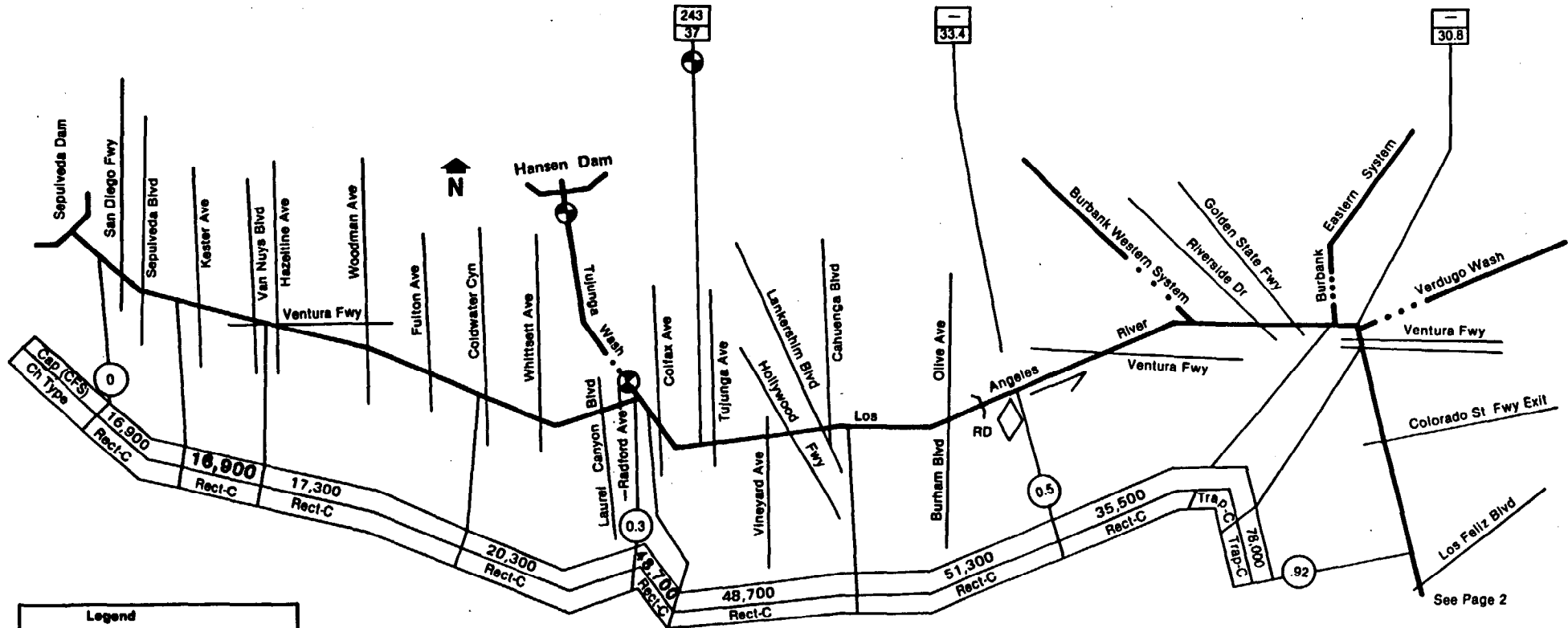
CHANNEL CAPACITIES & CONFIGURATION  
TUJUNGA WASH

HANSEN DAM  
TO  
LOS ANGELES RIVER

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US ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

SOURCE: LACDA REVIEW PART 1 HYDROLOGY REPORT



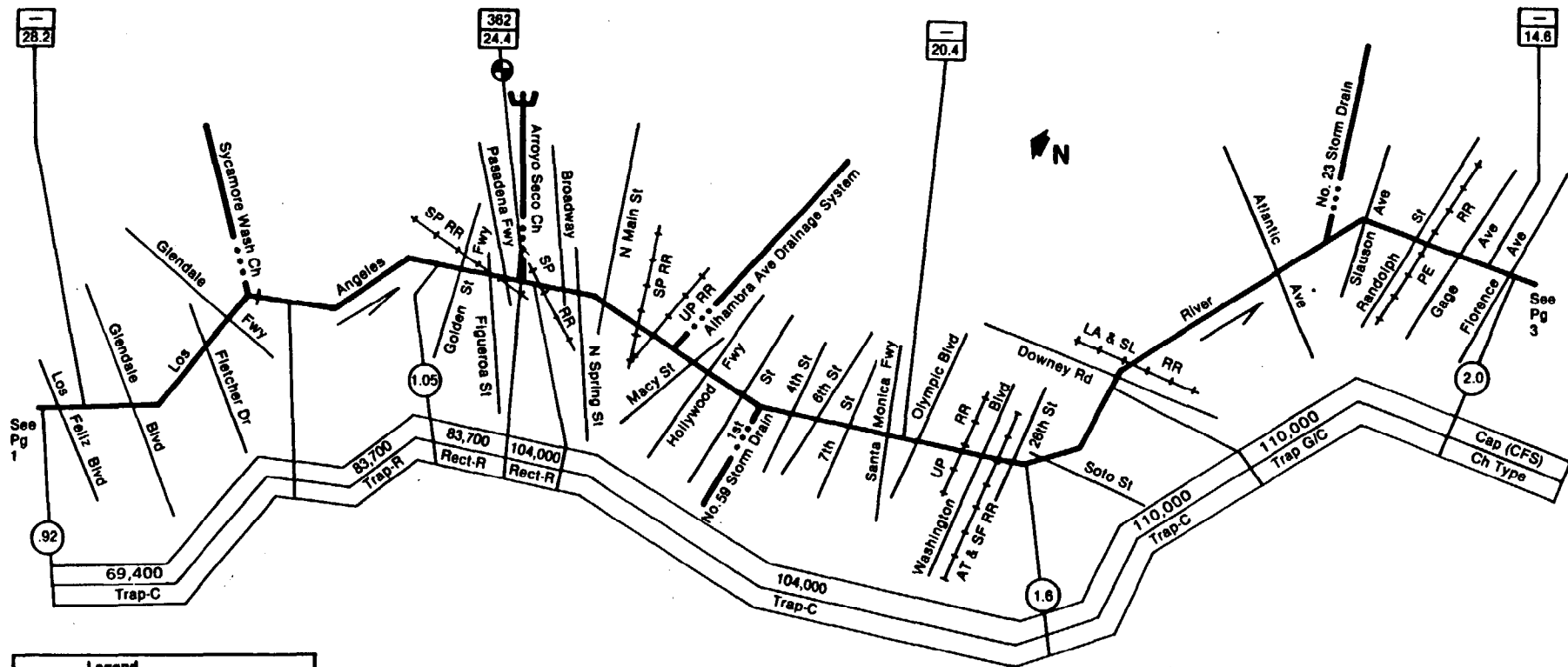
See Page 2

| Legend |                         |
|--------|-------------------------|
|        | Dam                     |
|        | Recharge Basin          |
|        | RD Rubber Dam           |
|        | Drop Structure          |
|        | Stream Gage             |
|        | Drainage Area           |
|        | Miles From Stream Mouth |
|        | Travel Time (Hours)     |
|        | Foot Bridge             |
| U      | Channel Unlined         |
| R      | Rip Rap Side Slopes     |
| S      | Soft Bottom             |
| C      | Concrete                |
| G      | Grouted Stone           |
| G/C    | Side Slope              |
| C      | Bottom                  |
| L      | Levee                   |

|    | Significant Features                               | Miles | Remarks  |
|----|--|-------|--|
| RD | Headworks Spreading Grounds                        | 33.4  | Intake Capacity 40 CFS at Rubber Dam                           |
|    | Los Angeles River at Tujunga AVE F300-R (LACDPW)   | 37    | Telemetry LART   |
|    | Tujunga Wash below Moorpark St F105B-R (LACDPW)    | 37.8  | Flows Regulated by Hansen, Big Tujunga, Pacoima and Lopez Dams |
|    | Big Tujunga Creek below Hansen Dam 11057000 (USGS) |       |  |

SOURCE: LACDA REVIEW PART 1 HYDROLOGY REPORT

|   |
|---|
| <b>HANSEN DAM</b><br><b>TUJUNGA WASH, CALIFORNIA</b>  |
| <b>CHANNEL CAPACITIES &amp; CONFIGURATION</b><br><b>LOS ANGELES RIVER</b><br><br><b>SEPULVEDA DAM</b><br><b>TO</b><br><b>LOS FELIZ BLVD</b> |
| U.S. ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT  |



| Legend |                         |
|--------|-------------------------|
|        | Dam                     |
|        | Recharge Basin          |
|        | RD Rubber Dam           |
|        | Drop Structure          |
|        | Stream Gage             |
|        | Drainage Area           |
|        | Miles From Stream Mouth |
|        | Travel Time (Hours)     |
|        | Foot Bridge             |
| U      | Channel Unlined         |
| R      | Rip Rap Side Slopes     |
| S      | Soft Bottom             |
| C      | Concrete                |
| G      | Grouted Stone           |
| G/C    | Side Slope              |
| C      | Bottom                  |
| L      | Levee                   |

|   | Significant Features  | Miles | Remarks  |
|---|---|-------|--|
| + | Los Angeles River Above Arroyo Seco F57C-R (LACDPW) Arroyo Seco Channel | 24.4  | Telemetry LARA   |
|   |   | 24.3  | Flow Regulated by Devils Gate Dam (Max Q = 43,000 CFS) |

**HANSEN DAM**  
**TUJUNGA WASH, CALIFORNIA**

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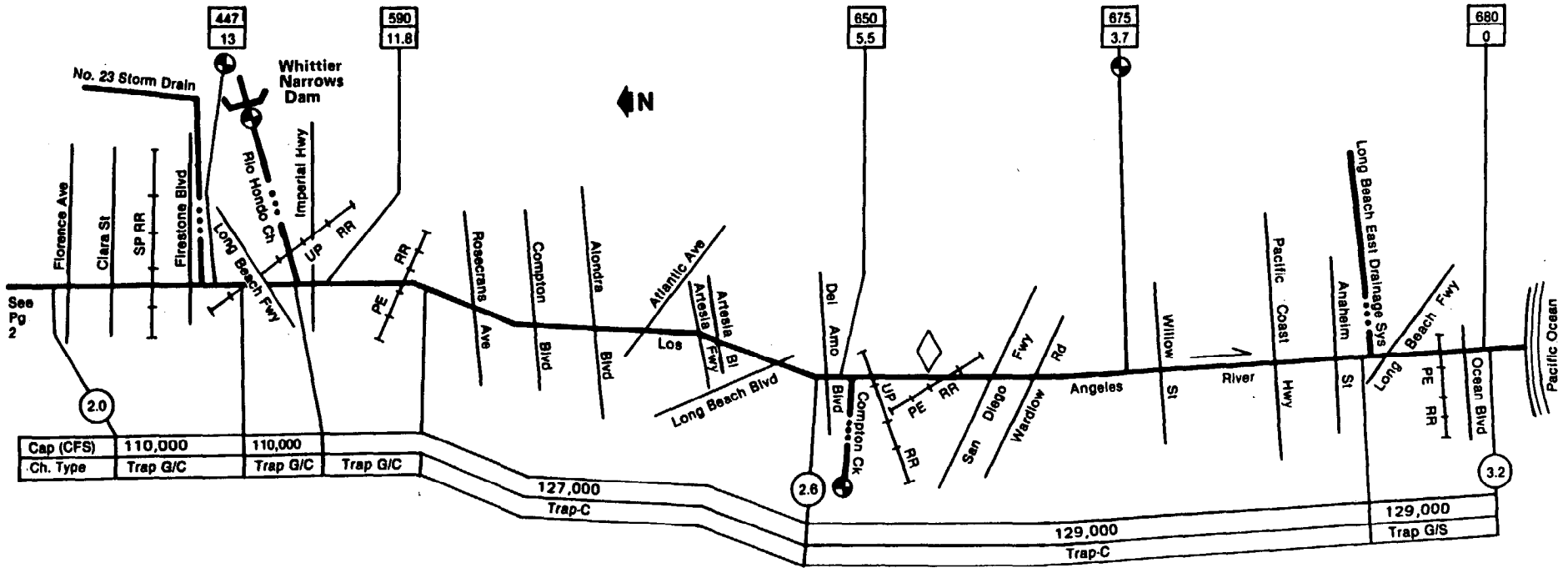
**CHANNEL CAPACITIES & CONFIGURATION**  
**LOS ANGELES RIVER**

**LOS FELIZ BLVD**  
**TO**  
**FLORENCE AVE**

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U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

SOURCE: LACDA REVIEW PART 1 HYDROLOGY REPORT



**Legend**

- Dam
- Recharge Basin
- RD Rubber Dam
- Drop Structure
- Stream Gage
- Drainage Area Miles From Stream Mouth
- Travel Time (Hours)
- Foot Bridge
- Channel Unlined
- Rip Rap Side Slopes
- Soft Bottom
- Concrete
- Grouted Stone
- Side Slope
- Bottom
- Levee

| Symbol | Significant Features                                 | Miles | Remarks   |
|--------|--|-------|---|
|        | Los Angeles River below Firestone F34D-R             | 13    | Telemetry LARF  |
|        | Rio Hondo below Whittier Narrows Dam 11102300 (USGS) | 12.1  | Flows Regulated by Whittier Narrows Flood Control Reservoir |
|        | Dominguez Gap Spreading Grounds                      | 4.7   | Intake Capacities 3-20 CFS                                  |
|        | Los Angeles River below Wardlow F319-R (LACDPW)      | 5.1   | Telemetry LARW  |
|        | Compton Creek Near Greenleaf F37B-R (LACDPW)         | 3.7   | Telemetry CCKG  |

**HANSEN DAM**  
**TUJUNGA WASH, CALIFORNIA**

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**CHANNEL CAPACITIES & CONFIGURATION**  
**LOS ANGELES RIVER**

**FLORENCE AVE**  
**TO**  
**PACIFIC OCEAN**

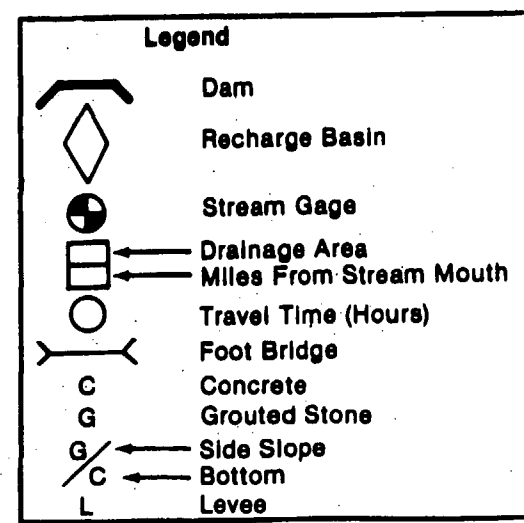
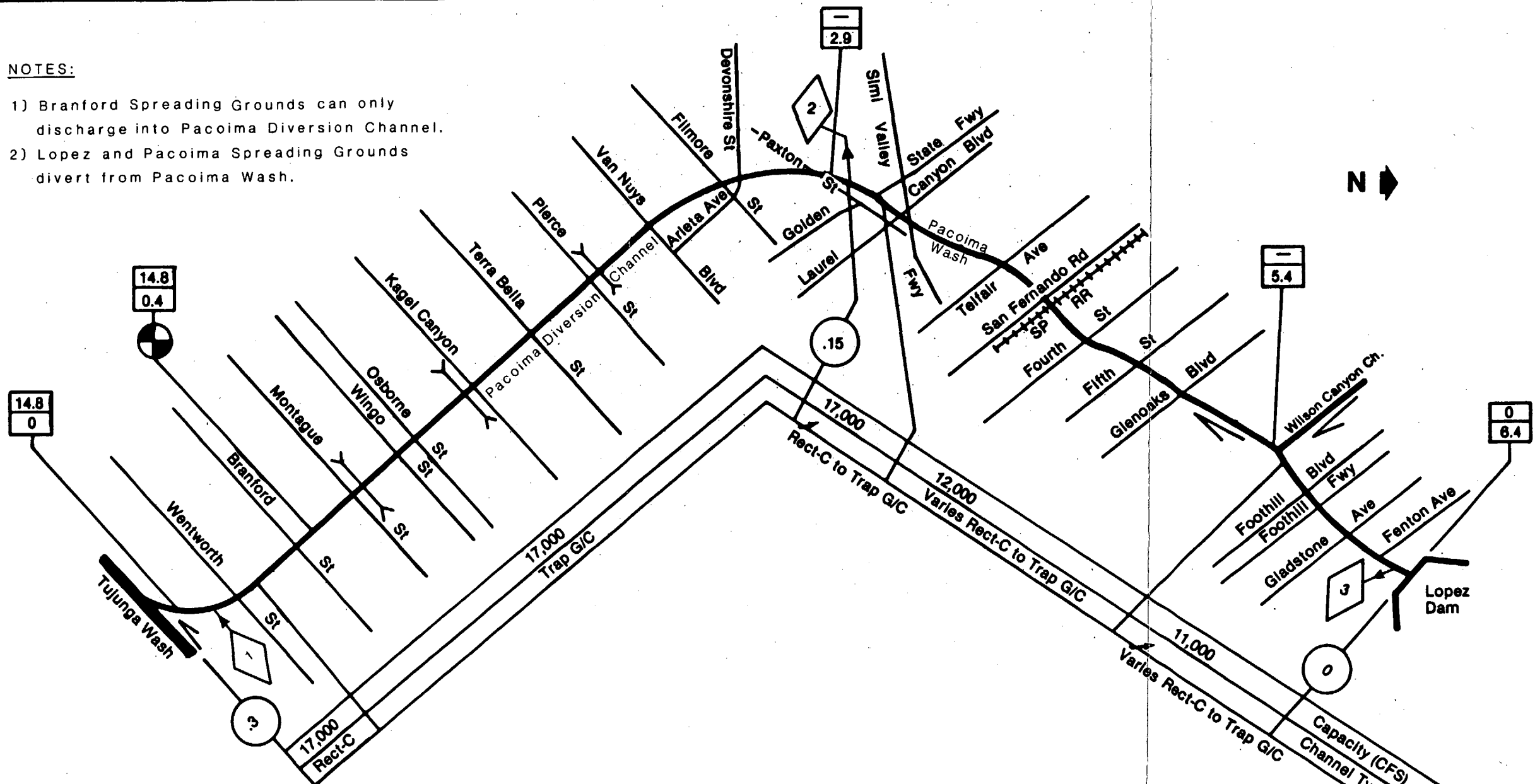
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U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

SOURCE: LACDA REVIEW PART 1 HYDROLOGY REPORT

**NOTES:**

- 1) Branford Spreading Grounds can only discharge into Pacoima Diversion Channel.
- 2) Lopez and Pacoima Spreading Grounds divert from Pacoima Wash.



HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

CHANNEL CAPACITIES & CONFIGURATION  
PACOIMA WASH

LOPEZ DAM  
TO  
TUJUNGA WASH

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

**Hansen Dam Reservoir Regulation Schedule**  
(For rising and falling stages)

| Step No.   | When reservoir water surface is between elevation | Gate setting for gates as indicated |                 |                 |                 |                 |                 |                 |                 | Total Computed discharges | Downstream gauge height** |
|--|---|-------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------------------|---------------------------|
|  | Feet - NGVD                                       | No. 1                               | No. 2           | No. 3           | No. 4           | No. 5           | No. 6           | No. 7           | No. 8           | ft <sup>3</sup> /s        | Feet                      |
|  |   | Feet of opening                     | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening |                           |                           |
| <u>Follow Step 1 during rising stages</u>                  |   |                                     |                 |                 |                 |                 |                 |                 |                 |                           |                           |
| 1..  | 990.0 - 1,010.5                                   | 1.0                                 | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 0 to 1,260                | 0.97 - 2.52               |
| <u>Follow Steps 2 to 9 during rising or falling stages</u> |   |                                     |                 |                 |                 |                 |                 |                 |                 |                           |                           |
| 2..  | 1,010.5 - 1,053.0*                                | 8.0                                 | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 7,920 to 20,730:          | 5.61 - 9.30               |
| 3..  | 1,053.0 - 1,060.0                                 | 8.0                                 | 7.0             | 7.0             | 8.0             | 8.0             | 7.0             | 7.0             | 8.0             | 19,370 to 20,520:         | 8.88 - 9.22               |
|  |   |                                     |                 |                 |                 |                 |                 |                 |                 |                           | Spillway, Gated & Ungated |
| 4..  | 1,060.0 - 1,061.0                                 | 8.0                                 | 6.0             | 6.0             | 8.0             | 8.0             | 6.0             | 6.0             | 8.0             | 19,400 to 20,430:         | 8.89 - 9.20               |
| 5..  | 1,061.0 - 1,062.0                                 | 7.0                                 | 6.0             | 6.0             | 7.0             | 7.0             | 6.0             | 6.0             | 7.0             | 18,960 to 20,740:         | 8.78 - 9.29               |
| 6..  | 1,062.0 - 1,063.0                                 | 5.0                                 | 6.0             | 6.0             | 4.0             | 4.0             | 6.0             | 6.0             | 5.0             | 18,160 to 20,430:         | 8.56 - 9.20               |
| 7..  | 1,063.0 - 1,064.0                                 | 5.0                                 | 3.0             | 3.0             | 4.0             | 4.0             | 3.0             | 3.0             | 5.0             | 17,580 to 20,280:         | 8.41 - 9.15               |
| 8..  | 1,064.0 - 1,065.0                                 | 5.0                                 | 0               | 3.0             | 4.0             | 0               | 3               | 0               | 5.0             | 17,590 to 20,680:         | 8.42 - 9.26               |
| 9..  | 1,065.0 - 1,066.0                                 | 0                                   | 0               | 3.0             | 1.0             | 0               | 3               | 0               | 0               | 17,300 to 20,660:         | 8.35 - 9.26               |
|  |   |                                     |                 |                 |                 |                 |                 |                 |                 |                           | Spillway and ungated flow |
| 10..   | 1,066.0 - 1,067.0                                 | 0                                   | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 18,690 to 22,420:         | 8.70 - 9.71               |
|  | Above 1,067.0                                     | 0                                   | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 22,420+                   | 9.71+                     |

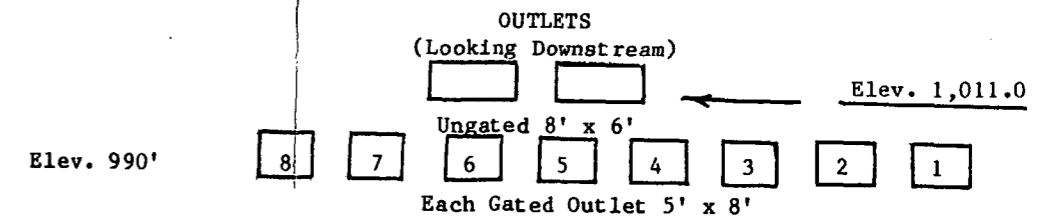
\*During falling stages the gates shall be left fully open to drain the reservoir completely. Then the gates shall be set at 1.0 feet.  
 \*\*Source for elevations up to 8.30 feet from USGS Rating Table No. 5; for elevations greater than 8.30 feet values were extrapolated from USGS data.  
 \*\*\* It may be necessary to regulate discharge according to downstream emergency conditions as authorized by the District Office.

**DAM OPERATOR INSTRUCTIONS**

1. Communication with the District Office is available. \*\*\*
  - a. Notify the Reservoir Operations Center when a gate change will be required according to the schedule.
  - b. Notify the Reservoir Operations Center if unable to set the gates as instructed.
2. Communication with the District Office is not available.
  - a. Try to reestablish communications through the Los Angeles County Flood Control DPW (WUK470).
  - b. (i) Rising stages. Allow a period of one hour to pass to reestablish communications with the District Office. If, after one hour, communication is not reestablished, follow the gate operation schedule.  
 (ii) Falling stages. Maintain current downstream gauge height until communication is reestablished.
  - c. If one or more of the gates cannot be operated, adjust the remaining gates gradually and uniformly until the downstream gauge height agrees with scheduled values. Keep a close check on gauge height and change the gate opening as often as required. If the downstream gauge height is unobtainable, adjust the gates that are functioning so that the sum of the gate openings will equal the sum of the openings shown in the schedule.
3. Trash Blockage.

If outlets become blocked with trash, increase gate openings to maintain scheduled downstream gauge height.
4. Notification to Los Angeles County DPW and to Los Angeles City DWP.

Notify personnel at Los Angeles County DPW and Los Angeles City DWP of the impending flood releases so that these agencies can take whatever action is necessary to mitigate damage to their spreading grounds downstream.



Estimated and Projected Annual Sediment Removal  
from Hansen Dam (1981 - 1990)

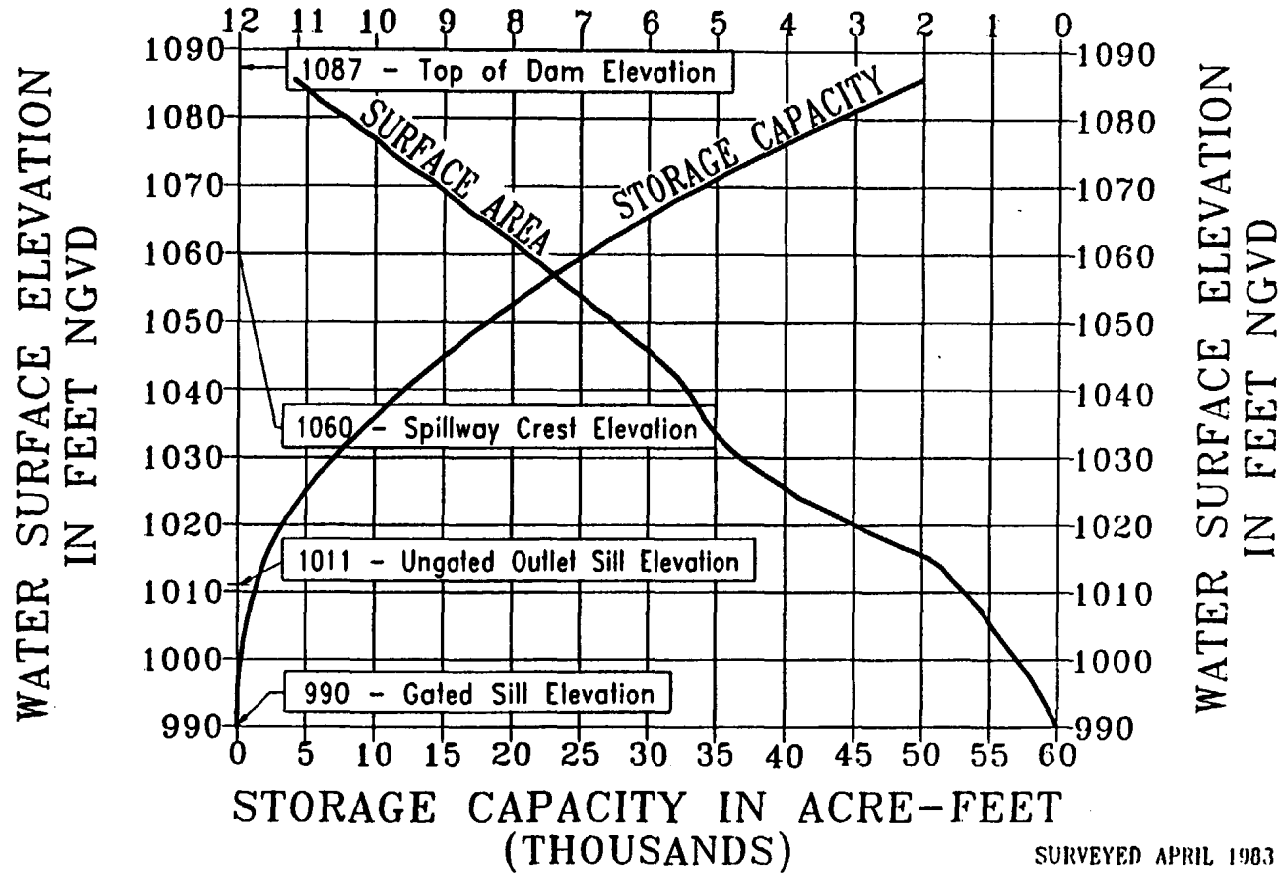
| Year   | Sediment Removed   |       |
|--------|--------------------|-------|
|        | <sup>3</sup><br>Yd | Ac-Ft |
| 1981   | 131,600            | 82    |
| 1982   | 197,000            | 122   |
| 1983   | 208,400            | 129   |
| 1984   | 337,267            | 209   |
| 1985   | 406,933            | 253   |
| 1986   | 1,382,071          | 857   |
| 1987   | 1,792,504          | 1111  |
| 1988   | 2,381,695          | 1477  |
| * 1989 | 2,838,202          | 1760  |
| * 1990 | 2,128,652          | 1320  |

\* Projected, based on Operations Branch records

|  |
|--|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA                 |
| ANNUAL SEDIMENT REMOVAL<br>FROM HANSEN DAM (1981-1990) |
| U.S. ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT   |

# HANSEN DAM

SURFACE AREA IN ACRES  
(HUNDREDS)



SOURCE: 1983 RESERVOIR SEDIMENT SURVEY

|   |
|---|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA                          |
| AREA-CAPACITY CURVE   |
| U. S. ARMY ENGINEER DISTRICT<br>LOS ANGELES, CORPS OF ENGINEERS |

SURVEYED APRIL 1983

**RESERVOIR SEDIMENT  
DATA SUMMARY**

Reservoir Sediment  
Data Summary, Hansen Dam

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS

NAME OF RESERVOIR

DATA SHEET NO.

|                         |                                       |                                 |                                     |   |                                   |                                  |                         |
|-------------------------|---------------------------------------|---------------------------------|-------------------------------------|---|-----------------------------------|----------------------------------|-------------------------|
| DAM                     | 1. OWNER                              |                                 | 2. STREAM                           |   | 3. STATE                          |                                  |                         |
|                         | 4. SEC.                               | TWP.                            | RANGE                               |   | 5. NEAREST P.O.                   |                                  |                         |
|                         | 7. LAT. " LONG. "                     |                                 | 8. TOP OF DAM ELEVATION             |   | 9. SPILLWAY CREST ELEV.           |                                  |                         |
| RESERVOIR               | 10. STORAGE ALLOCATION                | 11. ELEVATION TOP OF POOL       | 12. ORIGINAL SURFACE AREA, ACRES    | 13. ORIGINAL CAPACITY, ACRE-FEET          | 14. GROSS STORAGE, ACRE-FEET      | 15. DATE STORAGE BEGAN           |                         |
|                         | a. FLOOD CONTROL                      | 1,060                           | 794                                 | 33,100                                    | 33,100                            | Sep 40                           |                         |
|                         | b. MULTIPLE USE                       |                                 |                                     |   | 35,800                            |                                  |                         |
|                         | c. POWER                              |                                 |                                     |   |                                   |                                  |                         |
|                         | d. WATER SUPPLY                       |                                 |                                     |   |                                   | 16. DATE NORMAL OPER. BEGAN      |                         |
|                         | e. IRRIGATION                         |                                 |                                     |   |                                   |                                  |                         |
|                         | f. CONSERVATION                       |                                 |                                     |   |                                   |                                  |                         |
| g. INACTIVE             | 990                                   | 198                             | 2,700                               | 2,700                                     | Sep 40                            |                                  |                         |
| 17. LENGTH OF RESERVOIR |                                       | 1.3                             | MILES                               |   | AV. WIDTH OF RESERVOIR 1.0 MILES  |                                  |                         |
| WATERSHED               | 18. TOTAL DRAINAGE AREA               |                                 | 151.9                               | SQ. MI.                                   |                                   | 22. MEAN ANNUAL PRECIPITATION    |                         |
|                         | 19. NET SEDIMENT CONTRIBUTING AREA 1/ |                                 | 150.9                               | SQ. MI.                                   |                                   | 23. MEAN ANNUAL RUNOFF           |                         |
|                         | 20. LENGTH                            |                                 |                                     | MILES                                     |                                   | 24. MEAN ANNUAL RUNOFF           |                         |
|                         | 21. MAX. ELEV.                        |                                 |                                     | MIN. ELEV.                                |                                   | 25. ANNUAL TEMP. MEAN RANGE      |                         |
|                         | 26. DATE OF SURVEY                    | 27. PERIOD YEARS                | 28. ACCL. YEARS                     | 29. TYPE OF SURVEY                        | 30. NO. OF RANGES OR CONTOUR INT. | 31. SURFACE AREA, ACRES          | 32. CAPACITY, ACRE-FEET |
| Sep 40                  | Orig                                  | survey                          | Contour                             | 5'  | 794                               | 35,800                           |                         |
| Jul 41                  | 0.8                                   | 0.8                             | Contour                             | 5'  | 786                               | 35,200                           |                         |
| Oct 43                  | 2.3                                   | 3.1                             | Contour                             | 5'  | 789                               | 34,100                           |                         |
| Nov 45                  | 2.1                                   | 5.2                             | Contour                             | 5'  | 786                               | 33,500                           |                         |
| Jan 62                  | 16.2                                  | 21.4                            | Contour                             | 2'  | 780                               | 33,265                           |                         |
| Aug 69                  | 7.58                                  | 28.91                           | Contour                             | 2'  | 782                               | 29,700                           |                         |
| Oct 78                  | 9.17                                  | 38.08                           | Contour                             | 2'  | 770                               | 26,087                           |                         |
| SURVEY DATA             | 26. DATE OF SURVEY                    | 34. PERIOD ANNUAL PRECIPITATION | 35. PERIOD WATER INFLOW, ACRE-FEET  |   |                                   | 36. WATER INFL. TO DATE, AC.-FT. |                         |
|                         |                                       |                                 | a. MEAN ANNUAL                      | b. MAX. ANNUAL                            | c. PERIOD TOTAL                   | a. MEAN ANNUAL                   | b. TOTAL TO DATE        |
|                         | Sep 40                                | Original survey                 |                                     |   |                                   |                                  |                         |
|                         | Jul 41                                | 48.03                           |                                     |   | 91,040                            | 93,300                           | 91,040                  |
|                         | Oct 43                                | 27.03                           | 38,880                              | 75,930                                    | 89,430                            | 59,870                           | 180,470                 |
|                         | Nov 45                                | 26.22                           | 35,400                              | 59,720                                    | 74,340                            | 50,720                           | 254,310                 |
|                         | Jan 62                                | 18.54                           | 6,855                               | 34,258                                    | 111,051                           | 17,096                           | 365,361                 |
| 26. DATE OF SURVEY      | 37. PERIOD CAPACITY LOSS, ACRE-FEET   |                                 |                                     | 38. TOTAL SED DEPOSITS TO DATE, ACRE-FEET |                                   |                                  |                         |
|                         | a. PERIOD TOTAL                       | b. AV. ANNUAL                   | c. PER SQ. MI.-YEAR                 | a. TOTAL TO DATE                          | b. AV. ANNUAL                     | c. PER SQ. MI.-YEAR              |                         |
| Sep 40                  | Original survey                       |                                 |                                     |   |                                   |                                  |                         |
| Jul 41                  | 600                                   |                                 |                                     | 600                                       | 600                               | 4.1                              |                         |
| Oct 43                  | 1,100                                 | 550                             | 3.78                                | 1,700                                     | 570                               | 3.9                              |                         |
| Nov 45                  | 600                                   | 300                             | 2.06                                | 2,300                                     | 460                               | 3.2                              |                         |
| Jan 62                  | 235                                   | 14.5                            | 0.01                                | 2,535                                     | 118                               | 0.8                              |                         |
| 69                      | 3,565                                 | 470                             | 3.22                                | 6,100                                     | 211                               | 1.45                             |                         |
| 26. DATE OF SURVEY      | 39. AV. DRY WGT., LBS. PER CU. FT.    |                                 | 40. SED. DEP., TONS PER SQ. MI.-YR. |   | 41. STORAGE LOSS, PCT.            |                                  |                         |
|                         | a. PERIOD                             | b. TOTAL TO DATE                | a. AV. ANN.                         | b. TOT. TO DATE                           | a. PERIOD                         | b. TOT. TO DATE                  |                         |

|   |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
|---|---|------------|-----------------|------------|------------|------------|-----------------|----------|-------|--------|------|------|------|------|
| 26. DATE OF SURVEY  | 43. DEPTH DESIGNATION RANGE IN FEET BELOW, AND ABOVE, CREST ELEVATION |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
|   | -70   | 70-50      | 50-30           | 30-Crest   |            |            |                 |          |       |        |      |      |      |      |
| PERCENT OF TOTAL SEDIMENT LOCATED WITHIN DEPTH DESIGNATION  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| Sep 40  | Original survey   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| Jul 41  | 65  | 35         | 0               | 0          |            |            |                 |          |       |        |      |      |      |      |
| Oct 43  | 51  | 49         | 0               | 0          |            |            |                 |          |       |        |      |      |      |      |
| Nov 45  | 37  | 48         | 10              | 5          |            |            |                 |          |       |        |      |      |      |      |
| Jan 62  | 56  | 44         | 0               | 0          |            |            |                 |          |       |        |      |      |      |      |
| Aug 69  | 25  | 45         | 25              | 5          |            |            |                 |          |       |        |      |      |      |      |
| 26. DATE OF SURVEY  | 44. REACH DESIGNATION PERCENT OF TOTAL ORIGINAL LENGTH OF RESERVOIR   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
|   | 0-10  | 10-20      | 20-30           | 30-40      | 40-50      | 50-60      | 60-70           | 70-80    | 80-90 | 90-100 | -105 | -110 | -115 | -120 |
| PERCENT OF TOTAL SEDIMENT LOCATED WITHIN REACH DESIGNATION  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| 45. RANGE IN RESERVOIR OPERATION  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| WATER YEAR  | MAX. ELEV.  | MIN. ELEV. | INFLOW, AC.-FT. | WATER YEAR | MAX. ELEV. | MIN. ELEV. | INFLOW, AC.-FT. |          |       |        |      |      |      |      |
| 1945-46   | 1010.63   | 989.76     | 12,206          | 1957-58    | 1012.55    | 975.60     | 34,133          |          |       |        |      |      |      |      |
| 1946-47   | 998.41  | 989.17     | 17,160          | 1958-59    | 997.50     | 982.75     | 2,165           |          |       |        |      |      |      |      |
| 1947-48   | 993.29  | 986.77     | 1,722           | 1959-60    | 983.52     | 981.69     | 330             |          |       |        |      |      |      |      |
| 1948-49   | 991.86  | 977.76     | 93              | 1960-61    | 985.30     | 982.16     | 486             |          |       |        |      |      |      |      |
| 1949-50   | 992.97  | 973.24     | 250             | 1961-62    | 1011.19    | 981.82     | 25,153          |          |       |        |      |      |      |      |
| 1950-51   | 998.71  | 963.15     | 34              | 1962-63    | 988.70     | 982.44     | 765             |          |       |        |      |      |      |      |
| 1951-52   | 1023.78   | Dry        | 32,175          | 1963-64    | 985.35     | 982.32     | 645             |          |       |        |      |      |      |      |
| 1952-53   | 999.27  | 979.32     | 1,430           | 1964-65    | 992.83     | 981.71     | 1,484           |          |       |        |      |      |      |      |
| 1953-54   | 996.37  | 982.22     | 5,090           | 1965-66    | 1017.57    | 982.29     | 57,363          |          |       |        |      |      |      |      |
| 1954-55   | 985.79  | 977.68     | 712             | 1966-67    | 1013.58    | 990.42     | 41,175          |          |       |        |      |      |      |      |
| 1955-56   | 999.00  | 975.61     | 2,100           | 1967-68    | 1007.33    | 988.92     | 16,581          |          |       |        |      |      |      |      |
| 1956-57   | 992.98  | 976.55     | 495             | 1968-69    | 1003.78    | 986.81     | 180,372         |          |       |        |      |      |      |      |
| 46. ELEVATION-AREA-CAPACITY DATA  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| ELEVATION   | AREA  | CAPACITY   | ELEVATION       | AREA       | CAPACITY   | ELEVATION  | AREA            | CAPACITY |       |        |      |      |      |      |
| 990   | 0   | 0          | 1035            | 529        | 10,702     | 1080       | 1013            | 44,614   |       |        |      |      |      |      |
| 995   | 47  | 158        | 1040            | 565        | 13,430     | 1085       | 1071            | 49,831   |       |        |      |      |      |      |
| 1000  | 81  | 467        | 1045            | 607        | 16,357     |            |                 |          |       |        |      |      |      |      |
| 1005  | 115   | 962        | 1050            | 660        | 19,516     |            |                 |          |       |        |      |      |      |      |
| 1010  | 154   | 1630       | 1055            | 718        | 22,965     |            |                 |          |       |        |      |      |      |      |
| 1015  | 221   | 2538       | 1060            | 776        | 26,695     |            |                 |          |       |        |      |      |      |      |
| 1020  | 331   | 3914       | 1065            | 834        | 30,720     |            |                 |          |       |        |      |      |      |      |
| 1025  | 427   | 5819       | 1070            | 900        | 35,044     |            |                 |          |       |        |      |      |      |      |
| 1030  | 492   | 8136       | 1075            | 958        | 39,691     |            |                 |          |       |        |      |      |      |      |
| 47. REMARKS AND REFERENCES  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| 1/ Item 19 - Includes 82 Sq. Mi. above Big Tujunga Dam; however, practically all sediment inflow is passed downstream by sluicing operations. |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| 48. AGENCY MAKING SURVEY  |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |
| 49. AGENCY SUPPLYING DATA   |   |            |                 |            |            |            |                 |          |       |        |      |      |      |      |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA.

RESERVOIR SEDIMENT DATA SURVEY

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

RESERVOIR SEDIMENT  
DATA SUMMARY

(Continued)

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS

NAME OF RESERVOIR

DATA SHEET NO.

|                                  |                                    |  |                                    |                        |  |                                  |                         |                                     |
|----------------------------------|------------------------------------|--|------------------------------------|------------------------|--|----------------------------------|-------------------------|-------------------------------------|
| DAM                              | 1. OWNER                           |  | 2. STREAM                          |                        | 3. STATE                                   |                                  |                         |                                     |
|                                  | 4. SEC.                            | TWP.                                   | RANGE                              |                        | 5. NEAREST P.O.                            |                                  |                         |                                     |
|                                  | 7. LAT. ° ' " LONG. ° ' "          |  | 8. TOP OF DAM ELEVATION            |                        | 9. SPILLWAY CREST ELEV.                    |                                  |                         |                                     |
| RESERVOIR                        | 10. STORAGE ALLOCATION             |  | 11. ELEVATION TOP OF POOL          |                        | 12. ORIGINAL SURFACE AREA, ACRES           |                                  |                         |                                     |
|                                  | a. FLOOD CONTROL                   |  |                                    |                        |  |                                  |                         |                                     |
|                                  | b. MULTIPLE USE                    |  |                                    |                        |  |                                  |                         |                                     |
|                                  | c. POWER                           |  |                                    |                        |  |                                  |                         |                                     |
|                                  | d. WATER SUPPLY                    |  |                                    |                        |  |                                  |                         |                                     |
|                                  | e. IRRIGATION                      |  |                                    |                        |  |                                  |                         |                                     |
|                                  | f. CONSERVATION                    |  |                                    |                        |  |                                  |                         |                                     |
| 13. ORIGINAL CAPACITY, ACRE-Feet |                                    | 14. GROSS STORAGE, ACRE-Feet           |                                    | 15. DATE STORAGE BEGAN |  |                                  |                         |                                     |
| 16. DATE NORMAL OPER. BEGAN      |                                    |  |                                    |                        |  |                                  |                         |                                     |
| WATERSHED                        | 17. LENGTH OF RESERVOIR            |  | MILES                              |                        | AV. WIDTH OF RESERVOIR                     |                                  |                         |                                     |
|                                  | 18. TOTAL DRAINAGE AREA            |  | SQ. MI.                            |                        | 22. MEAN ANNUAL PRECIPITATION              |                                  |                         |                                     |
|                                  | 19. NET SEDIMENT CONTRIBUTING AREA |  | SQ. MI.                            |                        | 23. MEAN ANNUAL RUNOFF                     |                                  |                         |                                     |
|                                  | 20. LENGTH                         |  | MILES                              |                        | AV. WIDTH                                  |                                  |                         |                                     |
|                                  | 21. MAX. ELEV.                     |  | MIN. ELEV.                         |                        | 25. ANNUAL TEMP. MEAN RANGE                |                                  |                         |                                     |
| SURVEY DATA                      | 26. DATE OF SURVEY                 | 27. PERIOD YEARS                       | 28. ACCL. YEARS                    | 29. TYPE OF SURVEY     | 30. NO. OF RANGES OR CONTOUR INT.          | 31. SURFACE AREA, ACRES          | 32. CAPACITY, ACRE-Feet | 33. C/I. RATIO, AC.-FT. PER AC.-FT. |
|                                  | Jul 82                             | 3.75                                   | 41.83                              | Contour                | 2'   | 776                              | 26,695                  |                                     |
|                                  | Apr 83                             | 0.75                                   | 42.58                              |                        |  |                                  | 25,446                  |                                     |
|                                  | 26. DATE OF SURVEY                 | 34. PERIOD ANNUAL PRECIPITATION        | 35. PERIOD WATER INFLOW, ACRE-Feet |                        |  | 36. WATER INFL. TO DATE, AC.-FT. |                         |                                     |
|                                  | Aug 69                             | 27.58                                  | a. MEAN ANNUAL                     | b. MAX. ANNUAL         | c. PERIOD TOTAL                            | a. MEAN ANNUAL                   | b. TOTAL TO DATE        |                                     |
|                                  | Oct 78                             | 28.47                                  | 41,997                             | 180,372                | 318,336                                    | 23,666                           | 834,197                 |                                     |
|                                  | Jul 82                             | 30.51                                  | 25,978                             | 163,185                | 238,217                                    | 24,223                           | 922,414                 |                                     |
|                                  |                                    |  | 58,396                             | 115,809                | 218,985                                    | 27,287                           | 1,141,399               |                                     |
|                                  | 26. DATE OF SURVEY                 | 37. PERIOD CAPACITY LOSS, ACRE-Feet    |                                    |                        | 38. TOTAL SED. DEPOSITS TO DATE, ACRE-Feet |                                  |                         |                                     |
|                                  | Oct 78                             | a. PERIOD TOTAL                        | b. AV. ANNUAL                      | c. PER SQ. MI.-YEAR    | a. TOTAL TO DATE                           | b. AV. ANNUAL                    | c. PER SQ. MI.-YEAR     |                                     |
| Jul 82                           | 3,613                              | 394.00                                 | 2.70                               | 9,713                  | 255.07                                     | 1.75                             |                         |                                     |
| Apr 83                           | -608                               | Excavation increased storage capacity. |                                    |                        |  |                                  |                         |                                     |
|                                  | 1,249                              |  |                                    |                        |  |                                  |                         |                                     |
| 26. DATE OF SURVEY               | 39. AV. DRY WGT., LBS. PER CU. FT. | 40. SED. DEP., TONS PER SQ. MI.-YR.    |                                    | 41. STORAGE LOSS, PCT. |  | 42. SED. INFLOW, PPM             |                         |                                     |
|                                  |                                    | a. PERIOD                              | b. TOTAL TO DATE                   | a. AV. ANN.            | b. TOT. TO DATE                            | a. PERIOD                        | b. TOT. TO DATE         |                                     |

|  |   |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
|--|---|------------|-----------------|------------|--|------------|-----------------|----------|-------|--------|------|------|------|------|
| 26. DATE OF SURVEY   | 43. DEPTH DESIGNATION RANGE IN FEET BELOW, AND ABOVE, CREST ELEVATION |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
|  | -70   | 70-50      | 50-30           | 30-Crest   |  |            |                 |          |       |        |      |      |      |      |
| Oct 78<br>Jul 82   | PERCENT OF TOTAL SEDIMENT LOCATED WITHIN DEPTH DESIGNATION            |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
|  | 12  | 34         | 45              | 9          | Excavation increased storage capacity. |            |                 |          |       |        |      |      |      |      |
| 26. DATE OF SURVEY   | 44. REACH DESIGNATION PERCENT OF TOTAL ORIGINAL LENGTH OF RESERVOIR   |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
|  | 0-10  | 10-20      | 20-30           | 30-40      | 40-50                                  | 50-60      | 60-70           | 70-80    | 80-90 | 90-100 | -105 | -110 | -115 | -120 |
| PERCENT OF TOTAL SEDIMENT LOCATED WITHIN REACH DESIGNATION |   |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
| 45. RANGE IN RESERVOIR OPERATION                           |   |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
| WATER YEAR   | MAX. ELEV.  | MIN. ELEV. | INFLOW, AC.-FT. | WATER YEAR | MAX. ELEV.                             | MIN. ELEV. | INFLOW, AC.-FT. |          |       |        |      |      |      |      |
| 1969-70  | 1007.32   | 993.97     | 16,886          | 1981-82    | 1010.60                                | 996.86     | 39,755          |          |       |        |      |      |      |      |
| 1970-71  | 1009.36   | 995.23     | 14,996          |            |  |            |                 |          |       |        |      |      |      |      |
| 1971-72  | 1004.62   | 993.50     | 2,273           |            |  |            |                 |          |       |        |      |      |      |      |
| 1972-73  | 1015.34   | 992.91     | 15,626          |            |  |            |                 |          |       |        |      |      |      |      |
| 1973-74  | 1010.48   | 996.35     | 7,829           |            |  |            |                 |          |       |        |      |      |      |      |
| 1974-75  | 1007.06   | 994.77     | 6,565           |            |  |            |                 |          |       |        |      |      |      |      |
| 1975-76  | 1006.72   | 994.57     | 5,222           |            |  |            |                 |          |       |        |      |      |      |      |
| 1976-77  | 1007.20   | 996.45     | 5,635           |            |  |            |                 |          |       |        |      |      |      |      |
| 1977-78  | 1023.90   | 994.92     | 163,185         |            |  |            |                 |          |       |        |      |      |      |      |
| 1978-79  | 1016.72   | 991.10     | 55,429          |            |  |            |                 |          |       |        |      |      |      |      |
| 1979-80  | 1025.30   | 996.31     | 115,809         |            |  |            |                 |          |       |        |      |      |      |      |
| 1980-81  | 999.05  | 997.00     | 10,054          |            |  |            |                 |          |       |        |      |      |      |      |
| 46. ELEVATION-AREA-CAPACITY DATA                           |   |            |                 |            |  |            |                 |          |       |        |      |      |      |      |
| ELEVATION  | AREA  | CAPACITY   | ELEVATION       | AREA       | CAPACITY                               | ELEVATION  | AREA            | CAPACITY |       |        |      |      |      |      |

47. REMARKS AND REFERENCES

48. AGENCY MAKING SURVEY

49. AGENCY SUPPLYING DATA

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

RESERVOIR SEDIMENT DATA SURVEY

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

Summary of Climatological Data at Burbank, California,  
Hansen Flood Control Basin, Los Angeles County Drainage  
Area, California.\*

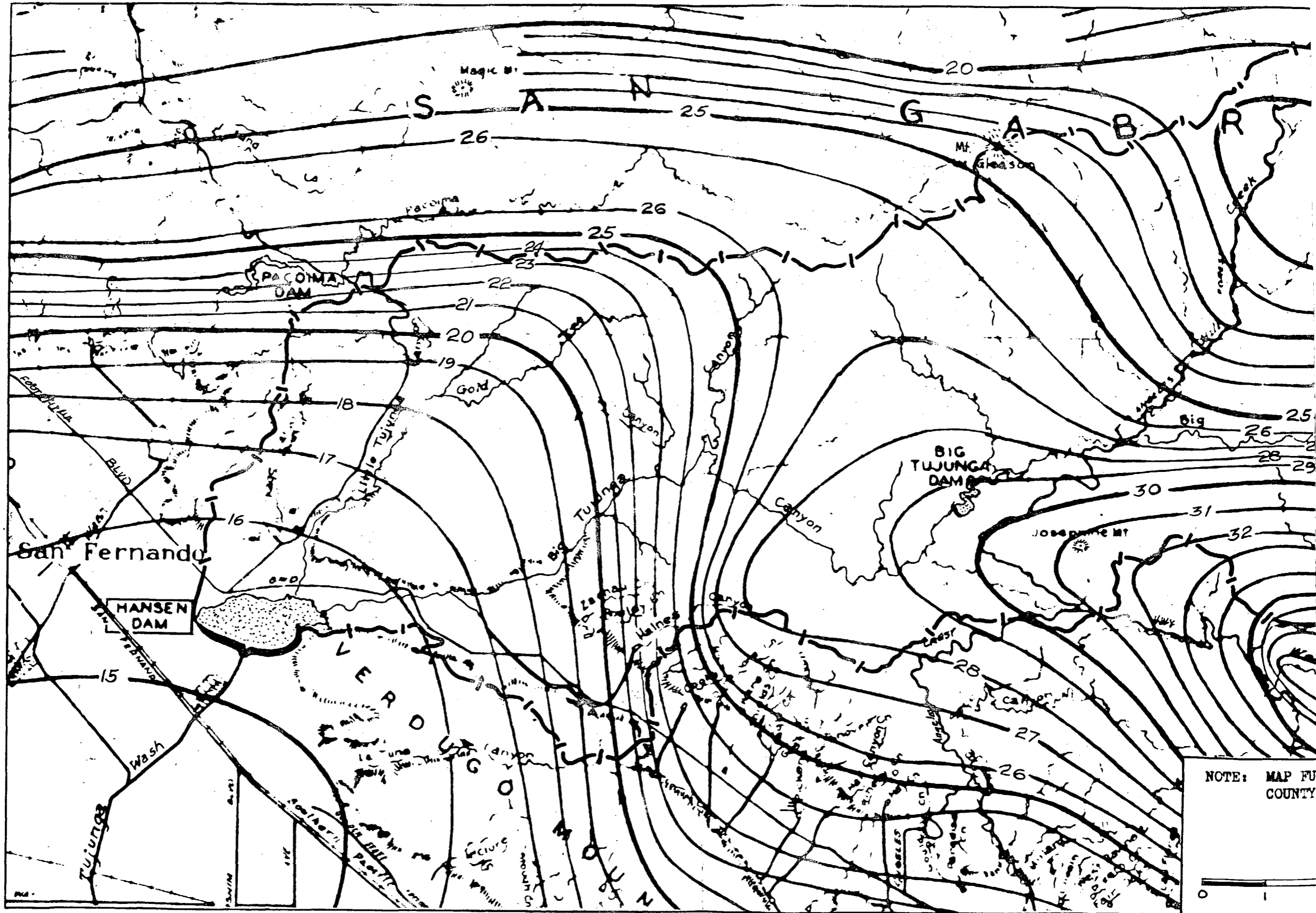
| Month    | Temperature                                   |   |  | Precipitation             |                              |
|----------|---|---|--|---------------------------|------------------------------|
|          | Mean<br>Monthly<br>Degrees<br>Fahren-<br>heit | Record<br>Highest<br>Degrees<br>Fahren-<br>heit | Record<br>Lowest<br>Degrees<br>Fahren-<br>heit | Mean<br>Monthly<br>Inches | Maximum<br>Monthly<br>Inches |
| Jan..... | 53.8  | 92  | 22   | 3.77                      | 14.16                        |
| Feb..... | 56.3  | 92  | 27   | 3.33                      | 15.19                        |
| Mar..... | 57.5  | 96  | 22   | 2.52                      | 12.87                        |
| Apr..... | 60.6  | 100   | 32   | 1.24                      | 5.66                         |
| May..... | 64.5  | 106   | 39   | 0.28                      | 3.79                         |
| Jun..... | 69.3  | 111   | 43   | 0.04                      | 0.31                         |
| Jul..... | 75.1  | 108   | 45   | 0.01                      | 0.05                         |
| Aug..... | 75.2  | 110   | 46   | 0.14                      | 2.97                         |
| Sep..... | 73.1  | 113   | 45   | 0.24                      | 3.89                         |
| Oct..... | 67.1  | 108   | 33   | 0.31                      | 2.42                         |
| Nov..... | 59.6  | 98  | 29   | 1.94                      | 10.63                        |
| Dec..... | 54.7  | 92  | 22   | 1.96                      | 6.84                         |

\*34°12'N latitude 118°22'W longitude; elevation 699 feet above mean sea level.  
NOTE: Period of record is 30 years (1951-1980)

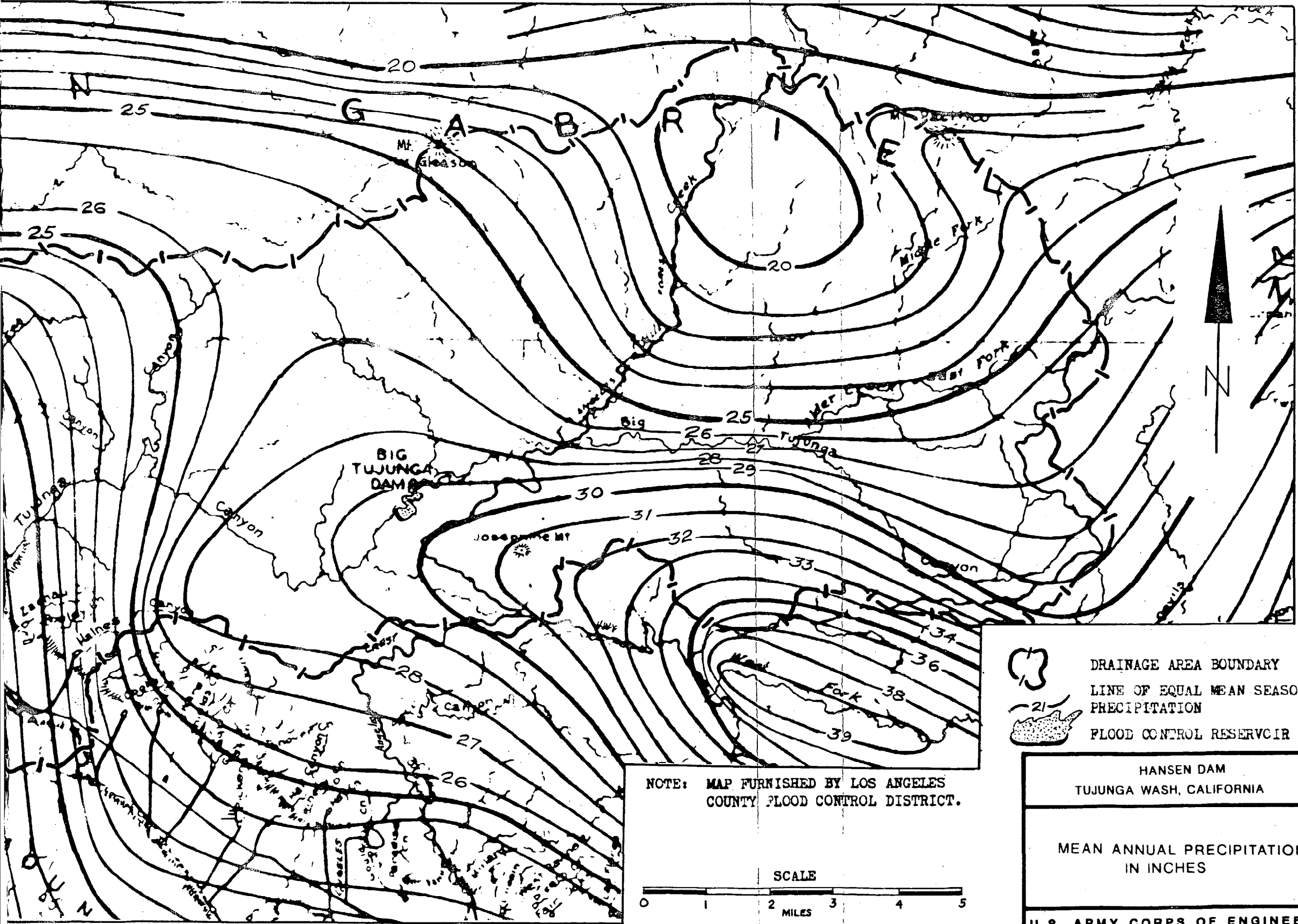
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

SUMMARY OF CLIMATOLOGICAL DATA  
AT BURBANK, CA

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



SOURCE: LACDPW



NOTE: MAP FURNISHED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT.



DRAINAGE AREA BOUNDARY  
LINE OF EQUAL MEAN SEASONAL  
PRECIPITATION  
FLOOD CONTROL RESERVOIR

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

MEAN ANNUAL PRECIPITATION  
IN INCHES

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

Summary of Precipitation Data at Hansen Dam and  
Three Stations in Watershed above Dam.

| LACDPW<br>Number | Station Name         | Lat (N)  | Long (W)  | Elev<br>(feet) | Period of<br>Record |
|------------------|----------------------|----------|-----------|----------------|---------------------|
| 46D-E            | Big Tujunga Dam      | 34-17-40 | 118-11-14 | 2315           | 1924 - 1988         |
| 436C             | Hansen Dam           | 34-16-08 | 118-23-59 | 1110           | 1938 - 1988         |
| 488B             | Kagel Canyon Ptl Stn | 34-17-45 | 118-22-30 | 1450           | 1943 - 1987         |
| 54C              | Lomis Ranch Alder Cr | 34-20-55 | 118-02-54 | 4325           | 1916 - 1987         |

MEAN AND MAXIMUM OBSERVED MONTHLY AND ANNUAL PRECIPITATION VALUES (INCHES)  
PLUS MAXIMUM OBSERVED DAILY VALUES (INCHES), BY MONTH:

| LACDPW NO: | 46D-E |         |       | 436C  |         |       |
|------------|-------|---------|-------|-------|---------|-------|
|            | MEAN  | MAXIMUM |       | MEAN  | MAXIMUM |       |
|            |       | Monthly | Daily |       | Monthly | Daily |
| JAN        | 5.58  | 33.39   | 14.39 | 2.81  | 14.39   | 3.84  |
| FEB        | 5.86  | 21.12   | 11.24 | 2.96  | 13.16   | 4.83  |
| MAR        | 4.60  | 20.38   | 10.83 | 2.33  | 11.92   | 5.61  |
| APR        | 2.31  | 9.86    | 3.60  | 1.17  | 6.25    | 2.30  |
| MAY        | 0.66  | 6.59    | 4.38  | 0.33  | 2.88    | 1.84  |
| JUN        | 0.14  | 1.80    | 1.08  | 0.07  | 0.55    | 0.25  |
| JUL        | 0.06  | 0.15    | 0.15  | 0.03  | 0.24    | 0.24  |
| AUG        | 0.14  | 1.60    | 1.28  | 0.07  | 2.90    | 2.77  |
| SEP        | 0.43  | 5.61    | 3.19  | 0.22  | 3.44    | 3.03  |
| OCT        | 0.97  | 6.07    | 5.28  | 0.49  | 2.29    | 1.39  |
| NOV        | 2.83  | 24.86   | 5.59  | 1.43  | 12.63   | 4.91  |
| DEC        | 5.01  | 15.58   | 8.19  | 2.53  | 7.94    | 3.45  |
| ANNUAL     | 28.59 | 60.68   |       | 14.44 | 46.45   |       |

| LACDPW NO: | 488B  |         |       | 54C   |         |       |
|------------|-------|---------|-------|-------|---------|-------|
|            | MEAN  | MAXIMUM |       | MEAN  | MAXIMUM |       |
|            |       | Monthly | Daily |       | Monthly | Daily |
| JAN        | 3.24  | 12.50   | 4.22  | 3.63  | 17.87   | 9.69  |
| FEB        | 3.40  | 13.81   | 4.02  | 3.82  | 14.82   | 8.13  |
| MAR        | 2.68  | 12.03   | 4.83  | 3.00  | 15.50   | 5.90  |
| APR        | 1.35  | 6.54    | 2.75  | 1.51  | 13.04   | 5.48  |
| MAY        | 0.38  | 4.38    | 2.15  | 0.43  | 4.80    | 2.60  |
| JUN        | 0.08  | 0.62    | 0.45  | 0.09  | 0.68    | 0.45  |
| JUL        | 0.03  | 0.19    | 0.17  | 0.04  | 2.15    | 2.15  |
| AUG        | 0.08  | 3.15    | 2.64  | 0.09  | 2.00    | 1.60  |
| SEP        | 0.25  | 3.30    | 1.97  | 0.28  | 6.38    | 5.25  |
| OCT        | 0.57  | 2.18    | 1.18  | 0.63  | 4.50    | 2.25  |
| NOV        | 1.64  | 10.75   | 2.05  | 1.84  | 13.66   | 6.93  |
| DEC        | 2.91  | 7.54    | 3.86  | 3.26  | 17.30   | 7.43  |
| ANNUAL     | 16.61 | 42.47   |       | 18.62 | 40.56   |       |

- NOTES: 1. Minimum observed monthly values are approximately zero at each stn.  
2. Data were obtained from Los Angeles County Dept. of Public Works (LACDPW).

|  |
|--|
| <b>HANSEN DAM</b><br><b>TUJUNGA WASH, CALIFORNIA</b>               |
| <b>SUMMARY OF PRECIPITATION DATA</b><br><b>HANSEN WATERSHED</b>    |
| <b>U.S. ARMY CORPS OF ENGINEERS</b><br><b>LOS ANGELES DISTRICT</b> |

Precipitation Frequency Values (Inches) for Hansen Watershed.

| DURATION | RETURN PERIOD |      |       |       |       |        |
|----------|---------------|------|-------|-------|-------|--------|
|          | 2-YR          | 5-YR | 10-YR | 25-YR | 50-YR | 100-YR |
| 5-MIN    | 0.19          | 0.29 | 0.36  | 0.45  | 0.51  | 0.58   |
| 10-MIN   | 0.30          | 0.46 | 0.46  | 0.70  | 0.80  | 0.90   |
| 15-MIN   | 0.37          | 0.58 | 0.71  | 0.88  | 1.01  | 1.14   |
| 30-MIN   | 0.52          | 0.80 | 0.98  | 1.23  | 1.40  | 1.58   |
| 1-HR     | 0.66          | 1.02 | 1.25  | 1.55  | 1.77  | 1.99   |
| 2-HR     | 0.99          | 1.53 | 1.88  | 2.34  | 2.67  | 3.00   |
| 3-HR     | 1.30          | 2.01 | 2.47  | 3.08  | 3.53  | 3.96   |
| 6-HR     | 2.03          | 3.15 | 3.89  | 4.82  | 5.52  | 6.20   |
| 12-HR    | 3.04          | 5.01 | 6.28  | 7.96  | 9.19  | 10.40  |
| 24-HR    | 4.04          | 6.87 | 8.74  | 11.10 | 12.86 | 14.60  |

- NOTES: 1. Values from NOAA Atlas 2 data, are for a site at the centroid of the watershed above Hansen Dam at latitude 34°19'N, longitude 118°11'W, elevation 3900 feet.  
 2. All values are for annual series.

**HANSEN DAM**  
**TUJUNGA WASH, CALIFORNIA**

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**PRECIPITATION FREQUENCY VALUES**  
**FOR HANSEN WATERSHED**

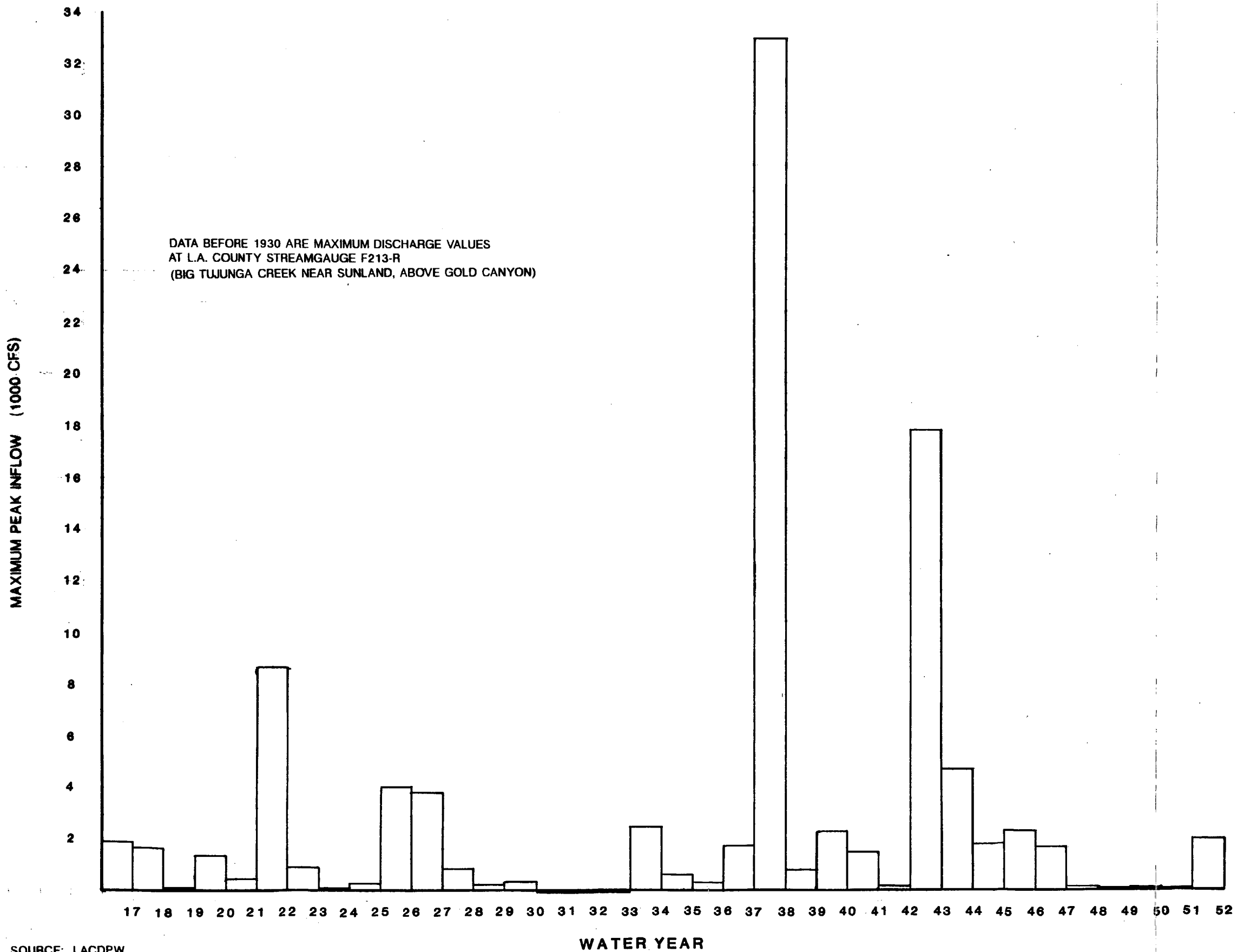
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**U.S. ARMY CORPS OF ENGINEERS**  
**LOS ANGELES DISTRICT**

ANNUAL MAXIMUM INFLOW, OUTFLOW, AND STORAGE OF WATER AT HANSEN DAM

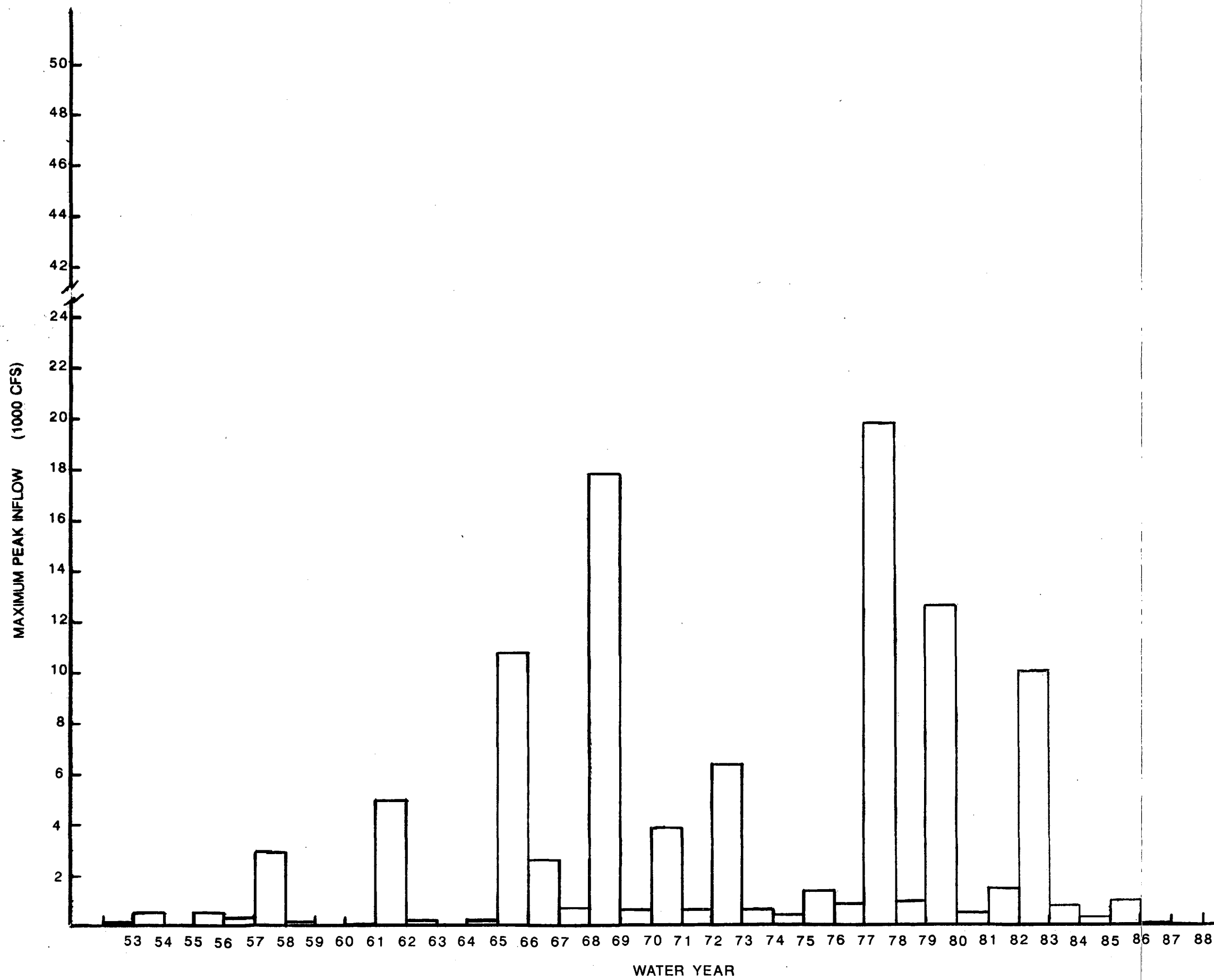
| Water Year | Peak Inflow (cfs) | Date   | Peak Outflow (cfs) | Date   | Maximum                             | Max.            | Date   | Annual Inflow (ac-ft) |
|------------|-------------------|--------|--------------------|--------|-------------------------------------|-----------------|--------|-----------------------|
|            |                   |        |                    |        | Water Surface Elevation (ft., NGVD) | Storage (ac-ft) |        |                       |
| 1941-42    | 678               | 28 Dec | 58                 | 31 Dec | 992.40                              | 2126            | 30 Dec | 9870                  |
| 1942-43    | 18860             | 23 Jan | 1640               | 25 Jan | 1036.47                             | 18743           | 24 Jan | 75930                 |
| 1943-44    | 6600              | 22 Feb | 1020               | 24 Feb | 1022.32                             | 11622           | 23 Feb | 59720                 |
| 1944-45    | 1320              | 2 Feb  | 707                | 5 Feb  | 1004.02                             | 4807            | 1 Oct  | 14310                 |
| 1945-46    | 1200              | 30 Mar | 610                | 23 Dec | 1010.62                             | 6876            | 7 Apr  | 12206                 |
| 1946-47    | 608               | 27 Dec | 455                | 28 Dec | 996.67                              | 2934            | 27 Dec | 17160                 |
| 1947-48    | 33                | 5 Feb  | 2                  | 5 Feb  | 990.40                              | 1812            | 6 Jun  | 1722                  |
| 1948-49    | 4                 | 26 Feb | 0                  |        | 986.72                              | 1275            | 1 Oct  | 93                    |
| 1949-50    | 18                | 6 Feb  | 0                  |        | 977.86                              | 415             | 4 Mar  | 250                   |
| 1950-51    | 4                 | 29 Jan | 0                  |        | 973.24                              | 132             | 1 Oct  | 34                    |
| 1951-52    | 2835              | 18 Jan | 2550               | 25 Jan | 1023.90                             | 12354           | 22 Jan | 32175                 |
| 1952-53    | 110               | 15 Nov | 3                  | 27 Apr | 999.27                              | 3541            | 9 Jan  | 1430                  |
| 1953-54    | 286               | 4 Mar  | 471                | 3 Mar  | 995.82                              | 2751            | 10 Mar | 5090                  |
| 1954-55    | 960               | 18 Jan | 2                  | 3 days | 985.79                              | 1139            | 23 Jan | 712                   |
| 1955-56    | 411               | 26 Jan | 4                  | 2 days | 993.83                              | 2364            | 1 Feb  | 2100                  |
| 1956-57    | 32                | 1 Mar  | 2                  | 12 Jan | 981.80                              | 557             | 18 Mar | 495                   |
| 1957-58    | 1327              | 4 Apr  | 1450               | 4 Apr  | 1012.54                             | 7556            | 16 Apr | 34113                 |
| 1958-59    | 339               | 16 Feb | 333                | 25 Feb | 997.51                              | 3123            | 25 Feb | 2165                  |
| 1959-60    | 13                | 11 Jan | 0                  |        | 983.52                              | 808             | 28 Aug | 330                   |
| 1960-61    | 39                | 5 Nov  | 0                  |        | 985.98                              | 1167            | 27 Nov | 486                   |
| 1961-62    | 4603              | 10 Feb | 3159               | 12 Feb | 1011.19                             | 6275            | 12 Feb | 25153                 |
| 1962-63    | 173               | 9 Feb  | 0                  |        | 988.69                              | 1219            | 14 Feb | 765                   |
| 1963-64    | 64                | 20 Jan | 0                  |        | 985.35                              | 862             | 3 Apr  | 645                   |
| 1964-65    | 146               | 9 Apr  | 0                  |        | 992.83                              | 1755            | 13 Apr | 1484                  |
| 1965-66    | 5200              | 22 Nov | 3147               | 24 Nov | 1017.54                             | 8705            | 30 Dec | 57363                 |
| 1966-67    | 3133              | 6 Dec  | 405                | 22 Dec | 1013.58                             | 7140            | 9 Dec  | 41175                 |
| 1967-68    | 1050              | 21 Nov | 305                | 22 Apr | 1007.33                             | 5014            | 23 Nov | 16581                 |
| 1968-69    | 26012             | 25 Feb | 15993              | 25 Feb | 1030.78                             | 14872           | 25 Feb | 180372                |
| 1969-70    | 1640              | 6 Nov  | 144                | 3 Mar  | 1007.32                             | 2761            | 5 Mar  | 16886                 |
| 1970-71    | 2771              | 29 Nov | 212                | 1 Mar  | 1009.36                             | 3209            | 1 Dec  | 14996                 |
| 1971-72    | 482               | 27 Dec | 275                | 29 Dec | 1004.62                             | 2239            | 29 Dec | 2273                  |
| 1972-73    | 3205              | 11 Feb | 269                | 21 Feb | 1015.34                             | 4882            | 12 Feb | 15626                 |
| 1973-74    | 1220              | 7 Jan  | 404                | 1 Apr  | 1010.48                             | 3480            | 8 Jan  | 7829                  |
| 1974-75    | 863               | 6 Mar  | 205                | 17 Mar | 1007.06                             | 2707            | 16 Mar | 6565                  |
| 1975-76    | 1549              | 1 Mar  | 213                | 19 Feb | 1006.72                             | 2638            | 19 Feb | 5222                  |
| 1976-77    | 607               | 3 Jan  | 205                | 20 Sep | 1008.35                             | 2980            | 11 May | 5635                  |
| 1977-78    | 35048             | 10 Feb | 13541              | 10 Feb | 1023.90                             | 8211            | 10 Feb | 163185                |
| 1978-79    | 1784              | 27 Mar | 1481               | 21 Feb | 1016.64                             | 2931            | 29 Mar | 55429                 |
| 1979-80    | 11346             | 16 Feb | 5025               | 17 Feb | 1025.30                             | 5950            | 17 Feb | 115809                |
| 1980-81    | 378               | 29 Jan | 372                | 29 Jan | 998.99                              | 390             | 4 Mar  | 10054                 |
| 1981-82    | 5026              | 17 Mar | 3981               | 17 Mar | 1010.60                             | 1724            | 18 Mar | 39755                 |
| 1982-83    | 27901             | 1 Mar  | 18104              | 2 Mar  | 1039.70                             | 13261           | 2 Mar  | 182946                |
| 1983-84    | 1187              | 28 Dec | 397                | 5 Oct  | 1012.80                             | 1680            | 27 Dec | 21923                 |
| 1984-85    | 1882              | 19 Dec | 1084               | 20 Dec | 1006.20                             | 802             | 20 Dec | 22583                 |
| 1985-86    | 1473              | 30 Jan | 1212               | 25 Feb | 1008.40                             | 1050            | 17 Feb | 22432                 |

HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA  
 ANNUAL MAXIMUM INFLOW,  
 OUTFLOW, AND STORAGE OF  
 WATER AT HANSEN DAM  
 U. S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT



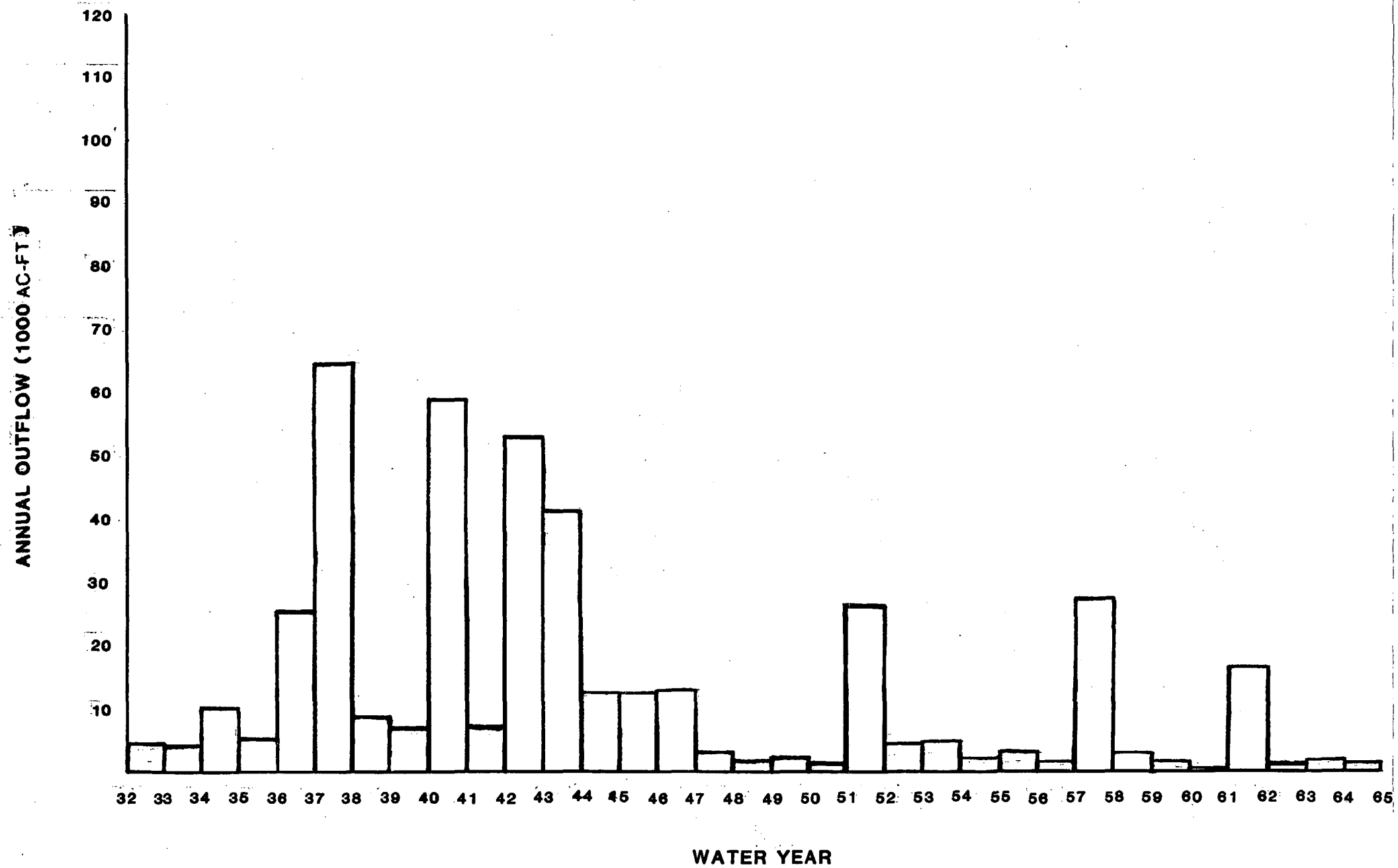
SOURCE: LACDPW

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| <b>HANSEN DAM</b><br><b>TUJUNGA WASH, CALIFORNIA</b>             |
| MAXIMUM PEAK INFLOW<br>BIG TUJUNGA DAM (1917-1952)               |
| <b>US ARMY CORPS OF ENGINEERS</b><br><b>LOS ANGELES DISTRICT</b> |



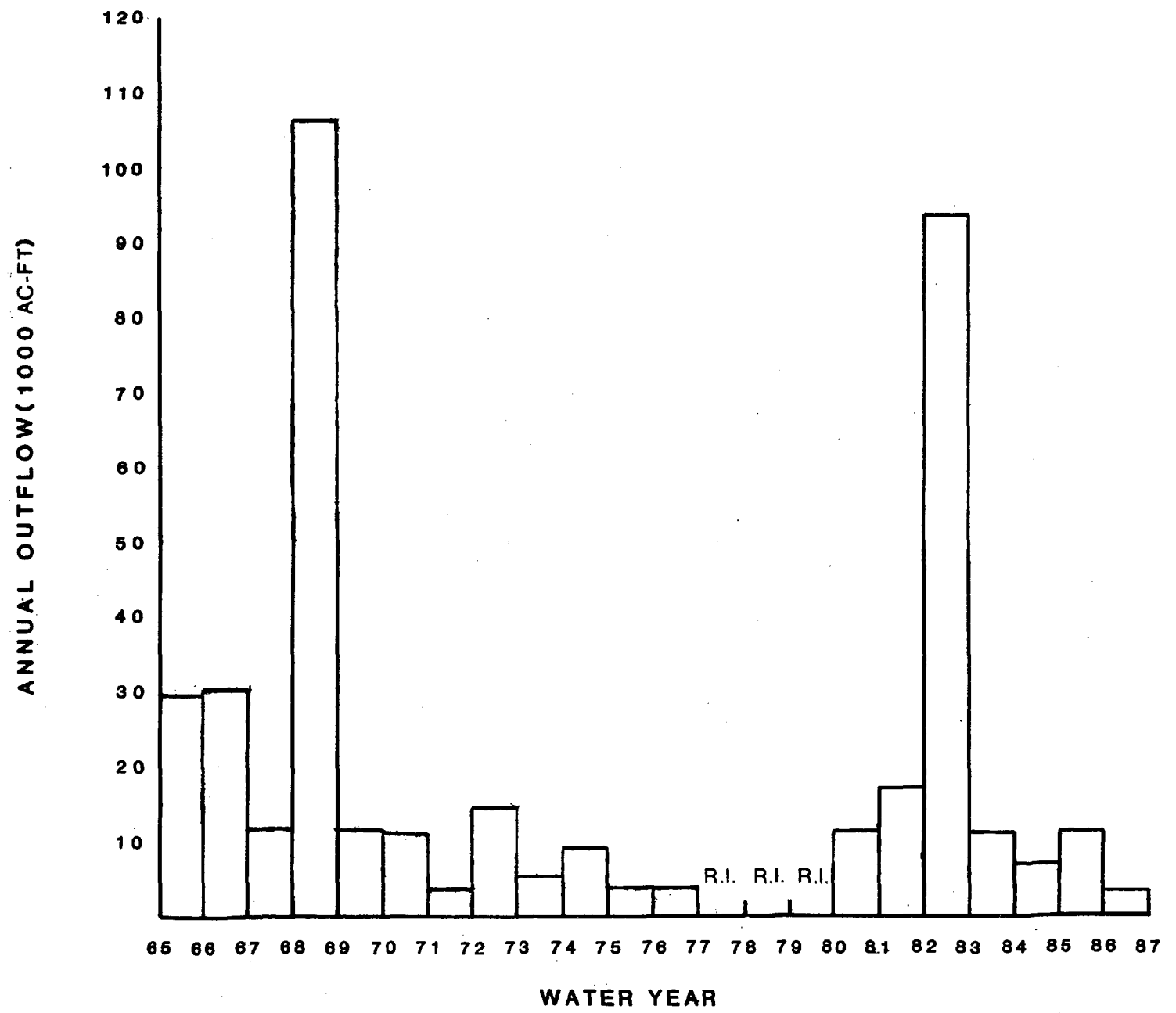
SOURCE: LACDPW

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|--|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA             |
| MAXIMUM PEAK INFLOW<br>BIG TUJUNGA DAM (1953-1987) |
| US ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT |



SOURCE: LACDPW

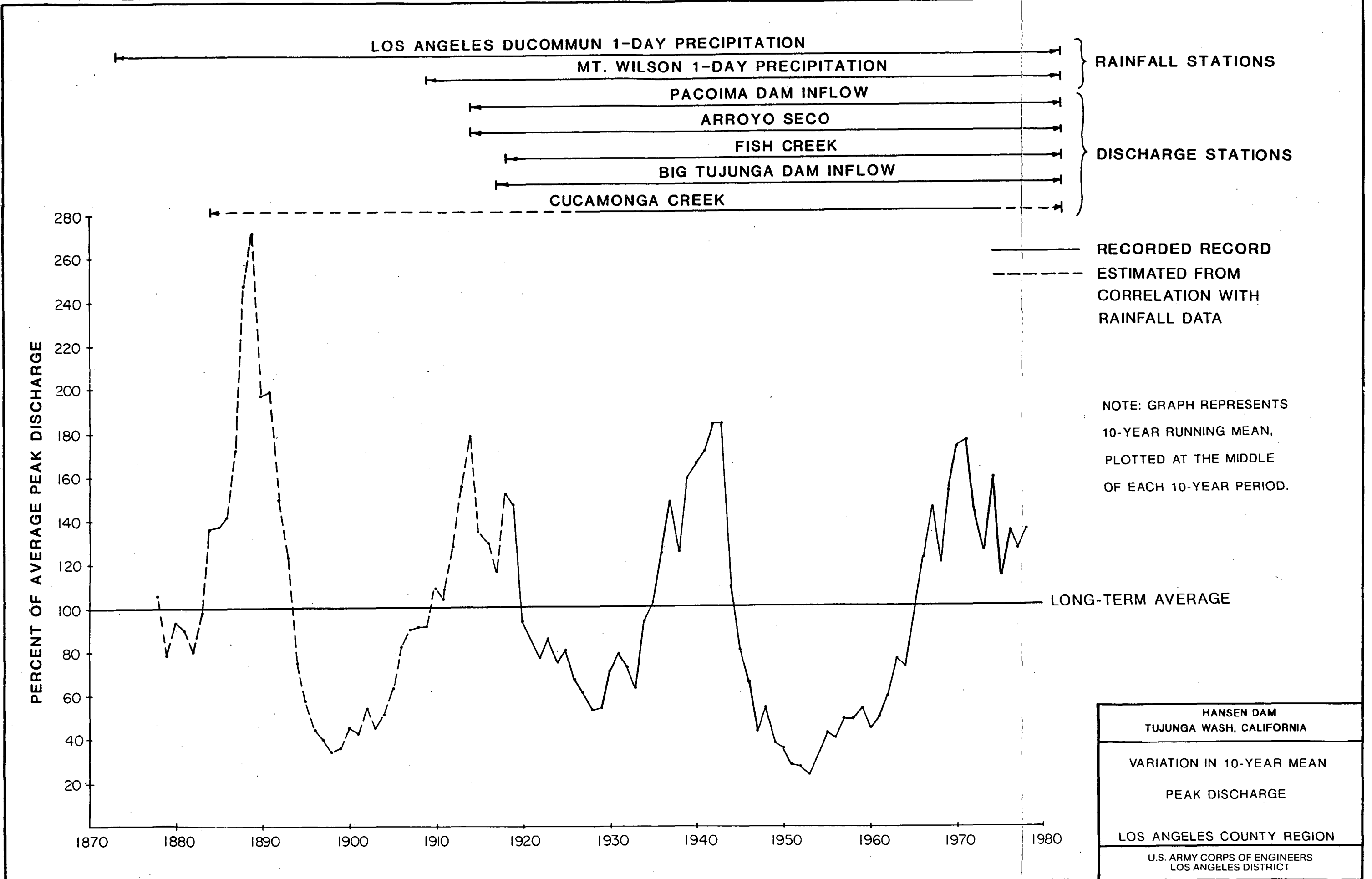
HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA  
 BIG TUJUNGA DAM ANNUAL OUTFLOW  
 (1932-1965)  
 US ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT



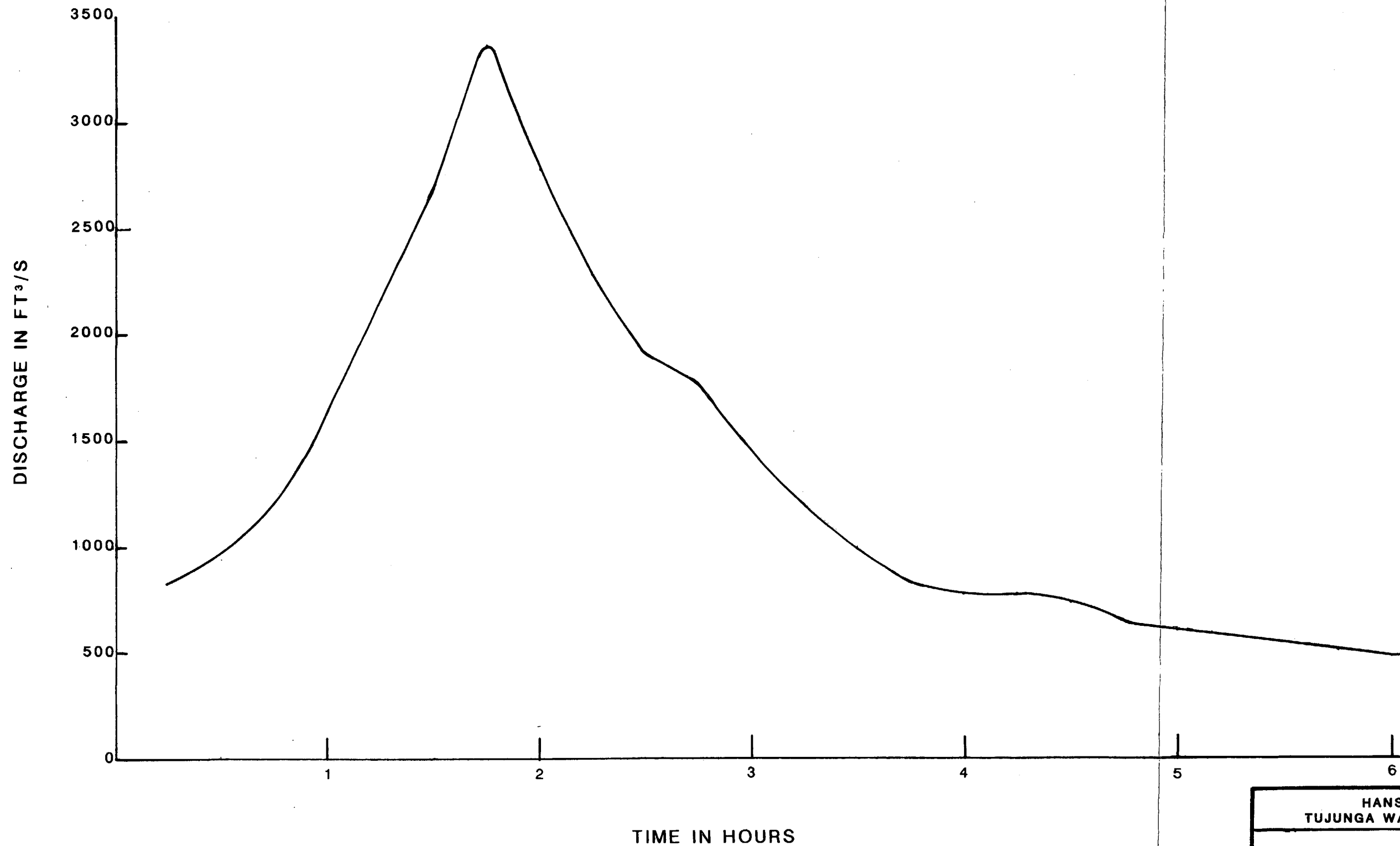
SOURCE: LACDPW

NOTE: 77-80 RECORD INCOMPLETE

|  |
|--|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA             |
| BIG TUJUNGA DAM ANNUAL OUTFLOW<br><br>(1965-1987)  |
| US ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT |



HANSEN DAM - UNIT HYDROGRAPH



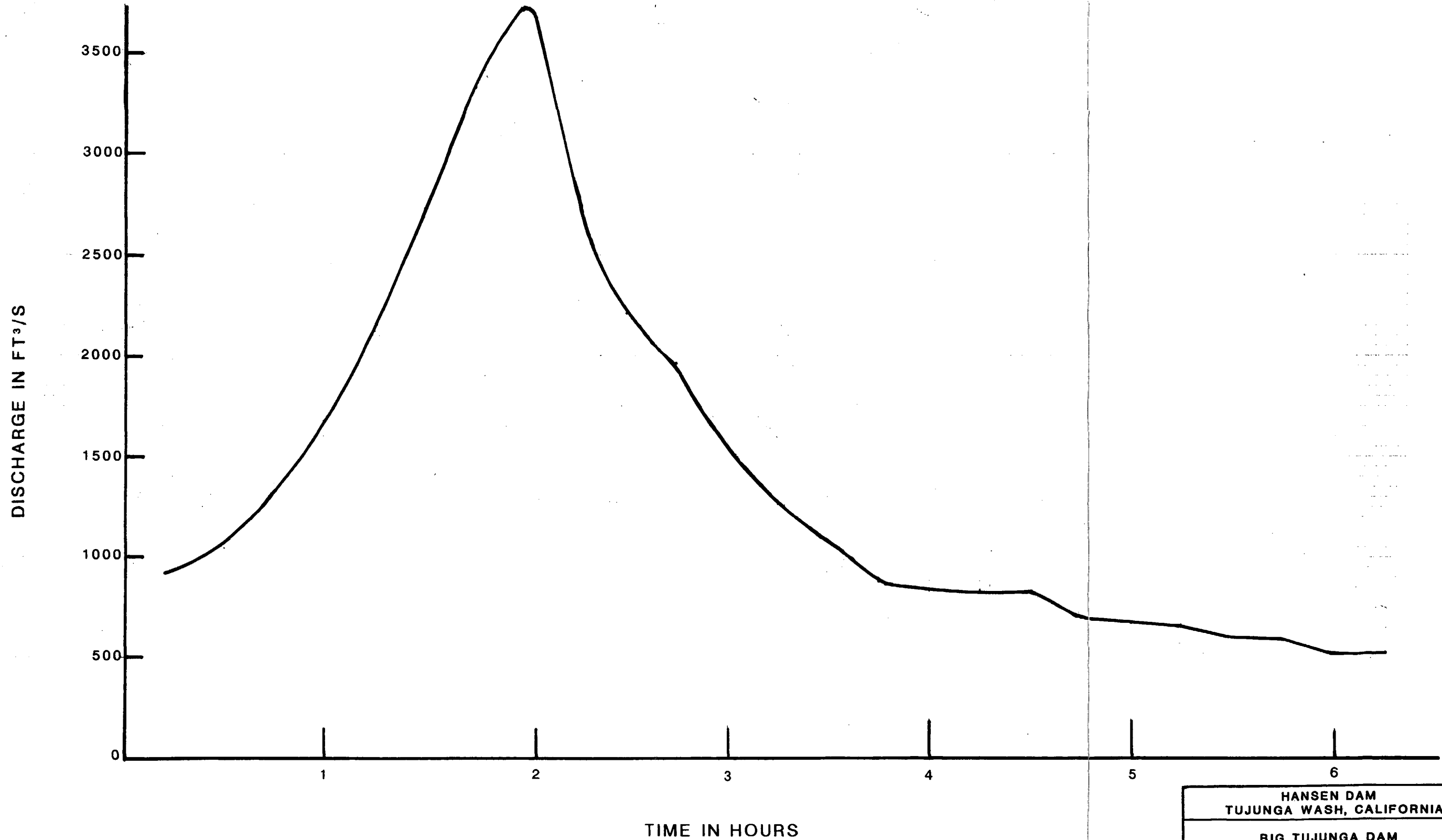
SOURCE: LACDA REVIEW PART 1 HYDROLOGY

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

BASIN UNIT HYDROGRAPH  
DRAINAGE AREA BETWEEN  
HANSEN DAM AND BIG TUJUNGA DAM

US ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

BIG TUJUNGA DAM - UNIT HYDROGRAPH



SOURCE: LACDA REVIEW PART 1 HYDROLOGY

|  |
|--|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA   |
| BIG TUJUNGA DAM<br>BASIN UNIT HYDROGRAGH<br>DRAINAGE AREA ABOVE<br>BIG TUJUNGA DAM |
| U.S. ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT                               |

ELEVATION (FT. NGVD)

720  
700  
680  
660  
640  
620  
600  
580  
560

0+00 20+00 40+00 60+00 80+00 100+00 120+00 140+00 160+00 180+00 200+00

STATION

LOS ANGELES RIVER CONFLUENCE (STA. 0 00)  
CHANNEL ELEVATION: 567.35

GAGING STATION (RIGHT WALL)

RADFORD AVE.

MOORPARK ST.

LAUREL CANYON CANYON BLVD.

RIVERSIDE DRIVE

WHITSETT AVE.

MAGNOLIA BLVD.

CHANDLER BLVD. (SOUTH)

S.P.R.R. TRACK

CHANDLER BLVD. (NORTH)

BURBANK BLVD.

COLDWATER CANYON AVE.

66" PIPELINE

OXNARD ST.

VICTORY BLVD.

INTERSECTION  
VAN OWEN ST.  
& FULTON AVE.

SHERMAN  
WAY

CONTINUED ON PLATE 4-11

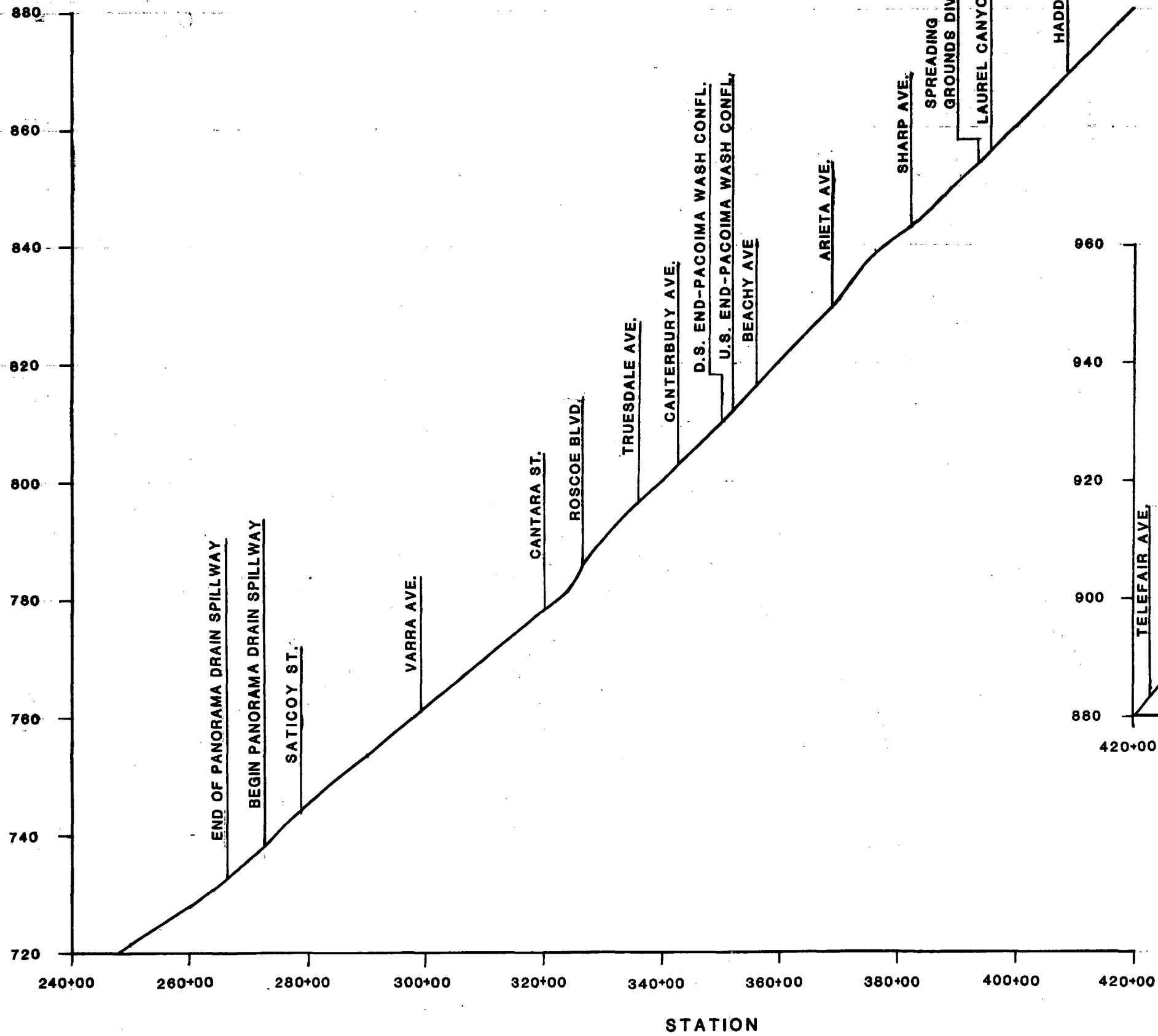
220+00 240+00 260+00

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

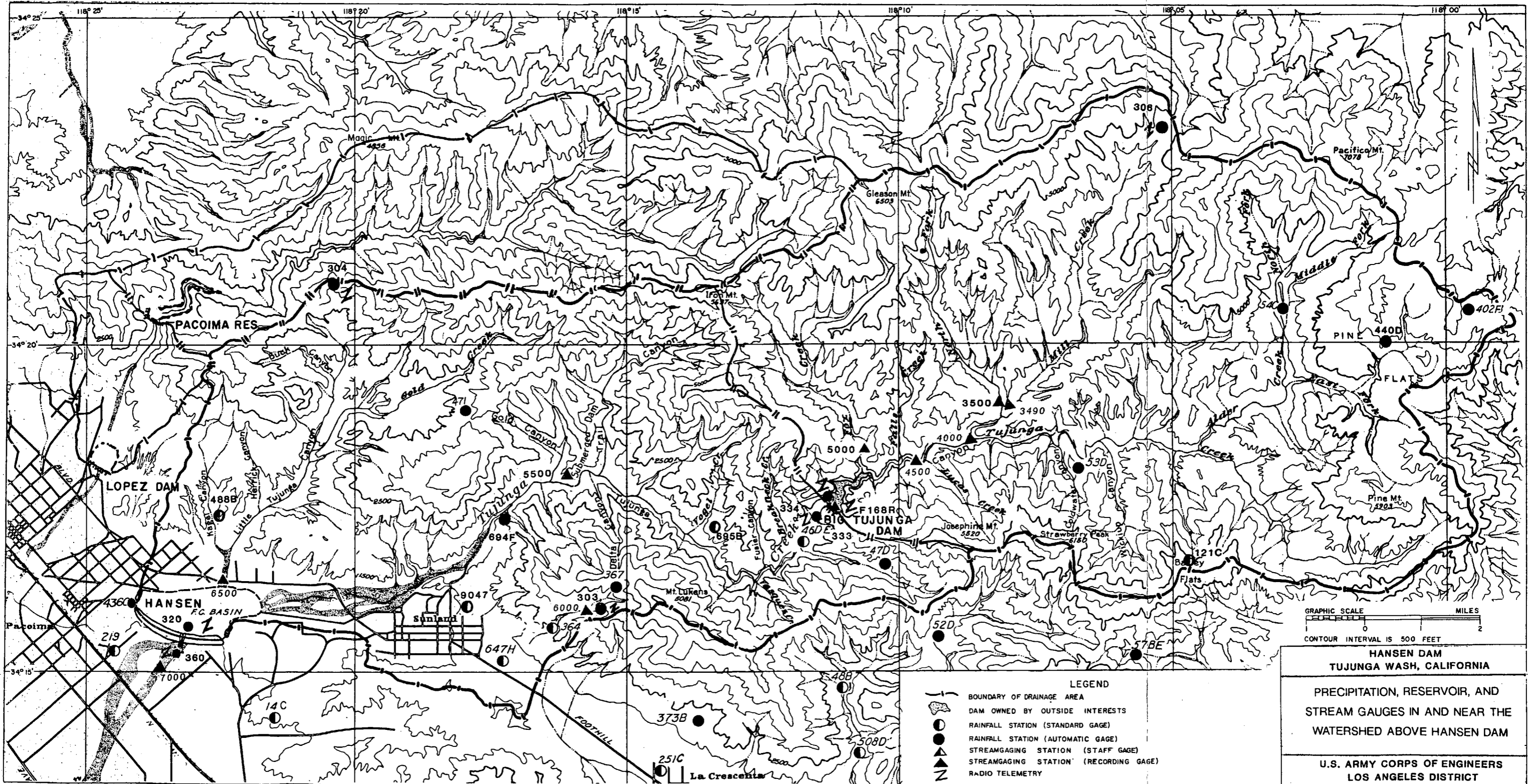
BIG TUJUNGA CHANNEL PROFILE  
STA. 0+00-STA. 260+00

US ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

ELEVATION FT (FT. NGVD)



|  |
|--|
| HANSEN DAM<br>TUJUNGA WASH, CALIFORNIA                   |
| BIG TUJUNGA CHANNEL PROFILE<br>(STA. 240+00-STA. 500+00) |
| US ARMY CORPS OF ENGINEERS<br>LOS ANGELES DISTRICT       |



SOURCE: TABLE 5-1

PLATE 5-1A

Precipitation, Reservoir, and Stream Gauges In and Near  
the Watershed Above Hansen Dam.

| Designation  | Name                                 | Latitude | Longitude | Elevation | Description                         | Designation   | Name                         | Latitude | Longitude | Elevation | Description       |
|--------------|--------------------------------------|----------|-----------|-----------|-------------------------------------|---------------|------------------------------|----------|-----------|-----------|-------------------|
| # 1 (303)*   | Haines Canyon                        | 34-16-03 | 118-15-20 | 3480      | Precip.                             | #19 (47D)**   | Clear Creek<br>City School   | 34-16-38 | 118-10-12 | 3150      | Precip.<br>Stream |
| # 2 (304)*   | Mendenhall Ridge                     | 34-20-57 | 118-18-23 | 4320      | Precip.                             | #20 (54C)**   | Loomis Ranch<br>Alder Creek  | 34-20-55 | 118-11-16 | 4325      | Precip.<br>Stream |
| # 3 (306)*   | Mill Creek Summit                    | 34-23-19 | 118-05-12 | 5400      | Precip.                             | #21 (219)**   | Pacomia Wash                 | 34-15-21 | 118-24-24 | 955       | Stream            |
| # 4 (319)*   | Hansen Dam Out                       | 34-15-23 | 118-23-13 | 960       | Stage                               | #22 (365C)**  | Mt. Lukens                   | 34-16-05 | 118-14-06 | 5040      | Stream            |
| # 5 (320)*   | Hansen Dam                           | 34-15-37 | 118-23-06 | 960       | Precip.                             | #23 (367)**   | Upper Haines Cyn             | 34-16-18 | 118-15-07 | 3440      | Precip.<br>Stream |
| # 6 (332)*   | Big Tujunga Dam Lvl                  | 34-17-40 | 118-11-14 | 2315      | Level                               | #24 (402F)**  | Ceder Springs                | 34-21-21 | 117-52-34 | 6780      | Precip.           |
| # 7 (333)*   | Big Tujunga Dam Out                  | 34-17-19 | 118-11-38 | 2315      | Stage                               | #25 (436C)**  | Hansen Dam                   | 34-16-08 | 118-23-59 | 1110      | Precip.           |
| # 8 (334)*   | Big Tujunga Dam                      | 34-17-40 | 118-11-14 | 2315      | Precip.                             | #26 (440D)**  | Chilao-USFS Camp             | 34-20-00 | 118-01-23 | 5220      | Stream            |
| # 9 (357)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Wind                                | #27 (471)**   | Little Tujunga<br>Goln Creek | 34-18-57 | 118-18-02 | 2750      | Precip.           |
| #10 (360)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Precip.                             | #28 (488B)**  | Kagel Canyon<br>Patrol Stn.  | 34-17-45 | 118-22-30 | 1450      | Stream            |
| #11 (361)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Rhum                                | #29 (647J)**  | Tujunga                      | 34-15-45 | 118-17-34 | 1685      | Stream            |
| #12 (362)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Temp.                               | #30 (694F)**  | Big Tujunga Cyn              | 34-17-22 | 118-17-17 | 1525      | Precip.           |
| #13 (363)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Solar                               | #31 (695B)**  | Tujunga Cyn<br>Vogel Flat    | 34-17-12 | 118-13-22 | 1850      | Stream            |
| #14 (364)*   | Hansen Yard                          | 34-15-22 | 118-23-13 | 950       | Pressure                            | #32 (1121C)** | Barley Flat                  | 34-16-40 | 118-04-40 | 5525      | Stream            |
| #15 (F168R)  | Tujunga Cr. below<br>Big Tujunga     |          |           |           | Punch<br>Tape                       | #33 (W9047)** | Tujunga                      | 34-16-99 | 118-17-99 | 1820      | Stream            |
| #16 (34)**   | Hansen Dam COE                       | 34-15-22 | 118-23-04 | 1090      | Wind,<br>Gauge<br>Height<br>Precip. | #34 (7000)*** | Big TJC Bl.<br>Hansen Dam    | 34-15-13 | 118-23-17 | 943       | Stream            |
| #17 (72)**   | Tujunga Wash D/S<br>Hansen Dam (COE) | X        | X         | X         | Gauge<br>Height                     |               |                              |          |           |           |                   |
| #18 (46DE)** | Big Tujunga Dam                      | 34-17-40 | 118-11-16 | 2315      | Precip.<br>Stream                   |               |                              |          |           |           |                   |

NOTE: \*LACFCD ALERT Station and Designation.  
\*\*LAD, COE Gauge and Designation.  
\*\*\*USGS Gauge and Designation.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

PRECIPITATION, RESERVOIR,  
AND STREAM GAUGES IN  
AND NEAR THE HANSEN WATERSHED

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

Hydrologic Instrumentation of Hansen Dam

| <u>Parameter</u>        | <u>Gauge Type</u>  | <u>Report Mode</u> | <u>Stored Record (period available)</u>  | <u>Comments</u>  |
|-------------------------|--|--------------------|--|--|
| Water Surface Elevation | Staff Boards   | Visual             | Flood Control Basin Operation Report SPL 19 (1941-present)   |  |
|                         | Stevens A-71 recorder                                      | Visual             | Reservoir Operation Report SPL 424 (1941-present)<br>paper strip chart (1941-present)<br>punch tape (1974-present) |  |
|                         | D.R.*  | Telemetry          | telemetry data file  |  |
| Downstream gauge height | Digital Recorder*  | Visual             | Flood Control Basin Operators Report SPL 19 (1941-pres.)<br>punch tape (1974-present)                              | USGS operates the gauge, publishes the daily record and stores the paper punch tape for USGS station 11097000                |
|                         |  | Telemetry          | telemetry data file  |  |
| Outlet Gate opening     | Gate Opening Indicator                                     | Visual             | Flood Control Basin Operators Report SPL 19 (1941-present)   |  |
|                         | Leitz Recorders  |                    |  | Leitz are operational but will eventually be replaced with Leopold & Stevens Type F recorders (chart drum recorders)         |
| Precipitation           | tipping bucket gauge connected by magnetic sensor to D.R.* | Telemetry          | Reservoir Operation Report SPL 424 (1941-present)<br>punch tape (1974-present)<br>telemetry data file              | Tipping bucket type installed in 1985, float type gauge used previously  |
|                         | Belfort recording  | None               | paper chart (1941-present)   | Data on paper charts evaluated for daily rainfall amounts and charts are then sent to NWS in Asheville, N.C. for publication |
|                         | glass raintube   | Visual             | Rainfall Record SPL 31 (1941-present)  |  |

\*Digital Recorder - A device that converts gauge motion into coded digital information and records this periodically as a pattern of punched holes in paper tape.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

HYDROLOGIC INSTRUMENTATION

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

**Methods of Reporting Hydrologic Data**

|                                      | Precipitation                              | Reservoir Water<br>Surface Elevation | Streamflow Water<br>Surface Elevation      | Gate Heights              |
|--------------------------------------|--|--------------------------------------|--|---------------------------|
| <b>Manual</b>                        | Glass Tube Pre-<br>cipitation Gauge        | Staff Gauge                          | Staff Gauge                                | Gate Height<br>Indicators |
| <b>Recording</b>                     | Precipitation<br>Digital Recorder          | Water Surface<br>Recorder            | Gauge Height<br>Digital Recorder           | Gate Height<br>Recorder   |
|                                      | Universal Recording<br>Precipitation Gauge |                                      |  |                           |
| <b>Telemetry</b>                     | Precipitation<br>Telemetry HNSN            | Water Surface<br>HNSN                | Stream Gauge<br>Telemetry TJWH             |                           |
| <b>Interrogated</b>                  | Precipitation<br>Digital Recorder          | Water Surface<br>Digital Recorder    | Water Surface<br>Gauge Height<br>Recorders |                           |
| <b>Fixed-Time<br/>Self-Reporting</b> | Telemetry<br>At Dam                        | Self-Timed<br>Interrogated           | Telemetry<br>Down Stream<br>Gauge          |                           |
| <b>Event-Reporting</b>               | Alert System                               | Alert System                         |  |                           |

**HANSEN DAM  
TUJUNGA WASH, CALIFORNIA**

**METHODS OF REPORTING  
HYDROLOGIC DATA**

**U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT**

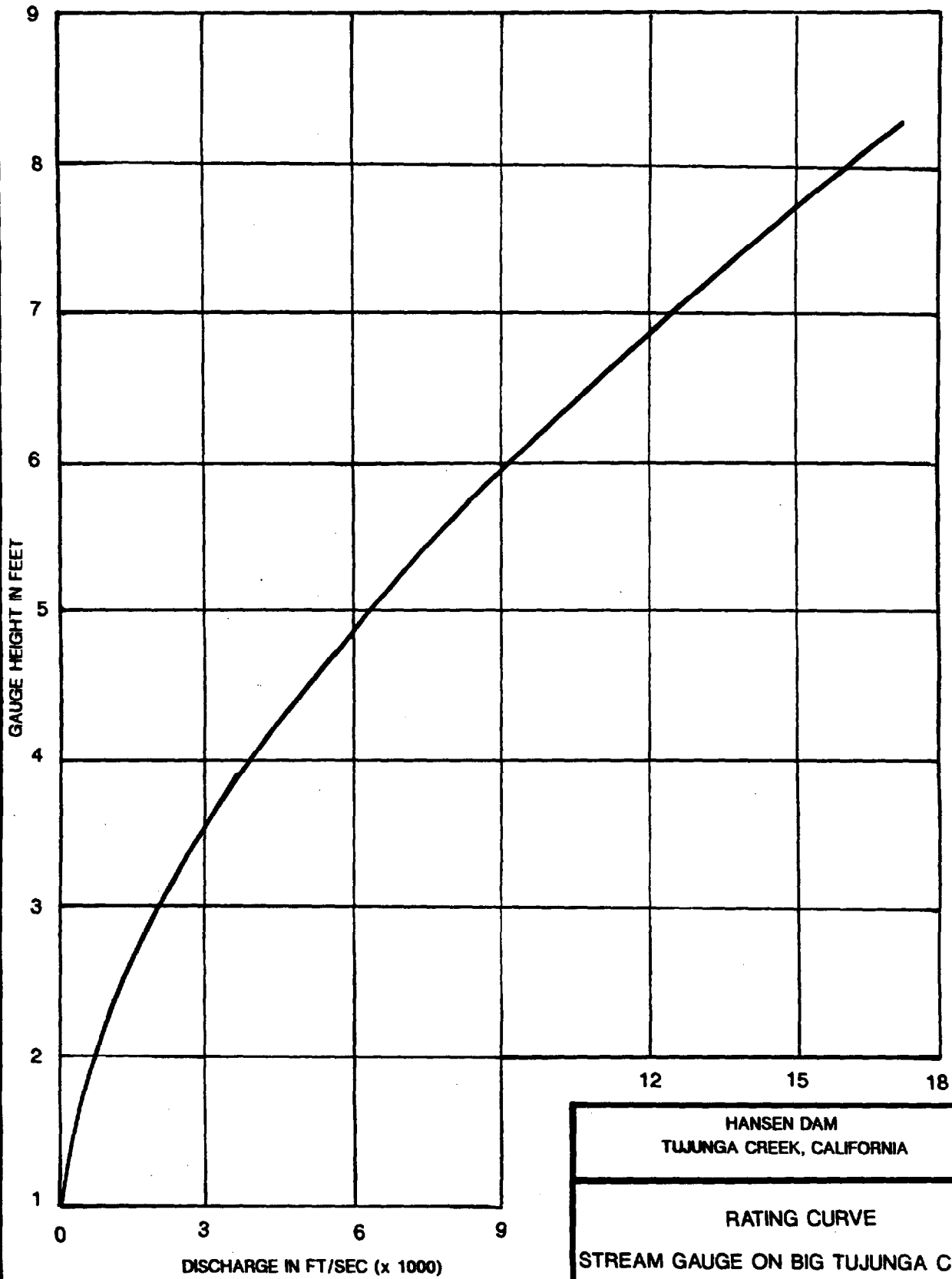
Rating Table for Big Tujunga Creek below Hansen Dam

| Gauge Height (ft) | Channel Flow (cfs) | Gauge Height (ft) | Channel Flow (cfs) |
|-------------------|--------------------|-------------------|--------------------|
| 1.00              | 0.0                | 4.70              | 5477.0             |
| 1.10              | 19.0               | 4.80              | 5728.0             |
| 1.20              | 47.0               | 4.90              | 5983.0             |
| 1.30              | 86.0               | 5.00              | 6243.0             |
| 1.40              | 138.0              | 5.10              | 6507.0             |
| 1.50              | 200.0              | 5.20              | 6776.0             |
| 1.60              | 273.2              | 5.30              | 7050.0             |
| 1.70              | 358.0              | 5.40              | 7328.0             |
| 1.80              | 446.9              | 5.50              | 7610.0             |
| 1.90              | 545.0              | 5.60              | 7897.0             |
| 2.00              | 646.4              | 5.70              | 8189.0             |
| 2.10              | 753.2              | 5.80              | 8484.0             |
| 2.20              | 864.5              | 5.90              | 8785.0             |
| 2.30              | 982.1              | 6.00              | 9089.0             |
| 2.40              | 1106.0             | 6.10              | 9398.0             |
| 2.50              | 1236.0             | 6.20              | 9711.0             |
| 2.60              | 1372.0             | 6.30              | 10030.0            |
| 2.70              | 1514.0             | 6.40              | 10350.0            |
| 2.80              | 1661.0             | 6.50              | 10680.0            |
| 2.90              | 1815.0             | 6.60              | 11010.0            |
| 3.00              | 1974.0             | 6.70              | 11340.0            |
| 3.10              | 2138.0             | 6.80              | 11680.0            |
| 3.20              | 2308.0             | 6.90              | 12020.0            |
| 3.30              | 2483.0             | 7.00              | 12370.0            |
| 3.40              | 2664.0             | 7.10              | 12720.0            |
| 3.50              | 2850.0             | 7.20              | 13080.0            |
| 3.60              | 3042.0             | 7.30              | 13440.0            |
| 3.70              | 3238.0             | 7.40              | 13800.0            |
| 3.80              | 3440.0             | 7.50              | 14170.0            |
| 3.90              | 3646.0             | 7.60              | 14540.0            |
| 4.00              | 3858.0             | 7.70              | 14910.0            |
| 4.10              | 4075.0             | 7.80              | 15290.0            |
| 4.20              | 4297.0             | 7.90              | 15680.0            |
| 4.30              | 4523.0             | 8.00              | 16060.0            |
| 4.40              | 4754.0             | 8.10              | 16460.0            |
| 4.50              | 4991.0             | 8.20              | 16850.0            |
| 4.60              | 5232.0             | 8.30              | 17250.0            |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

RATING TABLE FOR BIG TUJUNGA CREEK  
BELOW HANSEN DAM

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



HANSEN DAM  
 TUJUNGA CREEK, CALIFORNIA

---

RATING CURVE  
 STREAM GAUGE ON BIG TUJUNGA CREEK  
 BELOW HANSEN DAM

---

U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT

**Notification List for Hansen Dam**  
(see Orange Book for home phone numbers)

**a. At start of releases notify:**

|  |              |
|--|--------------|
| Department of Water and Power (N. Hlywd) | 818-503-1824 |
| (24 Hour)                                | 213-481-4900 |
| L.A. County Department of Public Works   | 818-458-6177 |
| Emergency Operations Center              | 818-458-5503 |
| L.A. County Emergency Operation Bureau   | 213-946-7935 |
| L.A. County Sheriff                      | 213-974-4211 |
| L.A. Police Department (Foothill)        | 818-989-8861 |
| Sewer Maintenance Robert Parrish         | 213-485-5881 |
| or Robert Watts                          | 213-485-5892 |
| or Ray Jellison                          | 213-485-5888 |

**b. At water surface elevation 1005 feet notify:**

|   |              |
|---|--------------|
| California Department of Fish and Game    | 213-590-5151 |
| Department of Parks and Recreation (L.A.) | 213-665-5188 |
| Department of P&R (Van Nuys) Tom Craig    | 818-989-8189 |
| or Martin Castille                        | 818-989-8190 |

**c. If water will reach elevation 1010 feet notify:**

|  |              |
|--|--------------|
| Sediment Removal Contractor, Bill Blomgren | 818-353-1921 |
| A.E. Schmidt                               | 818-983-0297 |
| U.S. Army Corps of Engineers               |              |
| CON-OPS Division Lowell Flannery           | 213-894-4926 |

**d. If water will reach elevation 1039 feet notify:**

|   |              |
|---|--------------|
| L.A. District Special Dam Inspection Team |              |
| Team Leader Vance Carson                  | 213-894-5533 |
| Jim Berkland                              | 213-894-4068 |
| Algis Bliudzuis                           | 213-894-6979 |

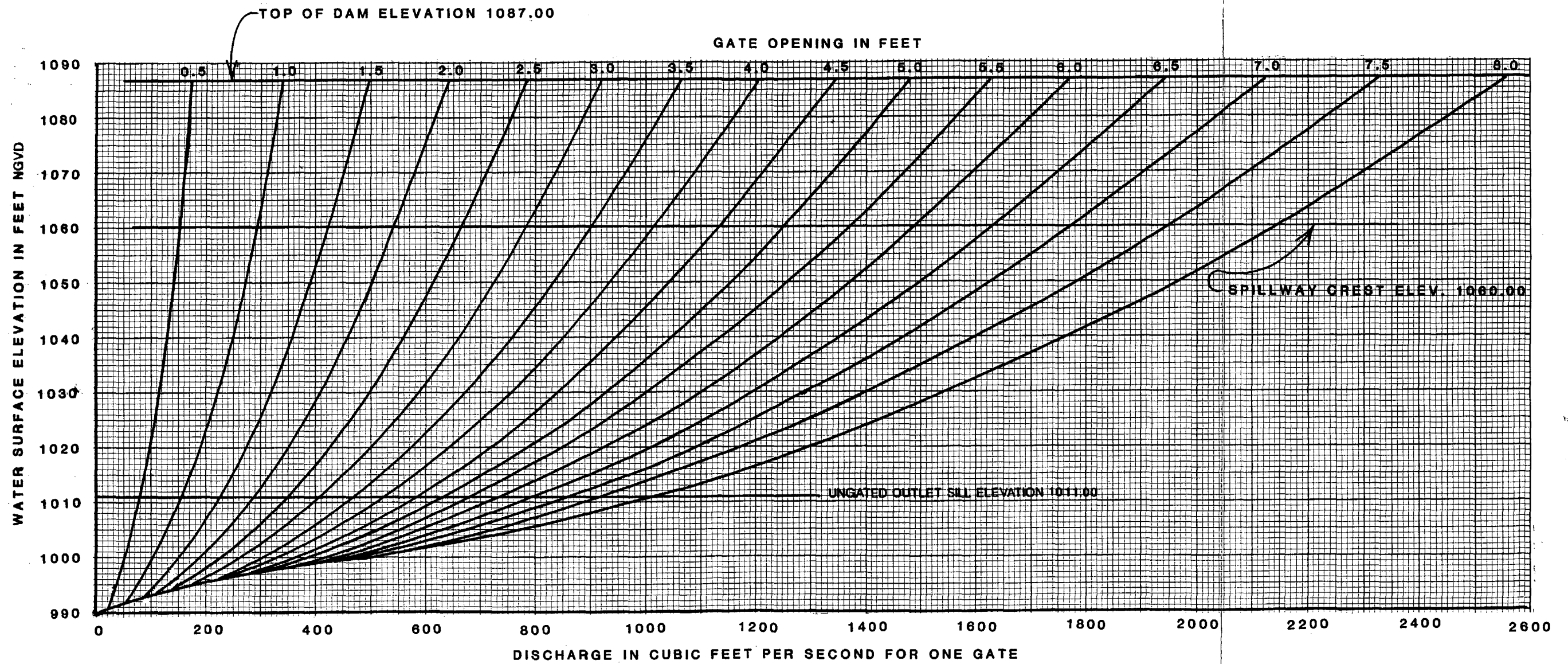
**e. If spillway flow (elev. 1067) or dam break is imminent notify:**

|   |              |
|---|--------------|
| L.A. Police Dept. (Ask for Foothill Div.)     | 818-989-8861 |
| U.S. Army Corps of Engineers, Chief Emergency |              |
| Management Branch Warren Hagstrom             | 213-894-3440 |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

NOTIFICATION LIST

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



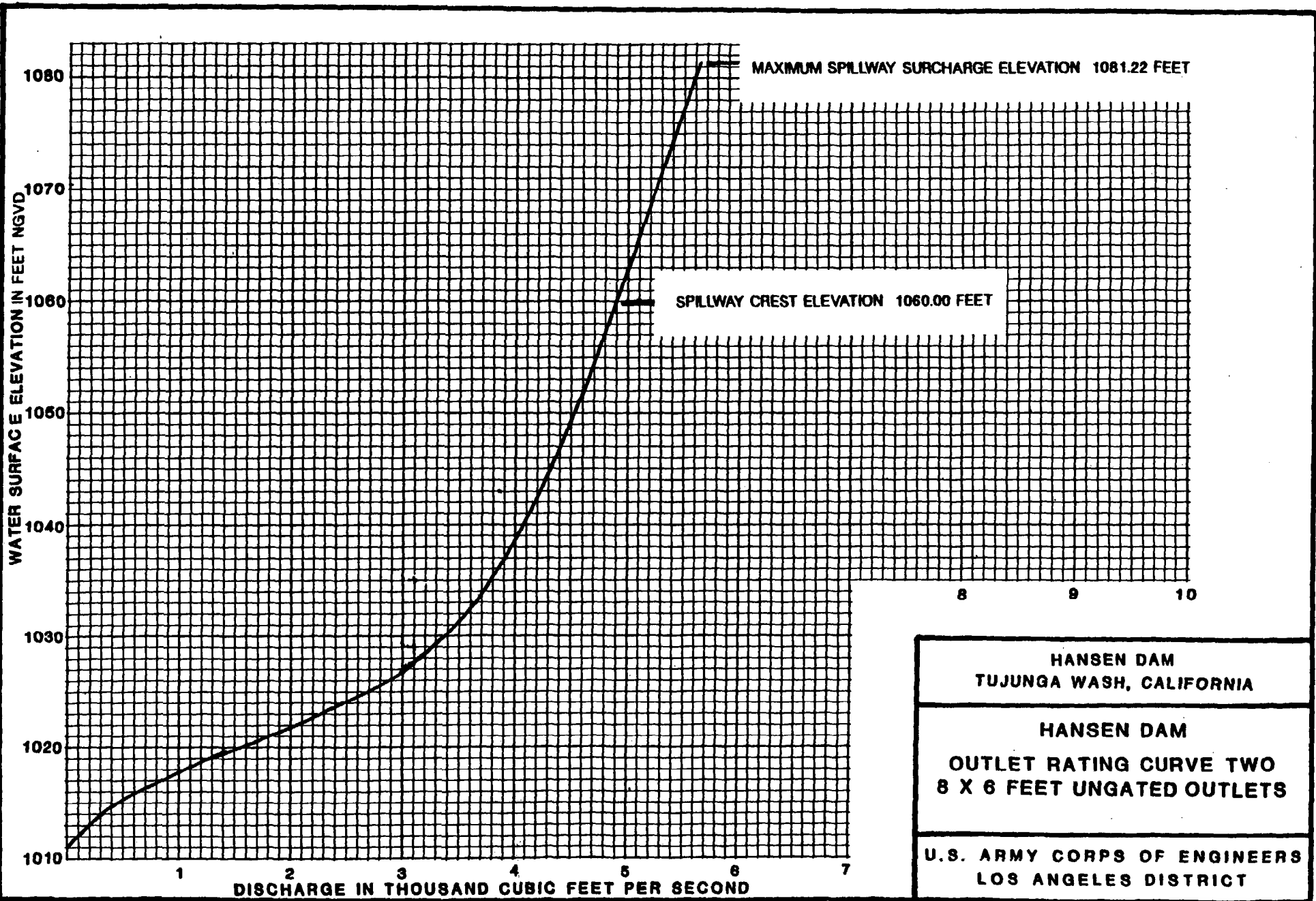
NOTE: TOTAL OUTFLOW IS THE SUM OF DISCHARGES FOR THE EIGHT GATED CONDUITS PLUS THE TWO UNGATED CONDUITS AND SPILLWAY FLOW

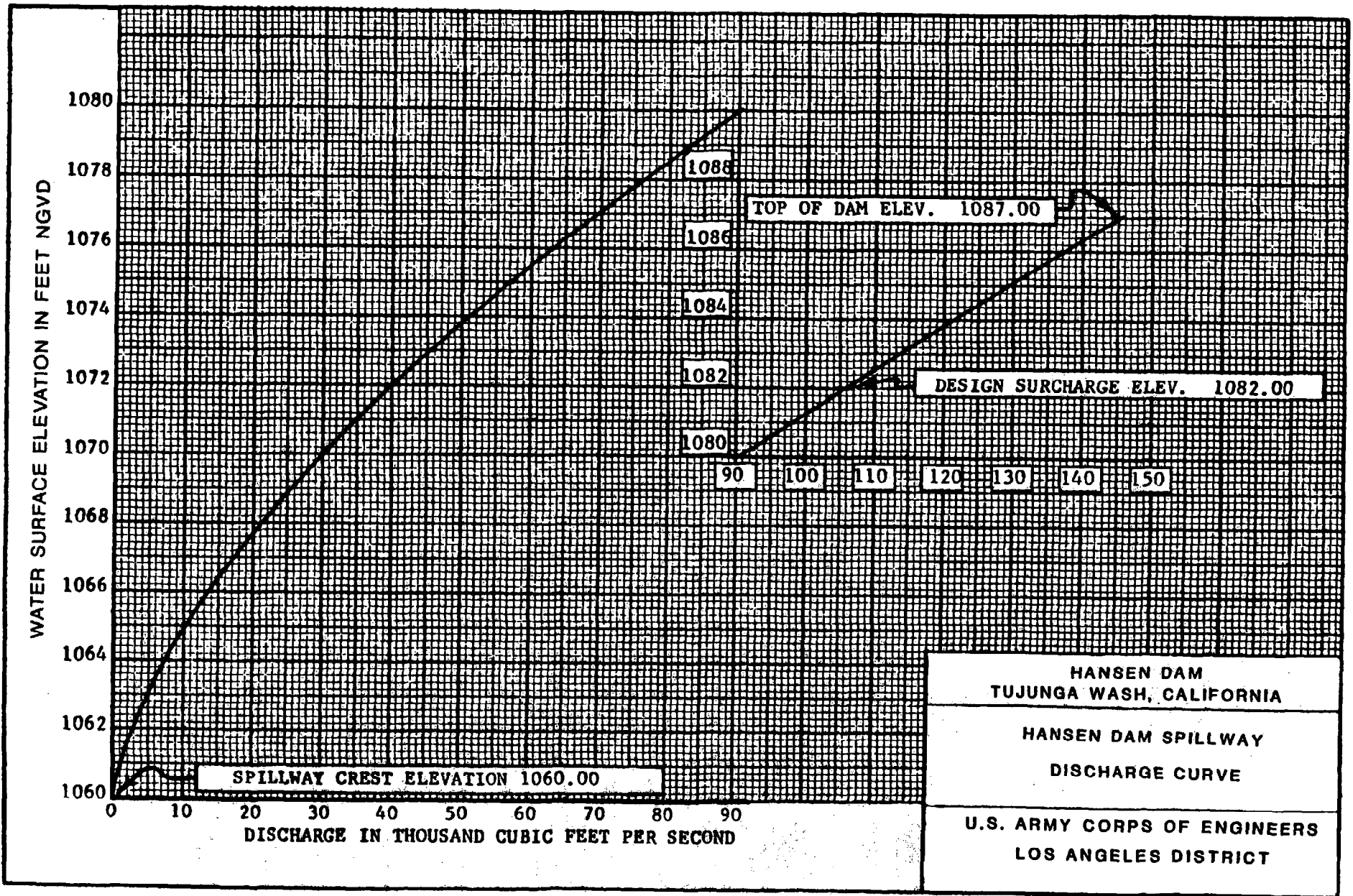
HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA

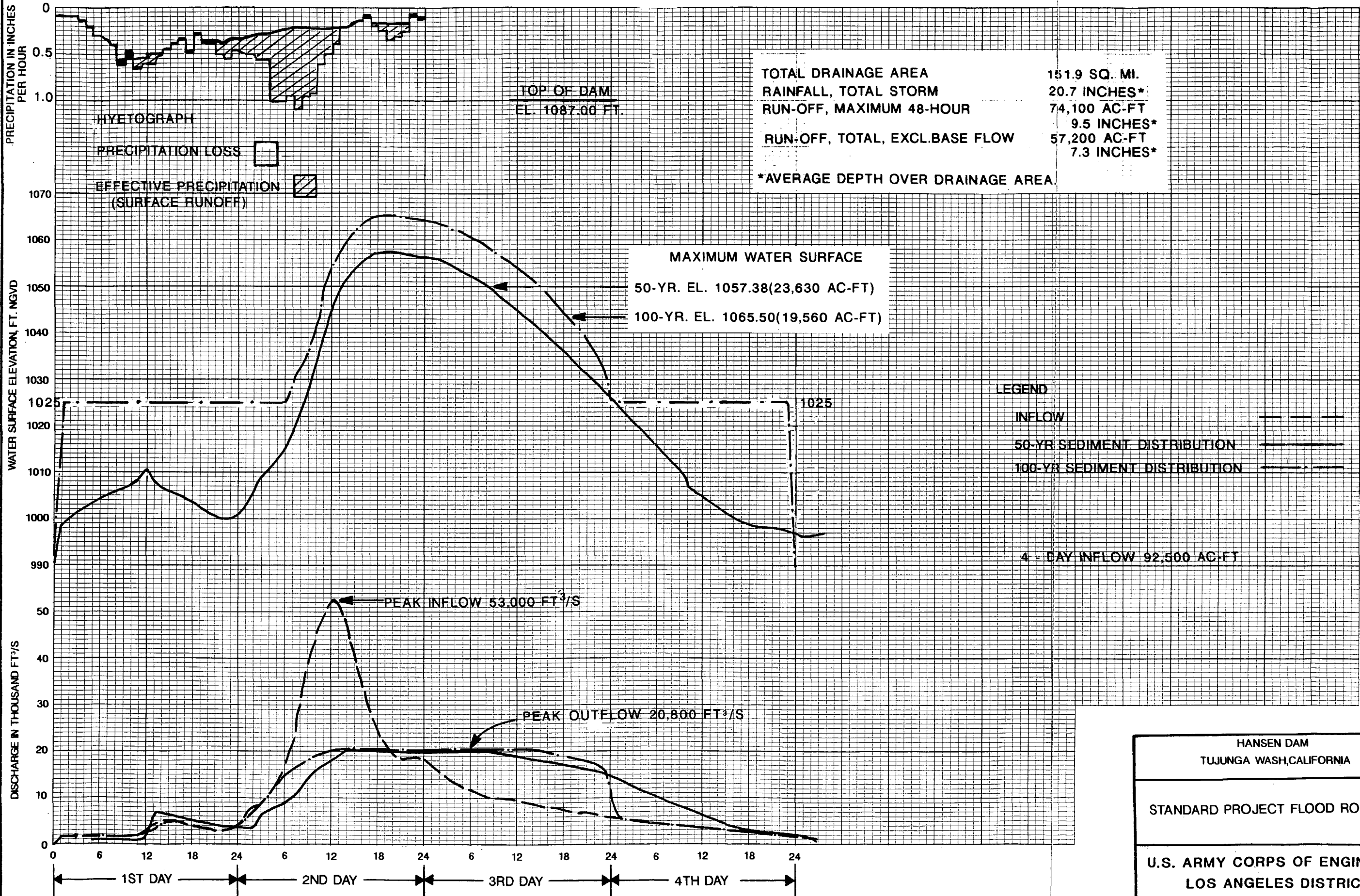
HANSEN DAM OUTLET  
 RATING CURVE

1-5X8 FEET GATED OUTLET

US ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT







|                                    |               |
|------------------------------------|---------------|
| TOTAL DRAINAGE AREA                | 151.9 SQ. MI. |
| RAINFALL, TOTAL STORM              | 20.7 INCHES*  |
| RUN-OFF, MAXIMUM 48-HOUR           | 74,100 AC-FT  |
|                                    | 9.5 INCHES*   |
| RUN-OFF, TOTAL, EXCL. BASE FLOW    | 57,200 AC-FT  |
|                                    | 7.3 INCHES*   |
| *AVERAGE DEPTH OVER DRAINAGE AREA. |               |

TOP OF DAM  
EL. 1087.00 FT.

MAXIMUM WATER SURFACE  
50-YR. EL. 1057.38(23,630 AC-FT)  
100-YR. EL. 1065.50(19,560 AC-FT)

LEGEND

|                              |       |
|------------------------------|-------|
| INFLOW                       | ---   |
| 50-YR SEDIMENT DISTRIBUTION  | —     |
| 100-YR SEDIMENT DISTRIBUTION | - - - |
| 4 - DAY INFLOW 92,500 AC-FT  |       |

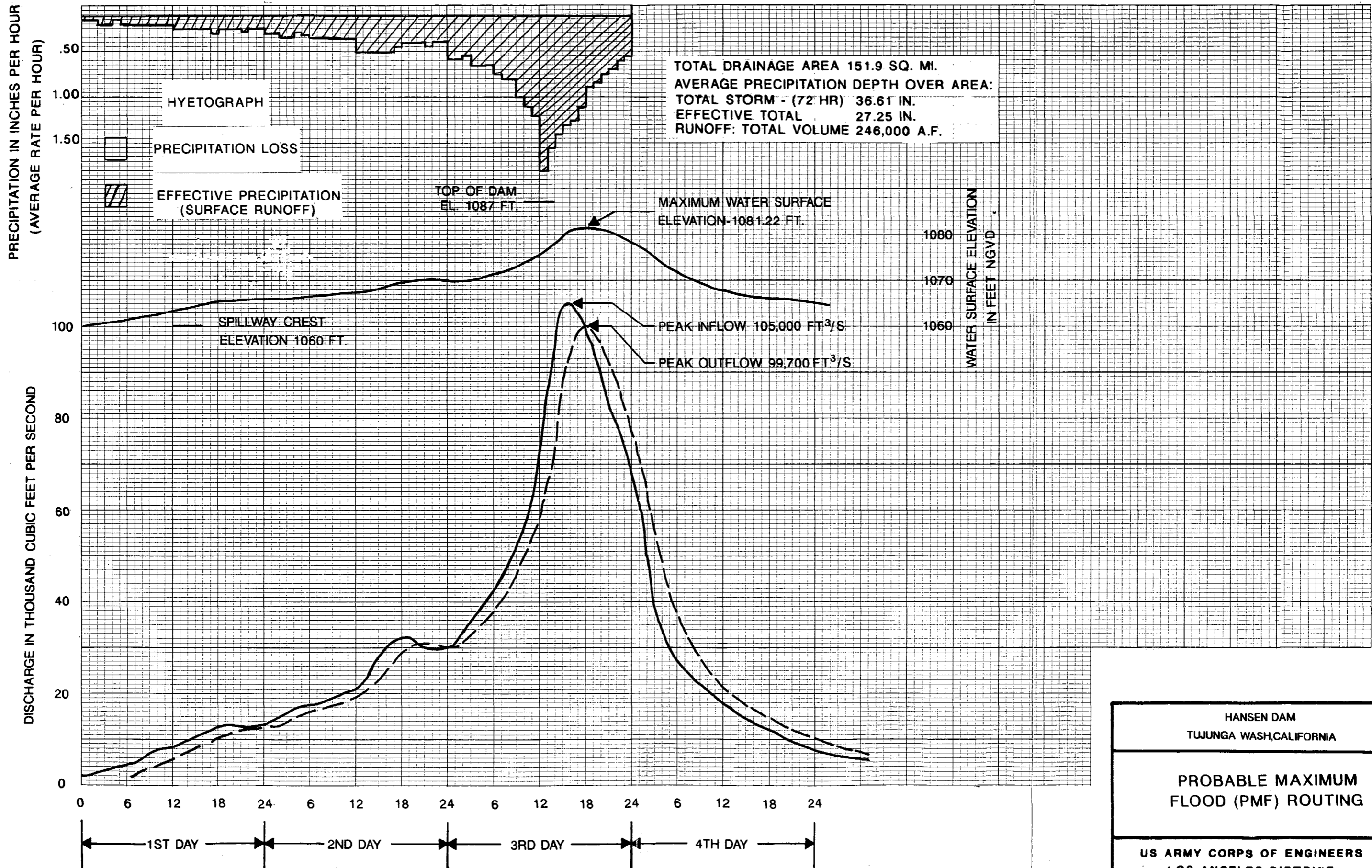
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

---

STANDARD PROJECT FLOOD ROUTING

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U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



SOURCE: INTERIM REPORT OF H & H REVIEW OF DESIGN  
 FEATURES OF EXISTING LACDA DAMS JUNE 1978

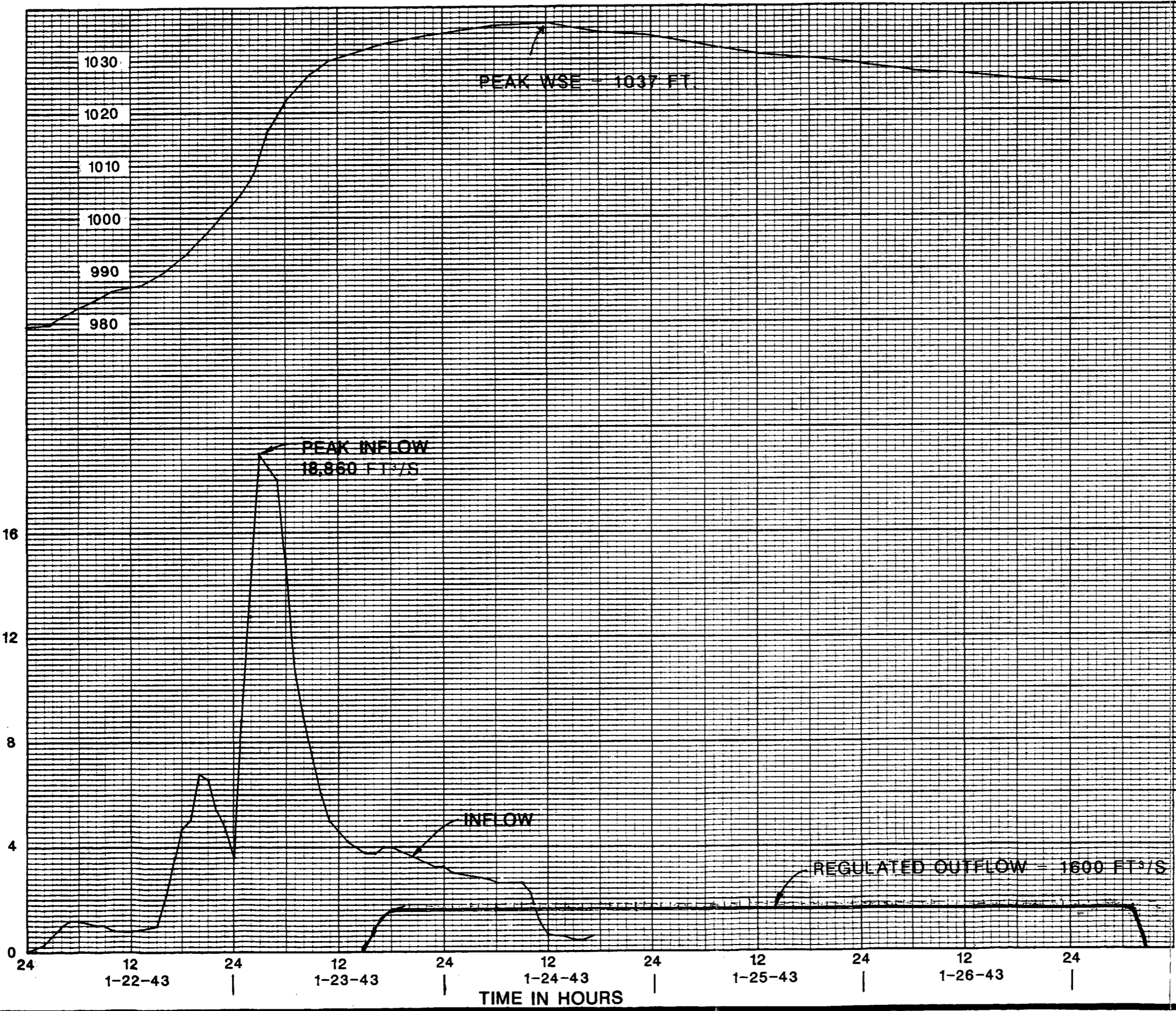
HANSEN DAM  
 TUJUNGA WASH, CALIFORNIA

PROBABLE MAXIMUM  
 FLOOD (PMF) ROUTING

US ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT

WATER SURFACE ELEVATION, IN FT NGVD

DISCHARGE IN THOUSAND FT<sup>3</sup>/S



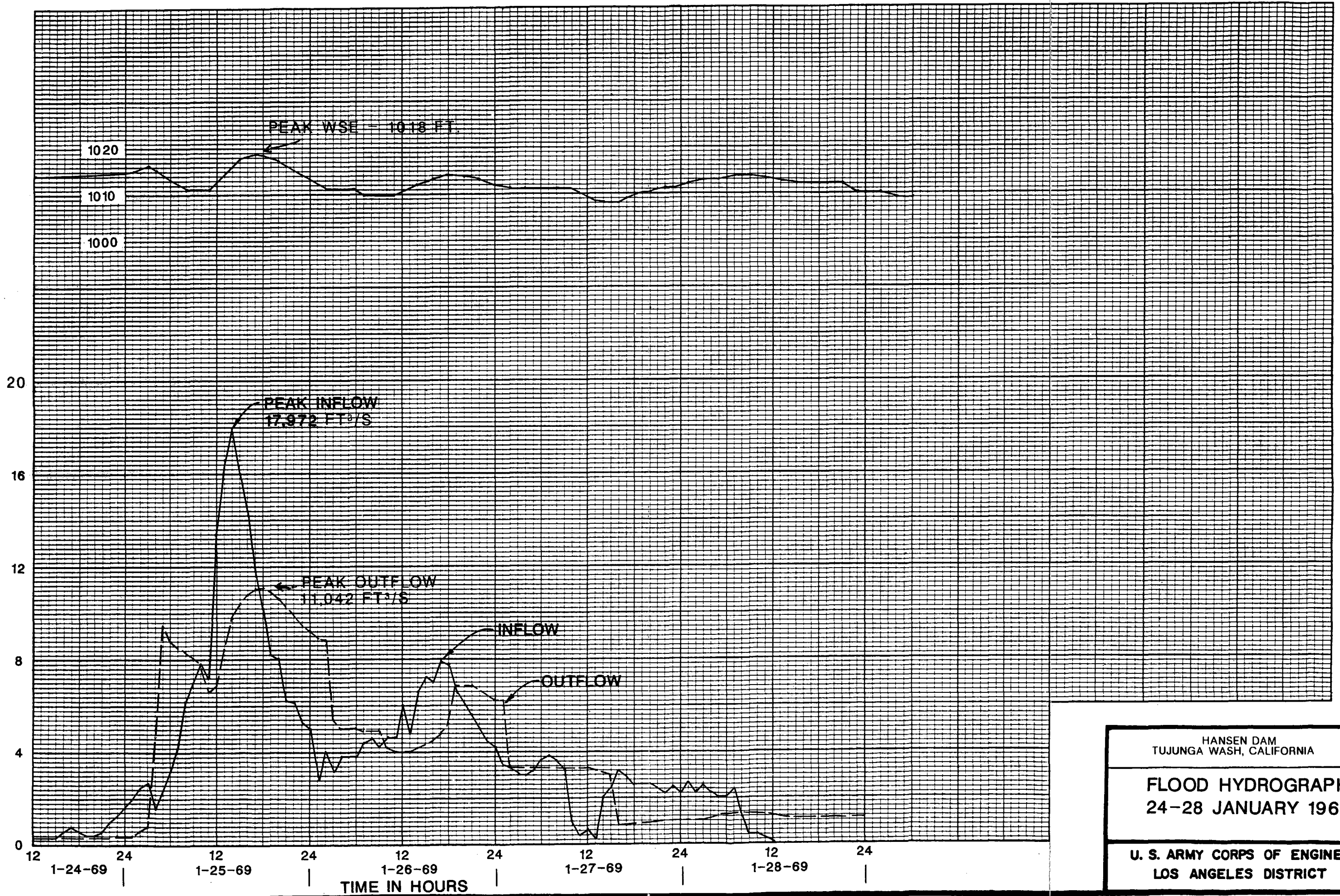
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

**FLOOD HYDROGRAPH**  
**22-26 JANUARY 1943**

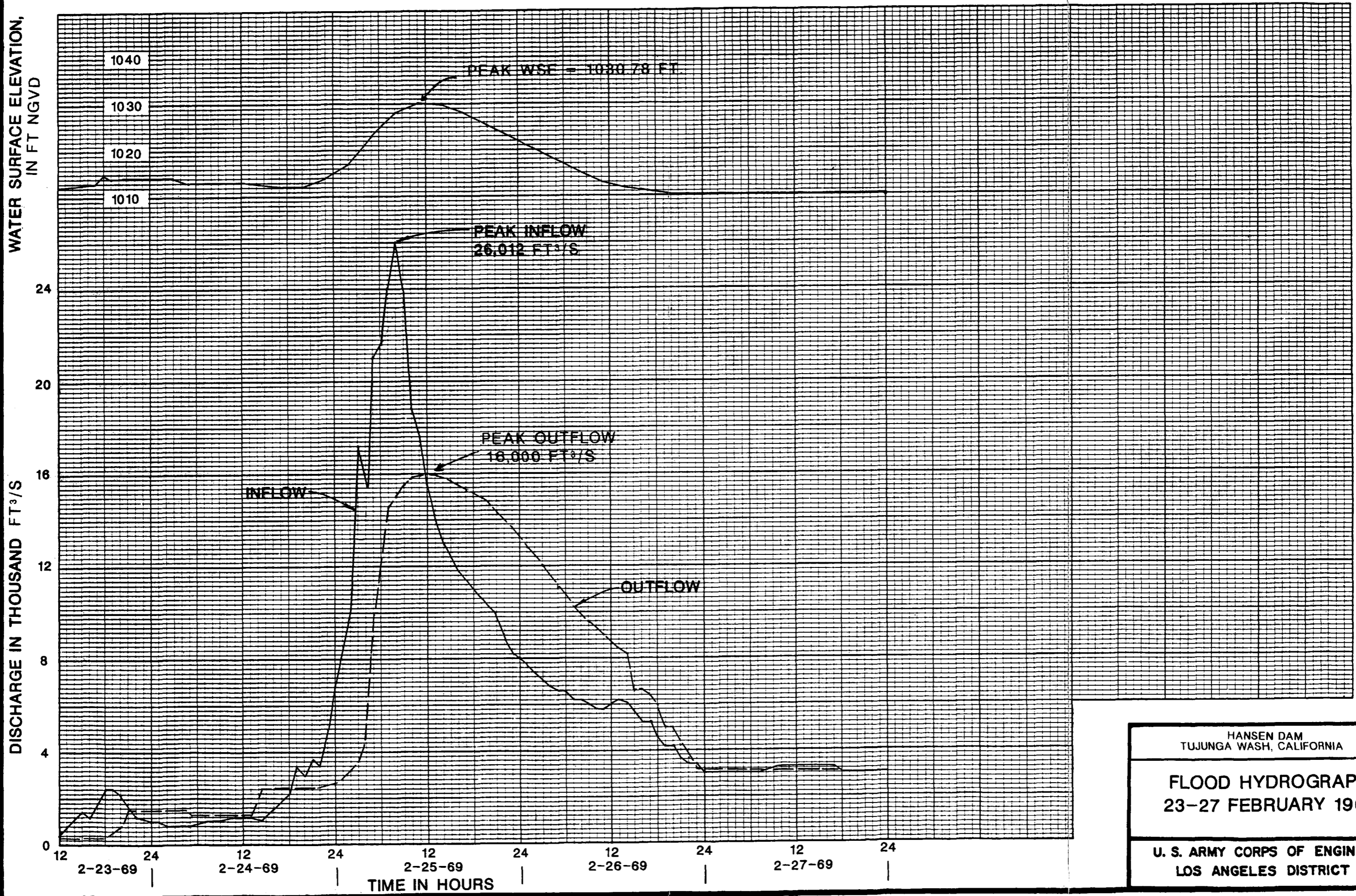
U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

WATER SURFACE ELEVATION, IN FT NGVD

DISCHARGE IN THOUSAND FT<sup>3</sup>/S



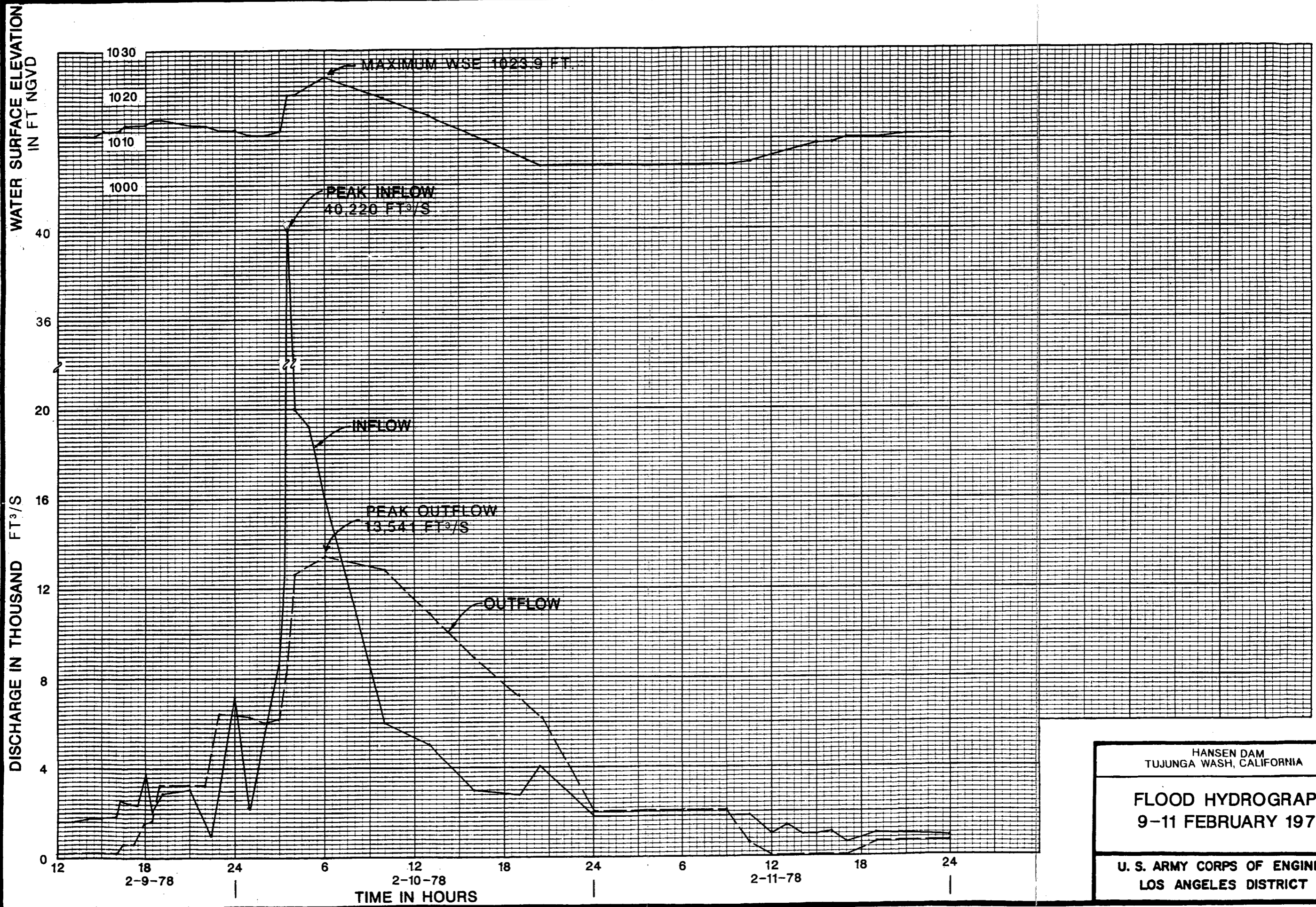
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA  
**FLOOD HYDROGRAPH**  
24-28 JANUARY 1969  
U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

**FLOOD HYDROGRAPH**  
**23-27 FEBRUARY 1969**

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



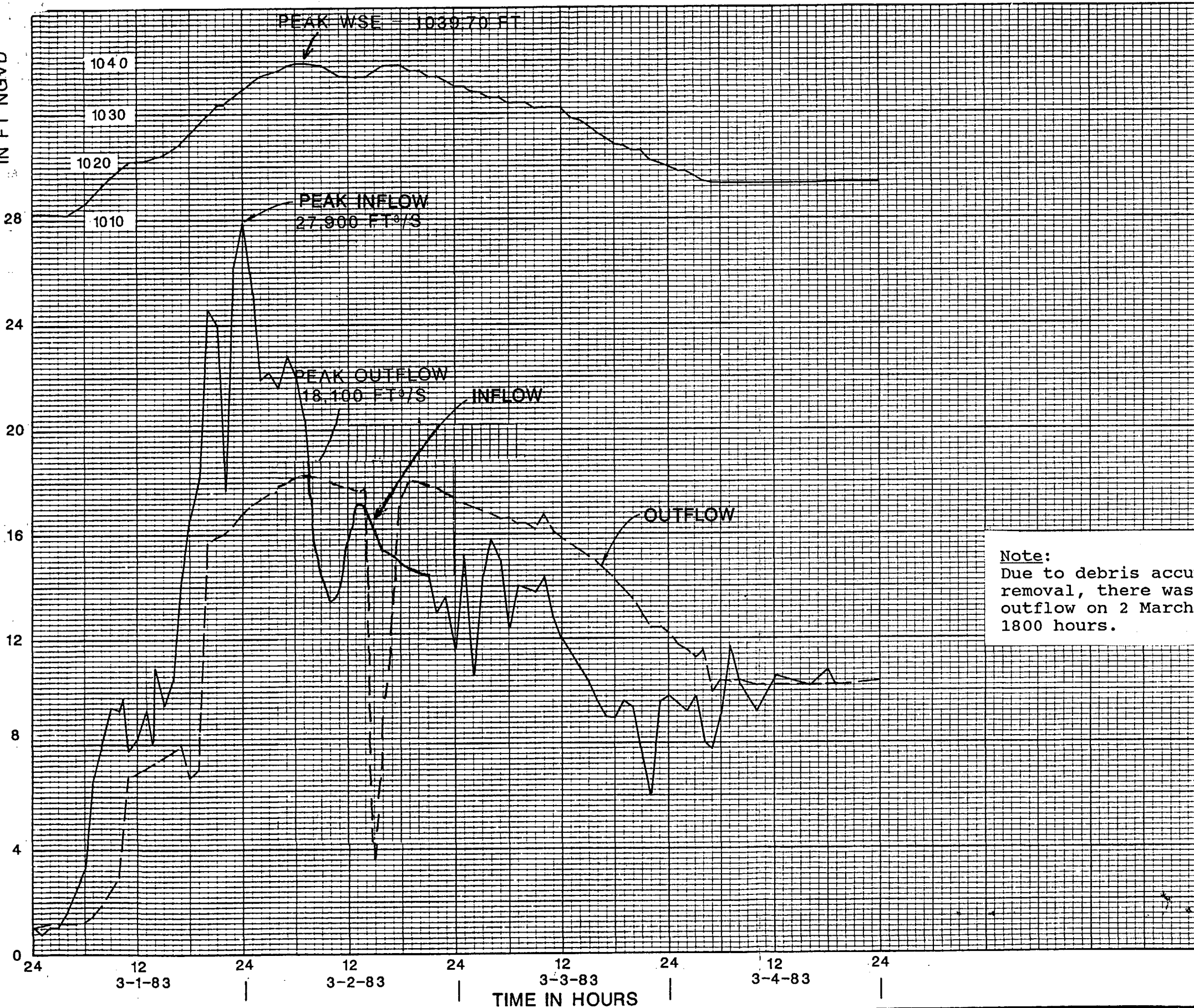
HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

FLOOD HYDROGRAPH  
9-11 FEBRUARY 1978

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

WATER SURFACE ELEVATION,  
IN FT NGVD

DISCHARGE IN THOUSAND FT<sup>3</sup>/S



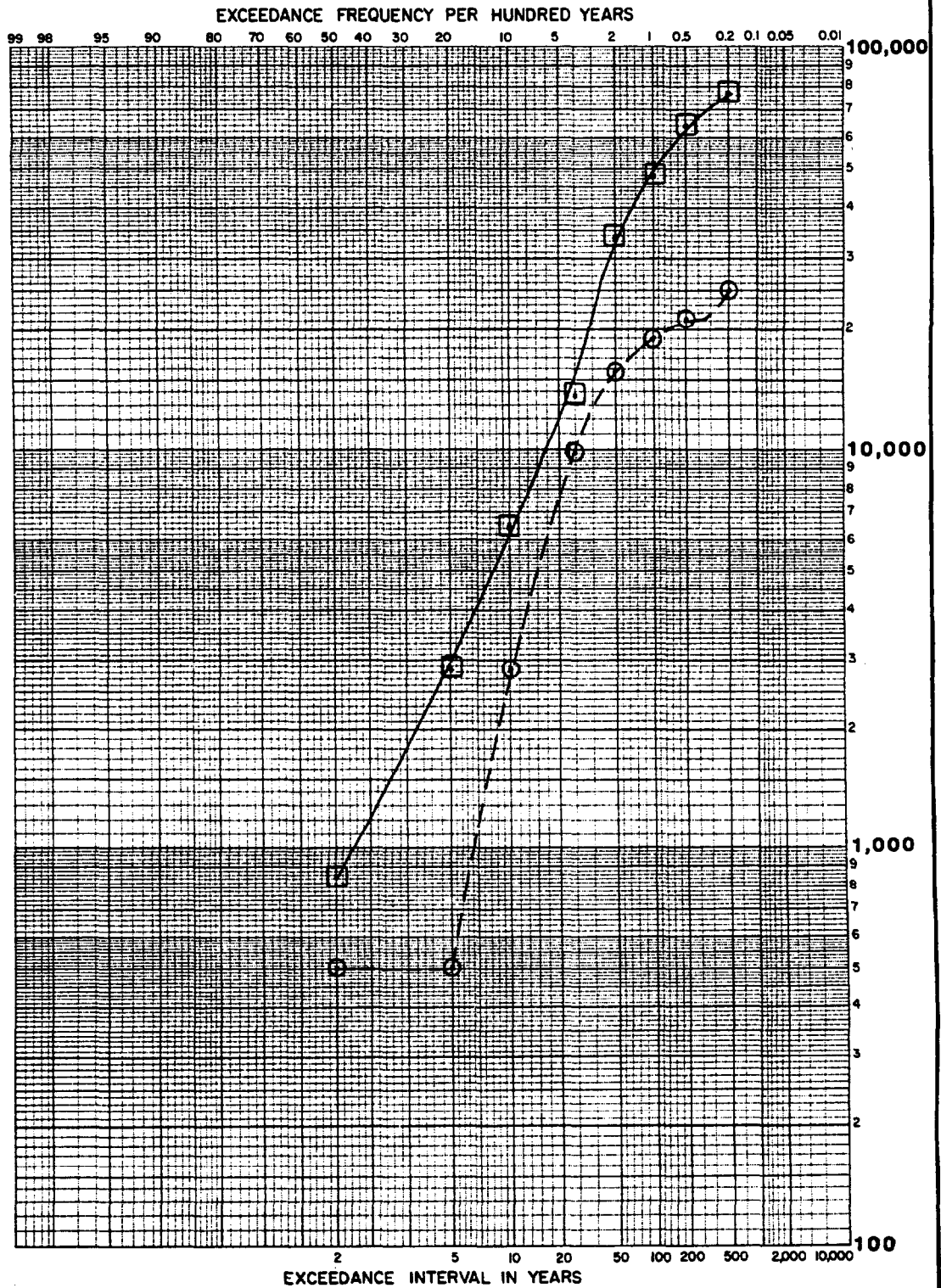
Note:  
Due to debris accumulation and subsequent removal, there was a wide fluctuation in outflow on 2 March 1983 between 1400 and 1800 hours.



HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

FLOOD HYDROGRAPH  
1-4 MARCH 1983

U. S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

DISCHARGE, IN CUBIC FEET PER SECOND



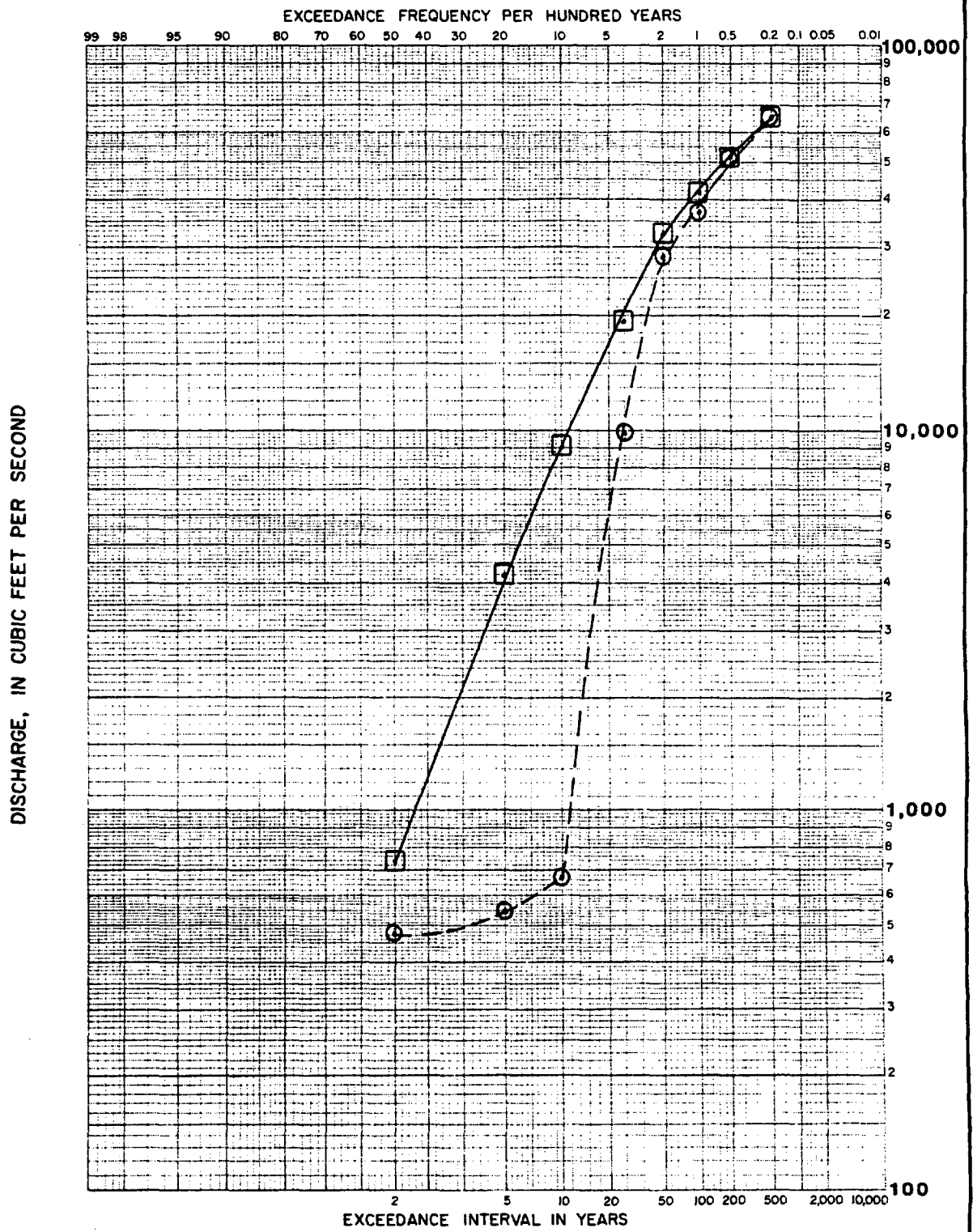
 OUTFLOW  
 INFLOW

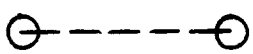

Data points derived from a rainfall runoff analysis as part of a 1989 Corps of Engineers review study. Frequency values of the data points are listed in Plate 8-10.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

DISCHARGE FREQUENCY  
CURVES FOR HANSEN DAM

U S ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT



 OUTFLOW  
 INFLOW

Data points derived from a rainfall runoff analysis as part of a 1989 Corps of Engineers review study. Frequency values of the data points are listed in Plate 8-11.

**HANSEN DAM**  
**TUJUNGA WASH, CALIFORNIA**  
**DISCHARGE FREQUENCY CURVES**  
**FOR BIG TUJUNGA DAM**  
**U S ARMY CORPS OF ENGINEERS**  
**LOS ANGELES DISTRICT**

Inflow, Outflow, and Filling Frequency Values  
for Hansen Reservoir

| Return<br>Period<br>(Years)          | 2     | 5      | 10     | 20     | 50     | 100    | 200    | 500    |
|--------------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| Peak Inflow<br>(ft <sup>3</sup> /s)  | 865   | 2,840  | 6,350  | 13,800 | 33,500 | 47,900 | 64,000 | 76,500 |
| Peak Outflow<br>(ft <sup>3</sup> /s) | 500   | 500    | 2,860  | 9,840  | 15,800 | 18,900 | 21,100 | 25,000 |
| Peak Eleva-<br>tion<br>(feet, NGVD)  | 999.4 | 1009.7 | 1010.5 | 1015.6 | 1030.3 | 1043.7 | 1054.2 | 1066.0 |

Note: These values, representing 1980 watershed conditions, were obtained from the peak inflow and outflow analysis of Plate 8-8 and from the frequency filling curve of Plate 8-12. The curves were drawn as best-fit lines through data points derived from a rainfall-runoff analysis as part of a 1989 Corps of Engineers LACDA review study.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

HANSEN RESERVOIR  
INFLOW, OUTFLOW, AND  
FILLING FREQUENCY VALUES

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

Inflow, Outflow, and Filling Frequency Values  
for Big Tujunga Reservoir

| Return<br>Period<br>(Years)          | 2      | 5      | 10     | 20     | 50     | 100    | 200    | 500    |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Peak Inflow<br>(ft <sup>3</sup> /s)  | 730    | 4,160  | 9,050  | 19,300 | 32,200 | 41,400 | 51,700 | 65,200 |
| Peak Outflow<br>(ft <sup>3</sup> /s) | 470    | 540    | 665    | 9,820  | 28,400 | 36,300 | 51,700 | 65,200 |
| Peak Eleva-<br>tion<br>(feet, NGVD)  | 2219.7 | 2242.3 | 2281.9 | 2297.7 | 2305.5 | 2308.1 | 2308.5 | 2309.8 |

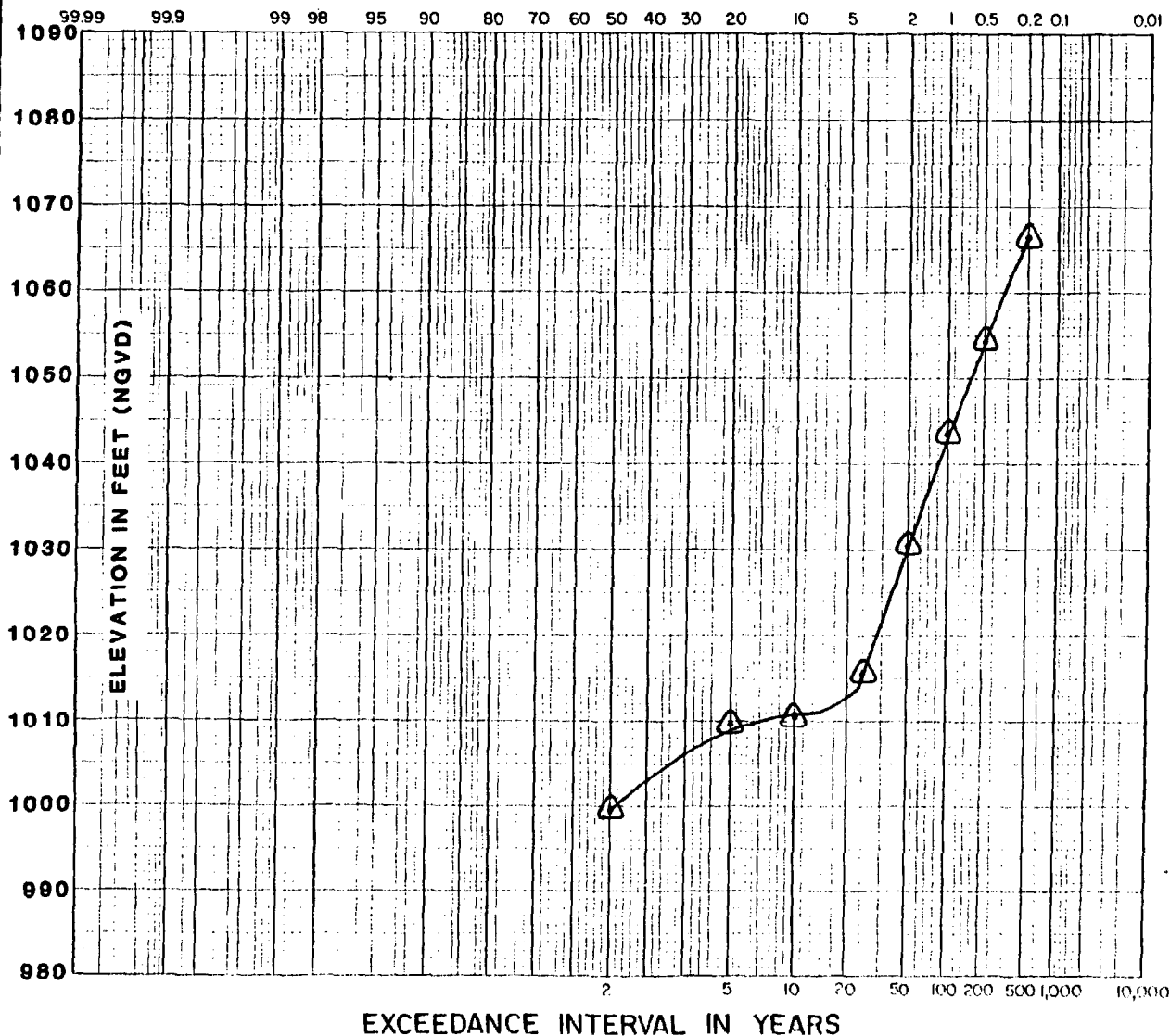
Note: These values, representing 1980 watershed conditions, were obtained from the peak inflow and outflow analysis of Plate 8-9 and from the frequency filling curve of Plate 8-13. The curves were drawn as best-fit lines through data points derived from a rainfall-runoff analysis as part of a 1989 Corps of Engineers LACDA review study.

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

BIG TUJUNGA RESERVOIR  
INFLOW, OUTFLOW, AND FILLING  
FREQUENCY VALUES

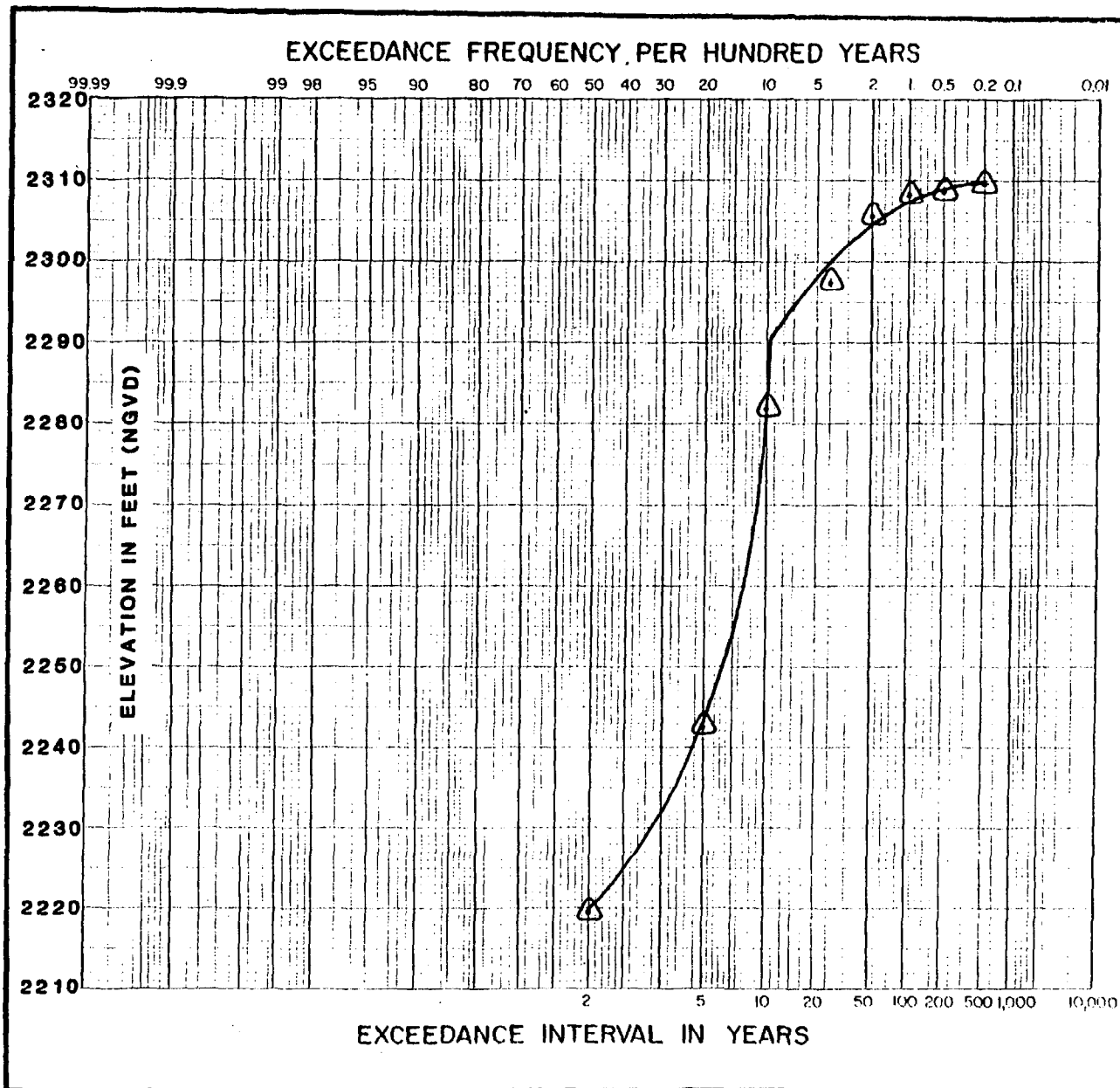
U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

### EXCEEDANCE FREQUENCY PER HUNDRED YEARS



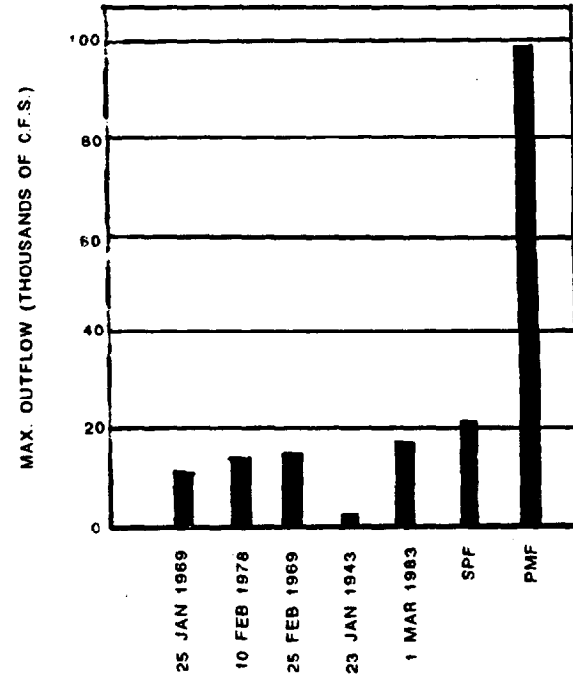
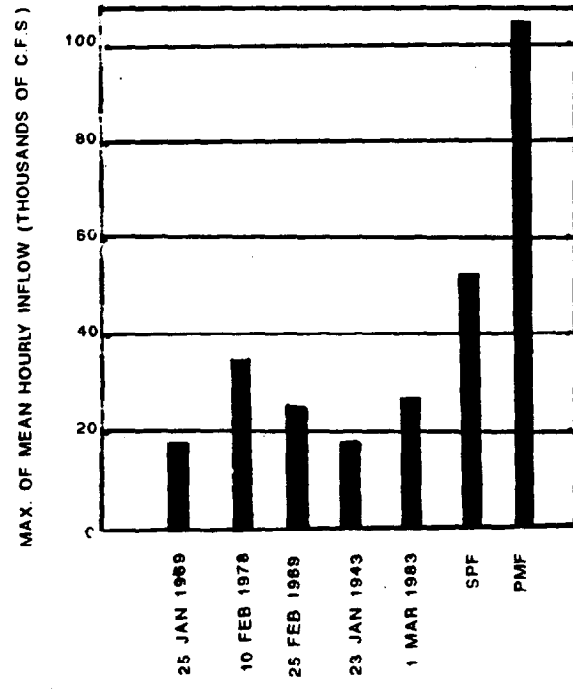
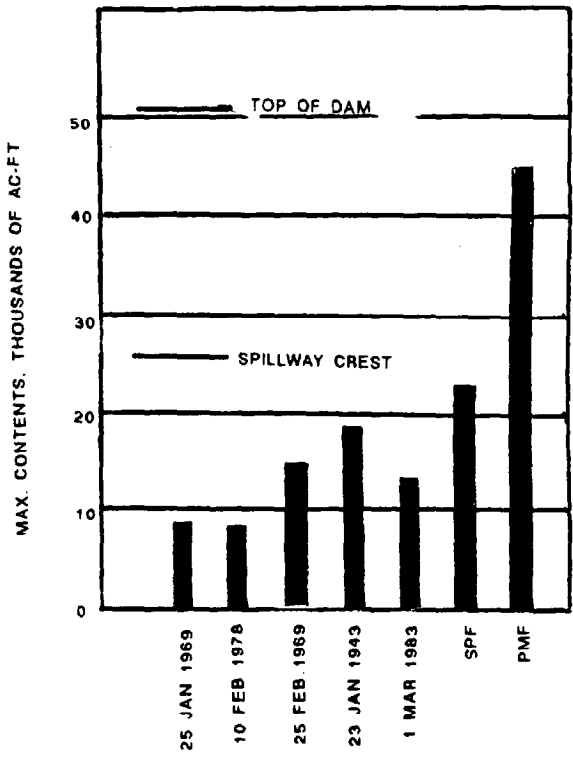
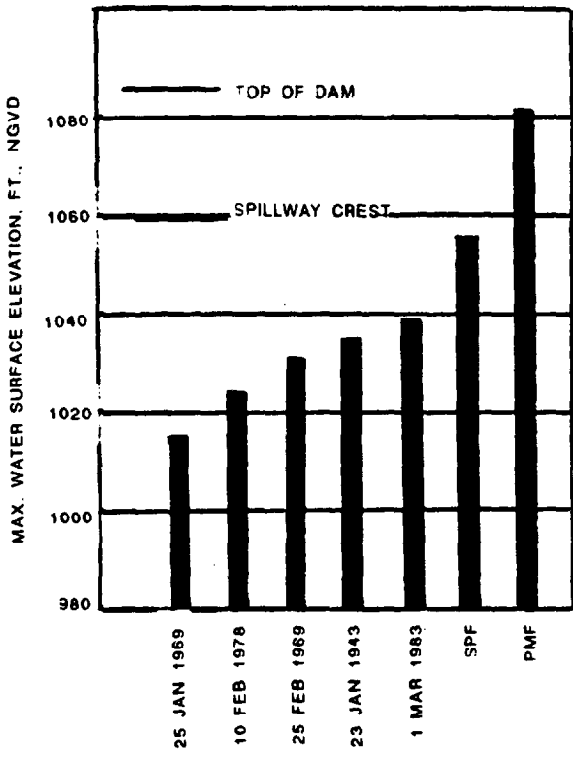
Data points derived from a rainfall runoff analysis as part of a 1989 Corps of Engineers review study. Frequency values of the data points are listed in Plate 8-10.

|   |
|---|
| <b>HANSEN DAM</b><br><b>TUJUNGA WASH, CALIFORNIA</b>  |
| <b>ELEVATION FREQUENCY</b><br><b>HANSEN DAM</b>   |
| <b>U. S. ARMY CORPS OF ENGINEERS</b><br><b>LOS ANGELES DISTRICT</b><br>TO ACCOMPANY REPORT DATED: |



Data points derived from a rainfall runoff analysis as part of a 1989 Corps of Engineers review study. Frequency values of the data points are listed in Plate 8-11.

|  |
|--|
| <b>HANSEN DAM</b><br><b>TUJUNGA WASH, CALIFORNIA</b>   |
| <b>ELEVATION FREQUENCY</b><br><b>BIG TUJUNGA DAM</b>   |
| <b>U.S. ARMY CORPS OF ENGINEERS</b><br><b>LOS ANGELES DISTRICT</b><br>TO ACCOMPANY REPORT DATED: |



PMF--PROBABLE MAXIMUM FLOOD  
 SPF--STANDARD PROJECT FLOOD

**HANSEN DAM**  
 TUJUNGA WASH, CALIFORNIA

---

**COMPARISON OF HISTORICAL  
 FLOODS AND DESIGN FLOODS**

---

**U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT**

Comparison of Historical Floods and Design Floods  
Hansen Reservoir

|                        | Plate<br>No. | Water<br>Surface<br>Elevation<br>(feet) | Contents<br>(acre-<br>feet) | Inflow*<br>(cfs) | Outflow<br>(cfs) |
|------------------------|--------------|---|-----------------------------|------------------|------------------|
| Probable Maximum Flood | 8-02         | 1081.22                                 | 44,990                      | 105,000          | 99,700           |
| Standard Project Flood | 8-01         | 1057.25                                 | 23,350                      | 53,000           | 20,640           |
| 23 January 1943        | 8-03         | 1036.47                                 | 18,743                      | 18,860           | 1,640            |
| 25 January 1969        | 8-04         | 1018.28                                 | 9,015                       | 17,972           | 11,042           |
| 25 February 1969       | 8-05         | 1030.78                                 | 14,872                      | 26,012           | 15,993           |
| 10 February 1978       | 8-06         | 1023.90                                 | 8,211                       | 35,050**         | 13,541           |
| 1 March 1983           | 8-07         | 1039.70                                 | 13,261                      | 27,900           | 18,104           |

\* Maximum of mean hourly values

\*\* Maximum inflow for 40 minutes: 40,220 cfs

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

COMPARISON OF  
HISTORICAL AND DESIGN FLOODS  
AT HANSEN RESERVOIR

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

Chain of Command for Reservoir Operations Decisions

Corps of Engineers  
Los Angeles District

| <u>Title</u>                   | <u>Office Phone Number:</u> |
|--------------------------------|-----------------------------|
| District Engineer              | (213) 894-5300              |
| <u>Water Control Decisions</u> | <u>Gate Operations</u>      |

| <u>Title</u>                          | <u>Phone</u>   | <u>Title</u>                            | <u>Phone</u>   |
|---------------------------------------|----------------|---|----------------|
| Chief, Engineering Division           | (213) 894-5470 | Chief, Construction-Operations Division | (213) 894-5600 |
| Chief, Hydrology and Hydraulic Branch | (213) 894-5520 | Chief, Operations Branch                | (213) 894-5620 |
| Chief, Reservoir Regulation Section   | (213) 894-6915 | Chief, Operations & Maintenance Section | (818) 401-4008 |
| Chief, Reservoir Regulation Unit      | (213) 894-6916 | Dam Tender Foreman                      | (818) 401-4006 |
|                                       |                | Hansen Dam Tender                       | (818) 767-3810 |

HANSEN DAM  
TUJUNGA WASH, CALIFORNIA

CHAIN OF COMMAND FOR  
RESERVOIR OPERATIONS DECISIONS

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR  
FOR WATER CONTROL

HANSEN DAM

TUJUNGA CREEK

Los Angeles River Basin

Exhibit A  
to the  
Water Control Manual  
for  
Hansen Dam

Los Angeles District Office  
U.S. Army Corps of Engineers

July 1990

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR  
FOR WATER CONTROL  
HANSEN DAM

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| 1-02  | Role of the Project Operator.....            | A-1-2       |
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STANDING INSTRUCTIONS TO THE PROJECT OPERATOR  
FOR WATER CONTROL  
HANSEN DAM

I. BACKGROUND AND RESPONSIBILITIES.

1-01 General Information.

(1) This exhibit is prepared in accordance with instructions contained in EM 1110-2-3600, paragraph 9-2, (Standing Instructions to Project Operators for Water Control), and ER 1110-2-240, and pertains to duties and responsibilities of dam tenders associated with the operation of Hansen Dam.

Operational instructions to dam tenders are outlined with specific emphasis on flood emergencies when communication between the dam tender and the LAD Reservoir Operation Center (ROC) have been disrupted. This exhibit is designed to be used as an operational guide for the dam tender to use in implementing the Hansen Dam Reservoir Regulations Schedule (Exhibit B). Associated plates are contained in the main body of the water control manual.

The dam tender is required to have available at the damsite this water control manual and exhibit, and the current version of other manuals that complement these standing instructions. These manuals are: (a) "Instructions for Reservoir Operations Center Personnel"; (b) "Operation and Maintenance Manual for Hansen Dam"; and (c) Hansen Dam Flood Emergency Plan. Any deviation from Standing Instructions will require approval of the District Commander.

(2) The purpose of Hansen Dam is regulating flood stage flows through Tujunga Creek, and minimizing flood damage downstream of the structure. Hansen Dam is an essential element for flood control in the Los Angeles River drainage basin. In conjunction with Sepulveda and Lopez Dams, Hansen Dam is vital for the flood protection of lower portions of the San Fernando Valley and the City of Los Angeles. Storage regulation given by the flood control basins permits efficient use of the Los Angeles River Channel. The storage allocation for Hansen Dam is shown on plate 2-2.

(3) Plate 9-01 is an organizational chart depicting the chain of command for reservoir regulation decisions.

Gate operation instructions to the dam tender are issued by the Reservoir Regulation Unit. Dam tenders are part of the Operations Branch, under the Construction-Operations Division.

(4) Hansen Dam is located near the northern edge of the San Fernando Valley on Tujunga Wash, about one mile below the confluence of Tujunga and Little Tujunga Washes, and about four miles southeast of the town of San Fernando, in Los Angeles County. The boundary of the drainage area is formed by the San Gabriel Mountains on the north and west, and by the Verdugo Mountains and a secondary range of the San Gabriel Mountains on the south and

east. The location of the project is shown on plate 2-1A. The drainage area is shown on plate 2-1B.

(5) Debris accumulation on the trash racks can be an operational concern. Repetitive blocking of the trash racks by floatable debris has threatened the water control regulation of Hansen Dam in the past when it was necessary to bring heavy cranes to pull debris from in front of the trash racks in order to discharge flood waters. Due to past forest fires, Hansen Dam has the heaviest sediment load of COE dams in LAD. These fires have also contributed to floatable debris, which must be monitored and physically removed until trash rack modifications can be implemented.

(6) Hansen Dam was constructed and is owned and operated by the U.S. Army Corps of Engineers, Los Angeles District (LAD), which has complete regulatory responsibility. Hansen Dam is operated for local flood control on Tujunga Wash and is part of the Los Angeles County Drainage Area (LACDA) system for flood control in the Los Angeles River Drainage Area.

#### 1-02 Role of the Project Operator.

(1) Normal Conditions. The Project Operator (Dam tender) will be instructed by the Reservoir Regulation Unit as necessary for water control actions under normal conditions. The dam tender will verify that all equipment at the project is in good operating condition; test-operate gates and electrical facilities in the control house, and inspect all structures and equipment according to a pre-established schedule; and refer to the Operation and Maintenance Manual for instructions on actual operation procedures for all equipment.

(2) Emergency Conditions. The dam tender will be present at the dam during periods of significant runoff, as instructed by the Operations Branch; operate the dam in accordance with instructions from the Reservoir Regulation Section; and follow the Reservoir Regulation Schedule provided in Exhibit B during periods of communication disruption.

## II. DATA COLLECTION AND REPORTING.

### 2-01 Normal Conditions.

(1) During normal conditions, measurements are made on week days at 0800 hours local time by the dam tender to determine reservoir staff reading (water surface elevation), float well or manometer gauge "tape" reading, incremental precipitation since last report, total accumulated precipitation for the season, the settings of each outlet gate, and the times of these measurements.

This information will be logged on the appropriate forms and reported by radio to the Reservoir Regulation Unit, WUK4ROC as requested.

(2) The dam tender will also maintain records, including water surface elevations, outflow gauge heights, precipitation amounts, outlet gate settings, and log all radio and telephone communications on forms prescribed below.

(a) The Record of Calls Form (SPL-188). This form is used each time a message is transmitted or received by radio or telephone. The purpose of every call will be noted, whether for a radio check, reservoir report, etc.

(b) Flood Control Basin Operation Report Form (SPL-19). The dam tender should log all of the information on this form each time a water surface elevation measurement is taken or a gate change has been completed.

(c) Rainfall Record Form (SPL-31). This form should be filled in each time a rainfall measurement is taken from a glass tube rainfall gauge.

(d) Record of Data From Digital Recorders Form (SPL 648). This form is filled in once daily at 08:00 when the dam tender reads the recorder drum on the digital punch tape record and logs the number read onto Form SPL 648.

(e) All of these forms should be submitted monthly to the Water Control Data Unit CESPL-ED-HR (BASEYARD) of the Reservoir Regulation Section for archival storage. A copy of each of these forms is included in the Hansen Dam Water Control Manual in within figure set 9-1 through 9-7.

### 2-02 Emergency Conditions.

During flood events, the dam tender should follow instructions as issued by the Reservoir Regulation Section on measurement type and frequency. When reporting to the Reservoir Regulation Section, the dam tender should clearly describe the silt and debris situation at the trash racks, gates, and downstream gauges. When instruments are not working or are stuck in the silt, the operator should not report the erroneous reading, but should rather state the instrument or staff problem. Care should be taken to avoid issuing misleading reports due to siltation at the reservoir staff boards. When debris or silt causes flows to be deceptively perched above the invert, or causes a loss of contact with the staff board, the dam tender should report

a descriptive message identifying the limitations, and quantifying the estimated reservoir depth. If the radio system, including the dam tender's mobile unit, malfunctions, the Reservoir Regulation Section will contact the operator via telephone. It is especially important to maintain all records discussed above during emergency conditions.

2-03 Regional Hydrometeorological Conditions.

Dam tenders will be informed by the Reservoir Regulation Section of regional hydrometeorological conditions that may/will impact Hansen Dam. If regional conditions change, the dam tender should notify Reservoir Regulation Section of those conditions.

### III. WATER CONTROL ACTION AND REPORTING.

#### 3-01 Normal Conditions.

Except during times of emergency when fast action is critical, the Reservoir Regulation Section must approve all gate changes. The Reservoir Regulation Section will originate the request for a gate change, and will provide settings for the gates whenever a gate change is necessary. The dam tender should implement gate changes immediately following acknowledgment of instructions. Delaying a gate change may have serious impacts on affected activities. If other concurrent activities cause a delay in implementation of a gate change, the dam tender should advise the Reservoir Regulation Section by calling radio call sign WUK4ROC and request guidance.

Once a gate change is completed, the dam tender should radio back to the Reservoir Regulation Section (WUK4ROC) to report the time the change was completed, the staff and tape readings, the downstream discharge reading, and the current settings of all 8 gates. All individuals involved should strive to achieve accuracy and complete clarity regarding gate settings.

The eight vertical lift gates are hydraulically controlled from the control house. The dam tender should refer to the O&M Manual for instructions on actual operating procedures.

#### 3-02 Emergency Conditions.

During flood events and other emergency conditions water control actions and reporting are vital to the successful operation of the dam reservoir.

If flooding conditions or some other emergency occurs at the dam, the dam tender should notify the Reservoir Regulation Section as soon as possible with a description of the conditions.

During an emergency condition such as a hazardous chemical spill or a potential drowning where immediate action is necessary, the dam tender should make the appropriate gate changes and report in to the Reservoir Regulation Section as soon as possible.

During a flood event, it is important to maintain the procedures for data collection and water control actions (gate changes) used during normal conditions. Hansen Dam is operated in flood events with all eight gates at standby (1.0 feet open) position until the debris pool elevation of 1010.5 feet NGVD is reached, at which point all gates are opened to 8.0 feet. See Exhibit B.

The Reservoir Regulation Section should keep the dam tender apprised of operational objectives and critical operational constraints whenever possible. This will afford the dam tender a greater opportunity to recognize and identify potential problems in the field. The Reservoir

Regulation Section may also provide additional water surface elevation criteria, instructing the dam tender to alert them via radio channel WUK4ROC when the reservoir pool reaches the indicated level. Such an action would normally be conducted during periods of intense storm runoff, and would require the operator to remain at the control house.

### 3-03 Inquiries.

All significant inquiries received by the dam tender from citizens, constituents or interest groups regarding water control procedures or actions must be referred directly to the Reservoir Regulation Section.

### 3-04 Water Control Problems.

The Reservoir Regulation Section must be contacted immediately by the most rapid means available in the event that an operational malfunction, erosion, or other incident occurred that could impact project integrity in general or water control capability in particular.

Emergency departures from the regulation instructions issued by the Reservoir Regulation Section may be required, because of equipment failures, accidents, or other emergencies requiring immediate action. Under these situations, the dam tender should contact the Reservoir Regulation Section via radio for instructions. When communications are broken, or the situation demands immediate action, the dam tender may proceed independently. The Reservoir Regulation Section should be notified of such actions as soon as possible. All other emergency deviations from normal procedure should be approved in advance by the Reservoir Regulation Section. The District Engineer, Los Angeles District, U.S. Army Corps of Engineers, may make temporary modifications to the water control regulations. Permanent changes are subject to approval by the Division Engineer, South Pacific Division, U.S. Army Corps of Engineers.

The dam tender should immediately alert the Reservoir Regulation Section via radio channel WUK4ROC whenever the requested gate change cannot be fully implemented due to mechanical or other physical problems. For example, debris occasionally prevents total gate closure. The Reservoir Regulation Section will evaluate the problem and provide further instructions to the dam tender.

### 3-05 Communication Outage.

Coordination of flood control operation is under the direction of the Reservoir Regulation Section, Corps of Engineers, Los Angeles District. During flood periods, close contact will be maintained between operating personnel at Hansen Dam and the Reservoir Regulation Section in Los Angeles. If communication is broken between the dam tender and the Reservoir Regulation Section, initially continue releases in accordance with the last instructions from the Reservoir Regulation Section, and make every attempt to re-establish communications. If this effort is unsuccessful for one hour, the dam tender

should use water surface elevations to make releases following the Reservoir Regulation Schedule (Exhibit B).

Emergency notifications are normally made by the Reservoir Regulation Section. However, if the dam tender loses communication with the Reservoir Regulation Section, and an emergency notification situation arises, such as an imminent dam failure or uncontrolled spillway flow (water surface elevation above 1060 feet NGVD), the dam tender should make the necessary notifications. The parties listed below are to be immediately notified upon declaration of an uncontrollable emergency.

Los Angeles Police Department  
(ask for Foothill Division)

818-989-8861

Corps Emergency Management Branch

213-894-3440

Notifications should include: (a) description of the type and extent of existing or impending emergency; (b) advisement for evacuation from the flood plain; (c) information on the time of initial release of hazardous amounts of water; (d) the depth of water behind the dam; and (e) the dam tender's name and telephone number.

Upon completing the above notifications, attempt to re-establish communications with the Reservoir Regulation Section. Document all notifications made, and refer to the Orange Book (Instructions for Reservoir Operations Center Personnel) for more information on additional emergency notifications. The dam tender should not leave the dam unless his safety is in jeopardy.

**EXHIBIT B**

**Reservoir Regulation Schedule and  
Instructions to Dam Operator**

EXHIBIT B

Hansen Dam Reservoir Regulation Schedule  
(For rising and falling stages)

| Step No.  | When reservoir water surface is between elevation | Gate setting for gates as indicated |                 |                 |                 |                 |                 |                 |                 | Total Computed discharges<br>ft <sup>3</sup> /s | Downstream gauge height**<br>Feet |
|---|---|-------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---|-----------------------------------|
|   |   | No. 1                               | No. 2           | No. 3           | No. 4           | No. 5           | No. 6           | No. 7           | No. 8           |   |                                   |
|   | Feet - NGVD                                       |                                     |                 |                 |                 |                 |                 |                 |                 |   |                                   |
|   |   | Feet of opening                     | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening | Feet of opening |   |                                   |
| Follow Step 1 during rising stages                  |   |                                     |                 |                 |                 |                 |                 |                 |                 |   |                                   |
| 1..   | 990.0 - 1,010.5                                   | 1.0                                 | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 1.0             | 0 to 1,260                                      | 0.97 - 2.52                       |
| Follow Steps 2 to 9 during rising or falling stages |   |                                     |                 |                 |                 |                 |                 |                 |                 |   |                                   |
| 2..   | 1,010.5 - 1,053.0*                                | 8.0                                 | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 8.0             | 7,920 to 20,730                                 | 5.61 - 9.30                       |
| 3..   | 1,053.0 - 1,060.0                                 | 8.0                                 | 7.0             | 7.0             | 8.0             | 8.0             | 7.0             | 7.0             | 8.0             | 19,370 to 20,520                                | 8.88 - 9.22                       |
| Spillway, Gated & Ungated                           |   |                                     |                 |                 |                 |                 |                 |                 |                 |   |                                   |
| 4..   | 1,060.0 - 1,061.0                                 | 8.0                                 | 6.0             | 6.0             | 8.0             | 8.0             | 6.0             | 6.0             | 8.0             | 19,400 to 20,430                                | 8.89 - 9.20                       |
| 5..   | 1,061.0 - 1,062.0                                 | 7.0                                 | 6.0             | 6.0             | 7.0             | 7.0             | 6.0             | 6.0             | 7.0             | 18,960 to 20,740                                | 8.78 - 9.29                       |
| 6..   | 1,062.0 - 1,063.0                                 | 5.0                                 | 6.0             | 6.0             | 4.0             | 4.0             | 6.0             | 6.0             | 5.0             | 18,160 to 20,430                                | 8.56 - 9.20                       |
| 7..   | 1,063.0 - 1,064.0                                 | 5.0                                 | 3.0             | 3.0             | 4.0             | 4.0             | 3.0             | 3.0             | 5.0             | 17,580 to 20,280                                | 8.41 - 9.15                       |
| 8..   | 1,064.0 - 1,065.0                                 | 5.0                                 | 0               | 3.0             | 4.0             | 0               | 3               | 0               | 5.0             | 17,590 to 20,680                                | 8.42 - 9.26                       |
| 9..   | 1,065.0 - 1,066.0                                 | 0                                   | 0               | 3.0             | 1.0             | 0               | 3               | 0               | 0               | 17,300 to 20,660                                | 8.35 - 9.26                       |
| Spillway and ungated flow                           |   |                                     |                 |                 |                 |                 |                 |                 |                 |   |                                   |
| 10..  | 1,066.0 - 1,067.0                                 | 0                                   | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 18,690 to 22,420                                | 8.70 - 9.71                       |
|   | Above 1,067.0                                     | 0                                   | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 22,420+   | 9.71+                             |

\*During falling stages the gates shall be left fully open to drain the reservoir completely. Then the gates shall be set at 1.0 feet.

\*\*Source for elevations up to 8.30 feet from USGS Rating Table No. 5; for elevations greater than 8.30 feet values were extrapolated from USGS data.

\*\*\* It may be necessary to regulate discharge according to downstream emergency conditions as authorized by the District Office.

DAM OPERATOR INSTRUCTIONS

- Communication with the District Office is available.\*\*\*
  - Notify the Reservoir Operations Center when a gate change will be required according to the schedule.
  - Notify the Reservoir Operations Center if unable to set the gates as instructed.
- Communication with the District Office is not available.
  - Try to reestablish communications through the Los Angeles County Flood Control DPW (WUR470).
    - Rising stages. Allow a period of one hour to pass to reestablish communications with the District Office. If after one hour communication is not reestablished follow the gate operation schedule.
    - Falling stages. Maintain current downstream gauge height until communication is reestablished.
  - If one or more of the gates cannot be operated adjust the remaining gates gradually and uniformly until the downstream gauge height agrees with scheduled values. Keep a close check on gauge height and change the gate opening as often as required. If the downstream gauge height is unobtainable adjust the gates that are functioning so that the sum of the gate openings will equal the sum of the openings shown in the schedule.
- Trash Blockage.
 

If outlets become blocked with trash, increase gate openings to maintain scheduled downstream gauge height.
- Notification to Los Angeles County DPW.
 

Notify personnel at the Los Angeles County DWP spreading grounds prior to making each gate change. Do not increase release until confirmation is received that their diversion gate located in the downstream channel has been adjusted.

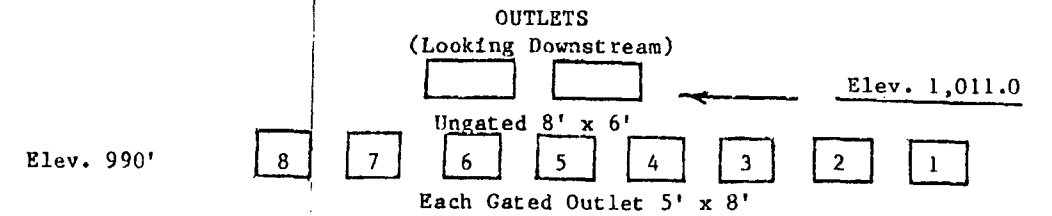


EXHIBIT C

Pertinent Data, Big Tujunga Dam and Reservoir

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

MEMORANDUM

TO: Mr. Mas Nagami

August 17, 1983

FROM: C. J. Wilt  
Hydraulic Division

File No. 63.121  
Big Tujunga Dam and Reservoir  
Operations Plan

Approved  
JLE

10/6

Recommendation

It is recommended that the operation plan for Big Tujunga Dam and Reservoir described herein be approved.

Concur  
KWK  
12/3

Capital Flood Operations

No release plan would be effective for routing the capital flood through the dam with the peak inflow Q of 43,800 cfs passing virtually unchanged during the routing.

MN  
12/3

Deviation from the operation plan described below to accommodate large events will be implemented at the discretion of the operations engineer.

Operations Plan

The proposed plan is similar to current practice (memorandum dated October 18, 1976, File No. same as above, from H. C. Martin to Mr. C. F. Eshelby) with emphasis placed on water conservation compatibility. The No. 1 valve is used to control the outflows from the smaller more frequent storms while the No. 2 and No. 3 outlets are reserved for the larger storms to prevent spillway flows, or in an emergency to reduce drawdown times. Frequent use of the No. 3 valve during the smaller storms increases its chance of failure. Therefore, if it is needed it is used at 100 per cent open.

E of  
UK 12/3  
Wilt  
check chart  
approval due  
Vibrations  
B-10/11/83  
M/W  
B/W  
12/4/83

At the beginning of the season, the water surface in the dam will be held at the minimum cushion pool elevation of 2205 feet. As the storm season progresses, the water surface will be held below the State restricted elevation of 2213 feet whenever possible, and as water conservation activities allow, the level will be returned to elevation 2205 feet.

A. Rising Reservoir

1053 AF

2213 Ft

1273 AF

2290 Ft

5688 AF

There is no change over the existing plan for this phase of the operation. The activities are designed to minimize spillway flow and to minimize excessive downstream discharge.

1. During periods of low inflow, the reservoir will be held below elevation 2213 feet by using the No. A2 valve (25 cfs capacity at elevation 2213 feet).
2. When the reservoir reaches elevation 2213 feet, water will be released in accordance with the following schedule:

| <u>Elevation<br/>(Feet)</u> | <u>Storage **<br/>(Acre-Feet)</u> | <u>Valve No. 1<br/>(% Open)</u> | <u>Q<br/>(cfs)</u> |
|-----------------------------|-----------------------------------|---------------------------------|--------------------|
| 2213                        | 1450                              | 12                              | 60                 |
| 2215                        | 1521                              | 25                              | 125                |
| 2217                        | 1594                              | 50                              | 250                |
| 2219                        | 1670                              | 100                             | 470                |
| 2290                        | 5750                              | 100                             | 690                |
| 2291                        | 5832                              | 0                               | 400*               |

• Spillway flow.

3. As the storm progresses, and inflow rates, weather forecasts, or other conditions suggest that spillway flow may be prevented by an increase in the above release rates, Valves Nos. 2 and 3 will be opened at the discretion of the operations engineer.
4. Drawdown of the reservoir will follow the release schedule described below unless the safety and protection of downstream facilities warrant a temporary reduction or suspension of outflow. Conversely, a forecast of rain may necessitate drawdown releases greater than outlined below.

*see note on Page 1*

B. Falling Reservoir

Drawdown of the reservoir will be accomplished as follows:

1. Valve No. 1 will be operated to limit the outflow to between 300 cfs in larger storms or initial inflow in smaller storms (whichever is less) to accommodate water conservation activities at Hansen Spreading Grounds. The duration for this release is to be for a maximum of 2 days.
2. After 2 days in the 300 cfs discharge mode, the outflow is to be limited to 200 cfs or initial inflow (whichever is less) for the next 30 days in order to draw the reservoir down at a reasonable rate. Any further releases for the following 30 days are to be limited to 150 cfs or inflow following the same rationale.

*? hat*

The proposed operating plan is based on the following considerations:

For normal storms (most probable storm events), the reservoir water surface will be above elevation 2213 feet for 2 to 5 days at an average elevation of 2234 feet, assuming no follow-up storm. Further, we could expect on the average of once in 10 years to experience an event that, using the proposed operating criteria, would cause the water surface to exceed elevation 2213 feet for a total of about a month with an average water surface elevation of 2222 feet. These types of events would produce spillway flow.

\*\* Storage figures from table dated 4/5/83

Mr. Nagami  
Page 3  
August 17, 1983

Channel Restrictions

Flows in excess of 600 cfs begin to flood the Oro Vista Street crossing of Big Tujunga Wash impeding access to residents of Ebey and Doane Canyons. Since the discharge of the No. 1 valve is 470 cfs when first fully opened, the road should remain passable during most smaller storms. However, as the reservoir water surface elevation builds and flows from local drainage areas increase, the access could temporarily be lost.

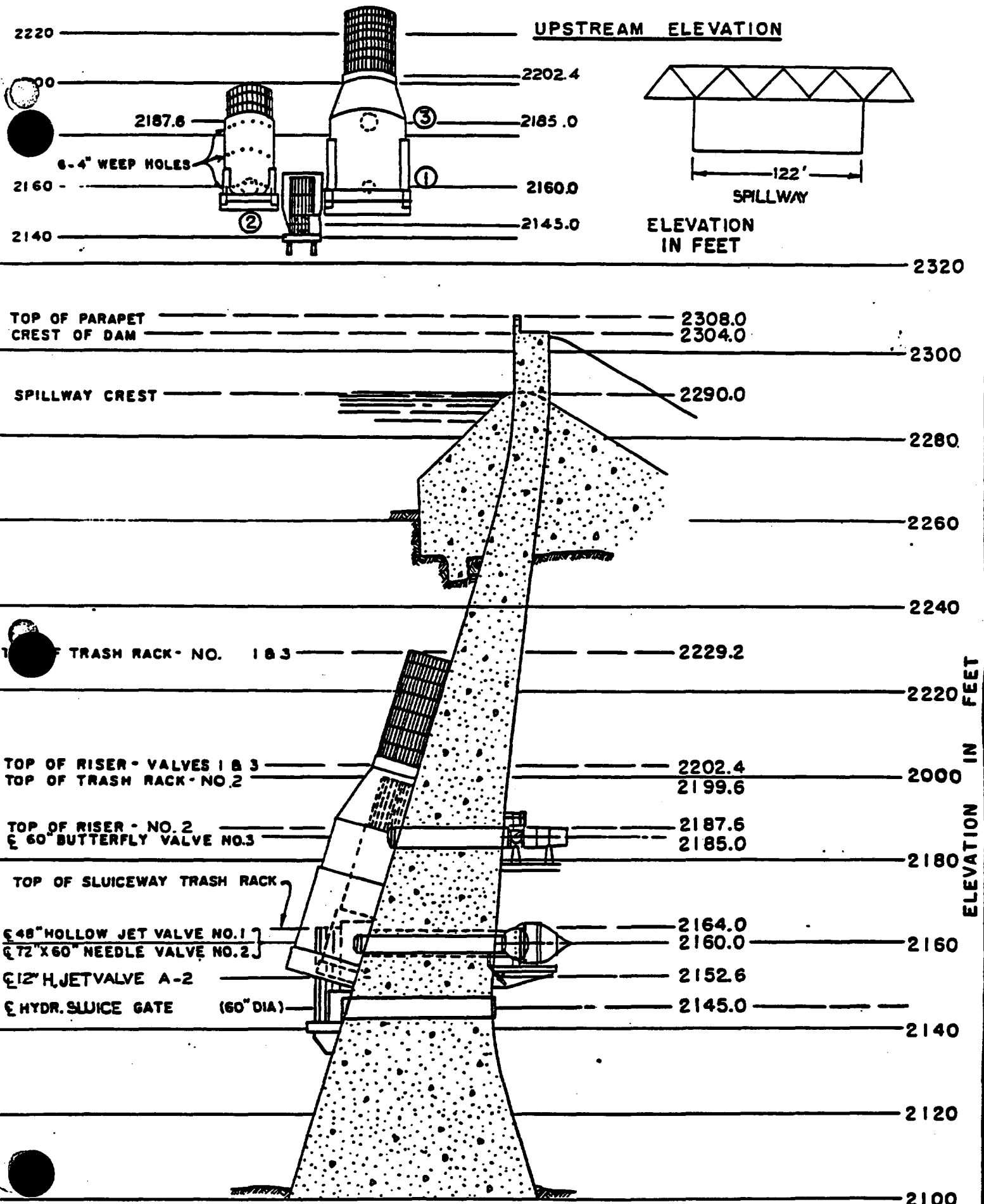
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James T. Sparks  
Operations Section  
Extension 4190

AMB:eg

Attach.

cc: Operation and Maintenance  
Program Management  
Hydraulic (2) (Operations, Files) ✓  
Water Conservation (2) (Erhard, Division)  
General Files



**BIG TUJUNGA DAM**

X

Department of Public Works

FLOOD CONTROL DAM

DATA SHEET

GENERAL

|          |   |                                   |
|----------|---|-----------------------------------|
| NAME     | - BIG TIJUNGA DAM                           | ROAD ISSUE - 1924                 |
| LOCATION | - BIG TIJUNGA CANYON 10 MI. N.E. OF SUNLAND | DRAINAGE AREA - 82.3 SQ. MI. FROM |
| STREAM   | - BIG TIJUNGA CREEK                         | ELEV. 2290 FT. TO ELEV. 7078 FT.  |
| PURPOSE  | - FLOOD CONTROL AND CONSERVATION            | ABOVE MEAN SEA LEVEL              |
| TYPE     | - CONCRETE VARIABLE RADIUS ARCH             |                                   |

CONSTRUCTION

|                                     |                |                                   |
|-------------------------------------|----------------|-----------------------------------|
| BEGAN - JANUARY 1930                |                | CONSTRUCTED BY L.E. DIXON CO.     |
| COMPLETED - JULY 1931               |                | RESIDENT ENGINEER - K.J. HARRISON |
| COST -                              | \$1,166,915.95 | DESIGN AND COMPUTATIONS - LACFD   |
| COST PER A.F. F.C.                  | 156.42         | DESIGN DIVISION                   |
| COST PER A.F. F.C. CONSERV.         | 187.01         |                                   |
| COSTS BASED ON ORIGINAL SURVEY DATA |                |                                   |

DIMENSIONS

|                                  |           |
|----------------------------------|-----------|
| CREST HT. ABOVE ORIG. STREAMBED  | 200.0 FT. |
| CREST HT. ABOVE FOUNDATION       | 251.0 FT. |
| CREST LENGTH (LESS SPILLWAY)     | 505.0 FT. |
| CREST WIDTH                      | 8.0 FT.   |
| HEIGHT OF PARAPET WALL           | 4.0 FT.   |
| BASE THICKNESS AT ELEV. 2060 FT. | 73.0 FT.  |

EXCAVATION AND FILL AS CONSTRUCTED

|                           |             |
|---------------------------|-------------|
| TOTAL VOL. OF EXCAVATION  | 81,318 C.Y. |
| TOTAL VOL. OF CONCRETE    | 79,293 C.Y. |
| TOTAL VOL. OF EARTH/FILL  | 5,574 C.Y.  |
| CHARACTER OF FOUNDATION - | GRANITE     |

OUTLETS

| NO.                           | TYPE            | SIZE    | RISER OR INLET ELEVATION | ¢ ELEV. VALVE | MAX. DISCH. AT SPILLWAY ELEV. CFS. |
|-------------------------------|-----------------|---------|--------------------------|---------------|------------------------------------|
| <u>FLOOD OPERATION VALVES</u> |                 |         |                          |               |                                    |
| (4) 1                         | HOLLOW JET      | 48"     | (1) 2202.4               | 2160.0        | 690.                               |
| 1A                            | SLIDE GATE (H)  | 48"     | 2202.4                   | 2160.0        | —                                  |
| 2                             | NEEDLE VALVE    | 72"     | (1) 2187.6               | 2160.0        | 1175.                              |
| (3) 2A                        | BUTTERFLY VALVE | 72"     | 2187.6                   | 2160.0        | —                                  |
| (5) 3                         | BUTTERFLY VALVE | 60"     | (1) 2202.4               | 2185.0        | 1035                               |
| 3A                            | HYD. GATE       | 62"     | 2202.4                   | 2185.0        | —                                  |
| <u>SERVICE VALVES</u>         |                 |         |                          |               |                                    |
| (6) A2                        | HOLLOW JET      | 12"     | 2187.6                   | 2152.6        | 38.4                               |
| (2) A2A                       | GATE VALVE      | 12"     | 2187.6                   | 2153.1        | —                                  |
| S.G.                          | SLUICE GATE     | 6' x 6' | 2142.5                   | 2145.0        | —                                  |

| SPILLWAY NO. | TYPE            | SILL ELEV. | LENGTH | SPILLWAY ORIGINAL CAP. A.F. | MAX. DISCH. AT ASSUMED H.W.L. CFS |
|--------------|-----------------|------------|--------|-----------------------------|-----------------------------------|
| 1            | OPEN ORICE WEIR | 2290.0     | 122.0  | 6240.                       | 24,250 CFS                        |

ELEVATIONS

|                    | ELEV. (FT.) |
|--------------------|-------------|
| ORIGINAL STREAMBED | 2104.0      |
| LOWEST EXCAVATION  | 2053.0      |
| CREST              | 2304.0      |
| TOP OF PARAPET     | 2308.0      |
| ASSUMED H.W.L.     | 2304.0      |

REMARKS

- (1) SILL OF RISERS CONSTRUCTED JANUARY 1939.
- (2) 12" GATE VALVE INSTALLED OCTOBER 1956. RESEMBLED FROM A2 to A2A DUE TO INSTALLATION OF THE 12" H.J. ON 5/23/73.
- (3) 72" HYD. BUTTERFLY INSTALLED OCTOBER 1956.
- (4) 48" HOLLOW JET VALVE INSTALLED JUNE 1957.
- (5) 60" HYD. BUTTERFLY INSTALLED NOVEMBER 1960.
- (6) 12" HOLLOW JET VALVE INSTALLED 5/23/73 TO REPLACE ORIFICE PLATES. 2289.97 HDGS - 2290.0 SPILLWAY DATUM. SPILLWAY DATUM SHOWN. LATEST STATE APPROVAL MAY 13, 1976. RESTRICTED ELEV. 2213 FT.

REVISED OCTOBER 1984

**EXHIBIT D**

**Pertinent Data for Other Reservoirs  
Affecting the Los Angeles River**

Table 1  
SEPULVEDA DAM AND RESERVOIR  
LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA  
SEPTEMBER 1988

|   |                   |
|---|-------------------|
| Construction Completed.....                         | 30 December 1941  |
| Stream System.....                                  | Los Angeles River |
| Drainage area.....sq. miles..                       | 152               |
| Reservoir:  |                   |
| Elevation   |                   |
| Top of crest gates (raised position)...ft., NGVD... | 710.0             |
| Flood control pool.....ft., NGVD...                 | 710.0             |
| Spillway design surcharge level.....ft., NGVD...    | 716.7             |
| Top of dam.....ft., NGVD...                         | 725**             |
| Crest gates begin to automatically                  |                   |
| lower.....ft., NGVD...                              | 712.0             |
| Crest gates complete automatic                      |                   |
| lowering.....ft., NGVD...                           | 715.0             |
| Area  |                   |
| Top of crest gates (raised position).....acres..    | 1,335             |
| Flood control pool.....acres..                      | 1,335             |
| Fixed spillway crest.....acres..                    | 765               |
| Fixed spillway design surcharge level.....acres..   | 1,710             |
| Top of dam.....acres..                              | 2,447             |
| Purchased real estate***.....acres..                | 2,097             |
| Capacity, gross                                     |                   |
| Top of crest gates (raised position)....acre-feet.. | 17,425 (2.15*)    |
| Flood control pool.....acre-feet..                  | 17,425 (2.15*)    |
| Fixed spillway crest.....acre-feet..                | 6,857 (0.85*)     |
| Spillway design surcharge level.....acre-feet..     | 27,563 (3.40*)    |
| Top of dam.....acre-feet..                          | 44,727 (5.52*)    |
| Allowance for sediment .....acre-feet..             | 0                 |
| Dam: - Type.....                                    | Earthfill         |
| Height above original streambed.....ft..            | 57                |
| Top length.....ft..                                 | 15,440            |
| Top width.....ft..                                  | 30                |
| Freeboard.....ft..                                  | 7.3               |
| Spillway: - type.....                               | Concrete ogee     |
| Crest length.....ft..                               | 399               |
| Crest elevation.....ft., NGVD...                    | 700               |
| Design surcharge.....ft..                           | 6.7               |
| Design discharge.....c.f.s..                        | 99,540            |
| Outlets:  |                   |
| Uncontrolled.....number..                           | 4                 |
| Size.....   | 6'W x 6.5'H       |
| Entrance invert elevation.....ft., NGVD...          | 668               |
| Controlled.....number..                             | 4                 |
| Size.....ft..                                       | 6'W x 9'H         |
| Gate type.....                                      | Vertical lift     |
| Entrance invert elevation.....ft., NGVD...          | 668               |
| Conduits - (Rectangular)                            |                   |
| Number and Size                                     |                   |
| Ungated.....  | 4 - 6'W x 6.5'H   |
| Gated.....  | 4 - 6'W x 9'H     |
| Length.....ft..                                     | 40                |
| Maximum capacity at spillway crest.....c.f.s..      | 16,500            |
| Regulated capacity at spillway crest.....c.f.s..    | 16,500            |
| Standard project flood:                             |                   |
| Duration (inflow).....days..                        | 3                 |
| Total volume (including base flow).....acre-feet..  | 68,200 (8.41*)    |
| Inflow peak.....c.f.s..                             | 50,000            |
| Probable maximum flood:                             |                   |
| Duration (inflow).....days..                        | 4                 |
| Total volume.....acre-feet..                        | 163,200 (20.13*)  |
| Inflow peak.....c.f.s..                             | 114,000           |
| Historic maximums:                                  |                   |
| Maximum inflow.....c.f.s..                          | 58,970            |
| Date.....   | 2-16-80           |
| Maximum release.....c.f.s..                         | 15,320            |
| Date.....   | 2-16-80           |
| Maximum water surface elevation.....ft., NGVD...    | 705.1             |
| Date.....   | 2-16-80           |
| Maximum storage.....acre-feet..                     | 11,470            |
| Date.....   | 2-16-80           |

\*inches of runoff

\*\*December 1980 survey shows variation in elevation of top of dam from 723.7 feet northeast of Control House to 725.5 feet southwest of Control House.

\*\*\*There are no easements acquired in the reservoir area. All real estate is acquired in fee title.

WHITTIER NARROW DAM AND RESERVOIR  
LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA  
JUNE 1987

|  |                                  |                 |
|--|----------------------------------|-----------------|
| Stream System.....                             | Rio Hondo and San Gabriel Rivers |                 |
| Drainage area.....                             | sq. miles..                      | 554             |
| Reservoir:                                     |                                  |                 |
| Elevation                                      |                                  |                 |
| Water supply pool (Rio Hondo).....             | ft., m.s.l..                     | 201.6           |
| Water supply pool (San Gabriel).....           | ft., m.s.l..                     | 213.5           |
| Flood control pool.....                        | ft., m.s.l..                     | 228.5           |
| Top of gates (gates closed).....               | ft., m.s.l..                     | 229             |
| Spillway design surcharge level.....           | ft., m.s.l..                     | 238.9           |
| Top of Dam.....                                | ft., m.s.l..                     | 239             |
| Area   |                                  |                 |
| Water supply (Rio Hondo).....                  | acres..                          | 252.0           |
| Water supply (San Gabriel).....                | acres..                          | 89              |
| Flood Control.....                             | acres..                          | 2,411           |
| Top of gates (gates closed).....               | acres..                          | 2,470           |
| Spillway design surcharge level.....           | acres..                          | 3,622.8         |
| Top of dam.....                                | acres..                          | 3,630           |
| Capacity, gross                                |                                  |                 |
| Water supply (Rio Hondo).....                  | acre-feet..                      | 2,498 (0.09*)   |
| Water supply (San Gabriel).....                | acre-feet..                      | 532 (0.02*)     |
| Flood control pool.....                        | acre-feet..                      | 34,947 (1.18*)  |
| Top of gates (gates closed).....               | acre-feet..                      | 36,160 (1.22*)  |
| Spillway design surcharge level.....           | acre-feet..                      | 66,702 (2.26*)  |
| Top of dam.....                                | acre-feet..                      | 67,060 (2.27*)  |
| Allowance for sediment.....                    | acre-feet..                      | 0               |
| Dam: - Type.....                               |                                  | Earthfill       |
| Height above original streambed.....           | ft..                             | 56.0            |
| Top length.....                                | ft..                             | 16,960          |
| Top width.....                                 | ft..                             | 16              |
| Freeboard.....                                 | ft..                             | 0.1             |
| Outlets: (Rio Hondo)                           |                                  |                 |
| Type of gates.....                             |                                  | Tainter         |
| Number and size of gates.....                  |                                  | 4 - 30'W x 20'H |
| Size of outlets.....                           |                                  | 30'W x 19'H     |
| Gate sill elevation.....                       | ft., m.s.l..                     | 184.0           |
| Regulated outflow.....                         | c.f.s..                          | 40,000          |
| Maximum capacity (el. 229.0).....              | c.f.s..                          | 74,700          |
| Spillway: (San Gabriel)                        |                                  |                 |
| Type of gates.....                             |                                  | Tainter         |
| Number and size of gates.....                  |                                  | 9 - 50' x 29'   |
| Gate sill elevation.....                       | ft., m.s.l..                     | 200.0           |
| Top of gates (gates closed) elevation.....     | ft., m.s.l..                     | 229             |
| Discharge at design surcharge (el. 234.0)..... | c.f.s..                          | 251,000         |
| Maximum discharge capacity (el. 239.0).....    | c.f.s..                          | 307,900         |
| Standard project flood:                        |                                  |                 |
| Duration (inflow).....                         | days..                           | 4               |
| Total volume.....                              | acre-feet..                      | 198,000 (6.70*) |
| Inflow peak.....                               | c.f.s..                          | 40,000          |
| Probable maximum flood:                        |                                  |                 |
| Duration (inflow).....                         | days..                           | 4               |
| Total volume.....                              | acre-feet..                      | 910,000 (3.80*) |
| Inflow peak.....                               | c.f.s..                          | 365,000         |
| Historic maximums:                             |                                  |                 |
| San Gabriel:                                   |                                  |                 |
| Maximum release.....                           | c.f.s..                          | 11,500          |
| Date.....                                      |                                  | 1-25-69         |
| Maximum water surface elevation.....           | ft. m.s.l..                      | 216.5           |
| Date.....                                      |                                  | 1-25-69         |
| Rio Hondo:                                     |                                  |                 |
| Maximum release.....                           | c.f.s..                          | 38,800          |
| Date.....                                      |                                  | 2-17-82         |
| Maximum water surface elevation.....           | ft. m.s.l..                      | 213.5           |
| Date.....                                      |                                  | 1-25-69         |

\*inches of runoff

LOPEZ DAM AND RESERVOIR  
LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA  
JULY 1985

|  |                 |
|--|-----------------|
| Stream system.....                                   | Pacoima Wash    |
| Drainage area.....sq. miles..                        | 34              |
| Reservoir:   |                 |
| Elevation  |                 |
| Streambed at Dam.....ft., m.s.l..                    | 1,253.72        |
| Flood control pool (spillway crest).....ft., m.s.l.. | 1,272.92        |
| Spillway design surcharge level.....ft., m.s.l..     | 1,293.48        |
| Top of dam.....ft., m.s.l..                          | 1,298.92        |
| Area   |                 |
| Spillway crest.....acres..                           | 41.3            |
| Spillway design surcharge level.....acres..          | 70.7            |
| Top of dam.....acres..                               | 80.1            |
| Capacity, gross                                      |                 |
| Spillway crest.....acre-feet..                       | 441 (0.24*)     |
| Spillway design surcharge level.....acre-feet..      | 1,613.3 (0.89*) |
| Top of dam.....acre-feet..                           | 2,021.4 (1.12*) |
| Allowance for sediment (50-year).....acre-feet..     | 794 (0.44*)     |
| Dam: - type.....                                     |                 |
| Earthfill  |                 |
| Height above original streambed.....ft..             | 50              |
| Top length.....ft..                                  | 1,330           |
| Top width.....ft..                                   | 20              |
| Freeboard.....ft..                                   | 6.1             |
| Spillway: - type.....                                |                 |
| Broad-crested  |                 |
| Crest length.....ft..                                | 110             |
| Design surcharge.....ft..                            | 19.9            |
| Design discharge.....c.f.s..                         | 31,000          |
| Outlets:   |                 |
| Number and size-diameter.....ft..                    | 1-5' diameter   |
| Length.....ft..                                      | 428             |
| Entrance invert elevation.....ft., m.s.l..           | 1,253.92        |
| Standard project flood:                              |                 |
| Duration (inflow).....days..                         | 3               |
| Total volume.....acre-feet..                         | 14,000 (7.78*)  |
| Inflow peak.....c.f.s..                              | 11,200          |
| Probable maximum flood                               |                 |
| Duration (inflow).....days..                         | 1               |
| Total volume.....acre-feet..                         | 19,900 (10.97*) |
| Inflow peak.....c.f.s..                              | 30,400          |
| Historic maximums:                                   |                 |
| Maximum release.....c.f.s..                          | 3,900           |
| Date.....  | 3-1-83          |
| Maximum water surface elevation.....ft., m.s.l..     | 1,277.7         |
| Date.....  | 3-1-83          |

\*inches of runoff

SANTA FE DAM AND RESERVOIR  
LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA  
MAY 1983

|   |                                |
|---|--------------------------------|
| Stream System.....  | San Gabriel River              |
| Drainage area.....sq. miles..                             | 236                            |
| Reservoir:  |                                |
| Elevation   |                                |
| Debris pool.....ft., m.s.l..                              | 456                            |
| Water supply pool.....ft., m.s.l..                        | 466                            |
| Flood control pool (spillway crest).....ft., m.s.l..      | 496                            |
| Spillway design surcharge level.....ft., m.s.l..          | 508.4                          |
| Top of dam.....ft., m.s.l..                               | 513                            |
| Area  |                                |
| Debris pool.....acres..                                   | 331.2                          |
| Water supply pool.....acres..                             | 473.9                          |
| Spillway crest.....acres..                                | 1,084                          |
| Spillway design surcharge level.....acres..               | 1,258                          |
| Top of dam.....acres..                                    | 1,298                          |
| Capacity, gross   |                                |
| Debris pool.....acre-feet..                               | 4,351.1 (0.35 <sup>o</sup> )   |
| Water supply pool.....acre-feet..                         | 8,291.4 (0.66 <sup>o</sup> )   |
| Spillway crest.....acre-feet..                            | 32,109 (2.55 <sup>o</sup> )    |
| Spillway design surcharge level.....acre-feet..           | 46,712 (3.71 <sup>o</sup> )    |
| Top of dam.....acre-feet..                                | 53,088 (4.22 <sup>o</sup> )    |
| June 1978   |                                |
| Allowance for sediment (50-year).....acre-feet..          | 8,000 (0.64 <sup>o</sup> )     |
| June 1978   |                                |
| Allowance for sediment (100-year).....acre-feet..         | 16,000 (1.27 <sup>o</sup> )    |
| 1969 Reduction in storage due to sediment.....acre-feet.. | 4222                           |
| Dam: - Type.....  | Earthfill                      |
| Height above original streambed.....ft..                  | 92                             |
| Top length.....ft..                                       | 23,800                         |
| Top width.....ft..  | 30                             |
| Freeboard.....ft..  | 4.6                            |
| Spillway: - type.....                                     | Ungated overflow concrete ogee |
| Crest length.....ft..                                     | 1,200                          |
| Design surcharge.....ft..                                 | 221,800                        |
| Design Discharge.....c.f.s..                              | 13.21                          |
| Outlets:  |                                |
| Gates - Type.....   | Vertical lift                  |
| Number and size.....ft..                                  | 16 - 6'W x 9'H                 |
| Gate sill elevation.....ft., m.s.l..                      | 421                            |
| Conduits  |                                |
| Number and size.....                                      | 76 - 7.33'W x 7.33'H           |
| Length.....ft..   | 515                            |
| Maximum capacity at spillway crest.....c.f.s..            | 41,000                         |
| Regulated discharge at spillway crest.....c.f.s..         | 41,000                         |
| Standard project flood:                                   |                                |
| Duration (inflow).....days..                              | 3.5                            |
| Total volume.....acre-feet..                              | 171,400 (13.62 <sup>o</sup> )  |
| Inflow peak.....c.f.s..                                   | 96,000                         |
| Probable maximum flood:                                   |                                |
| Duration (inflow).....days..                              | 4                              |
| Total volume.....acre-feet..                              | 556,000 (44.17 <sup>o</sup> )  |
| Inflow peak.....c.f.s..                                   | 222,000                        |
| Historic maximums:  |                                |
| Maximum discharge on record.....c.f.s..                   | 30,900                         |
| Date.....   | 1-26-69                        |
| Maximum water surface elevation.....ft., m.s.l..          | 473.97                         |
| Date.....   | 12-19-66                       |

\*inches of runoff

**CHARACTERISTICS OF MAJOR STORAGE PROJECTS  
LOS ANGELES COUNTY**

| PROJECT           |                             | DAM                     |       |              |                           |  |                      | SPILLWAY |                           |                       | RESERVOIR           |                            |                             |                          |                           |                             |                              |   |
|-------------------|-----------------------------|-------------------------|-------|--------------|---------------------------|--|----------------------|----------|---------------------------|-----------------------|---------------------|----------------------------|-----------------------------|--------------------------|---------------------------|-----------------------------|------------------------------|---|
| NAME OF DAM       | STREAM                      | DRAINAGE AREA (sq. mi.) | TYPE  | HEIGHT (ft.) | CREST ELEVATION (ft. msl) | OUTLET SILL (ft. msl)                      | LENGTH (ft.)         | TYPE     | CREST ELEVATION (ft. msl) | DESIGN CAPACITY (cfs) | PRIMARY PURPOSE(S)  | ELEVATION                  |                             |                          | STORAGE                   |                             |                              |   |
|                   |                             |                         |       |              |                           |  |                      |          |                           |                       |                     | MAX. NORMAL POOL (ft. msl) | MAX. DESIGN POOL (ft. msl)* | MAX. NORMAL POOL (ac-ft) | DESIGN SURCHARGE (ac-ft)* | DAM CREST ELEVATION (ac-ft) | MAX. SCHEDULE RELEASES (cfs) | MAX. RELEASES INCLUDING SPILLWAY (cfs)* |
| Big Dalton        | Big Dalton Creek            | 4.49                    | C,A,G | 146.0        | 1711.0                    | 1613.0**                                   | 480.0                | U        | 1706.0                    | 5310.0                | FC, WS              | 1706.0                     | 1711.0                      | 915.0                    | 119.2                     | 1037.0                      | 888.0                        | 6198.0                                  |
| Big Tujunga       | Big Tujunga Creek           | 82.30                   | C,A   | 200.0        | 2304.0                    | 2160.0**                                   | 505.0                | U        | 2290.0                    | 24,250.0              | FC, WS              | 2290.0                     | 2304.0                      | 5750.0                   | 1186.0                    | 6906.0                      | 2900.0                       | 27,150.0                                |
| Cogswell          | San Gabriel River-West Fork | 39.20                   | R     | 265.0        | 2405.0                    | 2148.0                                     | 585.0                | U        | 2385.0                    | 29,500.0              | FC, WS              | 2385.0                     | 2398.0                      | 8853.0                   | 2031.0                    | N/A                         | 8725.0                       | 38,225.0                                |
| Devil's Gate      | Arroyo Seco                 | 31.90                   | C,A,G | 100.0        | 1070.0                    | <sup>1</sup> 958.8**<br><sup>2</sup> 985.5 | 310.0                | U        | 1054.0<br>1065.5          | 14,800.0<br>1000.0    | FC, WS              | 1054.0<br>1065.5           | 1072.0                      | 2869.0<br>4787.0         | OT<br>OT                  | 2820<br>5683.0              | 5637.0                       | 20,937.0                                |
| Eaton Wash        | Eaton Creek                 | 12.42                   | E     | 62.0         | 902.0                     | 841.0                                      | 1525.0               | U        | 887.5                     | 33,500.0              | FC, WS              | 887.5                      | 897.5                       | 721.0                    | 457.0                     | N/A                         | 5040.0                       | 38,540.0                                |
| Live Oak          | Live Oak Creek              | 2.28                    | C,A,G | 70.0         | 1500.1                    | 1429.8**                                   | 303.0                | U        | 1496.4<br>1497.0          | 2400.0<br>(COMB.)     | FC, WS              | 1496.4<br>1497.0           | 1500.0                      | 239.0<br>245.0           | 6.5<br>N/A                | 282.3                       | 368.0                        | 2768.0                                  |
| Morris            | San Gabriel River           | 217.0                   | C,G   | 245.0        | 1175.0                    | 960.0                                      | 800.0                | G        | 1152.0<br>1170.0          | 34,200.0<br>100,000   | FC, WS              | 1175.0<br>(GR)             | 1175.0                      | 22,758.0<br>N/A          | N/A<br>N/A                | N/A                         | 5280.0                       | 100,000                                 |
| Pacoima           | Pacoima Creek               | 28.20                   | C,A,G | 365.0        | 2015.0                    | 1700.0**                                   | 640.0                | U        | 1950.0<br>1989.95         | 10,780.0              | FC, WS              | 1950.0<br>1989.0           | 2025.0                      | 3115.0<br>6589.0         | 5204.0<br>N/A             | 8981.0                      | 1048.0                       | 11,828.0                                |
| Puddingstone      | Puddingstone Creek          | 33.10                   | E,C   | 147.0        | 982.0                     | 882.1                                      | 2698.0<br>(Combined) | U        | 970.0                     | 6900.0                | FC, WS              | 970.0                      | 975.0                       | 16,468.0                 | 2504.0                    | N/A                         | 850.0                        | 7,750.0                                 |
| Puddingstone Div. | San Dimas Creek             | 20.0                    | E,C   | 33.5         | 1163.8                    | 1145.5                                     | 825.0                | U        | 1152.5                    | 10,600.0              | FC, DIVERSION<br>WS | 1152.5                     | 1158.5                      | 191.0                    | 116.0                     | N/A                         | 2180.0                       | 14,100.0                                |
| San Dimas         | San Dimas Creek             | 16.20                   | C,A,G | 117.0        | 1470.26                   | <sup>1</sup> 1358.0<br><sup>2</sup> 1369   | 340.0<br>(LS)        | U        | 1462.0                    | 27,455.0              | FC, WS              | 1462.0                     | 1470.0                      | 1306.0                   | 315.0                     | 1630.0                      | 2060.0                       | 28,600.0                                |
| San Gabriel       | San Gabriel River           | 202.70                  | E,R,C | 310.0        | 1481.0                    | 1205.8**                                   | 1500.0               | U        | 1453.0                    | 92,000.0              | FC, WS              | 1453.0                     | 1466.0                      | 44,226.0                 | 7412.0                    | N/A                         | 13,470.0                     | 110,870.0                               |
| Santa Anita       | Big Santa Anita Creek       | 10.82                   | C,A,G | 224.8        | 1324.8                    | 1161.2**                                   | 612.0                | U        | 1316.0<br>1324.8          | 2900.0                | FC, WS              | 1316.0<br>1324.8           | 1324.8                      | 776.5<br>905.7           | 129.2<br>N/A              | 905.7                       | 647.0                        | 3533.0                                  |
| Sawpit            | Sawpit Creek                | 3.24                    | C,A   | 147.0        | 1375.18                   | 1235.7**                                   | 527.0                | U        | 1360.0<br>1375.18         | 1450.0<br>610         | FC, WS              | 1360.0<br>1375.18          | 1375.18                     | 354.0<br>506.6           | 152.6<br>N/A              | 506.6                       | 457.0                        | 2584.0                                  |
| Thompson Cr.      | Thompson Creek              | 3.51                    | C,GL  | 66.0         | 1648.0                    | 1579.4                                     | 1500.0               | U        | 1634.1                    | 4520.0                | FC, WS              | 1634.1                     | 1645.0                      | 543.0                    | 369.7                     | N/A                         | 320.0                        | 4985.0                                  |

Dam Types  
Material Structure  
E - Earthfill A - Arch  
R - Rockfill G - Gravity  
C - Concrete GL - Gravel  
M - Masonry

Outlet Types  
1. Slide Gates  
2. Valves

Spillway Types  
U - Ungated  
G - Gated

Project Purposes  
FC - Flood Control  
P - Power  
WS - Water Supply

OT - Overtop the Dam  
GR - Gated in Raised Position  
LS - Less Spillway

\* Assumed at H.W.L.  
\*\* Center Line of Outlet Sill

EXHIBIT E

Streamflow Data For Big Tujunga  
Creek Stations

LITTLE TUJUNGA CREEK NEAR SAN FERNANDO, CALIFORNIA  
 Station Number F19-R (11096500)  
 Drainage Area 21.1 square miles  
 Elevation 1068 feet  
 Period of Record 1928 to 1974  
 No regulation or diversions above station  
 See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN<br>DAILY<br>FLOW<br>CFS | PEAK<br>FLOW<br>CFS | DATE  | MAX<br>DAILY<br>CFS | DATE  | MIN<br>DAILY<br>CFS | DATE | RUNOFF<br>AC-FT |
|--------------------------------|------------------------------|---------------------|-------|---------------------|-------|---------------------|------|-----------------|
| 1929                           | 0                            | 0                   |       | 0                   | 0     | 0                   |      | 0               |
| 1930                           | 0                            | 0                   |       | 0                   | 0     | 0                   |      | 0               |
| 1931                           | 0.078                        | 30                  | FEB04 | 7                   | FEB14 | 0                   |      | 56              |
| 1932                           | 2.57                         | 660                 | FEB09 | 274                 | FEB09 | 0                   |      | 1870            |
| 1933                           | 0.71                         | 450                 | JAN19 | 118                 | JAN19 | 0                   |      | 514             |
| 1934                           | 1.13                         | 1360                | JAN01 | 258                 | JAN01 | 0                   |      | 819             |
| 1935                           | 0.63                         | 89                  | DEC13 | 63                  | DEC13 | 0                   |      | 455             |
| 1936                           | 1.28                         | 653                 | FEB02 | 83                  | FEB12 | 0                   |      | 929             |
| 1937                           | 6.58                         | 964                 | FEB14 | 175                 | FEB14 | 0                   |      | 4760            |
| 1938                           | 12.4                         | 8500                | MAR02 | 1300                | MAR02 | 0                   |      | 8960            |
| 1939                           | 0.71                         | 175                 | MAR09 | 40                  | DEC18 | 0                   |      | 510             |
| 1940                           | 1.24                         | 2090                | JAN08 | 148                 | JAN08 | 0                   |      | 899             |
| 1941                           | 14.6                         | 1310                | MAR04 | 534                 | MAR04 | 0                   |      | 10600           |
| 1942                           | 0.27                         | 198                 | DEC28 | 30                  | DEC28 | 0                   |      | 199             |
| 1943                           | 10.2                         | 3700                | JAN23 | 592                 | JAN22 | 0                   |      | 7380            |
| 1944                           | 8.04                         | 4220                | FEB22 | 826                 | FEB22 | 0                   |      | 5840            |
| 1945                           | 0.76                         | 244                 | NOV11 | 48                  | FEB02 | 0                   |      | 551             |
| 1946                           | 0.8                          | 156                 | MAR30 | 96                  | MAR30 | 0                   |      | 577             |
| 1947                           | 0.98                         | 200                 | NOV20 | 54                  | DEC26 | 0                   |      | 706             |
| 1948                           | 0.01                         | 16                  | MAR24 | 2.6                 | MAR24 | 0                   |      | 9.1             |
| 1949                           | 0.0003                       | 0.9                 | MAY19 | 0.1                 | MAY19 | 0                   |      | 0.2             |
| 1950                           | 0.04                         | 9.8                 | DEC18 | 3.1                 | FEB06 | 0                   |      | 29              |
| 1951                           | 0.01                         | 13                  | JAN11 | 1.4                 | JAN29 | 0                   |      | 9               |
| 1952                           | 7.67                         | 2110                | JAN16 | 422                 | JAN16 | 0                   |      | 5570            |
| 1953                           | 0.25                         | 138                 | DEC01 | 18                  | DEC20 | 0                   |      | 184             |
| 1954                           | 0.56                         | 198                 | FEB13 | 43                  | JAN25 | 0                   |      | 407             |
| 1955                           | 0.06                         | 35                  | JAN18 | 7.3                 | JAN18 | 0                   |      | 47              |
| 1956                           | 0.52                         | 445                 | JAN26 | 123                 | JAN26 | 0                   |      | 381             |
| 1957                           | 0.05                         | 112                 | FEB28 | 5                   | JAN13 | 0                   |      | 35              |
| 1958                           | 4.75                         | 559                 | APR03 | 223                 | APR01 | 0                   |      | 3440            |
| 1959                           | 0.1                          | 84                  | JAN06 | 10                  | FEB11 | 0                   |      | 71              |
| 1960                           | 0.002                        | 6.7                 | FEB01 | 0.6                 | FEB01 | 0                   |      | 1.4             |

LITTLE TUJUNGA CREEK NEAR SAN FERNANDO, CALIFORNIA  
 Station Number F19-R (11096500)  
 Drainage Area 21.1 square miles  
 Elevation 1068 feet  
 Period of Record 1928 to 1974  
 No regulation or diversions above station  
 See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN<br>DAILY<br>FLOW<br>CFS | PEAK<br>FLOW<br>CFS | DATE  | MAX<br>DAILY<br>CFS | DATE  | MIN<br>DAILY<br>CFS | DATE | RUNOFF<br>AC-FT |
|--------------------------------|------------------------------|---------------------|-------|---------------------|-------|---------------------|------|-----------------|
| 1961                           | 0.07                         | 266                 | NOV05 | 11                  | NOV06 | 0                   |      | 52              |
| 1962                           | 3.31                         | 1630                | FEB11 | 365                 | FEB11 | 0                   |      | 2390            |
| 1963                           | 0.06                         | 52                  | FEB10 | 9.8                 | FEB10 | 0                   |      | 45              |
| 1964                           | 0.11                         | 251                 | JAN22 | 20                  | JAN21 | 0                   |      | 81              |
| 1965                           | 0.28                         | 223                 | APR09 | 50                  | APR19 | 0                   |      | 201             |
| 1966                           | 5.19                         | 1300                | NOV22 | 355                 | NOV24 | 0                   |      | 3760            |
| 1967                           | 5.71                         | 901                 | DEC06 | 358                 | DEC06 | 0                   |      | 4130            |
| 1968                           | 0.58                         | 112                 | NOV19 | 43                  | NOV21 | 0                   |      | 420             |
| 1969                           | 16.9                         | 1420                | FEB25 | 1180                | FEB25 | 0                   |      | 12250           |
| 1970                           | 0.39                         | 353                 | FEB28 | 37                  | MAR01 | 0                   |      | 286             |
| 1971                           | 0.98                         | est 569             | NOV29 | 93                  | NOV30 | 0                   |      | 711             |
| 1972                           | 0.33                         | 762                 | DEC25 | 58                  | DEC25 | 0                   |      | 240             |
| 1973                           | 2.14                         | 1570                | FEB11 | 477                 | FEB11 | 0                   |      | 1550            |

Average Discharge, 45 years: 2.51 cfs (1820 acre-feet per year)  
 Maximum Discharge on record: estimated 8500 cfs on 02 MAR 1938  
 Peak flows are instantaneous maximum discharge values corresponding  
 to the highest stage that occurred.

BIG TUJUNGA CREEK BELOW HANSEN DAM, CALIFORNIA

Station Number F20-R (11097000)

Drainage Area 153 square miles

Elevation 943 feet

Period of Record 1932 to present--fragmentary records

before 1940 available in LACFCD Annual Reports

Flow regulated since 1931 by Big Tujunga Dam, and since 1940

by Hansen Dam--LACDPW began diverting water 0.3 miles

upstream of gage beginning in 1952

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN                 |         | PEAK<br>FLOW<br>CFS | MAX<br>DAILY<br>CFS | MIN<br>DAILY<br>CFS | MIN<br>DAILY<br>CFS | RUNOFF<br>AC-FT | RUNOFF<br>PLUS<br>DIVER-<br>SION | PER-<br>CENT<br>DIVRTO<br>* |
|--------------------------------|----------------------|---------|---------------------|---------------------|---------------------|---------------------|-----------------|----------------------------------|-----------------------------|
|                                | DAILY<br>FLOW<br>CFS | DATE    |                     |                     |                     |                     |                 |                                  |                             |
| 1941                           | 115                  |         | 1200                | MAR06               | 1050                | MAR07               | 0               | 83220                            |                             |
| 1942                           | 5.8                  |         | 59                  | DEC30               | 59                  | JAN01               | 0               | 4190                             |                             |
| 1943                           | 9.25                 |         | 1780                | JAN23               | 1610                | JAN24               | 0               | 66970                            |                             |
| 1944                           | 60.3                 |         | 1100                | FEB22               | 985                 | FEB24               | 0               | 43750                            |                             |
| 1945                           | 13.8                 |         | 70                  | FEB05               | 441                 | FEB05               | 0               | 9960                             |                             |
| 1946                           | 7.01                 |         | 610                 | DEC23               | 543                 | DEC24               | 0               | 5070                             |                             |
| 1947                           | 21.6                 |         | 900                 | DEC27               | 480                 | DEC27               | 0               | 15650                            |                             |
| 1948                           | 0.013                |         | 34                  | FEB05               | 2.3                 | FEB05               | 0               | 9.1                              |                             |
| 1949                           | 0.004                |         | 0.5                 | APR01               | 0.08                | MAR10               | 0               | 2.6                              |                             |
| 1950                           | 0.002                |         | 1.6                 | MAR01               | 0.01                | MAR01               | 0               | 1.8                              |                             |
| 1951                           | 0                    |         | 0                   |                     | 0                   |                     | 0               | 0                                |                             |
| 1952                           | 12.1                 | est3000 |                     | JAN24               | 2550                | JAN25               | 0               | 8810                             | 29040 70                    |
| 1953                           | 0.09                 |         | 178                 | FEB04               | 3.8                 | DEC28               | 0               | 68                               | 1330 95                     |
| 1954                           | 0.34                 |         | 50                  | MAR02               | 9.4                 | JAN19               | 0               | 245                              | 1290 81                     |
| 1955                           | 0.03                 |         | 8.9                 | MAY07               | 1.9                 | APR30               | 0               | 20                               | 20 0                        |
| 1956                           | 0.03                 |         | 20                  | MAR01               | 4.1                 | APR12               | 0               | 25                               | 25 0                        |
| 1957                           | 0.03                 |         | 18                  | FEB28               | 1.7                 | FEB12               | 0               | 22                               | 22 0                        |
| 1958                           | 18                   |         | 1700                | APR03               | 1510                | APR04               | 0               | 13040                            | 33560 61                    |
| 1959                           | 0.006                |         | 16                  | JAN06               | 1                   | JAN06               | 0               | 4.6                              | 1020 99                     |
| 1960                           | 0.001                |         | 1.8                 | APR26               | 0.2                 | APR26               | 0               | 0.6                              | 0.6 0                       |
| 1961                           | 0.003                |         | 4.2                 | FEB05               | 0.3                 | MAR15               | 0               | 2                                | 2 0                         |
| 1962                           | 6.54                 |         | 3130                | FEB12               | 1600                | FEB12               | 0               | 4740                             | 17310 73                    |
| 1963                           | 0                    |         | 0                   |                     | 0                   |                     | 0               | 0                                | 0 0                         |
| 1964                           | 0                    |         | 0                   |                     | 0                   |                     | 0               | 0                                | 0 0                         |
| 1965                           | 0                    |         | 0                   |                     | 0                   |                     | 0               | 0                                | 0 0                         |
| 1966                           | 26.1                 |         | 3240                | NOV23               | 2320                | NOV23               | 0               | 18900                            | 38710 51                    |
| 1967                           | 8.54                 |         | 5130                | DEC22               | 404                 | DEC22               | 0               | 6180                             | 39090 84                    |
| 1968                           | 0.055                |         | 372                 | NOV21               | 16                  | APR25               | 0               | 40                               | 9870 99                     |
| 1969                           | 158                  |         | 11700               | FEB25               | 9450                | FEB25               | 0               | 114200                           | 147700 77                   |
| 1970                           | 3.3                  |         | 200                 | MAR17               | 58                  | MAR18+              | 0               | 2400                             | 14340 83                    |

**BIG TUJUNGA CREEK BELOW HANSEN DAM, CALIFORNIA**

Station Number F20-R (11097000)

Drainage Area 153 square miles

Elevation 943 feet

Period of Record 1932 to present--fragmentary records  
before 1940 available in LACFCD Annual Reports

Flow regulated since 1931 by Big Tujunga Dam, and since 1940  
by Hansen Dam--LACDPW began diverting water 0.3 miles  
upstream of gage beginning in 1952

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN                 | PEAK<br>FLOW<br>CFS | DATE  | MAX          | MIN  | RUNOFF<br>AC-FT | RUNOFF<br>PLUS<br>DIVER-<br>SION | PER-<br>CENT<br>DIVRTD<br>* |
|--------------------------------|----------------------|---------------------|-------|--------------|------|-----------------|----------------------------------|-----------------------------|
|                                | DAILY<br>FLOW<br>CFS |                     |       | DAILY<br>CFS |      |                 |                                  |                             |
| 1971                           | 0.05                 | 228                 | DEC01 | 9.5          | 0    | 43              | 11700                            | 99                          |
| 1972                           | 0                    | 0                   |       | 0            | 0    | 0               | 1932                             | 100                         |
| 1973                           | 4.54                 | 329                 | FEB15 | 272          | 0    | 3290            | 15050                            | 78                          |
| 1974                           | 0.03                 | 71                  | FEB08 | 2.1          | 0    | 28              | 6310                             | 99                          |
| 1975                           | 20.77                | 38                  | OCT31 | 2.5          | 0    | 41              | 5470                             | 99                          |
| 1976                           | 0.032                | 31                  | MAR11 | 1.9          | 0    | 23              | 5530                             | 99                          |
| 1977                           | 0.098                | 108                 | MAY11 | 5.9          | 0    | 71              | 3170                             | 98                          |
| 1978                           | 154                  | 12500               | FEB10 | 7760         | 0    | 111200          | 139344                           | 20                          |
| 1979                           | 24.8                 | 1040                | MAY24 | 597          | 0    | 17980           | 42670                            | 58                          |
| 1980                           | 119                  | 5020                | FEB17 | 3680         | 0.14 | 86100           | 117176                           | 27                          |
| 1981                           | 8.25                 | 1070                | JAN29 | 372          | 0    | 5980            | 20440                            | 71                          |
| 1982                           | 13.5                 | 2100                | MAR19 | 655          | 0    | 9750            | 24000                            | 59                          |
| 1983                           | 188                  | 15200               | MAR02 | 11400        | 0    | 136300          | 213223                           | 36                          |
| 1984                           | 22.4                 | 761                 | DEC29 | 384          | 0    | 16270           | M                                | M                           |
| 1985                           | 2.38                 | 1350                | DEC20 | 337          | 0    | 1720            | 13274                            | 87                          |
| 1986                           | 2.95                 | 887                 | FEB25 | 126          | 0    | 2130            | M                                | M                           |
| 1987                           | 0.36                 | 38                  | OCT02 | 8.3          | 0    | 258             | 7570                             | 97                          |

Maximum Discharge on Record: 15200 cfs on 02 MAR 1983

Maximum Outside of Record: 54000 cfs on 02 MAR 1938

Peak flows are instantaneous maximum discharge values corresponding  
to the highest stage that occurred.

\* percentage of flow through Hansen Dam that is diverted  
by LACDPW for spreading

RATING TABLE NO. 5

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

VERSION PC 1.0 5/20/85

EXPANDED RATING TABLE DATE PRINTED 07/11/88

11097000 BIG TUJUNGA CREEK BELOW HANSEN DAM

TYPE LOG (SCALE OFFSET = .9 ) RATING NO 5

BASED ON.....DISCHARGE MEASUREMENTS, NO....., AND....., AND IS..... WELL DEFINED BETWEEN..... AND.....  
 \*COMP BY.....DATE.....  
 FROM.....TO....., FROM.....TO..... \*CKD: BY.....DATE.....

| GAGE<br>HEIGHT<br>IN FEET | DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION) |          |          |          |          |          |          |          |          |          | DIFF IN Q<br>PER<br>TENTH GH |
|---------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|------------------------------|
|                           | .00   | .01      | .02      | .03      | .04      | .05      | .06      | .07      | .08      | .09      |                              |
| 1.00                      |   | 0.500    | 3.400    | 4.620    | 6.140    | 8.000    | 9.710    | 11.700   | 13.800   | 16.300   |                              |
| 1.10                      | 19.000  | 21.300   | 23.700   | 26.300   | 29.100   | 32.000   | 34.800   | 37.600   | 40.600   | 43.800   | 28.000                       |
| 1.20                      | 47.000  | 50.400   | 53.800   | 57.400   | 61.100   | 65.000   | 68.900   | 73.000   | 77.200   | 81.500   | 39.000                       |
| 1.30                      | 86.000  | 90.600   | 95.400   | 100.200  | 105.200  | 110.400  | 115.600  | 121.000  | 126.600  | 132.200  | 52.000                       |
| 1.40                      | 138.000   | 143.700  | 149.500  | 155.400  | 161.400  | 167.500  | 173.800  | 180.200  | 186.700  | 193.300  | 62.000                       |
| 1.50                      | 200.000   | 206.800  | 213.700  | 220.800  | 227.900  | 235.200  | 242.500  | 250.000  | 257.700  | 265.400  | 73.200                       |
| 1.60                      | 273.200   | 281.200  | 289.300  | 297.400  | 305.700  | 314.200  | 322.700  | 331.400  | 340.100  | 349.000  | 84.800                       |
| 1.70                      | 358.000   | 366.500  | 375.000  | 383.700  | 392.500  | 401.300  | 410.200  | 419.300  | 428.400  | 437.600  | 88.900                       |
| 1.80                      | 446.900   | 456.300  | 465.800  | 475.400  | 485.100  | 494.800  | 504.700  | 514.600  | 524.700  | 534.800  | 98.100                       |
| 1.90                      | 545.000   | 554.800  | 564.700  | 574.600  | 584.700  | 594.800  | 604.900  | 615.200  | 625.500  | 635.900  | 101.400                      |
| 2.00                      | 646.400   | 657.000  | 667.600  | 678.300  | 689.100  | 700.000  | 710.500  | 721.100  | 731.700  | 742.400  | 106.800                      |
| 2.10                      | 753.200   | 764.000  | 774.900  | 785.900  | 796.900  | 808.000  | 819.200  | 830.400  | 841.700  | 853.100  | 111.300                      |
| 2.20                      | 864.500   | 875.900  | 887.500  | 899.100  | 910.800  | 922.500  | 934.300  | 946.100  | 958.100  | 970.000  | 117.600                      |
| 2.30                      | 982.100   | 994.200  | 1006.000 | 1019.000 | 1031.000 | 1043.000 | 1056.000 | 1068.000 | 1081.000 | 1093.000 | 123.900                      |
| 2.40                      | 1106.000  | 1119.000 | 1131.000 | 1144.000 | 1157.000 | 1170.000 | 1183.000 | 1196.000 | 1209.000 | 1223.000 | 130.000                      |
| 2.50                      | 1236.000  | 1249.000 | 1263.000 | 1276.000 | 1290.000 | 1303.000 | 1317.000 | 1330.000 | 1344.000 | 1358.000 | 136.000                      |
| 2.60                      | 1372.000  | 1386.000 | 1400.000 | 1414.000 | 1428.000 | 1442.000 | 1456.000 | 1470.000 | 1485.000 | 1499.000 | 142.000                      |
| 2.70                      | 1514.000  | 1528.000 | 1543.000 | 1557.000 | 1572.000 | 1587.000 | 1601.000 | 1616.000 | 1631.000 | 1646.000 | 147.000                      |
| 2.80                      | 1661.000  | 1676.000 | 1691.000 | 1707.000 | 1722.000 | 1737.000 | 1753.000 | 1768.000 | 1783.000 | 1799.000 | 154.000                      |
| 2.90                      | 1815.000  | 1830.000 | 1846.000 | 1862.000 | 1877.000 | 1893.000 | 1909.000 | 1925.000 | 1941.000 | 1957.000 | 159.000                      |
| 3.00                      | 1974.000  | 1990.000 | 2006.000 | 2022.000 | 2039.000 | 2055.000 | 2072.000 | 2088.000 | 2105.000 | 2121.000 | 164.000                      |
| 3.10                      | 2138.000  | 2155.000 | 2172.000 | 2188.000 | 2205.000 | 2222.000 | 2239.000 | 2256.000 | 2274.000 | 2291.000 | 170.000                      |
| 3.20                      | 2308.000  | 2325.000 | 2343.000 | 2360.000 | 2378.000 | 2395.000 | 2413.000 | 2430.000 | 2448.000 | 2466.000 | 175.000                      |
| 3.30                      | 2483.000  | 2501.000 | 2519.000 | 2537.000 | 2555.000 | 2573.000 | 2591.000 | 2609.000 | 2628.000 | 2646.000 | 181.000                      |
| 3.40                      | 2664.000  | 2683.000 | 2701.000 | 2720.000 | 2738.000 | 2757.000 | 2775.000 | 2794.000 | 2813.000 | 2831.000 | 186.000                      |
| 3.50                      | 2850.000  | 2869.000 | 2888.000 | 2907.000 | 2926.000 | 2945.000 | 2964.000 | 2984.000 | 3003.000 | 3022.000 | 192.000                      |
| 3.60                      | 3042.000  | 3061.000 | 3081.000 | 3100.000 | 3120.000 | 3139.000 | 3159.000 | 3179.000 | 3198.000 | 3218.000 | 196.000                      |
| 3.70                      | 3238.000  | 3258.000 | 3278.000 | 3298.000 | 3318.000 | 3338.000 | 3358.000 | 3379.000 | 3399.000 | 3419.000 | 202.000                      |
| 3.80                      | 3440.000  | 3460.000 | 3481.000 | 3501.000 | 3522.000 | 3542.000 | 3563.000 | 3584.000 | 3605.000 | 3626.000 | 206.000                      |
| 3.90                      | 3646.000  | 3667.000 | 3688.000 | 3709.000 | 3731.000 | 3752.000 | 3773.000 | 3794.000 | 3815.000 | 3837.000 | 212.000                      |
| 4.00                      | 3858.000  | 3880.000 | 3901.000 | 3923.000 | 3944.000 | 3966.000 | 3988.000 | 4009.000 | 4031.000 | 4053.000 | 217.000                      |
| 4.10                      | 4075.000  | 4097.000 | 4119.000 | 4141.000 | 4163.000 | 4185.000 | 4207.000 | 4229.000 | 4252.000 | 4274.000 | 222.000                      |

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| GAGE<br>HEIGHT<br>IN FEET | DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION) |           |           |           |           |           |           |           |           |           | DIFF IN Q<br>PER<br>TENTH GH |
|---------------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------------|
|                           | .00   | .01       | .02       | .03       | .04       | .05       | .06       | .07       | .08       | .09       |                              |
| 4.20                      | 4297.000  | 4319.000  | 4341.000  | 4364.000  | 4387.000  | 4409.000  | 4432.000  | 4455.000  | 4477.000  | 4500.000  | 226.000                      |
| 4.30                      | 4523.000  | 4546.000  | 4569.000  | 4592.000  | 4615.000  | 4638.000  | 4661.000  | 4685.000  | 4708.000  | 4731.000  | 231.000                      |
| 4.40                      | 4754.000  | 4778.000  | 4801.000  | 4825.000  | 4848.000  | 4872.000  | 4896.000  | 4919.000  | 4943.000  | 4967.000  | 237.000                      |
| 4.50                      | 4991.000  | 5015.000  | 5038.000  | 5062.000  | 5086.000  | 5111.000  | 5135.000  | 5159.000  | 5183.000  | 5207.000  | 241.000                      |
| 4.60                      | 5232.000  | 5256.000  | 5280.000  | 5305.000  | 5329.000  | 5354.000  | 5379.000  | 5403.000  | 5428.000  | 5453.000  | 245.000                      |
| 4.70                      | 5477.000  | 5502.000  | 5527.000  | 5552.000  | 5577.000  | 5602.000  | 5627.000  | 5652.000  | 5677.000  | 5703.000  | 251.000                      |
| 4.80                      | 5728.000  | 5753.000  | 5779.000  | 5804.000  | 5829.000  | 5855.000  | 5880.000  | 5906.000  | 5932.000  | 5957.000  | 255.000                      |
| 4.90                      | 5983.000  | 6009.000  | 6035.000  | 6060.000  | 6086.000  | 6112.000  | 6138.000  | 6164.000  | 6190.000  | 6217.000  | 260.000                      |
| 5.00                      | 6243.000  | 6269.000  | 6295.000  | 6322.000  | 6348.000  | 6374.000  | 6401.000  | 6427.000  | 6454.000  | 6481.000  | 264.000                      |
| 5.10                      | 6507.000  | 6534.000  | 6561.000  | 6587.000  | 6614.000  | 6641.000  | 6668.000  | 6695.000  | 6722.000  | 6749.000  | 269.000                      |
| 5.20                      | 6776.000  | 6803.000  | 6830.000  | 6858.000  | 6885.000  | 6912.000  | 6940.000  | 6967.000  | 6995.000  | 7022.000  | 274.000                      |
| 5.30                      | 7050.000  | 7077.000  | 7105.000  | 7133.000  | 7160.000  | 7188.000  | 7216.000  | 7244.000  | 7272.000  | 7300.000  | 278.000                      |
| 5.40                      | 7328.000  | 7356.000  | 7384.000  | 7412.000  | 7440.000  | 7468.000  | 7497.000  | 7525.000  | 7553.000  | 7582.000  | 282.000                      |
| 5.50                      | 7610.000  | 7639.000  | 7667.000  | 7696.000  | 7724.000  | 7753.000  | 7782.000  | 7811.000  | 7839.000  | 7868.000  | 287.000                      |
| 5.60                      | 7897.000  | 7926.000  | 7955.000  | 7984.000  | 8013.000  | 8042.000  | 8072.000  | 8101.000  | 8130.000  | 8159.000  | 292.000                      |
| 5.70                      | 8189.000  | 8218.000  | 8247.000  | 8277.000  | 8306.000  | 8336.000  | 8366.000  | 8395.000  | 8425.000  | 8455.000  | 295.000                      |
| 5.80                      | 8484.000  | 8514.000  | 8544.000  | 8574.000  | 8604.000  | 8634.000  | 8664.000  | 8694.000  | 8724.000  | 8754.000  | 301.000                      |
| 5.90                      | 8785.000  | 8815.000  | 8845.000  | 8876.000  | 8906.000  | 8936.000  | 8967.000  | 8997.000  | 9028.000  | 9059.000  | 304.000                      |
| 6.00                      | 9089.000  | 9120.000  | 9151.000  | 9181.000  | 9212.000  | 9243.000  | 9274.000  | 9305.000  | 9336.000  | 9367.000  | 309.000                      |
| 6.10                      | 9398.000  | 9429.000  | 9460.000  | 9492.000  | 9523.000  | 9554.000  | 9586.000  | 9617.000  | 9648.000  | 9680.000  | 313.000                      |
| 6.20                      | 9711.000  | 9743.000  | 9775.000  | 9806.000  | 9838.000  | 9870.000  | 9901.000  | 9933.000  | 9965.000  | 9997.000  | 319.000                      |
| 6.30                      | 10030.000   | 10060.000 | 10090.000 | 10130.000 | 10160.000 | 10190.000 | 10220.000 | 10250.000 | 10290.000 | 10320.000 | 320.000                      |
| 6.40                      | 10350.000   | 10380.000 | 10420.000 | 10450.000 | 10480.000 | 10510.000 | 10550.000 | 10580.000 | 10610.000 | 10640.000 | 330.000                      |
| 6.50                      | 10680.000   | 10710.000 | 10740.000 | 10780.000 | 10810.000 | 10840.000 | 10870.000 | 10910.000 | 10940.000 | 10970.000 | 330.000                      |
| 6.60                      | 11010.000   | 11040.000 | 11070.000 | 11110.000 | 11140.000 | 11170.000 | 11210.000 | 11240.000 | 11270.000 | 11310.000 | 330.000                      |
| 6.70                      | 11340.000   | 11380.000 | 11410.000 | 11440.000 | 11480.000 | 11510.000 | 11540.000 | 11580.000 | 11610.000 | 11650.000 | 340.000                      |
| 6.80                      | 11680.000   | 11710.000 | 11750.000 | 11780.000 | 11820.000 | 11850.000 | 11890.000 | 11920.000 | 11950.000 | 11990.000 | 340.000                      |
| 6.90                      | 12020.000   | 12060.000 | 12090.000 | 12130.000 | 12160.000 | 12200.000 | 12230.000 | 12270.000 | 12300.000 | 12340.000 | 350.000                      |
| 7.00                      | 12370.000   | 12410.000 | 12440.000 | 12470.000 | 12510.000 | 12550.000 | 12580.000 | 12620.000 | 12650.000 | 12690.000 | 350.000                      |
| 7.10                      | 12720.000   | 12760.000 | 12790.000 | 12830.000 | 12860.000 | 12900.000 | 12930.000 | 12970.000 | 13010.000 | 13040.000 | 360.000                      |
| 7.20                      | 13080.000   | 13110.000 | 13150.000 | 13180.000 | 13220.000 | 13260.000 | 13290.000 | 13330.000 | 13360.000 | 13400.000 | 360.000                      |
| 7.30                      | 13440.000   | 13470.000 | 13510.000 | 13540.000 | 13580.000 | 13620.000 | 13650.000 | 13690.000 | 13730.000 | 13760.000 | 360.000                      |
| 7.40                      | 13800.000   | 13840.000 | 13870.000 | 13910.000 | 13950.000 | 13980.000 | 14020.000 | 14060.000 | 14090.000 | 14130.000 | 370.000                      |
| 7.50                      | 14170.000   | 14200.000 | 14240.000 | 14280.000 | 14310.000 | 14350.000 | 14390.000 | 14430.000 | 14460.000 | 14500.000 | 370.000                      |
| 7.60                      | 14540.000   | 14580.000 | 14610.000 | 14650.000 | 14690.000 | 14730.000 | 14760.000 | 14800.000 | 14840.000 | 14880.000 | 370.000                      |
| 7.70                      | 14910.000   | 14950.000 | 14990.000 | 15030.000 | 15060.000 | 15100.000 | 15140.000 | 15180.000 | 15220.000 | 15250.000 | 380.000                      |
| 7.80                      | 15290.000   | 15330.000 | 15370.000 | 15410.000 | 15450.000 | 15480.000 | 15520.000 | 15560.000 | 15600.000 | 15640.000 | 390.000                      |
| 7.90                      | 15680.000   | 15720.000 | 15750.000 | 15790.000 | 15830.000 | 15870.000 | 15910.000 | 15950.000 | 15990.000 | 16030.000 | 380.000                      |
| 8.00                      | 16060.000   | 16100.000 | 16140.000 | 16180.000 | 16220.000 | 16260.000 | 16300.000 | 16340.000 | 16380.000 | 16420.000 | 400.000                      |
| 8.10                      | 16460.000   | 16490.000 | 16530.000 | 16570.000 | 16610.000 | 16650.000 | 16690.000 | 16730.000 | 16770.000 | 16810.000 | 390.000                      |
| 8.20                      | 16850.000   | 16890.000 | 16930.000 | 16970.000 | 17010.000 | 17050.000 | 17090.000 | 17130.000 | 17170.000 | 17210.000 | 400.000                      |
| 8.30                      | 17250.000   |           |           |           |           |           |           |           |           |           |                              |

9-m

BIG TUJUNGA CREEK BELOW MILL CREEK, NEAR COLBY RANCH, CALIFORNIA

Station Number F111-R (1930-1932)

Station Number F111B-R (1932-1950) Drng Area 66.9 sq mi, Elev 2410 feet

Station Number F111C-R (1948-1972) Drng Area 64.9 sq mi, Elev 2650 feet  
11094000

No regulation or diversions above station

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN                 |                     | DATE | MAX          |      | MIN          |      | RUNOFF<br>AC-FT |
|--------------------------------|----------------------|---------------------|------|--------------|------|--------------|------|-----------------|
|                                | DAILY<br>FLOW<br>CFS | PEAK<br>FLOW<br>CFS |      | DAILY<br>CFS | DATE | DAILY<br>CFS | DATE |                 |

Stations F111-R and F111B-R

|      |      |       |       |      |       |     |        |                 |
|------|------|-------|-------|------|-------|-----|--------|-----------------|
| 1931 | 2    | 216   | FEB05 | 65   | FEB04 | 0   | JUN30  | 1450            |
| 1932 | 14.8 | 3910  | FEB08 | 964  | FEB09 | 0   | OCT01+ | 10800           |
| 1933 | 3.6  | 324   | JAN19 | 108  | JAN19 | 0   | OCT01+ | 2600            |
| 1934 | 4.27 | 1520  | JAN01 | 707  | JAN01 | 0   | OCT01+ | 3090            |
| 1935 | 13.3 | 640   | APR08 | 296  | APR08 | 0   | OCT01+ | 9600            |
| 1936 | 3.21 | 159   | FEB12 | 60   | FEB12 | 0   | JUL02+ | 2330            |
| 1937 | 26.9 | 1030  | FEB06 | 707  | FEB14 | 0   | OCT01+ | 19440           |
| 1938 | 63   | M     | MAR02 | 8200 | MAR02 | 0.8 | OCT01+ | 45600           |
| 1939 | 10.9 | 543   | DEC19 | 345  | DEC19 | 0.9 | AUG13+ | 7920            |
| 1940 | 7.62 | M     | M     | 276  | JAN08 | 0.2 | AUG20+ | 5530            |
| 1941 | 67.3 | 1380  | FEB20 | 1120 | FEB20 | 0.8 | OCT01+ | 48710           |
| 1942 | 8.2  | 112   | DEC10 | 57   | DEC29 | 0.6 | AUG05+ | 5930            |
| 1943 | 61.7 | 14800 | JAN23 | 4510 | FEB23 | 0.8 | OCT02+ | 44670           |
| 1944 | 50.2 | 3300  | FEB22 | 2240 | FEB22 | 2.5 | OCT02+ | 36470           |
| 1945 | 14.2 | 1870  | NOV11 | 500  | FEB02 | 1.1 | AUG09+ | 10300           |
| 1946 | 13.9 | 2700  | MAR30 | 1330 | MAR30 | 0.7 | JUL29+ | 10080           |
| 1947 | 15.2 | 1500  | DEC26 | 634  | DEC26 | 0.1 | AUG05+ | 11020           |
| 1948 | 2.64 | 140   | APR29 | 49   | APR29 | 0.1 | JUL13+ | 1910            |
| 1949 | 2.09 | 16    | JAN20 | 11   | MAR11 | 0   | JUL17+ | 1510            |
| 1950 | M    | 40    | FEB06 | 23   | FEB06 | 0.1 | OCT01+ | 1330 THRU MAY17 |

BIG TUJUNGA CREEK BELOW MILL CREEK, NEAR COLBY RANCH, CALIFORNIA

Station Number F111-R (1930-1932)

Station Number F111B-R (1932-1950) Drng Area 66.9 sq mi, Elev 2410 feet

Station Number F111C-R (1948-1972) Drng Area 64.9 sq mi, Elev 2650 feet  
11094000

No regulation or diversions above station

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN<br>DAILY<br>FLOW<br>CFS | PEAK<br>FLOW<br>CFS | MAX<br>DAILY<br>FLOW<br>CFS | MIN<br>DAILY<br>FLOW<br>CFS | DATE  | DATE | DATE   | RUNOFF<br>AC-FT |
|--------------------------------|------------------------------|---------------------|-----------------------------|-----------------------------|-------|------|--------|-----------------|
| Station F111C-R                |                              |                     |                             |                             |       |      |        |                 |
| 1949                           | 1.78                         | 13                  | MAR04                       | 11                          | MAR11 | 0    | JUL09  | 1290            |
| 1950                           | 1.48                         | 36                  | FEB06                       | 21                          | FEB06 | 0    | OCT01+ | 1070            |
| 1951                           | 0.55                         | 6.7                 | JAN29                       | 4.3                         | APR29 | 0    | OCT03+ | 398             |
| 1952                           | 26.7                         | 1380                | JAN18                       | 674                         | JAN18 | 0.06 | OCT01+ | 19390           |
| 1953                           | 3.28                         | 65                  | DEC02                       | 22                          | DEC02 | 0    | JUL22+ | 2370            |
| 1954                           | 5.28                         | 260                 | JAN25                       | 138                         | JAN25 | 0    | JUL19+ | 3820            |
| 1955                           | 2.63                         | 41                  | MAY01                       | 26                          | FEB17 | 0    | JUL13+ | 1910            |
| 1956                           | 2.49                         | 324                 | JAN26                       | 146                         | JAN26 | 0    | OCT01+ | 1810            |
| 1957                           | 2.03                         | 313                 | JAN13                       | 112                         | JAN13 | 0    | OCT01+ | 1470            |
| 1958                           | 27.6                         | 1770                | APR03                       | 844                         | APR03 | 0    | OCT01+ | 19970           |
| 1959                           | 3.29                         | 421                 | FEB16                       | 154                         | FEB16 | 0    | JUL23+ | 2380            |
| 1960                           | 0.94                         | 13                  | JAN10                       | 7.4                         | APR27 | 0    | JUN11+ | 683             |
| 1961                           | 0.64                         | 82                  | NOV06                       | 23                          | NOV06 | 0    | OCT01+ | 461             |
| 1962                           | 15.6                         | 2860                | FEB11                       | 1720                        | FEB11 | 0    | OCT01+ | 11260           |
| 1963                           | 1.61                         | 292                 | FEB09                       | 95                          | FEB10 | 0    | JUL13+ | 1170            |
| 1964                           | 1.17                         | 93                  | APR01                       | 55                          | APR01 | 0    | OCT01+ | 852             |
| 1965                           | 2.32                         | 99                  | APR19                       | 64                          | APR19 | 0    | OCT01+ | 1680            |
| 1966                           | 26.8                         | 6550                | DEC29                       | 1640                        | DEC29 | 0    | OCT01+ | 19370           |
| 1967                           | 26                           | 1630                | DEC06                       | 814                         | DEC06 | 0.8  | OCT01+ | 18810           |
| 1968                           | 21                           | 410                 | NOV21                       | 275                         | NOV22 | 1.3  | SEP11+ | 15260           |
| 1969                           | 98.9                         | 20700               | FEB25                       | 5320                        | FEB25 | 0.9  | OCT01+ | 71600           |
| 1970                           | 10.8                         | 707                 | FEB28                       | 320                         | MAR01 | 1    | SEP26  | 7800            |
| 1971                           | 12.2                         | 3300                | NOV29                       | 1050                        | NOV29 | 0.5  | SEP19+ | 8850            |

Average Discharge, 19 years, 1930-1949: 20.3 cfs  
Maximum Discharge 1930-1950, not determined, probably on  
March 2, 1938

Average Discharge, 23 years, 1949-1971: 12.3 cfs (8910 acre-feet per year)  
Maximum Discharge, 1949-1971: 20700 cfs on 25 FEB 1969

Peak flows are instantaneous maximum discharge values corresponding  
to the highest stage that occurred.

BIG TUJUNGA CREEK ABOVE GOLD CANYON (near SUNLAND)

Station Number F213-R (11095500)

Drainage Area 106 square miles

Elevation 1572 feet

Period of Record 1916 to 1979

Flow regulated since 1931 by Big Tujunga Dam

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN<br>DAILY<br>FLOW<br>CFS | PEAK<br>FLOW<br>CFS | DATE  | MAX<br>DAILY<br>CFS | DATE   | MIN<br>DAILY<br>CFS | DATE   | RUNOFF<br>AC-FT |
|--------------------------------|------------------------------|---------------------|-------|---------------------|--------|---------------------|--------|-----------------|
| 1917                           |                              | 800                 | DEC24 | 288                 | DEC24  | 0.3                 | AUG29  | 15000           |
| 1918                           | 30.6                         | 1760                | MAR11 | 1150                | MAR12  | 0.3                 | OCT05+ | 22200           |
| 1919                           | 7.92                         | 136                 | FEB11 | 73                  | FEB11  | 0.1                 | SEP20  | 5730            |
| 1920                           | 22.9                         | 1400                | MAR22 | 750                 | MAR22  | 0.5                 | OCT09  | 16600           |
| 1921                           | 14.4                         | 411                 | MAR13 | 232                 | MAY22  | 0.5                 | SEP26  | 10500           |
| 1922                           | 143                          | 8600                | DEC19 | 2500                | DEC29  | 1.5                 | OCT20  | 103000          |
| 1923                           | 20.4                         | 900                 | DEC13 | 628                 | DEC13  | 0.4                 | AUG03+ | 14700           |
| 1924                           | 5.06                         | 87                  | MAR26 | 55                  | MAR27  | 0.1                 | AUG06+ | 3670            |
| 1925                           | 5.1                          | 325                 | APR05 | 122                 | APR05  | 0.1                 | OCT01+ | 3700            |
| 1926                           | 26.9                         | 4000                | APR07 | 1040                | APR08  | 0.2                 | OCT01+ | 19500           |
| 1927                           | 29.6                         | 3830                | FEB16 | 1820                | FEB16  | 0.5                 | OCT17+ | 21400           |
| 1928                           | 6.67                         | 850                 | FEB04 | 350                 | APR04  | 0.1                 | AUG04+ | 4840            |
| 1929                           | 5.72                         | 216                 | APR04 | 99                  | APR05  | 0.1                 | OCT08+ | 4130            |
| 1930                           | 6.01                         | 260                 | MAY03 | 128                 | MAR15  | 0.1                 | OCT01+ | 4350            |
| 1931                           | 4.24                         | 228                 | FEB04 | 152                 | FEB05  | 0.1                 | NOV11+ | 3070            |
| 1932                           | 24.6                         | 1330                | FEB08 | 854                 | FEB09  | 0.1                 | OCT01+ | 17900           |
| 1933                           | 10.5                         | 1390                | JAN19 | 488                 | JAN19  | 1.1                 | NOV24+ | 7590            |
| 1934                           | 10.6                         | 1450                | JAN01 | 634                 | JAN01  | 0.9                 | NOV25  | 7700            |
| 1935                           | 20.5                         | 671                 | APR08 | 354                 | APR08  | 2.6                 | JUN27  | 14840           |
| 1936                           | 10.5                         | 494                 | FEB02 | 150                 | FEB12  | 2.4                 | DEC04+ | 7640            |
| 1937                           | 50.1                         | 495                 | DEC12 | 423                 | FEB17+ | 1                   | NOV08+ | 36260           |
| 1938                           | 116                          | 50000               | MAR02 | 13000               | MAR02  | 2.5                 | DEC17  | 83960           |
| 1939                           | 18.8                         | 380                 | DEC20 | 316                 | DEC21  | 3.5                 | JUL23+ | 13640           |
| 1940                           | 15.1                         |                     |       | 350                 | FEB06  | 1.6                 | OCT29+ | 10990           |
| 1941                           | 109                          | 1650                | FEB21 | 1260                | FEB21  | 1.2                 | NOV26+ | 78840           |
| 1942                           | 14.8                         | 165                 | DEC28 | 62                  | DEC31  | 4.4                 | JUL07+ | 10690           |
| 1943                           | 105                          | 23000               | JAN23 | 8000                | JAN23  | 1.2                 | NOV10+ | 76020           |
| 1944                           | 79.9                         | 4760                | FEB22 | 3320                | FEB22  | 2.3                 | NOV15+ | 57990           |
| 1945                           | 24                           | 897                 | FEB02 | 320                 | FEB02  | 4.8                 | MAY16+ | 17370           |
| 1946                           | 23.7                         | 1300                | MAR30 | 698                 | MAR31  | 4.9                 | MAR25  | 17160           |
| 1947                           | 26.2                         | 745                 | DEC25 | 644                 | DEC26  | 4                   | AUG06  | 18960           |
| 1948                           | 6.4                          | 53                  | FEB05 | 25                  | JUL16+ | 0.7                 | SEP13+ | 4640            |
| 1949                           | 3.4                          | 20                  | JAN20 | 13                  | JAN20  | 0.6                 | OCT08+ | 2460            |
| 1950                           | 4.1                          | 73                  | NOV10 | 30                  | NOV10  | 1.7                 | MAY11+ | 2960            |

BIG TUJUNGA CREEK ABOVE GOLD CANYON (near SUNLAND)

Station Number F213-R (11095500)

Drainage Area 106 square miles

Elevation 1572 feet

Period of Record 1916 to 1979

Flow regulated since 1931 by Big Tujunga Dam

See Plate 2-1B for location

| WATER YEAR<br>ENDING<br>SEP 30 | MEAN                 |       | PEAK<br>FLOW<br>CFS | MAX          |       | MIN          |        | RUNOFF<br>AC-FT |
|--------------------------------|----------------------|-------|---------------------|--------------|-------|--------------|--------|-----------------|
|                                | DAILY<br>FLOW<br>CFS | DATE  |                     | DAILY<br>CFS | DATE  | DAILY<br>CFS | DATE   |                 |
| 1951                           | 2.1                  | 10    | NOV13               | 7.1          | NOV13 | 0.2          | AUG15+ | 1510            |
| 1952                           | 56.9                 | 2960  | JAN18               | 1740         | JAN18 | 1.3          | OCT01+ | 41320           |
| 1953                           | 9                    | 108   | NOV15               | 59           | FEB07 | 1.8          | MAY02  | 6510            |
| 1954                           | 11.4                 | 387   | JAN25               | 227          | JAN25 | 0.6          | OCT18+ | 8240            |
| 1955                           | 5                    | 73    | JAN18               | 33           | JAN18 | 1.1          | OCT26+ | 3580            |
| 1956                           | 6.5                  | 301   | JAN27               | 214          | JAN27 | 0.3          | SEP23+ | 4700            |
| 1957                           | 3.2                  | 60    | JAN13               | 25           | JAN13 | 0.2          | OCT03+ | 2290            |
| 1958                           | 53.7                 | 1670  | APR03               | 1190         | APR04 | 0.8          | NOV20+ | 38910           |
| 1959                           | 6.3                  | 245   | FEB11               | 133          | FEB18 | 1.8          | OCT17  | 4570            |
| 1960                           | 2.7                  | 22    | JAN12               | 12           | JAN12 | 0.1          | SEP11  | 1950            |
| 1961                           | 1.3                  | 86    | NOV05               | 16           | NOV06 | 0.2          | OCT06+ | 926             |
| 1962                           | 29.8                 | 4770  | FEB11               | 1850         | FEB12 | 0.6          | OCT14+ | 21540           |
| 1963                           | 3.3                  | 412   | FEB09               | 94           | FEB10 | 0.6          | OCT27  | 2370            |
| 1964                           | 3.7                  | 166   | JAN22               | 44           | JAN22 | 0.2          | SEP09+ | 2690            |
| 1965                           | 3.9                  | 220   | APR09               | 77           | APR09 | 0.1          | OCT04+ | 2790            |
| 1966                           | 63.9                 | 5220  | DEC30               | 2850         | NOV23 | 1            | NOV07+ | 46250           |
| 1967                           | 62.9                 | 1900  | DEC06               | 906          | DEC06 | 10           | OCT30  | 45540           |
| 1968                           | 21                   | 410   | NOV21               | 275          | NOV22 | 1.9          | SEP11+ | 15260           |
| 1969                           | 213                  | 21300 | FEB25               | 9250         | FEB25 | 0.8          | OCT23+ | 148100          |
| 1970                           | 21.9                 | 560   | FEB28               | 208          | MAR01 | 2.6          | AUG27  | 15830           |
| 1971                           | 22.8                 | 1320  | NOV29               | 290          | NOV29 | 2.9          | OCT01  | 16520           |
| 1972                           | 6.4                  | 121   | JAN04               | 121          | JAN04 | 0.9          | OCT23+ | 4670            |
| 1973                           | 28.3                 | 1840  | FEB11               | 970          | FEB11 | 0.3          | AUG03  | 20480           |
| 1974                           | 13.6                 | 336   | JAN07               | 235          | JAN07 | 1            | SEP17+ | 9820            |
| 1975                           | 15.1                 | 232   | MAR06               | 94           | APR05 | 1            | NOV07+ | 10900           |
| 1976                           | 8.5                  | 378   | FEB09               | 151          | SEP11 | 0.9          | DEC30+ | 6080            |
| 1977                           | 8.7                  | 444   | JAN03               | 202          | MAY10 | 0.05         | AUG03  | 6264            |
| 1978                           | 208                  | 26000 | FEB10               | 13600        | FEB10 | 0            |        | 150645          |
| 1979                           | 55.1                 |       |                     | 579          |       |              |        | 39785           |

Average Discharge, 60 years, 1918-77: 28.0 cfs (20290 acre-feet/year)

Maximum Discharge on Record: estimated 50000 cfs on 02 MAR 1938

Peak flows are instantaneous maximum discharge values corresponding to the highest stage that occurred.

EXHIBIT F

Environmental Evaluation

DEPARTMENT OF THE ARMY  
LOS ANGELES DISTRICT CORPS OF ENGINEERS  
FINDING OF NO SIGNIFICANT IMPACT  
HANSEN DAM WATER CONTROL MANUAL  
LOS ANGELES COUNTY, CALIFORNIA

I have reviewed the attached Environmental Assessment (EA) prepared for the Hansen Dam Water Control Manual Project, Los Angeles County, California. The reservoir operation schedule was revised in 1988 to limit the maximum release to 20,800 cfs in order to maximize the discharge of water flow from the basin while not exceeding the capacity of the downstream channel. Under the recommended plan, the gates on the eight gated outlets will be kept open at 1.0 ft. until the water surface elevation reaches 1,010.5 feet. After the water surface elevation reaches 1,010.5 feet, all gates will be opened fully to 8.0 feet, until the downstream capacity of 20,800 cfs is reached at a pool elevation of 1053.0 feet. The gates will be progressively closed as the water surface elevation rises until, at elevation of 1066.0 feet, the gates are fully closed. At this point, spillway flow, plus flow through the two ungated outlets, will approximately equal downstream channel capacity.

I have considered possible impacts of implementation of the revised schedule on the environment, including those associated with significant resources as discussed in the Environmental Assessment. No significant adverse impact to vegetation or wildlife at Hansen Dam will occur. Communities such as willow riparian and riparian scrub were already subjected to inundation under the previous operations schedule. These communities will also be subject to inundation under revised operations. Under the proposed revisions, surface water elevation levels will generally be less than one foot greater than under existing conditions. Inundation will last less than two hours longer than under current operations. For any given flood event this increased inundation will affect less than five additional acres of habitat; therefore, no significant adverse impacts will be associated with the revised schedule.

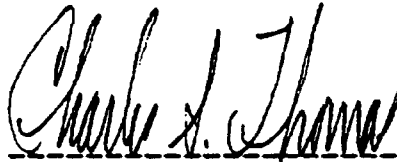
Implementation of the revised operations schedule will not affect the continued existence of the least Bell's vireo, which has historically nested at Hansen Dam, or any other endangered or threatened wildlife or plant species.

Three prehistoric sites fall within the Hansen Dam flood control basin, LAN-167, LAN-300 and "Hansen 3". These sites within the basin are presently subject to inundation and flooding of the Tujunga Wash in extreme conditions. Sites will not be affected by temporary inundation. No impacts are expected to occur as a result of the change in operational schedule in the basin.

I have considered the available information contained in the EA, and it is my determination that the proposed project will not result in a significant effect on the existing environment. Therefore, preparation of an Environmental Impact Statement (EIS) is not required.

15 Jun 90

DATE



-----  
CHARLES S. THOMAS  
Colonel, Corps of Engineers  
District Engineer

EXHIBIT G

Chain of Correspondence For Approval of Water Control Manual

CESPD-ED-W (CESPL-ED-HR/14 Nov 89) (1110-2-240) 3rd End Hsu/bg/5-1521  
SUBJECT: Hansen Dam Water Control Manual

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street,  
Room 720, San Francisco, CA 94111-2206

28 SEP 1990

For Commander, Los Angeles District, ATTN: CESPL-ED-HR

1. Subject manual is approved subject to the correction of the anomaly on the outflow hydrograph curve at 15 hours on 3-2-83 in Plate 8-7.
2. District is requested to submit four copies of report quality reproduction of this final version of the manual to this office after completion.

FOR THE COMMANDER:

Encl  
wd

JAY K. SOPER  
Director, Engineering

CF:  
CESPD-ED-W  
~~CESPD-ED-W/HSU~~  
CESPD RF

JH  
JH/bg  
CESPD-E  
5-1521  
28 SEP

JH  
CESPD-E

WCD  
WCD

WCD  
JKS 285  
CESPD-E

10 SEP 1990

CESPL-ED-HR (CESPL-ED-HR/14 Nov 89) (1110-2-240b) 2nd End. Stuart FTS 798-3001  
SUBJECT: Hansen Dam Water Control Manual

DA, Los Angeles District, Corps of Engineers, 300 N. Los Angeles Street,  
Los Angeles, CA 90053-2325

FOR Commander, South Pacific Division, ATTN: CESP-ED

1. Enclosed are four copies of the final Hansen Dam Water Control Manual prepared in accordance with ETL 110-2-251. Responses to CESP comments (enclosure 1) provided by 1st endorsement have been incorporated into the enclosed manuals. Report quality reproduction of this final version of the manual will begin upon receipt of your final approval.
2. If you have any questions, please contact Robert Stuart of our Reservoir Regulation Section.

FOR THE COMMANDER:

Encls

ROBERT E. KOPLIN, PE  
Chief, Engineering Division

CF: (wo/encls)

KOPLIN  
CESPL-ED

CESPL-ED-H  
CESPL-ED-HR (2)  
CESPL-ED-S

LEIFIELD  
CESPL-ED

EVELYN  
CESPL-ED-H

BIGORNIA  
CESPL-ED-HR

STUART  
CESPL-ED-HR  
ep/X3001

CESPD-ED-W (CESPL-ED-HR/14 Nov 89) (1110-2-240b) 1st End Krhoun/B-465-1433  
SUBJECT: Hansen Dam Water Control Manual

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 720,  
San Francisco, CA 94111-2206

28 MAR 1990

FOR Commander, Los Angeles District, ATTN: CESPL-ED-HR

1. Subject final draft manual has been reviewed and comments are enclosed. These comments are submitted to assist the District in finalizing the manual. Approval will be given after review by this office of the final manual.
2. The EA associated with the manual was received and reviewed in January 1990. There are no comments on this document.
3. District is requested to submit its responses to the comments along with the submission of the final manual.

FOR THE COMMANDER:

2 Encls  
Wd all cpy of encl 1  
Added 1 Encl  
2. Comments

JAY E. BOYER  
Director  
DIRECTORATE OF ENGINEERING

FK/dh  
CESPD-ED  
5-1433  
23 IL. 90

CF: VCESPD-ED-W/Krhoun (w/encl)  
CESPD-ED-W (w/encl)  
CESPD RF

JM  
CESPD-ED

WCD

JKS  
CESPD-ED

FACSIMILE HEADER SHEET  
(ER 105-1-5)

|                          |                              |                           |                                   |                  |     |
|--------------------------|------------------------------|---------------------------|-----------------------------------|------------------|-----|
| FROM (Name)<br>F. Krhoun | OFFICE SYMBOL<br>CESPD-ED-W  | TELEPHONE NO.<br>705-1433 | RELEASER'S SIGNATURE<br>F. Krhoun |                  |     |
| TO (Name)<br>B. Bigornia | OFFICE SYMBOL<br>CESPL-ED-HR | TELEPHONE NO.<br>705-6915 | PAGES<br>2                        | PRIORITY<br>ASAP | DTG |
| SUBJECT                  |                              |                           |                                   |                  |     |

U.S. Government Printing Office: 1989-629-550

CESPD-ED-W

8 March 1990

**SOUTH PACIFIC DIVISION  
COMMENTS ON  
WATER CONTROL MANUAL  
HANSEN DAM**

1. Page III-2, 2nd line- Hansen Dam was authorized as a single purpose flood control reservoir. As such, its operation of the dam was for flood control and it should not have to be operated "more strictly" due to sediment increase. Suggest this sentence be revised.

2. Page III-3, Paragraph 3-05- Delete "and conservation storage" in the third line of this paragraph. Since the project was authorized for only flood control storing water for conservation purposes is not appropriate. It is noted that releasing water from the debris pool to enhance groundwater activities of LACDPW is desirable as this storage would not effect the protection afforded downstream.

3. Page V-3, Paragraph 5-06a- Indicate that Lopez Dam is ungated and that is the reason that there are no electrical or telephone at the dam. This would eliminate any possibility someone questioning the lack of facilities at dam.

4. Page VI-1, Paragraph 6-01a- Delete the last sentence in this sub-paragraph as it relates to future operations.

5. Page VII-2, Paragraph 7-05-

a. In the first paragraph change coordinated to attempt to inform. It appears the manual as written infers approval of LACDPW prior to the Corps making flood control releases. In the event of a communication outage the Corps should make flood control releases even if it can't contact LACDPW.

b. Revise the third sentence of the second paragraph. It is unlikely that outflow could equal inflow unless the reservoir is in a static condition, that is there is no change in storage. In most cases there will be a change of storage which is caused by a difference between inflow and outflow unless the gates settings are constantly changed. The plan in the manual calls for all gates to be fully opened once the reservoir reaches elevation 1010.5 feet.

6. Page VII-3, Paragraph 7-05- In the first full sub-paragraph on this page the manual states Hansen Dam is a component of a reservoir system and will be operated accordingly. Briefly describe in this section how that is to be accomplished.

7. Page VII-5, Paragraph 7-13- Eliminate the second sub-paragraph. The water control plan is based on the rated capacity of the downstream channel which should be able to pass the maximum release with minor damages. It is noted that the

District Commander has the approval authority for emergencies. Any planned deviations from approved operating criteria must be submitted to the Division office for approval.

8. Page VIII-7, Paragraph 8-06- This paragraph indicates that flood control releases will not be made until until LACDFW has adjusted its diversion gate in the channel downstream of the dam. The District should not be restricted to making releases by the downstream interests. Revise this paragraph to indicate the District will attempt to provide adequate warning time to downstream interests if flood control releases are to be made. District should make releases as shown in the operating plan even if LACDFW has not been able to adjust its diversion gate.

9. Plate 3-4- See comment 8 for notification of LACDFW.

10. Plate 4-2- The row marked annual is misleading. The data in this row is either average like mean monthly temperature and precipitation or maximums and minimums. Please revise the table accordingly. Although this table is based on 34 years of record the period of record ends in 1964. It would be more appropriate if this data could be shown for a gage with approximately the same length of record in the vicinity of the one shown in the chart which is still active and would be representative of Burbank.

11. Plate 4-8- Extend this chart through water year 1989.

12. Plates 5-4 and 5-6- Extend these tables through the channel capacity of 20,800 cfs.

13. Plate 8-7- There appears to be an error in the inflow and outflow curves at 1500 hours on 3-2-83.

**DEPARTMENT OF THE ARMY**LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 2711  
LOS ANGELES, CALIFORNIA 90003-0211REPLY TO  
ATTENTION OF.

CESPL-ED-HR (1110-2-240)

14 November 1989

MEMORANDUM FOR Commander, South Pacific Division, ATTN: CESPD-ED-W

SUBJECT: Hansen Dam Water Control Manual

1. Enclosed are three draft copies of the Hansen Dam Water Control Manual for your review and approval. The draft Environmental Assessment (EA) has been completed and requires additional coordination to address biological issues with the U.S. Fish and Wildlife Service. Submittal of the draft EA is expected to be made before the end of the calendar year. We are sending the draft Water Control Manual ahead of the EA in order to expedite the review process and minimize delays in the 3-year program for water control manual updates.
2. A copy of the draft Water Control Manual has also been sent to the Los Angeles County Department of Public Works for concurrent review.

FOR THE COMMANDER:



ROBERT E. KOPLIN, PE  
Chief, Engineering Division

Encl (3 copies)