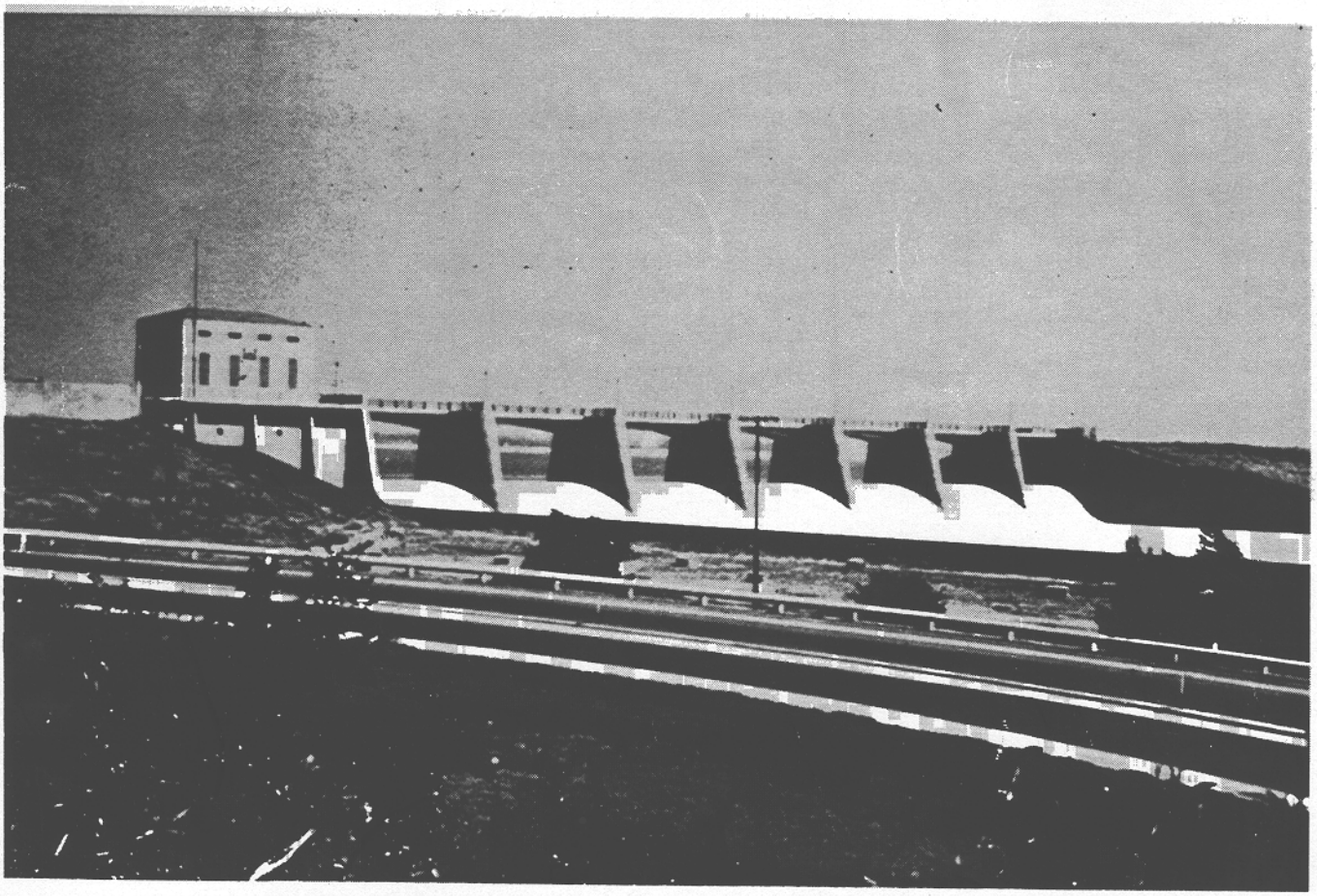
US Army Corps
of Engineers
Los Angeles District

WATER CONTROL MANUAL

SEPULVEDA DAM & RESERVOIR
LOS ANGELES RIVER, CALIFORNIA



MAY 1989

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 spillway 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**
Spillway gates begin to automatically lower	ft., NGVD	712.0
Spillway gates complete automatic lowering	ft., NGVD	715.0
Area		
Top of spillway 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 spillway 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
Freeboard	ft	30
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.

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SEPULVEDA DAM AND RESERVOIR
LOS ANGELES RIVER, CALIFORNIA

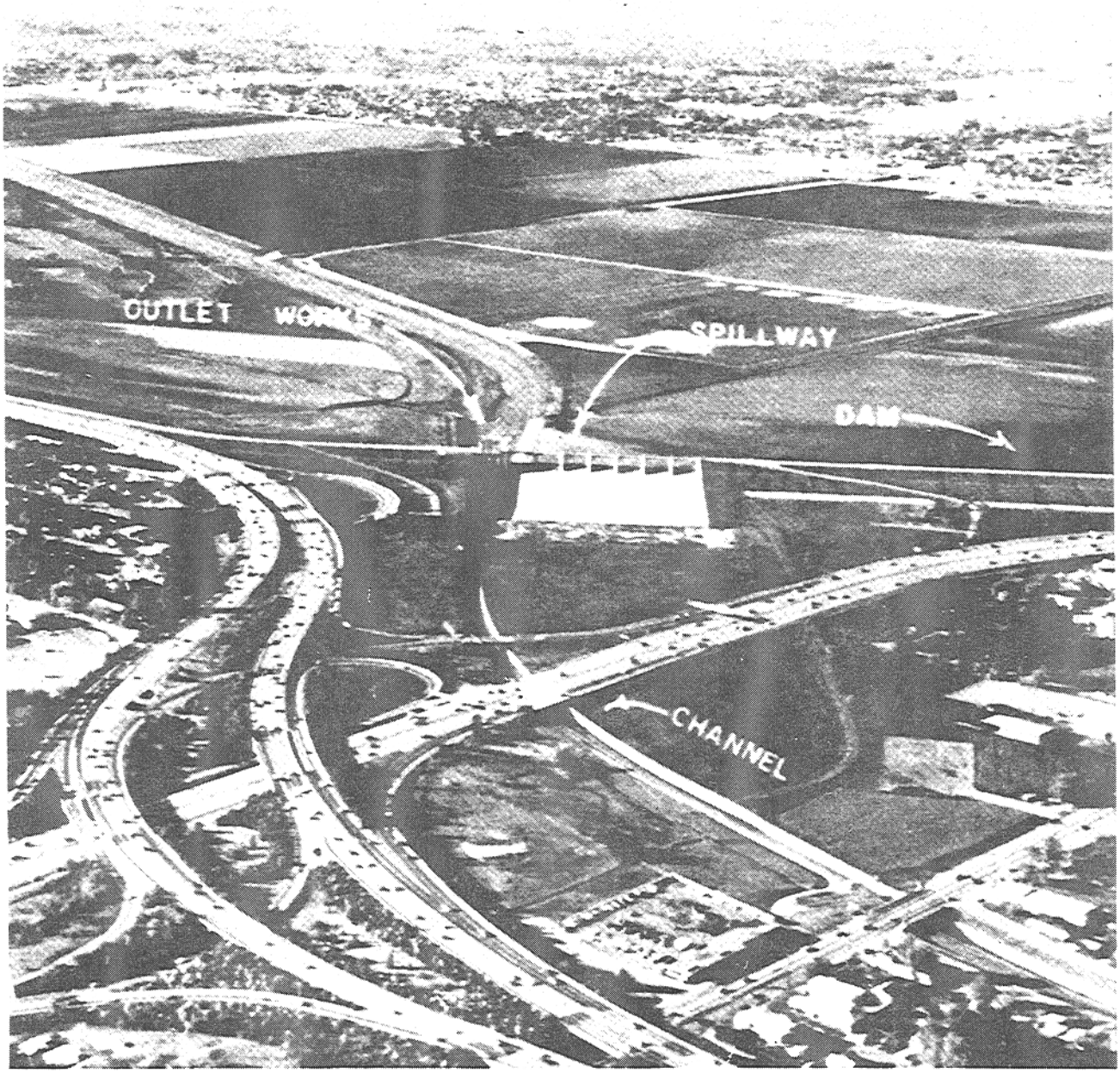
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

May, 1989

Prepared by

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

Reservoir Regulation Section



SEPULVEDA DAM

NOTICE TO USERS OF THIS MANUAL

Regulations specify that this Water Control Manual be published in looseleaf 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 in order to keep the manual current.

EMERGENCY REGULATION ASSISTANCE PROCEDURES

In the event that unusual conditions arise, contact can be made by telephone to the U.S. Army Corps of Engineers, Los Angeles District Office during official business hours (0730-1600, Monday through Friday), plus during non-duty periods of flood operations:

Reservoir Regulation Unit (213)452-3530

Sepulveda Dam and Reservoir (view from downstream of dam, taken 5/14/85).

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EXHIBITS

ABBREVIATIONS USED

ac-ft	acre-feet
ALERT	Automated Local Evaluation in Real Time (a hydrologic system consisting of automatic telemetry precipitation and stream gauges that report to a local community computer which is programmed to process data from these gauges in real time and make hydrologic forecasts)
cfs	cubic feet per second
LACDA	Los Angeles County Drainage Area (the drainage area, or watershed, of Los Angeles and San Gabriel River and their tributaries)
mph	miles per hour
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration

I - INTRODUCTION

1-01. Authorization

The authority and directives for the preparation of this manual are contained in the following U.S. Army Corps of Engineers publications:

ETL 1110-2-251, 14 March 1980: Guide for Preparing Water Control Manuals.

ER 1110-2-240, 8 October 1982: Engineering and Design, Water Control Management.

EM 1110-2-3600, 30 November 1987: Engineering and Design, Management of Water Control Systems.

1-02. Purpose and Scope

This water control manul is prepared pursuant to requirements set fourth in the Code of Federal Regulations, Title 33, Part 208.11, subparagraph d-4, entitle, "Water Control Plan and Manual." This Manual contains (a) descriptive information pertaining to the drainage area and the project; (b) a description of the plan of operation of Sepulveda Dam and its application to various floods; (c) the organization for operations by the U.S. Army Corps of Engineers, Los Angeles District; and (d) sources of hydrologic data and forecasts.

1-03. Related Manuals and Reports

Manuals and reports relevant to Sepulveda Dam, Sepulveda Reservoir, the drainage areas above and below Sepulveda Reservoir, and significant hydraulic structures relating to these drainage areas are listed in table 1-01.

1-04. Project Owner

Sepulveda Dam and the Reservoir lands behind the dam(frequently referred to as the Sepulveda Flood Control Basin) are owned by the Federal Government and are under the jurisdiction of the U.S. Army Corps of Engineers, Los Angeles District.

Under the authority of Public Law 387, 77th Congress (PL 77-387), PL 78-534 and PL 79-526 (the latter two have effectively superseded PL 77-387), the Corps of Engineers leases reservoir lands behind Sepulveda Dam. One thousand five hundred twenty-seven (1,527) acres are leased to the City of Los Angeles, Department of Parks and Recreation, for park and recreational purposes. Ninety-five point six (95.6) acres are leased to the City of Los Angeles, Department of Public Works, for operation of Donald C. Tillman Water Reclamation Plant. The Corps also leases 28 acres to Franklin Field, Inc., for use as a children's baseball park and other purposes.

1-05. Operating Agency

The operation of Sepulveda Dam is the responsibility of the U.S. Army Corps of Engineers, Los Angels District. The District Engineer has delegated authority for this function through the Chief, Engineering Division, Chief, Hydrology and Hydraulics Branch, to the Chief, Reservoir Regulation Section. The chain of command for reservoir operations decisions ins given in table 9-01.

1-06. Regulating Agency

The U.S. Army Corps of Engineers, Los Angeles District, is totally responsible for the regulation and maintenance of Sepulveda Dam and associated structures and facilities in Sepulveda Reservoir and along portions of Los Angeles River and its tributaries.

Table 1-01. Previously Issued Publications.

Title	Date
Analysis of Design, Vol I, Sepulveda Dam	August 1939 Revised October 1941
Analysis of Design, 57-ft. X 10-ft. Crest Gates for Sepulveda Dam	October 1939
Survey Report, Sep	January 1940
Analysis of Design, Vol. II, Bridges and Channels	March 1940
Analysis of Design, Vol. III, Balboa Blvd. Bridge	November 1940
Trash Rack Alteration, Historical, Removing Trash Racks and Construction of Temporary Timber Bulkhead	January 1946
Preliminary Report, Recreational Development, Sepulveda Flood-Control Basin	April 1947
Report, Master Recreation Plan, Sepulveda Flood-Control Reservoir	March 1953
Draft: Sedimentation Studies for Sepulveda Flood-Control Basin, June 1961 Survey	September 1963
Sepulveda Dam and Reservoir, Periodic Inspection and Continuing Evaluation, Report No. 1	May 1970
Operation and Maintenance Manual for Sepulveda Dam, Los Angeles River Improvement, Los Angeles County Drainage Area, California	December 1970
Report on Sedimentation, Resurvey of June 1961, Sepulveda Flood Control Reservoir	August 1971
Revised Recreation Master Plan for Sepulveda Flood Control Reservoir	November 1973
Sepulveda Dam: Dam, Outlet Works and Spillway, Periodic Inspection Report No. 2	July 1975
Operation and Maintenance Manual, Los Angeles County Drainage Area Project, California	December 1975
Interim Report on Hydrology and Hydraulic Review of Design Features of Existing Dams for Los Angeles County Drainage Area Dams	June 1978

Table 1-01. (Continued)

Title	Date
Sepulveda Dam: Dam, Outlet Works and Spillway, Periodic Inspection No. 3	May 1980
Sepulveda Basin Master Plan, Final Environmental Impact Report/Environmental Impact Statement	March 1981
Sepulveda Basin Recreation Lake: Feature Design Memorandum	March 1987
Environmental Assessment, Water Control Plan, Sepulveda Flood Control Basin	May 1987
Sepulveda Basin Recreation Lake and Wildlife Area: Specifications	August 1987
Draft: Los Angeles County Drainage Area R	February 1988

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II - DESCRIPTION OF PROJECT

2-01. Location

Sepulveda Dam is located across the Los Angeles River, 43 miles above the mouth of the river, and 6 miles above the confluence of Tujunga Wash and the 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. Highway 101) and the San Diego Freeway (Interstate Highway 405). (See pls. 2-01 through 2-04).

Sepulveda Dam, which lies within the City of Los Angles, is about 2 miles southwest of the City of Van Nuys Civic Center, 9 miles west of the City of Burbank, and about 15 miles northwest of the Civic Center of Los Angels. The geographical coordinates of the outlet works of the dam are 34E09'48"N latitude, 118E27'59"W longitude.

2-02. Purpose

The primary purpose for which Sepulveda Dam was constructed is flood control. Other uses and benefits of the dam and reservoir such as recreation, agriculture, and wildlife mitigation are secondary. Sepulveda Dam regulates flows on the Los Angeles Rive, and is designed to prevent flooding along the river below the dam.

Sepulveda Dam forms part of the system of flood control structures located on the San Gabriel and the Los Angeles Rivers and their tributaries, which are collectively known as the Los Angeles County Drainage Area (LACDA) (see pl. 2-02 and Exhibit C).

2-03. Physical Components

Sepulveda Dam a consists of an earthfilled embankment with a reinforced concrete spillway and outlet works. The components of Sepulveda Dam and Reservoir include:

a. Dam. The dam is an unzoned, impervious, rolled-earth embankment with a crest length, including outlet works and spillway, of 15,444 feet (2.93 miles) at top of dam, elevation 725 feet, NGVD, and a crest width of 30 feet (pl. 2-05). The maximum height above the original Los Angeles River streambed is 57 feet. The upstream slope is 1:3, and the downstream slope is 1:4. The upstream slope is protected by grouted stone paving.

One flank of the dam’s embankment extends southwestward from the outlet works, then westward alongside the Ventura Freeway (merging with the freeway embankment for approximately 0.6 miles) (pl. 2-07). The other flank extends northeastward, then northward, along the Aan Diego Freeway (merging with the freeway embankment for approximately 1.1 miles).

b. Outlet Works. The outlet works are located at the southwest end of the spillway section and aligned to discharge into the downstream Los Angeles River (pls. 2-08 through 2-12).

(1). Approach Cannel. Inflow to the outlet works (when water is not stored behind the dam) is from the northwest via the approach channel of the Los Angeles River (pls. 2-05 and 2-08).

(2) Outlets. The outlets of the dam are installed in a concrete section, 83 feet in width. Outflow is discharged through four gated outlets, 6 feet wide y 9 feet high, and four ungated outlets, 6 feet wide by 6,5 feet high–all with entrance invert (sometimes referred to as gated sill) at elevation 668 feet.

The four gated outlets are in the center of the outlet works, with tow ungated outlets on each side (pls. 2-08 through 2-12). The hydraulically operated, vertical lift type gates open and close about one foot per minute and may be locked in any position.

The outlet works are equipped with trash racks on the upstream side to prevent debris from obstructing the outlets or washing downstream (pl.2-10).

Plate 2-13 shows discharge rating curves for each of the four gated and four ungated outlets at Sepulveda Dam, plus curves for all gated and/or ungated outlets combined. The discharge (in thousands of cubic feet per second) is plotted against reservoir water surface elevation (in feet, NGVD), assuming in each case fully opened gates. A tabulation of total discharge through all eight gates (fully open) is given in Exhibit E.

(3) Outlet Channel. Downstream of the conduit outlet portals, piers 13 feet in length provide a smooth transition to the flow from the eight conduits to the downstream channel (see pls. 2-08 through 2-12). Below the piers, the outflow discharges into a rectangular concrete channel, which is 83 feet side for a distance of 294 feet, then tapers, over a 400-foot transition, to a width of 50 feet (pls. 2-08 through 2-12).

The channel invert, from the portal piers through the transition taper, is designed on a slope of 0.00924, which is sufficient to prevent backwater on the conduits and to insure smooth flow through the transition for discharges up to at least 15,300 cubic feet per second (cfs).

The combined maximum capacity of the outlets is 16,500 cfs at a reservoir water surface elevation of 710 feet–the height of the spillway crest with spillway gates raised (see Section2-03.d.(2)).

Downstream of Sepulveda Dam, the channel capacity of Los Angeles River increases progressively (pl. 2-04).

c. Control House. A control house, located on top of the dam and entered over the outlet conduits (pls. 2-08 through 2-12), contains a switchboard, standby power units, service hoist, and communication and hydrologic equipment. Commercial power is supplied for lighting, with standby power available.

d. Spillway. The spillway is a reinforced concrete ogee section of the overflow gravity type, having a gross length of 469 feet and a crest elevation of 700 feet, NGVD (pls. 2-08 through 2-12). The spillway has seven submersible drum gates, each 57 feet long. The description of a drum gate is give in EM 1110-2-3600 (4-2.b.(3)) and is quoted below.

A drum gate is designed to float on water in a chamber located in the spillway crest. The water which is being spilled flows over the top of the drum onto the ogee section of the spillway. The drum is raised by hydrostatic pressure and its range of operation is from its lower limit where the top of the drum is at the spillway crest elevation (fully open) to its upper limit where the top of the drum corresponds to full pool level (fully closed).

The drum gates are separated by six 10-foot-wide piers, with a 5-foot-wide pier abutting each end of the spillway (pl. 2-09). The total net spillway width over which can pass is thus 399 feet.

(1) Spillway Approach. The approach to the spillway (pls. 2-08 and 2-09; photograph 2-20) is a very gently sloping unpaved earthen ramp, rising from the river's approach channel to an elevation of 680 feet (pl.2-10).

(2) Crest Gates. Sepulveda Dam was designed with operable crest gates instead of with a fixed spillway. This was done in order to minimize the water surface elevation of a spillway design flood, and hence minimize the height of the op of the dam–-thus saving on both construction costs and the amount of land that would have to be acquired for the reservoir. With a fixed spillway elevation, flow over the spillway crest would increase rather gradually as the water would rise above the reservoir design flood elevation (and spillway crest elevation) of 710 feet. With moveable spillway crest gates, on the other hand, the lowering of these gates would allow for a much greater discharge from the reservoir at heights not greatly in excess of the spillway crest.

The seven crest gates, each submersible drum gates, are constructed of structural steel, with each complete gate assembly weighing about 100,000 pounds. These gates are designed to rise of the ogee section in unison to a maximum elevation of 710 feet– the elevation above which an uncontrolled spill occurs (pls. 2-08 and 2-10). The gates are set for fully automatic operations, but can also be operated in semi-automatic or emergency manual modes, as described below.

(a) Fully Automatic Operation. The crest gates are designed to operate automatically as the reservoir water surface elevation rises above 692.5 feet. This operation, which is essential to prevent overtopping and failure of the embankment of the dam by a probably maximum flood, is depicted on plates 2-14 and 2-15, and is explained in the subparagraphs below.

1. Crest Gate Operation as Function of Water Surface Elevation.

a. Water Surface Elevation Below 692.5 feet. At all reservoir surface elevations below approximately 692.5 feet, the crest gates are in their lowest position, with spillway crest elevation of 700 feet.

Below each crest gate is a gate pit. When the reservoir water surface elevation reaches elevation 686 feet (the bottom of the gate pit inlet–pls. 2-09 through 2-12), water begins to flow through the inlet into the gate pit (pls. 2-14, diagram I).

The water surface elevation inside the gate pit rises with that of the reservoir, but lags behind the reservoir water surface elevation by perhaps a foot or more if the reservoir is rising rapidly (pl.2-14).

b. Water Surface Elevation 692.5-699 feet. When the gate pit water surface elevation reaches 692.5 feet, the corresponding crest gate begins to float. The gate then rises ahead of the reservoir surface, maintaining an increasing freeboard above the reservoir (pl. 2-15), but with the maximum rate of rise of each crest gated limited to approximately 6 feet per hour. When the water surface inside each gate pit has reached approximately 699 feet, the corresponding crest gate has reached its maximum elevation of 710 feet.

During the floods of 16 February 1980 (when the reservoir water surface elevation reached its all-time historical maximum of 705.10 feet) and 1 March 1983 (maximum reservoir surface 702.53 feet), all crest gates had risen to their maximum height of 710 feet.

If the reservoir water surface elevation were to peak below 699 feet, the water in each gate pit will begin to flow out through the inlet, back into the reservoir, and the crest gate will be gin to lower.

During the storm and reservoir impoundment of 20-24 February 1944, the automatic operation of each crest each gate was recorded, and the results are diagramed on plates 2-16 and 2-17. Plate 2-16 depicts the rise and fall with time of both the reservoir water surface and each of the seven crest gates on 22 February 1944. Plate 2-17 plots the crest gate elevation against the reservoir water surface elevation. The lag of each crest gate behind the rise or fall of the reservoir can be seen on plate 2-17.

c. Water Surface Elevation 699-712 feet. As can be seen on plate 2-15, the top of each crest gate is maintained at maximum elevation of 710 feet for reservoir surface elevations between approximately 699 feet and 712 feet. The latter number is the current setting of an adjustable elevation at which the crest gates begin to automatically lower.

The diagrams of Plate 2-14 show a cable stretching from the crest gate around an idler wheel and a pair of pulleys to a float housed within a float well located within the reservoir. At a water surface elevation of about 710 feet (diagram II), the idler wheel has been lifted to near the top of its slot by upward forces exerted by both the float and the floating crest gate.

d. Water Surface Elevation 712-715 feet. When the reservoir water surface elevation (and hence the water surface inside each float well) reaches 712 feet (according to the current setting), the idler wheel rises sufficiently to hoist the lift valve, opening the outflow conduit, and allowing water to escape from the gate pit (pl. 2-14, diagram III). Since the outflow conduit is larger than the inflow conduit, the water surface in the gate it lowers, and the floating crest gate also begins to fall until the lift valve reaches a level at which the inflow to, and outflow from the gate pit are balanced. The rate of spill over the top of the lowering crest gates is now increasing rapidly.

The lowering of the crest gates as a function of the rising reservoir surface (between 712 and 715 feet–-the current settings) can be seen on Plate 2-15. The mechanical cause of the automatic lowering of each crest gate is the continued rise of the float inside the float well.

The leverage that is exerted by the rising float (pl. 2-14) is determined by settings of the Crest Gate Control Mechanism. These are described on plate 2-18. According to the current settings, a float-rise of 3 feet (from 712 to 175) will lower the top of the crest gate all the way down from its maximum elevation of 710 to its lowest position of 700 feet (pl. 2-12).

It should be noted that the physical top of the crest gate is its exposed end point when the gate is mostly or totally elevated (pl. 2-14, diagrams II and III). As the gate is lowered, the highest point on the gate travels along the curved upper surface of the gate, progressively closer to the gate hinge (pl. 2-14, diagram I).

The minimum time required for the crest gates to lower all the way from 710 to 100 feet is about 15 minutes.

e. Water Surface Elevation Above 715 feet. For any reservoir water surface elevation 715 feet (according to the current setting), the crest gates will have completely lowered to the ogee crest elevation of 700 feet (pl. 2-15), and water will be spilling over all seven bays of the spillway at depths exceeding 15 feet.

2. Spillway Discharge Rates. Plate 2-19 depicts the rating curve for the discharge through the seven spillway bays as a function of reservoir water surface elevation, given the current fully automatic crest

gate settings. For reservoir surface elevations between 710 and 712 feet, the discharge over the top of the crest gates increases very slowly. At elevations between 712 and 715 feet, however, the rate of discharge increases very rapidly with elevation, as the crest gates lower from 710 to 700 feet.

One characteristic of this type of crest gate is that for reservoir elevations in excess of 712 feet (as the crest gates are currently set), the spill rate increases so rapidly that serious downstream flooding could result in the event of a reservoir surface elevation of 713 or 714 feet. The Standard Project Flood is calculated to produce a maximum reservoir surface elevation of 713.52 feet. This is discussed and illustrated in more detail in Section 8-02.b.

3. Adjustments of Crest Gate Settings. The crest gates, as currently set, begin to lower automatically when the reservoir surface elevation reaches 712 feet. They complete their lowering process when the reservoir surface reaches 715 feet. Theses elevations are individually adjustable within certain limits.

The reservoir surface elevation at which the crest gates begin to lower automatically can be individually set between 710 feet and 715 feet. The reservoir surface at which the gates become fully lowered can be set between 710 feet and 716 feet. The mechanisms by which these adjustments are possible, along with diagrams, discussions, and examples of how such adjustments are made, are depicted on plate 2-18.

(b) Semi-Automatic Crest Gate Operation. It is also possible for the control mechanism of each crest gate to be adjusted so that the gate will float upward ahead of a rising reservoir surface, but will remain at any selected elevation from 700 though 710 feet inclusively, without automatically lowering again as the reservoir surface continues to rise above elevation 710 feet. This semi-automatic operation procedure option is described on plate 2-18, and in more detail in the Operation and Maintenance Manual for Sepulveda Dam, Los Angeles River Improvements, Los Angeles County Drainage Area, California (December 1970).

Implementation of this semi-automatic type of crest gate control requires a minimum of one-half hour for each of the seven crest gates, and requires the physically demanding labor of at least one person (for the opening and closing of nine gate valves by the turning of large heavy valve wheels). If all gates were to be placed from fully automatic operation into semi-automatic operation at the same time (for example, during a major storm and runoff event), a crew of seven trained persons would be required. The same task could perhaps be accomplished with a crew of four, working for at least one hour. (In the opinion of the current Sepulveda Dam Tender, two gates are about the maximum that one person could change at one time without becoming overly fatigued.)

The reverse procedure (from semi-automatic to fully automatic) involves approximately the same time and manpower requirements.

During a major storm event, with streets flooded and with helicopter

travel dangerous because of low clouds and strong winds, it may not be practical to transport a crew to Sepulveda Dam in time to implement such semi-automatic operation in order to avoid the automatic lowering of the crest gates. On the other hand, the crest gates must not be left on semi-automatic operation permanently. This would defeat the purpose for which fully automatic crest gate operation is designed and programmed in order to prevent overtopping and failure of the embankment of the dam by a Probable Maximum Flood. (And for the same reasons as transport a crew to the dam in time to change the crest gate operation from semi-automatic to fully automatic in anticipation of a near Probable Maximum Flood.)

(C) Manual Crest Gate Operation. The crest gates can also be operated manually during periods of low or zero water storage behind Sepulveda Dam, as is illustrated on plate 2-18.

1. Testing, Using City Water. In this test operation, which is normally performed once each year, city water is piped into the gate pit to of each crest gate, and the gate is floated to its maximum elevation of 710 feet. The water is then released, and the gate lowers to its minimum elevation of 700 feet. The entire test operation of all seven crest gates takes several hours and requires many thousands of gallons of city water.

The automatic lowering of the spillway gates cannot, however, be tested by the use of city water. There is no easy way t sustain high water in the float well. Furthermore, no historical flood has ever approached the threshold of automatic lowering (currently set at 712 feet), so no natural test of this feature has ever occurred.

2. Emergency Manual Operation. If the control mechanism of any crest gate should become inoperative, there is an emergency procedure by which a crest gate can be manually raised or lowered. Implementation of this procedure requires at least one-half hour, and requires the services of one able-bodied crew member for each gate.

(3) Spillway Apron. Water Spilling over the raised crest gates would cascade down across the ogee onto the spillway apron. This apron is a large concrete slab with a gentle downward slope, extending 694 feet downstream of the ogee (see pls. 2-05 through 2-09).

e. Reservoir Lands. The boundaries of this normally dry reservoir are defined according to the real estate acquired by the Federal Government for the purpose of flood control behind Sepulveda Dam. These boundaries (shown on pl. 2-07) encompass a total of 2,097 acres and extend essentially from the San Diego Freeway (I-405) on the east and the Ventura Freeway (U.S.-101) on the south to Victory Boulevard on the north and to about 0.2 miles beyond Balboa Boulevard on the west, with a strip of flood control land about 0.4 mile wide extending westward on either side of the Los Angeles River to White Oak Avenue.

Table 2-01 lists the volume of, and area covered by, impounded water in Sepulveda Reservoir as a function of water surface elevation. Plate 2-20 graphically depicts these relationships. Exhibit D is a detailed table of the reservoir water surface elevation vs. capacity (storage) for Sepulveda Dam.

The inundation caused by the impoundment of water to specific elevations behind Sepulveda Dam are shown in table 2-02.

f. Los Angeles River Channel. The channel of the Los Angeles River, along most of its length below Sepulveda Dam, and for about 7 miles upstream of Sepulveda Dam, is of concrete construction on the sides and bottom, either rectangular or trapezoidal, with a shallow rectangular low-flow channel in the center. The channel capacities and configurations of the Los Angeles River between Sepulveda Dam and the Pacific Ocean are depicted on plate 2-04.

2-04. Related Control Facilities

The flows of the Los Angeles River, upstream to the confluence with Tujunga Wash, is regulated exclusively by Sepulveda Dam. Below Tujunga Wash, the Los Angeles River is regulated jointly by Sepulveda, Pacoima, Lopez, and Hansen Dams. Still farther downstream, other dams, including Devil's gate and Whittier Narrows, are added to the list (see Section 4-11).

2-05 Real Estate Acquisition

The boundaries of real estate that the U.S. Army Corps of Engineers acquired for Sepulveda Reservoir are depicted on plate 2-07. The original cost of this 2,097-acre acquisition, which took place between 1939 and 1942, was $1,497,595.

2-06. Public Facilities

Plate 2-07 is a map of Sepulveda Reservoir, depicting the various recreational and other facilities that comprise the Sepulveda Basin Master Plan.

A summary and discussion of existing and proposed facilities within Sepulveda Reservoir is contained in the U.S. Army Corps of Engineers Final Report of Sepulveda Basin Master Plan, Final Environmental Impact Report/Environmental Impact Statement (March 1981) and the Sepulveda Basin Recreation Lake; Feature Design Memorandum (March 1987). Table 2-03 lists these facilities.

In accordance with guidance outline in EC 113–2-121, the Corp s of Engineers participates with the City of Los Angeles in a cost-sharing program for recreational development, known as the Code 710 Program. The Sepulveda Basin Master Plan, Final Environmental Impact Report/Environmental Impact Statement, approved in March 1981, provides the basis for future development within the basin.

a. Recreation Facilities. Bull Creek Park, located in the central area of Sepulveda Flood Control Basin, is to be composed of a 26-acre recreation lake and adjacent facilities and 134 acres of park lands. The park will provide multiple recreational opportunities including bicycling, jogging, hiking, non-motorized boating, informal play activities, and picnicking.

The recreation lake facility is currently under construction. The volume of the lake will be approximately 180 ac-ft at a maximum water surface elevation of 704.5 feet. The entire lake will be formed by excavation. Materials excavated from the lake are deposited along the northern perimeter of the site above the Probable Maximum Flood (PMF) elevation of 716.66 feet resulting in no net impact to the Sepulveda Basin that inundate the recreation lake facility.

b. Wildlife Management Facilities. A wildlife area is located in the eastern portion of the Sepulveda Basin. North of Burbank Boulevard, near the intersection of Woodley Avenue, a wildlife management section is currently under expansion; upon completion of the current phase the management section will include a 15-acre riparian area, an 8-acre Oak-woodland area, a 26-acre native grassland and coastal sage scrub area, and an 11-acre wildlife pond. At a maximum water surface elevation of 684 feet, the approximate volume of the pond will be 43 ac-ft. The volume will be completely compensated for by excavating material upstream and adjacent to the dam spillway structure below the spillway crest elevation (700 feet, NGVD), and removing the material from the basin. An overflow spillway will keep the maximum elevation of the pond at 684 feet by passing excess water to the Los Angeles River Channel. South of the intersection of Burbank Boulevard and Woodley Avenue is a designated wildlife area though no current or future plan exists for enforcement of wildlife management policies. Again, no net impact to flood control capacity of Sepulveda Dam has occurred as a result of wildlife mitigation activity.

c. Arts Park Facility. In the north-central corner of Sepulveda Basin, closest to urban areas with high intensity use and adjacent to the recreation lake, an Arts Park has been designated. The park will be limited to tents and other temporary structures that would be erected seasonally. The Arts Park poses not threat to Sepulveda basin’s primary objectives of flood control.

It can be anticipated that, in time, public facilities within the Sepulveda Flood Control Basin will be inundated at various elevations. It is for this reason that all projects within the basin must comply with hydraulic criteria as developed by the U.S. Army Corps of Engineers (Sepulveda Basin Recreation Lake: Feature Design Memorandum (March 1987)).

Subsequent phases of future project development intended for enhancement of public recreation and wildlife preservation must also not impact flood control objectives. Flood management needs are the primary purpose of Sepulveda Basin, with all future development adhering to these needs and requirements.

d. Wastewater Treatment Facilities. Located in the northeast corner of the Sepulveda Flood Control Basin is the Donald C. Tillman Water Reclamation Plan (TWRP). TWRP is owned and operated by the City of Los Angeles, Department of Public Works on land leased by the department from the U.S. Army Corps of Engineers since 1969. The plant was place on-line in September 1985 and currently provides advanced secondary treatment for an average influent of 40 million gallons per day. Phase II expansion of TWRP is expected to be completed in 1991, increasing the capacity of the plant to 80 million gallons per day.

As a result of continuing urbanization in the San Fernando Valley (causing an increase in the expected inflow), the TWRP is located within the expected 100-year frequency flood water surface elevation (see pl. 2-07), increasing the chances of inundation of the plant. Because TWRP was constructed with Federal assistance, the National Flood Insurance Act Amendments of 1973 required that it be protected from the 100-year frequency flood event (see table 1-01; Environmental assessment, Water Control Plan, Sepulveda Flood Control Basin, (may 1987)). The Environmental Protection Agency (EPA) has thus requested the City of Los Angeles to provide a floodwall and/or floodproofing for the plant. The design is currently under evaluation, however, the design alternative chosen will no result in any net negative impact to the flood control capability of the Sepulveda Flood Control Reservoir. As stated in previous sections of this report, operation of the reservoir is committed to flood control objectives regardless of any deleterious effects that may occur to facilities within the basin. In the event the TWRP becomes inundated during flood control operations, the plant would be shut down and all sewage would be diverted via a sewer line connected with the Los Angeles Hyperion Treatment Plant.

Any future development associated with the TWRP will be subject to the same conditions stated above, to preserve the flood control capability of the Sepulveda Food Control Reservoir.

Table 2-01. Relationships of Water Surface Elevation to Capacity (Storage) and Area, Sepulveda Dam, Los Angeles County Drainage Area, California.

Water Surface Elev.* (ft., NGVD)	Volume (ac-ft)	% of Capacity to Spillway Crest (Crest Gates Raised)	Area (acres)	Maximum Depth (ft)
668.0	0.0	0.00	0.00	0
669.0	0.3	0.00	0.45	1
670.0	0.9	0.01	0.90	2
671.0	2.1	0.01	1.50	3
672.0	3.9	0.02	2.30	4
673.0	6.7	0.04	3.55	5
674.0	11.0	0.06	5.65	6
675.0	18.0	0.10	9.15	7
676.0	29.3	0.17	13.50	8
677.0	45.0	0.26	18.15	9
678.0	65.6	0.38	24.10	10
679.0	93.2	0.53	32.35	11
680.0	130.3	0.75	42.55	12
681.0	178.3	1.02	54.15	13
682.0	238.6	1.37	68.25	14
683.0	314.8	1.81	86.00	15
684.0	410.6	2.36	109.70	16
685.0	534.2	3.07	141.80	17
686.0	694.2	3.98	176.60	18
687.0	887.4	5.09	208.35	19
688.0	1,110.9	6.38	239.90	20
689.0	1,367.2	7.85	274.00	21
690.0	1,658.9	9.52	310.75	22
691.0	1,988.7	11.41	350.30	23
692.0	2,359.5	13.54	390.15	24
693.0	2,769.0	15.89	427.80	25
694.0	3,215.1	18.45	466.20	26
695.0	3,701.4	21.24	508.35	27
696.0	4,231.8	24.29	553.90	28
697.0	4,809.2	27.60	602.35	29
698.0	5,436.5	31.20	654.25	30
699.0	6,117.7	35.11	710.25	31
700.0	6,857.0	39.35	765.20	32
701.0	7,648.1	43.89	814.00	33
702.0	8,485.1	48.69	865.00	34
703.0	9,378.1	53.82	926.20	35
704.0	10,337.5	59.33	1,007.95	36
705.0	11,364.0	65.22	1,060.25	37
706.0	12,458.0	71.49	1,126.00	38
707.0	13,616.0	78.14	1,187.00	39

Table 2-01. (Continued)

Water Surface Elev.* (ft., NGVD)	Volume (ac-ft)	% of Capacity to Spillway Crest (Crest Gates Raised)	Area (acres)	Maximum Depth (ft)
708.0	14,832.0	85.12	1,243.50	40
709.0	16,103.0	92.41	1,296.50	41
710.0	17,425.0	100.00	1,335.25	42
711.0	18,799.0	107.88	1,403.00	43
712.0	20,225.0	116.07	1,453.00	44
713.0	21,704.0	124.56	1,504.00	45
714.0	23,232.0	133.33	1,555.00	46
715.0	24,813.0	142.41	1,609.00	47
716.0	26,450.0	151.81	1,667.00	48
717.0	28,147.0	161.53	1,731.00	49
718.0	29,912.0	171.66	1,800.00	50
719.0	31,747.0	182.21	1,873.00	51
720.0	33,637.0	193.15	1,954.00	52
721.0	35,654.0	204.61	2,046.00	53
722.0	37,749.0	216.64	2,150.00	54
723.0	39,954.0	229.31	2,226.00	55
724.0	42,280.0	242.60	2,387.00	56
725.0	44,727.0	256.68	2,447.00	57

*Outlet invert elevation is 668 ft., NGVD.

Table 2-02. Inundation Caused By the Impoundment of Water to Specific Elevations Behind Sepulveda Dam.

Reservoir Level	Max. Elevation (ft., NGVD)	Volume (acre-feet)	Area (acres)
At Revised Spillway Design Flood	716.66	27,563	1,710
At Standard Project Flood	713.52	22,493	1,529
At Top of Spillway Gates (raised position)	710.00	17,425	1,335
At 50-Year Flood	706.50	13,037	1,156
At Historical Maximum	705.10	11,503	1,067
At 25-Year Flood	703.00	9,378	926

Table 2-03. Recreation, Wildlife, and Other Facilities in Sepulveda Reservoir (with reference elevations).

	Name of Facility or Reference	Area (acres)	Range of Elevations (ft., NGVD)
1.	Invert Outlet Works (Sill)		668.0
2.	Recreational Lake (and adjacent lake facilities)	26	676.7 - 704.5
3.	Wildlife Management Area (north of Burbank Boulevard)	60	678.5 - 690.8
4.	Wildlife Management Area (south of Burbank Boulevard)	48	680.2 - 690.8
5.	Sepulveda Golf Course	300	682.8 - 714.2
6.	Hjelte Park - Phase I: Athletic Fields	25	687.2 - 697.0
7.	Burbank Boulevard (lowest elevation at Los Angeles River)		687.2 - 725.2
8.	Agricultural lands	varbl[a]	688.5 - 725.0
9.	Bicycle Trail	11	688.7 - 725.0
10.	Woodley Avenue (lowest elevation at Burbank Blvd; highest elevation at Victory Blvd.)		689.1 - 717.9
11.	Hjelte Park - Phase II: Athletic Fields, Picnic Tables, Trails, Landscaping (CURRENTLY UNDER DEVELOPMENT)	25	690.0 - 707.0
12.	Woodley Golf Course	200	690.6 - 713.0
13.	Model Airplane Center	31	694.6 - 696.5
14.	Woodley Avenue Park	80	698.1 - 711.4
15.	Family Services Community Center	15	698.5 - 701.0
16.	Arts Park (FUTURE FACILITY)	60	699.0 - 720.8
17.	Spillway Crest (crest gates lowered)		700.0

[a]Variable from season to season and year to year.

Table 2-03. (Continued)

	Name of Facility or Reference	Area (acres)	Range of Elevations (ft., NGVD)
18.	Donald C. Tillman Water Reclamation Plant	80	702.6 - 713.0
19.	Balboa Sports Center	80	703.0 - 715.0
20.	Balboa Boulevard (lowest elev. near Los Angeles River; highest elev. at Victory Boulevard)		704.2 - 725.1
21.	Highest Reservoir Surface of Record, 2/16/80		705.1
22.	Hayvenhurst Avenue (lowest elev. at Burbank Blvd.)		705.7 - 716[b]
23.	Headquarters Building, Sepulveda Golf Course: Basement Floor (many golf carts stored)		708.3
24.	Parking Lot for Woodley Golf Course and Bicycle Trail	7	708.7 - 714.8
25.	Hayvenhurst Avenue Field (Encino Little League)	13	708.8 - 718.1
26.	Strawberries and Corn Stand (southwest of corner, Burbank Blvd. and Hayvenhurst Avenue)		709.5
27.	Hayvenhurst Avenue Offramp from Ventura Freeway (U.S. 101) Westbound		709.9 - 725.0
28.	Spillway Crest (crest gates raised)		710.0
29.	Franklin Field (Little League, Velodrome)	33[c]	710.2 - 723.9
30.	Burbank Boulevard and Balboa Boulevard		711.8
31.	Residential private property: front yard, southeast corner, McLellan Ave. and Burbank Blvd. (lowest such elevation upstream of dam)		711.9

[b] Approximate elevation at southern end of reservoir lands.
[c] Area of lease is 28.3 acres.

Table 2-03. (Continued)

	Name of Facility or Reference	Area (acres)	Range of Elevations (ft., NGVD)
32.	Spillway gates begin to lower		712.0
33.	Garden Center	16	712.2 - 719.7
34.	100-Year Flood Water Surface Elevation		712.2
35.	Encino Velodrome (part of Franklin Field)		712.4[d] - 723.9
36.	Hayvenhurst Avenue Onramp to Ventura Freeway (U.S. 101) Eastbound		713.0 - 727.0
37.	Magnolia Avenue (lowest elev. at Hayvenhurst Ave.)		713.1 - 716[e]
38.	Valley Region Office and Service Yard	4.5	713.3 - 715.1
39.	Standard Project Flood Water Surface Elevation		713.5
40.	Residential private property: first floor of dwelling, southeast corner, McLellan Ave. and Burbank Blvd. (lowest such elevation upstream of dam)		713.8
41.	Pro Shop (at Sepulveda Golf Course Hdqtrs. Bldg.)		714.0
42.	Valley Christian League Fields (Little League)	23	716.4 - 720.0
43.	Probable Maximum Flood Water Surface Elevation		716.7
44.	Encino Inn Restaurant: floor (part of Sepulveda Golf Course Headquarters Bldg)		716.7

[d]Closed basin below 716.0 feet (not exposed to water from reservoir until reservoir surface exceeds 716.0 feet).
[e]Approximate elevation at Petit Avenue (west end of reservoir lands).

Table 2-03. (Continued)

	Name of Facility or Reference	Area (acres)	Range of Elevations (ft., NGVD)
45.	Victory Boulevard Fields (Senior Division Little League)	9	717.2 - 718.9
46.	Commercial property: first floor, southwest corner, Burbank and Balboa Blvds, AND north side of Victory Blvd. near Woodley Avenue (lowest such elevations upstream of dam)		718.6
47.	California National Guard Building, south side of Victory Blvd. near Encino Avenue		720[f]
48.	U.S. Navy and Marine Reserve Building, southwest of Victory and Balboa Blvds.		720[f]
49.	Air National Guard: Reserve Training and Communication Center Installation		720[f]
50.	Railroad Track around Northeast End of Dam		721.7
51.	Top of Dam: Design elevation Actual range of elevations		725.0 723.7 - 725.5[g]
52.	Informal Park/Multi-purpose Play (CURRENTLY UNDER CONSTRUCTION)	280	h - h
53.	Community Tennis/Gym Center (FUTURE FACILITY)	20	h - h
54.	Neighborhood Recreation (FUTURE FACILITY)	10	h - h
55.	Sepulveda Fire Station of Magnolia	9	h - h

[f]Approximate elevation.
[g]The decrease in elevation of the northeastern embankment to as low as 723.7 feet reflects settlement that has taken place since the Dam was completed in December 1941 (data obtained from December 1980 topographic survey of the reservoir, and from ongoing Settlement Study, consisting of periodic elevation surveys of the dam, 1941-1985).
[h]Exact range of elevations not yet determined.

Photo No. 2-01. Los Angeles River, with Sepulveda Dam and Reservoir (view from downstream of dam, taken 5/6/75).

Photo No. 2-02. Sepulveda Dam, Reservoir, and Los Angeles River Channel (view from downstream of dam, taken between 1962 and 1970).

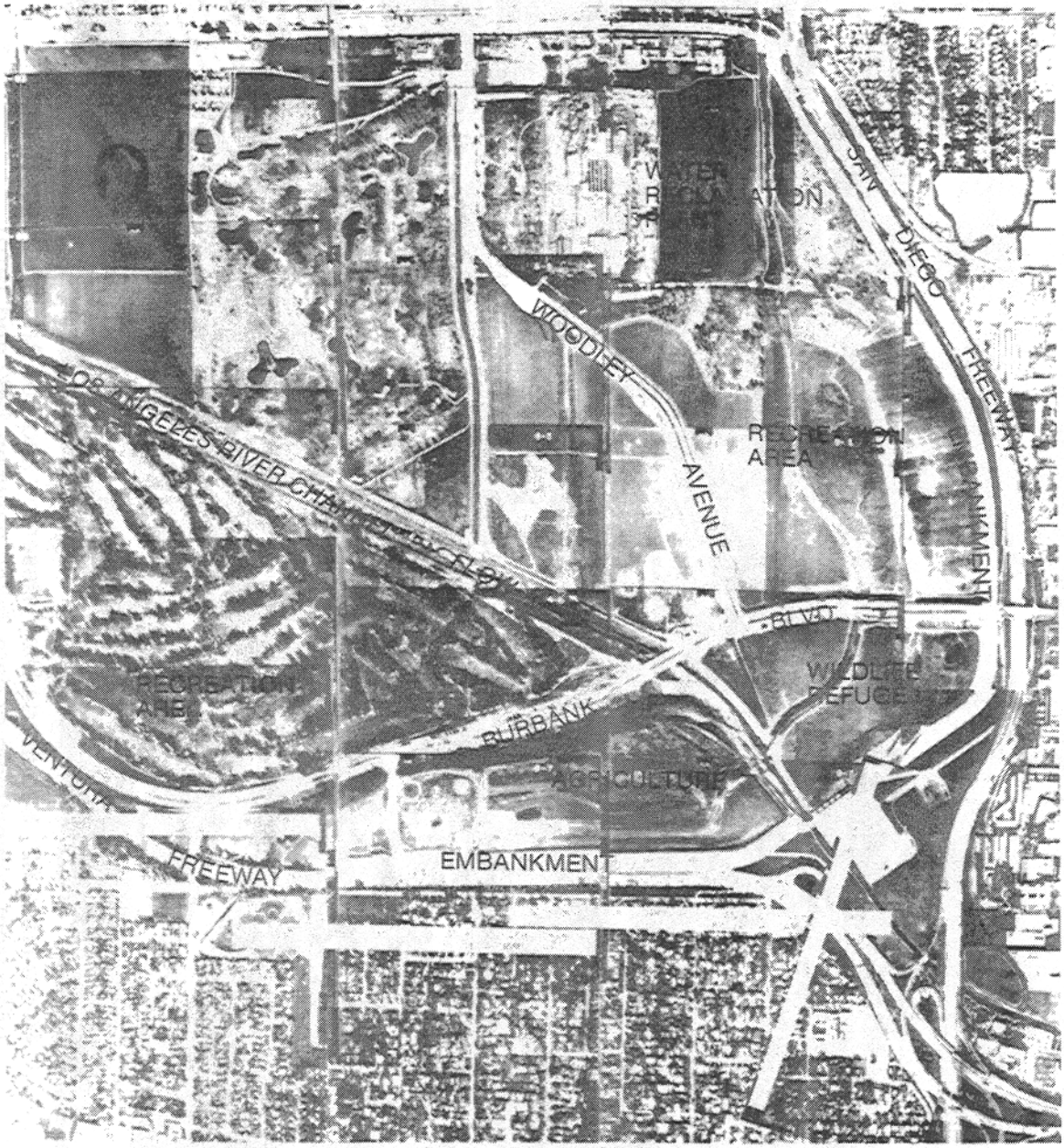


Photo No. 2-03. Sepulveda Flood Control Basin (aerial composite, taken 12/16/82).

Photo No. 2-04. Sepulveda Dam (enlargement of Photo No. 2-03).

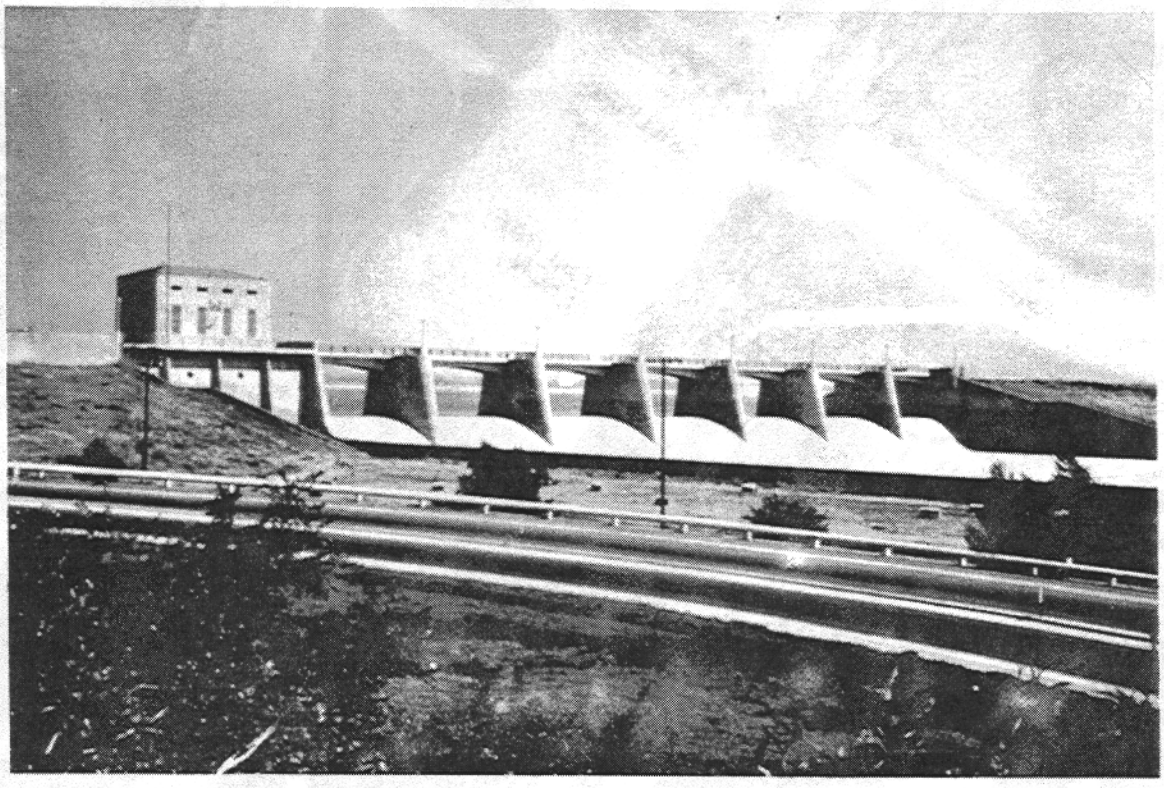


Photo No. 2-05. Sepulveda Dam, with Control House (left) and Spillway (view from downstream, along Ventura Freeway).

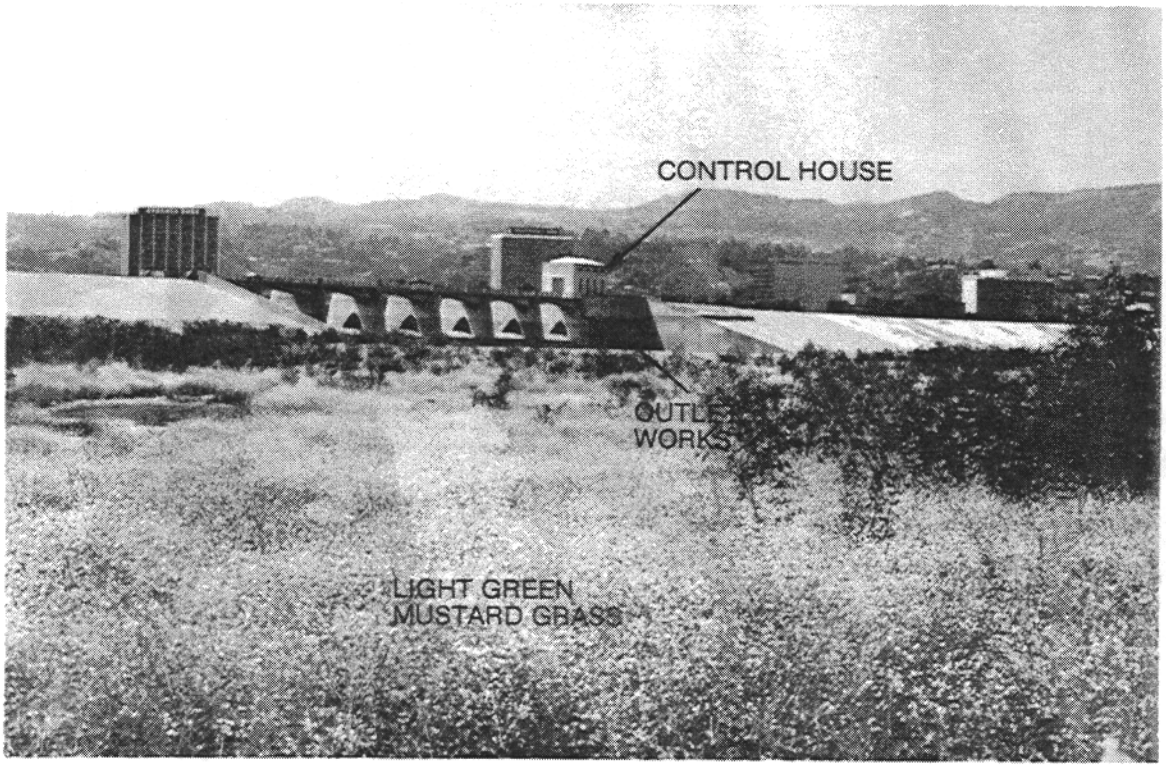


Photo No. 2-06. Sepulveda Dam (view from upstream, within reservoir).

Photo No. 2-07. Upstream Slope of Dam Southwest of Outlet Works (view toward southwest, from outlet works).

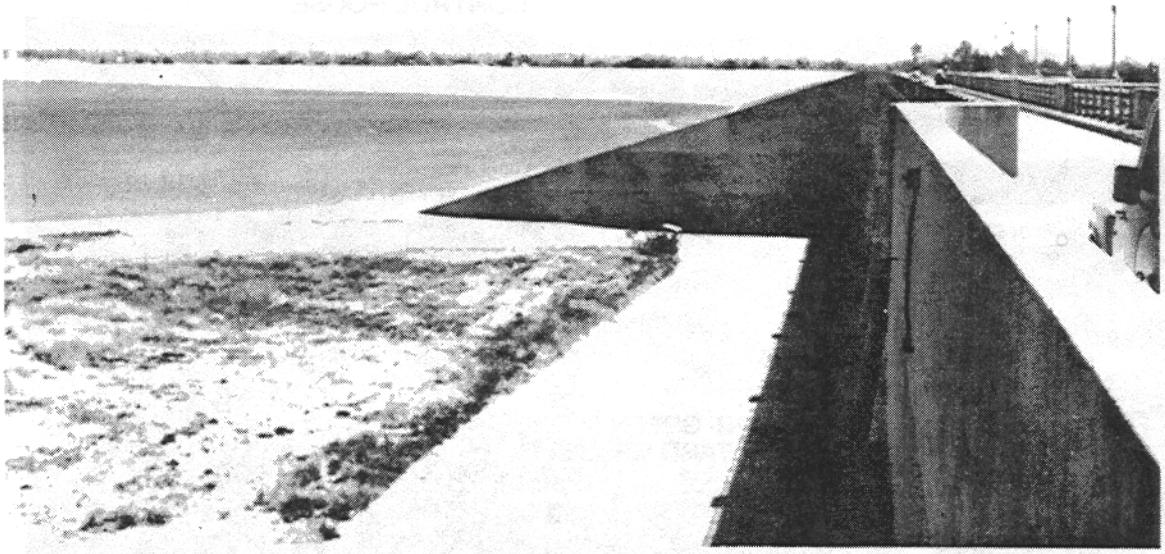


Photo No. 2-08. Upstream Face of Dam Northeast of Spillway (view toward northeast, from spillway bridge).

Photo No. 2-09. Upstream Slope of Dam Northeast of Spillway (view toward south, from east embankment of dam.)

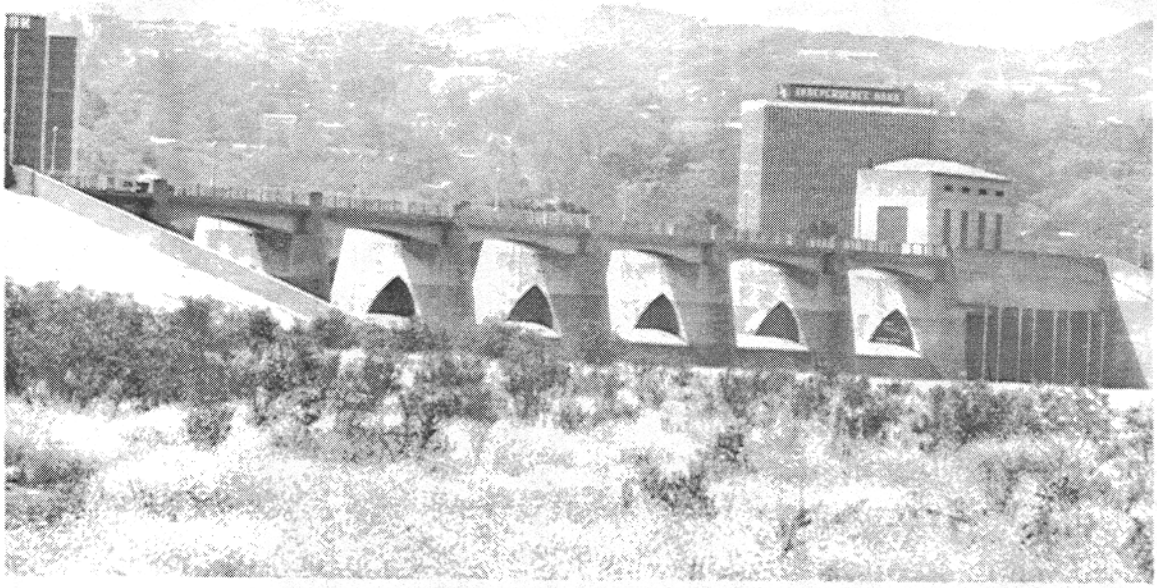


Photo No. 2-10. Control House (right) and Spillway (view from upstream, with reservoir.)

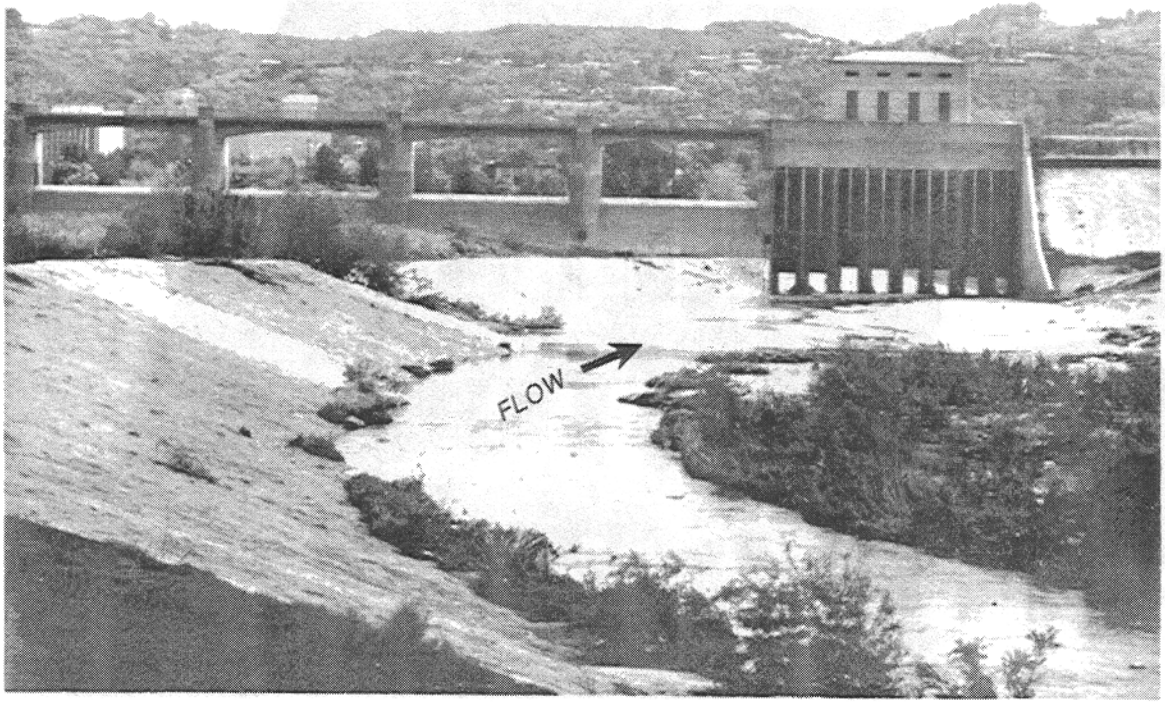


Photo No. 2-11. Control House and Outlet Works, with Spillway to left (view from upstream, within reservoir, along approach channel)

Photo No. 2-12. Los Angeles River: Approach Channel to Outlet Works, with portion of spillway approach to right (view toward upstream from bridge above outlet works).

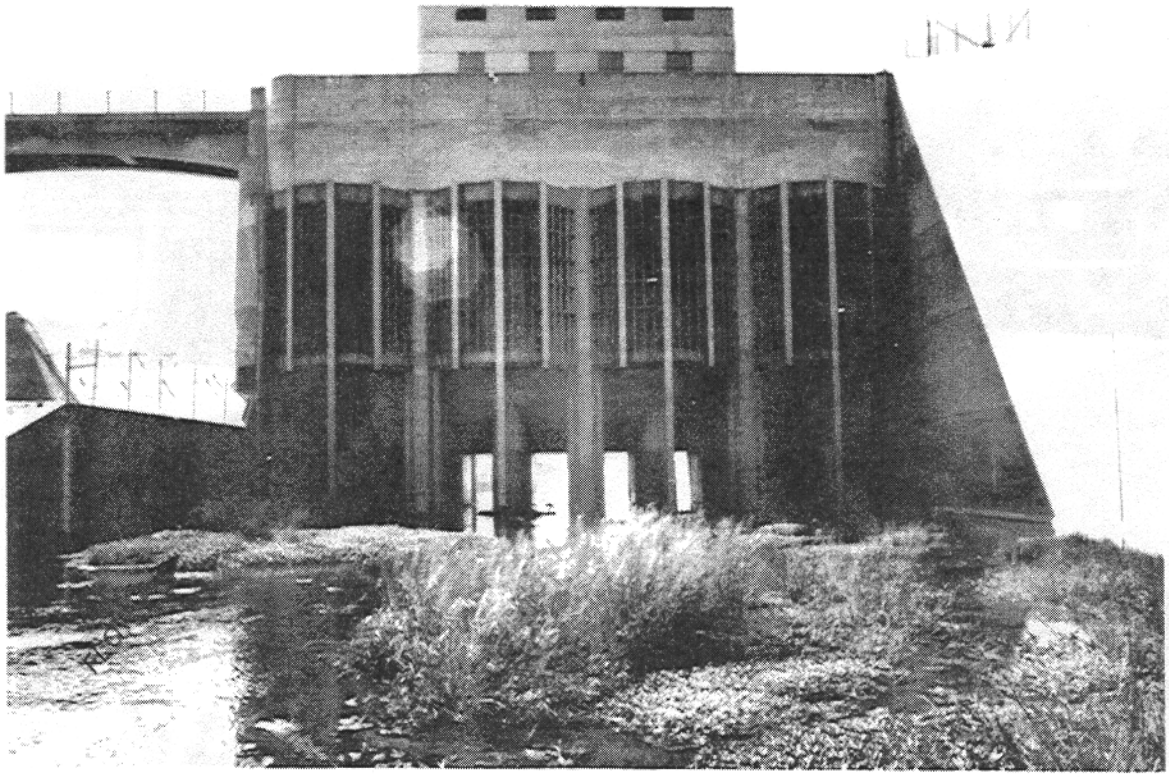


Photo No. 2-13. Outlet Works (gates fully open), with edge of spillway to left (view from channel upstream).

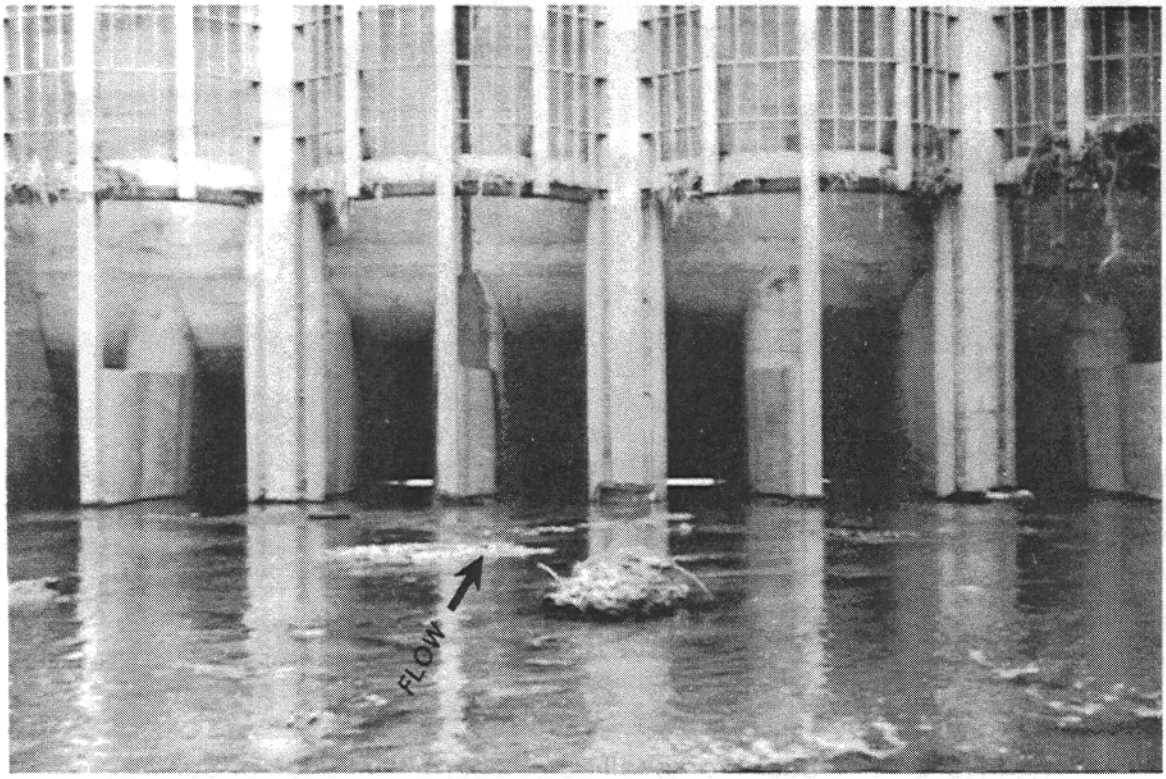


Photo No. 2-14. Approach to Outlet Works (gates partially open) (view from channel upstream).

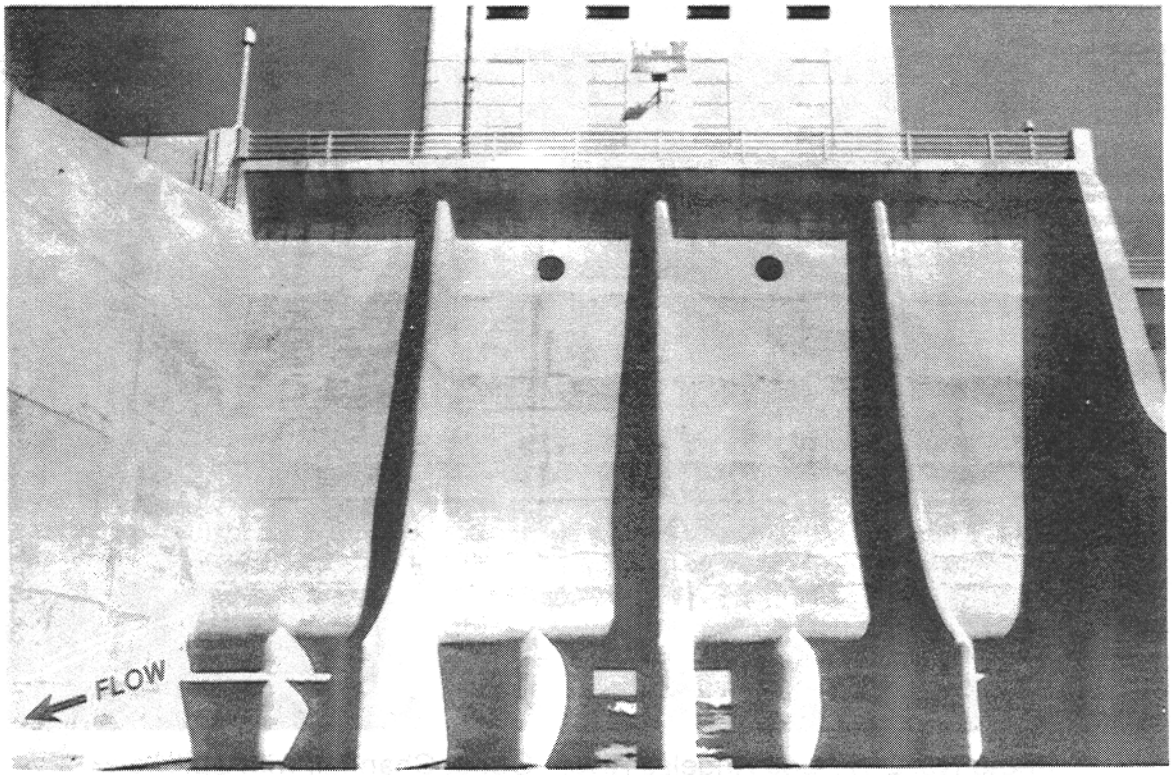


Photo No. 2-15. Outlet Works (center gates fully open) (view from channel downstream).

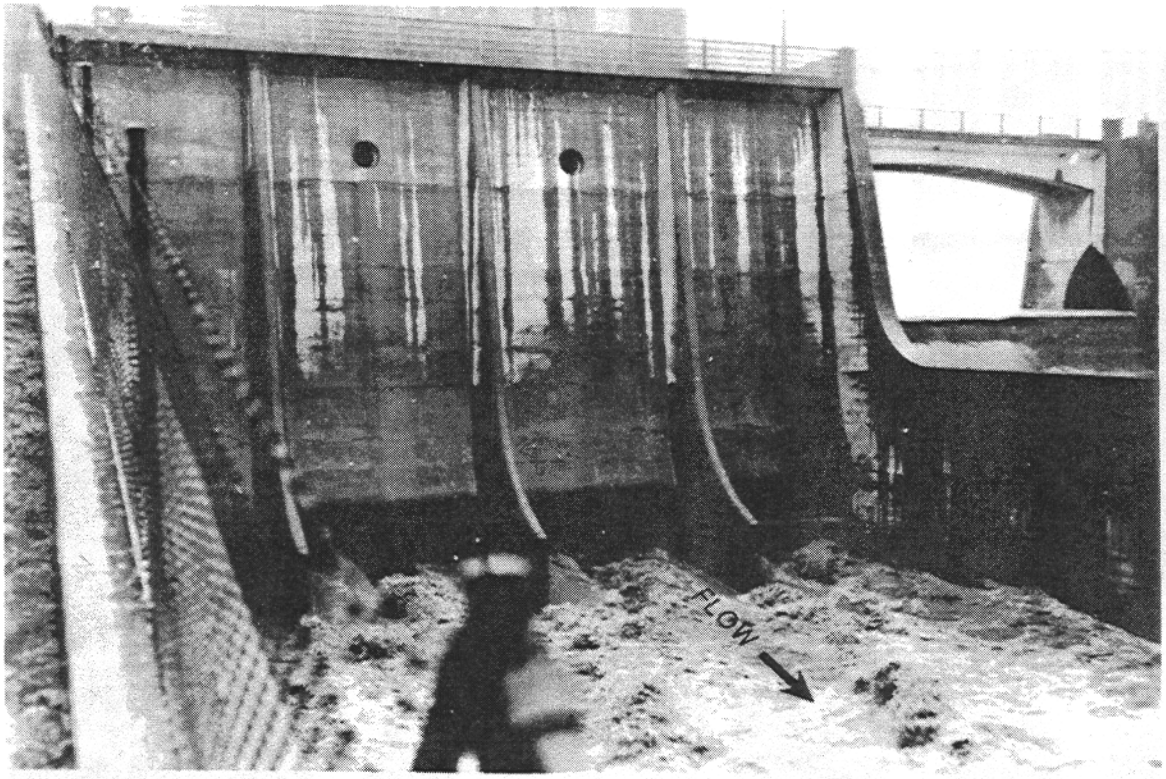


Photo No. 2-16. Outlet Works (all gates open), with edge of Spillway to right (view from alongside channel downstream).

Photo No. 2-17. Los Angeles River: Outlet Channel, with Spillway Apron on left (view toward downstream from bridge above outlet works during high outflows of February 1980).

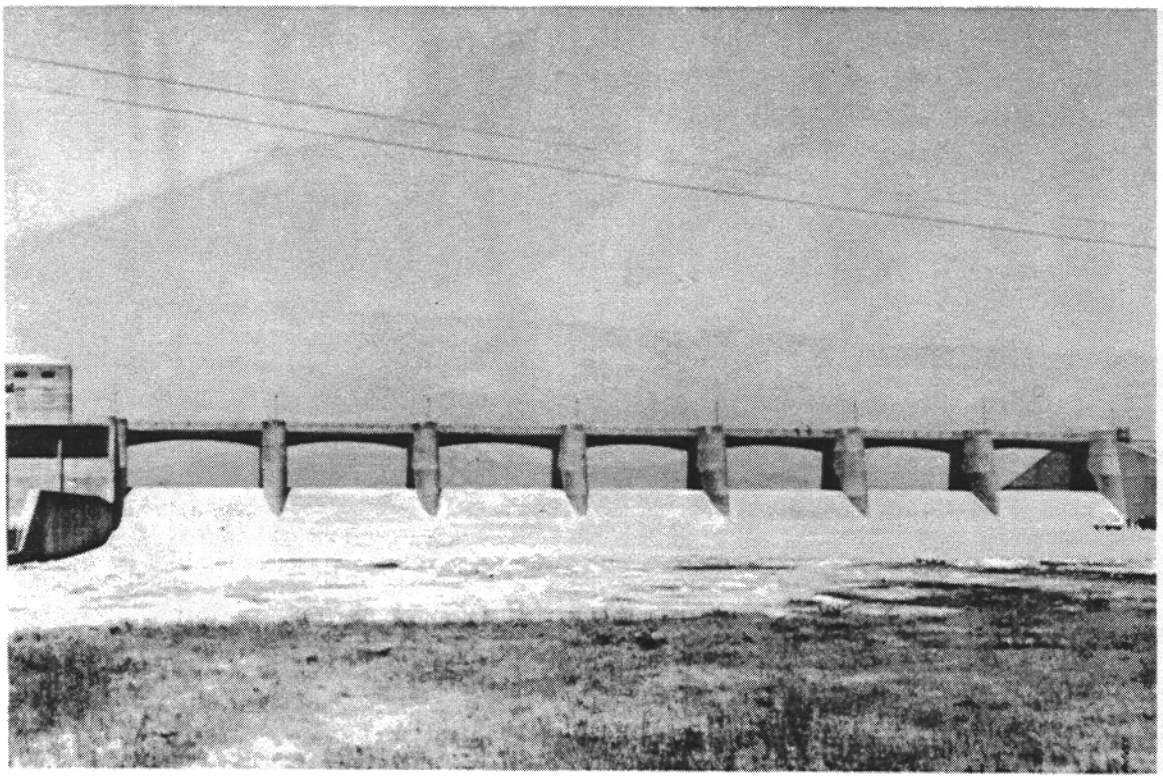


Photo No. 2-18. Spillway (Ogee type), with Control House and Outlet Works on left (view from downstream, below spillway apron).

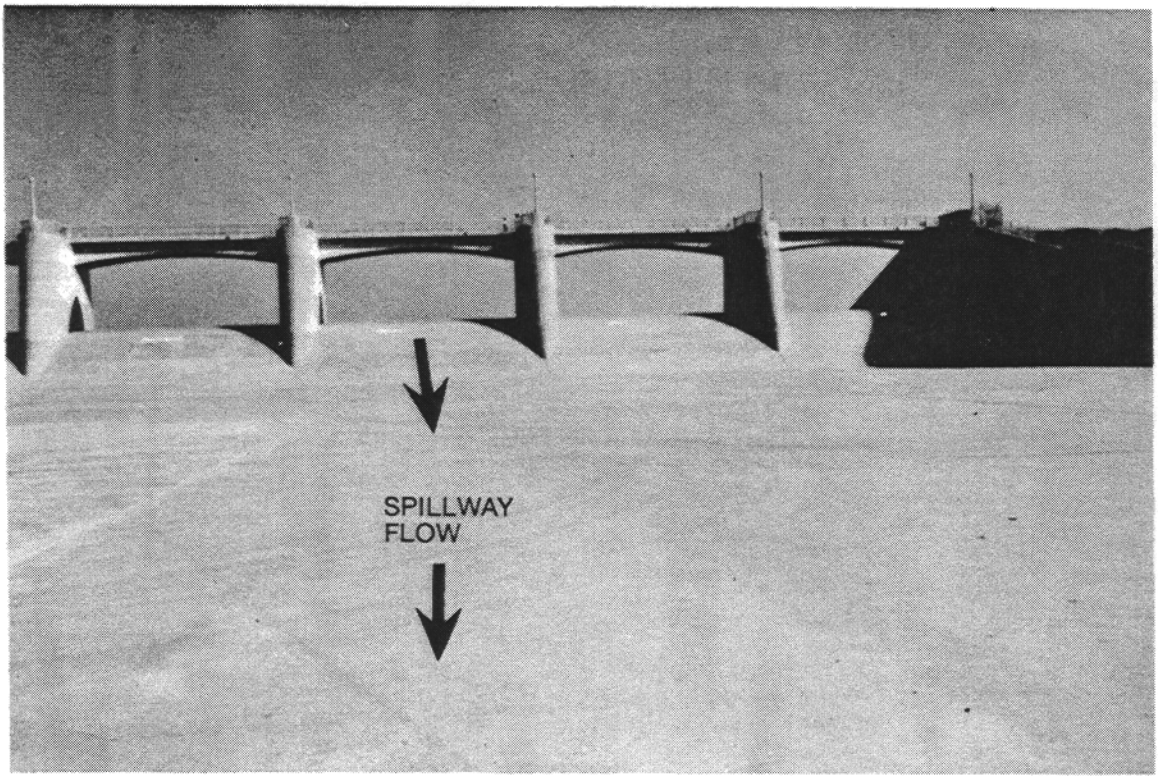


Photo No. 2-19. Spillway Apron (Spillway Outlet Channel), with portion of spillway in background (view from downstream, atop spillway apron).

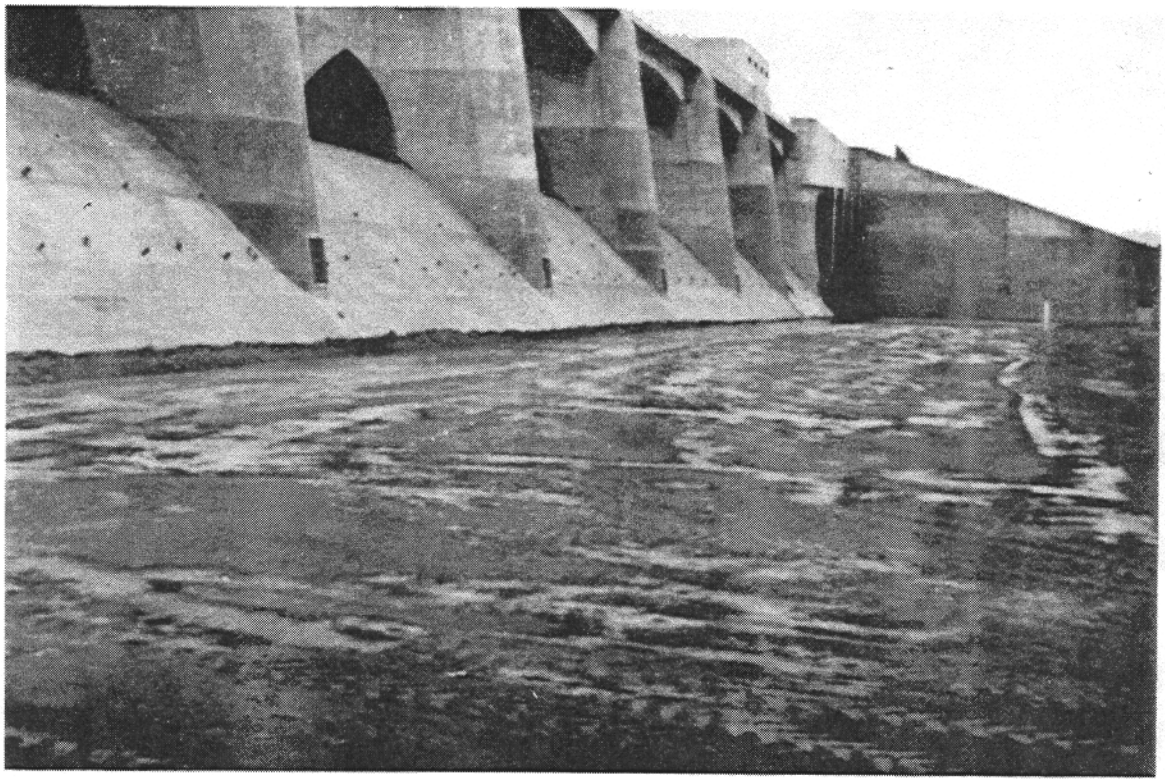


Photo No. 2-20. Approach to Spillway, with Spillway at left (view from approach slab to spillway, looking toward southwest).

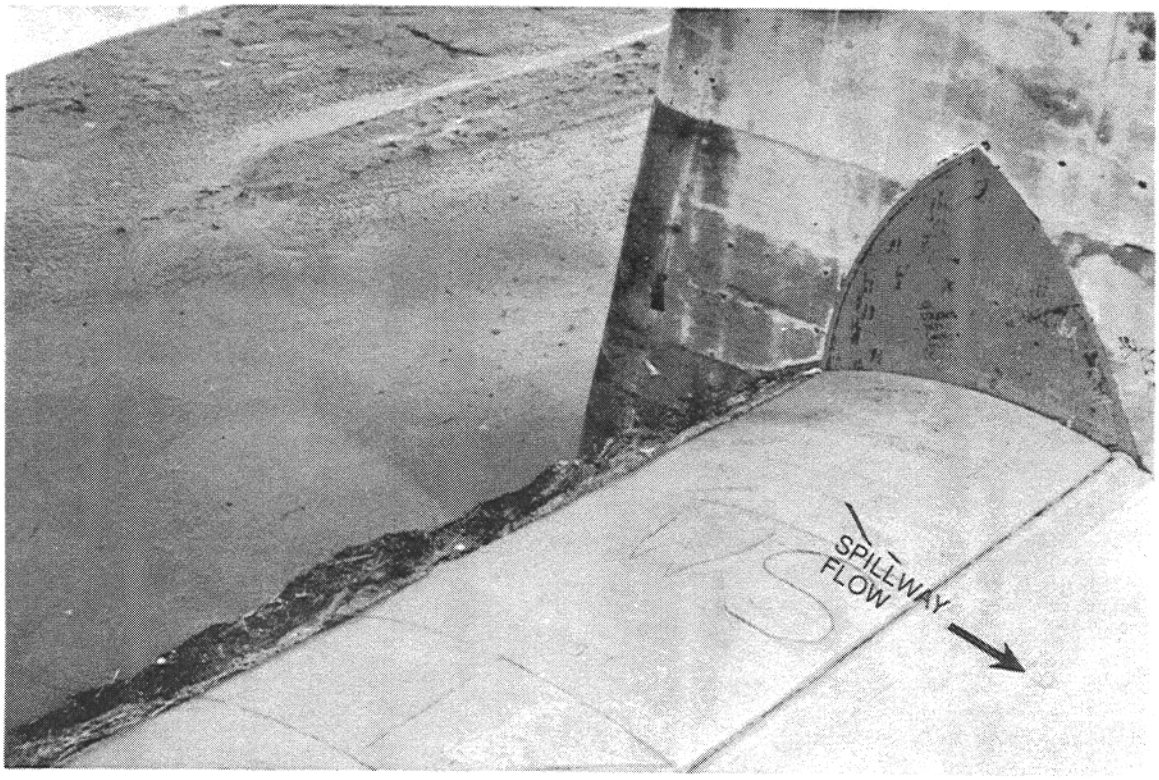


Photo No. 2-21. Spillway Gate in Lowered Position (view from spillway bridge, with reservoir to left).

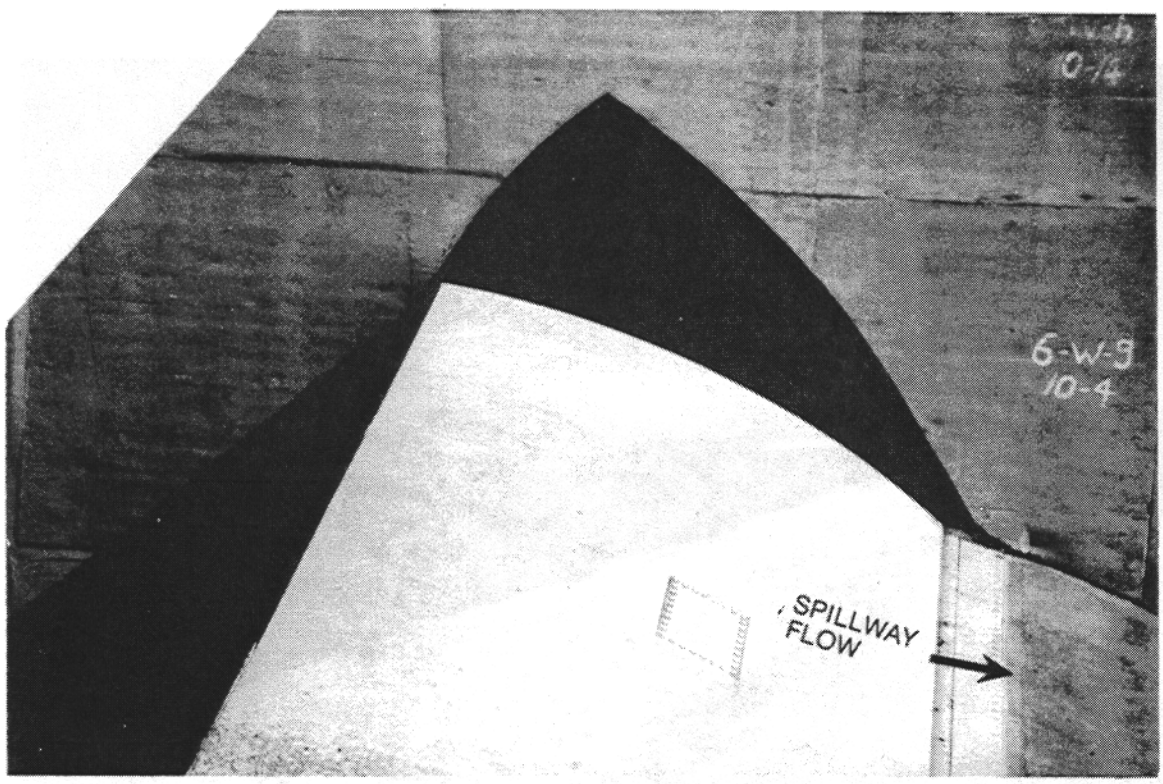


Photo No. 2-22. Spillway Gate Partially Raised (during test operation of spillway gates) (view from spillway bridge, with reservoir to left).

Photo No. 2-23. Spillway Apron, with Outlet Channel to right (view from spillway bridge, toward downstream).

Photo No. 2-24. Landscaped recreation area within reservoir (view toward south from near northeast end of dam).

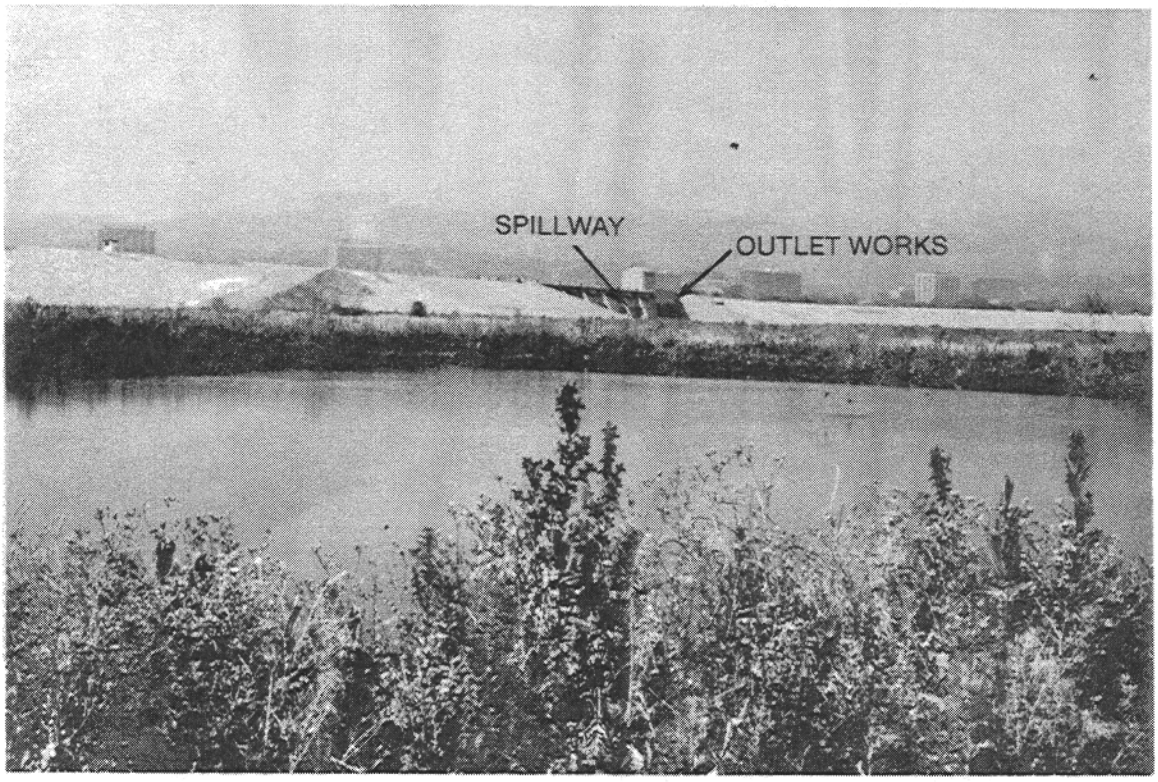


Photo No. 2-25. Wildlife Pond (view from within reservoir, looking downstream toward southeast).

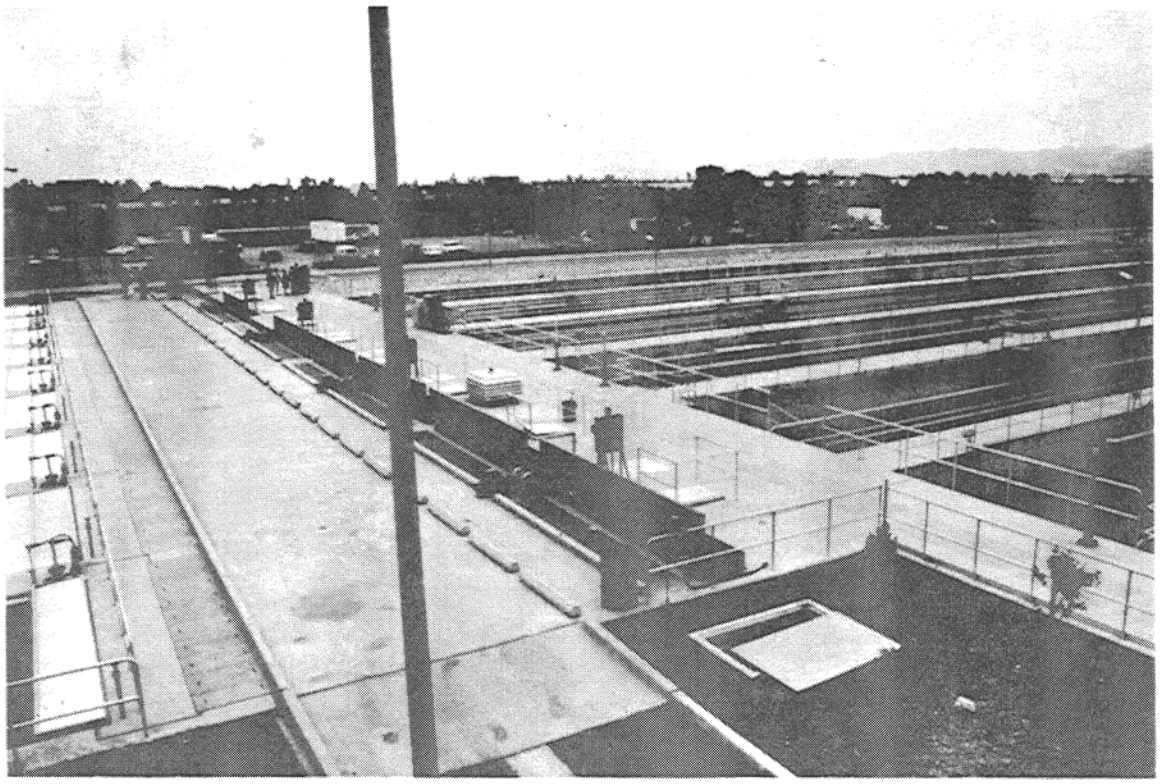


Photo No. 2-26. Donald C. Tillman Water Reclamation Plant (view toward northwest from atop plant building, located in northeastern portion of reservoir).

Photo No. 2-27. Japanese Garden (constructed as mitigation for the Donald C. Tillman Water Reclamation Plant)

III - HISTORY OF PROJECT

3-01 Authorization

The construction and operation of Sepulveda Dam and other flood control projects in Los Angeles County by the U.S. Army Corps of Engineers are authorized by several Acts of Congress: the Emergency Relief Appropriation Acts of 8 April 1935 and 8 April 1936; and the Flood Control Act of 22 June 1936 (PL 74-738), as amended by the Acts of 15 May 1937 and 28 June 1938 (PL 75-761); plus the Flood Control Act of 18 August 1941 (PL 77-228).

3-02 Planning and Design

The need for flood control in the coastal drainages of Los Angeles County was recognized before 1900, but really began to grow after the floods of January and February 1914. On 12 June 1915, Los Angeles County Flood Control District (now Los Angles County Department of Public Works, Hydraulic Division) was created. This new County agency worked with the Corps of Engineers, Los Angeles District, on various minor flood control projects, but it was not until two decades later that major flood control construction projects were given serious consideration.

The major flood of 1 January 1934 emphasized the need for major flood control projects in southern California, and the Federal Depression-relief jobs programs provided the financial vehicle for comprehensive construction programs.

In 1935 and 1936, the Corps of Engineers, Los Angeles District, and Los Angeles County Flood Control District became partners in a large Works Progress Administration contract to design a comprehensive flood control plan for Los Angeles County. The Flood Control Act of 1936 changed the Civil Works mission of the Corps of Engineers from one of temporary status (designed to relieve unemployment during the Depression), to one of permanent responsibility for flood control.

During the next three years, a comprehensive flood control system for the Santa Ana, San Gabriel, and Los Angeles Rivers and their tributaries was designed. The included a Definite Project Report for the control of Los Angeles River, submitted in December 1936.

The severe storm and flood of February-March 1938 provided additional impetus for the need for a comprehensive flood control program in southern California, and it provided excellent rainfall and runoff data for use in new design criteria and as verification for existing design criteria.

Increasing hostilities overseas in 1938 and 1939 created still another aspect of flood-control–its importance to national defense through the need to protect defense industry facilities that were subject to flooding.

One of the components of the comprehensive flood control system under consideration for southern California was a large dam and reservoir on the main stem of the Los Angeles River in the San Fernando Valley. Several sites for this structure were examined, and the one ultimately selected was considered to be a best overall combination as to effectiveness, cost, and minimum disruption to existing dwellings, utilities, railroads, and other facilities (see table 1-01: Survey Report, Sepulveda Dam (January 1940) and Analysis of Design, Vol. I, Sepulveda Dam (August 1939, rev. October 1941)). The dam that was to be built on this site was named Sepulveda because of its location.

3-03 Construction

After approval of the final designs, construction on Sepulveda Dam was authorized, and work began on 31 December 1939. The crest gates and the outlet gates were completed in July 1941, and construction of the embankment and appurtenant concrete structure was completed on 30 December 1941. The cost of the project, which was financed by Federal funds, was $6,650,561.

At the time that Sepulveda Dam was completed, the downstream channel capacity on the Los Angles River was 7,100 cfs. A major channel improvement project, conducted in 1951-1953, increased the channel capacity to 16,900 cfs.

3-04 Related Projects

Sepulveda Dam is one component of a large Los Angeles County Drainage Area system of flood control dams and improved river channels. The operating agencies and major of features of six reservoirs that directly affect the Los Angeles River (in addition to Sepulveda Dam), plus four other reservoirs in this system are discussed in Sections 4-10 and 4-11 of this manual.

In addition to the facilities discussed in the above mentioned sections, there is an old dam on the upstream Browns Canyon Wash that is now completely filled with debris and thus functions merely as a waterfall. Its origins are unknown, according to the Los Angeles County Department of Public Works' historians.

3-05 Modifications to Regulations

At the time of construction of Sepulveda Dm in 1941, the downstream channel of the Los Angeles River had a capacity of about 7,100 cfs. Therefore, the initial water-control plan limited releases from Sepulveda Dam to 7,100 cfs or less, depending upon downstream tributary flow. In 9153 the U.S. Army Corps of Engineers improved the downstream channel, developing a capacity of about 16,900 cfs. Accordingly, the water control plan was then revised to allow release rates as high as the new channel capacity. Within this upper limit, the operating criteria for Sepulveda Dam were based strictly upon reservoir water surface elevation criteria, irrespective of downstream

channel conditions. Those basic criteria were applied for use in this manual (see Exhibit A), with additional options to consider real-time storm and channel conditions and available forecast information.

3-06 Principal Regulation Problems

There have been no major problems in the regulation of Sepulveda Dam since construction was completed in 1941. The dam has never spilled; there have never been any structural deficiencies or major hydraulic malfunctions. The dam has performed very adequately since its construction.

During the storms and impoundments of January 1943 and February 1944 (see Sections 8-02.c.(1) and (2)), the trash racks became clogged from excess debris accumulation, impending flow through the outlet works. The condition was remedied in November and December 1944, when the racks were modified below elevation 687.5 feet by the removal of some of the frames and I-beams.

IV - WATERSHED CHARACTERISTICS

4-01. General Characteristics

The drainage area of the Los Angeles River and its tributaries above Sepulveda Dam is 152 square miles, comprising the westernmost portion of the Los Angeles County Drainage Area (pl.2-02), and covering virtually the entire San Fernando Valley and surrounding mountain slopes west of Interstate Highway 405 (San Diego Freeway) (pl.2-03).

The drainage area boundary on the south is formed by the Santa Monica Mountains; on the west, but the Simi Hills; on the north, by the Santa Susana Mountains; and on the east by a line extending approximately north and south across the valley and generally along the San Diego Freeway (pl. 2-03).

The headwaters of the Los Angeles River are in the Simi Hills on the west, formed by Chatsworth Creek, Dayton Canyon Wash, Bell Creek, and Arroyo Calabasas (pl. 2-03). Other major tributaries above Sepulveda Dam include Devil Canyon, Brown's Canyon, Limekiln Canyon, Wilbur, and Aliso Canyon Washes; and Caballero and Bull Creeks. The longest watercourse above the dam is Devil Canyon-Brown's Canyon-Los Angels River (See pls. 2-03 and 4-09). This watercourse is about 19 miles long with an average slope of 143 feet per mile.

4-02. Topography

Approximately 85 square miles of the drainage basin above Sepulveda Dam is of relatively steep, mountainous terrain, and about 67 square miles is of comparatively flat valley floor. Elevations in the valley vary from 668 feet at the base of the dam to about, 1,200 feet at the base of the foothills. The average elevation of the Santa Monica Mountains is about 1,700 feet, NGVD; that of the Simi Hills is about 1,800 feet, NGVD; and that of the Santa Susana Mountains is about 2,000 feet, NGVD. The highest point in the drainage area is San Fernando Peak, in the Santa Susana Mountains, having an elevation of 3,741 feet, NGVD.

4-03. Geology and Soils

The dam is located in the San Fernando Valley which lies between the Santa Susana and San Gabriel Mountains to the north, the Santa Monica Mountains to the south, the Verdugo Hills to the east and the Simi Hills to the west. The valley is approximately 20 miles in length and ranges in width from 2 to 12 miles.

The San Gabriel, Verdugo, Santa Susana, and Santa Monica Mountains are part of the Traverse Ranges. The San Gabriel Mountains are generally composed of Mesozoic and older igneous and metamorphic rock. The Verdugo Mountains are in an uplifted sliver of crystalline rock, along the south side of the San Gabriel Mountains. The Santa Monica Mountains are composed mainly of

Cretaceous to Miocene sedimentary and volcanic rock. The Santa Susan Mountains are composed mainly of Miocene to Pleistocene marine and non-marine sedimentary rock. The adjacent Santa Susan Knolls are composed of upper Cretaceous marine sedimentary rock.

The greater part of the San Fernando Valley is overlaid by Recent Alluvium, consisting of unconsolidated and unweathered, poorly graded clay, silt, gravel, and boulders. The eastern half o the plain is largely dominated by Tujunga Wash and contains coarser alluvium than is granitic origin. Along the Los Angeles River above the confluence with Tujunga Wash the alluvium is notably lacking in boulders and in appreciable quantities of coarse gravel. The dam site is almost entirely covered by Recent Alluvium composed of relatively fine material.

Between one and two miles west (upstream) from the spillway site there is a low, topographic ridge lying about midway between the river and Ventura Boulevard. The ridge is nearly a mile long, east and west, and is covered at both ends with older alluvium. About two miles east (downstream) from the spillway site and on the north side of the river there is a somewhat longer east-west ridge along which older alluvium is exposed. Elsewhere throughout the valley, particularly in the northern part, there are numerous small terraces of older alluvium at elevations somewhat above that of recent deposits. These terraces have been raised above the general level of present deposition and are now covered by a reddish-brown soil typical of older alluvium. Recent and older alluvium comprise the unconsolidated formations found within the valley. Both are continental deposits of Quaternary Age.

Underlying the unconsolidated alluvium formations are the Tertiary (Miocene) shales and sandstones which forms the bedrock of this area. The top of bedrock ranges in depth from surface exposures south of Ventura Boulevard to more than 400 feet below the general ground level vicinity in which bedrock was penetrated to depths of several hundred feet. In general, the strike of this bedrock surface is parallel to the course of the Los Angeles River and the dip is northeasterly. The only outcrop of bedrock near the proposed site and north of Ventura Boulevard is at the central part of the low ridge previously mentioned as lying upstream from the spillway site. This outcrop of consolidated formation is classified as Tertiary (Miocene) shale, and lies between the two exposures of older alluvium which occupy either end of the same ridge. Its isolated position is due to an upthrust movement of formations north of the covered fault line parallel to the ridge.

4-04 Sediment

Sediment production within the drainage area abo e Sepulveda Dam varies considerably, according to terrain. In the urbanized valley areas, production is at a minimum, and has been decreasing over the years as the percentage of urbanization has increased. In the steep and largely unurbanized mountain and

foothill areas, sediment production is significant, particularly during periods of recurring heavy rains, and especially great after a severe brush or forest fire. Upstream reservoirs and debris basins intercept part of this sediment load (see pl. 2-03).

A 1969 report by the U.S. Army Corps of Engineers, Los Angeles District entitled, Draft: Sedimentation Studies for Sepulveda Flood Control Basin, June 1961 Survey (September 1969) indicates that between November 1944 and June 1961, a total of 141 acre-feet of sediment was deposited into Sepulveda Reservoir. This represents 0.8 percent of the total available storage to elevation 710 feet (spillway crest with crest gates raised). See table 4-11.

The rate of sediment accumulation in Sepulveda Reservoir, according to surveys (see table 4-11) appears to be relatively minor, and is thus considered insignificant to the viability of the project's flood control function.

4-05 Climate

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

a. Temperature. Average daily minimum/maximum winter temperatures (degrees Fahrenheit) range from about 40/65 on the valley floor to about 35/55 in the surrounding mountains. The corresponding summer figures are about 65/95 and 60/85 respectively. All-time low/high extremes of temperatures are about 10/120 in portions of the valley and about 5/110 in the mountains.

Table4-01 shows average and extreme temperature data for Burbank, California (located about 9 miles east of Sepulveda 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 in table 4-01 extends only through 1964.

b. Precipitation. Plate 4-01 shows the normal annual precipitation over the Sepulveda drainage and surrounding areas. Within the Sepulveda drainage itself, normal annual precipitation ranges from less than 15 inches over much of the valley floor to more than 22 inches atop both the Santa Susan Mountains to the north and the Santa Monica Mountains to the south.

Table 4-01 lists the man and maximum observed monthly precipitation for Burbank, California. Table 4-01 lists the mean and maximum observed monthly precipitation for Burbank, California. Table 4-02 lists the same for Sepulveda Dam and for three stations within the Sepulveda drainage basin. This table shows that there can be great year-to-year variability in monthly, as well as annual, precipitation. Not listed in these tables are the minimum observed monthly precipitation values, which for each station are at most 0.01 or 0.02 inches for every month of the year.

Table 4-03 is a precipitation depth-duration-frequency tabulation for the centroid of the watershed above Sepulveda Reservoir. In it are listed the computed point-value precipitation depths for durations of from 5 minutes to 24 hours, and for return periods from 2 years to 100 years. Data for this table were obtained from the National Oceanic and Atmospheric Administration publication, NOAA Atlas 2.

(1) Winter Storms. Most precipitation in southern California coastal drainages occurs during the cool season, primarily from November though early April, as mid-latitude cyclones from the north Pacific Ocean occasionally move across the West Coast of the United Sates to bring precipitation to southern California. Most of these storms are of the general winter type, with hours of light to moderate steady precipitation, but with occasional heavy showers or thunderstorms. Plate 4-02 depicts the time distribution of precipitation during the intense winter storm of 16-17 February 1980 at Sepulveda Dam and in the upstream watershed.

(2) Summer Storms. Two other types of 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 occasion, these can drift westward into the coastal drainages, including the Sepulveda 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 the most likely to significantly affect southern California 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, souther California has received light rain from non-tropical general summer storms, some of which have exhibited some characteristics of general winter storms.

c. Snow. Snow in southern California is relatively uncommon at elevations below 6,000 feet and is extremely rare below ,2000 feet. 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 Sepulveda drainage.

d. Evaporation. Few formal studies of evaporation have been made in the San Fernando Valley; and since Sepulveda Reservoir is normally dry, with any impoundment 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 about one-quarter inch in winter to about one-half inch in summer. On days of very strong, dry Santa Ana winds, evaporation can be considerably greater than one inch.

e. 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 mph.

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 impounded behind Sepulveda Dam. The characteristic very low humidities and strong gusts of Santa Anas (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.

Rainstorm-related winds are the next common type in southern California. Winds from the southeast ahead of an approaching storm average 20-30 mph, with occasional gusts to more than 40 mph. West to northwest winds 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 Sepulveda 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 the Los Angeles River, including those of January 1862, February and March 1884, January and February 1914, January 1915, February - March 1938. There was also on e significant summer tropical storm that occurred in September 1939, but no widespread flooding on the Los Angeles river resulted from this event.

a. Storm and Flood of February - March 1938. The flood of 27 February - 3 March 1939 was the most destructive of record on the Los Angeles River and several other streams of southern California, and its occurrence played a major role in the justification for the construction of Sepulveda Dam.

The storm developed as a series of low-latitude north Pacific disturbances and brought several bands of very heavy rain to southern California during a 5-day period. The intense band occurring during 1-2 March produced a peak flow of 11,600 cfs on the Los Angeles River at Van Nuys Boulevard (about 1.8 miles below the Sepulveda Dam site–see pl. 2-04), with a total volume of runoff for the 5-day storm estimated to be 16,400 acre-feet at that location. This flow combined with heavy runoff from the Tujunga Wash and other tributaries to produce a very destructive flood on the Los Angeles River through 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 the Los Angeles River since the completion of Sepulveda Dam in 1941 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 urban watershed. The time of concentration at the dam site is 1.5 hours. Flood hydrographs are typically of less than 12 hours' duration and are always less than 48 hours' duration. Inflow rates drop rapidly between storms, and inflow during the dry summer season is approximately 65 cfs due to outflow from the Donald C. Tillman Water Reclamation Plant. Long-term average inflow to Sepulveda Dam for the period 1930 through 1979 is reported by the U.S. Geological Survey as 24,920 acre-feet per year (or 34.4 cfs). Table 4-04 lists historic peak inflows to the Sepulveda Dam site from 1930 to 1987. Table 4-05 lists the annual maximum of inflows, outflows, and capacity (storage), elevation, and surface area at Sepulveda Dam from 1942 through 1987.

The greater Los Angeles area has historically experienced long-term wet and dry periods. Plate 4-03 illustrates the historic regional response of flood peaks from the 1870's to the 1970's.

Increasing urbanization and upstream channelization have caused inflow peaks and volumes to rise dramatically in recent years. Most of the valley area is urbanized, with a high percentage of the ground surface covered by paving or structures. Urbanization continues to increase in the western San Fernando Valley, but at a somewhat slower rate than that which occurred between 9150 and 1975. IN the residential areas, much of the uncovered soil is under cultivation by grasses, trees, and plants. There remains a small and decreasing amount of commercial agriculture in the valley, especially in the far western portions. The small and diminishing amount of uncultivated native vegetation remaining in the valley consists of grass and scattered shrubs. The watershed currently has about 35 percent impervious cover. Plate 4-04 shows the historical increases in impervious cover over the past 50 years. An increase to about 45 percent impervious cover is projected for the year 2030.

Plate 4-05 shows the historic increase at peak inflow in response to watershed urbanization changes. Average annual peak inflow has risen from approximately 2,000 cfs in 1930 to about 12,000 cfs in 1980, and is expected to continue to rise more moderately over the next 50 years.

Table 4-06 summarizes the effect of watershed urbanization on increasing peak and volume characteristics of reservoir inflow.

For the period of 1970 to 1985 the median annual inflow was 62,797 acre-feet. Table 4-07 provides average monthly inflows for the 1970 to 1988 period. These values are considered representative of current 1987 conditions.

Plate 4-06 presents an inflow frequency curve computed for present watershed conditions and an outflow frequency curve computed for the present operating criteria. Plate 4-07 is an elevation frequency curve for Sepulveda Reservoir, based upon, and adjust for, 1980 conditions. Table 4-08 lists the values of the curves of plates 4-06 and 4-07 at specific return periods (or specific frequencies). These values were obtained from the Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report (February 1988), a study performed by the U.S. Army Corps of Engineers, Los Angeles District.

In general, antecedent precipitation is required as a prerequisite for the occurrence of large floods from the unurbanized parts of the 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 time a major storm occurs. Because much os the watershed is urbanized, however, significant runoff events may occur even when dry antecedent conditions exist.

Unit hydrographs values for the watershed upstream of Sepulveda Dam are tabulated in table 4-09 and shown graphically on plate 4-08.

Unit hydrographs were derived using a rainfall distribution having intensities of 1 inch per hour for each 15-minute period. The derivation is applied to the 152-square mile watershed above the dam.

4-08. Water Quality

Because Sepulveda Reservoir is strictly a flood control project that rarely impounds water for more than 24 hours, it has not appreciable affect on water quality. The nature of the urban storm runoff entering the reservoir is generally of poor quality. Routine base flow (usually less than 10 cfs) is typically high in salinity content, whereas storm runoff is generally low in salinity content. Also passing through Sepulveda Reservoir outlet works is treated effluent from the Donald C. Tillman Water Reclamation Plant (TWRP); average flow produced by the treatment area approximately 65 cfs. In the near future a portion of the reclaimed water produced by TWRP will be delivered for use in the Recreation Lake, Wildlife Lake, and various agricultural sections within Sepulveda Basin (see Sections 2-06.a., 2-06.b., 3-06.d., and 8-04; in addition see table 1-01, Sepulveda Basin Master Plan, Final Environmental Impact Report/Environmental Impact Statement (March 1981) and Sepulveda Basin Recreation Lake: Feature Design Memorandum (March 1987).

Unless flood protection is provided for TWRP (as discussed above in Section 2-06.d.) portions of the plant will become inundated at an elevation of approximately 705 feet, NGVD. Initially, contamination of surface waters from untreated or partially treated wastewater sewage will occur. Continued increase of the water surface elevation will result in plant shut down and diversion of untreated sewage to the Los Angeles Hyperion Treatment Plant.

Instream channel use downstream of Sepulveda Dam is limited. Two diversion exist for groundwater recharge facilities. Generally the quality of

urban base flow has been so poor that these facilities are rarely used. A downstream reach with cobblestone invert near Griffith Park has been identified as having some environmental attributes. No actions taken to regulate the discharge rates from Sepulveda Dam will adversely affect this reach.

4-09. Channel and Floodway Characteristics

The channel of the Los Angeles River downstream from Sepulveda Dam is a concrete-lined open channel: rectangular through the San Fernando Valley, and trapezoidal from there to the Pacific Ocean (except for a short rectangular portion just north of downtown Los Angeles) (see pl. 2-04). Along portions of the lower Los Angeles River, the trapezoidal sides are formed by levees that rise above adjacent ground levels.

Channel capacities increase from 16,900 cfs just below Sepulveda Dam to 129,000 cfs from Del Amo Boulevard to the ocean (pl.2-04). Travel times for significant flows are also shown on plate 2-04, and include a total time of 3,2 hours from Sepulveda Dam to the ocean.

4-10. Upstream Structures

a. Chatsworth Reservoir. This now unused reservoir site formerly served as a water-storage facility fro Los Angels Department of Water and Power (DWP). It is located on Chatsworth Creek in the far northwestern portion of the San Fernando Valley, about 10 river miles above Sepulveda Dam (see pls. 2-02 and 2-03). Pertinent Data for Chatsworth Dam and Reservoir are included in Exhibit C of this manual.

Chatsworth Dam, an older earthen facility, was deemed unsafe in 1969, and not water has since been stored in Chatsworth Reservoir (all runoff is passed directly through the outlet). The structure was considered to be unable to withstand a major earthquake—-a point that was underscored by the severe damage sustained by the Lower Van Norman Dam in the February 1971 San Fernando Earthquake (see Section4-10.c.). DWP however, is considering a long term plan to restore Chatsworth Reservoir for water supply impoundment.

It should be noted that whereas the normal outlet for Chatsworth Dam is located at the south-central corner of the reservoir, the emergency spillway is located at the far eastern end of the reservoir, and spillway flow would flood a developed area adjacent to Tampa Avenue in Chatsworth. From there, these waters would drain southward toward Bell Creek and the Los Angeles River, and eventually to Sepulveda Dam.

b. Encino Reservoir. This small reservoir, located in the steep densely developed northern slopes of the Santa Monica Mountains south of the San Fernando Valley (see pls. 2-02 and 2-03), is another water supply reservoir, owned and operat4ed by DWP. Pertinent Data on this reservoir is included in Exhibit C.

Although this reservoir, filled by imported water, does not have a regular outlet, the path of spillway flow, which would flood a residential area, would be northward toward the Los Angeles River and Sepulveda Dam (see pl. 2-03).

c. Los Angeles Reservoir. Another water-supply reservoir, owned and operated by DWP and located upstream of Sepulveda Dam, is Los Angeles Reservoir. Located at the north end of Bull Creek, in the far northern San Fernando Valley about 8 rive miles north of Sepulveda Dam (see pls. 2-02 and 2-03), this reservoir was completed and began storing water in August 1977.

This facility was built as a replacement for the Upper and Lower Van Norman Reservoirs, whose dams were found to be structurally unsound following the February 1971 San Fernando Earthquake. (The Lower Van Norman Dam was severely damaged by the earthquake). Both the Upper and Lower Van Norman Dams have been reconstructed to modern safety standards, but the reservoir basins behind these two dams now serve only for emergency flood control storage. They are now known as the Upper and Lower San Fernando Storm Water Detention Basins. Plate 4-10 (furnished by DWP) depicts the entire Los Angeles and San Fernando Reservoir complex, including reservoirs and bypass channels.

Pertinent Data for Los Angeles Reservoir, which is fed by the main stem of the California Aqueduct, and which serves as a major water supply facility for the greater Los Angels area, included in Exhibit C.

4-11. Downstream Structures

a. Lopez Dam. This dam is constructed on Pacoima Wash 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 U.S. Army Corps of Engineers, Los Angeles District, as part of the overall Los Angeles County Drainage Area (LACDA) flood control project. The reservoir drainage area is 34 square miles. Pertinent Data for Lopez Dam are include in Exhibit C.

b. Hansen Dam. Located along Tujunga Wash,9 miles above its confluence with the Los Angles River (see pl. 2-02), Hansen Dam is a major flood control facility owned by the Federal Government and operated and maintained by the U.S. Army Corps of Engineers, Los Angeles District, as part of the LACDA system. The reservoir drainage are is 151.9 square miles.

Like Sepulveda Dam, Hansen Dam controls floods on the downstream portions of the Los Angeles River, as well as on Tujunga Wash, immediately downstream of Hansen Dam. During appreciable flows on the Los Angeles River, these two dams must be operated as a system (see Section 7-05).

c. Whittier Narrows Dam. This unique flood control facility was built by the U.S. Army Corps of Engineers at the narrows of the San Gabriel and Rio Hond in Los Angeles County, just north of Pico Rivera (see pl. 2-02). The facility is Federally owned and is operated and maintained by the Corps of Engineers. The reservoir drainage area is 554 square miles. Pertinent Data for Whittier Narrows Dam are included in Exhibit C.

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 tow 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 Dam is operated in conjunction with Sepulveda Dam to control floods on the lower reaches of the Los Angeles River.

d. Other Facilities. Upstream of each of the three U.S. Army Corps of Engineers dams discussed in Section 4-11.a. through 4-11.c., are once or more additional dams with reservoir (see pl. 2-02 and Exhibit c).

(1) Pacoima Dam. This project is water supply and flood control facility of Los Angeles County Department of Public Works and is located on Pacoima Wash upstream of Lopez Dam. The reservoir drainage area is 28.2 square miles.

(2) Big Tujunga Dam. This project is a water supply and flood control facility of Los Angels County Department of Public Works and is on Big Tujunga Creek above Hansen Dam. The reservoir drainage area is 82.3 square miles.

(3) Santa Fe Dam. This Federally owned, U.S. Army Corps of Engineers-operated flood control facility is on the San Gabriel River upstream of Whittier Narrows Dam. IT is operated in conjunction with Whittier Narrows Dam, and thus, at times, indirectly in conjunction with Hansen and Sepulveda Dams. The reservoir drainage is 236 square miles.

(4) 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 cam be seen on plate 2-02, and Pertinent Data for these reservoirs are included in Exhibit C.

4-12. Economic Data

a. Population. No population figures area available specifically for the watersheds above or below Sepulveda Dam. The San Fernando Valley is estimate to have a population of approximately 1,081,000, according to the 1980 Census. The population of the greater San Fernando Valley, including Sunland, Tujunga, and Lakeview Terrace, is approximately 1,133,000. Table 4-10 lists the estimated population as of 1979 and the projected population for the years of 1990 and 2000 for each of the four communities surrounding Sepulveda Dam. Sepulveda Reservoir lies in the center of these four communities.

b. Agriculture. Agriculture was at one time a major activity in the San Fernando Valley, both upstream and downstream of Sepulveda Reservoir 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.

About 340 acres of Sepulveda Reservoir Land is leased by the U.S. Army Corps of Engineers to commercial agriculture. The primary products grown here are corn, alfalfa, and other truck crops. These agricultural leases are limited to periods not exceeding 5 years and are subject to termination by the Corps of Engineers if the Corps should require the land for other usage.

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 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.

There is a corridor of commerce along the entire length of Ventura Boulevard, which closely parallels the Los Angles River below Sepulveda Dam.

d. Flood Damages. Flood damage estimates are not available for most floods that occurred in the Sepulveda Dam drainage area. However, estimates are available for the flood of 1938, which caused considerable loss of life and major property damage in the Los Angeles County Drainage Area. Although no lives were lost in the Sepulveda drainage area, $43,300 in property damages occurred. Considerable runoff occurred above and below Sepulveda Dam on 20 February and 3 March 1941. Numerous thunderstorms were observed and flood damage above the dam in the vicinity of Reseda was estimated at $370,960. Since completion of the dam in 1941,, there has been relatively little in the way of damaging flows on the Los Angeles River. There have, however, been a few incidents in recent years in which water has left the channel as the result of hydraulically unstable channel flow. An example of this, which can be seen in Photographs 4-01 and 4-02, occurred along the river 1.5 miles below Sepulveda Dam in February 1980. IN this and other cases, the water approached, but did not enter, residential and commercial property alongside the river. Further downstream on the Los Angeles River through parts of Long Beach, where the contribution from Sepulveda Dam constitutes on ly a relatively small portion of the total flow, the water reached the top of the levees, as can be seen by the debris left on the levees in Photograph 4-03.

An ongoing Corps of Engineers review study for Los Angeles County Drainage Area rivers and reservoir indicates that there is a fairly low level of protection along the middle and lower portions of the Los Angeles River, and that a storm and flood not greatly in excess of those experienced during recent years (including the flood of 1969, 1978, and 1980, and 1983) could overtop the levees on the Lower Los Angeles River.

Table 4-01. Summary of Climatological Data at Burbank, Calif., Sepulveda Flood Control Basin, Los Angeles County Drainage Area, California*

Month	Temperature			Precipitation		
	Mean monthly	Record highest	Record lowest	Mean monthly	Maximum monthly	Minimum monthly
	Degrees Fahrenheit	Degrees Fahrenheit	Degrees Fahrenheit	Inches	Inches	Inches
Jan.	53.0	87	21	2.95	13.42	(T)
Feb.	54.7	91	25	3.29	13.84	(T)
Mar.	57.0	90	32	2.18	10.24	0
Apr.	60.6	100	33	1.09	4.00	(T)
May	63.5	105	36	.16	1.23	(T)
Jun.	67.4	103	43	.06	.37	(T)
Jul.	73.5	108	47	0	.03	0
Aug.	73.7	111	47	.05	.72	0
Sep.	72.2	111	43	.26	6.63	0
Oct.	66.0	103	33	.47	2.42	(T)
Nov.	59.8	95	26	1.09	6.61	0
Dec.	55.3	92	27	2.42	8.07	(T)
Annual	63.1	111	21	14.02		

* $34^{\circ}12'$N latitude; $118^{\circ}22'$W longitude; elevation 699 feet, NGVD.

T Indicates less than 0.01 inch of precipitation.

NOTE: Period of record is 34 years (1931-1964).

Table 4-02. Summary of Precipitation Data at Sepulveda Dam and Three Stations in Watershed Above Dam.

LACDPW Number	Station Name	Lat (N)	Long (W)	Elev (feet)	Period of Record
446	Aliso Canyon-Oat Mtn	34°18'53"	118°33'25"	2367	1939-1983
735	Bell Canyon	34°11'40"	118°39'23"	895	1946-1983
259D	Chatsworth-Twin Lakes	34°16'43"	118°35'41"	1275	1929-1983
465	Sepulveda Dam	34°09'48"	118°27'59"	727	1939-1983

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

LACDPW No:	446			735			259D			465		
	Mean	Maximum		Mean	Maximum		Mean	Maximum		Mean	Maximum	
		Monthly	Daily		Monthly	Daily		Monthly	Daily		Monthly	Daily
Jan	4.43	21.59	8.20	2.94	5.31	4.11	3.65	16.32	6.91	2.82	16.26	4.61
Feb	4.66	19.22	6.03	3.09	13.60	4.30	3.83	16.78	4.55	2.96	18.38	5.77
Mar	3.66	13.90	4.40	2.43	13.80	4.70	3.01	10.87	6.10	2.32	13.18	5.53
Apr	1.84	8.35	2.74	1.22	5.65	2.15	1.52	6.94	2.59	1.17	6.66	1.93
May	.52	3.35	1.94	.35	3.20	2.00	.43	2.70	1.44	.33	3.94	2.40
Jun	.11	.42	.42	.07	.44	.35	.09	.50	.50	.07	.16	.16
Jul	.05	.20	.19	.03	.08	.08	.04	.20	.20	.03	.61	.61
Aug	.11	3.47	3.19	.07	2.60	2.50	.09	2.75	2.47	.07	3.00	2.90
Sep	.34	3.53	2.80	.23	2.60	1.80	.28	3.31	3.00	.22	2.25	1.32
Oct	.77	2.95	1.91	.51	1.37	.44	.64	2.52	1.13	.49	1.63	.09
Nov	2.24	18.98	5.05	1.49	6.60	5.24	1.85	14.42	5.23	1.43	12.90	6.16
Dec	3.98	11.00	5.44	2.64	6.16	3.30	3.27	7.36	4.61	2.53	8.67	6.05
Annual	22.71			15.07			18.70			14.44		

NOTES: 1. Minimum observed monthly values are approximately zero at each station.

2. Data were obtained from Los Angeles County Department of Public Works (LACDPW).

Table 4-03. Precipitation Frequency Values (Inches) for Sepulveda Watershed.

DURATION	RETURN PERIOD 2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5-MIN	0.18	0.23	0.27	0.32	0.35	0.38
10-MIN	0.27	0.36	0.42	0.49	0.54	0.60
15-MIN	0.35	0.46	0.53	0.62	0.69	0.76
30-MIN	0.48	0.63	0.73	0.86	0.95	1.05
1-HR	0.61	0.80	0.92	1.09	1.21	1.33
2-HR	0.85	1.11	1.28	1.51	1.67	1.83
3-HR	1.08	1.41	1.62	1.90	2.11	2.31
6-HR	1.62	2.10	2.42	2.83	3.13	3.42
12-HR	2.24	3.05	3.57	4.26	4.76	5.26
24-HR	2.86	3.99	4.74	5.69	6.40	7.10

NOTES: 1. Values, from NOAA Atlas 2 data, are for a site at the centroid of the watershed above Sepulveda Dam at latitude $34^{o}13'$N, longitude $118^{o}34'$W, elevation 920 feet.

2. All values are for annual series.

Table 4-04. Sepulveda Dam Inflow History.

Water Year	Peak Inflow (cfs)	Water Year	Peak Inflow (cfs)
1929-30	389	1961-62	16,100
1930-31	1,295	1962-63	8,123
1931-32	2,000	1963-64	4,637
1932-33	1,720	1964-65	6,170
1933-34	7,382	1965-66	17,040
1934-35	885	1966-67	12,879
1935-36	281	1967-68	15,995
1936-37	2,700	1968-69	16,800
1937-38	11,600	1969-70	6,816
1938-39	2,980	1970-71	20,013
1939-40	2,690	1971-72	7,097
1940-41	6,610	1972-73	13,400
1941-42	1,060	1973-74	10,788
1942-43	12,700	1974-75	16,017
1943-44	15,900	1975-76	4,348
1944-45	1,360	1976-77	10,627
1945-46	1,450	1977-78	25,670
1946-47	900	1978-79	17,149
1947-48	310	1979-80	58,970
1948-49	85	1980-81	8,600
1949-50	400	1981-82	12,125
1950-51	290	1982-83	38,675
1951-52	12,400	1983-84	6,281
1952-53	4,680	1984-85	8,276
1953-54	3,200	1985-86	36,938
1954-55	2,400	1986-87	16,520
1955-56	4,300		
1956-57	3,040		
1957-58	8,000		
1958-59	8,020		
1959-60	4,420		
1969-61	4,740		

NOTES: 1. Data prior to 1941 were obtained from Los Angeles County Flood Control District gauging station on the Los Angeles River at Van Nuys Blvd bridge (about 1-1/2 miles below the dam site). Data after Sepulveda Dam was completed (1941 to date) were computed by the Corps of Engineers.

2. 1941-42 and subsequent years are maximum mean hourly discharges.

Table 4-05. Annual Maximum Inflow, Outflow, Elevations Capacity (Storage), and Surface Area at Sepulveda Dam
Los Angeles County Drainage Area, California

May 1985

Water Year	Peak Inflow (cfs)	Date	Peak Outflow (cfs)	Date	Maximum Water Surface Elev. (ft., NGVD)	Date	Maximum Capacity (ac-ft)	Date	% of Capacity to threshold of Spilling with Spillway Gates Raised	Surface Area (Acres)
41-42	1,060	28 DEC	1,040	28 DEC	671.83	28 DEC	10	28 DEC	0.1	2.15
42-43	12,700	23 JAN	2,710	23 JAN	699.29	23 JAN	6,341	23 JAN	36.4	727.28
43-44	15,900	22 FEB	4,740	22 FEB	697.92	22 FEB	5,070	22 FEB	29.1	656.00
44-45	1,360	2 FEB	1,360	2 FEB	675.00	2 FEB	26	2 FEB	0.2	9.15
45-46	1,450	21 DEC	1,450	21 DEC	673.20	21 DEC	15	21 DEC	0.1	3.85
46-47	900	26 DEC	900	26 DEC	671.44	26 DEC	8	26 DEC	0.0	1.80
47-48	310	24 MAR	310	24 MAR	670.27	24 MAR	3	24 MAR	0.0	1.05
48-49	85	17 DEC	85	17 DEC	668.44	17 DEC	0	17 DEC	0.0	0.40
49-50	400	6 FEB	400	6 FEB	669.87	6 FEB	2	6 FEB	0.0	0.85
50-51	290	29 JAN	290	29 JAN	668.80	30 JAN	1	30 JAN	0.0	0.60
51-52	12,400	18 JAN	7,000	15 JAN	692.86	18 JAN	2,600	18 JAN	14.9	422.65
52-53	4,680	15 NOV	1,500	15 NOV	686.00	15 NOV	613	15 NOV	3.5	176.60
53-54	3,200	13 FEB	3,200	13 JAN	676.00	13 FEB	34	13 FEB	0.2	13.50
54-55	2,400	18 JAN	2,400	18 JAN	673.50	18 JAN	16	18 JAN	0.1	4.45
55-56	4,300	26 JAN	4,300	26 JAN	677.83	26 JAN	52	26 JAN	0.3	23.00
56-57	3,040	13 JAN	3,160	13 JAN	676.20	13 JAN	36	13 JAN	0.2	14.40
57-58	8,000	15 DEC	8,000	15 DEC	684.35	15 DEC	346	15 DEC	2.0	120.00
58-59	8,020	6 JAN	9,000	6 JAN	682.90	6 JAN	162	6 JAN	0.9	84.05
59-60	4,420	1 FEB	5,320	11 JAN	678.00	11 JAN	54	11 JAN	0.3	24.10
60-61	4,740	5 NOV	5,700	5 NOV	678.40	5 NOV	58	5 NOV	0.3	27.10
61-62	16,100	12 FEB	13,600	12 FEB	686.50	12 FEB	790	12 FEB	4.0	192.85
62-63	8,123	9 FEB	7,820	9 FEB	671.00	9 FEB	2	9 FEB	0.0	1.50
63-64	4,637	22 JAN	2,830	20 NOV	675.00	20 NOV	14	20 NOV	0.1	9.15
64-65	6,170	9 APR	6,170	9 APR	678.26	9 APR	49	9 APR	0.3	26.05
65-66	17,040	29 DEC	11,150	29 DEC	691.40	29 DEC	2,181	29 DEC	12.2	366.50
66-67	12,879	6 NOV	9,425	6 NOV	687.00	6 NOV	896	6 NOV	5.1	208.35
67-68	15,995	8 MAR	9,375	8 MAR	686.82	8 MAR	857	8 MAR	4.6	202.85
68-69	16,800	25 JAN	11,825	25 JAN	693.30	25 JAN	2,945	25 JAN	16.5	438.95
69-70	6,816	6 NOV	7,150	28 FEB	682.43	28 FEB	205	28 FEB	1.2	75.45
70-71	20,013	29 NOV	1,170	29 NOV	693.03	29 NOV	2,828	29 NOV	15.8	428.90
71-72	7,097	27 DEC	6,850	27 DEC	681.90	27 DEC	172	27 DEC	1.0	67.40
72-73	13,400	11 FEB	9,940	11 FEB	688.38	11 FEB	1,228	11 FEB	6.7	252.55
73-74	10,788	7 JAN	8,681	7 JAN	685.45	7 JAN	590	7 JAN	3.2	157.85
74-75	16,017	4 DEC	9,919	4 DEC	688.33	4 DEC	1,215	4 DEC	6.6	250.90
75-76	4,348	9 FEB	5,150	9 FEB	679.20	9 FEB	70	9 FEB	0.4	34.30
76-77	10,627	2 JAN	8,150	2 JAN	684.36	2 JAN	416	2 JAN	2.4	120.25
77-78	25,670	4 MAR	13,190	4 MAR	697.65	4 MAR	5,253	4 MAR	30.2	635.65
78-79	16,410	27 MAR	9,680	27 MAR	687.62	27 MAR	1,038	27 MAR	6.0	227.65
79-80	58,970	16 FEB	15,100	16 FEB	705.10	16 FEB	11,503	16 FEB	66.6	1074.00
80-81	8,600	29 JAN	7,300	28 JAN	682.69	29 JAN	289	29 FEB	1.2	80.10
81-82	12,125	17 MAR	8,514	17 MAR	685.00	17 MAR	534	17 MAR	3.0	141.80
82-83	38,676	1 MAR	14,397	1 MAR	702.53	1 MAR	8,950	1 MAR	51.4	896
83-84	6,281	25 DEC	6,079	25 DEC	680.62	25 DEC	159	25 DEC	0.9	49.55
84-85	8,276	13 NOV	4,024	13 NOV	683.11	19 DEC				
85-86	36,938	8 MAR	10,310	15 FEB	689.20	15 FEB				
86-87	16,520	17 NOV	4,300	17 NOV	686.80	17 NOV				

NOTE: Computed Values from Corps of Engineers Data.

Table 4-06. Effects of Watershed Urbanization on Inflow to Sepulveda Reservoir.

Inflow Characteristics Average Annual	Average Rate of Inflow	
	0% Impervious* Cover	35% Impervious** Cove.
	(cfs)	(cfs)
Peak	2,000	12,000
Maximum 1-Day Duration	800	3,500
Maximum 2-Day Duration	350	2,100
Maximum 3-Day Duration	300	1,600
Maximum 5-Day Duration	200	1,300

* 1930 watershed conditions. When Sepulveda Dam was completed in 1941, watershed impervious cover was about 3%, and watershed runoff was about the same as for the 0% impervious cover.

** 1980 watershed conditions.

Table 4-07. Sepulveda Dam Runoff Data (all values in ac-ft).

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Annual Total
1970	468.0	2656.0	500.0	2884.0	7061.0	6067.0	855.0	682.0	643.0	805.0	688.0	625.0	23934.0
1971	508.0	18530.0	15941.0	2029.0	4437.0	5643.0	2172.0	999.0	815.0	670.0	589.0	928.0	53261.0
1972	972.0	615.0	12248.0	492.0	736.0	591.0	589.0	601.0	577.0	571.0	599.0	686.0	19277.0
1973	428.0	4140.0	1730.0	7940.0	20533.0	5651.0	726.0	887.0	817.0	787.0	450.0	538.0	44627.0
1974	428.0	2168.0	1531.0	19204.0	424.0	6099.0	589.0	700.0	533.0	499.0	436.0	315.0	32926.0
1975	1571.0	284.0	7559.0	478.0	4889.0	10100.0	3025.0	573.0	482.0	500.0	260.0	313.0	30034.0
1976	373.0	401.0	496.0	286.0	6946.0	1545.0	756.0	575.0	563.0	409.0	482.0	3604.0	16436.0
1977	547.0	900.0	1091.0	7410.0	357.0	2628.0	234.0	5320.0	290.0	234.0	3638.0	125.0	22774.0
1978	182.0	224.0	6793.0	20602.0	30456.0	46342.0	3989.0	728.0	657.0	637.0	428.0	1688.0	112726.0
1979	442.0	3350.0	1789.0	17964.0	7256.0	11611.0	1349.0	1166.0	680.0	672.0	617.0	736.0	47632.0
1980	6127.0	4407.0	4592.0	88990.0	52080.0	14507.0	5242.0	3108.0	2184.0	3221.0	3935.0	3808.0	192201.0
1981	5903.0	5712.0	5617.0	8670.0	4374.0	10996.0	4389.0	2459.0	2380.0	2459.0	2848.0	2856.0	58663.0
1982	3961.0	8329.0	4167.0	7031.0	4284.0	12833.0	7139.0	4669.0	2380.0	2459.0	2459.0	3086.0	62797.0
1983	4062.0	13440.0	5819.0	21642.0	16322.0	44727.0	9273.0	4415.0	4320.0	4721.0	4925.0	4897.0	138563.0
1984	3477.0	7307.0	10897.0	3188.0	3681.0	5135.0	4979.0	4959.0	4030.0	2936.0	2848.0	2412.0	55849.0
1985	2584.0	4608.0	10302.0	5865.0	5893.0	6026.0	4760.0	4530.0	2380.0	2642.0	2951.0	2005.0	54546.0
1986	2858.0	8626.0	5345.0	11421.0	17639.0	15544.0	7307.0	6426.0	1785.0	3512.0	3396.0	4447.0	88306.0
1987	4711.0	5835.0	3872.0	5030.0	4082.0	4798.0	3316.0	3197.0	3094.0	3166.0	3209.0	3439.0	47749.0
1988	11847.0	5599.0	8474.0	7626.0	7983.0	5074.0	8039.0	3840.0	3951.0	3935.0	3935.0	3838.0	73841.0
Mean	2707.8	5112.2	5708.6	12565.9	10496.5	11364.1	3617.3	2622.8	1713.7	1833.4	2036.5	2123.5	64011.6
Median	1571	4407	5345	7410	5893	6067	3316	2459	817	805	2459	2005	62797
High	11847.0	18530.0	15941.0	88990.0	52080.0	46342.0	9273.0	6426.0	4320.0	4721.0	4925.0	4897.0	192201.0
Low	182.0	224.0	496.0	286.0	357.0	591.0	234.0	573.0	290.0	234.0	260.0	125.0	16436.0

NOTE: 1. Data are for U.S. Geological Survey gauge, "Los Angeles River at Sepulveda Dam," located immediately downstream of dam. Because impoundment durations are relatively short, these data are representative of both inflow and outflow.

Table 4-08. Rainfall, Inflow, Outflow and Elevation Frequency Values, Sepulveda Reservoir.

Return Period (Years)	24-Hour Rainfall (In)	Rainfall Loss (In)	Excess Rainfall (In)	48-Hour Runoff Volume (Ac-Ft)	48-Hour Rainfall Volume (Ac-Ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Elevation (Ft., NGVD)
500	11.23	3.82	7.41	60,049	91,038	108,970	77,584	714.57
200	9.94	3.82	6.12	49,497	80,580	94,735	40,633	713.36
100	8.84	3.77	5.07	41,106	71,663	82,516	16,989	712.24
50	7.37	3.63	3.74	30,334	59,746	54,863	15,645	706.46
25	6.59	3.47	3.12	25,292	53,423	47,327	14,740	703.04
10	5.24	3.18	2.06	16,653	42,479	34,285	12,806	696.44
5	4.41	2.94	1.47	11,930	35,750	26,162	11,481	692.53
2	3.05	2.19	0.86	6,983	24,725	12,851	8,860	685.86

NOTE: Peak inflow, outflow, and max. elevation values represent 1980 watershed conditions. The data were derived from a rainfall-runoff analysis as part of a 1985 Corps of Engineers hydrologic review study. See plates 4-06 and 4-07.

Table 4-09. Unit Hydrograph Ordinates for Watershed Above Sepulveda Dam.

15-min Time Period	Discharge* (cfs)
1	11,115
2	29,758
3	52,124
4	63,490
5	69,358
6	67,854
7	39,574
8	23,494
9	15,314
10	8,538
11	4,706
12	2,186
13	2,186
14	2,186
15	278

*Unit hydrograph derived on the basis of 1 inch per 15-minute period. Application uses a rainfall distribution having intensities of 1 inch per hour for each 15-minute period. Applied to the 152-square mile watershed.

Table 4-10. Population Projections Near Sepulveda Dam.

	10/1/79[1]	1990[2]	2000[2]
Encino - Tarzana	72,478	80,158	83,789
Reseda - W. Van Nuys	79,259	86,530	90,405
Sherman Oaks - Studio City	70,613	73,822	76,588
Van Nuys - North Sherman Oaks	113,016	110,660	114,007
	335,366	351,170	364,789

NOTES: (1) Population Estimate and Housing Inventory as of 1 October 1979, Los Angeles City Planning Department.

(2) Projected Population (1990-2000), Los Angeles City Planning Department, April, 1979.

(3) Sepulveda Dam lies in the center of the four communities indicated above.

Table 4-11. Sediment Survey Data Summary.

Date of Survey	Type of Survey	No. of Ranges or Contour Inc.	Surface Areas (Acres)	Capacity (Ac-Ft)	Period Capacity Loss (Ac-Ft)			Depth Designation Range in Ft. below Crest Elevation				
					Period Total	Averg. Annual	Per Sq. Mile Per Year	42-40	40-30	30-20	20-10	10-Crest
								% of Total Sediment Located Within Depth Designation				
Nov 41	Contour	5 feet	1301	16,720	Original Survey	Original Survey	Original Survey	Original Survey				
Nov 44	Ranges	76	1335	17,437	-717	-239	-1.68	Change from a topographic to a range line survey shows an increase in storage.				
Jun 61	Ranges	76	1335	17,296	141	8.49	0.06	1	0	0	15	84
Dec 80	Contour	2 feet	1348	17,425	-129	-6.61	-0.05	Change from range line to topographic survey shows increase in storage.				

Photo No. 4-01. Flood of 16 February 1980, Los Angeles River at Cedros Street, approximately 1.5 river miles below Sepulveda Dam (view toward downstream, showing overflow of left bank resulting from hydraulic instability due to a side drain in the channel wall).

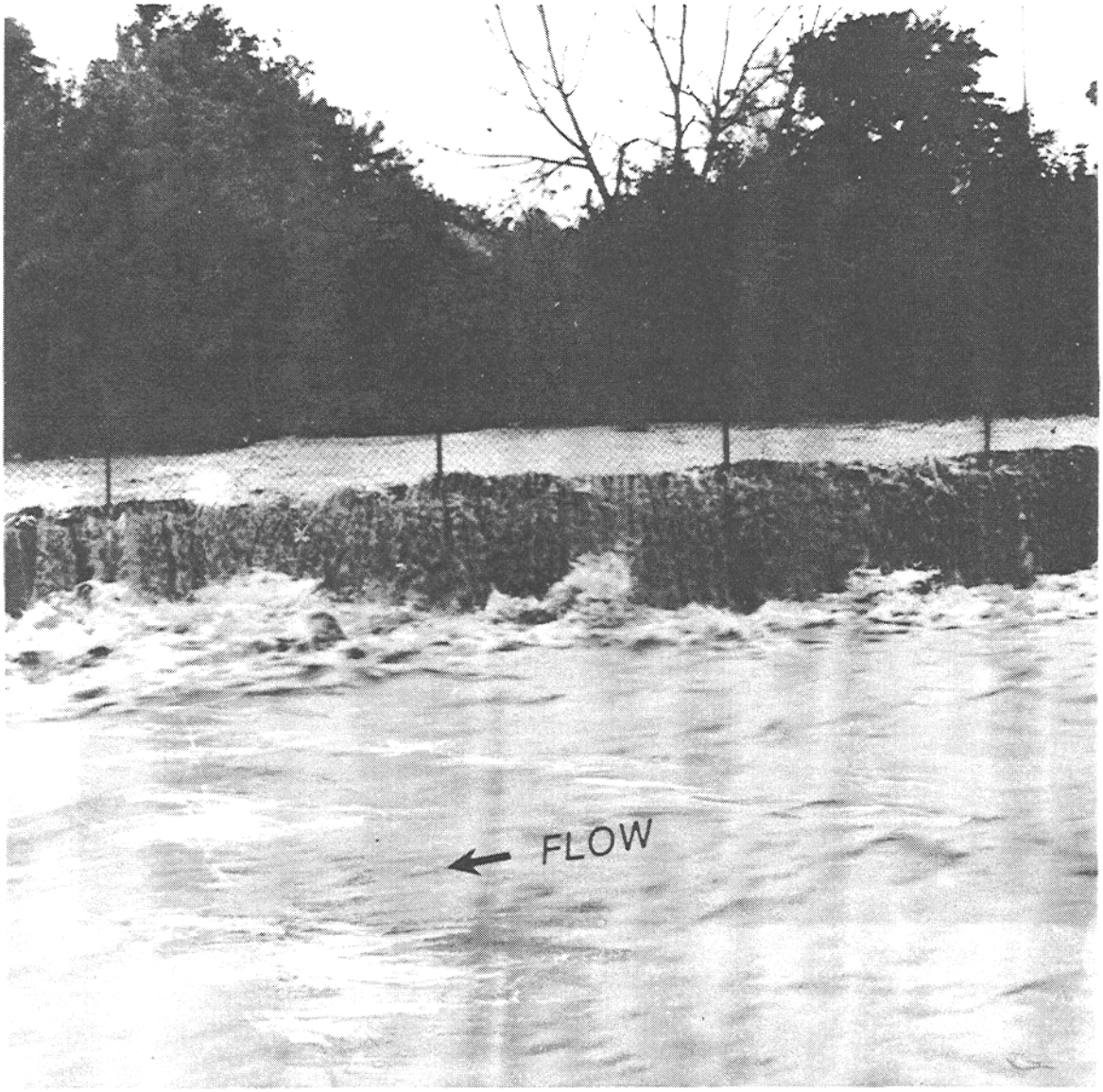


Photo No. 4-02. Flood of 16 February 1980, Los Angeles River at Cedros Street (view toward right bank, from location downstream of channel overflow in Photo No. 4-01).

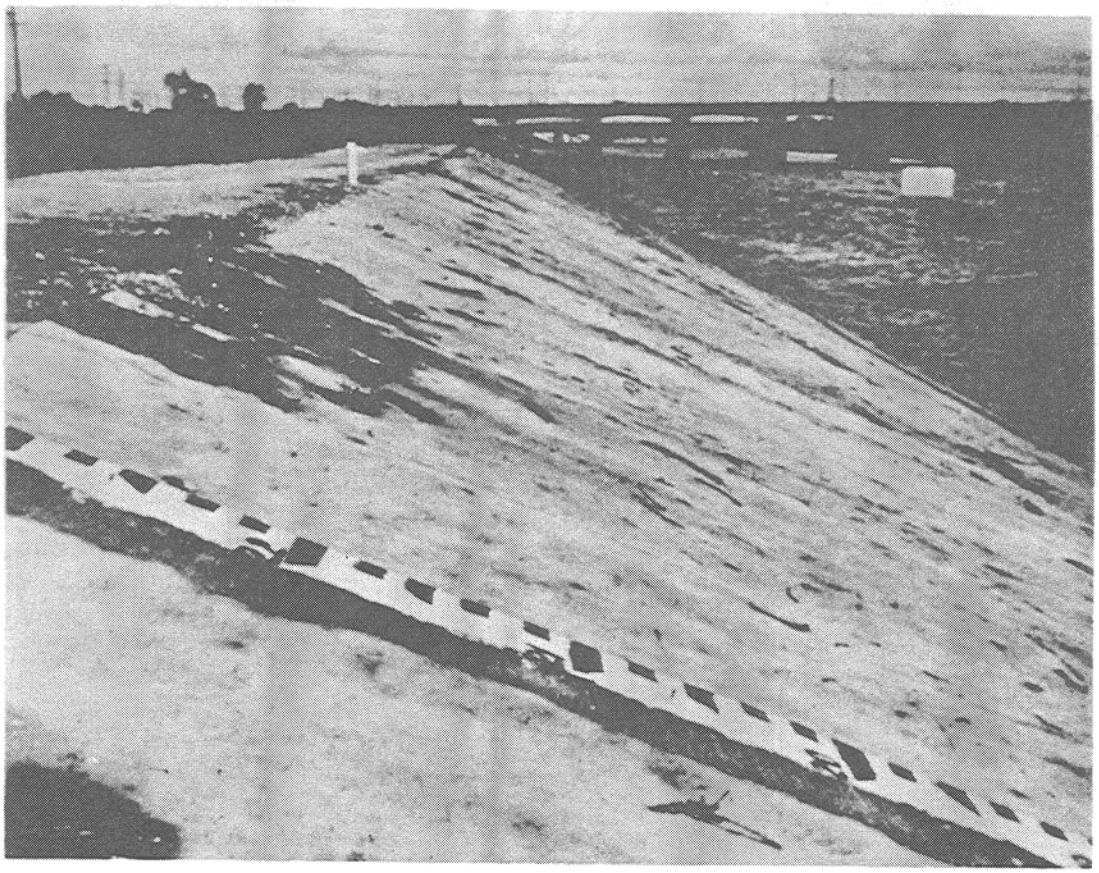


Photo No. 4-03. Aftermath, Flood of 16 February 1980, Los Angeles River below Wardlow Road, Long Beach (view toward downstream, showing debris at top of levee left by flood).

V - DATA COLLECTION AND COMMUNICATION NETWORKS

5-01. Hydrometeorological Stations

a. Facilities. Plate 5-01 is a map of gauging stations for precipitation, reservoir level, and streamflow in and immediately surrounding the watershed above Sepulveda Dam, plus the stream gauge stations on the Los Angeles River between Sepulveda Dam and the Pacific Ocean. These stations, along with their latitudes, longitudes, and elevations, are listed in table 5-01. Many of the stations consist of more than one type of gauge, such as a recording and a non recording precipitation gauge. Stream gauge rating curves for stations located between Sepulveda Dam and the Pacific Ocean are shown on plate 5-02. The relationship depicted between gauge height and discharge can provide useful information about downstream channel conditions (this is discussed further in section 8-09.c.; in addition rating tables associated with the rating curves are given in Exhibit F).

b. Reporting. Hydrologic data from Sepulveda Dam and the upstream and downstream watersheds are observed and reported in three different ways, as illustrated in table 5-02.

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

(4) ALERT System. There is also an even-recording gauge system throughout southern California sponsored by the National Weather Service. This system is referred to as the ALERT System (Automatic Local Evaluation in Real Time). 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 gauges.

5-02. Water Quality Stations

There are no water quality stations in the watershed above Sepulveda Reservoir. The U.S. Geological Survey operates a water quality station downstream at the gauge site known as “Los Angeles River at Willow Street Bridge, Long Beach, California.”

5-03. Sediment Stations

There are no sediment stations (as such)in the watershed above Sepulveda Reservoir or along the Los Angeles River downstream of Sepulveda Dam. However, estimates of sediment production can be obtained from records at debris basins within the watershed.

5-04. Recording Hydrologic Data

Each agency maintains records of its own data (Section 5-01 above). The National Weather Service data are archived at the National Oceanic and Atmospheric Administration, National Climatic Data Center in Asheville, North Carolina. Precipitation and other data are published monthly by the National Climatic Data Center in Climatological Data and Hourly Precipitation Data.

The State of California, Department of Water Resources, published monthly data from the ALERT telemetry gauge network. The Ventura County Flood Control District and Los Angeles County Department of Public Works archive their recording and nonrecording data and furnish theses data to other agencies upon request.

The U.S. Army Corps of Engineers maintains a file of data from its recording and telemetry gauges and provides selected data to the National Weather Service for Publication. The Corps also enters data from its manual observations on various forms, which are maintained on file in the District. These are discussed further in Section 9-05 and illustrated in figures 9-01 through 9-07.

5-05. Communication Network

The U.S. Army Corps of Engineers maintains a voice radio communication network for its entire operations activities. This routinely includes communication between the District Office and the various dam tenders, as well as with vehicles in the field.

During periods of significant runoff, communication to and from the dam tenders becomes vital. The existing radio network, which has proven itself reliable, is back ed up by the local telephone system.

Power at eh District office, as well as at each dam is backed up by an emergency generator system; there is also a complete radio station at the District’s Base Yard, a few miles east of the District Office in El Monte, California.

5-05. 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 District Office to each dam tender, including that of Sepulveda Dam. This Reservoir Operation Report (or "Morning Report") is usually made at 0800 hours, Monday through Friday (see fig 9-07). Other routine or nonroutine radio or telephone calls are made as needed (see also Section 5-07).

In the even t that all communication with the District Office including the Base Yard, should be interrupted, a set of Standing Operating Instructions to Dam Tenders have been compiled for each dam. A copy of these instructions for Sepulveda Dam is included in Exhibit A of this manual.

b. Between Project Offices and Others. No routine communication exists between Sepulveda Dam and other agencies.

c. Between Regulating Office and Others. Before and during the various stages of any reservoir impoundment, the Corps of Engineers notifies offices of the City of Los Angeles, as well as selected private interests, of the impending rises in the reservoir water surface elevation and corresponding outflow. A list of agencies to notify, with applicable office and home telephone numbers, is published annually be the Corps of Engineers, Los Angeles District, in the Instructions for Reservoir Operations Center Personnel (hereinafter referred to as the "Orange Book"). During major runoff events, the Reservoir Operations Center of the Corps is in constant contact with the Hydraulics Division of Los Angeles County Department of Public Works in order to fully coordinate the operations of both agencies' reservoirs. The County is directly tied into the Corps of Engineers radio and telephone system. The Reservoir Operation Center is also in direct radio contact with channel observers dispatched to patrol the downstream channel during significant floods.

5-07. Project Reporting Instructions

During periods of water operations, communication between the District Office and each affected dam tender is made on a frequent basis, normally once each hour (at times more frequent communication may be required). If a gate change is required, the operating hydrologic engineers provide the radio operator at the District Office with the gate change instructions. These are broadcast to the dam tender. When the gate change is completed, the dam tender calls back to the District radio operator with information on the change. The radio operator eh informs the engineer who initiated the change.

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

5-08. Warnings

The responsibility for issuing all weather watches a warning and all flood and flash flood watches and warnings rests with the National Weather Service. Local emergency officials of cities and counties are responsible for issuing any public warning regarding unusual overflows, evacuations, unsafe roads or bridges, toxic spills, etc. The U.S. Army Corps of Engineers is responsible for providing theses official with up-to-date information, and forecast where possible, of water rises within Sepulveda Dam. If an uncontrolled spillway flow or dam break were imminent, the Reservoir Operations Center of the Corps would immediately notify the Los Angeles Police Department, Van Nuys Division (telephone no. (818) 989-8383), the Los Angeles County Sheriff, Disaster Communications Office (telephone no. (213) 946-7935), the California Office of Emergency Services–Headquarters, Sacramento (telephone no. (916) 427-4900), and the California Highway Patrol, 24 hour Communications Center (telephone no. 911). Upon completing the above notifications, contact would be made with the District Emergency Response Team. For other pertinent telephone numbers refer to the “Orange Book”.

Table 5-01. Precipitation, Reservoir, and Stream Gauges in and near the Watershed Above Sepulveda Dam. July 1985.

Station Identification	Station Name	Latitude (N)	Longitude (W)	Elevation (ft., NGVD)	Type of Gauge(s)*
L-32, W-6162	Newhall-Soledad Division Headquarters	34°23'07"	118°31'54"	1243	NR
L-395	Olive View Sanitarium	34°19'29"	118°26'55"	1425	SR
V-234, T-622, T-623	Las Llajas Canyon	34°18'04"	118°41'24"	1150	SR
V-248	Simi Hills - Burro Flat	34°14'42"	118°42'32"	1750	SR, RR
V-187	Susana Knolls - County Fire Station	34°15'43"	118°40'08"	1085	SR
L-1173	Tapo Canyon	34°12'54"	118°42'41"	1525	SR, RR
L-735	Bell Canyon	34°11'40"	118°39'23"	895	RR
L-5	Calabasas	34°09'24"	118°38'14"	924	SR
L-1050	Old Topanga Canyon	34°06'28"	118°37'40"	1000	SR
L-1023	Santa Maria Creek-Speer	34°07'44"	118°34'42"	1415	SR
L-1147	El Caballero Country Club	34°08'52"	118°31'53"	1000	SR
L-292	Encino Reservoir	34°08'56"	118°30'57"	1075	SR, RR
L-17	Sepulveda Canyon - Mulholland Highway	34°07'51"	118°29'26"	1425	SR, RR
L-767	Mandeville Canyon Road	34°06'24"	118°30'10"	1140	RR
L-237	Stone Canyon Reservoir	34°06'21"	118°27'13"	865	SR
L-762	Upper Stone Canyon	34°07'27"	118°27'15"	943	RR
L-465, C-SPDA, W-8092	Sepulveda Dam	34°09'48"	118°27'59"	725	NR, SR, RR, CR, NW, RW, CW, NG, RG, CG
L-15, W-9260	Van Nuys	34°10'48"	118°27'03"	695	SR
L-725	Birmingham Hospital	34°11'13"	118°30'17"	728	RR
L-21	Woodland Hills	34°10'14"	118°35'33"	875	SR
L-1051, W-1484	Canoga Park - Pierce College	34°10'51"	118°34'23"	800	SR
L-25	Northridge - Los Angeles Department of Water and Power	34°13'52"	118°32'28"	810	SR
L-1157	California State University Northridge	34°14'17"	118°31'48"	890	RR
L-29	Granada Hills	34°17'09"	118°30'59"	1280	SR
L-293	Van Norman Lake - Lower	34°17'18"	118°28'54"	1150	SR
L-30	Sylmar	34°18'37"	118°28'15"	1250	SR
L-1084	May Debris Basin	34°19'50"	118°25'45"	1680	SR
L-1213	Northridge Davis	34°15'15"	118°30'58"	950	SR
L-9	Sepulveda and Rayen	34°13'52"	118°28'04"	828	SR
L-24, W-1680	Chatsworth	34°15'20"	118°36'36"	948	SR
L-31	Orcutt Ranch	34°19'28"	118°34'14"	2850	SR
L-259	Chatsworth - Twin Lakes	34°16'43"	118°35'41"	1275	SR, RR
L-446, W-0115	Aliso Canyon - Oat Canyon	34°18'53"	118°33'25"	2367	SR, RR
L-284	Placerita Canyon	34°22'37"	118°28'43"	1485	SR
L-357	Van Norman Lake - Upper	34°18'49"	118°29'30"	1248	SR, RR
L-23	Chatsworth Reservoir	34°13'44"	118°37'18"	900	SR, RR
L-20	Girard Reservoir	34°09'07"	118°36'36"	986	SR
L-F57C-R	Los Angeles River above Arroyo Seco	34°04'55"	118°13'35"	330	RS, CS
L-F300-R, C-LART	Los Angeles River at Tujunga Avenue	34°08'28"	118°22'44"	550	RS, CS
L-F34D-R	Los Angeles River below Firestone Boulevard	33°57'03"	118°19'22"	120	RS, CS, AS
L-F319-R	Los Angeles River below Wardlow Road	33°49'06"	118°12'17"	23	RS, CS, AS
L-E285-R	Burbank - Western Storm Drain above Los Angeles River	34°09'38"	118°18'13"	466	RS
T-320, T-321	Los Angeles River Below Sepulveda Dam	34°09'43"	118°27'56"	680	AR, AS

*Legend:	Rain (Precipitation)	Reservior Water Surface Elevation	Streamflow Water Surface Elevation	Gate Height
Nonstandard, Nonrecording (Staff)	NR	NW	NS	NG
Standard, Nonrecording	SR			
Recording (at site)	RR	RW	RS	RG
Corps Event-Reporting Telemetry	CR	CW	CS	CG
ALERT Event-Reporting Automatic Telemetry	AR	AW	AS	

For locations of these gauges, see Plate 5-01.

Table 5-02 Hydrologic Instrumentation of Sepulveda Dam

Parameter	Gauge Type	Report Mode	Stored Record (period available)	Comments
Water Surface Elevation	staff boards	Visual	Flood Control Basin Operation Report SPL 19 (1941-present)	
	Stevens A-71 recorder w/ quartz clock & D.R.*	Visual Telemetry	paper strip charts (1941-present) punch tape (1974-present) telemetry data file	the paper strip chart is operated at 9.6"/day during the rainy season for better data definition; 2.4"/day in other periods
Downstream Gauge Height	Digital Recorder *	Visual Telemetry	Flood Control Basin Operation Report SPL 19 (1941-present) punch tape (1974-present) telemetry data file	paper punch tape stored via telemetry systems
Outlet Gate Opening	gate opening indicator	Visual	Flood Control Basin Operation Report SPL 19 (1941-present)	
	Leupold & Stevens recorders			
Precipitation	tipping bucket gauge connected by magnetic sensor to D.R.*	Telemetry	Reservoir Operation Report SPL 424 (1941-present) punch tape (1974-present) telemetry data file	
	Belford recording gauge	None	paper chart (1941-present)	data on paper charts is 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 punch holes in paper tape.

VI - HYDROLOGIC FORECASTS

6-01. General

a. Role of Corps of Engineers. The U.S. Army Corps of Engineers does not make any formal hydrologic forecasts for Sepulveda Dam. Los Angeles River water quality is also not predicted by the Corps of Engineers or any other agency.

Despite the lack of formal hydrologic forecasts, the Corps of Engineers does carefully monitor the reservoir water surface elevation in Sepulveda Reservoir, and does notify other agencies of any significant changes or anticipated changes.

The Corps of Engineers continues to improve its monitoring capabilities, not only at Sepulveda Dam, but in upstream and downstream water-sheds. Many stream and precipitation gauges have been upgraded with event-reporting telemetry technology. Future plans include placement of additional even-reporting gauges to increase drainage area coverage to enable improved representation of watershed characteristics for roe-casting and modeling purposes. The improved data collection status will eventually be used in a real-time rainfall-runoff model to forecast inflow into the Los Angeles County Drainage Area reservoirs and downstream control points. It is intended that these predictions will become accurate and reliable enough that they can be shared with the National Weather Service, Los Angeles County Department of Public Works and other County Flood Control Districts, city and county emergency officials, and other, and used as a basis of reservoir systems operations during the upcoming years.

The Corps of Engineers, Los Angeles District, Meteorologist prepares special quantitative precipitation forecasts for the Los Angeles River drainages and other watersheds. These are used in determining the potential for significant runoff into Sepulveda and other reservoirs. Research is progressing into the direct incorporation of these quantitative precpiptati8on forecasts into the rain-fall-runoff forecast models being developed.

b. Role of Other Agencies. No Agency has any specific forecast responsibility for water surface elevation in Sepulveda Reservoir or for discharges on the Los Angeles River, either upstream or downstream of Sepulveda Dam. About the closest that any forecast or warning would come to this might be a Flash Flood Watch or Flash Flood Warning issued by the National Weather Service for rivers and other watercourses in the San Fernando Valley.

The U.S. Army Corps of Engineers does receive real-time weather reports and forecasts, as well as historical weather data, from the National Weather Service, NOAA. This is a accomplished by means of weather facsimile pictures and teletype data and forecasts transmitted by the National Weather Service, and also by means of telephone communication with, and visits by the District Meteorologist to, the National weather Service Forecast Office, Los Angeles.

Historical precipitation data are available from Los Angeles County Department of Public Works and Ventura County Flood Control District. Historical streamflow data are also available from these agencies and from the U.S. Geological Survey. 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 Condition Forecasts

Forecasts of flood hydrographs are not currently made. However, routine evaluation of inflow, observed precipitation, and forecast precipitation provides for valuable subjective predictions of flood situations (see p. 4-08 and tables 4-08 and 4-09). Using such information, the Reservoir Operation Center of the Corps can evaluate if an ongoing flood will increase or decrease over the next 24 hours. See table 5-01 and plate 5-01 for control points in and near the watershed above Sepulveda Dam.

6-03. Conservation Purpose Forecasts

Since Sepulveda Dam is strictly a flood control facility, no forecasts for the purpose of water conservation, hydropower, fish spawning, or other such objectives are made.

Only in the event of major impoundment at Sepulveda Reservoir, as well as simultaneously at other reservoirs affecting the downstream Los Angeles River (see Section 4-11), would a forecast of more than one day be of immediate significance to the operation of Sepulveda Dam. In such a case, the forecast of another impending major storm or lack of such storm might influence the release rate of water from Sepulveda Dam in consideration of the release rates from all of the other dams in the system or order to prevent or minimize downstream damages.

VII - WATER CONTROL PLAN

7-01. General Objectives

The objective of Sepulveda Dam is flood control, specifically, the minimization of flood damages on the Los Angeles River downstream from Sepulveda Dam. In this regard, water is temporarily stored behind Sepulveda Dam during periods of high inflows and is released more slowly through the downstream Los Angeles River 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. The Los Angeles District should ensure that reservoir lease holders have a clear understanding of risk and subsequent willingness to locate within the flood control reservoir.

7-02. Major Constraints

Constraints that impact the regulation and operation of Sepulveda Dam are as follows:

a. Channel Capacity. The channel capacity downstream of the dam is restricted to 16,900 cfs. The river channel just above the Verdugo Wash confluence is restricted to a maximum 35,500 cfs capacity in order to maintain a 2-foot freeboard, as determined by the Los Angeles County Drainage Area Review (see table 1-01; Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report).

b. Rubber Dam. The City of Los Angeles Department of Water and Power constructed a rubber dam approximately 10 mils below Sepulveda Dam for diversion of water into adjacent spreading grounds. The dam, which is air-inflated, is 6.9 feet in height and is designed to impound water to maximum depth of 8.3 feet in the channel before automatically deflating. The low over the dam is 800 cfs at this stage. Approximately 30 minutes is required to completely deflate the dam; the dam is also equipped with manual override capabilities if automatic deflation fails. The maximum channel capacity with the dam full raised is approximately 20,000 cfs. The maximum channel capacity with the dam lowered is 55,000 cfs.

The dam is currently not in operation because the necessary water quality permits to divert the water have not ben obtained.

c. Tributary Inflow Downstream from Dam. Major tributary inflow occurs in the river channel downstream from a side drain near Cedros Avenue, and at the Tujunga Wash, Verdugo Wash, Arroyo Seco Wash, and Rio Hond Rover confluence. The inflows can cause hydraulic instability and possible overbank flow in the river channel at these locations. Releases from Sepulveda Dam

should be reduced accordingly in order to compensate for the effect of these inflows as necessary. Referring back to photo 4-01, an example of this potential instability is shown at Cedros Street during the flood of 16 February f1980.

During a major flood event, channel observers should be sent to the above locations and report on conditions as directed by the Reservoir Operation Center.

7-03. Overall Plan for Water Control

Sepulveda Dam is operated for flood control on the Los Angeles River. Plate 7-01, which depicts the storage allocations for Sepulveda Reservoir, shows that the entire space of the reservoir below elevation 710.0 feet (the spillway crest, with crest gates raised) is devoted to flood control. Between elevation 710.0 and 713.52 feet (the maximum reservoir surface elevation for a Standard Project Flood (SPF)), the space is used jointly for flood control and spillway surcharge. Between 713,52 and 716.66 feet (the maximum reservoir surface elevation for a Probable Maximum Flood (PMF)), the space is allocated to spillway surcharge, with flood control no longer the primary objective in deference to passing as much water out of the reservoir as is required to assure the safety of the dam. The space between elevation 716.66 and 725.0 feet (the top of the dam) is reserved for freeboard.

Sepulveda Dam is operated in coordination with other projects protecting the upper Los Angeles River. These projects include Pacoima, Hansen, Big Tujunga, and Devil's Gate Dams. Because of Sepulveda Dam's ungated outlets (four of eight are ungated) and limited capacity (spillway flow occurs for events with return periods of greater than an estimated 80-years, as determined by the Los Angeles County Drainage Area Review; refer to the report listed in table 1-01, Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report, (February 1988); in addition see table 4-08 and pl.4-07), it is give an priority over these other projects with respect to releases into the Los Angeles River.

There may, however, be instances where some reduction in releases may be considered necessary from a systems perspective. Thes4e conditions are discussed in Section 7-13.

7-01. Standing Operating Instructions to Dam Tenders

In the even that all communication with the District Office, including the Base Yard, should be interrupted, a set of Standing Operating Instructions to Dam Tender have ben compiled for each dam. A copy of these instructions for Sepulveda Dam are included in Exhibit A of this manual.

7-05. Flood Control

a. General. The plan for controlling floods on the Los Angles River below Sepulveda Dam is presented in this section.

The objective of the water control plan is to maximize flood control benefits. Project releases will be regulated to protect downstream communities and to avoid spillway flow.

The most critical reach of the downstream channel extends from the dam to the Tujunga Wash confluence (see Plate 2-04).

The project should be regulated to pass all inflow through the dam as rapidly as possible. This is achieved by keeping the four gated outlets full open until spillway flow occurs, and then by progressively closing the gates outlets such that the combined flow from the spillway and from the gated and ungated outlets does not exceed the downstream channel capacity of 16,900 cfs. Plate 7-02 provides a schedule that is to be used as a guide in achieving this regulation.

It should be noted that as a result of the Los Angeles County Drainage Area review (see table 1-10, Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report, (February 1988)), the channel capacity immediately downstream of the outlet works was found to be 100 cfs less than previously computed (see pl. 2-04). Because of this change, the water surface elevation at which gate operations were performed on the previous version of the reservoir regulation schedule were modified, though not by more than 0.2 foot (see pl. 7-02). This change was necessary to stay within the channel capacity of 16,900 cfs.

Sepulveda Dam will be regulated as a component of a reservoir system protecting (primarily) the upper and middle Los Angeles River and (to a lesser extent) the lower Los Angeles River, downstream from the Rio Hondo confluence. From a systems perspective, Sepulveda will normally be given priority to make channel capacity releases. However, if system conditions should warrant, Sepulveda releases may be curtailed in order to minimize downstream channel overflow and damages or threat to life, based upon reports from telemetry gauges or channel observers.

b. Reservoir Evacuation. Sepulveda Reservoir should be drained as rapidly as possible, consistent with the achievement of downstream flood control. The objective is to empty the reservoir in preparation for the next flood. When on additional storms are forecast, however, and flood control benefits can be achieved, the four gated outlets may be partially or fully closed.

c. Forecasts. A forecast to make operational decisions may be either a series of computer-generated inflow hydrographs (expected in future years) or a reasonable judgemental assessment of ongoing rainfall and runoff, based upon available information. In either case, the Reservoir Operation Center of the Corps of Engineers, Los Angeles District, 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 describe above.

7-06. Recreation

As mentioned previously (Section 2-06.a.), the sole purpose of Seulveda Dam is flood control. No water is impounded by the dam for the purpose of recreation.

The channel of the Los Angeles River downstream of Seulveda Dam is strictly a flood control channel, and provides no water-oriented recreational use. Thus no releases are made for recreational purposes.

7-07. Water Quality

Because Sepulveda Dam has four ungated outlets, it cannot be operated to totally contain contaminant spills. Sepulveda Dam is not operated for water quality objectives (refer to Section 2-06.d.).

7-08. Fish and Wildlife

No Sepulveda Dam water control objectives exist for fish and wildlife, either within the reservoir, or within the channel of the Los Angeles River downstream of the reservoir (refer to Section 2-06.b.).

7-09. Drought Contingency Plan

Sepulveda Dam and Reservoir does not contain any storage allocation for water supply or water conservation. The Los Angeles River downstream of the dam is mostly concrete lined. Groundwater recharge facilities approximately 10 miles below Sepulveda Dam can divert 40 cfs, however, because there are four ungated outlets at Sepulveda Dam no water can be impounded. However, in the event of a drought, should a water conservation plan be proposed that would not compromise the flood control purpose of the project, it’s implementation would be considered.

7-10. Hydroelectric Power

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

7-11. Navigation

No navigation of any sort is possible or allowed in Sepulveda Reservoir or in the Los Angeles River, either upstream or downstream of Sepulveda Dam.

7-12. Other

Maintenance and construction on the downstream channel of the Los Angeles River normally occur during the dry season of late spring and summer. During such periods, the four Sepulveda Dam gated outlets may be closed in order to reduce releases in support of such downstream activities.

7-13. Deviation from Normal Regulation

As outlined on plat 7-02, and as discussed in Sections 7-05.b. and 7-05.c.(1), the release plan for Sepulveda Dam generally calls for all gated outlets to be fully open for any water surface elevation below 710.2 feet. Thus the rate of release from Seuplveda Dam cannot be increased above that which is prescribed.

It is physically possible, however, and would be desirable, under certain limited circumstances, for the release rate from Sepulveda Dam to be decrease what is called for on plate 7-02.

For water surface elevations above 710.2 feet, it would be physically possible to either increase or decrease the release rate from that which is published on plate 7-02.

In addition to the prevention of downstream damages (discussed in Section 7-05.b. and 7-05.c.), there are other possible reasons for deviation from the normal release plan at Sepulveda Dam:

a. Emergencies. In the even t of a potential drowning, toxic spill, or other accident in which high flows on the Los Angeles River downstream of Sepulveda Dam could prevent rescue or could cause further injury, the four gated outlets at Sepulveda Dam could temporarily be partially or totally closed. However, because of the four ungated outlets, this would reduce, but not eliminate, the flow to the downstream channel. (See section 2-03.b.(2) for gate descriptions). 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 plate 7-02 include emergency bridge repairs, the restoration of utility lines across the Los Angeles River, and certain unplanned necessary maintenance and inspection. Sepulveda Dam may be operated to support these activities, provided that flood protection is not jeopardized, and that no significant threat is made to potentially endangered wildlife species in the reservoir (see Section 8-05), and that the Cit of Los Angeles Donald C. Tillman Water Reclamation is not unnecessarily subjected to inundation.

c. Planned Deviations. The same arguments apply t planned construction, maintenance, inspections, etc., as under 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 of early fall).

d. No Spillway Flow Forecast. When forecast information clearly indicates that Sepulveda Dam will not experience spillway flow (reservoir

water surface will not exceed elevation 710 feet), all four gated outlets may be partially or fully closed in order to alleviate downstream emergencies (see Section 7-13), to prevent downstream damages, or to add an additional safety factor when the downstream channel is experiencing high flows. Outflow might then be limited to the discharge from the four ungated outlets, which is a maximum of approximately 7000 cfs at reservoir elevation 710 feet.

As discussed in Section 2-03.d.(2)(a), the crest gates are designed to lower automatically during major spillway flow events. This feature was provided in the interest of dam safety in order to increase the hydraulic outflow capacity during extreme inflows.

There may be some instances, however, when the fully automatic lowering of the crest gates, and the consequent major downstream flooding, could be avoided. When real-time data and forecast information indicate that: (a) the inflow peak of a major storm and flood event has occurred, and the inflow is in recession, and (b) all data and forecasts indicate that future rainfall clearly will not produce amounts of runoff that could possibly threaten the overtopping of the dam, then actions to prevent the automatic lowering of the crest gates should be taken.

The semi-automatic operation procedures described in Section 2-03.d.(2)(c) allow for the manual locking of the crest gates in the fully upright position (elevation 710 feet). That section also noted that the implementation of this locking procedure is awkward and time-consuming, with travel of crews to Sepulveda Dam often difficult during stormy conditions. This, under certain conditions, it may not be possible to achieve a rapid change from fully automatic crest gate operation to semi-automatic operation on all seven crest gates. Such action, however, even if only partially achieved, may be able to prevent substantial downstream damages.

It is important, though, that all crest gates be reset to the fully automatic mode immediately after the flood crest has passed, or sooner if updated forecast information indicates the possibility of appreciable additional precipitation and runoff.

7-14. Rate of Release Change

The gated outlets at Sepulveda Dam can generally be adjusted in as rapid a manner as possible without concern over the rate of rise of the downstream channel. This is possible because the ungated outlets will always be releasing large discharges at times when significant changes could be achieved through the gated outlets. Concrete lining of the downstream channel precludes concern over bank erosion or sloughing due to sudden gate changes. During emergencies, or when downstream inflow has filled the channel of the Los Angels River, gradual increases in gate openings, based on downstream reports, may be desired.

VIII - EFFECT OF WATER CONTROL PLAN

8-01. General

The sole purpose of Sepulveda 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 Sepulveda 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 Sepulveda 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. Spillway Design Flood. The spillway of the dam was designed to pass, without danger to the dam or threat of overtopping the dam, the greatest rate of discharge that could be expected from the most severe combination of rainfall and runoff conditions that could reasonable occur. This hypothetical flood is called the Probable Maximum Flood.

(1) Original Criteria. The spillway at Sepulveda Dam was designed in 1939 for a peak outflow of 100,500 cfs, having a surcharge of 17.6 feet on the ogee crest (with crest gates at their lowest of 17.6 feet on the ogee crest (with crest gates at their lowest position–elevation 700 feet). An additional 7.4 feet of freeboard to handle runup by waves set the top of the dam at elevation 725 feet.

The spillway design flood resulted from a hypothetical four-day storm that produced 8.4 inches of rain during the maximum 24 hours, as averaged over the drainage area above Sepulveda Dam. Such a storm would result in a peak inflow of 177,000 cfs and a maximum impoundment of 28,700 ac-ft of water.

In a subsequent 1978 study, the adequacy of the Sepulveda Dam spillway was reviewed under the revised criteria. This led to the development of a revised Probable Maximum Flood.

(2) Revised Criteria. Plate 8-01 depicts the hyetograph (graph of incremental precipitation vs. time) of the revised Probable Maximum Precipitation over the drainage area above Sepulveda Dam, plus the hydrograph of the computed inflow, reservoir water surface elevation, and outflow that would result if such a storm were routed into Sepulveda Reservoir and through Sepulveda Dam.

The probable maximum precipitation is based upon a hypothetical 72-hour rain storm developed from the criteria published by the National Weather Service in Hydrometeorological Report No. 36, entitled, “Interim report - Probable Maximum Precipitation in California” (1961, revised 1969). This storm is then critically centered over the drainage area above Sepulveda Dam.

The judgements made for this revised spillway design flood include: reservoir initially full to elevation 710.0 feet (spillway crest with crest gates raised); the flood control outlet works completely blocked by debris; and initial infiltration rates (loss rates) over the 70% pervious portion of the drainage area at the constant low value of 0.12 inch per hour (for basin average effective infiltration rate of 0.08 inch per hour).

The revised Probably Maximum Flood generates a maximum inflow to Sepulveda Reservoir of 114,000 cfs late on the third day of the storm (see pl. 8-01). The maximum water surface elevation in the reservoir rises to 716.66 feet, storing 27,563 ac-ft behind the dam. At this time, the automatic crest gates will have lowered all the way down to 700 feet, and the computed maximum outflow would be 99,300 cfs.

b. Standard Project Flood. The Standard Project Flood represents the runoff event that would result from the most severe combination of rainfall and watershed conditions that are considered reasonably characteristic for the region in question.

For the rainfall to be used in the determination of the Standard Project Flood at a given site, a Standard project Storm is normally selected as the most severe reasonably characteristic storm of record within a climatically homogeneous region surrounding the site, and is then transposed to the drainage area above the target site.

For the drainage area above Sepulveda Dam, the storm of 21-25 January 1943, centered in the San Gabriel Mountains and foothills about 15 to 25 miles east-northeast of Sepulveda Dam, was selected (see Section 8-02.c.(10) for more discussion of this storm). The storm was transposed to the drainage area above Sepulveda Dam, using a transposition factor based upon the mean annual precipitation.

As with the Probable Maximum Precipitation, the portion of the basin impervious to infiltration was set at 30% (with the pervious portion thus at 70%). The infiltration rate for the pervious portion of the basin was determined to average 0.16 inches per hour (for an effective infiltration rate of 0.11 inches per hour). The reservoir was judged to be empty at the start of the Standard Project Storm, but rapidly fills up during the storm and runoff.

Plate 8-02 depicts the hyetograph of the Standard Project Storm and the inflow, storage, and outflow hydrographs of the Standard Project Flood at Sepulveda Dam. The maximum inflow to the dam was computer to be 50,000 cfs on the second day of the storm. Shortly thereafter, the water surface elevation in the reservoir would reach a maximum of 713.52 feet, with 22,492 ac-ft of water stored behind the dam. At the same time, the combined outflow through the ungated outlets and over the spillway (with crest gates partially lowered) would be 41,300 cfs. Under a Standard Project Flood (using modern criteria, with modern watershed conditions), the downstream channel(16,900 cfs capacity) would overflow, inundating a highly urbanized area.

c. Other Floods

(1) 21-25 January 1943. The storm of 21-25 January 1943 was in many respects the most severe of record in the coastal drainages of southern California. It occurred as a series of warm Pacific cyclones from Hawaii, collided with a cold storm moving south from British Columbia, producing strong winds and heavy rain over most of California.

Plate 8-04 depicts the rainfall and runoff of this storm. The total 21-25 January precipitation ranged from less than 8 inches in the northern and western San Fernando Valley to more than 25 inches in the Santa Monica Mountains southwest of Sepulveda Dam. Rainfall was heaviest during the first hour of 22 January, with a less intense but long-lasting period of generally heavy rain during the last six 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 Sepulveda Dam following the intense burst of rain early on 22 January (pl.8-04). 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 12,700 cfs during the first hour of 23 January.

The maximum water surface elevation of 669.29 feet was reached several hours later, then 6,341 ac-ft water was stored behind the dam. The maximum outflow released to the channel downstream was 2,710 cfs near mid-day 23 January.

(2) 20-24 February 1944. The storm of late February 1944 developed as a cold storm from the north moved into southern California and intensified. The rainfall of the 20-24 February 1944 even t actually began on 19 February (pl. 8-05), but the reservoir did not begin to rise until early 20 February. Rainfall intensities fluctuated over the light to moderate range until early 22 February, when a 4-hour period of heavier rain resulted in a major acceleration of inflow to Sepulveda Dam.

Because of fairly substantial antecedent precipitation, infiltration rates began relatively low, and dropped even further during the course of the vent. By the time of the heaviest rain of early 22 February, the ground was largely saturated. As a result of this, the peak in the mean hourly inflow to Sepulveda Dam was 15,900 cfs early 22 February; and the maximum water surface elevation o f697.92 feet, with 5,070 ac-ft of water stored behind the dam, occurred about 4 hours later. The maximum outflow of 4,740 cfs occurred at that time.

It might be noted that it was during this even t that a documentation of the rise and fall of the crest gates was made (see Sections 2-03.d.(2)(a) 1b, and pls. 2-16 and 2-17).

(3) 23-27 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 (see pl. 8-06). The total precipitation for the period of 23-27 January to southern California ranged from 5-8 inches in the coastal lowlands to more than 25 inches in the San Gabriel Mountains.

By the time of the 24-25 January rain, the ground throughout the Sepulveda Basin and elsewhere was heavily saturated, with a high runoff potential. The result was a peak in the mean hourly inflow to Sepulveda Dam of 16,800 cfs between 0600 and 0700 hours 24 January (pl. 8-06). The water surface in the reservoir peaked four hours later at 693.30 feet, with 2,945 ac-ft of water stored; and the maximum outflow of 11,825 cfs occurred at the same time.

(4) 28 February - 4 March 1978. The storm of late February and early March of 1978 was actually a series of low-latitude Pacific storms that moved into southern California from the west and southwest, dropping more than 10inches of rain in portions of the coastal drainages. Because of numerous heavy storms in January and February 1978, the ground in southern California was almost totally saturated by the time of the major February-March storm.

There were three major peaks of rain between 28 February and 5 March 1978: 28 February, 1 March, and 4 March (pl. 8-07). Each resulted in a sharp up-and-down pattern in the inflow, water surface elevation, and outflow at Sepulveda Dam. The third and largest peak, with four consecutive hours, each having rainfall over the watershed equal to or greater than 0.8 inch, resulted in a maximum hourly inflow of 25,670 cfs just before noon 4 March, followed shortly by a maximum reservoir surface elevation of 697.65 feet, with 5,253 ac-ft stored. The maximum outflow was 13,190 cfs just after noon.

(5) 15-17 February 1980. From 13 though 21 February 1980 a series of intense, warm Pacific storms moved into southern California from out of the west-southwest. The heaviest of these occurred on 16 February (pl. 8-08), in which an intense cold front nearly stalled directly over the western portion of the San Fernando Valley, bringing very heavy rain throughout the afternoon over the drainage area above Sepulveda Dam.

The intensity and total amount of this rainfall can be seen on plate 4-02, which depicts mass curves of accumulated precipitation for the date at Sepulveda Dam and at two stations within the watershed above the reservoir: On (Encino Reservoir) in the Santa Monica Mountains to the south, and the other (Aliso Canyon-Oat Mountain) in the foothills north of the San Fernando Valley. At each of these stations, rainfall rates approaching or exceeding 1 inch per hour were recorded for at least 3 consecutive hours.

With the ground nearly saturated from heavy rains in late January and again 13-15 February, the intense rain of 16 February resulted in the greatest inflow to, and storage of water behind, Sepulveda Dam ever recorded. From 1600 to 1700 hours on the 16th, a mean hourly inflow of 58,970 cfs was computed; this included a maximum of 62,636 cfs recorded at 1625 hours.

As the result of this heavy inflow, and to some extent, the result of a temporarily reduced outflow because of the flooding problems on the downstream Los Angeles River channel, the water behind Sepulveda Dam reached an elevation of 705.10 feet at 1845 hours, with 11,503 ac-ft stored (also see section 2-03.e.(5)). At this time the downstream problems abated and all gated outlets were reopened, producing a peak outflow of 15,288 cfs (the largest ever recorded at Sepulveda Dam).

(6) 28 February - March 1983. The storm period of later February and early March 1983 was the climax of a winter and spring of repeated intense, low-latitude Pacific storms that moved into southern California from the west. Plate 8-09 shows the precipitation , inflow, water surface elevation, and outflow at Sepulveda Dam from 28 February through 3 March.

During the course of the storm, there were several up-and-down fluctuations in each of these parameters, but the largest by far of these occurred during the morning go 1 march, when the maximum hourly inflow reached 38,676 cfs; the maximum water surface elevation reached 702.53 feet, storing 8,950 ac-ft; and the maximum outflow reached 14,397 cfs after a brief reduction during mid-morning to alleviate downstream channel problems. Each of these 1 March 1983 values (inflow, water surface elevation, contents stored, and outflow) represents the second greatest value of record (after February 1980) for the respective parameters at Sepulveda Dam.

d. Comparison of Floods. Plate 8-10 is a comparison of the floods discussed in Sections 8-02.a. through 8-02.c. Table 8-01 is a listing of the values depicted on plate 8-10 (as well as on pls. 8-01 through 8-09). The four diagrams of plate 8-10 (corresponding to the four columns of table 8-01) depict the maximum values of water surface elevation, reservoir capacity, the mean hourly inflow, and outflow for the six historical floods and the two design floods at Sepulveda Reservoir. In each of the diagrams of plate 8-10, the floods are arranged in ascending order, according to maximum water surface elevations and capacity.

In all four diagrams of plate 8-10, the Probable Maximum Flood (PMF) is clearly of greatest magnitude. The Standard Project Flood (SPF) is second, except for inflow, where the highest mean hourly inflow on 16 February 1980 exceeded that for the Standard Project Flood. The flood of 1 March 1983 is the second greatest historical flood in all four diagrams of plate 8-10

(fourth highest when the design floods are included). Based on recent hydrologic study conducted in February 1988 (see table 1-01; Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report), the maximum flood for which spillway flow will not occur is approximately the 80-year event (refer to table 4-08 and pl- 4-07).

It can ben seen from plate 8-10 and table 8-01 that although the maximum inflows of the 1943 and 1944 floods were not as high as those of 1969 and 1978, the maximum storage of water in 1944 was comparable to that of 1978 and was much greater in 1983 than it was in 1969. This is because the outflows were considerably more limited before the 1953 completion of the downstream Los Angeles River channel improvement (Sections 3-03 and 3-05) than they have been in recent years.

e. Hypothetical Dam Failure. Plate 8-11 depicts that areas of probable inundation downstream of Sepulveda Dam that could result in the extremely unlikely event of a failure of Sepulveda Dam with water impounded to the top of the spillway crest with crest gates raised (elevation 710 feet). The floodwaters would, in such a scenario, spread out across a broad zone on either side of the Los Angeles River, with widths exceeding one mile in some places. This inundation zone would narrow rapidly at a distance of about 5 miles downstream of the dam, would widen slightly again about three miles further downstream, and would eventually narrow and become confined to the river channel near downtown Los Angeles.

Travel times for such a dam-failure crest are shown on plate 8-11. The travel rates would be very rapid at first, reaching about 5 miles downstream within the first 30 minutes, but requiring 1 hour 50 minutes to reach the Ventura (U.S.-101) and Golden State (I-5) Freeway interchange, approximately 6 miles further downstream.

8-03. Recreation and Agriculture.

a. Recreation. None of the recreational facilities in Sepulveda Reservoir depend upon runoff water impounded behind the dam. Thus, there are no direct recreational benefits that result from the dam or its operation. The recreational facilities were constructed because the land within the reservoir could not be used for other purposes. Thus there is an indirect benefit of the project upon recreation.

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 Sepulveda Reservoir lands. Because the overall acreage of agriculture within the reservoir basin is small compared to the needs of the local population, the impact of Sepulveda 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 Sepulveda Dam to the water quality of the Los Angeles River. On the other hand, Sepulveda Dam and its operation should not in any way contribute to the degradation of the water quality of the river.

The Donald D. Tillman Water Reclamation Plant (TWRP), constructed within the reservoir boundaries of Sepulveda Dam provides advanced secondary treatment of wastewater produced by the San Fernando Valley area (refer to section 2-06.d.). To date, reclaimed water is designated for the recreation lake, wildlife management, and irrigation. Sepulveda Flood Control Reservoir will in ono way supplement treatment of wastewater and because of potential inundation to TWRP, all flood control operation will have zero or negative net benefits on the plant.

8-05 Fish and Wildlife

The reservoir lands that constitute the Sepulveda Flood Control Basin provide open space and some natural riparian habitat in the middle of an extensive urban area, thereby providing very important wildlife habitat. A large portion of the Los Angeles River within the basin is one of only two reaches of the river that constitutes a soft-bottom channel, thus allowing a unique habitat to flourish. More than 200 species of birds, 20 species of mammals, 13 species of reptiles and amphibians, and 5 species of fish have been reported in the reservoir basin (see table 1-01; Sepulveda Basin Master Plan, Final Environmental Impact/Environmental Impact Statement, (March 1980), in addition see Planning Aid Report–A Reconnaissance Survey of Biological Resources in the Los Angeles County Drainage Area, prepared for U.S. Army Corps of Engineers, Los Angeles District, by U.S. Fish and wildlife Service, 1984).

Flooding within the reservoir basin is relatively uncommon (especially May-October) and is usually not prolonged, and therefore does not normally cause serious adverse impacts upon biological resources within the basin, although some impacts are inevitable. Wildlife taking refuge in burrows, or slow-moving species, such as the San Diego horned lizard, a Category 2 Federal Candidate Species, might be trapped and killed by flooding. If deviations from the reservoir regulation schedule for closing the gated outlets (pl. 7-02) should result in the flooding of greater areas of reservoir lands than would have otherwise been the case, then a greater number of animals may drown. Any deviations from the reservoir regulation schedule (pl. 7-02) occurring after approximately the beginning of April could disrupt the nesting of some birds, including some sensitive species: for example the Least Bell’s Vireo and the Yellow Warbler. The Blue Grosbeak is another species of interest which, although not uncommon in the western United States, is a rare nester in Los Angeles County and is found along this portion of the channel of the Los Angeles River.

Flooding within the reservoir basin also has a beneficial impact upon some wildlife. Large numbers of migratory waterfowl and shorebirds utilize low-lying flooded areas within the basin for wintering.

This manual is the first operational document written for Sepulveda Flood Control Reservoir since passage of the National Environmental Protection Act in 1969. An environmental assessment, prepared in conjunction with this manual, resulted in a Finding of No Significant Impact (FONSI). The FONSI was singed by Colonel Butler, District Engineer, Los Angeles District, on 21 May 1987, and is included as Exhibit G.

8-06. Water Supply

Since Sepulveda Dam is not operated for water supply, there are not 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. There are no practical indirect benefits of Sepulveda Dam upon the downstream groundwater spreading facilities even through the flow rates on the Los Angeles River, past theses facilities, are at times reduced, and the duration of runoff prolonged, by the dam.

8-07. Hydroelectric Power

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

8-08. Navigation

There is no navigation on the Los Angeles River or in Sepulveda Reservoir at any time.

8-09. Frequencies

a. Peak Inflow and Outflow Probability. Plate 4-06 is a graph of the inflow and outflow frequencies at Sepulveda Dam, computed from the 1985 Los Angeles County Drainage Area review study (see table 1-01; Draft: Los Angeles County Drainage Area Review: Part I Hydrology Report (February 1988)). The values of these curves at specific return periods are listed in table 4-08. The inflow curve, which was discussed in Section 4-07, is of course not affected by the water control plan for Sepulveda Dam, which has bearing only upon regulation of the outflow and consequently the impoundment of water behind the dam. This inflow curve, however, reflects the effects of the upstream Los Angeles River channel improvement, which has been in place for many years.

The outflow curve of the plate 4-06, on the other hand, does reflect the Sepulveda Dam water control plan, including the gate operation schedule shown in plate 7-02. The sharp break in the slope of the curve reflects the fact that (according to the current settings) the crest gates are set to begin to lower when the water surface reaches elevation 712 feet, with the outflow rate thus increasing rapidly for any additional rise to the reservoir water surface (pl.2-19).

b. Pool Elevation Duration and Frequency. Plate 4-07 is the computed filling frequency curve for Sepulveda Dam, based upon, and adjusted for, 1980 conditions. These conditions include percent of impervious cover in the drainage area above Sepulveda Reservoir, runoff routing conditions, and the gate operation schedule of the water control plan. The values of the curve at specific return periods are listed in table 4-08. As with the outflow frequency curve (pl. 4-06), the relatively sharp change in slope of the filling frequency curve (pl. 4-07) reflects the fact that the crest gates begin to lower as the reservoir water surface exceeds elevation 712 feet, thus reducing the rate of additional impoundment of water within the reservoir for a given increase in flow.

c. Key Control Points. Exhibit F is a set of four stage/discharge rating tables for stream gauges on the Los Angeles River between Sepulveda Dam and the Pacific Ocean. These ratings, which were furnished by Los Angeles Country Department of Public Works, are graphically depicted on plate 5-02. The stages, or gauge heights, and the corresponding discharges in Exhibit F and plate 5-02 range from zero at the bottom of the low-flow channel to approximately the channel capacity of the river at each location (refer to pl. 2-04).

As one measure of comparison, table 8-02 lists the peak discharges at each of the four gauges listed in Exhibit F for several of the greatest floods of record. It should be noted that none of these historical floods has exceeded channel capacity at any of the gauges, although during the flood of 16 February 1980, water reached the top of the levees near the gauge on the Los Angeles River below Wardlow Road (see Section 4-12.d. and Photograph 4-03), apparently as the result of a local hydraulic instability.

8-10. Other Studies

a. Examples of Regulation. Discharge frequency values presented in this manul were derived from ongoing (1985) investigations in the U.S. Army Corps of Engineers Los Angeles County Drainage Area Study. Preliminary analyses in this study have been applied to evaluate Sepulveda Dam and have been considered in preparing the water control plan. 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 Probable Maximum and Standard Project Floods used in this manual.

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. These studies show no downstream flood problem. Currently (1988) the Corps of Engineers is conduction an ongoing review study of the entire Los Angeles County Drainage Area system in order to reassess the adequacy of flood protection provided by the downstream channels. This study does show that there is a potential for flooding on the Los Angeles River for floods having a return period of approximately 50 years (see pl. 4-06 and table 1-01; Draft: Los Angeles County Drainage Area Review: Part I, Hydrology Report (February 1988)).

Table 8-01. Comparison of Historical Floods and Design Floods, Sepulveda Reservoir.

	Plate No.	Water Surface Elevation (ft., NGVD)	Capacity (ac-ft)	Inflow* (cfs)	Outflow (cfs)
Probable Maximum Flood	8-01	716.66	27,563	114,000	99,300
Standard Project Flood	8-02	713.52	22,492	50,000	41,300
23 January 1943	8-04	699.29	6,341	12,700	2,710
22 February 1944	8-05	697.92	5,070	15,900	4,740
23 January 1969	8-06	693.30	2,945	16,800	11,825
4 March 1978	8-07	697.65	5,253	25,670	13,190
16 February 1980	8-08	705.10	11,503	58,970**	15,100
1 March 1983	8-09	702.53	8,950	38,676	14,397

*Maximum of mean hourly values.
**Maximum inflow for 25 minutes: 62,636 cfs.

NOTE: See plate 8-10 for graphical comparison of the values listed here.

Table 8-02. Peak Discharges of Record, Los Angeles River Below Sepulveda Dam.

Values are in cubic feet per second (cfs)

Name of Station	Date 1/25/69	2/10/78	2/16/80	3/01/83
Los Angeles River at Tujunga Avenue, F300-R	30,800*	30,100	27,625	27,625
Los Angeles River above Arroyo Seco, F57C-R	41,800	52,700**	52,200	44,500
Los Angeles River below Firestone Blvd., F34D-R	58,000	73,600	74,400**	61,400
Los Angeles River below Wardlow Road, F319-R	102,000	94,820	128,700*	81,800

*Greatest discharge of record.
**Greatest discharge since the construction of Sepulveda, Hansen, Santa Fe, and Whittier Narrows Dams in the early 1940's, and exceeded only by the flood of 3/02/38: 68,000 cfs (estimated) at F57C-R, and 79,000 cfs at F34D-R.

NOTE: See plate 5-01 for location of stations.

Photo No. 8-01. Flood of 1 March 1983, Los Angeles River at Whitsett Avenue Channel, Studio City (approximately 5 river miles below Sepulveda Dam).

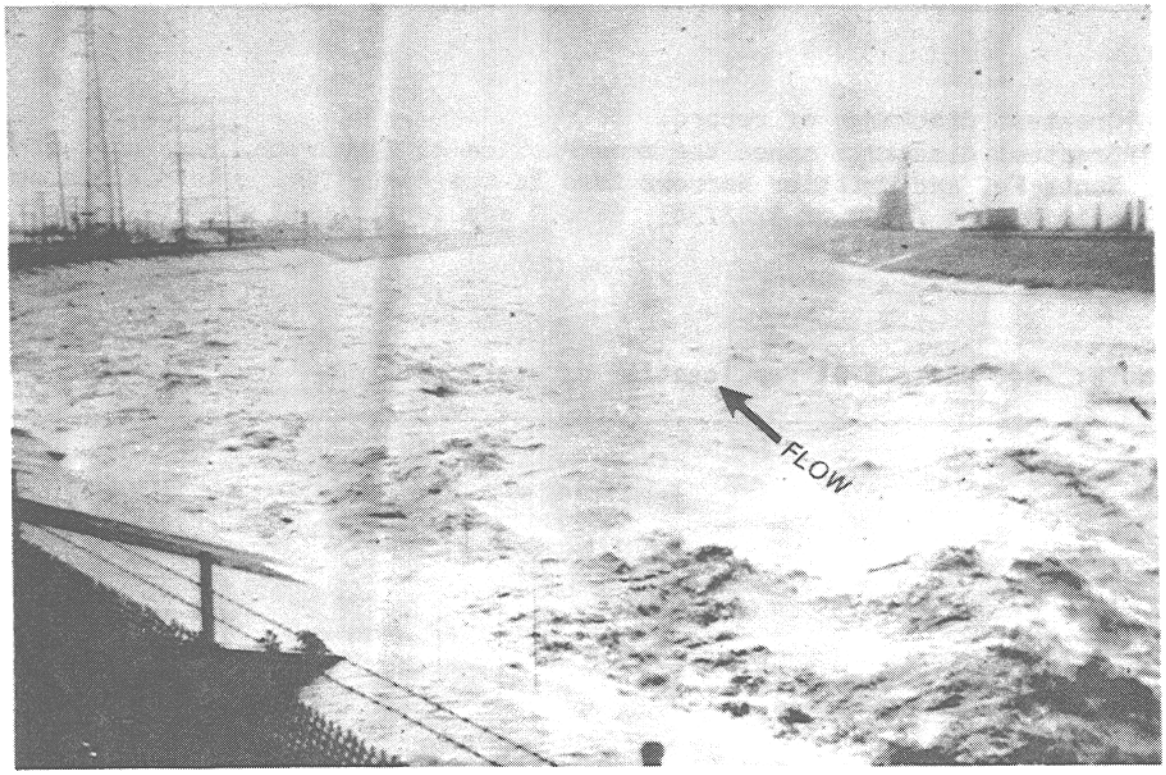


Photo No. 8-02. Flood of 1969 (most likely 25 January), Los Angeles River near downtown Los Angeles, approximately 22 river miles below Sepulveda Dam (view toward downstream).

IX - WATER CONTROL MANAGEMENT

9-01. Responsibilities and Organization

a. Corps of Engineers. Sepulveda Dam is owned by the Federal Government and is operated and maintained by the U.S. Army Corps of Engineers, Los Angeles District, which has complete regulatory responsibility for the dam, the reservoir lands, and a portion of the downstream Los Angeles River.

Reservoir operations at Sepulveda Dam and other Corps of Engineers facilities are conducted by the Reservoir Regulation Unit of the Reservoir Regulation Section of Los Angeles District. Table 9-01 is an organizational chart depicting the chain of command for the Reservoir Regulation Unit.

Gate Regulation instructions to the dam tender are issued by the Reservoir Regulation Unit (see Sections 5-05 and 5-06). In the event that communication between the Reservoir Regulation Unit and Sepulveda Dam are interrupted, a set of Standing Operating Instructions to Dam Tender are included in this manual as Exhibit A. Dam tenders are part of the Operations Branch, under the Construction-Operations Division of the Corps of Engineers, Los Angeles District.

b. Other Federal Agencies. The U.S. Army Corps of Engineers has complete responsibility for the operation of Sepulveda Dam; and although the Corps of Engineers receives data and information from other Federal and local agencies and informs these agencies of major decisions affecting Sepulveda Dam, no other agency has any responsibility in the operation of Sepulveda Dam The U.S. Geological Survey operates stream gauges within Los Angeles Country Drainage Area.

c. State and County Agencies. Los Angeles County Department of Public Works has maintenance responsibility for portions of the Los Angeles River channel downstream of Sepulveda Dam and maintains and operates a number of flood control reservoirs on tributary streams (see Exhibit C).

d. City of Los Angeles. A large portion of the Sepulveda Reservoir lands, owned by the Federal Government and operated by the Corps of Engineers, is leased to the City of Los Angeles for recreational and wildlife management purposes. The Corps of Engineers retains all right to inundate this land.

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

9-02. Interagency Coordination

The U.S. Army Corps of Engineers coordinates with other Federal, State, County, and local organizations, as well as with the press, concerning the water control for Sepulveda Reservoir.

a. Local Press and Corps of Engineers Bulletins. The Public Affairs Office of the Corps of Engineers, Los Angeles District, is responsible for interfacing with the press regarding operations at Sepulveda Dam and flows on the Los Angeles River downstream of the dam. This is accomplished through both interviews and the occasional issuance of press releases. The Corps of Engineers does not publicly issue flood watches or warnings or other status reports or forecasts. These are the responsibility of the National Weather Service.

b. National Weather Service. The Corps of Engineers utilizes National Weather Service data and forecasts in the operation of Sepulveda Dam, including the real-time telemetry data from gauges installed in the watershed by Los Angeles Department of Public Works and by other County Flood Control Districts in cooperation with the National Weather Service. The Corps share data with the National Weather Service and other agencies both on a real-time basis and after the fact.

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

d. Other Federal, State, or Local Agencies. The Corps of Engineers and Los Angeles County Department of Public Works closely coordinate the operation of their reservoir projects and the maintenance and patrolling of their channels within Los Angeles County Drainage Area. The Corps keeps the City of Los Angeles informed of any anticipated and actual reservoir impoundments. Other interested agencies, such as the California Department of Transportation (CAL TRANS), are informed by the Corps of Engineers whenever a major inundation or release at Sepulveda Dam is anticipated.

9-03. Interagency Agreements

The Corps of Engineers has a maintenance agreement with Los Angeles County Department of Public Works for portions of the improved channel of the Los Angels River. The Corps maintains the reach between Lankershim Boulevard in North Hollywood (pl. 2-04) to Stewart and Gray Road, just south of Firestone Boulevard, in South Gate. All other portions of the Los Angels River, above and below Sepulveda Dam, are maintained by Los Angels County Department of Public Works.

9-04. Commissions, River Authorities, Compacts, and Committees

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

9-05. Reports

The U.S. Army Corps of Engineers, Los Angles District, 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 of the Corps of Engineers.

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

The Corps of Engineers also collects and files charts from recording instruments at Sepulveda Dam (and other dams), including precipitation, reservoir water surface elevation, and gate height. Daily precipitation, reservoir water surface elevation, and gate 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 Corps of Engineers, Los Angeles District.

Table 9-01. Chain of Command for Reservoir Operations Decisions.

Corps of Engineers
Los Angeles District

Title	Office Phone Number:
District Engineer	(213) 894-5300

Water Control Decisions

Title	Phone:
Chief, Engineering Division	(213) 894-5470
Chief, Hydrology & Hydraulics Branch	(213) 894-5520
Chief, Reservoir Regulation Section	(213) 894-6915
Chief, Reservoir Regulation Unit	(213) 894-6916

Operational and Maintenance

Title	Phone
Chief, Construction-Operations Division	(213) 894-5600
Chief, Operations Branch	(213) 894-5620
Chief, Operations and Maintenance Section	(818) 401-4008
Dam Tender Foreman	(818) 401-4007
Sepulveda Dam Tender	(818) 784-0240

FLOOD CONTROL BASIN OPERATION REPORT

Reports Control Symbol SPLCO – 7

Name | **Month** | **Year**

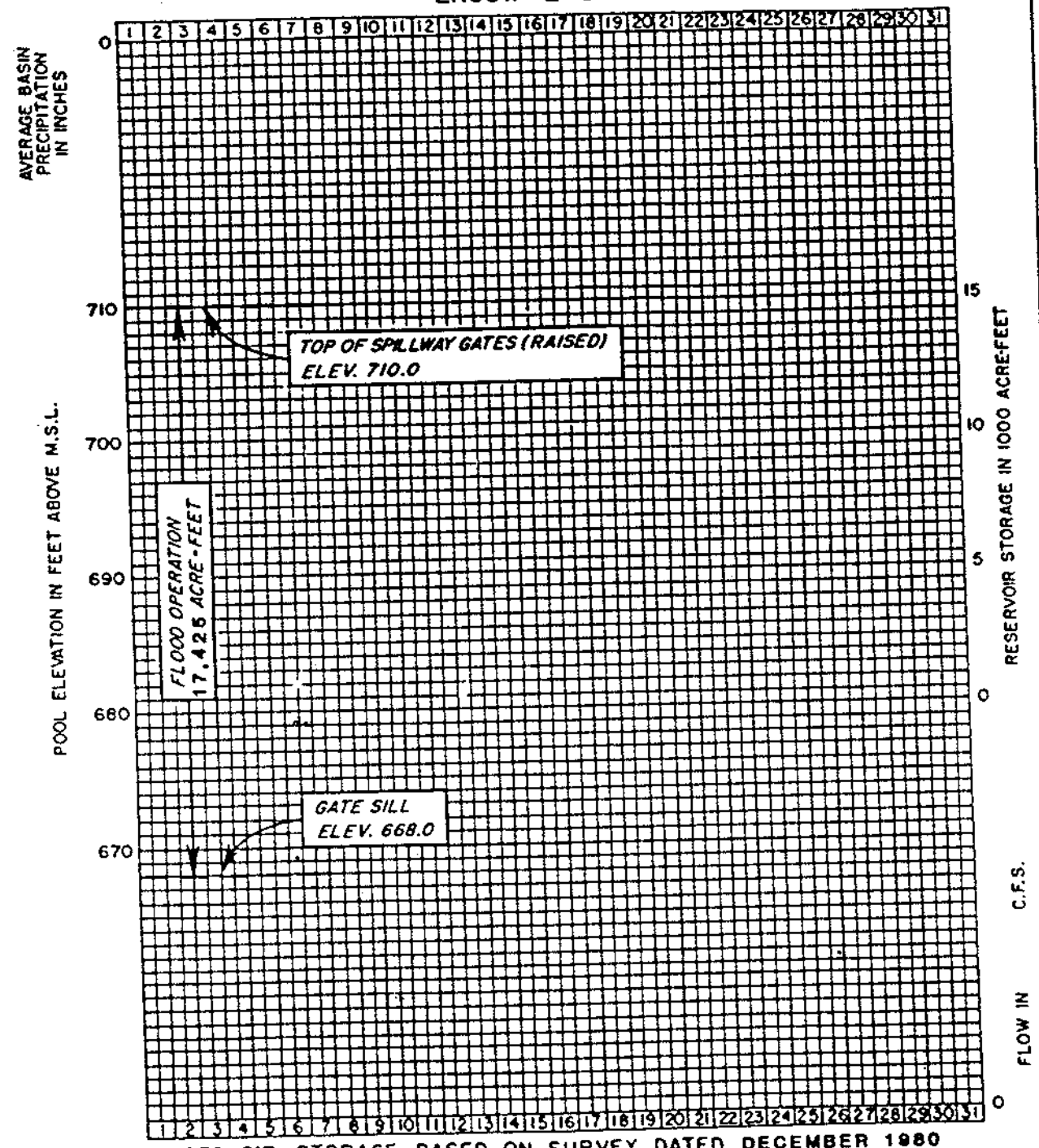
Day	Reservoir W.S.Elev			Outlet channel		Gate operation																	OPERATOR
	Time	Type of Gage	Gage reading in feet	Time	Gage height in feet	Time	Gate opening in feet																
							No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	

REMARKS:

SPL FORM 1 DEC 72 19 EDITION OF 1 MAR 55 MAY BE USED

FIGURE 9-01

ENGCW-E-6



RESERVOIR STORAGE BASED ON SURVEY DATED DECEMBER 1980

MONTH OF 19

	ELEV.	GROSS STORAGE (ACRE-FT.)
Conservation Pool		NONE
Full Pool.	710.0	17,425

Outlet Capacity at Full Pool 16,500 c.f.s.

MONTHLY RESERVOIR OPERATION

SEPULVEDA FLOOD-CONTROL BASIN

LOS ANGELES RIVER BASIN

DRAINAGE AREA 152 SQ. MILES

SOUTH PACIFIC DIVISION

LOS ANGELES DISTRICT

FILE NO. RO 05/

FIGURE 9-02

RAINFALL RECORD

STATION					☐ HOURLY ☐ 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						
TOTAL							

SPL FORM OCT 65 31

PREV. ED. OF THIS FORM MAY BE USED
REPLACES SPL FORM 32 WHICH MAY BE USED

FIGURE 9-03

RECORD OF CALLS ☐ Radio ☐ Telephone

DATE

LOCAL TIME	FROM		TO		CHECK REPTBLE CALLS*	MESSAGE OR REMARKS
	PERSON AND/OR CALL SIGN	TELEPHONE AND CITY	PERSON AND/OR CALL SIGN	TELEPHONE AND CITY		

Reportable telephone calls include collect calls, charge calls and long distance calls that can not be dialed without a code number. Calls are chargeable to MA 3-1311 unless otherwise indicated.

SPL FORM 29 APR 59 188 PREVIOUS EDITIONS ARE OBSOLETE

FIGURE 9-04

RECORD OF DATA FROM DIGITAL RECORDERS				NAME OF DAM	
DATE	TIME	WATER SURFACE	GAGE HEIGHT	PRECIPITATION	OPERATOR

SPL FORM 1 FEB 77 648

FIGURE 9-05

RESERVOIR COMPUTATIONS

☐ HOURLY ☐ DAILY

DAM		TIME OF READING (IF DAILY)	DATE
COMPUTED BY	CHECKED BY	DATA SOURCE	

HR.	DA.	WATER SURFACE ELEV. FT.	STORAGE AC. FT.	GATE STEP NO.	INST. OUTFLOW OUT-LETS CFS	INST. OUTFLOW DOWNSTREAM G. HT. FT.	INST. OUTFLOW DOWNSTREAM FLOW CFS	HRS.	STORAGE CHANGE ACRE-FEET	STORAGE CHANGE CFS	AV. OUT-FLOW CFS	AV. INFLOW CFS	GATE SETTINGS FT.
PREVIOUS REPORT													
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
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	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	31												

REMARKS				
	TOTAL			
	MEAN			

SPL FORM 30 MAY 67 PREVIOUS EDITIONS MAY BE USED; REPLACES SPL FORM 29 WHICH MAY BE USED

ARMY - C. OF E. - LOS ANGELES

FIGURE 9-

RESERVOIR OPERATION REPORT

DATE | TIME

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

SPL FORM 1 APR 82 424 REPLACES EDITION JUL 75, WHICH IS OBSOLETE.

FIGURE 9-07

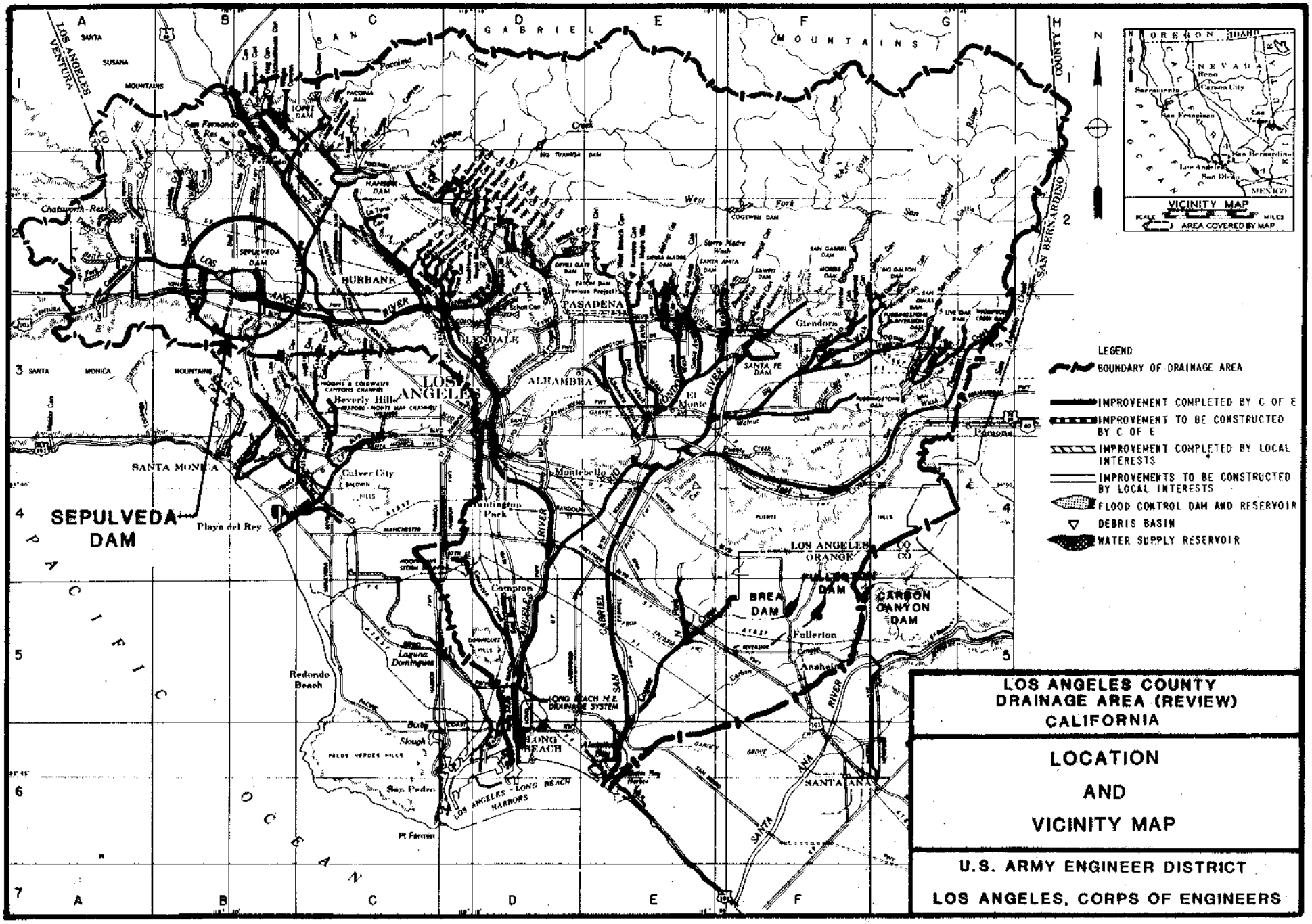

LEGEND
BOUNDARY OF DRAINAGE AREA
IMPROVEMENT COMPLETED BY C OF E
IMPROVEMENT TO BE CONSTRUCTED BY C OF E
IMPROVEMENT COMPLETED BY LOCAL INTERESTS
IMPROVEMENTS TO BE CONSTRUCTED BY LOCAL INTERESTS
FLOOD CONTROL DAM AND RESERVOIR
DEBRIS BASIN
WATER SUPPLY RESERVOIR
VICINITY MAP
AREA COVERED BY MAP
SEPULVEDA DAM
BREA DAM
CARBON CANYON DAM
FULLERTON DAM
LOS ANGELES
PASADENA
BURBANK
GLENDALE
ALHAMBRA
SANTA MONICA
LONG BEACH
SANTA ANA
PACIFIC OCEAN
SAN GABRIEL MOUNTAINS
LOS ANGELES COUNTY DRAINAGE AREA (REVIEW) CALIFORNIA
LOCATION AND VICINITY MAP
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS

PLATE 2-01

PACOIMA DAM
BIG TUJUNGA DAM
LOS ANGELES RESERVOIR
LOPEZ DAM
PACOIMA WASH
HANSEN DAM
DEVIL'S GATE DAM
COGSWELL DAM
SAN GABRIEL DAM
SIERRA MADRE DAM
SANTA ANITA DAM
MORRIS DAM
BIG DALTON DAM
SAN DIMAS DAM
CHATSWORTH RESERVOIR
RUBBER DAM
TUJUNGA WASH
VERDUGO WASH
SECO
EATON WASH DAM
SAWPIT DAM
SAWPIT WASH
SANTA ANITA WASH
EATON WASH
LITTLE DALTON WASH
DALTON WASH
SAN DIMAS WASH
THOMPSON CREEK DAM
LIVE OAK DAM
PUDDINGSTONE DIVERSION DAM
PUDDINGSTONE DAM
LOS ANGELES RIVER
ENCINO RESERVOIR
SEPULVEDA DAM
16,900 CFS CHANNEL CONSTRAINT
20,000 CFS CHANNEL CONSTRAINT
35,000 CFS CHANNEL CONSTRAINT
ARROYO
HONDO
RIVER
BIG WALNUT CR
SANTA FE DAM
WHITTIER NARROWS DAM
RIO SAN JOSE WASH
PACIFIC OCEAN
COMPTON
LOS ANGELES
GABRIEL
BREA DAM
FULLERTON DAM
MILLER BASIN (DIVERSION)
CR
COYOTE
CARBON
CR.
SAN
LOS

5 0 5 10 15 STATUTE MILE
5 0 5 10 20 KILOMETERS

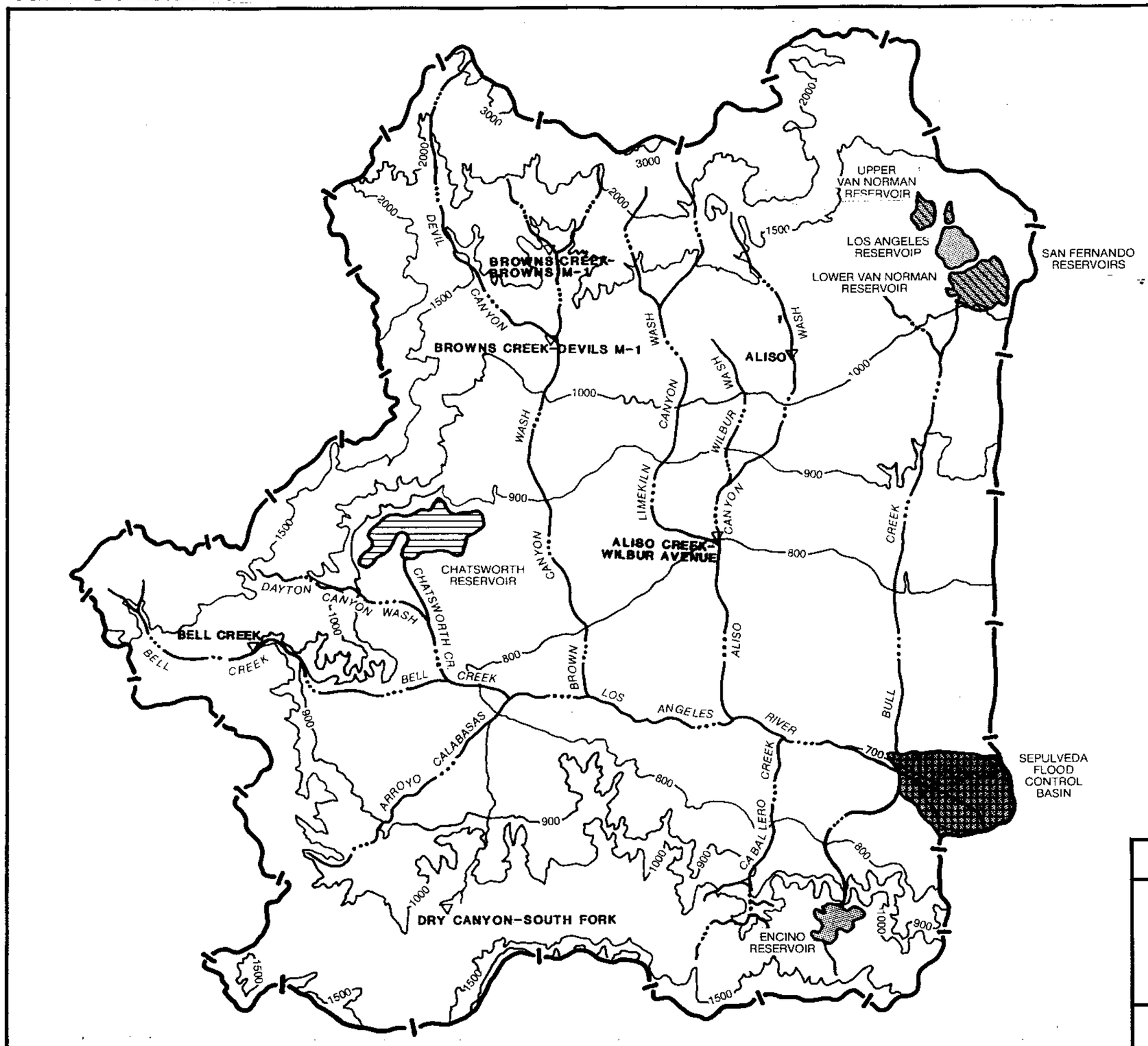
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

LOS ANGELES COUNTY DRAINAGE AREA

RIVERS AND DAMS

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

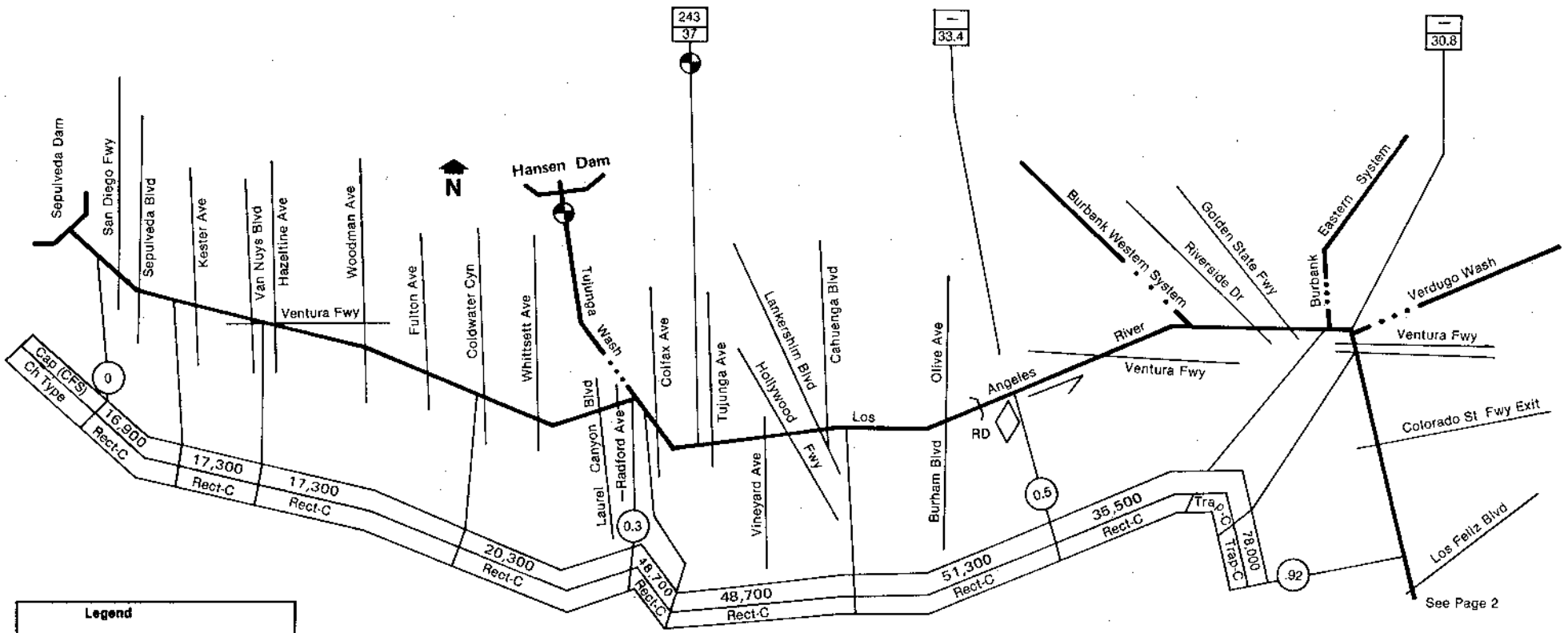
PLATE 2-02



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

RIVERS AND RESERVOIRS ABOVE SEPULVEDA DAM

U.S. ARMY CORPS OF ENGINEERS
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 / Bottom
- L Levee

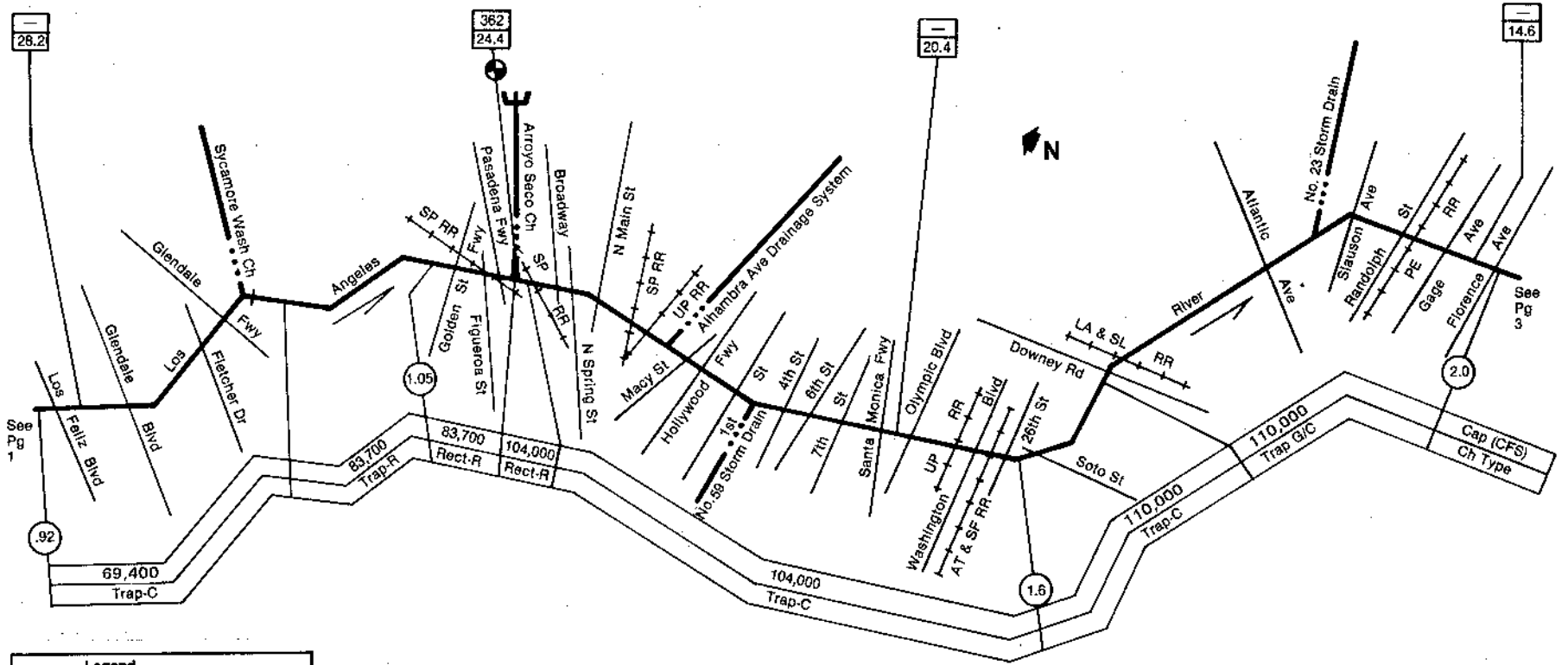
	Significant Features	Miles	Remarks
RD	Headworks Spreading Grounds	33.4	Intake Capacity 40 CFS at Rubber Dam
	Los Angeles River at Tujunga (LACFCD)	37	Telemetry LART
	Tujunga Wash	37.8	Flows Regulated by Hansen, Big Tujunga, Pacoima and Lopez Dams

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

CHANNEL CAPACITIES & CONFIGURATIONS LOS ANGELES RIVER

SEPULVEDA DAM TO LOS FELIZ BLVD

U.S. ARMY CORPS OF ENGINEERS
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 / Bottom
- L Levee

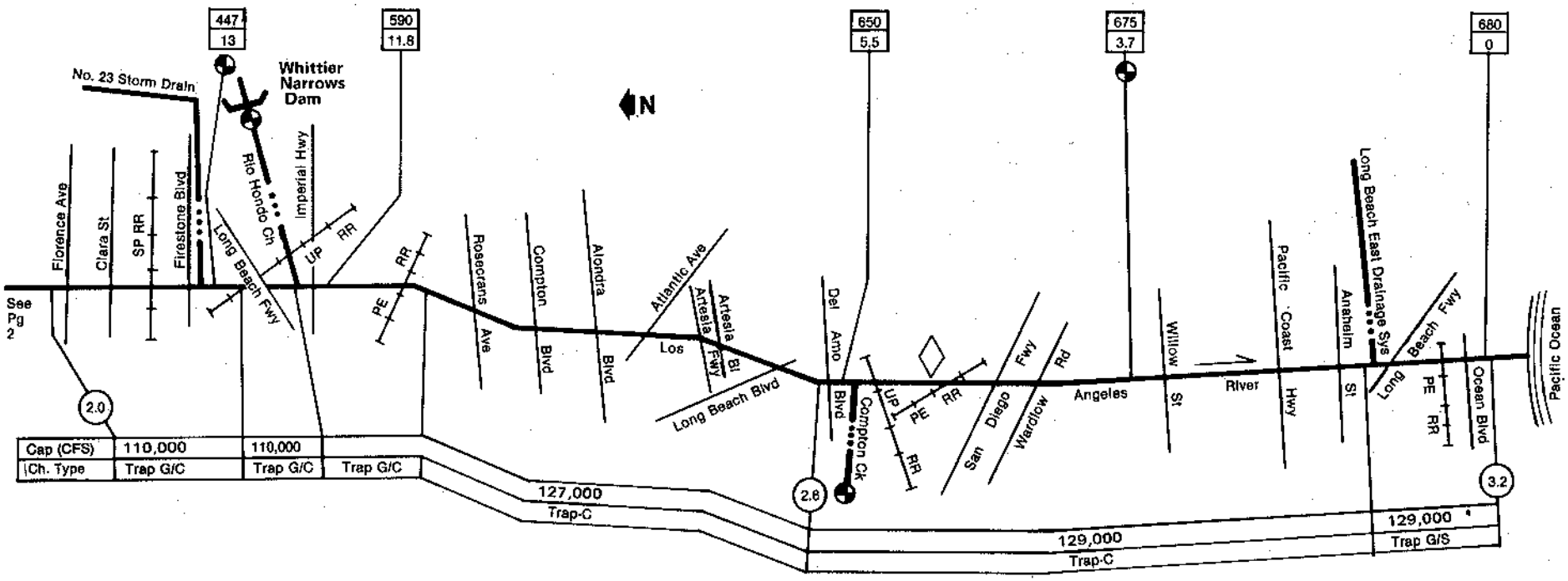
	Significant Features	Miles	Remarks
◓	Los Angeles River Above Arroyo Seco	24.4	Telemetry 002 LARA
	Arroyo Seco Channel	24.3	Flow Regulated by Devils Gate Dam (Max Q = 43,000 CFS)

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

CHANNEL CAPACITIES & CONFIGURATIONS LOS ANGELES RIVER

LOS FELIZ BLVD
TO
FLORENCE AVE

U.S. ARMY CORPS OF ENGINEERS
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 / Bottom
- L Levee

	Significant Features	Miles	Remarks
◔	Los Angeles River Near Firestone	13	Telemetry LARF
◔	Rio Hondo Channel near Downey	12.1	Flows Regulated by Whittier Narrows Flood Control Reservoir
◇	Dominguez Gap Spreading Grounds	4.7-5.1	Intake Capacities 3-20 CFS
◔	Los Angeles River Near Wardlow	3.7	Telemetry LARW
◔	Compton Creek Near Greenleaf		(LACFCD)

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

CHANNEL CAPACITIES & CONFIGURATIONS LOS ANGELES RIVER

FLORENCE AVE TO PACIFIC OCEAN

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

The Plate you are attempting to access is not currently available.

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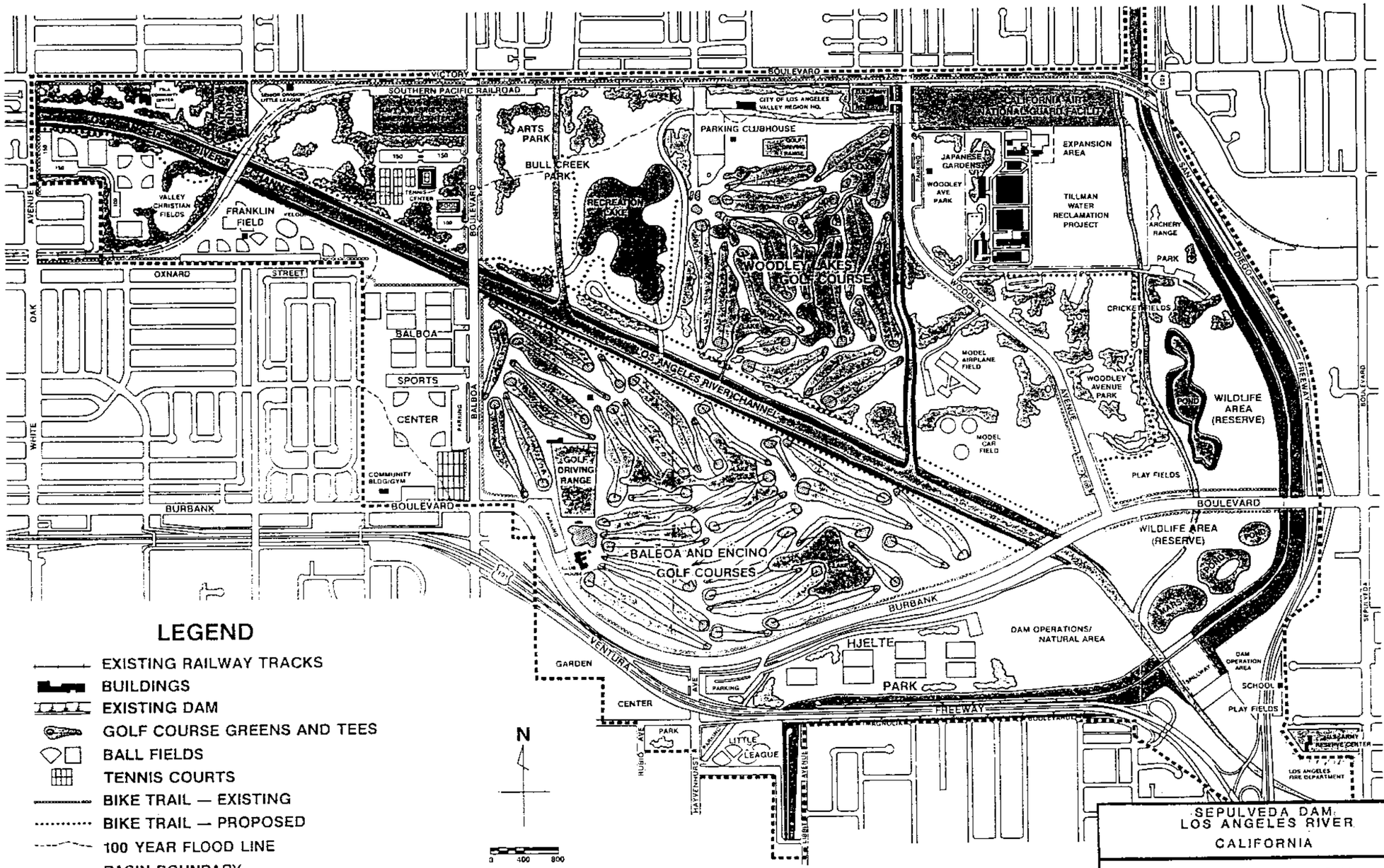

LEGEND

- EXISTING RAILWAY TRACKS
- BUILDINGS
- EXISTING DAM
- GOLF COURSE GREENS AND TEES
- BALL FIELDS
- TENNIS COURTS
- BIKE TRAIL — EXISTING
- BIKE TRAIL — PROPOSED
- 100 YEAR FLOOD LINE
- BASIN BOUNDARY
- MILITARY FACILITIES

SEPULVEDA BASIN MASTER PLAN

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

SEPULVEDA BASIN
WILDLIFE AND RECREATION
MASTER PLAN

U.S. CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 2-07

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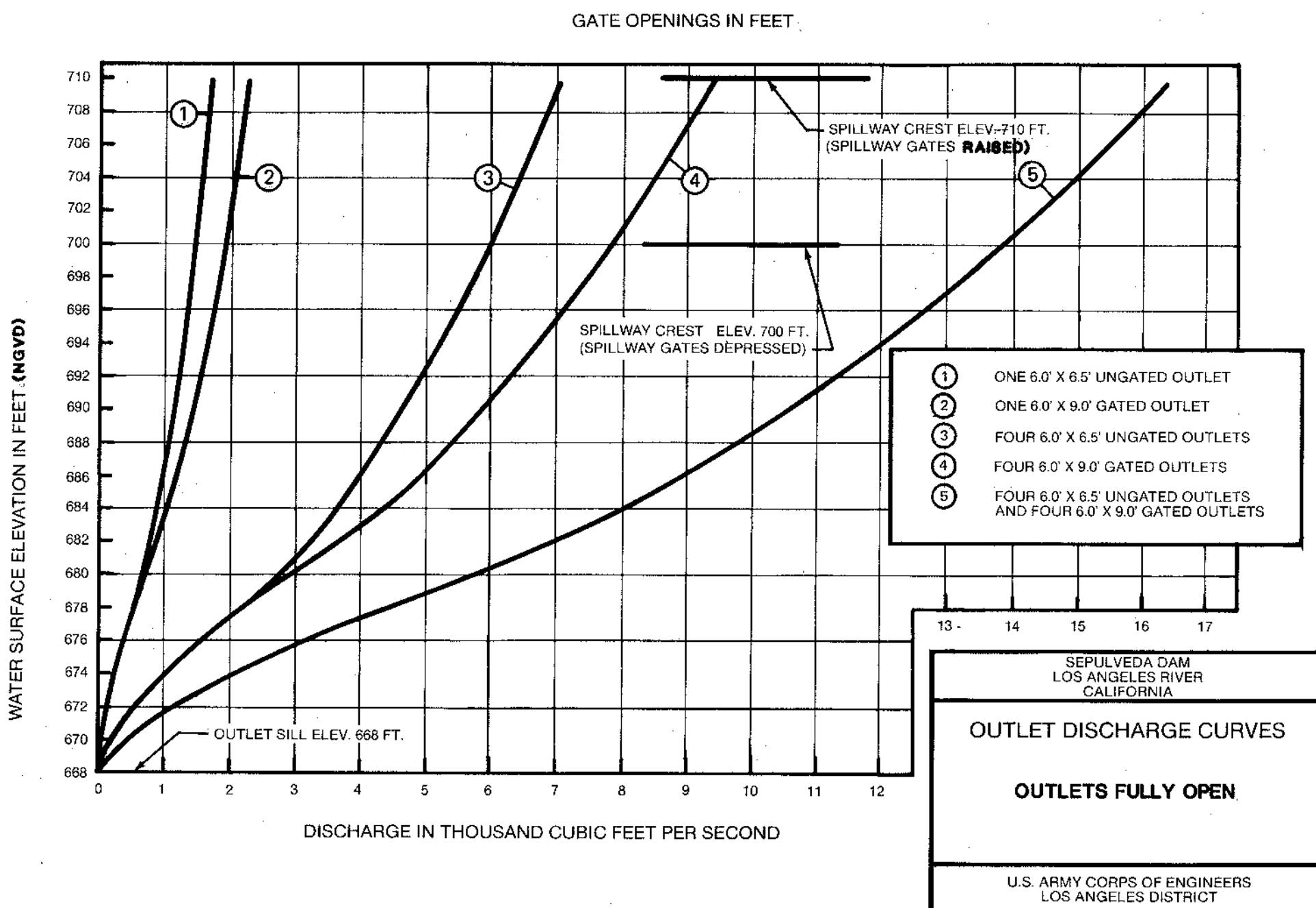
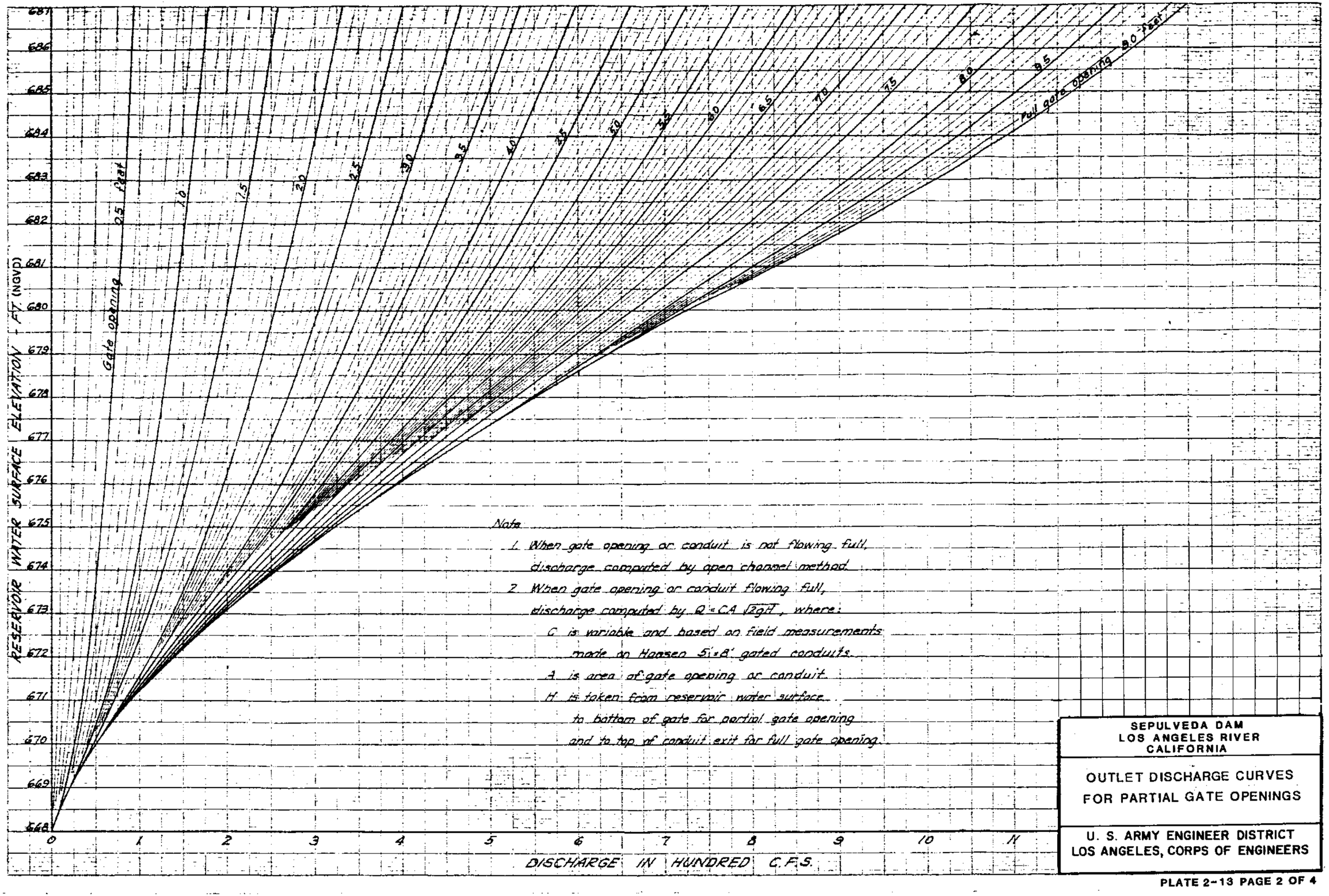


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OUTLET DISCHARGE CURVES

OUTLETS FULLY OPEN

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



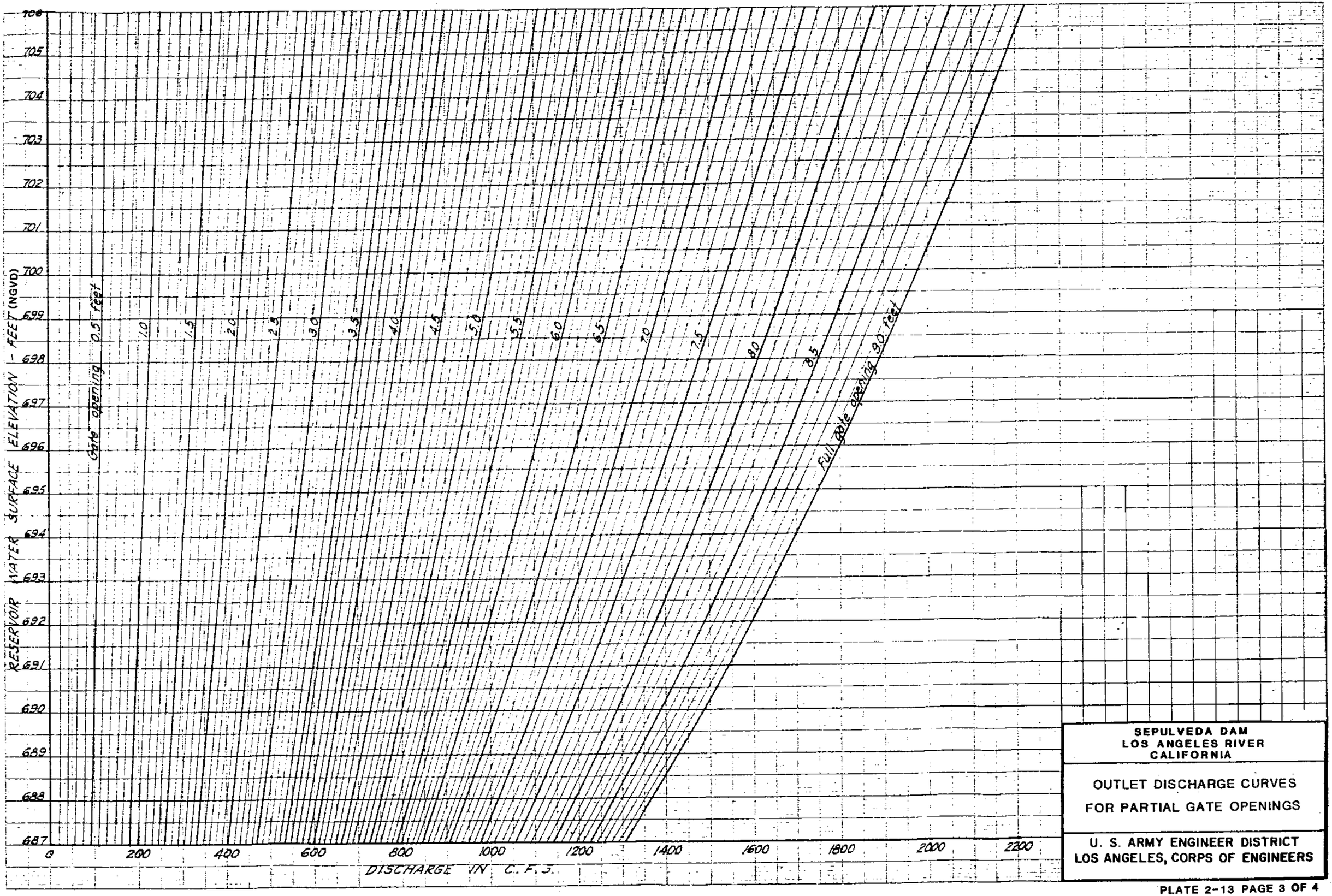
Note

1. When gate opening or conduit is not flowing full, discharge computed by open channel method.
2. When gate opening or conduit flowing full, discharge computed by $Q = CA\sqrt{2gH}$, where:
   - C is variable and based on field measurements made on Hansen 5'×8' gated conduits.
   - A is area of gate opening or conduit.
   - H is taken from reservoir water surface to bottom of gate for partial gate opening and to top of conduit exit for full gate opening.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OUTLET DISCHARGE CURVES
FOR PARTIAL GATE OPENINGS

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



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OUTLET DISCHARGE CURVES
FOR PARTIAL GATE OPENINGS

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

RESERVOIR WATER SURFACE ELEVATION - FEET (NGVD)

725
724
723
722
721
720
719
718
717
716
715
714
713
712
711
710
709
708
707
706

Gate opening - 0.5 feet

10'
15'
20'
25'
30'
35'
40'
45'
50'
55'
60'
65'
70'
75'
80'
85'
Full gate opening 90 ft.

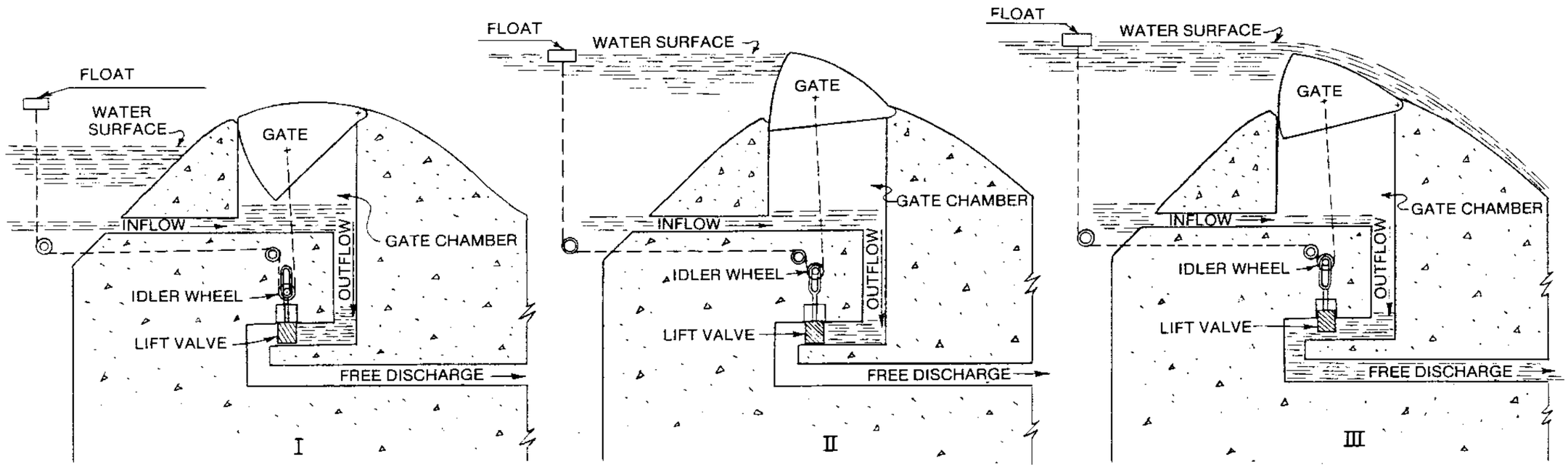
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200

DISCHARGE IN C.F.S.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OUTLET DISCHARGE CURVES
FOR PARTIAL GATE OPENINGS

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



WATER IS RISING, GATE IS CLOSED, AND FLOAT IS AT LOWEST POSITION. IDLER WHEEL IS AT BOTTOM OF SLOT TO TAKE UP SLACK IN CABLE. LIFT VALVE IS CLOSED BY ITS OWN WEIGHT.

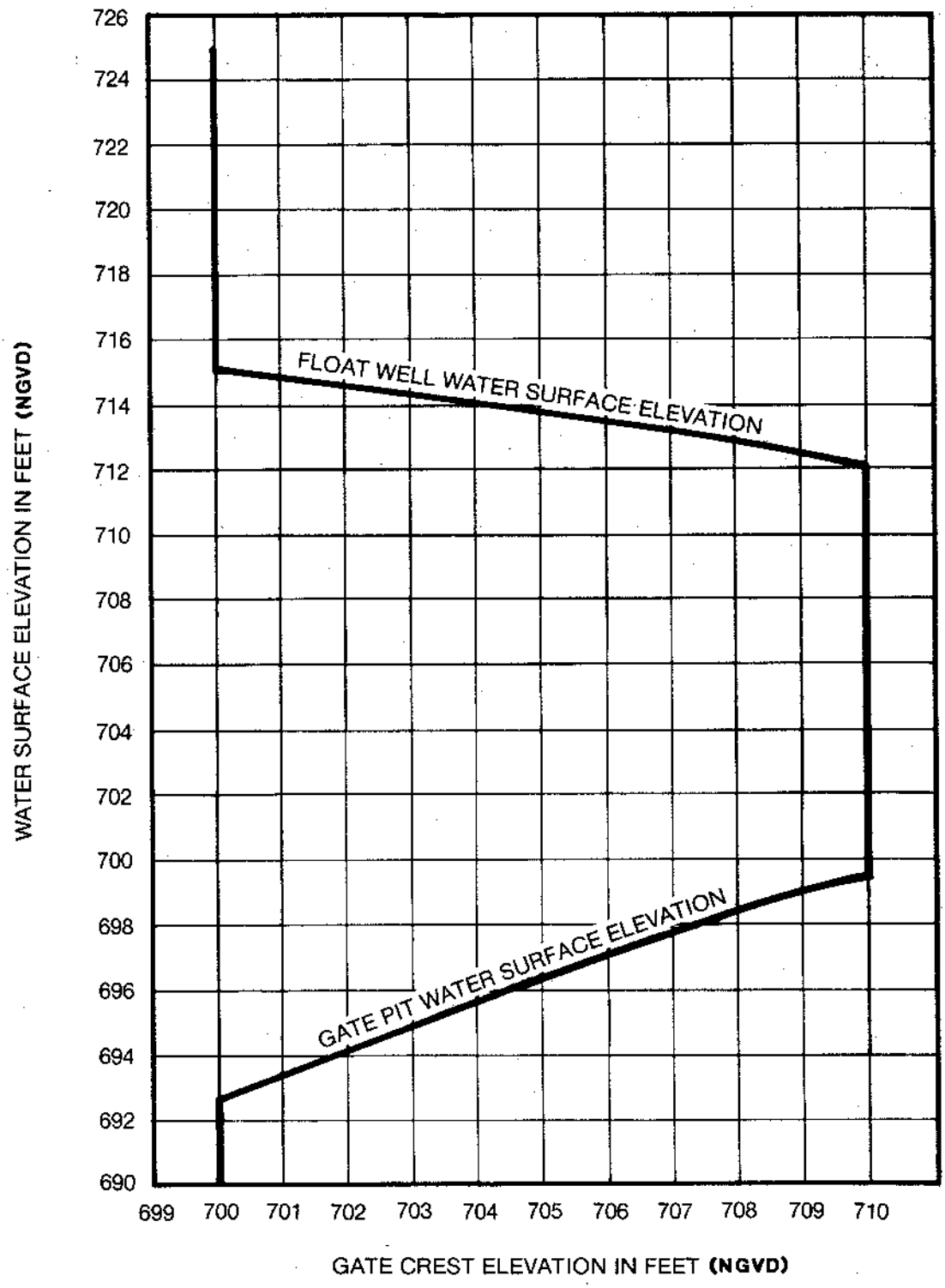
WATER IS AT MAXIMUM ELEVATION WITHOUT SPILLING. GATE HAS FLOATED TO TOP POSITION BY WATER IN GATE CHAMBER. IDLER WHEEL IS RAISED TO NEAR TOP OF SLOT, BUT LIFT VALVE IS STILL CLOSED. A FURTHER RISE OF THE FLOAT BY MORE THAN 1 FOOT WILL OPEN THE LIFT VALVE.

WATER IS PASSING OVER GATE. A FLOAT ELEVATION OF MORE THAN 1 FOOT ABOVE POSITION II (THE THRESHOLD OF SPILLING) OPENS THE LIFT VALVE. WHEN OUTFLOW EXCEEDS INFLOW TO THE GATE CHAMBER, THE GATE IS LOWERED. THE LOWERING OF THE GATE ALLOWS THE LIFT VALVE TO CLOSE UNDER ITS OWN WEIGHT UNTIL THE OUTFLOW AND INFLOW BALANCE, AND THE GATE REMAINS STATIONARY.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

SCHEMATIC DIAGRAM OF CREST GATE OPERATION

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

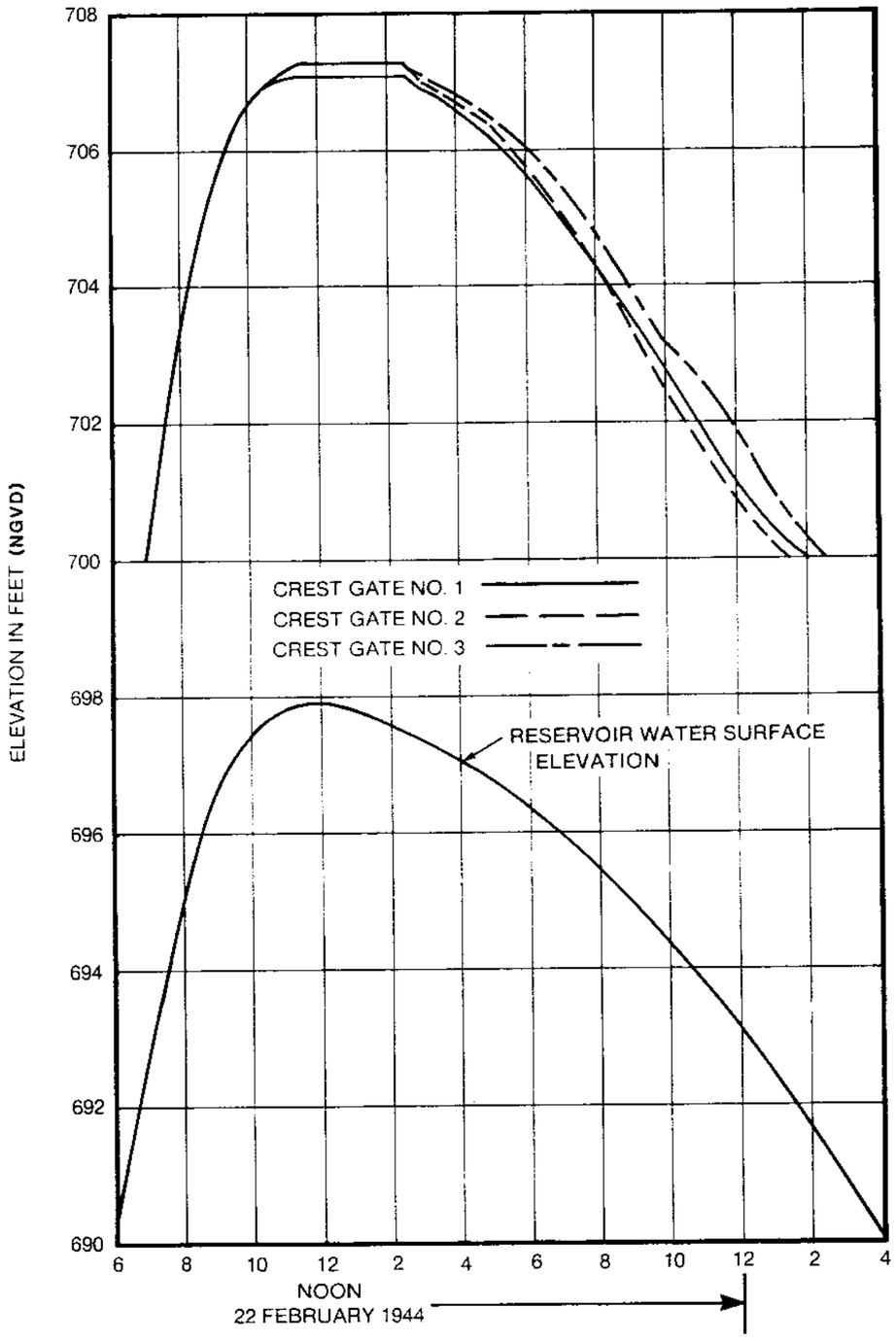


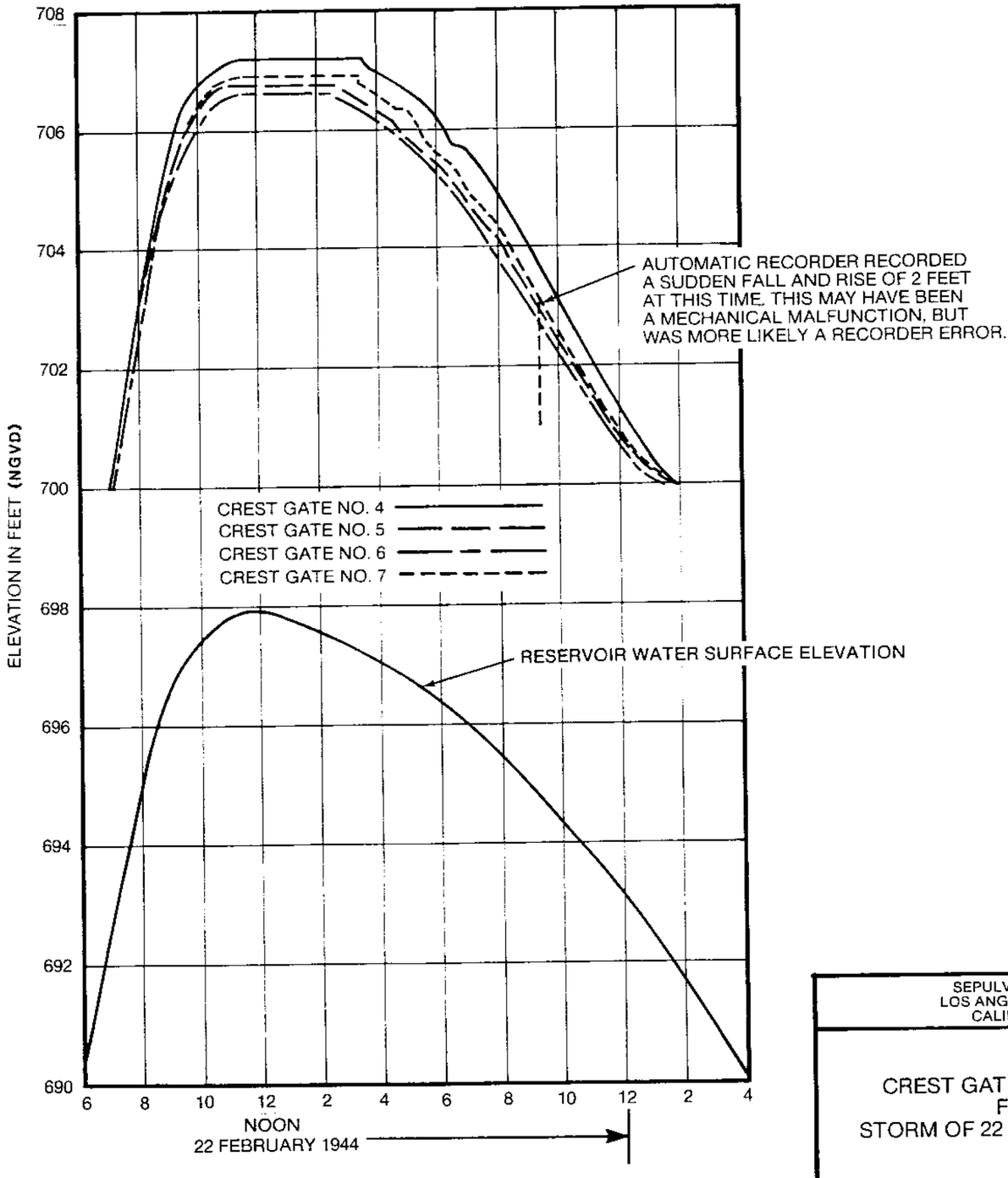
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

ELEVATION OF CREST GATES VS WATER SURFACE ELEVATION IN GATE PIT AND FLOAT WELL

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 2-15

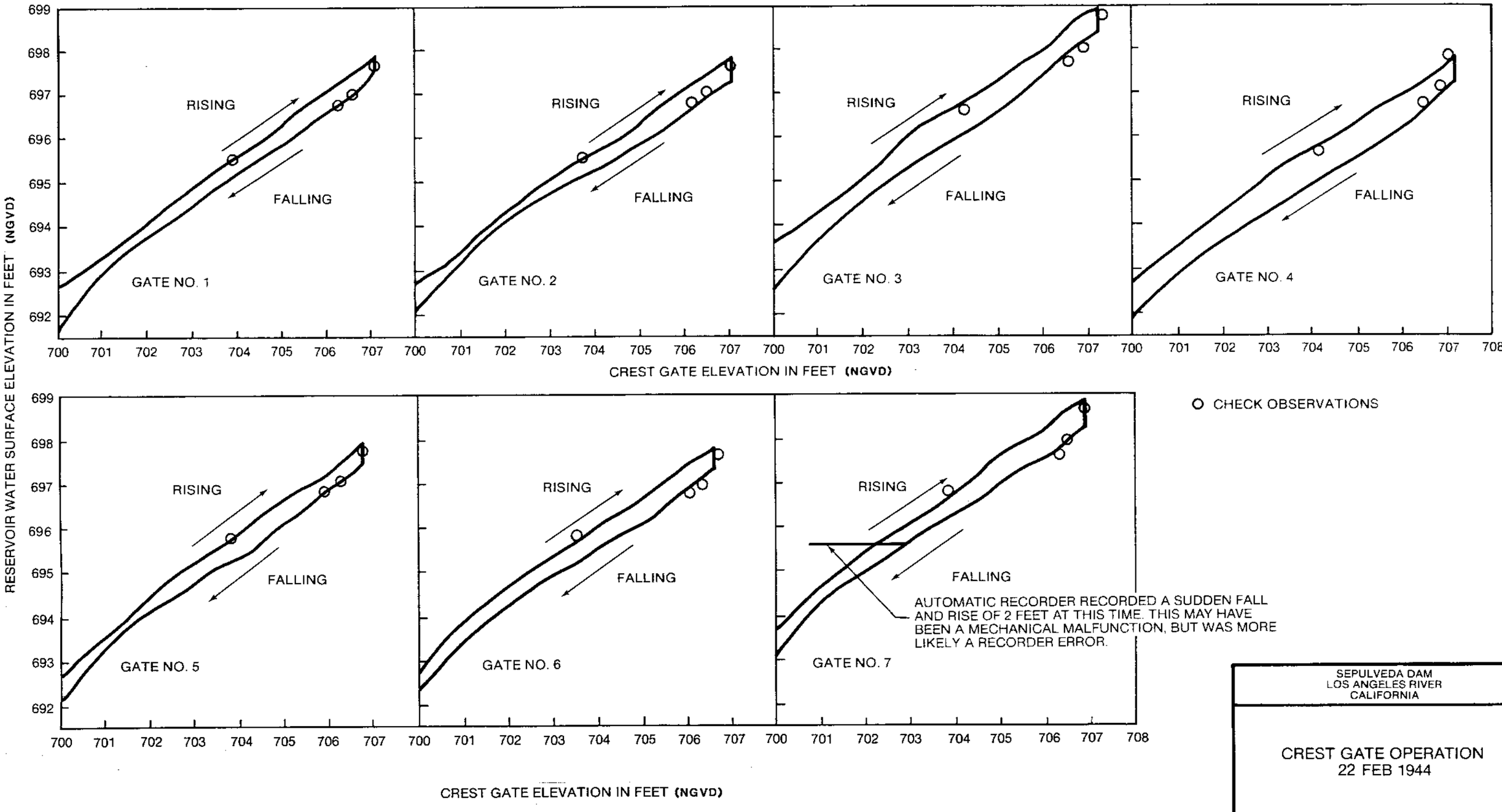




SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

CREST GATE OPERATION FOR STORM OF 22 FEBRUARY 1944

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

CREST GATE OPERATION
22 FEB 1944

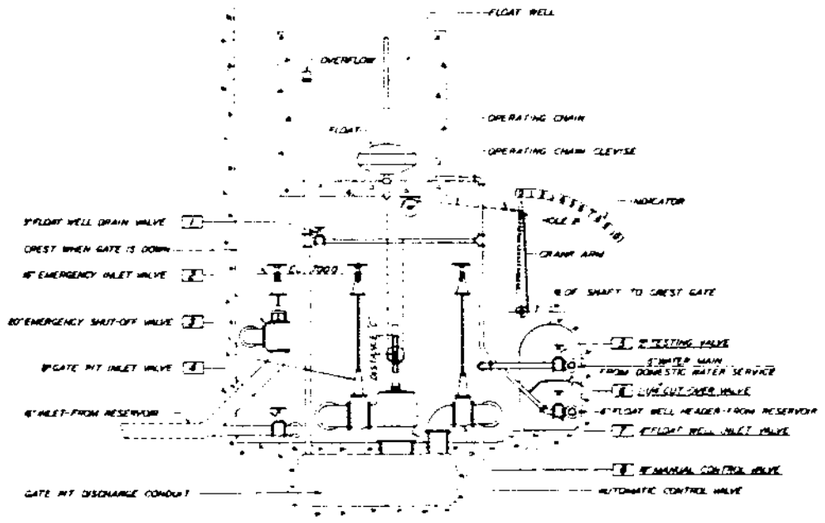
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

GENERAL

THE CREST GATES ARE DESIGNED TO PERMIT STORAGE OF FLOOD WATERS TO ELEV 710.0 WHEN THE GATES ARE FULLY RAISED, OR TO PERMIT DISCHARGE OF FLOOD WATERS DOWN TO ELEV 700.0 WHEN THE GATES ARE LOWERED. THE FLOATS WHICH NORMALLY CONTROL THE ELEVATION OF THE CREST GATES, HAVE A WORKING RANGE BETWEEN RESERVOIR WATER SURFACE ELEVATION OF 709.6 AND RESERVOIR WATER SURFACE ELEVATION OF 716.0

WITHIN THE LIMITS SET FORTH ABOVE, AN INFINITELY LARGE NUMBER OF OPERATING CHARACTERISTICS ARE AVAILABLE.

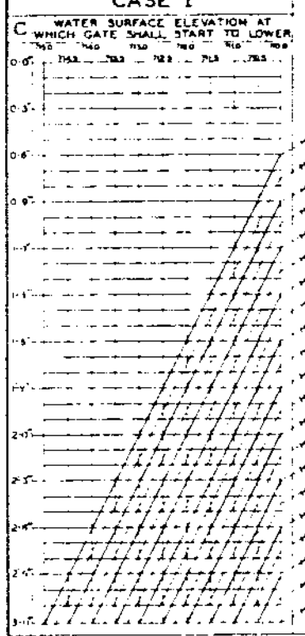
THE INSTRUCTIONS ON THIS SHEET ARE INTENDED TO FACILITATE THE ADJUSTMENT OF THE MECHANISM TO MEET ANY OPERATING CHARACTERISTIC WITHIN THE LIMITS SET FORTH ABOVE.

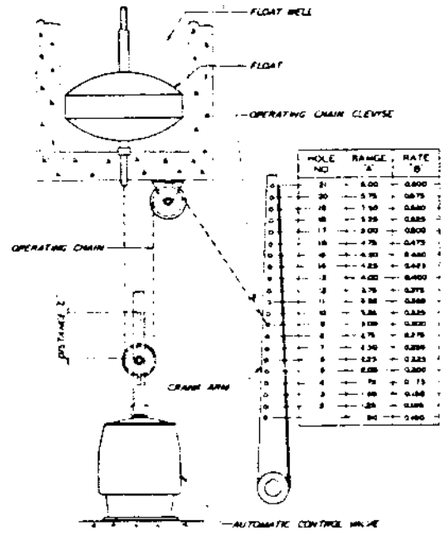


SCHEMATIC SKETCH
NOT TO SCALE

CASE I

C = WATER SURFACE ELEVATION AT WHICH GATE SHALL START TO LOWER



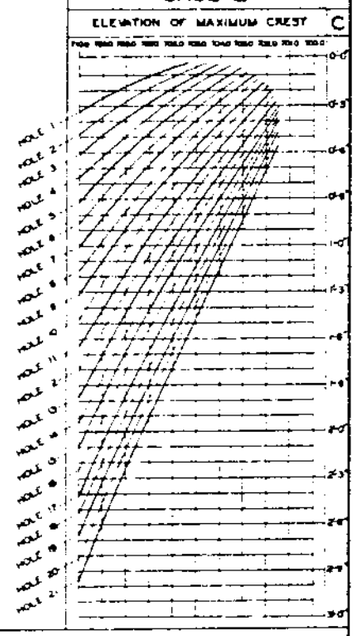


HOLE NO	RANGE A	RATE B
21	6.00	0.800
20	5.75	0.875
19	5.50	0.880
18	5.25	0.885
17	5.00	0.800
16	4.75	0.875
15	4.50	0.880
14	4.25	0.941
13	4.00	0.900
12	3.75	0.875
11	3.50	0.880
10	3.25	0.900
9	3.00	0.875
8	2.75	0.880
7	2.50	0.900
6	2.25	0.875
5	2.00	0.880
4	1.75	0.915
3	1.50	0.933
2	1.25	0.960
1	1.00	1.000

SCHEMATIC SKETCH
NOT TO SCALE

CASE II

ELEVATION OF MAXIMUM CREST = C



THE ABOVE SCHEMATIC SKETCH SHOWS THE VALVES BY WHICH THE CREST GATES ARE CONTROLLED

TESTING WITH CITY WATER TO TEST THE GATE DURING THE DRY SEASON CLOSE VALVES NUMBERED 1 2 3 4 5 6 7 8 THEN
- TO RAISE GATE OPEN VALVE 5
- TO RAISE FLOAT OPEN VALVE 6
- TO DRAIN GATE PIT OPEN VALVE 4
- TO DRAIN FLOAT CHAMBER OPEN VALVE 7

FULL AUTOMATIC CONTROL THIS IS THE NORMAL OPERATING CONDITION FOR WHICH THE CREST GATES ARE DESIGNED. TO PERMIT THE FULL AUTOMATIC MECHANISM TO FUNCTION, VALVES 5 & 7 SHALL BE OPEN AND VALVES 1 2 3 6 & 8 SHALL BE CLOSED. DETAILED INSTRUCTIONS ARE GIVEN ELSEWHERE ON THIS SHEET EXPLAINING THE METHOD OF ADJUSTING THE CONTROL MECHANISM TO PRODUCE THE DESIRED OPERATING CHARACTERISTIC.

SEMI-AUTOMATIC CONTROL TO ADJUST THE CONTROL MECHANISM TO MAINTAIN THE GATE CREST AT ANY CHOSEN ELEVATION REGARDLESS OF THE FLOOD STAGE.—

1ST CLOSE VALVES 2 3 6 7 & 8 AND OPEN VALVES 1 5 & 4

2ND CONNECT THE OPERATING CHAIN CLEVISE TO HOLE 21 IN THE CRANK ARM

3RD (a) IF THE INDICATOR READS ZERO (CREST ELEV 700.0) ADJUST THE LENGTH OF THE OPERATING CHAIN SO THAT DISTANCE 'C' (SEE SKETCH ABOVE) IS 3'-0"

(b) IF THE INDICATOR READS 10 (CREST ELEV 710.0) ADJUST THE LENGTH OF THE OPERATING CHAIN SO THAT DISTANCE 'C' (SEE SKETCH ABOVE) IS 0'-0"

4TH CLOSE VALVE 1

THE CREST GATE IS NOW SET TO RISE IN ADVANCE OF A FLOOD TO REACH A MAXIMUM CREST OF 710.0. TO LOWER THE CREST (OR TO CHECK ITS RISE) OPEN VALVE 8 UNTIL THE INDICATOR SHOWS THE DESIRED CREST. SHOULD IT BE DESIRED TO RAISE THE CREST, WHILE BEING MAINTAINED BELOW ELEVATION 710.0, OPEN VALVE 1 UNTIL THE INDICATOR SHOWS THE DESIRED CREST. THE MECHANISM WILL THEN MAINTAIN THIS CREST AT A VIRTUALLY CONSTANT ELEVATION WITHOUT FURTHER ATTENTION.

NOTE: UNDER CERTAIN CONDITIONS THERE WILL BE A TIME LAG WHILE ADJUSTING THE CREST FOR SEMI-AUTOMATIC CONTROL, HENCE ALLOW A FEW MINUTES FOR THE MECHANISM TO ATTAIN EQUILIBRIUM.

EMERGENCY MANUAL OPERATION SHOULD THE CONTROL MECHANISM BECOME INOPERATIVE, EMERGENCY MANUAL CONTROL MAY BE RESORTED TO. CLOSE VALVES 1 2 3 4 5 6 7 THEN TO LOWER GATE OPEN VALVE 8 TO RAISE GATE CLOSE VALVE 8 AND OPEN VALVE 4.

OUT OF COMMISSION SHOULD IT BE DESIRED TO PUT THE GATE OUT OF COMMISSION, CLOSE VALVES 2 3 4 5 6 7 AND OPEN VALVES 1 & 8. THE CREST GATE WILL THEN REMAIN LOWERED REGARDLESS OF THE FLOOD STAGE.

TO SET THE CREST GATE CONTROL MECHANISM TO MEET A FULL AUTOMATIC OPERATING REQUIREMENT

CASE I—IN WHICH THE MAXIMUM CREST SHALL BE AT ELEVATION 710.0

NOTE: THIS CASE INCLUDES ALL NORMAL OPERATING REQUIREMENTS

1ST SUBTRACT THE WATER SURFACE ELEVATION AT WHICH THE GATE SHALL START TO LOWER, FROM THE WATER SURFACE ELEVATION AT WHICH THE GATE SHALL BE FULLY LOWERED. THE REMAINDER SHALL BE DESIGNATED 'RANGE A'

2ND SELECT THE HOLE IN THE CRANK ARM (SEE SKETCH) WHICH MOST NEARLY AGREES WITH THE DESIRED 'RANGE A' AND CONNECT THE OPERATING CHAIN CLEVISE THERETO

3RD ON THE CASE I CHART (ABOVE) TRACE THE LINE CORRESPONDING TO THE SELECTED CRANK ARM HOLE TO ITS INTERSECTION WITH THE W.S. ELEV. AT WHICH GATE SHALL START TO LOWER. READ DISTANCE 'C' TO THE LEFT

4TH ADJUST THE LENGTH OF THE OPERATING CHAIN SO THAT DISTANCE 'C' (SEE SKETCH) AGREES WITH DISTANCE 'C' FROM THE CHART

EXAMPLE CASE I

PROBLEM. GATE SHALL START TO LOWER WHEN W.S. REACHES EL 711.0 AND SHALL BE FULLY LOWERED WHEN W.S. REACHES EL 714.0

SOLUTION: 714.0 − 711.0 = 3'-0" = 'RANGE A', WHICH CORRESPONDS (SEE SKETCH) TO HOLE 8. FROM CASE I CHART, INTERSECTION OF HOLE 8 LINE AND W.S. EL. 711-0 IS OPPOSITE C = 2'-0" WHICH IS USED

CASE II—IN WHICH THE MAXIMUM CREST SHALL BE LESS THAN ELEVATION 710.0

NOTE: IN THIS CASE THE RESERVOIR W.S. AT WHICH GATE STARTS TO LOWER IS ELEV 709.6

1ST SUBTRACT 709.6 FROM THE W.S. ELEV AT WHICH THE GATE SHALL BE FULLY LOWERED. DIVIDE THE REMAINDER BY THE FINAL WHOLE DIGIT AND ITS DECIMAL FRACTION IN THE DESIRED MAXIMUM CREST. THE QUOTIENT SHALL BE DESIGNATED 'RATE B'.

2ND SELECT THE HOLE IN THE CRANK ARM (SEE SKETCH) WHICH MOST NEARLY AGREES WITH THE DESIRED 'RATE B' AND CONNECT THE OPERATING CHAIN CLEVISE THERETO.

3RD ON THE CASE II CHART (ABOVE) TRACE THE LINE CORRESPONDING TO THE SELECTED CRANK ARM HOLE TO ITS INTERSECTION WITH THE DESIRED MAXIMUM CREST. READ DISTANCE 'C' TO THE RIGHT

4TH ADJUST THE LENGTH OF THE OPERATING CHAIN SO THAT DISTANCE 'C' (SEE SKETCH) AGREES WITH DISTANCE 'C' FROM THE CHART

EXAMPLE CASE II

PROBLEM. DESIRED MAXIMUM CREST = EL 707.0 AND GATE SHALL BE FULLY LOWERED WHEN W.S. REACHES EL 713.0.

SOLUTION: 713.0 − 709.6 = 3.4' = 0.48 = 'RATE B', WHICH CORRESPONDS (SEE SKETCH) TO HOLE 16. FROM CASE II CHART, INTERSECTION OF HOLE 16 LINE AND MAXIMUM CREST EL. 707.0 IS OPPOSITE C = 1'-5 1/4" WHICH IS USED

FUNCTION OF VALVES

VALVE 1—THIS VALVE DRAINS THE FLOAT CHAMBER UNDER SEMI-AUTOMATIC CONTROL. THIS ACTION RAISES THE GATE BY CLOSING THE AUTOMATIC CONTROL VALVE

VALVE 2—THIS VALVE IS AN AUXILIARY VALVE TO VALVE 4. IT ADMITS WATER INTO THE GATE CHAMBER THEREBY TENDING TO RAISE THE GATE. THIS VALVE SHOULD BE OPENED ONLY IF VALVE 4 IS OF INSUFFICIENT CAPACITY TO RAISE THE GATE, WHICH MAY HAPPEN IF THE GATE SEALS SHOULD LEAK EXCESSIVELY, OR AN OUTLET VALVE SHOULD BECOME INOPERATIVE IN OPEN POSITION. THIS VALVE SHOULD BE LOCKED CLOSED

VALVE 3—THIS VALVE IS IN SERIES WITH THE AUTOMATIC CONTROL VALVE AND MUST BE CLOSED ONLY IF THE AUTOMATIC CONTROL VALVE SHOULD BECOME INOPERATIVE IN OPEN POSITION

VALVE 4—THIS VALVE ADMITS WATER INTO THE GATE CHAMBER THEREBY TENDING TO RAISE THE GATE

VALVE 5—THIS VALVE ADMITS WATER FROM THE DOMESTIC WATER SUPPLY TO THE GATE CHAMBER IN THIS WAY THE GATE MAY BE OPENED FOR TESTING DURING THE DRY SEASON.

VALVE 6—THIS VALVE ADMITS WATER FROM THE DOMESTIC WATER SUPPLY TO THE CONTROL FLOAT WELL. THIS VALVE IS USED IN SEMI-AUTOMATIC OPERATION

VALVE 7—THIS VALVE ADMITS WATER FROM THE RESERVOIR INTO THE CONTROL FLOAT WELL. THIS VALVE IS OPEN FOR AUTOMATIC OPERATION

VALVE 8—THIS VALVE BYPASSES THE AUTOMATIC CONTROL VALVE IT CAN BE USED TO RELEASE WATER FROM THE GATE CHAMBER AND THUS LOWER THE GATE

NOTE: ALL ADJUSTMENTS COVERED ABOVE IN CASE I & II SHALL BE MADE WITH CREST GATE FULLY LOWERED AND WITH FLOAT WELL EMPTY

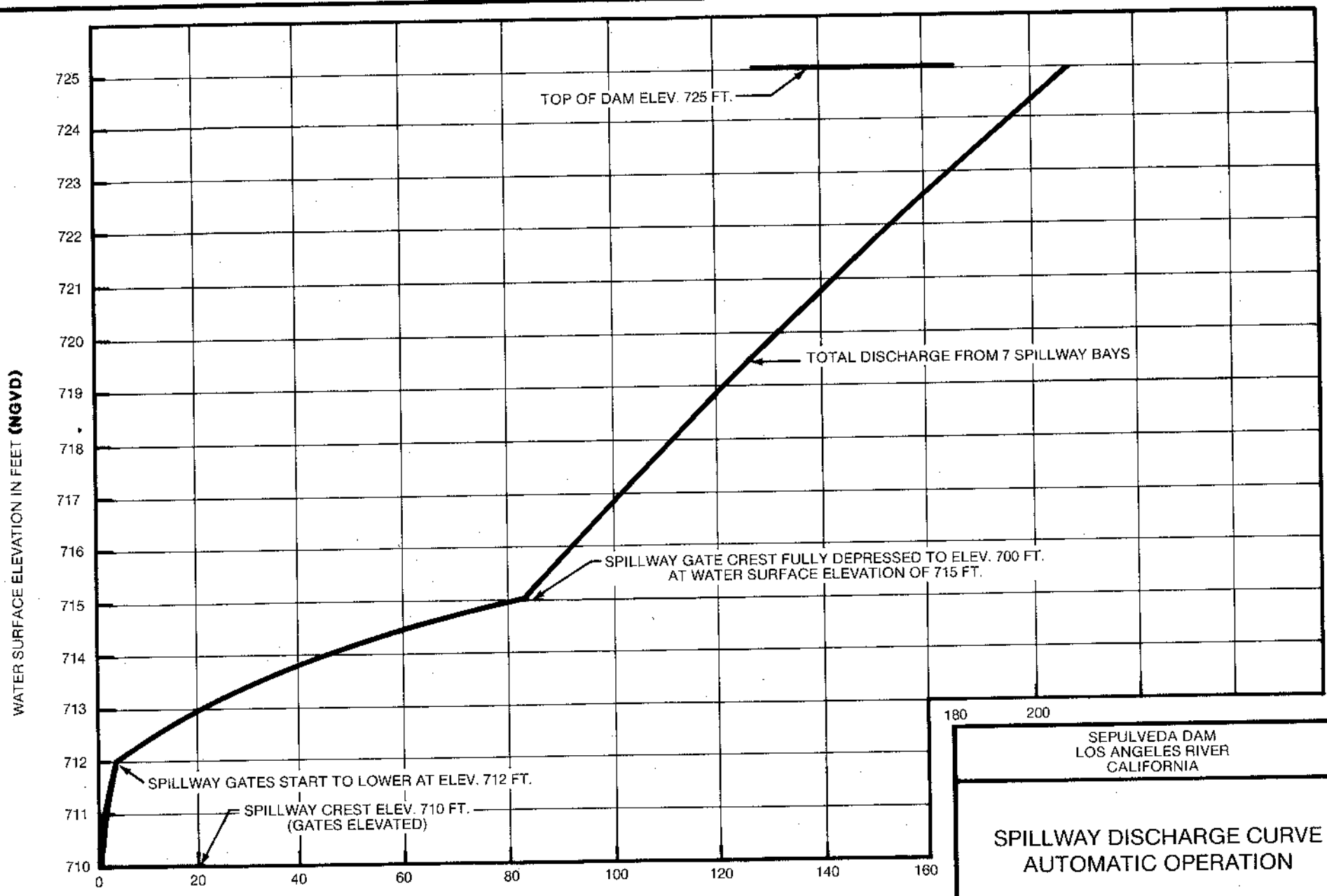
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OPERATING INSTRUCTIONS

FOR CREST GATES

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 2-18

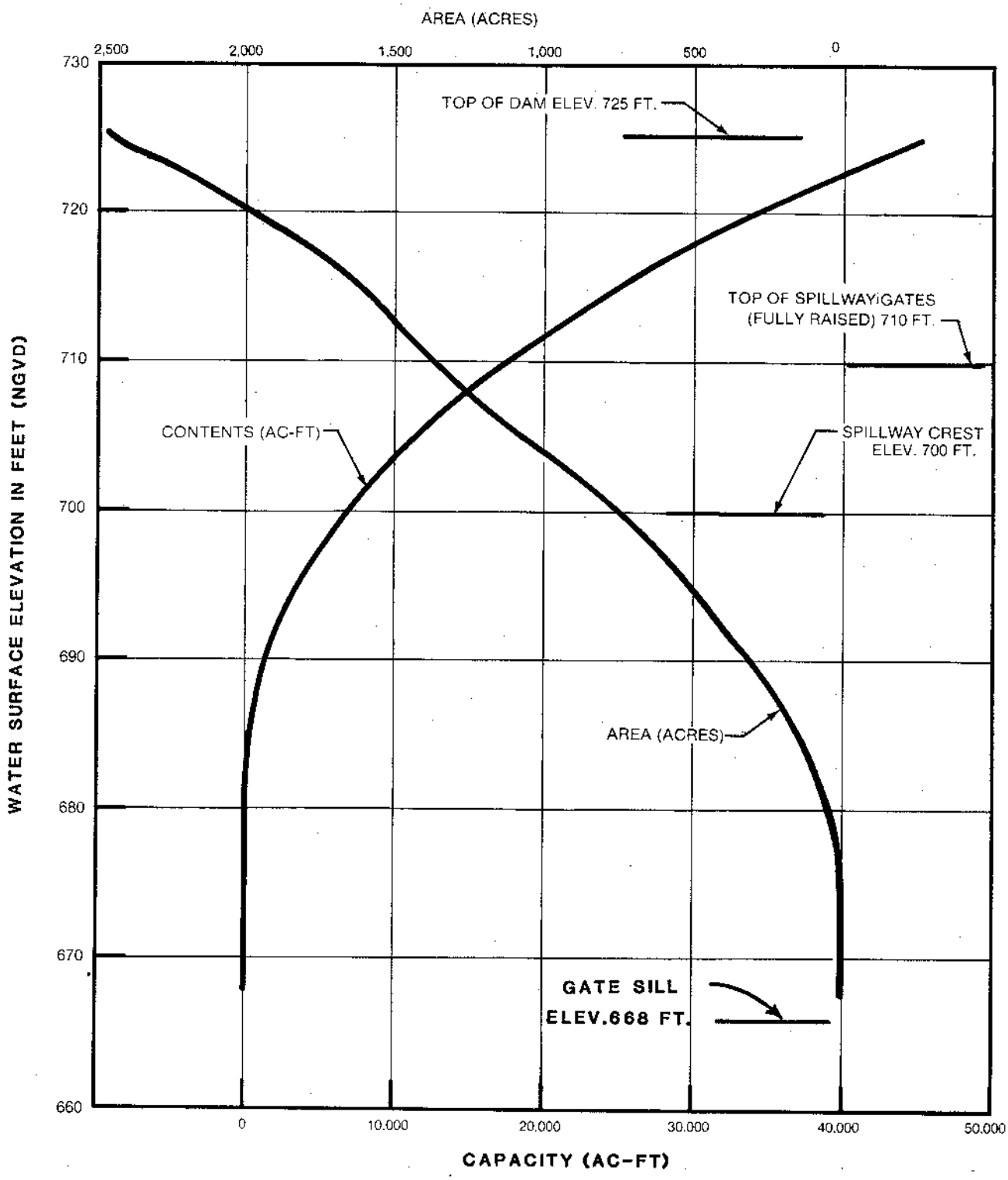


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

SPILLWAY DISCHARGE CURVE AUTOMATIC OPERATION

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 2-19

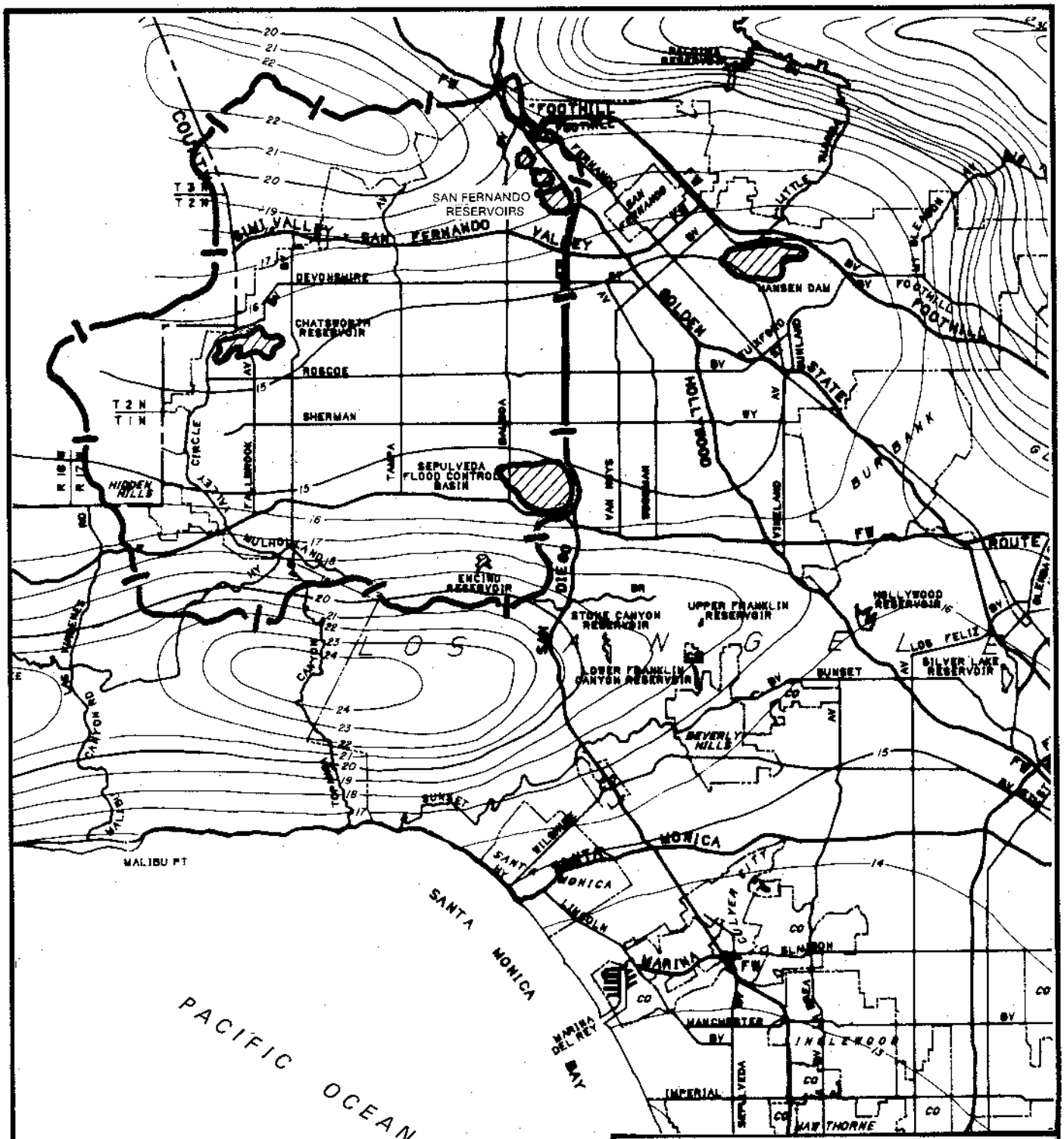


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

WATER SURFACE ELEVATION VS CAPACITY AND AREA

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 2-20



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

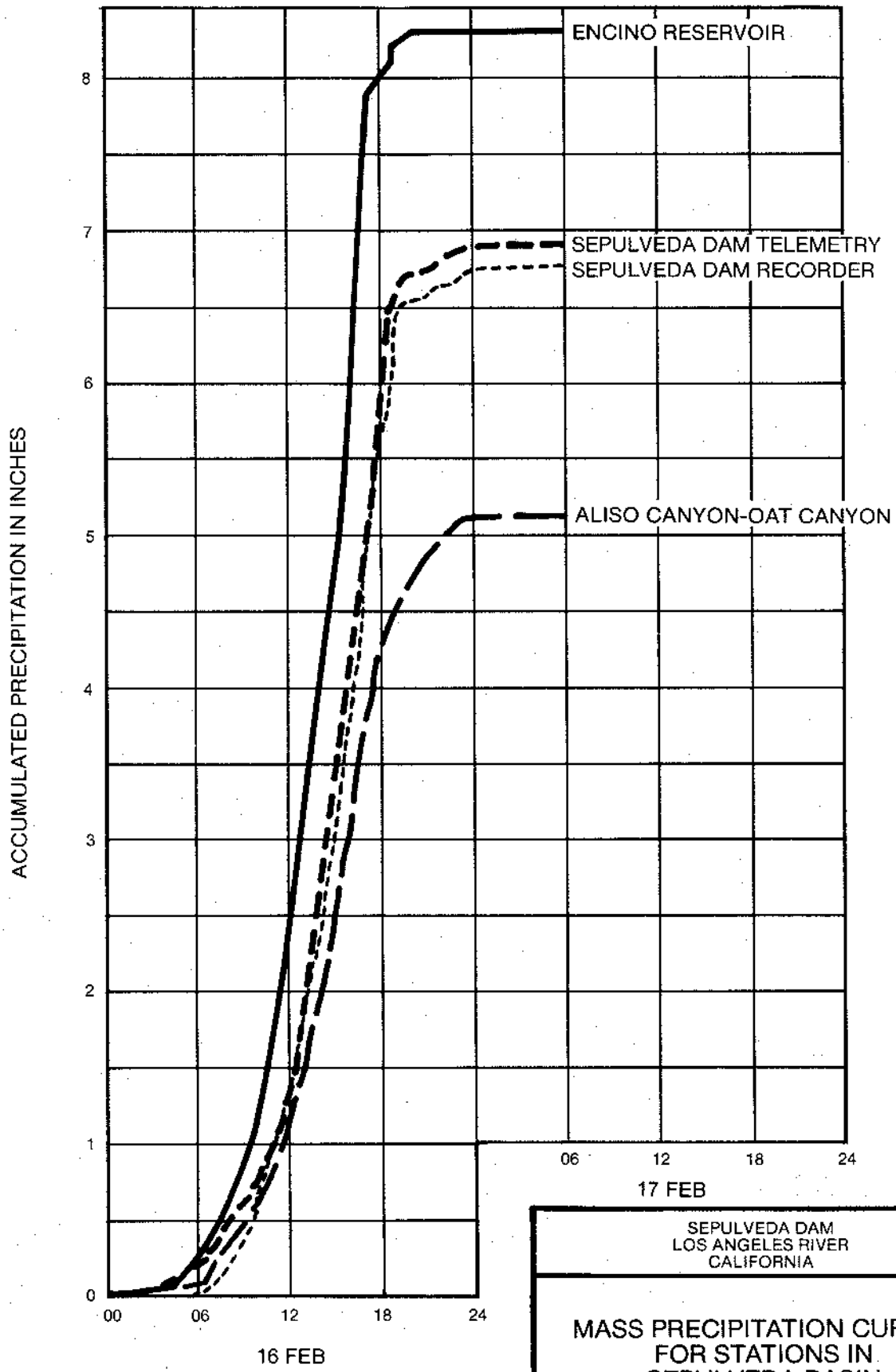
MEAN ANNUAL

PRECIPITATION

IN INCHES

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 4-01

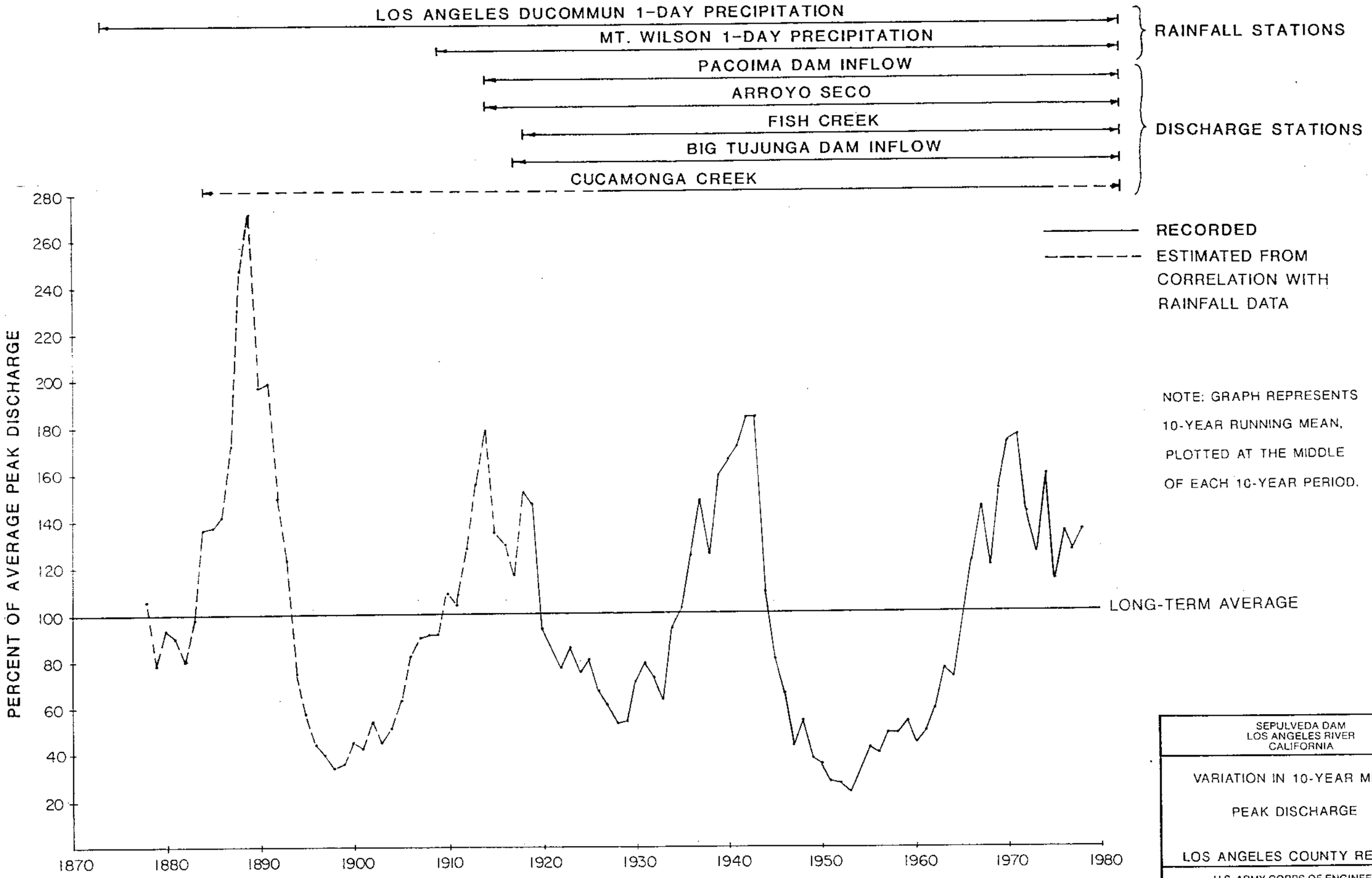


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

MASS PRECIPITATION CURVES FOR STATIONS IN SEPULVEDA BASIN 16-17 FEB, 1980

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 4-02

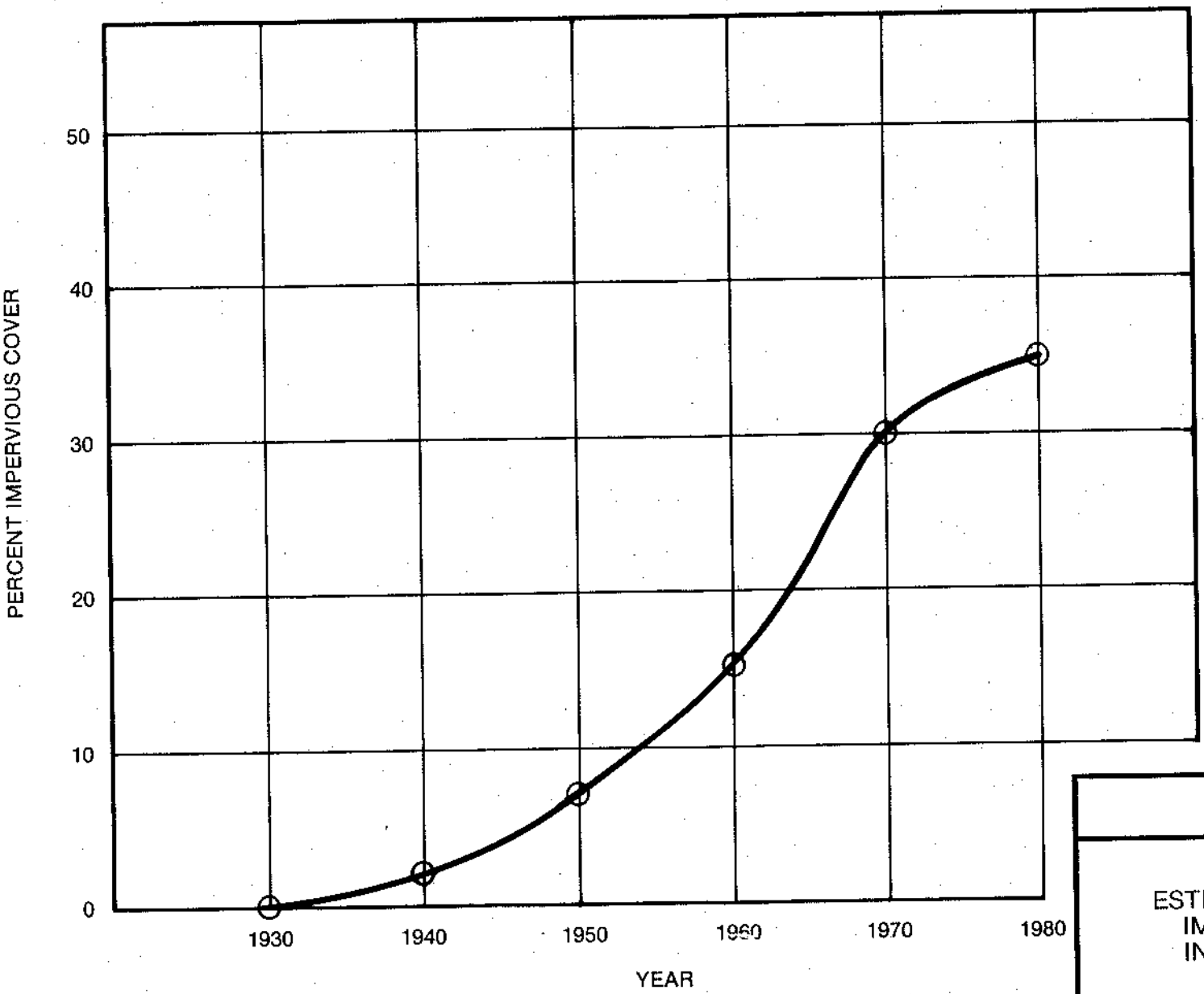


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

VARIATION IN 10-YEAR MEAN PEAK DISCHARGE

LOS ANGELES COUNTY REGION

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

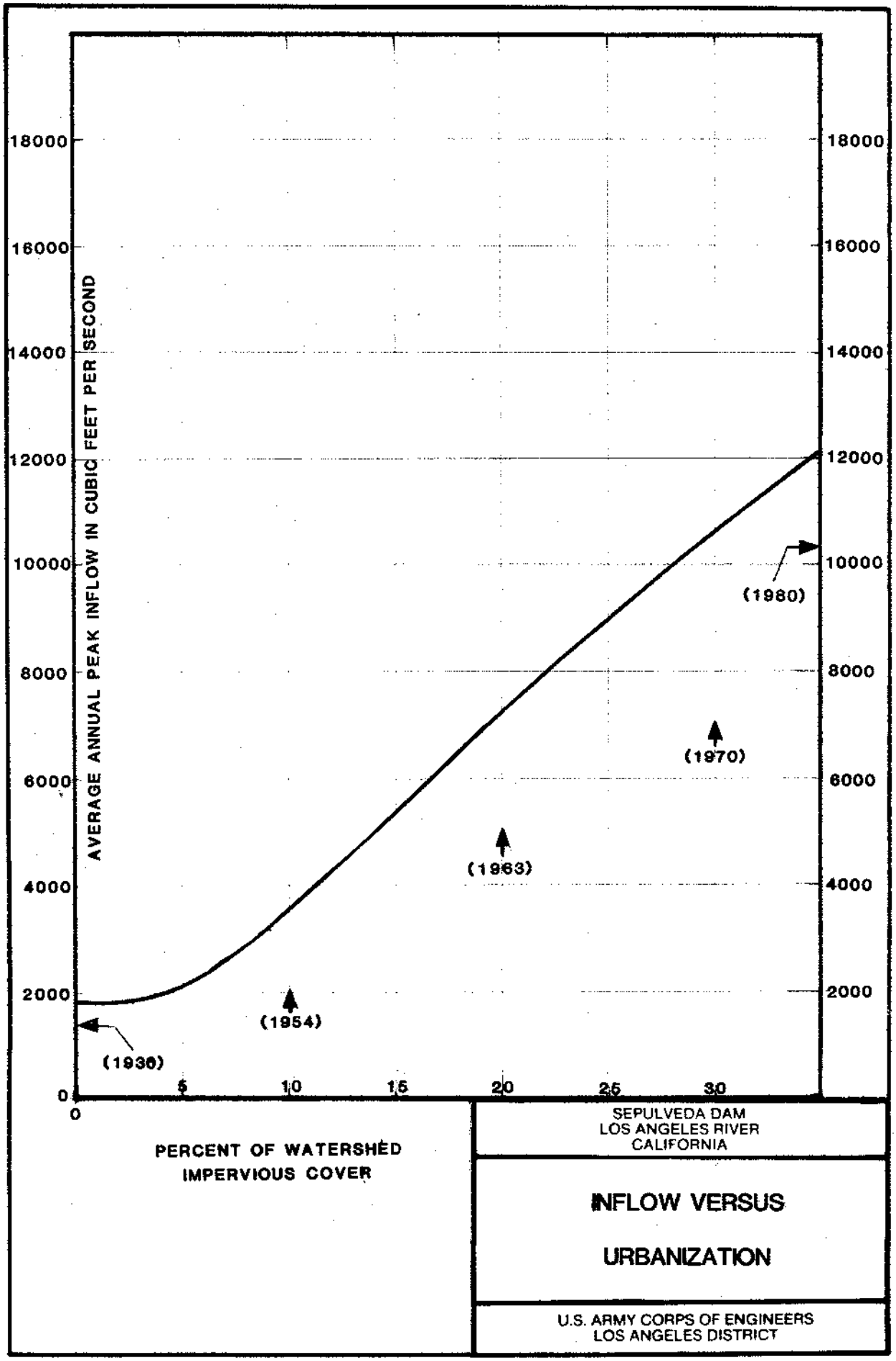


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

ESTIMATED PERCENT OF IMPERVIOUS COVER IN DRAINAGE BASIN

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 4-04

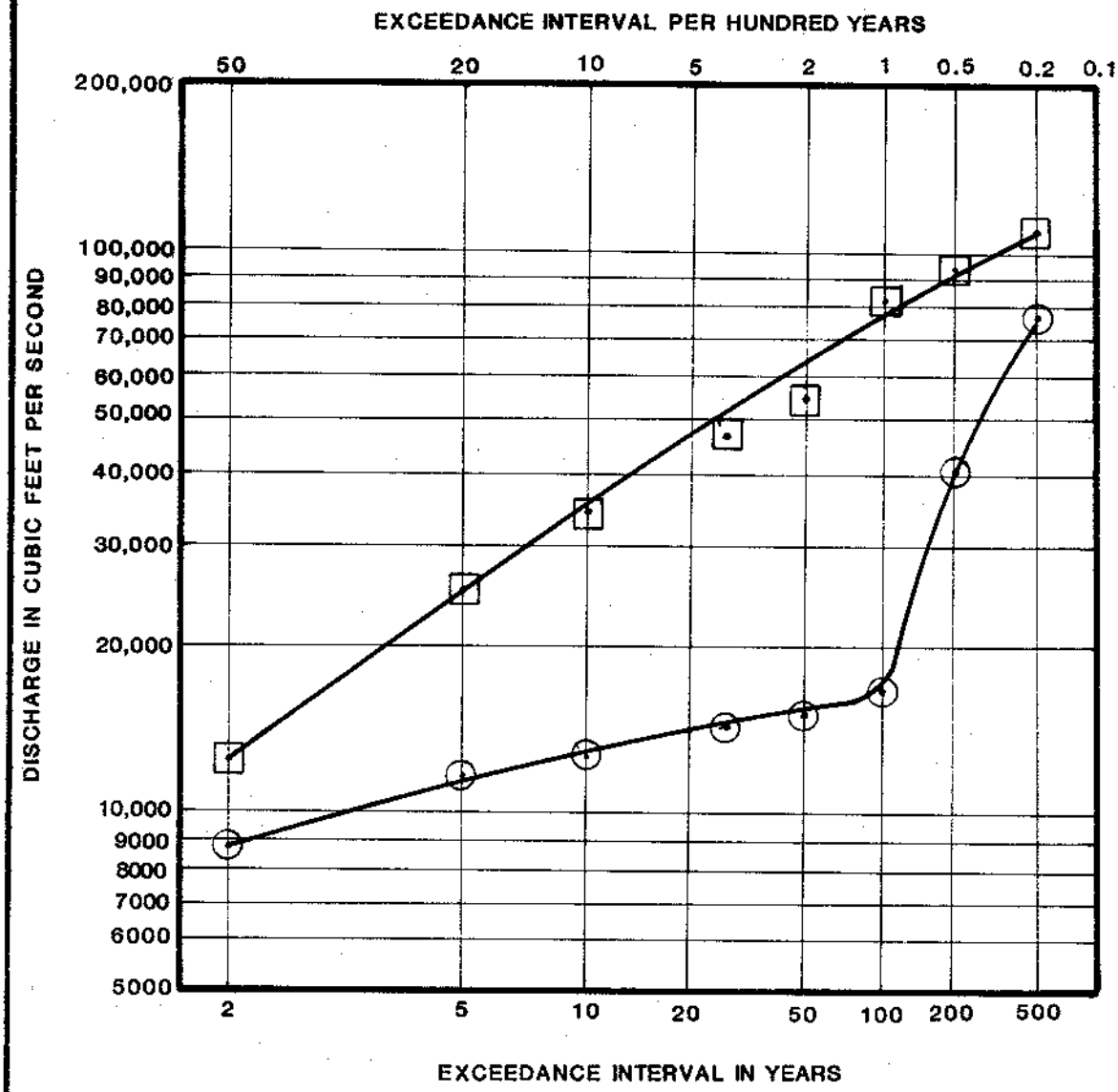


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

INFLOW VERSUS URBANIZATION

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 4-05



INFLOW

OUTFLOW

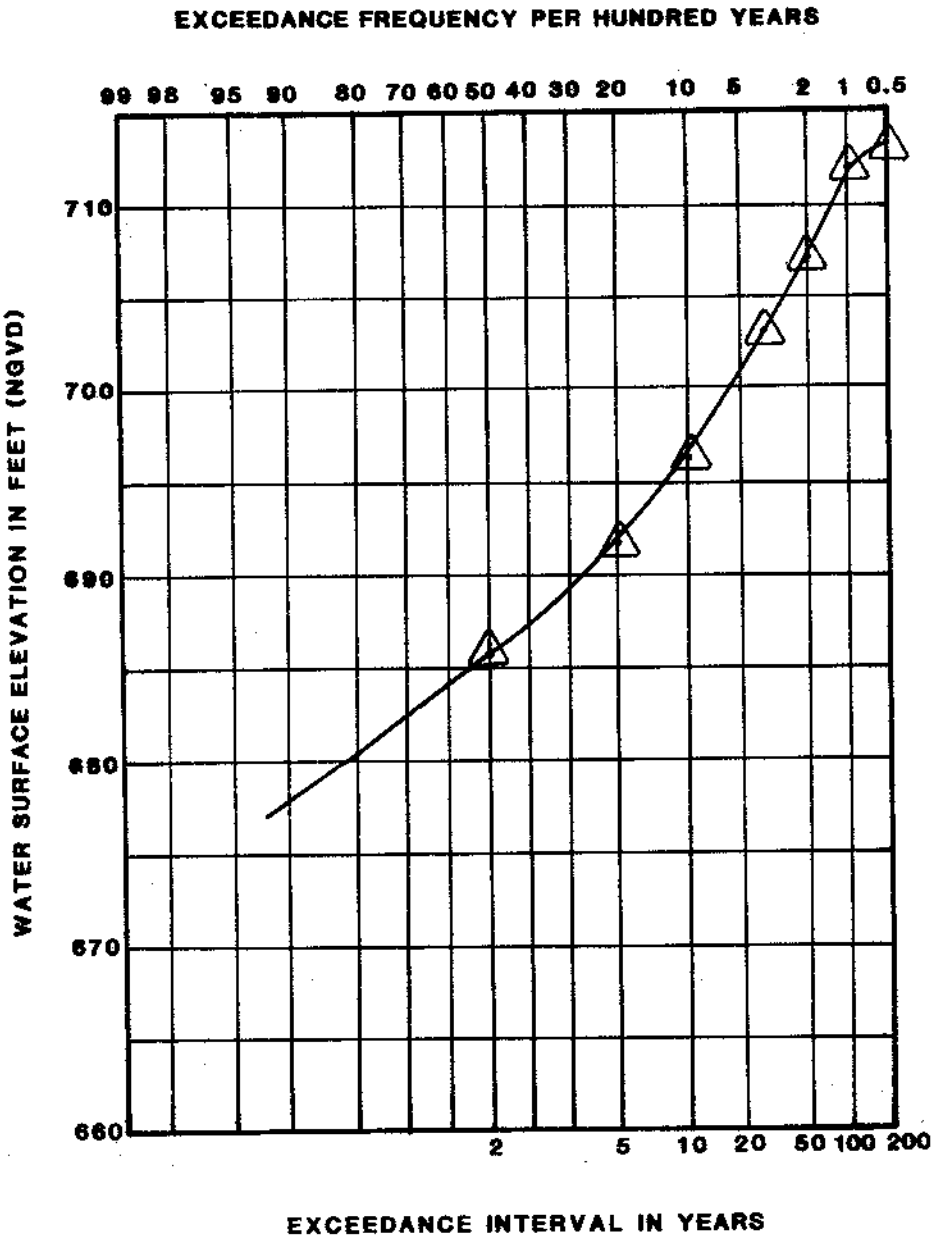
⊡, ⊙ Data points derived from a rainfall-runoff analysis as a part a 1985 Corps of Engineers review study. Frequency values from the curves of this plate are listed in Table 4-08.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

DISCHARGE FREQUENCY CURVES
1980 CONDITIONS

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

PLATE 4-06



△ Data points derived from a rainfall-runoff analysis as part of a 1985 Corps of Engineers review study. Frequency values from the curves of this plate are listed in Table 4-08.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

ELEVATION FREQUENCY CURVE
1980 CONDITIONS

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

PLATE 4-07

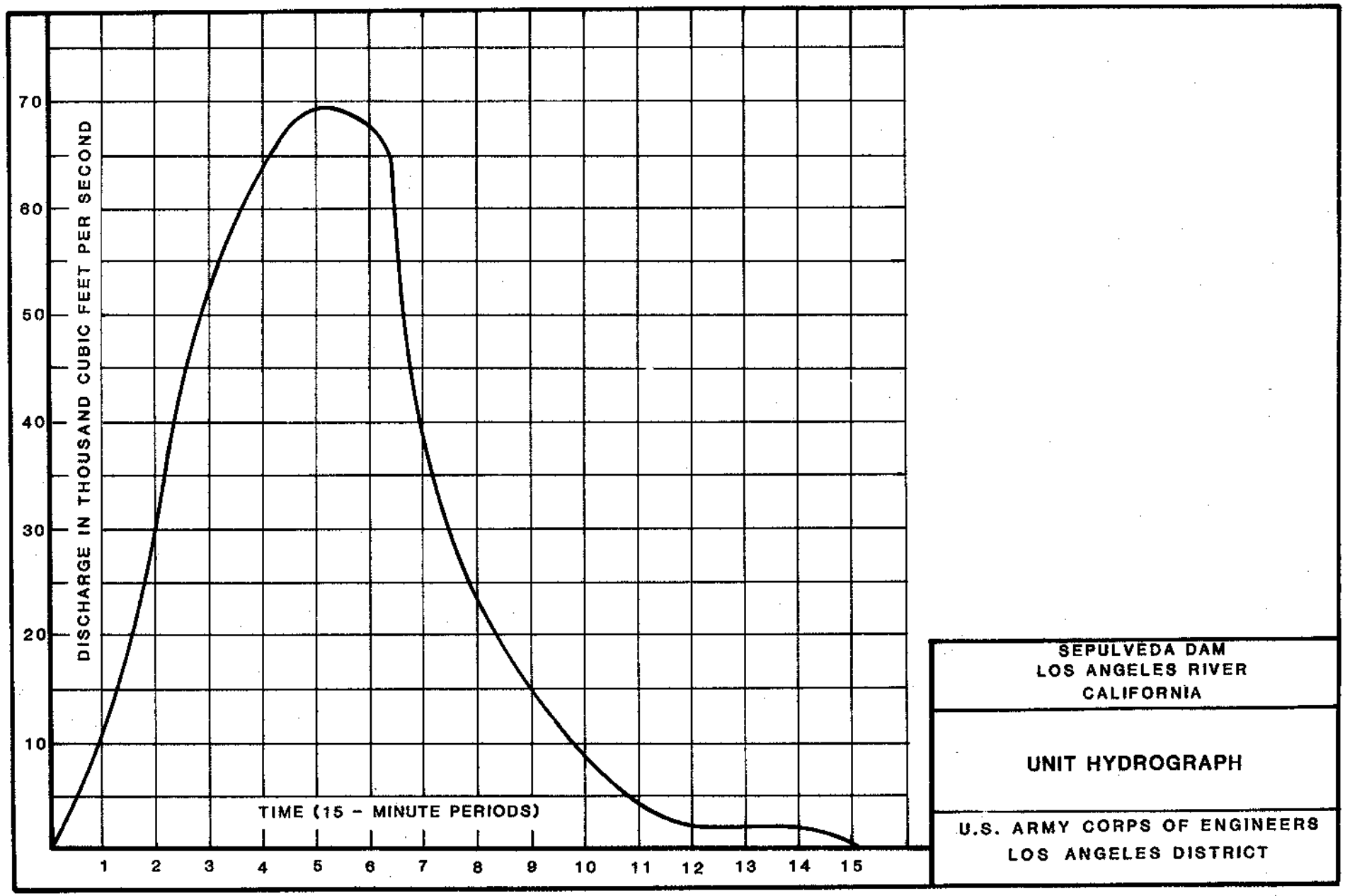
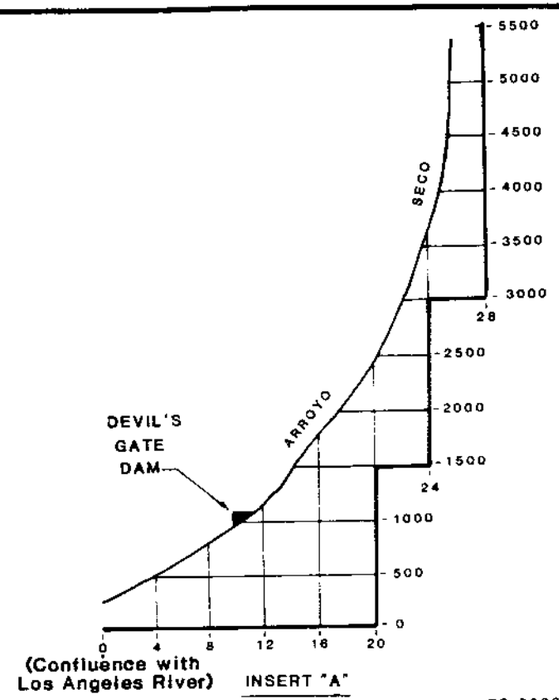
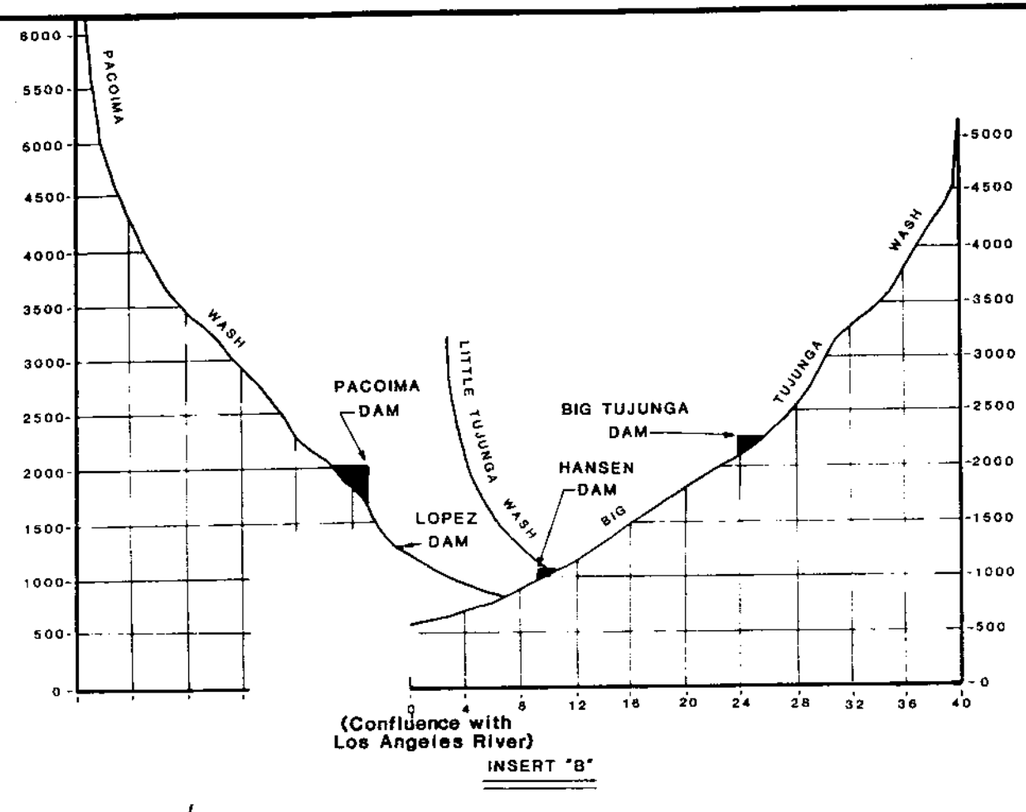

DISCHARGE IN THOUSAND CUBIC FEET PER SECOND
70
60
50
40
30
20
10
TIME (15 - MINUTE PERIODS)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA
UNIT HYDROGRAPH
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

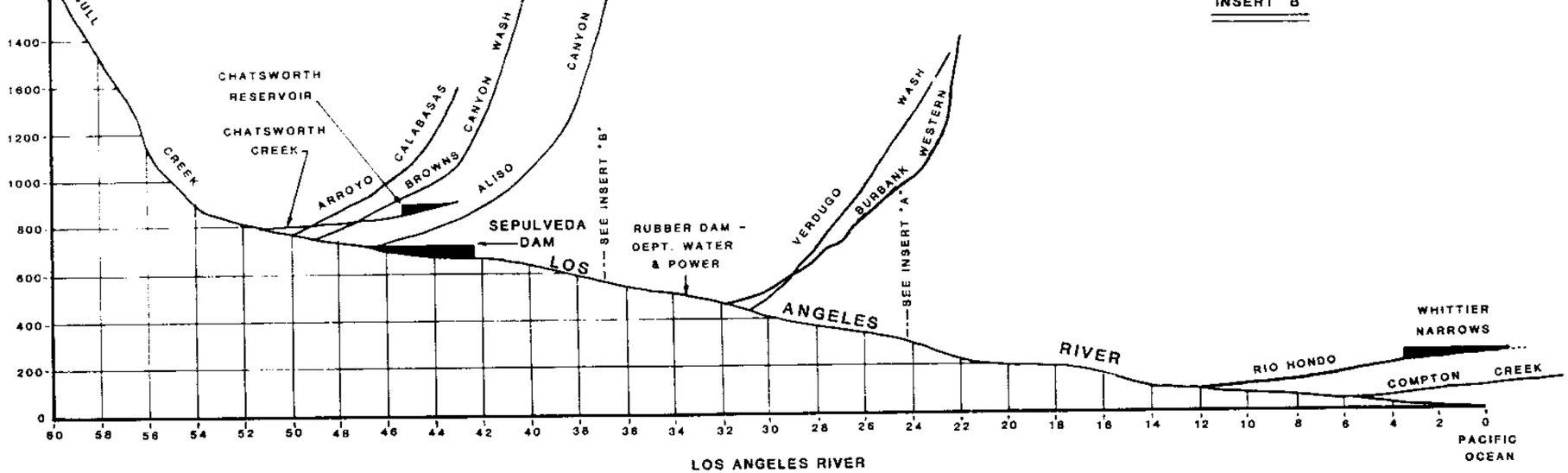
PLATE 4-08



INSERT "A"



INSERT "B"



LOS ANGELES RIVER

NOTES:

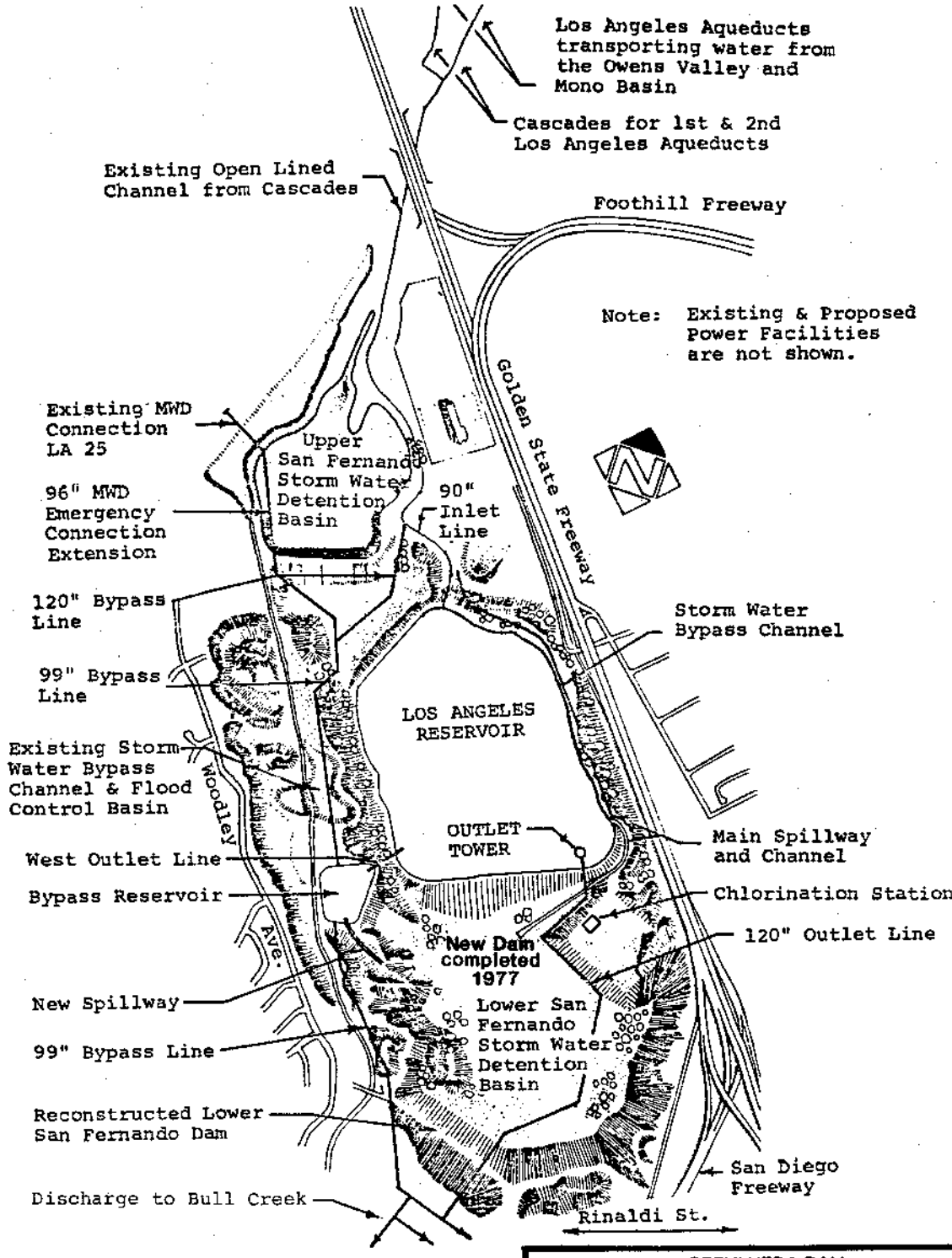
1. HORIZONTAL SCALES INDICATE MILES
2. VERTICAL SCALES INDICATE FEET (NGVD)

LOS ANGELES COUNTY
DRAINAGE AREA (REVIEW)
CALIFORNIA

LOS ANGELES RIVER & MAJOR TRIBUTARIES STREAMBED PROFILES

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

PLATE 4-09



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

SAN FERNANDO

RESERVOIRS

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 4-10

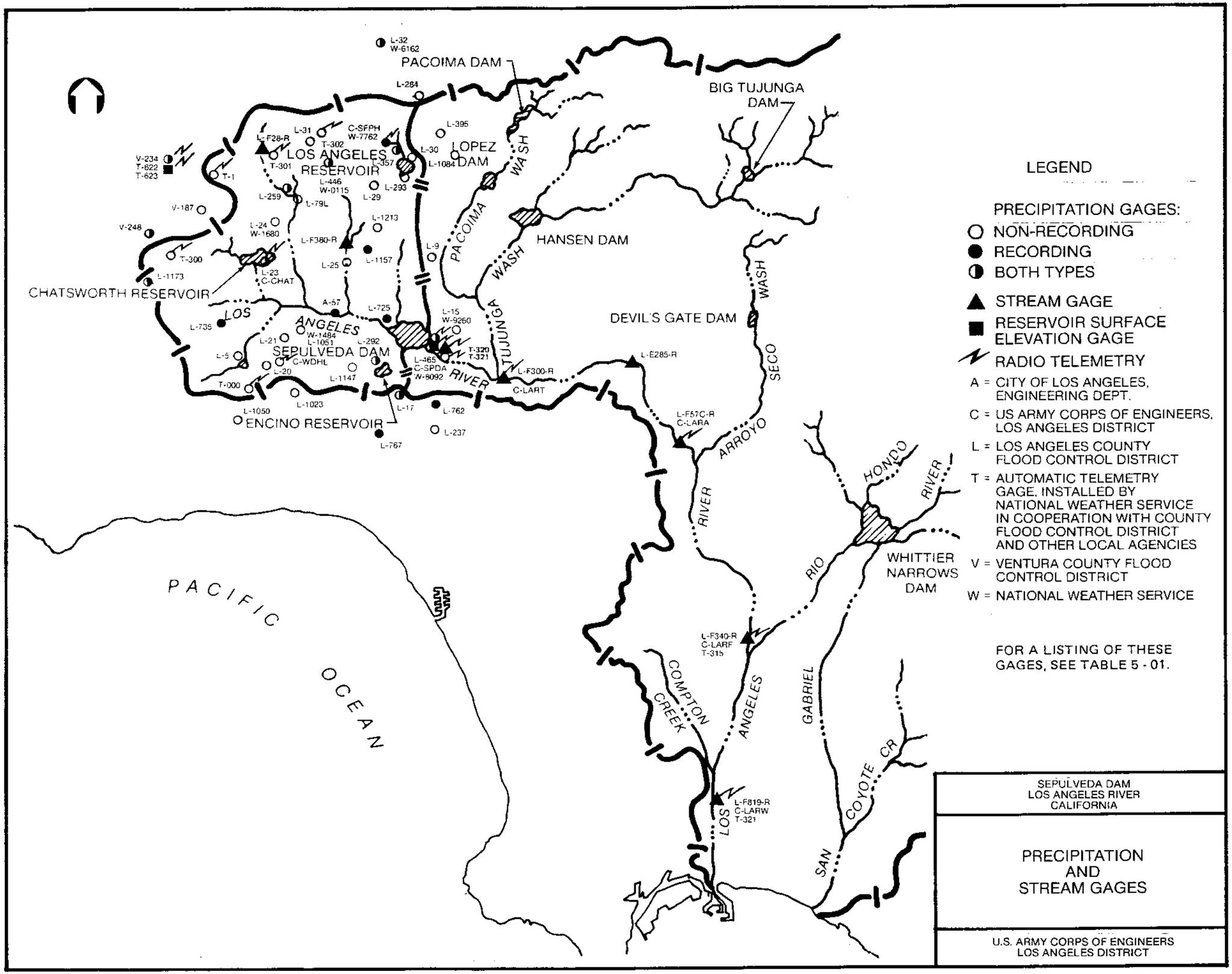
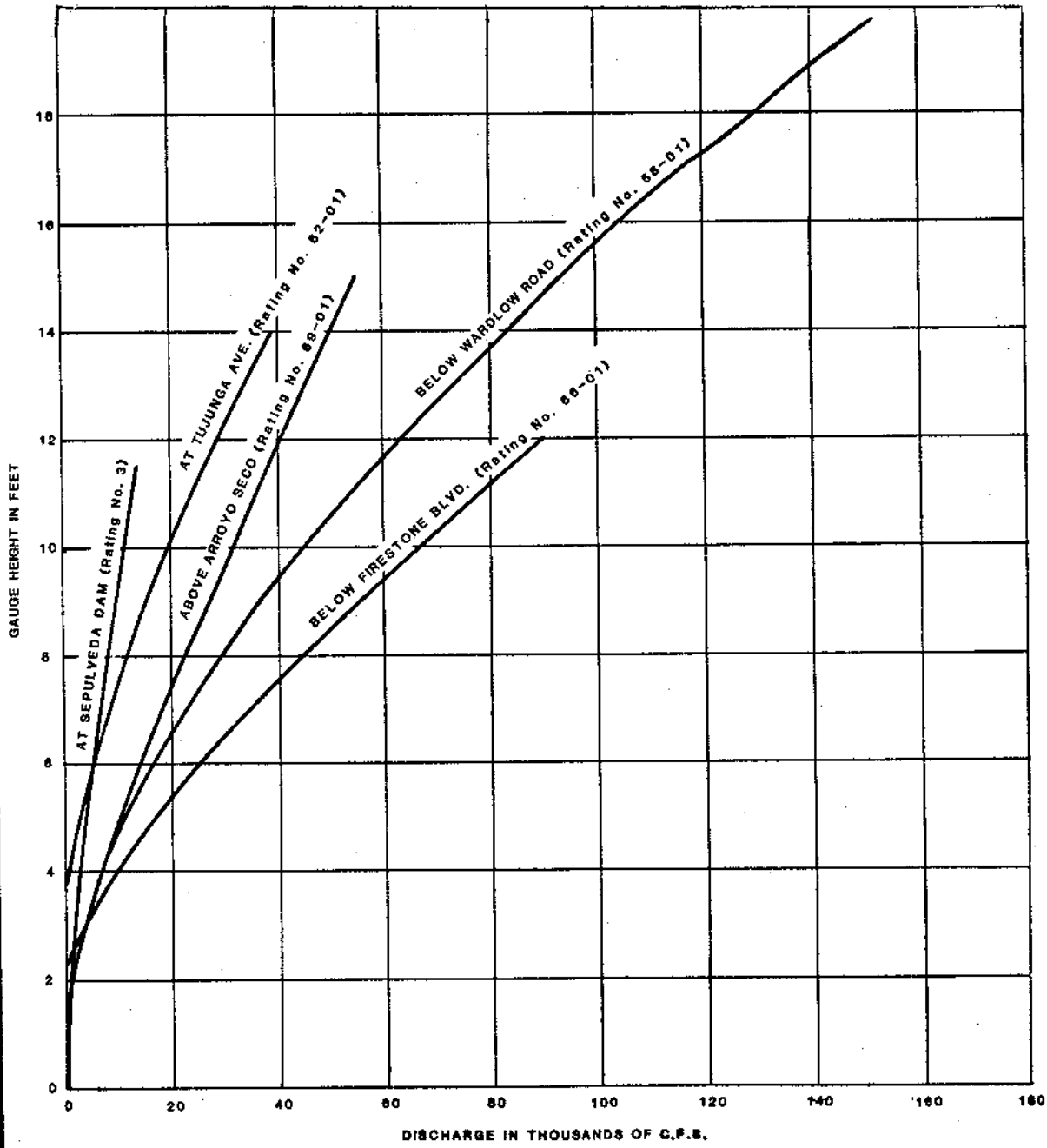

PACOIMA DAM
BIG TUJUNGA DAM
LOPEZ DAM
LOS ANGELES RESERVOIR
HANSEN DAM
CHATSWORTH RESERVOIR
SEPULVEDA DAM
DEVIL'S GATE DAM
ENCINO RESERVOIR
WHITTIER NARROWS DAM
PACOIMA WASH
TUJUNGA WASH
LOS ANGELES RIVER
ARROYO SECO
HONDO RIVER
RIO HONDO
COMPTON CREEK
GABRIEL RIVER
SAN GABRIEL RIVER
COYOTE CR
PACIFIC OCEAN
L-32 W-6162
L-284
L-31
C-SFPH W-7762
L-395
L-F28-R
T-302
T-301
L-357
L-30
L-1084
V-234 T-622 T-623
T-1
L-446 W-0115
L-293
L-29
L-259
L-79L
V-187
L-1213
V-248
L-24 W-1680
L-F380-R
L-9
T-300
L-25
L-1157
L-1173
L-23 C-CHAT
A-57
L-725
L-15 W-9260
L-735
L-21
W-1484
L-1051
L-292
T-320 T-321
L-5
C-WDHL
L-465 C-SPDA W-8092
L-F300-R
L-20
L-1147
C-LART
L-E285-R
T-000
L-1023
L-17
L-762
L-1050
L-237
L-767
L-F57C-R C-LARA
L-F340-R C-LARF T-315
L-F819-R C-LARW T-321
LEGEND
PRECIPITATION GAGES:
NON-RECORDING
RECORDING
BOTH TYPES
STREAM GAGE
RESERVOIR SURFACE ELEVATION GAGE
RADIO TELEMETRY
A = CITY OF LOS ANGELES, ENGINEERING DEPT.
C = US ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT
L = LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
T = AUTOMATIC TELEMETRY GAGE, INSTALLED BY NATIONAL WEATHER SERVICE IN COOPERATION WITH COUNTY FLOOD CONTROL DISTRICT AND OTHER LOCAL AGENCIES
V = VENTURA COUNTY FLOOD CONTROL DISTRICT
W = NATIONAL WEATHER SERVICE
FOR A LISTING OF THESE GAGES, SEE TABLE 5 - 01.
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA
PRECIPITATION AND STREAM GAGES
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 5-01



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

RATING CURVES FOR STREAM GAUGES ON THE LOS ANGELES RIVER

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

PLATE 5-02

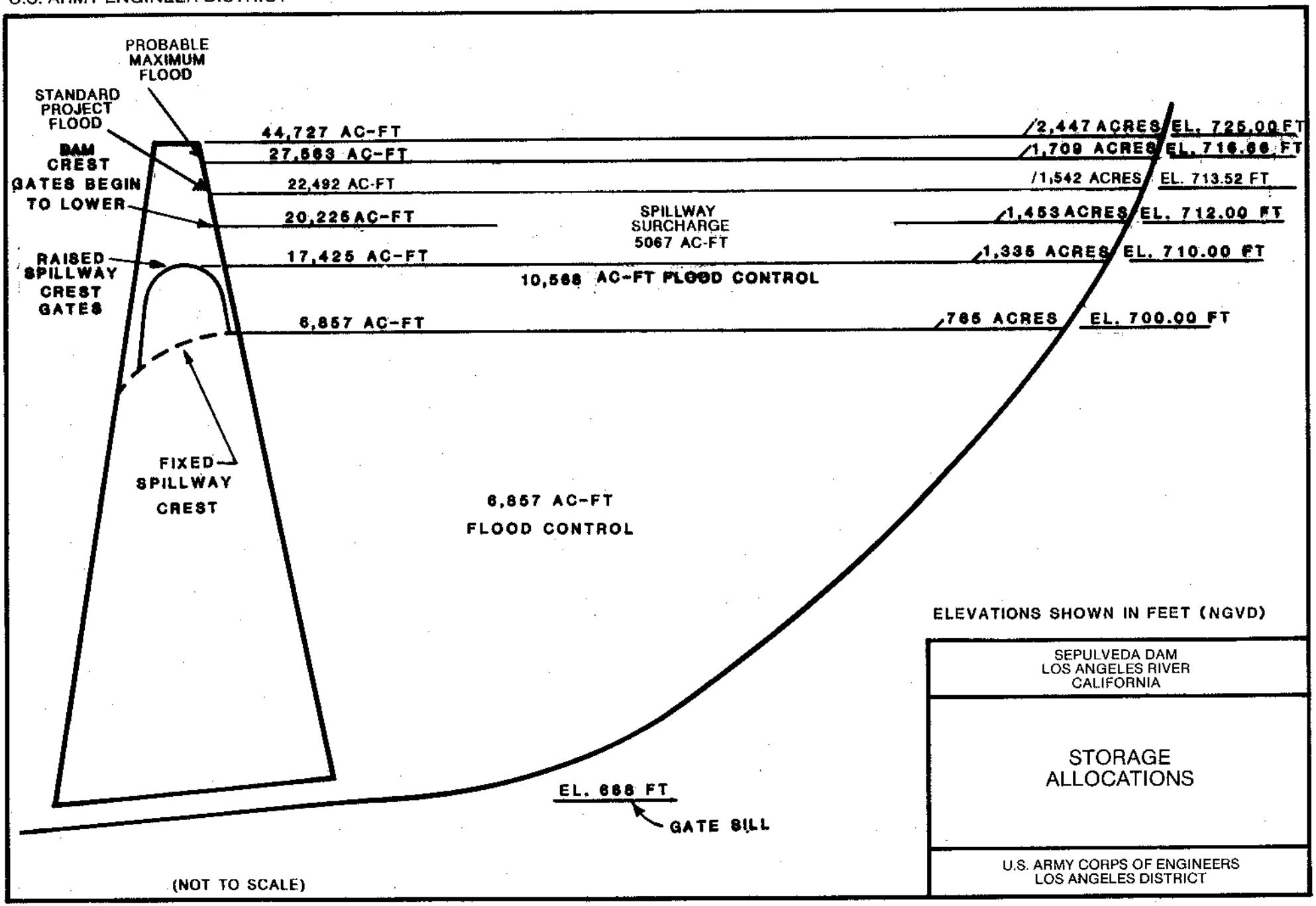

PROBABLE MAXIMUM FLOOD
STANDARD PROJECT FLOOD
DAM CREST
GATES BEGIN TO LOWER
RAISED SPILLWAY CREST GATES
FIXED SPILLWAY CREST
44,727 AC-FT
27,563 AC-FT
22,492 AC-FT
20,225 AC-FT
17,425 AC-FT
6,857 AC-FT
2,447 ACRES EL. 725.00 FT
1,709 ACRES EL. 716.66 FT
1,542 ACRES EL. 713.52 FT
1,453 ACRES EL. 712.00 FT
1,335 ACRES EL. 710.00 FT
765 ACRES EL. 700.00 FT
SPILLWAY SURCHARGE 5067 AC-FT
10,568 AC-FT FLOOD CONTROL
6,857 AC-FT FLOOD CONTROL
EL. 666 FT
GATE SILL
(NOT TO SCALE)
ELEVATIONS SHOWN IN FEET (NGVD)
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA
STORAGE ALLOCATIONS
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 7-01

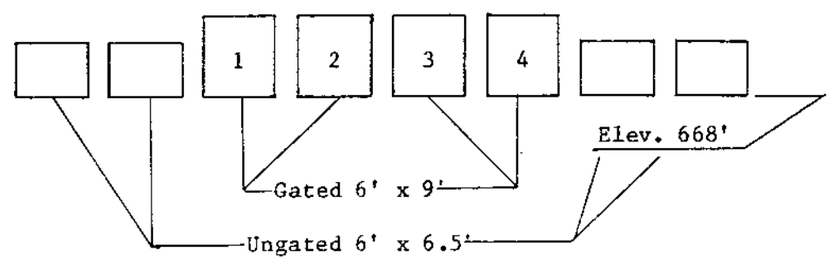
Sepulveda Dam Reservoir Regulation Schedule
(for rising and falling stages)

Step No	When reservoir water surface is between elevation	Gate setting for gates as indicated				Computed discharge*	Downstream gage height
		No. 1	No. 2	No. 3	No. 4		
	Feet, NGVD	Feet of opening	Feet of opening	Feet of opening	Feet of opening	Cubic feet per second	Feet
1....	668.0 & 710.2	9.0	9.0	9.0	9.0	0 to 16,780	0 - 13.61
2....	710.2 & 710.7	7.6	9.0	9.0	7.6	15,770 to 16,550	13.14 - 13.48
3....	710.7 & 711.3	7.6	7.6	7.6	7.6	15,530 to 16,830	13.04 - 13.66
4....	711.3 & 711.6	6.0	7.6	7.6	6.0	15,870 to 16,760	13.18 - 13.60
5....	711.6 & 712.0**	6.0	5.7	5.7	6.0	15,680 to 16,890	13.09 - 13.67
6....	712.0 & 712.2	0.0	4.5	4.5	0.0	13,420 to 16,620	11.95 - 13.52
7....	Above 712.2	0.0	0.0	0.0	0.0	14,400+	12.45

*Includes discharge of ungated outlets. Crest gates in action above elevation 710.0 feet, NGVD (National Geodetic Vertical Datum).

**At elevation 712.0 feet, NGVD, crest gates automatically begin to lower. At elevation 715.0 feet, NGVD, crest gates are completely lowered.

OUTLETS
(Looking Downstream)



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 Department of Public Works (WUK 4470).

   b. (i) Rising Stages. Allow a period of one half hour to pass to reestablish communication with the District Office. If after one half hour communication is not reestablished follow the gate operation schedule.

   (ii) Falling Stages. Maintain current downstream gage height until communication is reestablished.

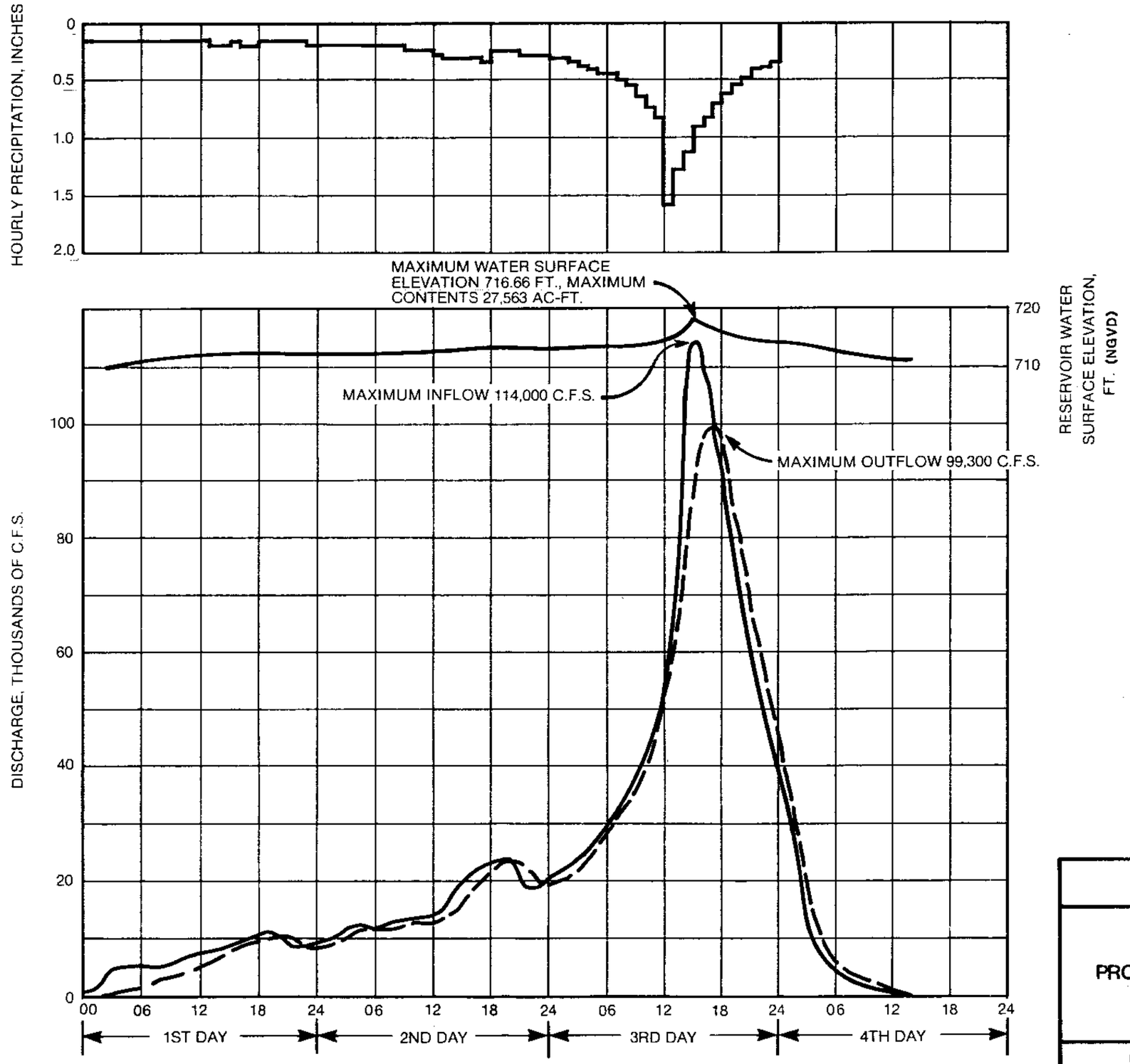
   c. If one of the gates cannot be operated, adjust the remaining gates gradually until the downstream gage height agrees with scheduled values. Keep a close check on gage height and change the gate openings as often as required. If the downstream gage height is not obtainable, adjust the gates that are functioning so that the gate openings are equal to the sum of the openings shown in the schedule.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

RESERVOIR REGULATION
SCHEDULE

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

PLATE 7-02

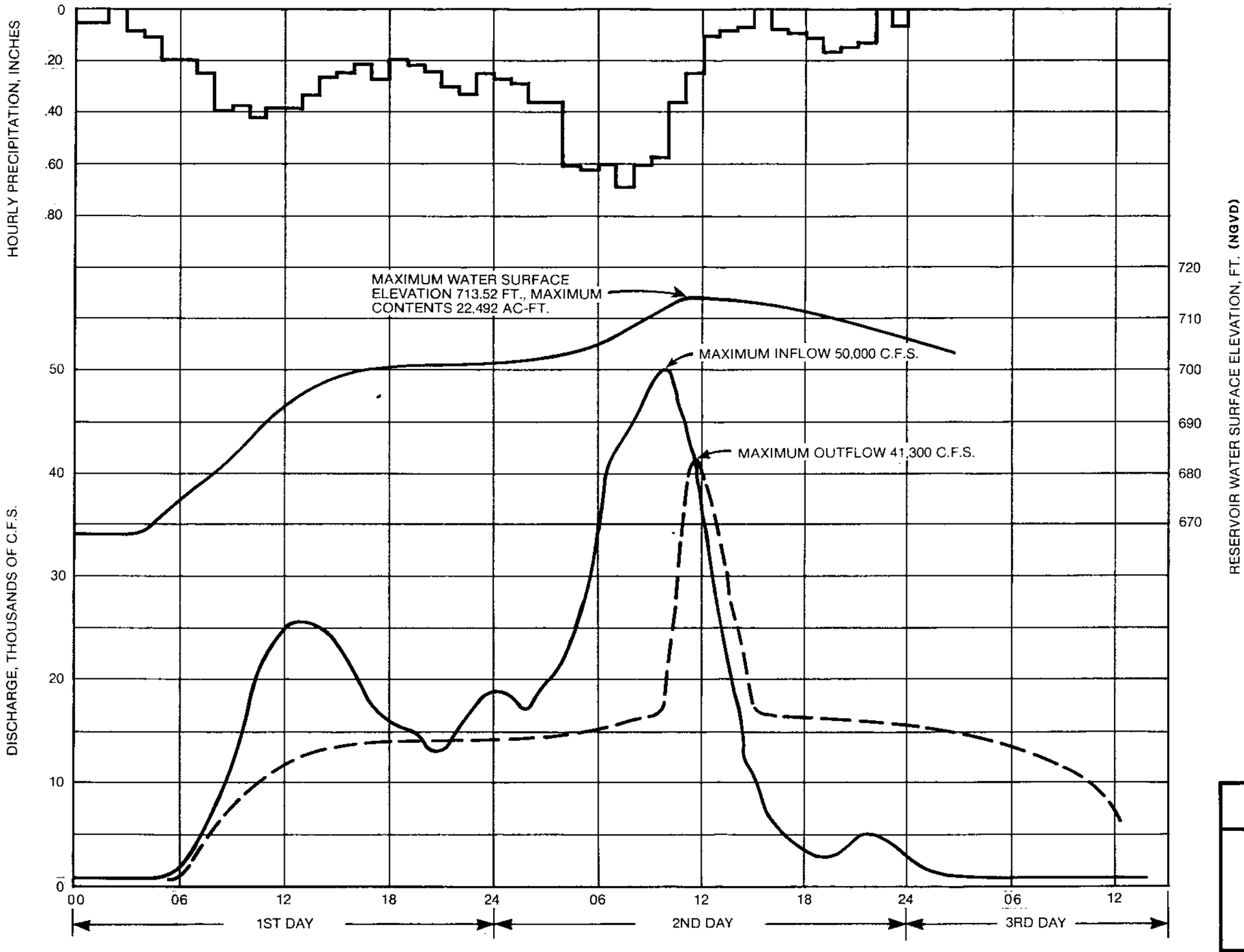


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

PROBABLE MAXIMUM FLOOD ROUTING

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-01

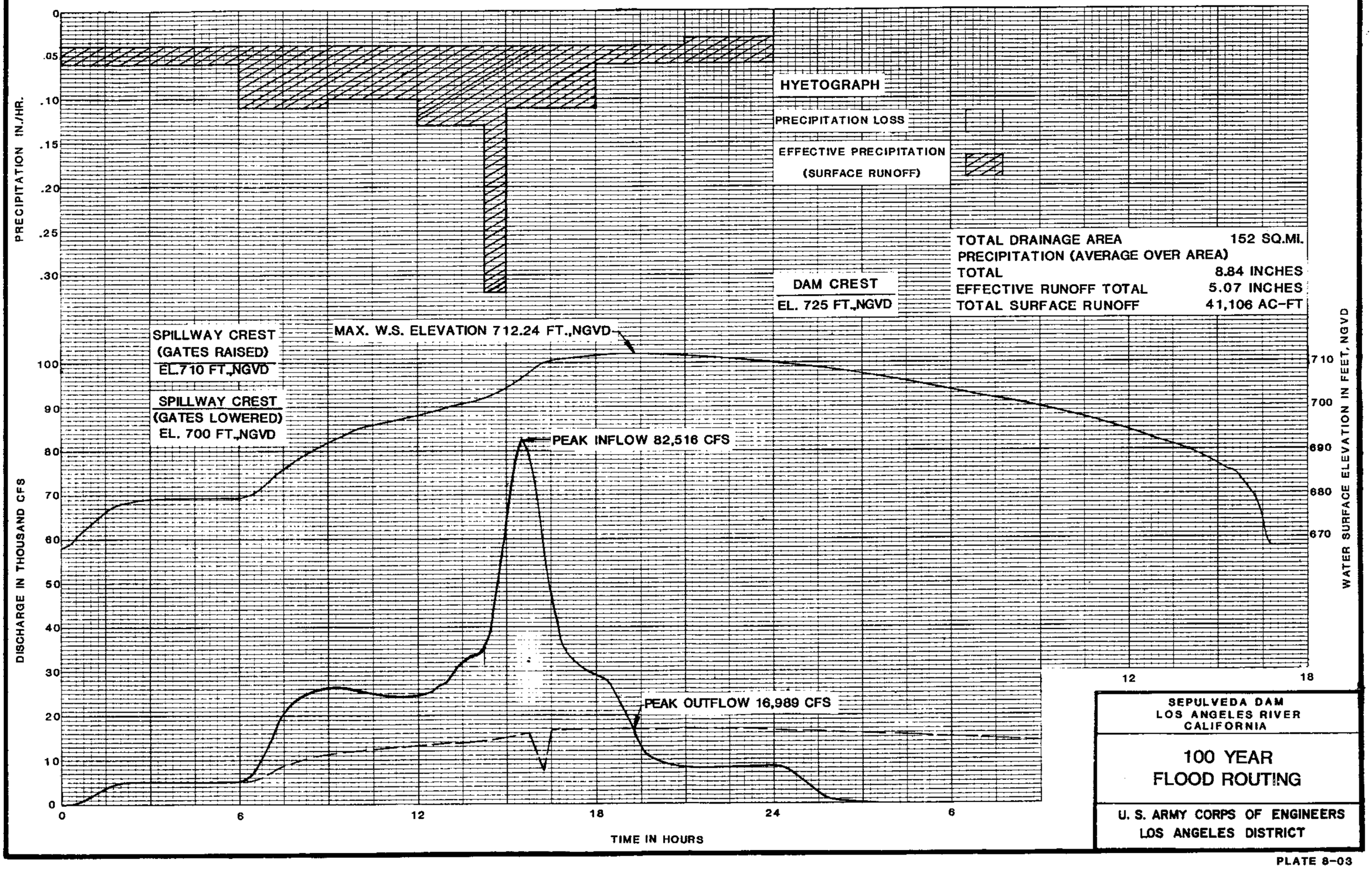


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

STANDARD PROJECT FLOOD ROUTING

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-02

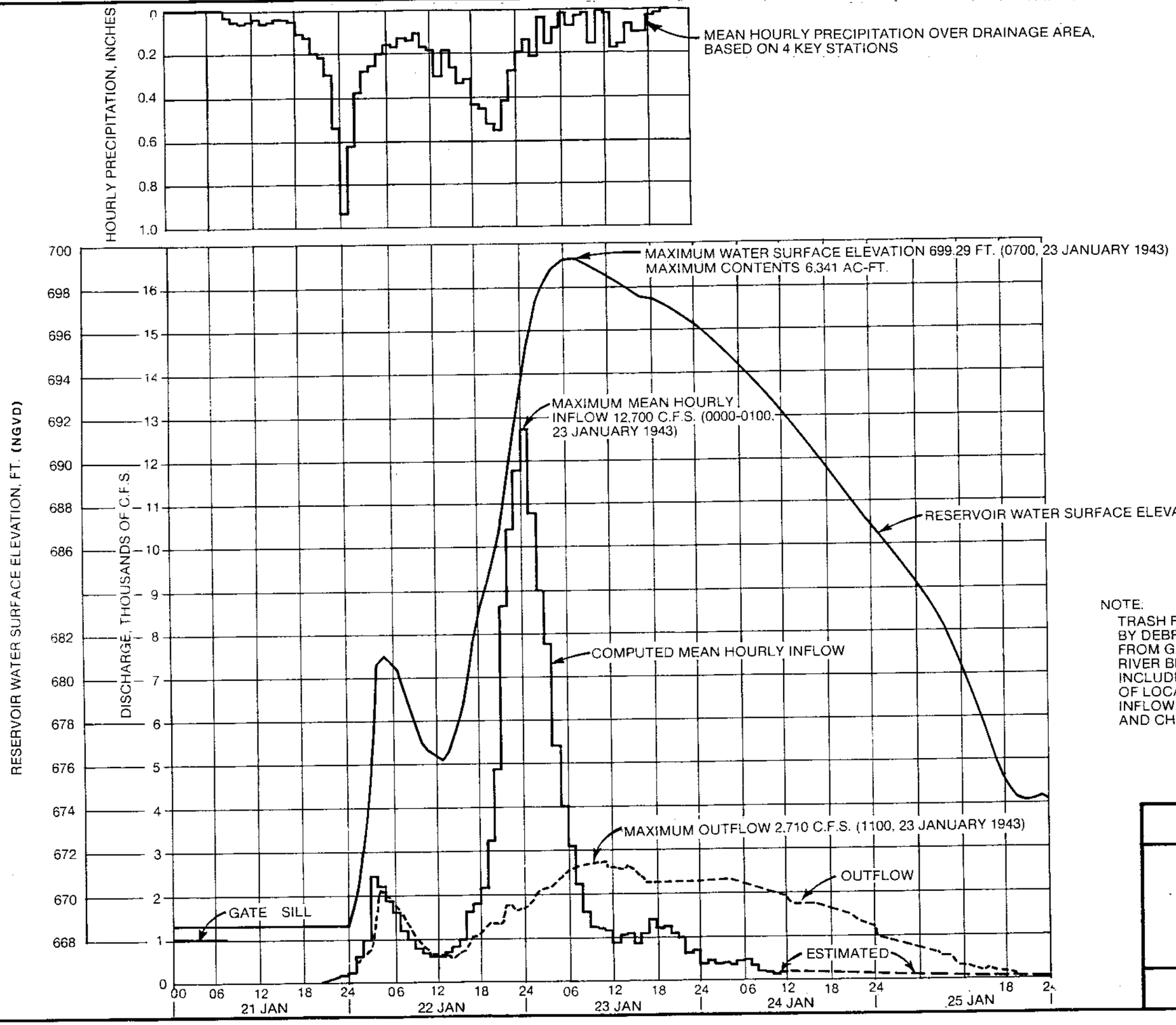


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

100 YEAR FLOOD ROUTING

U. S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-03



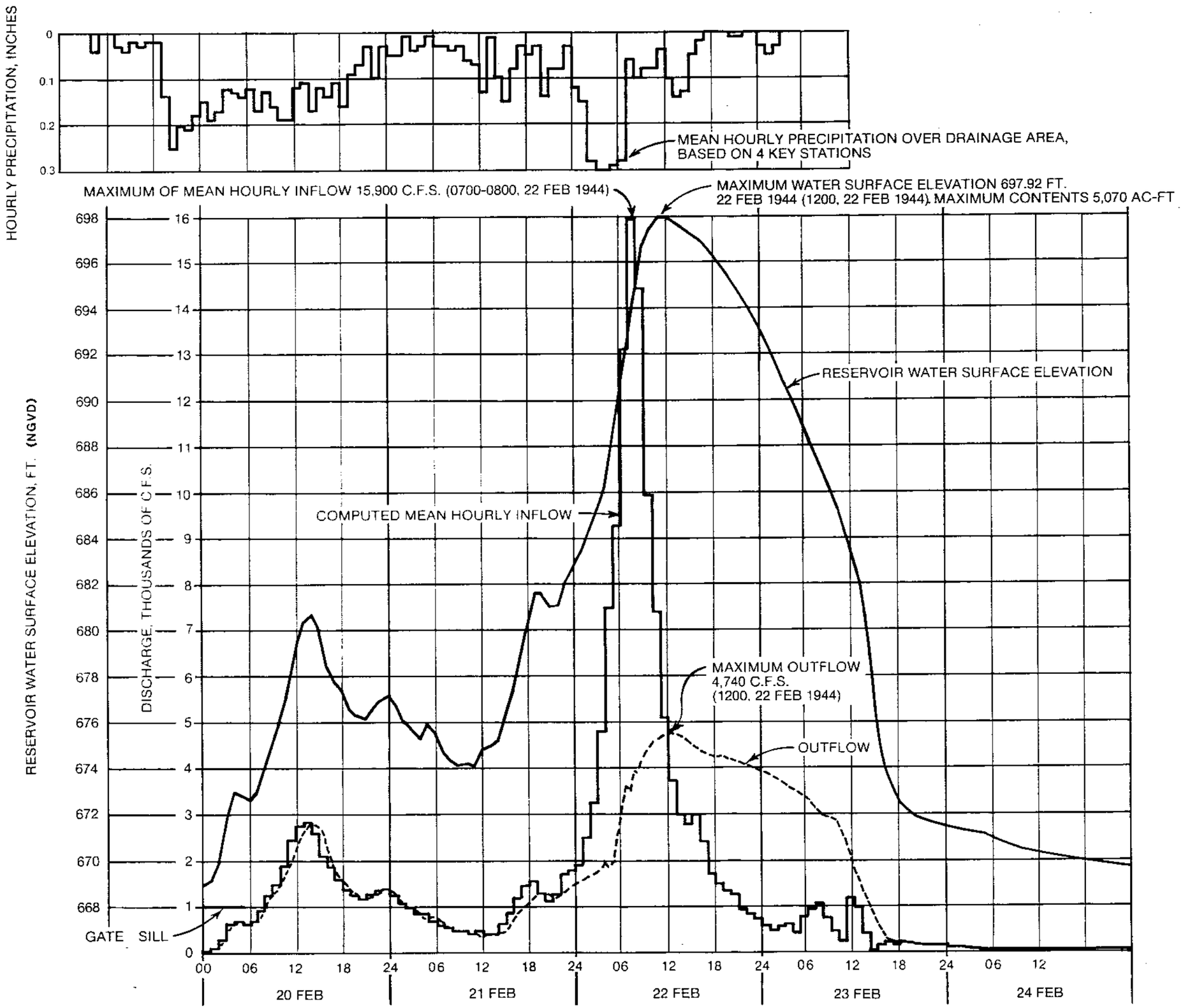
NOTE:
TRASH RACKS WERE PARTIALLY BLOCKED BY DEBRIS. OUTFLOW WAS DETERMINED FROM GAGING STATION ON LOS ANGELES RIVER BELOW SEPULVEDA BLVD WHICH INCLUDED A MAXIMUM OF SOME 100 C.F.S. OF LOCAL DRAINAGE BELOW THE DAM. INFLOW COMPUTED ON BASIS OF OUTFLOW AND CHANGE IN STORAGE.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OPERATION HYDROGRAPHS 21-25 JANUARY 1943

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-04



NOTES:

RAINFALL IN SOUTH PORTION OF DRAINAGE AREA OF CLOUDBURST INTENSITY PROBABLY CAUSED PEAK.

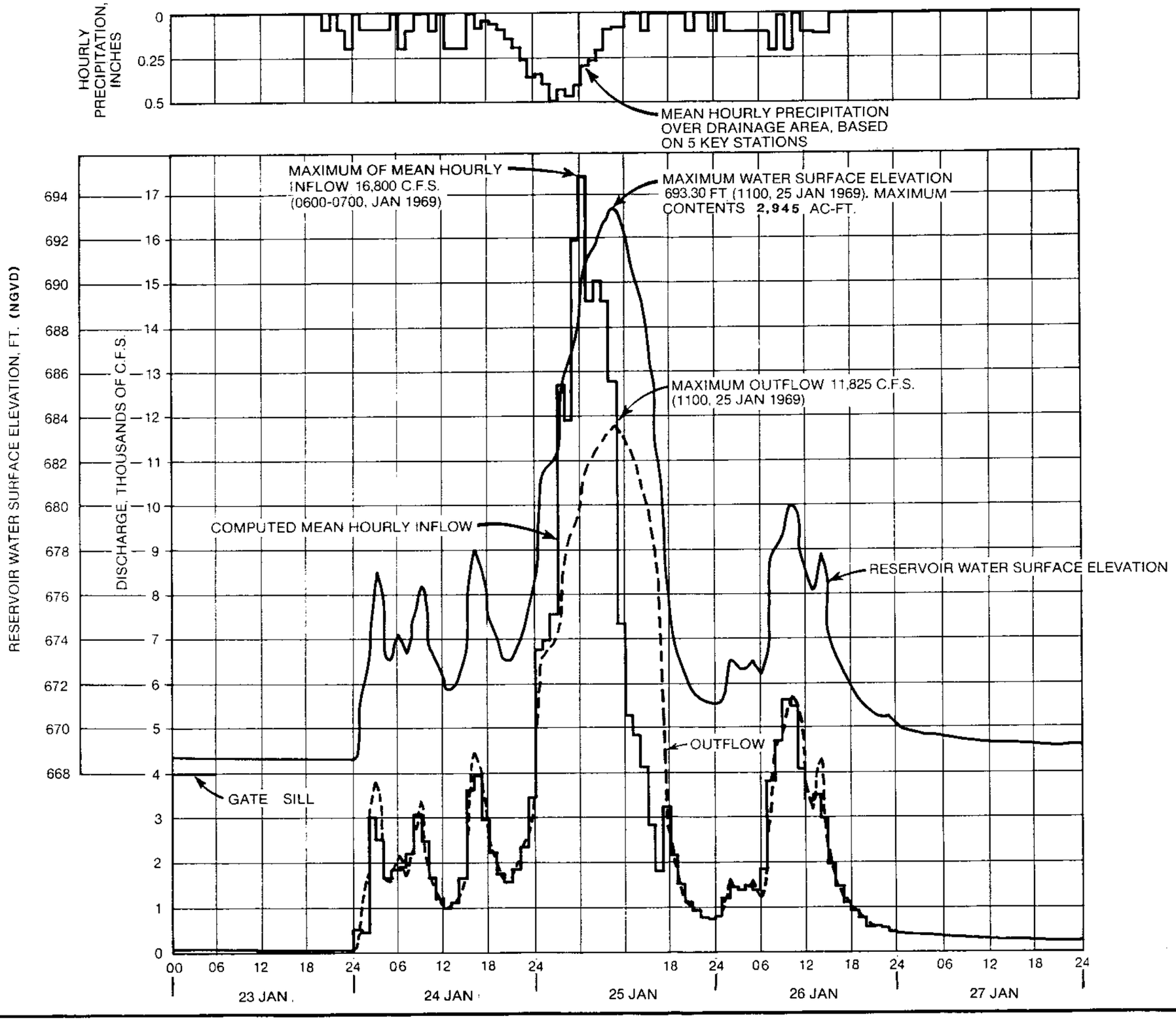
OUTFLOW AFFECTED BY CLOGGING OF TRASH RACKS

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OPERATION HYDROGRAPHS 20-24 FEBRUARY 1944

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-05



SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

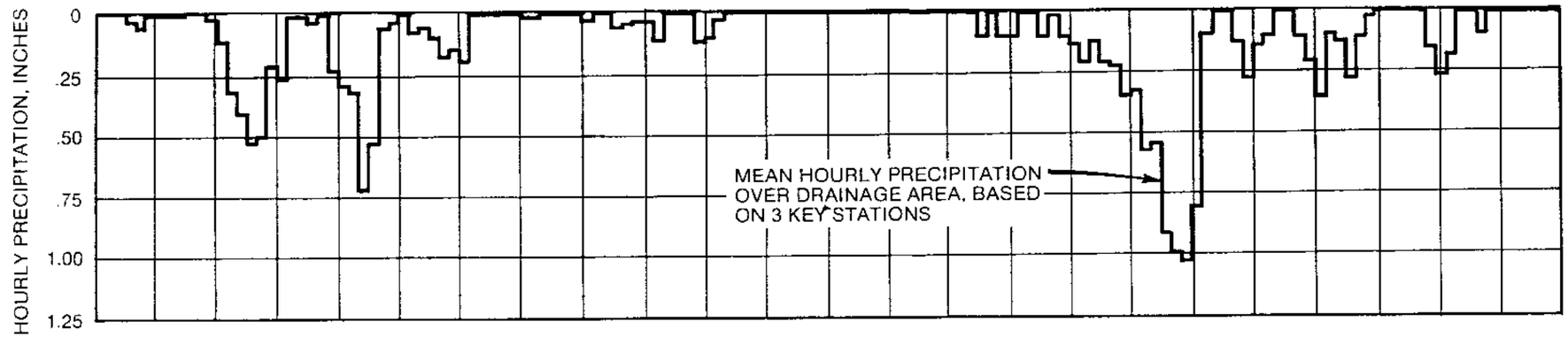
OPERATION HYDROGRAPHS
23-27 JANUARY 1969

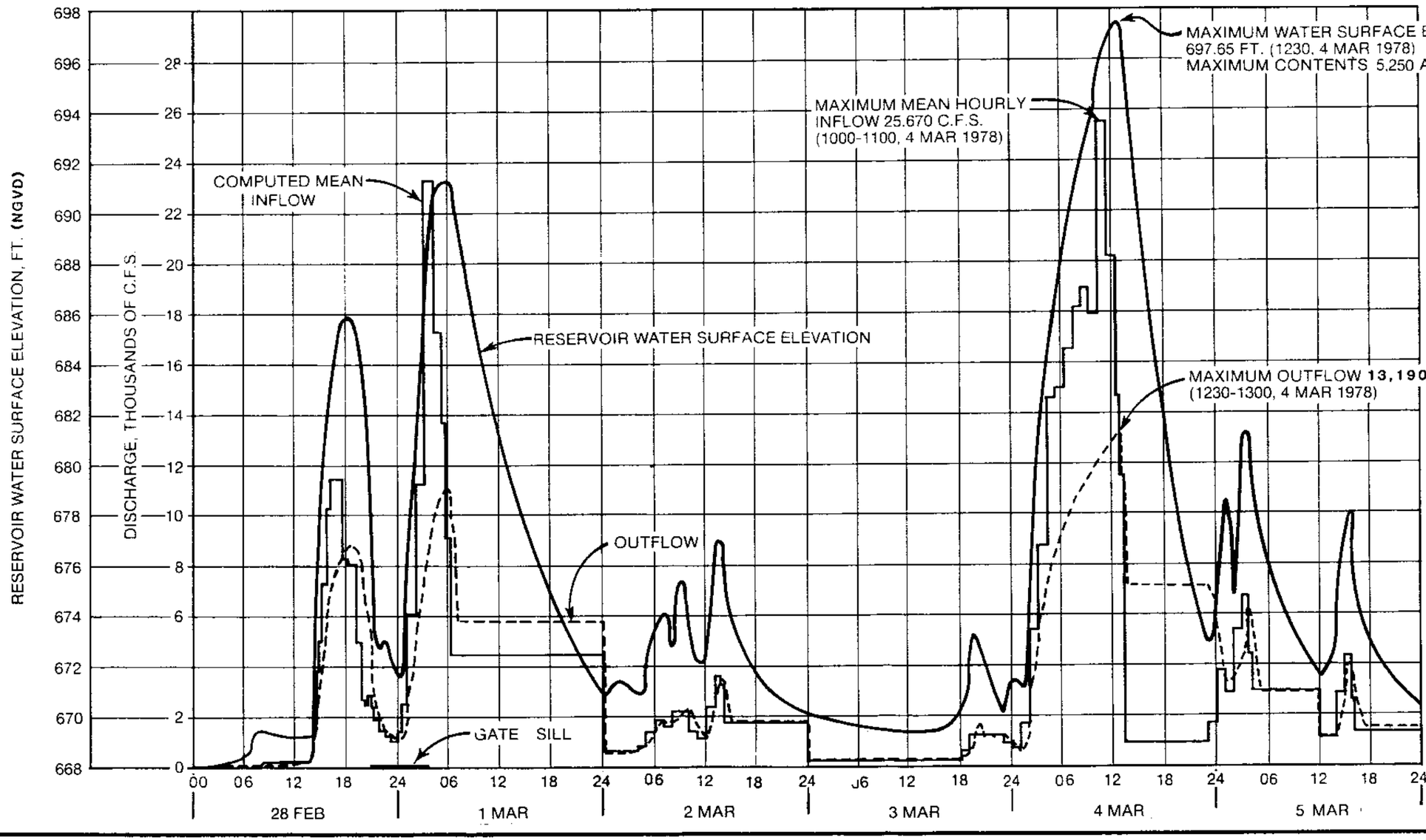
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-06

U.S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS



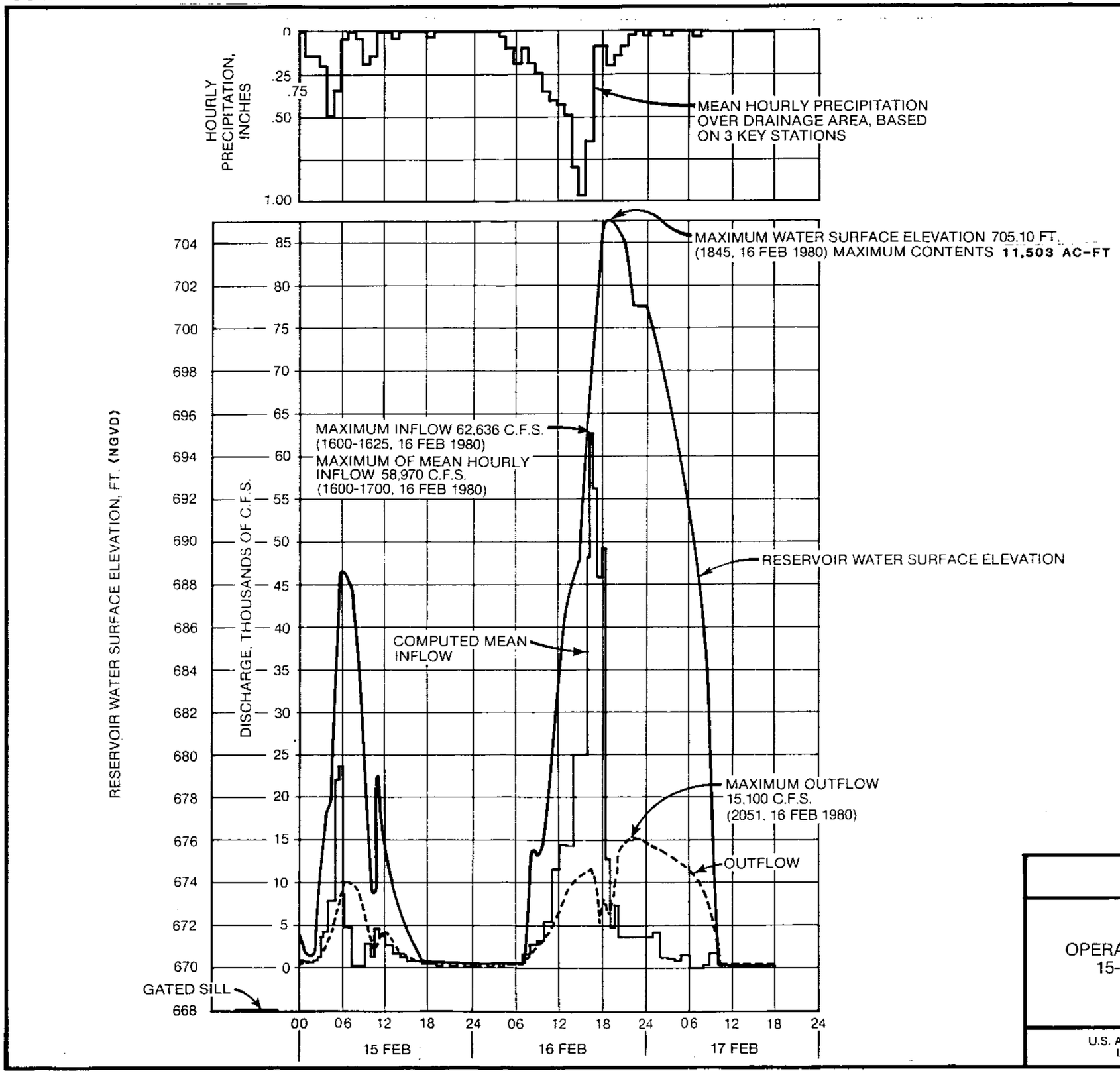


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OPERATION HYDROGRAPHS
28 FEBRUARY-5 MARCH 1978

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-07

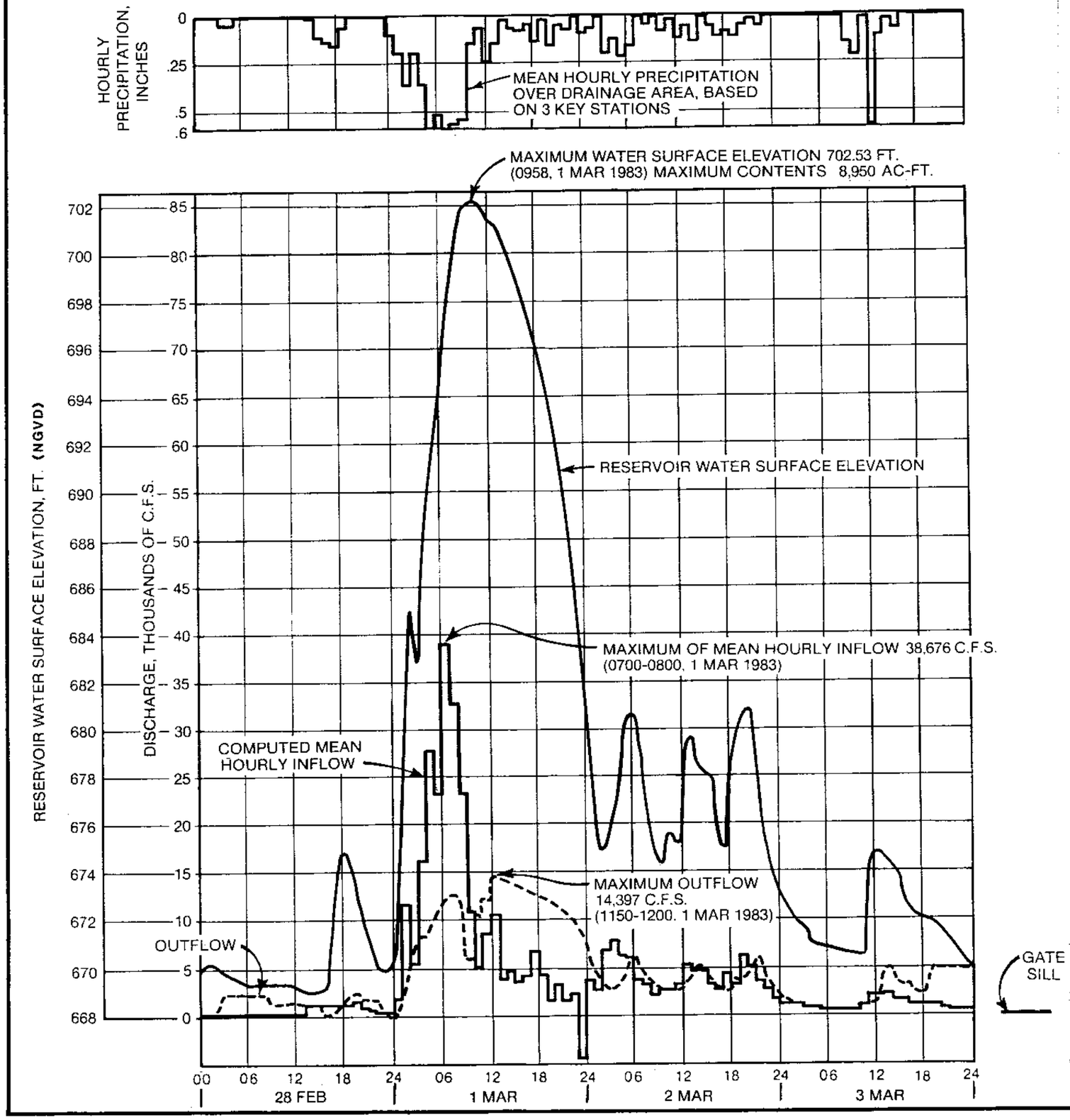


SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

OPERATION HYDROGRAPHS
15-17 FEBRUARY 1980

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-08

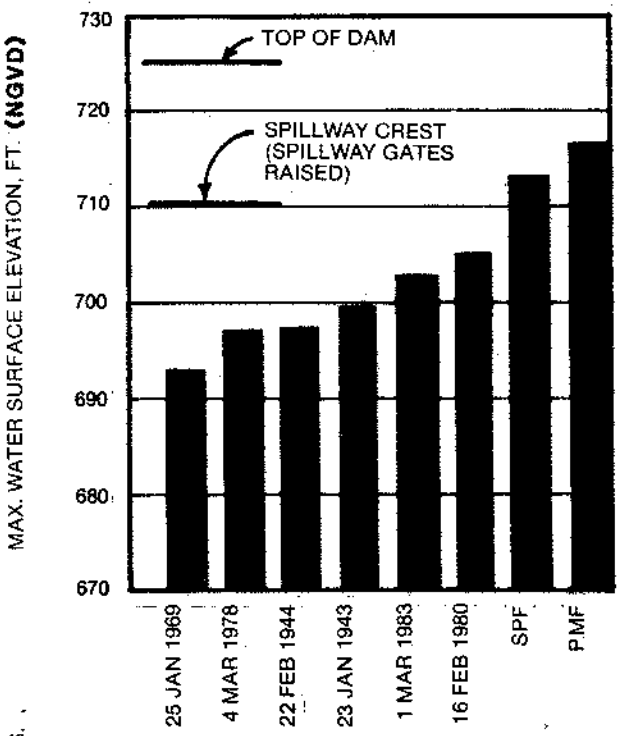


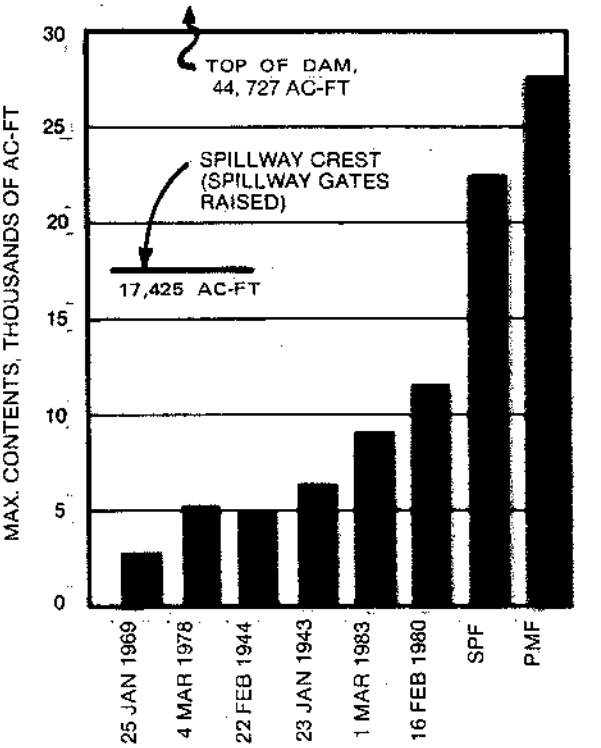
SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

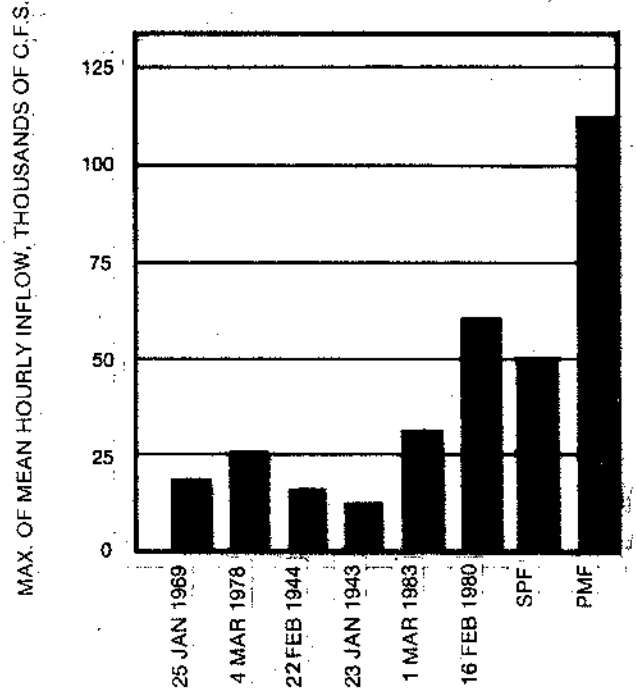
OPERATION HYDROGRAPHS
28 FEBRUARY - 3 MAR 1983

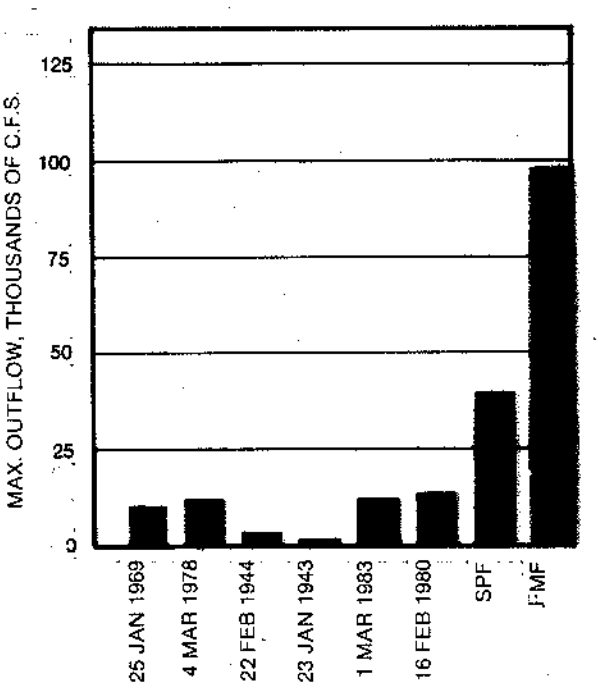
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

PLATE 8-09









SPF = STANDARD PROJECT FLOOD
PMF = PROBABLE MAXIMUM FLOOD

A listing of each of the values depicted here can be found in Table 8-01 and on Plates 8-01 through 8-08.

SEPULVEDA DAM
LOS ANGELES RIVER
CALIFORNIA

COMPARISON OF HISTORICAL FLOODS AND DESIGN FLOODS

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

EXHIBIT A

STANDING OPERATING
INSTRUCTIONS TO DAM TENDER

STANDING OPERATING INSTRUCTIONS TO DAM TENDER

EXHIBIT A

to the

WATER CONTROL MANUAL

for

SEPULVEDA DAM AND RESERVOIR,
LOS ANGELES RIVER

Los Angeles District
U.S. Army Corps of Engineers

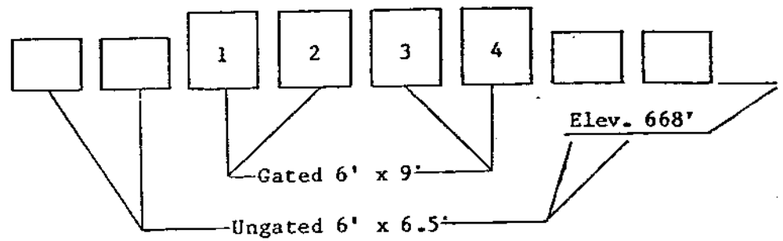
September 1988

TABLE OF CONTENTS

Sepulveda Dam Reservoir Regulation Schedule
(for rising and falling stages)

Step No	When reservoir water surface is between elevation	Gate setting for gates as indicated				Computed discharge*	Downstream gage height
		No. 1	No. 2	No. 3	No. 4		
	Feet, NGVD	Feet of opening	Feet of opening	Feet of opening	Feet of opening	Cubic feet per second	Feet
1....	668.0 & 710.2	9.0	9.0	9.0	9.0	0 to 16,780	0 - 13.61
2....	710.2 & 710.7	7.6	9.0	9.0	7.6	15,770 to 16,550	13.14 - 13.48
3....	710.7 & 711.3	7.6	7.6	7.6	7.6	15,530 to 16,830	13.04 - 13.66
4....	711.3 & 711.6	6.0	7.6	7.6	6.0	15,870 to 16,760	13.18 - 13.60
5....	711.6 & 712.0**	6.0	5.7	5.7	6.0	15,680 to 16,890	13.09 - 13.67
6....	712.0 & 712.2	0.0	4.5	4.5	0.0	13,420 to 16,620	11.95 - 13.52
7....	Above 712.2	0.0	0.0	0.0	0.0	14,400+	12.45

OUTLETS
(Looking Downstream)



*Includes discharge of ungated outlets. Crest gates in action above elevation 710.0 feet, NGVD (National Geodetic Vertical Datum).
**At elevation 712.0 feet, NGVD, crest gates automatically begin to lower.
At elevation 715.0 feet, NGVD, crest gates are completely lowered.

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 Department of Public Works (WUK 4470).

   b. (i) Rising Stages. Allow a period of one half hour to pass to reestablish communication with the District Office. If after one half hour communication is not reestablished follow the gate operation schedule.

   (ii) Falling Stages. Maintain current downstream gage height until communication is reestablished.

   c. If one of the gates cannot be operated, adjust the remaining gates gradually until the downstream gage height agrees with scheduled values. Keep a close check on gage height and change the gate openings as often as required. If the downstream gage height is not obtainable, adjust the gates that are functioning so that the gate openings are equal to the sum of the openings shown in the schedule.

1. GENERAL

a. This exhibit is prepared in accordance with instructions contained in EM 1110-2-3600, paragraph 9-02, (Standing Instructions to Project Operators for Water Control), and ETL 1110-2-251 and pertains to duties and responsibilities of the dam tender in connection with the operation of Sepulveda Dam and the reporting of required hydrologic data.

b. Operation instructions to the dam tender are outlined with specific emphasis on flood emergencies when communication facilities between the dam tender and the Reservoir Operation Center (ROC) have been disrupted. This exhibit is designed to be used in conjunction with the rest of the water control manuals. Plates and tables referred to in this exhibit that are used in the main body of the water control manual are not duplicated. The only exception to this is the reservoir regulation schedule, which is duplicated in this exhibit. Other plates or tables such as chain of command for reservoir operations decisions, etc., that are in the main body of the manual are referenced in this exhibit as necessary. This avoids duplication of work and the possibility of two versions of one table in the same water control manual.

c. The dam tender is required to have available at the dam other pertinent book that complement these standing instructions. These books are the current year's Orange Book - "Instructions for Reservoir Operations Center Personnel," the "Sepulveda Dam Flood Emergency Plan" and the "Operation and Maintenance Manual for Sepulveda Dam."

2. RESERVOIR OPERATION REQUIREMENTS

Sepulveda Dam should be operated for flood control according to the reservoir regulation schedule which is included at the front of this exhibit and is also shown on plate 7-02. The flood control objective for Sepulveda Dam is too minimize flood damage and the flood risk to public safety along the Los Angeles River downstream from the dam.

Plate 7-01, which depicts the storage allocations for the reservoir, shows that the entire space of the reservoir below the spillway crest (crest gates in raised position–710 feet, NGVD) is devoted to flood control.

3. OPERATION RESPONSIBILITIES

The primary responsibilities for operating Sepulveda Dam are delegated to units of the Engineering Division and Construction-Operations Division of the Los Angeles District, U.S. Army Corps of Engineers, as outlined below. The chain of command for reservoir operations decisions is give in table 9-01.

a. The Reservoir Regulation Unit (Reservoir Regulation Section, H&H Branch, Engineering Division) responsibilities are:

(1) Obtain current hydrometeorological data and weather forecasts fro the region.

(2) Establish and update water control criteria for flood and nonflood periods and document in water control manual.

(3) Monitor meteorologic conditions, activate the Reservoir Operations Center (ROC), analyze current reservoir and hydrologic data, and issue appropriate water control instructions to the dam tender.

(4) Initiate the call out of mobile channel observation teams.

(5) Coordinate the control of water with, and make notifications to pertinent organizations. Keep up to date on all temporary conditions and actions that are restrictive or that require a change to established water control practices.

(6) Prepare daily, monthly and other special reports relative to the control of water at the reservoir and keep district management and higher authority offices informed of ongoing water control activities.

(7) Advise the District Engineer, through the chain of command, whenever there is evidence that Sepulveda Dam will not be able to provide flood protection along the Los Angeles River.

b. The Water Control Data Unit (Reservoir Regulation Section, H&H Branch, Engineering Division) responsibilities are:

(1) Maintain and supervise the operation of all hydrologic recording and telemetry system equipment.

(2) Calculate and maintain a record of all hydrologic data including stage, inflows, outflows, storage, weather data, etc.

c. The Dam Tender’s responsibilities are:

(1) Be present at the dam when rainfall or runoff occurs as requested by the Reservoir Regulation Unit through appropriate supervision.

(2) Ensure that all equipment at the project, including recording and indicating gauges, gate mechanisms, power units, radio, etc., are in good operating conditions.

(3) Operate the gates in accordance with instructions from the Reservoir Regulation Unit, Engineering Division.

(4) Follow the reservoir regulation schedule provided at the front of this exhibit and also shown on plate 7-02, during communication outage with the Reservoir Operation Center (ROC), as outlined in the following paragraph 8.

(5) Reports all pertinent conditions at the dam on a real time basis such as the trash buildup on the trash rack, hydraulic connections of stage recorders, erosion problems, conditions of the embankment, hazardous

public actions at the project, intensity of rainfall and any other conditions pertinent to the safe and successful operation of the dam.

(6) Maintain records, including water surface elevations, outflow gauge heights, precipitation amounts, gate openings, and log all radio and telephone calls forms prescribed in paragraph 12.

(7) Periodically test/operate the gates and electrical facilities in the control house, and inspects all structures sand equipment according tot he preestablished schedule.

(8) Refer to the O&M manual for instructions on actual operating procedures for all mechanical equipment.

(9) Follow a preestablished plan to call in the alternate operator to continue staffing on the next shift as advised by the ROC.

4. GATE/VALVE OPERATION

a. Outlet Slide Gates.

(1) General.

The four outlet slide gates are hydraulically controlled from a manually operated-valve manifold located in the control room. The dam tender should refer to O&M manual for instructions on actual operating procedures.

(2) Outlet Gate Change Procedure.

The Reservoir Regulation Unit (Reservoir Regulation Section-Engineering Division) will order the dam outlet gate changes via the District's voice radio system. The Reservoir Regulation Unit will provide settings for all four gated outlets whenever a gate change is necessary. The dam tender should implement gate changes immediately following acknowledgment of radio instructions. IF the performance of other concurrent activities require a delay in implementation of a gate change, the dam tender should advise the ROC through radio call sign WUK 4ROC and wait for guidance. The concern is the delaying a gate change may have serious impacts on affected activities. Once the gate change is completed, the dam tender should radio back a report of the time that the change was completed the staff and tape reading, and the setting of all four gates after the change was completed. All individuals involved should strive for complete clarity regarding gate settings. The dam tender should immediately alert the ROC through radio call sign WUK 4ROC whenever the requested gate change cannot be fully implemented due to mechanical or other physical problems. For example, thrash occasionally prevents full closure of a gate. The problem should then be evaluated and further instructions provided to the dam tender by the ROC.

(3) Coordination Between ROC and Dam Tender.

The Reservoir Operation Center should keep the dam tender appraised of operations objectives and critical operations a constraints whenever possible. This will afford the dam tender with a greater opportunity to recognize and identify field problems. The dam tender shall notify the ROC whenever a water surface elevation level is reached corresponding to a gate setting step on the reservoir regulation schedule shown on the front of this exhibit. The ROC may also provide water surface elevation criteria, such that the dam tender shall call the ROC at radio call sign WUK 4ROC when the reservoir pool reaches the specific elevation. This action will normally be conducted during periods of intense storm runoff and will require the dam tender to stay at the control house.

ROC personnel should appraise dam tender when gate operations will be “off-schedule” or “non-routine”. In turn, the dam tender should not delay implementation of the non-routine operations by asking informational questions. Such questions are better answered after the gate change is implemented. However, the dam tender should always question gate operations that pose obvious dangers to people or disruption to sanctioned activities in the reservoir or in the downstream channel. The objective is to avoid costly time delays to the gate change process. The resulting time delay to address the question could, in itself, generate unnecessary overtime. All dam tenders should seek clarification of the desired gate setting in feet of opening and the desired time of change whenever necessary.

b. Crest Gates.

(1) The crest gates control is a combination of manual and full automatic operation. The crest gates are normally operated in an automatic mode, and rise and fall in response to changes in the reservoir water surface elevation.

(2) The automatic operation mode may be overridden by manual control, however the process is cumbersome and slow (20-30 minutes per gate) and shall not be implemented unless the ROC determines it is necessary in order to minimize unusually high spillway flows.

5. NORMAL OPERATION PROCEDURES

Sepulveda Dam under normal operation procedures is operated for flood control on the Los Angeles River according to the reservoir regulation schedule provided at the front of this exhibit and on plate 7-02. According to this schedule the project should be regulated to pass all inflow through the dam as rapidly as possible. This is achieved by keeping the four gated outlets fully open until spillway flow occurs, and then by progressively closing the gated outlets such that the combined flow from the spillway and from the gated and ungated outlets does not exceed the downstream channel capacity of 16,900 cfs.

It is physically possible, however, and would be desirable, under certain circumstances, for the release rate from Sepulveda Dam to be decreased below what is called for in the schedule. IN addition to Emergency Deviations described in paragraph 9, there are other possible reasons for deviation from the normal release plan such as downstream flooding, construction, maintenance, inspections and other planned or unplanned activities.

6. LIMITATIONS ON STORAGE

There are no legal limitations on storage, as the project boundary is above the maximum operating water surface elevation of 712,2 feet, NGVD.

7. LIMITATIONS RELEASES

The maximum discharge that can be released without exceeding downstream channel capacity is 16,900 cfs. This release would be achieved when all gated outlets are open (as they are supposed to be under normal operation) and the water surface elevation is just above 710 feet, NGVD. Gates at Sepulveda Dam can generally be adjusted in as rapid a manner as possible without concern over the rate or rise of the reservoir water surface elevation. This is possible because the ungated outlets will always be releasing large discharges at times when significant changes in outflow could be achieved through the gated outlets. Concrete lining of the downstream channel precludes concern over bank erosion or sloughing due to sudden gate changes.

8. STANDING INSTRUCTIONS DURING COMMUNICATION OUTAGE

If communication is broken between the dam tender and the Reservoir Regulation Unit (ROC), initially continue releases in accordance with the last instructions from the Reservoir Regulation Unit and make every attempt to reestablish communications. During rising stages if after one half hour communication cannot be reestablished, make releases in accordance with the reservoir regulation schedule, shown at the front of this exhibit and plate 7-02, following dam operator instructions at the bottom of the schedule. During falling stages maintain current outflow until communication is reestablished.

9. EMERGENCY DEVIATION FROM NORMAL REGULATION

Emergence departures from the regulation instructions issued by the Reservoir Regulations Unit may be required because of operating equipment failures, accidents such as drownings, or other emergencies that require immediate action. Under theses situations the dam tender should contact the Reservoir Regulations Unit through radio call sign WUK 4ROC for instructions. When the communications are broken or when actions must be implemented within minutes, the dam tender may independently take appropriate actions. The Reservoir Regulation Unit should be notified of such departures as soon as possible. All other nonemergency deviations should be approved by the Reservoir Regulation Unit in advance.

10. EMERGENCY NOTIFICATIONS

Emergency notifications are normally made by the Reservoir Regulation Unit. However, if the dam tender loses communication with the District Office, and an emergency notification situation arises, such as an imminent dam failure possible from a major earthquake or a water surface level exceeding elevation 710 feet, NGVD, that will generate spillway flow and downstream channel overflow, the dam tender should make the necessary notifications himself, if possible.

The parties listed below are to be notified immediately upon declaration of an uncontrollable emergency. Notification should include: (a) description of the type and extent of emergency that exists or is impending; (b) advise to evacuate people from flood plains; (c) information on the time that release of hazardous amounts of water began or is estimated to begin; and (d) the dam tender's name and telephone number.

a.	Los Angeles Police Department, Van Nuys Division	(181) 989-8383
b.	Los Angeles County Sheriff, Disaster Communications Office	(213) 946-7935
c.	California Office of Emergency Services - Headquarters, Sacramento	(916) 427-4990
d.	California Highway Patrol 24 Hour Communications Center	911

Upon completing the above notifications, try to reestablish communications with the Los Angeles District Office. Document all notifications made and refer to Orange Book, "Instructions for Reservoir Operations Center Personnel", for more information on additional desirable emergency notifications. Also, refer to the "Sepulveda Dam Flood Emergency Plan" book for further instructions and information. The dam tender should not leave the dam unless his personal safety is in jeopardy.

11. MEASUREMENT OF HYDROLOGIC DATA

The dam tender should follow instructions as issued by the Reservoir Regulation Unit on what measurements should be taken and what at what frequency. During normal conditions measurements should be taken daily at 8:00 a.m. During flood situations hourly measurements are usually sufficient. All measurements should be documented. Measurements should include the reservoir staff reading (water surface elevation), the "tape" reading, incremental precipitation since the last report, the downstream discharge gauge reading (if available), the time of these measurements and the settings of each outlet gate at the dam, elevation of the top of the crest gates, and

the initiation ane termination of spillway flow. When calling, the dam tender should clearly describe the silt and debris situation at the trash racks and gates. When instruments are not working properly or are stuck in the silt, the dam tender should not call in the erroneous reading, but should rather state the instruments or staff problem. When debris or silt cause the flows to be deceptively perched above the invert or result in a loss of contact with a staff board, the dam tender should call in a descriptive message identifying the limitation and quantifying the average streamflow depth and width or estimated reservoir depth as appropriate.

12. REPORTS

Communication with the dam tender for reservoir status reporting and gate change instructions is made using the Los Angeles District's radio system. If the radio system including the dam tender's mobile unit malfunctions, the dam tender will be contacted by telephone. The Record of Calls Forms (SPL 188) is to be used each time a message is transmitted by or received at the radio or telephone. Every call will be noted whether it is for a radio check, reservoir report, channel observation, etc. During nonflood situations the dam tender will report daily to the ROC using the Los Angeles District's radio system or by using the telephone. During storm conditions, the dam tender will be instructed on the desired radio reporting time interval by the Reservoir Regulation Unit.

Reservoir reports will be requested whenever appreciable inflow appears imminent and should continue through operation of the structure. Each report information is described in the previous paragraph 11.

In addition to the Record of Calls Form (SPL-188), the dam tender should also use the Flood Control Basin Operation Report Form (SPL-19), and the Rainfall Record Form (SPL-648) to log the rainfall and digital recorder information. These forms should be submitted to the Water Control Data Unit for archiving on a monthly basis. A copy of each of these forms is included in this Water Control Manual as figures 9-01, 9-03, 9-04, and 9-05.

EXHIBIT B

SUPPLEMENTARY PERTINENT DATA

EXHIBIT B

SUPPLEMENTARY PERTINENT DATA

GENERAL INFORMATION

Name of Project	Sepulveda Dam; Sepulveda Reservoir.
Other Names for Project	Sepulveda Flood Control Basin.
Location	Los Angeles County Drainage Area, California. On Los Angeles River, 43 miles above mouth, at 30°09'48"N, 118°27'59"W.
Type of Project	Flood control reservoir.
Objectives of Regulation	Project authorized for single-purpose operation (flood control).
Project Owner	U.S. Army Corps of Engineers, Los Angeles District.
Operating Agency	U.S. Army Corps of Engineers, Los Angeles District. Official business hours: 0730-1600, Monday through Friday. Tel. (213) 894-4756, FTS 798-4756.
Regulating Agency	U.S. Army Corps of Engineers, Los Angeles District.
Inter-Agency Agreements	Portion of the land within Sepulveda Reservoir is leased to the City of Los Angeles for recreational, wildlife management, and agricultural purposes. The Corps of Engineers reserves the right to inundate any portion of the reservoir at any time. U.S. Army Corps of Engineers has a maintenance agreement with Los Angeles County Flood Control District for the improved channel of Los Angeles River.
Project Cost	Real estate acquisition, 1939-1942: $1,497,595. Construction of dam, 1939-1941: $6,650,561.
Closure Date	30 December 1941.

RESERVOIR

Pertinent Elements	See table 1 (inside front cover).
Real Estate	Depicted on plates 2-07 and 2-21. Elevation is approximately the top of the dam, elevation 725 feet, NGVD. Total purchased real estate in fee is 2,097 acres. Total purchased real estate in easement is 0 acres. Total purchased real estate below guide control line el. 725.0 feet (top of freeboard) is 1942.31 acres. Total purchased real estate below flood control pool el. 717.5 feet (bottom of freeboard) is 1808.26 acres. Total purchased real estate below spillway crest el. 710.0 feet is 1322.81 acres.
Reservoir Elevation Corresponding to Maximum Non-Damaging Releases	Non-damaging release is approximately the capacity of the Los Angeles River channel immediately downstream of dam: 16,900 cfs.
Conservation Pool	None.
Safety Aspects	The U.S. Army Corps of Engineers notifies Los Angeles County Flood Control District, the City of Los Angeles, and the California Department of Transportation of any significant impoundment behind, or release from, Sepulveda Dam.
Emergency Drawdown	Not applicable. Gate sill elevation is at 668 feet, NGVD, directly on the Los Angeles River channel, and is essentially the lowest elevation within the reservoir.
Project Area Data	For locations and elevations of facilities within Sepulveda Reservoir, see table 2-02 and plate 2-07.

HYDROLOGY

Drainge Area	152 square miles.
Design Floods	See Table 1 (inside front cover).
Climate	Temperate, semi-arid, with wet winters and dry summers.

Flood Seasons	Flood Season is 15 November - 15 April.
One Inch of Runoff	Over Sepulveda Basin drainage area (152 square miles) is equivalent to a volume of 8107 ac-ft.
Low-Flow Season	Reservoir remains dry, and the Los Angeles River remains in low flow entire year, except for occasional storms (mostly 15 November - 15 April). Driest season is normally June-August.
Maximum Annual Flow	137,793 acre-feet, (Period of record: 1941-1984 (mostly January-March 1983).
Maximum Instantaneous Inflow	62,636 cfs, 1600-1625 hours, 16 February 1980.
Maximum of Mean Hourly Inflow	58,970 cfs, 1600-1700 hours, 16 February 1980.
Maximum Reservoir Elevation	705.10 feet msl (11,503 ac-ft impounded), 1845 hours, 16 Feburary 1980.
Maximum Outflow	15,100 cfs, 2051 hours, 16 February 1980.
Key Streamflow Stations	Los Angeles River at Tujunga Avenue; Los Angeles River Above Arroyo Seco; Los Angeles River Below Firestone Blvd.; and Los Angeles River Below Wardlow Road (see Table 5-01, Plate 5-01, and Exhibit F). The LADPW owns and operates 2 stream gaging stations upstream of the damsite. The Browns Creek at Variel Ave. (#F2B-R) and the Limekiln Creek (#F350-R) above Aliso, stream gauging stations. For details refer to Chapter 5 and table 5-02.
Type of Data at Dam	Manual, recording, and automatic telemetry gauges for precipitation, reservoir surface elevation, gate height, and outflow, plus automatic telemetry streamflow gauges downstream.
Stations Used in Hydrologic Forecasting	None at this time. Hydrologic forecasting will soon be implemented. See Chapter 5.
No. of Sediment Ranges	See table 4-11.

EMBANKMENT

Length	15,444 feet (2.93 miles).
Height	57 feet; top of dam 725 feet msl.*
Streambed	668 feet, NGVD at gate sill.
Freeboard	Top of dam is 8.34 feet above Probable Maximum Flood pool.
Crest Width	30 feet.
Special Features	None. No special dikes, levees, or other flood barriers.
Type of Fill	Earthfill.
Slope Protection	Upstream slope is protected by grouted stone paving. Downstream slope is grassed, except 10-15 feet grouted toe protection.

SPILLWAY

Location	Near center of dam, just to left of Outlet Works (when looking downstream).
Type	Concrete ogee, with floatable crest gates.
Crest Elevation	700 feet, NGVD (crest gates lowered); 710 feet, NGVD (crest gates raised).
Net Overflow Length	399 feet.
Number of Gates	Seven.
Size of Gates	57 feet long x 10 feet wide (above the concrete ogee section of the spillway).
Types of Gates	Submersible drum gates.

* December 1980 topographic survey of reservoir shows variation in elevation of top of dam from as low as 723.7 feet in the northeastern portion of the embankment to as high as 725.5 feet in two locations along the southwestern portion of the embankment. An on-going Settlement Study, consisting of periodic elevation surveys of the dam from December 1941 through January 1985, shows settlement in portions of the embankment from 0.5 foot to more than 1.0 foot over the 43-year period.

Top of Crest Gate Elevation in Open Position	710 feet.
Induced Surcharge, Standard Project Flood	3.52 feet (Standard Project Flood elevation 713.52 feet, compared to spillway crest with gates raised to 710.00 feet).
Maximum Spillway Discharge Capacity	190,020 cfs for spillway flow (independent of outlet works discharge) with reservoir at elevation 725 feet, NGVD (top of dam).
Bridge Deck Elevation	Top of dam is 725 feet, NGVD. Top of curb is 725.75 feet, NGVD. Top at retaining wall is 729.25 feet, NGVD (See pl. 2-10).
Type of Energy Dissipator	None.
Time Required to open/ close all crest gates	Crest gates open/close automatically depending on the water surface elevation (see paragraph 2-03, d,(2)). The minimum required time to open/close all gates is 15 minutes.
Automatic Crest Gate Operation	Crest gates rise out of ogee crest, ahead of reservoir level, to maximum elevation 710 feet, NGVD. Gates remain at this elevation until reservoir surface reaches predetermined elevation (currently set at 712 feet). Gates then begin to lower automatically. Gates lower to elevation 700 feet (ogee crest) by the time that reservoir surface reaches a second predetermined elevation (currently set at 715 feet). Both predetermined elevations are adjustable. Crest gates can be placed into semi-automatic or emergency manual operation (see pl. 2-18).
Recurrence Interval for Reservoir to Attain Crest Elevation	Approximately 80 years, to reach elevation 710 feet, NGVD (spillway crest with crest gates raised). See plate 4-07 and table 4-08.

OUTLET FACILITIES

Location	In center of dam, on Los Angeles River.
Purpose	Flood control.
Type of Outlets	Four gated, four ungated; all outlets rectangular.

Size of Outlets	Gated: 6 feet wide, 9 feet high. Ungated: 6 feet wide, 6.5 feet high.
Entrance Invert Elevation	668 feet, NGVD.

HYDROELECTRIC POWER FACILITIES; LOCKS; DOWNSTREAM CONTROL POINTS

None.

EXHIBIT C

PERTINENT DATA FOR OTHER RESERVOIRS AFFECTING LOS ANGELES RIVER

EXHIBIT C

DAM DATA SHEET

Name Chatsworth, Embankment Nos. 2 and 3 Completed 1918

Location West end of the San Fernando Valley, City of Los Angeles, 25 miles northwest of the Los Angeles Civic Center.

GENERAL DATA

Purpose Domestic Water Storage Current max. storage 0* A.F.

Max. height 48' Crest length Embankment No. 2: 1700', Embankment No. 3: 750' Crest width 21'

Crest elev. 900' USGS Datum Spillway lip elev. 889' USGS Datum

Drainage area 5.4 square miles

Drainage type Hydraulic fill; in 1931 the upstream face and crest were removed and replaced with compacted fill

Cutoff type and dimensions Cutoff wall 2' wide by 3' to 23' deep at the upstream toe of the dam

U.S. slope, angle and protection 2-1/2h:1v, 6" concrete slab

D.S. slope, angle and protection 3h:1v above berm, native brush

Designers LADWP

Constructed by LADWP

Consultants Information not available

FOUNDATION AND ABUTMENTS

Material Sandstone bedrock at abutments, alluvium foundation

Treatment Removed top soil

Drainage Embankment #2: Rock drain at the downstream toe of the dam
Embankment #3: Subdrain at the downstream toe of the dam

SPILLWAY AND OUTLET

Spillway type, location, foundation Open channel on the right abutment of Embankment No. 3, sandstone bedrock

Outlet type, location, foundation Vertical tower w/72" tunnel northeast of Embankment No. 3, sandstone bedrock

Remarks: * Chatsworth Reservoir has been out of service and empty since 1969.

WEDD May 1978

DAM DATA SHEET

Name Encino Completed Original 1921; Existing 1962

Location San Fernando Valley on the north slope of the Santa Monica Mountains

GENERAL DATA

Purpose Domestic Water Storage Current max. storage 10,300 A.F.

Max. height 168' Crest length 1,850' Crest width 30'

Crest elev. 1,088' USGS Datum Spillway lip elev. 1,075' USGS Datum

Drainage area 1.4 square miles

Dam type Approximately 80% is sheepsfoot roller compaced soil on bedrock; downstream remainder is old fill on alluvium.

Cutoff type and dimensions None, upstream two-thirds of the dam is on bedrock.

U.S. slope, angle & protection 3h:1v; 3" asphaltic concrete

D.S. slope, angle & protection 2h:1v above berm, 2h:1v below berm; berm 100' wide at elev. 1020'; native brush & grasses

Designers LADWP

Constructed by Contract

Consultants No outside consultants for major alterations in 1962.

FOUNDATION AND ABUTMENTS

Material Sandstone, siltstone, and shale

Treatment Upstream two-thirds of foundation was stripped to bedrock

Drainage Abutment and toe tile subdrain systems

SPILLWAY AND OUTLET

Spillway type, location, foundation Operating spillway pipe located at left abutment. Auxiliary spillway open trapezoidal channel at same location.

Outlet type, location, foundation Vertical tower with 72" tunnel; west or left abutment; sandstone and shale bedrock

Remarks:

WEDD May 1978

LOS ANGELES DAM AND RESERVOIR DATA

DESIGN:

Embankment	Compacted earth
Crest Dam Elevation	1187 feet, USGS
Crest Length	3072 feet
Crest Width	30 feet
Maximum Height	155 feet
Slope Upstream, Main Dam	3-1/2:1
Slope Downstream	2-1/2:1 & 3:1
Compacted Fill, Dam Only	5,352,764 cubic yards*
Compacted Fill, North Dike	1,349,051 cubic yards (including rock)
Compacted Fill, Total Project	8,155,457 cubic yards
Reservoir Capacity	10,170 acre-feet**
Maximum Depth @ HW	75 feet
Area @ HW	176.2 acres
Spillway Lip Elevation	1,175 feet
Spillway Capacity	7,049 cfs*** (PMP storm)
Reservoir Inlet	90" WSP, 900 cfs capacity
Reservoir Outlet	120" WSP, 1,100 cfs capacity
Reservoir West Outlet	84" WSP, 600 cfs capacity
Emergency Blowoff	2--48" outlets, 1,250 cfs capacity
Storm Water Bypass East Side	850 cfs (50-year storm)

DRAINAGE AREA: 8,374 acres

RESERVOIR CONSTRUCTED: 1974-1977

PROJECT COST: Contracts 8860 & 9245 only, $33,251,601

*Includes 405,512 cubic yards of clay and 506,887 cubic yards rock and gravel.

**The reservoir level can be lowered 10 feet in nine hours, and the total storage reduced by one-half in 30 hours.

***Probable maximum precipitation (PMP) storm, as determined by the U.S. Weather Bureau, is greater than the 1,000-year storm.

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

HANSEN DAM
LOS ANGELES COUNTY, CALIFORNIA

PERTINENT DATA
SEPTEMBER 1988

Completion date	September 1940
Stream system	Tujunga Wash
Drainage area, mi^2	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	1,081.22
Top of dam, ft., NGVD	1,087
Area	
Debris pool, acre	142.4
Spillway crest, acre	781.4
Spillway design surcharge level, acre	1,061.5
Top of dam, acre	1,136.0
Capacity, gross	
Debris pool, acre-feet	1,329 (0.17*)
Spillway crest, acre-feet	25,446.1 (3.24*)
Spillway design surcharge level, acre-feet	44,990 (5.72*)
Top of dam, acre-feet	51,360 (6.53*)
Allowance for sediment (50-year), acre-feet	10,500 (1.34*)
Allowance for sediment (100-year), acre-feet	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
Design surcharge (Revised June 1978), ft.	21.2
Design discharge (Original), ft.	21.8
Design discharge (Revised June 1978), c.f.s.	99,700
Design discharge (Original), c.f.s.	101,000
Outlets:	
Uncontrolled	
Number and size	2 - 8'W x 6'H
Entrance invert elevation, ft., NGVD	1,011
Controlled	
Gates - Type	Vertical lift
Number and size	8 - 5'W x 8'H
Entrance invert elevation, ft., NGVD	990
Conduits	
Number and size, ft.	2 - 8'W x 6'H
Length, ft.	265
Maximum capacity at spillway crest, c.f.s.	22,000
Regulated capacity at spillway crest, c.f.s.	22,800
Reservoir Design Flood (Original)	
Total volume (4-day), acre-feet	70,700
Inflow peak (4-day), c.f.s.	64,800
Standard Project Flood (Current)	
Total volume (4-day), acre-feet	57,200
Inflow peak (4-day), c.f.s.	53,000
Spillway Design Flood (Original)	
Total volume (1-day), acre-feet	76,800
Inflow peak (1-day), c.f.s.	129,600
Probable Maximum Flood (Current)	
Total volume (5-day), acre-feet	246,000
Inflow peak (5-day), c.f.s.	105,000
Historic maximums:	
Maximum release, c.f.s.	12,371
Date	3-3-83
Maximum water storage elevation, ft., NGVD	1,039.70
Maximum storage, acre-feet	
Date	3-2-83
Maximum inflow peak (1 hour), c.f.s.	27,800
Date	3-2-83

*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*)
Water supply pool, acre-feet	8,291.4 (0.66*)
Spillway crest, acre-feet	32,109 (2.55*)
Spillway design surcharge level, acre-feet	46,712 (3.71*)
Top of dam, acre-feet	53,088 (4.22*)
June 1978 Allowance for sediment (50-year), acre-feet	8,000 (0.64*)
June 1978 Allowance for sediment (100-year), acre-feet	16,000 (1.27*)
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*)
Inflow peak, c.f.s.	96,000
Probable maximum flood:	
Duration (inflow), days	4
Total volume, acre-feet	556,000 (44.17*)
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

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 surchange (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

CHARACTERISTICS OF MAJOR STORAGE PROJECTS
LOS ANGELES COUNTY

PROJECT		DAM						SPILLWAY			RESERVOIR						
											ELEVATION		STORAGE				
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)	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	1) 958.8** 2) 985.5	310.0	U	1054.0 1065.5	14,800.0 1000.0	FC, WS	1054.0 1065.5	1072.0	2869.0 4787.0	OT OT	2820 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 1497.0	2400.0 (COMB.)	FC, WS	1496.4 1497.0	1500.0	239.0 245.0	6.5 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 1170.0	34,200.0 100,000	FC, WS	1175.0 (GR)	1175.0	22,758.0 N/A	N/A 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 1989.95	10,780.0	FC, WS	1950.0 1989.0	2025.0	3115.0 6589.0	5204.0 N/A	8981.0	1048.0	11,828.0
Puddingstone	Puddingstone Creek	33.10	E,C	147.0	982.0	882.1	2698.0 (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 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	1) 1358.0 2) 1369	340.0 (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 1324.8	2900.0	FC, WS	1316.0 1324.8	1324.8	776.5 905.7	129.2 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 1375.18	1450.0 610	FC, WS	1360.0 1375.18	1375.18	354.0 506.6	152.6 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: E - Earthfill; R - Rockfill; C - Concrete; M - Masonry
Structure: A - Arch; G - Gravity; GL - Gravel

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 D

RESERVOIR WATER SURFACE ELEVATION VS.
CAPACITY (STORAGE) FOR SEPULVEDA DAM

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
668.0	0.	.0	.0	.0	.0	.0	.0	.0	.0	.0
668.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
668.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
668.3	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1
668.4	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
668.5	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2
668.6	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
668.7	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
668.8	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3
668.9	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
669.0	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
669.1	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
669.2	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
669.3	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5
669.4	.5	.5	.5	.5	.5	.5	.5	.5	.6	.6
669.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
669.6	.6	.6	.6	.7	.7	.7	.7	.7	.7	.7
669.7	.7	.7	.7	.7	.7	.7	.7	.8	.8	.8
669.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
669.9	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9
670.0	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
670.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
670.2	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1
670.3	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
670.4	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2
670.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3
670.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
670.7	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
670.8	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5
670.9	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6
671.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7
671.1	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
671.2	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
671.3	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
671.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
671.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
671.6	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
671.7	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2
671.8	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
671.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
672.0	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.1	4.1
672.1	4.1	4.1	4.2	4.2	4.2	4.2	4.3	4.3	4.3	4.3
672.2	4.3	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.6
672.3	4.6	4.6	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8
672.4	4.9	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.1	5.1
672.5	5.1	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.4	5.4
672.6	5.4	5.5	5.5	5.5	5.5	5.6	5.6	5.6	5.7	5.7
672.7	5.7	5.8	5.8	5.8	5.9	5.9	5.9	6.0	6.0	6.0
672.8	6.0	6.1	6.1	6.1	6.2	6.2	6.2	6.3	6.3	6.3
672.9	6.4	6.4	6.4	6.5	6.5	6.6	6.6	6.6	6.7	6.7
673.0	6.7	6.8	6.8	6.8	6.9	6.9	6.9	7.0	7.0	7.1
673.1	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.4	7.4
673.2	7.5	7.5	7.5	7.6	7.6	7.7	7.7	7.7	7.8	7.8
673.3	7.9	7.9	7.9	8.0	8.0	8.1	8.1	8.1	8.2	8.2
673.4	8.3	8.3	8.3	8.4	8.4	8.5	8.5	8.5	8.6	8.6
673.5	8.7	8.7	8.8	8.8	8.8	8.9	8.9	9.0	9.0	9.1
673.6	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.5	9.5
673.7	9.5	9.6	9.6	9.7	9.7	9.8	9.8	9.9	9.9	10.0
673.8	10.0	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.4	10.4
673.9	10.5	10.5	10.6	10.6	10.7	10.7	10.8	10.8	10.9	10.9
674.0	11.0	11.0	11.1	11.1	11.2	11.2	11.3	11.3	11.4	11.4
674.1	11.5	11.5	11.6	11.6	11.7	11.7	11.8	11.9	11.9	12.0
674.2	12.0	12.1	12.1	12.2	12.3	12.3	12.4	12.4	12.5	12.6
674.3	12.6	12.7	12.8	12.8	12.9	12.9	13.0	13.1	13.1	13.2
674.4	13.3	13.3	13.4	13.5	13.5	13.6	13.7	13.7	13.8	13.9
674.5	14.0	14.0	14.1	14.2	14.2	14.3	14.4	14.5	14.5	14.6
674.6	14.7	14.8	14.8	14.9	15.0	15.0	15.1	15.2	15.3	15.4
674.7	15.4	15.5	15.6	15.7	15.8	15.9	15.9	16.0	16.1	16.2
674.8	16.3	16.3	16.4	16.5	16.6	16.7	16.8	16.8	16.9	17.0
674.9	17.1	17.2	17.3	17.4	17.5	17.5	17.6	17.7	17.8	17.9
675.0	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.6	18.7	18.8
675.1	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8
675.2	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8
675.3	20.9	21.0	21.1	21.2	21.4	21.5	21.6	21.7	21.8	21.9
675.4	22.0	22.1	22.2	22.3	22.4	22.5	22.7	22.8	22.9	23.0
675.5	23.1	23.2	23.3	23.4	23.6	23.7	23.8	23.9	24.0	24.1
675.6	24.2	24.4	24.5	24.6	24.7	24.8	25.0	25.1	25.2	25.3
675.7	25.4	25.6	25.7	25.8	25.9	26.0	26.2	26.3	26.4	26.5
675.8	26.7	26.8	26.9	27.0	27.2	27.3	27.4	27.5	27.7	27.8
675.9	27.9	28.1	28.2	28.3	28.5	28.6	28.7	28.9	29.0	29.1

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
676.0	29.3	29.4	29.5	29.7	29.8	29.9	30.1	30.2	30.3	30.5
676.1	30.6	30.7	30.9	31.0	31.2	31.3	31.4	31.6	31.7	31.9
676.2	32.0	32.2	32.3	32.4	32.6	32.7	32.9	33.0	33.2	33.3
676.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	34.5	34.7	34.8
676.4	35.0	35.1	35.3	35.4	35.6	35.7	35.9	36.1	36.2	36.4
676.5	36.5	36.7	36.8	37.0	37.2	37.3	37.5	37.6	37.8	38.0
676.6	38.1	38.3	38.5	38.6	38.8	38.9	39.1	39.3	39.4	39.6
676.7	39.8	39.9	40.1	40.3	40.4	40.6	40.8	41.0	41.1	41.3
676.8	41.5	41.6	41.8	42.0	42.2	42.3	42.5	42.7	42.9	43.0
676.9	43.2	43.4	43.6	43.7	43.9	44.1	44.3	44.5	44.6	44.8
677.0	45.0	45.2	45.4	45.6	45.7	45.9	46.1	46.3	46.5	46.7
677.1	46.8	47.0	47.2	47.4	47.6	47.8	48.0	48.2	48.4	48.5
677.2	48.7	48.9	49.1	49.3	49.5	49.7	49.9	50.1	50.3	50.5
677.3	50.7	50.9	51.1	51.3	51.5	51.7	51.9	52.1	52.3	52.5
677.4	52.7	52.9	53.1	53.3	53.5	53.7	53.9	54.1	54.3	54.5
677.5	54.7	54.9	55.1	55.3	55.5	55.7	55.9	56.1	56.3	56.6
677.6	56.8	57.0	57.2	57.4	57.6	57.8	58.0	58.2	58.5	58.7
677.7	58.9	59.1	59.3	59.5	59.8	60.0	60.2	60.4	60.6	60.8
677.8	61.1	61.3	61.5	61.7	61.9	62.2	62.4	62.6	62.8	63.1
677.9	63.3	63.5	63.7	64.0	64.2	64.4	64.6	64.9	65.1	65.3
678.0	65.6	65.8	66.0	66.3	66.5	66.7	67.0	67.2	67.4	67.7
678.1	67.9	68.1	68.4	68.6	68.9	69.1	69.4	69.6	69.8	70.1
678.2	70.3	70.6	70.8	71.1	71.3	71.6	71.8	72.1	72.4	72.6
678.3	72.9	73.1	73.4	73.6	73.9	74.2	74.4	74.7	75.0	75.2
678.4	75.5	75.8	76.0	76.3	76.6	76.8	77.1	77.4	77.7	77.9
678.5	78.2	78.5	78.8	79.0	79.3	79.6	79.9	80.2	80.5	80.7
678.6	81.0	81.3	81.6	81.9	82.2	82.5	82.8	83.1	83.3	83.6
678.7	83.9	84.2	84.5	84.8	85.1	85.4	85.7	86.0	86.3	86.6
678.8	86.9	87.2	87.5	87.9	88.2	88.5	88.8	89.1	89.4	89.7
678.9	90.0	90.3	90.7	91.0	91.3	91.6	91.9	92.3	92.6	92.9
679.0	93.2	93.5	93.9	94.2	94.5	94.9	95.2	95.5	95.8	96.2
679.1	96.5	96.8	97.2	97.5	97.8	98.2	98.5	98.9	99.2	99.5
679.2	99.9	100.2	100.6	100.9	101.3	101.6	102.0	102.3	102.7	103.0
679.3	103.4	103.7	104.1	104.4	104.8	105.1	105.5	105.8	106.2	106.6
679.4	106.9	107.3	107.6	108.0	108.4	108.7	109.1	109.5	109.8	110.2
679.5	110.6	111.0	111.3	111.7	112.1	112.4	112.8	113.2	113.6	114.0
679.6	114.3	114.7	115.1	115.5	115.9	116.3	116.6	117.0	117.4	117.8
679.7	118.2	118.6	119.0	119.4	119.8	120.1	120.5	120.9	121.3	121.7
679.8	122.1	122.5	122.9	123.3	123.7	124.1	124.5	124.9	125.4	125.8
679.9	126.2	126.6	127.0	127.4	127.8	128.2	128.6	129.1	129.5	129.9

SEPULVEDA DAM
SURVEYED DEC 1960

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	.0	.01	.02	.03	.04	.05	.06	.07	.08	.09
680.0	130.3	130.7	131.1	131.6	132.0	132.4	132.8	133.3	133.7	134.1
680.1	134.5	135.0	135.4	135.8	136.3	136.7	137.1	137.6	138.0	138.5
680.2	138.9	139.3	139.8	140.2	140.7	141.1	141.6	142.0	142.5	142.9
680.3	143.4	143.8	144.3	144.8	145.2	145.7	146.1	146.6	147.1	147.5
680.4	148.0	148.5	148.9	149.4	149.9	150.4	150.8	151.3	151.8	152.3
680.5	152.7	153.2	153.7	154.2	154.7	155.2	155.6	156.1	156.6	157.1
680.6	157.6	158.1	158.6	159.1	159.6	160.1	160.6	161.1	161.6	162.1
680.7	162.6	163.1	163.6	164.1	164.6	165.1	165.6	166.1	166.7	167.2
680.8	167.7	168.2	168.7	169.2	169.8	170.3	170.8	171.3	171.9	172.4
680.9	172.9	173.4	174.0	174.5	175.0	175.6	176.1	176.6	177.2	177.7
681.0	178.3	178.8	179.4	179.9	180.4	181.0	181.5	182.1	182.6	183.2
681.1	183.7	184.3	184.9	185.4	186.0	186.5	187.1	187.7	188.2	188.8
681.2	189.3	189.9	190.5	191.0	191.6	192.2	192.8	193.3	193.9	194.5
681.3	195.1	195.6	196.2	196.8	197.4	198.0	198.6	199.1	199.7	200.3
681.4	200.9	201.5	202.1	202.7	203.3	203.9	204.5	205.1	205.7	206.3
681.5	206.9	207.5	208.1	208.7	209.3	209.9	210.5	211.1	211.7	212.4
681.6	213.0	213.6	214.2	214.8	215.5	216.1	216.7	217.3	217.9	218.6
681.7	219.2	219.8	220.5	221.1	221.7	222.4	223.0	223.6	224.3	224.9
681.8	225.5	226.2	226.8	227.5	228.1	228.8	229.4	230.0	230.7	231.3
681.9	232.0	232.7	233.3	234.0	234.6	235.3	235.9	236.6	237.3	237.9
682.0	238.6	239.3	239.9	240.6	241.3	241.9	242.6	243.3	244.0	244.7
682.1	245.3	246.0	246.7	247.4	248.1	248.8	249.5	250.2	250.9	251.6
682.2	252.3	253.0	253.7	254.4	255.1	255.8	256.5	257.3	258.0	258.7
682.3	259.4	260.1	260.9	261.6	262.3	263.1	263.8	264.5	265.3	266.0
682.4	266.8	267.5	268.2	269.0	269.7	270.5	271.2	272.0	272.8	273.5
682.5	274.3	275.0	275.8	276.6	277.3	278.1	278.9	279.7	280.4	281.2
682.6	282.0	282.8	283.6	284.4	285.1	285.9	286.7	287.5	288.3	289.1
682.7	289.9	290.7	291.5	292.3	293.1	293.9	294.8	295.6	296.4	297.2
682.8	298.0	298.9	299.7	300.5	301.3	302.2	303.0	303.8	304.7	305.5
682.9	306.3	307.2	308.0	308.9	309.7	310.6	311.4	312.3	313.1	314.0
683.0	314.8	315.7	316.6	317.4	318.3	319.2	320.0	320.9	321.8	322.7
683.1	323.5	324.4	325.3	326.2	327.1	328.0	328.8	329.7	330.6	331.5
683.2	332.4	333.3	334.2	335.1	336.0	336.9	337.9	338.8	339.7	340.6
683.3	341.5	342.4	343.4	344.3	345.2	346.1	347.1	348.0	348.9	349.9
683.4	350.8	351.7	352.7	353.6	354.6	355.5	356.5	357.4	358.4	359.3
683.5	360.3	361.2	362.2	363.2	364.1	365.1	366.1	367.0	368.0	369.0
683.6	370.0	370.9	371.9	372.9	373.9	374.9	375.8	376.8	377.8	378.8
683.7	379.8	380.8	381.8	382.8	383.8	384.8	385.8	386.8	387.9	388.9
683.8	389.9	390.9	391.9	392.9	394.0	395.0	396.0	397.0	398.1	399.1
683.9	400.1	401.2	402.2	403.3	404.3	405.3	406.4	407.4	408.5	409.5

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
684.0	410.6	411.6	412.7	413.8	414.8	415.9	417.0	418.1	419.1	420.2
684.1	421.3	422.4	423.5	424.6	425.7	426.8	427.9	429.0	430.2	431.3
684.2	432.4	433.5	434.7	435.8	437.0	438.1	439.2	440.4	441.6	442.7
684.3	443.9	445.0	446.2	447.4	448.6	449.7	450.9	452.1	453.3	454.5
684.4	455.7	456.9	458.1	459.3	460.5	461.7	463.0	464.2	465.4	466.6
684.5	467.9	469.1	470.4	471.6	472.9	474.1	475.4	476.6	477.9	479.2
684.6	480.4	481.7	483.0	484.3	485.5	486.8	488.1	489.4	490.7	492.0
684.7	493.3	494.6	496.0	497.3	498.6	499.9	501.3	502.6	503.9	505.3
684.8	506.6	507.9	509.3	510.7	512.0	513.4	514.7	516.1	517.5	518.9
684.9	520.2	521.6	523.0	524.4	525.8	527.2	528.6	530.0	531.4	532.8
685.0	534.2	535.7	537.1	538.5	539.9	541.4	542.8	544.2	545.7	547.1
685.1	548.6	550.1	551.5	553.0	554.4	555.9	557.4	558.9	560.3	561.8
685.2	563.3	564.8	566.3	567.8	569.3	570.8	572.3	573.8	575.4	576.9
685.3	578.4	579.9	581.5	583.0	584.5	586.1	587.6	589.2	590.7	592.3
685.4	593.9	595.4	597.0	598.6	600.1	601.7	603.3	604.9	606.5	608.1
685.5	609.7	611.3	612.9	614.5	616.1	617.7	619.3	621.0	622.6	624.2
685.6	625.8	627.5	629.1	630.8	632.4	634.1	635.7	637.4	639.0	640.7
685.7	642.4	644.1	645.7	647.4	649.1	650.8	652.5	654.2	655.9	657.6
685.8	659.3	661.0	662.7	664.4	666.1	667.9	669.6	671.3	673.1	674.8
685.9	676.5	678.3	680.0	681.8	683.6	685.3	687.1	688.8	690.6	692.4
686.0	694.2	696.0	697.7	699.5	701.3	703.1	704.9	706.7	708.5	710.3
686.1	712.1	713.9	715.8	717.6	719.4	721.2	723.1	724.9	726.7	728.6
686.2	730.4	732.2	734.1	735.9	737.8	739.6	741.5	743.4	745.2	747.1
686.3	749.0	750.8	752.7	754.6	756.5	758.4	760.2	762.1	764.0	765.9
686.4	767.8	769.7	771.6	773.5	775.5	777.4	779.3	781.2	783.1	785.1
686.5	787.0	788.9	790.9	792.8	794.7	796.7	798.6	800.6	802.6	804.5
686.6	806.5	808.4	810.4	812.4	814.3	816.3	818.3	820.3	822.3	824.3
686.7	826.2	828.2	830.2	832.2	834.2	836.2	838.3	840.3	842.3	844.3
686.8	846.3	848.4	850.4	852.4	854.4	856.5	858.5	860.6	862.6	864.7
686.9	866.7	868.8	870.8	872.9	874.9	877.0	879.1	881.2	883.2	885.3
687.0	887.4	889.5	891.6	893.7	895.8	897.9	900.0	902.1	904.2	906.3
687.1	908.4	910.5	912.6	914.7	916.9	919.0	921.1	923.3	925.4	927.5
687.2	929.7	931.8	934.0	936.1	938.3	940.4	942.6	944.8	946.9	949.1
687.3	951.3	953.4	955.6	957.8	960.0	962.2	964.4	966.6	968.8	971.0
687.4	973.2	975.4	977.6	979.8	982.0	984.2	986.4	988.7	990.9	993.1
687.5	995.4	997.6	999.8	1002.1	1004.3	1006.6	1008.8	1011.1	1013.3	1015.6
687.6	1017.9	1020.1	1022.4	1024.7	1027.0	1029.2	1031.5	1033.8	1036.1	1038.4
687.7	1040.7	1043.0	1045.3	1047.6	1049.9	1052.2	1054.5	1056.8	1059.1	1061.5
687.8	1063.8	1066.1	1068.4	1070.8	1073.1	1075.5	1077.8	1080.1	1082.5	1084.8
687.9	1087.2	1089.6	1091.9	1094.3	1096.6	1099.0	1101.4	1103.8	1106.1	1108.5

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
688.0	1110.9	1113.3	1115.7	1118.1	1120.5	1122.9	1125.3	1127.7	1130.1	1132.5
688.1	1135.0	1137.4	1139.8	1142.2	1144.7	1147.1	1149.5	1152.0	1154.4	1156.9
688.2	1159.3	1161.8	1164.3	1166.7	1169.2	1171.7	1174.2	1176.6	1179.1	1181.6
688.3	1184.1	1186.6	1189.1	1191.6	1194.1	1196.6	1199.1	1201.6	1204.2	1206.7
688.4	1209.2	1211.7	1214.3	1216.8	1219.3	1221.9	1224.4	1227.0	1229.5	1232.1
688.5	1234.7	1237.2	1239.8	1242.4	1244.9	1247.5	1250.1	1252.7	1255.3	1257.9
688.6	1260.5	1263.1	1265.7	1268.3	1270.9	1273.5	1276.1	1278.7	1281.4	1284.0
688.7	1286.6	1289.3	1291.9	1294.5	1297.2	1299.8	1302.5	1305.2	1307.8	1310.5
688.8	1313.1	1315.8	1318.5	1321.2	1323.8	1326.5	1329.2	1331.9	1334.6	1337.3
688.9	1340.0	1342.7	1345.4	1348.1	1350.9	1353.6	1356.3	1359.0	1361.8	1364.5
689.0	1367.2	1370.0	1372.7	1375.5	1378.2	1381.0	1383.7	1386.5	1389.3	1392.0
689.1	1394.8	1397.6	1400.4	1403.1	1405.9	1408.7	1411.5	1414.3	1417.1	1419.9
689.2	1422.7	1425.5	1428.4	1431.2	1434.0	1436.8	1439.7	1442.5	1445.3	1448.2
689.3	1451.0	1453.9	1456.7	1459.6	1462.4	1465.3	1468.2	1471.0	1473.9	1476.8
689.4	1479.7	1482.5	1485.4	1488.3	1491.2	1494.1	1497.0	1499.9	1502.8	1505.7
689.5	1508.6	1511.6	1514.5	1517.4	1520.3	1523.3	1526.2	1529.1	1532.1	1535.0
689.6	1538.0	1540.9	1543.9	1546.9	1549.8	1552.8	1555.8	1558.7	1561.7	1564.7
689.7	1567.7	1570.7	1573.7	1576.7	1579.7	1582.7	1585.7	1588.7	1591.7	1594.7
689.8	1597.7	1600.7	1603.8	1606.8	1609.8	1612.9	1615.9	1619.0	1622.0	1625.1
689.9	1628.1	1631.2	1634.2	1637.3	1640.4	1643.5	1646.5	1649.6	1652.7	1655.8
690.0	1658.9	1662.0	1665.1	1668.2	1671.3	1674.4	1677.5	1680.6	1683.8	1686.9
690.1	1690.0	1693.2	1696.3	1699.4	1702.6	1705.7	1708.9	1712.1	1715.2	1718.4
690.2	1721.6	1724.7	1727.9	1731.1	1734.3	1737.5	1740.7	1743.9	1747.1	1750.3
690.3	1753.5	1756.7	1760.0	1763.2	1766.4	1769.6	1772.9	1776.1	1779.4	1782.6
690.4	1785.9	1789.1	1792.4	1795.7	1798.9	1802.2	1805.5	1808.8	1812.1	1815.4
690.5	1818.7	1822.0	1825.3	1828.6	1831.9	1835.2	1838.5	1841.8	1845.2	1848.5
690.6	1851.8	1855.2	1858.5	1861.9	1865.2	1868.6	1872.0	1875.3	1878.7	1882.1
690.7	1885.4	1888.8	1892.2	1895.6	1899.0	1902.4	1905.8	1909.2	1912.6	1916.0
690.8	1919.4	1922.9	1926.3	1929.7	1933.2	1936.6	1940.0	1943.5	1946.9	1950.4
690.9	1953.9	1957.3	1960.8	1964.3	1967.7	1971.2	1974.7	1978.2	1981.7	1985.2
691.0	1988.7	1992.2	1995.7	1999.2	2002.7	2006.2	2009.8	2013.3	2016.8	2020.4
691.1	2023.9	2027.5	2031.0	2034.6	2038.1	2041.7	2045.3	2048.8	2052.4	2056.0
691.2	2059.6	2063.1	2066.7	2070.3	2073.9	2077.5	2081.1	2084.8	2088.4	2092.0
691.3	2095.6	2099.2	2102.9	2106.5	2110.2	2113.8	2117.4	2121.1	2124.8	2128.4
691.4	2132.1	2135.7	2139.4	2143.1	2146.8	2150.5	2154.2	2157.8	2161.5	2165.2
691.5	2169.0	2172.7	2176.4	2180.1	2183.8	2187.5	2191.3	2195.0	2198.7	2202.5
691.6	2206.2	2210.0	2213.7	2217.5	2221.3	2225.0	2228.8	2232.6	2236.4	2240.1
691.7	2243.9	2247.7	2251.5	2255.3	2259.1	2262.9	2266.7	2270.6	2274.4	2278.2
691.8	2282.0	2285.9	2289.7	2293.5	2297.4	2301.2	2305.1	2308.9	2312.8	2316.7
691.9	2320.5	2324.4	2328.3	2332.2	2336.1	2340.0	2343.9	2347.8	2351.7	2355.6

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
692.0	2359.5	2363.4	2367.3	2371.2	2375.2	2379.1	2383.0	2386.9	2390.9	2394.8
692.1	2398.8	2402.7	2406.7	2410.6	2414.6	2418.6	2422.5	2426.5	2430.5	2434.5
692.2	2438.5	2442.4	2446.4	2450.4	2454.4	2458.4	2462.4	2466.4	2470.5	2474.5
692.3	2478.5	2482.5	2486.5	2490.6	2494.6	2498.7	2502.7	2506.7	2510.8	2514.8
692.4	2518.9	2523.0	2527.0	2531.1	2535.2	2539.2	2543.3	2547.4	2551.5	2555.6
692.5	2559.7	2563.8	2567.9	2572.0	2576.1	2580.2	2584.3	2588.4	2592.6	2596.7
692.6	2600.8	2604.9	2609.1	2613.2	2617.4	2621.5	2625.7	2629.8	2634.0	2638.1
692.7	2642.3	2646.5	2650.7	2654.8	2659.0	2663.2	2667.4	2671.6	2675.8	2680.0
692.8	2684.2	2688.4	2692.6	2696.8	2701.0	2705.3	2709.5	2713.7	2717.9	2722.2
692.9	2726.4	2730.7	2734.9	2739.2	2743.4	2747.7	2751.9	2756.2	2760.5	2764.7
693.0	2769.0	2773.3	2777.6	2781.9	2786.2	2790.5	2794.7	2799.1	2803.4	2807.7
693.1	2812.0	2816.3	2820.6	2824.9	2829.3	2833.6	2837.9	2842.3	2846.6	2851.0
693.2	2855.3	2859.7	2864.0	2868.4	2872.7	2877.1	2881.5	2885.9	2890.2	2894.6
693.3	2899.0	2903.4	2907.8	2912.2	2916.6	2921.0	2925.4	2929.8	2934.2	2938.6
693.4	2943.1	2947.5	2951.9	2956.4	2960.8	2965.2	2969.7	2974.1	2978.6	2983.0
693.5	2987.5	2991.9	2996.4	3000.9	3005.4	3009.8	3014.3	3018.8	3023.3	3027.8
693.6	3032.3	3036.8	3041.3	3045.8	3050.3	3054.8	3059.3	3063.8	3068.4	3072.9
693.7	3077.4	3082.0	3086.5	3091.0	3095.6	3100.1	3104.7	3109.3	3113.8	3118.4
693.8	3123.0	3127.5	3132.1	3136.7	3141.3	3145.8	3150.4	3155.0	3159.6	3164.2
693.9	3168.8	3173.4	3178.1	3182.7	3187.3	3191.9	3196.5	3201.2	3205.8	3210.4
694.0	3215.1	3219.7	3224.4	3229.0	3233.7	3238.4	3243.0	3247.7	3252.4	3257.1
694.1	3261.7	3266.4	3271.1	3275.8	3280.5	3285.2	3289.9	3294.7	3299.4	3304.1
694.2	3308.8	3313.6	3318.3	3323.1	3327.8	3332.6	3337.3	3342.1	3346.8	3351.6
694.3	3356.4	3361.2	3365.9	3370.7	3375.5	3380.3	3385.1	3389.9	3394.7	3399.5
694.4	3404.3	3409.2	3414.0	3418.8	3423.7	3428.5	3433.3	3438.2	3443.0	3447.9
694.5	3452.8	3457.6	3462.5	3467.4	3472.3	3477.1	3482.0	3486.9	3491.8	3496.7
694.6	3501.6	3506.5	3511.4	3516.4	3521.3	3526.2	3531.1	3536.1	3541.0	3546.0
694.7	3550.9	3555.9	3560.8	3565.8	3570.8	3575.7	3580.7	3585.7	3590.7	3595.7
694.8	3600.7	3605.6	3610.7	3615.7	3620.7	3625.7	3630.7	3635.7	3640.8	3645.8
694.9	3650.8	3655.9	3660.9	3666.0	3671.0	3676.1	3681.1	3686.2	3691.3	3696.4
695.0	3701.4	3706.5	3711.6	3716.7	3721.8	3726.9	3732.0	3737.1	3742.3	3747.4
695.1	3752.5	3757.6	3762.8	3767.9	3773.0	3778.2	3783.3	3788.5	3793.7	3798.8
695.2	3804.0	3809.2	3814.3	3819.5	3824.7	3829.9	3835.1	3840.3	3845.5	3850.7
695.3	3855.9	3861.2	3866.4	3871.6	3876.8	3882.1	3887.3	3892.6	3897.8	3903.1
695.4	3908.3	3913.6	3918.8	3924.1	3929.4	3934.7	3939.9	3945.2	3950.5	3955.8
695.5	3961.1	3966.4	3971.7	3977.1	3982.4	3987.7	3993.0	3998.4	4003.7	4009.0
695.6	4014.4	4019.7	4025.1	4030.4	4035.8	4041.2	4046.6	4051.9	4057.3	4062.7
695.7	4068.1	4073.5	4078.9	4084.3	4089.7	4095.1	4100.5	4105.9	4111.4	4116.8
695.8	4122.2	4127.7	4133.1	4138.5	4144.0	4149.5	4154.9	4160.4	4165.9	4171.3
695.9	4176.8	4182.3	4187.8	4193.3	4198.8	4204.3	4209.8	4215.3	4220.8	4226.3

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
696.0	4231.8	4237.3	4242.9	4248.4	4254.0	4259.5	4265.1	4270.6	4276.2	4281.7
696.1	4287.3	4292.9	4298.5	4304.1	4309.6	4315.2	4320.8	4326.4	4332.1	4337.7
696.2	4343.3	4348.9	4354.6	4360.2	4365.8	4371.5	4377.1	4382.8	4388.4	4394.1
696.3	4399.8	4405.5	4411.1	4416.8	4422.5	4428.2	4433.9	4439.6	4445.3	4451.0
696.4	4456.8	4462.5	4468.2	4474.0	4479.7	4485.5	4491.2	4497.0	4502.7	4508.5
696.5	4514.3	4520.0	4525.8	4531.6	4537.4	4543.2	4549.0	4554.8	4560.6	4566.4
696.6	4572.2	4578.1	4583.9	4589.7	4595.6	4601.4	4607.3	4613.1	4619.0	4624.9
696.7	4630.7	4636.6	4642.5	4648.4	4654.3	4660.2	4666.1	4672.0	4677.9	4683.8
696.8	4689.7	4695.6	4701.6	4707.5	4713.4	4719.4	4725.3	4731.3	4737.3	4743.2
696.9	4749.2	4755.2	4761.1	4767.1	4773.1	4779.1	4785.1	4791.1	4797.1	4803.2
697.0	4809.2	4815.2	4821.2	4827.3	4833.3	4839.4	4845.4	4851.5	4857.5	4863.6
697.1	4869.7	4875.7	4881.8	4887.9	4894.0	4900.1	4906.2	4912.3	4918.4	4924.5
697.2	4930.6	4936.8	4942.9	4949.0	4955.2	4961.3	4967.5	4973.6	4979.8	4985.9
697.3	4992.1	4998.3	5004.5	5010.7	5016.8	5023.0	5029.2	5035.5	5041.7	5047.9
697.4	5054.1	5060.3	5066.6	5072.8	5079.0	5085.3	5091.5	5097.8	5104.0	5110.3
697.5	5116.6	5122.9	5129.1	5135.4	5141.7	5148.0	5154.3	5160.6	5166.9	5173.2
697.6	5179.6	5185.9	5192.2	5198.5	5204.9	5211.2	5217.6	5223.9	5230.3	5236.7
697.7	5243.0	5249.4	5255.8	5262.2	5268.6	5275.0	5281.4	5287.8	5294.2	5300.6
697.8	5307.0	5313.4	5319.9	5326.3	5332.7	5339.2	5345.6	5352.1	5358.5	5365.0
697.9	5371.5	5378.0	5384.4	5390.9	5397.4	5403.9	5410.4	5416.9	5423.4	5429.9
698.0	5436.5	5443.0	5449.5	5456.1	5462.6	5469.1	5475.7	5482.3	5488.8	5495.4
698.1	5502.0	5508.6	5515.1	5521.7	5528.3	5535.0	5541.6	5548.2	5554.8	5561.4
698.2	5568.1	5574.7	5581.4	5588.0	5594.7	5601.3	5608.0	5614.7	5621.4	5628.1
698.3	5634.7	5641.4	5648.1	5654.9	5661.6	5668.3	5675.0	5681.8	5688.5	5695.2
698.4	5702.0	5708.8	5715.5	5722.3	5729.1	5735.8	5742.6	5749.4	5756.2	5763.0
698.5	5769.8	5776.7	5783.5	5790.3	5797.1	5804.0	5810.8	5817.7	5824.5	5831.4
698.6	5838.3	5845.1	5852.0	5858.9	5865.8	5872.7	5879.6	5886.5	5893.4	5900.3
698.7	5907.2	5914.2	5921.1	5928.1	5935.0	5942.0	5948.9	5955.9	5962.9	5969.8
698.8	5976.8	5983.8	5990.8	5997.8	6004.8	6011.8	6018.8	6025.9	6032.9	6039.9
698.9	6047.0	6054.0	6061.1	6068.1	6075.2	6082.3	6089.3	6096.4	6103.5	6110.6
699.0	6117.7	6124.8	6131.9	6139.0	6146.2	6153.3	6160.4	6167.5	6174.7	6181.9
699.1	6189.0	6196.2	6203.4	6210.5	6217.7	6224.9	6232.1	6239.3	6246.5	6253.7
699.2	6260.9	6268.1	6275.4	6282.6	6289.8	6297.1	6304.3	6311.6	6318.9	6326.1
699.3	6333.4	6340.7	6348.0	6355.3	6362.5	6369.9	6377.2	6384.5	6391.8	6399.1
699.4	6406.5	6413.8	6421.1	6428.5	6435.8	6443.2	6450.6	6457.9	6465.3	6472.7
699.5	6480.1	6487.5	6494.9	6502.3	6509.7	6517.1	6524.5	6532.0	6539.4	6546.9
699.6	6554.3	6561.8	6569.2	6576.7	6584.1	6591.6	6599.1	6606.6	6614.1	6621.6
699.7	6629.1	6636.6	6644.1	6651.6	6659.2	6666.7	6674.3	6681.8	6689.3	6696.9
699.8	6704.5	6712.0	6719.6	6727.2	6734.8	6742.4	6750.0	6757.6	6765.2	6772.8
699.9	6780.4	6788.1	6795.7	6803.3	6811.0	6818.6	6826.3	6833.9	6841.6	6849.3

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS — ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
700.0	6857.0	6864.6	6872.3	6880.0	6887.7	6895.4	6903.1	6910.8	6918.6	6926.3
700.1	6934.0	6941.7	6949.5	6957.2	6965.0	6972.7	6980.5	6988.2	6996.0	7003.8
700.2	7011.5	7019.3	7027.1	7034.9	7042.7	7050.5	7058.3	7066.1	7073.9	7081.7
700.3	7089.5	7097.3	7105.1	7113.0	7120.8	7128.7	7136.5	7144.3	7152.2	7160.1
700.4	7167.9	7175.8	7183.7	7191.5	7199.4	7207.3	7215.2	7223.1	7231.0	7238.9
700.5	7246.8	7254.7	7262.6	7270.6	7278.5	7286.4	7294.4	7302.3	7310.3	7318.2
700.6	7326.2	7334.1	7342.1	7350.1	7358.0	7366.0	7374.0	7382.0	7390.0	7398.0
700.7	7406.0	7414.0	7422.0	7430.0	7438.0	7446.0	7454.1	7462.1	7470.1	7478.2
700.8	7486.2	7494.3	7502.3	7510.4	7518.5	7526.5	7534.6	7542.7	7550.8	7558.8
700.9	7566.9	7575.0	7583.1	7591.2	7599.4	7607.5	7615.6	7623.7	7631.8	7640.0
701.0	7648.1	7656.3	7664.4	7672.6	7680.7	7688.9	7697.0	7705.2	7713.4	7721.6
701.1	7729.8	7737.9	7746.1	7754.3	7762.5	7770.7	7779.0	7787.2	7795.4	7803.6
701.2	7811.9	7820.1	7828.3	7836.6	7844.8	7853.1	7861.3	7869.6	7877.9	7886.1
701.3	7894.4	7902.7	7911.0	7919.3	7927.6	7935.9	7944.2	7952.5	7960.8	7969.1
701.4	7977.4	7985.7	7994.1	8002.4	8010.7	8019.1	8027.4	8035.8	8044.2	8052.5
701.5	8060.9	8069.3	8077.6	8086.0	8094.4	8102.8	8111.2	8119.6	8128.0	8136.4
701.6	8144.8	8153.2	8161.7	8170.1	8178.5	8186.9	8195.4	8203.8	8212.3	8220.7
701.7	8229.2	8237.7	8246.1	8254.6	8263.1	8271.6	8280.0	8288.5	8297.0	8305.5
701.8	8314.0	8322.5	8331.1	8339.6	8348.1	8356.6	8365.2	8373.7	8382.2	8390.8
701.9	8399.3	8407.9	8416.5	8425.0	8433.6	8442.2	8450.7	8459.3	8467.9	8476.5
702.0	8485.1	8493.7	8502.3	8510.9	8519.5	8528.2	8536.8	8545.5	8554.1	8562.8
702.1	8571.4	8580.1	8588.8	8597.4	8606.1	8614.8	8623.5	8632.2	8641.0	8649.7
702.2	8658.4	8667.1	8675.9	8684.6	8693.4	8702.1	8710.9	8719.7	8728.5	8737.3
702.3	8746.0	8754.9	8763.7	8772.5	8781.3	8790.1	8799.0	8807.8	8816.6	8825.5
702.4	8834.4	8843.2	8852.1	8861.0	8869.9	8878.8	8887.7	8896.6	8905.5	8914.4
702.5	8923.3	8932.3	8941.2	8950.2	8959.1	8968.1	8977.0	8986.0	8995.0	9004.0
702.6	9013.0	9022.0	9031.0	9040.0	9049.0	9058.0	9067.1	9076.1	9085.2	9094.2
702.7	9103.3	9112.3	9121.4	9130.5	9139.6	9148.7	9157.8	9166.9	9176.0	9185.1
702.8	9194.2	9203.4	9212.5	9221.6	9230.8	9240.0	9249.1	9258.3	9267.5	9276.7
702.9	9285.8	9295.0	9304.3	9313.5	9322.7	9331.9	9341.1	9350.4	9359.6	9368.9
703.0	9378.1	9387.4	9396.7	9405.9	9415.2	9424.5	9433.8	9443.1	9452.4	9461.8
703.1	9471.1	9480.4	9489.8	9499.1	9508.4	9517.8	9527.2	9536.5	9545.9	9555.3
703.2	9564.7	9574.1	9583.5	9592.9	9602.3	9611.7	9621.2	9630.6	9640.1	9649.5
703.3	9659.0	9668.4	9677.9	9687.4	9696.9	9706.4	9715.9	9725.4	9734.9	9744.4
703.4	9753.9	9763.4	9773.0	9782.5	9792.1	9801.6	9811.2	9820.8	9830.3	9839.9
703.5	9849.5	9859.1	9868.7	9878.3	9887.9	9897.6	9907.2	9916.8	9926.5	9936.1
703.6	9945.8	9955.4	9965.1	9974.8	9984.5	9994.1	10003.8	10013.5	10023.3	10033.0
703.7	10042.7	10052.4	10062.2	10071.9	10081.7	10091.4	10101.2	10110.9	10120.7	10130.5
703.8	10140.3	10150.1	10159.9	10169.7	10179.5	10189.3	10199.2	10209.0	10218.8	10228.7
703.9	10238.5	10248.4	10258.3	10268.1	10278.0	10287.9	10297.8	10307.7	10317.6	10327.5

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
704.0	10337.5	10347.4	10357.3	10367.3	10377.2	10387.2	10397.1	10407.1	10417.1	10427.0
704.1	10437.0	10447.0	10457.0	10467.0	10477.1	10487.1	10497.1	10507.2	10517.2	10527.2
704.2	10537.	10547.	10557.	10568.	10578.	10588.	10598.	10608.	10618.	10628.
704.3	10638.	10648.	10659.	10669.	10679.	10689.	10699.	10709.	10719.	10730.
704.4	10740.	10750.	10760.	10770.	10781.	10791.	10801.	10811.	10822.	10832.
704.5	10842.	10852.	10863.	10873.	10883.	10894.	10904.	10914.	10925.	10935.
704.6	10945.	10956.	10966.	10976.	10987.	10997.	11007.	11018.	11028.	11038.
704.7	11049.	11059.	11070.	11080.	11090.	11101.	11111.	11122.	11132.	11143.
704.8	11153.	11164.	11174.	11185.	11195.	11206.	11214.	11227.	11237.	11248.
704.9	11258.	11269.	11279.	11290.	11300.	11311.	11322.	11332.	11343.	11353.
705.0	11364.	11375.	11385.	11396.	11406.	11417.	11428.	11438.	11449.	11460.
705.1	11470.	11481.	11492.	11502.	11513.	11524.	11534.	11545.	11556.	11567.
705.2	11577.	11588.	11599.	11610.	11620.	11631.	11642.	11653.	11664.	11674.
705.3	11685.	11696.	11707.	11718.	11728.	11739.	11750.	11761.	11772.	11783.
705.4	11794.	11804.	11815.	11826.	11837.	11848.	11859.	11870.	11881.	11892.
705.5	11903.	11914.	11925.	11936.	11947.	11957.	11968.	11979.	11990.	12001.
705.6	12012.	12023.	12034.	12046.	12057.	12068.	12079.	12090.	12101.	12112.
705.7	12123.	12134.	12145.	12156.	12167.	12178.	12190.	12201.	12212.	12223.
705.8	12234.	12245.	12256.	12268.	12279.	12290.	12301.	12312.	12323.	12335.
705.9	12346.	12357.	12368.	12380.	12391.	12402.	12413.	12425.	12436.	12447.
706.0	12458.	12470.	12481.	12492.	12504.	12515.	12526.	12538.	12549.	12560.
706.1	12572.	12583.	12594.	12606.	12617.	12628.	12640.	12651.	12662.	12674.
706.2	12685.	12697.	12708.	12720.	12731.	12742.	12754.	12765.	12777.	12788.
706.3	12800.	12811.	12823.	12834.	12845.	12857.	12868.	12880.	12891.	12903.
706.4	12914.	12926.	12938.	12949.	12961.	12972.	12984.	12995.	13007.	13018.
706.5	13030.	13042.	13053.	13065.	13076.	13088.	13100.	13111.	13123.	13134.
706.6	13146.	13158.	13169.	13181.	13193.	13204.	13216.	13228.	13239.	13251.
706.7	13263.	13274.	13286.	13298.	13309.	13321.	13333.	13345.	13356.	1336A.
706.8	13380.	13392.	13403.	13415.	13427.	13439.	13450.	13462.	13474.	13486.
706.9	1349A.	13509.	13521.	13533.	13545.	13557.	13569.	13580.	13592.	13604.
707.0	13616.	13628.	13640.	13652.	13664.	13675.	13687.	13699.	13711.	13723.
707.1	13735.	13747.	13759.	13771.	13783.	13795.	13807.	13819.	13831.	13843.
707.2	13855.	13867.	13879.	13891.	13903.	13915.	13927.	13939.	13951.	13963.
707.3	13975.	13987.	13999.	14011.	14023.	14035.	14047.	14059.	14071.	14083.
707.4	14095.	14108.	14120.	14132.	14144.	14156.	14168.	14180.	14192.	14205.
707.5	14217.	14229.	14241.	14253.	14265.	14278.	14290.	14302.	14314.	14326.
707.6	14339.	14351.	14363.	14375.	14388.	14400.	14412.	14424.	14437.	14449.
707.7	14461.	14473.	14486.	14498.	14510.	14523.	14535.	14547.	14559.	14572.
707.8	14584.	14596.	14609.	14621.	14633.	14646.	14658.	14671.	14683.	14695.
707.9	1470A.	14720.	14733.	14745.	14757.	14770.	14782.	14795.	14807.	14820.

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
708.0	14832.	14844.	14857.	14869.	14882.	14894.	14907.	14919.	14932.	14944.
708.1	14957.	14969.	14982.	14994.	15007.	15019.	15032.	15044.	15057.	15069.
708.2	15082.	15095.	15107.	15120.	15132.	15145.	15157.	15170.	15183.	15195.
708.3	15208.	15220.	15233.	15246.	15258.	15271.	15283.	15296.	15309.	15321.
708.4	15334.	15347.	15359.	15372.	15385.	15397.	15410.	15423.	15435.	15448.
708.5	15461.	15474.	15486.	15499.	15512.	15524.	15537.	15550.	15563.	15575.
708.6	15588.	15601.	15614.	15626.	15639.	15652.	15665.	15678.	15690.	15703.
708.7	15716.	15729.	15742.	15754.	15767.	15780.	15793.	15806.	15819.	15832.
708.8	15844.	15857.	15870.	15883.	15896.	15909.	15922.	15935.	15947.	15960.
708.9	15973.	15986.	15999.	16012.	16025.	16038.	16051.	16064.	16077.	16090.
709.0	16103.	16116.	16129.	16142.	16155.	16167.	16180.	16193.	16206.	16219.
709.1	16232.	16246.	16259.	16272.	16285.	16298.	16311.	16324.	16337.	16350.
709.2	16363.	16376.	16389.	16402.	16415.	16428.	16441.	16454.	16468.	16481.
709.3	16494.	16507.	16520.	16533.	16546.	16559.	16573.	16586.	16599.	16612.
709.4	16625.	16638.	16652.	16665.	16678.	16691.	16704.	16718.	16731.	16744.
709.5	16757.	16770.	16784.	16797.	16810.	16823.	16837.	16850.	16863.	16876.
709.6	16890.	16903.	16916.	16929.	16943.	16956.	16969.	16983.	16996.	17009.
709.7	17023.	17036.	17049.	17063.	17076.	17089.	17103.	17116.	17129.	17143.
709.8	17156.	17169.	17183.	17196.	17210.	17223.	17236.	17250.	17263.	17277.
709.9	17290.	17303.	17317.	17330.	17344.	17357.	17371.	17384.	17398.	17411.
710.0	17425.	17438.	17452.	17465.	17478.	17492.	17505.	17519.	17533.	17546.
710.1	17560.	17573.	17587.	17600.	17614.	17627.	17641.	17654.	17668.	17682.
710.2	17695.	17709.	17722.	17736.	17749.	17763.	17777.	17790.	17804.	17818.
710.3	17831.	17845.	17858.	17872.	17886.	17899.	17913.	17927.	17940.	17954.
710.4	17968.	17981.	17995.	18009.	18023.	18036.	18050.	18064.	18077.	18091.
710.5	18105.	18119.	18132.	18146.	18160.	18174.	18187.	18201.	18215.	18229.
710.6	18243.	18256.	18270.	18284.	18298.	18312.	18325.	18339.	18353.	18367.
710.7	18381.	18395.	18409.	18422.	18436.	18450.	18464.	18478.	18492.	18506.
710.8	18520.	18533.	18547.	18561.	18575.	18589.	18603.	18617.	18631.	18645.
710.9	18659.	18673.	18687.	18701.	18715.	18729.	18743.	18757.	18771.	18785.
711.0	18799.	18813.	18827.	18841.	18855.	18869.	18883.	18897.	18911.	18925.
711.1	18939.	18953.	18967.	18981.	18995.	19009.	19023.	19037.	19051.	19066.
711.2	19080.	19094.	19108.	19122.	19136.	19150.	19164.	19179.	19193.	19207.
711.3	19221.	19235.	19249.	19264.	19278.	19292.	19306.	19320.	19335.	19349.
711.4	19363.	19377.	19391.	19406.	19420.	19434.	19448.	19463.	19477.	19491.
711.5	19505.	19520.	19534.	19548.	19562.	19577.	19591.	19605.	19620.	19634.
711.6	19648.	19663.	19677.	19691.	19706.	19720.	19734.	19749.	19763.	19777.
711.7	19792.	19806.	19821.	19835.	19849.	19864.	19878.	19893.	19907.	19921.
711.8	19936.	19950.	19965.	19979.	19994.	20008.	20022.	20037.	20051.	20066.
711.9	20080.	20095.	20109.	20124.	20138.	20153.	20167.	20182.	20196.	20211.

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
712.0	20225.	20240.	20254.	20269.	20284.	20298.	20313.	20327.	20342.	20356.
712.1	20371.	20386.	20400.	20415.	20429.	20444.	20459.	20473.	20488.	20502.
712.2	20517.	20532.	20546.	20561.	20576.	20590.	20605.	20620.	20634.	20649.
712.3	20664.	20678.	20693.	20708.	20722.	20737.	20752.	20767.	20781.	20796.
712.4	20811.	20825.	20840.	20855.	20870.	20884.	20899.	20914.	20929.	20943.
712.5	20958.	20973.	20988.	21003.	21017.	21032.	21047.	21062.	21077.	21092.
712.6	21106.	21121.	21136.	21151.	21166.	21181.	21195.	21210.	21225.	21240.
712.7	21255.	21270.	21285.	21300.	21315.	21329.	21344.	21359.	21374.	21389.
712.8	21404.	21419.	21434.	21449.	21464.	21479.	21494.	21509.	21524.	21539.
712.9	21554.	21569.	21584.	21599.	21614.	21629.	21644.	21659.	21674.	21689.
713.0	21704.	21719.	21734.	21749.	21764.	21779.	21794.	21809.	21824.	21839.
713.1	21854.	21869.	21884.	21900.	21915.	21930.	21945.	21960.	21975.	21990.
713.2	22005.	22021.	22036.	22051.	22066.	22081.	22096.	22111.	22127.	22142.
713.3	22157.	22172.	22187.	22203.	22218.	22233.	22248.	22263.	22279.	22294.
713.4	22309.	22324.	22340.	22355.	22370.	22385.	22401.	22416.	22431.	22446.
713.5	22462.	22477.	22492.	22508.	22523.	22538.	22554.	22569.	22584.	22599.
713.6	22615.	22630.	22645.	22661.	22676.	22692.	22707.	22722.	22738.	22753.
713.7	22768.	22784.	22799.	22815.	22830.	22845.	22861.	22876.	22892.	22907.
713.8	22923.	22938.	22953.	22969.	22984.	23000.	23015.	23031.	23046.	23062.
713.9	23077.	23093.	23108.	23124.	23139.	23155.	23170.	23186.	23201.	23217.
714.0	23232.	23248.	23263.	23279.	23294.	23310.	23326.	23341.	23357.	23372.
714.1	23388.	23403.	23419.	23435.	23450.	23466.	23482.	23497.	23513.	23528.
714.2	23544.	23560.	23575.	23591.	23607.	23622.	23638.	23654.	23669.	23685.
714.3	23701.	23717.	23732.	23748.	23764.	23779.	23795.	23811.	23827.	23842.
714.4	23858.	23874.	23890.	23905.	23921.	23937.	23953.	23969.	23984.	24000.
714.5	24016.	24032.	24048.	24063.	24079.	24095.	24111.	24127.	24143.	24158.
714.6	24174.	24190.	24206.	24222.	24238.	24254.	24270.	24286.	24301.	24317.
714.7	24333.	24349.	24365.	24381.	24397.	24413.	24429.	24445.	24461.	24477.
714.8	24493.	24509.	24525.	24541.	24557.	24573.	24589.	24605.	24621.	24637.
714.9	24653.	24669.	24685.	24701.	24717.	24733.	24749.	24765	24781.	24797.
715.0	24813.	24830.	24846.	24862.	24878.	24894.	24910.	24926.	24942.	24958.
715.1	24975.	24991.	25007.	25023.	25039.	25055.	25072.	25088.	25104.	25120.
715.2	25136.	25152.	25169.	25185.	25201.	25217.	25234.	25250.	25266.	25282.
715.3	25299.	25315.	25331.	25347.	25364.	25380.	25396.	25412.	25429.	25445.
715.4	25461.	25478.	25494.	25510.	25527.	25543.	25559.	25576.	25592.	25608.
715.5	25625.	25641.	25657.	25674.	25690.	25707.	25723.	25739.	25756.	25772.
715.6	25789.	25805.	25821.	25838.	25854.	25871.	25887.	25904.	25920.	25937.
715.7	25953.	25970.	25986.	26002.	26019.	26035.	26052.	26068.	26085.	26102.
715.8	26118.	26135.	26151.	26168.	26184.	26201.	26217.	26234.	26250.	26267.
715.9	26284.	26300.	26317.	26333.	26350.	26367.	26383.	26400.	26416.	26433.

SEPULVEDA DAM
SURVEYED DEC 1980 CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
716.0	26450.	26466.	26483.	26500.	26516.	26533.	26550.	26566.	26583.	26600.
716.1	26616.	26633.	26650.	26667.	26683.	26700.	26717.	26734.	26750.	26767.
716.2	26784.	26801.	26817.	26834.	26851.	26868.	26885.	26901.	2691A.	26935.
716.3	26952.	26969.	26986.	27002.	27019.	27036.	27053.	27070.	270A7.	27104.
716.4	27121.	27138.	27154.	27171.	271A8.	27205.	27222.	27239.	27256.	27273.
716.5	27290.	27307.	27324.	27341.	2735A.	27375.	27392.	27409.	27426.	27443.
716.6	27460.	27477.	27494.	27511.	2752A.	27545.	27561.	275A0.	27597.	27614.
716.7	27631.	27648.	27665.	276A2.	27699.	27717.	27734.	27751.	2776A.	27785.
716.8	27802.	27820.	27837.	27854.	27871.	278A8.	27906.	27923.	27940.	27957.
716.9	27974.	27992.	28009.	28026.	28043.	28061.	28078.	28095.	28113.	28130.
717.0	28147.	28165.	28182.	28199.	28217.	28234.	28251.	28269.	28286.	28303.
717.1	28321.	28338.	28355.	28373.	28390.	28408.	28425.	28442.	28460.	28477.
717.2	28495.	28512.	28530.	28547.	28565.	28582.	28600.	28617.	28635.	28652.
717.3	28670.	28687.	28705.	28722.	28740.	28757.	28775.	28792.	288A10.	28827.
717.4	28845.	28863.	28880.	28898.	28915.	28933.	28951.	28968.	289A6.	29004.
717.5	29021.	29039.	29056.	29074.	29092.	29109.	29127.	29145.	29163.	29180.
717.6	29198.	29216.	29233.	29251.	29269.	292A7.	29304.	29322.	29340.	2935A.
717.7	29375.	29393.	29411.	29429.	29447.	29464.	29482.	29500.	2951A.	29536.
717.8	29554.	29571.	295A9.	29607.	29625.	29643.	29661.	29679.	29697.	29715.
717.9	29732.	29750.	2976A.	297A6.	29804.	29822.	29840.	2985A.	29A76.	29894.
718.0	29912.	29930.	2994A.	29966.	29984.	30002.	30020.	30038.	30056.	30074.
718.1	30092.	30110.	3012A.	30146.	30164.	301A3.	30201.	30219.	30237.	30255.
718.2	30273.	30291.	30309.	30328.	30346.	30364.	303A2.	30400.	3041A.	30437.
718.3	30455.	30473.	30491.	30509.	3052A.	30546.	30564.	305A2.	30601.	30619.
718.4	30637.	30655.	30674.	30692.	30710.	30729.	30747.	30765.	307A4.	30802.
718.5	30820.	30839.	30857.	30875.	30894.	30912.	30931.	30949.	30967.	30986.
718.6	31004.	31023.	31041.	31060.	31078.	31097.	3111S.	31133.	31152.	31170.
718.7	31189.	31207.	31226.	31245.	31263.	312A2.	31300.	31319.	31337.	31356.
718.8	31374.	31393.	31412.	31430.	31449.	31467.	314A6.	31505.	31523.	31542.
718.9	31561.	31579.	3159A.	31617.	31635.	31654.	31673.	31691.	31710.	31729.
719.0	31747.	31766.	317A5.	31A04.	31822.	31A41.	31860.	31879.	31A97.	31916.
719.1	31935.	31954.	31973.	31991.	32010.	32029.	3204A.	32067.	320A6.	32105.
719.2	32123.	32142.	32161.	321A0.	32199.	32218.	32237.	32256.	32275.	32294.
719.3	32313.	32332.	32350.	32369.	323AA.	32407.	32426.	32445.	32464.	32483.
719.4	32502.	32521.	32540.	32560.	32579.	32598.	32617.	32636.	32655.	32674.
719.5	32693.	32712.	32731.	32750.	32770.	327A9.	32A0A.	32A27.	32A46.	32A65.
719.6	32A84.	32904.	32923.	32942.	32961.	329A0.	33000.	33019.	3303A.	33057.
719.7	33077.	33096.	33115.	33134.	33154.	33173.	33192.	33211.	33231.	33250.
719.8	33269.	332A9.	3330A.	33327.	33347.	33366.	33385.	33405.	33424.	33444.
719.9	33463.	33482.	33502.	33521.	33541.	33560.	33579.	33599.	3361A.	33638.

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
720.0	33657.	33677.	33696.	33716.	33735.	33755.	33774.	33794.	33813.	33833.
720.1	33852.	33872.	33892.	33911.	33931.	33950.	33970.	33990.	34009.	34029.
720.2	34049.	34068.	34088.	34108.	34127.	34147.	34167.	34187.	34206.	34226.
720.3	34246.	34266.	34285.	34305.	34325.	34345.	34365.	34384.	34404.	34424.
720.4	34444.	34464.	34484.	34504.	34524.	34543.	34563.	34583.	34603.	34623.
720.5	34643.	34663.	34683.	34703.	34723.	34743.	34763.	34783.	34803.	34823.
720.6	34843.	34863.	34883.	34903.	34924.	34944.	34964.	34984.	35004.	35024.
720.7	35044.	35065.	35085.	35105.	35125.	35145.	35166.	35186.	35206.	35226.
720.8	35246.	35267.	35287.	35307.	35328.	35348.	35368.	35389.	35409.	35429.
720.9	35450.	35470.	35490.	35511.	35531.	35552.	35572.	35592.	35613.	35633.
721.0	35654.	35674.	35695.	35715.	35736.	35756.	35777.	35797.	35818.	35838.
721.1	35859.	35879.	35900.	35920.	35941.	35962.	35982.	36003.	36024.	36044.
721.2	36065.	36085.	36106.	36127.	36148.	36168.	36189.	36210.	36230.	36251.
721.3	36272.	36293.	36313.	36334.	36355.	36376.	36397.	36417.	36438.	36459.
721.4	36480.	36501.	36522.	36543.	36563.	36584.	36605.	36626.	36647.	36668.
721.5	36689.	36710.	36731.	36752.	36773.	36794.	36815.	36836.	36857.	36878.
721.6	36899.	36920.	36941.	36962.	36983.	37004.	37025.	37047.	37068.	37089.
721.7	37110.	37131.	37152.	37173.	37195.	37216.	37237.	37258.	37279.	37301.
721.8	37322.	37343.	37364.	37386.	37407.	37428.	37450.	37471.	37492.	37514.
721.9	37535.	37556.	37578.	37599.	37620.	37642.	37663.	37685.	37706.	37727.
722.0	37749.	37770.	37792.	37813.	37835.	37856.	37878.	37899.	37921.	37942.
722.1	37964.	37986.	38007.	38029.	38050.	38072.	38094.	38115.	38137.	38159.
722.2	38180.	38202.	38224.	38245.	38267.	38289.	38311.	38332.	38354.	38376.
722.3	38398.	38420.	38441.	38463.	38485.	38507.	38529.	38551.	38573.	38594.
722.4	38616.	38638.	38660.	38682.	38704.	38726.	38748.	38770.	38792.	38814.
722.5	38836.	38858.	38880.	38903.	38925.	38947.	38969.	38991.	39013.	39035.
722.6	39057.	39080.	39102.	39124.	39146.	39168.	39191.	39213.	39235.	39257.
722.7	39280.	39302.	39324.	39347.	39369.	39391.	39414.	39436.	39458.	39481.
722.8	39503.	39526.	39548.	39571.	39593.	39616.	39638.	39660.	39683.	39706.
722.9	39728.	39751.	39773.	39796.	39818.	39841.	39863.	39886.	39909.	39931.
723.0	39954.	39977.	39999.	40022.	40045.	40067.	40090.	40113.	40136.	40158.
723.1	40181.	40204.	40227.	40250.	40272.	40295.	40318.	40341.	40364.	40387.
723.2	40410.	40432.	40455.	40478.	40501.	40524.	40547.	40570.	40593.	40616.
723.3	40639.	40662.	40685.	40708.	40731.	40754.	40777.	40801.	40824.	40847.
723.4	40870.	40893.	40916.	40939.	40963.	40986.	41009.	41032.	41055.	41079.
723.5	41102.	41125.	41148.	41172.	41195.	41218.	41242.	41265.	41288.	41312.
723.6	41335.	41359.	41382.	41405.	41429.	41452.	41476.	41499.	41523.	41546.
723.7	41570.	41593.	41617.	41640.	41664.	41687.	41711.	41734.	41758.	41782.
723.8	41805.	41829.	41852.	41876.	41900.	41923.	41947.	41971.	41995.	42018.
723.9	42042.	42066.	42090.	42113.	42137.	42161.	42185.	42209.	42232.	42256.

SEPULVEDA DAM
SURVEYED DEC 1980

CORPS OF ENGINEERS ELEV (FT) VS STORAGE (AC-FT)

ELEV	0.	.01	.02	.03	.04	.05	.06	.07	.08	.09
724.0	42280.	42304.	42328.	42352.	42376.	42400.	42424.	42447.	42471.	42495.
724.1	42519.	42543.	42567.	42591.	42615.	42639.	42664.	42688.	42712.	42736.
724.2	42760.	42784.	42808.	42832.	42856.	42881.	42905.	42929.	42953.	42977.
724.3	43002.	43026.	43050.	43074.	43099.	43123.	43147.	43171.	43196.	43220.
724.4	43244.	43269.	43293.	43318.	43342.	43366.	43391.	43415.	43440.	43464.
724.5	43489.	43513.	43538.	43562.	43587.	43611.	43636.	43660.	43685.	43709.
724.6	43734.	43758.	43783.	43808.	43832.	43857.	43882.	43906.	43931.	43956.
724.7	43980.	44005.	44030.	44055.	44079.	44104.	44129.	44154.	44178.	44203.
724.8	44228.	44253.	44278.	44303.	44328.	44352.	44377.	44402.	44427.	44452.
724.9	44477.	44502.	44527.	44552.	44577.	44602.	44627.	44652.	44677.	44702.
725.0	44727.									

EXHIBIT E

WATER SURFACE ELEVATION VS.
OUTFLOW (ALL OUTLET GATES OPEN) FOR SEPULVEDA DAM

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
668.0	0	2	3	5	6	8	10	11	13	14
668.1	16	18	19	21	22	24	26	27	29	30
668.2	32	34	35	37	38	40	42	43	45	46
668.3	48	50	51	53	54	56	58	59	61	62
668.4	64	66	67	69	70	72	74	75	77	78
668.5	80	82	83	85	86	88	90	91	93	94
668.6	96	98	99	101	102	104	106	107	109	110
668.7	112	114	115	117	118	120	122	123	125	126
668.8	128	130	131	133	134	136	138	139	141	142
668.9	144	146	147	149	150	152	154	155	157	158
669.0	160	162	165	167	170	172	174	177	179	182
669.1	184	186	189	191	194	196	198	201	203	206
669.2	208	210	213	215	218	220	222	225	227	230
669.3	232	234	237	239	242	244	246	249	251	254
669.4	256	258	261	263	266	268	270	273	275	278
669.5	280	282	285	287	290	292	294	297	299	302
669.6	304	306	309	311	314	316	318	321	323	326
669.7	328	330	333	335	338	340	342	345	347	350
669.8	352	354	357	359	362	364	366	369	371	374
669.9	376	378	381	383	386	388	390	393	395	398
670.0	400	403	406	409	412	415	418	421	424	428
670.1	431	434	437	440	443	446	449	452	455	458
670.2	461	464	467	470	473	476	480	483	486	489
670.3	492	495	498	501	504	507	510	513	516	519
670.4	522	525	529	532	535	538	541	544	547	550
670.5	553	556	559	562	565	568	571	574	577	581
670.6	584	587	590	593	596	599	602	605	608	611
670.7	614	617	620	623	626	629	633	636	639	642
670.8	645	648	651	654	657	660	663	666	669	672
670.9	675	678	682	685	688	691	694	697	700	703

SEPULVEDA DAM (4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
671.0	706	710	714	718	722	726	730	733	737	741
671.1	745	749	753	757	761	765	769	773	777	780
671.2	784	788	792	796	800	804	808	812	816	820
671.3	824	828	831	835	839	843	847	851	855	859
671.4	863	867	871	875	878	882	886	890	894	898
671.5	902	906	910	914	918	922	926	929	933	937
671.6	941	945	949	953	957	961	965	969	973	976
671.7	980	984	988	992	996	1000	1004	1008	1012	1016
671.8	1020	1024	1027	1031	1035	1039	1043	1047	1051	1055
671.9	1059	1063	1067	1071	1074	1078	1082	1086	1090	1094
672.0	1098	1103	1107	1112	1116	1121	1126	1130	1135	1140
672.1	1144	1149	1153	1158	1163	1167	1172	1177	1181	1186
672.2	1190	1195	1200	1204	1209	1213	1218	1223	1227	1232
672.3	1237	1241	1246	1250	1255	1260	1264	1269	1274	1278
672.4	1283	1287	1292	1297	1301	1306	1311	1315	1320	1324
672.5	1329	1334	1338	1343	1347	1352	1357	1361	1366	1371
672.6	1375	1380	1384	1389	1394	1398	1403	1408	1412	1417
672.7	1421	1426	1431	1435	1440	1444	1449	1454	1458	1463
672.8	1468	1472	1477	1481	1486	1491	1495	1500	1505	1509
672.9	1514	1518	1523	1528	1532	1537	1542	1546	1551	1555
673.0	1560	1565	1570	1575	1579	1584	1589	1594	1599	1604
673.1	1608	1613	1618	1623	1628	1633	1637	1642	1647	1652
673.2	1657	1662	1666	1671	1676	1681	1686	1691	1696	1700
673.3	1705	1710	1715	1720	1725	1729	1734	1739	1744	1749
673.4	1754	1758	1763	1768	1773	1778	1783	1787	1792	1797
673.5	1802	1807	1812	1817	1821	1826	1831	1836	1841	1846
673.6	1850	1855	1860	1865	1870	1875	1879	1884	1889	1894
673.7	1899	1904	1908	1913	1918	1923	1928	1933	1939	1902
673.8	1947	1952	1957	1962	1967	1971	1976	1981	1986	1991
673.9	1998	2000	2005	2010	2015	2020	2025	2029	2034	2039

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
674.0	2044	2050	2055	2061	2066	2072	2077	2083	2088	2094
674.1	2100	2105	2111	2116	2122	2127	2133	2139	2144	2150
674.2	2155	2161	2166	2172	2177	2183	2189	2194	2200	2205
674.3	2211	2216	2222	2227	2233	2239	2244	2250	2255	2261
674.4	2266	2272	2278	2283	2289	2294	2300	2305	2311	2316
674.5	2322	2328	2333	2339	2344	2350	2355	2361	2366	2372
674.6	2378	2383	2389	2394	2400	2405	2411	2417	2422	2428
674.7	2433	2439	2444	2450	2455	2461	2467	2472	2478	2483
674.8	2489	2494	2500	2505	2511	2517	2522	2528	2533	2539
674.9	2544	2550	2556	2561	2567	2572	2578	2583	2589	2594
675.0	2600	2606	2611	2617	2622	2628	2633	2639	2644	2650
675.1	2656	2661	2667	2672	2678	2683	2689	2695	2700	2706
675.2	2711	2717	2722	2728	2733	2739	2745	2750	2756	2761
675.3	2767	2772	2778	2783	2789	2795	2800	2806	2811	2817
675.4	2822	2828	2834	2839	2845	2850	2856	2861	2867	2872
675.5	2878	2884	2889	2895	2900	2906	2911	2917	2922	2928
675.6	2934	2939	2945	2950	2956	2961	2967	2973	2978	2984
675.7	2989	2995	3000	3006	3011	3017	3023	3028	3034	3039
675.8	3045	3050	3056	3061	3067	3073	3078	3084	3089	3095
675.9	3100	3106	3112	3117	3123	3128	3134	3139	3145	3150
676.0	3156	3162	3168	3174	3180	3187	3193	3199	3205	3211
676.1	3217	3223	3229	3236	3242	3248	3254	3260	3266	3272
676.2	3278	3285	3291	3297	3303	3309	3315	3321	3327	3333
676.3	3340	3346	3352	3358	3364	3370	3376	3382	3389	3395
676.4	3401	3407	3413	3419	3425	3431	3438	3444	3450	3456
676.5	3462	3468	3474	3480	3486	3493	3499	3505	3511	3517
676.6	3523	3529	3535	3542	3548	3554	3560	3566	3572	3578
676.7	3584	3591	3597	3603	3609	3615	3621	3627	3633	3639
676.8	3646	3652	3658	3664	3670	3676	3682	3688	3695	3701
676.9	3707	3713	3719	3725	3731	3737	3744	3750	3756	3762

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
677.0	3768	3774	3781	3787	3793	3800	3806	3812	3819	3825
677.1	3831	3838	3844	3850	3856	3863	3869	3875	3882	3888
677.2	3894	3901	3907	3913	3920	3926	3932	3939	3945	3951
677.3	3958	3964	3970	3977	3983	3989	3996	4002	4008	4014
677.4	4021	4027	4033	4040	4046	4052	4059	4065	4071	4078
677.5	4084	4090	4097	4103	4109	4116	4122	4128	4135	4141
677.6	4147	4154	4160	4166	4172	4179	4185	4191	4198	4204
677.7	4210	4217	4223	4229	4236	4242	4248	4255	4261	4267
677.8	4274	4280	4286	4293	4299	4305	4312	4318	4324	4330
677.9	4337	4343	4349	4356	4362	4368	4375	4381	4387	4394
678.0	4400	4407	4413	4420	4427	4433	4440	4447	4454	4460
678.1	4467	4474	4480	4487	4494	4500	4507	4514	4521	4527
678.2	4534	4541	4547	4554	4561	4567	4574	4581	4588	4594
678.3	4601	4608	4614	4621	4628	4634	4641	4648	4655	4661
678.4	4668	4675	4681	4688	4695	4701	4708	4715	4722	4728
678.5	4735	4742	4748	4755	4762	4768	4775	4782	4789	4795
678.6	4802	4809	4815	4822	4829	4835	4842	4849	4856	4862
678.7	4869	4876	4882	4889	4896	4902	4909	4916	4923	4929
678.8	4936	4943	4949	4956	4963	4969	4976	4983	4990	4996
678.9	5003	5010	5016	5023	5030	5036	5043	5050	5057	5063
679.0	5070	5076	5082	5088	5094	5100	5107	5113	5119	5125
679.1	5131	5137	5143	5149	5155	5161	5168	5174	5180	5186
679.2	5192	5198	5204	5210	5216	5222	5229	5235	5241	5247
679.3	5253	5259	5265	5271	5277	5283	5290	5296	5302	5308
679.4	5314	5320	5326	5332	5338	5344	5351	5357	5363	5369
679.5	5375	5381	5387	5393	5399	5405	5412	5418	5424	5430
679.6	5436	5442	5448	5454	5460	5466	5473	5479	5485	5491
679.7	5497	5503	5509	5515	5521	5527	5534	5540	5546	5552
679.8	5558	5564	5570	5576	5582	5588	5595	5601	5607	5613
679.9	5619	5625	5631	5637	5643	5649	5656	5662	5668	5674

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
680.0	5680	5686	5693	5699	5706	5712	5719	5725	5732	5738
680.1	5744	5751	5757	5764	5770	5777	5783	5789	5796	5802
680.2	5809	5815	5822	5828	5835	5841	5847	5854	5860	5867
680.3	5873	5880	5886	5893	5899	5905	5912	5918	5925	5931
680.4	5938	5944	5950	5957	5963	5970	5976	5983	5989	5996
680.5	6002	6008	6015	6021	6026	6034	6041	6047	6054	6060
680.6	6066	6073	6079	6086	6092	6099	6105	6111	6118	6124
680.7	6131	6137	6144	6150	6157	6163	6169	6176	6182	6189
680.8	6195	6202	6208	6215	6221	6227	6234	6240	6247	6253
680.9	6260	6266	6272	6279	6285	6292	6298	6305	6311	6318
681.0	6324	6330	6336	6342	6349	6355	6361	6367	6373	6379
681.1	6385	6392	6398	6404	6410	6416	6422	6428	6435	6441
681.2	6447	6453	6459	6465	6471	6477	6484	6490	6496	6502
681.3	6508	6514	6520	6527	6533	6539	6545	6551	6557	6563
681.4	6570	6576	6582	6588	6594	6600	6606	6613	6619	6625
681.5	6631	6637	6643	6649	6656	6662	6668	6674	6680	6686
681.6	6692	6699	6705	6711	6717	6723	6729	6735	6742	6748
681.7	6754	6760	6766	6772	6778	6784	6791	6797	6803	6809
681.8	6815	6821	6827	6834	6840	6846	6852	6858	6864	6870
681.9	6877	6883	6889	6895	6901	6907	6913	6920	6926	6932
682.0	6938	6944	6949	6955	6960	6966	6971	6977	6982	6988
682.1	6993	6999	7004	7010	7016	7021	7027	7032	7038	7043
682.2	7049	7054	7060	7065	7071	7076	7082	7088	7093	7099
682.3	7104	7110	7115	7121	7126	7132	7137	7143	7149	7154
682.4	7160	7165	7171	7176	7182	7187	7193	7198	7204	7209
682.5	7215	7221	7226	7232	7237	7243	7248	7254	7259	7265
682.6	7270	7276	7281	7287	7293	7298	7304	7309	7315	7320
682.7	7326	7331	7337	7342	7348	7353	7359	7365	7370	7376
682.8	7381	7387	7392	7398	7403	7409	7414	7420	7426	7431
682.9	7437	7442	7448	7453	7459	7464	7470	7475	7481	7486

SEPULVEDA DAM (4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
683.0	7492	7497	7503	7508	7513	7519	7524	7529	7535	7540
683.1	7545	7551	7556	7561	7567	7572	7577	7583	7588	7593
683.2	7599	7604	7609	7615	7620	7625	7631	7636	7642	7647
683.3	7652	7658	7663	7668	7674	7679	7684	7690	7695	7700
683.4	7706	7711	7716	7722	7727	7732	7738	7743	7748	7754
683.5	7759	7764	7770	7775	7780	7786	7791	7796	7802	7807
683.6	7812	7818	7823	7828	7834	7839	7844	7850	7855	7860
683.7	7866	7871	7876	7882	7887	7892	7898	7903	7909	7914
683.8	7919	7925	7930	7935	7941	7946	7951	7957	7962	7967
683.9	7973	7978	7983	7989	7994	7999	8005	8010	8015	8021
684.0	8026	8031	8036	8041	8046	8050	8055	8060	8065	8070
684.1	8075	8080	8085	8089	8094	8099	8104	8109	8114	8119
684.2	8124	8128	8133	8138	8143	8148	8153	8158	8163	8168
684.3	8172	8177	8182	8187	8192	8197	8202	8207	8211	8216
684.4	8221	8226	8231	8236	8241	8246	8250	8255	8260	8265
684.5	8270	8275	8280	8285	8290	8294	8299	8304	8309	8314
684.6	8319	8324	8329	8333	8338	8343	8348	8353	8358	8363
684.7	8368	8372	8377	8382	8387	8392	8397	8402	8407	8412
684.8	8416	8421	8426	8431	8436	8441	8446	8451	8455	8460
684.9	8465	8470	8475	8480	8485	8490	8494	8499	8504	8509
685.0	8514	8519	8523	8528	8533	8537	8542	8547	8551	8556
685.1	8561	8565	8570	8575	8580	8584	8589	8594	8598	8603
685.2	8608	8612	8617	8622	8626	8631	8636	8640	8645	8650
685.3	8654	8659	8664	8668	8673	8678	8682	8687	8692	8697
685.4	8701	8706	8711	8715	8720	8725	8729	8734	8739	8743
685.5	8748	8753	8757	8762	8767	8771	8776	8781	8785	8790
685.6	8795	8799	8804	8809	8814	8818	8823	8828	8832	8837
685.7	8842	8846	8851	8856	8860	8865	8870	8874	8879	8884
685.8	8888	8893	8898	8902	8907	8912	8916	8921	8926	8931
685.9	8935	8940	8945	8949	8954	8959	8913	8968	8973	8977

SEPULVEDA DAM 4 GATED AND 4 UNGATED] CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)
DN = 28 FEB 78

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
686.0	8982	8986	8991	8995	8999	9004	9008	9012	9017	9021
686.1	9025	9030	9034	9039	9042	9047	9051	9055	9060	9064
686.2	9068	9073	9077	9081	9086	9090	9094	9099	9103	9107
686.3	9112	9116	9120	9125	9129	9133	9138	9142	9146	9150
686.4	9155	9159	9163	9168	9172	9176	9181	9185	9189	9194
686.5	9198	9202	9207	9211	9215	9220	9224	9228	9233	9237
686.6	9241	9246	9250	9254	9258	9263	9267	9271	9276	9280
686.7	9284	9289	9293	9297	9302	9306	9310	9315	9319	9323
686.8	9328	9332	9336	9341	9345	9349	9354	9358	9362	9366
686.9	9371	9375	9379	9384	9388	9392	9397	9401	9405	9410
687.0	9414	9418	9422	9427	9431	9435	9439	9444	9448	9452
687.1	9456	9460	9465	9469	9473	9477	9482	9486	9490	9494
687.2	9498	9503	9507	9511	9515	9519	9524	9528	9532	9536
687.3	9541	9545	9549	9553	9557	9562	9566	9570	9574	9579
687.4	9583	9587	9591	9595	9600	9604	9608	9612	9617	9621
687.5	9625	9629	9633	9638	9642	9646	9650	9655	9659	9663
687.6	9667	9671	9676	9680	9684	9688	9693	9697	9701	9705
687.7	9709	9714	9718	9722	9726	9730	9735	9739	9743	9747
687.8	9752	9756	9760	9764	9768	9773	9777	9781	9785	9790
687.9	9794	9798	9802	9806	9811	9815	9819	9823	9828	9832

SEPULVEDA DAM (4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
688.0	9836	9840	9844	9848	9852	9856	9860	9864	9868	9872
688.1	9876	9880	9884	9888	9892	9896	9900	9904	9908	9912
688.2	9916	9920	9924	9928	9932	9935	9939	9943	9947	9951
688.3	9955	9959	9963	9967	9971	9975	9979	9983	9987	9991
688.4	9995	9999	10003	10007	10011	10015	10019	10023	10027	10031
688.5	10035	10039	10043	10047	10051	10055	10059	10063	10067	10071
688.6	10075	10079	10083	10087	10091	10095	10099	10103	10107	10111
688.7	10115	10119	10123	10127	10131	10134	10138	10142	10146	10150
688.8	10154	10158	10162	10166	10170	10174	10178	10182	10186	10190
688.9	10194	10198	10202	10206	10210	10214	10218	10222	10226	10230
689.0	10234	10238	10242	10245	10249	10253	10257	10260	10264	10268
689.1	10272	10276	10279	10283	10287	10291	10294	10298	10302	10306
689.2	10310	10313	10317	10321	10325	10328	10332	10336	10340	10344
689.3	10347	10351	10355	10359	10363	10366	10370	10374	10378	10381
689.4	10385	10389	10393	10397	10400	10404	10408	10412	10415	10419
689.5	10423	10427	10431	10434	10438	10442	10446	10449	10453	10457
689.6	10461	10465	10468	10472	10476	10480	10483	10487	10491	10495
689.7	10499	10502	10506	10510	10514	10517	10521	10525	10529	10533
689.8	10536	10540	10544	10548	10552	10555	10559	10563	10567	10570
689.9	10574	10578	10582	10585	10589	10593	10597	10601	10604	10608
690.0	10612	10616	10619	10623	10627	10630	10634	10638	10642	10645
690.1	10649	10653	10656	10660	10664	10667	10671	10675	10679	10682
690.2	10686	10690	10693	10697	10701	10704	10708	10712	10715	10719
690.3	10723	10727	10730	10734	10738	10741	10745	10749	10752	10756
690.4	10760	10764	10767	10771	10775	10778	10782	10786	10789	10793
690.5	10797	10800	10804	10808	10812	10815	10819	10823	10826	10830
690.6	10834	10837	10841	10845	10849	10852	10856	10860	10863	10867
690.7	10871	10874	10878	10882	10886	10889	10893	10897	10900	10904
690.8	10908	10911	10915	10919	10922	10926	10930	10934	10937	10941
690.9	10945	10948	10952	10955	10959	10963	10967	10971	10974	10978

SEPULVEDA DAM (4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
691.0	10982	10985	10988	10992	10995	10999	11002	11005	11009	11012
691.1	11016	11019	11022	11026	11029	11033	11036	11039	11043	11046
691.2	11050	11053	11056	11060	11063	11066	11070	11073	11077	11080
691.3	11083	11087	11090	11094	11097	11100	11104	11107	11111	11114
691.4	11117	11121	11124	11128	11131	11134	11138	11141	11145	11148
691.5	11151	11155	11158	11162	11165	11169	11172	11175	11179	11182
691.6	11185	11189	11192	11195	11199	11202	11206	11209	11213	11216
691.7	11219	11223	11226	11230	11233	11236	11240	11243	11246	11250
691.8	11253	11257	11260	11263	11267	11270	11274	11277	11280	11284
691.9	11287	11291	11294	11297	11301	11304	11308	11311	11314	11318
692.0	11321	11325	11328	11332	11336	11339	11343	11346	11350	11354
692.1	11357	11361	11364	11369	11372	11375	11379	11382	11386	11390
692.2	11393	11397	11400	11404	11408	11411	11415	11418	11422	11425
692.3	11429	11433	11436	11440	11443	11447	11451	11454	11459	11461
692.4	11465	11469	11472	11476	11479	11483	11487	11490	11494	11497
692.5	11501	11505	11508	11512	11515	11519	11523	11526	11530	11533
692.6	11537	11541	11544	11548	11551	11555	11559	11562	11566	11569
692.7	11573	11577	11580	11584	11587	11591	11594	11598	11602	11605
692.8	11609	11612	11616	11620	11623	11627	11630	11634	11638	11641
692.9	11645	11648	11652	11656	11659	11663	11666	11670	11674	11677
693.0	11681	11684	11688	11691	11694	11698	11701	11705	11708	11711
693.1	11715	11718	11722	11725	11728	11732	11735	11739	11742	11745
693.2	11749	11752	11756	11759	11762	11766	11769	11772	11776	11779
693.3	11783	11786	11789	11793	11796	11800	11803	11806	11810	11813
693.4	11817	11820	11823	11827	11830	11834	11837	11840	11844	11847
693.5	11851	11854	11857	11861	11864	11868	11871	11874	11878	11881
693.6	11885	11888	11891	11895	11898	11902	11905	11908	11912	11915
693.7	11919	11922	11925	11929	11932	11935	11939	11942	11946	11949
693.8	11952	11956	11959	11963	11966	11969	11973	11976	11980	11983
693.9	11986	11990	11993	11997	12000	12003	12007	12010	12014	12017

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
694.0	12020	12024	12027	12031	12034	12038	12041	12045	12048	12052
694.1	12055	12059	12062	12065	12069	12073	12076	12080	12083	12087
694.2	12090	12094	12097	12101	12104	12108	12111	12115	12118	12122
694.3	12125	12129	12132	12135	12139	12143	12146	12150	12153	12157
694.4	12160	12164	12167	12171	12174	12178	12181	12185	12188	12192
694.5	12195	12199	12202	12205	12209	12213	12216	12220	12223	12227
694.6	12230	12234	12237	12241	12244	12248	12251	12255	12258	12262
694.7	12265	12269	12272	12275	12279	12283	12286	12290	12293	12297
694.8	12300	12304	12307	12311	12314	12318	12321	12325	12328	12332
694.9	12335	12339	12342	12345	12349	12353	12356	12360	12363	12367
695.0	12370	12373	12376	12379	12383	12386	12389	12392	12395	12398
695.1	12401	12405	12408	12411	12414	12417	12420	12423	12427	12430
695.2	12433	12436	12439	12442	12445	12448	12452	12455	12458	12461
695.3	12464	12467	12470	12474	12477	12480	12483	12486	12489	12492
695.4	12496	12499	12502	12505	12508	12511	12514	12518	12521	12524
695.5	12527	12530	12533	12535	12540	12543	12546	12549	12552	12555
695.6	12558	12562	12565	12569	12571	12574	12577	12580	12584	12587
695.7	12590	12593	12596	12599	12602	12605	12609	12612	12615	12618
695.8	12621	12624	12627	12631	12634	12637	12640	12643	12646	12649
695.9	12653	12656	12659	12662	12665	12668	12671	12675	12678	12681
696.0	12684	12687	12690	12693	12696	12699	12702	12705	12708	12711
696.1	12714	12717	12720	12724	12727	12730	12733	12736	12739	12742
696.2	12745	12748	12751	12754	12757	12760	12763	12766	12769	12772
696.3	12775	12778	12781	12784	12787	12790	12793	12796	12800	12803
696.4	12806	12809	12812	12815	12818	12821	12824	12827	12830	12833
696.5	12836	12839	12842	12845	12848	12851	12854	12857	12860	12863
696.6	12866	12869	12872	12875	12879	12882	12885	12888	12891	12894
696.7	12897	12900	12903	12905	12909	12912	12915	12916	12921	12924
696.8	12927	12930	12933	12936	12939	12942	12945	12948	12952	12955
696.9	12958	12961	12964	12967	12970	12973	12976	12979	12982	12985

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
697.0	12988	12991	12994	12997	13001	13004	13007	13010	13013	13016
697.1	13019	13023	13026	13029	13032	13035	13038	13041	13045	13048
697.2	13051	13054	13057	13060	13063	13066	13070	13073	13076	13079
697.3	13082	13085	13088	13092	13095	13098	13101	13104	13107	13110
697.4	13114	13117	13120	13123	13126	13129	13132	13136	13139	13142
697.5	13145	13148	13151	13154	13158	13161	13164	13167	13170	13173
697.6	13176	13180	13183	13185	13189	13192	13195	13198	13202	13205
697.7	13208	13211	13214	13217	13220	13223	13227	13230	13233	13236
697.8	13239	13242	13245	13249	13252	13255	13258	13261	13264	13267
697.9	13271	13274	13277	13280	13283	13286	13289	13293	13296	13299
698.0	13302	13305	13308	13311	13314	13317	13320	13323	13326	13328
698.1	13331	13334	13337	13340	13343	13346	13349	13352	13355	13358
698.2	13361	13364	13367	13370	13373	13375	13378	13381	13384	13387
698.3	13390	13393	13396	13399	13402	13405	13408	13411	13414	13417
698.4	13420	13423	13425	13428	13431	13434	13437	13440	13443	13446
698.5	13449	13452	13455	13458	13461	13464	13467	13470	13473	13475
698.6	13478	13481	13484	13487	13490	13493	13496	13499	13502	13505
698.7	13508	13511	13514	13517	13520	13522	13525	13528	13531	13534
698.8	13537	13540	13543	13545	13549	13552	13555	13558	13561	13564
698.9	13567	13570	13572	13575	13578	13581	13584	13587	13590	13593
699.0	13596	13599	13602	13605	13608	13611	13614	13617	13620	13622
699.1	13625	13628	13631	13634	13637	13640	13643	13646	13649	13652
699.2	13655	13658	13661	13664	13667	13669	13672	13675	13678	13681
699.3	13684	13687	13690	13693	13696	13699	13702	13705	13708	13711
699.4	13714	13717	13719	13722	13725	13728	13731	13734	13737	13740
699.5	13743	13746	13749	13752	13755	13758	13761	13764	13767	13769
699.6	13772	13775	13778	13781	13784	13787	13790	13793	13796	13799
699.7	13802	13805	13808	13811	13814	13816	13819	13822	13825	13828
699.8	13831	13834	13837	13840	13843	13846	13849	13852	13855	13858
699.9	13861	13864	13866	13869	13872	13875	13878	13881	13884	13887

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
700.0	13890	13893	13896	13899	13902	13905	13908	13911	13914	13916
700.1	13919	13922	13925	13928	13931	13934	13937	13940	13943	13946
700.2	13949	13952	13955	13958	13961	13963	13966	13969	13972	13975
700.3	13978	13981	13984	13987	13990	13993	13996	13999	14002	14005
700.4	14008	14011	14013	14015	14019	14022	14025	14028	14031	14034
700.5	14037	14040	14043	14044	14049	14052	14055	14058	14061	14063
700.6	14066	14069	14072	14075	14078	14081	14084	14087	14090	14093
700.7	14096	14099	14102	14105	14108	14110	14113	14116	14119	14122
700.8	14125	14128	14131	14134	14137	14140	14143	14146	14149	14152
700.9	14155	14158	14160	14163	14166	14169	14172	14175	14178	14181
701.0	14184	14187	14190	14193	14195	14198	14201	14204	14207	14210
701.1	14212	14215	14218	14221	14224	14227	14229	14232	14235	14238
701.2	14241	14244	14246	14249	14252	14255	14258	14261	14264	14266
701.3	14269	14272	14275	14278	14281	14283	14286	14289	14292	14295
701.4	14298	14300	14303	14306	14309	14312	14315	14317	14320	14323
701.5	14326	14329	14332	14335	14337	14340	14343	14346	14349	14352
701.6	14354	14357	14360	14363	14366	14369	14371	14374	14377	14380
701.7	14383	14386	14388	14391	14394	14397	14400	14403	14406	14408
701.8	14411	14414	14417	14420	14423	14425	14428	14431	14434	14437
701.9	14440	14442	14445	14445	14451	14454	14457	14459	14462	14465
702.0	14468	14471	14473	14476	14479	14482	14484	14487	14490	14493
702.1	14495	14498	14501	14504	14506	14509	14512	14515	14517	14520
702.2	14523	14526	14528	14531	14534	14536	14539	14542	14545	14547
702.3	14550	14553	14556	14558	14561	14564	14567	14569	14572	14575
702.4	14578	14580	14583	14585	14589	14591	14594	14597	14600	14602
702.5	14605	14608	14610	14613	14616	14619	14621	14624	14627	14630
702.6	14632	14635	14638	14641	14643	14646	14649	14652	14654	14657
702.7	14660	14663	14665	14668	14671	14673	14676	14679	14682	14684
702.8	14687	14690	14693	14695	14698	14701	14704	14706	14709	14712
702.9	14715	14717	14720	14723	14726	14728	14731	14734	14737	14739

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
703.0	14742	14745	14747	14750	14753	14756	14758	14761	14764	14767
703.1	14769	14772	14775	14779	14780	14783	14786	14789	14791	14794
703.2	14797	14800	14802	14805	14808	14810	14813	14816	14819	14821
703.3	14824	14827	14830	14832	14835	14838	14841	14843	14846	14849
703.4	14852	14854	14857	14860	14863	14865	14868	14871	14874	14876
703.5	14879	14882	14884	14887	14890	14393	14895	14898	14901	14904
703.6	14906	14909	14912	14915	14917	14920	14923	14926	14928	14931
703.7	14934	14937	14939	14942	14945	14947	14950	14953	14956	14958
703.8	14961	14964	14967	14969	14972	14975	14978	14980	14983	14986
703.9	14969	14991	14994	14997	15000	15002	15005	15008	15011	15013
704.0	15016	15019	15021	15024	15027	15030	15032	15035	15038	15041
704.1	15043	15046	15049	15052	15054	15057	15060	15063	15065	15068
704.2	15071	15074	15076	15079	15082	15084	15087	15090	15093	15095
704.3	15098	15101	15104	15106	15109	15112	15115	15117	15120	15123
704.4	15126	15128	15131	15134	15137	15139	15142	15145	15148	15150
704.5	15153	15156	15158	15161	15164	15167	15169	15172	15175	15178
704.6	15180	15183	15186	15189	15191	15194	15197	15200	15202	15205
704.7	15208	15211	15213	15216	15219	15221	15224	15227	15230	15232
704.8	15235	15238	15241	15243	15246	15249	15252	15254	15257	15260
704.9	15263	15265	15268	15271	15274	15276	15279	15282	15285	15287
705.0	15290	15292	15295	15297	15300	15302	15305	15307	15309	15312
705.1	15314	15317	15319	15322	15324	15326	15329	15331	15334	15336
705.2	15339	15341	15343	15345	15348	15351	15353	15356	15358	15360
705.3	15363	15365	15368	15370	15373	15375	15377	15380	15382	15385
705.4	15387	15390	15392	15394	15397	15399	15402	15404	15407	15409
705.5	15411	15414	15416	15419	15421	15424	15426	15428	15431	15433
705.6	15436	15438	15441	15443	15445	15448	15450	15453	15455	15458
705.7	15460	15462	15465	15467	15470	15472	15475	15477	15479	15482
705.8	15484	15487	15489	15492	15494	15496	15499	15501	15504	15506
705.9	15509	15511	15513	15516	15518	15521	15523	15526	15528	15530

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
706.0	15533	15535	15538	15540	15543	15545	15548	15550	15553	15556
706.1	15558	15561	15563	15565	15568	15571	15573	15576	15578	15581
706.2	15583	15586	15588	15591	15593	15596	15599	15601	15604	15606
706.3	15609	15611	15614	15616	15619	15621	15624	15626	15629	15631
706.4	15634	15636	15639	15642	15644	15647	15649	15652	15654	15657
706.5	15659	15662	15664	15667	15669	15672	15674	15677	15679	15682
706.6	15684	15687	15690	15692	15695	15697	15700	15702	15705	15707
706.7	15710	15712	15715	15717	15720	15722	15725	15727	15730	15733
706.8	15735	15738	15740	15743	15745	15748	15750	15753	15755	15758
706.9	15760	15763	15765	15768	15770	15773	15775	15778	15781	15783
707.0	15786	15788	15790	15793	15795	15797	15800	15802	15804	15807
707.1	15809	15811	15814	15816	15818	15821	15823	15825	15828	15830
707.2	15832	15834	15837	15839	15841	15844	15846	15848	15851	15853
707.3	15855	15858	15860	15862	15865	15867	15869	15872	15874	15876
707.4	15879	15881	15883	15886	15888	15890	15893	15895	15897	15900
707.5	15902	15904	15907	15909	15911	15914	15916	15918	15921	15923
707.6	15925	15928	15930	15932	15935	15937	15939	15942	15944	15946
707.7	15949	15951	15953	15956	15958	15960	15963	15965	15967	15970
707.8	15972	15974	15976	15979	15981	15983	15986	15988	15990	15993
707.9	15995	15997	16000	16002	16004	16007	16009	16011	16014	16016
708.0	16018	16021	16023	16025	16029	16031	16034	16036	16039	16041
708.1	16044	16046	16049	16051	16054	16056	16059	16061	16064	16066
708.2	16069	16071	16074	16077	16079	16082	16084	16087	16089	16092
708.3	16094	16097	16099	16102	16104	16107	16109	16112	16114	16117
708.4	16120	16122	16125	16127	16130	16132	16135	16137	16140	16142
708.5	16145	16147	16150	16152	16155	16157	16160	16162	16165	16168
708.6	16170	16173	16175	16178	16180	16183	16185	16188	16190	16193
708.7	16195	16198	16200	16203	16205	16208	16211	16213	16216	16218
708.8	16221	16223	16226	16228	16231	16233	16236	16238	16241	16243
708.9	16246	16248	16251	16254	16256	16259	16261	16264	16266	16269

SEPULVEDA DAM 4 GATED AND 4 UNGATED) CORPS OF ENGINEERS ELEV (FT) VS OUTFLOW (CFS)

ELEV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
709.0	16271	16274	16276	16279	16281	16283	16286	16288	16291	16293
709.1	16295	16298	16300	16303	16305	16308	16310	16312	16315	16317
709.2	16320	16322	16325	16327	16329	16332	16334	16337	16339	16342
709.3	16344	16346	16349	16351	16354	16356	16359	16361	16363	16366
709.4	16368	16371	16373	16375	16378	16380	16383	16385	16388	16390
709.5	16393	16395	16397	16400	16402	16405	16407	16410	16412	16414
709.6	16417	16419	16422	16424	16427	16429	16431	16434	16436	16439
709.7	16441	16444	16446	16448	16451	16453	16456	16458	16461	16463
709.8	16465	16468	16470	16473	16475	16478	16480	16482	16485	16487
709.9	16490	16492	16495	16497	16499	16502	16504	16507	16509	16512
710.0	16514									

EXHIBIT F

RATING TABLE FOR STREAM GAUGES ON LOS ANGELES RIVER DOWNSTREAM OF SEPULVEDA DAM

LOS ANGELES RIVER AT TUJUNGA AVE.

STATION F300-R

RECORDER STATION RATING TABLE

********** RATING TABLE NO. 62-01 **********

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
0.0	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	0.10
0.1	1.00	1.13	1.26	1.39	1.52	1.65	1.78	1.91	2.04	2.17	0.13
0.2	2.30	2.45	2.60	2.75	2.90	3.05	3.20	3.35	3.50	3.65	0.15
0.3	3.80	3.97	4.14	4.31	4.48	4.65	4.82	4.99	5.16	5.33	0.17
0.4	5.50	5.69	5.88	6.07	6.26	6.45	6.64	6.83	7.02	7.21	0.19
0.5	7.40	7.61	7.82	8.03	8.24	8.45	8.66	8.87	9.08	9.29	0.21
0.6	9.50	9.73	9.96	10.20	10.40	10.70	10.90	11.10	11.30	11.60	0.23
0.7	11.8	12.0	12.3	12.5	12.8	13.0	13.2	13.5	13.7	14.0	0.24
0.8	14.2	14.5	14.7	15.0	15.2	15.5	15.7	16.0	16.2	16.5	0.25
0.9	16.7	17.0	17.2	17.5	17.8	18.1	18.3	18.6	18.9	19.1	0.27
1.0	19.4	19.7	20.0	20.3	20.6	20.9	21.2	21.5	21.8	22.1	0.30
1.1	22.4	22.7	23.1	23.4	23.8	24.1	24.4	24.8	25.1	25.5	0.34
1.2	25.8	26.2	26.5	26.9	27.2	27.6	28.0	28.3	28.7	29.0	0.36
1.3	29.4	29.8	30.2	30.6	31.0	31.4	31.7	32.1	32.5	32.9	0.39
1.4	33.3	33.7	34.1	34.5	34.9	35.4	35.8	36.2	36.6	37.0	0.41
1.5	37.4	37.8	38.3	38.7	39.2	39.6	40.0	40.5	40.9	41.4	0.44
1.6	41.8	42.3	42.7	43.2	43.6	44.1	44.6	45.0	45.5	45.9	0.46
1.7	46.4	46.9	47.4	47.9	48.4	48.9	49.4	49.9	50.4	50.9	0.50
1.8	51.4	52.0	52.5	53.1	53.6	54.2	54.7	55.3	55.8	56.4	0.55
1.9	56.9	57.5	58.1	58.6	59.2	59.8	60.4	61.0	61.5	62.1	0.58
2.0	62.7	63.3	63.9	64.5	65.1	65.8	66.4	67.0	67.6	68.2	0.61
2.1	68.8	69.5	70.1	70.8	71.5	72.2	72.8	73.5	74.2	74.8	0.67
2.2	75.5	76.2	76.9	77.6	78.3	79.1	79.8	80.5	81.2	81.9	0.71
2.3	82.6	83.3	84.1	84.8	85.6	86.3	87.0	87.8	88.5	89.3	0.74
2.4	90.0	90.8	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	0.80
2.5	98.0	98.9	99.8	100.7	101.6	102.5	103.4	104.3	105.2	106.1	0.90
2.6	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.0	115.0	116.0	1.00
2.7	117.0	118.1	119.2	120.3	121.4	122.5	123.6	124.7	125.8	126.9	1.10
2.8	128.0	129.2	130.4	131.6	132.8	134.0	135.2	136.4	137.6	138.8	1.20
2.9	140.0	141.5	143.0	144.5	146.0	147.5	149.0	150.5	152.0	153.5	1.50

SOURCE: LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS

STATION NO. F300-R
RATING TABLE NO. 62-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
3.0	155.0	156.8	158.6	160.4	162.2	164.0	165.8	167.6	169.4	171.2	1.80
3.1	173.0	175.7	178.4	181.1	183.8	186.5	189.2	191.9	194.6	197.3	2.70
3.2	200.0	205.0	210.0	215.0	220.0	225.0	230.0	235.0	240.0	245.0	5.00
3.3	250.0	259.0	268.0	277.0	286.0	295.0	304.0	313.0	322.0	331.0	9.00
3.4	340.0	352.0	364.0	376.0	388.0	400.0	412.0	424.0	436.0	448.0	12.00
3.5	460.0	474.0	488.0	502.0	516.0	530.0	544.0	558.0	572.0	586.0	14.00
3.6	600.0	614.0	628.0	642.0	656.0	670.0	684.0	698.0	712.0	726.0	14.00
3.7	740.0	754.0	768.0	782.0	796.0	810.0	824.0	838.0	852.0	866.0	14.00
3.8	880.0	894.0	908.0	922.0	936.0	950.0	964.0	978.0	992.0	1006.	14.00
3.9	1020.	1035.	1050.	1065.	1080.	1095.	1110.	1125.	1140.	1155.	15.00
4.0	1170.	1186.	1202.	1218.	1234.	1250.	1266.	1282.	1298.	1314.	16.00
4.1	1330.	1346.	1362.	1378.	1394.	1410.	1426.	1442.	1458.	1474.	16.00
4.2	1490.	1506.	1522.	1538.	1554.	1570.	1586.	1602.	1618.	1634.	16.00
4.3	1650.	1667.	1684.	1701.	1718.	1735.	1752.	1769.	1786.	1803.	17.00
4.4	1820.	1837.	1854.	1871.	1888.	1905.	1922.	1939.	1956.	1973.	17.00
4.5	1990.	2008.	2026.	2044.	2062.	2080.	2098.	2116.	2134.	2152.	18.00
4.6	2170.	2188.	2206.	2224.	2242.	2260.	2278.	2296.	2314.	2332.	18.00
4.7	2350.	2369.	2388.	2407.	2426.	2445.	2464.	2483.	2502.	2521.	19.00
4.8	2540.	2560.	2580.	2600.	2620.	2640.	2660.	2680.	2700.	2720.	20.00
4.9	2740.	2760.	2780.	2800.	2820.	2840.	2860.	2880.	2900.	2920.	20.00
5.0	2940.	2960.	2980.	3000.	3020.	3040.	3060.	3080.	3100.	3120.	20.00
5.1	3140.	3161.	3182.	3203.	3224.	3245.	3266.	3287.	3308.	3329.	21.00
5.2	3350.	3372.	3394.	3416.	3438.	3460.	3482.	3504.	3526.	3548.	22.00
5.3	3570.	3593.	3616.	3639.	3662.	3685.	3708.	3731.	3754.	3777.	23.00
5.4	3800.	3824.	3848.	3872.	3896.	3920.	3944.	3968.	3992.	4016.	24.00
5.5	4040.	4064.	4088.	4112.	4136.	4160.	4184.	4208.	4232.	4256.	24.00
5.6	4280.	4305.	4330.	4355.	4380.	4405.	4430.	4455.	4480.	4505.	25.00
5.7	4530.	4555.	4580.	4605.	4630.	4655.	4680.	4705.	4730.	4755.	25.00
5.8	4780.	4806.	4832.	4858.	4884.	4910.	4936.	4962.	4988.	5014.	26.00
5.9	5040.	5066.	5092.	5118.	5144.	5170.	5196.	5222.	5248.	5274.	26.00
6.0	5300.	5327.	5354.	5381.	5408.	5435.	5462.	5489.	5516.	5543.	27.00
6.1	5570.	5599.	5628.	5657.	5686.	5715.	5744.	5773.	5802.	5831.	29.00
6.2	5860.	5889.	5918.	5947.	5976.	6005.	6034.	6063.	6092.	6121.	29.00
6.3	6150.	6179.	6208.	6237.	6266.	6295.	6324.	6353.	6382.	6411.	29.00
6.4	6440.	6470.	6500.	6530.	6560.	6590.	6620.	6650.	6680.	6710.	30.00
6.5	6740.	6770.	6800.	6830.	6860.	6890.	6920.	6950.	6980.	7010.	30.00
6.6	7040.	7072.	7104.	7136.	7168.	7200.	7232.	7264.	7296.	7328.	32.00
6.7	7360.	7392.	7424.	7456.	7488.	7520.	7552.	7584.	7616.	7648.	32.00
6.8	7680.	7712.	7744.	7776.	7808.	7840.	7872.	7904.	7936.	7968.	32.00
6.9	8000.	8033.	8066.	8099.	8132.	8165.	8198.	8231.	8264.	8297.	33.00

STATION NO. F300-R
RATING TABLE NO. 62-01 SHEET 3

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
7.0	8330.	8364.	8398.	8432.	8466.	8500.	8534.	8568.	8602.	8636.	34.00
7.1	8670.	8704.	8738.	8772.	8806.	8840.	8874.	8908.	8942.	8976.	34.00
7.2	9010.	9045.	9080.	9115.	9150.	9185.	9220.	9255.	9290.	9325.	35.00
7.3	9360.	9395.	9430.	9465.	9500.	9535.	9570.	9605.	9640.	9675.	35.00
7.4	9710.	9746.	9782.	9818.	9854.	9890.	9926.	9962.	9998.	10034.	36.00
7.5	10070.	10106.	10142.	10178.	10214.	10250.	10286.	10322.	10358.	10394.	36.00
7.6	10430.	10466.	10502.	10538.	10574.	10610.	10646.	10682.	10718.	10754.	36.00
7.7	10790.	10826.	10862.	10898.	10934.	10970.	11006.	11042.	11078.	11114.	36.00
7.8	11150.	11189.	11228.	11267.	11306.	11345.	11384.	11423.	11462.	11501.	39.00
7.9	11540.	11579.	11618.	11657.	11696.	11735.	11774.	11813.	11852.	11891.	39.00
8.0	11930.	11969.	12008.	12047.	12086.	12125.	12164.	12203.	12242.	12281.	39.00
8.1	12320.	12359.	12398.	12437.	12476.	12515.	12554.	12593.	12632.	12671.	39.00
8.2	12710.	12749.	12788.	12827.	12866.	12905.	12944.	12983.	13022.	13061.	39.00
8.3	13100.	13140.	13180.	13220.	13260.	13300.	13340.	13380.	13420.	13460.	40.00
8.4	13500.	13540.	13580.	13620.	13660.	13700.	13740.	13780.	13820.	13860.	40.00
8.5	13900.	13940.	13980.	14020.	14060.	14100.	14140.	14180.	14220.	14260.	40.00
8.6	14300.	14340.	14380.	14420.	14460.	14500.	14540.	14580.	14620.	14660.	40.00
8.7	14700.	14740.	14780.	14820.	14860.	14900.	14940.	14980.	15020.	15060.	40.00
8.8	15100.	15140.	15180.	15220.	15260.	15300.	15340.	15380.	15420.	15460.	40.00
8.9	15500.	15540.	15580.	15620.	15660.	15700.	15740.	15780.	15820.	15860.	40.00
9.0	15900.	15940.	15980.	16020.	16060.	16100.	16140.	16180.	16220.	16260.	40.00
9.1	16300.	16340.	16380.	16420.	16460.	16500.	16540.	16580.	16620.	16660.	40.00
9.2	16700.	16740.	16780.	16820.	16860.	16900.	16940.	16980.	17020.	17060.	40.00
9.3	17100.	17140.	17180.	17220.	17260.	17300.	17340.	17380.	17420.	17460.	40.00
9.4	17500.	17540.	17580.	17620.	17660.	17700.	17740.	17780.	17820.	17860.	40.00
9.5	17900.	17940.	17980.	18020.	18060.	18100.	18140.	18180.	18220.	18260.	40.00
9.6	18300.	18341.	18382.	18423.	18464.	18505.	18546.	18587.	18628.	18669.	41.00
9.7	18710.	18751.	18792.	18833.	18874.	18915.	18956.	18997.	19038.	19079.	41.00
9.8	19120.	19161.	19202.	19243.	19284.	19325.	19366.	19407.	19448.	19489.	41.00
9.9	19530.	19571.	19612.	19653.	19694.	19735.	19776.	19817.	19858.	19899.	41.00
10.0	19940.	19981.	20022.	20063.	20104.	20145.	20186.	20227.	20268.	20309.	41.00
10.1	20350.	20391.	20432.	20473.	20514.	20555.	20596.	20637.	20678.	20719.	41.00
10.2	20760.	20801.	20842.	20883.	20924.	20965.	21006.	21047.	21088.	21129.	41.00
10.3	21170.	21212.	21254.	21296.	21338.	21380.	21422.	21464.	21506.	21548.	42.00
10.4	21590.	21632.	21674.	21716.	21758.	21800.	21842.	21884.	21926.	21968.	42.00
10.5	22010.	22052.	22094.	22136.	22178.	22220.	22262.	22304.	22346.	22388.	42.00
10.6	22430.	22472.	22514.	22556.	22598.	22640.	22682.	22724.	22766.	22808.	42.00
10.7	22850.	22892.	22934.	22976.	23018.	23060.	23102.	23144.	23186.	23228.	42.00
10.8	23270.	23313.	23356.	23399.	23442.	23485.	23528.	23571.	23614.	23657.	43.00
10.9	23700.	23743.	23786.	23829.	23872.	23915.	23958.	24001.	24044.	24087.	43.00

STATION NO. F300-R
RATING TABLE NO. 62-01 SHEET 4

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
11.0	24130.	24173.	24216.	24259.	24302.	24345.	24388.	24431.	24474.	24517.	43.00
11.1	24560.	24604.	24648.	24692.	24736.	24780.	24824.	24868.	24912.	24956.	44.00
11.2	25000.	25044.	25088.	25132.	25176.	25220.	25264.	25308.	25352.	25396.	44.00
11.3	25440.	25484.	25528.	25572.	25616.	25660.	25704.	25748.	25792.	25836.	44.00
11.4	25880.	25924.	25968.	26012.	26056.	26100.	26144.	26188.	26232.	26276.	44.00
11.5	26320.	26365.	26410.	26455.	26500.	26545.	26590.	26635.	26680.	26725.	45.00
11.6	26770.	26815.	26860.	26905.	26950.	26995.	27040.	27085.	27130.	27175.	45.00
11.7	27220.	27265.	27310.	27355.	27400.	27445.	27490.	27535.	27580.	27625.	45.00
11.8	27670.	27715.	27760.	27805.	27850.	27895.	27940.	27985.	28030.	28075.	45.00
11.9	28120.	28166.	28212.	28258.	28304.	28350.	28396.	28442.	28488.	28534.	46.00
12.0	28580.	28627.	28674.	28721.	28768.	28815.	28862.	28909.	28956.	29003.	47.00
12.1	29050.	29098.	29146.	29194.	29242.	29290.	29338.	29386.	29434.	29482.	48.00
12.2	29530.	29579.	29628.	29677.	29726.	29775.	29824.	29873.	29922.	29971.	49.00
12.3	30020.	30070.	30120.	30170.	30220.	30270.	30320.	30370.	30420.	30470.	50.00
12.4	30520.	30571.	30622.	30673.	30724.	30775.	30826.	30877.	30928.	30979.	51.00
12.5	31030.	31082.	31134.	31186.	31238.	31290.	31342.	31394.	31446.	31498.	52.00
12.6	31550.	31603.	31656.	31709.	31762.	31815.	31868.	31921.	31974.	32027.	53.00
12.7	32080.	32134.	32188.	32242.	32296.	32350.	32404.	32458.	32512.	32566.	54.00
12.8	32620.	32675.	32730.	32785.	32840.	32895.	32950.	33005.	33060.	33115.	55.00
12.9	33170.	33226.	33282.	33338.	33394.	33450.	33506.	33562.	33618.	33674.	56.00
13.0	33730.	33787.	33844.	33901.	33958.	34015.	34072.	34129.	34186.	34243.	57.00
13.1	34300.	34358.	34416.	34474.	34532.	34590.	34648.	34706.	34764.	34822.	58.00
13.2	34880.	34939.	34998.	35057.	35116.	35175.	35234.	35293.	35352.	35411.	59.00
13.3	35470.	35530.	35590.	35650.	35710.	35770.	35830.	35890.	35950.	36010.	60.00
13.4	36070.	36131.	36192.	36253.	36314.	36375.	36436.	36497.	36558.	36619.	61.00
13.5	36680.	36742.	36804.	36866.	36928.	36990.	37052.	37114.	37176.	37238.	62.00
13.6	37300.	37363.	37426.	37489.	37552.	37615.	37678.	37741.	37804.	37867.	63.00
13.7	37930.	37994.	38058.	38122.	38186.	38250.	38314.	38378.	38442.	38506.	64.00
13.8	38570.	38635.	38700.	38765.	38830.	38895.	38960.	39025.	39090.	39155.	65.00
13.9	39220.	39286.	39352.	39418.	39484.	39550.	39616.	39682.	39748.	39814.	66.00
14.0	39880.										

LOS ANGELES RIVER ABOVE ARROYO SECO

STATION F57C-R

RECORDER STATION RATING TABLE

********** RATING TABLE NO. 69-01 **********

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
0.0	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.20	1.40	
0.0	1.60	1.90	2.20	2.50	2.80	3.10	3.40	3.80	4.20	4.60	
0.0	5.00	5.00	5.40	5.80	6.20	6.70	7.20	7.70	8.20	8.70	
0.0	9.20	9.80	10.40	11.00	11.60	12.20	12.80	13.50	14.20	14.90	
0.4	15.6	16.5	17.5	18.4	19.4	20.3	21.2	22.2	23.1	24.1	0.94
0.5	25.0	26.2	27.3	28.5	29.6	30.8	31.9	33.1	34.2	35.4	1.15
0.6	36.5	37.9	39.2	40.6	41.9	43.3	44.6	46.0	47.3	48.7	1.35
0.7	50.0	51.5	53.0	54.5	56.0	57.5	59.0	60.5	62.0	63.5	1.50
0.8	65.0	66.7	68.5	70.2	72.0	73.7	75.4	77.2	78.9	80.7	1.74
0.9	82.4	85.0	87.5	90.1	92.6	95.2	97.8	100.3	102.9	105.4	2.56
1.0	108.0	111.0	114.0	117.0	120.0	123.0	126.0	129.0	132.0	135.0	3.00
1.1	138.0	144.2	150.4	156.6	162.8	169.0	175.2	181.4	187.6	193.8	6.20
1.2	200.0	209.3	218.6	227.9	237.2	246.5	255.8	265.1	274.4	283.7	9.30
1.3	293.0	304.5	316.0	327.5	339.0	350.5	362.0	373.5	385.0	396.5	11.50
1.4	408.0	421.2	434.4	447.6	460.8	474.0	487.2	500.4	513.6	526.8	13.20
1.5	540.0	554.2	568.4	582.6	596.8	611.0	625.2	639.4	653.6	667.8	14.20
1.6	682.0	697.2	712.4	727.6	742.8	758.0	773.2	788.4	803.6	818.8	15.20
1.7	834.0	850.4	866.8	883.2	899.6	916.0	932.4	948.8	965.2	981.6	16.40
1.8	998.0	1015.	1033.	1050.	1068.	1085.	1102.	1120.	1137.	1155.	17.40
1.9	1172.	1190.	1208.	1226.	1244.	1263.	1281.	1299.	1317.	1335.	18.10
2.0	1353.	1372.	1391.	1410.	1429.	1448.	1467.	1486.	1505.	1524.	19.00
2.1	1543.	1563.	1583.	1603.	1623.	1643.	1662.	1682.	1702.	1722.	19.90
2.2	1742.	1763.	1784.	1804.	1825.	1846.	1867.	1888.	1908.	1929.	20.80
2.3	1950.	1972.	1993.	2015.	2037.	2059.	2080.	2102.	2124.	2145.	21.70
2.4	2167.	2190.	2213.	2235.	2258.	2281.	2304.	2327.	2349.	2372.	22.80
2.5	2395.	2419.	2442.	2466.	2489.	2513.	2536.	2560.	2583.	2607.	23.50
2.6	2630.	2654.	2678.	2702.	2726.	2750.	2774.	2798.	2822.	2846.	24.00
2.7	2870.	2896.	2922.	2948.	2974.	3000.	3026.	3052.	3078.	3104.	26.00
2.8	3130.	3156.	3182.	3208.	3234.	3260.	3286.	3312.	3338.	3364.	26.00
2.9	3390.	3417.	3444.	3471.	3498.	3525.	3552.	3579.	3606.	3633.	27.00

SOURCE: LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS

STATION NO. F57C-R

RATING TABLE NO. 69-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
3.0	3660.	3688.	3716.	3744.	3772.	3800.	3828.	3856.	3884.	3912.	28.00
3.1	3940.	3969.	3998.	4027.	4056.	4085.	4114.	4143.	4172.	4201.	29.00
3.2	4230.	4260.	4290.	4320.	4350.	4380.	4410.	4440.	4470.	4500.	30.00
3.3	4530.	4561.	4592.	4623.	4654.	4685.	4716.	4747.	4778.	4809.	31.00
3.4	4840.	4872.	4904.	4936.	4968.	5000.	5032.	5064.	5096.	5128.	32.00
3.5	5160.	5192.	5224.	5256.	5288.	5320.	5352.	5384.	5416.	5448.	32.00
3.6	5480.	5513.	5546.	5579.	5612.	5645.	5678.	5711.	5744.	5777.	33.00
3.7	5810.	5843.	5876.	5909.	5942.	5975.	6008.	6041.	6074.	6107.	33.00
3.8	6140.	6173.	6206.	6239.	6272.	6305.	6338.	6371.	6404.	6437.	33.00
3.9	6470.	6504.	6538.	6572.	6606.	6640.	6674.	6708.	6742.	6776.	34.00
4.0	6810.	6844.	6878.	6912.	6946.	6980.	7014.	7048.	7082.	7116.	34.00
4.1	7150.	7185.	7220.	7255.	7290.	7325.	7360.	7395.	7430.	7465.	35.00
4.2	7500.	7535.	7570.	7605.	7640.	7675.	7710.	7745.	7780.	7815.	35.00
4.3	7850.	7886.	7922.	7958.	7994.	8030.	8066.	8102.	8138.	8174.	36.00
4.4	8210.	8246.	8282.	8318.	8354.	8390.	8426.	8462.	8498.	8534.	36.00
4.5	8570.	8607.	8644.	8681.	8718.	8755.	8792.	8829.	8866.	8903.	37.00
4.6	8940.	8977.	9014.	9051.	9088.	9125.	9162.	9199.	9236.	9273.	37.00
4.7	9310.	9347.	9384.	9421.	9458.	9495.	9532.	9569.	9606.	9643.	37.00
4.8	9680.	9717.	9754.	9791.	9828.	9865.	9902.	9939.	9976.	10013.	37.00
4.9	10050.	10088.	10126.	10164.	10202.	10240.	10278.	10316.	10354.	10392.	38.00
5.0	10430.	10468.	10506.	10544.	10582.	10620.	10658.	10696.	10734.	10772.	38.00
5.1	10810.	10848.	10886.	10924.	10962.	11000.	11038.	11076.	11114.	11152.	38.00
5.2	11190.	11228.	11266.	11304.	11342.	11380.	11418.	11456.	11494.	11532.	38.00
5.3	11570.	11608.	11646.	11684.	11722.	11760.	11798.	11836.	11874.	11912.	38.00
5.4	11950.	11988.	12026.	12064.	12102.	12140.	12178.	12216.	12254.	12292.	38.00
5.5	12330.	12368.	12406.	12444.	12482.	12520.	12558.	12596.	12634.	12672.	38.00
5.6	12710.	12749.	12788.	12827.	12866.	12905.	12944.	12983.	13022.	13061.	39.00
5.7	13100.	13140.	13180.	13220.	13260.	13300.	13340.	13380.	13420.	13460.	40.00
5.8	13500.	13540.	13580.	13620.	13660.	13700.	13740.	13780.	13820.	13860.	40.00
5.9	13900.	13940.	13980.	14020.	14060.	14100.	14140.	14180.	14220.	14260.	40.00
6.0	14300.	14341.	14382.	14423.	14464.	14505.	14546.	14587.	14628.	14669.	41.00
6.1	14710.	14751.	14792.	14833.	14874.	14915.	14956.	14997.	15038.	15079.	41.00
6.2	15120.	15161.	15202.	15243.	15284.	15325.	15366.	15407.	15448.	15489.	41.00
6.3	15530.	15571.	15612.	15653.	15694.	15735.	15776.	15817.	15858.	15899.	41.00
6.4	15940.	15981.	16022.	16063.	16104.	16145.	16186.	16227.	16268.	16309.	41.00
6.5	16350.	16391.	16432.	16473.	16514.	16555.	16596.	16637.	16678.	16719.	41.00
6.6	16760.	16802.	16844.	16886.	16928.	16970.	17012.	17054.	17096.	17138.	42.00
6.7	17180.	17222.	17264.	17306.	17348.	17390.	17432.	17474.	17516.	17558.	42.00
6.8	17600.	17643.	17686.	17729.	17772.	17815.	17858.	17901.	17944.	17987.	43.00
6.9	18030.	18073.	18116.	18159.	18202.	18245.	18288.	18331.	18374.	18417.	43.00

STATION NO. F57C-R
RATING TABLE NO. 69-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
7.0	18460.	18503.	18546.	18589.	18632.	18675.	18718.	18761.	18804.	18847.	43.00
7.1	18890.	18933.	18976.	19019.	19062.	19105.	19148.	19191.	19234.	19277.	43.00
7.2	19320.	19363.	19406.	19449.	19492.	19535.	19578.	19621.	19664.	19707.	43.00
7.3	19750.	19793.	19836.	19879.	19922.	19965.	20008.	20051.	20094.	20137.	43.00
7.4	20180.	20224.	20268.	20312.	20356.	20400.	20444.	20488.	20532.	20576.	44.00
7.5	20620.	20664.	20708.	20752.	20796.	20840.	20884.	20928.	20972.	21016.	44.00
7.6	21060.	21104.	21148.	21192.	21236.	21280.	21324.	21368.	21412.	21456.	44.00
7.7	21500.	21544.	21588.	21632.	21676.	21720.	21764.	21808.	21852.	21896.	44.00
7.8	21940.	21984.	22028.	22072.	22116.	22160.	22204.	22248.	22292.	22336.	44.00
7.9	22380.	22424.	22468.	22512.	22556.	22600.	22644.	22688.	22732.	22776.	44.00
8.0	22820.	22864.	22908.	22952.	22996.	23040.	23084.	23128.	23172.	23216.	44.00
8.1	23260.	23304.	23348.	23392.	23436.	23480.	23524.	23568.	23612.	23656.	44.00
8.2	23700.	23744.	23788.	23832.	23876.	23920.	23964.	24008.	24052.	24096.	44.00
8.3	24140.	24184.	24228.	24272.	24316.	24360.	24404.	24448.	24492.	24536.	44.00
8.4	24580.	24624.	24668.	24712.	24756.	24800.	24844.	24888.	24932.	24976.	44.00
8.5	25020.	25064.	25108.	25152.	25196.	25240.	25284.	25328.	25372.	25416.	44.00
8.6	25460.	25504.	25548.	25592.	25636.	25680.	25724.	25768.	25812.	25856.	44.00
8.7	25900.	25944.	25988.	26032.	26076.	26120.	26164.	26208.	26252.	26296.	44.00
8.8	26340.	26384.	26428.	26472.	26516.	26560.	26604.	26648.	26692.	26736.	44.00
8.9	26780.	26824.	26868.	26912.	26956.	27000.	27044.	27088.	27132.	27176.	44.00
9.0	27220.	27264.	27308.	27352.	27396.	27440.	27484.	27528.	27572.	27616.	44.00
9.1	27660.	27704.	27748.	27792.	27836.	27880.	27924.	27968.	28012.	28056.	44.00
9.2	28100.	28144.	28188.	28232.	28276.	28320.	28364.	28408.	28452.	28496.	44.00
9.3	28540.	28584.	28628.	28672.	28716.	28760.	28804.	28848.	28892.	28936.	44.00
9.4	28980.	29024.	29068.	29112.	29156.	29200.	29244.	29288.	29332.	29376.	44.00
9.5	29420.	29464.	29508.	29552.	29596.	29640.	29684.	29728.	29772.	29816.	44.00
9.6	29860.	29904.	29948.	29992.	30036.	30080.	30124.	30168.	30212.	30256.	44.00
9.7	30300.	30344.	30388.	30432.	30476.	30520.	30564.	30608.	30652.	30696.	44.00
9.8	30740.	30784.	30828.	30872.	30916.	30960.	31004.	31048.	31092.	31136.	44.00
9.9	31180.	31224.	31268.	31312.	31356.	31400.	31444.	31488.	31532.	31576.	44.00
10.0	31620.	31664.	31708.	31752.	31796.	31840.	31884.	31928.	31972.	32016.	44.00
10.1	32060.	32104.	32148.	32192.	32236.	32280.	32324.	32368.	32412.	32456.	44.00
10.2	32500.	32544.	32588.	32632.	32676.	32720.	32764.	32808.	32852.	32896.	44.00
10.3	32940.	32984.	33028.	33072.	33116.	33160.	33204.	33248.	33292.	33336.	44.00
10.4	33380.	33424.	33468.	33512.	33556.	33600.	33644.	33688.	33732.	33776.	44.00
10.5	33820.	33865.	33910.	33955.	34000.	34045.	34090.	34135.	34180.	34225.	45.00
10.6	34270.	34315.	34360.	34405.	34450.	34495.	34540.	34585.	34630.	34675.	45.00
10.7	34720.	34765.	34810.	34855.	34900.	34945.	34990.	35035.	35080.	35125.	45.00
10.8	35170.	35215.	35260.	35305.	35350.	35395.	35440.	35485.	35530.	35575.	45.00
10.9	35620.	35665.	35710.	35755.	35800.	35845.	35890.	35935.	35980.	36025.	45.00

RATING TABLE NO. 69-01 SHEET 4

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
11.0	36070.	36116.	36162.	36208.	36254.	36300.	36346.	36392.	36438	36484.	46.00
11.1	36530.	36576.	36622.	36668.	36714.	36760.	36806.	36852.	3689[illegible].	36944.	46.00
11.2	36990.	37036.	37082.	37128.	37174.	37220.	37266.	37312.	37358.	37404.	46.00
11.3	37450.	37496.	37542.	37588.	37634.	37680.	37726.	37772.	37818.	37864.	46.00
11.4	37910.	37956.	38002.	38048.	38094.	38140.	38186.	38232.	38278.	38324.	46.00
11.5	38370.	38416.	38462.	38508.	38554.	38600.	38646.	38692.	38738.	38784.	46.00
11.6	38830.	38876.	38922.	38968.	39014.	39060.	39106.	39152.	39198.	39244.	46.00
11.7	39290.	39336.	39382.	39428.	39474.	39520.	39566.	39612.	39658.	39704.	46.00
11.8	39750.	39796.	39842.	39888.	39934.	39980.	40026.	40072.	40118.	40164.	46.00
11.9	40210.	40256.	40302.	40348.	40394.	40440.	40486.	40532.	40578.	40624.	46.00
12.0	40670.	40716.	40762.	40808.	40854.	40900.	40946.	40992.	41038.	41084.	46.00
12.1	41130.	41176.	41222.	41268.	41314.	41360.	41406.	41452.	41498.	41544.	46.00
12.2	41590.	41636.	41682.	41728.	41774.	41820.	41866.	41912.	41958.	42004.	46.00
12.3	42050.	42096.	42142.	42188.	42234.	42280.	42326.	42372.	42418.	42464.	46.00
12.4	42510.	42556.	42602.	42648.	42694.	42740.	42786.	42832.	42878.	42924.	46.00
12.5	42970.	43016.	43062.	43108.	43154.	43200.	43246.	43292.	43338.	43384.	46.00
12.6	43430.	43476.	43522.	43568.	43614.	43660.	43706.	43752.	43798.	43844.	46.00
12.7	43890.	43936.	43982.	44028.	44074.	44120.	44166.	44212.	44258.	44304.	46.00
12.8	44350.	44396.	44442.	44488.	44534.	44580.	44626.	44672.	44718.	44764.	46.00
12.9	44810.	44856.	44902.	44948.	44994.	45040.	45086.	45132.	45178.	45224.	46.00
13.0	45270.	45316.	45362.	45408.	45454.	45500.	45546.	45592.	45638.	45684.	46.00
13.1	45730.	45776.	45822.	45868.	45914.	45960.	46006.	46052.	46098.	46144.	46.00
13.2	46190.	46236.	46282.	46328.	46374.	46420.	46466.	46512.	46558.	46604.	46.00
13.3	46650.	46696.	46742.	46788.	46834.	46880.	46926.	46972.	47018.	47064.	46.00
13.4	47110.	47156.	47202.	47248.	47294.	47340.	47386.	47432.	47478.	47524.	46.00
13.5	47570.	47616.	47662.	47708.	47754.	47800.	47846.	47892.	47938.	47984.	46.00
13.6	48030.	48076.	48122.	48168.	48214.	48260.	48306.	48352.	48398.	48444.	46.00
13.7	48490.	48536.	48582.	48628.	48674.	48720.	48766.	48812.	48858.	48904.	46.00
13.8	48950.	48996.	49042.	49088.	49134.	49180.	49226.	49272.	49318.	49364.	46.00
13.9	49410.	49456.	49502.	49548.	49594.	49640.	49686.	49732.	49778.	49824.	46.00
14.0	49870.	49916.	49962.	50008.	50054.	50100.	50146.	50192.	50238.	50284.	46.00
14.1	50330.	50376.	50422.	50468.	50514.	50560.	50606.	50652.	50698.	50744.	46.00
14.2	50790.	50836.	50882.	50928.	50974.	51020.	51066.	51112.	51158.	51204.	46.00
14.3	51250.	51296.	51342.	51388.	51434.	51480.	51526.	51572.	51618.	51664.	46.00
14.4	51710.	51756.	51802.	51848.	51894.	51940.	51986.	52032.	52078.	52124.	46.00
14.5	52170.	52216.	52262.	52308.	52354.	52400.	52446.	52492.	52538.	52584.	46.00
14.6	52630.	52676.	52722.	52768.	52814.	52860.	52906.	52952.	52998.	53044.	46.00
14.7	53090.	53136.	53182.	53228.	53274.	53320.	53366.	53412.	53458.	53504.	46.00
14.8	53550.	53596.	53642.	53688.	53734.	53780.	53826.	53872.	53918.	53964.	46.00
14.9	54010.	54056.	54102.	54148.	54194.	54240.	54286.	54332.	54378.	54424.	46.00

LOS ANGELES RIVER BELOW FIRESTONE BLVD.

STATION F34D-R

RECORDER STATION RATING TABLE

RATING TABLE NO. 66-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
0.1	0.00	0.08	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72	0.08
0.2	0.80	0.94	1.08	1.22	1.36	1.50	1.64	1.78	1.92	2.06	0.14
0.3	2.20	2.43	2.66	2.89	3.12	3.35	3.58	3.81	4.04	4.27	0.23
0.4	4.50	4.99	5.48	5.97	6.46	6.95	7.44	7.93	8.42	8.91	0.49
0.5	9.40	10.10	10.80	11.60	12.30	13.00	13.70	14.40	15.20	15.90	0.72
0.6	16.6	17.5	18.4	19.3	20.2	21.1	21.9	22.8	23.7	24.6	0.89
0.7	25.5	26.7	27.8	29.0	30.2	31.4	32.5	33.7	34.9	36.0	1.17
0.8	37.2	38.8	40.3	41.9	43.4	45.0	46.6	48.1	49.7	51.2	1.56
0.9	52.8	54.6	56.4	58.3	60.1	61.9	63.7	65.5	67.4	69.2	1.82
1.0	71.0	73.1	75.2	77.3	79.4	81.5	83.6	85.7	87.8	89.9	2.10
1.1	92.0	94.2	96.4	98.6	100.8	103.0	105.2	107.4	109.6	111.8	2.20
1.2	114.0	116.5	119.0	121.5	124.0	126.5	129.0	131.5	134.0	136.5	2.50
1.3	139.0	141.7	144.4	147.1	149.8	152.5	155.2	157.9	160.6	163.3	2.70
1.4	166.0	169.0	172.0	175.0	178.0	181.0	184.0	187.0	190.0	193.0	3.00
1.5	196.0	199.5	203.0	206.5	210.0	213.5	217.0	220.5	224.0	227.5	3.50
1.6	231.0	235.2	239.4	243.6	247.8	252.0	256.2	260.4	264.6	268.8	4.20
1.7	273.0	278.1	283.2	288.3	293.4	298.5	303.6	308.7	313.8	318.9	5.10
1.8	324.0	330.9	337.8	344.7	351.6	358.5	365.4	372.3	379.2	386.1	6.90
1.9	393.0	402.7	412.4	422.1	431.8	441.5	451.2	460.9	470.6	480.3	9.70
2.0	490.0	505.5	521.0	536.5	552.0	567.5	583.0	598.5	614.0	629.5	15.50
2.1	645.0	665.0	685.0	705.0	725.0	745.0	765.0	785.0	805.0	825.0	20.00
2.2	845.0	866.5	888.0	909.5	931.0	952.5	974.0	995.5	1017.	1039.	21.50
2.3	1060.	1083.	1107.	1130.	1154.	1177.	1200.	1224.	1247.	1271.	23.40
2.4	1294.	1319.	1345.	1370.	1395.	1421.	1446.	1471.	1496.	1522.	25.30
2.5	1547.	1575.	1604.	1632.	1660.	1689.	1717.	1745.	1773.	1802.	28.30
2.6	1830.	1862.	1894.	1926.	1958.	1990.	2022.	2054.	2086.	2118.	32.00
2.7	2150.	2185.	2220.	2255.	2290.	2325.	2360.	2395.	2430.	2465.	35.00
2.8	2500.	2538.	2576.	2614.	2652.	2690.	2728.	2766.	2804.	2842.	38.00
2.9	2880.	2921.	2962.	3003.	3044.	3085.	3126.	3167.	3208.	3249.	41.00
3.0	3290.	3334.	3378.	3422.	3466.	3510.	3554.	3598.	3642.	3686.	44.00

SOURCE: LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS

STATION NO. F34D-R
RATING TABLE NO. 66-01 SHEET 2

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
3.1	3730.	3777.	3824.	3871.	3918.	3965.	4012.	4059.	4106.	4153.	47.00
3.2	4200.	4250.	4300.	4350.	4400.	4450.	4500.	4550.	4600.	4650.	50.00
3.3	4700.	4753.	4806.	4859.	4912.	4965.	5018.	5071.	5124.	5177.	53.00
3.4	5230.	5286.	5342.	5398.	5454.	5510.	5566.	5622.	5678.	5734.	56.00
3.5	5790.	5848.	5906.	5964.	6022.	6080.	6138.	6196.	6254.	6312.	58.00
3.6	6370.	6431.	6492.	6553.	6614.	6675.	6736.	6797.	6858.	6919.	61.00
3.7	6980.	7044.	7108.	7172.	7236.	7300.	7364.	7428.	7492.	7556.	64.00
3.8	7620.	7688.	7756.	7824.	7892.	7960.	8028.	8096.	8164.	8232.	68.00
3.9	8300.	8369.	8438.	8507.	8576.	8645.	8714.	8783.	8852.	8921.	69.00
4.0	8990.	9060.	9130.	9200.	9270.	9340.	9410.	9480.	9550.	9620.	70.00
4.1	9690.	9762.	9834.	9906.	9978.	10050.	10122.	10194.	10266.	10338.	72.00
4.2	10410.	10484.	10558.	10632.	10706.	10780.	10854.	10928.	11002.	11076.	74.00
4.3	11150.	11225.	11300.	11375.	11450.	11525.	11600.	11675.	11750.	11825.	75.00
4.4	11900.	11975.	12050.	12125.	12200.	12275.	12350.	12425.	12500.	12575.	75.00
4.5	12650.	12725.	12800.	12875.	12950.	13025.	13100.	13175.	13250.	13325.	75.00
4.6	13400.	13480.	13560.	13640.	13720.	13800.	13880.	13960.	14040.	14120.	80.00
4.7	14200.	14280.	14360.	14440.	14520.	14600.	14680.	14760.	14840.	14920.	80.00
4.8	15000.	15080.	15160.	15240.	15320.	15400.	15480.	15560.	15640.	15720.	80.00
4.9	15800.	15880.	15960.	16040.	16120.	16200.	16280.	16360.	16440.	16520.	80.00
5.0	16600.	16685.	16770.	16855.	16940.	17025.	17110.	17195.	17280.	17365.	85.00
5.1	17450.	17535.	17620.	17705.	17790.	17875.	17960.	18045.	18130.	18215.	85.00
5.2	18300.	18385.	18470.	18555.	18640.	18725.	18810.	18895.	18980.	19065.	85.00
5.3	19150.	19235.	19320.	19405.	19490.	19575.	19660.	19745.	19830.	19915.	85.00
5.4	20000.	20090.	20180.	20270.	20360.	20450.	20540.	20630.	20720.	20810.	90.00
5.5	20900.	20990.	21080.	21170.	21260.	21350.	21440.	21530.	21620.	21710.	90.00
5.6	21800.	21890.	21980.	22070.	22160.	22250.	22340.	22430.	22520.	22610.	90.00
5.7	22700.	22795.	22890.	22985.	23080.	23175.	23270.	23365.	23460.	23555.	95.00
5.8	23650.	23745.	23840.	23935.	24030.	24125.	24220.	24315.	24410.	24505.	95.00
5.9	24600.	24695.	24790.	24885.	24980.	25075.	25170.	25265.	25360.	25455.	95.00
6.0	25550.	25645.	25740.	25835.	25930.	26025.	26120.	26215.	26310.	26405.	95.00
6.1	26500.	26595.	26690.	26785.	26880.	26975.	27070.	27165.	27260.	27355.	95.00
6.2	27450.	27545.	27640.	27735.	27830.	27925.	28020.	28115.	28210.	28305.	95.00
6.3	28400.	28500.	28600.	28701.	28801.	28901.	29001.	29102.	29202.	29302.	100.22
6.4	29402.	29502.	29602.	29703.	29803.	29903.	30003.	30104.	30204.	30304.	100.22
6.5	30404.	30504.	30604.	30705.	30805.	30905.	31005.	31106.	31206.	31306.	100.22
6.6	31406.	31506.	31606.	31707.	31807.	31907.	32007.	32108.	32208.	32308.	100.22
6.7	32408.	32508.	32608.	32709.	32809.	32909.	33009.	33110.	33210.	33310.	100.22
6.8	33410.	33510.	33610.	33711.	33811.	33911.	34011.	34112.	34212.	34312.	100.22
6.9	34412.	34512.	34612.	34713.	34813.	34913.	35013.	35114.	35214.	35314.	100.22
7.0	35414.	35514.	35614.	35715.	35815.	35915.	36015.	36116.	36216.	36316.	100.22

STATION NO. 534D-R
RATING TABLE NO. 66-01 SHEET 3

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
7.1	36416.	36516.	36616.	36717.	36817.	36917.	37017.	37118.	37218.	37318.	100.22
7.2	37418.	37518.	37618.	37719.	37819.	37919.	38019.	38120.	38220.	38320.	100.22
7.3	38420.	38520.	38620.	38721.	38821.	38921.	39021.	39122.	39222.	39322.	100.22
7.4	39425.	39528.	39630.	39733.	39835.	39938.	40040.	40143.	40245.	40348.	102.50
7.5	40450.	40553.	40655.	40758.	40860.	40963.	41065.	41168.	41270.	41373.	102.50
7.6	41475.	41578.	41680.	41783.	41885.	41988.	42090.	42193.	42295.	42398.	102.50
7.7	42500.	42603.	42705.	42808.	42910.	43013.	43115.	43218.	43320.	43423.	102.50
7.8	43525.	43628.	43730.	43833.	43935.	44038.	44140.	44243.	44345.	44448.	102.50
7.9	44550.	44653.	44755.	44858.	44960.	45063.	45165.	45268.	45370.	45473.	102.50
8.0	45575.	45678.	45780.	45883.	45985.	46088.	46190.	46293.	46395.	46498.	102.50
8.1	46600.	46705.	46811.	46916.	47021.	47126.	47232.	47337.	47442.	47547.	105.25
8.2	47653.	47758.	47864.	47969.	48074.	48179.	48285.	48390.	48495.	48600.	105.25
8.3	48706.	48811.	48917.	49022.	49127.	49232.	49338.	49443.	49548.	49653.	105.25
8.4	49759.	49864.	49970.	50075.	50180.	50285.	50391.	50496.	50601.	50706.	105.25
8.5	50812.	50917.	51023.	51128.	51233.	51338.	51444.	51549.	51654.	51759.	105.25
8.6	51865.	51970.	52076.	52181.	52286.	52391.	52497.	52602.	52707.	52812.	105.25
8.7	52918.	53023.	53129.	53234.	53339.	53444.	53550.	53655.	53760.	53865.	105.25
8.8	53971.	54076.	54182.	54287.	54392.	54497.	54603.	54708.	54813.	54918.	105.25
8.9	55024.	55129.	55235.	55340.	55445.	55550.	55656.	55761.	55866.	55971.	105.25
9.0	56077.	56182.	56288.	56393.	56498.	56603.	56709.	56814.	56919.	57024.	105.25
9.1	57125.	57233.	57340.	57448.	57555.	57663.	57770.	57878.	57985.	58093.	107.50
9.2	58200.	58308.	58415.	58523.	58630.	58738.	58845.	58953.	59060.	59168.	107.50
9.3	59275.	59383.	59490.	59598.	59705.	59813.	59920.	60028.	60135.	60243.	107.50
9.4	60350.	60460.	60570.	60680.	60790.	60900.	61010.	61120.	61230.	61340.	110.00
9.5	61450.	61560.	61670.	61780.	61890.	62000.	62110.	62220.	62330.	62440.	110.00
9.6	62550.	62660.	62770.	62880.	62990.	63100.	63210.	63320.	63430.	63540.	110.00
9.7	63650.	63760.	63870.	63980.	64090.	64200.	64310.	64420.	64530.	64640.	110.00
9.8	64750.	64860.	64970.	65080.	65190.	65300.	65410.	65520.	65630.	65740.	110.00
9.9	65850.	65960.	66070.	66180.	66290.	66400.	66510.	66620.	66730.	66840.	110.00
10.0	66950.	67060.	67170.	67280.	67390.	67500.	67610.	67720.	67830.	67940.	110.00
10.1	68050.	68160.	68270.	68380.	68490.	68600.	68710.	68820.	68930.	69040.	110.00
10.2	69150.	69260.	69370.	69480.	69590.	69700.	69810.	69920.	70030.	70140.	110.00
10.3	70250.	70360.	70470.	70580.	70690.	70800.	70910.	71020.	71130.	71240.	110.00
10.4	71350.	71460.	71570.	71680.	71790.	71900.	72010.	72120.	72230.	72340.	110.00
10.5	72450.	72560.	72670.	72780.	72890.	73000.	73110.	73220.	73330.	73440.	110.00
10.6	73550.	73660.	73770.	73880.	73990.	74100.	74210.	74320.	74430.	74540.	110.00
10.7	74650.	74760.	74870.	74980.	75090.	75200.	75310.	75420.	75530.	75640.	110.00
10.8	75750.	75860.	75970.	76080.	76190.	76300.	76410.	76520.	76630.	76740.	110.00
10.9	76850.	76965.	77080.	77195.	77310.	77425.	77540.	77655.	77770.	77885.	115.00
11.0	78000.	78115.	78230.	78345.	78460.	78575.	78690.	78805.	78920.	79035.	115.00

STATION NO. F34' R

RATING TABLE NO. 66-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
11.1	79150.	79265.	79380.	79495.	79610.	79725.	79840.	79955.	80070.	80185.	115.00
11.2	80300.	80415.	80530.	80645.	80760.	80875.	80990.	81105.	81220.	81335.	115.00
11.3	81450.	81565.	81680.	81795.	81910.	82025.	82140.	82255.	82370.	82485.	115.00
11.4	82600.	82715.	82830.	82945.	83060.	83175.	83290.	83405.	83520.	83635.	115.00
11.5	83750.	83865.	83980.	84095.	84210.	84325.	84440.	84555.	84670.	84785.	115.00
11.6	84900.	85015.	85130.	85245.	85360.	85475.	85590.	85705.	85820.	85935.	115.00
11.7	86050.	86165.	86280.	86395.	86510.	86625.	86740.	86855.	86970.	87085.	115.00
11.8	87200.	87315.	87430.	87545.	87660.	87775.	87890.	88005.	88120.	88235.	115.00
11.9	88350.	88465.	88580.	88695.	88810.	88925.	89040.	89155.	89270.	89385.	115.00
12.0	89500.										

LOS ANGELES RIVER BELOW WARDLOW ROAD

STATION F319-R

RECORDER STATION RATING TABLE

********** RATING TABLE NO. 58-01 **********

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
0.1	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.02
0.2	0.20	0.36	0.52	0.68	0.84	1.00	1.16	1.32	1.48	1.64	0.16
0.3	1.80	2.03	2.26	2.49	2.72	2.95	3.18	3.41	3.64	3.87	0.23
0.4	4.10	4.49	4.88	5.27	5.66	6.05	6.44	6.83	7.22	7.61	0.39
0.5	8.00	8.50	9.00	9.50	10.00	10.50	11.00	11.50	12.00	12.50	0.50
0.6	13.0	13.8	14.6	15.4	16.2	17.0	17.8	18.6	19.4	20.2	0.80
0.7	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	1.00
0.8	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	1.00
0.9	41.0	42.3	43.6	44.9	46.2	47.5	48.8	50.1	51.4	52.7	1.30
1.0	54.0	55.4	56.8	58.2	59.6	61.0	62.4	63.8	65.2	66.6	1.40
1.1	68.0	69.7	71.4	73.1	74.8	76.5	78.2	79.9	81.6	83.3	1.70
1.2	85.0	86.9	88.8	90.7	92.6	94.5	96.4	98.3	100.2	102.1	1.90
1.3	104.0	106.0	108.0	110.0	112.0	114.0	116.0	118.0	120.0	122.0	2.00
1.4	124.0	126.2	128.4	130.6	132.8	135.0	137.2	139.4	141.6	143.8	2.20
1.5	146.0	151.4	156.8	162.2	167.6	173.0	178.4	183.8	189.2	194.6	5.40
1.6	200.0	211.0	222.0	233.0	244.0	255.0	266.0	277.0	288.0	299.0	11.00
1.7	310.0	324.0	338.0	352.0	366.0	380.0	394.0	408.0	422.0	436.0	14.00
1.8	450.0	467.0	484.0	501.0	518.0	535.0	552.0	569.0	586.0	603.0	17.00
1.9	620.0	638.0	656.0	674.0	692.0	710.0	728.0	746.0	764.0	782.0	18.00
2.0	800.0	819.0	838.0	857.0	876.0	895.0	914.0	933.0	952.0	971.0	19.00
2.1	990.0	1011.	1032.	1053.	1074.	1095.	1116.	1137.	1158.	1179.	21.00
2.2	1200.	1222.	1244.	1266.	1288.	1310.	1332.	1354.	1376.	1398.	22.00
2.3	1420.	1442.	1464.	1486.	1508.	1530.	1552.	1574.	1596.	1618.	22.00
2.4	1640.	1664.	1688.	1712.	1736.	1760.	1784.	1808.	1832.	1856.	24.00
2.5	1880.	1905.	1930.	1955.	1980.	2005.	2030.	2055.	2080.	2105.	25.00
2.6	2130.	2156.	2182.	2208.	2234.	2260.	2286.	2312.	2338.	2364.	26.00
2.7	2390.	2417.	2444.	2471.	2498.	2525.	2552.	2579.	2606.	2633.	27.00
2.8	2660.	2688.	2716.	2744.	2772.	2800.	2828.	2856.	2884.	2912.	28.00
2.9	2940.	2968.	2996.	3024.	3052.	3080.	3108.	3136.	3164.	3192.	28.00
3.0	3220.	3248.	3276.	3304.	3332.	3360.	3388.	3416.	3444.	3472.	28.00

SOURCE: LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS

STATION NO. F319-R
RATING TABLE NO. 58-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
3.1	3500.	3530.	3560.	3590.	3620.	3650.	3680.	3710.	3740.	3770.	30.00
3.2	3800.	3832.	3864.	3896.	3928.	3960.	3992.	4024.	4056.	4088.	32.00
3.3	4120.	4152.	4184.	4216.	4248.	4280.	4312.	4344.	4376.	4408.	32.00
3.4	4440.	4474.	4508.	4542.	4576.	4610.	4644.	4678.	4712.	4746.	34.00
3.5	4780.	4816.	4852.	4888.	4924.	4960.	4996.	5032.	5068.	5104.	36.00
3.6	5140.	5176.	5212.	5248.	5284.	5320.	5356.	5392.	5428.	5464.	36.00
3.7	5500.	5538.	5576.	5614.	5652.	5690.	5728.	5766.	5804.	5842.	38.00
3.8	5880.	5920.	5960.	6000.	6040.	6080.	6120.	6160.	6200.	6240.	40.00
3.9	6280.	6321.	6362.	6403.	6444.	6485.	6526.	6567.	6608.	6649.	41.00
4.0	6690.	6731.	6772.	6813.	6854.	6895.	6936.	6977.	7018.	7059.	41.00
4.1	7100.	7142.	7184.	7226.	7268.	7310.	7352.	7394.	7436.	7478.	42.00
4.2	7520.	7563.	7606.	7649.	7692.	7735.	7778.	7821.	7864.	7907.	43.00
4.3	7950.	7994.	8038.	8082.	8126.	8170.	8214.	8258.	8302.	8346.	44.00
4.4	8390.	8435.	8480.	8525.	8570.	8615.	8660.	8705.	8750.	8795.	45.00
4.5	8840.	8886.	8932.	8978.	9024.	9070.	9116.	9162.	9208.	9254.	46.00
4.6	9300.	9348.	9396.	9444.	9492.	9540.	9588.	9636.	9684.	9732.	48.00
4.7	9780.	9830.	9880.	9930.	9980.	10030.	10080.	10130.	10180.	10230.	50.00
4.8	10280.	10331.	10382.	10433.	10484.	10535.	10586.	10637.	10688.	10739.	51.00
4.9	10790.	10841.	10892.	10943.	10994.	11045.	11096.	11147.	11198.	11249.	51.00
5.0	11300.	11352.	11404.	11456.	11508.	11560.	11612.	11664.	11716.	11768.	52.00
5.1	11820.	11873.	11926.	11979.	12032.	12085.	12138.	12191.	12244.	12297.	53.00
5.2	12350.	12405.	12460.	12515.	12570.	12625.	12680.	12735.	12790.	12845.	55.00
5.3	12900.	12956.	13012.	13068.	13124.	13180.	13236.	13292.	13348.	13404.	56.00
5.4	13460.	13517.	13574.	13631.	13688.	13745.	13802.	13859.	13916.	13973.	57.00
5.5	14030.	14087.	14144.	14201.	14258.	14315.	14372.	14429.	14486.	14543.	57.00
5.6	14600.	14657.	14714.	14771.	14828.	14885.	14942.	14999.	15056.	15113.	57.00
5.7	15170.	15227.	15284.	15341.	15398.	15455.	15512.	15569.	15626.	15683.	57.00
5.8	15740.	15797.	15854.	15911.	15968.	16025.	16082.	16139.	16196.	16253.	57.00
5.9	16310.	16367.	16424.	16481.	16538.	16595.	16652.	16709.	16766.	16823.	57.00
6.0	16880.	16938.	16996.	17054.	17112.	17170.	17228.	17286.	17344.	17402.	58.00
6.1	17460.	17519.	17578.	17637.	17696.	17755.	17814.	17873.	17932.	17991.	59.00
6.2	18050.	18110.	18170.	18230.	18290.	18350.	18410.	18470.	18530.	18590.	60.00
6.3	18650.	18711.	18772.	18833.	18894.	18955.	19016.	19077.	19138.	19199.	61.00
6.4	19260.	19321.	19382.	19443.	19504.	19565.	19626.	19687.	19748.	19809.	61.00
6.5	19870.	19932.	19994.	20056.	20118.	20180.	20242.	20304.	20366.	20428.	62.00
6.6	20490.	20553.	20616.	20679.	20742.	20805.	20868.	20931.	20994.	21057.	63.00
6.7	21120.	21183.	21246.	21309.	21372.	21435.	21498.	21561.	21624.	21687.	63.00
6.8	21750.	21813.	21876.	21939.	22002.	22065.	22128.	22191.	22254.	22317.	63.00
6.9	22380.	22443.	22506.	22569.	22632.	22695.	22758.	22821.	22884.	22947.	63.00
7.0	23010.	23073.	23136.	23199.	23262.	23325.	23388.	23451.	23514.	23577.	63.00

STATION NO. F319-R
RATING TABLE NO. 58-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
7.1	23640.	23703.	23766.	23829.	23892.	23955.	24018.	24081.	24144.	24207.	63.00
7.2	24270.	24334.	24398.	24462.	24526.	24590.	24654.	24718.	24782.	24846.	64.00
7.3	24910.	24975.	25040.	25105.	25170.	25235.	25300.	25365.	25430.	25495.	65.00
7.4	25560.	25626.	25692.	25758.	25824.	25890.	25956.	26022.	26088.	26154.	66.00
7.5	26220.	26287.	26354.	26421.	26488.	26555.	26622.	26689.	26756.	26823.	67.00
7.6	26890.	26958.	27026.	27094.	27162.	27230.	27298.	27366.	27434.	27502.	68.00
7.7	27570.	27639.	27708.	27777.	27846.	27915.	27984.	28053.	28122.	28191.	69.00
7.8	28260.	28330.	28400.	28470.	28540.	28610.	28680.	28750.	28820.	28890.	70.00
7.9	28960.	29031.	29102.	29173.	29244.	29315.	29386.	29457.	29528.	29599.	71.00
8.0	29670.	29742.	29814.	29886.	29958.	30030.	30102.	30174.	30246.	30318.	72.00
8.1	30390.	30463.	30536.	30609.	30682.	30755.	30828.	30901.	30974.	31047.	73.00
8.2	31120.	31194.	31268.	31342.	31416.	31490.	31564.	31638.	31712.	31786.	74.00
8.3	31860.	31935.	32010.	32085.	32160.	32235.	32310.	32385.	32460.	32535.	75.00
8.4	32610.	32686.	32762.	32838.	32914.	32990.	33066.	33142.	33218.	33294.	76.00
8.5	33370.	33447.	33524.	33601.	33678.	33755.	33832.	33909.	33986.	34063.	77.00
8.6	34140.	34217.	34294.	34371.	34448.	34525.	34602.	34679.	34756.	34833.	77.00
8.7	34910.	34988.	35066.	35144.	35222.	35300.	35378.	35456.	35534.	35612.	78.00
8.8	35690.	35768.	35846.	35924.	36002.	36080.	36158.	36236.	36314.	36392.	78.00
8.9	36470.	36548.	36626.	36704.	36782.	36860.	36938.	37016.	37094.	37172.	78.00
9.0	37250.	37328.	37406.	37484.	37562.	37640.	37718.	37796.	37874.	37952.	78.00
9.1	38030.	38108.	38186.	38264.	38342.	38420.	38498.	38576.	38654.	38732.	78.00
9.2	38810.	38888.	38966.	39044.	39122.	39200.	39278.	39356.	39434.	39512.	78.00
9.3	39590.	39668.	39746.	39824.	39902.	39980.	40058.	40136.	40214.	40292.	78.00
9.4	40370.	40448.	40526.	40604.	40682.	40760.	40838.	40916.	40994.	41072.	78.00
9.5	41150.	41228.	41306.	41384.	41462.	41540.	41618.	41696.	41774.	41852.	78.00
9.6	41930.	42009.	42088.	42167.	42246.	42325.	42404.	42483.	42562.	42641.	79.00
9.7	42720.	42799.	42878.	42957.	43036.	43115.	43194.	43273.	43352.	43431.	79.00
9.8	43510.	43589.	43668.	43747.	43826.	43905.	43984.	44063.	44142.	44221.	79.00
9.9	44300.	44380.	44460.	44540.	44620.	44700.	44780.	44860.	44940.	45020.	80.00
10.0	45100.	45181.	45262.	45343.	45424.	45505.	45586.	45667.	45748.	45829.	81.00
10.1	45910.	45992.	46074.	46156.	46238.	46320.	46402.	46484.	46566.	46648.	82.00
10.2	46730.	46813.	46896.	46979.	47062.	47145.	47228.	47311.	47394.	47477.	83.00
10.3	47560.	47644.	47728.	47812.	47896.	47980.	48064.	48148.	48232.	48316.	84.00
10.4	48400.	48484.	48568.	48652.	48736.	48820.	48904.	48988.	49072.	49156.	84.00
10.5	49240.	49325.	49410.	49495.	49580.	49665.	49750.	49835.	49920.	50005.	85.00
10.6	50090.	50175.	50260.	50345.	50430.	50515.	50600.	50685.	50770.	50855.	85.00
10.7	50940.	51025.	51110.	51195.	51280.	51365.	51450.	51535.	51620.	51705.	85.00
10.8	51790.	51875.	51960.	52045.	52130.	52215.	52300.	52385.	52470.	52555.	85.00
10.9	52640.	52725.	52810.	52895.	52980.	53065.	53150.	53235.	53320.	53405.	85.00
11.0	53490.	53576.	53662.	53748.	53834.	53920.	54006.	54092.	54178.	54264.	86.00

STATION NO. F319-R
RATING TABLE NO. 58-01 SHEET 4

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
11.1	54350.	54437.	54524.	54611.	54698.	54785.	54872.	54959.	55046.	55133.	87.00
11.2	55220.	55308.	55396.	55484.	55572.	55660.	55748.	55836.	55924.	56012.	88.00
11.3	56100.	56188.	56276.	56364.	56452.	56540.	56628.	56716.	56804.	56892.	88.00
11.4	56980.	57068.	57156.	57244.	57332.	57420.	57508.	57596.	57684.	57772.	88.00
11.5	57860.	57948.	58036.	58124.	58212.	58300.	58388.	58476.	58564.	58652.	88.00
11.6	58740.	58829.	58918.	59007.	59096.	59185.	59274.	59363.	59452.	59541.	89.00
11.7	59630.	59719.	59808.	59897.	59986.	60075.	60164.	60253.	60342.	60431.	89.00
11.8	60520.	60610.	60700.	60790.	60880.	60970.	61060.	61150.	61240.	61330.	90.00
11.9	61420.	61511.	61602.	61693.	61784.	61875.	61966.	62057.	62148.	62239.	91.00
12.0	62330.	62422.	62514.	62606.	62698.	62790.	62882.	62974.	63066.	63158.	92.00
12.1	63250.	63343.	63436.	63529.	63622.	63715.	63808.	63901.	63994.	64087.	93.00
12.2	64180.	64274.	64368.	64462.	64556.	64650.	64744.	64838.	64932.	65026.	94.00
12.3	65120.	65215.	65310.	65405.	65500.	65595.	65690.	65785.	65880.	65975.	95.00
12.4	66070.	66166.	66262.	66358.	66454.	66550.	66646.	66742.	66838.	66934.	96.00
12.5	67030.	67127.	67224.	67321.	67418.	67515.	67612.	67709.	67806.	67903.	97.00
12.6	68000.	68098.	68196.	68294.	68392.	68490.	68588.	68686.	68784.	68882.	98.00
12.7	68980.	69079.	69178.	69277.	69376.	69475.	69574.	69673.	69772.	69871.	99.00
12.8	69970.	70070.	70170.	70270.	70370.	70470.	70570.	70670.	70770.	70870.	100.00
12.9	70970.	71071.	71172.	71273.	71374.	71475.	71576.	71677.	71778.	71879.	101.00
13.0	71980.	72081.	72182.	72283.	72384.	72485.	72586.	72687.	72788.	72889.	101.00
13.1	72990.	73091.	73192.	73293.	73394.	73495.	73596.	73697.	73798.	73899.	101.00
13.2	74000.	74101.	74202.	74303.	74404.	74505.	74606.	74707.	74808.	74909.	101.00
13.3	75010.	75111.	75212.	75313.	75414.	75515.	75616.	75717.	75818.	75919.	101.00
13.4	76020.	76121.	76222.	76323.	76424.	76525.	76626.	76727.	76828.	76929.	101.00
13.5	77030.	77132.	77234.	77336.	77438.	77540.	77642.	77744.	77846.	77948.	102.00
13.6	78050.	78153.	78256.	78359.	78462.	78565.	78668.	78771.	78874.	78977.	103.00
13.7	79080.	79184.	79288.	79392.	79496.	79600.	79704.	79808.	79912.	80016.	104.00
13.8	80120.	80225.	80330.	80435.	80540.	80645.	80750.	80855.	80960.	81065.	105.00
13.9	81170.	81275.	81380.	81485.	81590.	81695.	81800.	81905.	82010.	82115.	105.00
14.0	82220.	82325.	82430.	82535.	82640.	82745.	82850.	82955.	83060.	83165.	105.00
14.1	83270.	83375.	83480.	83585.	83690.	83795.	83900.	84005.	84110.	84215.	105.00
14.2	84320.	84425.	84530.	84635.	84740.	84845.	84950.	85055.	85160.	85265.	105.00
14.3	85370.	85475.	85580.	85685.	85790.	85895.	86000.	86105.	86210.	86315.	105.00
14.4	86420.	86525.	86630.	86735.	86840.	86945.	87050.	87155.	87260.	87365.	105.00
14.5	87470.	87575.	87680.	87785.	87890.	87995.	88100.	88205.	88310.	88415.	105.00
14.6	88520.	88625.	88730.	88835.	88940.	89045.	89150.	89255.	89360.	89465.	105.00
14.7	89570.	89675.	89780.	89885.	89990.	90095.	90200.	90305.	90410.	90515.	105.00
14.8	90620.	90725.	90830.	90935.	91040.	91145.	91250.	91355.	91460.	91565.	105.00
14.9	91670.	91775.	91880.	91985.	92090.	92195.	92300.	92405.	92510.	92615.	105.00
15.0	92720.	92825.	92930.	93035.	93140.	93245.	93350.	93455.	93560.	93665.	105.00

STATION NO. F319-R
RATING TABLE NO. 58-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
15.1	93770.	93876.	93982.	94088.	94194.	94300.	94406.	94512.	94618.	94724.	106.00
15.2	94830.	94937.	95044.	95151.	95258.	95365.	95472.	95579.	95686.	95793.	107.00
15.3	95900.	96008.	96116.	96224.	96332.	96440.	96548.	96656.	96764.	96872.	108.00
15.4	96980.	97089.	97198.	97307.	97416.	97525.	97634.	97743.	97852.	97961.	109.00
15.5	98070.	98181.	98292.	98403.	98514.	98625.	98736.	98847.	98958.	99069.	111.00
15.6	99180.	99293.	99406.	99519.	99632.	99745.	99858.	99971.	100084.	100197.	113.00
15.7	100310.	100425.	100540.	100655.	100770.	100885.	101000.	101115.	101230.	101345.	115.00
15.8	101460.	101577.	101694.	101811.	101928.	102045.	102162.	102279.	102396.	102513.	117.00
15.9	102630.	102749.	102868.	102987.	103106.	103225.	103344.	103463.	103582.	103701.	119.00
16.0	103820.	103941.	104062.	104183.	104304.	104425.	104546.	104667.	104788.	104909.	121.00
16.1	105030.	105152.	105274.	105396.	105518.	105640.	105762.	105884.	106006.	106128.	122.00
16.2	106250.	106372.	106494.	106616.	106738.	106860.	106982.	107104.	107226.	107348.	122.00
16.3	107470.	107593.	107716.	107839.	107962.	108085.	108208.	108331.	108454.	108577.	123.00
16.4	108700.	108823.	108946.	109069.	109192.	109315.	109438.	109561.	109684.	109807.	123.00
16.5	109930.	110053.	110176.	110299.	110422.	110545.	110668.	110791.	110914.	111037.	123.00
16.6	111160.	111283.	111406.	111529.	111652.	111775.	111898.	112021.	112144.	112267.	123.00
16.7	112390.	112513.	112636.	112759.	112882.	113005.	113128.	113251.	113374.	113497.	123.00
16.8	113620.	113743.	113866.	113989.	114112.	114235.	114358.	114481.	114604.	114727.	123.00
16.9	114850.	114974.	115098.	115222.	115346.	115470.	115594.	115718.	115842.	115966.	124.00
17.0	116090.	116216.	116342.	116468.	116594.	116720.	116846.	116972.	117098.	117224.	126.00
17.1	117350.	117477.	117604.	117731.	117858.	117985.	118112.	118239.	118366.	118493.	127.00
17.2	118620.	118748.	118876.	119004.	119132.	119260.	119388.	119516.	119644.	119772.	128.00
17.3	119900.	120028.	120156.	120284.	120412.	120540.	120668.	120796.	120924.	121052.	128.00
17.4	121180.	121308.	121436.	121564.	121692.	121820.	121948.	122076.	122204.	122332.	128.00
17.5	122460.	122588.	122716.	122844.	122972.	123100.	123228.	123356.	123484.	123612.	128.00
17.6	123740.	123868.	123996.	124124.	124252.	124380.	124508.	124636.	124764.	124892.	128.00
17.7	125020.	125148.	125276.	125404.	125532.	125660.	125788.	125916.	126044.	126172.	128.00
17.8	126300.	126428.	126556.	126684.	126812.	126940.	127068.	127196.	127324.	127452.	128.00
17.9	127580.	127708.	127836.	127964.	128092.	128220.	128348.	128476.	128604.	128732.	128.00
18.0	128860.	128989.	129118.	129247.	129376.	129505.	129634.	129763.	129892.	130021.	129.00
18.1	130150.	130280.	130410.	130540.	130670.	130800.	130930.	131060.	131190.	131320.	130.00
18.2	131450.	131581.	131712.	131843.	131974.	132105.	132236.	132367.	132498.	132629.	131.00
18.3	132760.	132892.	133024.	133156.	133288.	133420.	133552.	133684.	133816.	133948.	132.00
18.4	134080.	134213.	134346.	134479.	134612.	134745.	134878.	135011.	135144.	135277.	133.00
18.5	135410.	135544.	135678.	135812.	135946.	136080.	136214.	136348.	136482.	136616.	134.00
18.6	136750.	136885.	137020.	137155.	137290.	137425.	137560.	137695.	137830.	137965.	135.00
18.7	138100.	138236.	138372.	138508.	138644.	138780.	138916.	139052.	139188.	139324.	136.00
18.8	139460.	139597.	139734.	139871.	140008.	140145.	140282.	140419.	140556.	140693.	137.00
18.9	140830.	140968.	141106.	141244.	141382.	141520.	141658.	141796.	141934.	142072.	138.00
19.0	142210.	142349.	142488.	142627.	142766.	142905.	143044.	143183.	143322.	143461.	139.00

STATION NO. F319-R
RATING TABLE NO. 53-01

G.H.	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF.
19.1	143600.	143739.	143878.	144017.	144156.	144295.	144434.	144573.	144712.	144851.	139.00
19.2	144990.	145129.	145268.	145407.	145546.	145685.	145824.	145963.	146102.	146241.	139.00
19.3	146380.	146519.	146658.	146797.	146936.	147075.	147214.	147353.	147492.	147631.	139.00
19.4	147770.	147909.	148048.	148187.	148326.	148465.	148604.	148743.	148882.	149021.	139.00
19.5	149160.	149299.	149438.	149577.	149716.	149855.	149994.	150133.	150272.	150411.	139.00
19.6	150550.	150689.	150828.	150967.	151106.	151245.	151384.	151523.	151662.	151801.	139.00
19.7	151940.	152079.	152218.	152357.	152496.	152635.	152774.	152913.	153052.	153191.	139.00
19.8	153330.	153470.	153610.	153750.	153890.	154030.	154170.	154310.	154450.	154590.	140.00
19.9	154730.	154870.	155010.	155150.	155290.	155430.	155570.	155710.	155850.	155990.	140.00
20.0	156130.										

EXHIBIT G

FINDING OF NO SIGNIFICANT IMPACT
WATER CONTROL PLAN
SEPULVEDA FLOOD CONTROL BASIN
LOS ANGELES COUNTY, CALIFORNIA

LOS ANGELES DISTRICT CORPS OF ENGINEERS

FINDING OF NO SIGNIFICANT

IMPACT

WATER CONTROL PLAN

SEPULVEDA FLOOD CONTROL BASIN

LOS ANGELES COUNTY, CALIFORNIA

APRIL 1987

I have reviewed the attached environmental assessment that has been prepared for the Water Control Plan, Sepulveda Flood Control Basin, Los Angeles County, California. The significant resources potentially affected by this project are biological resources, cultural resources, water quality and land use, including flood control, recreation and agriculture.

Although the proposed Water Control Plan permits deviations from the operation schedule for Sepulveda Dam, these deviations are not discernibly different from existing conditions and, therefore, should not have any effect on the extent and duration of inundation within the flood control basin. The impacts on the quality of the human environment due to these changes are not considered significant. Therefore, an environmental impact statement is not required for this project.

21 May 87
Date

D. FRED BUTLER
Colonel, CE
Commanding

EXHIBIT H

CHAIN OF CORRESPONDENCE
FOR APPROVAL OF
WATER CONTROL MANUAL

CESPD-ED-W (CESPL-ED-HR/13 OCT 88) (1110-2-240b) 3d End
Krhoun/dh/556-2033
SUBJECT: Sepulveda Dam Water Control Manual

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 720, San Francisco CA 94111-2206 18 JUN 1989

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

1. Subject report is approved.

2. Please furnish this office four copies of the final printing of the report.

FOR THE COMMANDER:

JAY K. SOPER
Chief, Engineering Division

Encl
wd

1 - JUN 1989

CESPL-ED-HR (CESPD-ED-W/12 Jan 89) (1110-2-240b) 2nd End
Reid/ep/894-3003
SUBJECT: Sepulveda Dam Water Control Manual

DA, Los Angeles District, Corps of Engineers, 300 N. Los Angeles Street, Room 6042, Los Angeles, CA 90053-2325 30 May 1989

FOR Commander, South Pacific Division, Attn: CESPD-ED-W

1. Enclosed are four copies of the final Sepulveda Dam Water Control Manual prepared in accordance with ETL 1110-2-251. Responses to CESPD comments 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 there are any questions, please contact Boni Bigornia of the Reservoir Regulation Unit at (213)894-6916.

FOR THE COMMANDER:

Robert C. Jaglis

Carl F. Ensor, PE
Chief, Engineering Division

Enclosure
1. as

05 April 1989

LAD RESPONSES TO SPD COMMENTS ON THE SEPULVEDA DAM WATER CONTROL MANUAL:

1. Concur. The title page has been changed accordingly.

2. Concur. Table 4-07 on page 4-19 has been updated to the present, and the footnotes clarified.

3. Concur. A description of the unit hydrograph procedure was expanded and included on page 4-7, para. 4-07.

4. Concur. The rubber dam and Verdugo Wash have been located on Plate 2-02. The channel capacity of 16,900 cfs downstream of the dam and other points of constraints have also been included on Plate 2-02. With the rubber dam fully inflated to 6.9 feet, the flow in the channel will reach 800 cfs, when the depth of flow in the channel is 8.3 feet. At that time, the dam begins to deflate automatically. The channel capacity of the Los Angeles River with the dam lowered is 55,000 cfs. With the dam in the raised position, the maximum channel capacity is about 20,000 cfs. This information has been noted on page 7-1, para. 7-02.

5. Concur. The Section on Flood Control on page 7-2, para. 7-05 was modified to describe only the flood control plan regardless of the forecast. Deviations from the plan in the event of a forecast of no spillway flow was moved to page 7-5, paragraph 7-13d.

6. Concur. A small paragraph on drought contingency plans has been added to Section 7-09, entitled " Drought Contingency Plan".

7. Additions to the text resulting from the SPD comments are attached.

CESPD-ED-W (CESPL-ED-HR/13 OCT 1988) (1110-2-240b) 1st End\Krhoun\dh\6-2033
SUBJECT: Sepulveda Dam Water Control Manual

19 JAN 1989

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

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

1. Subject final draft manual has been reviewed and comments are attached. 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. District is requested to submit its responses to the comments along with the final manual.

THE COMMANDER:

WALTER C. DAY
Acting Chief, Engineering Division

2 Encls
wd encl 1
Added 1 encl
2. SPD Comments

SOUTH PACIFIC DIVISION
COMMENTS
FINAL DRAFT
SEPULVEDA WATER CONTROL MANUAL

1. Page i- Title of project should be identical to the name on the cover of the manual.

2. Page 4-19, Table 4-07- This table should be updated to include years from 1980 to present. Note 2 is unclear. It should be modified or eliminated when the table is updated.

3. Page 6-2, paragraph 6-02- A description of the unit hydrograph procedures should be included in this paragraph or on Plate 4-08. This will permit the reader to understand the method used.

4. Page 7-1, paragraph 7-02- Locate Verdugo Wash and the rubber dam on Plate 2-02. Another constraint appears to be the channel capacity of 16,900 cfs immediately downstream of the dam (see paragraph 7-05b). Indicate the channel capacity corresponding to the 8.3 feet depth at the rubber dam. In addition the correlation of the flows at the points of constraints should be noted.

5. Page 7-2, paragraph 7-05- This paragraph should describe the flood control plan regardless of the forecast. The manual infers that the plan shown on plate 7-02 will only be followed if there is no forecast or if large spillway flow is anticipated. The operating criteria should be developed for all storms regardless of their magnitude. Deviations for emergencies are handled as shown in paragraph 7-13. Paragraph 7-05 should be revised accordingly.

6. A small paragraph on drought contingency plans should be included in Chapter 7. This paragraph would explain in general terms water control actions that would occur during drought conditions.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS

REPLY TO ATTENTION OF

13 OCT 1988

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

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

SUBJECT: Sepulveda Dam Water Control Manual

1. Enclosed for your review and approval are three copies of the updated Sepulveda Dam Water Control Manual (final draft) dated September 1988 (enclosure 1). The previous version of this manual was approved by SPDED-W by endorsement dated 23 October 1986.

2. Before final reproduction of the previously approved water control manual could be initiated, a final Environmental Assessment (EA) had to be approved by SPD. The final EA, dated May 1987, determined a Finding of No Significant Impact (FONSI) and was subsequently approved by SPD. However, because of the time difference between approval of the water control manual and approval of the May 1987 EA, new developments had occured in the Sepulveda Basin that needed to be included in the water control manual.

3. The enclosed September 1988 version of the manual updates the October 1986 approved version to include the changes to the basin. None of the basin changes affect the conclusions stated in the existing EA. In addition, the changes included in the September 1988 water control manual do not significantly impact the reservoir regulation schedule used to operate the outlet works. Enclosure 2 is a list of the revisions to the previously approved water control manual furnished to expedite the your review process. You may refer to the May 1987 EA as necessary, as it still applies in all respects.

4. We request an expedited review and approval of the enclosed manual in keeping with the Division's goal of having all water control manuals brought up to date by the end of FY 91.

FOR THE COMMANDER:

Robert C. Kapli

CARL F. ENSON
Chief, Engineering Division

Encls

SPDED-W (SPLED-HE/28 May 85) 3rd End Bhamidipaty/6-6210
SUBJECT: Sepulveda Reservoir Water Control Manual

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 720, San Francisco, CA 94111-2206 23 OCT 1986

TO: Commander, Los Angeles District, ATTN: SPLED-HE

The subject reservoir regulation manual is approved.

FOR THE COMMANDER:

SB/dh
SPDED-W
6-6210
16 Oct 86

3 Encls
wd encl 2
1&3. nc

A. E. WANKET
Chief, Engineering Division

JM
SPDED-W

WCD

AEW
SPDED

CF: SPDED-W/Bhamidipaty
SPDED-W
SPD RF

8 - OCT 1986

SPLED-EE (25 May 1955) 2nd End
SUBJECT: Sepulveda Reservoir Water Control Manual

DA, Los Angeles District, Corps of Engineers, P.O. Box 2711, Los Angeles, California 90053

TO: Commander, South Pacific Division, ATTN: SPDED-W

1. Enclosed for your review and approval are two copies of the updated Sepulveda Dam Water Control Manual (final draft) dated May 1986. The draft water control manual was transmitted to SPD in May 1985 and comments were returned to LAD by the 1st Endorsement dated 11 Feb 1986. Response to all SPD comments received with the 1st Endorsement have been incorporated in the final draft with the exception of comments addressed in enclosure 3.

2. A draft Environmental Assessment was forwarded to SPLPD-R for review in the summer of 1985. The final Environmental Assessment for Sepulveda Reservoir is being prepared at this time by Planning Division, LAD, and will be forwarded seperately.

FOR THE COMMANDER:

3 Encls
added 1 encl
3. Response to Comments

BURTON ARNO
Chief, Engineering Division

APNO
SPLED

KOFLIN
SPLED

EVELYN
SPLED-G

MARFICE
SPLED-HE

MANIOS
SPLED-HE
x4756/rg
MAY

CF (w/o/encls):

M&R
CDR
ED
E&H Br.
LMES (3)
Op Br.
PD
ERB
RF (KOENIGS)

SEPULVEDA DAM AND RESERVOIR
DRAFT WATER CONTROL MANUAL (MAY 1986)
RESPONSE TO SPDED-W COMMENTS

All SPDED-W comments have been incorporated in this update of the water control manual except as follows:

Comment # 9. Section 4-06. Information on historic flood damages is included in Section 4-12 (d) under economic data and it is not duplicated in Section 4-06 under Storms and Floods.

Comment # 10. Plate 4-33. This plate was kept because it helps to establish plate 4-05.

Comment # 13. Section 4-09. The water surface profiles for control points on the Los Angeles River are not available at this time. The old ones are obsolete since more side drains and new construction changed the original channel design. However, these water surface profiles will be incorporated in the next update of the water control manual which is scheduled for FY 88.

Comment # 23. Table 4-06. The values of this table are correct. Backup material can be sent if requested.

Comment # 24. Plates. The plates are kept at the end of the report rather than with each section, because this way the water control manual is more easily used.

Comment # 25. Exhibit F. This exhibit is incorporated in this update of the water control manual but Plates and Tables that are used in the main body of the water control manual are not duplicated in the exhibit. This avoids duplication of work and the possibility of two versions of one table in the same water control manual. The dam tender is required to have available at the dam other pertinent books that complement this exhibit. These books are: the current Orange Book - "Instructions for Reservoir Operations Center Personnel" the "Sepulveda Dam Flood Emergency Plan" and the "Operation and Maintenance Manual for Sepulveda Dam". Names and telephone numbers are included in the "Orange Book", not in the water control manual, otherwise an annual update and distribution of the water control manual would be required.

Encl 3

SPDED-W (SPLED-HE/Undated Ltr Received on 28 May 1985) 1st End
SUBJECT: Sepulveda Reservoir Water Control Manual

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 720, San Francisco, CA 94111-2206 11 JUL 1985

TO: Commander, Los Angeles District, ATTN: SPLED-HE

The referenced draft manual (July 85 Draft) has been reviewed. Our comments are attached, together with a marked-up copy of the draft for incorporation in the final.

FOR THE COMMANDER:

2 Encl

/s/ Walter C. Day
A. E. WANKET
Chief, Engineering Division

SEPULVEDA DAM AND RESERVOIR
DRAFT WATER CONTROL MANUAL (JULY 1985)
SPDED-W COMMENTS

1. Make title on the front cover and page i consistent.

2. Table 1. Make the date at the beginning of the table consistent with the date of the manual. Provide real estate taking lines by fee and easements. Change MSL to NGVD through out the table and through out the report. Under Elevation, items 4 and 5 are not clear and appears something is missing. Either provide allowance for sediment or delete-50-year.

3. Paragraph Titles: Use lower case letters and underscore the title.

4. Para 1-01: Add EM 1110-2-3600.

5. Add Para 1-05 with necessary information as required by ETL 1110-2-251.

6. Chapter II: Too descriptive and can be condensed.

7. Section 4-03: Provide brief description of the geology of the area.

8. Section 4-04: Identify various debris basins on plate 2-01 or plate 2-02.

9. Section 4-06: Provide information on historic flood damages.

10. Plate 4-03: This plate shows the 10-year moving mean of peak flows. There is no significance to this plate and should be removed.

11. Table 4-07: There are some errors in this table. For example for the month of March, the mean is 3,124 and not 2,035, and the median is 2,200 and not 1,111. Correct these and check other values.

12. Section 4-07: Provide time of concentration value at the dam site.

13. Section4-09: Provide water surface profiles for floods such as 10-year and 100-year. Indicate control points and damage centers, and provide rating curves.

14. Section 4-10: Provide drainage area at Chatsworth Reservoir amd Encino Reservoir.

15. Section 4-11 d: Provide drainage areas.

16. Section 5-08: Does LAD inform local and state Emergency Management agencies instead of LA Police Department in case of

flood emergencies? Check into this and if necessary correct it. Also provide phone numbers and addresses of these agencies.

17. Section 6-01.a: Reference to Sec. 5-06.b does not make any sense. Check this and correct it, if necessary.

18. Section 6-02. The information provided is inadequate. Provide details as required by ETL 1110-2-251.

19. Section 7-02: This section is incomplete. Provide maximum discharge that can be released without exceeding downstream channel capacity, maximum changes in releases from time to time and the release that can be made in case of gate failure. Discuss the impact of flows from downstream uncontrolled area on the releases from Sepulveda Dam.

20. Section 7.05 c(1): Provide the maximum release that can be made the rough the four ungated outlets when the water level is at spillway crest.

21. Section 7.05: Paragraph e is missing and paragraph f appears to be out of place.

22. Plates: Provide the following plates.
Location and Vicinity Maps.
Sediment Ranges or Sediment Survey Info.
Embankment Section.
Unit hydrograph.
Tailwater Rating curve.
Profile of the downstream reach of the river.

23. Table 4-06: The values in this table appear to be not correct. How could the ratio of the flows in columns (2) and (3) be the same for peak flow and 5-day duration flow.

24. Plates: Provide the plates with each section rather than at the end of the report.

25. Exhibit A: a. Provide Exhibit A on a colored paper.

b. Provide time required to raise and lower the gates of spillway outlets.

c. Type of energy dissipator for spillway and outlets.

d. Discharge through the outlets at pertinent elevations.

e. Control points downstream and pertinent information.

26. Exhibit F: This exhibit is incomplete and inadequate for dam tender's use during flood emergency. This exhibit should be self contained with all the necessary backup information.

Provide as a minimum the following:

a. A table containing the names, offices, and office and home telephone numbers of all concerned people with the regulation of floods of Sepulveda Dam and Reservoir.

b. A narrative covering

(I) General
(II) Flood Control Operational Requirements
(III) Limitations on Storage and Releases
(IV) Standing Instruction During Flood Emergency
(V) Operational Responsibilities
(VI) Gate Operation
(VII) Normal and Emergency Operation Procedures
(VIII) Reports (Number, estent and frequency)
(IX) Emergency Notification
(X) Modification of Regulations
(XI) Spillway and Outlet Rating Curves
(XII) Tailwater Rating Curve
(XIII) Rating Curves for Downstream Control Points
(XIV) Flood Control Diagram

SPDPD COMMENTS

1. Water Control Manual, Page 2-1, Paragraph 2-01. There is no Table 1 in Exhibit A. Also, Plate 2-01 is sufficient reference for the location discussed.

2. Para 8.02(b), Page 8-3. Contains an incorrect statement regarding status of SPF flood design for reservoirs which ignores all guidance that is current. Change it.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

REPLY TO
ATTENTION OF
SPLED-HE

SUBJECT: Sepulveda Reservoir Water Control Manual

Commander, South Pacific Division
ATTN: SPDED-W

1. Enclosed are two draft copies of the Water Control Manual for Sepulveda Reservoir for your review and comments.

2. Copies of this draft report are also being circulated simultaneously for review by local water resources and flood control agencies.

3. An Environmental Assessment for Sepulveda Reservoir is also being prepared at this time by Planning Division, LAD, and will be forwarded separately.

FOR THE COMMANDER:

Robert C. Kaplan

Encl (2 cys)

NORMAN ARNO
for Chief, Engineering Division

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

REPLY TO
ATTENTION OF:

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

MAR 20 1991

MEMORANDUM FOR Commander, Los Angeles District
Commander, Sacramento District

SUBJECT: Planned Deviations from Approved Water Control Plans

1. All planned deviations from approved water control plans for reservoir projects within the South Pacific Division must be coordinated with the Coastal Engineering and Water Management Division at CESPD. Approval must be given prior to implementation of the deviation.

2. Emergency deviations do not require prior approval but coordination must still be made as soon as is practical.

ROGER E. VANKOPPE
Brigadier General, U.S. Army
Commanding