III - HISTORY OF PROJECT

3-01 AUTHORIZATION

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

3-02 PLANNING AND DESIGN

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reports include: "Analysis of Design of Tujunga Wash Improvement - Hansen Dam" - Volume I and II, dated 2 May 1939, superseded by Volume III, dated 1 June 1940; "Analysis of Design of 5 ft.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

3-03 CONSTRUCTION

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

3-04 RELATED PROJECTS

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

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

b. Hansen Spreading Grounds. Hansen Spreading Grounds is owned and operated by the LACDPW. The facility is located approximately 1,500 ft. downstream of Hansen Dam. A radial gate across Tujunga Wash can divert flow into the spreading grounds. Photographs of the diversion structure and the spreading facility are shown in figures 3-1 and 3-2. pertinent information concerning Hansen Spreading Grounds is listed below:

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

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

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

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

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

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

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

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

3-05. MODIFICATIONS TO REGULATIONS

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

3-06. PRINCIPAL REGULATION PROBLEMS

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

However, based on the results of the April 1983 reservoir sedimentation survey, current storage capacity below the spillway crest elevation of 1,060 ft. is approximately 25,500 ac-ft, which is about 23 percent less than the initially allocated net flood control storage capacity of 33,100 ac-ft. Figures presented on plates 4-1A, 4-1B are indicative of the fact that sediment has accumulated behind the dam at an average rate of 255 ac-ft per year during the 1940-1978 period. Beginning in 1981 and continuing through 1983, the date of the most recent survey, excavation to remove sediment started. Total sediment removed during this period is estimated to be 333 ac-ft. Excavation has continued since 1983; the estimated annual sediment removals are given on plate 3-5. Excavation is continuing and since excavation began in 1981 it is projected to remove 7,320 ac-ft through 1990 thereby returning hansen reservoir close to original flood control capacity. Because of the uncertainties of sediment removed and the inconsistency of the 1982 survey with these figures, no sedimentation rate was determined since 178. For this manual, the sedimentation rate of 255 ac-ft/yr, for the period 1940-1978, is indicative of the long term sedimentation rate. The results of the 1983 reservoir sedimentation survey are graphically presented on plate 3-6. This plate showns the relationships between water surface elevation, surface area, and storage capacity based on this survey,. It is evident that sediment has accumulated behind the dam at a rate much faster than the 100-ac-ft per year initially anticipated during the dam's design, and that current flood control storage capacity of the reservoir is barely adequate to control the Standard Project Flood (SPF) event without exceeding downstream channel capacity. Consequently, in recent years the reservoir regulation plan has been altered. No storage will be used for water conservation until local interests formally agree to participate in the removal of sediment deposits accumulated in the reservoir that are attributable to water conservation operation.

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

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

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

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

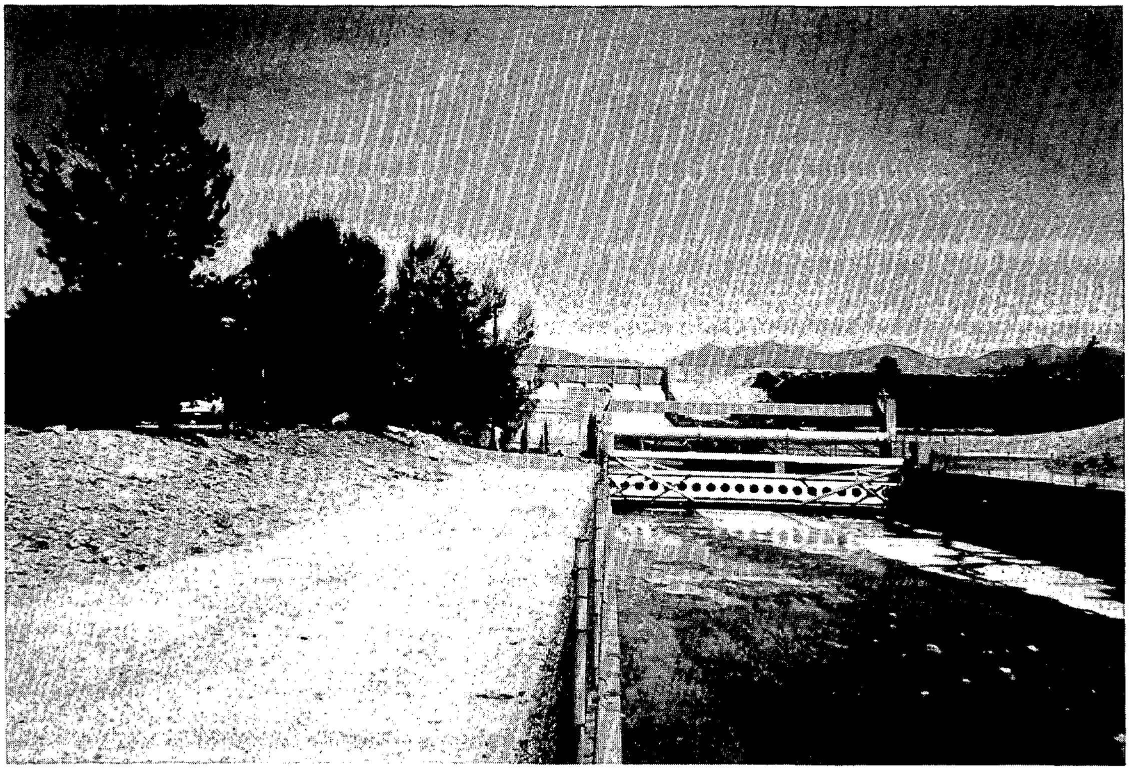

Figure 3-1. Hansen Spreading Grounds Diversion Structure.

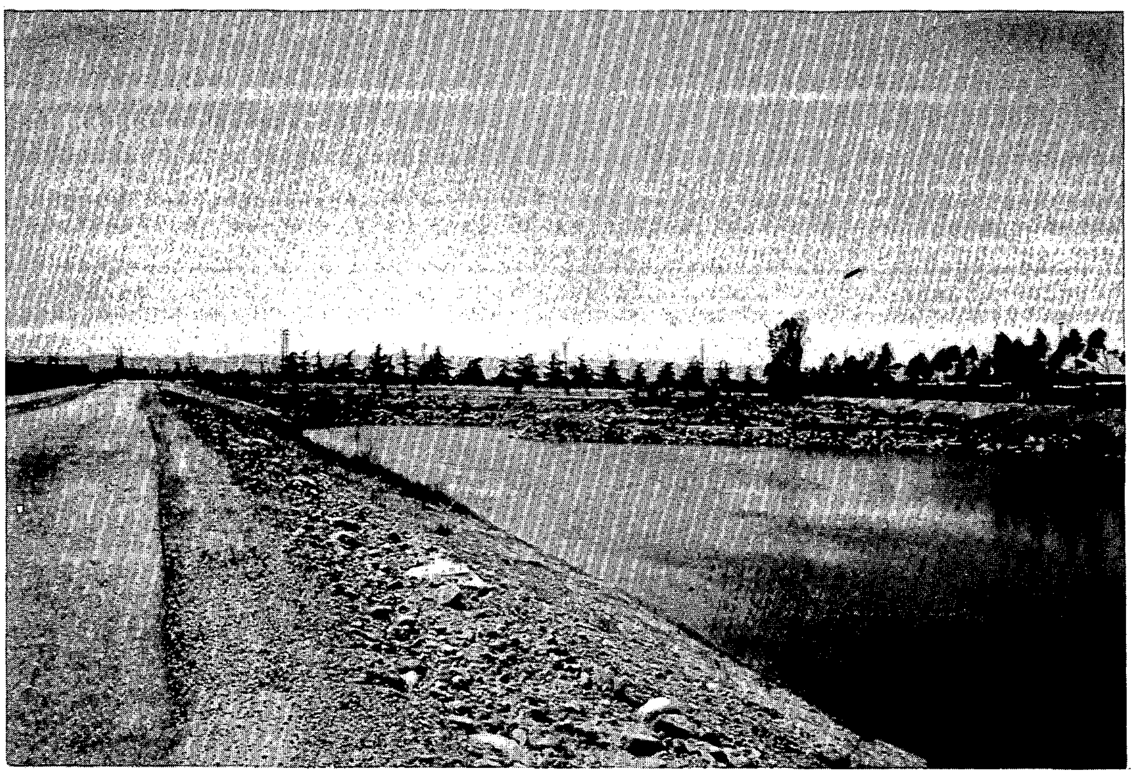

Figure 3-2. Hansen Spreading Grounds' Infiltration Pond.

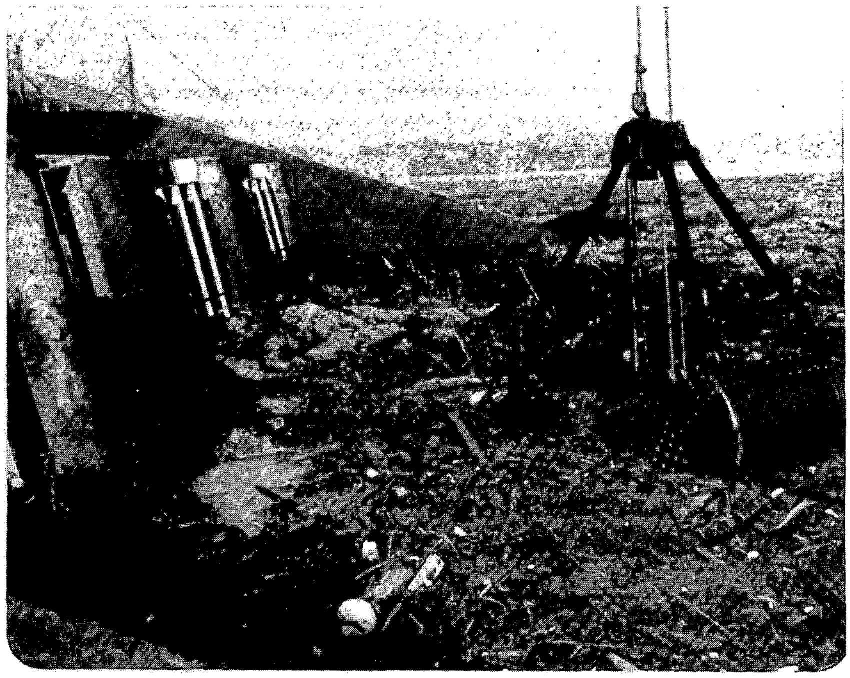

Figure 3-3. Debris at Hansen Dam after February 17, 1980 storm.

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