HAER
CAL
19-GLENDO,
1—

HAER No. CA-227

Big Dalton Dam
2600 Big Dalton Canyon Road
Angeles National Forest
Glendora
Los Angeles County
California

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
San Francisco, California

HAER
CAL
19-GLENDO,
1—

HISTORIC AMERICAN ENGINEERING RECORD

BIG DALTON DAM

HAER No. CA-227

Location:	Big Dalton Wash 2600 Big Dalton Canyon Road Angeles National Forest 4 miles northeast of the City of Glendora Los Angeles County, California U.S.G.S. Glendora Quadrangle Universal Transverse Mercator Coordinates: 11.425500.3781400
Date of Construction:	December 1927 - August 1929. Spillway extended 1958.
Engineers:	S.M. Fisher, Los Angeles County Flood Control District, Design Division Fred A. Noetzli, Consulting Engineer B.R. Metcalf, Resident Engineer
Builder:	H.W. Rohl Contracting Company
Present Owner:	Los Angeles County, Department of Public Works 900 S. Fremont Avenue Alhambra, California 91803
Present Use:	Flood Control and Water Conservation
Significance:	The dam was built as part of a flood control and water conservation program in Los Angeles County to protect the growing community and provide water as the demand increased. The dam was designed by the Los Angeles Flood Control District under S.M. Fisher, the Chief Designer, in cooperation with Fred A. Noetzli, the Consulting Engineer. Fred A. Noetzli promoted the design of multiple arch concrete buttress dams as an inexpensive solution to impound water for the developing Los Angeles basin.
Report Prepared by:	Maryann VanderVis Principal Civil Engineering Assistant Los Angeles County, Department of Public Works 900 S. Fremont Avenue Alhambra, California 91803
Date:	December 1998

I. DESCRIPTION

Big Dalton Dam consists of six arches divided by five buttresses stretching across the canyon. The arch barrels and buttresses are made of reinforced concrete. The dam features special diagonal expansion joints in the buttresses, designed in response to natural expansion cracks in Lake Hodges Dam built in 1918. The spillway is located between the west abutment and the adjacent buttress in arch number one. The drop inlet spillway is a "morning glory" type where the inlet is funnel-shaped. The water flows over the edge of the spillway and drops vertically through a shaft and then horizontally through a tunnel downstream. Photograph number 2 shows the "morning glory" type spillway in arch number one. The outlet works with valves pass through the middle three buttresses. The dam is 146 feet high from the original streambed and has a crest length of 480 feet. The dam has a storage capacity of 938 acre-feet when the reservoir is full at spillway. Photograph number one is a view of the downstream elevation of the dam. Photograph number 8 shows the hollow bays between the buttresses.

During storm season, October 15 through April 15, the dam is operated to control floodwaters. The reservoir is lowered in the fall in preparation for the winter storms. In the spring, water is held behind the dam to store water for the dry summer months. The dam is also used for water conservation by spreading the water in various basins located downstream of the dam.

The spillway functions to release excess floodwater that cannot be stored behind the dam. The excess water is drawn from the top of the reservoir and funneled back to the stream downstream of the dam. Spillway flows usually occur during periods of sustained high runoff. Photograph number 15 shows the reservoir near spillway elevation. In 1958, the spillway was extended to divert spillway flows downstream of the toe weir. Photograph number 23 shows the general plan of the spillway extension. Photograph number 15 and 16 show the spillway outlet before and after the spillway extension was completed.

There is a control house and a shelter house on the crest of the dam located at the west and east abutments, respectively. The control house is where valve controls and the dam tender's office are located. Photograph number 2 shows the control house on the crest of the dam in the top left corner of the photograph. The shelter house is the relief quarters for the dam tender during storms when the dam is manned 24 hours a day. The shelter house is a one story reinforced concrete building with about 312 square feet. Photograph number 6 shows the shelter house at the far right on the crest of the dam. Photograph numbers A-1, A-2, and A-3 show the exterior and interior of the shelter house.

II. HISTORICAL BACKGROUND

The people of Los Angeles County realized the necessity for a flood control program following the flood of 1914, which caused a property loss of over $10,000,000, made hundreds of people homeless, isolated communities, and resulted in personal injury and loss of life. A broad program for flood control and water conservation in Los Angeles County was necessary to protect the growing population in the county and provide water as the demand for water increased.

The Flood Control District was created on June 12, 1915, in response to the Los Angeles County Flood Control Act passed by the California State Legislature. The flood control program in Los Angeles County became well established. Bond issues were passed to provide funds for construction of flood control and water conservation dams. The dams and channels were not designed to provide protection from the greatest possible flood because such high cost protection was not affordable. The dams were designed for a flood which occurs once every 50 years, the maximum size considered economically justifiable to control.

III. ENGINEERING INFORMATION

Big Dalton Dam is a multiple arch concrete dam located about four miles northeast of the City of Glendora, thirty miles east of Los Angeles, in Section 15, Township 1 North, Range 9 West. The dam is a flood control and water conservation structure serving Los Angeles County. Big Dalton Dam was designed by Los Angeles County Flood Control District, Design Department under S.M. Fisher, the Chief Designer, in cooperation with Fred A. Noetzli, the Consulting Engineer. Fred A. Noetzli promoted the design of multiple arch concrete buttress dams as an inexpensive solution to impound water for the developing Los Angeles basin. He was an advocate of "elastic theory-mathematical analysis" to design multiple arch dams. He contributed in developing "wide-span, 'double-wall' buttress designs," which provides a massive and solid appearance. The double wall buttress feature also provides greater stability in the vertical direction than the single wall buttress. Noetzli's design of Big Dalton Dam included semi-circular arches to provide added stability. Photograph number 17 shows the general plan of the semi-circular arches across the canyon.

A contract was awarded November 5, 1927 to H.W. Rohl Company from San Francisco, California for construction of Big Dalton Dam. The construction began in December 1927 and was completed in August 1929. The Board of Supervisors of Los Angeles County dedicated Big Dalton Dam on August 23, 1929 as part of the flood control and water conservation plan for the County. The Resident Engineer for construction was B.R. Metcalf. During construction, Saint Francis Dam failed in March 1928. The construction of Big Dalton Dam was halted for five weeks for additional exploration at buttress locations to confirm solid foundation.

IV. ROLE OF DAM

Big Dalton Dam was built just above an extensive development of orange groves which had been menaced by floods. The dam provided flood control and a steady, year-round water source for agriculture and for development of Glendora and other towns at the base of the San Gabriel Mountains.

Big Dalton Dam is located in the San Dimas Experimental Forest, an area for international forestry study of reforestation for fire and flood control. In 1926, the California Forest and Range Experiment Station was established by the University of California, Berkeley to study the effects of fire and erosion on mountain watersheds and develop better methods of protection for these areas.

In 1933 the San Dimas Forest, including San Dimas and Big Dalton Canyons, was chosen for the experimental forest because of the layered vegetation zones, isolation from the rest of the drainage systems, the abundance of small tributaries, and the fact that both canyons are controlled by dams to control water flow through the canyons. These two canyons were the ideal site for the experimental forest in the chaparral zones of Southern California. The study was staffed by people who were and became major names in worldwide forestry research. In 1959, the California Forest and Range Experiment Station was renamed to Pacific Southwest Forest and Range Experiment Station to reflect its worldwide status. The forest continues to be a major research facility of the U.S. Forest Service. The total runoff of the San Dimas Experimental Forest watershed is measured by streamflow gages at both Big Dalton and San Dimas Dams. The measured runoff is used for testing growth patterns of chaparral and various trees in the area.

V. REFERENCES

1. Jackson, Donald C. Building the Ultimate Dam: John S. Eastwood and the Control of Water in the West (Development of Western Resources). University Press of Kansas, 1995.

2. Robinson, John W. The San Gabriels. Arcadia, CA. Big Santa Anita Historical Society, 1991.

3. Eaton, E.C. Los Angeles County Flood Control District: Big Dalton Dam. September 21, 1929.

VI. PROJECT INFORMATION

This documentation has been prepared at the request of the Federal Emergency Management Agency. The Los Angeles County Department of Public Works plans on rehabilitating Big Dalton Dam to meet current seismic stability and spillway discharge capacity standards as mandated by the State of California, Department of Water Resources, Division of Safety of Dams. The rehabilitation will consist of constructing a concrete buttress by filling the middle four bays with concrete, enlarging the existing spillway capacity by raising the parapet wall, and construction of a foundation drainage system.

Project Manager for the recordation was Maryann VanderVis of Los Angeles County Department of Public Works. The photographer was Monticello Miller of Los Angeles County Department of Public Works. The documentation is based on historical records of Big Dalton Dam available at Los Angeles County Department of Public Works and on the information given by Jeanette Schulz of the State of California, Department of Parks and Recreation, Office of Historic Preservation.