History of the Big Dalton Dam

Patrick Gavit, August 2025

The city of Glendora was founded on April 1, 1887. This was during a time of booming real estate in Southern California. The advent of low-cost railway transport made it enticing for people to move across the country to this area. Glendora's population grew in the early 20th century largely because of the citrus industry. In the 1920 census, the population was about 2000. With more people moving to Glendora and given the cities' proximity to the San Gabriel Mountains, it was becoming increasingly clear that flood control measures were needed. Additionally, with the expansion of the citrus industry, water conservation took on added importance. The risk to homes and citrus groves was brought to light with the flood of 1914 that caused $25M in damage. There were three days of heavy rainfall from February 18 to February 20 that led to water overflowing the banks of both the Little Dalton and Big Dalton channels.[1] This flood led to the formation of the Los Angeles County Flood Control District led by chief engineer James W. Reagan. To mitigate and reduce damage in the future some tentative measures were taken in 1916 that consisted of check dams in Big Dalton Canyon. Check dams reduce the velocity of water flow. Sediment in the water settles out forming a barrier behind the dam. In the Big Dalton Canyon basin, including side canyons, 42 check dams were constructed. Recognizing the importance of flood control and water retention, additional funding was procured including a bond measure that provided $4.5M, a tax levy that brought in another $1.7M, and $1.2M from the federal government.[2] However, on a county wide basis it was realized that in order to control the vast amounts of water coming down from the San Gabriel Mountains it would be necessary to build dams. Thus, a $35M bond measure was placed on the May 1924 Los Angeles County ballot. The bond measure passed by 121,000 votes. This measure provided funds to construct nine dams in Los Angeles County including Thompson Creek, Big Dalton, San Gabriel, Big Santa Anita, Eaton Canyon, Big Tujunga, Puddingstone, Pacoima, and Sierra Madre. The largest of these dams was the San Gabriel Dam that utilized $25M of the $35M in the bond measure.

Over the next year work progressed on the preparations for the Big Dalton Dam. Los Angeles County Flood Control Engineer James W. Reagan declared in 1925 "work on the Dalton Dam this summer seems an assured fact".[3] State Engineer Wilbur F. McClure evaluated several types of dams and their costs and decided on a gravity type dam even though a multiple arch type was specified in the bond measure. This was the most expensive option at $750,000. A multiple arch dam would have been $550,000 and a constant angle arch dam would have been $480,000.[3] As preparation work was proceeding on the dam, the State Engineer inspected the 29 tunnels, five shafts, and other cuts made into the hills at the dam site. These cuts were all to determine the quality and depth of the bedrock.[3] In May 1926 the County Board of Supervisors ordered the flood control department to proceed with construction of the Dalton Dam under force account.[4] This meant that the flood control agency would use its own personnel, equipment, and resources instead of hiring a contractor through a competitive bidding process. By this time the cost was estimated at $1M. The 1924 bond measure provided enough money for a multiple arch dam, however since the plans had now called for a gravity dam, extra money was needed, which was provided by Los Angeles County. In May 1926 there were more than 50 men working at the dam site mainly evaluating locations for the foundation. Actual construction work began in July of 1926, the same time as construction of Glendora Mountain Road. Concrete pouring to form the dam wall was complete by October of 1926. Additionally, a railroad track was built for moving rock that was removed from the hillsides.[5]

An engineering study in 1927 questioned not only the design of Big Dalton Dam but other Los Angeles County dams as well. The competence of Reagan as the chief engineer of the Flood Control District was questioned. The engineering study concluded that “for flood control the Big Dalton Dam is of no value” and “without a larger spillway than is now contemplated this dam is considered to be positively unsafe”.[6] Reagan soon resigned and was replaced by Eugene C. Eaton. Over the next several months issues related to the abutment walls emerged during construction of the dam. There was seepage of water and much “broken and disintegrated rock”.[7] Soon after in July 1927 the engineers decided to abandon the current dam and focus on building another. The new dam would be a multi arch type made of stronger and heavier concrete. It was to be located 400 feet upstream of the abandoned dam. The plan was for the abandoned dam to remain and serve as a sort of check dam. Unlike the original dam that was built using “in-house” labor, the new dam construction was put through a competitive bidding process to select a contractor. The contract was awarded to H.W. Rohl Construction Company on October 31, 1927 by the Los Angeles County Board of Supervisors. The winning bid was for $381,194. This same construction company was also building the Puddingstone Dam. Bids ranged from $381,000 to $532,000.[8] Ground was broken on November 17, 1927. Rohl Construction Company also received a contract to build a road up to and around the dam. As part of the plan a tunnel was cut through the old dam to facilitate work on the new dam (Figure 1). When the dam was complete, the hole was plugged and made watertight so that water could be impounded between the two dams. Work on the road began in late December 1927.

On March 12, 1928, William Mulholland, head of the Los Angeles Bureau of Water Works and Supply- precursor to the Los Angeles Department of Water and Power, received a phone call from Tony Harnischfeger, the dam keeper of St. Francis Dam in northern LA County. In the call Harnischfeger informed Mulholland of a large leak in one of the abutments. Mulholland, along with his Assistant Chief Engineer Harvey Van Norman, went in earnest to investigate the dam. They arrived at 10:30 AM and inspected the dam for two hours. Upon leaving they assured Harnischfeger that the dam was sound. Twelve hours later the dam collapsed, and Harnischfeger became one of the first causalities. His body was never recovered. Over 430 people perished in the flood waters from the collapsed dam.[9] To assuage any concerns about the Big Dalton Dam in the aftermath of the St. Francis Dam disaster Eaton had the following to say, "In view of the failure of the St. Francis Dam, I want the people to know that every precaution is being and will continue to be taken by the flood control district to make the Big Dalton Dam an absolutely safe and dependable structure". He went on further "There is nothing experimental about the type, and over thirty have been built in the United States. None has ever failed."[10] Nevertheless, the Los Angeles Board of Supervisors ordered work on all dam projects to stop until foundation tests could be conducted. The supervisors were understandably concerned since the first Big Dalton Dam had to be abandoned, and the St. Francis Dam collapse was fresh on everyone's mind. The structural safety of the new Big Dalton Dam was under question, particularly regarding the rock foundation. Eaton held that a solid rock foundation was not needed for an arch dam. Additionally, there were cost/benefit concerns about the new dam. The cost of the new dam was more than double the original estimate and storage capacity would be relatively small in the reservoir. Because of these concerns, the Los Angeles Record newspaper wrote that the dam may never be built, and the supervisors would vote to terminate the project.[11] In April 1928 the supervisors decided to have a committee of engineers take over management from Eaton. Meanwhile, Andrew Lawson, a geology professor from the University of California, conducted a geological assessment at the Big Dalton Dam site and concluded that the "rock will support the structure with a large margin of safety and there is no occasion to doubt the sufficiency of the foundation." [12] Buoyed by this positive report, on May 7, 1928 the supervisors voted 4-1 to continue work, but expressed concerns about the high cost.[13] The first concrete pour was July 14, 1928. As work proceeded, plans changed again when it was decided first to make the west abutment a gravity section, and then later to make the east abutment a gravity section, which added more cost.

Some workers boarded at the dam site during construction. The Anderson Boarding and Supply Company provided meals and boarding for $1.36 per day. Other workers stayed in tent houses just below the dam construction site, while some commuted from nearby towns.[14]

The dam was completed in August 1929 and can store over 1000-acre feet of water. The dam is a majestic structure standing 153 feet tall and 480 feet long[15] with a base that is 200 feet thick (Figures 2 and 3). The final cost ranged from $931,000 to $1.25M depending on the source. This is considerably higher than the original cost estimate of $550,000. The original plan called for an eight-arch structure. What ultimately was built was a six-arch structure with gravity abutments on the east and west side. During construction, in October 1928, two men died after they were overtaken by a landslide while they were operating a steam shovel.

The dam drains an area of 4.3 square miles (Figure 4).[15] For any dam, as sediment in the reservoir settles out, the capacity is reduced. To maintain the design capacity the sediment was periodically removed. Up until 2008, sediment had been removed six times, 1969, 1972, 1981, 1993, 2006, and 2008. There have certainly been times since 2008 when sediment was removed, but the author could not find the documentation. The first sediment removal in 1969 was done using a technique known as sluicing. In this method, the water level in the reservoir is first lowered. Then when there is heavy rainfall the sluice gates near the bottom of the dam are opened to allow sediment to be flushed downstream. All other sediment removal was done using excavation. Initially the excavated material was placed at the Big Dalton Sediment Placement Site (Figure 5). However, that sediment placement site is at capacity and unable to store more sediment. The Big Dalton Sediment Placement Site currently holds 3 MCY (million cubic yards) of sediment. The material cannot be transported out because of an agreement between the United States Forest Service and the Los Angeles County Flood Control District that stipulates the sediment placement site must be revegetated. The Dalton Sediment Placement Site further west can however be used as a temporary site for storing sediment and then gradually transported out (Figure 5).[16]

California has published a list of all dams in the state that includes the current condition and the hazard potential. For Big Dalton Dam the downstream hazard potential is listed as “extremely high”, which means that a dam failure would be “expected to cause loss of human life or would result in an inundation area with a population of 1000 or more”. The condition of the dam is rated as satisfactory, which is the highest category.[15]

The dam has been a success for 95 years providing flood control for Glendora and cities downstream and allowing for water storage and controlled flows to downstream settling ponds.

Figure 1: The core wall of the original partially constructed Big Dalton Dam that was abandoned. A road was built through this structure to facilitate construction of a new dam farther up the canyon. In this photo the amount of money that had already been spent was superimposed on the concrete wall.[17]

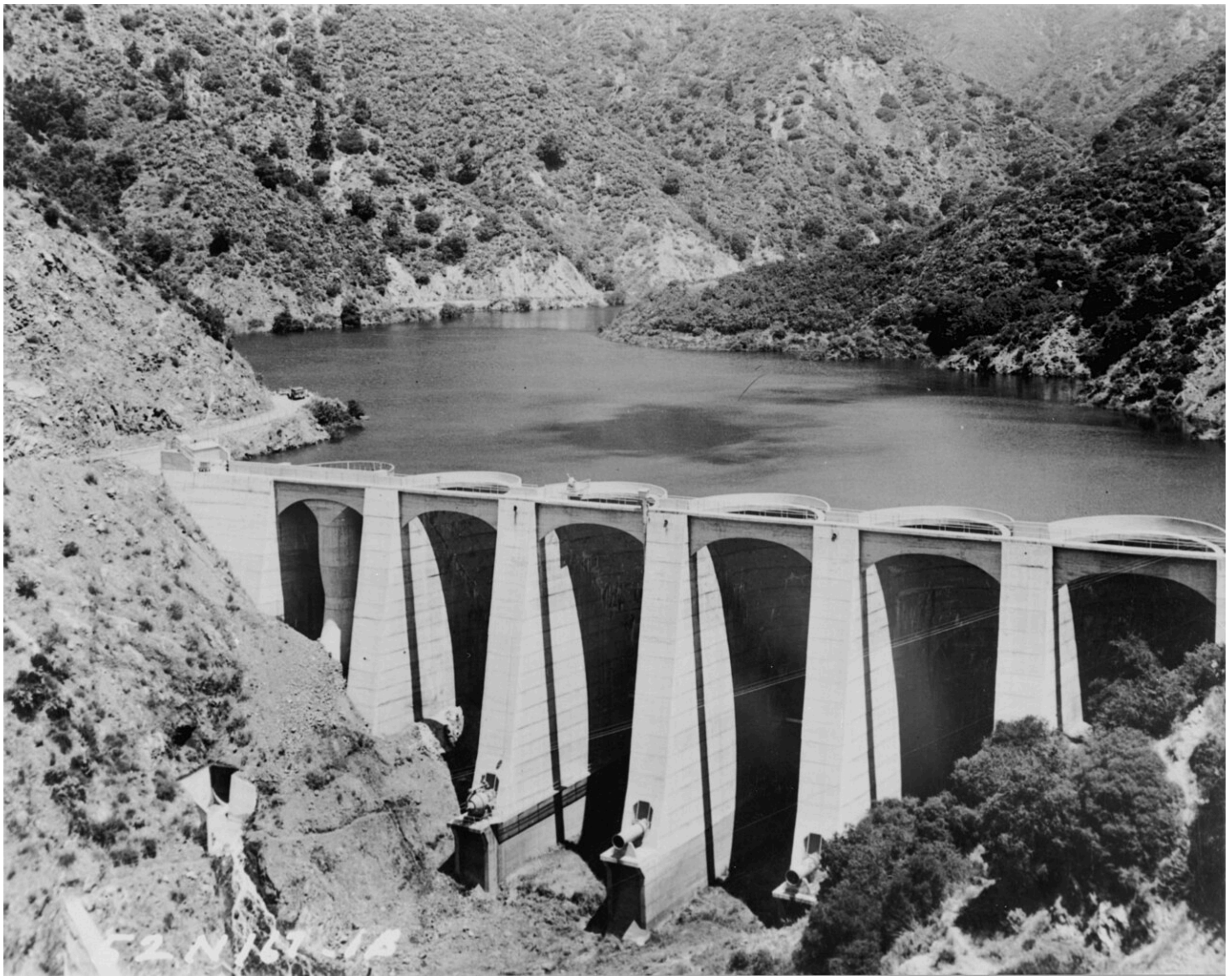

Figure 2: Big Dalton Dam and reservoir near full capacity, February 15, 1973. Photo by Monticello Miller.

Figure 3: The six multiple arches of Big Dalton Dam. The original dam whose construction was abandoned is seen downstream of the current dam.[16]

Figure 4: Some of the Big Dalton Canyon drainage area topography with the reservoir and dam at the bottom. The reservoir has a length of approximately 1300 feet and an average width of 400 feet.[16]

Figure 5: Key features related to flood control and water retention in the Big Dalton and Little Dalton Canyons.[16]

References:

1) Glendora Gleaner, February 20, 1914
2) Glendora Gleaner, November 2, 1923
3) Glendora Gleaner, June 26, 1925
4) Glendora Gleaner, May 28, 1926
5) Glendora Press, October 8, 1926
6) Hollywood Citizen, March 22, 1927
7) Glendora Press, July 8, 1927
8) Glendora Gleaner, November 4, 1927

9) The St. Francis Dam Disaster: Revisited, Edited by Doyce B. Nunis Jr., Historical Society of Southern California and Ventura County Museum of History and Art, 1995
10) Covina Argus, March 23, 1928
11) Los Angeles Record, April 26, 1928
12) Los Angeles Times, April 24, 1928
13) Los Angeles Times, May 8, 1928
14) Glendora Gleaner, May 3, 1929
15) Publication of California Department of Water Resources Division of Safety of Dams, September 2024
16) Sediment Management Strategic Plan, Los Angeles County Department of Public Works, LA Flood Control District, March 2013
17) Los Angeles Record, April 21, 1928