

Building the Sweetwater Dam

Under balmy skies and amidst brilliant flowers the celebration of the completion of the National City waterworks and the great Sweetwater Dam was held at National City yesterday. It was a success in every way, and April 19 will ever be a red letter day in the history of the rising young city down the bay. –San Diego Union, April 20, 1888.

Jubilation greeted the opening of the Sweetwater Dam in the spring of 1888. On the heels of the great land “boom of the eighties,” National City and the south bay reveled in the completion of an engineering marvel—the tallest masonry arch dam in the United States, which created San Diego County’s first large reservoir of water—an essential key to the region’s growth and prosperity.

National City pioneer Frank Kimball had acquired the site for the dam 21 years earlier. By 1880, the San Diego Land and Town Company owned the franchise. This land syndicate (and subsidiary of the Santa Fe Railroad) owned thousands of acres of agricultural land but found its property almost worthless without access to a reliable water supply. Investment potential, more than the needs of people, spurred the start of dam construction on the Sweetwater in November 1886.

The Sweetwater River (known as *El Dulce* in the Spanish days in the early 1800s) is an intermittent stream. Though often dry in the summer and fall, heavy winter storms could produce quick, violent floods, creating a roaring river heard for miles as it raced to the sea.

To capture this flow for irrigation and drinking water, construction of a dam began in a narrow gorge seven miles from the river’s mouth. A level valley behind the dam provided a site for a reservoir. Rushing to build the dam quickly to stimulate land sales, the San Diego Land and Town Company ignored the need for preliminary studies and hired engineer F. E. Brown, who had recently built a small rock dam at Bear Canyon in the San Bernardino Mountains.

Brown designed a thin, 50-foot tall concrete dam, reinforced on the upstream side by a dirt embankment. The project started off badly. After two months of work, a frustrated Frank Kimball would write in his journal, “Am thoroughly disgusted with the entire management and the method of construction and I believe the dam cannot stand.”

The land syndicate agreed. Brown was fired and replaced by James Dix Schulyer, 39, a professional civil engineer, with expertise in irrigation systems. Schulyer immediately rejected the old design and began work on a 60-foot tall, masonry dam that would impound more water in a larger reservoir.

“To meet a pressing demand for water, the new dam was hastily run up,” recalled Schulyer. By June, the dam hit the 60 foot target, but Schulyer suggested going higher when his studies determined that a 90 foot dam would impound five times the water of the smaller design. The Land and Town Company endorsed the added expenditure and the work sped forward.

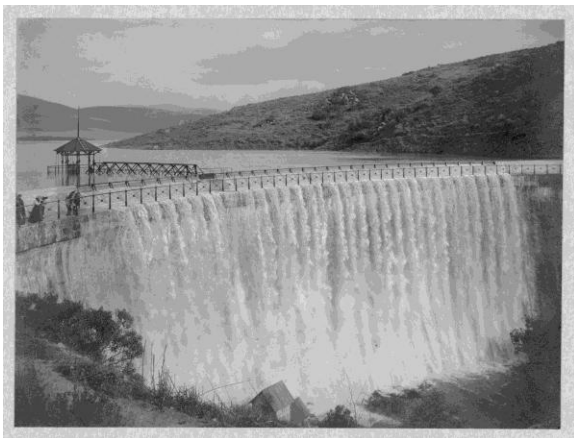
Schulyer’s masonry dam was built with huge stones—some weighing several tons--quarried from rock cliffs 800 feet downstream. The stone was hauled to the work site in horse-drawn wagons, then hoisted aloft and set in position from wooden derricks mounted on the wall of the

dam. Animal power alone worked the derricks “as fuel was scarce and dear.” Portland cement and river sand composed the mortar.

Manpower needs were considerable and Schulyer would complain that “labor of all kinds was difficult to obtain and hard to hold.” Wages in booming Southern California were high for the day. Laborers earned up to \$2.50 per day on the Sweetwater project, while their foremen made between \$4 and \$6. Stone masons made \$5, carpenters and blacksmiths \$4. The most specialized workers, the machinists, earned a lucrative \$1 per hour. Schulyer proudly pointed out that “there was no loss of human life and no serious accident during the work.”

The dam was finished on April 7, 1888, after only sixteen months of construction. The final structure had a 46 foot base, narrowing to 12 feet at the top. The dam was 90 feet tall with a top length of 396 feet. The 700-acre lake behind the dam was three miles long and $\frac{3}{4}$ of mile wide. The builders boasted that the lake’s six billion gallons of water was “sufficient for 500,000 people, or would “cover 20,000 acres twelve inches in depth.”

Ironically, the Sweetwater reservoir would be mostly dry at first. When an upstream landowner complained that the lake was flooding his property, the courts ordered the San Diego Land and Town Company to release water, lowering the reservoir to a fraction of its capacity. The plaintiff, rancher George Neal, would battle the aggravated land syndicate for two years before settling for \$80,000.



The strength and capacity of Sweetwater Dam received its first test in January 1895. Five inches of rain fell on two consecutive days and filled the reservoir to overflowing. For forty hours, water cascaded over the top of the dam at a depth of two feet. The dam survived but the foundation and abutments were weakened. Engineers repaired the damage and raised the dam two feet. In 1910-11, the dam was raised another 15 feet, increasing the potential capacity of Sweetwater Reservoir by seventy per cent.

Flood water topped Sweetwater Dam in January 1895. From the Wittemann Collection, Library of Congress.

The dam’s biggest test came with the great “Rainmaker Flood” of January 1916, which dropped 20 inches of rain on Sweetwater. The dam was overtopped to a depth of $3 \frac{1}{2}$ feet. Once again, Schulyer’s dam stood up to the torrent, but the abutments on both sides washed away, leaving gaping channels for the floodwater to race through. Tragically, eight people died in the downstream flood.

Over the years, several rehabilitations have preserved and improved the Sweetwater structure and raised its height to its current 127 feet. For 120 years the Sweetwater Dam has served the south bay communities. On April 7, 2006, the American Society of Civil Engineers officially recognized this remarkable dam as a National Historic Landmark.

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