

ARROWROCK DAM, SPILLWAY BRIDGE
Boise River, 22 miles upstream east of Boise
Twin Springs vicinity
Boise County
Idaho

HAER ID-27-F
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
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Oakland, CA 94607

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HAER No. ID-27-F

Location: Boise River, 22 miles upstream east of Boise
Twin Springs Vicinity
Boise County
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UTM: 11:586870:4827510
Quad: Arrowrock Dam, Idaho, 1:24,000

Dates of Construction: 1914-1915

Builder: Midland Bridge Company, Kansas City, Missouri

Project Engineer: A.P. Davis

Present Owner: United States Bureau of Reclamation

Present Use: Access bridge across spillway

Significance: Arrowrock Dam is a key component of the Boise Project, an irrigation project designed by the United States Reclamation Service (USRS) to irrigate roughly 390,000 acres in the Boise and Payette Valleys in southwestern Idaho. This Project helped to make the Boise and Payette Valleys the most agriculturally productive region in Idaho. In large measure this was due to Arrowrock Dam on the Boise River, a dam that created a reservoir of more than 272,200 acre-feet of water for irrigation. Arrowrock Dam was the highest dam in the world when it was completed in 1915, measuring 350.5 feet high from bedrock. Experimental elements of its gravity-arch design would be applied to later dams that were even higher. It was only one of two Reclamation dams built with sand cement for the concrete. It was the first USRS dam built whose design required Ensign valves for its outlets to release water. Ensign valves were an important step in the rapid evolution of water regulating valves triggered by construction of ever higher dams at the beginning of the twentieth century. In order to get to Arrowrock Dam this bridge was needed to cross the spillway. For over 90 years it was the chief means of accessing the dam.

Description:

Although manufactured in 1914, the bridge was installed over the spillway in 1915. The crossing consists of a single-span, steel, pin-connected, Pratt through truss. The 96 foot long structure has an upper chord of back-to-back channels and V-lacing. The lower chord is a double line of eyebars. Endposts consist of back-to-back channels covered by a solid plate. V-lacing links the channels on the underside. The northeast endpost and southwest endpost each hold bridge plates that read: "1914, The Midland Bridge Co., Kansas City, Mo., Freygang & Trocon, Proprietors." The bridge's verticals are back-to-back channels with V-lacing, while most diagonals are two lines of eyebars. The center panel of the web, however, is formed of counters in an "X" configuration. Portal bracing utilizes members formed from back-to-back angles. Sway bracing is also back-to-back angles. Top lateral bracing is steel rods in an "X" design. The crossing's 16 foot wide wood deck is supported upon seven rows of stringers edged at either side by a single line of channels. The stringers rest upon four I-beam floor beams. The deck is embraced by railings made of two rows of angles linked by X-lacing. Abutments are concrete and are situated just above the walls of the spillway channel.

Two bridges cross the spillway today. The truss bridge that crosses the northwest end of the spillway was the first bridge built for vehicles to reach the dam site. A new concrete girder vehicular bridge is situated immediately east of the truss crossing. The structure's deck is supported upon three girders. The deck is edged by concrete parapets that serve as railings. The bridge was built to support the large machinery used to replace the dam's original Ensign valves, because the equipment could not be accommodated by the original truss bridge's weight tolerances.

History:

A steel bridge was erected over the spillway channel at its northwest end. The bridge connected the roadway atop the dam with a minimum maintenance road just to the north. The Pratt through truss bridge has a span of 96 feet with a 16 foot-wide deck. Although it was installed in 1915, the Midland Bridge Company of Kansas City, Missouri had actually manufactured it the year before.¹ The through truss design limited the height of vehicles that could pass over it, but the crossing type was probably chosen because of the width of the channel. While vertical clearance was not an issue with girder bridges. Of course, the force of water coming down the spillway channel from the reservoir would likely demolish any pier. A truss, however, was self-supporting over a considerable distance, and the crossing type could easily span the spillway channel at Arrowrock. Engineers at Arrowrock may have concluded that a girder bridge over the spillway channel would require a pier for support or that a pier able to withstand the flows would be too expensive to build.

¹ USRS, *Boise Project: Storage Unit, Annual Report, 1915, 27.*

Starting in 1941 a gate was installed at the north end of the truss bridge over the spillway channel to bar unauthorized public access to the dam.² In 1980 the bridge's timber deck was replaced with a new deck.³ In 2003 the truss bridge was replaced as the main access to the dam by a new concrete bridge located farther upstream in the spillway in order to handle the equipment needed for the clamshell gates to be installed in Arrowrock Dam.

Sources: U. S. Department of the Interior, U.S. Reclamation Service. *Boise Project: Storage Unit, Annual Report*. Various dates. Available at Reclamation's Pacific Northwest Regional Office, Boise.

Wheeler, Bill. "Arrowrock is Termed 14th Largest Dam." (*Boise*) *Idaho Statesman*, May 22, 1949.

Historian(s): A rough draft of the historical narrative was done by Denis Gardner of Hess, Roise and Company in Minneapolis, Minnesota in 2002. Kelsey J. Doncaster of Reclamation completed, revised, edited and finalized the document in 2013.

Project Information: By the late 1990s, many of the Ensign valves at Arrowrock Dam were no longer functioning as reliably due to wear from long use. Reclamation decided to replace 10 of the original valves with new clam shell-type gates and retire the other 10 Ensign valves from service. Since Arrowrock Dam has been determined eligible for the National Register of Historic Places, this Historic American Engineering Record (HAER) documentation was undertaken to mitigate the adverse effects of valve replacement and other alterations. Large format photography was done by three different photographers starting in August 1995 with Brent F. Smith and then Clayton B. Fraser of Fraserdesign in Loveland, Colorado in June 1999 prior to modification of the structure and Kirsten Strough of Reclamation on April 5, 2012 and March 15, 2013 after its modification.

² Bill Wheeler, "Arrowrock is Termed 14th Largest Dam," (*Boise*) *Idaho Statesman*, May 22, 1949, 6.

³ Numerous communications concerning inspections and work on Arrowrock Dam in the 1980s, 1990s, and early 2000s is available in the "Arrowrock Dam" correspondence files at Reclamation's Pacific Northwest Regional Office in Boise.