

HISTORIC AMERICAN ENGINEERING RECORD

GENERALS HIGHWAY, LODGEPOLE BRIDGE
(Generals Highway, Marble Fork Bridge)

Sequoia National Park - *Three Rivers* Vicinity
HAER No. CA-140A

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Location: Spanning the Marble Fork of the Kaweah River, on the Generals Highway, approximately 21 miles from the park entrance at Ash Mountain, Sequoia National Park, Tulare County, California.

USGS quadrangle: Giant Forest, California
UTM: 11/344960/4052200

Date of Construction: 1930-1931

Structure Type: Reinforced concrete filled spandrel arch bridge

Contractor: W. A. Bechtel Co., San Francisco, California
Subcontractors: C. D. DeVelbiss, San Francisco
Arise-Knapp Co., Oakland, California
A. Pernu
Glen Falls Indemnity Co.

Designer: John B. Wosky, National Park Service

Engineer: Eric E. Erhart, Bureau of Public Roads

Owner: Sequoia National Park, National Park Service

Use: Park road bridge

Significance: The Marble Fork Bridge was an important link of the Generals Highway allowing for the road construction to continue to the General Grant Tree, creating a continuous loop connecting Sequoia and General Grant national parks in 1935. The concrete arch bridge with masonry facade is a good surviving example of the park service rustic aesthetic.

Project
Information:

Documentation of the Lodgepole Bridge is part of the Generals Highway Recording Project, conducted during the summer of 1993 under the co-sponsorship of HABS/HAER and Sequoia National Park.

This is one in a series of reports prepared for the Generals Highway Recording Project, undertaken by the Historic American Engineering Record in summer 1993. HAER No. CA-140, GENERALS HIGHWAY, contains an overview history of the road.

Christina Slattery, HAER Historian, 1993.

INTRODUCTION

The Lodgepole or Marble Fork Bridge carries the Generals Highway across the Marble Fork of the Kaweah River in Sequoia National Park. The concrete arch bridge is between the Lodgepole campground and the Clover Creek Bridge approximately 21 miles northeast of the Ash Mountain entrance at an elevation of 6,700'. Listed in the National Register of Historic Places in 1977, the bridge is a feature on the major transportation route connecting Sequoia with Kings Canyon National Park. The Generals Highway, constructed between 1921 and 1935, extends 32.5 miles through Sequoia rising 5300' in elevation. In October 1928, the section of the highway from the General Sherman Tree to the Marble Fork River was graded and prepared for the construction of the three structures: Lodgepole and Clover Creek bridges and the Silliman Creek culvert. The three structures were placed under the same contract in 1930 and the construction was supervised by the Bureau of Public Roads (BPR).

DESCRIPTION

The Lodgepole Bridge is a 45' reinforced concrete filled spandrel arch bridge with self-supporting masonry spandrel and wing walls and is situated in a densely wooded area. The bridge supports a roadway 25'-6", with a 5' sidewalk on the upstream side. The centerline of the roadway is on a 300' radius curve to the left.¹ Footings for the concrete masonry wing walls are stepped. The north abutment rests on a solid rock foundation, while the south abutment is supported on moderately compacted boulders and gravel. The contractor obtained material for the cement rubble masonry construction from weathered and quarried stones found at the Silliman Creek quarry site about a mile above the creek; granite for the arch ring was supplied from the excavation of the Clover Creek Bridge site, .8 miles north on the Generals Highway.

John B. Wosky, resident summer landscape architect for Sequoia and Yosemite national parks, prepared the architectural plans for

¹Eric E. Erhart, Senior Engineer Inspection Superintendent, Bureau of Public Roads, *Final Construction Report on the Lodgepole, Silliman, and Clover Creek Bridges, Route 1, Generals Highway, Sequoia 1-C2, D1, Sequoia National Park, Tulare County, California, 1930-1931* (San Francisco, CA: Bureau of Public Roads, 27 February 27, 1933), 12.

the bridge. He completed them in the winter of 1928 under the supervision of Thomas C. Vint, Chief of the National Park Service Landscape Engineering Division in San Francisco. In accordance with the 1926 agreement between the NPS and the BPR, it was standard for the BPR engineers to design the structural elements and the Park Service landscape architects to prepare plans for architectural details such as stone facing. The BPR completed the structural plans in January 1929 and following minor changes in design and landscape features the construction drawings were approved by the NPS Landscape Architecture Division in 1930.²

The stone arch design was widely employed on park road and parkway bridges during this period. Wosky and Ken Carter had been sent from the San Francisco office to New York to study the Bronx River Parkway, the nation's first parkway designed expressly for motor vehicles. The parkway featured a number of elaborate stone faced concrete arch bridges which strongly influenced NPS design. On their return to San Francisco they adapted the idea for national park use including the Clover Creek and Lodgepole bridges. The concrete arch and stone veneer design was used in the design of other bridges in Yosemite, Mount Rainier, and other national parks in the 1930s.

CONSTRUCTION

The BPR advertised the combined contract for the three bridges in trade journals and opened bids for the project in June 1930. It awarded the contract to the W. A. Bechtel Company of San Francisco on 29 July on the basis of its bid of \$86,396, which amounted to 97 percent of the engineers estimate.³ The BPR gave 200 days, beginning 1 August 1930, to complete the work. The company proceeded to establish a construction camp one mile west of Clover Creek and began construction on 11 August.

When construction was halted for winter in November 1930 only 30 percent of the entire contract was completed while 54 percent of the contract time had elapsed. The concrete arch, with the exception of the construction keys, had been completed in one continuous pour lasting 48 hours, and 15 percent of the masonry work was completed. In order to prevent damage to the curing

²*Ibid.*, 2.

³*Ibid.*, 3.

concrete from cold winter weather the crew was forced to heat the mixing water and use stoves and canvas housing to protect it.⁴

Bechtel was inexperienced in stonework construction and encountered several problems that exceeded the estimated costs. First, the company abandoned its initial quarry site after completing the crushing plant because the rock at the site was structurally weak. The new quarry site, located about 1/4 mile from the crushing plant, required transporting the rock to the plant. Second, the paid lower wages than average and consequently was unable to engage highly skilled stone masons and cutters. The lesser skilled masons had difficulty cutting the soffits of the ring stones to the proper bevels, and frequently had to recut the stones before they could be placed in the falsework. As a result of the delays and increased costs Bechtel was forced to subcontract the remaining stonework in 1931.

On 11 May, Bechtel subcontracted all of the remaining work to C. D. DeVelbiss of San Francisco. In turn, DeVelbiss subcontracted to A. Pernu many of the specialized items of work including the cement rubble masonry, the arch ring stones and the curb stones. Hoping to avoid the previous difficulty with stone cutting, A. Pernu built wooden patterns for each stone so it would be cut and shaped before being set into the falsework. Pernu, however, experienced financial difficulty and the Glen Falls Indemnity Co. resumed construction of the finishing stonework. The use no less than 50 percent weathered stone for the exposed masonry was specified in the original contract, but a majority of the stone actually used was quarried. The quarried stone was easier to shape to the proper proportions and was more accessible to the crews.

The three structures were completed 19 October 1931 at a cost of \$28,495.32.⁵ The contractor's inexperience led to mismanagement of the stone and cement rubble masonry work and both the contractor and the subcontractors suffered losses on the project.

⁴*Ibid.*, 7.

⁵*Ibid.*

BIBLIOGRAPHY

All correspondence, reports, and documentation is available in historic resource files of the archives of Sequoia National Park (Abbreviated as SEKI Archives).

Erhart, Eric H., Senior Engineering Inspector Superintendent, Bureau of Public Roads. *Final Construction Report on the Lodgepole, Silliman, and Clover Creek Bridges, Route 1, Generals Highway, Sequoia 1-C2, D1, Sequoia National Park, Tulare County, California, 1930-1931.* United States Department of Agriculture, Bureau of Public Roads, District No.2, 27 February 1993.

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