SUGAR PINE BRIDGE
Yosemite National Park Roads and Bridges
Spanning Merced River on service road
Yosemite National Park
Mariposa County
California

HAER NO. CA-99



PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
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HISTORIC AMERICAN ENGINEERING RECORD

SUGAR PINE BRIDGE
(Kenneyville Bridge No. 2)
Yosemite National Park
HAER No. CA-99

I. INTRODUCTION

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| Location: | Sugar Pine Bridge carries a limited-access road across the Merced River in the east end of Yosemite Valley, Yosemite National Park, Mariposa County, California. The structure is one of two spans located approximately 1/4-mile south of the Ahwahnee Hotel.<br><br>QUAD: El Capitan, CA<br>UTMs: 11/273650/4180350 |
| Date of Construction: | 1927-1928 |
| Designer and Builder: | Designed by George D. Whittle, Senior Highway Engineer for the San Francisco district office of the Bureau of Public Roads.<br><br>Contractors: Rocca and Caletti |
| Original and Present Owner | Yosemite National Park, National Park Service. |
| Present Use: | Park road bridge. |
| Significance: | The National Park Service replaced bridges in Yosemite Valley with a series of rustic structures designed to harmonize with the landscape. Sugar Pine Bridge is a good example; the bridge's reinforced concrete arch is disguised by a veneer of native granite, making the bridge appear to be rough stone construction. |
| Project Information: | This document is part of the Yosemite Roads and Bridges Recording Project, undertaken in summer 1991 by the Historic American Engineering Record.<br><br>Richard H. Quin, Historian, 1991 |

II. HISTORY

This is one in a series of reports prepared for the Yosemite National Park Roads and Bridges Recording Project. HAER No. CA-117, YOSEMITE NATIONAL PARK ROADS AND BRIDGES, contains an overview history of the park roads.

HISTORY OF SUGAR PINE BRIDGE

The Sugar Pine Bridge carries a limited-access road to Mirror Lake, a popular attraction in the upper end of Yosemite Valley. The single-span reinforced concrete arch bridge is faced with native granite in the characteristic "rustic style" adopted for the Yosemite Valley bridges.

The structure was originally known as "Kenneyville Bridge No. 2" after the old livery stable and service complex of "Kenneyville," named for George Kenney, an early stage operator who in 1885 gained an interest in the stables. The stables, originally established by early Yosemite hotelier James Mason Hutchings, stood a little north of the bridge on the site of the luxurious Ahwahnee Hotel.[1] [The nearby Ahwahnee Bridge (HAER No. CA-100) was "Kenneyville Bridge No. 1."] The original construction drawings and park administrative records referred to the bridge by its original name.

Construction of the Sugar Pine and Ahwahnee bridges was necessitated by the National Park Service's decision to relocate the north Valley road leading to Mirror Lake southward. The lavish new Ahwahnee Hotel was to be built on the old Kenneyville site, and the old road would be used as a dead-end spur road to serve the hotel. The new road would head east across Ahwahnee Meadow, where the Merced River made a northward bend, and the two new bridges were required to carry the new road across.

Sugar Pine Bridge, like five others constructed in Yosemite Valley at the same time, was designed and built by the Bureau of Public Roads (U.S. Department of Agriculture). The Bureau had taken responsibility for major park road projects under an agreement with the National Park Service signed in July 1925. The bridge was designed by George B. Whittle, Senior Highway Engineer for the Bureau's San Francisco district office.

A number of alternative designs were provided to the National Park Service, including two plans for steel trusses. Nathan W. Morgan, NPS Office Engineer, wrote Thomas C. Vint of the NPS landscape division, urging him to reject the steel trusses, as one would look all out of place in its setting. Morgan reported that Yosemite National Park Superintendent Washington B. Lewis "strongly favored" a stone arched bridge, but called the suggestion "impracticable" because of foundation conditions and "excessive cost." Morgan favored alternate plan No. 13, a suspension bridge with either "rustic" or stone-faced towers.

> I feel sure the suspension bridge will be perfectly suitable to the surroundings and will be one of the most picturesque places in the Park. I cannot see that it will in any way interfere with people seeing the scenery. Mr. Mather seemed to like this type and I hope Mr. Hull will favor it also. We can't use overhead structures here, as Mr. Hull points out, and for this long and important crossing it seems to me that this is the most desirable type and about the only thing left that is not really overhead construction. There is not enough to the towers to think of their obstructing the view and the cables surely will not. I would like to see a <u>long</u> span at this site.[2]

If an arch were employsd, he suggested that it be a 90' or 100' span with the east abutment extending some 10'-15' out from ths bank in dsep water. As an alternative, two 50' girders with a central pier would also do. A single arched girder bridge, would be, in Morgan's opinion, "a bad mistake." Morgan argued against alternatives Nos. 8, 9 and 12, exposed concrete bridges, stating "I do not favor the use of cement finished structures in the Park....I think [they] would ruin the appearance of these beautiful stream crossings."[3]

In the end, a long single span reinforced concrete arch bridge with stone facing was adopted. Architectural details were prepared with the assistance of the National Park Service's landscape architecture division. This office, under division chief Vint, maintained its offices in San Francisco as well. The design was reviewed by two members of the National Commission of Fine Arts. The contract for the construction of the Sugar Pine Bridge and four others was awarded to the San Francisco firm of Rocca and Caletti.[4]

A construction road between the two bridge sites was built in the winter of 1925-26. Excavation work on the bridges began in July 1927. At Kenneyville Number 2, some wooden piles for the abutments were drivsn before Rocca and Caletti work crews were concentrated on Bridge Number 1. By the end of the year, the bridge abutments had been poured and the wooden arch centering was erected.[5] Winter snows then put a halt to further construction.

Work resumed in March 1928 with the placing of the hand-cut arch ring stones or voussoirs. Next came the pouring of the concrete wing walls below the line of stone facing. Once the arch ring was complete, the arch centering was removed. Facing for the spandrel walls and wing walls was placed in April, and the form work for the concrete backing was installed.[6]

The parapet walls were built in June, along with the concrete backs for the spandrel walls and the membrane waterproofing. Excavated material for the fill was taken from a gravel bar on the upstream side of the Kenneyville No. 1 Bridge site. Only a small amount of pointing work and the placing of riprap remained by the end of July. The bridge was completed and accepted by the National Park Service in September 1928; total cost of construction was $73,507.44[7] Following the demolition of the old Kenneyville stables and the erection of the Ahwahnee Hotel, the bridge became known as the "Sugar Pine Bridge" after a large sugar pine, quite unusual in the lower Yosemite Valley, growing to the north side of the east abutment.

The bridge approaches were landscaped by Emergency Conservation Works personnel in 1934.[8] The bridge's abutments were damaged three years later in the November flood of 1937, and substantial repairs had to be made by park maintenance crews.[9]

The road across the bridge, along with other roads in the eastern park of Yosemite Valley, was closed to automobile traffic in the summer of 1970. The National Park Service wished to reduce automobile traffic and its related problems and to provide more of a wilderness sxperience to users of this picturesque end of the Valley. Shuttles were instituted to Happy Isles, but the Mirror Lake Road was closed to all vehicles. Today, the Sugar Pine Bridge mostly carries hikers and cyclists. The graceful arched bridge continues in service; however, concerns that the bridge is restricting the flow of the Merced River have led the National Park Service to consider replacing the structure. As of this writing (1991), the fate of the structure has not been settled.

The Sugar Pine Bridge is a single-span reinforced concrste and stone masonry structure. The bridge is 170' long and 42' 6" wide. This allows for two 13'

road lanes, a 5' sidewalk on the north side and a 7' bridle path on the south side. The single semi-elliptical arch has a clear span of 106', the longest span of any of the Yosemite Valley bridges, rising 12' 2 5/8" from the springing line. The concrete abutments rest on deep wooden piles; 111 piles were required for each abutment. Class "B" concrete was used for the abutments, and Class "A" concrete for the arch vault and all other work.* Once the abutments were completed, the hand-cut arch ring stones or voussoirs were placed and the arch centering was removed. The steel reinforcing rods were then laid in a grid to form the main arch and the backing of the spandrel walls. Longitudinal rods were 1 1/8" diameter rods on 6" centers; transverse rods were 1/2" diameter on 24" centers. The two rows of rods were joined by 1/2" diameter hoops. The concrete for the arches was then poured over four stages. First, the crown sections of the arch were poured, followed by the ring sections adjacent to the abutments. The intermediate sections of the ring were poured next, and the construction keys at the base of the haunches were poured last. A waterproofing membrane was then applied to the concrete before the gravel fill was added. The roadway was surfaced under a separate contract. Stone curbs for the sidewalks and bridle path were then laid in place and 4" of rock screenings were applied as the base for the walks.[10]

Traffic over the bridge is restricted, and the bridge carries only occasional service or patrol vehicles. The structure appears to be in good condition, although the river is scouring the abutments. Sugar Pine Bridge is listed in the National Register of Historic Places as part of the multiple resources nomination for the Yosemite Valley Bridges.

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* Classes of concrete refer to the amount of Portland cement used in the mixture, with Class "A" having the highest proportion and so on.

III. ENDNOTES

1. "Hite's Cove and Yo Semite," *Mariposa Gazette*, 15 April 1876, 2; "Incorporated," *Mariposa Gazette*, 3 November 1877; "The Yosemite Travel--A Round Trip," *Mariposa Gazette*, 21 April 1877, 2; Homer W. Robinson, "The History of Business Concessions in Yosemite National Park." *Yosemite Nature Notes* XXVII (June 1948), 89.

2. Nathan W. Morgan, NPS Office Engineer, Yosemite, California, to Thomas C. Vint, NPS Landscape Engineering Division, 9 October 1925, National Archives, Record Group 76, Entry 22, Box 20.

3. *Ibid.*.

4. Robert C. Pavlik, "In Harmony with the Landscape: A History of the Built Environment of the Yosemite National Park" (Master's Thesis, University of California at Santa Barbara, 1986), 47-48.

5. Washington B. Lewis, Superintendent's Monthly Report, December 1925, 1; Superintendent's Monthly Report, October 1927, 8; E. P. Leavitt, Acting Superintendent's Monthly Report, November 1927, 7.

6. Leavitt, Acting Superintendent's Monthly Report, March 1928, 5; Acting Superintendent's Monthly Report, April 1928, 4.

7. Idem, Acting Superintendent's Monthly Report, June 1928, 4; Acting Superintendent's Monthly Report, July 1928, 4; Acting Superintendent's Monthly Report, September 1928, 3.

8. Thomson, Superintendent's Monthly Report, February 1934, 10.

9. Linda Wedel Greene, *Yosemite, The Park and Its Resources: A History of the Discovery, Management, and Physical Development of Yosemite National Park, California*, 3 vols. (Washington, D.C.: National Park Service, 1987), II:784.

10. Construction details taken in part from United States Department of Agriculture, Bureau of Public Roads, "Yosemite National Park, Plans for Five Bridges, Kenneyville Bridge No. 2 Over Merced River," construction drawings, sheet 6 and supplemental sheet 6A, December 1926. Measurements confirmed by HAER field survey, July 1991.

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"Incorporated." *Mariposa Gazette*, 3 November 1877.

"The Yosemite Travel--A Round Trip." *Mariposa Gazette*, 21 April 1877, 2.

### CONSTRUCTION DRAWINGS

United States Department of Agriculture, Bureau of Public Roads. "Yosemite National Park, Plans for Five Bridges, Kenneyville Bridge No. 2 Over Merced River." Construction drawings, sheet 6 and supplemental sheet 6A, December 1926.

SECONDARY SOURCE DOCUMENTS

Pavlik, Robert C. "In Harmony with the Landscape: A History of the Built Environment of the Yosemite National Park." (Master's Thesis, University of California at Santa Barbara, 1986).

Robinson, Homer W. "The History of Business Concessions in Yosemite National Park." *Yosemite Nature Notes* XXVII (June 1948).