

Two bridges are at the center of an effort
to improve a scenic route through Six Rivers National Forest.

OVER the River and THROUGH the Woods

BY SAMIR SIDHOM, P.E.

All photos: Central Federal Lands

SIX RIVERS NATIONAL FOREST has certainly earned the right to be named a National Forest.

Established in 1947 by President Harry Truman, it is nearly 1,500 sq. miles in size, including 137,000 acres of old-growth forest, and has 366 miles of wild and scenic rivers, distinct botanical areas and public use areas for camping, hiking and fishing—a nature-lover's paradise in northwestern California.

Given the sheer number and mileage of rivers in the park, there are, of course, several bridges. In 2012, the Central Federal Lands Highway Division of the Federal Highway Administration (FHWA), in cooperation with Six Rivers and Del Norte County, Calif., began the process of constructing the second phase of an improvement plan project to CA FH 112, also known as the South Fork Smith River Road, which spans the Smith River in the northernmost section of the forest. The project included the replacement of two bridges on the road: the Steven Memorial and Hurdy Gurdy Creek Bridges, both designed to AASHTO LRFD *Bridge Design Specifications*. The \$8.6 million project is entirely funded by FHWA and is part of a larger project to upgrade all of the one-lane sections of South Fork Smith River Road to allow traffic in both directions.

A bridge selection study evaluated structural options based on: required bridge length, the remoteness of the construction sites, transporting girders to these sites via forest roads with difficult angles, initial cost, the use of deep foundations in a high-seismic area, maintenance and minimal impact of the bridge piers on the environmentally sensitive areas and waterways that they would cross—and a steel plate girder design was chosen as the best option for both bridges. In addition, staged construction wasn't required for either bridge.

Hurdy Gurdy Creek Bridge

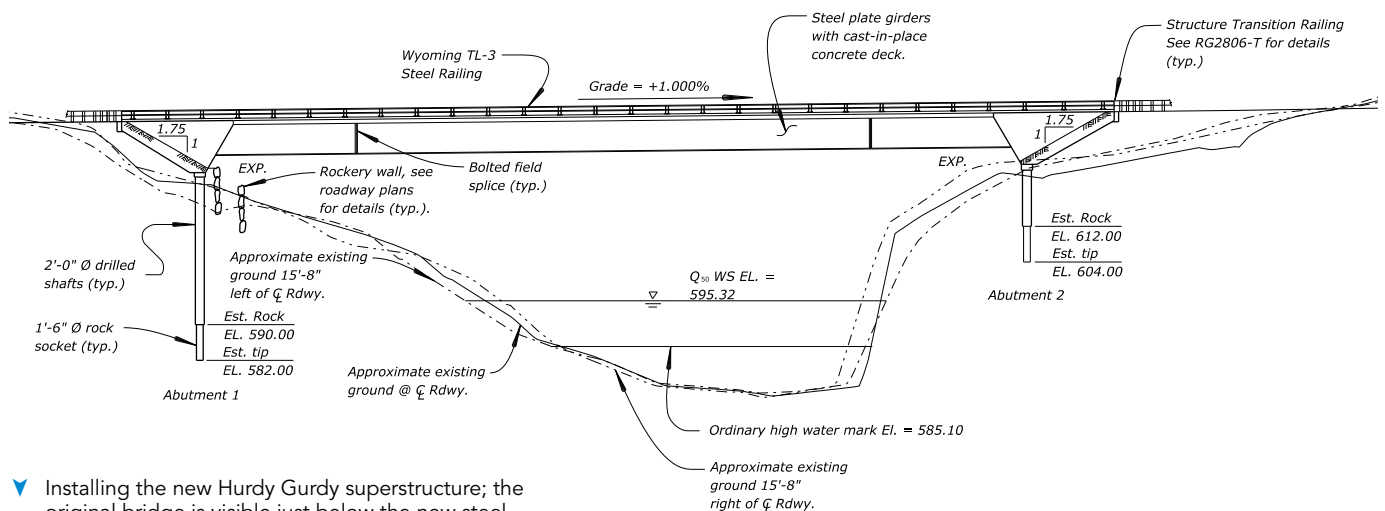
The original Hurdy Gurdy Creek Bridge was a one-lane, 170-ft-long bridge with two simple spans: a rolled beam approach span and a riveted steel plate girder main span. The approach was 30 ft long and the main span was 140 ft long, and the bridge's total width was 15 ft, 6 in., resulting in a clear roadway width of 14 ft.

For the replacement, a single-span bridge was selected to avoid the need for, significant cost of and environmental degradation inherent to pier construction in a streambed. The new bridge is a two-lane, 190-ft-long, steel plate girder bridge consisting of four 189-ft, 4-in. spliced girders (7 ft deep) with a 110-ft long midsection, two 37-ft, 2-in. end sections and a cast-in-place concrete deck.



- ▲ The Hurdy Gurdy Creek Bridge spans were placed with two cranes, one on each side of the river.
- ◀ The two-lane, 190-ft-long bridge replaces a 170-ft span.

- ▲ The bridge consists of four 189-ft, 4-in. spliced girders, 7 ft deep, with a 110-ft long midsection and two 37-ft, 2-in. end sections.



- ▼ Installing the new Hurdy Gurdy superstructure; the original bridge is visible just below the new steel.

- ▲ An elevation drawing of the Hurdy Gurdy Creek Bridge.



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- ▶ The three-span Steven Memorial Bridge consists of four 6-ft-deep spliced girders.

In addition, hammerhead pier caps with round columns were used to create a slender and open structure. To evaluate the effects of seismic forces on the superstructure, the piers and the drilled shafts supporting the piers and abutments, a complete 3D finite element model of the structure was developed to accurately predict the bridge's behavior.

The new bridge was constructed adjacent to (north of) the existing one to allow the latter to stay in service during construction, and the new alignment was shifted to the downstream side of the existing structure.

Over 415 tons of structural steel were used to build both bridges. Girders were shop painted using a three-coat system and were all preassembled at the fabrication shop for quality control purposes. Construction of the bridges began in May of 2013 and was completed in less than 12 months. The new pair now provides improved, scenic access through Six Rivers National Forest. ■

Owner

Six Rivers National Forest

Structural Engineer

Central Federal Lands Bridge Office, Lakewood, Colo.

General Contractor

West Coast Contractors, Inc., Coos Bay, Ore.

Steel Fabricator, Erector and Detailer

Fought and Company, Inc., Tigard, Ore. (AISC Member/NSBA Member/AISC Certified)

- ▶ A column-shaft rock socket connection detail for Pier 1 of the Steven Memorial Bridge.

