

New Portland Suspension Bridge (Wire Bridge)
Spanning Carrabasset River
New Portland
Somerset County
Maine

HAER No. ME-3

HAER
ME,
13-NEWPO,
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Historic American Engineering Record
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HISTORIC AMERICAN ENGINEERING RECORD

New Portland Suspension Bridge
(Wire Bridge)

HAER No. ME-3

Location: Spanning the Carrabasset River
New Portland, Somerset County, Maine

Date of Construction: ca. 1866; extensively rehabilitated in 1960

Builder/Designer: David Elder, Agent/promoter

Present Owner: Maine State Highway Commission

Present Use: Vehicular bridge

Significance: The New Portland (Wire) Bridge is the only early American suspension bridge that remains basically unaltered, aside from John A. Roebling's Delaware Aqueduct.

History

A document in the Maine State Library describes the New Portland Bridge as standing on March 1, 1866, and states that David Elder, "Agent for the bridge," was paid the sum of \$43,624.97. The only other bridge within the township that could possibly have cost this amount was a covered bridge that was built many years earlier. The price was also too high to have been for repairs. Therefore, it seems reasonable to assume that the sum was paid for the New Portland Bridge and that David Elder played an important role in its construction.

Charles A. Whitten, a retired Maine bridge engineer who grew up in New Portland, believes the bridge was built in the late 1860s and that David Elder and Capt. Charles B. Clark were its promoters. Whitten also observed that the cables were not wrapped where they passed over the saddles, an indication that they were spun in place rather than prefabricated, as local legend contends. Due to the lack of reliable records, it is difficult to ascertain the bridge's early history.

Architectural Information

The bridge is 188 feet long and 12 feet wide. Because of its narrow width, made so to discourage heavy wood pulp trucks from crossing, only one car at a time can pass over the bridge in one direction. The bridge towers are 25 feet high and are constructed of rugged 12x12s covered with shingles for protection. The wire cables are four inches in diameter.

The bridge underwent extensive repairs in 1960. The flooring and suspenders were replaced and some of the timbers in the towers set on new concrete pads. In all, most of the original tower framing, main cables, anchorages, and hardware were retained.

The New Portland Bridge is of prime importance since its original fabric has been so well preserved.

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ADDENDUM TO
NEW PORTLAND SUSPENSION BRIDGE
(WIRE BRIDGE)
Spanning Carrabasset River
New Portland
Somerset County
Maine

HAER No. ME-3

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HISTORIC AMERICAN ENGINEERING RECORD

NEW PORTLAND SUSPENSION BRIDGE
(Wire Bridge)

HAER No. ME-3

This report is an addendum to a 2-page report previously transmitted to the Library of Congress in the 1980s.

LOCATION: Spanning Carrabasset River, New Portland, Somerset County, Maine
UTM: 19.413722.4971388, New Portland, Maine Quad.

STRUCTURAL
TYPE: Suspension bridge with covered wood towers

DATE OF
CONSTRUCTION: Reportedly 1866; rehabilitated 1961

BUILDER: Capt. Charles B. Clark

PRESENT OWNER: Maine Department of Transportation

PREVIOUS USE: Vehicular bridge

PRESENT USE: Vehicular bridge

SIGNIFICANCE: The New Portland Suspension Bridge is the only extant example of a suspension bridge with covered wood towers in the United States.

HISTORIAN: Researched and written by Lola Bennett, Summer 2004

PROJECT
INFORMATION: The National Covered Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Historic American Buildings Survey/Historic American Engineering Record, a division of the National Park Service, U.S. Department of the Interior. The Federal Highway Administration funded the project.

Chronology

- 1801 James Finley erects America's first suspension bridge at Uniontown, Pennsylvania
- 1808 Town of New Portland, Maine, incorporated
- 1834 Henri Vicat pioneers wire cable spinning technology in Fribourg, France
- 1841 Charles Ellet erects America's first wire cable suspension bridge at Philadelphia
- 1841 John Roebling receives U.S. patent for a method of spinning wire cable
- 1849 Charles Ellet builds 1,010' wire cable suspension bridge at Wheeling, West Virginia
- 1852 Daniel Beedy builds iron chain suspension bridge at Kingfield, Maine
- 1855 John Roebling erects 821' suspension bridge at Niagara Falls
- 1857 Daniel Beedy builds wire cable suspension bridge at Strong, Maine
- 1864 Construction begins on New Portland Suspension Bridge
- 1866 New Portland Suspension Bridge completed
- 1872 Wire cable suspension bridge erected at Gilead, Maine
- 1883 Roebling's 1,595' Brooklyn Bridge completed at New York City
- 1936 New Portland Suspension Bridge damaged in flood; west abutment repaired
- 1959 Maine Legislature enacts legislation for preservation of New Portland Wire Bridge
- 1961 New Portland Suspension Bridge rehabilitated
- 1970 New Portland Suspension Bridge listed on the National Register of Historic Places
- 2004 New Portland Suspension Bridge recorded by the Historic American Engineering Record
- 2005 New Portland Suspension Bridge cables repaired

Description

The New Portland Suspension Bridge is a single span wire cable suspension bridge with wood towers on stone masonry abutments. The timber deck is supported by wire rope suspenders hung from steel wire cables. The bridge is 12' wide and has a clear span of 198'.

The 23' high towers are constructed of 12"x12" main timbers with 10"x10" intermediate bracing members or struts, notched and bolted together. Each tower has two A-frame legs, with transverse bracing between them and sway bracing within the portal opening. Each leg measures 7'-6" x 8'-6" at the bottom and 23' high. The legs are 20'-0" apart on center and rest on concrete caps on the abutments. The legs are topped with a timber cap beam that supports the cast iron saddles for the cables. A shingle covered narrow gable roof covers the cap. Horizontal planks covered with cedar shingles sheath the framework.

The main steel cables pass over the tops of towers on cast iron saddles and the back stays are anchored 60' behind them with 3" diameter wrought iron shackle pins. At the east anchorage, the shackle connects to two chain links, which connect to a forged anchor rod. At the west anchorage, the chain links are omitted. The head of each eye rod rests upon a mortared pile of stones, and the anchor rods are not parallel with the suspension strands. All anchorage components are constructed from 3" diameter wrought iron stock. At the west end of the bridge, boulders brace the anchors. Pins are set in concrete anchor blocks buried in the ground.

The 3 1/2" diameter cables are spaced 20' on center at the towers and 14' on center at the center of the span. Each closed-construction cable is comprised of many parallel strands of 1/8"-diameter wire, wrapped with wire and painted. At the anchorages the cables splay into their individual strands where they change direction. There are 100 1/2"-diameter twisted steel cable suspenders (originally metal rods) spaced at 1'-10 3/4" along the length of each cable. These suspenders support the floor beams, which in turn support the deck. The suspender cables are attached to the cable with clamps and to the floor beams with pins that pass through the outer ends of the floor beams and are fastened underneath with a plate and nut. The floor beams are 8"x10" timbers. There are twelve lines of 3"x10" plank decking spiked on top of the floor beams. The roadway is 10'-6" wide between the curbs, which are comprised of a stack of four 3"x12" planks bolted to the floor beams.

The abutments are dry laid granite masonry. The west abutment has a poured concrete face wall 1'-6" thick. There are rubble stone retaining walls along the east approach and wooden guardrails along both approaches.

New Portland Suspension Bridge

The Town of New Portland, Maine, was settled in 1783 and incorporated in 1808. In 1842, Col. F.B. Morse reportedly built a suspension bridge at this location for \$2,200, but no primary

documentation has been found concerning that structure.¹ The present bridge was built in 1866, when, according to a published annual report, the town paid \$3,624.97 to David Elder, “agent for the bridge.”² A fire reportedly destroyed all the town records in 1876, and no other nineteenth century records have been found concerning the structure, but it is reasonable to assume that the New Portland Suspension Bridge is the only bridge in town that could have cost such a large sum of money.³ Physical evidence, including the use of spun wire cable, also strongly suggests that this bridge was built in 1866, rather than 1842.

The New Portland Suspension Bridge has carried traffic for 150 years. It was repaired in 1936, after a flood damaged the west abutment, and it underwent an extensive rehabilitation in 1961. At that time, the deck was replaced, the original suspender rods were replaced with wire rope hangers, portions of the towers were rebuilt and the abutments were capped with concrete.

Maine’s Nineteenth-Century Suspension Bridges

In 1801, Judge James Finley (1756-1828) built the first modern suspension bridge at Uniontown, Pennsylvania. Unlike primitive suspension bridges made of vines or natural fibers, which deflected significantly under loads, Finley’s bridge had a level deck hung from wrought iron chains supported between timber towers. In 1808 he received a patent for his idea and was responsible for designing dozens of bridges prior to his death in 1828.⁴ In the 1840s, Charles Ellet (1810-1862) and John Roebling (1806-1869) took Finley's idea further, employing high-tensile strength wire cables and monumental stone towers to create some of the longest and most famous suspension bridges in the world.⁵ By the mid-nineteenth century, the pioneering work of Finley, Ellet and Roebling was inspiring many lesser-known engineers to successfully build suspension bridges throughout the country.

In 1852-53, Daniel Beedy (1810-1889), an engineer from Farmington, Maine, built a 190’ suspension bridge over the Carrabassett River at Kingfield, Maine. How Beedy, who reportedly designed mechanical systems for mills, came to design and build this bridge is not known, but it

¹ “Maine’s Wire Bridge to be Dedicated as an Historic Engineering Landmark,” *Lewiston Sun-Journal*, September 22, 1990.

² Elder, a New Portland farmer, presumably handled the town’s financial and legal matters concerning construction of the bridge.

³ New Portland native and retired state bridge engineer Charles Whitten reportedly located some town records dating to the 1860s during the course of his research in the 1950s. The author did not find these records in 2003. Whitten’s research notes are reportedly on file at the Maine Historic Preservation Commission in Augusta, but were not included in the files examined by the author in 2003. In 1959, Whitten examined the bridge and observed that the cables were not wrapped where they passed over the saddles, an indication that they were spun in place rather than prefabricated.

⁴ Eda Kranakis, *Constructing a Bridge: An Exploration of Engineering Culture, Design, and Research in Nineteenth-Century France and America* (Cambridge, Massachusetts: MIT Press, 1997).

⁵ See HAER No. MA-93, Essex-Merrimac Bridge (Chain Bridge), Essex County, Massachusetts; HAER No. WV-2, Wheeling Suspension Bridge, Ohio County, West Virginia; and HAER No. NY-18, Brooklyn Bridge, New York County, New York.

is likely he used one of James Finley's bridges as a prototype.⁶ Like Finley's bridges, the Kingfield Bridge had cables made of wrought iron chains and wood towers shingled over to protect them from decay. Four years later, Beedy built a similar wood-tower suspension bridge in the nearby town of Strong, Maine, but this time he used wire instead of eyebar links for the cables. Nine years later, Capt. Charles B. Clark, built a suspension bridge at New Portland that was strikingly similar to Daniel Beedy's bridges. No direct connection has been established between Beedy and Clark, but given their geographic proximity, it seems likely that the earlier bridges inspired the design of the later ones.

There were once dozens of wood tower suspension bridges in the United States, including four examples in Maine:

Kingfield, Maine	Carrabasset River	Daniel Beedy	1853	replaced 1916	chain cable
Strong, Maine	Sandy River	Daniel Beedy	1857	replaced 1922	wire cable
New Portland, Maine	Carrabasset River	Capt. Charles B. Clark	1866		wire cable
Gilead, Maine	Androscoggin River	Unknown	1872	replaced 1923	wire cable

The New Portland Suspension Bridge is the only surviving example of this type in the United States.

⁶ *Lewiston Falls Journal*, Lewiston Falls, Maine, June 3, 1854.

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