CLARK'S BRIDGE
Spanning Pemigewasset River at Clark's Trading Post
Lincoln
Grafton County
New Hampshire

HAER NH-39
NH-39

PHOTOGRAPHS

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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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HISTORIC AMERICAN ENGINEERING RECORD

CLARK'S BRIDGE

HAER No. NH-39

LOCATION:	Spanning Pemigewasset River at Clark's Trading Post, Lincoln, Grafton County, New Hampshire UTM: 19.284738E.4880717N, Lincoln, NH Quad.
DATE OF CONSTRUCTION:	Traditionally dated to 1904
BUILDER:	Barre Branch Railroad
PRESENT OWNER:	White Mountain Central Railroad, Inc.
PRESENT USE:	Tourist railroad bridge
SIGNIFICANCE:	One of only two railroad Howe truss covered bridges remaining in the country, Clark's Bridge is the only one that still carries rolling stock.
HISTORIAN:	Dr. Mark M. Brown, August 2003
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.

Description

Clark's Bridge is a single track, ten panel, Howe truss railroad bridge with roof monitor. The 116' bridge currently crosses the Pemigewasset River with a clear span of 107' and a greatest vertical clearance of 20'-6".[1] It rests on granite ashlar abutments moved from a Connecticut River crossing in Coos County, New Hampshire, that still show their yellow paint location numbers.[2] There are 15'-3-1/2" between the trusses. Each of the four sticks that make up the bottom chord are 6-1/2" x 15". Presumably, the top chords are the same. Bolted shear blocks and "C" shaped wood clamps transfer tension around the joints in the bottom chord. Four 7-1/2" timbers serve as end posts. Those on the southwest portal are probably replacements.[3] As is standard with Howe truss bridges, those diagonals leaning towards the center of the bridge are composed of two timbers, while those diagonals leaning away, also known as counters, use single timbers. The former measure approximately 11" x 11-1/2", and the latter are 7-1/2" x 7-1/2." At the middle of the span, however, the diagonals are 6-1/2" x 7-1/2" and the counters are 9-1/2" x 9-1/2". Since they have different finishes, they are probably replacements. Vertical tension rods keep the diagonals in compression, and their size and number vary depending on the panel. There are five verticals at U1:L1, U2:L2, U8:L8, U9:L9 and three at the other panel points including the end posts. At those panel points where there are five verticals, the outer two verticals are 1-3/4" in diameter and the innermost three are 2-1/8" in diameter. Where there are three verticals the outer two are 2" in diameter while the inner one has a diameter of 1-1/8".

Clark's Bridge has a complete set of upper and lower lateral bracing also employing the Howe pattern. Diagonals of the lower lateral bracing are 3" x 7-1/2", and the tension rods are 1-1/8" in diameter. This lower bracing system is bolted to the stringers. It is not clear whether or not the diagonals are mortised into the stringers. Two pieces of 6" wide lumber resting on top of each other serve as stringers. The bottom timber is notched to accommodate the deck beams. Exclusive of this notch, the effective stringer depth is 1'-4". Deck beams bolted to the underside of the bottom chord, measuring 10" x 15", support the entire deck system. Standard sleepers and rails complete the deck.

The roof system was inaccessible for measurement. The rafters have two collar beams (the uppermost one might be plywood) and a ridge beam. A solid triangular-shaped wood member supports the monitor roof's sheathing.

History

The covered bridge that would later be known as Clark's Bridge was an important link in the

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[1] These dimensions are found in Richard G. Marshall, *New Hampshire Covered Bridges: A Link with Our Past* (Nashua, N.H.: New Hampshire Dept. of Transportation, 1994), 107, and are not confirmed. The remaining dimensions were measured during a site inspection in June 2003. The truss depth could not be measured.
[2] Marshall, *New Hampshire Covered Bridges*, 107.
[3] W. Murray Clark and David Clark, Personal Conversations with author, June 26, 2003.

Barre Branch Railroad.[4] The granite quarries attracted railroads to the Barre, Vermont, vicinity. While Barre granite was used in the construction of the state capital at Montpelier between 1832 and 1837, railroads made it possible to transport larger blocks and higher volumes nationally. The Central Vermont Railroad built a spur line in 1876 and the Barre Branch arrived in 1889. Both of these branches crossed the North Branch of the Winooski River just a short distance upstream from its confluence with the Stevens Branch. Railroads and the development of the pneumatic cutting tool contributed to growth. Between 1880 and 1910, the population of Barre grew more than 700 percent: from 2,060 to 14,928.[5]

At least one source gives a construction date of 1904 for Clark's Bridge. If this date is correct, then there must have been at least one earlier bridge that carried the Barre Branch Railroad across the North Winooski.[6] Whatever the date and original name of the bridge, the Barre Branch generally prospered through several extensions, a major flood in 1927, and many name and ownership changes until the Great Depression brought a halt to building construction. After World War II, architectural style shifted from dimension stone to concrete, glass, and steel. A decreased demand for granite made it more economical to ship via interstate highway, and it became increasingly difficult for the Barre Branch to return a profit. In November 1956 the corporate descendants of the Barre Branch and the Montpelier & Wells River Railroad (M&WRR) ceased operations. Before the month passed, however, Samuel Pinsley, a Boston financier who owned several shortlines, acquired and reorganized the parts of what remained. The following year Pinsley also purchased the Barre Branch of the Central Vermont Railroad. In the consolidation that followed, the segment with the covered bridge was abandoned.[7]

Paul J. Dutton, owner of a transit mix business, purchased the covered bridge from the Pinsley interests about 1963. Edward M. Clark, son of the founders of what became Clark's Trading Post, a tourist attraction in Lincoln, New Hampshire, learned of the bridge sometime before the winter of 1963-64. Clark had been seeking a covered bridge to enhance his family's White Mountain Central Railroad. In the mid-1950s, Edward and Murray began collecting locomotives, especially geared locomotives used in the logging and granite industries. He and his brother, W. Murray Clark, had added the railroad to their family's tourist attraction, which was noted for its trained black bears and Eskimo sled dogs. When the White Mountain Central went into operation in 1958 it consisted of two parallel tracks laid out in an elongated "V" on the west bank of the Pemigewasset River. Acquisition of the covered bridge was necessary to

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[4] The M&WRR organized the Barre Branch Railroad in 1883, and it was not until 1913 that the Branch Railroad merged into the M&WRR. See Bruce P. Curry, "The History of the Montpelier & Wells River and Barre & Chelsea Railroads," *B&M Bulletin* VI, no.2 (Winter 1976-1977): 22; and Whitney J. Maxfield, Personal Conversation with author, June 27, 2003. For more on railroads in Barre see Robert C. Jones, Whitney J. Maxfield, and William G. Grove, *Vermont's Granite Railroads: The Montpelier & Wells River and the Barre & Chelsea* (Boulder, Colorado: Pruett, 1985). For a 1947 photograph of the bridge in its original location see page 188.

[5] Charles A. McNeil, "Carved from Stone? Community Life and Work in Barre, Vermont, 1900-1922" (M.A. Thesis, McGill University, 1989), 30-34.

[6] Marshall, *New Hampshire Covered Bridges*, p. 107. The author of this report has been unable to verify the 1904 date. Whitney J. Maxfield is confident that it is correct. Whitney J. Maxfield, Personal Conversation with author, June 27, 2003.

[7] Curry, "The History of the Montpelier & Wells River and Barre & Chelsea Railroads," 22-26, 28-29. For more on shortline and industrial railroads, see HAER No. AL-11, "Birmingham District Railroads."

expand the White Mountain Central across the Pemigewasset River and to free up scarce space on the west bank. The Clarks purchased the bridge for $1,000 along with the body of a 1910 Ford Model T touring car.[8]

Disassembly of Clark's Bridge began in January 1964 and required building cribwork on the river's ice to support the bridge. Ed Clark and three teenagers did most of the disassembly in cold and spartan conditions. Components were match marked and transported to the Trading Post. Reassembly began in the spring, suspended during the summer tourist season, and rushed to completion before winter snows. The trusses were reassembled horizontally at the river's bank and raised with the help of a crane and a steam shovel so that the upper and lower lateral bracing systems could be installed. Once assembled, excepting the siding, rollers and thick planking helped move the bridge into place on the granite piers. The Clarks devised a novel system to support the bridge as it was moved into place. Two sets of railroad tracks, one set for each bottom chord, were laid in the riverbed. On each of the tracks, the Clarks placed wheel trucks -- sets of four wheels and their housings typically used under railroad cars. Towers of timber cribbing were built on top of the trucks. The bridge was eased out onto the cribbing, and the whole system was pulled across the river using a Linn tractor crawler and a pulley block assembly attached to the wheel trucks. Clark's Bridge has been in service since the summer of 1965.

Significance

Clark's Bridge is a well-preserved example of the standard Howe railroad bridge and is the only covered bridge carrying any type of rail traffic in the country.[9] The history of the Howe truss has been extensively studied and need not be treated in any detail here.[10] In brief, William Howe

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[8] Aria C. Roberts, "A Railroad Grows in the Pemi Valley," *Plymouth (New Hampshire) Record*, December 17, 1964, p. 3; W. Murray Clark, Personal Conversation with author, June 26, 2003; Clark's Trading Post/White Mountain Central Railroad brochure, 2003.

[9] David W. Wright, President, National Society for the Preservation of Covered Bridges and Joseph Conwill, Editor of *Covered Bridge Topics*, Personal Conversation with author, August 6 and 19, 2003, report that there are only seven other extent covered railroad bridges in the country: Shoreham Bridge, Shoreham, VT, Howe truss (see HAER No. VT-32); Fisher Bridge, Wolcott, VT, Town truss; Sulphite Railroad Bridge, Franklin, NH, Pratt truss (see HAER No. NH-36); Contoocook Railroad Bridge, Contoocook Village, NH, Town lattice truss (see HAER No. NH-38); Wright's Bridge, Newport, NH, Town lattice & arch (see HAER No. NH-35); Pier Bridge, Newport, NH, Town lattice; and Chambers Bridge, Cottage Grove, Oregon, Howe truss (very bad condition).
In addition to these covered railroad bridges, American railroads also built boxed timber through-truss bridges without roofs, such as HAER WA- 133, Harpole Bridge, as well as trusses without any type of protective covering.

10 Carl W. Condit, *American Building Art: The Nineteenth Century* (New York: Oxford University Press, 1960), 92-99; J. G. James, "The Evolution of the Wooden Bridge Trusses to 1850: Part 2," *Journal of the Institute of Wood Science* 9, no.4: 168-193; and Dario Gasparini, and David Simmons, "American Truss Bridge Connections in the 19th-century. I: 1829-1850," *Journal of Performance of Constructed Facilities* 11, no.3 (August 1997): 119-29. For another example of a Howe railroad bridge see HAER No. VT-32, Shoreham Railroad Bridge. On the transition from timber Howe railroad bridges to metal railroad bridges see HAER No. PA-55 Reading-Halls Station Bridge. Two example of the Howe truss for highway bridges include HAER No. PA-458 McConnell's Mill Bridge and HAER No. OR-124, Larwood Bridge. See HAER No. OH-122, Eldean Bridge for an analysis of a Long truss – the

patented the type in 1840. His work, and that of Amasa Stone, was an improvement on the seminal work of Stephen Harriman Long wherein pre-stressing insured that diagonals are in compression and verticals in tension. The Howe truss, as it is generally known, was well adapted to the mechanical properties of wood and quickly became standard for American railroads. On most railroads, the truss type lost favor with the rise of the metal truss after the Civil War. As such Clark's Bridge appears to be an anachronism at the time of its apparent construction in 1904. This view is not entirely correct. The Boston & Maine Railroad (B&M), which took control of the M&WRR and its Barre Branch in 1911, favored timber bridges long after most bridges switched to iron and then to steel.[11] While the B&M did not influence selection of timber for the Barre Branch's bridge across the North Winooski, its institutional culture would have seen no reason to make replacement a priority.

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predecessor to the Howe truss. See HAER No. NH-38, Contoocook Railroad Bridge for information on the Town lattice.

[11] Curry, "The History of the Montpelier & Wells River and Barre & Chelsea Railroads," 20, 23-4;
Nelson H. Lawry, "Boston & Maine's Boxed Ponies: Galloping into Oblivion?," *Trains* (February 1994): 46-47.

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