

MISSOURI & NORTH ARKANSAS RAILROAD BRIDGE

(Middle Fork Bridge)

(Shirley Railroad Bridge

)

Arkansas Bridges 2005

Spanning Middle Fork Little Red River

Shirley

Van Buren County

Arkansas

HAER AR-76

AR-76

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

U.S. Department of the Interior

1849 C Street NW

Washington, DC 20240-0001

**HISTORIC AMERICAN ENGINEERING RECORD**  
**MISSOURI & NORTH ARKANSAS RAILROAD BRIDGE**  
**(Middle Fork Bridge)**  
**(Shirley Railroad Bridge)**

**HAER No. AR-76**

Location: Spanning Middle Fork Little Red River at former Missouri & Northern Arkansas Railroad right-of-way (now part of River Road), Shirley, Van Buren County, Arkansas

UTM: 15.561334.3946385, Shirley, Arkansas Quad.

AHTD#: 20045

Structural Type: Baltimore through truss

Construction Date: 1908; rehabilitated 1978

Fabricator: Possibly Wisconsin Bridge & Iron Co., Milwaukee, Wisconsin<sup>1</sup>

Owner: Van Buren County, Arkansas

Original Use: Railroad bridge

Present Use: Roadway bridge

Significance: The Missouri & North Arkansas Railroad Bridge at Shirley, Arkansas, is an example of a Baltimore through truss, a modification of the Pratt truss developed by the Pennsylvania Railroad in 1871. This structure is of interest as a former railroad bridge adapted for use as a roadway bridge.

Project Information: The Arkansas Historic Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program that documents historically significant engineering sites and structures in the United States. HAER is administered by the Heritage Documentation Programs Division of the National Park Service, United States Department of the Interior, Richard O'Connor, Manager. The Arkansas State Highway and Transportation Department sponsored this project.

Lola Bennett, HAER Historian, 2007

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<sup>1</sup> According to James Fair's 1969 book, *The North Arkansas Line* (p. 45), Wisconsin Bridge & Iron Company had the contract for all steel bridges between Harrison and Leslie. In 1907, they also replaced the original 1882 bridge at Beaver with the present Baltimore through truss (p. 73). No information has been found to confirm the fabricator of the bridge at Shirley, but a comparison of the two bridges might be useful.

## **Chronology**

- 1803 Louisiana Purchase doubles size of the United States
- 1819 Arkansas Territory created from part of Louisiana Purchase
- 1833 Van Buren County formed
- 1836 Arkansas becomes 25th state to join the Union
- 1844 Pratt truss patented
- 1845 Richard Osborne erects America's first iron railroad bridge at Manayunk, Pennsylvania
- 1855 First railroad built in Arkansas
- 1871 Baltimore truss introduced by the Pennsylvania Railroad
- 1882 Missouri & Arkansas Railroad chartered
- 1890 Van Buren County population 8,567
- 1906 Missouri & Arkansas Railroad reorganizes as Missouri & North Arkansas Railroad
- 1908 Missouri & North Arkansas Railroad Bridge erected
- 1909 Missouri & North Arkansas Railroad completed
- 1910 Town of "Sherley" appears on Arkansas Railroad Commission map
- 1911 Town of Shirley incorporated; population 350
- 1946 Missouri & North Arkansas Railroad abandons line
- 1978 Missouri & North Arkansas Railroad Bridge rehabilitated for use as a roadway bridge

## Description

The Missouri & North Arkansas Railroad Bridge at Shirley, Arkansas, is a single-span, pin-connected Baltimore through truss on concrete piers. The 154' main span has six panels. There is a 56' steel stringer approach span at the north end and a 136' concrete T-beam approach span at the south end of the bridge. The overall length of the bridge, including approaches, is 340'. Overhead clearance is 20'.

The trusses are 26' high and spaced 16' apart. The members are all riveted, built-up sections with gusseted connections. The upper chords and inclined endposts are comprised of back-to-back channels connected by a solid plate on top and lacing underneath. The lower chords are paired I-bars in the center panels and angles connected with tie plates in the end panels. The upper and lower chords are connected by 8" x 12" posts and 13" x 16" diagonal braces. Counters are paired 2" x 7" loop-ended eyebars. Upper lateral sway bracing consists of paired angles with lacing crossing between panel points.

The 1' x 4' steel floor beams are comprised of plates and angles riveted together. The beams are suspended from the trusses by means of brackets attached to each post. There are five lines of steel stringers on top of the floor beams and transverse wood planks laid on the stringers. There is a continuous concrete wearing surface on top of the deck. The railroad tracks were removed from the structure sometime prior to 1978, when the bridge was rehabilitated for use as a roadway bridge.

## History

In 1882, a group of St. Louis capitalists headed by Gen. Clayton Powell chartered the Missouri & Arkansas Railroad Company to build a railroad from Seligman, Missouri, to Eureka Springs, Arkansas. The railroad opened in February 1883 and was extended south to Leslie, Arkansas in 1903. In 1906, when the company reorganized as the Missouri & North Arkansas Railroad, plans were made to extend the line to Helena, on the Mississippi River.

Construction began in 1907, and the line was opened to travel in 1909. The route passed through the northeast corner of Van Buren County near the small hamlet of Settlement. At that location, contractors erected two steel truss railroad bridges over Middle Fork Little Red River. The bridges were completed sometime prior to June 15, 1908.<sup>2</sup> Shortly thereafter, several residents of Settlement purchased 80 acres of land across the river near the depot and platted a village named "Shirley." Within two years, most of Settlement's businesses had moved across the river, and Shirley boasted 350 residents, a bank, post office, two sawmills, a grist mill, a dozen stores and a livery stable.<sup>3</sup>

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<sup>2</sup> *Mountain Wave* [Marshall, Arkansas], 26 June 1908, 2.

<sup>3</sup> *Arkansas State Gazetteer and Business Directory, 1912-1913* (Memphis: R.L. Polk & Co., 1912), 517.

Despite its importance to the economy of the Ozark region, the Missouri & North Arkansas Railroad was plagued by accidents, floods, strikes and financial problems. The company ultimately declared bankruptcy and the line was abandoned in 1946. Thirty years later, Van Buren County rehabilitated the former railroad bridge at Shirley for use as a roadway bridge.

## **Design**

From the mid-nineteenth century on, the growing demand for railroad bridges was a major impetus to the development of American bridge building technology. In the quest for longer, stronger bridges, railroad engineers advanced the science of structural analysis and the understanding of bridge design.

Civil engineer Thomas Willis Pratt (1812-1875) was born in Boston, where his father, Caleb Pratt, was a noted architect. After obtaining his secondary education in the public schools of Boston, he enrolled at the Rensselaer Academy (now Rensselaer Polytechnic Institute) in Troy, New York, where he studied architecture. After graduation, Pratt worked for the Army Corps of Engineers, building dry docks for the Navy Yards at Charleston, South Carolina, and Norfolk, Virginia. In 1833, Pratt was employed by the Boston & Maine Railroad, where he began designing bridges. The remainder of his career was devoted to engineering and supervising work for railroad lines in the Eastern United States.

During his career, Thomas Pratt patented several inventions, including a steam boiler and a method of ship hull construction. The patent he achieved notoriety for is a roof and bridge truss, patented in 1844. The Pratt truss reversed the configuration of the 1840 Howe truss, putting the shorter web members in compression and the longer web members in tension, which greatly reduced the chances of structural failure through buckling. Developed at a time when the structural action of trusses was just beginning to be understood, the Pratt truss was one of several truss types that heralded the transformation from empirical to scientific bridge design. Over time, the Pratt truss came to be favored for its strength and straightforward design; by the 1870s it was the standard American truss type for moderate railroad and highway spans and continued to be so well into the twentieth century.

Introduced by the Pennsylvania Railroad in 1871, the Baltimore truss is a Pratt truss with subdivided panels, a modification that increases rigidity in longer, deeper spans without significantly increasing the overall weight of the structure. The Baltimore truss was used for long-span railroad bridges well into the twentieth century.

## Sources

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Wood, Stephen E. "The Development of Arkansas Railroads." *Arkansas Historical Quarterly* 7,  
No. 2 (Summer 1948).

ADDENDUM TO:  
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