

HISTORIC AMERICAN ENGINEERING RECORD

LEE CREEK BRIDGE

HAER No. AR-45

LOCATION: State Highway 220, spanning Lee Creek, Cove City, Crawford County, Arkansas.

UTM: 15/N3951665/E379980

Quad: Rudy NE, Arkansas

DATE OF CONSTRUCTION: Unknown (late nineteenth or early twentieth century).

BUILDER: Unknown

PRESENT OWNER: Arkansas Highway and Transportation Department.

PREVIOUS OWNER: Crawford County, Arkansas.

USE: Vehicular Bridge

SIGNIFICANCE: The Lee Creek Bridge is an excellent example of a Camelback Pennsylvania through truss, a late nineteenth/early twentieth century bridge type. It is significant as one of four Pennsylvania through trusses remaining in Arkansas, and is unique as the only one of the four which was not designed and engineered by the State Highway Department.

HISTORIAN: Lola Bennett

DESCRIPTION: Corinne Smith

Arkansas Historic Bridge Recording Project, 1988.

The Lee Creek Bridge is an excellent example of a Camelback Pennsylvania through truss, a late eighteenth/early nineteenth century bridge type. It is one of only four Pennsylvania through truss bridges remaining in Arkansas (see HAER reports AR-14, AR-23 and AR-24), and is unique as the only one of the four which was not designed and engineered by the State Highway Department. Although a date for this bridge could not be determined, its stone abutments and pinned connections indicate that it is the oldest of the four bridges, and possibly one of only three remaining nineteenth-century bridges in Arkansas.

COUNTY COURT RECORDS

Extensive research in Crawford County Court Records from 1876 to 1935 revealed no positive information regarding the bridge across Lee Creek on State Highway 220. Several bridges, all referred to as "Lee Creek Bridge," were mentioned in the court records, but inconsistencies indicate that none of these are the bridge in question.

The first Lee Creek Bridge mentioned in the court records is an iron bridge built in 1887 by the Wrought Iron Bridge Company of Canton, Ohio.(1) The bridge was erected near a place known as Foster's Ford, but several other references to this location indicate that it was in Van Buren Township. The Lee Creek Bridge on Highway 220 is located in Cove City Township, which was established in 1881, and lies about twenty miles north of the present town of Van Buren. A more obvious inconsistency is in the bridge contract: ". . .said Bridge to be 260 feet in length; to consist of two spans of 126 feet each in the clear."(2) The bridge on Highway 220 is approximately 357 feet long, having one main span of 171 feet and two 92-foot pony trusses on the south end. (The pony trusses appear to have been added to the bridge at a somewhat later date, probably by the State

Highway Department. They are constructed of heavy, riveted steel members, and have steel stringers, a concrete deck and concrete piers; the older main span has pinned connections, wooden stringers and stone abutments.) According to court records, this bridge was condemned in 1916.(3) The county bridge commissioners suggested that the county erect a new bridge, and recommended "that the Court adopt and contract for the plan to consist of steel superstructure of two spans 126'-0", with 14' roadway, and timber stringers to be placed upon piers now in place."(4)

In 1907, the Crawford County Court contracted with the Illinois Steel Bridge Co. to construct a bridge "across Lee Creek in Lee Creek Township at or near Evansville and Van Buren Road north of Natural Dam, Arkansas."(5) Judging from the description of its location, this bridge was apparently the predecessor of the present Natural Dam Bridge (see HAER report AR-24).

The Crawford County Judge's annual report of 1931 stated that "one bridge has been erected across Lee Creek since the last meeting of the Quorum Court, at a cost of Three Thousand dollars."(6) The court records did not mention any bridge being constructed across Lee Creek in 1931 but, considering the cost, it is likely that this bridge was a relatively insignificant one, and that it was built with funds out of the general county roads budget, thus making special appropriations for its construction unnecessary. The Lee Creek Bridge on Highway 220 could hardly be thought of as "insignificant," and--in all probability--would have cost more than \$3000 if it had been built in 1931.

These three bridges, built in 1887, 1907 and 1931, respectively, were all referred to as "Lee Creek Bridge," yet there were factors for each bridge which precluded the possibility of it being the Lee Creek bridge on Highway 220. The questions remain, then, as to the origins of that bridge. If it was built by the county, it is possible that it was known by a different name. In many cases,

the court records mentioned a bridge, but either did not describe its location, or made such a description so ambiguous that it would be nearly impossible to determine where it was. A more likely possibility, however, is that the bridge was not mentioned in court records because it was constructed as part of a road improvement district in the early 1900s.

ROAD IMPROVEMENT DISTRICTS

Act 338 of 1915 provided for the formation of road improvement districts, whereby local communities were granted the privilege of making road improvements and assessing the cost against the property benefited.(7) Apparently, the improvements made by these road improvement districts were not recorded in county records. In 1909, shortly before the establishment of road improvement districts, the General Assembly passed Act 119, "to lay off and establish parts of Crawford and Sebastian Counties into a Bridge District."(8) The purpose and outcome of this Act remain unclear, but it seems possible that if this bridge district was similar to a road improvement district, the Lee Creek Bridge may have been constructed under this legislation.

THE PENNSYLVANIA THROUGH TRUSS

The Pratt truss was patented in 1844 by Thomas and Caleb Pratt. Caleb was a Boston architect, and his interest in construction encouraged his son, Thomas, to obtain a degree in engineering from Rensselaer Polytechnic Institute. After college, Thomas served with the Army Corps of Engineers, and later worked as an engineer for several New England railroads. It was this railroad work that led him to develop an all-iron truss for bridges.(9)

The Pratt truss followed the structural pattern of a popular bridge type, the Howe truss, but

reversed the function of the verticals and diagonals. By subjecting the diagonals to tension rather than compression, Pratt reduced the danger of their buckling. The Pratt truss became one of the most popular metal-truss bridge designs in the United States during the nineteenth century.(10)

Many other popular bridge types were spin-offs of the original Pratt truss. These included: the Parker truss, which was a Pratt with a polygonal top chord; the Whipple truss, a double-intersection Pratt where the diagonals extend across two panels instead of one; the Lenticular truss, a Pratt with curved top and bottom chords; the Baltimore truss, which introduced sub-struts and sub-ties into the design; and the Pennsylvania truss, which combined sub-struts and sub-ties with a polygonal top chord.(11)

The Pennsylvania truss derived its name from its use on the Pennsylvania Railroad. The design became popular after 1875 and remained in use until the early twentieth century. The combination of the polygonal top chord with the Pratt truss allowed the depth of the truss to be adjusted differentially along the length of the bridge. This reduced the weight of the bridge, in addition to conserving metal.(12)

DESCRIPTION

The Lee Creek Bridge is a steel, single-span, Pennsylvania through truss, 171 feet in length, comprised of six panels, with two nine-panel Warren pony approach spans on the southwest end. The bridge has built-up members, punched eyebars, eyebars with turnbuckles, pinned connections, and ashlar stone abutments. The handrail is made up of two cables looped through steel hooks on each vertical.

The polygonal top chord of the main truss, reaching a maximum height of twenty-seven feet

above the deck, is constructed with two channel sections riveted to a continuous top plate with single-bar lacing on the bottom of the chord, and is riveted throughout its length. The compression forces in the top chord are resisted at the bearing blocks by the two rectangular punched eyebars of the bottom chord. Tension forces along the bottom chord of the bridge are passed through pinned connections at each panel point.

The bottom chord, verticals, and diagonals are all pin-connected. The vertical members are channels, flanges turned outward, with single-bar lacing on two sides. The main diagonal in each panel consists of two rectangular eyebars. The sub-struts and sub-ties are single or double round eyebars with turnbuckles, connected to the main diagonal by a pin at mid-panel height.

The lateral stability of the bridge is maintained by portal bracing, upper and lower lateral rods, and sway bracing at each vertical. A latticed truss acts as the portal brace at each inclined impost. Curved brackets made from angle sections brace the bottom of these four-panelled trusses. Sway bracing consists of a top lateral strut and round rods with turnbuckles crossing beneath the strut to attach to another strut. The top and bottom chords are laterally braced with rods, two in each panel, running diagonally from each panel point.

The floor system of the main truss consists of ten wooden stringers resting on I-beam girders at each panel point. The girders pass between the two channels of the vertical members and rest on the pin connection. The 16-foot-wide wooden deck features runners along each tire path.

The approaches have a two-land concrete deck. This deck is supported by steel I-beam stringers. The I-beam section is also used for the diagonals and verticals. The top chord consists of two channels with continuous top plate and lacing, while four angles joined by batten plates comprise the bottom chord.

ENDNOTES

1. Crawford County Court Records, November 16, 1886, Book B, (Van Buren, Arkansas), p.465.
2. Court Records, March 2, 1887, Book B, p.525.
3. Court Records, March 27, 1916, Book J, p.237.
4. *ibid.*
5. Court Records, April 3 and July 15, 1907, Book H, pp.91, 126-127.
6. Court Records, November 9, 1931, Book N, p.159.
7. "A Review of Highway Legislation in Arkansas," Ninth Biennial Report of the Arkansas State Highway Commission, 1929-1930 (Little Rock: Arkansas State Highway Commission, 1930).
8. Court Records, September 6, 1909, Book H.
9. James L. Cooper, Iron Monuments to Distant Posterity: Indiana's Metal Bridges 1870-1930, (Indiana's Historic Bridge Committee, 1987), p.55.
10. *ibid.*
11. T. Allen Comp and Donald Jackson, "Bridge Truss Types: A Guide to Dating and Identifying," (Nashville, Tennessee: American Association for State and Local History, 1977).
12. Cooper, p.70.

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