HISTORIC AMERICAN ENGINEERING RECORD

BUFFALO RIVER BRIDGE

(Pruitt Bridge)

HAER NO. AR-23

LOCATION:	State Highway 7, spanning Buffalo River, Newton County, Arkansas. UTM: 15/3990540/487580 QUAD: Jasper, Arkansas
DATE OF CONSTRUCTION:	1931
ENGINEER:	Arkansas State Highway and Transportation Department.
CONTRACTOR:	Fred Luttjohann, Topeka, Kansas.
PRESENT OWNER:	Arkansas State Highway and Transportation Department.
PRESENT USE:	Vehicular bridge
SIGNIFICANCE:	The bridge over the Buffalo River was erected by Luttjohann of Topeka, Kansas, a successful contractor in Arkansas. The bridge design was completed, following standard Highway Department bridge drawings, in only one day. The success of the structure, which may be considered to be the epitome of steel through truss principles, is undoubtedly due to the care of the contractor as much as it is due to the work of the State Highway Department.
HISTORIAN:	Sean O'Reilly
DESCRIPTION:	Corinne Smith Arkansas Historic Bridge Recording Project, 1988.

In February 1931 Arkansas State Highway Department began to consider replacing the bridge over the Buffalo River on the scenic Highway 7 near Jasper, county seat of Newton County.(1) Officials were said to be "not seriously alarmed by the condition of this bridge,"(2) indeed, an anonymous representative of the Bridge Department was recorded as saying that the old bridge "was almost as good today as when it was built."(3) However, while the old bridge was not in a condition that required immediate replacement, its older design could withstand only limited loading. In a study of the older bridge by the Highway Department, the bridge engineers suggested that "a three ton load limit sign should be placed on the old Buffalo River bridge."(4)

DESIGN AND CONTRACT

The design of the new bridge for the Buffalo River was not yet underway by April 8, 1931. The State Highway engineer W.M. Mitchell, reported in a letter of that date that the bridge designers had not "been able to get the plans started due to other work that was ordered ahead of this."(5)

On May 6, Mitchell requested the bridge engineers of the State Highway Department to commence and complete the plans "as early as possible."(6) He specifically requested the urgent attention of the bridge engineers to this project as "considerable pressure is being brought to bear to get this bridge in the next letting."(7) It cannot be ascertained precisely where that "pressure" was coming from, but the dire need for bridge projects to aid employment in the years of the Depression would suggest that pressure originated at county level.

The plans were commenced on May 11, 1931, and, remarkably, completed by the next day.(9) The speed with which the bridge was designed was undoubtedly due to the standardized work procedures and designs established by the State Highway Department.

The contract was advertised on May 13, with an estimated cost of $65,461.43. The contractor, Fred Luttjohann, of Topeka, Kansas received the contract for the lowest bid of $55,226.09. Work began on the bridge on July 18, 1931, with a contracted building period of 210 days.(10)

LUTTJOHANN

Fred Luttjohann was, as with many of the bridge contractors of the 1920s and 1930s, a largely unknown figure. He was involved with a number of Arkansan bridges of the period but as a contractor he was primarily engaged in subcontracting work, consequently leaving his work as regards the contracts largely supervisory and anonymous. His work, however, was regularly advertised in the State Highway Department magazine of the period. Advertisements there declare that his bridges are "built for the ages" and that his "best reference" was his record in the building of the mile-long Ramsey Bottom approach to the Batesville Free Bridge..."(11)

The position of bridge contractors in the 1920s and 1930s who subcontracted extensively requires further study. It has been noted that, after the First World War, bridge companies tended to be subcontracted to provide materials, rather than "focusing on full-service bridge building."(12) By this period the bridge-building companies, for example the Pittsburgh-Des Moines steel company,

has become more diverse in their operations, and small contractors are often able to bid more efficiently then the more unwieldy large companies.(13)

ENGINEERING DESCRIPTION

The Pruitt Bridge is a steel truss of total length 375 feet, comprised of a center span of 160 feet, two end spans of 80 feet each, and a 55-foot girder approach span on the south end. The Warren end spans and the Pennsylvania main span all have eight panels, where a panel is defined by the space spanned by a main diagonal. The horizontal, vertical, and diagonal sub-struts of the main span radiate from the main diagonal at mid-panel width. The end spans have verticals at every other panel point, meeting the top chord where the diagonals are riveted to it.

The inclined top chord of the end trusses slopes five degrees upward to the polygonal top chord of the main span. The top chord for the entire bridge consists of two 10-inch-deep channels, increasing in weight toward the center of the span, joined by a continuous top plate and lacing bars. The chord is riveted along its length except for a pin connection between the main and secondary span at U7 (see Highway Drawing No. 3223). During construction this joint was riveted to support the center span, which was cantilevered from the end spans. Once the center span was complete, the bridge carried forces as three trusses, and all weight was transferred to the piers and not from one truss to another. So member U7-U8 did not carry any axial load.

The bottom chord, two 12-inch-deep channels with lacing and batten plates, is also pin connected at L8 to a fixed hinge on a concrete pier. The similarly positioned panel point on the other end of the bridge is pinned to an expansion rocker, as are the extreme ends of the end spans.

All verticals, sub-struts, and diagonals are riveted to the chords. Throughout the bridge the web members are 10-inch-deep I sections, oriented with the web transverse to the direction of the bridge.

All lateral, sway, and portal bracing is formed with angles. Top and bottom lateral bracing span one panel diagonally. Those on top are angles with lacing, but the bottom braces are single angles. Sway bracing at each panel point is a three-panel double-intersection Warren truss. Portal braces are trapezoidal with braces reaching from the center of the top strut to the inclined impost. A portal brace on the diagonal at the first vertical of the main span replaces the sway bracing at that point.

The 27-inch-deep I-beam floor girders are supported on the bottom chord and are riveted to the vertical web members. The girders support the 20 foot wide concrete slab deck with curbs without the aid of stringers.

ENDNOTES

1. W.M. Mitchell, Assistant State Highway Engineer, to R.C. Gibson, Bridge Department, State Highway Department, February 13, 1931. AHTD Microfilm Files.

2. Mitchell to Mr. Justin Matthews, Little Rock, April 8, 1931. AHTD Microfilm Files.

3. ibid.

4. N.B. Garver, Bridge Engineer, State Highway Department to Mitchell, February 3, 1931. AHTD Microfilm Files.

5. Mitchell to Matthews, loc. cit.

6. Mitchell to Garver, May 6, 1931, AHTD Microfilm Files.

7. ibid.

8. Bridge 1689. Card Index, AHTD.

9. ibid.

10. ibid.

11. Arkansas Highways, State Highway Commission, 1931.

12. Cooper, Jas. L. Iron Monuments to Distant Posterity, Indiana's Metal Bridges, 1870-1930, 1987, p.48.

13. Historic American Engineering Record. HAER Report AR-8: "The Black River Bridge," 1988.

BIBLIOGRAPHY

Arkansas Gazette, Little Rock, 1931.

Arkansas Highways. Arkansas State Highway Commission, 1925-1932.

Arkansas State Highway and Transportation Department, Bridge Section: Card Index Microfilm Files and Drawings. Ref. Bridge No. 1689 Job No. 9126.

Cooper Jas. L., Iron Monuments to Distant Posterity, Indiana's Metal Bridges. 1870-1930. Greencastle Inc., Depauw University, 1987.

Historic American Engineering Record. HAER Report AR-8: "Black River Bridge," 1988.

Hardaway, Billie Touchstone, These Hills, My Home, Western Printing Co., Missouri, 1980.