

**HISTORIC AMERICAN ENGINEERING RECORD**

**BIG PINEY CREEK BRIDGE**

(Fort Douglas Bridge)

HAER NO. AR-22

**LOCATION:** State Highway 123, spanning the Big Piney Creek, near Fort Douglas, Johnson County, Arkansas.

UTM: 15/3947950/478700

QUAD: Fort Douglas, 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 Big Piney Creek provides an interesting example of a State Highway Department bridge design of the early 1930s executed with limited funds; although there is no apparent loss of quality in design or execution the bridge has a narrow roadway and limited load capacity. Its status as a Forest Highway bridge caused its limited funding, and further enhances the significance of the bridge.

**HISTORIAN:** Sean O'Reilly

**DESCRIPTION:** Corinne Smith

Arkansas Historic Bridge Recording Project, 1988.

BIG PINEY CREEK BRIDGE

The bridge over Big Piney Creek, near Fort Douglas, Johnson County, lay within the Ozark National Forest and, as such, was classified as a Forest Highway bridge.(1) Though part of the State Highway System and erected by the State Highway Department the bridge was constructed within a special financial process related to its Forestry status. The limited funds available in this process explained the uncharacteristically narrow (12 foot) roadway and the limited loading catered for in the design. In a memorandum on the projected bridge it was noted that

the road is not on the Federal Aid System but appears to be a local mountain road. The 12 ft. roadway and H-10 loading are therefore considered justifiable in the interests of economy.(2)

As Federal funding was not available for the route, the bridge was to be financed within the general funding of the National Forestry Division of the Department of Agriculture, the body responsible for the route. Funding for routes within National Forests required "special congressional appropriation" to the Department and, in the 71st Congress, that funding was provided for the bridge over Big Piney Creek.

ACT 550

Preparations for the bridge over Big Piney Creek were particularly efficient. In Act No. 550 of the 71st Congress, there was granted to the Forestry Division of the Department of Agriculture "an allotment of approximately \$32,000 which had been made for emergency construction in Arkansas."(3) It was proposed that this fund be used to construct a bridge over Big Piney Creek. Due to the fact that this fund was "an emergency fund" and that, as such, the funds were to be used by September 1, 1931, the arrangements for the bridge were commenced immediately. In a meeting

held on January 12, 1931, in the offices of Senior Highway Engineer F.D. Hudgins, the State Highway Department agreed to "survey, prepare the plans for this structure and supervise the construction."(4)

#### DESIGNED CONTRACT LETTING

In view of the severe time restriction the drawings were commenced on January 28, 1931, just sixteen days after agreement on the bridge was reached, and completed on February 11.(5) On that same day the bridge bid was let.(6) The notice to bridge contractors of the letting described the bridge as consisting of "...one bridge with one 140-foot through steel truss span and reinforced concrete deck girder approaches."(7) The bridge construction contract was let to the lowest bidder, Fred Luttjohann, of Topeka, Kansas, at a contract price of \$24,336.04.(8) As in the case of the Big Buffalo River bridge, Newton County, Luttjohann sub-contracted the Virginia Bridge and Iron Company of Roanoke, Virginia, to provide the steel.(9)

#### LUTTJOHANN

Fred Luttjohann was, as with many of the bridge contractors of the 1920s and '30s, 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 sub-contracting 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...."(10)

The position of bridge contractors in the 1920s and 1930s who subcontract extensively requires further study. It has been noted that, after the First World War, bridge companies tended to be sub-contracted to provide materials, rather than "focusing on full-service bridge building."(11) 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 than the more unwieldy large companies.(12)

#### ENGINEERING DESCRIPTION

The Big Piney Creek Bridge is a one-lane, steel Warren truss of total length 461 feet, comprised of the 141-foot-long main span and 320 feet of reinforced concrete deck girder approaches, 240 feet of which are on the west end. This version of the Warren truss is unusual in that it uses verticals and diagonal and vertical sub-struts. By using sub-struts to create more units in the truss, the strength capacity of the bridge is increased; because there are more verticals to carry floor girders, this six-panel bridge is able to have thirteen floor girders.

The sub-struts are two angles, legs turned inward, joined with lacing on the top legs. All verticals and diagonals spanning a full panel are I-sections, with webs oriented transverse to the direction of the bridge. The web members are riveted to the top and bottom chords. The top chord consists of double channels, attached by single lacing on the bottom and a continuous top plate, and reaches a maximum height just over 23 feet. The bottom chord is composed of two 6-inch-deep angles, joined by batten plates. The ends of the chord are pin connected to a fixed hinge on the east concrete pier and an expansion rocker on the west. The rockers have tilted substantially toward the center of the bridge. Lateral bracing of the bridge is achieved in three ways. First, at each vertical

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a two-panel, double-intersection Warren truss spans the upper 5 feet between the paired trusses. Crossed angle sections between panel points take lateral forces as both upper and lower lateral bracing. The portal bracing is a single Warren truss made from angles and batten plates. Floor girders at each panel support four I-beam stringers. The 12-foot clear road deck is a concrete slab.

The handrail of two channels, connected to the verticals with angle brackets, is continuous from the main span to the approaches, where the rail then becomes concrete. The approaches are reinforced concrete slabs supported by two concrete stringers. The stringers rest on solid piers which are narrower than the roadway at the top and flare to the road width at the bottom.

ENDNOTES

1. c.f. Arkansas State Highway Commission, Ninth Biennial Report, Russellville, 1930, pp. 43-44.
2. Bridge Memorandum by C. E. Vincent, Highway Bridge Engineer, February 24, 1931, AHTD Microfilm Files.
3. F. D. Hudgins, Senior Highway Engineer, to C. S. Christian, State Highway Engineer, January 12, 1931, AHTD Microfilm Files.
4. *ibid.*
5. AHTD Card Index.
6. *ibid.*
7. Notice to bridge contractors, Job. No. 8160, February 11, 1931, AHTD Microfilm Files.
8. AHTD Card Index.
9. Records in AHTD Microfilm Files.
10. Arkansas Highways, State Highway Commission, 1931.
11. Cooper, Jas. L. "Iron Monuments to Distant Posterity, Indiana's Metal Bridges, 1870-1930", p. 48.
12. Historic American Engineering Record, HAER Report AR-8: "The Black River Bridge," 1988.

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- Arkansas State Highway Commission, Ninth Biennial Report. Russellville Printing Co., Russellville, Arkansas, 1930.
- Arkansas State Highway Commission, Arkansas Highways, 1925-1932.
- Builder's Plate: "Big Piney Creek Bridge."
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- Historic American Engineering Record, HAER Report AR-8: "Black River Bridge," 1988.
- Historic American Engineering Record, HAER Report AR-10: "North Fork Bridge," 1988.
- Langford, Ella Molloy, Johnson County, Arkansas The First One Hundred Years, Private Printing by E. M. Langford, 1921.
- Thomas, David Y., ed., Arkansas and its People, A History, American Historical Society, New York, 1930.