HISTORIC AMERICAN ENGINEERING RECORD

CACHE RIVER BRIDGE

HAER NO. AR-25

LOCATION:	U.S. Highway 412, spanning the Cache River between Lawrence County and Greene County, Arkansas. UTM: 15/3992595/696000 QUAD: Walnut Ridge, S.E., Arkansas
DATE OF CONSTRUCTION:	1934
ENGINEER:	Arkansas State Highway and Transportation Department.
BUILDER:	Vincennes Bridge Company, Vincennes, Indiana.
PRESENT OWNER:	Arkansas State Highway and Transportation Department.
PRESENT USE:	Vehicular bridge
SIGNIFICANCE:	The Cache River Bridge was designed by the Arkansas State Highway Department and erected as part of a general improvement of the road connecting Walnut Ridge, Lawrence County, and Paragould, Greene County. It was built, in 1934, by the Vincennes Bridge Company, historically one of the most important of the twentieth century bridge building companies. The structure, a representative Parker pony truss, is most renowned for its simple skew which allows the river to be spanned in a very economical fashion.
HISTORIAN:	Sean O'Reilly
DESCRIPTION:	Corinne Smith Arkansas Historic Bridge Recording Project, 1988.

REPLACEMENT

"It is our understanding that the existing Cache River bridge is light and in poor condition, and it must necessarily be replaced," commented C.E. Swain, District Engineer for the U.S. Public Works in 1934.(1) The bridge in question lay between Walnut Ridge, Lawrence County and Paragould, Greene County, over the Cache River which formed the boundary between the two counties. The section of Highway 5 which crossed the bridge was to be reconstructed as part of a 1936 Public Works project,(2) which involved an interim resurfacing of the road with a "single lane concrete pavement."(3) Most of the old bridges had 16-19 foot roadways with an estimated capacity of 10 tons.(4) Swain noted that "[t]he retention, for the present, of these structures on this basis is satisfactory, that is, with the understanding that when a full two lane width of surfacing is provided, these existing structures will be widened or re-built."(5)

Due to the poor conditions of the old Cache River bridge, Swain considered its replacement a necessary priority. The bridge lay midway between Paragould and Walnut Ridge, yet the planned process of construction was to commence at both towns simultaneously "from Walnut Ridge east towards the Cache River...and from Paragould west, in sections..." meaning that the Cache River bridge would be constructed last.(6) However, Swain felt that its reconstruction should be undertaken at the earliest possible stage; he stated in his letter to the Senior Highway Engineer: "The point we are trying to make is that the existing Cache River bridge...is the weak link in this highway between Walnut Ridge and Paragould, and the reconstruction of it should not be deferred as one of the last phases of the construction of this highway."(7)

Swain's request was granted by the Highway Department; the Cache River Bridge plans were commenced in the next month, on March 22, and received approval from the Bureau of Public Road on June 15, 1934.(8)

SIX BRIDGES

In a letter of May 9, 1934, N.B. Garver, Bridge Engineer to the State Highway Department, listed six bridges as part of the proposed development project between Walnut Ridge and Paragould.(9) This list consisted of four untitled bridges, a bridge over Eight Mile Creek, near Paragould, and the Cache River bridge.

One characteristic linking the bridges was "very little clearance above highwater."(10) Though it caused some minor revisions of the designs, the low clearance was justified by the geography of the areas crossed by the bridges, where "drainage areas are largely indeterminate due to the flat nature of the ground."(11)

The Cache River bridge was undoubtedly the most important of the six bridges. The four untitled bridges were simple I-beam spans with concrete floors, ranging in length from 46 to 100 feet.(12) The Eight Mile Creek bridge was an 84-foot pony truss of a relatively standard design.(13) In contrast, the Cache River bridge was a large 371 ft. bridge, with its skewed design as its most striking feature.

THE BRIDGE AND THE SKEW

The contract for the bridge was advertised on the same date the bridge received its approval, June 12, 1934 with an estimated cost of $40,020.64. It was let on June 20 to the Vincennes Bridge Company who tendered a bid of $34,626.21. The projected bridge of 376'-11" consisted of a central 100-foot pony truss with a forty-five degree skew, supported on pre-cast concrete pile bents and concrete piers with untreated timber foundation piles. The bridge was to be approached at either end by three I-beam spans, also skewed. The deck was concrete with a comparatively narrow 24-foot roadway and no sidewalks.(14)

The Cache River Bridge was built with a singularly efficient skew. The skew was a solution to two conflicting factors, the road meeting the river at a sharp angle, and the limited funds available for the bridge. While the sharp angle of the crossing suggested the use of a long main span, the financial limitations obviated this as a possibility. However, the potentially complex members of a skew could have increased cost beyond available funds.

The State Highway Department bridge engineers produced a remarkably successful and simple answer to the problem. They designed a simple pony truss with one side of the truss moved three panels forward, thus making an angle of forty-five degrees between the ends of each side. Consequently, the standard truss form could be used with a minimum of modifications to its design and at a scale much smaller than would otherwise have been required.

VINCENNES STEEL CORPORATION

The predecessor of the Vincennes Steel Corporation, the Vincennes Bridge Company, was incorporated in 1898 in Vincennes by three former schoolteachers, Frank L. Oliphant, John T. Oliphant and Jacob L. Riddle.(15) Ultimately to become one of Indiana's "most successful bridge-building firms," it began in a small one-room shop in Vincennes with an initial capital investment of $20,000. The early bridges of this burgeoning company were small I-beam spans and pony trusses. By 1920, annual production had surpassed 1200 spans with sales in excess of $1 million.

With the development of State Highway Systems in the 1920s, bridge- building expanded rapidly and efficiently. The Vincennes Bridge Company was ideally suited to the vigorous and effective pursuit of the numerous bridge contracts then let. Its continued concentration on "full service bridge building" after the First World War was untypical.(16) By the 1920s, most large bridge-building companies had expanded and diversified to the extent that the companies were only subcontracted to provide material.(17) Not only did the Vincennes Bridge Company compete directly in bridge contracts, but it "retained crews prepared to build concrete substructures and it erected its own spans."(18)

By 1932 the Vincennes Bridge Company was ready to expand into broader markets and a new company, the Vincennes Steel Corporation, was incorporated. "The operations of the business took on new vistas of expansion. In addition to the great program of bridge construction, mass assembly line production methods stepped up production."(19) The company continued its growth through to World War II and after. In 1956, after some decline, it was taken over by Industrial Enterprises, Inc. for a sum in the region of $1 million.

By 1956 the company had expanded beyond the proudest dreams of its founders, producing such notable bridges as the 420-foot steel bridge at Paw-Paw, West Virginia, as well as numerous bridges in Arkansas.(20)

> These and many other notable bridges are monuments to the. . Vincennes Bridge Company and many of them stand out in great contrast to the tiny span bridge over a creek near Arcola, Illinois, built in 1898, the first span ever designed and constructed by the company.(21)

ENGINEERING DESCRIPTION

The Cache River Bridge is a one-hundred-foot-long Parker pony truss with 276 feet of concrete I-beam approach spans. The two lines of eleven panel trusses are skewed at forty-five degrees, creating an offset equal to three panel widths. Floor girders at the ends of the main span and approach spans are also skewed, as are the reinforced concrete piers they bear on. All other members are placed perpendicularly to the truss lines as if no skew existed. The ten stringers run longitudinally, framing into the intermediary steel I-beam girders. Angle braces, spanning two panels, laterally brace the eight panels common to the bottom chords of the two truss lines.

The floor girders are riveted to the bottom chord so that their bottom planes are even. The bottom chord consists of two 12-inch channels with batten plates. Because the 30-inch I-beam floor girders are so much deeper than the bottom chord, the top of the 24-foot-wide concrete road deck is almost 3 feet above the chord.

The web members are riveted to the top and bottom chords. The vertical web members and diagonals in the second and third panels are 10-inch-deep I-beams with webs transverse to the longitudinal direction of the bridge. The remainder of the diagonals are two angles with batten

plates. The polygonal top chord, two channels with a continuous top plate and end plates only on the bottom, reaches a maximum height of 12 feet.

ENDNOTES

1. C.E. Swain, District Engineer, Bureau of Public Roads to J.M. Page, Senior Highway Engineer, Little Rock, February 15, 1934. AHTD Microfilm Files.

2. ibid., and N.B. Garver, Bridge Engineer to W.A. Vaught, Resident Engineer, Walnut Ridge, May 9, 1934. AHTD Microfilm Files.

3. Swain to Page, loc. cit.

4. ibid.

5. ibid.

6. ibid.

7. ibid.

8. "Bridge Memorandum", by C.S. Vincent, Highway Bridge Engineer, June 15, 1934, AHTD Microfilm Files.

9. Garver to Vaught, May 9, 1934. AHTD Microfilm Files.

10. "Bridge Memorandum," C.S. Vincent, loc. cit.

11. ibid.

12. ibid.

13. ibid.

14. Bridge 1892, Card Index. AHTD. c.f. also "Bridge Memorandum" by C.S. Vincent, loc. cit. The Builder's plate reads: "Cache River: Vincennes Bridge Co., Contractor; Arkansas; State Highway Commission; Jas. R. Rhyne, Director; N.B. Garver, Bridge Engineer; 1934."

15. Cooper, Jas. L., Monuments to Distant Posterity Indiana's Metal Bridges 1870-1930, Indiana 1987, p. 28 and "Bridge Works City Stalwart for 58 Years" Vincennes Sun Commercial, Vincennes, Indiana, November, 1956, p. 1.

16. Cooper, op.cit., p. 28.

17. ibid.

18. ibid.

19. "Bridge Works City Stalwart for 58 years", Vincennes Sun Commercial, loc.cit.

20. ibid. c.f. also Historic American Engineering Record, HAER No. AR-10: "North Fork Bridge," 1988.

21. Cooper, Jas. L., loc.cit.

BIBLIOGRAPHY

Arkansas State Highway and Transportation Department, Bridge Section: Card Index, Microfilm Files and Drawings. Ref. Bridge No., 1892, Job. No. 5126.

Builder's Plate: "Cache River Bridge".

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

Vincennes Sun Commercial, Vincennes, Indiana, November, 1956.