Little Niangua River Bridge

CAMD05

GENERAL DATA

structure no.: S 391
county: Camden

city/town: 7.7 miles northeast of Macks Creek
feature inters.: Little Niangua River
cadastral grid: S4, T38N, R19W
highway route: State Secondary Route J
highway distr.: 5
current owner: Missouri Highway and Transportation Department

STRUCTURAL DATA

superstructure: steel cable suspension bridge with pinned and rigid steel towers
substructure: concrete abutments, wingwalls and spill-through pedestal piers

span number: 3
span length: 225.0'
total length: 524.0'
roadway width: 20.0'

condition: good
alterations: none
floor/decking : asphalt-covered timber over steel stringers
other features: tower: 2 channels with lacing; vertical: 2 wide flanges with batten plates; diagonal: 2 angles with batten plates; lateral bracing: 2 angles; floor beam: I-beam field riveted to vertical; guardrail: 2 angles; main cable: 4 separate galvanized wound cables; 1 cable suspender; I-beam through girder; cables connected with pinned eyebars which lead into deadmen at abutments

HISTORICAL DATA

erection date: 1932-33
erection cost: $36,914.00
designer: Howard Mullins, Engineer, Missouri Highway and Transportation Department
fabricator : Skully Steel Company;
American Steel and Wire Company, Trenton NJ
contractor: Clinton Bridge Works, Clinton IA

references: Missouri Highway and Transportation Department, Structure Inventory and Appraisal: Structure Number S 391; **Eighth Biennial Report of the State Highway Commission of Missouri**, for the period ending 1 December 1932, page 240; "Self-Anchored Suspension Bridge Built in Missouri," **Engineering News-Record**, vol. 111, no. 13, (28 September 1933), pages 367-370; field inspection by Clayton Fraser, 5 May 1990.

sign. rating: 77
evaluation: NRHP eligible (nationally significant exercise in structural engineering)

inventoried by: Clayton B. Fraser 15 March 1993

HAER INVENTORY
Missouri Historic Bridge Inventory

NAME(S) OF STRUCTURE
Little Niangua River Bridge
MHTD: S 391

CAMD05

DATE(S) OF CONSTRUCTION
1932-33

LOCATION
State Secondary Route J over Little Niangua River; S4, T38N, R19W
7.7 miles northeast of Macks Creek; Camden County, Missouri

USE (ORIGINAL / CURRENT)
highway bridge / highway bridge

RATING NRHP eligible (score: 77)

CONDITION
good

OWNER
Missouri Highway and Transportation Department

span number:	3	superstructure:	steel cable suspension bridge with pinned and rigid steel towers
span length:	225.0'	substructure:	concrete abutments, wingwalls and spill-through pedestal piers
total length:	524.0'	floor/decking:	asphalt-covered timber over steel stringers
roadway wdt.:	20.0'	other features:	tower: 2 channels with lacing; vertical: 2 wide flanges with batten plates; diagonal: 2 angles with batten plates; lateral bracing: 2 angles; floor beam: I-beam field riveted to vertical; guardrail: 2 angles; main cable: 4 separate galvanized wound cables; 1 cable suspender; I-beam through girder; cables connected with pinned eyebars which lead into deadmen at abutments

Spanning the Little Niangua River in scenic west-central Camden County, the Little Niangua River Bridge is situated some eight miles northeast of the town of Macks Creek. The bridge forms an interesting study in the evolution of bridge design. During its design stage in 1932, with construction funds limited, engineers for the Missouri State Highway Department considered various truss and beam configurations. "The I-beam layout was entirely unsuited from an esthetic viewpoint," MSHD design engineer Howard Mullins wrote in 1933. "The truss layout was little better. The unstiffened suspension layout was considered inadequate for a bridge of such light weight and slender proportions. The self-anchored type proved the most economical and was adopted." The bridge consisted of a central 225-foot suspended span, anchored by shorter 112½-foot flanking spans and supported by steel towers on spill-though concrete pedestals. Spun and prestressed in the Trenton, New Jersey, plant of the American Steel and Wire Company, the four parallel wire cables were attached to steel eyebars at the bridge deck level and anchored to the lightweight concrete supports, without benefit of massive deadmen. Lateral stiffness was provided by 33-inch-deep rolled deck girders. Mullins stated: "Unique features of the design include the application of pre-stressed strands to the self-anchored type: an unusual arrangement of the strands in the cable; the use of rolled beam sections for the stiffening girders; the use of a built-up or laminated cable clamp; and the method of handling he expansion movement."

After soliciting competitive proposals, the state highway commission awarded a contract to build the bridge to the Clinton Bridge Works of Clinton, Iowa. A Clinton crew set up shop on the west bank of the river and began building a falsework trestle over which the bridge would be erected. Work on the substructure began in August and was completed the following March. "For the superstructure a guy derrick with a 70-ft. boom was set up on the lower tier of falsework and began setting steel at the east abutment," Mullins stated. "Moving toward the west end, this derrick set all upper-tier falsework and all steel complete, including the towers, in one pass. All

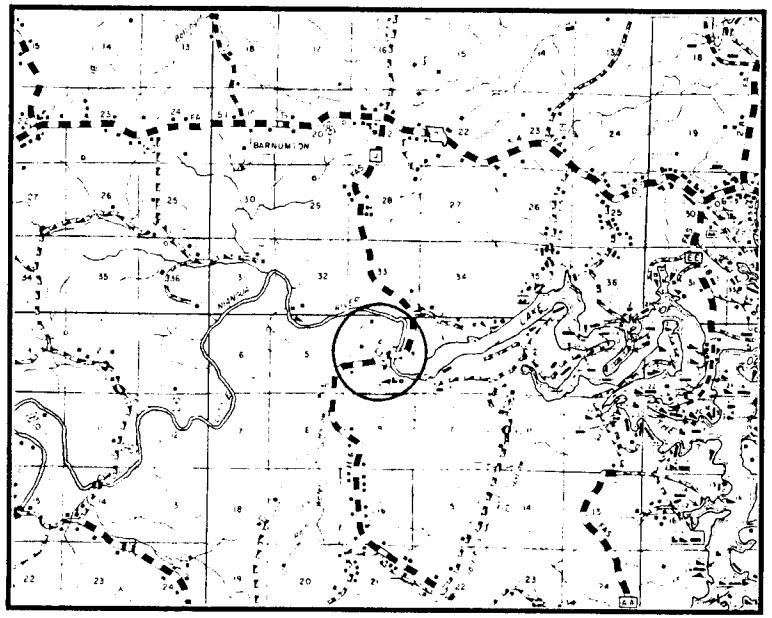
superstructure material was delivered too position by a cableway operating along the north side of the bridge. After all riveting was completed, the strands were hoisted into position and adjusted. After placing of the cable clamps and flooring, the hangers were connected by pulling the cable down by a ratchet device connected between a sling over the cable clamp and one underneath the stiffening girder." The superstructure was completed soon after the substructural work in March 1933. Aggregate cost of the bridge was an exceedingly low $36,914.00. This crossing effectively fulfilled the state highway department's goal of building an aesthetically pleasing bridge that would blend in with the surrounding area at a reasonable cost to the state. The Little Niangua River Bridge continues to carry traffic in Camden County in basically unaltered condition.

Standing in stark contrast with the ethereal suspension spans by central Missouri bridge builder A.J. Dice, the Little Niangua River Bridge marks a noteworthy foray into suspension bridge design by the state highway department. At the time of its completion, this structure was the fourth self-anchored suspension bridge built in America, preceded by only three urban structures in Pittsburgh. It was the first stiffened suspension bridge built in Missouri since the Grand Avenue Bridge in St. Louis, a cable-braced structure built in 1890. A seldom-used prototype of an esoteric bridge design, the Little Niangua River Bridge represents a daring exploration of structural design by the state highway department, an agency not usually associated with experimentation. It thus ranks among Missouri's most important early highway spans.

NAME(S) OF STRUCTURE

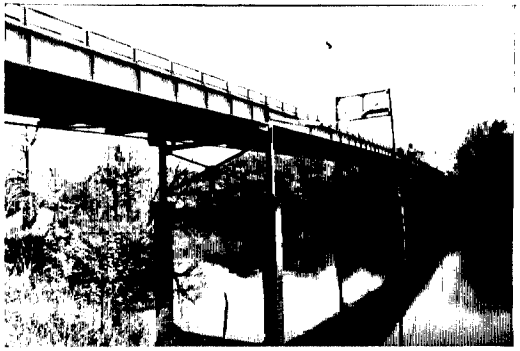
Little Niangua River Bridge

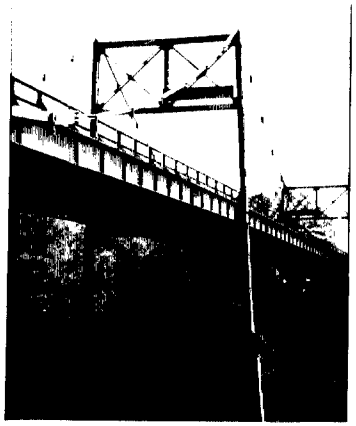
PHOTOS AND SKETCH MAP OF LOCATION



LOCATION MAP

TAKEN FROM MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT
GENERAL HIGHWAY MAP





SOURCES

Missouri Highway and Transportation Department, Structure Inventory and Appraisal: Structure Number S 391; **Eighth Biennial Report of the State Highway Commission of Missouri**, for the period ending 1 December 1932, page 240; "Self-Anchored Suspension Bridge Built in Missouri," **Engineering News-Record**, vol. 111, no. 13, (28 September 1933), pages 367-370; field inspection by Clayton Fraser, 5 May 1990.

INVENTORIED BY	**AFFILIATION**	**DATE**
Clayton B. Fraser	Fraserdesign, Loveland CO	15 March 1993