St. Francis River Bridge (Madison Bridge)
Spanning St. Francis River at U.S. Highway 70
Forrest City
St. Francis County
Arkansas

HAER No. AR-20

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, DC 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

ST. FRANCIS RIVER BRIDGE

(Madison Bridge)

HAER NO. AR-20

LOCATION:	US Highway 70, spanning St. Francis River, near Madison, St. Francis County, Arkansas. UTM: 15/3879260/708740 Quad: Madison, Arkansas
DATE OF CONSTRUCTION:	1933
ENGINEER:	Arkansas State Highway and Transportation Department.
BUILDER:	Wisconsin Bridge and Iron Company, Milwaukee,Wisconsin.
PRESENT OWNER:	Arkansas State Highway and Transportation Department.
PRESENT USE:	Vehicular traffic
SIGNIFICANCE:	The bridge over the St. Francis River on U.S. 70, constructed by the Wisconsin Bridge and Iron Company, was part of a 1930s highway and development project. Comparable with the Black River Bridge at Pocahontas (HAER NO. AR-8) the St. Francis River Bridge differs in its historical context and in its structural details. It is, with the bridge at Pocahontas, one of three swinging road bridges in the state.
HISTORIAN:	Sean O'Reilly
DESCRIPTION:	Corinne Smith Arkansas Historic Bridge Recording Project, 1988

MEMPHIS TO LITTLE ROCK

> The first mail route established between Little Rock and Memphis commenced operation in 1824 over practically the exact route of the present (1936) U. S. Highway 70. This route known as the "Trail of Tears" is the route used in moving the Cherokee Indians from their lands east of the Mississippi to those in the west" (1)

U.S. Highway No. 70, part of which formed the historic link between Memphis, Tennessee and Little Rock, Arkansas, was developed in the early decades of this century as one of the most important routes in the State of Arkansas.(2) Its informal title, "The Broadway of America" registered its national importance. Highway 70, between these two cities, formed a part of the route from the Atlantic to the Pacific coast, and its historic development characterized it as one of the most interesting overland routes in the State.

The earliest development of the route between Little Rock and Memphis took place in 1821 when, by an act of Congress passed in that year, "a road from Memphis to Fort Smith via Little Rock was authorized"(3) Its development was further stimulated by its establishment as a mail route in 1824. The road, later referred to as the Bankhead Highway, was already among the most important in the state.

It was the railroad, however, which first contributed to the real improvement of the route between Little Rock and Memphis, an improvement further stimulated by the increasing importance of Little Rock. The Memphis and Little Rock Railroad Company, incorporated on January 10, 1853, and later absorbed into the Chicago, Rock Island and Pacific Railroad Company, was the first to develop the overland route between the cities. It had been noted that:

> On February 20, 1862, that company advertised that trains were operating between DeValls Bluff and Little Rock and it was already

operating between the West Bank of the Mississippi River and Madison, Arkansas.(4)

Its development faced the same two problems that characterized the development of Highway 70, the river crossings at Madison, over the St. Francis River, and at DeValls Bluff, over the White River.

The passage between DeValls Bluff and Madison, interrupted by the rivers, was by steamer and coach. At this period the Memphis and Little Rock Railroad Company could advertise as an attraction "Only twelve hours staging between Little Rock and Memphis."(5) The costly and complex river crossings at DeValls Bluff and Madison, and the rail route between these towns, was completed by 1871. By 1936 the travel time between Little Rock and Memphis was reduced to two hours and forty-five minutes.(6)

The road route between Memphis and Little Rock, designated in the 1920s as State Highway 70 under the State Highway System, faced similar obstructions from the White River and the St. Francis River. The development of a modern vehicular route between Memphis and Little Rock involved, as an essential prerequisite, the bridging of these rivers. Highway 70, following a similar route to that established by the Memphis and Little Rock Railroad Company, crossed the White River and the St. Francis River at locations near the railroad crossings, at DeValls Bluff and at Madison.

THE NEW SITE

The redevelopment of Highway 70 between Forrest City, St. Francis County, and West Memphis was a project undertaken by the Arkansas State Highway Department from the late 1920s.(7) An essential part of this project was the bridging of the St. Francis River near Madison. In July 1929 L. N. Edwards, Senior Highway Bridge Engineer, submitted a report on the proposed

new site for the bridge over the river.(8) The new site was required due to the improved routing of No. 70, and its projected location was "about one and three quarter miles upstream from the old bridge."(9)

The new bridge was to cross the St. Francis River "at about the mid-length of a straight length of river about one mile in length."(10) The advantages of this new site were many, not only was it in keeping with the new and improved road line, but it also provided an ideal point for crossing the river.

As the river was considered a navigable river at this stage of its course, consideration had to be made of any river traffic that might occur. The new site did not endanger any river traffic as:

> The distance of one third to one half mile of distance from either of the curves will provide ample sight distance for navigation, as well as water area in which a river craft may maneuver, in the event of delays or difficulties arising in the operation of the movable span of the bridge.(11)

The new site was also ideal with respect to the new line of the highway. The projected Highway 70 route leading to this site

"avoided the construction of the highway across several small lakes and sloughs, likely to involve considerable cost for bridges and embankments"(12)

During the public hearings on the projected bridge, held in 1932, objections were voiced by concerned parties regarding the new location of the bridge. It was felt, by local people, that the new site and its new highway route would unnecessarily remove trade from the town. However, the suitability of this site, with respect to the crossing and to the new highway route, was to prevail over these objections.

ST. FRANCIS RIVER

The St. Francis River in the region of Madison was considered a navigable water by the War Department. Consequently a legislative and legal process, involving a special act of Congress and specific War Department approval, was required to be undertaken by any person or persons intending to build a bridge over such waters.(13) The object of this process was to ensure the free passage of river traffic during and after the construction of the bridge.

In a letter of January 12, 1931, Dwight H. Blackwood, Chairman of the State Highway Commission, requested Congressman W. J. Driver to pass an act in Congress granting permission to

> the Arkansas State Highway Commission and their successors and assigns to construct a free highway bridge and approaches thereto across the St. Francis River, at a point suitable to the interests of navigation, at or near Madison, Arkansas, on State Highway Number 70.(14)

This was submitted to the House of Representatives as a bill, H.R. 16419, on January 21, 1931, and approved by the 71st Congress as Act 823 on March 3, 1931.(15)

Despite the passing of the act it was noted by the Highway Department in a letter of March 14, 1931, that "although an Act of Congress to construct this bridge has been secured I do not believe that bids will be asked for the construction of this bridge this year. We have not started on the plans as yet."(16) According to the Congressional act of 1906 regarding bridge building over navigable waters it was required to commence bridge construction within one year of the passing of any act granting permission, unless otherwise specified.(17) The bridge over the St. Francis River

was not commenced within the required time and, consequently, a new congressional act was required.

On February 10, 1932, Blackwood contacted Driver, once again, asking him to submit a bill granting an extension in time.(18) This bill was submitted to the House of Representatives as H.R.9264 on February 12, 1932. In Act 81 of the 72nd Congress, approved on April 15, 1932, permission was given to the State Highway Commission allowing for this extension in time.(19)

WAR DEPARTMENT

With Congressional approval to build a bridge over the St. Francis River granted, further permission was required from the War Department and the Chief of Engineers. Application was made to the War Department on August 30, 1932, and approval received on October 31.(20) However, two complications arose prior to the granting of that approval. First, the War Department was concerned about the status of the old bridge after its decommissioning and required that the responsibility for the old bridge be returned to the county with the opening of the new bridge. The second problem faced by the Highway Department was a degree of public objection to the new location of the projected bridge. Both of these questions had to be solved prior to receiving approval for the new bridge from the War Department.

OWNERSHIP OF OLD BRIDGE

It was recorded in a letter of September 5, 1932, that the War Department required a court order from St. Francis County specifically stating that the county would "resume ownership" of the

old St. Francis River bridge and "maintain said bridge in connection with the County Highway System."(21)

The required court order stating that the county would "resume ownership" of the old bridge was granted on September 5, 1932, and immediately forwarded to the War Department by the State Highway Department.

The court order recognized that the old bridge "must be torn down when the new bridge is constructed and the present bridge is abandoned by the State Highway System, unless proper provision is made for its maintenance."(22) It further recognized that "the value of this existing bridge to the county will be too great to permit its being demolished."(23)

PUBLIC OBJECTIONS

Public opposition to the new bridge over the St. Francis River was founded in an objection to the new route of Highway 70. This route, selected in 1929, involved the construction of a highway parallel to the old Route 70. The new route was to bypass the old, thereby making it redundant.(24)

As essential part of the new route was the crossing of the St. Francis River, some two miles from the previous crossing. Those who opposed the new routing of Highway 70 felt that, if the projected crossing could be brought nearer the original crossing, the old road could be retained and developed. The War Department hearing on the siting of the projected bridge might, it was hoped, provide a suitable platform for voicing objections. The hearing, scheduled for October 4, 1932, was

primarily intended to establish the effect the bridge might have on navigating the river. However the local paper reported that:

> it is understood that a number of people who are desirous that the bridge be constructed at a point near the present bridge will attend the hearing and will make a plea for the abandonment of the proposed new location.(25)

The Highway Department also anticipated public objections at the hearing.(26) To "expedite the transactions" they requested that the War Department hold the hearing on the St. Francis River Bridge in conjunction with hearings on the Black River Bridge and the St. Francis River Bridge at Lake City.(27) This was intended to promote a smooth passage of the Route 70 bridge at the hearings.

The public objections raised at the hearing were over-ruled by the War Department engineers on the grounds that the hearing was concerned with navigation only. The rejection was reported in the local newspaper as follows:

> At the public hearing held by the U.S. Engineers at West Memphis, yesterday, the protests...on the proposed change of the location of the bridge to a point two miles North of Madison was presented by C. W. Norton. The engineers, however, declined to interfere with the location question, ruling that the hearing being conducted by them for the War Department was solely as to the effect the bridge would have upon navigation.(28)

CONTRACT AND CONSTRUCTION

With approval from the War Department, the State Highway Department could proceed with the bridge. On November 15, 1932, the contract for the new bridge over the St. Francis river was

let with an estimated cost of $213,905.20. The winner of the contract, with a low bid of $183,105.86, was the Missouri Valley Bridge and Iron Company(29).

Construction immediately commenced but, inconvenienced by floods, progressed erratically. By April 1933 it was reported that "the steel work has been placed on the east side of the river, three of the concrete piers having been completed, one in the river and two on land."(30) Construction crews were "working night and day in order to complete construction as speedily as possible.(31)

OPENING

The bridge was completed by August and on September 2, 1933, the Daily Forrest City Times Herald published the program for the official opening and dedication of the new bridge. A whole day, Monday, September 4, was to be devoted to the bridge opening.(32)

Festivities began at 12 noon, with the "Stuttgart Girls Drum and Bugle Corps Drill" opening the day. Water sports, speeches and parades provided further entertainment for the ten thousand visitors to the bridge. The climax of the evening was the bridge dedication ball, begun at 10 o'clock, which "brought the evening to a close at 3 a.m."(33)

The speech dedicating the bridge, originally to have been given by Governor J. Marion Futrell, was given by County Judge Miles, as the Governor could not attend due to illness. The bridge was then christened by the bridge queen, Miss Nana Jones, who "arrived with her eleven attendants on a prettily decorated barge."(34)

Perhaps the proudest moment of the day was when Senator Norfleet read a telegram from F.O. Mackey, Arizona President of the Broadway of American Association who wrote:

> On behalf of the Broadway of American Association, kindly convey to your Governor and people of the State of Arkansas sincere thanks and deep appreciation of their wonderful efforts in completing this link of the Broadway, the St. Francis River Bridge. Wishing you every success in your celebration and only regret I cannot be with you at the fish fry.(35)

The people of St. Francis County were re-affirmed as members of the inter-state elite who lived and worked by Route 70, part of the Broadway of America.

ENGINEERING DESCRIPTION

The Madison Bridge is a steel, four-span bridge of 921-foot length, comprised of three Parker through trusses of 162 feet each, the center-bearing swing span 230 feet long, and two I-beam approaches of 107 feet, one on each end. Spanning the St. Francis River in a southwest to northeast direction, the Parker truss swing span is the third span. When the bridge is turned, two channels 100 feet wide are opened for river traffic.

The twelve-panel swing span and the eight-panel fixed spans have single diagonal bracing with additional horizontal members at mid-panel height, as seen in the plan drawings. The two center panels of each fixed span has two diagonal braces. The members in the four spans are built-up from channels, angles, batten plates, continuous plates, or lacing bars riveted together. All members are rigidly connected to each other with rivets. The bottom chord is made of two channels connected by batten plates, staggered from the top to the bottom of the chord at 3-foot intervals. The bottom chord of the swing span is cambered so that the ends are one half inch below grade when the span is open. The top chord, made of two channels with a continuous top plate and lacing bars, reaches a maximum height of 32 feet in the swing span and 29 feet in the other three. The vertical

and web members are I-sections with the web oriented transverse to the longitudinal direction of the bridge. The web members in the center two panels of the swing span are two channels with lacing on either side.

The floor system and lateral bracing are essentially the same for the two types of span. Ten I-beam stringers run longitudinally, connecting to 20-inch-deep I-beam girders at each panel point. The original floor deck, laminated timber with asphalt planks, was replaced in 1953 with a concrete slab deck and refloored again in 1983. Lateral bracing is achieved in three ways: two angles laced together span panel points diagonally between the top chords of the trusses, and double angles laterally brace the floor. Sway bracing is formed at each panel point by 3-foot-deep, double intersection Warren trusses.

The center two panels of the swing span are supported on the center-bearing pivot made of cast steel and phosphor-bronze and hardened tool steel discs. The four balance wheels revolve on a 24 foot diameter reinforced concrete pier. The swing span was turned by two men operating a 6 foot hickory handle that keyed into a shaft near the center of the floor deck. This first shaft was short and operated a small gear, less than one foot in diameter. This gear engaged a larger gear, of 3 foot diameter. A shaft from the second gear transmitted the torque down to another small gear on a gear track on the top of the pier. This track travels a quarter-way around the pier and allowed the bridge to swing ninety degrees clockwise. The combination of the two small gears and one large decreased the number of turns the operator had to make to open and close the bridge.

Before the bridge was turned, the operator released four wedges at the ends, two wedges at the center, and latches at the ends of the span with a captain's wheel near the hickory handle. The

wedges direct the bridge back into place when it is closed. Manganese-bronze was applied to the sliding faces of the wedges to reduce friction between the moving parts involved. The latches held the swing span closed.

ENDNOTES

1. Murray, J. C. "State's Fine Transportation Facilities." Arkansas Centennial 1836-1936. Arkansas Democrat, 1936, p. 64.

2. ibid., p. 65.

3. ibid., p. 64.

4. ibid.

5. ibid.

6. ibid., p. 65.

7. c.f. Arkansas State Highway Commission, Ninth Biennial Report, 1930.

8. Bridge Memorandum, L. N. Edwards, Senior Highway Engineer, July 31, 1929, pp.2-3. AHTD Microfilm Files.

9. ibid.

10. ibid., p. 3.

11. ibid., p. 2.

12. ibid.

13. Historic American Engineering Record, HAER Report AR-9: "Black River Bridge," 1988.

14. Dwight H. Blackwood, Chairman State Highway Commission, to W. J. Driver, Congressman, First District; January 12, 1931. AHTD Microfilm Files.

15. On file in AHTD Microfilm Files.

16. R. Archibald, Assistant Bridge Engineer, to Virginia Bridge and Iron Co.; March 14, 1931, AHTD Microfilm Files.

17. Historic American Engineering Record, HAER Report AR-9: "Black River Bridge," 1988.

18. Blackwood to Driver; February 10, 1921, AHTD Microfilm Files.

19. On file AHTD Microfilm Files.

20. On file AHTD Microfilm Files.

21. N. B. Garver, Bridge Engineer, to W.G. Huxtable, District Engineer, Forest City; September 5, 1932. AHTD Microfilm Files.

22. Court order enclosed by Garver to Brehon Somervell, District Engineer, U.S. Engineer Office; September 12, 1932. AHTD Microfilm Files.

23. ibid.

24. c.f. Forrest City Times Herald. May, 1929. Particular reference may be made to "New Route 70 to Memphis Selected", loc.cit., May 9, 1929, p. 1 and "Proponents of New Road to Memphis Waging Strong Fight", loc.cit., May 30, 1929, p. 1.

25. Daily Forrest City Times Herald, Monday, October 3, 1932, p.1.

26. Garver to Huxtable; September 29, 1932, AHTD Microfilm Files.

27. Garver to Somervell; September 2, 1932, AHTD Microfilm Files.

28. "Immediate Construction of Bridge Favored by State Highway Commission" Daily Forrest City Times Herald, October 5, 1932.

29. Bridge No. 1391, Card Index. AHTD.

30. "Work on Madison Bridge Progressing", Daily Forrest City Times Herald, April 10, 1933, p. 1.

31. ibid.

32. "Program" Daily Forrest City Times Herald, September 2, 1933, p. 1.

33. "Bridge Dedication Ceremonies Witnessed by Large Crowd", Daily Forrest City Times Herald, September 5, 1933, p.1.

34. ibid.

35. ibid., and "Colorful Rites at Bridge Dedication", Arkansas Gazette, September 5, 1933, p. 1.

BIBLIOGRAPHY

Arkansas Gazette, Little Rock, 1933.

Arkansas State Highway and Transportation Department, Bridge Section: Card Index, Microfilm Files and Drawings. Ref. Bridge No. 1391, Job No. 11058.

Arkansas State Highway Commission. Ninth Biennial Report, Russellville Printing Co., Russellville, 1930.

Daily Forrest City Times Herald, 1932-1933, (Daily, some issues missing, notably May 1932 - August 1932).

Forrest City Times Herald, 1929-1932, (Weekly).

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

Murray, J. C. "State's Fine Transportation Facilities." Arkansas Centennial 1836-1936. Arkansas Democrat, Little Rock, 1936, pp. 64-66.

Thomas, David Y., ed., Arkansas and Its People, A History", The American Historical Society, New York, 1930.

AR-20

STATE OF ARKANSAS

STATE HIGHWAY COMMISSION

PLAN OF PROPOSED BRIDGE

OVER ST. FRANCIS RIVER

AT MADISON

ST FRANCIS COUNTY

ROUTE 70 SEC. 19

JOB № 1-1058

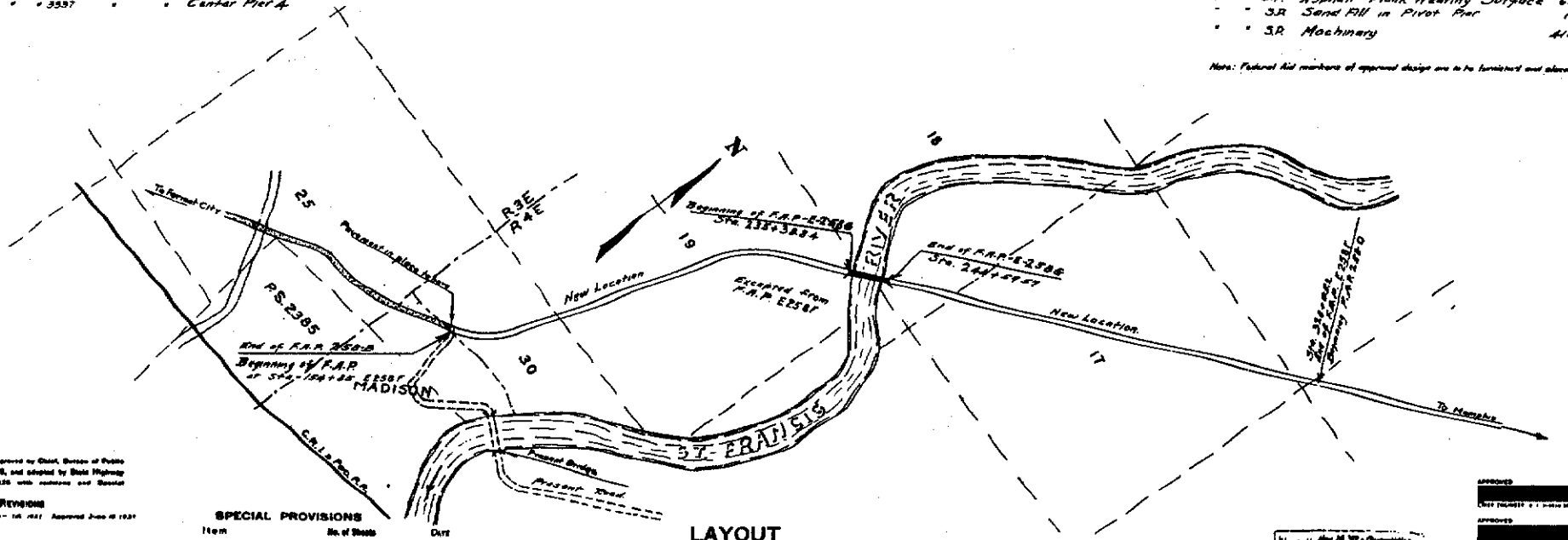
FEDERAL AID PROJECT NO. E-256G

INDEX OF SHEETS

QUANTITIES

Item	No.			
"	" 13	Dry Excavation for Structures	37.0	Cu.
"	" 13	Wet Excavation for Structures	382.3.0	Cu.
"	" 51	Class 'A' Concrete for Bridges	1879.96	Cu.
"	" 51	Class 'S' Concrete " "	431.38	"
"	" 51	Seal Concrete " "	1,264.08	"
"	" 52	Reinforcing Steel " "	229181	Pou
"	" 53	Concrete Piling	1144	Lin.
"	" 96	Structural Steel - Beam Bridges	190793	Pou
"	" 96	Structural Steel - Truss Bridges	1158865	"
"	" 97	Treated Bridge Timber	3144	M.F.
"	" 98	Untreated Timber Piling	14618	Lin
"	" S.P.	Asphalt Plank Wearing Surface	6072.12	Sq.
"	" S.P.	Sand Fill in Pivot Pier	127.0	Cu.
"	" S.P.	Machinery	41000	Pou

Note: Federal Aid numbers of approved design are to be furnished and placed by the Sta



LAYOUT

Scale: 1 inch = 1000 feet

LENGTH OF PROJECT	=	921.23	= 0.174 miles
LENGTH OF BRIDGES	=	921.29	= 0.174 "
LENGTH OF EMBANKMENT	=		
LENGTH OF JOB	=	921.23	= 0.174 miles

SPECIAL PROVISIONS

Item	No. of Sheets	Date
Requirements of Bridge Specs	16	Sept. 2, 1932
Asphalt Wearing Surface	1	Oct. 24, 1932
Labor	10	
Partial Payments	1	
Engineer's Field Office	1	Sept. 7, 1932
Time of Completion of Work	1	Nov. 1, 1932

Specifications approved by Chief, Bureau of Public Roads, September 28, 1929, and adopted by State Highway Commission May 20, 1930 with revisions and Special Provisions as follows:

REVISIONS

Pamphlet A Revised Mar. 1st 1931 Approved June 18 1931

I Revised Mar. 1st 1931 Approved June 18 1931

M Revised Sept. 1st 1932

O " " " "

P " " " "

N. B. Lamar
BRIDGE ENGINEER

BRIDGES No. 1391

DRAWING No. 33

APPROVED

APPROVED

APPROVED

APPROVED

APPROVED

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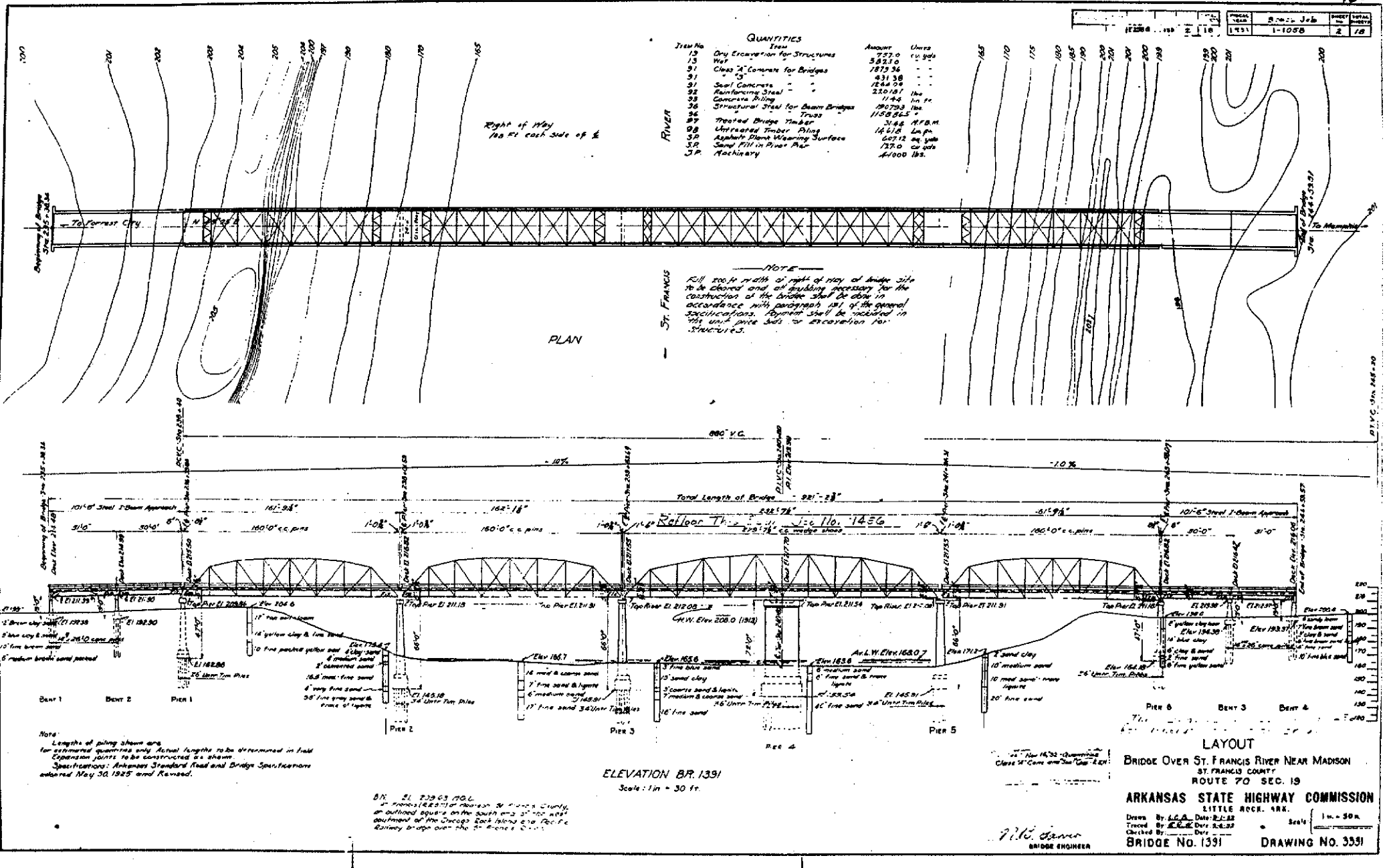
150


QUANTITIES
Item No. | Item | Amount | Units
13 Dry Excavation for Structures 737.0 cu. yds
13 Wet " " 582.10 " "
51 Class "A" Concrete for Bridges 1873.56 " "
51 " "B" " " " 431.38 " "
51 Seal Concrete " " 1244.09 " "
52 Reinforcing Steel " " 220187 lbs.
53 Concrete Piling 1144 lin. ft.
56 Structural Steel for Beam Bridges 190793 lbs.
56 " " Truss " 1158865 "
57 Treated Bridge Timber 3188 F.B.M.
98 Untreated Timber Piling 16618 Lin. ft.
SP Asphalt Plank Wearing Surface 667.12 sq. yds.
SP Sand Fill in River Pier 127.0 cu. yds.
SP Machinery Allow 1000 lbs.
Right of Way 100 Ft. each side of ℄
RIVER
St. FRANCIS
To Forrest City
To Memphis
NOTE
Fill 200 ft. width of right of way of bridge site to be cleared and all grubbing necessary for the construction of the bridge shall be done in accordance with paragraph 181 of the general specifications. Payment shall be included in the unit price bids for excavation for structures.
PLAN
Total Length of Bridge 921'-2 3/8"
Job No. 1456
Top Pier El. 211.91
Top Pier El. 212.06
Top Pier El. 211.54
Top Pier El. 211.91
Top Pier El. 211.18
Top Pier El. 211.91
H.W. Elev. 208.0 (1913)
Av. L.W. Elev. 168.07
Elev. 165.6
Elev. 165.8
Elev. 166.7
Elev. 171.2
Elev. 162.18
Elev. 193.37
Elev. 194.39
Elev. 196.0
Elev. 200.4
Elev. 204.6
El. 145.91
El. 145.54
El. 145.18
El. 162.86
El. 192.90
El. 211.39
BENT 1
BENT 2
PIER 1
PIER 2
PIER 3
PIER 4
PIER 5
PIER 6
BENT 3
BENT 4
ELEVATION BR. 1391
Scale: 1 in = 30 ft.
LAYOUT
BRIDGE OVER ST. FRANCIS RIVER NEAR MADISON
ST. FRANCIS COUNTY
ROUTE 70 SEC. 19
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.
BRIDGE ENGINEER
BRIDGE No. 1391
DRAWING No. 3351