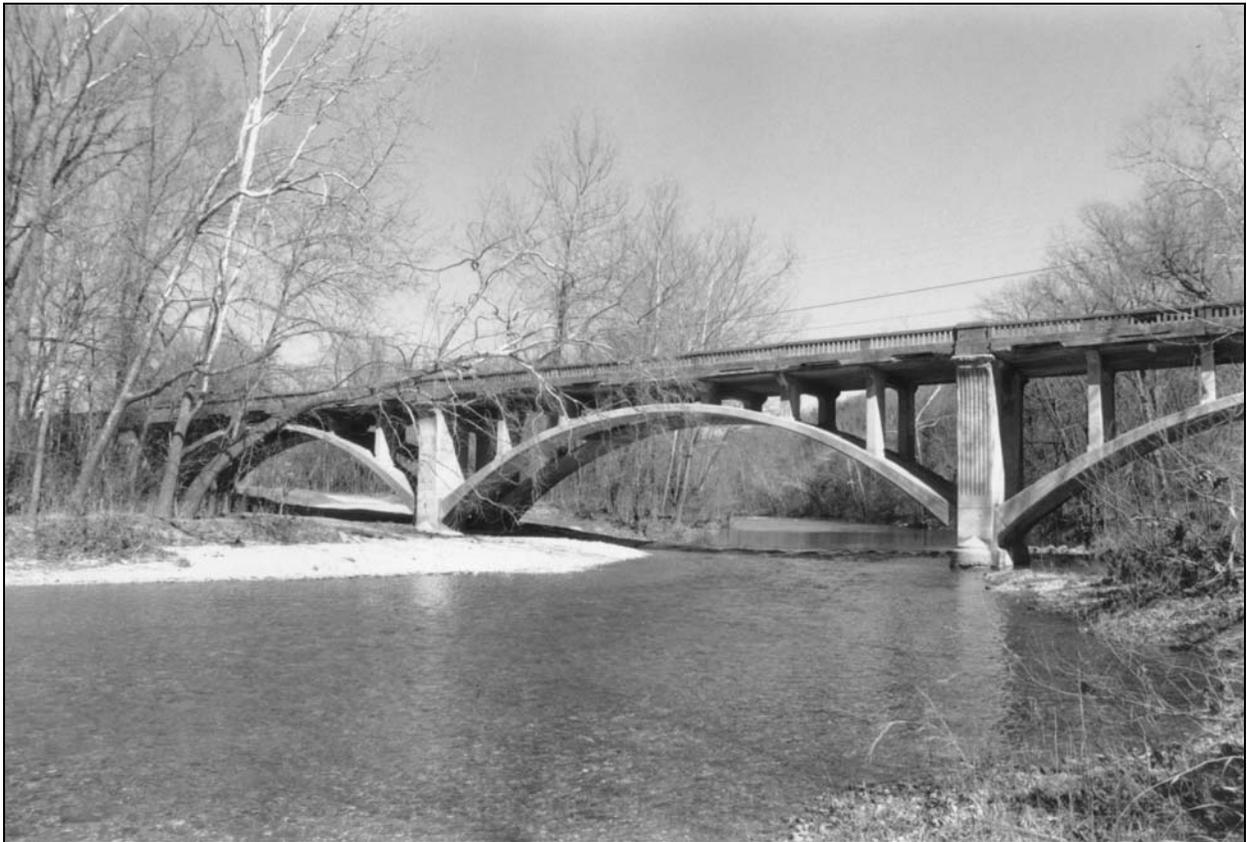


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# Documentation of the Historic Bull Creek Bridge

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Bridge No. H-39  
Taney County, Route 160



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**Bull Creek Bridge**  
Bridge No. H-39  
Taney County, Route 160  
MoDOT Job No. J8P0612

David C. Austin, Historian  
November 2001

## **Historical Narrative**

The Bull Creek Bridge (Bridge No. H-39) spans Bull Creek at U.S. Route 160 (Missouri Route 176) near the village of Walnut Shade in northwest Taney County. Designed by the Missouri State Highway Department and constructed by the C. T. Fogle Construction Company in 1925-1926, the Bull Creek Bridge is a three-span, reinforced concrete, two-rib open spandrel arch structure, with reinforced concrete abutments and piers. The bridge is significant as an early representative example of open spandrel arch design and construction from the formative years of the Missouri State Highway Department.<sup>1</sup>

Bridge No. H-39 was originally a part of Missouri Route 76, a secondary highway which led from its intersection with Route 65 in western Taney County to the county seat at Forsyth, a distance of about sixteen miles. A planned spur route, Route 76A, would extend south to the growing resort town of Rockaway Beach on Lake Taneycomo. Section 4 of Route 76 involved nearly 2.5 miles of new road construction, including the Bull Creek Bridge plus a skewed, three-span, steel pony truss bridge over Bear Creek about a mile to the north. It is not known why the highway department's bridge bureau chose an open spandrel arch bridge over some other structural type for the Bull Creek crossing. In general, however, the bridge bureau followed a prudent policy "to determine the best and most economical structure for each crossing. Alternate layouts are made to determine the most economical combination of span length and types."<sup>2</sup> The Missouri State Highway Commission let the contract for the Section 4 project on April 24, 1925, awarding it to the C. T. Fogle Construction Company of Jefferson City which, in competition with fourteen other firms, had submitted the low bid of \$75,028. The portion of Fogle's bid to construct the Bull Creek Bridge amounted to \$21,021. Earlier in 1924, C. T. Fogle had completed a two-span Pratt through truss bridge over the Blackwater River in Saline County. Otherwise, little is known of Fogle or his construction company. He is not listed in any contemporary Jefferson City directories. However, the *Taney County Republican* reported of

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<sup>1</sup> Clayton B. Fraser, "HAER Inventory Data Sheet, Bull Creek Bridge," Missouri Historic Bridge Inventory, 5 Vols., Missouri Department of Transportation, Project No. NBIH (6) (Loveland, Colorado: Fraserdesign, Inc., 1996); Mark A. Rees and David M. Quick, "Cultural Resources Investigations for Bull Creek Bridge (H-39) Replacement, Taney County, Missouri, MoDOT Job No. J8P0612 (Springfield: Center for Archaeological Research, 2001).

<sup>2</sup> Missouri State Highway Commission, *Fifth Biennial Report of the State Highway Commission of Missouri for the Period Ending December 1, 1926* (Jefferson City: Hugh Stephens Press, 1926), 140.

him in November 1925, “It seems he [Fogle] is a real bridge builder and is not satisfied unless he has two or three projects in operation at once.”<sup>3</sup>

Taney County residents welcomed the news of this impending highway construction. By the beginning of 1925, U.S. Route 65 (then designated Missouri Route 3) had been completed through western Taney County to Branson; a section of Route 76 had been built north of Forsyth; and some work had been done on Route 78 south of the White River between Forsyth and Hollister. Yet much of the county still remained practically isolated, hampered by a lack of good roads within the region’s rugged terrain. The local road districts could do little toward improving the roads in their areas. The Walnut Shade Special Road District which encompassed most of the Bull and Bear creek drainages received about \$1,000 annually, far too little to keep its roads in good repair. In early 1925, the road district held some roads which were “almost abandoned” because of their poor condition, and others which needed modern low-water crossings to replace the primitive fords. Consequently, the residents living in and around Walnut Shade on Bull Creek had limited use of their motor vehicles for a good part of the year. The anonymous local correspondent from Walnut Shade, writing for the *Taney County Republican* in March 1925, complained, “The only way we can get out of this part of the country now is to go out over No. 76 to No. 3. Recently the state has taken over No. 76 and has done a little work on it and made it possible to get out this way.”<sup>4</sup> The *Republican* restated the importance of the Route 76 project two months later when construction was just beginning:

“In the northwestern part of the county the completion of the state road through Jasper Township will bring to that section the hope of increased prosperity. It has been as completely isolated as any other section ever since the [Powersite] dam flooded its road down Bull Creek. The contract now let for the section across and between Bull and Bear Creeks will do much to give an outlet for this section.”<sup>5</sup>

The C. T. Fogle Construction Company arrived on the job site at the beginning of June 1925. Fogle set up his field headquarters west of Bear Creek, close to the access of Route 65, and focused his initial work on the pony truss bridge at Bear Creek, placing it under the supervision of John Anderson. Fogle meanwhile sub-contracted the road grading work to T. C. Boyd of Knob Noster, Missouri, who hired mostly local men and horse teams for the grading; a man with a three-horse team and dump wagon could earn as much as 60 cents an hour, compared to a common laborer’s wage of 20 cents an hour. In early July, Boyd shipped in by rail a large steam-powered shovel capable of moving several tons of earth and rock a day. It took several

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<sup>3</sup> Missouri State Highway Commission, “Map of Missouri Showing State Road System, Route Numbers, Road Conditions and Points of Interest,” (Jefferson City: Botz-Hugh Stephens Press, 1930); Missouri State Highway Department, “Tabulations of Bids Received,” Taney County, Route 76, Section 4, April 1925, Plans and Records Office, Design Division, Missouri Department of Transportation, Jefferson City; Fraser, Missouri Historic Bridge Inventory, 98; *Taney County Republican* (Forsyth), November 19, 1925.

<sup>4</sup> *Taney County Republican*, March 19, 1925.

<sup>5</sup> *Ibid.*, May 28, 1925.

days for the caterpillar machine to reach the job site under its own power. By early August, Boyd's crews had cleared the entire 2.4-mile length of the right of way which closely paralleled a previously existing county road. Fogle began work on the piers and abutments of the Bull Creek Bridge sometime in July or August, and had the substructure "well underway" by early September. The highway department's project engineer, W. W. McVey, was on hand to supervise the road and bridge construction.<sup>6</sup>

Although it was not intentionally engineered to be "scenic," local newspapers anticipated that the section of new highway would offer motorists some striking views of the surrounding countryside. Branson's *White River Leader* predicted in June 1925 that Route 76 "will be the most beautiful scenic driveway in the state." The *Taney County Republican* elaborated later that summer, "With the completion of this road it will be one of the most scenic roads in the county. Winding as it does among the rolling hills of that section of the county and crossing two of the most beautiful streams to be found anywhere, this road is certain to draw its share of the tourist travel."<sup>7</sup>

With the Bull Creek Bridge under construction, the highway department's bridge bureau advised Fogle to prepare detailed plans for the falsework or centering which would temporarily support the arch ribs while the concrete was poured and cured. They provided Fogle with an example of centering plans for a filled spandrel arch bridge built earlier in Pulaski County. Although those plans were not well adapted to an open spandrel arch bridge, they were the best illustration the department could provide at the time. Fogle gave the task of designing the arch centering to Frank J. Beard, a partner in the Beard and Crews general contracting firm of Versailles, Missouri, and a "mutual friend" of Fogle and the highway department's Bridge Engineer Lief J. Sverdrup. Beard and the bridge bureau subsequently collaborated on the design of the centering during September and October. Ultimately, the complex wood centering involved main support posts 10" in diameter, cross bracing extending the width of the structure, segmental pieces corresponding to the curvature of the arch ribs, and smaller "wedges" to bring the forms to the correct shapes and elevations. Once this design was worked out, Fogle sent Beard to Taney County to directly supervise the construction of the centering in his absence. (Fogle reportedly traveled to Florida to secure another bridge contract). Beard, however, admittedly had little experience in bridge building, saying, ". . . this sort of work is not in my line at present." The bridge bureau, therefore, carefully instructed Beard to take precautions against the settling or displacement of the falsework while pouring the concrete in order to obtain the

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<sup>6</sup> Ibid., June 4, July 2, 9, 16, August 20, 1925; *White River Leader* (Branson), June 18, August 6, November 12, 1925; B. H. Piepmeier to C. T. Fogle Construction Company, September 8, 1925, in Bridge H-39 Correspondence File, Bridge Division, Missouri Department of Transportation, Jefferson City; Missouri State Highway Commission, "Plan and Profile of Proposed State Road, Taney County," Route 76, Section 4, 1925, Plans and Records Office, Design Division, Missouri Department of Transportation, Jefferson City.

<sup>7</sup> *White River Leader*, June 18, 1925; *Taney County Republican*, August 20, 1925.

correct elevations on the finished arch ribs. Beard would afterward remain on the job as Fogle's construction superintendent.<sup>8</sup>

Details concerning the actual construction of the Bull Creek Bridge are scarce. It evidently went smoothly, however, despite Beard's relative inexperience. The *Taney County Republican* through its Walnut Shade correspondent reported at the end of December 1925 that the piers and abutments were completed, and that construction of the forms for the "big arches" would begin soon. Workers had been building a lean-to addition on the Walnut Shade store to warehouse the cement. By mid-January 1926, Beard's crews had begun to erect the falsework and forms, working from south to north. The first inspection report dated March 17, 1926, indicated that the arch ribs, spandrel columns, and floor were finished on Span 3 (the south span); Span 2 had its arch ribs complete, and the forms erected for its spandrels and floor; while only the ribs had been poured for Span 1 (the north span). The construction inspector J. S. Hazeltine noted with approval, "The general appearance of the concrete work is excellent and false work and forms are exceptionally well designed and constructed." The work on the other sections of the project, however, had not proceeded as well. There had been some confusion on the road grading work between the sub-contractor T. C. Boyd and the project engineer W. W. McVey, particularly in regard to the needed amounts of excavation. Hazeltine found the roadway surface "wavy" and most of the rock fill slopes "rough," and instructed Boyd to scarify and rework the road to obtain the proper grades. Hazeltine also believed Boyd had an insufficient workforce and inadequate equipment--namely, a six-foot maintenance grader and a seven-foot light grader pulled by a three-ton "crawler type" tractor. Boyd would need heavier equipment to finish the job properly. Even more problems occurred with the pony truss bridge at Bear Creek, which had been practically finished by then except for the paint. Serious flaws required that the two approach spans and a portion of a truss span be entirely removed and rebuilt, in addition to correcting numerous other deficiencies on the steel trusses.<sup>9</sup>

A subsequent inspection two weeks later by the highway department's acting Bridge Engineer Vaughn W. Enslow, in company with Division 8 engineers out of Springfield, confirmed Hazeltine's report. Enslow found the work on the Bear Creek bridge to be of generally poor quality, citing a long list of defects for the steel superstructure. In contrast, he reported that the open spandrel arch spans at Bull Creek had been well constructed so far, writing, "The workmanship on this structure is very good." All of the arch ribs and their spandrel columns were finished, and the deck on the south span and a part of the central span had

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<sup>8</sup> B. H. Piepmeier to C. T. Fogle, July 31, 1925; B. H. Piepmeier to C. T. Fogle Construction Co., September 8, 1925; C. T. Fogle to L. J. Sverdrup, September 15, 1925; B. H. Piepmeier to C. T. Fogle Construction Co., September 25, 1925; C. T. Fogle Construction Co. to Bridge Department, Missouri State Highway Commission, September 28, 1925; B. H. Piepmeier to C. T. Fogle Construction Co., October 1, 1925; Frank J. Beard to Bridge Department, Missouri State Highway Commission, October 13, 1925; B. H. Piepmeier to Frank Beard, October 17, 1925, in Bridge No. H-39 Correspondence File; *Taney County Republican*, November 19, 1925.

<sup>9</sup> *Taney County Republican*, December 31, 1925, January 14, 1926; Inspection Report, March 17, 1926, in Bridge No. H-39 Correspondence File.

been poured. Enslow approved of the quality of the falsework construction as well as the forms and bracing for the bridge deck which had all been done “in a workmanlike manner.” The completed sections of the bridge floor had “a smooth, uniform appearance” which he expected would provide a good riding surface. Enslow further admired the bridge overall, remarking, “This structure when completed should present a very good appearance as it fits in very well with the surroundings and since a very good view can be had of it in approaching from the north end.”<sup>10</sup>

Any additional highway department records concerning the Bull Creek Bridge have not survived. Construction presumably continued at least into May 1926 to complete the bridge deck and balustrades. Other work on the Route 76-Section 4 project would continue into early summer. In early May, the *Taney County Republican* estimated about two more months of work remained, commenting somewhat caustically, “At the present time there are places that look like a highway.” The newspaper reported in its June 10 edition that travelers were then using the Bear Creek bridge, although it had not yet been officially opened. Boyd meanwhile had shipped out his large steam shovel, and it was thought the project would be completed by July 1. The final inspection of the project, according to the *Taney County Republican*, occurred on Monday, July 19, 1926.<sup>11</sup>

Construction work on Route 76 continued, however, with the simultaneous lettings of four additional projects on July 1, 1926. These involved completing the highway from Walnut Shade to Forsyth, building the Route 76A spur connection to Rockaway Beach, and graveling the newly-completed Section 4 portion. The Stoner and Ruddles construction company which received these contracts used four Ford dump trucks, a tractor or grader, and two dozen horse teams to haul and spread the gravel on Section 4, finishing the job by the end of 1926. The highway would ultimately receive a bituminous mat surface in 1932.<sup>12</sup>

### **Physical Description of the Bull Creek Bridge**

The Bull Creek Bridge (Bridge No. H-39) spanning Bull Creek at U.S. Route 160 in Taney County consists of three 80'-0”, reinforced concrete, two-rib open spandrel arches with reinforced concrete abutments and piers. The overall bridge length is 248'-0”, and the roadway width is 20'-0”, with a grade of 2.24 percent. Bridge engineers of the Missouri State Highway Department drew up the plans for the Bull Creek Bridge during March and April 1925.<sup>13</sup>

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<sup>10</sup> Inspection Report, April 2, 1926, in Bridge No. H-39 Correspondence File.

<sup>11</sup> *Taney County Republican*, May 6, June 10, July 22, 1926.

<sup>12</sup> *Ibid.*, June 17, July 22, September 30, October 7, December 23, 1926.

<sup>13</sup> Missouri State Highway Department, “Bridge Over Bull Creek,” [bridge plans, five sheets], April 1925, Bridge Division, Missouri Department of Transportation, Jefferson City.

The two end abutments, while varying in dimensions, are similar in design, both having closed spandrel walls, fluted pilasters, and curved wing walls. Each abutment rests on a pair of large, irregular-shaped footings set at the same elevation of 737.5 feet. These footings serve to anchor the ends of the arch ribs as well as to support the spandrel walls. According to the construction drawings, the footings were to be cast “against firm and undisturbed rock,” likely a cherty dolomite at this location. The footings are stepped in the case of Abutment No. 4 at the bridge’s south end. That abutment extends 40’-0” in length (including the curved wingwalls), while Abutment No. 1 at the bridge’s north end extends 30’-0”. The front walls of each abutment measure 24’-6” across. Due to the 2.24 percent climbing grade of the roadway from north to south, the heights of the abutments range from 22’-0” at the back of Abutment No. 1 to over 29’ at the back of Abutment No. 4. The spandrel walls, 1’-3” thick, are braced by two reinforced concrete tie beams 1’-6” x 2’-0”, which are themselves supported by four 1’-0”-square columns within the interiors of the abutments. The lower abutment walls are furnished with 3”-diameter drain holes. The fluted pilasters at the exterior corners of the abutments are 4’-0” wide, with beveled tops. The curved wing walls with end posts provide a 30’-0” shoulder-to-shoulder roadway width at the bridge entrances.

The two central piers are open piers set on rectangular footings 3’-0” x 8’-0” x 29’-6”. Battered column bases (2’-6” high at Pier No. 2 and 3’-0” high at Pier No. 3) support two 7’-6” x 4’-0” fluted columns connected by an upper tie beam 3’-0” high. Flared, beveled crowns extend out an additional 1’-8”. The total height of Pier No. 2 is 26’-6”, while Pier No. 3 is 28’-10” high. Construction of the piers and abutments also entailed the simultaneous pouring of the short butts or stubs that form the spring points for the arch ribs. Each butt is tied to the abutment or pier by eighteen 7/8”-diameter steel reinforcing bars which also extend into the arch ribs. There is a construction joint at these butts as the arches themselves were formed and poured after the abutments and piers were completed.

Each of the arch ribs is 6’-0” wide, with 3” beveled edges. They have a vertical thickness at the springing line (elevation 742’-0”) of 2’-6” and taper gradually to a thickness of 1’-3” at the arch crown. The rise measures 16’-0” from the springing line to the crown intrados. The curvature of the arches is based upon a hyperbolic cosine curve rather than the radius of a circle. The two ribs on a given span were poured in four segments to equalize the stresses on the centering. The first blocks poured were from the construction joints at the spring point outward approximately 10’; next, block two was a 29’ section of the arch crown; then block three, 9’-6” sections adjoining the first blocks; finally, two 3’-0” key sections to close the arch. Pouring the final key sections occurred at least twenty-four hours after the adjacent blocks had been placed. The centering remained in place for at least twenty-one days after the arch ribs had been poured, and for at least fourteen days after the pouring of the adjacent span. The construction joints for the spandrel bents also were formed during the construction of the arch ribs.

Each arch span carries six open spandrel bents consisting of (in most cases) two columns 4’-0” x 1’-3” with connecting tie beams 1’-5” to 1’-7” high. These are spaced symmetrically 10’-4” apart. The spandrel bents act as floor beams to support the bridge deck. The heights of the bent columns vary according to their placement on the arch ribs. Also, the bents increase in height from north to south corresponding to the rise of the roadway grade. The two innermost spandrels closest to the arch crown at Span No. 1 (the north span) lack columns entirely, and

instead their beams overlap into the arch ribs. The tallest columns, in contrast, are 10'-8" high at the southern-most spandrel bent at the south end of Span No. 3.

The reinforced concrete bridge deck is 20'-0" wide between the curbs, and is 10" thick at the crown of the roadway at centerline. Expansion joints occur at the piers and abutments, and at the second and fifth spandrel bents along each span. The expansion joints are layered with ¾" bituminous felt. Curbs 1'-6" wide x 4 ½" high feature 5'-0"-long drainage outlets centered between each of the spandrel bents. The balustrades consist of main posts 3'-6" square above the piers and abutments, and 1'-4" square subposts above the spandrel bents. Between each of the subposts are fifteen balusters, 4" x 4" 1'-8", centered 8" apart. The balusters are capped with 10"-wide beveled coping.

The Bull Creek Bridge is one of the earliest surviving examples of an open spandrel arch bridge designed and constructed by the Missouri State Highway Department. Simultaneously with the design of this bridge in 1925, the department designed and built a similar structure of three 80' spans for the crossing at Sinking Creek on Route 19 in Shannon County. While the department continued to employ open spandrel arch designs through the 1920s and into the early 1930s, later multiple-span open spandrel arch bridges generally have spans of 90' or longer. Thus the Bull Creek Bridge has relatively shorter spans compared to later, multiple-span examples of this bridge type. Otherwise, it appears to be similar to others in its basic structural design and decorative details, namely the symmetry of the arches, the fluted piers and abutment pilasters, the concrete balustrades, and the curved entrances. Quick (1990) and Rees and Quick (2001) have defined its aesthetic detailing as a conservative form of "Classical Moderne," a subcategory of the Art Deco style. While the Bull Creek Bridge has not undergone any major alterations since its construction, its integrity has been severely diminished through steady physical deterioration of the deck, spandrel bents, and arch ribs, and the removal of one damaged section of the concrete guardrail.<sup>14</sup>

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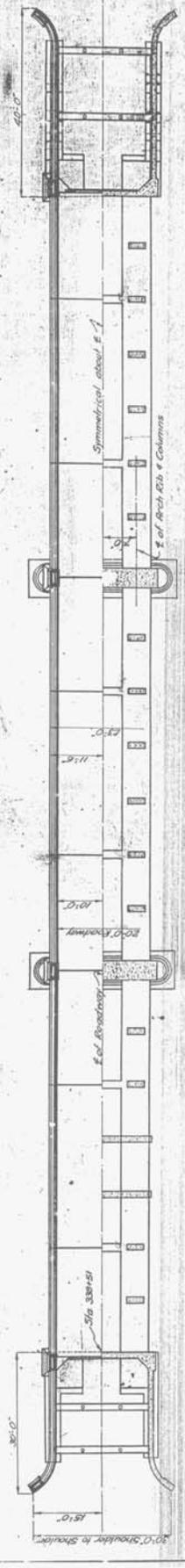
<sup>14</sup> Rees and Quick, "Cultural Resources Investigations for Bull Creek Bridge," 12; David Quick, "Early Twentieth Century Concrete Bridge Engineering and Aesthetics in the United States and the Y-Bridge at Galena, Missouri," *Material Culture*, Summer 1990, Vol. 22 (2): 27-35; Bridge Division, Missouri Department of Transportation, "Report on the Feasibility of Rehabilitating Bridge H-39, Route 160 Over Bull Creek, Taney County, Missouri," 2001.

MISSOURI STATE HIGHWAY DEPARTMENT

PROJECT NO. R76-34  
 STA. 338+51  
 SHEET NO. 1 OF 5

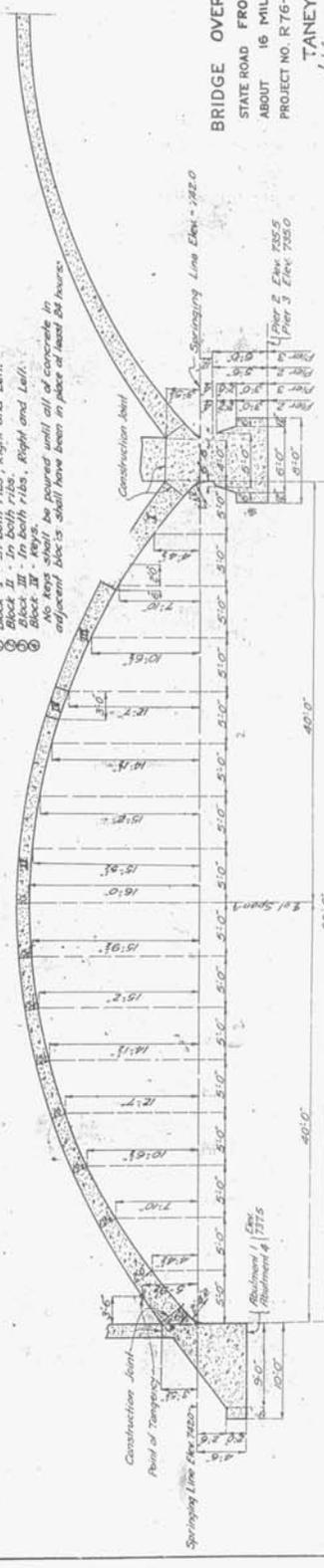


GENERAL ELEVATION



PLAN

NOTE: Four Arch Rib blocks in the following order:  
 Block I - In both ribs, Right and Left.  
 Block II - In both ribs, Right and Left.  
 Block III - In both ribs, Right and Left.  
 Block IV - In ribs.  
 No keys shall be poured until all of concrete in adjacent blocks shall have been in place at least 24 hours.



LONGITUDINAL SECTION THRU ARCH RIB

BRIDGE OVER BULL CREEK  
 STATE ROAD FROM FORSYTHE TO SPRINGFIELD  
 ABOUT 16 MILES EAST OF REED SPRINGS  
 PROJECT NO. R76-34 STA. 338+51

TANEY COUNTY  
 DRAWN BY: H. H. ...  
 CHECKED BY: ...

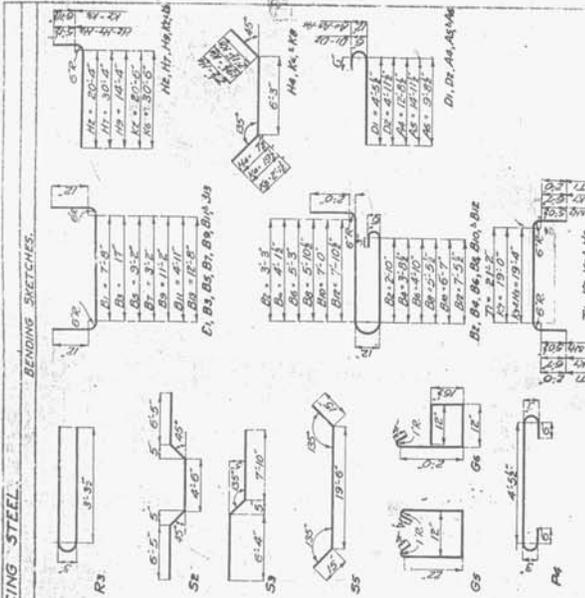
DRAWN APR 1925 BY C.B.S.  
 CHECKED APR 1925 BY J.R.L.

MISSOURI STATE HIGHWAY DEPARTMENT

APPROVED	DATE	BY
	10-24-34	J. W. BROWN
DESIGNED	DATE	BY
	10-24-34	J. W. BROWN

BILL OF REINFORCING STEEL

NO.	SIZE	LENGTH MARK	NO.	SIZE	LENGTH MARK	NO.	SIZE	LENGTH MARK	NO.	SIZE	LENGTH MARK
24	Handrail	36'-6"	20	1/2"	14'-0"	H1	1/2"	14'-0"	H1	1/2"	14'-0"
306	1/2"	11'-3"	21	1/2"	20'-3"	H2	1/2"	20'-3"	H2	1/2"	20'-3"
112	1/2"	11'-3"	22	1/2"	11'-0"	H3	1/2"	11'-0"	H3	1/2"	11'-0"
3072	1/2"	25'-9"	23	1/2"	11'-0"	H4	1/2"	11'-0"	H4	1/2"	11'-0"
24	1/2"	25'-9"	24	1/2"	11'-0"	H5	1/2"	11'-0"	H5	1/2"	11'-0"
52	1/2"	25'-9"	25	1/2"	11'-0"	H6	1/2"	11'-0"	H6	1/2"	11'-0"
0	1/2"	35'-9"	26	1/2"	10'-0"	H7	1/2"	10'-0"	H7	1/2"	10'-0"
24	1/2"	17'-0"	27	1/2"	10'-0"	H8	1/2"	10'-0"	H8	1/2"	10'-0"
30	1/2"	17'-0"	28	1/2"	10'-0"	H9	1/2"	10'-0"	H9	1/2"	10'-0"
374	1/2"	11'-9"	29	1/2"	10'-0"	H10	1/2"	10'-0"	H10	1/2"	10'-0"
419	1/2"	11'-9"	30	1/2"	10'-0"	H11	1/2"	10'-0"	H11	1/2"	10'-0"
477	1/2"	25'-0"	31	1/2"	10'-0"	H12	1/2"	10'-0"	H12	1/2"	10'-0"
16	1/2"	34'-6"	32	1/2"	10'-0"	H13	1/2"	10'-0"	H13	1/2"	10'-0"
36	1/2"	30'-3"	33	1/2"	10'-0"	H14	1/2"	10'-0"	H14	1/2"	10'-0"
4	1/2"	30'-3"	34	1/2"	10'-0"	H15	1/2"	10'-0"	H15	1/2"	10'-0"
4	1/2"	30'-3"	35	1/2"	10'-0"	H16	1/2"	10'-0"	H16	1/2"	10'-0"
60	1/2"	25'-0"	36	1/2"	10'-0"	H17	1/2"	10'-0"	H17	1/2"	10'-0"
30	1/2"	17'-0"	37	1/2"	10'-0"	H18	1/2"	10'-0"	H18	1/2"	10'-0"
36	1/2"	17'-0"	38	1/2"	10'-0"	H19	1/2"	10'-0"	H19	1/2"	10'-0"
172	1/2"	5'-9"	39	1/2"	10'-0"	H20	1/2"	10'-0"	H20	1/2"	10'-0"
36	1/2"	6'-0"	40	1/2"	10'-0"	H21	1/2"	10'-0"	H21	1/2"	10'-0"
16	1/2"	3'-3"	41	1/2"	10'-0"	H22	1/2"	10'-0"	H22	1/2"	10'-0"
8	1/2"	3'-3"	42	1/2"	10'-0"	H23	1/2"	10'-0"	H23	1/2"	10'-0"
16	1/2"	3'-3"	43	1/2"	10'-0"	H24	1/2"	10'-0"	H24	1/2"	10'-0"
16	1/2"	20'-6"	44	1/2"	10'-0"	H25	1/2"	10'-0"	H25	1/2"	10'-0"
16	1/2"	20'-6"	45	1/2"	10'-0"	H26	1/2"	10'-0"	H26	1/2"	10'-0"
16	1/2"	20'-6"	46	1/2"	10'-0"	H27	1/2"	10'-0"	H27	1/2"	10'-0"
16	1/2"	20'-6"	47	1/2"	10'-0"	H28	1/2"	10'-0"	H28	1/2"	10'-0"
16	1/2"	20'-6"	48	1/2"	10'-0"	H29	1/2"	10'-0"	H29	1/2"	10'-0"
16	1/2"	20'-6"	49	1/2"	10'-0"	H30	1/2"	10'-0"	H30	1/2"	10'-0"



GENERAL NOTES.

Concrete in handrail to be 1:2:3 mix; concrete in sub and curbs over arches to be 1:2:3 mix; all concrete to be placed in 6" lifts. Exposed surfaces to be rubbed, where no other level is shown, to a smooth and uniform surface. Arch ring shall be poured in radial blocks in the order indicated on the detail drawings. The centering shall not be removed until the span will be concrete over. It has been in place at least 14 days. The contractor shall submit details of proposed centering to the State Highway Department for approval before work is begun. Expanding sections in both ribs of each span shall be poured at the same time. Bridge excavation to be paid for below line shown as finished ground line.

B.M. U.S.G.S. Elev. 786.86 - On corner of yard across road from store of Walnut Street.

ESTIMATED QUANTITIES

Item	Concrete - Cu. Yds.	Reinforcing Steel - Lbs.
Handrail	32.1	3450
Sub and Curbs	175.6	22140
Abutments	268.6	22440
Piers	148.7	12030
Arch Ring	179.7	24030
Bents	55.2	12780
Totals	930.3	93320

Note: Weight of bar-spreaders included in arch ring reinforcing.

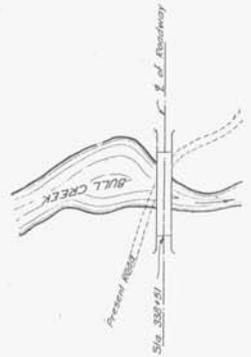
BRIDGE OVER BULL CREEK  
STATE ROAD FROM FORSYTHE TO SPRINGFIELD  
ABOUT 16 MILES EAST OF REED SPRINGS  
PROJECT NO. R76-54 STA. 338+51

TANEY COUNTY

DESIGNED BY J. W. BROWN  
CHECKED BY J. W. BROWN

DRAWN APR. 1935 BY E.C. COOK

H 39

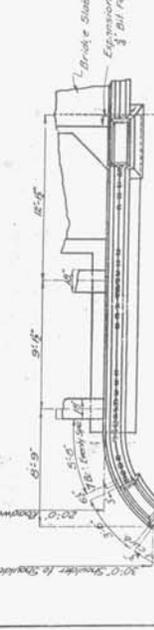
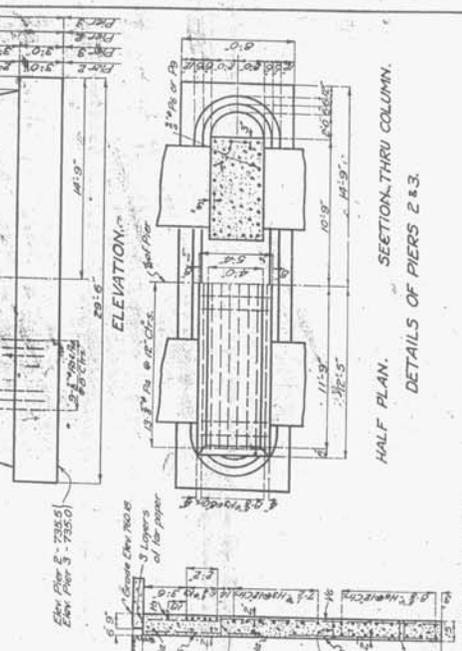
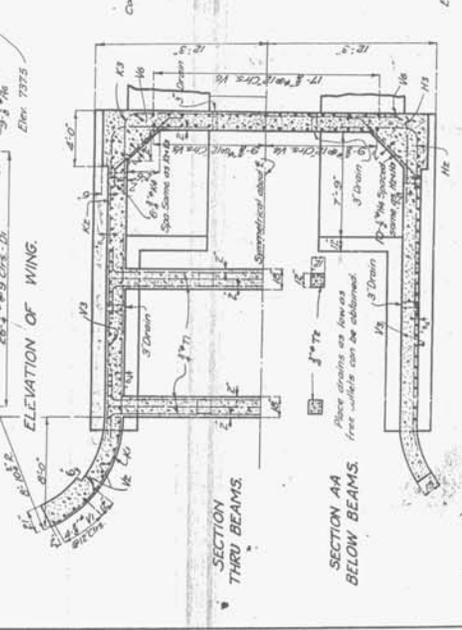
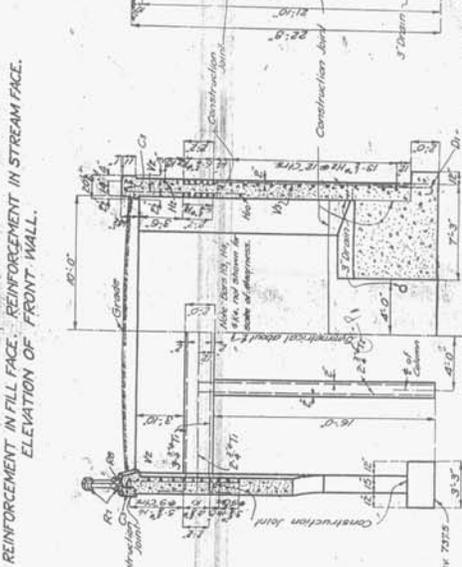
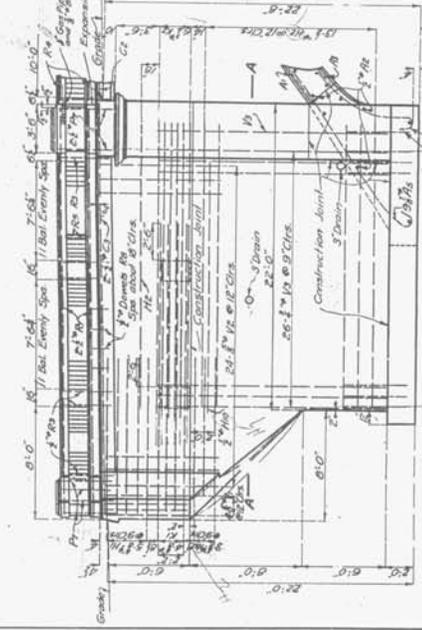
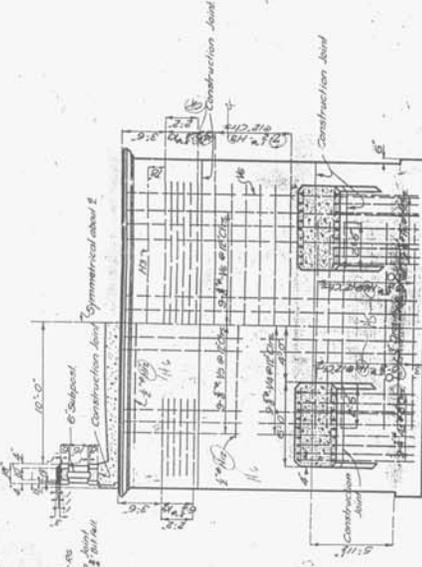


LOCATION SKETCH



MISSOURI STATE HIGHWAY DEPARTMENT

DESIGNED BY	DATE	PROJECT NO.	SCALE
BY	1935	R76-54	AS SHOWN



BRIDGE OVER BULL CREEK  
STATE ROAD FROM FORSYTHE TO SPRINGFIELD  
ABOUT 16 MILES EAST OF REED SPRINGS  
PROJECT NO. R76-54 STA. 338+51

TANEY COUNTY  
DESIGNED BY: *[Signature]*  
CHECKED BY: *[Signature]*  
APPROVED BY: *[Signature]*

DETAILS OF ABUTMENT- NO. 1.

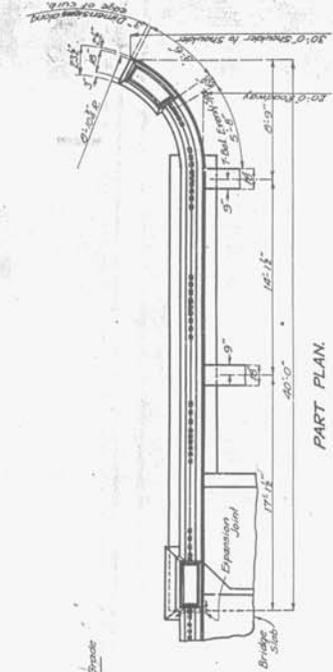
DRAWN MAR 1935 BY ERS

Sheet No. 4 of 8

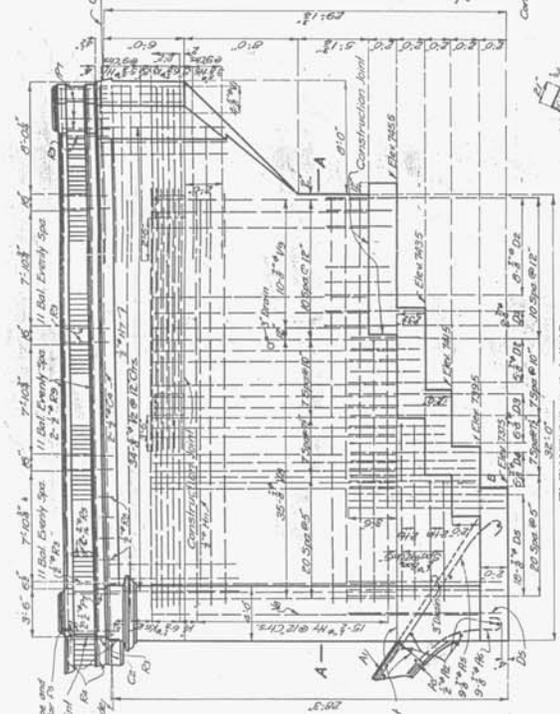
H 39

MISSOURI STATE HIGHWAY DEPARTMENT

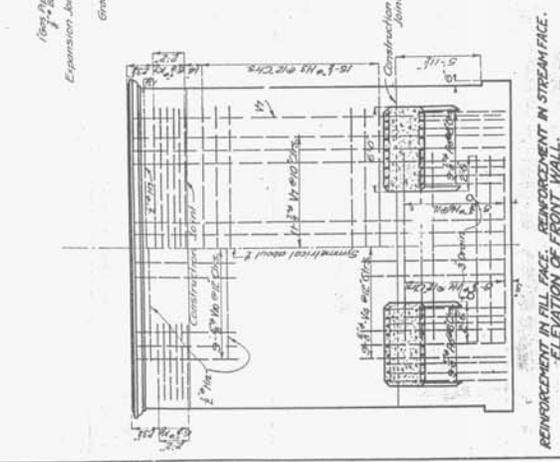
DATE	BY	CHKD	APP'D
10/15/54	J. H. ...	J. H. ...	J. H. ...
10/15/54	J. H. ...	J. H. ...	J. H. ...
10/15/54	J. H. ...	J. H. ...	J. H. ...



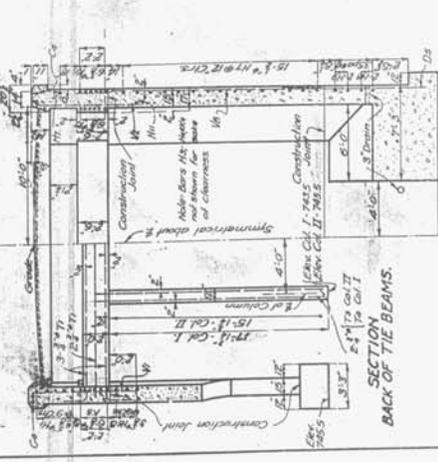
PART PLAN



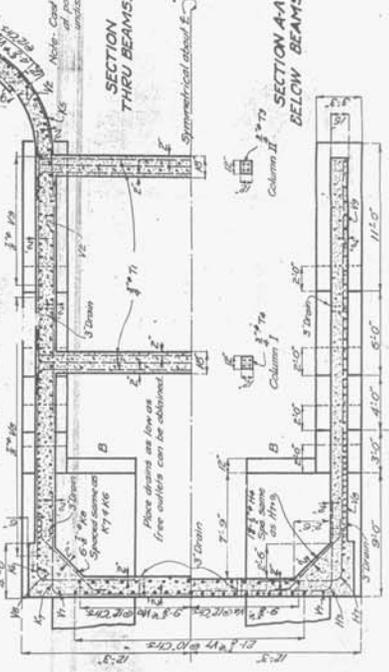
ELEVATION OF WING



REINFORCEMENT IN RILL FACE, REINFORCEMENT IN STREAM FACE, ELEVATION OF FRONT WALL

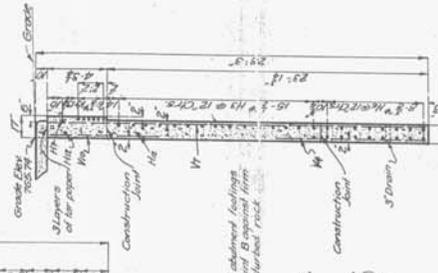


SECTION OF TIE BEAMS, BACK OF FRONT WALL

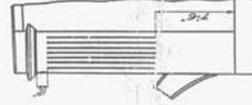


SECTION THRU BEAMS

SECTION A-A BELOW BEAMS



SECTION THRU FRONT WALL AT E



DETAIL OF PANELING ON PILASTERS

BRIDGE OVER BULL CREEK  
STATE ROAD FROM FORSYTHE TO SPRINGFIELD  
ABOUT 16 MILES EAST OF REED SPRINGS  
PROJECT NO. R 76-54 STA 338+51

TANEY COUNTY  
DESIGNED BY: J. H. ...  
CHECKED BY: J. H. ...

DETAILS OF ABUTMENT - NO. 4.

DRAWN AND DESIGNED BY: J. H. ...  
CHECKED BY: J. H. ...

**Bull Creek Bridge**  
Bridge No. H-39  
Route 160, Taney County, Missouri

Randall Dawdy, Photographer  
February, 2001

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Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



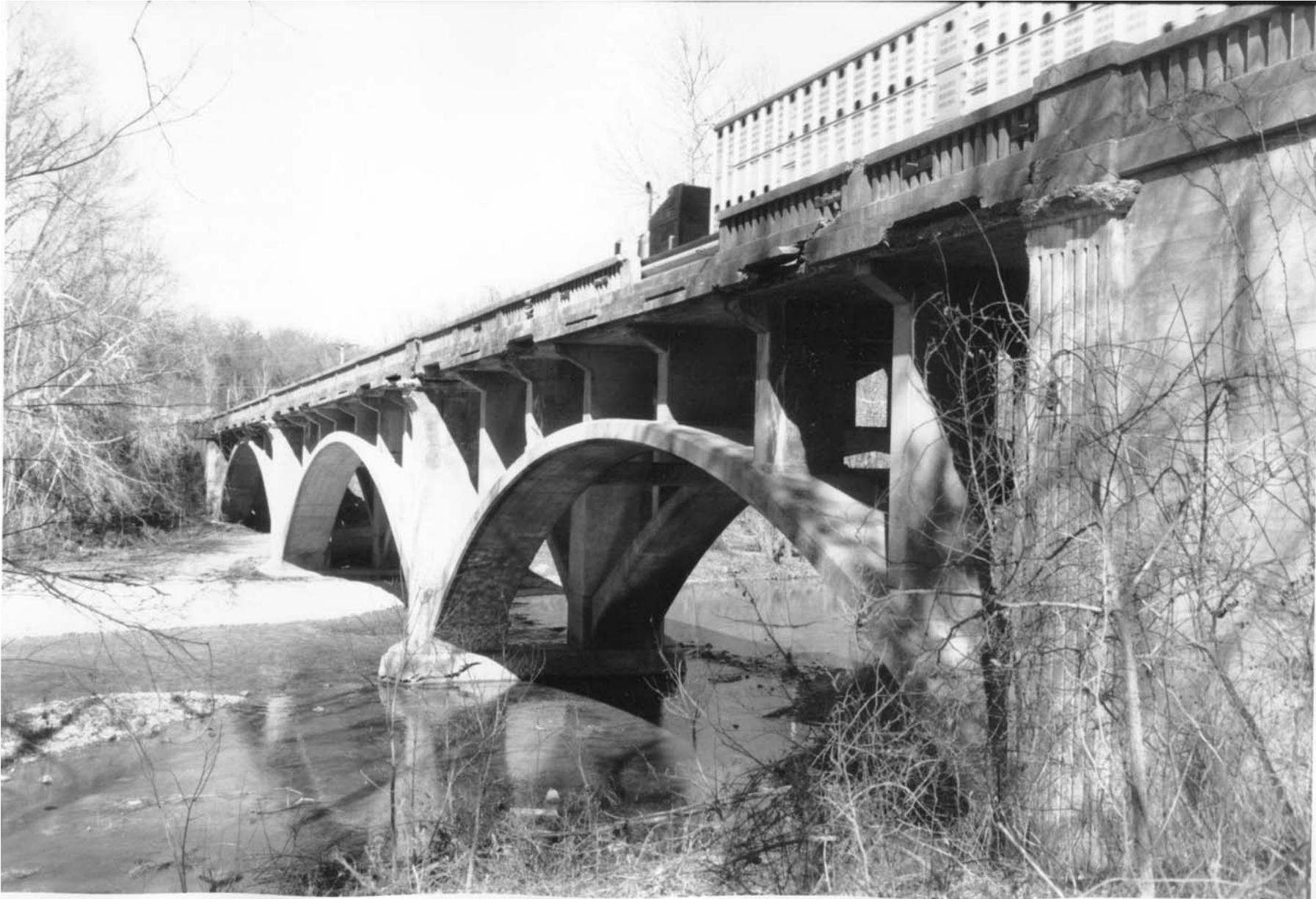
Photograph 6



Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



Photograph 12



Photograph 13



Photograph 14



Photograph 15



Photograph 16



Photograph 17

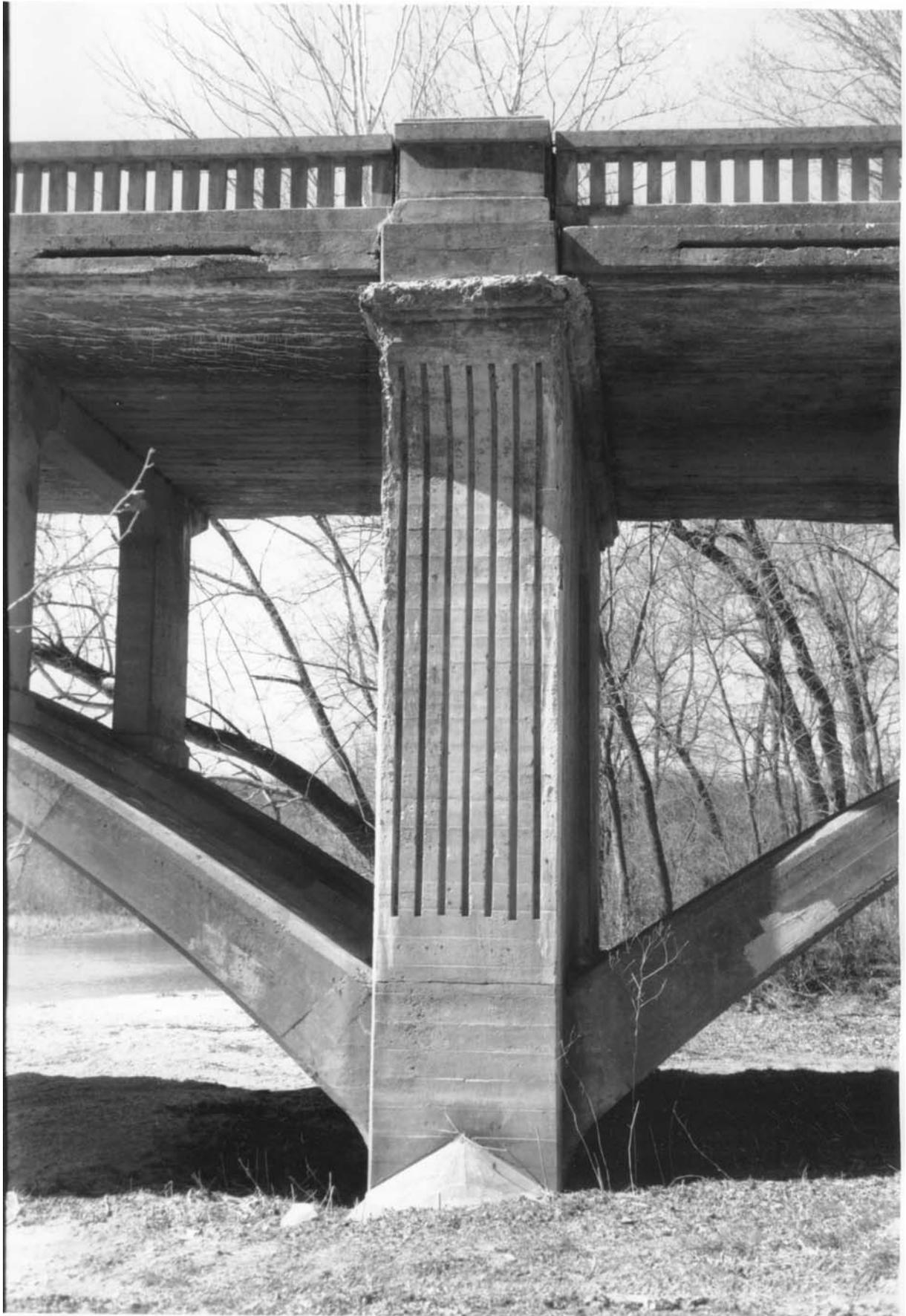


Photograph 18



Photograph 19





Photograph 21





Photograph 23



Photograph 24

