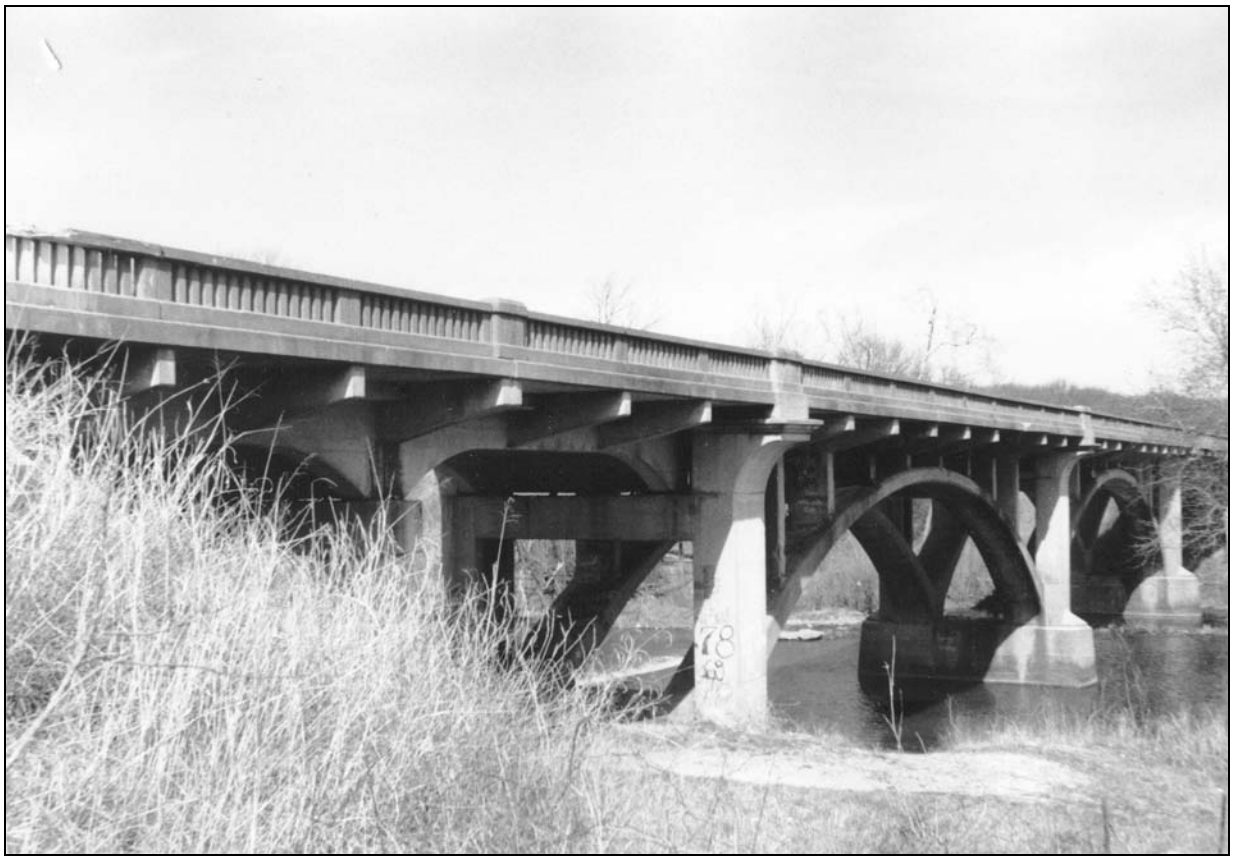
Documentation of the Historic Shoal Creek Bridge

Bridge No. J-349
Newton County, Route 86



MoDOT

U.S. Department of Transportation
Federal Highway Administration

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Newton County, Route 86
Bridge No. J-349
Shoal Creek
MoDOT Job No. J7U0384B
Thomas J. Gubbels, Historian

Background Information

Ever since its founding in 1847, Newton County has had a strong market economy. During the antebellum era, county farmers grew tobacco and raised horses and mules, while other residents mined local lead deposits. After the Civil War, two railroad lines were built through Newton County. In 1870 the Atlantic and Pacific Railroad linked Granby to Neosho, while the "Splitlog" line linked Joplin to mining towns throughout the region. Newton County's agricultural economy flourished in the late nineteenth century, with increasing production of tobacco, grains, fruits, and vegetables. Small manufacturing concerns also sprang up in the county, including brick and marble works, distilleries, and flour mills. Overall, Newton County in the nineteenth century prospered due to an active involvement in the market economy. Local products were shipped throughout Missouri and the nation thanks to convenient railroad transportation, and this led to general prosperity (Anon. 1876, Austin 1999a, Goodspeed 1888).

As the twentieth century approached, changes occurred in the economic and social conditions of Newton County. Lead mining declined as other sources began to be discovered in Missouri. Agricultural production declined and Missourians began to move from rural areas to urban centers. The automobile slowly replaced railroads as the primary mode of transportation, and Newton County residents realized that there was a need for a new road system. Within Newton County, residents of the small town of Reding's Mill began to clamor for a new link to the nearby industrial city of Joplin. Reding's Mill was a small town that rose around a flour and saw mill owned by John and Nancy Reding, and in the early twentieth century it was an active agricultural community. During the 1900s, the local community collected subscriptions and convinced the Newton County government to construct a road between Reding's Mill and Joplin. By 1908, a new road had been established from Reding's Mill to Joplin which basically followed the current alignment of State Route 86. This new road included an iron truss bridge over Shoal Creek, a small creek running through the northern sections of Newton County, built by the Midland Bridge Company. The first bridge over Shoal Creek was built in 1886, and in 1903 this bridge was significantly renovated. Renovation of this bridge took a long time, and it still proved to be inadequate for local needs. In 1903, John Reding and his son Matthew testified before the county court:

> They say the work is only little more than half done, about half the floor not being laid and the contractors claim they cannot go on with it because they are unable to get the lumber. The bridge has been in that condition now for over a month and travel must be done by the ford which is not at all safe. Of course it is a great

inconvenience and damage and the people want the bridge completed or the bond of the contractors forfeited (*Neosoho Times*, September 10, 1903).

As automobile traffic increased in the 1910s and 1920s, it became clear that a new road and bridge were needed if Reding's Mill was to remain a commercially viable community (Austin 1999a, Austin 1999b, Cozad 1965, Ozarks Mounaineer 1958, Rafferty 1980).

Construction History

Prior to 1907, highway improvement and road construction in Missouri was left entirely to local counties. This situation changed in 1921 when the Missouri legislature passed the Centennial Road Law. This law created a four-member Highway Commission and initiated a program to connect all of Missouri's county seats. In 1927, Missouri voters approved a bond issue totaling $75,000,000 to provide for the construction of new roads. Under this law the Missouri State Highway Department was authorized to take over local county roads and improve them to meet State standards. In 1930, the Missouri State Highway Department subsumed the local road between Reding's Mill and Joplin into the State system. This road was designated Route C, and it later became part of State Highway 86. When the State took over this road, the highway department noted that the bridge over Shoal Creek was inadequate. The old bridge had a roadway less than 20' wide, and this was considered too narrow to handle modern road traffic. In addition, a small resort community had developed around Reding's Mill, and the increased tourist traffic led to the need for a wider bridge. The Missouri State Highway Department realized that a new bridge over Shoal Creek was critical to the survival of Reding's Mill, and in 1929 the department drew up construction plans for the new bridge (Austin 1999b, Bridge File 1930, Missouri Department of Transportation 2000, Rafferty 1980)

The Missouri State Highway Department began by studying different alternatives for replacing the bridge over Shoal Creek. After carefully studying the roadway, the department came up with three design alternatives. The first design called for building the new bridge along a curve that would extend for the entire length of the span. The second design mirrored the original design of the existing bridge. This design called for an alignment that crossed the stream at right angles, placing the span along a tangent that included a sharp curve at the north end of the roadway. The final option called for moving the bridge to the east and creating a straight roadway without any sharp curves. The Missouri State Highway Department ultimately decided that the second option was preferable. The department estimated that the second design would cost approximately $50,000, while the other options would cost upward of $80,000. Department engineers noted that by slightly elevating the north side of the bridge, the dangers of the sharp curve could be reduced. In addition, Assistant Bridge Engineer V.K. Enslow noted that the second alternative "would eliminate some bad features in the design of the structure and would provide a structure which would be much better in appearance (Missouri State Highway Department 1930a)."

Official blueprints for the new bridge were approved on January 17, 1930. The bridge plans called for construction of a three span open-spandrel arch bridge. The Missouri State Highway Department normally used open spandrel designs for single span concrete bridges that were less than eighty feet long, but the new bridge over Shoal Creek would feature multiple concrete spans. During the preliminary study for the new bridge, department engineers noted that multiple concrete spans would be effective for the Shoal Creek Bridge because the stream conditions were ideal for such a structure. Solid rock outcroppings were found on either bank and within the streambed, and thus a concrete bridge would be solidly supported and an inexpensive alternative to a more expensive steel girder structure. Final approval for the design was given in January 1930, and the Missouri State Highway Department set out to find a contractor to build the new structure (Fraser 1996, Missouri State Highway Department 1930a, Missouri State Highway Department 1930b).

Once the Missouri State Highway Department finally decided on a design and route for the Shoal Creek Bridge, it turned to the task of selecting a contractor for the project. After examining the submitted bids to determine the low bidder, the department awarded the job to the M.E. Gillioz Construction Company of Monett, Missouri. This company was founded by Maurice E. Gillioz in 1905. Gillioz was born in rural Phelps County in 1877, and as a young man he worked as a laborer for both the Santa Fe Railroad and the St. Louis and San Francisco Railroad. In 1905 Gillioz put in a successful bid to build a foundation and floor for St. Mary's Catholic Church in Pierce City, Missouri. Upon receiving this contract Gillioz decided to become a full-time contractor. Gillioz began to win construction contracts for projects throughout Missouri, and in 1914 he moved the headquarters of his company to Monett, Missouri. Gillioz built several structures in the 1920s. Within Monett alone he built the Plymouth School, the City Park Casino, the Monett City Hall, and the local Masonic Temple. During the 1930s Gillioz received contracts to build bridges throughout Missouri, and by 1934 Gillioz was a millionare. Although Gillioz eventually came to own a wide range of businesses, including the Gillioz Motor Company, the Gillioz Clothing Store, and the Gillioz Theater, construction remained his primary enterprise. Some of the major projects completed by the Gillioz Construction Company included the Route 66 Bridge over the Arkansas River in Tulsa, Oklahoma, the Blue Mountain Dam near Boonville, Arkansas, and the Southwest Trafficway through Kansas City, Missouri. By 1957, the Gillioz Construction Company had completed over $31 million worth of projects for the Missouri State Highway Department. Gillioz was widely hailed as a civic leader in Monett, Missouri, with over 300 guests attending his eightieth birthday party in 1957. At this party Gillioz was hailed by Rex Whitton, Chief Engineer of the Missouri State Highway Department, as a pioneer road and bridge builder who had a tremendous impact upon transportation throughout the State. Maurice Gillioz died on April 17, 1962, and the Gillioz Construction Company went out of business in the late 1960s. The Gillioz Construction Company played a key role in expanding Missouri's transportation system, including the construction of the Shoal Creek Bridge. (Austin 1999a, Gillioz Papers 1995)

Construction of the new Shoal Creek Bridge began in January 1930, and the construction process proceeded extremely smoothly. Prior to the start of construction, the Gillioz Construction Company build a temporary bridge over Shoal Creek. This simple wood and steel structure was designed to aid in the pouring of the concrete superstructure, and it could support a weight of ten tons. Once this temporary bridge was in place, construction of the structure began. Several cubic yards of rock had to be removed from the site before construction of the piers and abutments could be completed. During an onsite inspection in late February 1930, Bridge Construction Engineer D.C. Wolfe from the Missouri State Highway Department noted that the thirty five men and three foreman who were working on the project had made excellent progress. The footings for the entire substructure were in place, piers two through six had been built, and construction of the concrete arch between piers four and five was already complete. Wolfe praised the construction workers, noting in his report that:

> The lines of the completed work are very good, as is the workmanship. The exposed surfaces are being rubbed soon after the forms are stripped. No honeycomb surface was in evidence on any of the completed work (Missouri State Highway Department 1930a).

The Missouri State Highway Department hoped that the project would be completed by May 1930, but the department was willing to accept a later date of completion. However, the department warned Gillioz that August was the absolute latest date for completion. If Gillioz failed to complete the project by August, the department would make a major deduction from the construction contract and reopen the project for bids. This threat proved completely unnecessary because the bridge was completed by April 1930 at a cost of $49,179. However, a brief dispute arose between Gillioz and the Missouri State Highway Department over payment for rock excavation at the bridge site. Gillioz demanded that the state pay him for extra expenses incurred during excavation, but the department did want to alter the terms of the original contract. After a brief negotiation, the Missouri State Highway Department agreed to pay Gillioz an additional $5,705 for his work. The temporary bridge was torn down, and the old Shoal Creek Bridge was removed. The iron spans that were originally built by the Midland Bridge Company were still in good condition, so they were reused to provide new bridges over South Indian Creek near Boulder, Missouri and over Clear Creek near Richey, Missouri. The Shoal Creek Bridge built by Gillioz was one of twenty such multi-span, open spandrel arch bridges built in Missouri. This bridge provided a critical link between Joplin and Reding's Mill, and it helped Newton County to develop new links to the rest of the State (Missouri Department of Transportation 1999, Missouri State Highway Department 1930a, Missouri State Highway Department 1930b).

The Shoal Creek Bridge still stands today, but it is no longer sufficient to handle modern traffic conditions. Bridge inspectors from the Missouri Department of Transportation have discovered significant cracks in the concrete along the deck and superstructure of the bridge. In 1998, the Missouri Department of Transportation held a series of public hearings regarding the Shoal Creek Bridge and received permission from the Joplin City Council to acquire new right of way within the city limits. The Missouri

Department of Transportation then decided that a new bridge was needed and that Route 86 would be widened and straightened to the south of Joplin, Missouri. Overall, the Shoal Creek Bridge served well as a link between Joplin and Reding's Mill, and it is an excellent example of the Missouri State Highway Department's use of concrete open-spandrel bridges to link Southwest Missouri to the rest of the State. However, since it is no longer suitable to support modern highway traffic, it must be replaced (Fraser 1996, Kennedy 1998).

Physical Description

The Shoal Creek Bridge (Bridge No. J-349) spanning Shoal Creek at State Highway 86 consists of three 90', reinforced concrete, two-rib open spandrel arches carried by reinforced concrete piers. The bridge also features two concrete deck girder approach spans supported by reinforced concrete bents, wingwalls, and abutments. The total length of the bridge is 417', and the roadway is 20' wide with 5' sidewalks on both sides. The Missouri Highway Department often used the open spandrel designs for concrete arch bridges with spans of over 80 feet. Approximately twenty multiple-span, open spandrel arch bridges still exist in Missouri. These bridges were built almost exclusively in Southern Missouri where concrete was cheap and plentiful. The Shoal Creek Bridge represents an excellent example of this common construction technique used frequently by the Missouri Highway Department in the 1920s and 1930s.

There are a total of four bents supporting the Shoal Creek Bridge. All the bents are sunk into solid rock. Although each bent features an open pier design featuring front battered columns, they vary dramatically is size and design. Bent 1 is unique in that it features three columns instead of the standard two. The three rectangular bent footings that support bent 1 vary in size from 3'6" wide to 4'6" wide, but they are all 2'6" high. The height of each column varies from 10'7" to 12'11". This variation was necessary due to the uneven nature of the northern edge of the bridge. This end rests on a curved bank of the creek, so a three-column bent with divergent measurements was needed. The columns are linked by 18"-thick tie beams, and the bent is backed by a wingwall that is 6'7" high and over 30' long.

Bent 2 on the north end of the Shoal Creek Bridge and bents 7 and 8 on the south end are two column, open bents that help support the approach spans. These spans are similar in design but vary in their specific dimensions. All three bents rest on large concrete footings that measure 4'6" wide by 2'6" deep. The heights of the columns vary from 12'7" to 13'6", while the space between the two columns ranges from 15' to 18'10". Bent 8 supports the south end of the bridge, and it features a wingwall that is 6'4" high and over 40' long.

Piers 3 and 6 anchor the ends of the three arch spans with massive footings and buttresses that serve as extensions of the adjoining arch ribs. The footings at each pier are 9' wide and are sunk 12' through the creek to bedrock. The buttresses that extend from the base of the piers are 3' wide and angle upward 10' to 12' where they are joined by a 3' tie beam. These buttresses rest on vertical columns or "pilasters" which extend

from the front of the footings. These pilasters measure 5’ by 3’ and they are slightly offset from the center of the arch ribs. The two columns that make up piers 3 and 6 are joined by 3’3” upper tie beams, and the top of the columns flare out 3’1” to support the roadbed.

Piers 4 and 5 support the center of the bridge, and they are the largest part of the substructure. The huge footings that support these piers are 32’6” long by 9’6” wide by 3’ high. Two 9’ pyramidal column bases battered 1” per foot support the pilasters and columns of each pier. The pilasters that support the arch ribs measure 3’ by 5’, and flared crowns at the top of the piers extend 3’3” outward. The distance from the bottom of the piers to the roadbed is 23’, and the piers’ two columns are 5’ thick and joined at the top by a 2’9” tie beam.

The arch ribs are 5’ wide throughout the bridge, and they contain 3” steel rings that anchor the ribs to the pilasters. The arch ribs have a vertical thickness at the springing line of 2’8” and narrow gradually to a thickness of 17” at the crown. The rise measures 16’2” from the springing line to the crown extrados. The arches are 90’ long as measured from the outside of the piers. The arches support spandrel bents that act as floor beams to support the deck of the bridge. The spandrel bents are placed 8’10.5” apart, giving eight bents per span. The spandrel bent columns are 15” thick and 3’6” wide, with cap beams 22’ long.

The roadbed of the Shoal Creek Bridge is framed by four approach spans, two on each side of the bridge. The end spans are 33’7” long, and the others are 32’7” long. The steel girders that reinforce the roadway and approach spans vary in thickness from 17” to 20”. Cross beam floor beams 16” thick are spaced from 8’5” to 8’8” apart underneath the entire length of the approach spans and roadway to provide additional support. The bridge deck is 20’ wide with 5’ sidewalks on both sides of the deck. The guardrails along the sidewalks featured balustrade construction made up of 12-13 balustrades between each arch bent. This provides a 3’ guardrail along the entire length of the bridge. Builder’s plates at either end of the roadway read “Built by M.E. Gillioz Contractor Monett MO.

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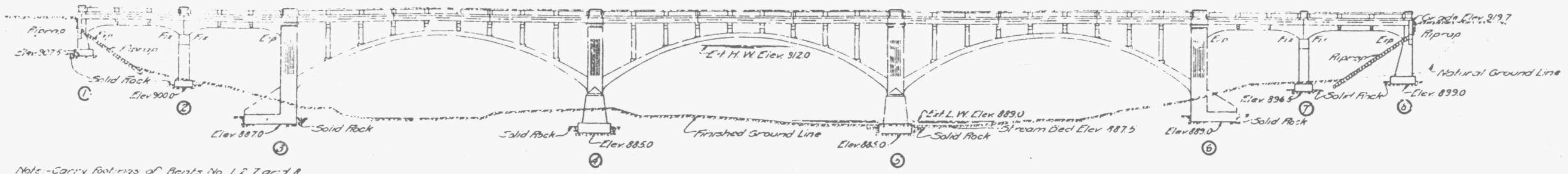
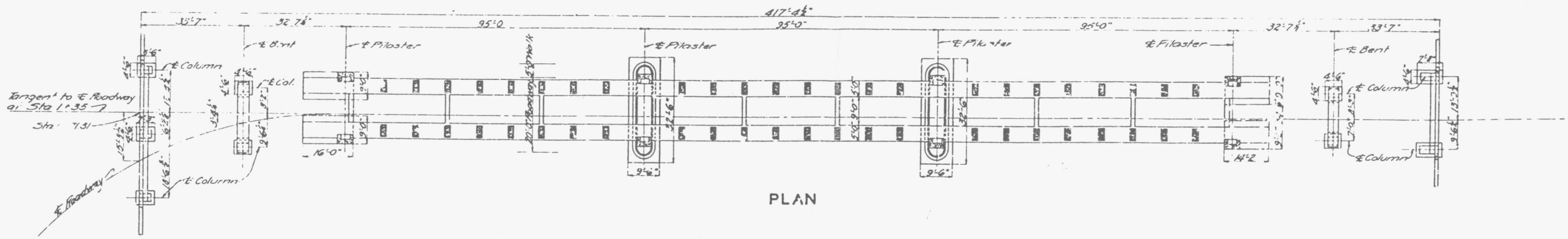
MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO	STATE	FED. AID PROJ. NO	FISCAL YEAR	SHEET NO	TOTAL SHEETS
5	MO	REF "I"	18		

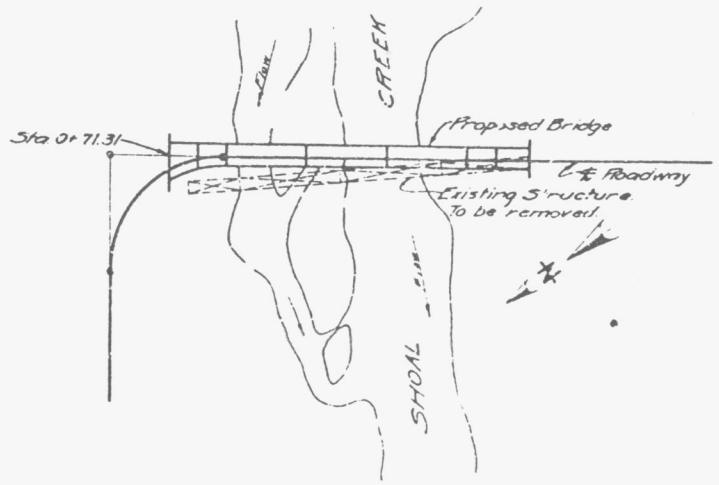


GENERAL ELEVATION

Note:-Carry footings of Bents No. 1, 2, 7 and 8 at least 6" into solid rock. Carry footings of Piers No. 3, 4, 5 and 6 at least 2'-0" into solid rock and cast against firm undisturbed rock.



PLAN



LOCATION SKETCH

INDEX OF SHEETS

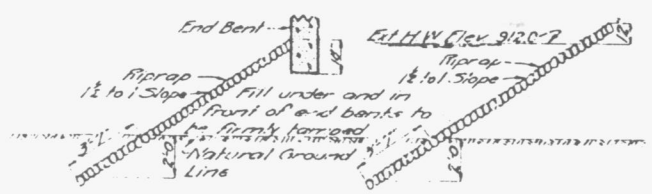
GENERAL NOTES:—

Concrete mixes to be as follows:—
All handrails 1:2:3.
All deck girders 1:2:3½.
Slab and curbs over arch rings 1:2:3½.
All girder bents, piers, pilasters, spandrel bents and arch rings 1:2:4.
Exposed edges shall be beveled ¾" where no other bevel is noted.
Exposed surfaces to be rubbed to a smooth and uniform appearance.
No plastering permitted.
Contractor shall submit details of the proposed centering to the State Highway Department before work is begun.
Arch rings shall be poured in radial blocks in the order indicated on the detail drawings.
Corresponding sections in both ribs of span shall be poured at the same time.
Columns over arch shall not be cast until after wedges under ring have been released.
Provision must be made in the arch centering to bring loading upon all points of the ring as nearly simultaneously as practical in removing centering.
The centering shall not be removed from any span until the concrete over it has been in place at least 21 days, nor until the concrete in the adjacent span has been in place at least 14 days.
No permanent camber desired in finished girders. Any construction camber remaining in girders to be taken out in floor slab by thickening floor over supports.
Where bituminous felt is used in expansion or partition joints in concrete, stitch felt in vertical joints securely to one face of concrete with copper wire.
Horizontal expansion joints in slab on arch span to consist of 3 layers of roofing felt applied on smoothly finished surfaces.
Excavation in accordance with specification XLIX of Standard Specifications issued Nov. 1, 1926, except that quantities paid for will be computed from extreme low water elevation 888.0 where existing ground line is below this elevation.
Two name plates, type "A" as shown on Std. 5818 to be furnished and placed by contractor. Cost of name plates to be included in price bid for other items.

ESTIMATED QUANTITIES

ITEM	Concrete Cu. Yds. 1:2:3 mix	1:2:3½ mix	1:2:4 mix
Handrails	41.9		
Deck Girder Spans 1-2, 2-3, 6-7 & 7-8		207.3	
Slab, Curbs and Walk over Arch Spans		230.0	
Arch Rings			181.0
Piers and Pilasters above Elev. 902.0			100.1
Piers below Elev. 902.0			380.9
Spandrel Bents			88.3
Girder Bents			96.8
Totals	41.9	437.3	347.1

Phosphor Bronze Bearing Plates Lbs	3130
Reinforcing Steel Lbs	168,420
Excavation Cu. Yds.	465
Cast Iron Drains Lbs	3960



Riprap fills at ends of bridge as shown in sketches. Approximately 435 sq yds of rip-rap work included in road contract.

RIPRAP SKETCHES

B.M. Elev. 913.80 Top of I-Beam at N.E. corner of present bridge about 30' Rt. of Sta 0+91.

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA
ABOUT 3.5 MILES SOUTH OF JOPLIN
PROJECT NO. REF. NO. 1 RT. C STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY W.R. Black DATE 1/17/30 BRIDGE ENGINEER
APPROVED BY W.H. Cuelle DATE 1/17/30 CHIEF ENGINEER

STD. 5818
J349

Drawn Nov 1929 by C.A.F.
Traced Nov 1929 by C.A.F.
Checked Dec 1929 by NWF & H.S.J.

MISSOURI STATE HIGHWAY DEPARTMENT

COMPLETE BILL OF REINFORCING STEEL

No.	Size	Length	Mark	Location
96	[illegible]	7'0"	F1	Column
102	[illegible]	6'0"	[illegible]	
108	[illegible]	6'0"	[illegible]	Beam
72	[illegible]	10'0"	[illegible]	Bracket
34	[illegible]	12'3"	U3	
Arch Ring				
270	[illegible]	34'6"	[illegible]	Ring
108	[illegible]	17'5"	[illegible]	
444	[illegible]	4'6"	[illegible]	
36	[illegible]	15'0"	N	Tie Beam
Superstructure				
Slab and Rail on Arch Spans				
13	[illegible]	29'6"	C1	Curb
108	[illegible]	15"	C2	
9	[illegible]	30'3"	C3	
18	[illegible]	30'0"	C4	
[illegible]	[illegible]	30'3"	C5	
192	[illegible]	12"	C8	Slab
189	[illegible]	6'3"	K1	Walk
201	[illegible]	4'9"	K2	
96	[illegible]	32'0"	K3	
48	[illegible]	30'3"	K4	
144	[illegible]	9'9"	R1	Rail
270	[illegible]	9"	R2	
102	[illegible]	6'3"	R3	Subpost
2760	[illegible]	18"	R	Baluster
48	[illegible]	9'6"	R6	Rail
24	[illegible]	10'0"	R8	
32	[illegible]	4'3"	R9	Post
8	[illegible]	3'3"	R10	
64	[illegible]	7'0"	R11	
102	[illegible]	7'5"	R12	Subpost
8	[illegible]	4'9"	R13	Post
216	[illegible]	22'3"	S1	Slab
114	[illegible]	18'6"	S2	
114	[illegible]	1'6"	S3	
171	[illegible]	13'5"	S4	
17	[illegible]	18'6"	S5	
28	[illegible]	16'9"	S6	
228	[illegible]	11'6"	S7	
12	[illegible]	20'6"	S8	
D.G. Spans 6-7 & 7-8				
4	[illegible]	12'0"	B4	Girder
4	[illegible]	11'0"	B5	
4	[illegible]	10'6"	B6	

No.	Size	Length	Mark	Location
4	[illegible]	9'0"	B30	Girder
4	[illegible]	8'6"	B31	
4	[illegible]	8'3"	B32	
10	[illegible]	34'6"	B38	
10	[illegible]	32'0"	B41	
8	[illegible]	36'0"	B45	
10	[illegible]	35'9"	B46	
3	[illegible]	31'3"	B5	
24	[illegible]	15"	C2	Curb
3	[illegible]	29'9"	C6	
3	[illegible]	33'3"	C7	
14	[illegible]	12"	C8	Walk
3	[illegible]	29'9"	C9	Curb
3	[illegible]	33'3"	C10	
45	[illegible]	6'3"	K1	Walk
16	[illegible]	32'3"	K2	
16	[illegible]	33'3"	K3	
[illegible]	[illegible]	11'9"	[illegible]	Bracket
[illegible]	[illegible]	[illegible]	K10	Walk
60	[illegible]	9"	R2	Rail
20	[illegible]	6'3"	R3	Subpost
8	[illegible]	4'0"	R4	Post
600	[illegible]	18"	R5	Baluster
4	[illegible]	2'3"	R7	Post
8	[illegible]	11'9"	R8	Rail
20	[illegible]	7'9"	R12	Subpost
[illegible]	[illegible]	9'9"	R13	Rail
[illegible]	[illegible]	12'0"	R15	
3	[illegible]	[illegible]	R16	Post
16	[illegible]	9'3"	R23	Rail
14	[illegible]	24'3"	S12	Slab
44	[illegible]	19'3"	S8	
34	[illegible]	24'9"	S9	
43	[illegible]	21'9"	S10	
16	[illegible]	32'0"	S11	
8	[illegible]	32'3"	S36	
16	[illegible]	32'3"	S37	
12	[illegible]	16'6"	W1	Web
16	[illegible]	18"	W2	
[illegible]	[illegible]	6'0"	W3	Bracket
[illegible]	[illegible]	5'0"	W4	
36	[illegible]	4'5"	W5	Web
D.G. Spans 1-2 & 2-3				

Bending diagram labels:

- G3, G8, G10, G11, G2, G3, J1 & J2
- 5-V10 BARS, CUT 5
- T4 & T8
- T3 & T5
- A5, D1, F1, V3, V6, V7, V13
- 5-V10 BARS, CUT 5
- F2
- F3
- G7
- U2, U3, U11 & P16
- U5 & U7
- P3 & P4
- B4, B44, B48 & B51
- 5-V10 BARS, CUT 5
- B4-B20 & B22-B38
- S9 & S10
- B45 B46 & B47
- B49, B50, P52, B53 & B54
- H3 BARS, CUT 3
- A6-A11, K4 & S40
- F1
- T1
- 5-V3 BARS, CUT 5
- G1 H4 & H5
- U3 & U9
- 6-U8 BARS, CUT 12, BEND AS SHOWN
- U9 BARS, CUT 84, BEND AS SHOWN
- S2, S5 & S6
- S13, S15, S17, S9, S21, S23 & S27 (variable)
- 9-S13 BARS, CUT 3, BEND AS SHOWN
- 7-S15 BARS, CUT 7, BEND AS SHOWN
- 6-S17 BARS, CUT 6, BEND AS SHOWN
- 4-S19 BARS, CUT 4, BEND AS SHOWN
- 8-S21 BARS, CUT 8, BEND AS SHOWN
- 6-S23 BARS, CUT 6, BEND AS SHOWN
- 6-S25 BARS, CUT 6, BEND AS SHOWN
- 11-S27 BARS, CUT, BEND AS SHOWN
- W2, W9, W10, W12, W13, W14, W15 & W18
- 9-S14 BARS, CUT 9
- 7-S16 BARS, CUT 7
- 6-S18 BARS, CUT 6
- 4-S20 BARS, CUT
- 8-S22 BARS, CUT 9
- 6-S24 BARS, CUT 6
- 6-S26 BARS, CUT 6
- 11-S28 BARS, CUT 11

Notes:
Dimensions of bars are given along centerline and are for computing lengths.
For bending sketches of bars in spandrel walls see Sheet No. 2.
Bars in each unit to be bundled and tagged separately.

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO. [illegible] STA. 0+71.31

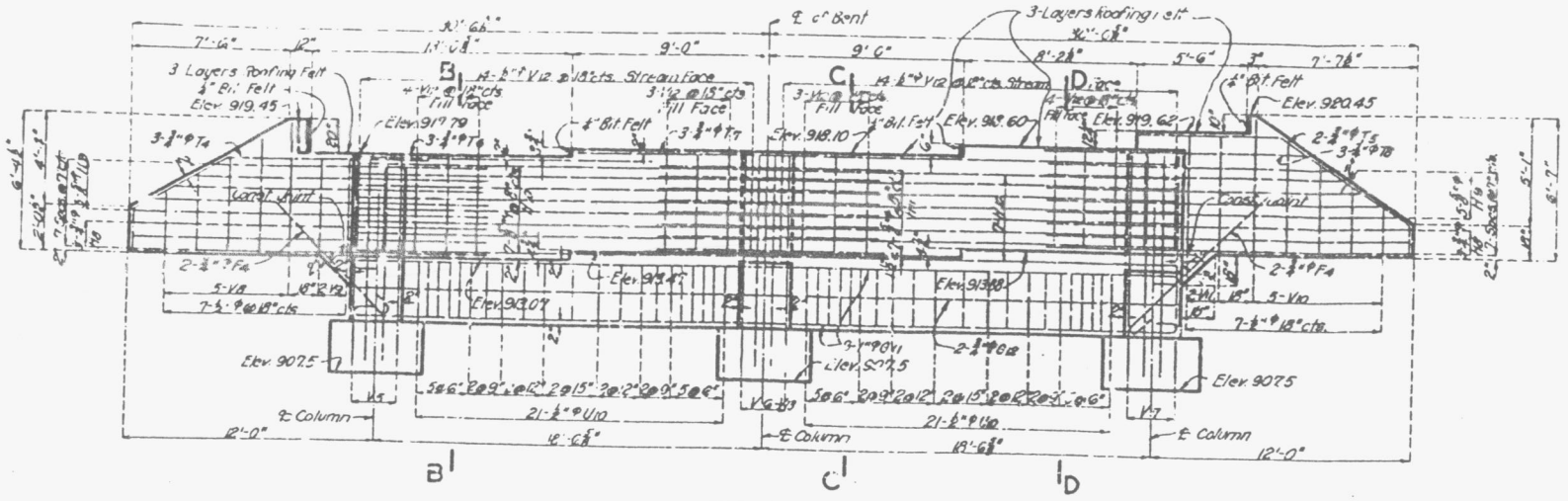
NEWTON COUNTY

STD. [illegible]

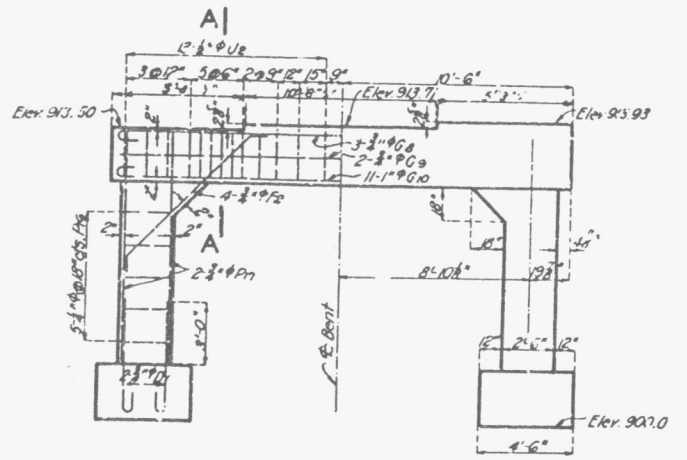
J-34[illegible]

MISSOURI STATE HIGHWAY DEPARTMENT

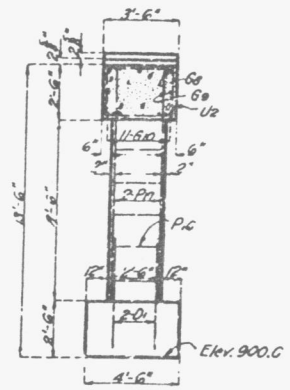
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	RFF-41	19		



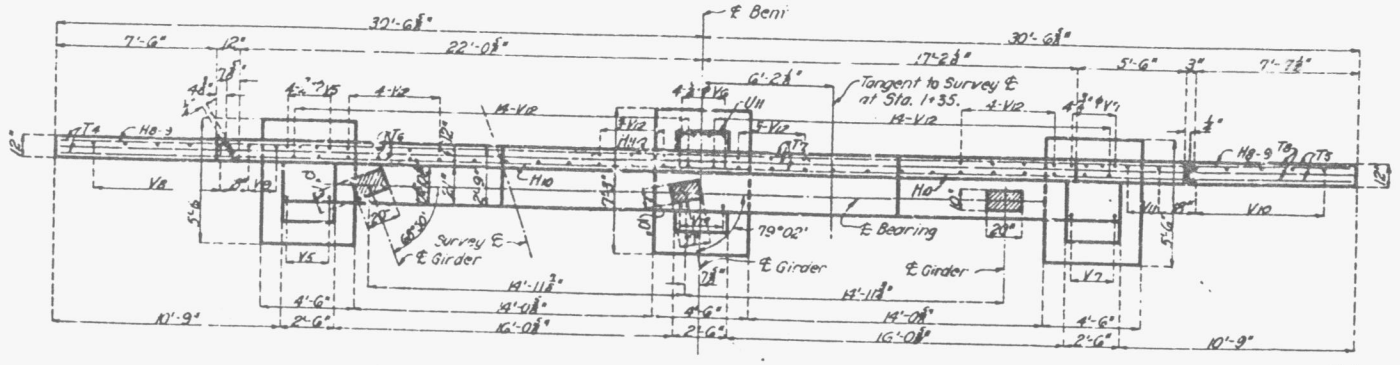
ELEVATION



ELEVATION

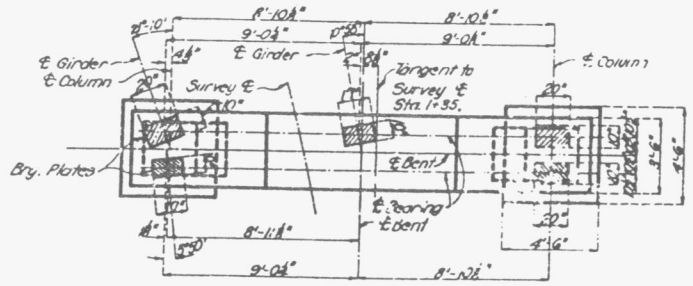


SECTION A-A



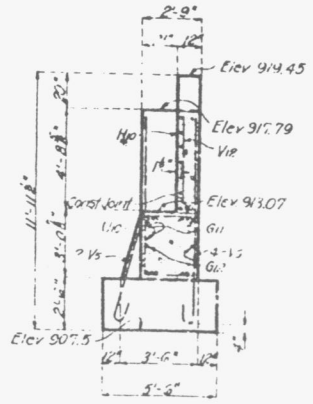
PLAN

Note:- This drawing is not to scale. Follow dimensions.

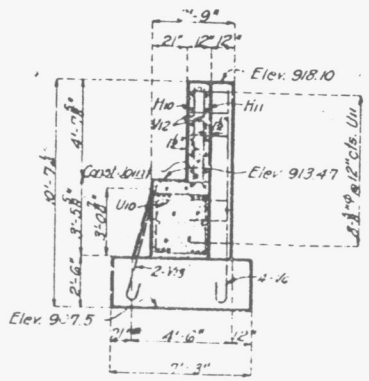


PLAN

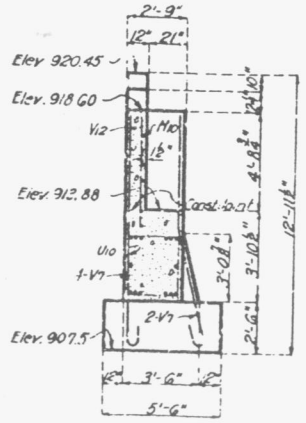
DETAILS OF BENT NO. 2



SECTION B-B



SECTION C-C



SECTION D-D

DETAILS OF END BENT NO. 1

Drawn Dec. 1929 By H.E.C & A.F.K
Traced Dec. 1929 By H.E.C.
Checked Dec. 1929 By H.S.J.

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA
ABOUT 3.5 MILES SOUTH OF JOPLIN
PROJECT NO. REF. 1 STA 0+71.31

NEWTON COUNTY

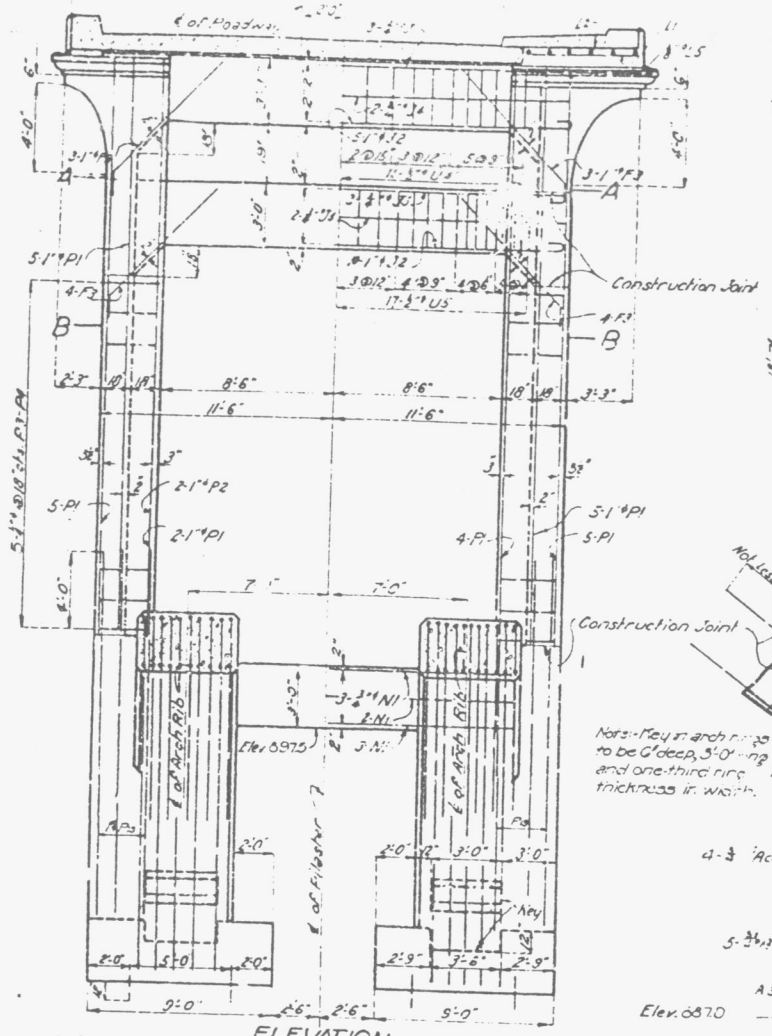
SUBMITTED BY W. P. Black DATE 1/17/30 BRIDGE ENGINEER
APPROVED BY W. Caddell DATE 1/18/30 CHIEF ENGINEER

J-349

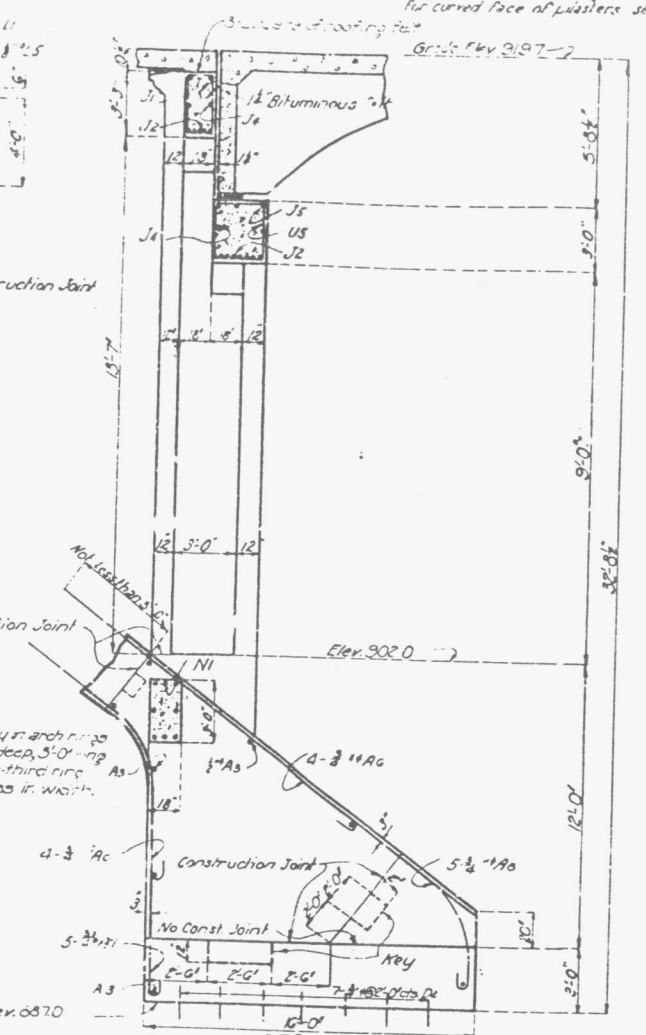
MISSOURI STATE HIGHWAY DEPARTMENT

FED. PROJ. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
5	MO	REF. #1		

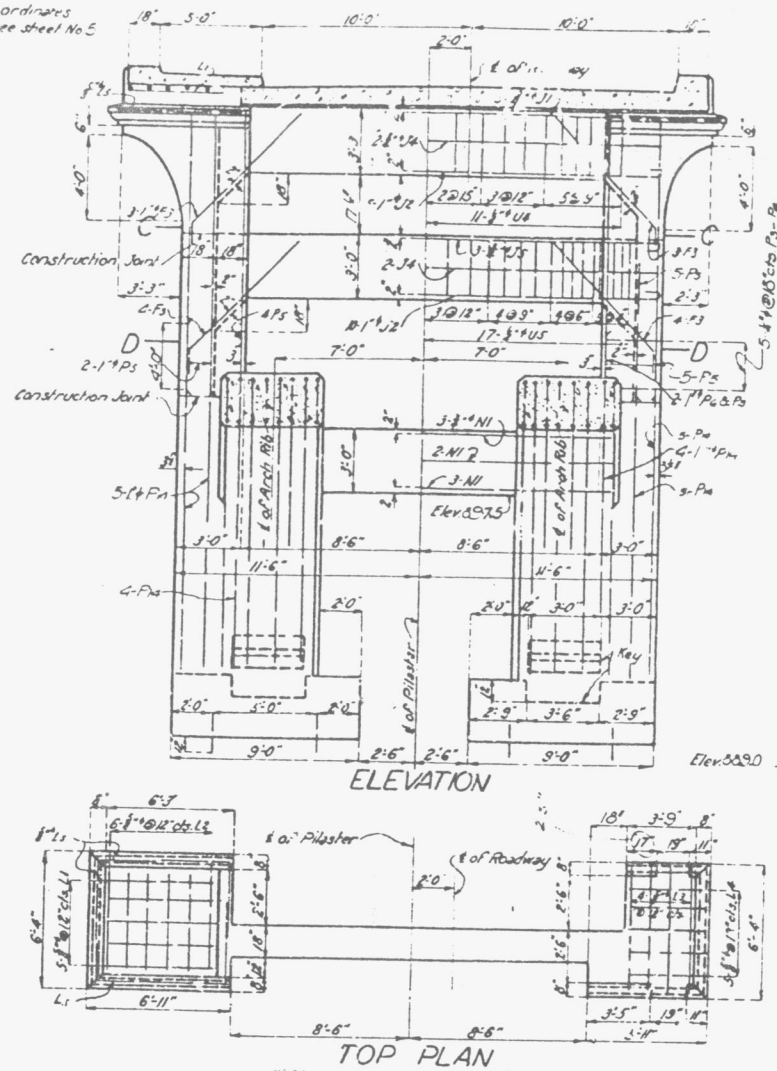
Note: For details of coping and ordinates for curved face of pilasters see sheet No. 5



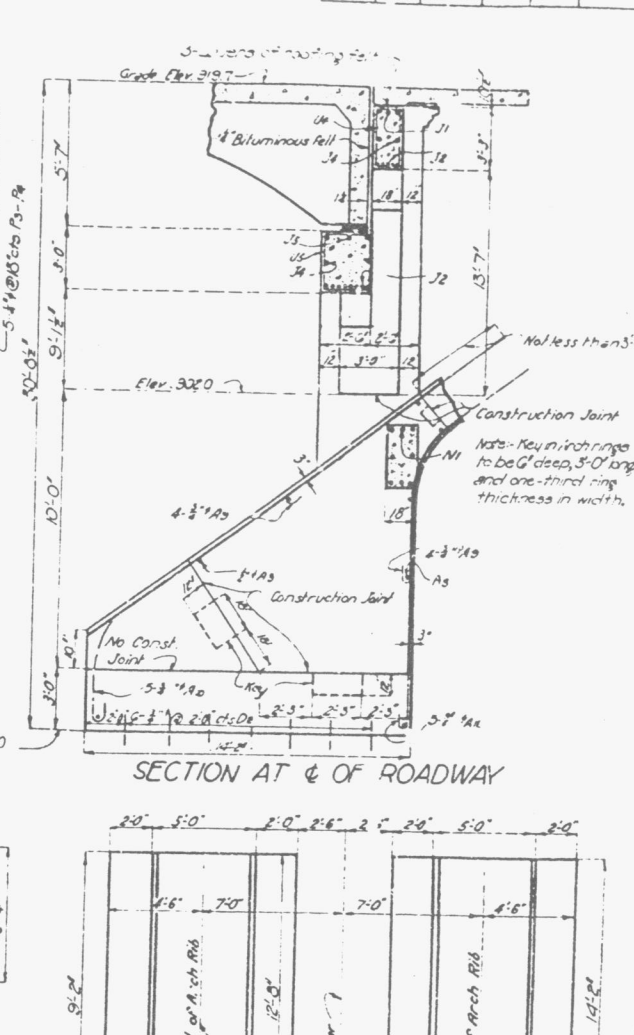
ELEVATION



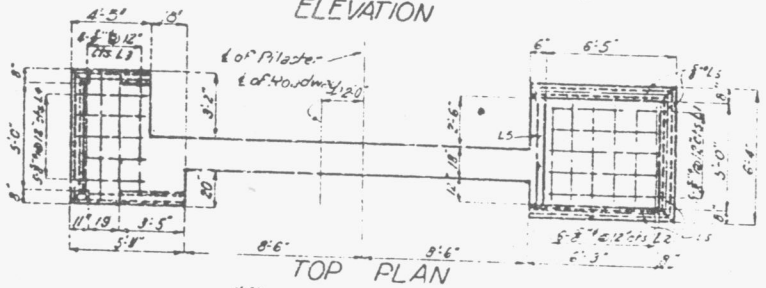
SECTION AT ℄ OF ROADWAY



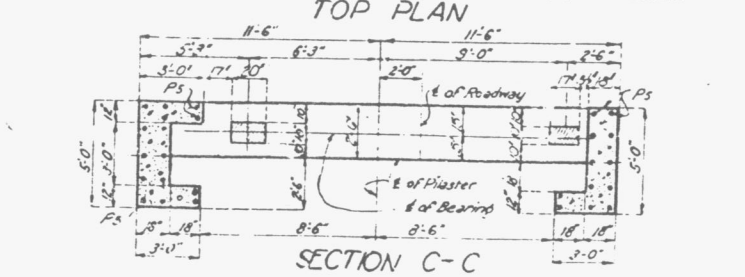
ELEVATION



SECTION AT ℄ OF ROADWAY

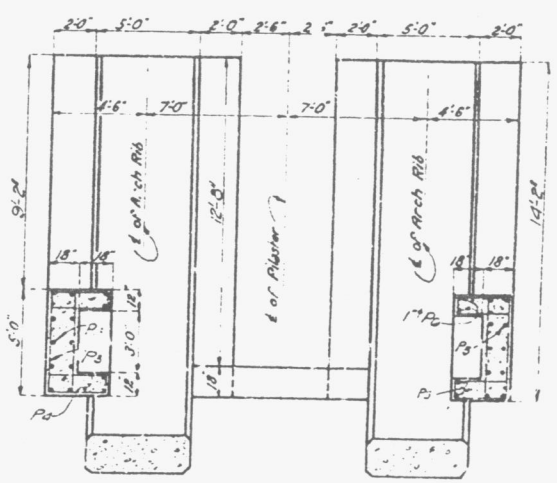


TOP PLAN

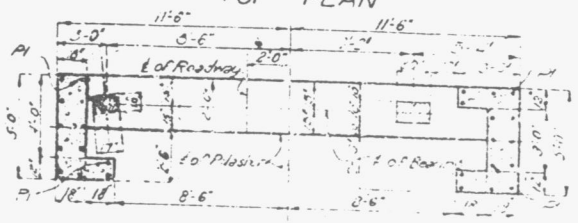


TOP PLAN

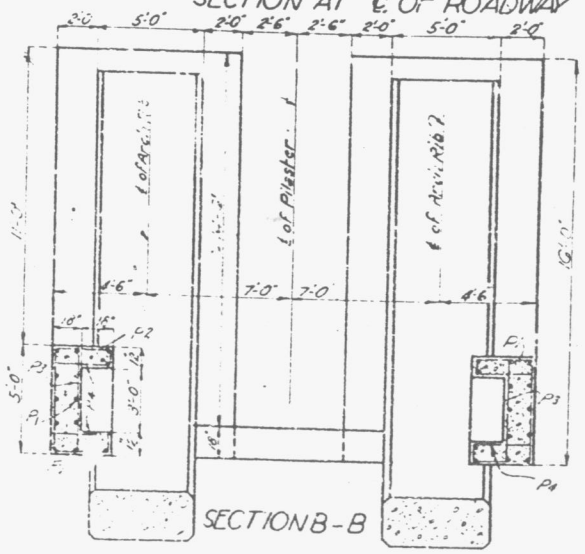
SECTION C-C



SECTION D-D



SECTION A-A



SECTION B-B

DETAILS OF END PILASTER NO 3

DETAILS OF END PILASTER NO. 6

Note: Holes to be drilled 12" into solid rock filled with cement mortar grout and dowel bars to be driven into grout.

Note: This drawing is not to scale. Follow dimensions.

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO. 1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY _____ DATE 1/17/50 BRIDGE ENGINEER

APPROVED BY _____ DATE 1/17/50 CHIEF ENGINEER

STD 5.815

J-349

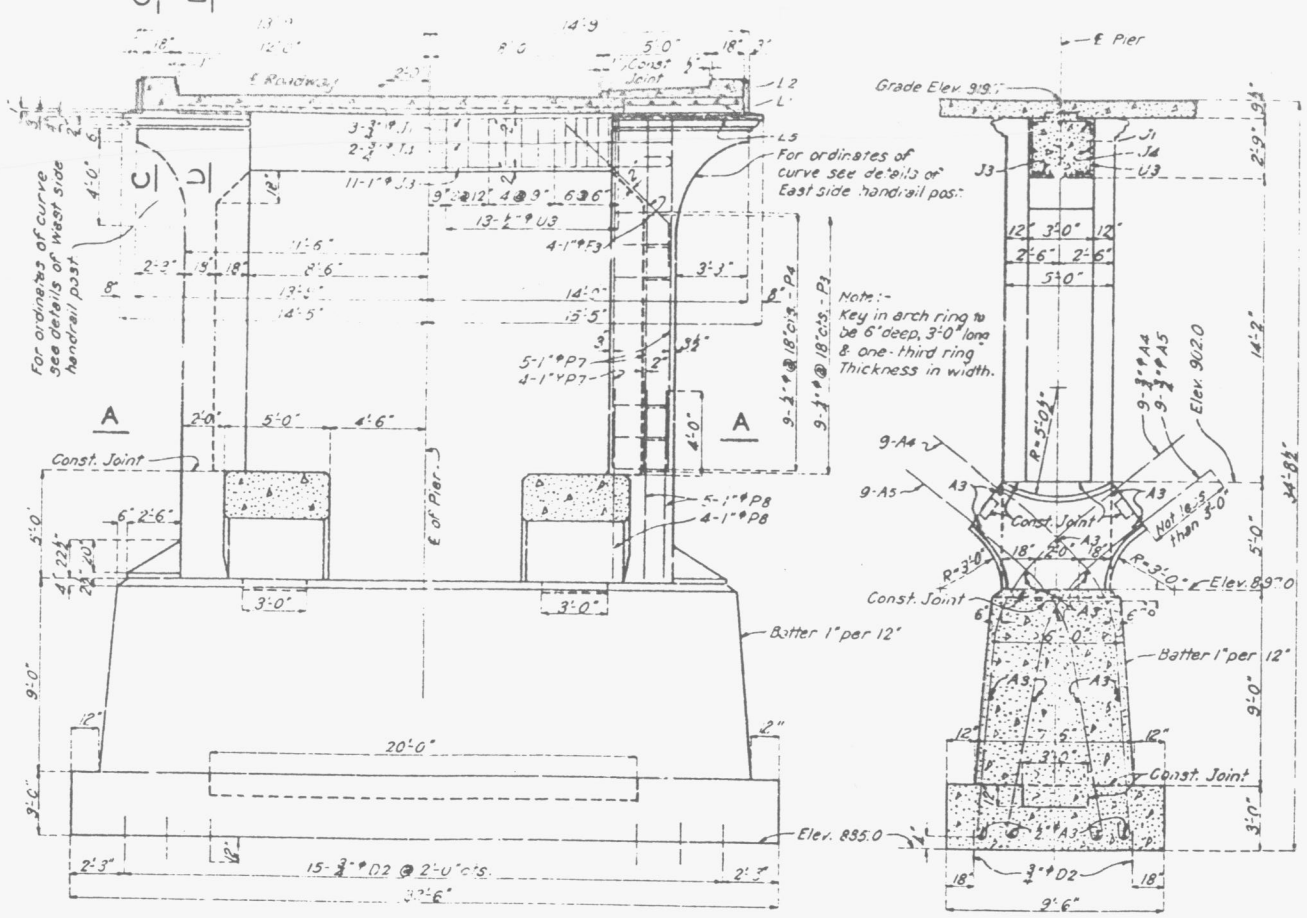
Made Dec. 1949 by A. F. K.
Checked Dec. 1949 by V. H. T.

Sheet 6 of 14

PIER AND PILASTERS NO. 3 & 6

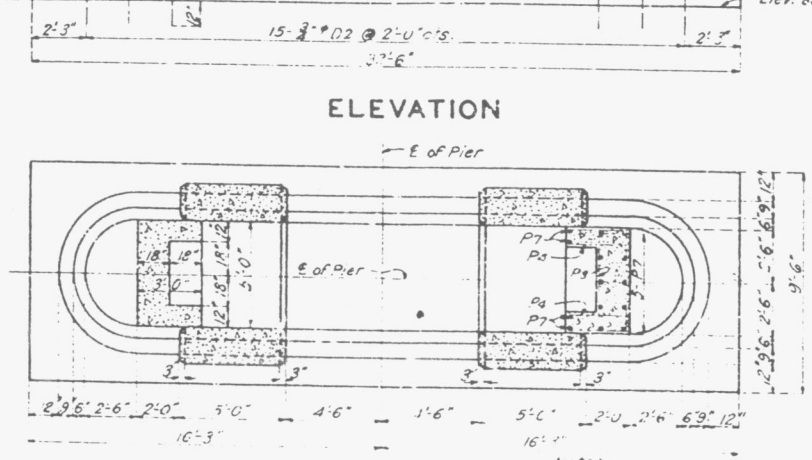
MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO	FEF.#1	18		

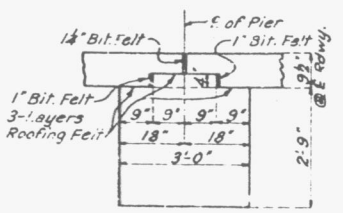


ELEVATION

SECTION AT ℄ OF ROADWAY

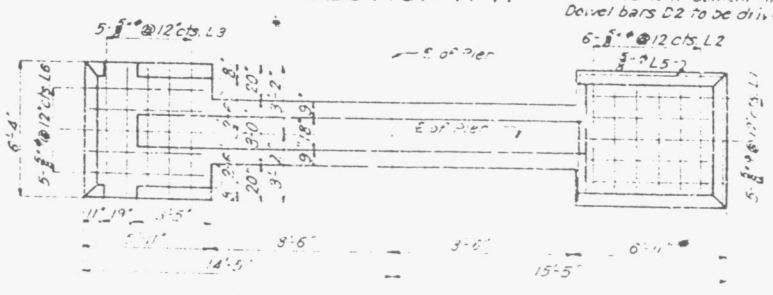


SECTION A-A

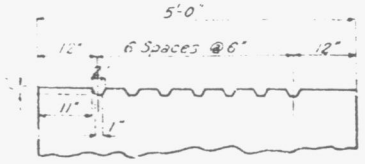


DETAIL OF SLAB BEARING

Note:- Holes to be drilled 12" into solid rock and filled with cement mortar grout. Dowel bars D2 to be driven into grout.

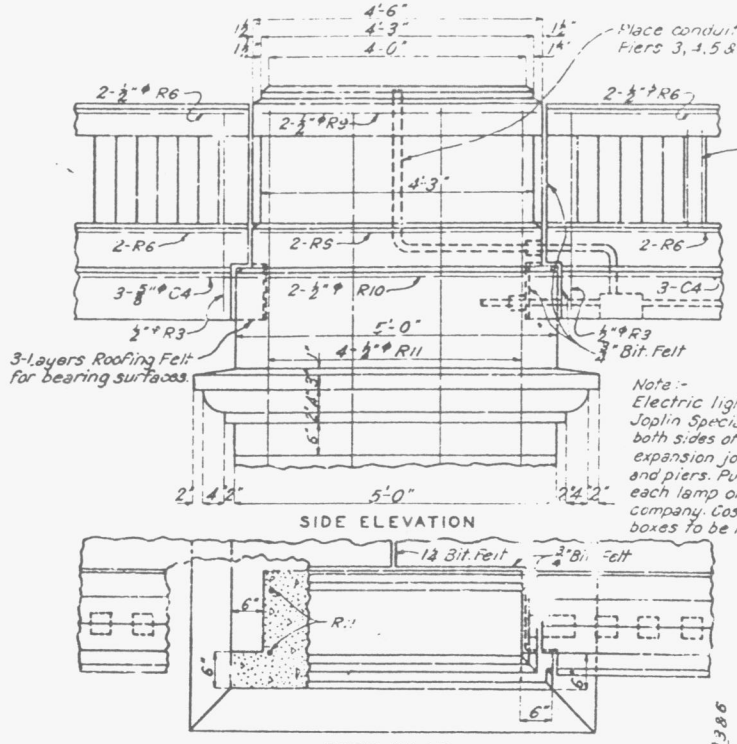


PLAN OF PIER TOP

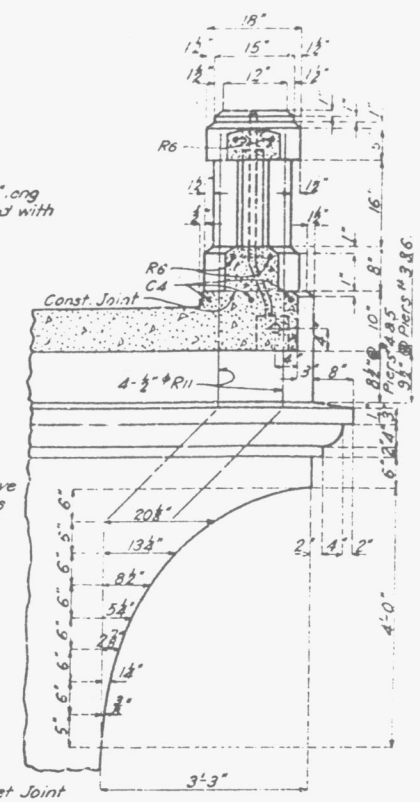


PART SECTION THRU PIER SHOWING DETAIL OF FLUTING

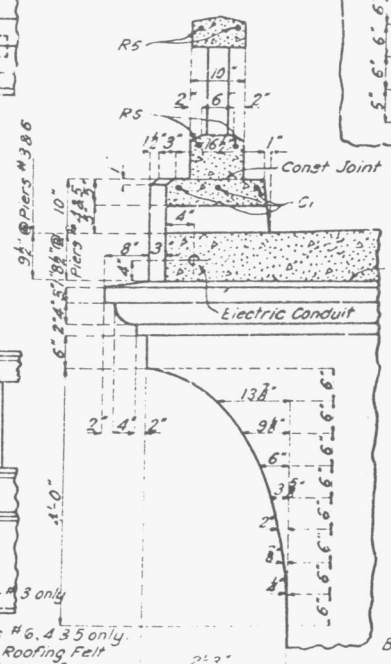
DETAILS OF PIERS NO. 4 & 5



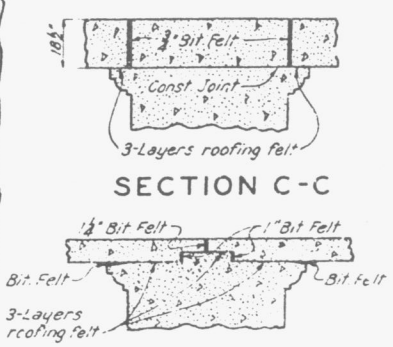
DETAILS OF EAST SIDE HANDRAIL POSTS

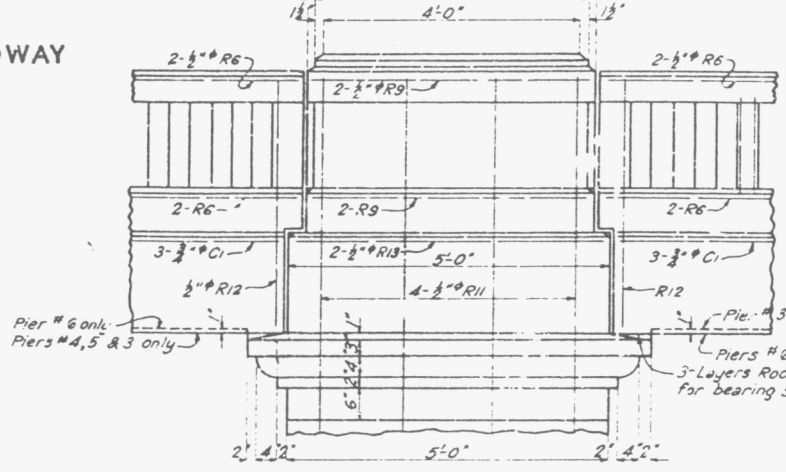


SECTION THRU HANDRAIL (EAST SIDE)



SECTION THRU HANDRAIL (WEST SIDE)





DETAILS OF WEST SIDE HANDRAIL POSTS

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. RE.F. NO.1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY [signature] DISTRICT ENGINEER DATE 11/7/30

APPROVED BY [signature] STATE ENGINEER DATE 11/11/30

Drawn Nov. 1929 By R.T.H. & H.S.C.
Traced Nov. 1929 By R.T.G.
Checked Dec. 1929 By H.W.H.

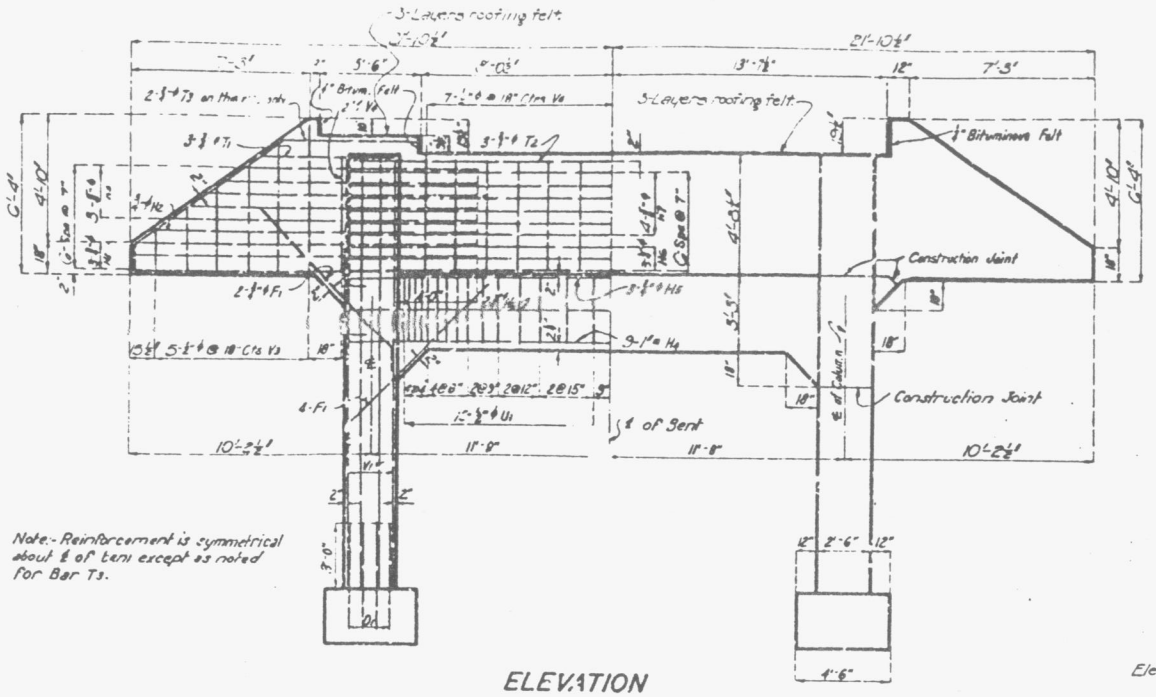
STD. 5818

J-349

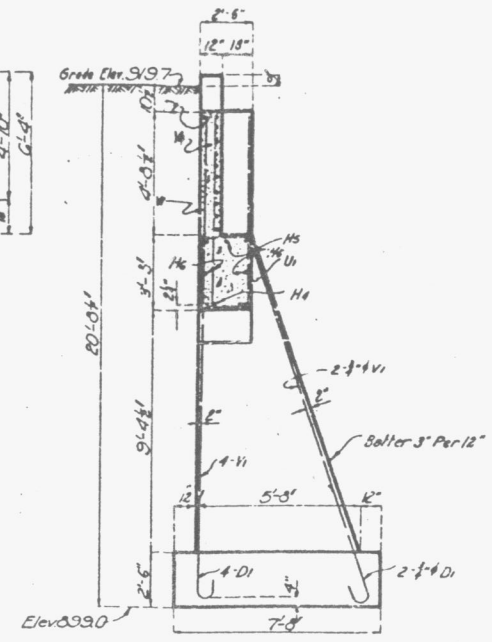
Sheet No. 5 of 14

MISSOURI STATE HIGHWAY DEPARTMENT

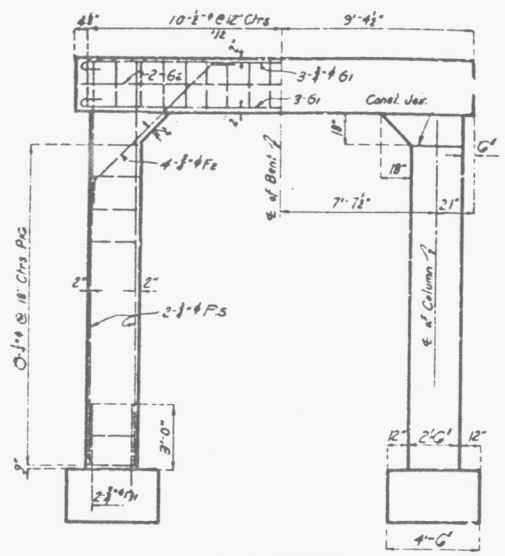
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	REF. NO. 1	19		



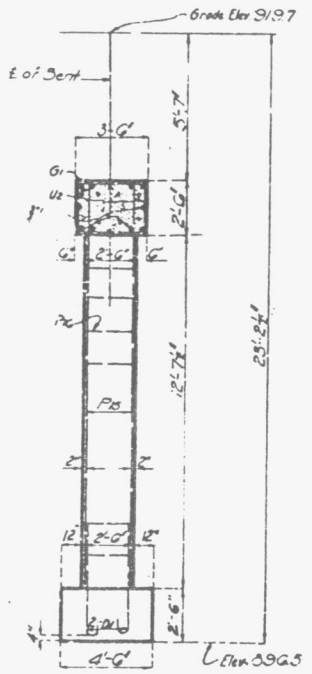
ELEVATION



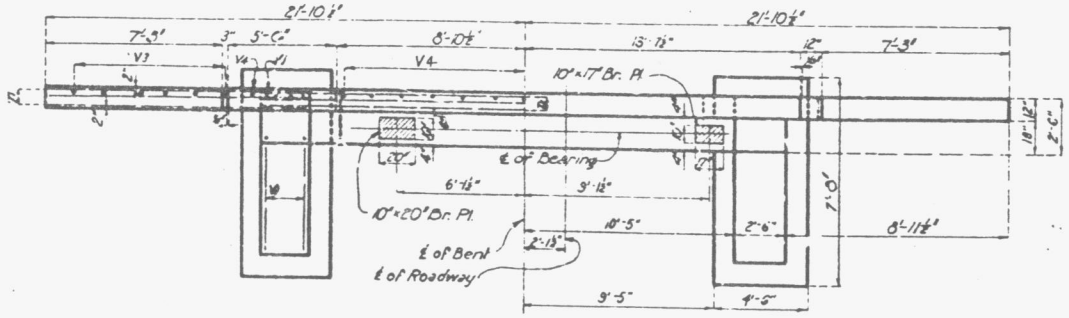
SECTION AT ℄



ELEVATION



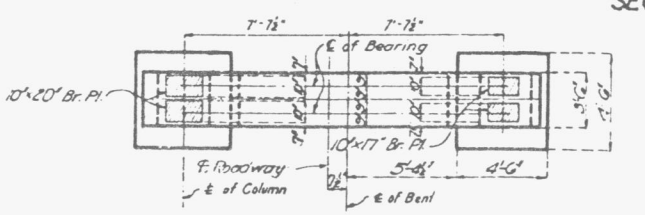
SECTION AT ℄



PLAN

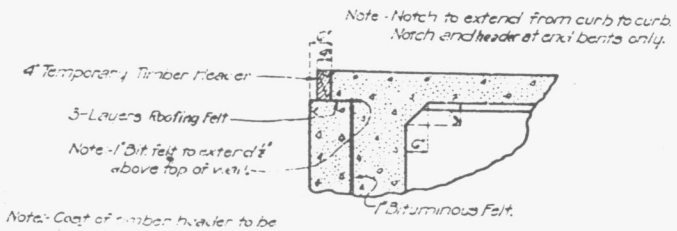
DETAILS OF END BENT NO. 8

Note: This drawing is not to scale. Follow dimensions.



PLAN

DETAILS OF BENT NO. 7



DETAILS OF NOTCH FOR APPROACH SLAB

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO REF. 1-S STA. 0+71.31

NEWTON COUNTY

SUBMITTED BY D.W. Rucker DATE 11/7/30 BRIDGE ENGINEER

FILED APPROVED BY T.H. Cutler DATE 11/7/30 CHIEF ENGINEER

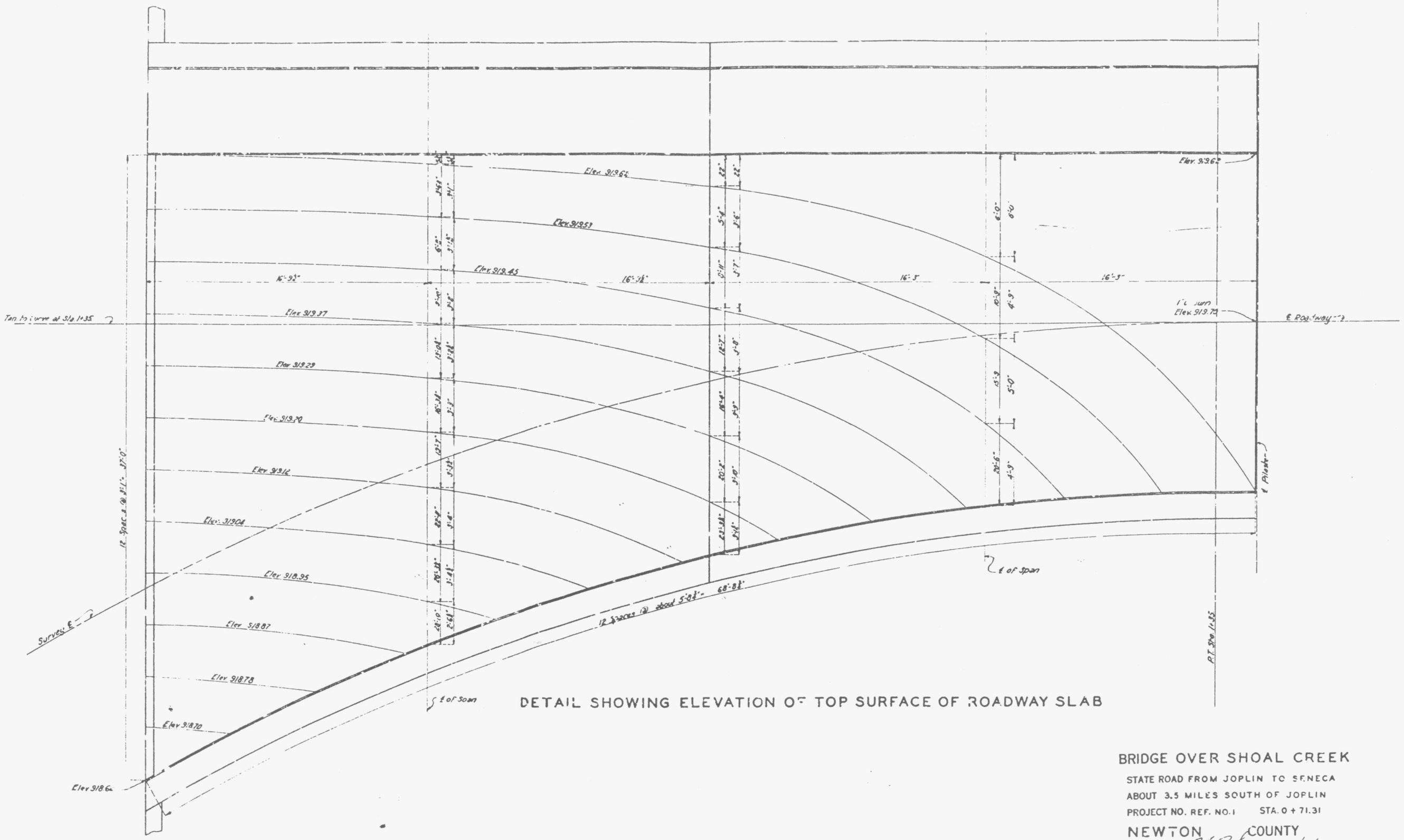
Assembled Dec. 1929 By A.F.K. and H.M.S.
Checked Dec. 1929 By H.S.J.

STD. 5818

J-349

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	MO.	REF NO 1	19		



DETAIL SHOWING ELEVATION OF TOP SURFACE OF ROADWAY SLAB

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO. 1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY W.R. Cheek DATE BRIDGE ENGINEER 1/17/30

APPROVED BY T.H. Cutler DATE CHIEF ENGINEER 1/17/30

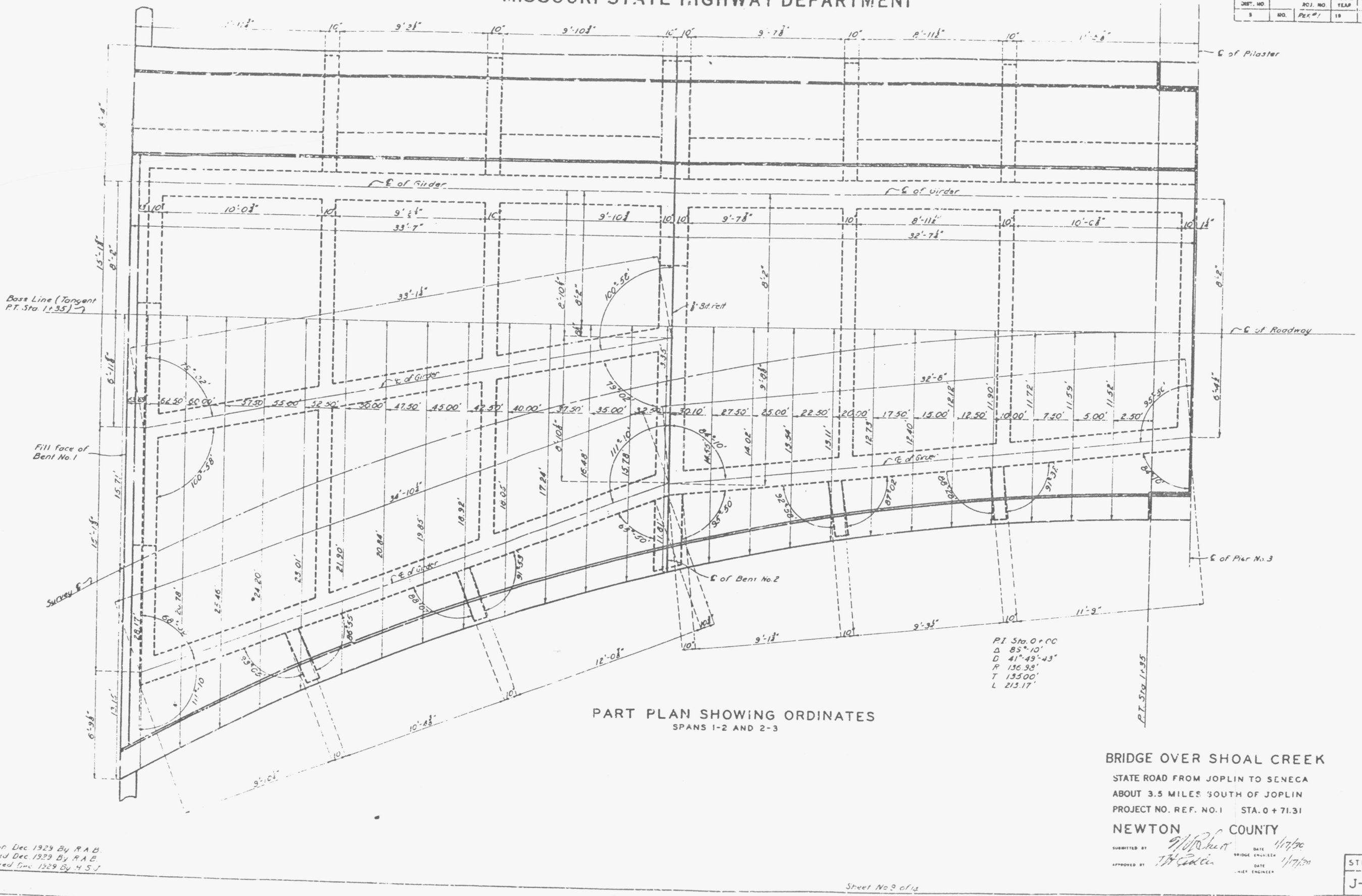
Drawn Dec 1929 By A.F.K.
Traced Dec 1929 By A.F.K.
Checked Dec 1929 By H.S.J.

STD. S818

J-349

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	PER #1	19		



PART PLAN SHOWING ORDINATES
SPANS 1-2 AND 2-3

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO. 1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY [signature] DATE 1/17/30 BRIDGE ENGINEER

APPROVED BY [signature] DATE 1/17/30 CHIEF ENGINEER

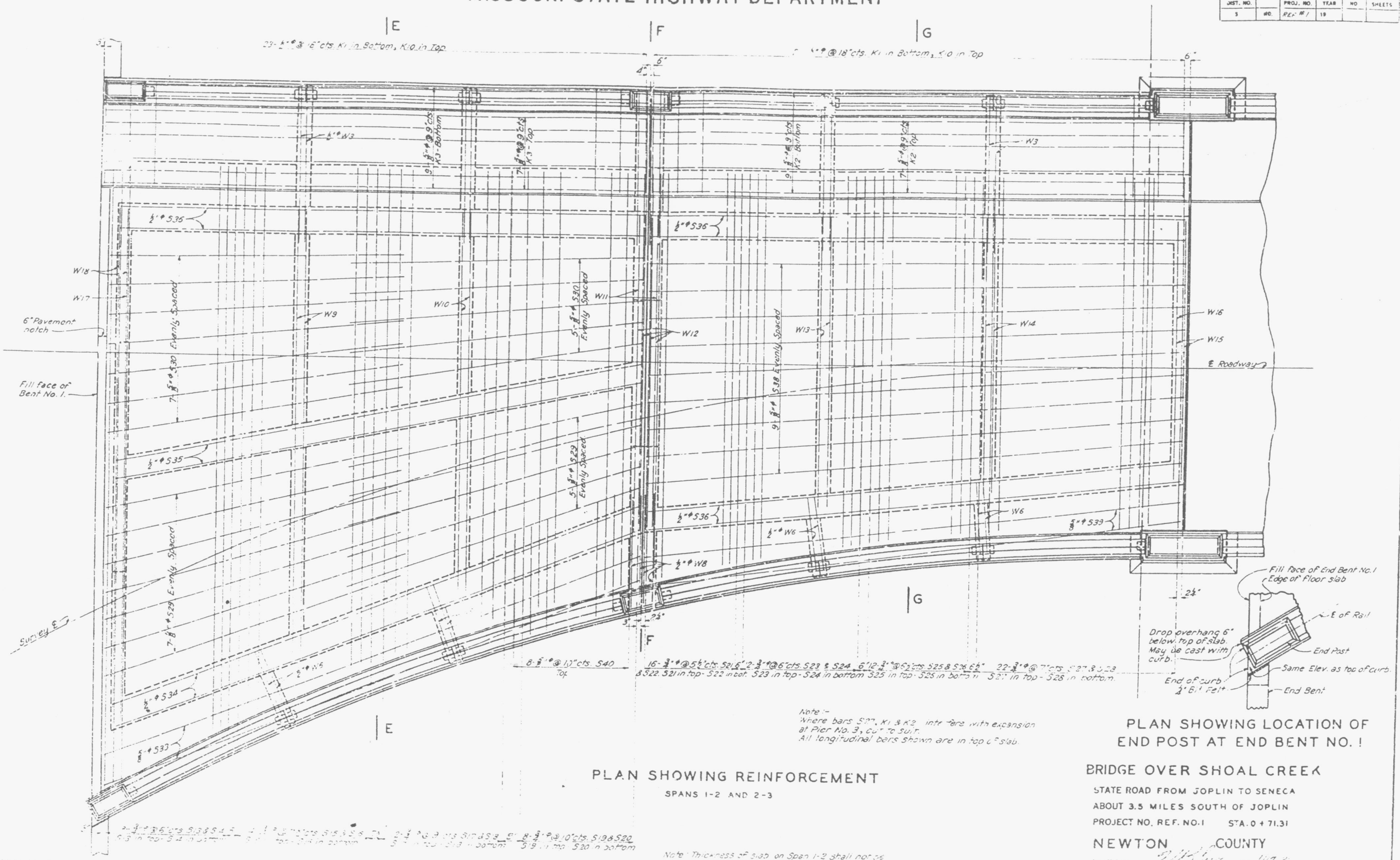
Drawn Dec 1929 By R.A.B.
Traced Dec 1929 By R.A.B.
Checked Dec 1929 By H.S.J.

STD. 5818

J-349

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO	TOTAL SHEETS
5	MO.	REF. #1	19		



Note:-
Where bars S27, K1 & K2 interfere with expansion at Pier No. 3, cut to suit.
All longitudinal bars shown are in top of slab.

PLAN SHOWING REINFORCEMENT

SPANS 1-2 AND 2-3

Note: Thickness of slab on Span 1-2 shall not be less than 10". Thickness of slab on Span 2-3 shall not be less than 10½".

PLAN SHOWING LOCATION OF END POST AT END BENT NO. 1

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO.1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY _____ DATE 1929
BRIDGE ENGINEER

APPROVED AT _____ DATE
STATE ENGINEER

Drawn Dec. 1929 By E.A.B
Traced Dec. 1929 By R.J.G.
Checked Dec. 30 By W.W.H.

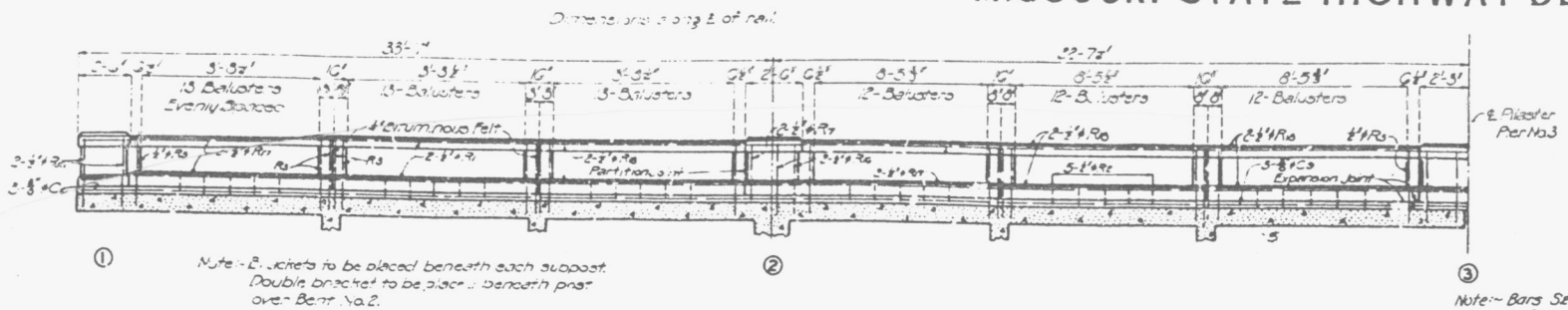
Sheet No. 1 of 1 Sheets

STD. 5818

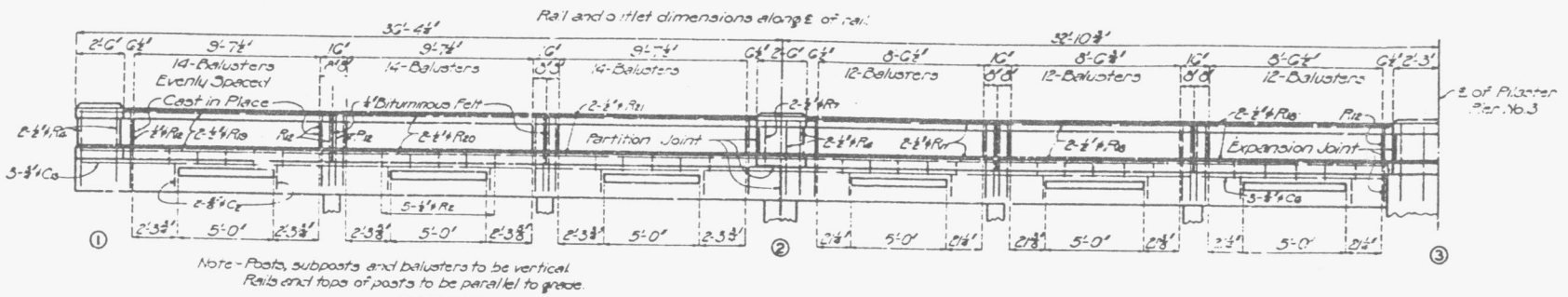
J-349

MISSOURI STATE HIGHWAY DEPARTMENT

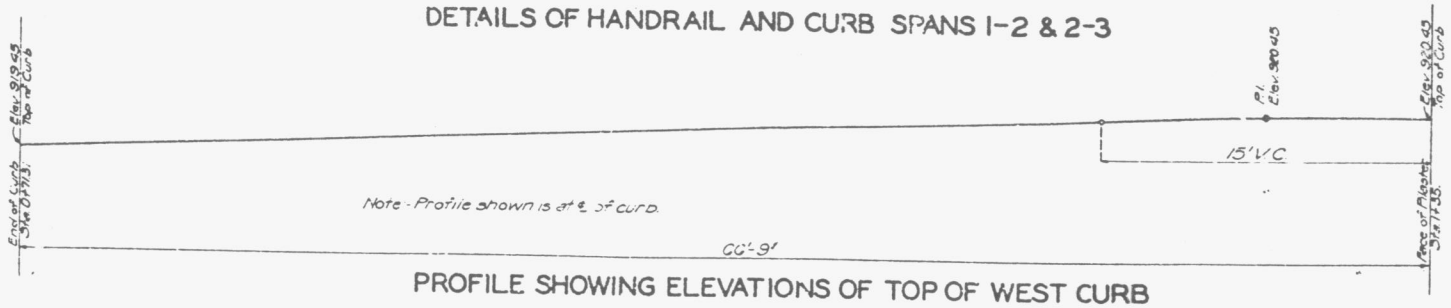
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
8	MO.	REF. NO. 1	19		



PART ELEVATION SHOWING HANDRAIL & CURB
EAST RAIL

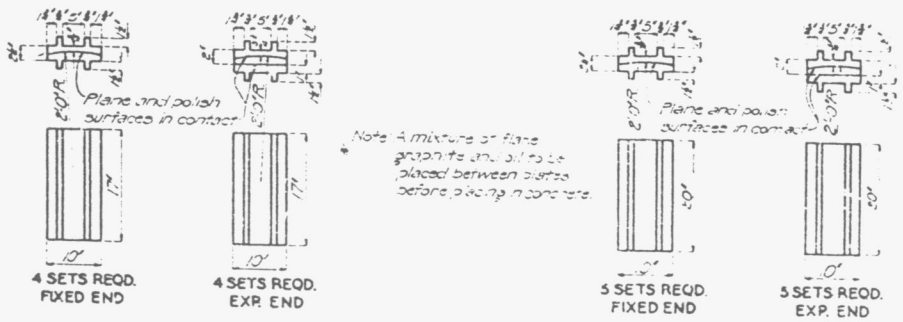


PART ELEVATION DEVELOPED SHOWING HANDRAIL & CURB
WEST RAIL

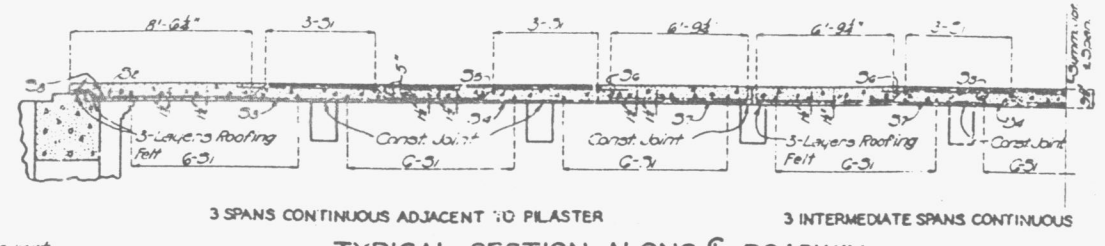


PROFILE SHOWING ELEVATIONS OF TOP OF WEST CURB

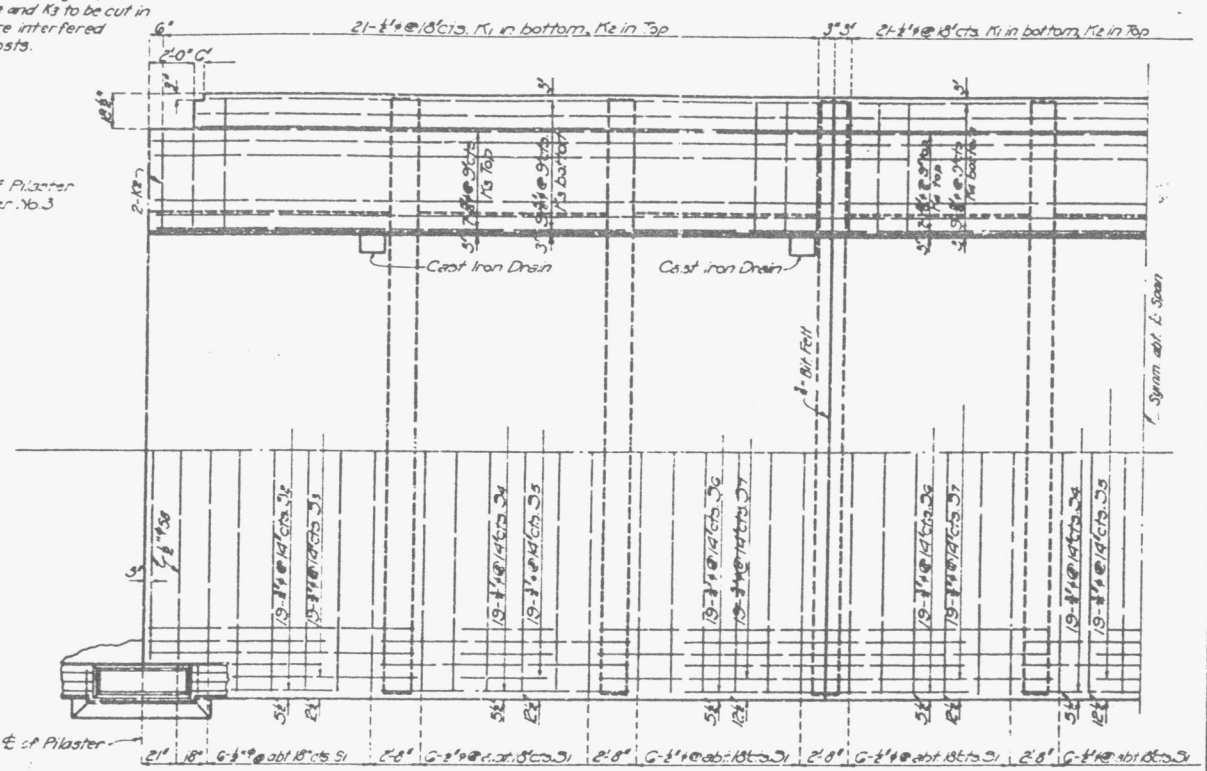
DETAILS OF HANDRAIL AND CURB SPANS 1-2 & 2-3



PHOSPHOR BRONZE BEARING PLATES



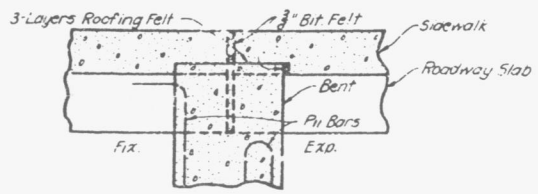
TYPICAL SECTION ALONG ℄ ROADWAY



Note - Reinforcing shown in roadway includes only that part in bottom of slab. Bars bent up into top of slab are shown in above section.

TYPICAL PLAN OF SLAB SPANS OVER ARCHES SHOWING REINFORCING

Note - Bars S2 and S3 to be bent in field to clear key at pilaster. Bars S2, S3 and K3 to be cut in field where interfered with by posts.



SECTION THRU BRACKET KEY AT SPANDREL BENTS NO.3 SHOWING EXPANSION JOINT

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJECT NO. REF. NO. 1 STA. 0 + 71.31

NEWTON COUNTY

SUBMITTED BY W.A. Green BRIDGE ENGINEER DATE 11/7/38

APPROVED BY T.H. Cutler CHIEF ENGINEER DATE 1/17/39

STD. S 818

J-349

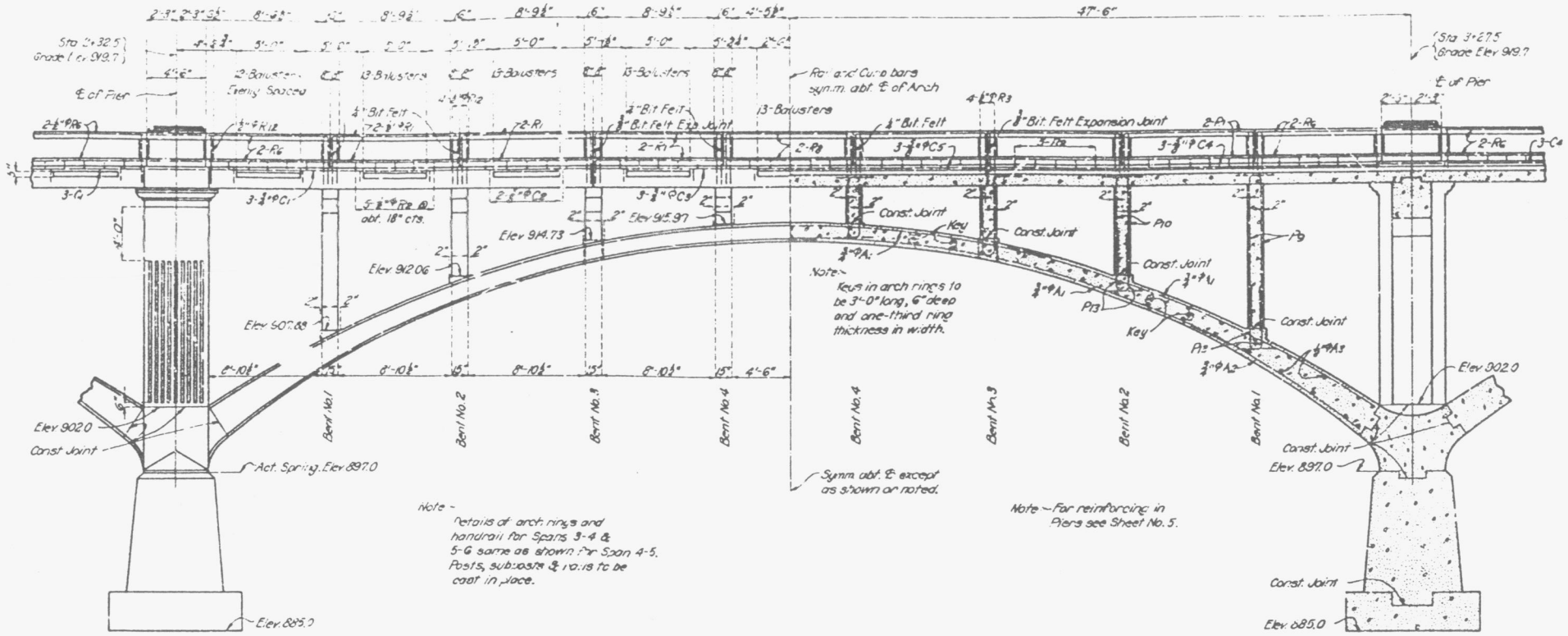
Drawn by 1929 by R.A.B. & H.E.C.
Traced by [illegible]
Checked by [illegible]

Sheet No 11 of 14

BEARING PLATES-ARCH SLAB-DECK GIRDER HANDRAIL

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	REF NO 1	19		



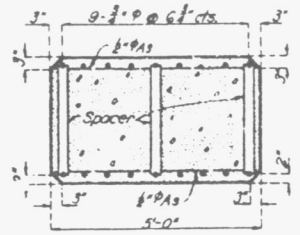
Note -
Details of arch rings and handrail for Spans 3-4 & 5-6 same as shown for Span 4-5. Posts, substructure & footing to be cast in place.

Note - Keys in arch rings to be 3'-0" long, 6" deep and one-third ring thickness in width.

Note - For reinforcing in Piers see Sheet No. 5.

④ HALF ELEVATION

HALF SECTION THRU ARCH RING ⑤

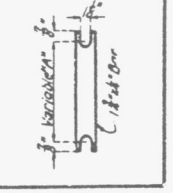


Note -
¾"℄ bars A3 @ 2'-6" ctrs. measured horizontally, are to be placed in ring at points where ordinates are shown in detail giving "Dimensions of Arch Ring." Spacers to be placed as shown in above detail and spaced same as ½"℄ tie bars. Wire spacers securely to both main and transverse steel

SECTION THRU ARCH RING SHOWING REINFORCING

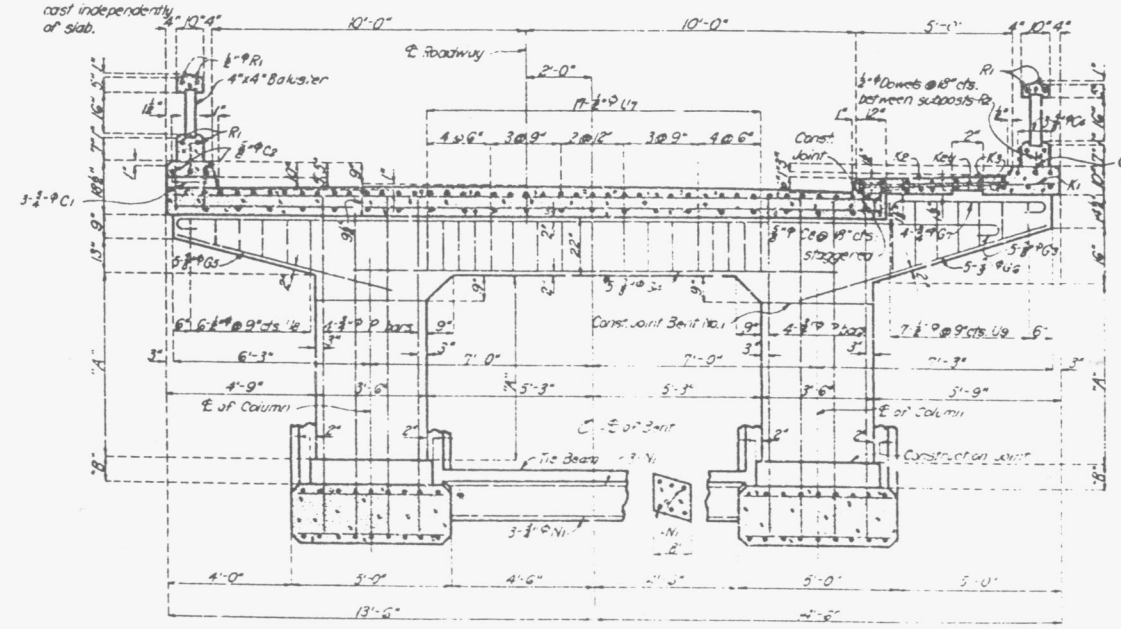
BAR SPACERS FOR RINGS

No. of Bars	Dimen. "A"	No. of Bars	Dimen. "A"
36	2'-5 ⅛"	36	14 ¾"
36	2'-4"	36	14 ¼"
36	2'-0 ⅜"	36	14 ⅛"
36	21 ¾"	72	14"
36	19 ⅜"	72	13 ¾"
36	17 ⅛"	36	13 ⅜"
36	16 ¾"	36	13 ⅛"
36	15 ⅜"	54	13"



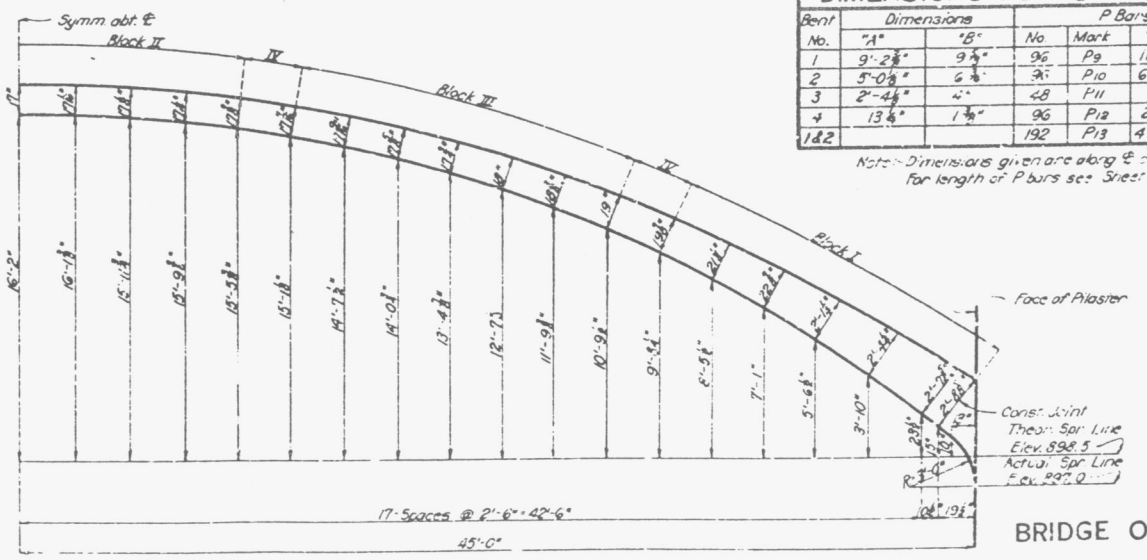
Note - Weight of bar spacers included in weight of reinforcing steel.

Note -
West curb to be cast independently of slab.



TYPICAL SECTION THRU ROADWAY
NEAR SPANDREL BENT NO. 2

Note -
Tie beams at spandrel bent No. 3, right and left.
For location of cast iron drains see plan of slab on Sheet No. 11.

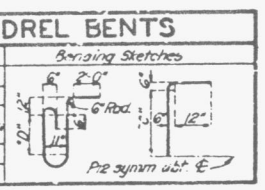


DIMENSIONS OF ARCH RING

Note -
Arch rings blocks to be poured in the following order.
Block I in both ribs, right and left.
Block II in both ribs.
Block III in both ribs, right and left.
Block IV keys.
No keys shall be poured until all of concrete in adjacent blocks has been in place at least 24 hours.

DIMENSIONS & BARS FOR SPANDREL BENTS

Bent No.	Dimensions "A"	Dimensions "B"	P Bars No.	P Bars Mark	P Bars "C"	P Bars "D"
1	9'-2⅝"	9 ¾"	96	P9	11'-2⅝"	
2	5'-0 ⅞"	6 ⅝"	96	P10	6'-5½"	
3	2'-4 ⅛"	2"	48	P11		4'-5½"
4	13 ¾"	1 ¾"	96	P12	20 ⅝"	
1&2			192	P13	4'-2⅝"	



Note - Dimensions given are along ℄ of bar and are for computed lengths. For length of P bars see Sheet No. 2

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA
ABOUT 3.5 MILES SOUTH OF JOPLIN
PROJECT NO. REF. NO. 1 STA. 0 + 71.31
NEWTON COUNTY

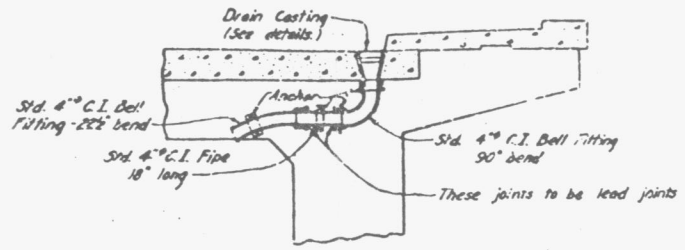
SUBMITTED BY [signature] DATE 11/1/30 BRIDGE ENGINEER
APPROVED BY [signature] DATE 11/1/30 CHIEF ENGINEER

STD. S818
J-349

Drawn Nov 1929 By H.F.C.
Traced Nov 1929 By H.F.C.
Checked Dec 1929 By N.W.R.

MISSOURI STATE HIGHWAY DEPARTMENT

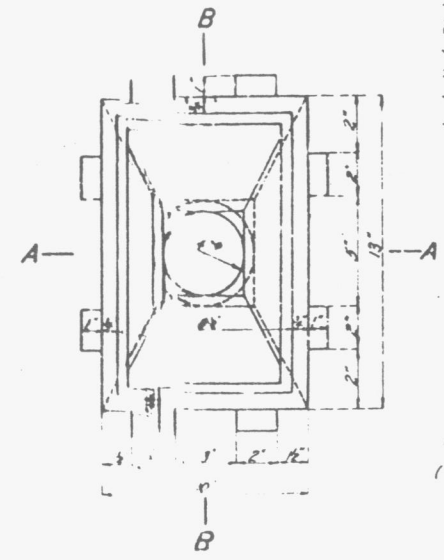
FED. PROJ. CONT. NO.	STATE	FED. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MO.	REF. #1	32		

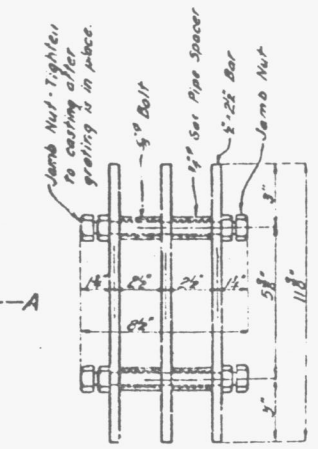


DRAIN CASTING AND DOWNSPOUT

12 - Required

Weight of drain casting, pipe, anchors and grating included in weight of cast iron.

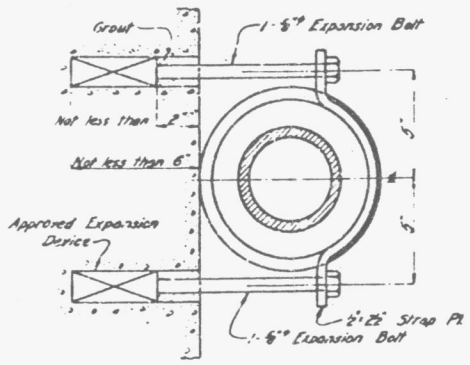




DETAIL OF GRATING

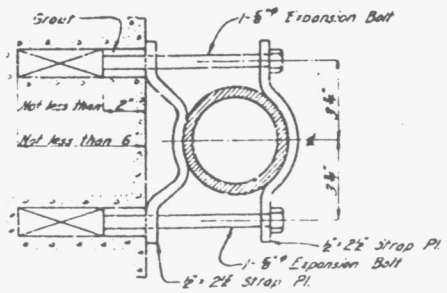
(Cast iron grating of approved design, and equivalent strength may be substituted if desired.)

PLAN



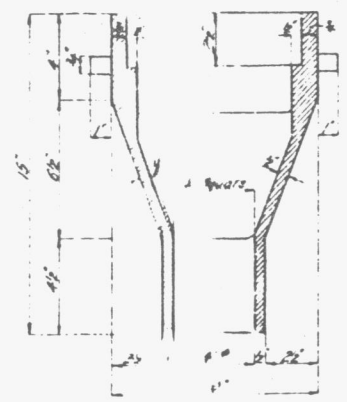
DETAIL OF ANCHOR AT BELL

24 - Required

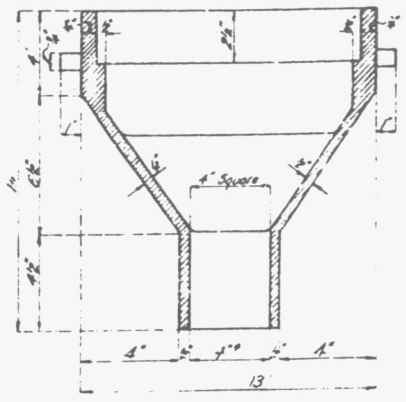


DETAIL OF ANCHOR ON STRAIGHT PIPE

24 - Required



SECTION A-A



SECTION B-B

DETAILS OF DRAIN CASTING

Materials - Cast Iron.
12 - Castings Required

Note:-
Drains to be placed at walk on [illegible] spans at spandrel bents no. 1 and 3.
See location shown on Plan of Arch [illegible] Sheet No. 11.

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA
ABOUT 3.5 MILES SOUTH OF JOPLIN
PROJECT NO. REF. NO. 1 STA. 0+71.31
NEWTON COUNTY

SUBMITTED BY W.K. Black DATE 1/17/30 BRIDGE ENGINEER

APPROVED BY T.H. Cutler DATE 1/17/30 CHIEF ENGINEER

STD. 5318
J-349

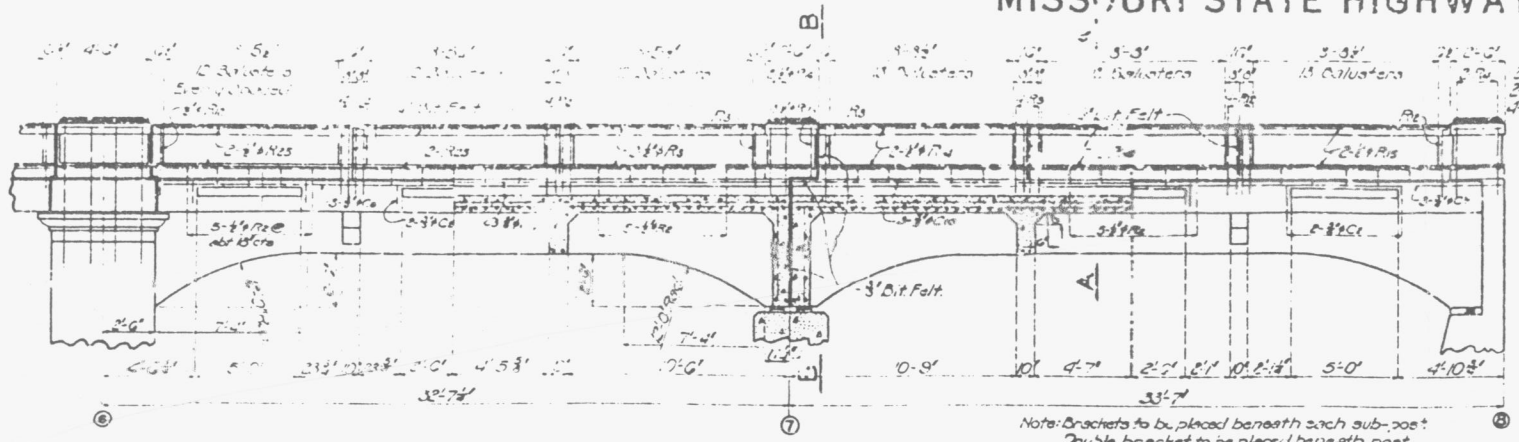
Assembled Dec. 1929 By P.J.G.
Checked Dec. 1929 By N.W.R.
Drawn May 1928 by F.M.H.
Traced May 1928 by K.M.R.
Checked May 1928 by [illegible]

[illegible] of 14

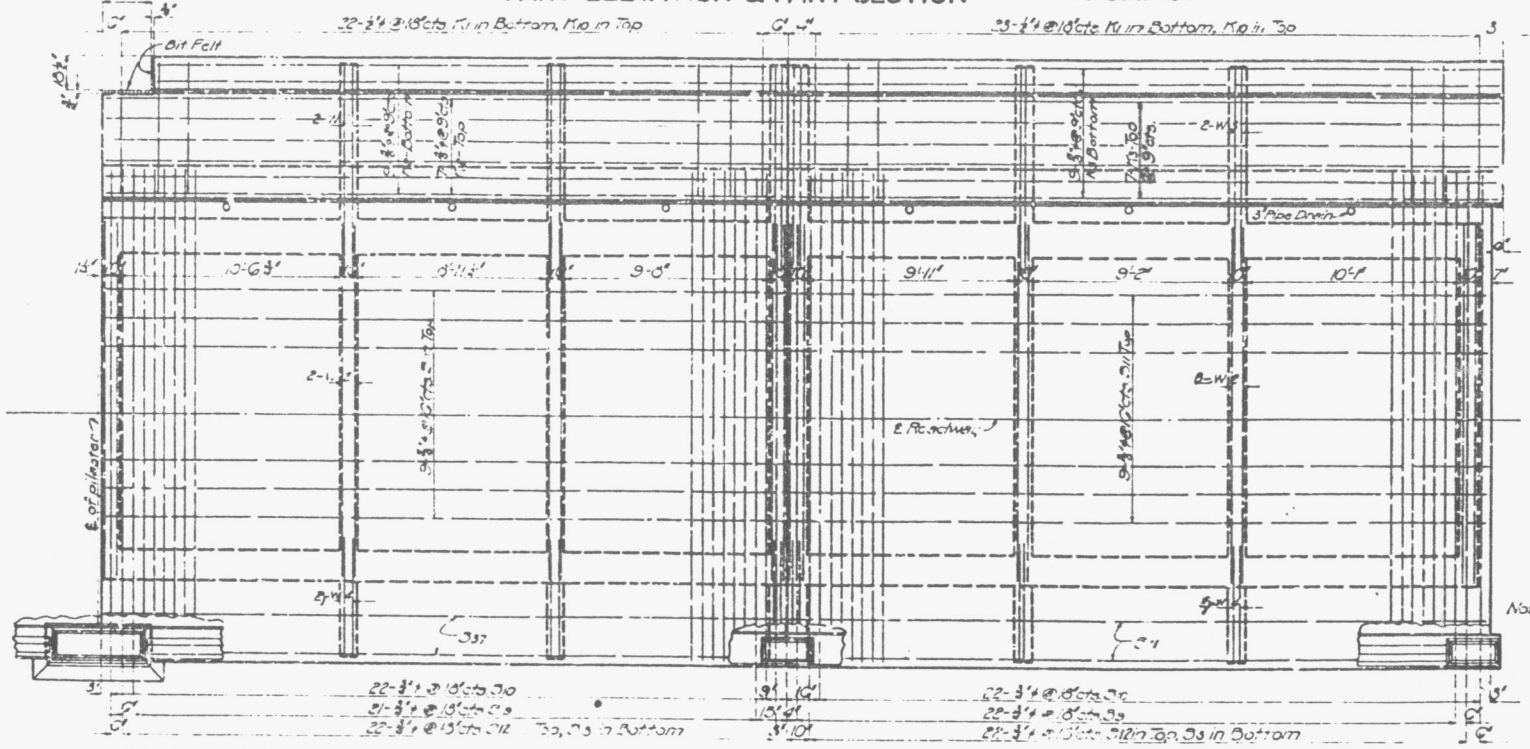
[illegible] DRAINS

MISSOURI STATE HIGHWAY DEPARTMENT

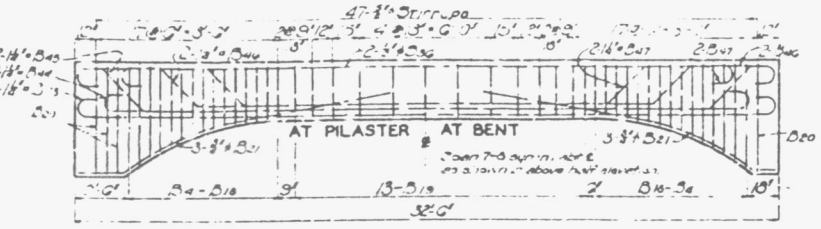
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	180	DEF. M)	19		



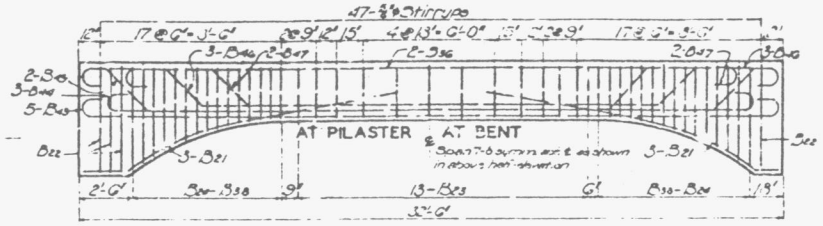
PART ELEVATION & PART SECTION



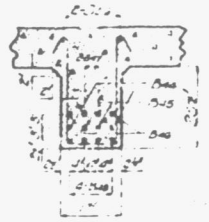
PLAN



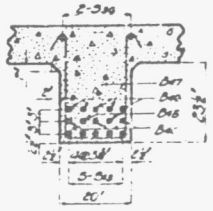
WEST GIRDER
SPAN 6-7 SHOWN



EAST GIRDER
SPAN 6-7 SHOWN

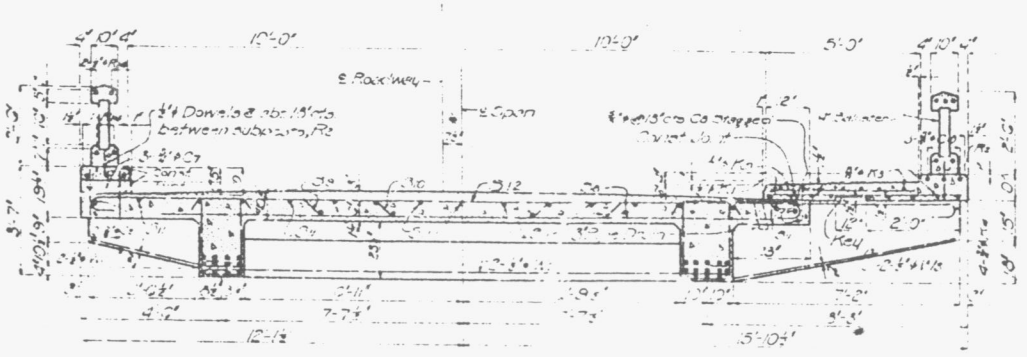


SECTION C-C

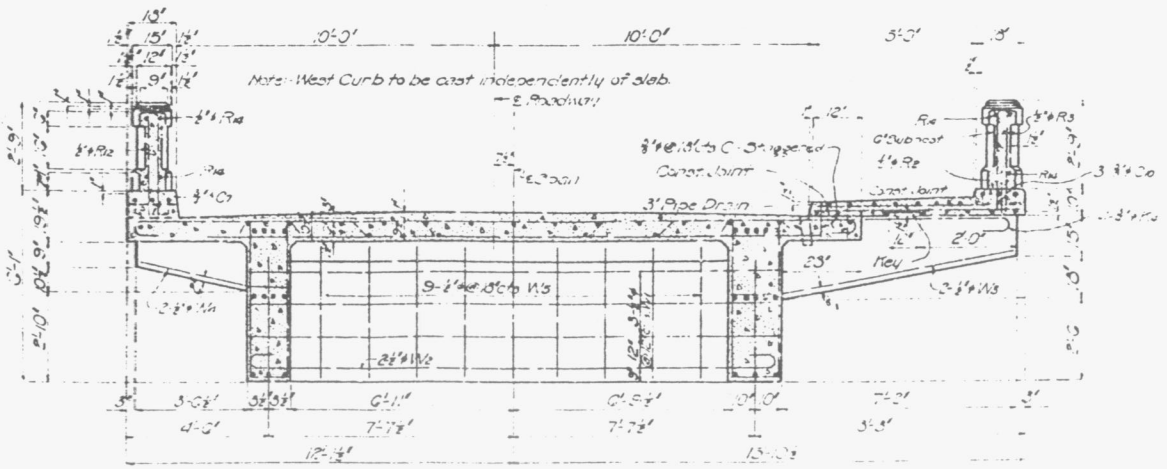


SECTION D-D

DETAILS OF GIRDER REINFORCEMENT



SECTION A-A



SECTION B-B

DETAILS OF GIRDER SPANS 6-7 & 7-8

BRIDGE OVER SHOAL CREEK

STATE ROAD FROM JOPLIN TO SENECA

ABOUT 3.5 MILES SOUTH OF JOPLIN

PROJ. NO. REF. NO. 1 STA. C 1 71.31

NEWTON COUNTY

SUBMITTED BY _____ DATE 11/17/30 BRIDGE ENGINEER

APPROVED BY _____ DATE 11/17/30 CHIEF ENGINEER

STD. 5818

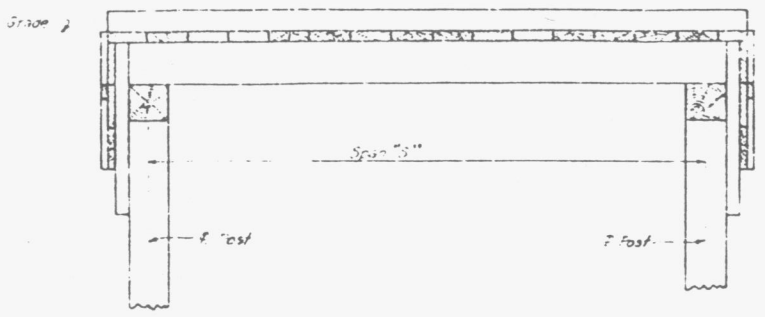
J-349

Drawn Nov 1929 by C.A.E.
Traced Dec 1929 by H.G.
Checked Jan 1930 by NNK

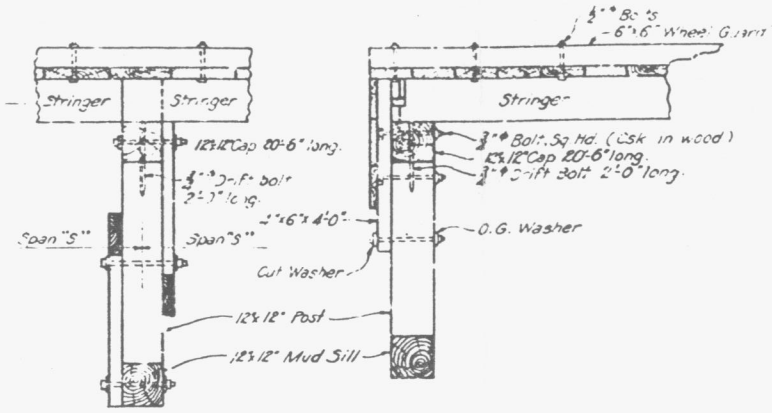
Sheet No 1 of 1 Sheets

MISSOURI STATE HIGHWAY DEPARTMENT

FED ROAD DIST NO	STATE	FED AID PROJ NO	FISCAL YEAR	SHEET NO	TOTAL SHEETS
5	MO	REF NO 1	19		

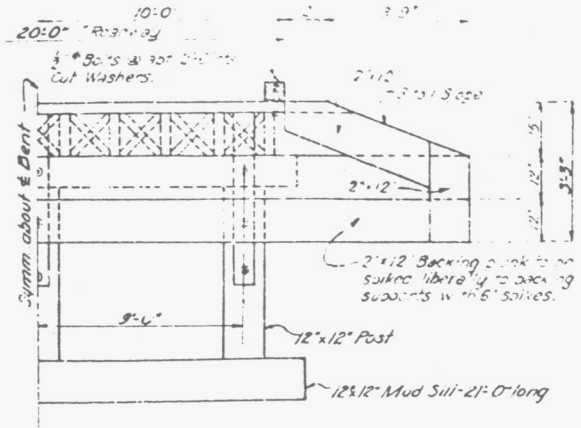


SIDE ELEVATION

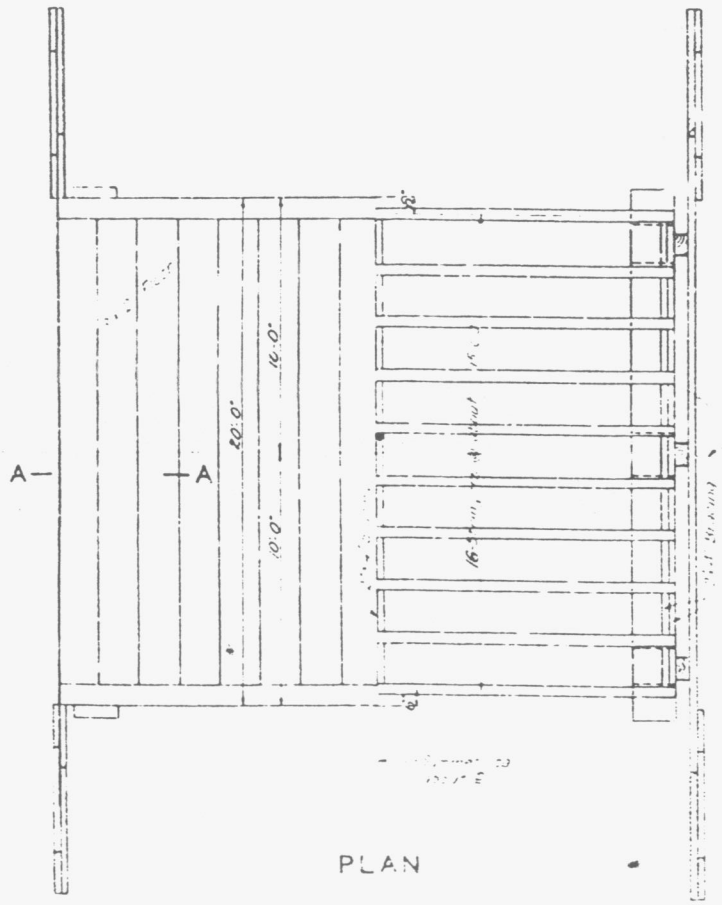


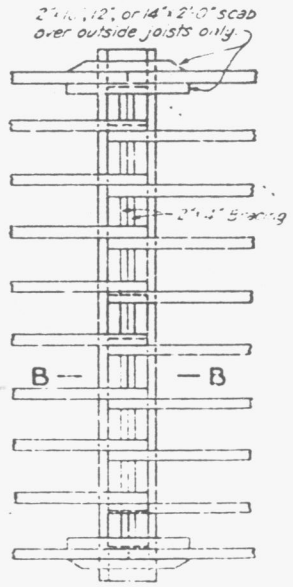
SECTION B-B

SECTION A-A

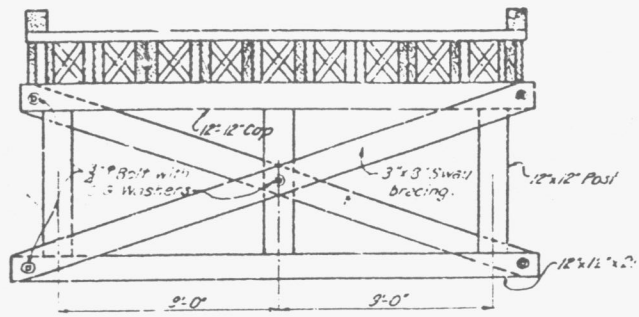


HALF ELEVATION OF END BENT





DETAIL OF JOIST CONNECTIONS OVER INTERMEDIATE BENT



ELEVATION OF INTERMEDIATE BENT

TABLE OF DIMENSIONS							
Span "S"	3'-0"	[illegible]-0"	[illegible]'-0"	[illegible]'-0"	[illegible]'-0"	[illegible]'-0"	[illegible]'-0"
Size of Joists	2"x10"	3"x10"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

GENERAL NOTES:
These spans are designed to support a load of 10 tons

TEMPORARY BRIDGE OVER SHOAL CREEK
STATE ROAD FROM JOPLIN TO SENECA
ABOUT 3.5 MILES SOUTH OF JOPLIN
PROJECT NO. REF. NO. 1 STA. 0+7131
NEWTON COUNTY
Sub mitted By [illegible]
Approved [illegible]

Assembled Dec 1939 By J.B.
Checked Dec 1939 By H.S.J.
Drawn [illegible]
Traced [illegible]
Specifications [illegible]

Sheet 1A of 1

J-349

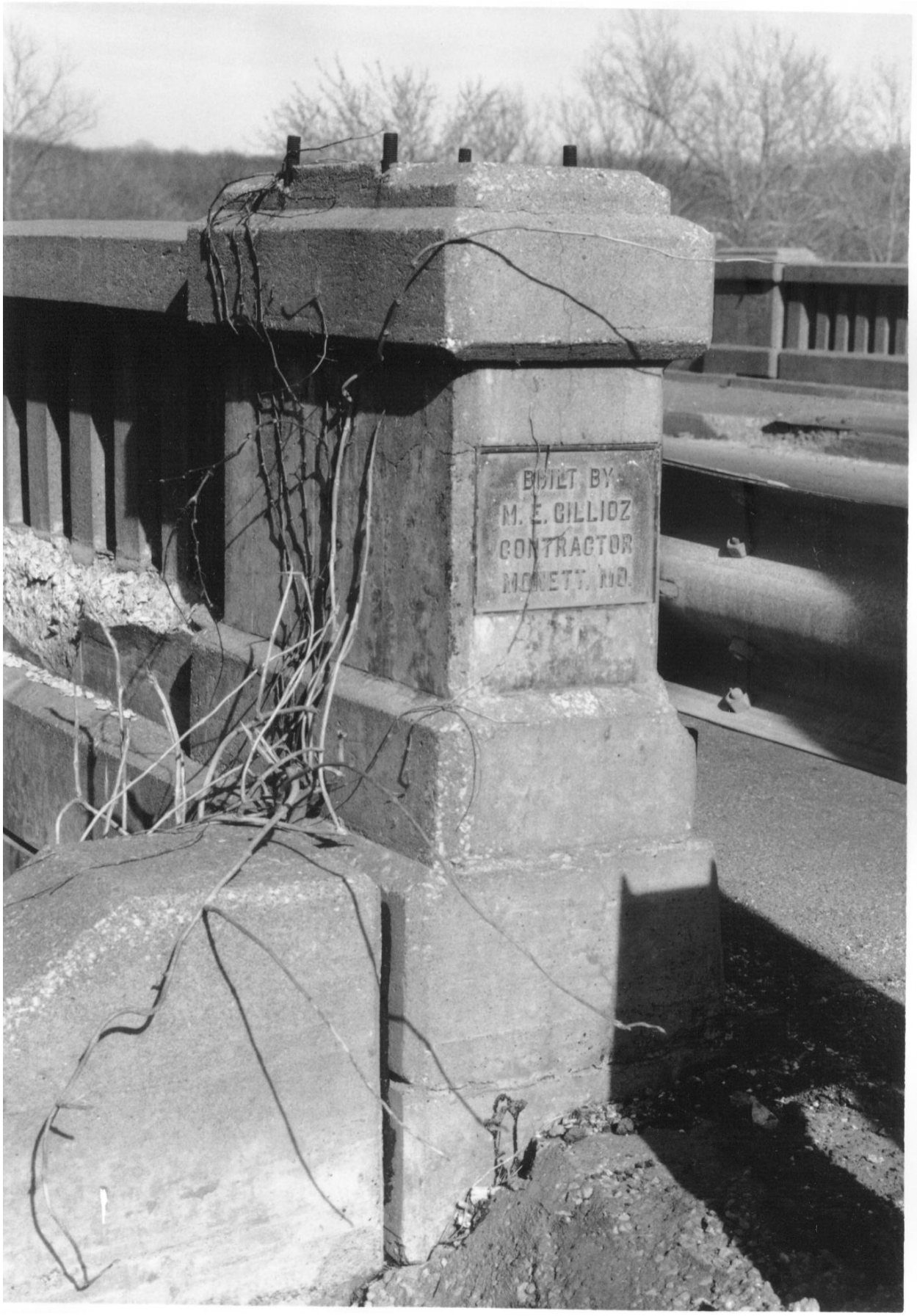
Index to Photographs

Reding's Mill Bridge over Shoal Creek
Bridge No. J-349
Newton County, Route 86

Randall Dawdy, Photographer
March 2000

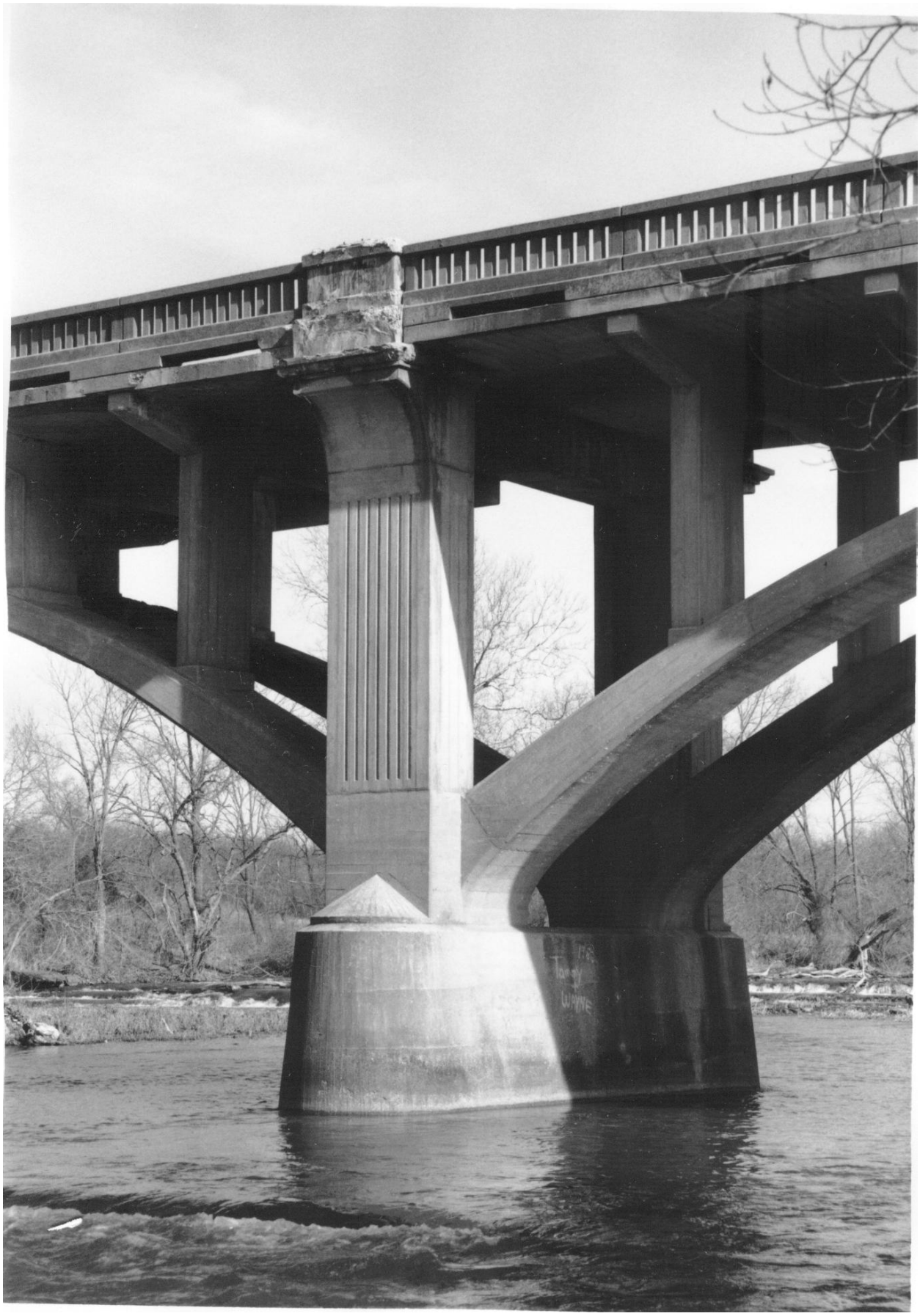
1. Endpost and nameplate on south side of bridge.
2. Bents 7 and 8 supporting approach span.
3. Details of Pier 5.
4. Concrete arch at span 3.
5. Balustrade and deck resting on superstructure.
6. Arches resting on piers.
7. Overall view of roadway.
8. Substructure detail.
9. Arches and subdeck.
10. Overall view of bridge from the southeast.

Photograph 1

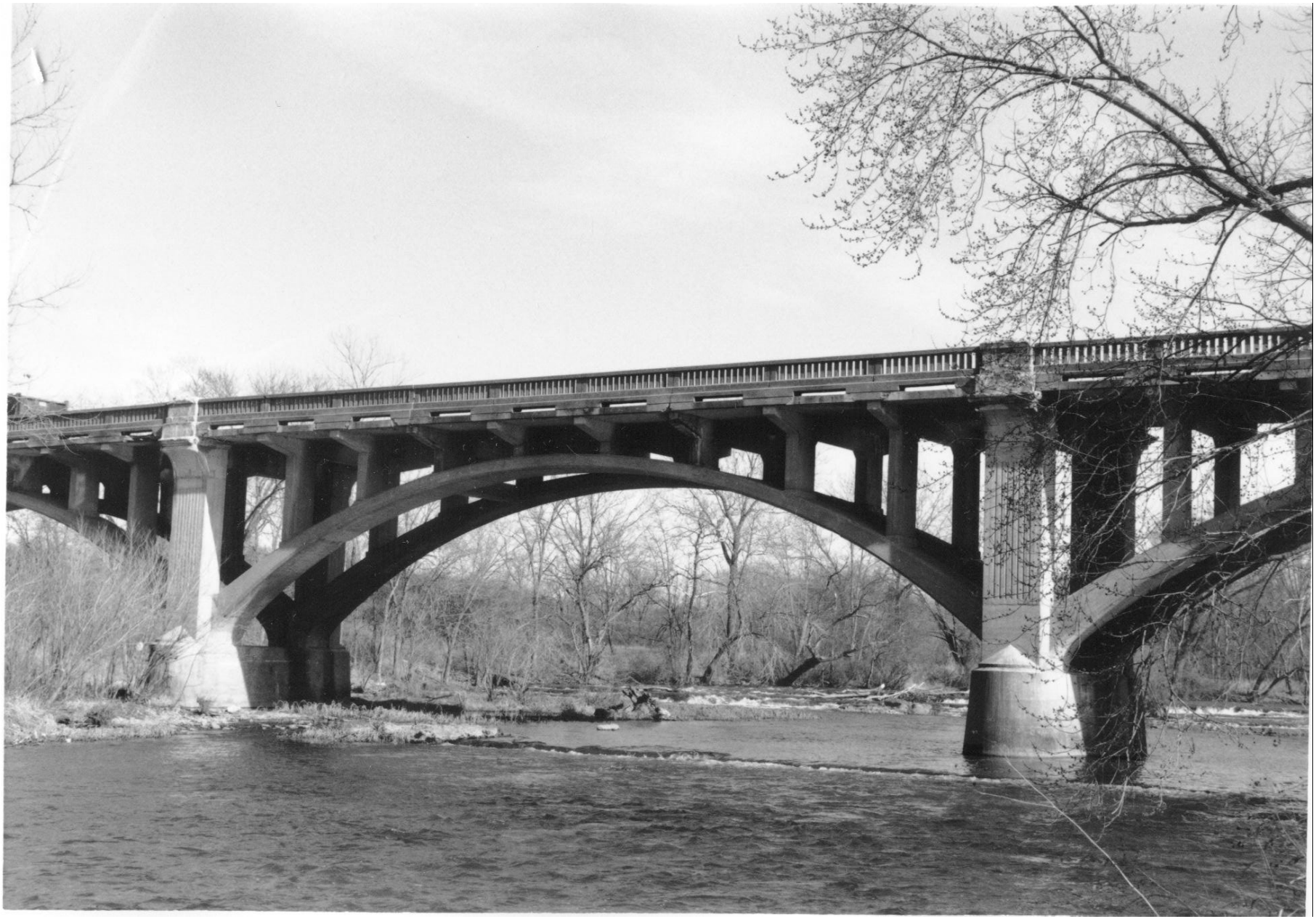


Photograph 2

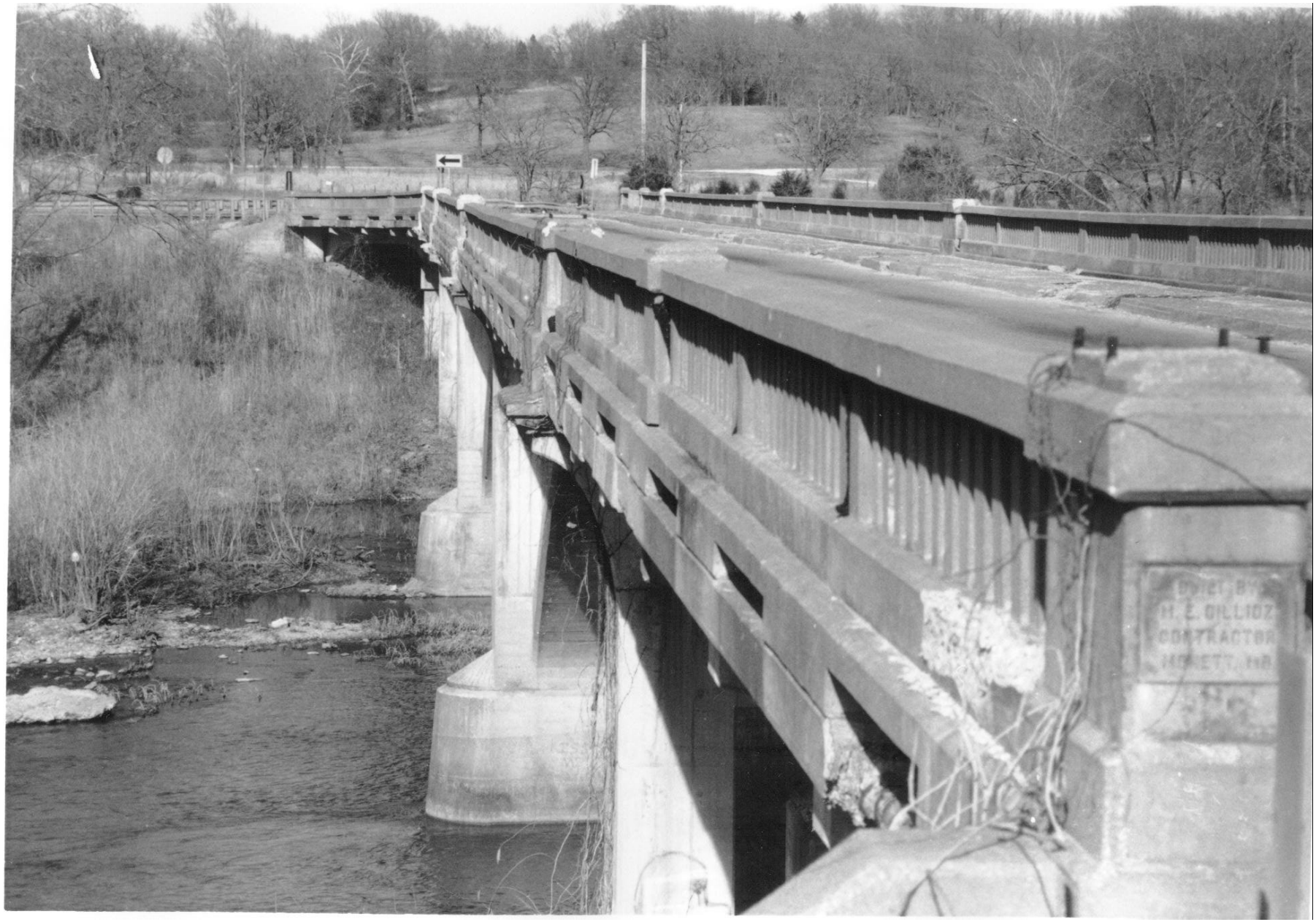
Photograph 3



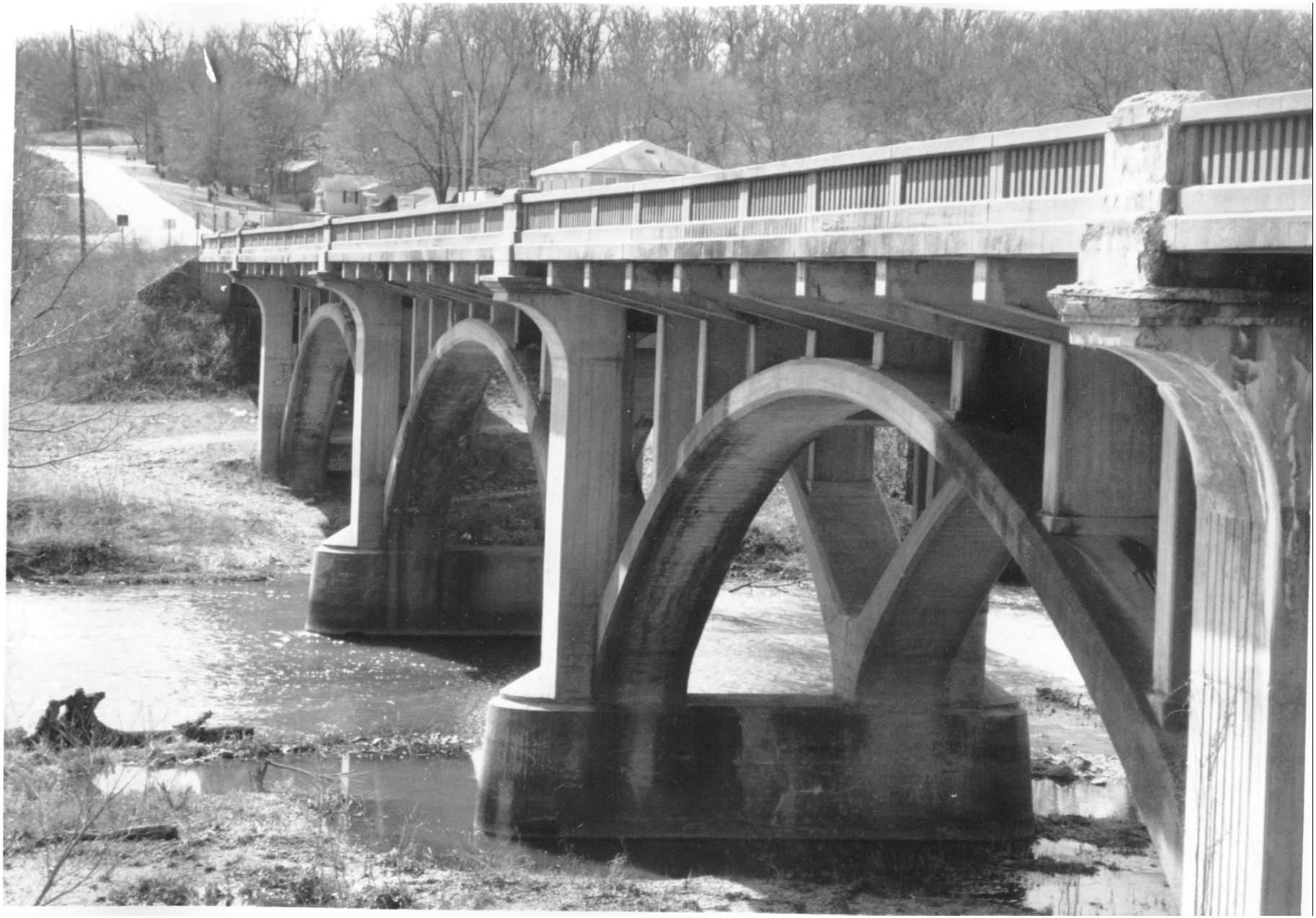
Photograph 4



Photograph 5



Photograph 6



Photograph 7

Photograph 8

Photograph 9

Photograph 10