
Documentation of the Historic Niangua River Bridge

Bridge No. X0195
Dallas County, Route K
January 2011



Historic Niangua River Bridge

MoDOT Bridge No. X0195

Dallas County, Route K
MoDOT Safe & Sound Project

Historical and Photographic Documentation

Prepared by:

Karen L. Daniels
Historian

Randall D. Dawdy
Photographer

Submitted to:

State Historic Preservation Office
Missouri Department of Natural Resources

Prepared for:

Federal Highway Administration
In Compliance with
Section 106 of the National Historic Preservation Act

Kevin L. Keith, Director
Missouri Department of Transportation

January 2011

HISTORIC DOCUMENTATION
BRIDGE X0195

I. Introduction

Location: Highway Bridge carrying Route K across Niangua River, Dallas County, Missouri

Construction Dates: ca. 1910, moved to this location 1937

Present Owner: Missouri Department of Transportation, Jefferson City, Missouri

Present Use: Highway Bridge to be removed and replaced by new river crossing

Significance: Bridge X0195 is eligible for the National Register of Historic Places under Criterion C as a well-preserved example of an early portable through truss bridge design. The bridge is 295' total length, with a 130' seven-panel, pin-connected Pratt through truss, and four steel I-beam stringer approach spans. The bridge has a 20' roadway.

Historian: Karen L. Daniels, Historic Preservation Section, Design Division, Missouri Department of Transportation, January 2011.

II. History of Bridge X0195

Improvements to Route K in Dallas County were planned in 1936 as part of the State Supplementary system authorized by the Painter-McCawley Act in 1927. This act had allowed for the creation of county highway commissions and the designation of 100 miles in each county as state supplementary, “farm to market” type roads. Funding for these roads came in 1928 when Proposition No. 3 was passed, amending the Missouri State Constitution. It provided \$75 million in bond funds and added 7000 miles of road to the state supplementary system.¹

In May 1936 the Preliminary Estimating and Design Division of the State Highway Department asked the Bridge Division to begin planning for a crossing of the Niangua River in Dallas County. At that time the tentative proposal was “to make use of the 130’ truss span formerly in place for the grade separation in Arlington, Phelps County, plus whatever approaches are necessary.”² It was noted that the present crossing was a ford, which was likely not serviceable more than it was, and the road was being improved under a Works Progress Administration (WPA) project up to the Niangua River crossing. The estimated cost of the project was about \$16,200 exclusive of engineering and contingencies, and not including estimated savings of about \$4,700 from using the old truss.³

In June a formal survey for the bridge and approaches to the Niangua River was approved. It was noted that, since the location of Route K had not yet been finalized, the crossing could be located on Route P or K.⁴

In July the Bridge Division had completed Preliminary Layouts for the Niangua crossing. The only change made between the preliminary layouts and bridge design was to decrease the road width from 20’6” to 20’. Special provisions noted the use of the old truss from the Frisco Railroad overhead at Arlington, which had been removed in 1923. Notes included changing the portals of the bridge to get acceptable clearances, and making sure that the plans included instructions to make sure all the bridge parts were available.⁵

In July 1936 *The Buffalo Reflex* announced that the State Highway Department was looking at locations for Routes K and P in Dallas County. The proposed location of Route K was described as:

¹ Austin, David C. and Thomas J. Gubbels. “A History of the Missouri State Highway Department.” Manuscript. Historic Preservation Section, Missouri Department of Transportation, Jefferson City, Missouri, pp. 14-15.

² “Memorandum” E. E. Dittbrenner to N. R. Sack, 28 May 1936. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

³ Ibid.

⁴ “Memorandum” C. W. Brown to S. M. Rudder, 10 June 1936. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

⁵ “Preliminary Layout.” 27 July 1936. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

Beginning on Route A just east of Niangua River bridge, thence north through west part of sections 28, 21, and 16, T34N, R19W, to point near Dulltown store, thence east and northeast through section 16 and northwest corner of 15, thence east along or near south line of sections 10, 11 and 12, thence northeast and east through section 7, thence east through sections 8 and 9, thence northwest through section 8, thence north through section 5 to Windyville.⁶

The article also included instructions for anyone who wanted to protest the location of either proposed route to contact the Springfield Division Engineer for procedures to get the opportunity to be heard by the Highway Commission before the final approval of the route.⁷

Two factions formed, one group preferring the route recommended by State Highway Department engineers, the other group preferring that Route K overlay an existing road “beginning at Buffalo and going north and east on the north side of the Niangua River to Windyville.”⁸ Both groups appeared before the State Highway Commission when it met in Jefferson City on September 8, and presented their arguments for their preferred routes. The Commission took the matter under consideration.⁹

At the October 13, 1936 meeting of the State Highway Commission, the report of the Chief Engineer was read and approved. Route K would be relocated:

Beginning on Route A in the southwest quarter of Section 28, thence on a relocation in a northerly direction through the western parts of Sections 28, 21 and 16, to or near the southeast corner of the southwest quarter of the northwest quarter of Section 16, in a northeasterly direction through the northwest quarter of Section 15, thence on a relocation along or near the north section line of Section 15, thence easterly along or near the present road and the section line between Sections 11 and 14 and east along or near the section line between Sections 12 and 13 to a point at or near the northeast corner of Section 13, all in Township 34 North, Range 19 West; thence from the point last named in an easterly and northeasterly direction through the south part of Section 7 and in an easterly direction through the south part of Section 8 to a point near the northeast corner of the southeast quarter of the southeast quarter of Section 8, thence on a relocation in a northwesterly direction through the northeast quarter of Section 8 to a point on the north section line of Section 8 near its midpoint, thence from the point last named in a general northerly direction along or near a present road for a distance

⁶ “To Locate Route K and P in Dallas County.” *The Buffalo Reflex*. 23 July 1936. Microfilm. Missouri State Historical Society, Columbia, Missouri, p.1.

⁷ *Ibid.*

⁸ Missouri State Highway Commission. “Minutes of the Meeting of the State Highway Commission Held in Jefferson City on September 8, 1936.” As held by the Secretary to the Missouri State Highway Commission, Missouri Department of Transportation General Headquarters, Jefferson City, MO, p. 7.

⁹ *Ibid.*

of approximately a mile and a half to a junction with the constructed portion of Route K.¹⁰

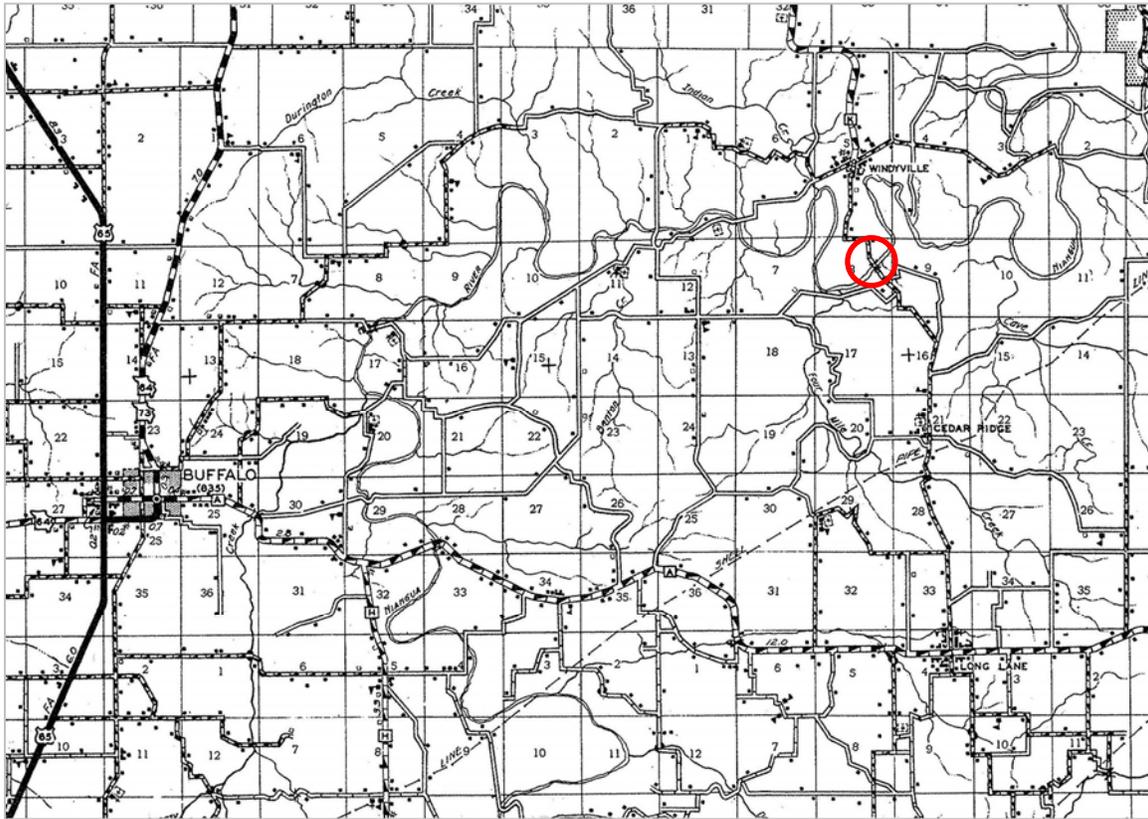


Figure 1. Location of Bridge X0195, Detail from *General Highway Map Dallas County, 1940*.

In November the WPA informed the State Highway Department that they would be unable to erect the Niangua River Bridge without financial assistance in renting the heavy equipment necessary. Equipment needed would include a small crane, an air compressor, jackhammer, pump and concrete mixer. It was estimated that the cost of the equipment would be about \$4000.¹¹

The State Highway Department had already agreed to supervise the erection of the bridge and provide necessary skilled workers, as long as the WPA reimbursed the department for the expenses and salaries of the workers.¹²

¹⁰ Missouri State Highway Commission. "Minutes of the Meeting of the State Highway Commission Held in Jefferson City on October 13, 1936." As held by the Secretary to the Missouri State Highway Commission, Missouri Department of Transportation General Headquarters, Jefferson City, MO, p. 40.

¹¹ "Memorandum" N. R. Sack to C. W. Brown. 3 November 1936. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

¹² Letter, J. J. Corbett to C. P. Owens, 16 September 1936. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

In December 1936 the Highway Commission approved providing assistance with engineering, skilled labor and heavy equipment. They approved the amount of \$4,000 to cover the costs of Highway Department participation in the project.¹³

In January 1937 *The Dallas County Republican* announced that Oren K. Watkins had been appointed General Foreman for WPA projects in Dallas County. At that time there were 8 active WPA projects employing 280 men.¹⁴

In April 1937 *The Buffalo Reflex* reported that H. H. Scott, a Windyville merchant, had reported that work had begun on the Niangua River bridge at the Bennett Ford two miles south of Windyville on the Windyville-Long Lane Road. Five or six State Highway Department men were working on the bridge, and the previous Saturday twenty WPA workers had been assigned to work on the bridge.¹⁵

In April and May 1937 the State Highway Department had a small crew, consisting of a foreman and three to four workers on the site. May personnel included a form builder, so work was progressing on the piers and bents for the bridge. Work was apparently delayed due to the lack of sufficient WPA workers on site. The deficiency was corrected in June when 18 additional men were added to the bridge crew and the WPA let a contract for two haulage teams.¹⁶

July expenses included drayage for a concrete mixer, indicating they were ready to pour concrete for the piers and bents.¹⁷ Construction must have proceeded quickly after that since the bridge was inspected and approved for acceptance by the State Highway Department on September 21, 1937.¹⁸

In September the County requested additional State Highway Department assistance in building the approaches to the bridge, including the fills. It was estimated that the work would cost about \$700. The Department took the view that the Commission had wanted

¹³ Missouri State Highway Commission. "Minutes of the Meeting of the State Highway Commission Held in Kansas City on December 3, 1936." As held by the Secretary to the Missouri State Highway Commission, Missouri Department of Transportation General Headquarters, Jefferson City, MO, p. 10.

¹⁴ "O K Watkins Appointed General WPA Foreman." *The Dallas County Republican*. 7 January 1937. Microfilm, State Historical Society of Missouri, Columbia, Missouri, p. 3.

¹⁵ "Begin Work on Bridge." *The Buffalo Reflex*. 8 April 1937. Microfilm. State Historical Society of Missouri, Columbia, Missouri, p. 1.

¹⁶ "Inter-department Correspondence." 28 August 1937. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri; Letter, N. R. Sack to J. M. McCann, 22 May 1937, Microfiche, Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri; Letter, N. R. Sack to J. M. McCann, 9 June 1937, N. R. Sack to J. M. McCann, Microfiche, Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

¹⁷ Letter, N. R. Sack to J. M. McCann, 11 August 1937. Microfiche, Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

¹⁸ Memorandum. C. P. Owens to N. R. Sack, 22 September 1937, Microfiche, Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

the bridge to be usable to the public, and assisted with the construction of the approaches.¹⁹

The last work done in the construction of the bridge was sandblasting the old truss and painting it with red lead paint. This work occurred in April 1938.²⁰

III. Physical Description of Bridge X0195

Bridge X0195 is 295' in total length, with a 130' seven-panel, pin-connected Pratt through truss main span, and four steel I-beam stringer approach spans. Between bent 1 and pier 2 is a 21' I-beam stringer span, between piers 2 and 3 is a 130' seven-panel pin-connected Pratt through truss, between pier 3 and bent 4 is a 45' I-beam steel stringer span, between bents 4 and 5 is a 45' I-beam steel stringer span, and between bents 5 and 6 is a 45' I-beam steel stringer span. The sub-structure of the bridge consists of six bents and piers.

Bent 1 is the end bent or abutment on the northwest end of the bridge. The footings of bent 1 are 2' 6" X 3' 6" and are at an elevation of 915.0' above mean sea level. The plans noted that all "loose, shelly, or disintegrated rock shall be removed and the footings placed on hard, solid, undisturbed rock."²¹ The two columns are centered on the footings, and are 18" square with a 6" inset from each edge of the footing. The haunches begin 18" below the bent cap, and angle out at a 45-degree angle and extend 18" from each side of the column. The beam contains four expansion bearings, centered 3' and 9' from the centerline of the bent. The bearings are 8" X 1" X 10." The beam is 16' 6-3/4" wide on centerline of the beam and 12" thick. The bent cap is 16' 6-3/4" wide on centerline, with a truss bed 10' 8" wide, a 12" curb, and 4' 10-3/4" of wing wall, the overall depth of the cap is 4' 9-1/8". The truss bed is 2' 0-1/8" deep, and the wing walls taper to 18" at their ends.

The overall height of bent 1 is 11' 0" from the base of the footing to the top of the bent cap. The riverside of the bent is battered at 3" per 12" and the bent tapers from 3' 6" at the base to 2' 3" at the top of the bent cap. Plans indicated that the bent was not to be filled "above bottom of beam until superstructure span (1-2) is in place."²²

Pier 2 has footings that are 5' X 5' 6" and are at an elevation of 909.0' above mean sea level. The footings are 4' thick. The columns are 3' X 3' 6" and are inset from the edges of the footings 12". The columns for pier 2 are 7' 8-7/8" tall between the footings and the column capital; each column has a 12" capital offset 4" wider than the column.

¹⁹ Memorandum. S. W. Rudder to C. P. Owens, 22 September 1937. Microfiche. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

²⁰ Letter. J. M. McCann to N. R. Sack, 6 April 1938. Microfiche, Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

²¹ Missouri State Highway Department. "Bridge over Niangua River, Project No. WPA-SK-S2A Dallas County." 1936. Microfilm. Bridge Division, Missouri Department of Transportation, Jefferson City, MO, p.

1.

²² Ibid, p. 2.

The bottom of the bent cap is at an elevation of 813.0' above mean sea level. The bent cap is 18" deep, 5' wide and 13' 5" long around the centerline of the pier, with the centerline of the I-beams being located 6' and 3' from the centerline of the pier with 8" X 1" X 10" fixed bearings. The fixed bearing plates for the Pratt truss measure 2' 10" X 2' 3-1/2" and are located above the columns.

Pier 3 has footings that are 5' X 5' 6" and are at an elevation of 893.0' above mean sea level. The footings are 5' thick. The columns are 3' X 3'6" and are inset from the edges of the footings 12". The columns for pier 3 are 22' 5-1/4" tall between the footings and the column capital; each column has a 12" capital offset 4" wider than the column.

The bottom of the bent cap is at an elevation of 906.0' above mean sea level. The bent cap is 18" deep, 5' wide and 13' 5" long around the centerline of the pier, with the centerline of the I-beams being located 6' and 3' from the centerline of the pier with 8" X 1" X 10" fixed bearings. The expansion bearing plates for the Pratt truss measure 2' 10" X 2' 3-1/2" and are located above the columns.

Bent 4 has footings that are 3' X 3' and are at an elevation of 894' above mean sea level. The footings are 2' thick. The columns are 2' X 2' and 25' 0-3/4" from the top of the footing to the bottom of the bent cap. The haunches begin 18" below the bent cap, 18" from either end of the bent cap, and extend out 18" from the column. The inside edges of the columns are 13' 6" apart, centered 6' 9" from the centerline of the bent.

The bottom of the bent cap is at an elevation of 921.75' above mean sea level. The bent cap is 2' 3" deep, 2' wide and 20' 6" wide. The expansion bearing plates measure 10" square. Two bearing plates are centered 3' from the centerline of the bent; the other two are located 6' from the centerline of the bent.

Bent 5 has footings that are 3' X 3' and are at an elevation of 891' above mean sea level. The footings are 2' thick. The columns are 2' X 2' and 28' 0-3/4" from the top of the footing to the bottom of the bent cap. The haunches begin 18" below the bent cap, 18" from either end of the bent cap, and extend out 18" from the column. The inside edges of the columns are 13' 6" apart, centered 6' 9" from the centerline of the bent.

The bottom of the bent cap is at an elevation of 921.75' above mean sea level. The bent cap is 2' 3" deep, 2' wide and 20' 6" wide. The expansion bearing plates measure 10" square. Two bearing plates are centered 3' from the centerline of the bent; the other two are located 6' from the centerline of the bent.

Bent 6 is the end bent or abutment on the south end of the bridge. The footings are 2' 6" X 8' 11" at an elevation of 892.0' above mean sea level. The footings are 2' thick. The columns are 18" wide and varying thicknesses tapering from 7' 11" at the base to 7-1/2" near the bent cap. The batter angle was 3" per 12." The column is 26' 9-3/4" from the top of the footing to the bottom of the bent cap. The haunches begin 8' 1" from the edge of the wing wall, are 18" deep and 18" wide. The inside edges of the columns are 16 feet apart.

The bottom of the bent cap is at an elevation of 920.9' above mean sea level. The bent cap is 36' 4" wide, including the bottoms of the wing walls and of varying height. The width is 2' 3" overall—which includes 15" for the girder chair and 12" behind the girder chair. The four bearing plates are 10" square and are located 3' and 6' from the centerline. The crown of the roadway is 21' 4" long with a 12" space before the wing walls begin. The wing walls taper from a height of 5' 11-1/4" to 18" high and are 6' 8" long.

The bridge spans include three 45' long I-beam deck spans, one 130' long Pratt Through truss main span, and one 21' long I-beam deck span.

The northern most span is a 24' 5" I-beam span between bent 1 and pier 2. The I-beam span consists of four longitudinal I-beam stringers, spaced 6' apart and 3' from the centerline of the bridge. The I-beams are 16" tall with an 8" flange. At the north end of the span the stringers have 1" X 3" slots in the flanges that fit onto the bearing plates. There is one set of cross braces between the stringers 11' 1" on centerline from the end beam in addition to cross braces at each end of the span. The cross braces are formed by bars that are 3" X 2-1/2" X 1/4". The cross braces are connected to each I-beam at a polygonal gusset plate by three rivets. The southern end of the span is connected to pier 2 by a fixed bearing plate.

The main span between piers 2 and 3 is a 130' long, seven-panel Pratt through truss. (Plans for the Pratt truss are unavailable, so the description is based on photographs of the bridge.) The truss members are pin connected. The inclined end posts are constructed of paired channels with crisscross (or double) short bar lacing. The hip verticals consist of paired metal rods. The upper chord and verticals are constructed of paired channels with zigzag (or single) short bar lacing. Lateral bracing consists of paired eye bars. The lower chord consists of two eye bars. The sway bracing consists of channels, attached at 45-degree angles to the top chord and verticals by gusset plates near the junction with the top chord. Top lateral bracing consists of rods. The floor system consists of four I-beam stringers and six floor beams in addition to the end floor beams.

The third span is a 47' 4" long I-beam span with four longitudinal I-beam stringers spaced 6' apart and 3' from the centerline of the bridge. The I-beams are 16" tall with an 8" flange. The northern end of the span rests on a fixed bearing plate, and the southern end of the span has 1" X 3" slots in the flange that fit onto the expansion bearing plate. There are two sets of cross braces in addition to cross braces at each end of the span. The cross braces are connected to each I-beam at a polygonal gusset plate by three rivets.

The fourth span is a 45' 10" long I-beam span with four longitudinal I-beam stringers spaced 6' apart and 3' from the centerline of the bridge. The I-beams are 16" tall with an 8" flange. The northern end of the span rests on a fixed bearing plate, and the southern end of the span has 1" X 3" slots in the flange that fit onto the expansion bearing plate. There are two sets of cross braces in addition to cross braces at each end of the span. The cross braces are connected to each I-beam at a polygonal gusset plate by three rivets.

The fifth span is a 46' 11" long I-beam span with four longitudinal I-beam stringers spaced 6' apart and 3' from the centerline of the bridge. The I-beams are 16" tall with an 8" flange. The northern end of the span rests on a fixed bearing plate, and the southern end of the span has 1" X 3" slots in the flange that fit onto the expansion bearing plate on bent 6, the southern abutment. There are two sets of cross braces in addition to cross braces at each end of the span. The cross braces are connected to each I-beam at a polygonal gusset plate by three rivets.

Guardrails are mounted on both sides of the bridge by rail brackets formed of polygonal gusset plates and 4' long I-beam posts, onto which the two channels that form the guardrail are riveted. The guardrail runs the length of the bridge with the terminal posts being located on the abutments on each side.

The bridge floor slab is a 7" thick steel reinforced concrete slab with curbs that were cast independently of the road deck. The floor slab is slightly thicker in the middle of each span to accommodate load deflection. The curb is 9" high and 6" deep with outlets spaced between the guardrail posts.

Modifications

In 1994, the bridge was strengthened with the attachment of steel plates to the bottom flanges. This allowed for an increase in the load capacity of the bridge and for two-way traffic. The strengthening was limited to the I-beam girders. The work was done by Osage Constructors of Fulton Missouri, and was completed on August 16, 1994, and accepted by the Bridge Division on August 17, 1994.²³

²³ Missouri Department of Transportation. "Design Layout" MoDOT Job Number J8S0519. Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri; Missouri Department of Transportation, "Final Inspection Report." Bridge Division, Missouri Department of Transportation, Jefferson City, Missouri.

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_____. "Minutes of the Meeting of the State Highway Commission Held in Jefferson City, Missouri, October 13, 1936." As held by the Secretary to the Missouri State Highway Commission, Missouri Department of Transportation General Headquarters, Jefferson City, MO.

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_____. "General Highway Map Dallas County Missouri." Jefferson City, MO: Missouri State Highway Department, 1940.

**Bridge X0195 over Niangua River
Route K, Dallas County, Missouri**

Photographer: Randall Dawdy, Missouri Department of Transportation

Date: November 16, 2010

Location of Negatives: Digital Images Provided to the
Missouri State Historic Preservation Office

Photo Index:

- #1 of 32. Bridge X0195. North approach. View to south.
- #2 of 32. Bridge X0195. North portal. View to south.
- #3 of 32. Bridge X0195. West side. View to southeast.
- #4 of 32. Bridge X0195. Lower chord. View to southeast.
- #5 of 32. Bridge X0195. Lower pin connection detail. View to east.
- #6 of 32. Bridge X0195. Lower pin connection. View to northeast.
- #7 of 32. Bridge X0195. Pier 3. View to east.
- #8 of 32. Bridge X0195. Pier 3 detail. View to east.
- #9 of 32. Bridge X0195. West side. View to northeast.
- #10 of 32. Bridge X0195. End Bent 1 and Pier 2. View to northeast.
- #11 of 32. Bridge X0195. North end. View to northeast.
- #12 of 32. Bridge X0195. Through truss detail. View to northeast.
- #13 of 32. Bridge X0195. South approach spans. View to southeast.
- #14 of 32. Bridge X0195. South approach. View to north.
- #15 of 32. Bridge X0195. South portal. View to north.
- #16 of 32. Bridge X0195. South portal detail. View to north.
- #17 of 32. Bridge X0195. Top lateral bracing and struts. View to north.
- #18 of 32. Bridge X0195. North portal. View to north.

- #19 of 32. Bridge X0195. Top chord connections. View to northeast.
- #20 of 32. Bridge X0195. Top chord connection detail. View to northeast.
- #21 of 32. Bridge X0195. Southwest guardrail end post. View to northwest.
- #22 of 32. Bridge X0195. Vertical, guardrail, and curb detail. View to east.
- #23 of 32. Bridge X0195. Guardrail end post detail. View to east.
- #24 of 32. Bridge X0195. Pier 2 and subdeck. View to north.
- #25 of 32. Bridge X0195. Subdeck. View to north.
- #26 of 32. Bridge X0195. Pier 3. View to north.
- #27 of 32. Bridge X0195. Through truss at Pier 3. View to west.
- #28 of 32. Bridge X0195. East side. View to west.
- #29 of 32. Bridge X0195. East side. View to northwest.
- #30 of 32. Bridge X0195. North end. View to northwest.
- #31 of 32. Bridge X0195. Pier 2. View to west.
- #32 of 32. Bridge X0195. Pier 2 detail. View to west.

Photographic Methods and Processing:

The archival photographs were taken and processed according to the standards for photographs accompanying NRHP documentation (NPS 2008). Randall Dawdy took the photographs on November 16, 2010 using a digital single lens reflex camera. Images were captured in a raw (nef) format, which was manipulated for light contrast before being converted to a tagged image file format (.tiff) and printed. Images were numbered according to the NRHP Photographic Imaging Policy (NPS 2008) and burned onto compact discs, which were provided to the SHPO along with this report.

Prints were made on Epson Premium Glossy Photo Paper and used Epson Matte Black UltraChrome K3 Ink, both identified as “best” practices by the NRHP photo policy, and which Epson identifies as having an 85-year permanence under glass (NHRP 2009, Epson 2009). Kept in archival conditions the materials will exceed the 75 year permanence standard for the NRHP, which is the standard being used for this project. A copy of the Epson rating is attached.

The .tiff images were burned onto Delkin Archival Gold compact discs, and provided to the SHPO in that format. In addition, a copy of the .tiff file will be maintained by the MODOT Environmental and Historic Preservation Section, and a copy will be provided to the Dallas County Historical Society.

Permanence rating for Epson prints framed under glass

MEDIA	6-Color Photo Dye Inks		DURABrite® Ink	PictureMate™ Ink	UltraChrome™ Ink	UltraChrome Hi-Gloss™ Inks
	Epson Stylus Photo 825/925/960/1280	Epson Stylus Photo R200/R300/R320/RX500/RX600	Epson Stylus C64/C66/C84/C86/CX4600/CX6400/CX6600	PictureMate Personal Photo Lab	Epson Stylus Photo 2200	Epson Stylus Photo R1800/R800
EPSON PREMIUM PHOTO PAPERS						
Premium Glossy Photo Paper		23 years			85 years	104 years
Premium Luster Photo Paper – Cut Sheet		22 years			71 years	64 years
Premium Semigloss Photo Paper		22 years			77 years	In progress
EPSON MATTE PAPERS						
Double-Sided Matte Paper	15 years					
Enhanced Matte Paper			71 years		76 years	110 years
Matte Paper Heavyweight	18 years	30 years	105 years			Over 150 years
Photo Quality Ink Jet Paper		8 years				In progress
PremierArt™ Matte Scrapbook Photo Paper for Epson			94 years		108 years	In progress
Premium Bright White Paper		5 years	74 years			In progress
EPSON FINE ART PAPERS						
UltraSmooth Fine Art Paper					108 years	
Epson Velvet Fine Art Paper					61 years	
Watercolor Paper Radiant White					92 years	
PremierArt Water-Resistant Canvas for Epson					75 years	
EPSON GLOSSY PAPERS						
ColorLife™ Photo Paper	27 years	36 years				
DURABrite Ink Glossy Photo Paper			55 years			
PictureMate Photo Paper				104 years		
Semigloss Scrapbook Photo Paper	27 years	36 years				

* Lightfastness ratings are based on accelerated testing of prints on specialty media displayed indoors, under glass. Actual print stability will vary according to media, printed image, display conditions, light intensity and atmospheric conditions. Lightfastness ratings do not measure paper deterioration, such as yellowing. Epson does not guarantee the longevity of prints. For maximum print life display all prints under glass or lamination or properly store them. Ratings based on testing conducted by Epson and Wilhelm Imaging Research www.wilhelm-research.com

**Testing currently in progress. Projected time estimated on current progress of test.

As with traditional photos, proper care will maximize display life. For indoor display, Epson recommends that prints be framed under glass or in a protective plastic sleeve to protect the prints from atmospheric contaminants like humidity, cigarette smoke, and high levels of ozone. And, as with all photographs, the prints should be kept out of direct sunlight. For proper storage, Epson recommends that your prints be stored in a photo album (or plastic photo storage box or museum storage box) in acid free, archival sleeves commonly available from most camera shops and other retailers. By taking these steps to protect prints from direct sunlight and contaminants, you can preserve your photos for many years.



#1 of 32. Bridge X0195. North approach. View to south.



#2 of 32. Bridge X0195. North portal. View to south.



#3 of 32. Bridge X0195. West side. View to southeast.



#4 of 32. Bridge X0195. Lower chord. View to southeast.



#5 of 32. Bridge X0195. Lower pin connection detail. View to east.



#6 of 32. Bridge X0195. Lower pin connection. View to northeast.



#7 of 32. Bridge X0195. Pier 3. View to east.



#8 of 32. Bridge X0195. Pier 3 detail. View to east.



#9 of 32. Bridge X0195. West side. View to northeast.



#10 of 32. Bridge X0195. End Bent 1 and Pier 2. View to northeast.



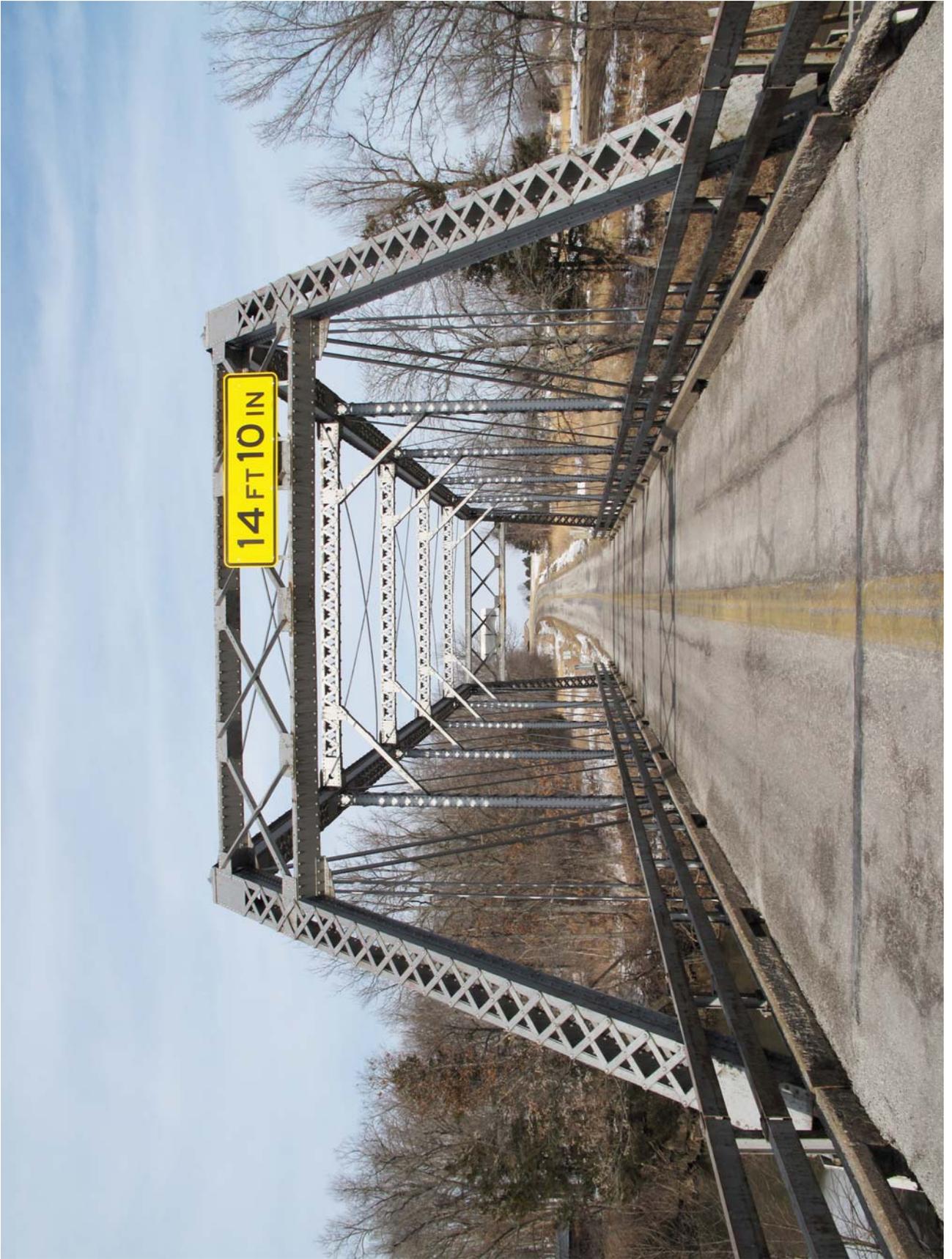
#11 of 32. Bridge X0195. North end. View to northeast.



#12 of 32. Bridge X0195. Through truss detail. View to northeast.



#13 of 32. Bridge X0195. South approach spans. View to southeast.



#15 of 32. Bridge X0195. South portal. View to north.



#16 of 32. Bridge X0195. South portal detail. View to north.



#17 of 32. Bridge X0195. Top lateral bracing and struts. View to north.



#18 of 32. Bridge X0195. North portal. View to north.



#19 of 32. Bridge X0195. Top chord connections. View to northeast.



#20 of 32. Bridge X0195. Top chord connection detail. View to northeast.



#21 of 32. Bridge X0195. Southwest guardrail end post. View to northwest.



#22 of 32. Bridge X0195. Vertical, guardrail, and curb detail. View to east.



#23 of 32. Bridge X0195. Guardrail end post detail. View to east.



#24 of 32. Bridge X0195. Pier 2 and subdeck. View to north.



#25 of 32. Bridge X0195. Subdeck. View to north.



#26 of 32. Bridge X0195. Pier 3. View to north.



#27 of 32. Bridge X0195. Through truss at Pier 3. View to west.



#28 of 32. Bridge X0195. East side. View to west.



#29 of 32. Bridge X0195. East side. View to northwest.



#30 of 32. Bridge X0195. North end. View to northwest.



#31 of 32. Bridge X0195. Pier 2. View to west.



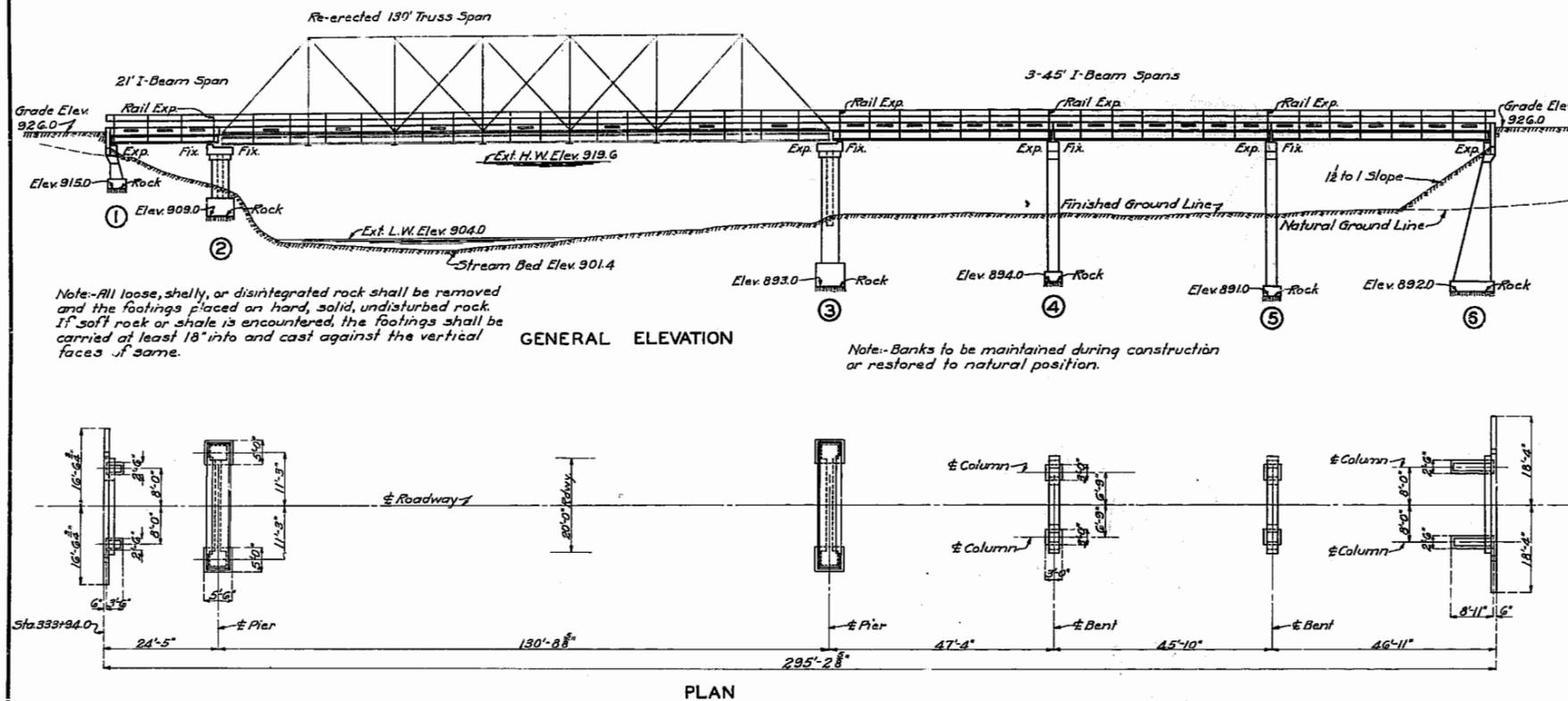
#32 of 32. Bridge X0195. Pier 2 detail. View to west.

Bridge Plans and Rehabilitations

**Bridge X0195 over Niangua River
Route K, Dallas County, Missouri**

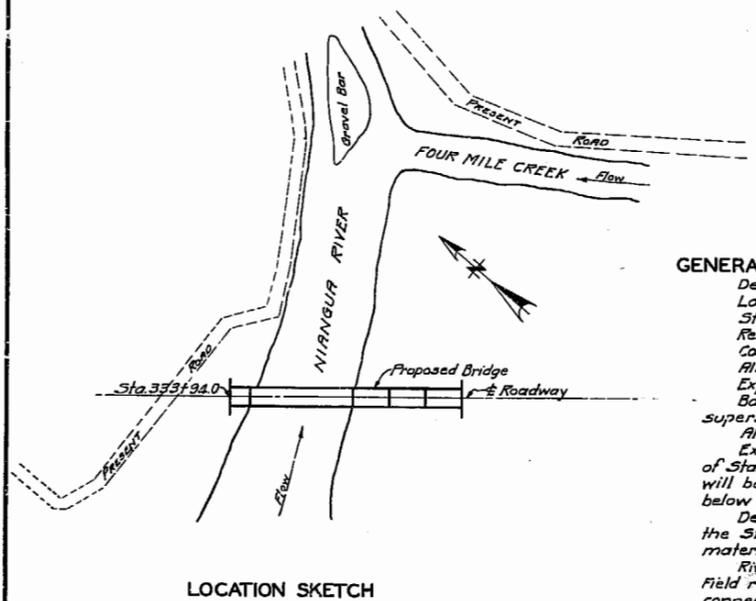
MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	WPA 5A-52A	11	11	11



Note: All loose, shelly, or disintegrated rock shall be removed and the footings placed on hard, solid, undisturbed rock. If soft rock or shale is encountered, the footings shall be carried at least 18" into and cast against the vertical faces of same.

Note: Banks to be maintained during construction or restored to natural position.



ESTIMATED QUANTITIES			
ITEM	SUBSTR.	SUPERSTR.	TOTAL
Class 1 Excavation for Structures	Cu. Yds. 105		105
Class 2 Excavation for Structures	Cu. Yds. 190		190
Class B Concrete	Cu. Yds. 142.4	147.4	289.8
Fabricated Structural Steel	Lbs. 88,500		88,500
Reinforcing Steel	Lbs. 12,275	39,655	51,930

Excavation above Elev. 905.0 will be paid for as Class 1 Excavation for Structures.
Excavation below Elev. 905.0 will be paid for as Class 2 Excavation for Structures.

GENERAL NOTES:
 Design Specifications A.A.S.H.O.-1931.
 Loading H-10 A.A.S.H.O. One Lane.
 Structural Steel Stress 16,000#/sq. in.
 Reinforcing Steel Stress 16,000#/sq. in. Single Line.
 Concrete Class B 750#/sq. in.
 All concrete shall be Class B.
 Exposed edges shall be beveled 1/4" where no other bevel is noted.
 Bar supports and spacers will be required for reinforcing steel in superstructure. See Spd. C-110R.
 All concrete shall be proportioned by the weight proportioning method.
 Excavation for structure shall be in accordance with Specification I of Standard Specifications issued November 12, 1935. Quantities paid for will be computed from Ext. L.W. Elev. 904.0 where existing ground line is below this elevation.
 Detail shop drawings for all structural steel shall be submitted to the State Highway Department in duplicate and shall be approved before material is ordered or work started.
 Rivets 3/4", holes 1 1/8", except in handrail where rivets shall be 5/8", holes 7/8".
 Field rivets in truss span to be of size required to erect old steel. Field connections for handrail channels shall be 3/8" button head bolts and for connections of rail to rail posts shall be 5/8" machine bolts, holes 1 1/8".
 All other field connections shall be riveted except as noted.
 Contractor to check old truss to see that all parts are available.

Where rubber compound is specified on plans for use in partition and expansion joints, the pre-moulded joint shall be securely stitched to one face of concrete with copper wire.
 Paint: Shop, none; field, contact surfaces of bolted field connections one coat of red lead and surfaces inaccessible after erection three coats of red lead. All other exposed surfaces in I-beam spans, first coat red lead, second coat aluminum. All exposed surfaces in truss span to be spot painted with red lead and one coat of aluminum.

COMPLETE BILL OF REINFORCING STEEL										
No.	SIZE	LENGTH	MARK	LOCATION	BENDING SKETCHES AND CUTTING DIAGRAMS	No.	SIZE	LENGTH	MARK	LOCATION
I-BEAM SPANS										
8	3/4"	23'-9"	C1	Curb (1-2)		40	1"	8'-0"	D2	Footings
204	3/4"	2'-0"	C2	Slab & Curb		20	1"	10'-0"	P5	Col. Pier #2
32	3/4"	24'-6"	C3	Curb		20	1"	24'-9"	P6	Col. Pier #3
16	3/4"	24'-0"	C4	"		62	1"	13'-0"	P7	Columns
714	3/4"	21'-0"	S1	Slab		24	3/4"	10'-0"	P8	Web of Pier #2
29	3/4"	23'-9"	S2	"		24	3/4"	16'-5"	P9	Pier #3
116	3/4"	24'-3"	S3	"		104	3/4"	8'-0"	P10	Cap
58	3/4"	23'-9"	S4	"		6	1"	25'-0"	H9	Web
						22	3/4"	25'-0"	H10	"
						8	1"	26'-0"	H11	Cap
TRUSS SPAN										
232	3/4"	8'-3"	C6	Slab & Curb		16	3/4"	5'-9"	D1	Footings
16	3/4"	20'-3"	C7	Curb		12	3/4"	8'-3"	F4	Haunch
40	3/4"	21'-3"	C8	"		12	3/4"	8'-0"	F3	"
568	3/4"	20'-9"	S6	Slab		26	3/4"	22'-3"	G1	Beam
30	3/4"	22'-3"	S7	"		4	3/4"	20'-3"	G2	"
30	3/4"	20'-3"	S8	"		8	3/4"	27'-0"	P1	Col. Bent #4
72	3/4"	24'-9"	S9	"		102	3/4"	8'-0"	P2	Columns
75	3/4"	21'-3"	S10	"		8	3/4"	30'-0"	P3	Col. Bent #5
						50	3/4"	8'-6"	U2	Beam
BENT No. 1										
14	3/4"	5'-9"	D1	Footings		6	3/4"	7'-6"	F1	Haunches
6	3/4"	7'-6"	F2	"		4	3/4"	22'-3"	H3	Beam
6	3/4"	9'-3"	H1	Wings		2	3/4"	20'-3"	H4	"
2	3/4"	16'-0"	H2	"		8	3/4"	22'-3"	H5	"
3	3/4"	22'-3"	H3	Beam		6	3/4"	11'-0"	H6	Wing
2	3/4"	20'-3"	H4	"		4	3/4"	17'-3"	H7	"
6	3/4"	22'-3"	H5	"		2	3/4"	21'-0"	T2	Beam
4	3/4"	10'-9"	T1	Wing		4	3/4"	15'-0"	T3	Wing
2	3/4"	21'-0"	T2	Beam		6	3/4"	7'-9"	V6	Columns
8	3/4"	6'-0"	V1	Wing		20	3/4"	7'-3"	V9	Wing
4	3/4"	4'-6"	V2	"	6	3/4"	7'-3"	V9	Wing	
20	3/4"	8'-6"	V3	Beam	4	3/4"	5'-6"	V10	"	
14	3/4"	6'-9"	V4	Column	20	3/4"	9'-6"	V11	"	
20	3/4"	3'-0"	V5	Beam	20	3/4"	4'-3"	V12	Beam & Bkwl	
6	3/4"	7'-9"	V6	Columns	26	3/4"	24'-3"	V13	Columns	
4	3/4"	13'-6"	V7	"	14	3/4"	29'-0"	V14	"	

Note: Dimensions are given along 1/2 of bars and are for computed lengths.
Reinforcing bars 1/2" or over in diameter, which are bent to an angle greater than 90°, shall be of structural grade.

BRIDGE OVER NIANGUA RIVER
 STATE ROAD FROM ROUTE 64 TO LONG LANE
 ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
 PROJECT NO. WPA- SK- 52A STA. 333+94.0
DALLAS COUNTY FINISHED

SUBMITTED BY: *N.R. Lack* DATE: 9/9/36
 APPROVED BY: *C.W. Brown* DATE: 9/9/36
ENGINEER CHIEF ENGINEER

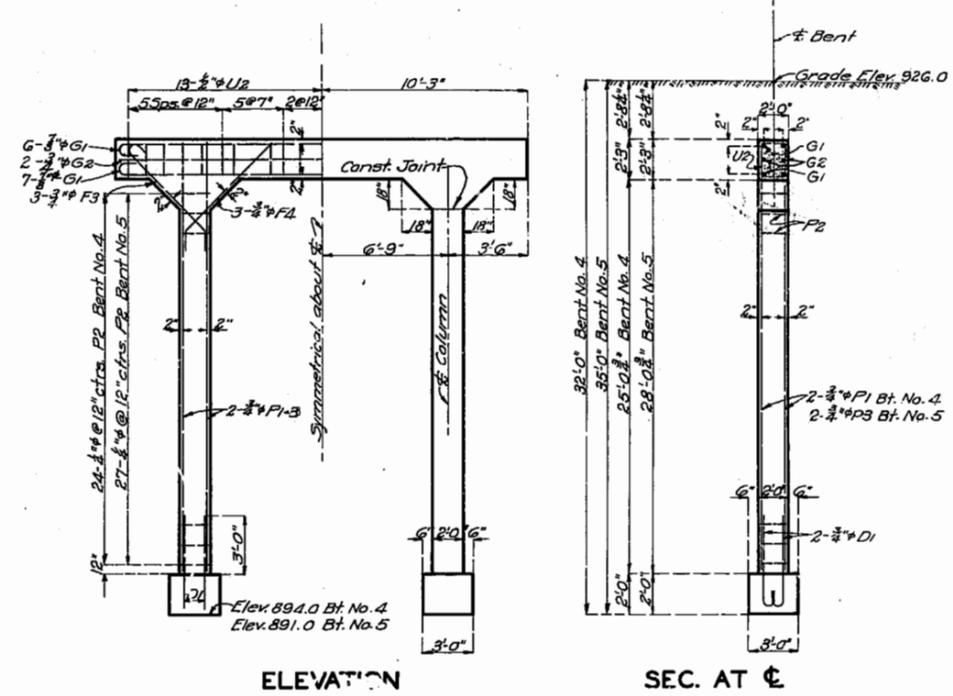
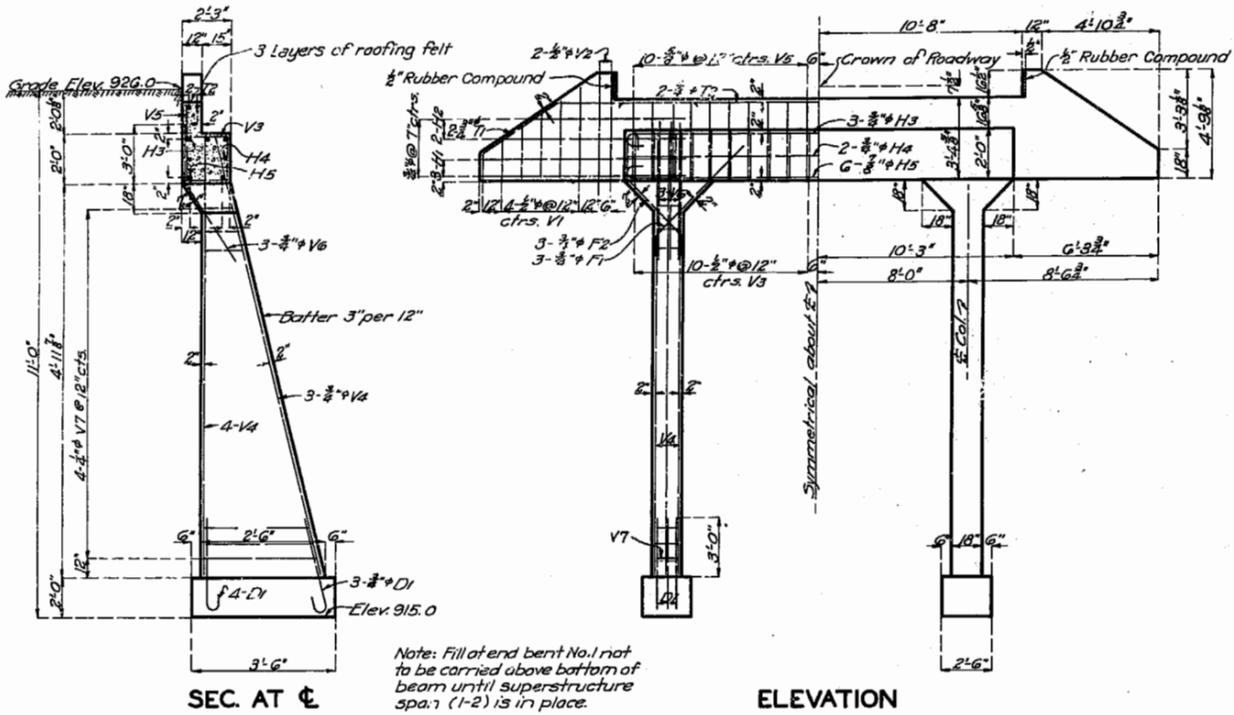
STD.C-110R
X-195

188

Drawn Aug. 1936 by F.C.L.
 Traced Aug. 1936 by C.R.F.
 Checked Sept. 1936 by d.Bd.

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE NO.	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5		WPA 24-52A	19		



DETAILS OF BENT NO. 1

DETAILS OF BENTS NO. 4 & 5

BRIDGE OVER NIANGUA RIVER
 STATE ROAD FROM ROUTE 64 TO LONG LANE
 ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
 PROJECT NO WPA. SK-52A STA. 333+94
DALLAS COUNTY

FINISHED

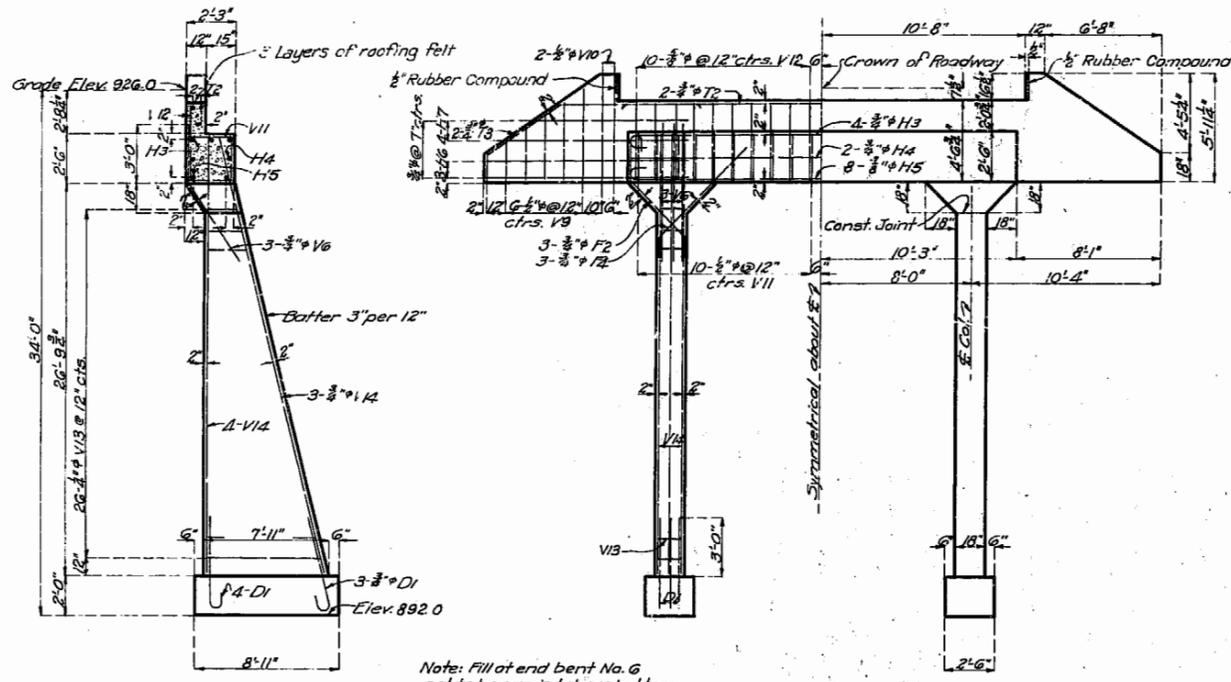
FINISH

Assembled Aug. 1936 by F.C.L.-G.W.
 Checked Sept. 1936 by U.B.
 Drawn Nov. 1930 by C.A.F.
 Checked Aug. 1932 by R.H.S.

681

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STAT. NO.	FED. AID PROJ. NO.	CONTRACT NO.	SHEET NO.	TOTAL SHEETS
5	10	WPA	SK-S2A	15	

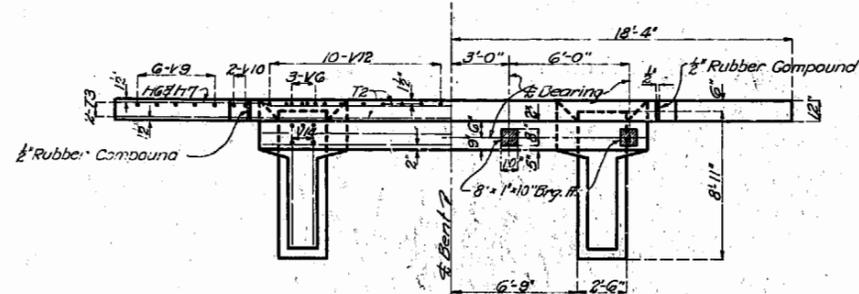


SEC. AT C

ELEVATION

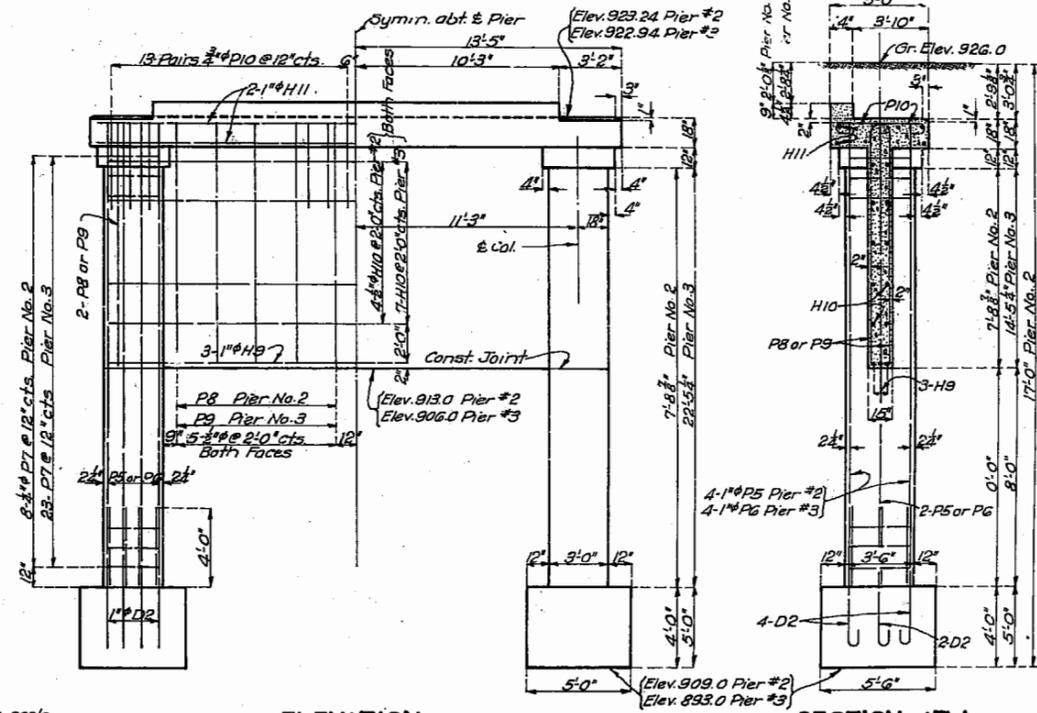
Note: Fill at end bent No. 6 not to be carried above bottom of beam until superstructure span (5-6) is in place.

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



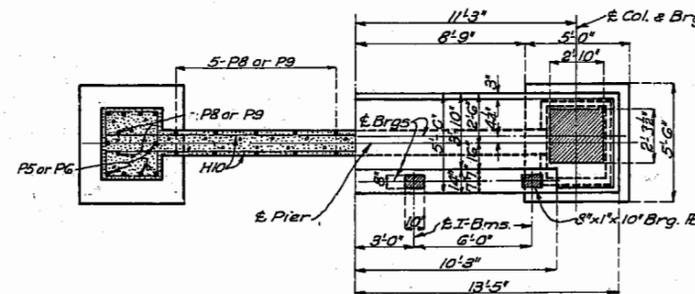
PLAN

DETAILS OF BENT NO. 6



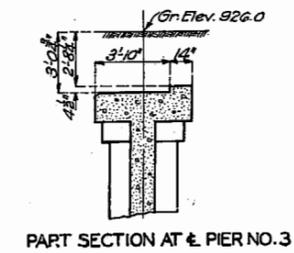
ELEVATION

SECTION AT E



HALF HORIZONTAL SEC. HALF PLAN

DETAILS OF PIERS NO. 2 & 3



PART SECTION AT E PIER NO. 3

BRIDGE OVER NIANGUA RIVER

STATE ROAD FROM ROUTE 64 TO LONG LANE
ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
PROJECT NO. WPA. SK-S2A STA 333+94

DALLAS COUNTY

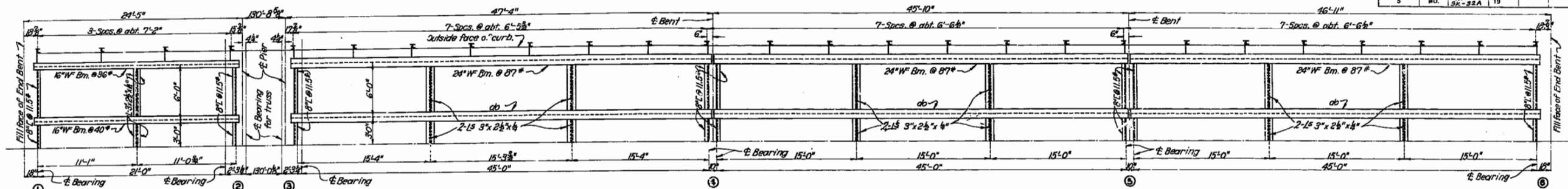
FINISHED

Assembled Aug. 1936 by F.C.L.-G.W.
Checked Sept. 1936 by J.B.U.
Drawn Nov. 1930 by C.A.F.
Checked Aug. 1932 by R.H.S.

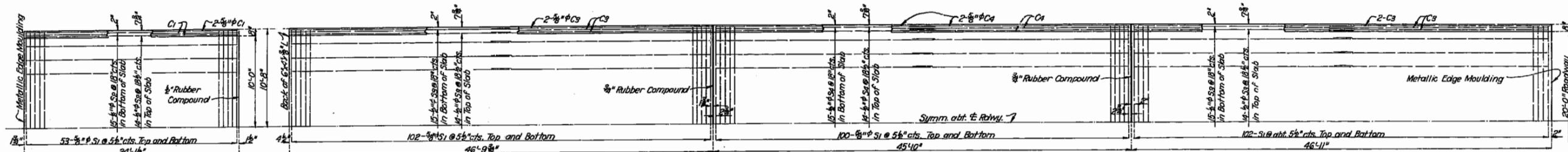
190

MISSOURI STATE HIGHWAY DEPARTMENT

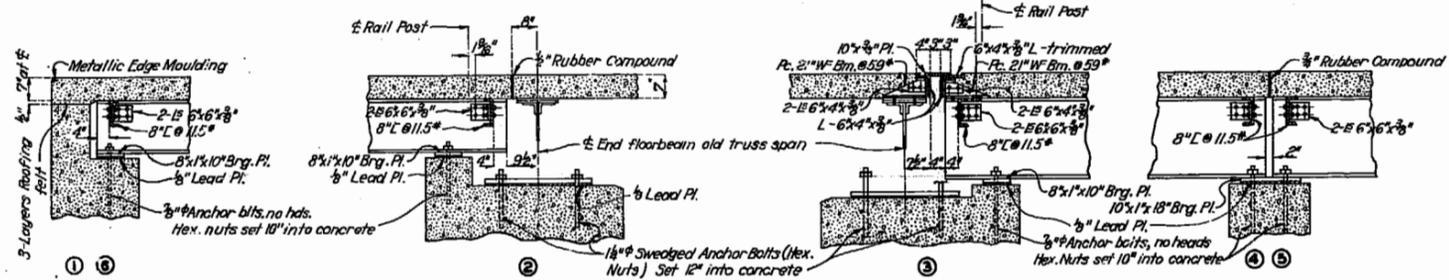
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5	MO.	WPA 52-52A	19	1	1



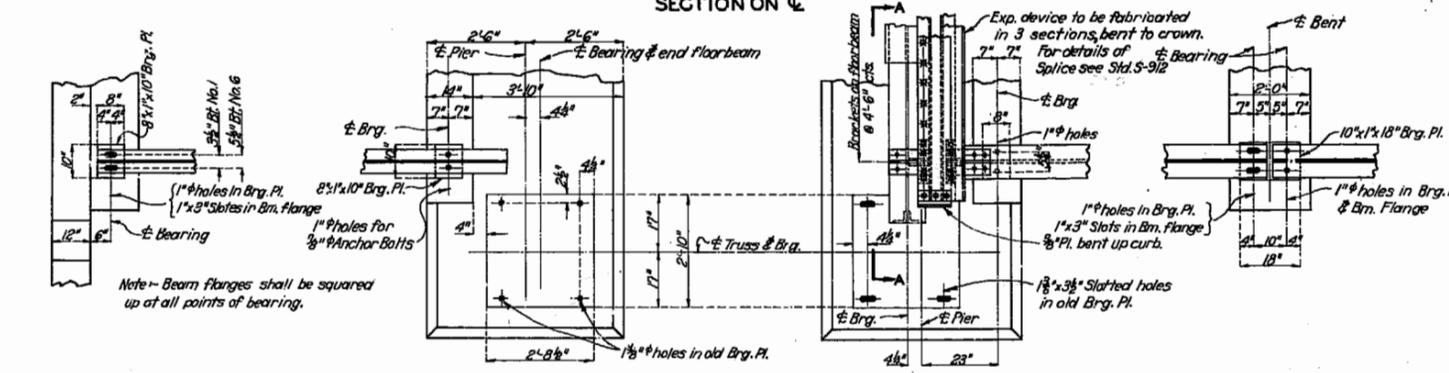
HALF PLAN SHOWING STRINGERS FOR I-BEAM SPANS



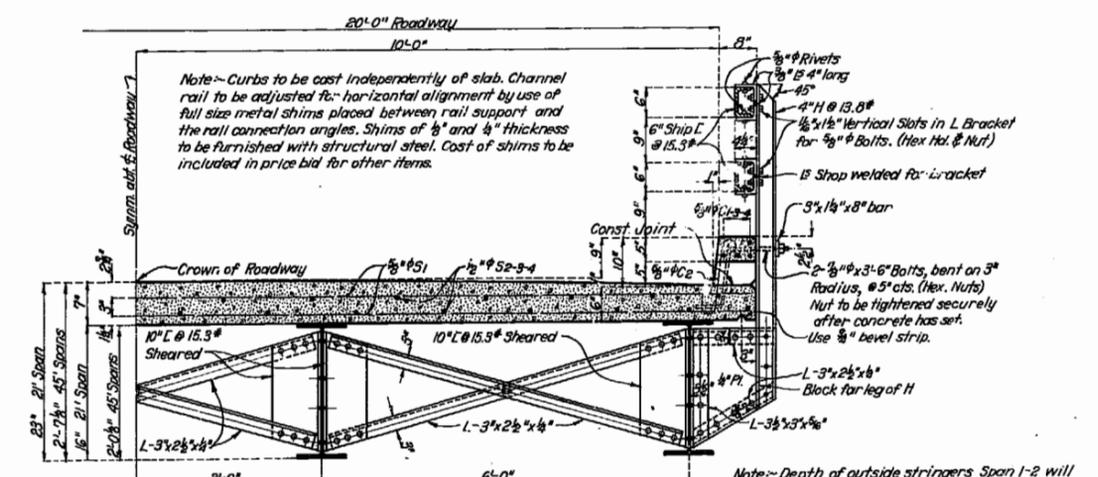
HALF PLAN OF FLOOR SLABS FOR I-BEAM SPANS SHOWING REINFORCING STEEL



SECTION ON C

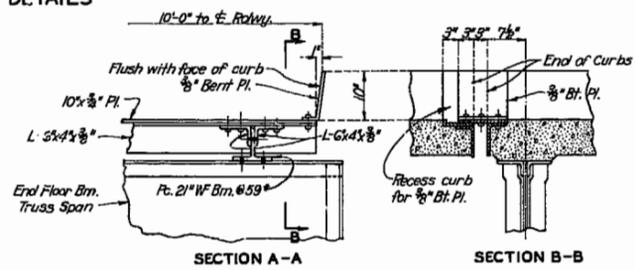


BEARING DETAILS



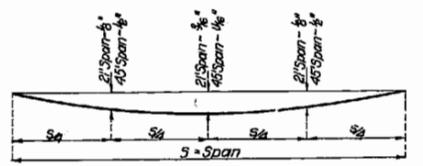
HALF SECTION THRU I-BM SPAN

Note - Depth of outside stringers Span 1-2 will be 1/2" less than that of inside stringers and in order to keep bottom of slab horizontal it will be necessary to haunch slab down to top of outside stringers.



SECTION A-A

SECTION B-B



DEFLECTION DIAGRAM

Note - Floor slab to be brought to grade and dead load deflection taken care of by increasing slab thickness. Depth of slab at outside face of curb to be kept uniform and bottom surface of slab warped between curb and outside beam to obtain required thickness at beam. Payment will be allowed for additional concrete required for thickening slab. Additional concrete is included in Estimated Quantities.

BRIDGE OVER NIANGUA RIVER

STATE ROAD FROM ROUTE 64 TO LONG LANE
ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
PROJECT NO. WPA. SK-52A STA. 333+94

DALLAS COUNTY

FINISHED

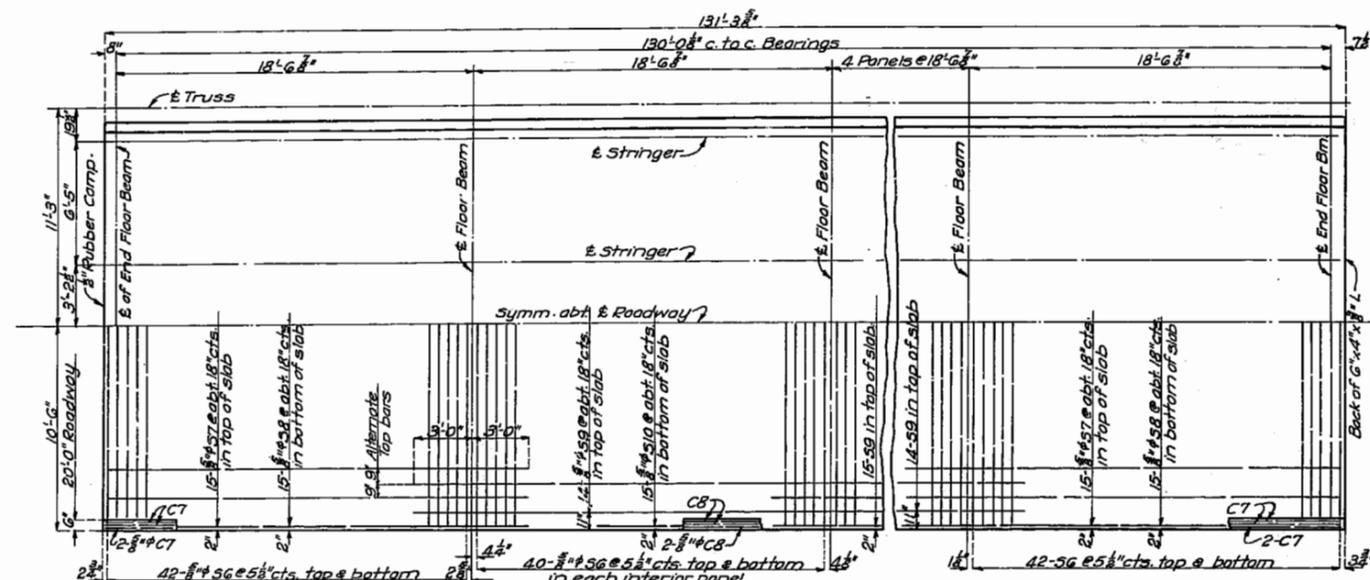
X-195

Drawn Aug. 1936 By F.C.L.
Traced Aug. 1936 By H.E.C.
Checked Sept. 1936 By J.B.U.

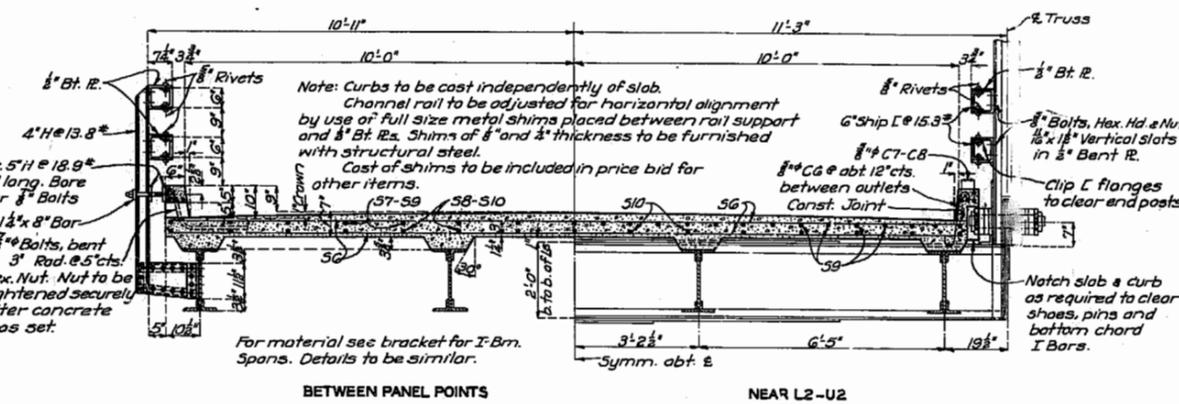
191

MISSOURI STATE HIGHWAY DEPARTMENT

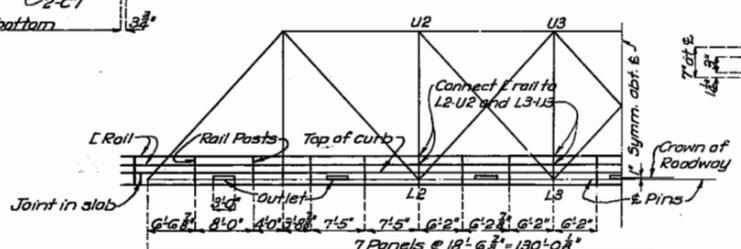
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SCALE	SHEET NO.	TOTAL SHEETS
5	MO.	WPA 35-32A	3/8" = 1'-0"	5	5



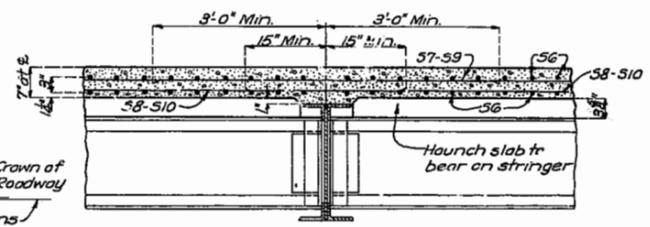
PART PLAN OF SLAB FOR TRUSS SPAN SHOWING REINFORCING STEEL



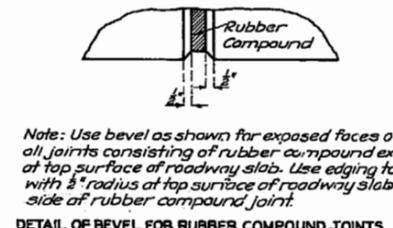
SECTION THRU TRUSS SPAN



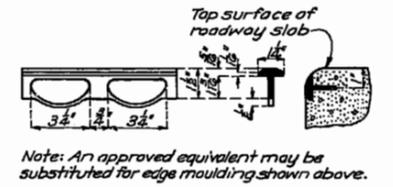
HALF ELEVATION SHOWING LOCATION OF RAIL POSTS & CURB OUTLETS
Note: Outlets to be 3'-0" long, centered between rail posts as shown.



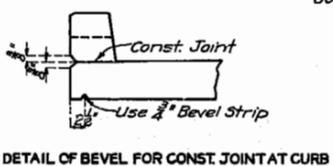
PART LONGITUDINAL SECTION NEAR OUTSIDE STRINGER



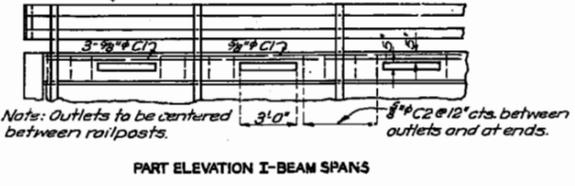
DETAIL OF BEVEL FOR RUBBER COMPOUND JOINTS



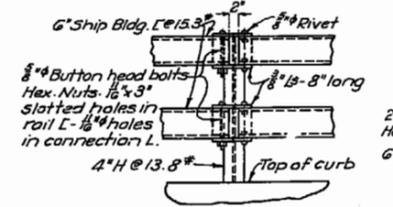
METALLIC EDGE Moulding
Note: Cost of metallic edge moulding to be included in unit bid price for concrete.



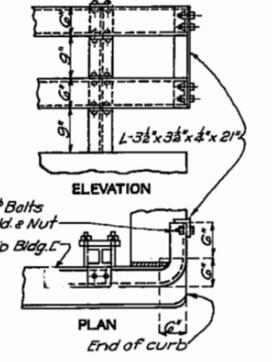
DETAIL OF BEVEL FOR CONST. JOINT AT CURB
Use 1/2" Bevel Strip



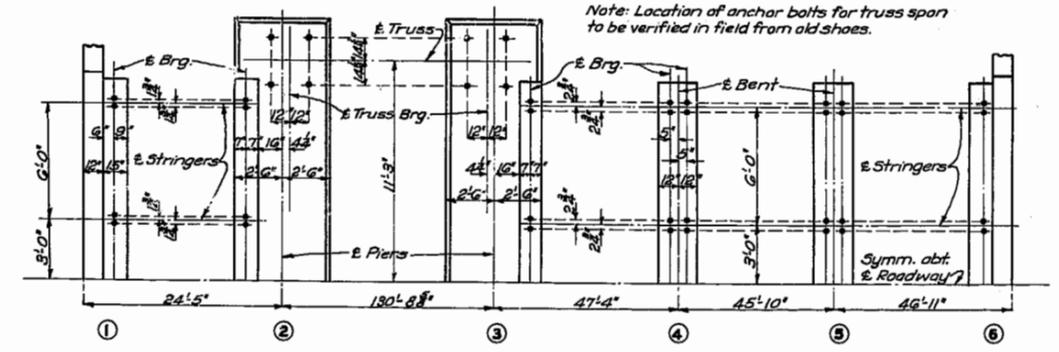
PART ELEVATION I-BEAM SPANS



DETAILS OF EXPANSION JOINT IN RAIL
Note: Use similar details of rail splices. Omit slotted holes and 2" expansion gap.

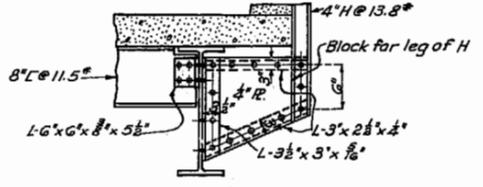


DETAILS OF RAIL AT ENDS OF BRIDGE



HALF ANCHOR BOLT PLAN

Note: Bearing areas on bents and piers under and extending 2' beyond edges of bearings are to be built monolithically with bents or pier above plan elevation. These areas shall be ground with carborundum brick to horizontal plane surfaces at plan elevation and shall be adequately protected until lead plates and bearings are in place. Cost of lead plates shall be included in price bid for structural steel.



DETAIL OF RAIL BRACKET AT ENDS OF I-BEAM SPANS

BRIDGE OVER NIANGUA RIVER
STATE ROAD FROM ROUTE 64 TO LONG LANE
ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
PROJECT NO. WPA. SK-32A STA. 333+94
DALLAS COUNTY

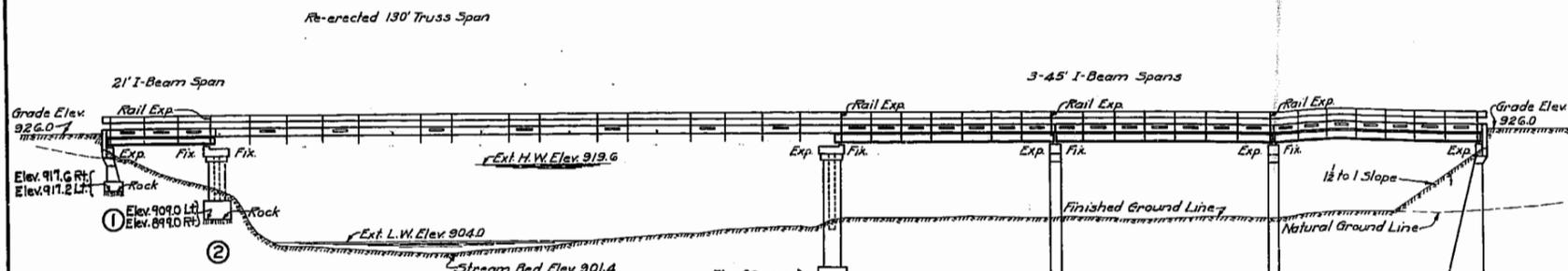
Drawn Aug. 1936 by F.C.L.
Traced Aug. 1936 by G.W.
Checked Sept. 1936 by J.B.H.

192

MISSOURI STATE HIGHWAY DEPARTMENT

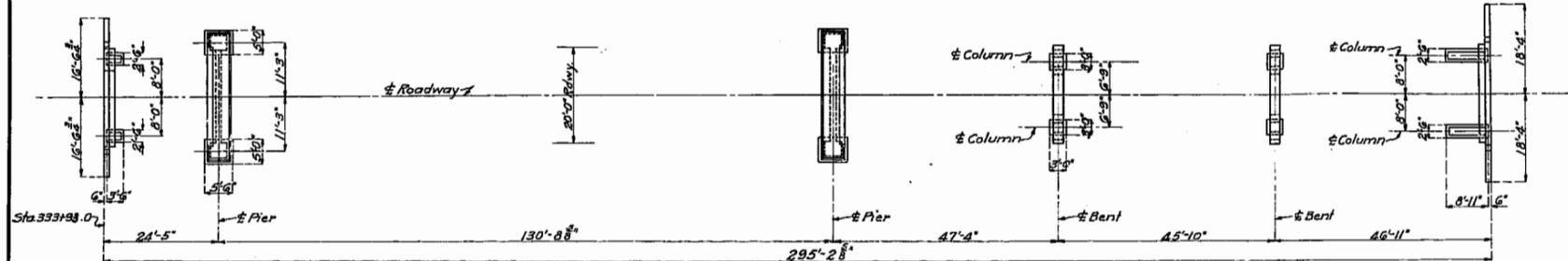
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	WPA 5K-52A	11	11	11

FINAL PLANS

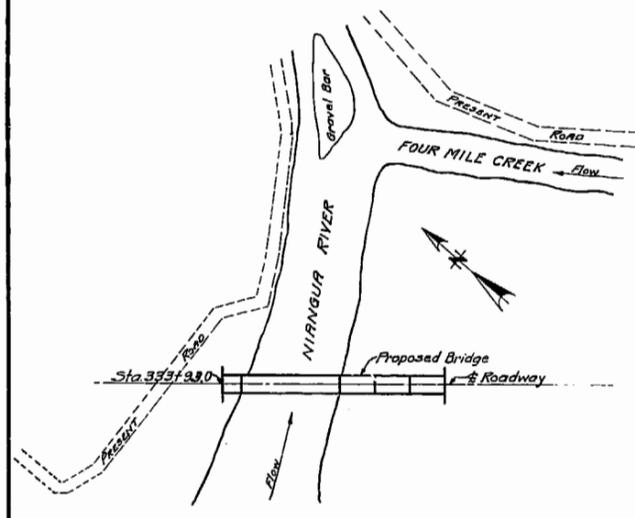


Note: All loose, shelly, or disintegrated rock shall be removed and the footings placed on hard, solid, undisturbed rock. If soft rock or shale is encountered, the footings shall be carried at least 18" into and cast against the vertical faces of same.

Note: Banks to be maintained during construction or restored to natural position.



PLAN



LOCATION SKETCH

ESTIMATED QUANTITIES			
ITEM	SUBSTR.	SUPERSTR.	TOTAL
Class 1 Excavation for Structures	Cu. Yds.	105	105
Class 2 Excavation for Structures	Cu. Yds.	190	190
Class "B" Concrete	Cu. Yds.	141.36	147.4
Fabricated Structural Steel	Lbs.	88,500	88,500
Reinforcing Steel	Lbs.	12,275	39,655
			51,930

Excavation above Elev. 905.0 will be paid for as Class 1 Excavation for Structures.
Excavation below Elev. 905.0 will be paid for as Class 2 Excavation for Structures.

GENERAL NOTES:-

Design Specifications A.A.S.H.O.-1931.
Loading H-10 A.A.S.H.O. One Lane.
Structural Steel Stress 16,000 #/sq. in.
Reinforcing Steel Stress 16,000 #/sq. in. } Single Line.
Concrete Class "B" 750 #/cu. ft.

All concrete shall be Class "B".
Exposed edges shall be beveled 1/4" where no other bevel is noted.
Bar supports and spacers will be required for reinforcing steel in superstructure. See Std. C-110R.
All concrete shall be proportioned by the weight proportioning method.
Excavation for structure shall be in accordance with Specification I of Standard Specifications issued November 12, 1935. Quantities paid for will be computed from Ext. L.W. Elev. 904.0 where existing ground line is below this elevation.
Detail shop drawings for all structural steel shall be submitted to the State Highway Department in duplicate and shall be approved before material is ordered or work started.
Rivets 3/4", holes 1 1/8", except in handrail where rivets shall be 5/8", holes 1 1/8".
Field rivets in truss span to be of size required to erect old steel. Field connections for handrail channels shall be 3/4" button head bolts and for connections of rail to rail posts shall be 3/4" machine bolts, holes 1 1/8".
All other field connections shall be riveted except as noted.
Contractor to check old truss to see that all parts are available.

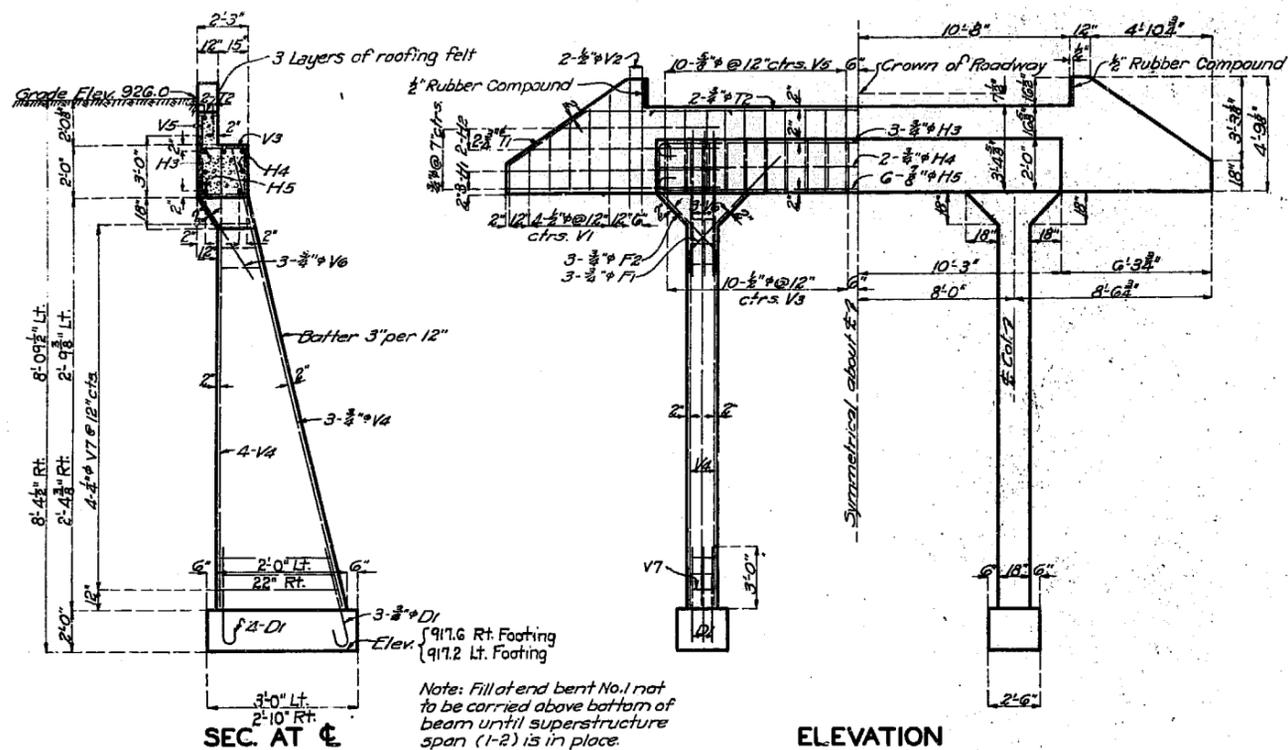
Where rubber compound is specified on plans for use in partition and expansion joints, the pre-moulded joint shall be securely stitched to one face of concrete with copper wire.
Paint: Shop, none; field, contact surfaces of bolted field connections one coat of red lead and surfaces inaccessible after erection three coats of red lead. All other exposed surfaces in I-beam spans, first coat red lead, second coat aluminum. All exposed surfaces in truss span to be spot painted with red lead and one coat of aluminum.

COMPLETE BILL OF REINFORCING STEEL										
No.	Size	Length	Mark	LOCATION	BENDING SKETCHES AND CUTTING DIAGRAMS	No.	Size	Length	Mark	LOCATION
I-BEAM SPANS										
8	3/4"	23'-9"	C1	Curb (1-2)		PIERS No. 2 AND 3				
204	3/4"	2'-0"	C2	Slab & Curb		40	1"	8'-0"	D2	Footings
32	3/4"	24'-6"	C3	Curb		20	1"	10'-0"	P5	Col. Pier #2
16	3/4"	24'-0"	CA	"		62	3/4"	13'-0"	P7	Columns
714	3/4"	21'-0"	S1	Slab		24	3/4"	10'-0"	P8	Web Rein #2
28	3/4"	23'-9"	S2	"		24	3/4"	16'-6"	P9	" Pier #3
116	3/4"	24'-3"	S3	"		104	3/4"	8'-0"	P10	Cap
58	3/4"	23'-9"	S4	"		6	1"	25'-0"	H9	Web
						22	3/4"	25'-0"	H10	"
						8	1"	2'-0"	H11	Cap
TRUSS SPAN										
232	3/4"	2'-3"	C6	Slab & Curb						

MISSOURI STATE HIGHWAY DEPARTMENT

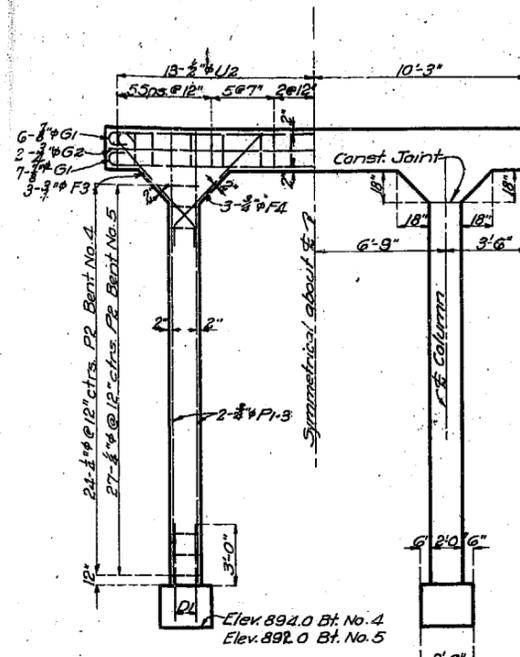
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	MO.	WPA 54-52A	19		

FINAL PLANS

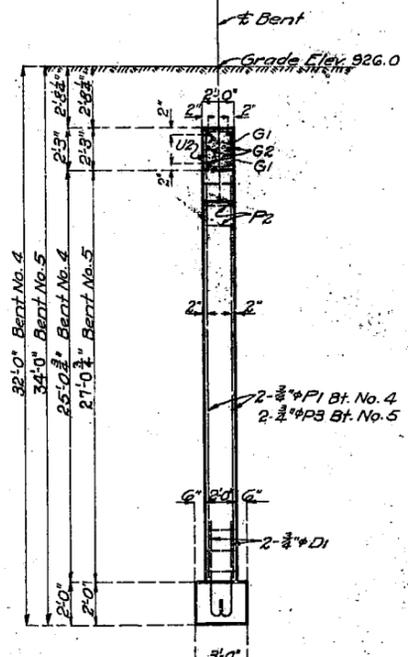


SEC. AT C

ELEVATION

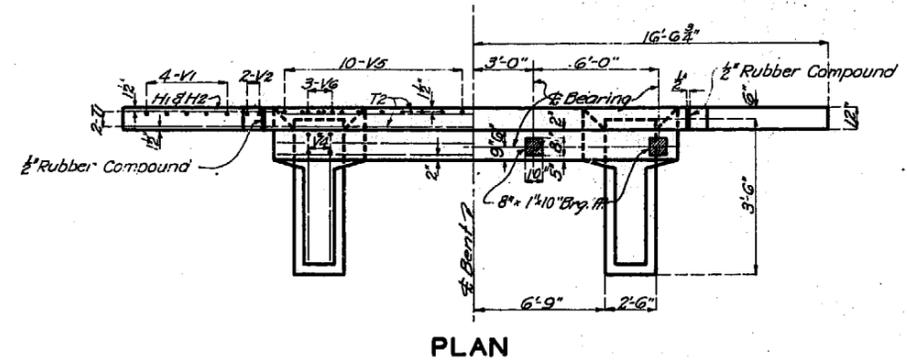


ELEVATION



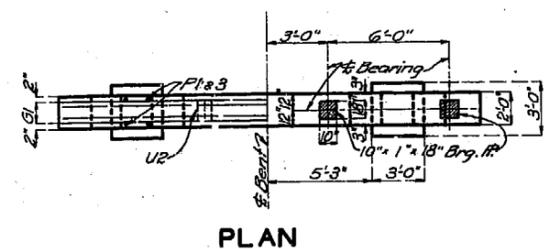
SEC. AT C

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



PLAN

DETAILS OF BENT NO. 1



PLAN

DETAILS OF BENTS NO. 4 & 5

BRIDGE OVER NIANGUA RIVER
 STATE ROAD FROM ROUTE 64 TO LONG LANE
 ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
 PROJECT NO WPA. 54-52A STA. 333+94
 DALLAS COUNTY

FINAL PLANS

X-195

Sheet No. 2A of 3

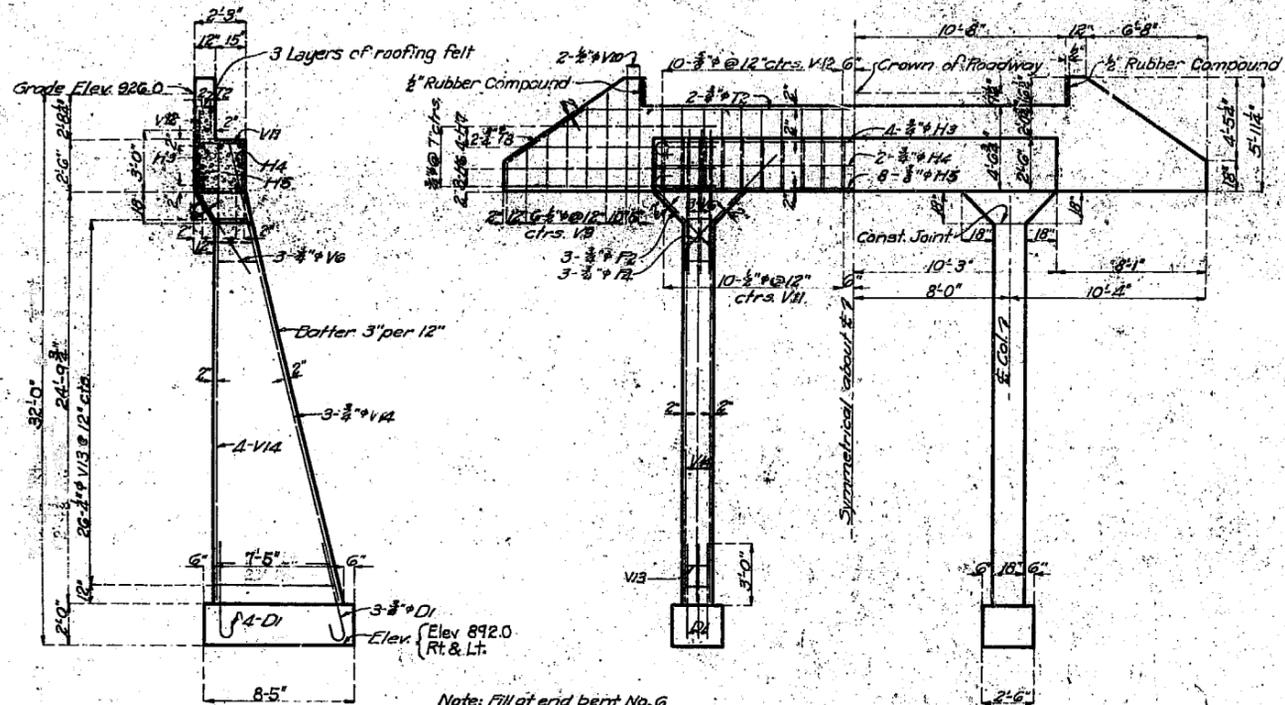
194

Assembled Aug. 1936 by F.C.L.-G.W.
 Checked Sept. 1936 by J.B.U.
 Drawn Nov. 1930 by C.A.F.
 Checked Aug. 1932 by R.H.S.

MISSOURI STATE HIGHWAY DEPARTMENT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SCALE	SHEET NO.	TOTAL SHEETS
5	MO	WPA SK-52A	1"		

FINAL PLANS

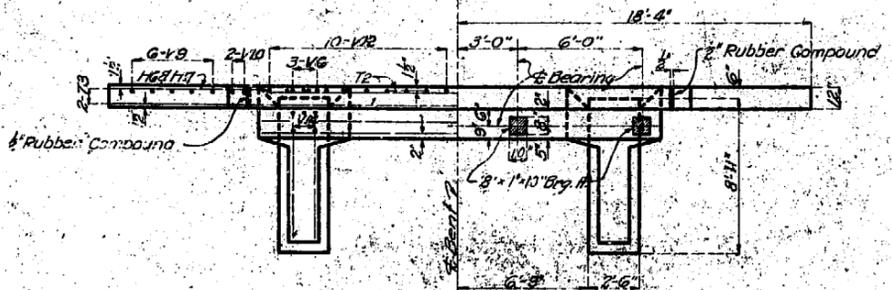


SEC. AT C

ELEVATION

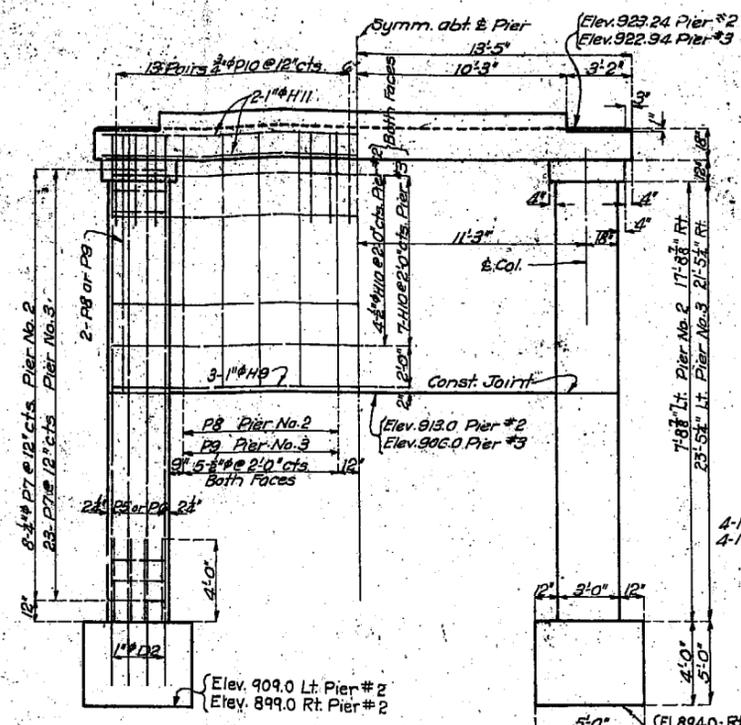
Note: Fill of end bent No. 6 not to be carried above bottom of beam until superstructure span (5-6) is in place.

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

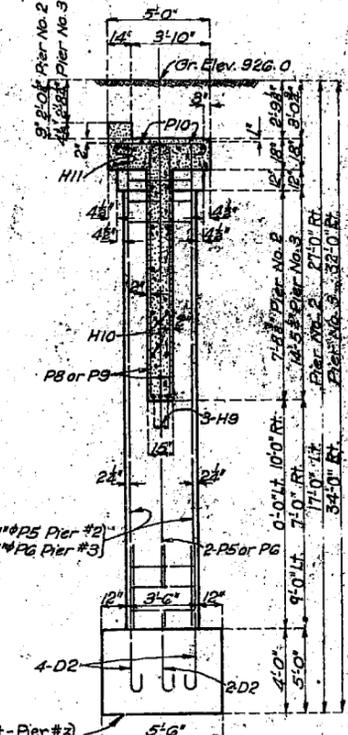


PLAN

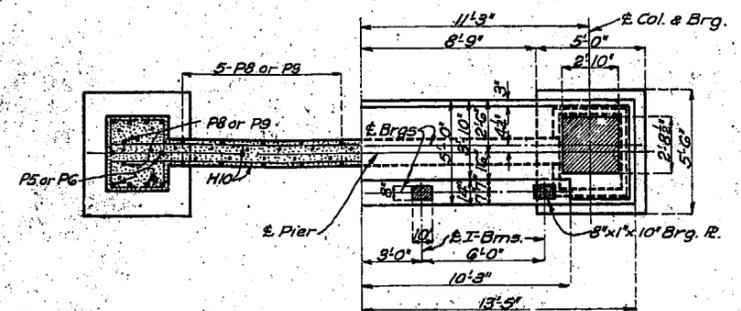
DETAILS OF BENT NO. 6



ELEVATION

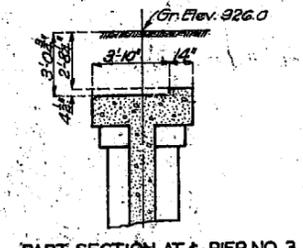


SECTION AT E



HALF HORIZONTAL SEC. HALF PLAN

DETAILS OF PIERS NO. 2 & 3



PART SECTION AT E PIER NO. 3

BRIDGE OVER NIANGUA RIVER
 STATE ROAD FROM ROUTE 64 TO LONG LANE
 ABOUT 17.0 MILES N.W. OF PHILLIPSBURG
 PROJECT NO. WPA. SK-52A STA 333+94

DALLAS COUNTY
FINAL PLANS

FINISHED

X-195

196

Assembled Aug. 1936 by F.C.L. & G.W.
 Checked Sept. 1936 by J.B.U.
 Drawn Nov. 1930 by C.A.F.
 Checked Aug. 1932 by P.H.S.

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

STATE	PROJ. NO.	SHEET NO.
MO.	J850519	4
SEC/SUR 8	TWP 34N RGE 18W	

General Notes:

Design Specifications:

A.A.S.H.T.O. 1992

Design Loading:

1993 Missouri Posting Loads. (H20 & 3S2)
No Future Wearing Surface

Design Unit Stresses:

Structural Carbon Steel $f_y=36,000$ psi. (New Steel)
Existing Steel $f_y=30,000$ psi.
Working stress Design based on 68% f_y . (Exist.)

Paint:

Calcium Sulfonate (2 coats)(See Special Provisions).

Old and New Work:

Outline of old work is indicated by light dashed lines.
Heavy lines indicate new work.

Dimensions:

Longitudinal dimensions are based on the original design plans.

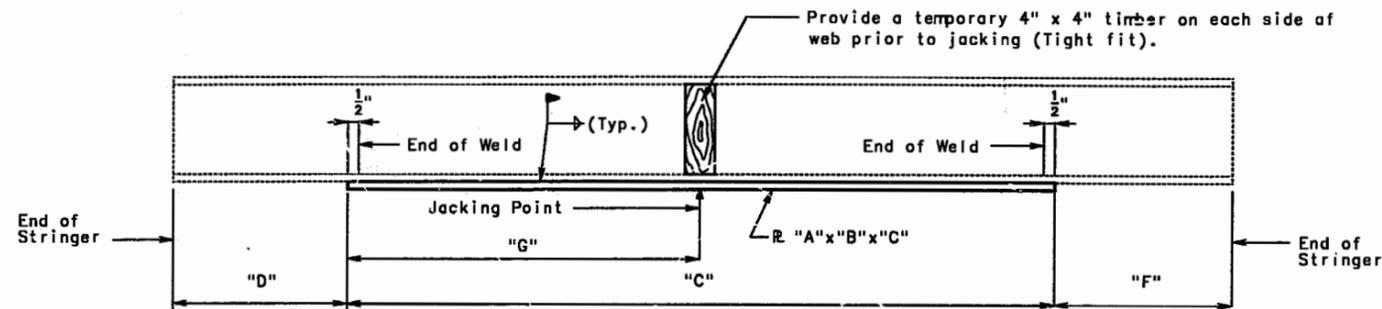
Traffic:

Maintain one lane of traffic during construction, (See Roadway Traffic Control Plans).

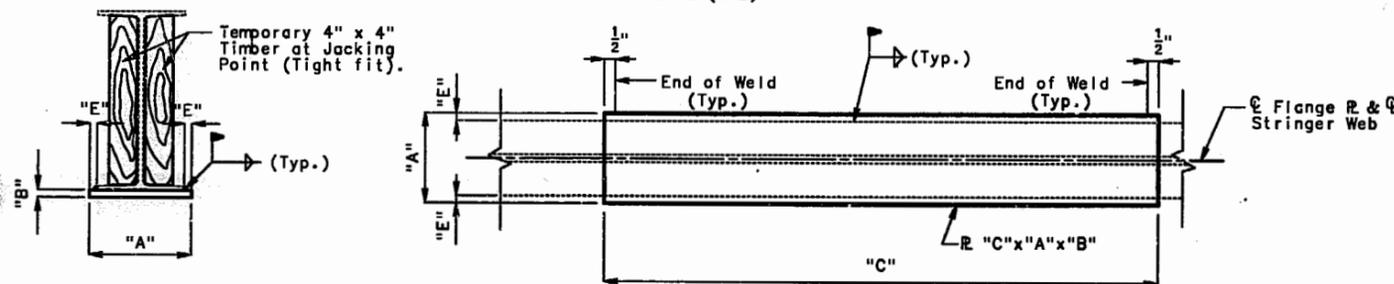
Stringer Support:

All existing stringers in the span being strengthened shall be raised simultaneously * at jacking point and supported during welding of new steel plates.

The temporary supports must be capable of safely supporting a service load of approximately ** tons per stringer. (Factor of safety not included) (See Special Provisions).



TYPICAL ELEVATION OF STRINGER
SPAN (1-2)



SECTION THRU STRINGER

DETAIL OF FLANGE R

ESTIMATED QUANTITIES		
ITEM	Lump Sum	TOTAL
Strengthening Existing Stringers		1

TABLE OF DIMENSIONS

Stringer Location	Dimensions								
	"A"	"B"	"C"	"D"	"E"	"F"	"G"	*	**
Exterior Span (1-2)	9"	3/4"	12'-0"	5'-4 7/8"	1"	5'-4 7/8"	6'-0"	3/16"	15.0
Interior Span (1-2)	No strengthening required							3/16"	19.0
Exterior Span (3-4)	No strengthening required								
Interior Span (3-4)	No strengthening required								
Exterior Span (4-5)	No strengthening required								
Interior Span (4-5)	No strengthening required								
Exterior Span (5-6)	No strengthening required								
Interior Span (5-6)	No strengthening required								

NOTE: THIS DRAWING IS NOT TO SCALE. FOLLOW DIMENSIONS.

SHEET NO. 1 OF 1

REPAIRS TO BRIDGE OVER NIANGUA RIVER

STATE ROAD FROM RTE. 64 S.E. TO RTE. P

ABOUT 5.0 MILES S.E. OF RTE. 64

PROJECT NO. J850519 STA. 333+93.00

JOB NO. J850519 RTE. K

DALLAS

COUNTY

STD.
STD.
X01951

DATE 3/10/94

526199

WID 5, FLA, 1, A
FLANGE BRACE REVISED NOV. 1993
AUG. 1993

DESIGNED: JAN. 1994
DETAILED: JAN. 1994
CHECKED: JAN. 1994