WARD'S CROSSING BRIDGE, 1905

YELL COUNTY, ARKANSAS

The Ward's Crossing Bridge is an excellent example of a Camelback through truss. The Camelback truss has the same geometry as the more common Pratt truss, but with a polygonal upper chord of exactly five slopes, that being the minimum number necessary to achieve the benefits of the polygonal shape. The polygonal chord made longer metal truss spans lighter and more economical by increasing the depth of the truss at the center of the span where the greatest bending moments occur, and reducing the truss depth at the ends of the truss where it isn't necessary. The Camelback truss was popular well into the twentieth century for spans of about 150 to 200 feet.

The bridge is an excellent example of early 20th century metal truss bridge building technology and one of only a few surviving metal truss bridges from the period of bridge building prior to the development of the Arkansas State Highway Commission, when counties built and maintained hundreds of metal truss bridges that have all but disappeared in recent decades.

Ward's Crossing, a name that appears on early county and township maps, was presumably the site of a 19th century ford or ferry on the Fourche LaFave River. Shortly after the turn of the century, Yell County initiated a series of bridge construction projects that included erecting a bridge at this site. Although details are lacking, county records and contemporary newspaper accounts suggest that the county appropriated funds to construct an iron bridge "at or near Ward's Crossing" in the fall of 1904, and that the bridge was completed the following year at a cost of $9,998. The superstructure was fabricated by the Converse Bridge Company of Chattanooga, Tennessee, a regionally significant bridge manufacturing firm.

The Arkansas Historic Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program that documents and interprets historically significant engineering, industrial and maritime sites and structures throughout the United States. This project was cosponsored in the summer of 2005 by the Arkansas State Highway and Transportation Department (AHTD), Dan Flowers, Director of Highways and Robert W. Scoggin, Historic Resources Coordinator, Environmental Division.

The summer field team was under the direction of Thomas M. Behrens, HAER Architect. The recording team included Brian Carnahan, Field Team Leader (University of Arkansas, Fayetteville), Amy James, Architect (University of Arkansas, Fayetteville), Tiziana Di Franscesco, Architect(US ICOMOS, Italy), Lola Bennett, HAER Historian (Stow, Massachusetts), and Jet Lowe, HAER Photographer.

DELINEATED BY: BRIAN CARNAHAN, TIZIANA DI FRANCESCO, SUMMER 2005

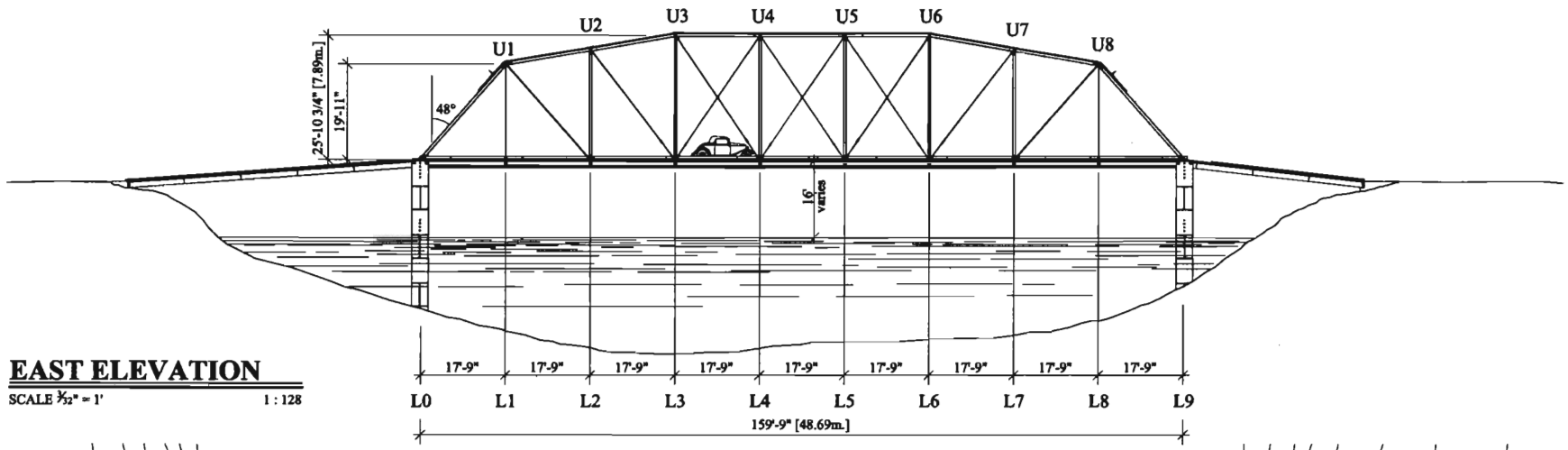
ARKANSAS HISTORIC BRIDGES
HAER NO. AR-70
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER AT SUNLIGHT BAY ROAD (CR 8)
YELL COUNTY
ARKANSAS

PLAINVIEW VICINITY

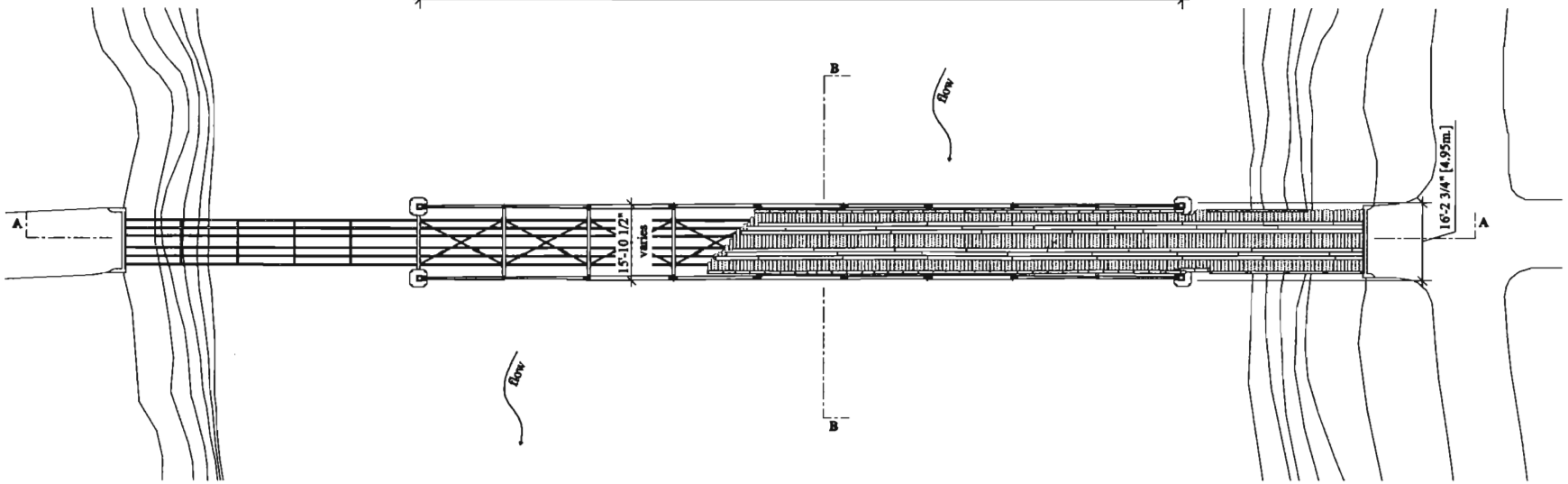
SHEET 1 OF 8

HISTORIC AMERICAN ENGINEERING RECORD
AR-70



EAST ELEVATION

SCALE 3/32" = 1' 1 : 128



PLAN

SCALE 3/32" = 1' 1 : 128

N

0 5 10 20 FEET

0 1 2 4 METERS

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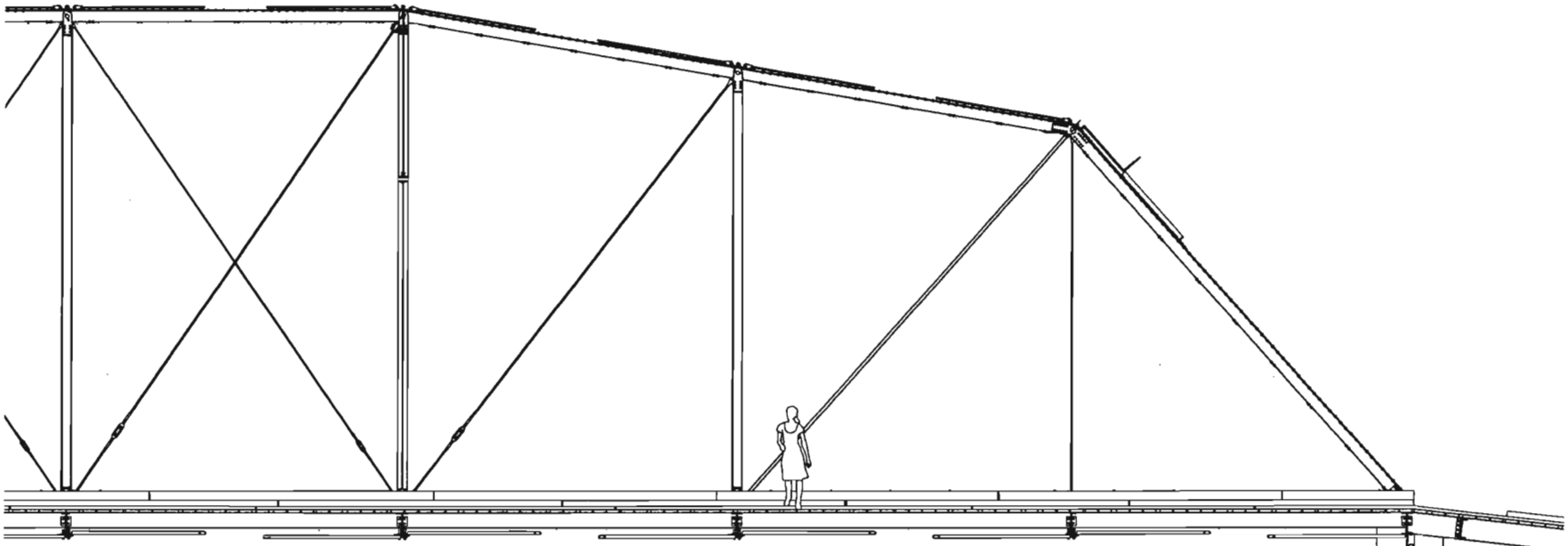
ARKANSAS HISTORIC BRIDGES
RECORDING PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

PLAINVIEW VICINITY

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER at SUNLIGHT BAY ROAD (CR 8)
YELL COUNTY
ARKANSAS

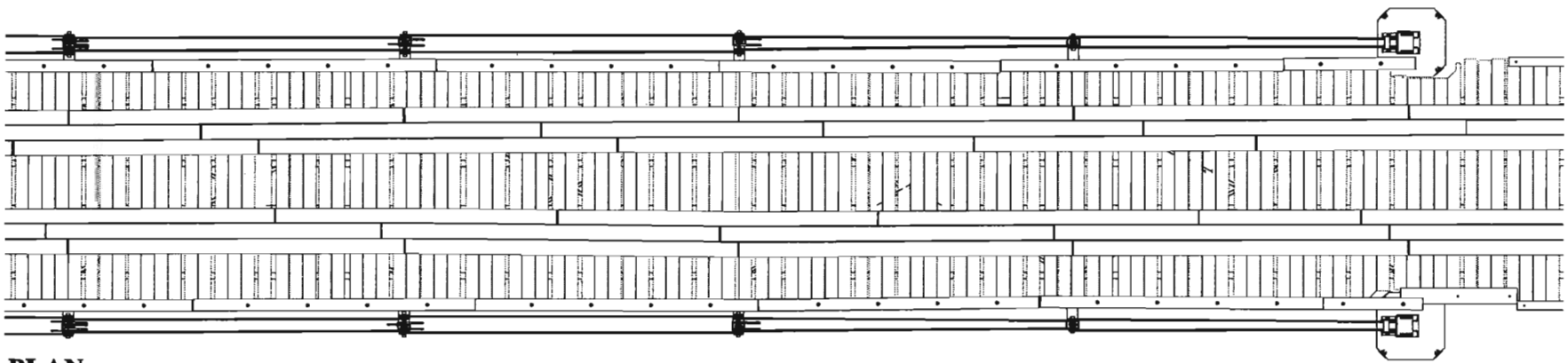
SHEET 2 OF 8

HISTORIC AMERICAN ENGINEERING RECORD
AR-70



LONGITUDINAL SECTION AA

SCALE ⅛"= 1' 1 : 32



PLAN

SCALE ⅛" = 1' 1 : 32

N

0 1 2 3 4 5 10 FEET

0 1 2 3 METERS

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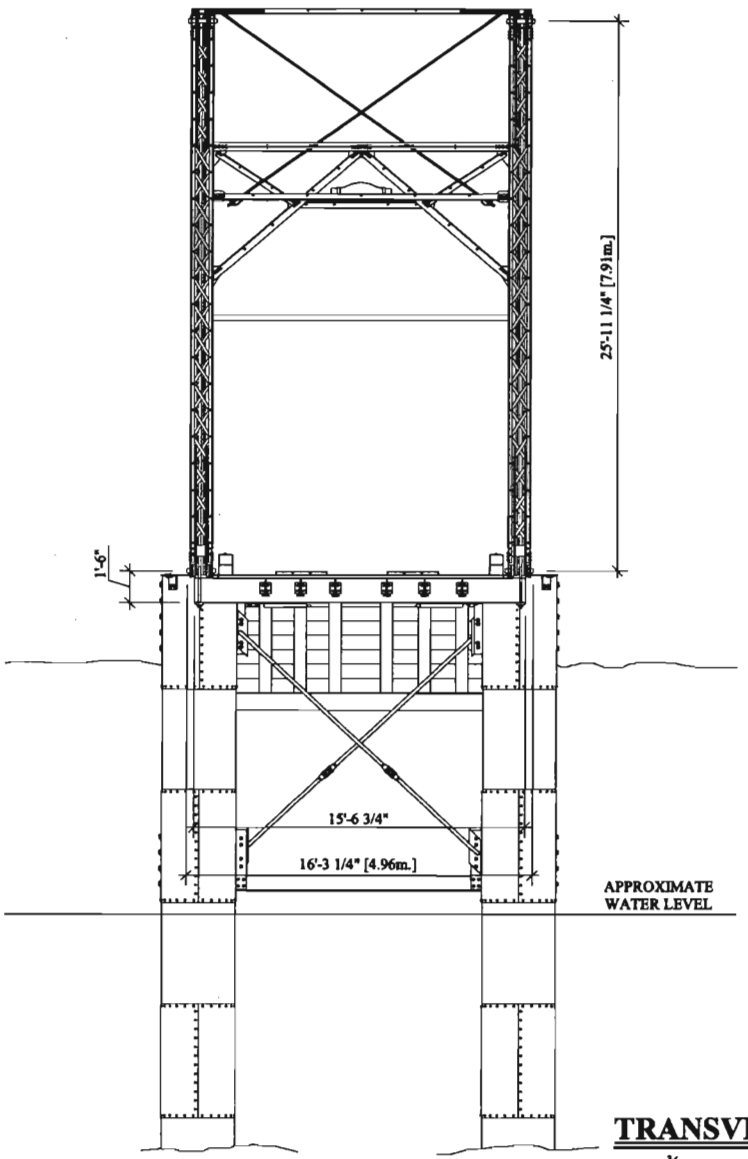
ARKANSAS HISTORIC BRIDGES
RECORDING PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

PLAINVIEW VICINITY

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER AT SUNLIGHT BAY ROAD (CR 9)
YELL COUNTY
ARKANSAS

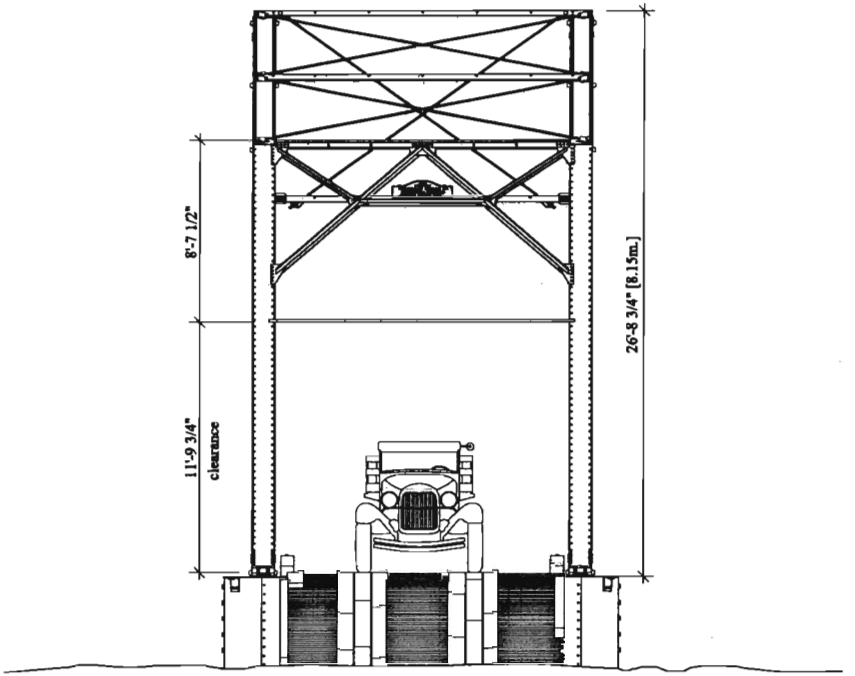
SHEET 3 OF 8

HISTORIC AMERICAN ENGINEERING RECORD
AR-70



TRANSVERSE SECTION BB

SCALE ⅜" = 1' 1 : 32



NORTH ELEVATION

SCALE ½"= 1' 1 : 24

0 1 2 3 4 5 10 FEET

0 1 2 3 METERS

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PLAINVIEW VICINITY

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER AT SUNLIGHT BAY ROAD (CR 8)
YELL COUNTY
ARKANSAS

SHEET 4 OF 8

HISTORIC AMERICAN ENGINEERING RECORD
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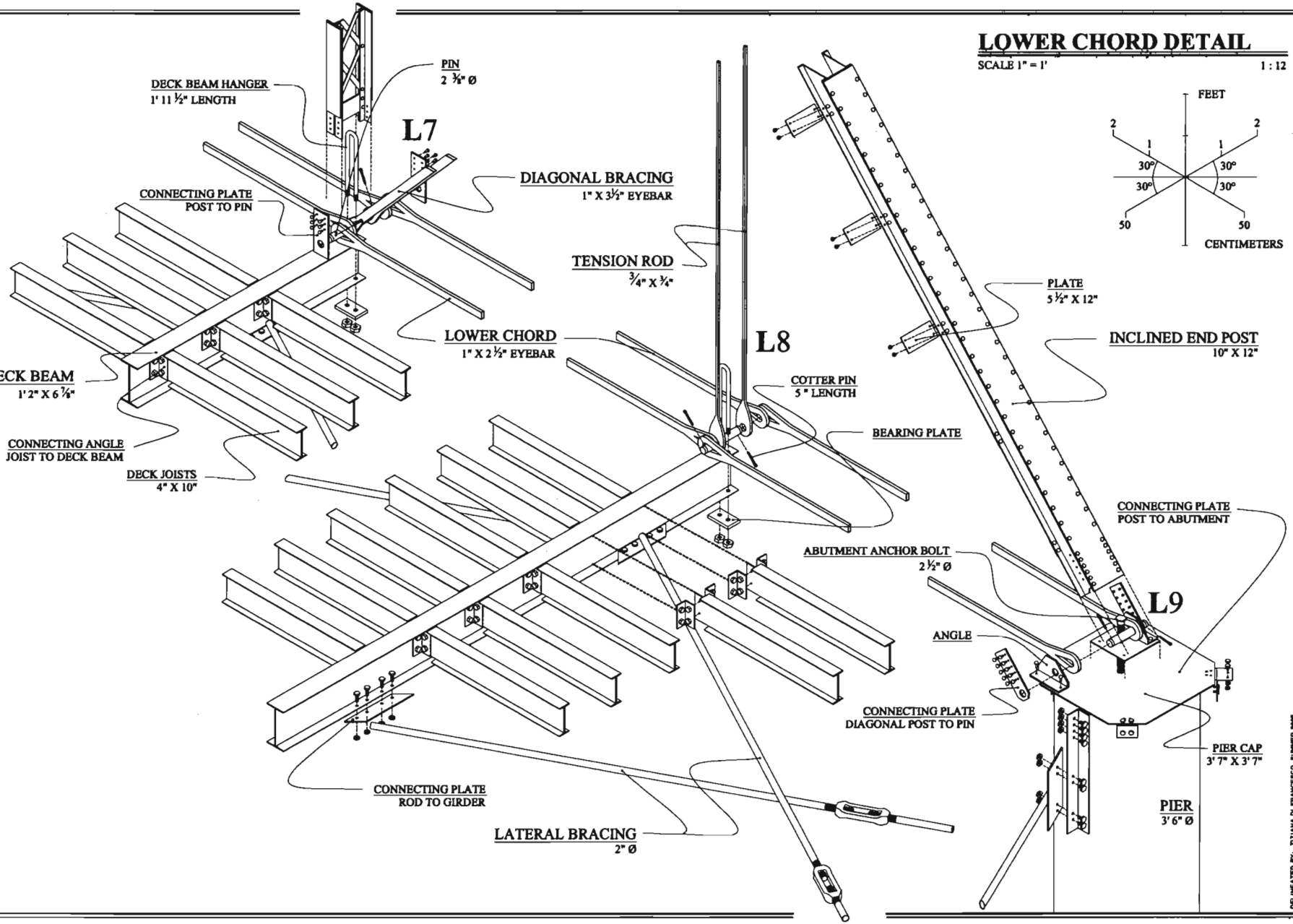
LOWER CHORD DETAIL

SCALE 1" = 1' 1 : 12



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ARKANSAS HISTORIC BRIDGES
RECORD PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER AT SAWLIGHT BAY ROAD (CR 6)
YELL COUNTY
ARKANSAS

PLAINVIEW VICINITY

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HISTORIC AMERICAN ENGINEERING RECORD
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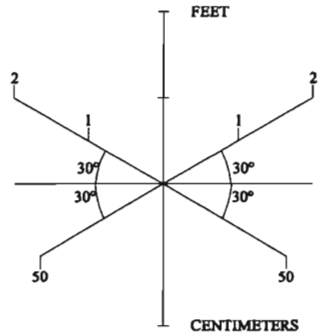
UPPER CHORD DETAIL

SCALE 1 ½" = 1' 1 : 8



WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LA'AVE RIVER AT 'SUNLIGHT BAY ROAD (CR 6)
YELL COUNTY
ARKANSAS

PLAINVIEW VICINITY

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ARKANSAS HISTORIC BRIDGES
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SHEET 6 OF 8

HISTORIC AMERICAN ENGINEERING RECORD
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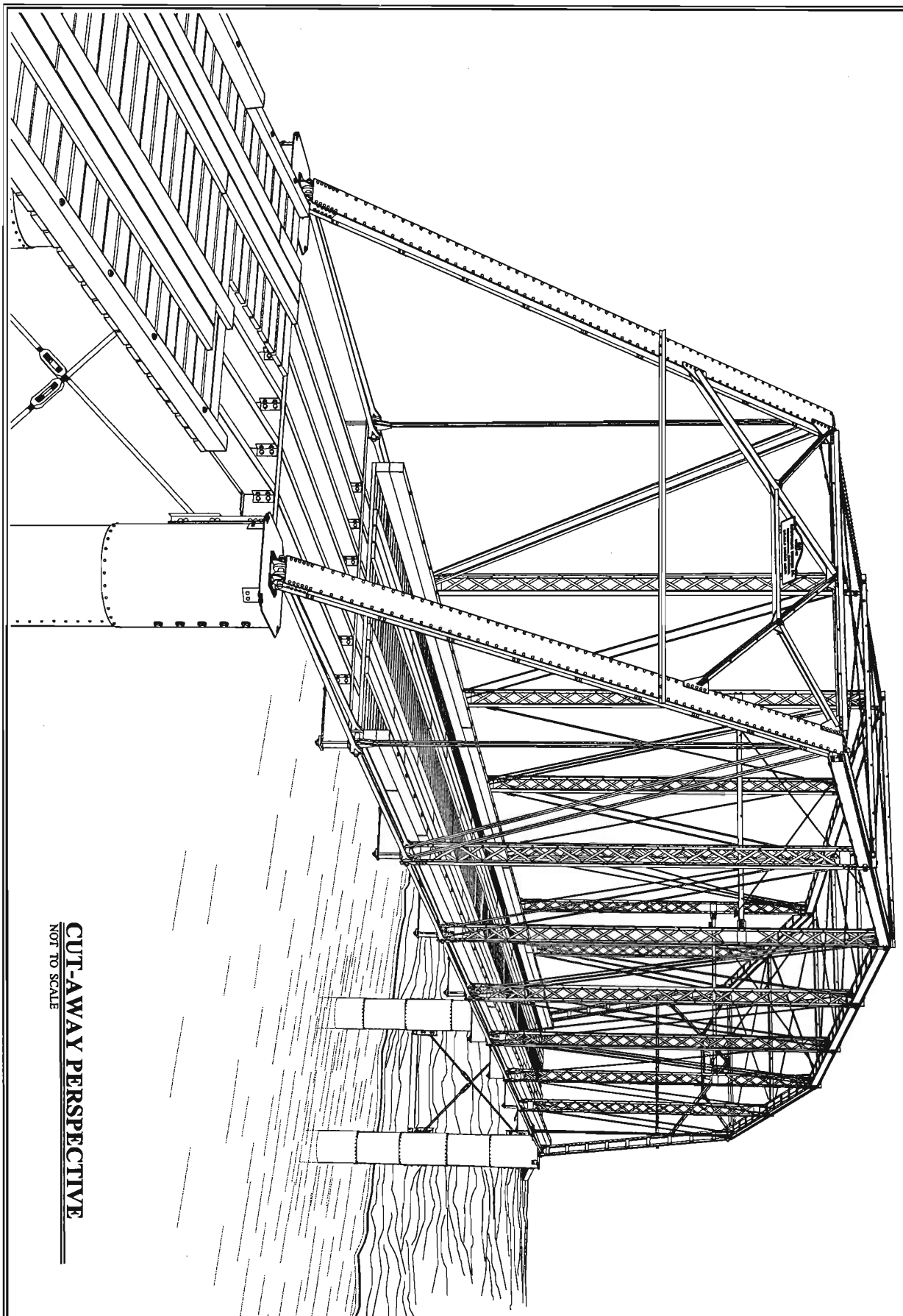

CUT-AWAY PERSPECTIVE

NOT TO SCALE

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ARKANSAS HISTORIC BRIDGES RECORDING PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

WARD'S CROSSING BRIDGE (WARD'S BRIDGE), 1905
SPANNING FOURCHE LAFAVE RIVER AT SUNLIGHT BAY ROAD (CR 8)
PLAINVIEW VICINITY
YELL COUNTY
ARKANSAS

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HISTORIC AMERICAN ENGINEERING RECORD
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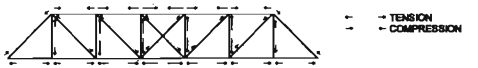
THREE BRIDGES

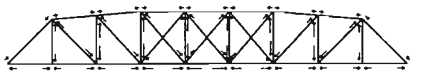
In 1844, Caleb Pratt and Thomas Willis Pratt received a patent for a timber and iron panel truss with vertical members in compression and diagonal members in tension. By keeping the compression members as short as possible (as opposed to a Howe truss, in which the diagonals are in compression), Pratt hoped to reduce lateral buckling. While not immediately popular in the combination wood and iron form, the Pratt truss became the seminal American truss type in the last quarter of the 19th century, when it was built in a simplified all-metal version. By the 1870's, the Pratt truss was the most popular type of truss for metal highway spans of up to about 150 feet. In the 20th century, the Pratt truss remained one of the two dominant metal truss types in America, the Warren truss being the other.



FORCE DIAGRAM: PRATT TRUSS

For longer spans, the truss needs to be deeper at the center, where the greatest bending moments occur. One of the most economical ways to accomplish this is to make the upper chord polygonal in shape. This idea was suggested, but not claimed, in Pratt's 1844 patent; it was later patented, in 1870, by Charles Henry Parker of Boston. The Parker truss was popular for long spans well into the twentieth century, but where it has an indefinite number of slopes in the upper chord, the Camelback truss is distinguished by a polygonal upper chord of exactly five slopes, the minimum number needed to obtain the benefits of the polygonal chord.

The Camelback truss was commonly used for bridges of 150 to 200 feet in length, and these longer spans required the introduction of a few components not generally seen in standard parallel chord Pratt truss bridges. For instance, the increased depth of the Camelback truss requires extensive overhead bracing to keep the structure rigid. In addition, counterbraces are required AT all but the end panels to accommodate reversal of tension/compression forces, which only occur at the very center of the parallel chord truss. Both the Nimrod Bridge and Ward's Crossing Bridge have these features, while the Fryer's Ford Bridge does not.

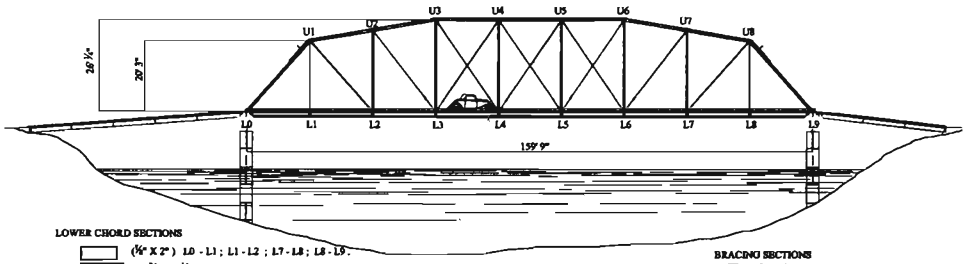


FORCE DIAGRAM: CAMELBACK TRUSS

Yet while these bridges have some differences, their similarities are also striking. Although built at different dates, by different companies, the three bridges shown here share many common characteristics, most notably built up compression members, wrought iron tension members, and pinned connections. In addition, there are marked similarities in truss dimensions, panel widths, and sizes of the individual metal components. These similarities clearly illustrate the trend toward standardization and mass-production that occurred in the latter half of the 19th century, as bridge fabricating firms adapted railroad technology for a mass market .

WARD'S CROSSING BRIDGE: CAMELBACK THROUGH TRUSS

SCALE 1/16" = 1' 1:192

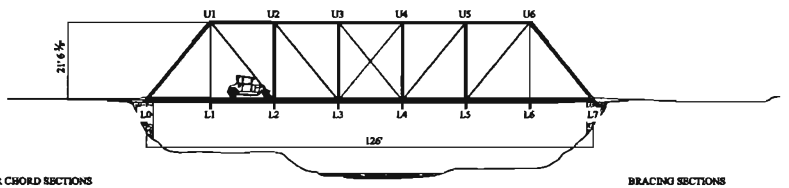


LOWER CHORD SECTIONS
- (5/16" X 2") L0 - L1 ; L1 - L2 ; L7 - L8 ; L8 - L9 .
- (5/16" X 2 1/2") L2 - L3 ; L6 - L7 .
- (5/16" X 3") L3 - L4 ; L4 - L5 ; L6 - L7.

BRACING SECTIONS
- (5/16" x 3/4") U1 - L1 ; U8 - L8 .
- (2" X 1") U1 - L2 ; U8 - L7 .
- (1" Ø) U2 - L3 ; U3 - L4 ; U4 - L5 ; U5 - L4 ; U6 - L5 ; U7 - L6 .
- (5/8" Ø) U4 - L3 ; U5 - L6 .

FRYER'S FORD BRIDGE: PRATT THROUGH TRUSS

SCALE 1/16" = 1' 1:192

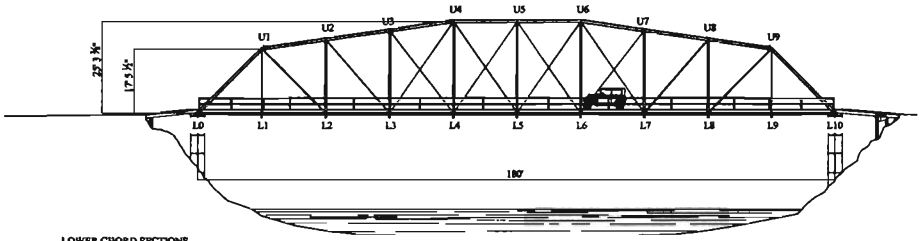


LOWER CHORD SECTIONS
- (5/16" X 1 1/2") L0 - L1 ; L1 - L2 ; L5 - L6 ; L6 - L7 .
- (5/16" X 2 1/2") L2 - L3 ; L4 - L5 .
- (5/16" X 3") L3 - L4 .

BRACING SECTIONS
- (5/16" X 3/4") U1 - L1 ; U6 - L6 .
- (2" X 3/4") U1 - L2 ; U6 - L5 .
- (2" X 1/2") U2 - L3 ; U3 - L4 .
- (3/4" Ø) U3 - L4 ; U4 - L3 .

NIMROD BRIDGE: CAMELBACK THROUGH TRUSS

SCALE 1/16" = 1' 1:192



LOWER CHORD SECTIONS
- (3" X 1/2") ALL CHORD.

BRACING SECTIONS
- (5/16" x 1/2") U1 - L1 ; U9 - L9 .
- (3" X 1/2") U1 - L2 ; U9 - L8 .
- (2" X 1/2") U2 - L3 ; U8 - L7 .
- (5/16" X 1/2") U3 - L4 ; U4 - L3 ; U4 - L5 ; U5 - L4 ; U5 - L6 ; U6 - L5 ; U6 - L7 ; U7 - L6 .

DELINEATED BY: TIZIANA DI FRANCESCO, AMY JAMES, BRIAN CARNAHAN, SUMMER 2005

ARKANSAS HISTORIC BRIDGES
HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

WARD'S CROSSING BRIDGE, 1905
SPANNING FOURCHE LAFAVE RIVER AT COUNTY ROAD 8
YELL COUNTY
ARKANSAS

PLAINVIEW VICINITY

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HISTORIC AMERICAN ENGINEERING RECORD
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