NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

RECEIVED
FEB 24 1995
INTERAGENCY RESOURCES DIVISION
NATIONAL PARK SERVICE

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Kansas City Southern Railroad Bridge, Cross Bayou

other names/site number Waddell "A" Truss Bridge

2. Location

street & number Cross Bayou and Spring St. N/A not for publication

city or town Shreveport N/A vicinity

state Louisiana code LA county Caddo code 017 zip code 71101

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this [X] nomination [ ] request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property [X] meets [ ] does not meet the National Register criteria. I recommend that this property be considered significant [X] nationally [ ] statewide [ ] locally. ([ ] See continuation sheet for additional comments.)

Jon Fricker 2/14/95
Signature of certifying official/Title Jonathan Fricker, Deputy SHPO, Dept of Culture, Recreation and Tourism Date

State of Federal agency and bureau

In my opinion, the property [ ] meets [ ] does not meet the National Register criteria. ([ ] See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

[X] entered in the National Register.
[ ] See continuation sheet.
[ ] determined eligible for the National Register
[ ] See continuation sheet.
[ ] determined not eligible for the National Register.
[ ] removed from the National Register.
[ ] other, (explain:) _____

for Edson H. Beall
Signature of the Keeper

Entered in the National Register
Date of Action 3/23/95

KCS Railroad Bridge
Name of Property

Caddo Parish, LA
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		buildings
		sites
1		structures
		objects
1	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION/rail-related

Current Functions
(Enter categories from instructions)

Vacant/not in use

7. Description

Architectural Classification
(Enter categories from instructions)

other: Waddell "A" Truss Bridge

Materials
(Enter categories from instructions)

foundation concrete
walls steel
roof
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

The Kansas City Southern Railroad Bridge is a single track steel structure whose most important component is a Waddell "A" truss bridge. It and the accompanying deck trusses were originally built in the 1890s over the Arkansas River in Oklahoma. They were erected in 1926 in their current location over Cross Bayou adjacent to downtown Shreveport.

The bridge consists of a 127 foot steel deck truss span, a 100 foot steel through truss span (the Waddell "A" Truss), and another 127 foot steel deck truss span. The deck trusses feature a repetitive pattern of diagonal and vertical braces. The Waddell "A" Truss is described below. The steel spans rest on concrete piers supported on foundation piling.

Patented in 1894 by bridge engineer J. A. L. Waddell, the Waddell "A" Truss bridge is regarded as an advancement in railroad bridge design (see Part 8). It is a type of short-span railroad bridge designed to effectively carry a maximum amount of weight using a minimum amount of materials in its construction. Its "A" shape truss, as seen in cross section, features a vertical eye-bar at the center and vertical and diagonal webbing. Other character-defining features of the type include strong lateral top chord bracing (the X shaped bracing seen at the top as one approaches the bridge) and the use of pin connections to join the major parts. The nature of the pin connections can be seen in the attached Historic American Engineering Record drawings of the nation's only other known surviving Waddell "A" Truss bridge. Essentially the pre-fabricated sections of the bridge are riveted together, and these major pieces are connected with pins when the bridge is erected. This method made the bridge quick and easy to erect on site (see Part 8).

Having been in use by KCS up until the late 1980s, the bridge retains its railroad trackage. To each side are deteriorated plank walks.

Assessment of Integrity:

A comparison of the 1926 drawings and the current structure shows that the Cross Bayou Bridge looks as it did when erected. As a well preserved example of a now rare railroad bridge type, it is an excellent candidate for the National Register.

KCS Railroad Bridge
Name of Property

Caddo Parish, LA
County and State

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☐ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☒ **B** removed from its original location.
- ☐ **C** a birthplace or grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

engineering

Period of Significance

1890s; 1926

Significant Dates

1890s; 1926

Significant Person
(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Engineer: John Alexander Law Waddell

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS): N/A

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary location of additional data:

- ☒ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Name of repository:

_____

KCS Railroad Bridge
Name of Property

Caddo Parish, LA
County and State

10. Geographical Data

Acreage of Property less than an acre

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	15	429520	3598080
2			
3			
4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title National Register Staff

organization Division of Historic Preservation date November 1994

street & number P. O. Box 44247 telephone 504-342-8160

city or town Baton Rouge state LA zip code 70804

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name City of Shreveport

street & number P. O. Box 31109 telephone 318-673-5050

city or town Sheveport state LA zip code 71130

The Kansas City Southern Railroad Bridge over Cross Bayou is of national significance as one of only two known remaining Waddell "A" truss bridges in the country.

The following background information on Waddell and his "A" truss bridge is excerpted from the National Register nomination on the Linn Creek Bridge in Missouri, the other remaining example of the type:

Summary: The Kansas City Southern Railroad Bridge represents the work of a master, John Alexander Law Waddell, who enjoyed an international reputation as a teacher of engineering and a practicing professional engineer. Waddell's "A" truss was developed to meet the need for a reliable, easily erected, inexpensive, short span railroad bridge and is regarded as a transitional phase in bridge design. The two, high main trusses, which were connected by top bracing and gave the bridge its characteristic "A" shape, answered the stress and vibration problems inherent in the more widely used pony truss form. Although rapid technological advances quickly made the "A" truss obsolete, Waddell's design was extensively used as a railroad bridge in both Japan, where he developed the type, and in the United States, where he perfected and patented his design.

The Engineer: John Alexander Law Waddell (1854-1938), a native of Canada, received a degree as Civil Engineer in 1875 from Rensselaer Polytechnic Institute. In the same year he worked as a draftsman for the Marine Department at Ottawa, Canada, and, in 1876 and 1877, served as an engineer with the Canadian Pacific Railroad. In 1878, Waddell returned to Rensselaer and spent two years on its faculty. Between 1880 and 1882, he worked as Chief Engineer for Raymond Campbell Bridge Builder of Council Bluffs, Iowa, and received a Masters in Engineering from McGill University of Montreal, Canada. In 1908, this same institution awarded him a doctorate in engineering.

In 1882, Waddell accepted a position as professor of civil engineering at the Imperial University of Tokyo. For his service, the Japanese Emperor awarded him the Knight's Cross of the Order of the Rising Sun in 1885. In 1886, he returned to the United States. The following year he established a practice in Kansas City, Missouri as a bridge designer and consultant, and for the next half century, was "one of the best known bridge engineers in the United States" (Dictionary of American Biography).

CONTINUED

According to the Dictionary of American Biography, "In his bridge work Waddell was noted for his boldness in innovation combined with a careful attention to detail." He designed bridges in the United States, Japan, Canada, Mexico, Russia, China and New Zealand. Waddell also was a prolific writer. His 1916 two-volume Bridge Engineering became the standard work on the subject.

The "A" Truss Design: From 1882 to 1886, while serving as professor of civil engineering at the Imperial University of Tokyo, Waddell debated the design of short span railroad bridges with British engineers, who were serving as advisers for the Japanese railroad currently being developed. According to his own account in De Pontius (1898), Waddell "was dissatisfied with all railroad bridges for spans between the superior limit of the plate-girder and a length of about one hundred and fifty feet, ordinary pin-connected, through, Pratt trusses being too light and vibratory, and the riveted bridges as then built being clumsy, unscientific and uneconomical."

The British engineers, who were then dominant in the engineering profession, advised the Japanese to built pony truss bridges for short spans of 120 feet or less. Waddell objected to the use of the pony truss because it had no top chord lateral bracing, so that it was less rigid and, consequently, more susceptible to stress and vibration. He also objected to the use of rivets to connect bridge components. Assemblage in the field required hand riveted connections, which were not as strong as shop riveting and were subject to vibration and susceptible to failure.

In 1893, Waddell was retained as an engineer by the Kansas City, Pittsburg and Gulf Railroad. In De Pontius, Waddell recalled that "after a little persuasion the General Manager was induced to agree to build a 100-ft. 'A' truss span as an experiment; but when he saw the completed plans he ordered at once four bridges to be built therefrom. . . ." The structure designed by Waddell was "a four panel truss bridge having eye bars in bottom chords and centre verticals, and rigid members for all the other portions of the trusses and for the entire lateral system." The resulting "A" shape was described by Waddell as "odd but not displeasing." In

CONTINUED

contrast to the pony truss railroad bridge, the two main trusses of Waddell's "A" truss design were high enough to be connected by lateral sway bracing. The "A" truss was also pin-connected, which eliminated Waddell's objection to the hand riveted connections of the British. In his own assessment of the design, Waddell noted: "The advantages of this type of bridge are great rigidity in all directions, ease and cheapness of erection, and economy of metal when it is compared with structures of other types having equal strength and rigidity."

Although the Waddell "A" truss never became a common bridge type, for its designed use it was, for a brief time, widely used in the United States, Japan and Canada. The Japanese Nippon Railways adopted the configuration as the standard bridge for spans between 65 to 116 feet, and the Kansas City, Pittsburg and Gulf Railroad adopted the design as the standard one hundred foot span for the line. The bridge was also used on the St. Louis Southwestern Railway and the Kansas City Southern. With the perfection of portable pneumatic riveting machines, the modern Pratt truss bridge supplanted Waddell's "A" truss design. By 1916, Waddell pronounced the design "antiquated," although "nearly all (the "A" truss bridges built) are still in use, notwithstanding the fact that some are frequently overloaded as much as sixty percent."

BIBLIOGRAPHY

Hauck, George F. W. and Gilleard, Gerald Lee. National Register Nomination Form, Waddell "A" Truss Bridge (Linn Branch Creek Bridge), Platte County, Missouri. Revised and edited by Steve Mitchell and Beverly Fleming. Copy in National Register file, Louisiana Division of Historic Preservation.

Historic American Engineering Record drawings and report on Waddell "A" Truss Bridge (Linn Branch Creek Bridge), Platte County, Missouri. Copy in National Register file, Louisiana Division of Historic Preservation.

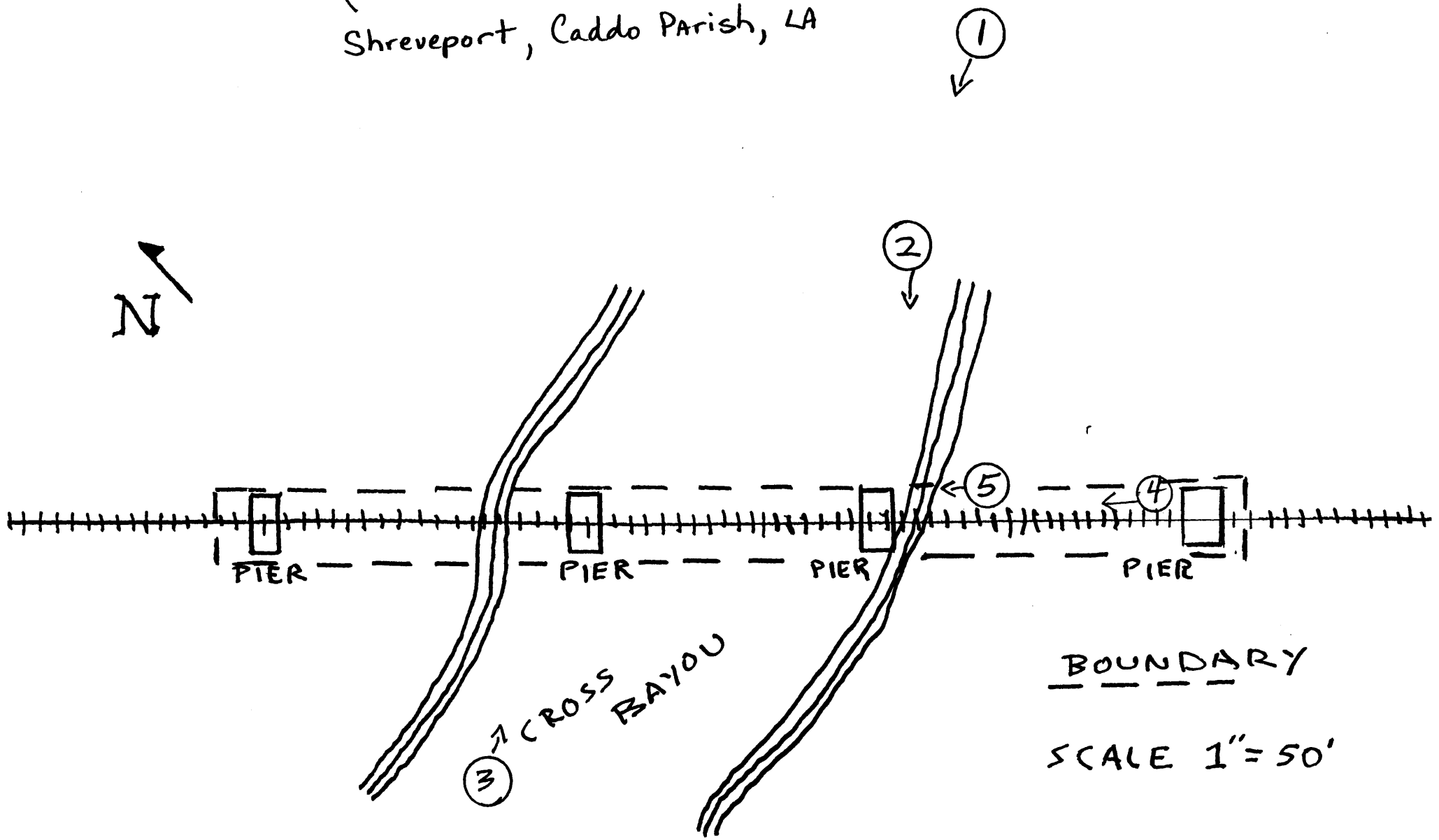
Kansas City Southern Railway Archives, contract and drawings for construction of Waddell "A" Truss Bridge over Cross Bayou. Copy in National Register file, Louisiana Division of Historic Preservation.

Eric DeLony, Chief, Historic American Engineering Record. Phone interview with National Register staff.

Boundary Description: Please refer to attached sketch map.

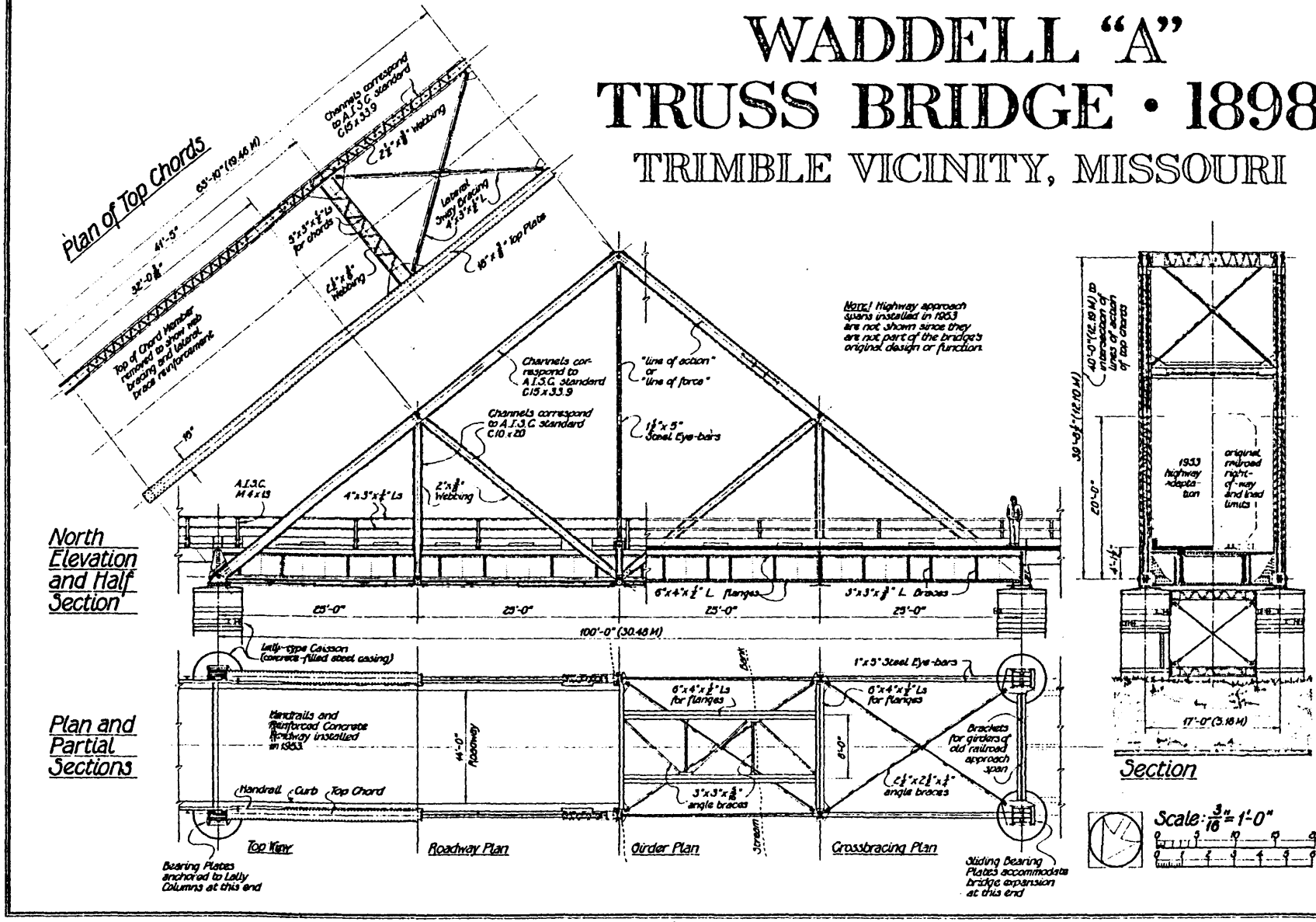
Boundary Justification: Boundaries were drawn to discretely encompass the nominated resource -- the Waddell A Truss with its accompanying deck trusses erected in Oklahoma in the 1890s and re-erected at the current location in 1926.

KCS Railroad Bridge
(Waddell "A" Truss Bridge)
Shreveport, Caddo Parish, LA



WADDELL "A" TRUSS BRIDGE • 1898

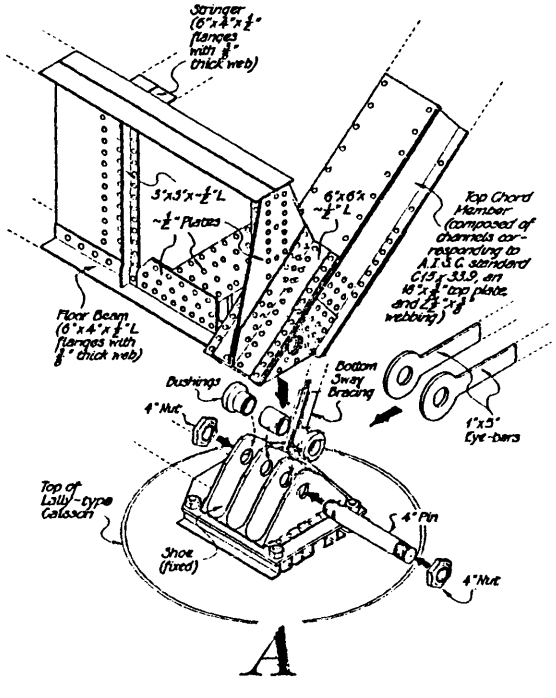
TRIMBLE VICINITY, MISSOURI

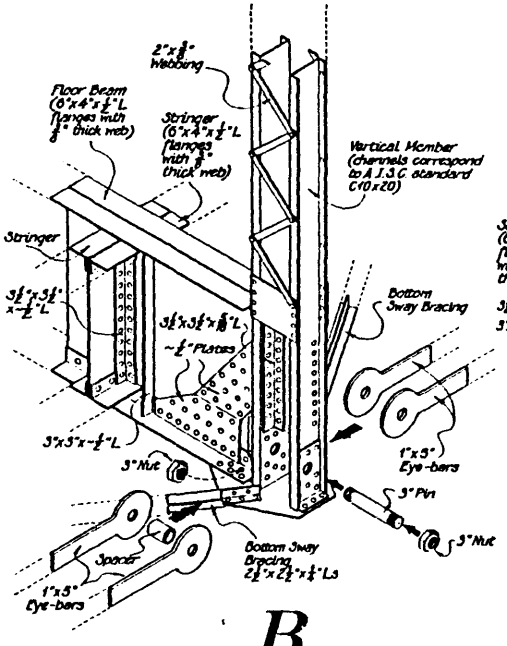


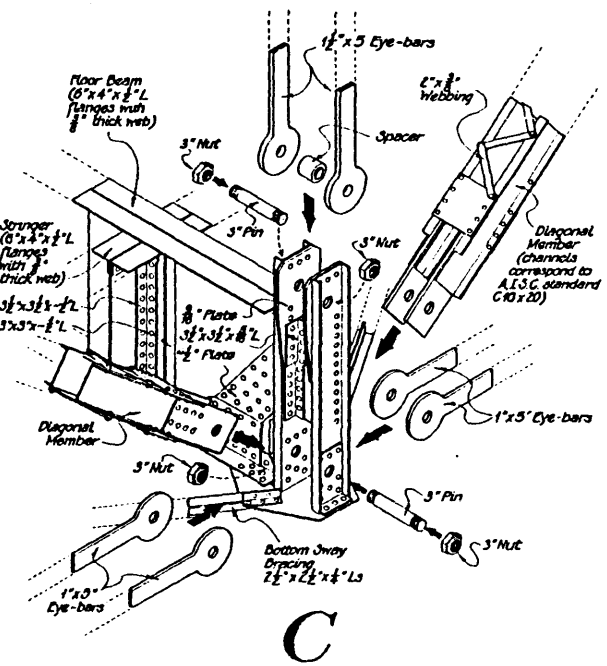
WADDELL "A" TRUSS BRIDGE (LINN BRANCH BRIDGE) : 1898
23 MILES EAST ON COUNTY ROAD "O" FROM STATE ROUTE 179
CLINTON COUNTY
TRIMBLE VICINITY
MISSOURI
SHEET 1 of 3
HISTORIC AMERICAN ENGINEERING RECORD MO-8

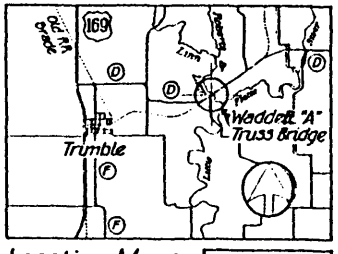
DELINEATED BY Richard H. Anderson Jr. 1980
WADDELL "A" TRUSS BRIDGE RECORDING PROJECT

HAER MO-8-1

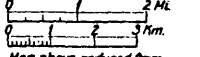




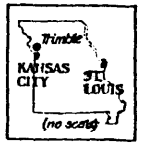




Location Maps



Map above reduced from U.S.G.S. 7.5 min. series, 1961 Smithfield Quadrangle UTM: 15.368170.4370860



Truss Type: Waddell "A" truss, patented by J.A.L. Waddell Nov. 13, 1894; No. 529,220.

Constructed: 1898

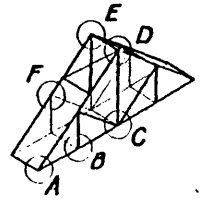
Fabricator: A. & P. Roberts Co., Pencoyd Bridge Works, Pencoyd, PA.

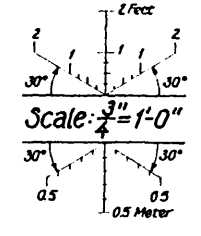
Owner/ Builder: The Quincy, Omaha and Kansas City Railway Co. (later a part of the Chicago, Burlington and Quincy Railroad)

Significant Dates: 1939 - removed from rail service when line was abandoned
1953 - converted to highway use; approach spans replaced with steel I-beams and new reinforced concrete traffic deck built
1980 - dismantled and removed from flood pool of Smithville Reservoir.

The Waddell "A" truss bridge on County Road "D" near Trimble, Missouri was documented by the Historic American Engineering Record as part of the Army Corps of Engineers' Smithville Reservoir Project. It is the only surviving example of this truss type identified by HAER at this time (1979). J.A.L. Waddell was one of America's most important bridge engineers of the late 19th and early 20th centuries and received wide acclaim for his books Designing Ordinary Iron Highway Bridges (1884), De Pontibus (1898), and Bridge Engineering (1916). The "A" truss was conceived by Waddell as an economical short-span, pin-connected structure capable of carrying heavy traffic without excessive vibration. In his patent application he acknowledged that many roof trusses had been built using a triangular form similar to his "A" truss and consequently confined his patent to triangular bridges that employed lateral bracing between the upper chords. Waddell also indicated that his "A" truss was "...designed especially for railroads." During the late 19th and early 20th centuries it was widely used in the Midwest and in Japan.

The HAER recording team for this project included: Donald C. Jackson, Engineer/Historian; Richard K. Anderson, Jr., Architectural Supervisor; and Thomas M. Hocker, Jr., Architectural Delineator.





DELINEATED BY Richard K. Anderson, Jr. 1980

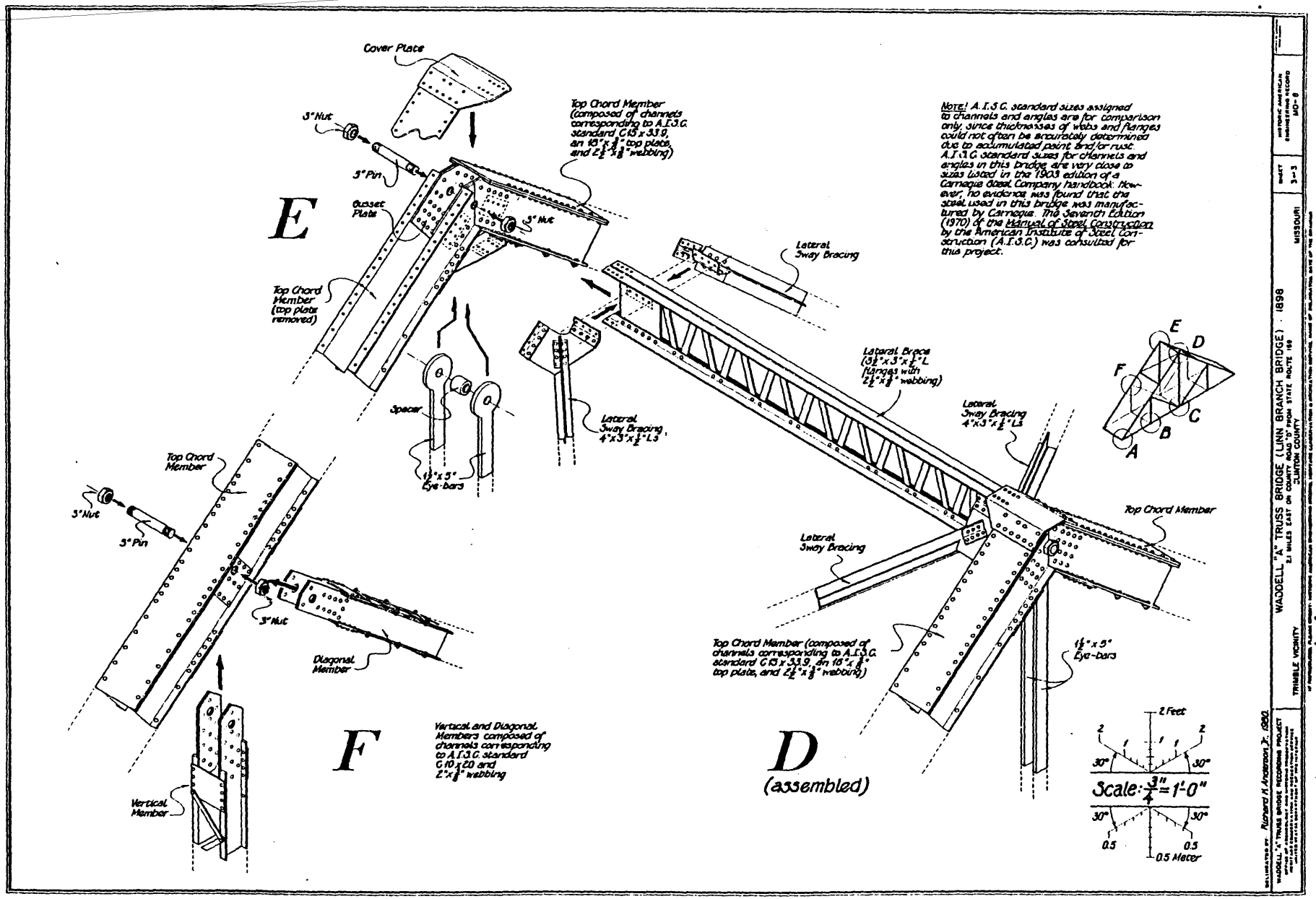
WADDELL "A" TRUSS BRIDGE (LINN BRANCH BRIDGE) : 1898
TRIMBLE VICINITY
2.1 MILES EAST ON COUNTY ROAD "D" FROM STATE ROUTE 149
CLINTON COUNTY
MISSOURI

SHEET 2 - 3

HISTORIC AMERICAN ENGINEERING RECORD MO-8

WADDELL "A" TRUSS BRIDGE RECORDING PROJECT

HAER MO-8-2



Note: A.I.S.C. standard sizes assigned to channels and angles are for comparison only, since thicknesses of webs and flanges could not often be accurately determined due to accumulated paint and/or rust. A.I.S.C. standard sizes for channels and angles in this bridge are very close to sizes listed in the 1903 edition of a Carnegie Steel Company handbook. However, no evidence was found that the steel used in this bridge was manufactured by Carnegie. The Seventh Edition (1970) of the Manual of Steel Construction by the American Institute of Steel Construction (A.I.S.C.) was consulted for this project.

WADDELL "A" TRUSS BRIDGE (LINN BRANCH BRIDGE) - 1898
2.1 MILES EAST ON COUNTY ROAD "D" FROM STATE ROUTE 158
CLINTON COUNTY
TRIMBLE VICINITY
MISSOURI

HISTORIC AMERICAN ENGINEERING RECORD
MO-8
SHEET 3-3

WADDELL "A" TRUSS BRIDGE RECORDING PROJECT

ILLUSTRATED BY: Richard H. Anderson Jr. 1980

HAER MO-8-3