

NORTH FORK OF CRAZY WOMAN CREEK BRIDGE
(Porcupine Creek Bridge)
Spanning North Fork of Crazy Woman Creek at Middle Fork Road
Buffalo vicinity
Johnson County
Wyoming

HAER WY-93
WY-93

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WY-93

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD
NORTH FORK OF CRAZY WOMAN CREEK BRIDGE (PORCUPINE CREEK BRIDGE)

I. INTRODUCTION

Location: T48N-R82W, Section 35, SE/NW/NW/NE/SE
Spanning North Fork of Crazy Woman Creek at Middle Fork Road
Buffalo vicinity
Johnson County
Wyoming

The bridge was originally erected at an unknown location in Casper, Wyoming. In 1964 it was moved to Campbell County Road CN17-4 over Porcupine Creek. In 1986, the bridge was moved to the Middle Fork Road over the North Fork of Crazy Woman Creek in Johnson County. The Wyoming Department of Transportation will construct a new bridge at this location, and the truss bridge will be moved to the City of Buffalo Greenbelt and used as a pedestrian and bicycle bridge on the Clear Creek Trail.

USGS Quad: Purdy Reservoir, Wyoming 7.5'

UTMS: Zone 13/366166 mE/4882502 mN

Date of
Construction: 1880

Present Owner: Wyoming Department of Transportation

Present Use: Vehicular bridge

Significance: This is the oldest datable vehicular truss bridge in use in the county road system in Wyoming. It displays an interesting variation of the classic Double Intersection Warren pony truss configuration using vertical posts at alternating panel points, making it one of the most significant truss bridges in Wyoming. It retains its essential character-defining features and is also an uncommon example nationally.

Project
Statement: The Wyoming Department of Transportation proposes to replace this bridge with a new bridge structure. The old bridge will be moved to a new location in the City of Buffalo Greenbelt and used as a pedestrian and bicycle bridge on the Clear Creek Trail. The approved mitigation plan for this National Register eligible property consists of Historic American Engineering Record (HAER) recordation.

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Historian: Robert Rosenberg
Rosenberg Historical Consultants
739 Crow Creek Road
Cheyenne, Wyoming 82009

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II. HISTORY

The western lands that encompassed Wyoming Territory after 1868 and the State of Wyoming after 1890 were crossed by hundreds of thousands of west-bound emigrants on the Oregon Trail and its many cutoffs starting in the early 1840s. From this first east-west transportation corridor, the Bozeman and Bridger Trails branched north to the goldfields of Montana in the 1860s, and the Overland Trail was pioneered south of the Oregon Trail to carry the transcontinental mail. During the remainder of the nineteenth century and the early twentieth century, a network of additional roads and trails were laid down as the territory and state of Wyoming were settled and developed. These early roads constituted the basis for Wyoming's twentieth century county, state, and federal road system.

Truss bridge technology was introduced in America in the seventeenth century with wood timber trusses. However, few engineering courses were offered in American schools in the early nineteenth century, except at the United States Military Academy at West Point. The Rensselaer Polytechnic Institute in Troy, New York, followed in 1835, and the two became the most important technical schools in the United States during the first half of the nineteenth century. By 1825, two new transportation modes had emerged in America: canals and railroads, both requiring bridge building. They served as training grounds for American civil engineers and resulted in the rapid advancement in truss bridge technology.¹

The railroads especially led the way in the developments of new bridge types, standard plans, and the use of metal for bridge construction. William Howe patented the Howe truss design in 1840, which pioneered the incorporation of iron in addition to wood. The truss employed diagonal bracing and top and bottom chords of timber, with vertical iron rods in tension. With its greater strength and ease in construction using prefabricated parts, it became the standard American railroad bridge before 1850. In 1844, Thomas and Caleb Pratt patented the Pratt truss, which incorporated vertical timber members in compression and diagonal iron rods in tension. The design proved stronger than the Howe, and when iron and later steel became cheaper to manufacture, the Pratt design became the American standard for highway and railroad bridges. In 1848, the Warren truss was patented by James Warren and Willoughby Monzani, two British engineers. The design used alternating diagonals in either tension or compression, and vertical components that strengthened the structure. This design was the basis for the North Fork of Crazy

Woman Creek Bridge. All bridge trusses can be classified as one of three basic types. The *through* truss carries its traffic load level with the bottom chords. The *pony* truss (current bridge) is a through truss with no lateral bracing between the top chords. The *deck* truss carries its traffic load level with the top chords.²

With the increasing demand for bridges after 1850 and the use of iron truss bridges by the railroads, a number of national bridge companies were established; metal foundries and fabricating shops manufactured standardized truss variations and mass-produced the individual members. With the completion of the first transcontinental railroad in 1869, railroad expansion and the demand for stronger rails and bridges stimulated progress in bridge engineering technology and in American iron production. Bridge companies generally submitted their own plans when bidding on specific bridge projects. However, few of them employed competent engineers, and as a result, many bridges failed each year across the United States. After 1880, steel replaced iron in the majority of truss bridges, and they became stronger and safer.³

In 1875, the military constructed the first vehicular truss bridge in Wyoming territory over the North Platte River near Fort Laramie on the Cheyenne-Deadwood Stage Road. The three-span 420-foot bowstring arch truss was constructed by the King Iron Bridge Company. However, this truss bridge represented an exception, as no concerted effort at highway bridge construction in Wyoming occurred until the first decade of the twentieth century. Individual counties were responsible for road building during the territorial and early state period. The counties did not follow any systematic plan but rather constructed roads and bridges in response to petitions from local citizens. In practice, few bridges were constructed by the counties before 1900, and travelers crossed the waterways via private bridges, toll ferries, or fords.⁴

The development of the automobile, auto tourism, and the associated good roads movements of the early twentieth century spurred county governments to improve their road systems and stream crossings. At the same time, Wyoming's population grew and provided a larger tax base for county road and bridge construction. Unlike timber bridges, manufactured iron or steel truss bridges generally cost several thousand dollars each, and most counties could afford to build only one to six such bridges per year. Decisions for the building program in any given year were based on which timber bridges had been washed away each spring. Typically, the county would advertise for competitive bids, giving only basic information about the location and length of the proposed bridge. Contractors generally submitted their own bridge designs. Sometimes

separate contracts were issued for the abutments work preparatory to building the superstructure. The county often let multi-bridge contracts for the year's construction so that a single bidder constructed all the bridges. Contracts were generally let to the "lowest and best" bidder. Most of the bidders consisted of a small number of national steel bridge contractors located in the West and Midwest. Therefore, local contractors were far less common, as it was difficult for them to compete. Local representatives of these national firms were required to stay informed on county bridge building projects. The firms who consistently bid on Wyoming bridge projects were Midland Bridge Company and Kansas City Bridge Company, both of Kansas City; Canton Bridge Company, Canton, Ohio; Security Bridge Company, Billings, Montana; Pueblo Bridge Company, Pueblo, Colorado; and Hennepin and Great Northern Bridge Companies of Minneapolis. Denver, Colorado, firms included Monarch Bridge Company, Denver Bridge Company, Midwest Steel and Iron Works, and Charles G. Sheely Construction Company (which became the Colorado Bridge and Construction Company in 1912-13). In addition to the established contractors, counties often purchased truss bridges from railroads that were replacing and/or upgrading bridges.⁵

Wyoming's early trusses were primarily the Pratt and Warren through and pony trusses. These were generally prefabricated from standardized designs and mass-produced by the major bridge companies. Around 1915, vehicular trusses in Wyoming shifted from pin to riveted connections. The first pneumatic riveting machines had appeared as early as 1875, but portable systems were not developed until the 1880s and 1890s. A single-person pneumatic riveting hammer was patented by Joseph A. Boyer in 1901, and coupled with portable compressors, the new technology allowed bridges to be easily riveted in the field. One of the most beneficial features of the steel truss bridges was that they could be quickly erected and easily dismantled and moved, depending on the changing needs of the county. Thus, an obsolete railroad bridge could be purchased and moved by the county to a location on the county road system. The North Fork of Crazy Woman Creek Bridge appears to be such an example, as its heavy component members suggest that it was originally built to carry railroad traffic. When the volume of traffic increased on a particular bridge or it became too old, it could be replaced, then moved to a location where it received lighter use.⁶

The Wyoming Highway Department was created in 1917 as a part of the Federal Highway Act of 1916 to improve the nation's road system by sharing federal funds with the states. As a result, individual counties assumed a minor role in truss bridge construction. At that time, Wyoming

boasted only four major highways: the Lincoln Highway, the nation's first transcontinental highway; the Black and Yellow Trail, starting in Minneapolis and passing through the Black Hills to Yellowstone National Park; the Custer Battlefield Highway from the Black Hills to Glacier National Park; and the Yellowstone Highway from Denver to Yellowstone National Park. The remainder of Wyoming's highway system was primitive and in poor condition. The Wyoming Highway Department standardized bridge plans and specifications and distributed them to each county. As a result, bridge failures declined, as did bridge engineering by national construction firms. However, it proved more economical to prepare custom designs for large bridges than to attempt to combine existing standard designs.⁷

Truss bridge building reached a peak in Wyoming in the early 1920s. The standardized designs preferred by the Highway Department still used the Pratt variations for the through trusses and Warren trusses for the shorter ponies, but they were designed with greater loading capacities with heavier members. One of the most popular bridge designs used in Wyoming in the mid-1930s was the rigid-connected Warren pony with polygonal top chords.⁸

Although funding for bridge construction was inadequate in the 1920s, the onset of the Great Depression actually aided in road and bridge construction in Wyoming. The federal government appropriated funds for numerous relief programs including expanded highway construction. With this massive federal aid, the State Highway Program improved more from 1930 to 1934 than in any other comparable period. The Works Progress Administration built or maintained over 570,000 miles of rural roads and erected 78,000 new bridges and viaducts between 1935 and 1943. The bidding process underwent a major shift, with local contractors rather than national bridge companies typically awarded the contracts. Contractors continued to use steel from the great midwestern foundries but implemented the standardized plans of the Highway Department.⁹

With the close of World War II, the era of truss bridge building in Wyoming came to an end. Steel truss bridges were replaced by those using more sophisticated designs and built with reinforced concrete such as concrete slab and girder, continuous slab, rigid frame, T-beam and prestressed concrete. Most of the truss bridges erected after that date were salvaged from other locations.¹⁰

III. NORTH FORK OF CRAZY WOMAN CREEK BRIDGE

According to a nameplate that was attached to the inclined end post of the bridge in 1981 but has since been removed, this bridge was constructed by the Detroit Bridge and Iron Company in 1880; however, little is known about the history of this bridge prior to 1964. The heavy component members of the truss suggest that it was originally manufactured as a railroad bridge. The bridge was acquired by Campbell County and moved from an unknown location in Casper, Wyoming, then erected by the county in 1964 over Porcupine Creek on Campbell County Road CN17-4 at milepost 0.1 approximately 15.1 miles southeast of Wright (S. 25, T42N-R71W). Records of the Campbell County Commissioners between 1961 and 1965 did not contain any information pertaining to purchasing or moving the bridge. In 1986, the bridge was moved to its current location within Johnson County. New abutments were constructed at that time, and the bridge also received a new treated wood timber deck. The bridge will be replaced with a new structure and moved to the City of Buffalo Greenbelt for use as a pedestrian and bicycle bridge over Clear Creek.¹¹

IV. PHYSICAL DESCRIPTION

The North Fork of Crazy Woman Creek Bridge is located along Johnson County Road 265 (Middle Fork Road), a gravel road, and spans the creek of the same name at milepost 2.10. The bridge is a single-span, rigid-connected steel Double Intersection Warren pony truss with verticals and alternating panel points. The top and bottom chords consist of two angles and web with cover plates. The verticals consist of two angles with stitch rivets. The diagonals consist of one or two angles with stitch rivets. The bridge has a span length of 48'11" and a clear roadway width of 15'0" and a 9'8" traveled way with a wood timber deck.

New bridge abutments were constructed when the bridge was moved to its current location in 1986. Each abutment consisted of fourteen steel piles with 3" x 12" x 20' long backing planks and stone riprap. The bridge also received a new treated wood timber deck at that time.¹²

The Double Intersection Warren truss is an adaptation of the classic Warren truss. When viewed in profile, it has two triangular web systems superimposed upon each other. The main structural members act in both compression and tension. The overlapping diagonals increase stiffness and load carrying capacity. This bridge represents an interesting and uncommon variation with its vertical posts at alternating panel points.¹³

Surviving examples of Double Intersection Warren truss bridges dating from the nineteenth century are uncommon in America. The North Fork of Crazy Woman Creek Bridge retains its character-defining features, which consist of parallel top and bottom chords, the diagonal members and vertical members at alternating panel points, floor beams, stringers, rigid connection, and the pony truss. This bridge is therefore considered to be a “highly significant” example of this type.¹⁴

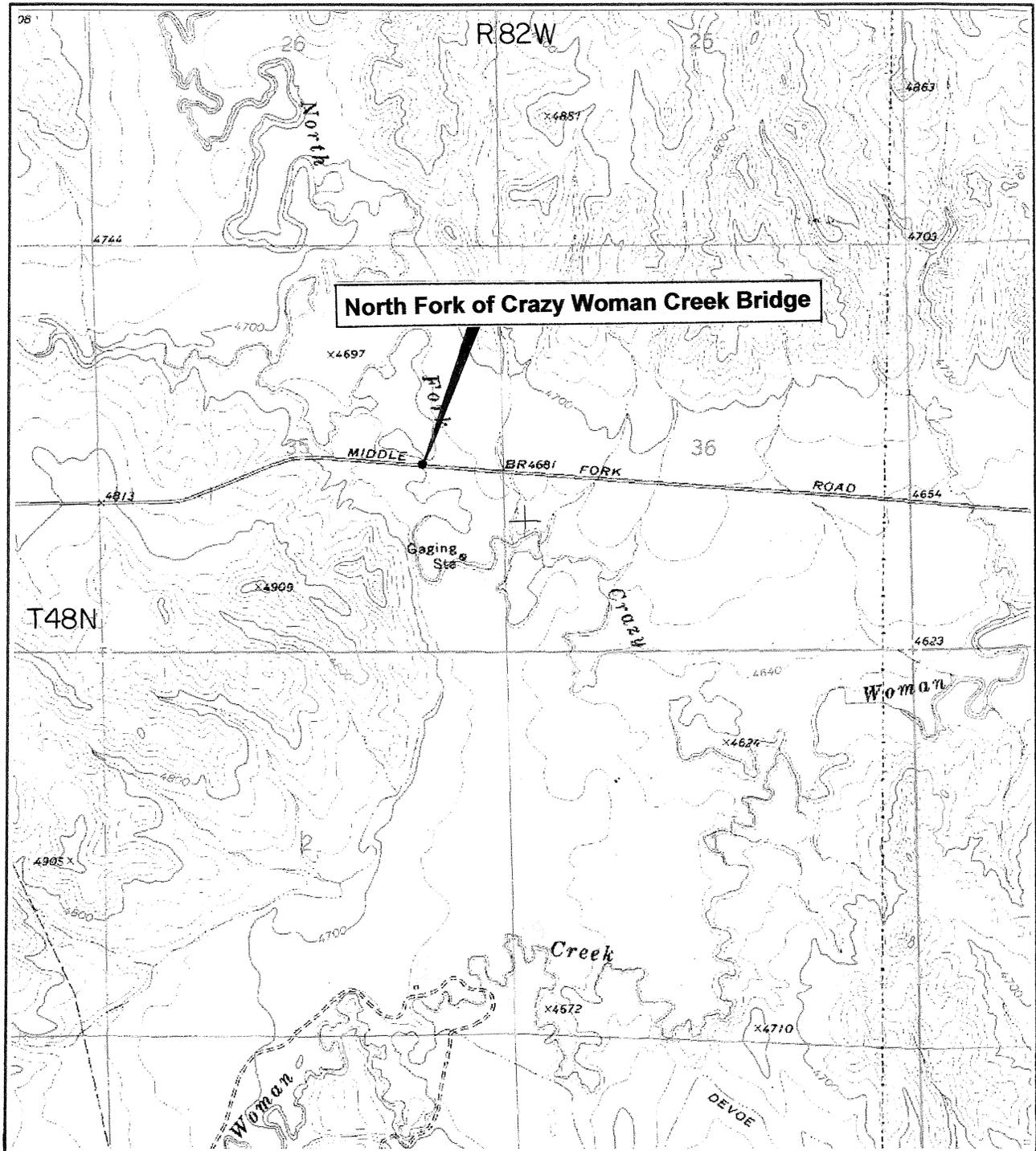
V. ENDNOTES

1. Parsons Brinckerhoff and Engineering and Industrial Heritage, *A Context for Common Historic Bridge Types, NCHRP Project 25-25, Task 15*. (Report Prepared for the National Cooperative Highway Research Program, Transportation Research Council, National Research Council, Washington, D.C., 2005) pp. 2-3 to 2-5.
2. Clayton B. Fraser, *Wyoming Truss Bridge Survey* (Loveland, Colorado: Fraserdesign; report prepared for the Wyoming State Highway Department, Cheyenne, Wyoming, 1981) pp. 4-6; Parsons Brinckerhoff, *Context for Historic Bridge Types*, pp. 2-6 and 2-7).
3. Fraser, *Wyoming Truss Bridge Survey*, p. 7; Parsons Brinckerhoff, *Context for Historic Bridge Types*, pp. 2-10 to 2-13).
4. Fraser, *Wyoming Truss Bridge Survey*, pp.10-11.
5. *Ibid.*, pp. 11-14.
6. *Ibid.*, pp. 13-14; Parsons Brinckerhoff, *Context for Historic Bridge Types*, pp.2-16 and 2-17.
7. Fraser, *Wyoming Truss Bridge Survey*, pp.14-16; Parsons Brinckerhoff, *Context for Historic Bridge Types*, p. 2-22.
8. Fraser, *Wyoming Truss Bridge Survey*, pp.16-17.
9. *Ibid.*, p.17; Parsons Brinckerhoff, *Context for Historic Bridge Types*, p. 2-24.
10. Fraser, *Wyoming Truss Bridge Survey*, p. 17; Parsons Brinckerhoff, *Context for Historic Bridge Types*, p. 2-26.
11. Memorandum of Agreement and Understanding between the Wyoming Department of Transportation, the Board of County Commissioners of Johnson County, and the City of Buffalo, Project BROS-0C16-00(015), Middle Fork Road, Johnson County, March 2006.
12. Wyoming Highway Department, Bridge Division, *General Notes, Bridge over North Fork Crazy Woman Creek, Sta 3 + 75, County Road 16-79, Poison Creek Road*, dated December 8, 1986.

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13. T. Allan Comp and Donald Jackson, *Bridge Truss Types: A Guide to Dating and Identifying*. *Technical Leaflet 95* (Nashville, Tennessee, 1977); Fraser, *Wyoming Truss Bridge Survey*, p. 26).
14. Parsons Brinkerhoff, *Context for Historic Bridge Types*, pp. 3-43 to 3-44.

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Map showing location of the North Fork of Crazy Woman Creek Bridge, which spans the creek at Middle Fork Road south of Buffalo, Wyoming. (Purdy Reservoir 7.5' USGS quadrangle)