

TAYLOR BRIDGE
MASON CITY,
CERRO GORDO, COUNTY
IOWA

HAER No. IA-11

HAER
IOWA,
17-MASLIT,
4-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
ROCKY MOUNTAIN REGIONAL OFFICE
DEPARTMENT OF THE INTERIOR
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IOWA,
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HISTORIC AMERICAN ENGINEERING RECORD

Taylor Bridge

Mason City, Cerro Cordo County, Iowa

HAER IA-11

Location: Carrying U.S. 18 across the Winnebago River on the eastern edge of Mason City, Iowa.

UTM: 15/486850 4777060

Quad: Mason City, Iowa.

Date of Construction: 1924.

Owner: State of Iowa.

Use: Vehicular bridge.

Statement of Significance: This concrete rainbow arch bridge was designed by the Marsh Engineering Company, Des Moines, Iowa. The patented design was promoted throughout the midwest as an economical form for short spans, and it represents an important structural form in the development of reinforced concrete technology.

Project Information: The Taylor Bridge was documented by Dennett, Muessig, Ryan & Associates, Ltd. (Iowa City, Iowa) for the Iowa Department of Transportation in 1983. J Ceronie was the photographer; and Marie Martin, Sarah Dennett, and J Ceronie completed the historical documentation.

The reinforced concrete "rainbow" arch bridge spanning the Winnebago River on the east side of Mason City, Iowa was constructed from plans drawn by the Marsh Engineering Company of Des Moines. The plans, preparation of which cost \$541.80, called for a span of one hundred feet between abutments, a twenty-four foot roadway, twenty foot approaches, and an overall length of one hundred forty feet. Three contractors submitted bids to the City of Mason City for constructing the bridge. Fifield Construction Company of Waterloo bid \$16,555.00; Carl Koluik of Mason City bid \$14,747.00; and the Miller-Taylor Company of Waterloo bid \$15,480.00. According to the local newspaper, the City selected Miller-Taylor for the project because of the firm's expertise, and their previous experience building bridges in the area. Harry Hayes, Street Commissioner, administered the contract for the City.¹

Construction began on June 10, 1924, and the bridge was opened to the public on the afternoon of September 25, 1924. The newspaper account of the opening notes that the bridge was guaranteed to hold forty tons, and that it had a clearance of 13 feet 5 inches above the normal water level. The deck and approaches were of cinder when the bridge opened, and were to be paved one year later. This procedure was apparently to accommodate any settling in the new structure.²

The new bridge was (and still is) referred to locally as the "Lime Creek Bridge" or the "Taylor Bridge." The first of these names reflects the fact that the Winnebago River has often been called Lime Creek or Lime River.

Taylor Bridge, which was also the name by which the previous span was known, may derive from the titles of the contracting firms. The earlier bridge was built by the Taylor Company (location undetermined) in 1887.³ It is not known whether this nineteenth century firm was a predecessor to the Miller-Taylor Company of Waterloo, the builders of the concrete arch.

The 1887 bridge was reported to have been a steel⁴ and wooden structure, with an undesirable hump and bend in the roadway. It was sold on August 31, 1924, as the new span neared completion, to the Wolf Brothers (a salvage firm) for \$10.00. There was apparently some concern about whether the concrete bridge would withstand flood waters, and the old one was to be left in place for about a year.⁵ The exact location of the 1887 bridge is not known. An early county map (1875) indicates that a road crossed the stream in the vicinity of the present bridge, but there is no information about whether the river was forded or bridged prior to 1887.⁶

The design for the bridge drawn by the Marsh Engineering Company presents a hybrid of the continuous concrete and the segmented steel arch bridge designs. During the 1920's, James Marsh promoted the rainbow arch throughout the Midwest as an economical form for relatively short spans. Marsh had been granted a patent for his bridge design in 1912, claiming that it provided "certain new and useful Improvements in Reinforced Arch Bridges."⁷

Marsh graduated from the Iowa State College of Agriculture and Mechanic Arts (Ames) in 1882, with a Bachelor of Mechanical Engineering degree. After graduation he worked in Des Moines, Iowa, first for the King Bridge

Company (home office in Cleveland, Ohio), then for the Kansas City Bridge Company (of Kansas City, Missouri), and finally for the King Bridge Company once again. In 1896 he left King and established his own Des Moines firm, providing consultation and contracting for engineering projects. At the time the bridge in Mason City was designed, his firm was known as Marsh Engineering Company. He began to specialize in reinforced concrete structures about 1900. In 1980 the records of the Iowa Department of Transportation noted that there were fifteen of Marsh's rainbow arch spans extant in Iowa, as well as several in adjacent states.⁹

As was typical of Marsh's concrete arch designs, the bridge in Mason City has a steel arch, steel hangers supporting steel floor beams, and a deck of reinforced concrete. The arch, hangers and floor beams are encased in concrete, which was poured in place. The portion of the span supported by the arches is 100 feet (30.48 M) long, and the approaches are each twenty feet (6.10 M) in length. The arches are spaced twenty-five feet (7.62 M) apart, and the roadway is twenty-four feet (7.32 M) wide. There are eight hangers from each arch, supporting floor beams which are placed nine feet nine inches (2.97 M) on center. The abutments are reinforced concrete.

In 1954 several modifications were apparently made to the bridge. Nemmers & Clark, Engineers, (Des Moines) drew four sheets of specifications for these changes. The wearing surface was built up with four and one half inches of additional concrete, a four foot sidewalk was added to the south side of the span, and the west approach was repaired. The sidewalk was poured in place, on cantilevered brackets attached to the existing structure. Reinforced concrete brackets were anchored to the abutments and

approaches, while steel brackets were attached to the ends of the floor beams. The sidewalk railing was metal. The paving was removed from the west approach, and replaced with a new ten inch thick reinforced concrete surface.¹⁰

As do many (if not all) of the extant Marsh-designed concrete arch spans, the bridge in Mason City exhibits moderate to serious deterioration. The original steel members and reinforcing bars were apparently not waterproofed in any way, and the original concrete was the relatively porous type common at the time. The steel inevitably rusts, causing spalling and cracking in the arches, abutments, floor beams and roadway.

The span is to be replaced with a prestressed concrete structure on the existing horizontal alignment. The vertical grade is to be raised eight to nine feet for improved clearance at high water.¹¹

FOOTNOTES

¹ Mason City Globe-Gazette, 1 May 1924.

² Ibid., 25 September 1924.

³ Ibid., 1 September 1925.

⁴ It is probable that a bridge of this date was constructed of wrought iron rather than steel.

⁵ Mason City Globe-Gazette, 1 September 1925, and 25 September 1924.

⁶ A.T. Andreas, ed., Illustrated Historical Atlas of the State of Iowa, (Chicago: Andreas Atlas Co., 1875), p. 27.

⁷ Iowa Department of Transportation, "The West 8th Street Bridge; A Rainbow Arch Structure; Newton, Iowa; A National Architectural and Engineering Record Documentation Project," (Ames, Iowa: 1980), p. 1. The structure documented in this report has been assigned the number IA-4 by the Historic American Engineering Record. The HAER archives in the collections of the Library of Congress (Washington, D.C.) include this report, as well as large format photographs of the bridge and its construction.

⁸ Ibid., p. 9.

⁹ Ibid., p. 7.

¹⁰ Iowa Department of Transportation, "Design No. 1252, Cerro Gordo County," (Ames, Iowa: 1953), sheets 1-4. These design specifications were recorded on microfilm by the Iowa Department of Transportation, and can be found in their archives. The first sheet of the set notes that the bridge was originally designed with working stresses as follows: $f_c = 750$ psi, $f_s = 16,000$ psi, and with a live load of one fifteen ton truck or an equivalent uniform load of 80 lb/square foot of roadway.

¹¹ Iowa Department of Transportation, "Finding of No Significant Impact; Final Section 4(f) Statement; U.S. 18 Reconstruction in Mason City, Cerro Gordo County, Project No. F-18-5," (Ames, Iowa: 1982), p. 5.

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- Mason City Globe Gazette, 1 May 1924 - 1 September 1925.