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IOWA  
33-STLU.V,  
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DIETZENBACH BOTTOM BRIDGE  
(Turkey River Bridge)  
(Mill Race Bridge)  
(Old Elgin Creamery Bridge)  
Iowa Bridges Recording Project  
Spanning Turkey River at Pheasant Road,  
8.6 miles Northwest of West Union  
St. Lucas Vicinity  
Fayette County  
Iowa

HAER No. IA-54

BLACK & WHITE PHOTOGRAPHS  
WRITTEN HISTORICAL & DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Department of the Interior  
P.O. Box 37127  
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Location: Spanning the Turkey River at Pheasant Road; 8.6 miles northwest of West Union; Fayette County, Iowa.  
UTM: 15.590440.4679800  
USGS: St. Lucas, Iowa quadrangle (7.5 minute series, 1981)

Date of Construction: 1890-91 (probable), moved in 1926

Designer: Horace E. Horton, Chicago, Illinois (probable)

Contractor/Fabricator: Chicago Bridge & Iron Company (probable)

Present Owner: Fayette County , Iowa

Present Use: One-lane roadway bridge

Significance: The Dietzenbach Bottom Bridge is an excellent example of the now rare late nineteenth century pin-connected, wrought-iron Warren truss. It seems to be the work of the creative and well-known engineer Horace Horton, the founder of Chicago Bridge & Iron Company. While the bridge has been moved from its original location, both sites show the transportation roles played by bridges in Iowa.

Historian: Leslie Pitner, August 1995

Project Information: This document was prepared as a part of the Iowa Historic Bridges Recording Project performed during the summer of 1995 by the Historic American Engineering Record (HAER). The project was sponsored by the Iowa Department of Transportation (IDOT). Preliminary research was performed by Clayton B. Fraser of Fraserdesign, Loveland, Colorado.

## INTRODUCTION

In July of 1890, the Fayette County supervisors approved a contract with the Chicago Bridge & Iron Company to build a bridge over Otter Creek in the town of Elgin. This new bridge was to connect downtown Elgin with the site of the cooperative creamery and a brewery. In 1926, it seems that this same bridge began a new life over the Turkey River in the hills of the northernmost part of Fayette County.<sup>1</sup> In these two sites, the different transportation roles of rural bridges in Iowa are revealed.

Fayette County is located in the northeast area of Iowa. It is made up of twenty townships and covers 730 square miles. The terrain of the county varies greatly, from the relatively flat lands of the southwest half to the hilly and more rugged terrain of the northeast. The topography changes quickly in the northeast, particularly along the Turkey and Volga rivers, with elevations varying by up to 200 feet.<sup>2</sup> Auburn Township, where the Dietzenbach Bottom Bridge is now located, lies in the hills of the northern area of the county. Elgin, the first site of the bridge, is in Pleasant Valley Township, in the eastern part of the county, an area known as the Switzerland of Iowa. The two sites are the two poles of the county, the bridge moved from the center of a town to span a rural farm-to-market road.

Originally built in 1890 in Elgin, the bridge was first known as the Elgin Creamery Bridge.<sup>3</sup> It spanned Otter Creek to connect

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<sup>1</sup>The former location of the bridge is reported only in the Iowa Department of Transportation Structure Inventory and Appraisal from 1973 (Fayette County Engineer's Office), which states "Old Elgin Creamery Bridge. 120' High Truss Reassembled. (Wes Barker documented this)." This is corroborated by an entry in the Bridge Contract Book (held by CBI Industries, Oakbrook, Illinois) dated July 21, 1890 for the Elgin Bridge, which describes a 121' bridge. Once moved, however, it is difficult to definitively trace the origins of a bridge.

<sup>2</sup>Helen Moeller, ed., Out of the Midwest: A Portrait, Marceline, Missouri: Walsworth Publishing Company, 1976, 89-90.

<sup>3</sup>The contract entry states "Elgin, Fayette, IA - 121' span, 16' width, comb. - contract date, July 21, 1890." The statement of "comb." is problematic, but the cost of the Elgin bridge, at least \$2,000, is close to the \$2,500 paid for a 135' iron bridge by Chicago Bridge and Iron of the same year [Fayette County Board of Supervisors Minutes, Book 6, November 13, 1890 (p. 266), January 6, 1891 (p. 285), April 10, 1891 (p. 314), and September 1891 (p. 342)].

the town to the local union creamery. Elgin thrived as a mill town, surrounded by the water sources of the Turkey River and Otter Creek. The first settlers came to Pleasant Valley Township in 1837, when Chancy Edson and Will Grant moved from Clayton County to establish a mill. They, however, were quickly informed by the Indians that they were in the Neutral Ground and would have to leave.<sup>4</sup> In 1830, a forty mile wide buffer zone had been established in this area to keep peace between the Sioux and the Sauk and Fox tribes.<sup>5</sup> Upon the departure of Edson and Grant, the Indians burned the dam and timber work they had begun.<sup>6</sup>

In 1848, after the purchase of the land by the U.S. Government and new statehood for Iowa, settlers returned. Samuel Conner first moved into the township, settling in the area that would become Elgin. A year later, he, with Benjamin Diamond, built the first sawmill along Otter Creek, on the same site as the ill-fated original mill. Conner and Diamond went on to build a grist mill, and Conner added a hotel. The town of Elgin was then platted by M.V. Burdick in 1849 and later incorporated in 1892.<sup>7</sup>

The town continued in its steady growth, adding a variety of new businesses. In 1871, Elgin received an additional burst of energy. The Burlington, Cedar Rapids, and Minnesota Railroad expanded into Pleasant Valley Township, establishing a station one-half mile west of Elgin, an area which became known as Lutra. Competition arose between the towns, but with the new railroad depot, both towns expanded and later merged under the name Elgin.<sup>8</sup>

By 1890, Elgin was a flourishing town of mills, railroad depot, and the township's Union Creamery Association. The creamery, positioned across Otter Creek from the downtown, served as the central depository for the local dairy farmers. The creamery would then produce butter and sour cream to be sold locally. Across Mill Street from the creamery was the Schori and Lehman Brewery, which was founded around 1873. The bridge, as it originally stood in Elgin, made the vital connection between the downtown and the creamery.

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<sup>4</sup>Moeller, 371.

<sup>5</sup>Leland L. Sage, A History of Iowa, (Ames, Iowa: Iowa State University Press, 1974), 47.

<sup>6</sup>Moeller, 371.

<sup>7</sup>Moeller, 372.

<sup>8</sup>Moeller, 371-72.

The move from Elgin to the farmland of Dietzenbach Bottom took place in 1926. Petitions for a bridge in this area had been made since the 1890s with no action taken. In 1923, a final request was made: "A petition signed by three hundred citizens asking the Board of Supervisors to construct a bridge across the Turkey River in Section three (Auburn Township) at the Dietzenbach Ford east of Old Mission Mill, was received and ordered filed."<sup>9</sup> This petition, remarkable in its number of advocates, was taken under consideration, and finally in the winter of 1926, concrete abutments were poured for the bridge.<sup>10</sup>

What had been the motivation to finally erect a bridge at this rural location which had been forded for so many years? The bridge does not perform the typical role of a bridge on a farm-to-market road by enabling farmers to move crops or livestock to the county seat more easily. The bridge, however, does make travel much easier to the small town of St. Lucas in northwest Auburn Township. For the Dietzenbach family (for whom the bridge is named) and other residents of that area, the town of St. Lucas was of great importance. The majority of farmers in northern Auburn Township were German Catholics, and St. Lucas was the home of their parish church, St. Luke's.

The original settling of the this area illuminates the decision to erect a bridge at Dietzenbach Bottom. Auburn Township borders Winneshiek County, which, in the 1840s, was an Indian reservation. At that time, a Catholic mission was established on the border to work with the Indians. The priest at the mission, Father Cretin, seems to have made contact with John Gaertner, another German Catholic. Gaertner came to the area in 1848, bringing with him two other men. The men immediately approached the bishop to ask him to assign a priest to the area. The bishop promised, but with the provision that other German families would settle in the area. The men returned home, sold their farms, and brought their own families and others as well. This settlement became known as "Old Mission."

When the settlement reached 50 families in 1853, the residents built a small stone chapel two miles north in Festina, Winneshiek County. The settlers farther south wanted their own parish church, and in 1854, plans were made for a church in Statheltown, now St. Lucas. The priests lived in Festina until 1871 when St.

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<sup>9</sup>Fayette County Board of Supervisors Minutes, February 5, 1923 (Book 9, 407).

<sup>10</sup>Fayette County Board of Supervisors Minutes, September 17, 1926 (Book 10).

Luke's received its first resident priest.<sup>11</sup> In 1882, Father Boeding became the parish priest, where he remained until his death in 1928. The area of the Dietzenbach family farms is in the parish of St. Luke's, but because of the Turkey River, it was easier for the residents to go north to Festina to attend mass. Father Boeding, however, wanted to expand his membership and open new areas to St. Luke's Church. He was behind petitions for other bridges in the area, and likely helped organize the 300-person petition which brought the bridge to Dietzenbach Bottom.<sup>12</sup>

#### THE DEVELOPMENT OF THE IRON TRUSS BRIDGE

While the timber truss bridge remained in use in America until the late 1800s, the development of the railroad drove the development of the iron truss bridge. The first iron bridge in America was developed by Thomas Paine, the same revolutionary pamphleteer, in 1786. He made several models of his bridge, but it was never actually constructed. The first iron bridge constructed in America was in Brownsville, Pennsylvania in 1836. These first bridges used cast iron, a material which is excellent in compression, but is brittle with low tensile strength. Several truss designs were patented in this early history, but these were based only on trial and error, with frequent failures.

Thomas Pratt was the designer of one of the first trusses based on scientific analysis in America. Born in 1812, he studied engineering at Rensselaer Polytechnic Institute in Troy, New York. After graduation, he was hired by the United States Army Engineers to work on the construction of dry docks. After a few years, he began work as a bridge engineer for the railroad.<sup>13</sup> Pratt received a patent with his father on a truss in 1844. It had parallel chords or a polygonal top chord, with the verticals, upper chord, and end posts in compression, and the bottom chord and diagonals in tension.

Squire Whipple, however, remains the pivotal figure in the development of the iron truss bridge in the United States. Trained in engineering at Union College, where he received a bachelor's degree in 1830, he was the first American engineer to

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<sup>11</sup>Moeller, 179.

<sup>12</sup>125 Years...St. Luke's Church, 1855-1980. (St. Lucas, Iowa: St Luke's Church, 1980), 15.

<sup>13</sup>Carl W. Condit, American Building Art: The Nineteenth Century, (New York: Oxford University Press, 1960), 109-10.

rationalize the analysis of iron trusses.<sup>14</sup> Whipple began his career as a surveyor, first for the Baltimore and Ohio Railroad, and later for the New York State Canal System. While working for the Canal System, he built his first cast-iron arch truss. On April 24, 1841, he obtained his first patent for a cast-iron bowstring arch-truss. In 1846, he designed a trapezoidal truss, known as a Whipple truss. It was a variation on the Pratt truss, where the diagonals extend across two panels, adding stability for long spans. In 1847, Whipple published A Work on Bridge Building, a seminal book in the application of scientific methods to measure the stresses of trusses. His analysis was a major step in bridge technology.

Whipple also claimed to have independently built the first Warren truss in the United States, the same truss type as the Dietzenbach Bottom Bridge. James Warren and Willoughby Monzani, English engineers, patented the Warren truss in 1848. The Warren truss was unique in two ways: it has no verticals and the diagonals slope in opposite directions. In its form, the Warren truss draws most heavily on the strength of triangulation. It was also an economical truss type because the primary members were all of the same length, making them easier to roll and erect. Later versions of the Warren truss sometimes added verticals or a second set of diagonals. The Warren truss gained in popularity after 1860, particularly for railroad bridges. The first wrought-iron Warren truss was built in 1869, and steel Warren trusses appeared frequently by the turn of the century.<sup>15</sup>

Wrought-iron Warren trusses were never common for roadway bridges. As a pin-connected Warren through truss, the Dietzenbach Bottom Bridge is one of only three left in the state of Iowa. Riveted steel Warren trusses, however, became very common in Iowa after the turn of the century, particularly ones built after 1913 to the Iowa State Highway Commission standards.<sup>16</sup> The Dietzenbach Bottom Bridge stands as an important example of the pin-connected wrought-iron Warren truss.

The truss consists of six panels for a 120' span and 16'1" roadway inches width. The upper chord and inclined end posts are two channels joined by a cover and batten plates, and the lower

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<sup>14</sup>Eric DeLony, "Surviving Cast- and Wrought-Iron Bridges in America," IA: The Journal of the Society for Industrial Archeology, 19:2, (1993), 28.

<sup>15</sup>Condit, 117-18.

<sup>16</sup>Fraserdesign, Iowa Historic Bridge Inventory, Vol. I, 130-37.

chord is made up of 2 rectangular eyebars. The verticals are two angles with lacing, and the diagonals two channels with lacing, except for the ends, which are two rectangular eyebars. The portal has a simple design which creates a triangle in both upper corners which is then bisected. The substructure of the bridge was replaced in 1987.<sup>17</sup>

#### CHICAGO BRIDGE & IRON COMPANY

The Chicago Bridge & Iron Company was founded by Horace Horton, a talented and innovative engineer who stands as a major figure in the history of bridge building in the Midwest. Chicago Bridge & Iron was created in 1889 when Horton combined his own company, Horace Horton and Company, based in Rochester, Minnesota, with the Kansas City Bridge and Iron Company. Chicago Bridge & Iron is still in operation today as a subsidiary of CBI Industries, headquartered in Oakbrook, Illinois.

Horace Horton, born on December 20, 1843, was a native of New York. His father became successful in land speculation in Iowa and Minnesota, and when Horace was 16, moved his family to Rochester, Minnesota. In 1863, Horton went back to Utica, New York to attend Fairfield Seminary where he studied civil engineering. Upon graduation in 1866, he returned to Rochester. He became county surveyor in 1867, the same year he built his first bridge, a wooden deck arch.<sup>18</sup>

Throughout the 1870s, Horton worked primarily in the area surrounding Rochester, Minnesota, receiving two important contracts for bridges over the Mississippi at the end of the 1870s. The Fort Snelling Bridge in St. Paul was Horton's first major commission, one received in competitive bidding by thirty companies. Horton's competition included some of the largest bridge construction companies in the country: Phoenix Bridge, Keystone Bridge, Wrought Iron Bridge, and American Bridge Company. This major bridge occupied most of Horton's time from 1878 to 1880.<sup>19</sup>

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<sup>17</sup>The design of the bridge is somewhat similar to those by N.M. Stark, a Des Moines-based contractor who built many bridges in Fayette County during the early 1900s. There is no other evidence, however, to suggest that he built this bridge.

<sup>18</sup>Eli Woodruff Imberman, "The Formative Years of Chicago Bridge and Iron Company," (Ph.D. Dissertation, University of Chicago, 1973), 85-87, 97-100.

<sup>19</sup>Imberman, 122-126, 159.



In the period after the Fort Snelling Bridge, Horton's business expanded to include markets in Wisconsin, Illinois, and Iowa. It was in this period that Horton began his long relationship with Fayette County, which started in 1880 with the West Auburn Bridge. Fayette County was a logical place for expansion as it is only 80 miles south of Rochester, Horton's headquarters. Horton's major commission from this period was the Dubuque High Bridge in Dubuque, Iowa, which was constructed in 1886. This bridge was only the second crossing on the Mississippi high enough not to require a draw, its predecessor the Eads Bridge in St. Louis. This commission put Horton into the league of the major contractors.<sup>20</sup>

Horton's only obstacle to continued growth was the lack of a fabricating yard. In the bridge contracting industry, many of the largest companies operated their own fabricating yards, eliminating unreliable delivery of bridge components and allowing greater control over costs and profits. To remove this problem, Horton approached the proprietors of the Kansas City Bridge and Iron Company, George Wheelock and A.M. Blodgett. Kansas City Bridge had its own fabrication shop and had established markets in Kansas, Missouri, and Texas. During 1888 and 1889, the two companies cooperated and kept joint records for jobs done under each company's name.<sup>21</sup>

In 1889, the decision was made to merge the two companies and move the headquarters to Chicago with the new name Chicago Bridge & Iron Company. The move to Chicago signalled the company's intention to be a power in the entire Midwest and West and focus entirely on iron bridges. The new headquarters put the company at the center of the new markets, railroads, and metal works. The major shareholders in the new company were Horace Horton (500 shares) and George Wheelock (377).

Early in 1890, the George King Bridge Company, based in Des Moines, also merged with Chicago Bridge & Iron. This merger gave Chicago Bridge & Iron a new toehold in Iowa, although it was already doing continued business with Fayette County. The three companies would continue to work under their individual names, but all of the profits were combined as the profits of Chicago

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<sup>20</sup>CBI Industries, The Bridge Works: A History of Chicago Bridge & Iron Company, (Chicago: The Mobium Press, 1987), 3-5.

<sup>21</sup>CBI Industries, 6.

Bridge & Iron.<sup>22</sup> This arrangement worked well until 1893 when the bridge market became more competitive and profits fell. Chicago Bridge & Iron discovered a new market of water towers and standpipes. After a fire in the Chicago fabricating plant in late 1897, King wanted to withdraw his investment. Horton and his son George, however, encouraged by the possibilities of the water tower business, decided to continue the business and buy back King's shares. The Hortons bought out King, paying him over the next several years.<sup>23</sup>

While Horace Horton then moved out of the bridge building business, he was highly respected as a bridge engineer. In a memorial from the Journal of the Western Society of Engineers, the writer noted: "Mr. Horton possessed unusual ability as a designer. He was amongst the foremost in the production of new features of design, seeming to grasp the requirements of each particular case and equally ready to plan the finished structure adapted to each case, and to devise the plant and methods of fabricating and erecting the material."<sup>24</sup>

The Dietzenbach Bottom Bridge stands as a striking illustration of bridge construction and bridge roles in Iowa. While rural bridges often play a prosaic role in moving crops or livestock to market, the Dietzenbach Bottom Bridge is remarkable in the local importance it has had in both sites. As a now rare example of a pin-connected iron Warren truss and the work of Chicago Bridge & Iron, it is significant in the history of bridge building in Iowa.

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<sup>22</sup>CBI Industries, 7-9. Also Chicago Bridge & Iron Bridge Contract Book (CBI Industries Records Office). In the contract book, work done under George King Bridge Company is noted under General Remarks. No notation is made for Kansas City Bridge and Iron.

<sup>23</sup>CBI Industries, 17-19.

<sup>24</sup>"In Memoriam: Horace Ebenezer Horton, Past-President, W.S.E.," Journal of the Western Society of Engineers, 18:5 (May 1913), 443.

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This appendix is an addendum to a 10-page report previously transmitted to the Library of Congress.

**APPENDIX: ADDITIONAL REFERENCES**

Interested readers may consult the Historical Overview of Iowa Bridges, HAER No. IA-88: "This historical overview of bridges in Iowa was prepared as part of Iowa Historic Bridges Recording Project - I and II, conducted during the summers of 1995 and 1996 by the Historic American Engineering Record (HAER). The purpose of the overview was to provide a unified historical context for the bridges involved in the recording projects."