

GERMANTOWN COVERED BRIDGE
Center Street spanning the
Little Twin Creek
Germantown
Montgomery County
Ohio

HAER No. OH-87

HAER
OHIO
57-GERM,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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Historic American Engineering Record
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HISTORIC AMERICAN ENGINEERING RECORD

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Location: Center Street over the Little Twin Creek, in Germantown, Montgomery County, Ohio.

UTM: 16/726160/4390610

Date of Construction: 1865 on Dayton Pike/Ohio 4 over the Little Twin Creek. Moved to its present site in 1911. Rebuilt five times due to accidents.

Fabricator: David H. Morrison, Columbia Bridge Works, Dayton OH

Present Owner: City of Germantown (City Council), 75 N. Walnut Street, City of Germantown, Ohio

Present Use: Pedestrian use and historical exhibit

Significance: The bridge is a composite wood and iron rigid suspension truss. It is an early work of David H. Morrison, founder of the Columbia Bridge Works of Dayton, Ohio, and one of the most important bridge engineers and manufacturers in 19th century Ohio. The bridge was listed on the National Register of Historic Places in 1971.

Project Information: The Ohio Cast- and Wrought-Iron Bridges Project was cosponsored by HAER, Dr. Robert J. Kapsch Chief; the Institute for the History of Technology and Industrial Archaeology, Dr. Emory L. Kemp, Director; the Ohio Historical Society, Gary Ness, Director and David Simmons, Historic Bridge Specialist; and the Department of Architecture, Ohio State University, Jose Obrerie, Chairman.

Wm. Michael Lawrence, Historian

The Germantown Covered Bridge is a rare example of a "rigid suspension truss bridge" in which all compression members are of wood and the main tension member is an iron suspension chain. Built by David H. Morrison on Dayton Pike (Ohio Route 4) over Twin Creek in 1865, it was moved to its present site at Center Street in Germantown in 1911. Due to various accidents, it has been repaired or rebuilt at least five times and was closed permanently to traffic in 1981. It was declared an exceptional landmark by the state of Ohio in 1967, an outstanding landmark in Montgomery County in 1968, and was listed on the National Register of Historic Places in 1971. David H. Morrison, the builder, was one of Ohio's preeminent engineers and bridge builders during the 19th century, and was founder of the Columbia Bridge Works of Dayton, Ohio.

The Germantown Covered Bridge has been repaired or restored several times during its existence; therefore, any analysis of the structure must be qualified. It is a 110' through truss protected by a wood roof; unlike the typical covered bridge, however, it does not have wood siding. The rafters of the roof rest on the upper chords, and a zigzag pattern of wood beams between the upper chords provides lateral bracing. The massive chords act in compression and consist of bundled wood beams. The intermediate posts act in compression to support the chords. These posts bear on iron post shoes which are pin-connected at their bases to paired chains of wrought-iron eye-bars. Iron loops hang from these pins and deep wood cross floor beams bear upon washer plates and nuts at their lower ends. The beams support wood stringers and decking. Each chain is in the form of an inverted curve or arch with its lowest point at the deck near the middle of the bridge. It is connected to the tops of the end posts, where it resists the tensile forces of the chain. The end posts are perhaps the most critical members in the entire bridge, and also the most vulnerable. Should a vehicle collide with one, which has happened once, the entire structure may collapse. Diagonal iron bracing rods from the upper ends of the intermediate posts to the pins in the chain provide longitudinal bracing. The date 1870 is painted on the siding over the portals.

The bridge represents the mid-nineteenth century transition period from iron to wood. Iron did not replace wood immediately due to the expense of the stronger material and a certain conservatism. In the original forms of the Howe truss, for example, all members were wood except the verticals, which acted in tension and were made of iron.¹ Bids for bridges after the Civil War, especially for smaller spans, typically included proposals for wood trusses as well as iron, usually at a much lower cost. In the state of Ohio during the last two decades of

the century, a reaction against the growth of large bridge building companies led to an attempt to return to wood construction, if only for small country bridges.²

David H. Morrison, one of Ohio's most prolific bridge builders during the middle of the century, developed several types of bridges during his career, including what he called the "rigid suspension truss." He used wood, stone and iron in his work of the 1850s to erect "Rafter Bridges," composite structures of iron and wood with standard Burr trusses. His first patent, issued in 1858, was for a cast iron connection to prevent "the deleterious effects" of wood shrinkage.

Morrison built a number of rigid suspension bridges of wood and iron similar to the Germantown bridge. While his first design appeared in 1858, the Germantown bridge was likely the first actually built. Among his works, the most notable example of a rigid suspension bridge constructed completely of iron was the 1870 four-span Main Street bridge in Dayton over the Great Miami River.³ Morrison was not the only engineer to work with this design. Iron eye-bar chains supplement the wood arch in the John Bright covered bridge built near Baltimore, Ohio and now located at the Ohio University Branch Campus at Lancaster.⁴ The John Bright bridge No. 1 is an example of an all iron suspension truss.⁵ Archibald McGuffie, of Rochester, New York, experimented with "that class of bridges in which the suspension and arch bridges are combined."⁶

The bridge's construction history of the bridge is partially documented by the Journal of the Montgomery County Commissioners. According to the Journal, on Tuesday, June 6, 1865,

(t)he Commissioners then commenced to examine bids for Bridges over Wolf Creek and Little Twin Creek at Germantown. Upon examination of bids presented, Mr. D. H. Morrison was awarded bridge at Germantown, Superstructure and Mason Work, the said Bridge to be an Iron Suspension bridge with roof.⁷

Three months later, the Journal reported that

Mr. D. H. Morrison by request of the Commissioners appeared before them with regard to Germantown Bridge. Said Morrison is to place one inch Castings under each post of Said Bridge. Said Castings are to Cost from twelve to fourteen dollars. Said Cost is to be added to Contract.⁸

The Commissioners apparently decided to change the thickness of the post shoes; it is hard to believe that Morrison had intended to build the bridge without them. The Journal does not record any payments to Morrison for his work.

The subsequent history of the bridge has been marked by recurring accidents necessitating repairs or rebuilding. In 1906, a steam-driven iron horse fell through the floor. The Village of Germantown moved the bridge to the less-travelled Center street in 1911. A truck driver tried to cross the bridge in 1958, despite "no truck" signs, and his vehicle fell through the floor; the following year, during a flood, a tree smashed into the bridge and it buckled. In 1962 the people of Germantown started a campaign to restore the bridge. The restoration proceeded, even though the county closed the bridge, and it was reopened in 1964. In 1972 another truck driver ignored warning signs and broke one of the main support beams while crossing; again citizens rebuilt the bridge. Finally, in 1981, a speeding automobile raced up the approach, flew into the air momentarily, and crashed through the floor, taking the bridge with it. Once again, the bridge was rebuilt, with private donations and volunteer labor, and, to prevent any more incidents, it was closed to all vehicular traffic. It was declared an exceptional landmark by the state of Ohio in 1967, an outstanding landmark in Montgomery County in 1968, and was listed on the National Register of Historic Places in 1971.⁹

Tradition is a powerful force. During the last restoration, David A. Simmons, of the Ohio Historical Society, informed these local preservationists that research had proven the 1870 date above the portals to be wrong. Because they were taking great pains to rebuild the structure "exactly" as it had been, they did not correct the date when they repainted the bridge.

David Humphreville Morrison¹⁰

The career of David Humphreville Morrison (1817-1882) spanned roughly four decades from 1840 until his death. He was the son of Thomas Morrison (1792-1879), a contractor who instilled in his son a strong sense of integrity and public-spiritedness, and who provided a practical basis for his career. David was also influenced by one of his teachers, Eliam E. Barney, who encouraged him to enter the field of civil engineering, and by Barney's brother Elijah, an engineer who worked on the Erie Canal and the Ohio Canal system.

Morrison's early training as an engineer was typical of his time, that of the apprenticeship. He worked as a rodman under Elijah

Barney on the Miami Canal system in Ohio beginning in 1836, was promoted to surveyor the following year, and by 1838 was an assistant engineer. After eight years he resigned and returned to Dayton, Ohio, where his subsequent career consisted of consulting work for the non-engineering community, working as a contractor and/or inventor, and activities as a businessman and manager.

He was appointed city engineer for Dayton in 1848, superintending contractors, surveying for streets and sidewalks, supervising internal improvements for and by the railroads, and designing bridges. He left the city and became a regular consultant for the Montgomery County Commission in 1852, providing designs for bridge contracts well into the 1860s. He was often called upon to resolve disputes arising during construction projects.

During his career Morrison produced many bridge designs in stone, wood, and iron. His first, "D.H. Morrison's Truss Bridge" of 1852, were based at least partially on observation and experimentation. His first exposure to a scientific approach to bridge design was Herman Haupt's General Theory of Bridge Construction. The list of his various bridge designs is lengthy: an elliptical stone arch on a skew or oblique on Jefferson Street in Dayton (1855); his "rafter bridges;" Burr trusses; "rigid suspension trusses," such as the Germantown bridge (1865) or the iron Main Street bridge in Dayton; a wire suspension bridge (1850); a short-span low truss cast- and wrought-iron bridge design that he built up and down the Miami and Erie Canal during the 1860s; and a cast-iron bowstring bridge (1864).¹¹ His most significant designs were "Morrison's Patent Wrought Iron Arch Truss Bridge"¹² and "Morrison's Patent Wrought Iron Truss Bridge."¹³ He built numerous examples of these bridges throughout Ohio and the Midwest, and an extensive collection of drawings for such bridges still survives.¹⁴

His most notable achievement as a manager and businessman, besides supervising the work of others, was the founding of his own firm in 1852 with his brother-in law. His son, Charles Carroll, joined the firm two years later and became a partner in 1868. The firm was named D. H. and C. C. Morrison and was later renamed the Columbia Bridge Works. The business expanded steadily and was incorporated five months after Morrison's death on July 21, 1882.

Morrison's career represents important developments in bridge building during the middle of the 19th century, and his bridge designs were pivotal in the transition from wood to metal construction.

ENDNOTES

1. Carl A. Condit, American Building Art in the Nineteenth Century (New York: The Oxford University Press, 1960), 94-96.
2. David A. Simmons, "The Risk of Innovation: Ohio Bridge Patents in the Nineteenth Century," in The Proceedings of the First Historic Bridge Conference in Columbus, Ohio (Columbus, Ohio: Ohio State University and the Ohio Historical Society, 1985): 126-9.
3. David A. Simmons, "Dayton's Premier Bridge Builder: David H. Morrison, Civil Engineer," in Miami Valley History: A Journal of the Montgomery County Historical Society, Vol. 3 (1991): 25. Revision of "David H. Morrison: Bridge Builder and Civil Engineer," paper presented at the 9th Annual Conference of the Society for Industrial Archaeology, Detroit, 31 May 1980.
4. See HAER No. OH-45.
5. See HAER No. OH-44.
6. Patent No. 33,954, 17 December 1861. Copy in the Bridge Files, Ohio Historical Society (compiled by David A. Simmons).
7. Montgomery County, Journal of the County Commissioners of Montgomery County, Vol. 5, p. 61, 6 June 1865. Notes in the Bridge Files.
8. Ibid., p. 70, 6 September 1865.
9. Jan Hofmann, "Its' More Than Just A Bridge," in The Magazine: 20, supplement to The Dayton Daily News (6 June 1982).
10. This is a summary of Simmons, "Dayton's Premier Bridge Builder," which is the definitive biography of David H. Morrison.
11. See HAER No. OH-86.
12. See HAER No. OH-88.
13. See HAER No. OH-92
14. Safety negatives of these drawings are available to the scholar at the Ohio Historical Society Library in Columbus, Ohio. Originals are in the Morrison Family Collection, Beaver, Pennsylvania.

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- Carl A. Condit. American Building Art in the Nineteenth Century.
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- HAER No. OH-45, John Bright No. 2 Iron Bridge, Carroll Vicinity,
Fairfield County, Ohio.
- HAER No. OH-86, Blackhoof Street Bridge, New Bremen, Auglaize
County, Ohio.
- HAER No. OH-88, Mallaham Bridge, Columbus Grove, Putnam County,
Ohio.
- HAER No. OH-92, Howard Bridge, Howard, Knox County, Ohio.
- Hofmann, Jan. "Its' More Than Just A Bridge," in The Magazine:
20, supplement to The Dayton Daily News, 6 June 1982).**
- Montgomery County. Journal of the County Commissioners of
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- Ibid., p. 70, 6 September 1865.**
- David H. Morrison. Drawings of various bridges. Safety
negatives of these drawings are curated at the Ohio
Historical Society Library in Columbus, Ohio and are
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ADDENDUM TO
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