NICHOLSON TOWNSHIP LENTICULAR BRIDGE
(Pierceville Bridge)
Pennsylvania Historic Bridges Recording Project
Spanning Tunkhannock Creek at State Rt. 1029
Nicholson vic.
Wyoming County
Pennsylvania

HAER No. PA-468

PHOTOGRAPHS

REDUCED COPIES OF MEASURED DRAWINGS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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NICHOLSON TOWNSHIP LENTICULAR BRIDGE
(Pierceville Bridge)

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Location:	Spanning Tunkhannock Creek at State Route 1029, Nicholson vicinity, Wyoming County, Pennsylvania.
USGS Quadrangle:	Factoryville, Pennsylvania (1994).
UTM Coordinates:	18/431400/4606010
Date of Construction:	1881.
Designer:	Corrugated Metal Company (East Berlin, Connecticut).
Builder:	Corrugated Metal Company (East Berlin, Connecticut).
Present Owner:	Pennsylvania Department of Transportation.
Present Use:	Vehicular bridge.
Significance:	The Nicholson Township Lenticular Bridge is a well-preserved example of a truss fabricated by the Corrugated Metal Company. Of special interest is how the company fabricated the pin connections at the end-posts and on the top chord. These connections on the Nicholson Bridge are not mitered — a more expensive procedure that the Corrugated Metal Company's successor firm, the Berlin Iron Bridge Company, would employ. The bridge was listed in the National Register of Historic Places in 1988.
Historian:	Dr. Mark M. Brown, August 1997.
Project Information:	This bridge was documented by the Historic American Engineering Record (HAER) as part of the Pennsylvania Historic Bridges Recording Project - I, co-sponsored by the Pennsylvania Department of Transportation (PennDOT) and the Pennsylvania Historical and Museum Commission during the summer of 1997. The project was supervised by Eric DeLony, Chief of HAER.

Description

The Nicholson Township Lenticular Bridge is a single-span, eight-panel, pin-connected lenticular through truss. Measuring 113'-9-1/4" from pin to pin of the end posts, the bridge has a clear span of 110'-0". Given the 1881 construction date, all original structural material is presumed to be wrought iron. The end-posts are 9'-4" high from the top of their bases to the center of the pin that connects to the top chord and the tension members. The end-posts are U-shaped members fabricated of three plates and four angles and are 21-1/8" wide and 9-1/2" deep. The top chords are similarly composed of riveted plates and angles and are 16" wide and 8-5/16" deep. None of the pin connections on the top chords are spliced or mitered. Rather, the splices are located between panel points. Thus, in order to obtain the curvature of the top chord that is distinctive of lenticular trusses, the manufacturer used blacksmithing techniques to bend the plates that make up the chord. The effect is most noticeable at panel points U1, U2 , U6, and U7. Two 3" x 1-1/8" eye-bars are used for the tension members in each panel. Countersunk rivets, more expensive than conventional rivets, were used on the inside sections of the end-posts closest to the pin in order to facilitate field assembly. The laced-angle web posts are attached to the outside of the top chord and vary in length from 8'-10-3/8" to 16'-0-7/16", measured pin to pin. Most web posts are stiffened with a 3/4" diameter mid-height tie rod. Diagonal panel members are 1", 7/8", or 3/4" diameter rods with turnbuckles. Laced sway-bracing, not unlike portal bracing on other truss patterns, support the trusses at panel points U2 and at U6. Top struts, 5" I-beams, serve similar duty at U3, U4, and U5. Three of the four original decorative cast-iron finials still remain atop the end-posts. A small hole in the top of the castings suggest the existence of components since lost. "Phœnix" is embossed on the sway bracing knees.

The 16'-6"-wide deck beam is hung from the lower chord pins by square-section U-bolts. The deck beams with riveted angle flanges taper from their maximum depth of 18" at the middle to 9-1/2" at the ends. The average distance between web posts is 14'-8-7/8". The stringers (7" I-beams) and wood flooring are not original. Two, 9-1/4" high, longitudinal edge stiffening members, fabricated of angles and lacing bars, connect the deck beams for the entire length of the truss. Lower lateral bracing consists of crossed 1-1/2"-diameter rods. There is no evidence of field bolts in the superstructure.

The abutments are constructed of coursed field stone from local quarries, with the exception of the lower portion of the lower portion of the south abutment, which is encased in concrete. Roller bearings support the north end-posts; the south end-posts are fixed.

Two of the four original maker's plates survive. They read:

Pat. Apl. 16, 1878.
Cor. Metal Co.
Builders.
East Berlin,
Conn.

and

J. C. Herman,
A. H. Frear,
Wm. Sickler
Commissioners.

Except for the deck surface and immediate support system, the bridge retains a high degree of integrity. A few repairs have been made to the inner angles of the web posts. These and others have suffered damage from collisions. High water, ice, and debris have bent several of the horizontal stiffening members that connect the deck beams.

Local History

Despite its early date and high integrity, the reputation of the Nicholson Township Lenticular Bridge is obscured by a more celebrated neighbor. While one of the approximately fifty lenticular trusses remaining in the United States, the Nicholson lenticular is coincidentally located about three miles downstream from the Delaware, Lackawanna and Western Railroad's monumental Tunkhannock Viaduct (HAER No. PA-87).

In late 1880, the county's road viewers recommended a "Bridge across the Tunkhannock Creek, in Nicholson Township, Wyoming County, near Perry Oakley's" and a grand jury concluded that the township could not afford the expense of the superstructure. The township did, however, construct abutments for the proposed bridge. The idea of a bridge across this particular section of the creek was not new in 1880. On the contrary, the commissioners had invited bids in early 1865 for a bridge across Tunkhannock Creek "near the residence of Joseph Stephens in Nicholson tp" — a location less one-half mile upstream from the current bridge. In preparing their 1881 budget, the commissioners estimated spending $3000.00 on bridges. In mid-April of that year the commissioners visited the site and measured the distance between the existing piers. They also formally approached and secured the donation of the abutments from the township supervisors.[1]

Two months later, on 16 June 1881, the county awarded the contract for the bridge superstructure to the Corrugated Metal Company of East Berlin, Connecticut, at the rate of $20 per linear foot. During the same meeting, the commissioners also awarded a different bridge contract to the Pittsburgh Bridge Company and contracted for the repair of a third. On November 25, the County paid $2073.20 to an agent, named Horton, of the Corrugated Metal Company after inspecting the bridge the previous day. This payment reflected a deduction for the cost of timber and other expenses incurred by the county on behalf of the bridge company.[2]

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[1] "Bridge Letting," Tunkhannock *Republican,* 30 January 1865, and *Map of Wyoming County,* 1865; Wyoming County, Pennsylvania, *Commissioners' Minutes* (Commissioners' Office, Wyoming County Courthouse, Tunkhannock, Pennsylvania), p. 61 (10 January 1881); p. 64 (18 April 1881); p. 65 (30 April 1881).

[2] *Commissioners' Minutes,* pp. 67-68 (16 June 1881); p. 76 (24 and 25 November 1881); p. 73 (10 October 1881); and p. 74 (29 October 1881). The *Commissioners' Minutes* for 29 October 1881 refer to the bridge as the

It is not entirely clear why the Nicholson Township lenticular was constructed where it was. Certainly the commissioners' minutes are not explicit. The crossing is one of several that connect Factoryville, to the south in Clinton Township, Wyoming County, with the Nicholson Borough-Tunkhannock Road. This particular crossing is about midway between two small streams: one was the site of the Stephens residence in 1865 and the other marks the location of Piereeville, now called Starkville. In 1880, Pierceville was the site of township meetings. It seems reasonable to suggest that the new bridge helped connect farmers in the southern part of the township with Pierceville.[3]

Corrugated Metal Company, Berlin Iron Bridge Company, and the Lenticular Truss Type

The history of the Corrugated Metal Company and the lenticular truss is well documented and need not be given elaborate treatment in the present report.[4] Suffiee it to note that the Corrugated Metal Company, one of the predecessors of the Berlin Iron Bridge Company, began building lenticular truss bridges in the late 1870s on the strength of William O. Douglas's 1878 patent.[5] In 1883, the company was renamed the Berlin Iron Bridge Company. The 1890s saw the company shift its overall business into other product lines. Several dynamie managers and entrepreneurs guided the company until it was acquired by the American Bridge Company in 1900.

While the patent was of questionahle originality, the Berlin interests did refine it to produce a distinctive truss form that used less material than other truss types. Ironically, this was possible because the lentieular design represents a combination of metal arch, suspension, and truss systems. One of the refinements made by the Corrugated Metal Company's engineers was to change the shape of the top and middle (eye-bar chain) chords to more closely follow the profile of a parabola — the same curve found in suspension bridge cables. Placing the panel-

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Pierceville Bridge. The mention of an agent Horton in the *Commissioners' Minutes* raises an interesting speculation. Could this Horton be C. Q. Horton, later of Austin, Texas? C. Q. Horton was an agent for the Kansas City Bridge and Iron Company around 1889 and subsequently for the Chicago Bridge Company. See U.S. Department of the Interior, Historic American Engineering Record (HAER) No. TX-60, "Bryant Station Bridge," 1996, Prints and Photographs Division, Library of Congress, Washington, D.C.

[3] *History of Luzerne, Lackawanna, and Wyoming Counties, Pennsylvania* (New York: W. W. Munsell and Company, 1880), pp. 522-23.

[4] See Victor Darnell, "Lenticular Bridges from East Berlin, Connecticut," *IA: The Journal of the Society for Industrial Archeology* 5, No. 1 (1979): 19-32, for the standard history. See also HAER No. MA-98, "Bardwell's Ferry Bridge," for additional corporate history, an example of a lenticular through truss, and drawings discussing the behavior of these trusses. See HAER No. MA-105, "Tuttle Bridge," HAER No. NY-186, "Cemetery Road Bridge," and HAER No. TX-31, "Kelley Crossing Bridge," for brief reports on pony lenticular trusses. All: Prints and Photographs Division, Library of Congress, Washington, D.C.

[5] W. O. Douglas requested the county, perhaps in person, to acquire lumber for the bridge on behalf of the company. See *Commissioners' Minutes*, p. 73 (10 October 1881).

point pins on such a curve required more elaborate fabrication procedures. Because the parabola made more efficient use of metal, it was possible to use less material. Reducing the amount of material gave the company a competitive advantage in bidding against other companies. It saved money when the cost of materials was comparatively high and also reduced shipping costs. On the other hand, the more refined the shape of the top chord, the more complex the fabrication. When labor cost were high, the lenticular design was not as advantageous when compared to the more common parallel-chord trusses.

The simpler fabrication of the Nicholson Township Lenticular Bridge represents a stage before the company completed many of the refinements. By placing the splices near, but not at, the pins, the fabricators may have been saving money by taking advantage of a 30'-0" standard length of plate.[6] The trade-off was that the vertical plates of the top chord could only be bent so much. Less bend meant that the chord profile could not as closely approximate the desired parabola shape. A less efficient profile required more metal to carry the same load.

The situation at the end-posts was a bit different. Given that the angle between the vertical post and the sloping top chord was too severe for a bent connection, the engineers were forced to wrap the end post around the top chord. To do this required a wider member than otherwise would be necessary. The overlapping material, needed to insure the soundness of the pin connection, was "wasted" in the sense that is was not directly involved in the transfer of loads.

Finally, it might be noted that the mitered top-chord pin connection that the company subsequently adopted give the lenticular truss a more elegant appearance, both in the overall impression and in the detailing. This visual refinement could not have hurt sales and might have reassured some customers about the bridges' quality.

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[6] Victor Darnell, conversation with author, 27 July 1997.

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