

YEAKLE MILL BRIDGE  
Pennsylvania Historic Bridges Recording Project III  
State Route 3026 (Mill Road) spanning Little Cove Creek  
Warren Township  
Franklin County  
Pennsylvania

HAER No. PA-591

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
1849 C St. NW  
Washington, DC 20240

# HISTORIC AMERICAN ENGINEERING RECORD

## YEAKLE MILL BRIDGE

HAER NO. PA-591

LOCATION: State Route 3026 (Mill Road) over Little Cove Creek,  
Warren Township, Franklin County, PA  
Bin # 28 30260010 1854

DATE OF  
CONSTRUCTION: 1888

BUILDER: Pittsburgh Bridge Company, Nelson & Buchanan, Agents,  
Chambersburg, PA

OWNER: Commonwealth of Pennsylvania, Department of  
Transportation

SIGNIFICANCE: The Yeakle Mill Bridge is one of a few surviving Pratt  
pony truss structures that once were common throughout  
South Central Pennsylvania. Designed by the Pittsburgh  
Bridge Company and erected through its local agents,  
Nelson and Buchanan, the bridge exemplifies early efforts  
at prefabrication and standardization.

HISTORIAN: Dr. Linda S. Phipps

PROJECT  
INFORMATION: The Yeakle Mill Bridge was listed on the National Register  
of Historic Places in 1988. The Pennsylvania Historic  
Bridges Recording Project III is part of the Historic  
American Engineering Record (HAER), a long-range  
program documenting historically significant engineering,  
industrial, and maritime sites in the United States. The  
National Park Service, U.S. Department of the Interior,  
administers the HAER program. The Pennsylvania  
Historic Bridges Recording Project III was co-sponsored  
during the summer of 2002 by HAER under the general  
direction of E. Blaine Cliver, Chief; and the Pennsylvania  
Department of Transportation (PENNDOT), Bureau of  
Design, Dean A. Schreiber, Director; and the Pennsylvania  
Historical and Museum Commission, Brent D. Glass,  
Executive Director and State Historic Preservation Officer.

Ms. Kara Russell of the Bureau of Design's Environmental Quality Assurance Division served as principal liaison.

The fieldwork, measured drawings, historical reports, and photographs were prepared under the direction of Eric DeLony, Chief of HAER. The team consisted of Architects—Todd Croteau, Project Leader (HAER Architect), Roland S. Flores, Field Supervisor (HAER Architect), Marcy Ann Giannunzio (University of Michigan, Ann Arbor), Katherine Marie Kozarek (University of California, Berkeley), Sara Kryda (Illinois Institute of Technology), Jenna Michelle Murphy (University of Detroit—Mercy), Sandra Christina Pires (ICOMOS—Portugal); Dr. Linda S. Phipps and Dr. Richard Vidutis served as project historians under the direction of Dr. Richard O'Connor, HAER Historian. Jose C. Colon (Pennsylvania State University, State College) was the project engineer and Prof. Thomas E. Boothby, Ph.D., PE, RA (Pennsylvania State University, State College) was the consulting engineer. Jet Lowe (HAER Photographer) took all large format photography. Justine Christianson (HAER Historian) prepared the documentation for transmittal to the Library of Congress.

## Description

Yeakle Mill Bridge is a Pratt pony truss of wrought iron and steel construction. It has a clear span of 70' and a width of 13' between the centers of the end posts.

Abutments and wing walls are of local ashlar masonry with a concrete coping that appears to be a modern addition.<sup>1</sup> The wrought iron end posts and top chord are built up members with pinned connections. The webs have five panels on 14' centers. The inclined end posts and upper chord members consist of flat upper plates riveted to channels, creating boxed sections that are braced on their lower open surfaces by iron straps at 2' intervals. Pin connections secured by hexagonal nuts over riveted plates join most of the major structural members at the panel points. The distance between these pin connections at the lower and upper chords is 8'.

The lacing bars of the verticals are riveted between paired angles that continue over the deck beams to terminate in the pin connections bearing the lower chord. The angles of the verticals are riveted to the deck beams. Below the deck beams, the angles are riveted perpendicularly to rectangular gusset plates that carry the pins connecting the lower chord and the web diagonals. In order to accommodate these pin connections as well as the flat face of the deck beam that passes through them, the gusset plates have a round hole below a slit cut from a point approximately one third up along their length. A u-shaped strap passing through the intersection of the deck beam and the vertical helps support the pin connection bearing the lower chord.

At the panel points, the deck is carried on built-up 16" beams, with paired angles and plates riveted to the upper and lower edges. Originally, the timber stringers carrying the decking fit snugly into the flanges of these beams, but a 1949 alteration replaced the stringers with steel I-beams (with "Bethlehem Steel" rolling mill marks), that were welded to the flanges of the floor beams so they can carry the present steel grid decking.

The floor beams taper upward at their lower extremities above the lower chord, resulting in a slight trapezoidal projection past the outer gusset plates. This trapezoidal extension supports a lateral bracing system that counteracts tendencies of the web to buckle under live loads such as heavy traffic, wind or water. Angles are riveted to the upper and lower surfaces on opposing sides of the trapezoid, creating an open triangular projection. A short strap runs from the inner surface of the upper angle to the outer surface of the lower, further bracing the triangle. A short folded plate secures an X-shaped diagonal bar on the upper surface of the top angle. At its lower end, this bar is upset and threaded. It passes through a hole in the folded plate, and is secured by a nut on its upper surface. At the upper chord, the diagonal transforms into a flat plate to be secured on the outer surface of the upper chord at the pin connection carrying the verticals. This lateral buttressing is a necessary characteristic shared by most pony truss structures. By contrast, through-truss structures, buttressed by transverse rods and diagonals connecting the upper chords provide adequate lateral stiffening without such bracing.

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<sup>1</sup> According to normal bridge building practices for the time, these stone wing walls would have been of masonry with timber roofing.

The lower chord consists of paired wrought iron eyebars secured by pin connections. These pins also secure diagonal bars that stiffen each panel against deformation. The form and distribution of the diagonals vary from one panel to the next in accordance with the differing stresses encountered along the length of the truss, although their overall placement is symmetrical from the center outwards. The central panels have two diametrically opposed cylindrical rods with turnbuckles near their upper extremities allowing for tension adjustments. The four intermediate panels, between the central and angled end panels, have pairs of flat parallel diagonal eye bars that run from the inner bottom chord to pin connections under the outer upper chord. All of the diagonals terminate in eyelets that facilitate their connections to the lower and upper chord pins. Additional diagonals below the deck stiffen each of the panels, crossing one another at the level of the composite floor beams. Each diagonal runs through oval cavities in the beams, crossing one another and bolted on the lower folded plate.

While the bridge was originally constructed with timber stringers and decking that were periodically replaced, the 1949 alteration resulted in a replacement of the stringers and decking with steel I-beams and an open grid deck. At that time, or later, a steel guide rail was also placed on the bridge to protect the latticework verticals. The original seat of the bridge was also replaced with reinforced concrete. The diagonals bracing the outer panels of the lower chord were embedded in this new concrete seat, thus, rendering them unable to perform their original function. Presently, these diagonals hang loosely and are no longer in tension. At the abutments, the bridge is mounted on metal plates bolted to the abutments. These appear to bear on sliding plates.

Metal plaques on the end posts identify the manufacturers of this bridge as the Pittsburgh Bridge Company and its date of its construction, 1888. Another refers to Nelson and Buchanan, Agents for the Pittsburgh Bridge Company, Chambersburg, PA. A third plaque that would have credited the three County Commissioners responsible for the bridge is missing and a rusted area attests to its former presence on one of the end posts. The Commissioners were: J.S. Sniverly, John Waidlich, and Jacob Middow.

### Significance

Yeakle Mill Bridge spans Little Cove Creek, which drains the valley comprising Warren Township. This valley runs north-south between Tuscarora and Cove Mountains, on the southwestern edge of Franklin County. Warren Township is bounded to the north by Peters Township, to the east by Montgomery Township, to the west by Fulton County, and by the Mason-Dixon Line, delineating the State of Maryland, 5 miles to the south. Mill Road, present State Route 3026, leads east from State Route 456, which runs north-south through the township. At the time of its construction, Yeakle Mill Bridge marked a bustling rural center for agricultural production in the area known as the Little Cove. During the nineteenth century, the areas to the north and south of the bridge along Little Cove Creek hosted a variety of local industries related to local mineral and agricultural resources. These included other grist and saw mills, iron mines, a furnace, a forge and a tannery. Mill Road derived its name from the preponderance of mills in the vicinity.

Today, the area remains predominantly agricultural with a large hog farm and some lumber operations located in the near vicinity.

Yeakle Mill, adjacent to the bridge site, was established in 1840 by John Myers near the sites of earlier chopping and saw mills. The Grist Mill passed into the hands of a number of interrelated families, the most prominent of which were the Fritz and the Yeakle families. When the bridge was commissioned, the county clerk referred to the mill alternately as the Fritz and Yeakle Mill. Levi and Sarah Fritz had traded the property to Abraham Yeakle in 1874. He operated the mill with his brother, Henry. The last operators of the mill were Russell Fritz and his wife, Reva Yeakle Fritz. By 1955, it had ceased operation.<sup>2</sup> The brick mill building remains, as does the water wheel, just upstream from the bridge. The milldam and race are visible directly to the north and east of the bridge, although they are now obscured by vegetation.

The Yeakle Mill Bridge was one of two Pratt pony truss bridges erected by Nelson and Buchanan for Franklin County in 1888. The other bridge, over Little Antietam Creek, "at the Dietrich's place," stood about a mile from Waynesboro in Washington Township. Both bridges were commissioned late in 1887, but were not constructed until 1888.<sup>3</sup> This delay was due, in part, to an election and a change in the commissioners leading the county. It also derived from the fact that most bridge construction took place during more element weather. The Little Antietam Creek Bridge was slightly longer, but it was virtually the double of the Yeakle Mill Bridge. Prior to its replacement by a modern reinforced concrete span in 1980, the Little Antietam Creek Bridge was studied and documented by the engineering firm of Nassaux-Hemsley in a report to the Franklin County Commissioners.<sup>4</sup> Photographs and measured drawings verify the similarities. A 1980 photograph accompanying a newspaper article on the replacement of the bridge confirms that the two bridges were, for all practical purposes, identical.<sup>5</sup> It further suggests that, like many of its competitors, the Pittsburgh Bridge

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<sup>2</sup> For a history of the region at the time of the construction of the present bridge, see Harry E. Foreman, "History of the Little Cove," in Kittochtinny Historical Society, Kittochtinny Historical Papers (Chambersburg, PA: 1967), pp. 40-41. For a discussion of the various shifts in state boundaries in the region, see the History of Franklin County, PA (Chicago: 1887), pp. 607-609 and pp. 1-5 in Cultural Heritage Research Services for the U.S. Dept. of Transportation, Federal Highway Administration, Bridge over Little Cove Creek, Historic Resources Survey and Determination of Eligibility Report (North Wales, PA: 1993). The map of Warren Township depicts the original location of the Mill in Atlas of Franklin County, PA (Philadelphia: 1868).

<sup>3</sup> The Franklin County Commissioners Meeting Minutes from 1887-88 provide a clear chronology of the bridge letting process. There was no competitive bidding. Thomas Nelson was given the commission for both bridges. On November 30, 1887, the commissioners met with Nelson at the site of the Little Antietam Creek Bridge and gave him a contract based on plans that he had drawn. The price was set at \$2097. On December 28, they contracted for the bridge over Little Cove Creek in Warren Township with Nelson. The cost of the bridge including both masonry abutments and metal superstructure was set at \$2027. Despite the change in commissioners, the earlier resolution to award the contracts was upheld on February 2, 1888. Construction was begun in March and satisfactory inspections of the completed structures were held on March 26 (Little Antietam Creek Bridge) and on April 19, 1888 (Yeakle Mill). The commissioners paid the full amount on the contracts as agreed.

<sup>4</sup> The author is indebted to Gordon Lambert, President of Nassaux-Hemsley, for making available reports and other information clarifying the nature of Pittsburgh Bridge Company's work in Franklin County.

<sup>5</sup> Newspaper clipping from the 1980 Chambersburg Public Opinion in the Bridge File of the Kittochtinny Historical Society, Chambersburg, PA. According to the dimensions given in the Franklin County

Company relied on standardization in its design in order to streamline costs and to facilitate erection in the field.

The success of the Pittsburgh Bridge Company in Central and Eastern Pennsylvania appears to have depended on the engineering and business skills of its primary agents in that region, Thomas M. Nelson and Andrew Buchanan. Each appears to have had some training in civil engineering. Little is known about Buchanan except that he is referred to as a Bridge Contractor in local directories.<sup>6</sup> Nelson was born in Franklin County in 1849, attending local public schools and later Chambersburg Academy and Lafayette College. It is not clear if he was formally educated in civil engineering, but from 1870-75, he worked as a civil engineer for the Boston-based firm of Walling and Gray on a number of railroads, including the Mont Alto, Cumberland Valley, Pennsylvania, and New York Central.<sup>7</sup> Little is known about his tenure with this firm, but within five years of his return (1880), he engaged in bridge building in partnership with a local founder and bridge builder, Calvin Gilbert. Nelson's background as the son of a local Presbyterian minister may have eased his transition into public life and prepared him for leadership positions in business. He worked at a number of local governmental posts including Justice of the Peace and County Clerk (1876-78). In the latter position, he assisted in developing specifications for the county commissioners to assist prospective bridge builders with bid proposals. He was thus able to learn the bridge building business from the client's perspective. This training was invaluable in his future career as a local agent for Pittsburgh Bridge Company (with Andrew Buchanan from 1883), and, after 1900, as a partner in his own company, Nelson and Buchanan, Bridge Constructors and Engineers, and its successors, the Nelson Construction Company, Nelson and Meredith. From 1896-1900, Nelson served as president of the Pittsburgh Bridge Company until its absorption by American Bridge Company. Although he resided in Pittsburgh during those same years, Nelson maintained an active bridge building business in Chambersburg. He remained in this business for a number of years after his association with Pittsburgh Bridge Company, and he ventured into plate girder construction and reinforced concrete in his later bridge designs.

The contract for the Yeakle Mill Bridge, like many others erected for Franklin County, was given to Nelson and Buchanan without competitive bidding. Under the terms of the contract, the Pittsburgh Bridge Company was to erect the masonry abutments and wing walls as well as the metal superstructure for \$2027, complete. Having worked closely with the commissioners for a number of years as county clerk, Nelson was trusted

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Commissioners Bridge Book (assembled by Nassaux-Hemsley, Inc.), the Little Antietam Creek Bridge had a slightly wider roadway of 14', measured between the parapets, but its clear span was the same, 70'.

<sup>6</sup> Sheriff & Taylor's Chambersburg & Hagerstown Directory of 1884-85 lists Andrew Buchanan on page 23 as a Bridge Contractor at 600 Broad Street in Chambersburg.

<sup>7</sup> Much of the biographical information presented here is derived from my observations of Nelson's bridge building activities throughout Pennsylvania, and is based on random readings of County Commissioners Minutes from other Pennsylvania counties during those same years. Other archival sources such as the records of the Franklin County Commissioners, as well as City Directories and newspaper articles from the period in Chambersburg helped me to develop this sketchy portrait of a man that appears to have been a central figure in the Pittsburgh Bridge Company. I am also indebted to Nelson's granddaughter, Mrs. Goode, a resident of Chambersburg, who in pointing out Nelson's gravesite, enabled me to locate a key obituary published in the local newspaper, the Public Opinion, on March 20, 1919.

with most of the bridge building in Franklin County for nearly twenty years beginning in the mid 1880s. Yet, even in other counties, Nelson was often successful in his efforts to procure commissions. Although few other examples survive, the Pratt pony truss of the Yeakle Mill Bridge resembles many built by Nelson and Buchanan for Pittsburgh Bridge Company throughout Central Pennsylvania. Little is known about the extent of the operations of the Pittsburgh Bridge Company or about Nelson and Buchanan, but this abbreviated sketch of Nelson's activities in Chambersburg raises intriguing questions about his activities as an entrepreneurial bridge builder.<sup>8</sup>

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<sup>8</sup> Paul E. Gill cites at least six metal truss bridges by Pittsburgh Bridge Co./Nelson and Buchanan agents that were constructed in Cumberland County in his "Drive the road and bridge the ford..." Highway Bridges of the 19<sup>th</sup> century in Cumberland County (Carlisle, PA: 1992). Dan Grove Deibler, in his Metal Truss Bridges in Virginia 1865-1932 (Richmond, VA: 1975) notes that as agents for Pittsburgh Bridge Co., Nelson and Buchanan erected a three-span through high Pratt truss bridge in Allegheny County Virginia over the Cowpasture River in 1896.

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ADDENDUM TO:  
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