

# HISTORIC AMERICAN ENGINEERING RECORD

## MOWERSVILLE ROAD BRIDGE

HAER NO. PA-590

**LOCATION:** Mowersville Road (TR 644), spanning Paxton Run, Mowersville, Franklin County, PA  
Bin # 28 7207 0644 3133

**UTM:** Shippensburg 18/279697/4443514

**DATES OF CONSTRUCTION:** Initial erection, 1897. In a 1921 rebuilding, reinforced concrete encasing the lower chord and an intermediate pier were added, transforming the bridge into a double span. Concrete coping on the wing walls was probably also added at this time. Further repairs in 1984 by J.B. Goetz and W.A. McClure, of Chambersburg, included tuck-pointing of masonry wing walls and abutments. Four of the five cast iron verticals on the north web were probably replaced at this time with hot-rolled steel I-beams.

**BUILDER:** Metal superstructure and masonry: Nelson & Buchanan, agents for the Pittsburgh Bridge Company. Concrete "rebuilding" by Frank Hafer and Calvin G. Laughlin, County Commissioners, and John Walters, "mason" in 1921.

**PRESENT OWNER:** Franklin County, PA

**PRESENT USE:** Vehicular bridge

**SIGNIFICANCE:** The cast and wrought iron Pratt pony truss bridge represents a rare survival of a design routinely applied in rural contexts throughout Franklin County in the 1870s. Although none of the earlier local bridges survive that the Mowersville Road Bridge resembles, the metal superstructure of the bridge is most likely similar to an older type that was developed and manufactured locally. These early Pratt truss structures were designed by the owners of foundries primarily engaged in the manufacture of agricultural implements and machinery. The sturdy, pragmatic forms of these bridges reflect the empirical

practices of these local bridge builders, as well as early efforts at standardization in rural bridge design.

PROEJCT HISTORIAN: Dr. Linda S. Phipps, summer 2002

PROJECT  
INFORMATION:

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 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 A. 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 Christine Pires (ICOMOS—Portugal); Dr. Linda S. Phipps and Dr. Richard Vidutis served as project historians under the supervision of Dr. Richard O'Connor (HAER Senior Historian). Professor Thomas E. Boothby, PhD, PE, RA (Pennsylvania State University, State College) was the Consulting Engineer; Jose C. Colon (Pennsylvania State University, State College), was the Project 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

The Mowersville Road Bridge is a pony Pratt truss, originally of a single 50' span. The upper chord and verticals are of cast iron. The truss has eight panels, reinforced by diagonal tension rods. The upper chord consists of four main castings, with the outermost casting extending over two panels. The two inner castings extend over a single panel each, but they differ in length by one foot. On the upper surfaces of the chord castings are chamfered, with outer surfaces angling out and down for approximately 2", sufficient to direct rain away from their undersides and the vertical and diagonal members that they cover. The upper surfaces of the castings are further stiffened against compression by slight ridged projections that run longitudinally the entire length of the member along either edge. In contrast to most chord connections in Pratt trusses, the compression members on the upper surfaces are cast as an integral part of the chord castings upon which they sit. Holes are drilled through these compression members to allow the diagonal tension rods to pass through them, where hexagonal nuts secure them to the upper surface. The castings of the compression members vary from one chord to the next. The outermost castings of the upper chord have compression blocks on either end of their upper surface, while the two intermediate castings present distinct conditions. The shorter of the two single panel upper chord castings has compression blocks cast at one end only, while the longer of the two single panel upper chord castings is symmetrical, with compression blocks at either end. The number of cavities in the compression castings varies according to its position relative to the end or center of the webs of the truss. For example, in the two end castings, there are three cylindrical cavities on the end closest to the angle panels—two accommodate the connections of the diagonal bracing rods and one for the vertical rod at that point. In the intermediate panels, there are only cavities to accommodate the connections of the diagonal rods in the compression blocks.

Except for those of the outermost panels, the vertical members consist of cast iron flanged I-plates with their long axes running transversely. Their outer faces have flanges that bow out slightly below their centers like the exaggerated entasis of a column. These verticals sit on the lower chord and have a short flange on their upper surface that fits into a cast groove on the under side of the upper chord. This groove and flange connection appears to have been mirrored by similar conditions on the lower chord and elsewhere. While these verticals mostly remain in place through their snug fit, they are further secured by their placement between the diagonal tension rods that pass by them as they penetrate the upper chord castings.

In place of the flanged I-plates that serve as the verticals of the inner panels, the end panels are terminated by vertical rods that are secured by hexagonal nuts as they pass through the compression blocks of the end blocks of the upper chord. The inclined end posts are also secured here through the tension exerted by the pin connections of the end vertical and of the paired diagonal tension rods that penetrate the outer end of the upper chord. The inclined end posts are flat and broad with three long flanges on their undersides to stiffen them as they rise from the lower to the upper chords. At the center of their upper surface they have a flanged projection that helps to seat the beam within

the grooved underside of the upper chord. This member, like most of the verticals, is kept in place through the tension of adjacent connections.

The outermost panels have double diagonal rods running from the innermost corner at the lower chord to the outermost corner at the upper chord. The two intermediate webs have three diagonal rods, each, with one pair running from the lower chord at the innermost corner to the upper chord at the outer corner, countered by a single rod running diagonally opposite them. The two innermost panels vary in the number of diagonal rods, suggesting perhaps that they may have been changed by subsequent modifications. On the north web, four of the five verticals have been replaced by steel I-beams. The wing walls would most likely have had a timber covering instead of the present concrete coping. The wing walls consist of narrowly coursed local stone. An expansion joint in the concrete coping interrupts the wall halfway.

Midway along the west web, on the upper face of the concrete curb that now encases the lower chord, is a marble plaque crediting the county commissioners for the 1921 rebuilding. It states "Rebuilt by C.V. Laughlin, J. Howard Poe, Frank Hafer 1921, John Walters, Mason." Original plaques crediting the first county commissioners and Nelson and Buchanan, agents of the Pittsburgh Bridge Company, for the initial construction of the bridge were probably removed at this time. This 1921 "rebuilding" completely encased the lower chord in reinforced concrete, which now has multiple delaminations and cracks.

A conjectural reconstruction of the lower chord can be derived from three sources: knowledge of typical late nineteenth century bridge building practices; a comparison with photographs of other bridges by contemporaneous local builders; and partial observations of sections visible through inadvertent loss due to wear and damage of the concrete covering.<sup>1</sup> Not surprisingly, the lower chord appears to have consisted of two wrought iron bars, 3/8" x 4". The original timber decking probably rested on timber stringers, possibly oak. The bridge now has an asphalt surface consistent with the 1921 alterations. Since the lower chord is encased in concrete, the bridge no longer functions as a truss. The intermediate concrete pier that was added to accommodate the added weight of the concrete deck, along with the two abutments, now holds the bridge in place. The original bridge shoes have been encased in concrete, so the precise nature of the original abutment connection at the bridge seat is indeterminate.

### Significance

Local industry and commercial trade flourished in South Central Pennsylvania in the mid-nineteenth century. Historically, Franklin County has been predominantly agricultural, with a concentration of fruit orchards and dairy farms, but the Cumberland Valley also hosted a number of regional industries. Like much of Pennsylvania, the area was dotted with lime quarries and kilns. Iron mines, metal furnaces and foundries were also plentiful. These industries grew apace with continuous improvements in the

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<sup>1</sup> The author wishes to thank Roland Flores, project architect, for sharing his insights regarding the lower chord.

transportation infrastructure. Local rail routes, canals, bridges, and road networks strengthened the links between regional centers as the population trebled during the 1800s.

The decades following the Civil War saw an unprecedented increase in rural bridge construction, supported, in part, by the ease and relatively low cost of metal fabrication. Bridges now spanned waterways great and small. Seasonal floods regularly washed out or damaged existing stone and wooden structures, and these were increasingly replaced by metal bridges produced by dozens of new bridge companies established shortly after the middle of the century. The ease of erection of these lightweight but strong structures led to an increase in construction. At key "fordings" on long-established roads over local creeks and streams, these new bridges linked rural agricultural and industrial centers.

The Mowersville Road Bridge fulfilled just such a purpose. Mowersville, in Lurgan Township, is a village three and a half miles east of Roxbury in Franklin County. Established in 1743, Lurgan Township is bounded on the north by Cumberland County, on the west by Kittoctinny Mountain, and on the east and south by Conodoguinet Creek. John Mower, an early settler, moved his family there in the early nineteenth century where he established a coach-making business. The village eventually took the family name. Mowersville appears to have thrived in the decades immediately following the Civil War. In addition to inheriting the coach-making business, Mower's son, Joseph, was the founding president of the Mowersville-based Lurgan Mutual Fire Insurance Company (established April 6, 1852). By December 1885, the company held over \$3 million dollars in coverage. When the demand for coaches declined, the blacksmith portion of the business was retained, surviving into the early twentieth century. On March 3, 1868, a post office was established there, with mail routed to Mowersville through Chambersburg.<sup>2</sup> In 1870, the Shippensburg News announced that a new stagecoach route from Shippensburg to Roxbury would pass through Mowersville, suggesting that there was a considerable amount of traffic along the route.<sup>3</sup>

Described in the 1866 Franklin County Road Record as the "Public Road from State Road to Maclay's Mill," (near Conodoguinet Creek to the east) Mowersville Road was an important local highway during the period after the Civil War.<sup>4</sup> In 1889, following particularly heavy rains that damaged several county bridges, Mowersville residents petitioned the County Commissioners for a bridge there, explaining that "a bridge is much wanted over Paxton Run in the Village of Mowersville at the place where the public highway crosses the said stream in said township. The fording at that point being frequently rendered impassible by ice and high waters; and that the expense of erecting said bridge would be to heavy and burthensome upon the inhabitants of said township

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<sup>2</sup> For a brief history of Lurgan Township and the Village of Mowersville, see History of Franklin County, Pennsylvania (Chicago: 1887) pp. 564-567. A biographical sketch appears on page 828. Further documentation regarding Joseph Mowers' activities can be found in the Mowers family files of the Shippensburg Historical Society, Shippensburg, PA, and in L. James Schaff's "The Church of the United Brethren in Christ in Franklin County," in The Kittoctinny Historical Society, Papers Read Before the Society, vol. 8 (1915), pp. 142-161.

<sup>3</sup> In the local news section on March 19, 1870, the Shippensburg News reported that "...after the first of April, a daily stage line will be run between this place and Roxbury via Mowersville."

<sup>4</sup> See relevant records in the Road Record, 1864-1875 and Road Docket, 1882-1891, County Assessor's Office, Franklin County Courthouse, Chambersburg, PA.

(sic).<sup>5</sup> Although the petition was approved, and plans drawn up, no further action was taken for nearly a decade. It is not known why this petition was set aside for so long since the county erected several other metal truss bridges during the subsequent decade. One possible reason was that the county budget was already taxed by extensive damages to other bridges caused by extremely heavy rains and flooding. Another possibility, suggested by a short article in the local weekly paper, The Valley Spirit, was that there was already a bridge at that site that had been constructed and owned by the township. If that is the case, one cannot help but wonder why the 1889 request did not mention the extant structure. Perhaps the 1889 request was answered by short-term repairs to the township bridge and the request for a new structure to be paid for by the county deferred indefinitely.<sup>6</sup>

In 1897, Mowersville residents renewed their request for a bridge. On May 3, their petition was finally actualized during a meeting of the commissioners. The county clerk reported their resolution, "... whereas the present board of commissioners made an inspection of said site for said bridge on 9<sup>th</sup> of April 1897 and being satisfied and convinced that a bridge is badly needed at said point. Therefore be it resolved, that the bridge be built according to the drawings etc. approved by the old board above mentioned."<sup>7</sup> This reference was to the Board of Commissioners who had initially approved the 1889 petition. On May 10, 1897, the commissioners visited the site of the bridge again for the purpose of drawing up specifications. "After their return, they decided to award contract for superstructure of said bridge to Pittsburg Bridge Co. Nelson & Buchanan Agts for \$400—according to specifications and contract on file in this office and described as #1.[sic]"<sup>8</sup>

There are two items of interest in this account. First, the county normally solicited competitive bids for both the metal superstructure and the masonry of such structures. On the appointed day, sealed bids would be opened, the amounts entered into the public record, and the contract usually awarded to the low bidder. In this case, the normal procedure of advertising for bids for the superstructure was waived and the contract simply handed to Nelson and Buchanan with no competitive bidding. How can these unusual circumstances be explained? The answer lies, in part, with Thomas M. Nelson, and his long association with the county commissioners. Other crucial clues lie in the forms of the bridge itself, for the Mowersville Road Bridge looks like no other Pratt pony truss bridge constructed by Nelson and Buchanan for the Pittsburgh Bridge Company. A more typical example of the Pratt pony truss erected by this company can be seen in the Yeakle Mill Bridge on Mill Road over Little Cove Creek in Warren Township (1888).<sup>9</sup>

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<sup>5</sup> Franklin County Road Docket.

<sup>6</sup> See "About the Court House," in the Chambersburg Valley Spirit May 3, 1897.

<sup>7</sup> Franklin County Commissioners, Meeting Minutes, 1897-99, County Commissioners' Office, Franklin County Courthouse, Chambersburg, PA.

<sup>8</sup> Ibid.

<sup>9</sup> See Yeakle Mill Bridge, HAER No. PA-591. 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). The American Bridge Company took over the Pittsburgh Bridge Company in 1900 and no further bridges were credited to it after that date, although Nelson and Buchanan continued as major forces in Pennsylvania bridge design and construction.

The success of the Pittsburgh Bridge Company in Central and Eastern Pennsylvania appears to have depended upon the engineering and business skills of its primary agents in that region, Thomas M. Nelson and Andrew Buchanan. Each seems to have had some training in civil engineering. Little is known about Buchanan except that he is referred to as a Bridge Contractor in Chambersburg directories during the mid 1880s.<sup>10</sup> Nelson was born in Franklin County in 1849, where he attended local public schools and, subsequently, Chambersburg Academy and Lafayette College. It is not known whether 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>11</sup> Little is known about his tenure with this firm, but within five years of his return (1880), he entered into a bridge building partnership with Calvin Gilbert.

Nelson's background as the son of a Presbyterian minister may have eased his transition into public life and prepared him for leadership positions in business. After leaving Walling and Gray, he worked at a number of local governmental posts including justice of the peace and Franklin 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, and was thus able to learn the bridge building business from the client's perspective. This training was invaluable in his later position 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.<sup>12</sup> 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.

It is possible that Nelson, in his well-established position as president of a multi-state bridge building company, was able to erect the Mowersville Bridge as a favor to his native county. If a local foundry such as T.B. Wood cast the bridge from extant patterns, the cost of shipping from Pittsburgh could have been avoided, thus minimizing costs. Also of note in the Meeting Minutes is the remark, "according to specifications and contract on file in this office and described as #1." This further supports the idea that the bridge was based on earlier designs and specifications already available in

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<sup>10</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>11</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 person who 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.

<sup>12</sup> Nelson appears to have persisted in his bridge building activities until late in life. His successor firms, the Nelson Construction Company and Nelson and Meredith, adapted to changing technology in bridge building, moving from metal trusses to plate girders and then to reinforced concrete arch and girder structures.

Chambersburg. It suggests that there were already types or standards on hand that had been established by earlier commissioners on the basis of prior bridge contracts. Although Nelson had assisted in the development of many such specifications, it is not clear how detailed those specifications were, since they were omitted in the published advertisements to bridge builders soliciting bids.

Nelson's leading position with the Pittsburgh Bridge Company, in light of his prior service as county clerk and his established record as the main bridge builder for the county from the 1880s help to explain the ease with which he was awarded the contract for the metal superstructure of the Mowersville bridge. However, bids were publicly solicited for the masonry (abutments and wing walls). William Frye, a local mason, submitted the low bid of \$4.20 per cubic yard. Although Nelson's bid of \$4.90 for the same work was higher, he had also submitted a second bid offering to do the entire job, including the masonry and metal superstructure for \$700. Nelson did not invent this bidding strategy. His predecessor, Calvin Gilbert, had used it successfully on many occasions during the 1870s. Yet, Nelson used it to his advantage in many successful bids.

For the county commissioners, this approach offered a convenient way to avoid dealing with multiple contractors on the same job, while obtaining services at economical prices. It helps to explain Nelson and Buchanan's near monopoly on bridge building in the county. Inexplicably, Nelson ultimately received a payment of \$1,100 for the bridge in 1897.<sup>13</sup> In retrospect, it is surprising that such a low bid would have been offered, since in 1872, Calvin Gilbert & Co. received a contract from the county to construct an iron bridge of the same dimensions for \$15.50 per lineal foot, or \$775.00 exclusive of the masonry.<sup>14</sup> One wonders how it was that Nelson was able to offer to build the bridge for so little. The most likely explanation is that the Mowersville Bridge represents a rare survival of a design routinely applied in such rural contexts throughout Franklin County from the 1870s. There are several reasons for believing that the Mowersville bridge was based on older plans. As an important manufacturing and trade center, Chambersburg was a key stop on the Cumberland Valley Railroad. With rich deposits of iron ore in the area, and a transportation infrastructure already in place, the Borough was home to at least two iron foundries that produced bridges during the second half of the nineteenth century. Plans for the Mowersville Bridge could have been based on specifications already on file in the County Commissioners' office, or Nelson and Buchanan could have relied on castings from patterns for the chord blocks and vertical supports that had been developed by local founders.

Whatever the case, the Mowersville Bridge more closely resembles earlier bridges designed by other local builders. Although none of these structures survive, they are recorded in photographs. Given these similarities, the metal superstructure of the Mowersville bridge most likely represents an important survival of an older type that was developed and manufactured locally. These early Pratt truss structures were designed by the owners of foundries primarily engaged in the manufacture of agricultural implements and machinery. The sturdy, pragmatic forms of this bridge reflect the empirical practices

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<sup>13</sup>Franklin County Commissioners, Day Book, 1872-1918, p. 316.

<sup>14</sup>Franklin County Commissioners, Meeting Minutes, 1897-99.



of these local bridge builders, and also reflect early efforts at standardization in rural bridge design.

Despite its association with the Pittsburgh Bridge Company, the Mowersville Bridge was more likely authored by empirically based local bridge builders without formal training. Two possible authors of the Mowersville design are Calvin Gilbert and T.B. Wood. The successful owner of the Chambersburg foundry, Gilbert and Company, Calvin Gilbert built a significant number of metal truss bridges for the county during the 1870s and early 1880s.<sup>15</sup> He worked closely with the county commissioners, often advising them and helping them to develop specifications. Occasionally, Gilbert took on partners in his bridge-building enterprise. An 1880 industrial census lists Thomas M. Nelson and Calvin Gilbert, as Bridge Builders in Chambersburg with ten employees. The firm of T.B. Wood & Company had an even greater output with twice the number of employees as Gilbert. Wood's foundry manufactured cast iron stoves, architectural members, agricultural implements and bridges. T.B. Wood designed and produced a number of iron bridges for the Cumberland Valley Railroad and for the Franklin County Commissioners from the late 1850s through the 1870s.<sup>16</sup> Ledger books for this period in the archives of the firm indicate not only a significant number of bridges for the railroad, but also attest to the fact that other bridge builders such as Gilbert and Thomas Nelson occasionally contracted bridge castings from the firm. One possibility is that Nelson sub-contracted the Mowersville bridge from T.B. Wood, knowing that appropriate patterns for an inexpensive Pratt pony truss bridge were already on hand at the company.

After the absorption of the Pittsburgh Bridge Company by the American Bridge Company in 1900, Nelson returned to Chambersburg where he founded the Chambersburg Trust Company, a local bank, continued in his own bridge building enterprise and also established a prep school and a number of other businesses.

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<sup>15</sup> Gilbert's activities are well documented in the Commissioners Minutes and the Daybooks/Ledgers in the Franklin County Courthouse from that period. He later relocated to his native Gettysburg, where he reestablished his foundry and continued to manufacture bridges under the name Gilbert and Smith. His activities there have been documented for 1886 in Victor Darnell, Directory of American Bridge-Building Companies 1840-1900, The Society for Industrial Archaeology, Occasional Publication No. 4. (Washington, D.C.: 1984), p. 59.

<sup>16</sup> See Decennial Manufacturing Census for Pennsylvania, 1880, State Library of Pennsylvania Local History Collection (Microforms), Harrisburg, PA. Partial records, including ledger books, record Wood's activities in the archives of T.B. Wood and Company. The author wishes to thank Connie Wagner, Administrative Assistant, for making these documents available.

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