

**MERCER COUNTY, PENNSYLVANIA
HEMPFIELD TOWNSHIP
STATE ROUTE 4006 (WILLIAMSON ROAD)
QUAKER BRIDGE
(a.k.a. WILLIAMSONS CROSSING BRIDGE)
SPANNING THE LITTLE SHENANGO RIVER**

STATE-LEVEL RECORDATION

E.R. #98-6179-085

Submitted to:

**PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 1-0**

Submitted by:

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MARCH 2005

QUAKER BRIDGE
a.k.a. WILLIAMSONS CROSSING BRIDGE

Location: State Route (S.R.) 4006 (Williamson Road), Spanning the Little Shenango River in Hempfield Township, Mercer County.

UTM: E 17 552400
N 17 4586000

Quadrangle: Greenville East, PA

Date of Construction: 1884

Builder: Cleveland Bridge and Iron Company

Present Owner: Pennsylvania Department of Transportation

Present Use: Highway Bridge (demolition slated for 2005)

Significance: The National Register of Historic Places (NRHP)-listed bridge is historically and technologically significant under Criterion C as a complete, unaltered, and well-preserved example of a pin-connected, metal Pratt through truss bridge built using standardized components. It is the oldest remaining truss bridge in Mercer County.

Project Information: The Pennsylvania Department of Transportation (PennDOT) is planning to demolish the Quaker Bridge in 2005. The bridge was listed in the NRHP on June 22, 1988 as a result of the 1982-1985 survey and evaluation of PennDOT-owned bridges. To mitigate the adverse effect of the proposed work, the State Historic Preservation Officer (SHPO) stipulated a recordation of the bridge to Pennsylvania standards.

Documentation
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Date: March 3, 2005

DESCRIPTION

The NRHP-listed Quaker Bridge (also known as the Williamsons Crossing Bridge) is a single-span, 38.4 m (126.0 ft) long, 4.3 m (14.0 ft) wide Pratt through truss bridge. It carries a single-lane of S.R. 4006 (Williamson Road) over the Little Shenango River in Hempfield Township, Mercer County. Historically, the bridge also crossed over the Shenango Division of the Erie Extension Canal (Figures 1 and 2), which used slackwater navigation at this point. A timber foundation of a canal dam is located just upstream of the Quaker Bridge. The bridge is located in the northern portion of the county, northeast of the Borough of Greenville. The setting consists of wooded lots, agricultural lots, and low-density residential buildings. Northeast of the bridge is predominantly agricultural in character. The area does not have historic district potential.

The Quaker Bridge is an example of a pin-connected, metal, Pratt through truss bridge. The design has parallel and straight upper and lower chords with webs consisting of right triangles. The upper chords and inclined end posts of the six-panel bridge are built up box sections composed of toe-out channels with cover plates riveted to the top flanges and flat bars riveted to the lower flanges. The vertical compression posts are toe-out channels with laced webs. Each compression member is shop riveted together. The lower chords and diagonals, which are in tension, consist of forged, paired eye bars. The hip verticals have looped ends. The counter diagonals in the middle panels are metal rods with eyes and turnbuckles. Various bridge members are stamped "Carnegie," indicating they were manufactured by the Carnegie Steel Company of Pittsburgh. The Carnegie Steel connection virtually assures that the bridge members are steel and not iron. The Carnegie Steel Company, founded in 1876, was one of the nation's first integrated steel manufacturers.

The trusses are supported by ashlar abutments and wingwalls, with visible quarry marks on the stones. The exterior mortar has deteriorated in most places, and a number of stones have shifted out of plumb. The abutments are topped by concrete bridge seats, indicating that the bridge has been raised.

U-shaped hangers loop over the lower panel points and support built up, fishbelly (or variable depth) floor beams. The hangers pass through holes burned through the flanges of the floor beams. The floor beams support rolled steel stringers and an open-grid steel deck. The stringers, deck, and W-beam guiderails that protect the trusses are the only alterations to the bridge. The guiderails replaced lattice railings.

The portals have a common, lattice web design. Centered on the lower flanges of the portals are plaques listing the county commissioners at the time the bridge was erected: H. Cole, S.P. Stewart, and J. Hoagland. Other plaques historically located on the bridge that identified the bridge fabricator have been removed. The four endpost blocks are topped by finials, a common bridge detail often lost over time. The bridge's top struts are metal channels; at every other panel point, sway bracing connects them to the verticals. Top and bottom lateral bracing are round rods.

Quaker Bridge has exceptional integrity of design, materials, workmanship, location, setting, feeling, and association. The only apparent modifications to the bridge are the stringers, deck, and guiderails. The truss members and their connections show no signs of alterations or repair. They illustrate and convey bridge building techniques used for spanning relatively long lengths in the late nineteenth century.

HISTORY

The NRHP-listed Quaker Bridge is significant under Criterion C as a complete, unaltered, and well-preserved example of a pin-connected, metal Pratt through truss bridge built using standardized components. The bridge was built by the Cleveland Bridge and Iron Company of Cleveland, Ohio. Two construction dates are given in the NRHP nomination, 1884 and 1898 (Paskie 1982). The historical record supports the 1884 date, making the Quaker Bridge the oldest surviving metal truss bridge in the county.

The Quaker Bridge is located at Williamsons Crossing, and that name is the alternative and generally used local name for the bridge. In the earliest days of white settlement in the region, the crossing was a ford in the Little Shenango River where James Williamson built, in 1796, the first gristmill in the territory. Eventually, Joseph Williamson settled across the river from James, and the Williamsons Crossing name was given to the ford. The existing Quaker Bridge is at least the third bridge built at the crossing. Mercer County bridge records for April 1859 characterized “the bridge near Williamson’s...over the Little Shenango and the Canal as unsafe” (Mercer County Bridge Records 1859). The county replaced the bridge the following year. The December 20, 1860 issue of the *Rural Argus*, a newspaper published in nearby Greenville, reported that “The Williamson Bridge across the slack water two-and-one-half miles above this place, has been completed. It is a substantial structure over 200 feet in length and about 25 feet from the surface of the water” (Greenville Historical Society 2004). The article does not mention what type of bridge this structure was.

The term “slack water” in the *Rural Argus* article is a reference to the Erie Extension Canal, which crossed under the bridge. Built during the height of Pennsylvania’s canal era, the Erie Extension Canal was designed to connect Beaver, located on the Ohio River, with Erie and the Great Lakes trade. Begun as a state venture in 1831, the canal would be completed in 1844 by a private venture, the Erie Canal Company. The 222.1 km (138.0 mi) long Erie Extension Canal followed the Beaver, Shenango, and Little Shenango rivers and passed through the communities of New Castle, West Greenville (today Greenville), Meadville, Conneaut Lake, and Erie. At various places, the canal utilized slackwater navigation; i.e., the canal was within the channel of the stream. One such stretch was between West Greenville and Crooked Creek, which included Williamsons Crossing (Corkan 1927:49-50; Hopkins 1950:37; Shank 1997:55-56).

Mercer County authorized construction of the current Quaker Bridge in 1884. On July 11 of that year, County Commissioners S.P. Stewart, Henry Cole, and Jesse Hoagland petitioned the Court of Quarter Sessions about “a new County Bridge across the Little Shenango at Williamsons Crossing in Hempfield Township, the contract of which was awarded to the Cleveland Bridge & Iron Company of Cleveland, Ohio at \$15 99/100 per lineal foot. That said Bridge is now completed agreeably to said contract.” The petitioners asked the court “to appoint six competent persons to inspect said bridge and the workmanship thereof...and to make report to the next Court of Quarter Sessions.” In response, the Court appointed the requested viewers on the same day (Mercer County Bridge Records 1884:286).

The viewers met at “the New Iron Bridge” (designated as Little Shenango Bridge No. 332 in the county bridge records) on July 17, 1884 to inspect the bridge. “After careful inspection and examination of plans and specifications and the contract...[they] found the Bridge to be in all material parts fully up to the requirements of the contract.” The court accepted the new bridge on behalf of the county on September 15, 1884 (Mercer County Bridge Records 1884:286).

The only bridge plaques remaining on the bridge support the 1884 construction date. Plaques located on each portal list the county commissioners in office when the bridge was erected: H. Cole, S.P. Stewart, and J. Hoagland, the same commissioners who petitioned the Court of Quarter Sessions. Cole, Stewart, and Hoagland served from 1881 through 1884 (Mercer County Commissioners 1996).

The NRHP nomination for the Quaker Bridge also lists a second construction date for the bridge, 1898. The source is given as “Bridge Plaque,” but the plaque has been removed. Mercer County bridge records do not indicate any bridge construction or repairs made at Williamsons Crossing during 1898, nor does the Mercer County Engineer’s Office, which retains archival records on county bridges. Attempts to locate the County Commissioners minutes from the 1890s were unsuccessful.

The fabricator of the Quaker Bridge, the Cleveland Bridge and Iron Company, was formed ca. 1850 as Thatcher, Burt, and Company, with offices in Springfield, Massachusetts and Cleveland, Ohio. The principals, Peter Thatcher, Jr. and George H. Burt, had experience building railroads and railroad bridges throughout the east coast. In 1852, Thatcher’s nephew, Henry Martyn Claflen, joined the firm, and the Massachusetts office was apparently closed. Thatcher, Burt, and Company purchased the regional rights to build Howe trusses, a bridge type with wood compression members and iron tension members. The company erected Howe truss bridges throughout Ohio, Michigan, Indiana, and Kentucky in the 1850s. During the Civil War, Claflen built railroad bridges for the Union Army, most notably to help relieve the siege of Chattanooga.

In 1865, Claflen and Albert C. McNairy formed the bridge building firm of McNairy, Claflen & Co. By 1868, the company’s name had been changed to Cleveland Bridge and Car Works. The company now held the rights in southern and western states to “Post’s Diagonal Truss,” a hybrid of a Warren and a Whipple truss. Like the Warren truss, the Post truss had compression posts placed at an angle; like the Whipple truss it had diagonals in tension stretching across more than one panel point. In 1875, McNairy, Claflen & Co. entered receivership, although its fabrication shop continued to operate under a lease to another company. In either 1877 or 1879 the company reorganized as the Cleveland Bridge and Iron Company, with Henry Claflen as its president. The last year Cleveland Bridge and Iron Company appears in the Cleveland city directory is 1894, the year it apparently went out of business (Simmons and Darnell 2004).

For the Quaker Bridge, the Cleveland Bridge and Iron Company chose a much more common and standard bridge design, electing to erect a pin-connected Pratt through truss. The choice reflected the increasing standardization of truss bridge designs in the last quarter of the nineteenth century. Patented in 1844 by Thomas and Caleb Pratt, the Pratt truss has vertical members and the upper chords in compression and diagonal members and the lower chords in tension. The Pratt truss reduced the length of the compression members compared to earlier truss types, which helped prevent them from bending or buckling (Condit 1960:112). The

diagonals of a Pratt truss extend from the outer corner of a panel downward toward the center. The mid-point panel(s) often have crisscrossing diagonals and counter diagonals. "This system of bracing and counterbracing afford[ed] a means of regulating the camber of the bridge, and allow[ed] it to be drawn up or depressed in any particular segment, and thus furnish[ed] a means of regulation not derivable from the then common single tension braces in each panel" (Brock 1882:418).

The first group of Pratt trusses were built in the 1850s for the rapidly expanding Pennsylvania Railroad. By the 1870s, the Pratt truss was the most popular bridge type on the Pennsylvania system, and its use had spread to other railroads throughout the country. Pratt trusses also began to be used for highway bridges in the 1870s, and by the 1880s, they had become quite common on both railroads and roads (Condit 1960:111-113).

The Pratt truss achieved enormous popularity because of its strength, straightforward design, and economy of fabrication and erection. The truss could be fabricated by building up standard shapes like plates, angles, and channels, eliminating the need to cast expensive custom components. The standard shapes simplified erection and made the truss adaptable to a wide variety of lengths and situations (Jackson 1988:24; Lichtenstein and Associates, Inc. 1999:III-7).

REPOSITORIES

Information on the Quaker Bridge was gathered from the following repositories and people: the Mercer County Historical Society, the Mercer County Commissioners Office, and the Mercer County Engineer's Office, Mercer; the Greenville Historical Society, Greenville; the Pennsylvania Room of the Carnegie Public Library, Pittsburgh; and David Simmons of the Ohio Historical Society.

SOURCES

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Mercer County Bridge Records

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Mercer County Commissioners

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INDEX TO PHOTOGRAPHS

Name of Bridge:	Quaker Bridge, a.k.a. Williamsons Crossing Bridge
County and State:	Mercer County, Pennsylvania
Name of Photographer:	Gerald M. Kuncio, Skelly and Loy, Inc.
Date of Photographs:	October 2004
Location of Negatives:	Skelly and Loy, Monroeville, Pennsylvania

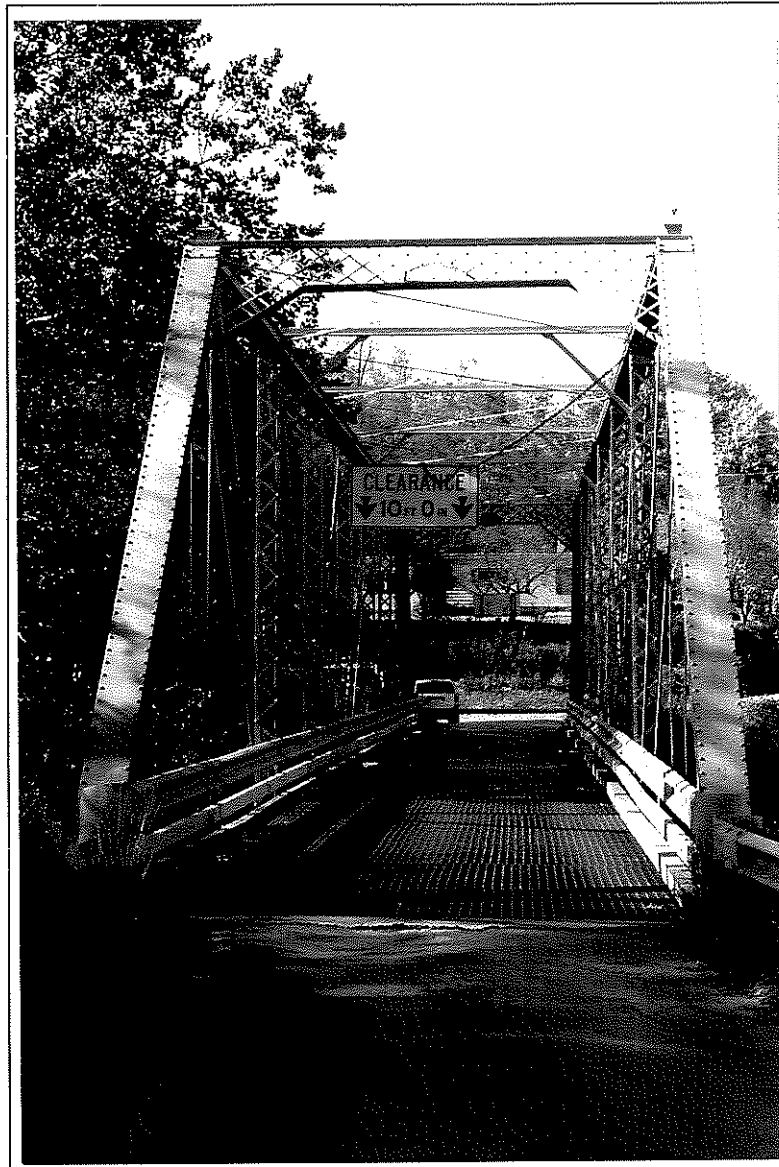
1. Elevation view, facing west.
2. Through view, facing southeast.
3. Through view, facing northwest.
4. Detail of a lower panel point connection and fishbelly floor beams, facing north.
5. Detail of a lower panel point detail, including the hangers and holes in the flanges of the floor beams, facing north.
6. Detail of a lower panel point detail at the hip vertical, facing northeast.
7. Detail of an exterior upper panel point detail, facing north.
8. Detail of an interior upper panel point detail, facing east.
9. Detail of a panel showing the upper chord, vertical, diagonal, and guiderail, facing southeast.
10. Detail of the bridge plaque listing the names of the county commissioners, facing northwest.
11. Detail of a finial, facing north.
12. Detail of a "Carnegie" stamp on an inclined end post, facing northeast.
13. Detail of an abutment, facing northeast.



Photograph 1. Elevation view, facing west.



Photograph 2. Through view, facing southeast.



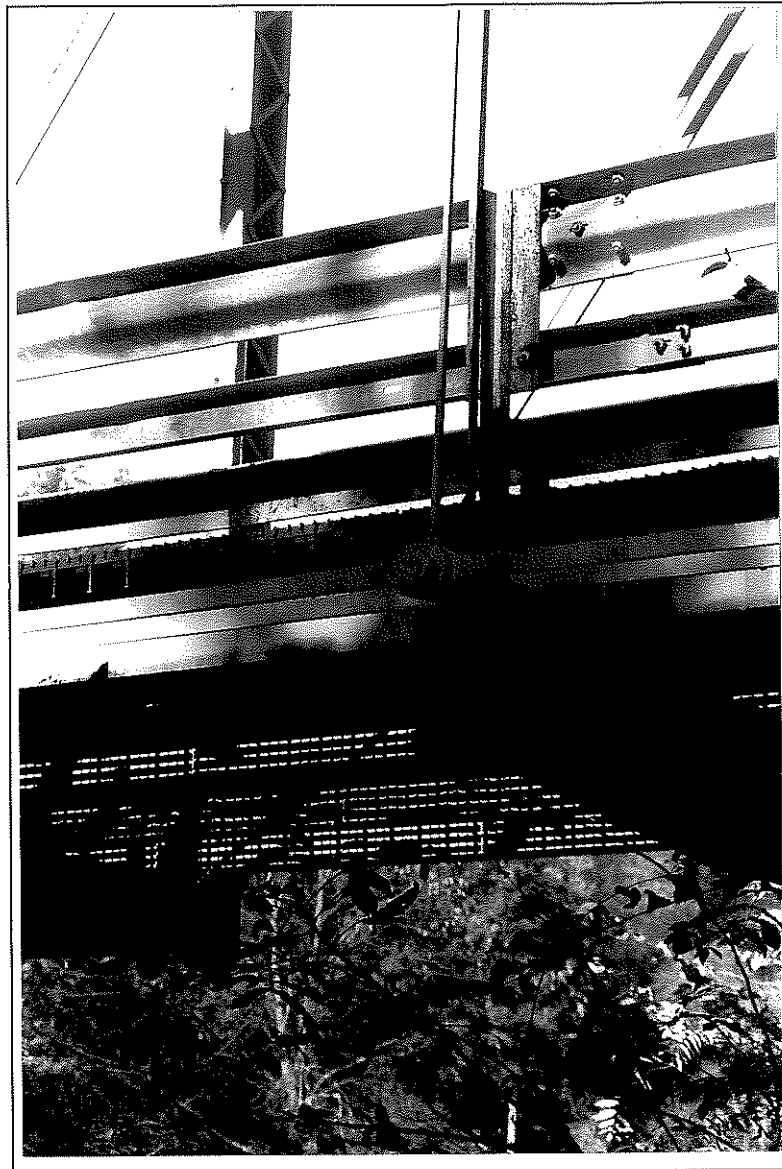
Photograph 3. Through view, facing northwest.



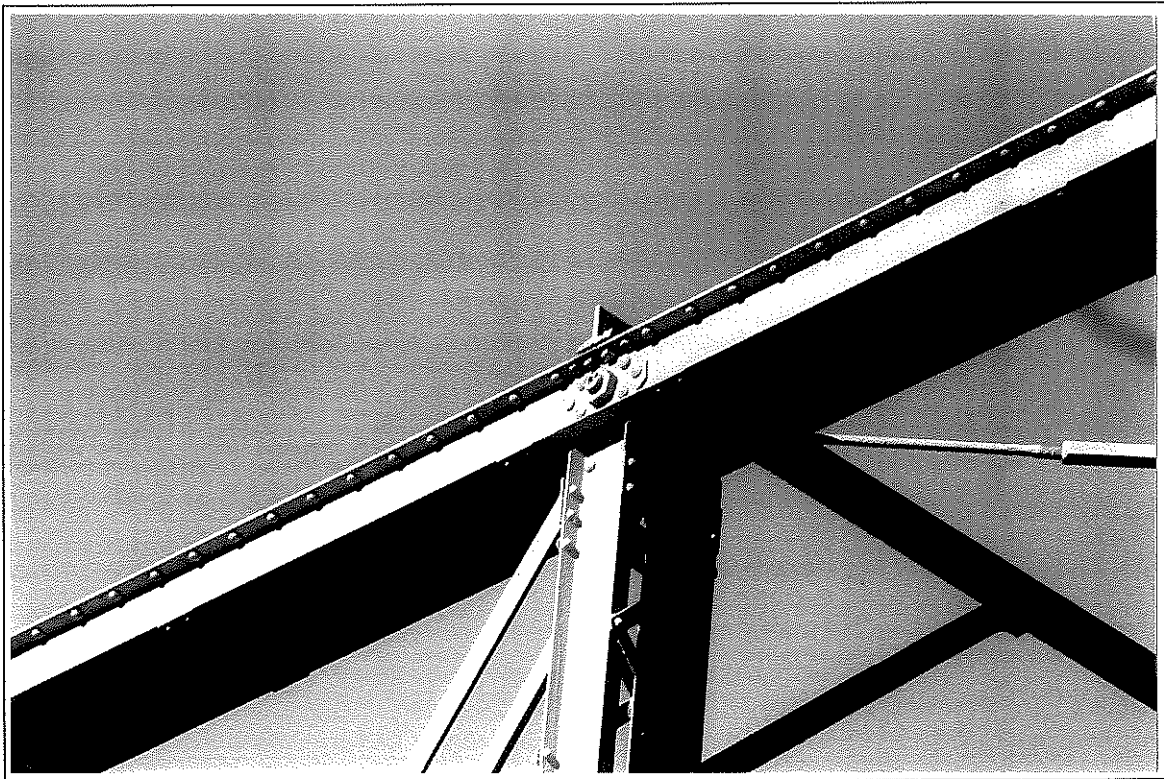
Photograph 4. Detail of a lower panel point connection
and fishbelly floor beams, facing north.



Photograph 5. Detail of a lower panel point detail, including the hangers and holes in the flanges of the floor beams, facing north.



Photograph 6. Detail of a lower panel point detail
at the hip vertical, facing northeast.



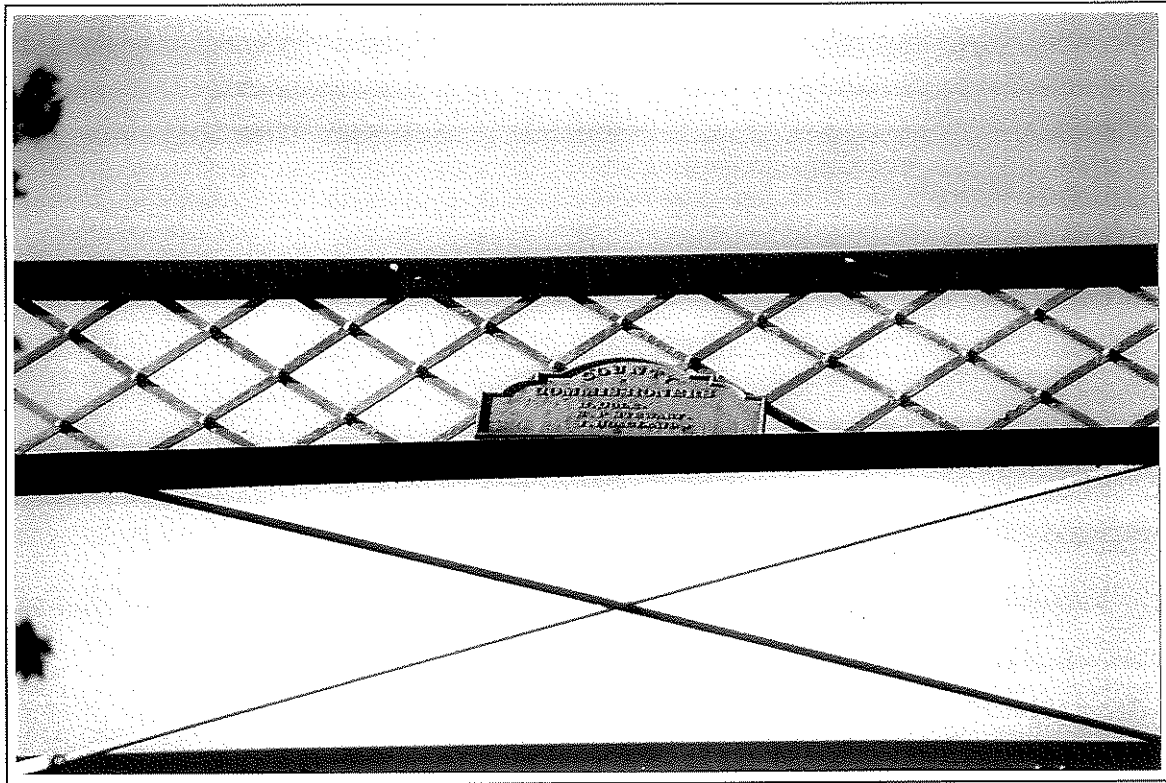
Photograph 7. Detail of an exterior upper panel point detail, facing north.



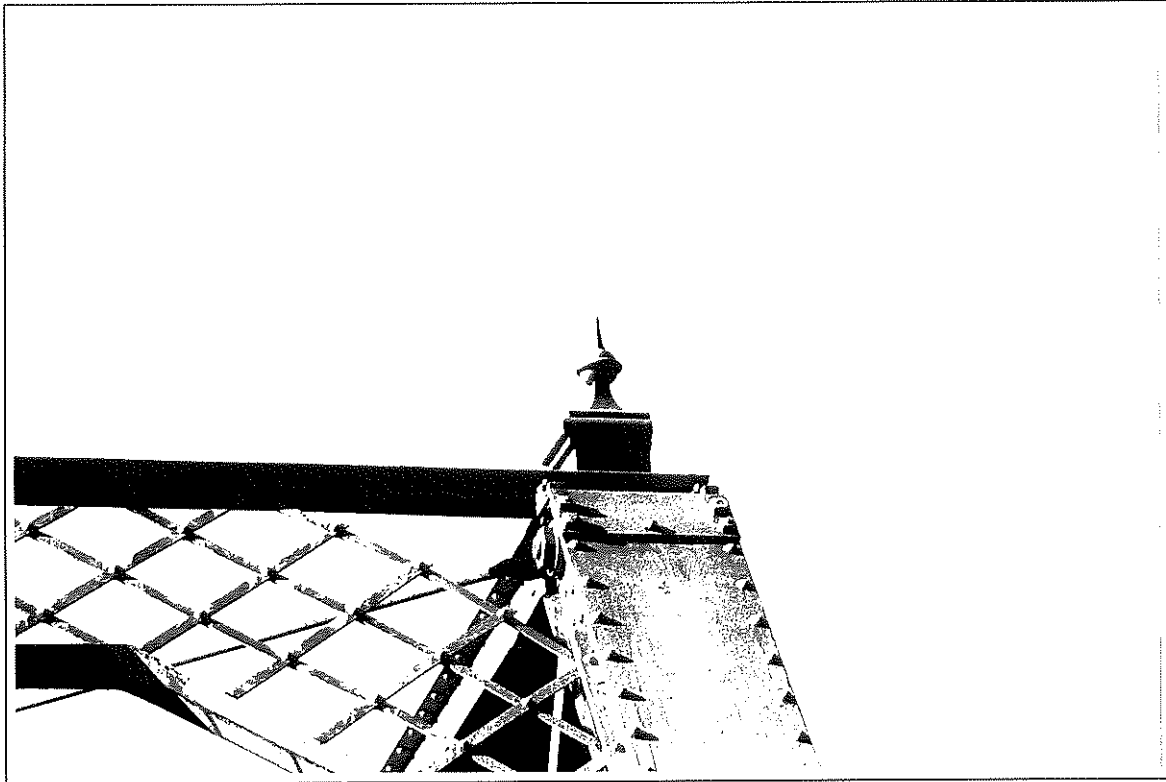
Photograph 8. Detail of an interior upper panel point detail, facing east.



Photograph 9. Detail of a panel showing the upper chord, vertical, diagonal, and guiderail, facing southeast.



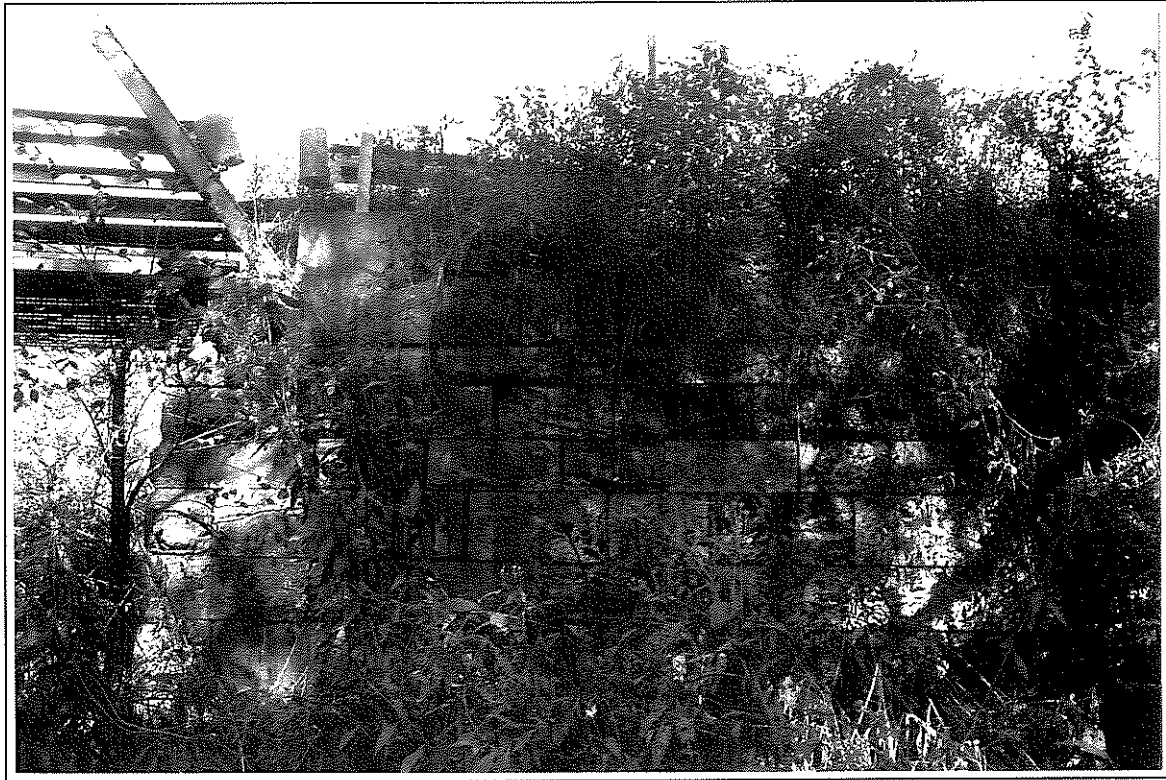
Photograph 10. Detail of the bridge plaque listing the names of the county commissioners, facing northwest.



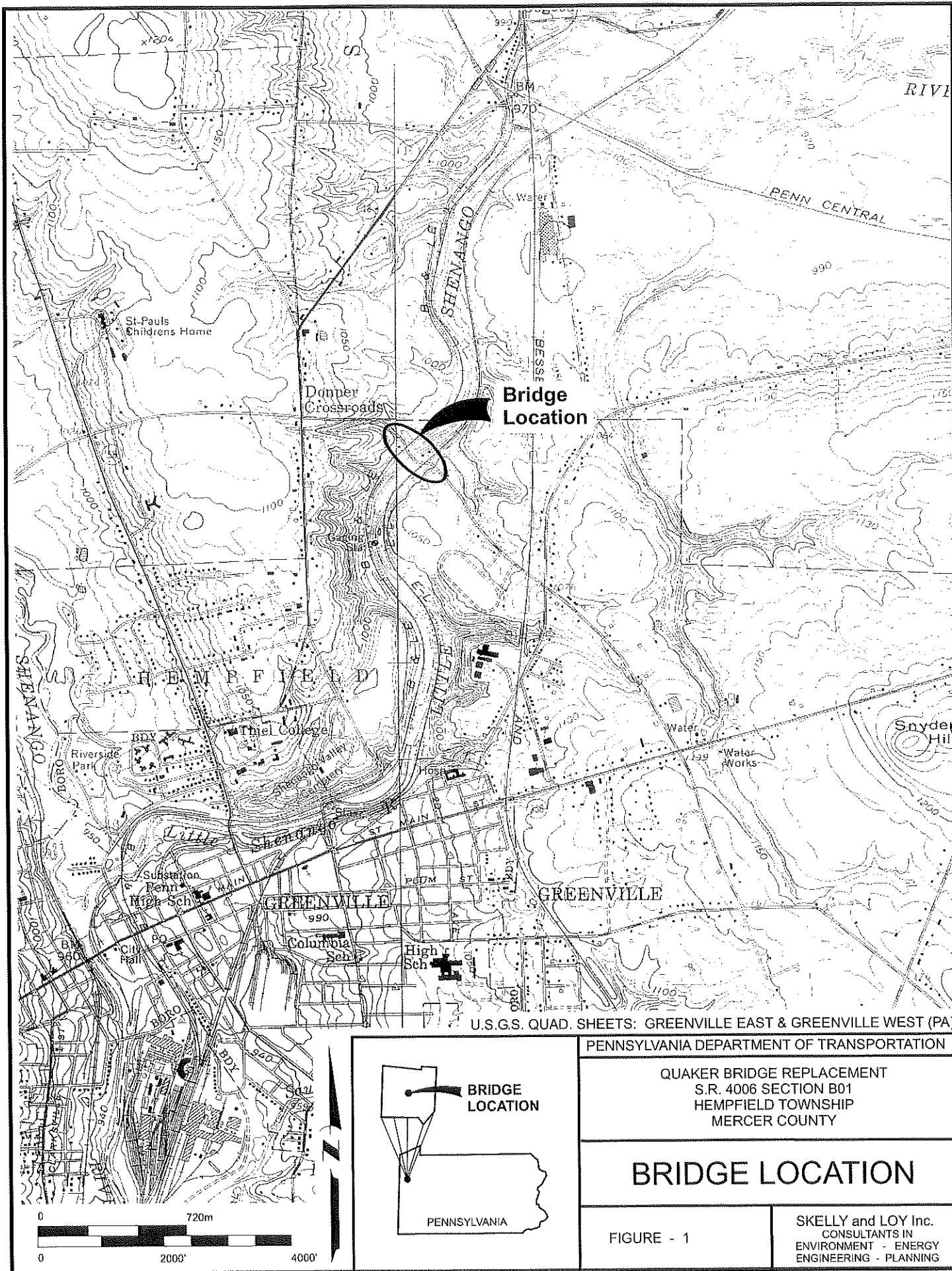
Photograph 11. Detail of a finial, facing north.



Photograph 12. Detail of a "Carnegie" stamp on an inclined end post, facing northeast.



Photograph 13. Detail of an abutment, facing northeast.



PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

QUAKER BRIDGE REPLACEMENT
S.R. 4006 SECTION B01
HEMPFIELD TOWNSHIP
MERCER COUNTY

BRIDGE LOCATION

FIGURE - 1

SKELLY and LOY Inc.
CONSULTANTS IN
ENVIRONMENT - ENERGY
ENGINEERING - PLANNING

