



# Timothy Palmer and His Bridges

by

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## Timothy Palmer 1751-1823 of Newburyport - and his Bridges -



Text herein was written by Dr. Frank E. Griggs Jr. and published by the Civil Engineering department of the University of Memphis ([www.ce.memphis.edu/3121/stuff/general/timothy\\_palmer.html](http://www.ce.memphis.edu/3121/stuff/general/timothy_palmer.html)). The text has been supplemented by illustrations from various sources, in some cases from additional recent articles by Dr. Griggs.

*Dr. Griggs specializes in the restoration of historic bridges, having restored many 19th century cast and wrought iron bridges. He was formerly Director of Historic Bridge Programs for Clough, Harbour & Associates LLP in Albany, NY and is now an independent Consulting Engineer.*

The beginning of Dr. Griggs' article mentions churches and meeting houses designed and built by Timothy Palmer, among them the Rocky Hill Meeting House in Amesbury (pictured below). Of some relevance regarding truss bridges, the meeting houses have interiors of essentially one large room with few internal supports (and those only for holding balconies) that would block views or otherwise hamper meetings. Timothy Palmer had thus groomed some sense of how to structurally span notable distances.



<https://www.thehistorylist.com/venues/rocky-hill-meeting-house-amesbury-massachusetts>

Early in life Timothy Palmer was apprenticed to Daniel Spofford, a leading local architect and millwright, who was involved in the design and construction of many churches and meetinghouses in the area. Palmer was one of the local minutemen who marched to Concord on April 16, 1775 and later served three months in the local militia. His main action was the Battle of Bunker Hill in June 1775. After the war, he continued his architect activities designing several meetinghouses.

In 1791, he took an entirely new path and designed a major bridge to cross the Merrimack River just west of the village of Newburyport, where an island (Deer Island) existed in the river. To address the demands of river traffic, Palmer needed a long span truss over the branch of the river between the southerly bank and the island. Without any local precedent he designed a highly cambered long span (160-feet) truss that resembled, but was an improvement on, a pattern developed by Andreas Palladio in mid-16th Century Italy.

### Timothy Palmer's Wood Truss Bridges at Deer Island, 1792



Period drawing, From: *Structure* (Magazine), Dr. Frank Griggs, June, 2013

## Timothy Palmer's Wood Arch Bridge at Deer Island. Ca. 1870

Palmer built this bridge in 1792, then covered and shingled it in 1808. Here, looking from the Amesbury side toward Spofford house on the island. The bridge was replaced in 1883 by an iron truss bridge, having a swing section, right beside the wood bridge on the near side. The current bridge keeper's house resides on the Deer Island (far) pier of this wood bridge.

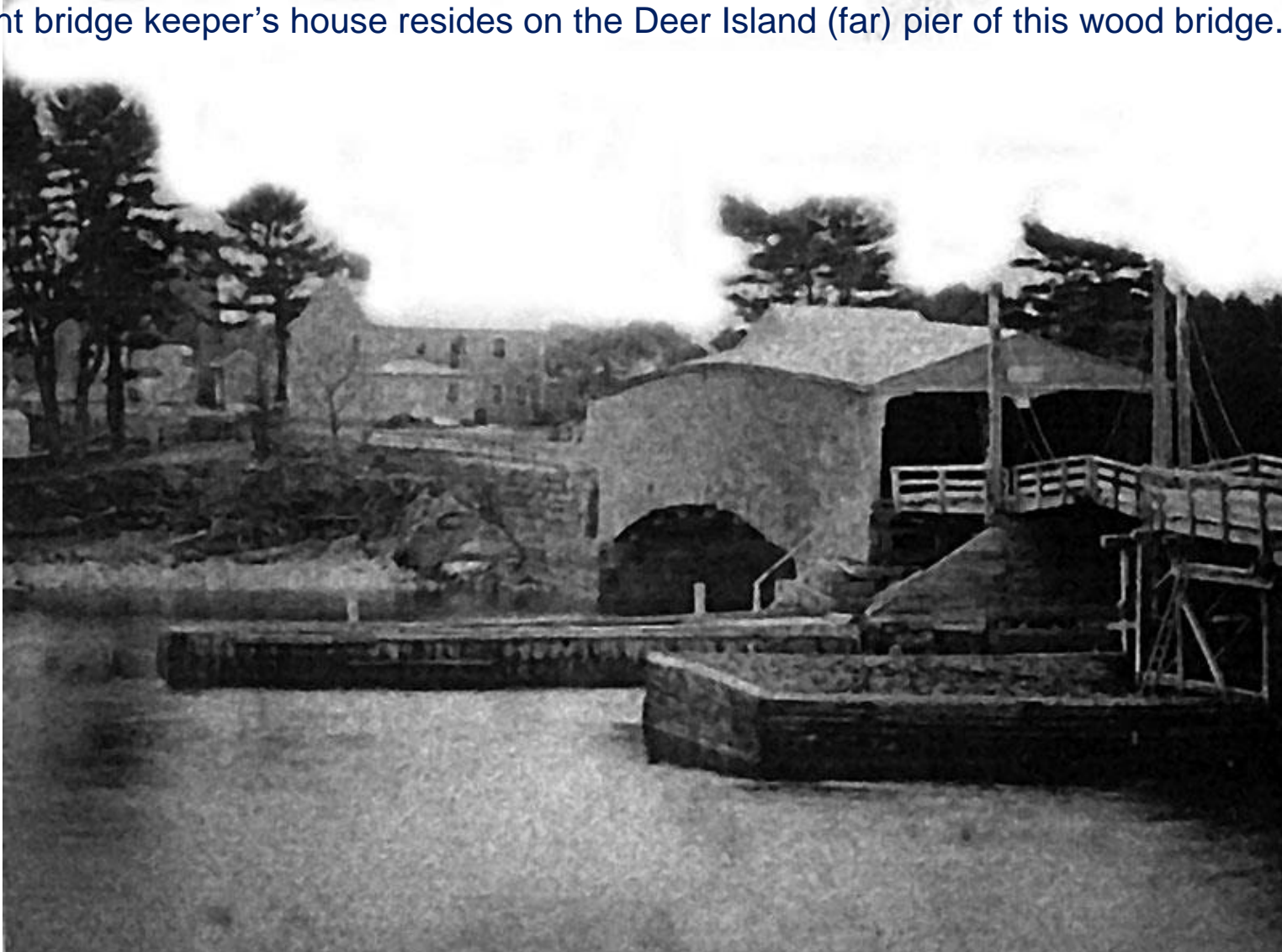


Photo from: *Structure* (Magazine), Dr. Frank Griggs, June, 2013

## Vista from Above the Old Newburyport Water Works, ca. 1880



Looking downstream (east) with chain bridge is right of Deer Island, on the Newburyport side. Left of the island is Timothy Palmer's covered wood arch bridge, which connects to the lift bridge on the Amesbury side

Palmer used the same truss pattern from the Deer Island bridge for structures over the Merrimack River at Andover, Haverhill, and Rocks Village.

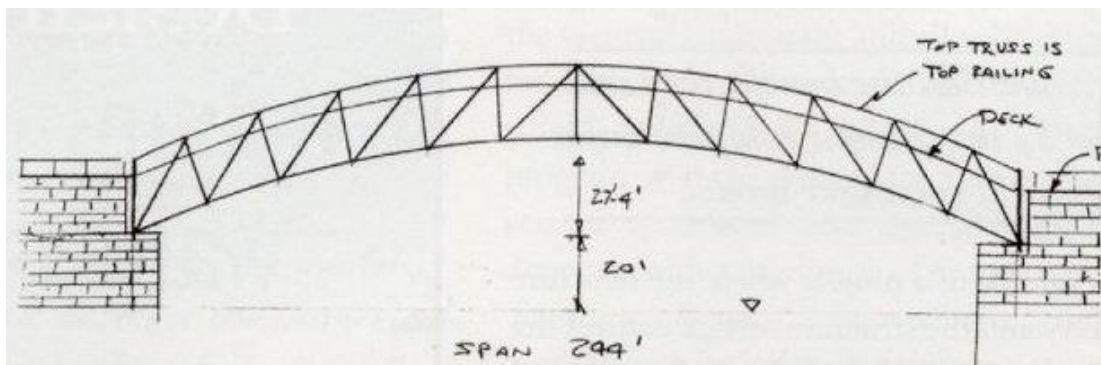
Palmer's Haverhill Bridge, early 1790s, looking toward Haverhill essentially two bridges side by side, each of three spans.



Period drawing, From: <http://ascelibrary.org/cms/attachment/83381/1766638/figure4.gif>

Timothy Palmer's next innovation was a bridge across "Great Bay of the Piscataqua River" (the bridge is not over the Piscataqua River but over the Bay adjacent to the river). The chain of bridges totaled 2,360 feet long and 38-feet wide. Palmer designed and built a main span of 244 feet over the navigable channel. The water at the bridge site was about 52-feet deep, thus requiring major falsework. Prior to this he had the deck resting on the bottom chord of the truss with overhead bracing. At Piscataqua he introduced another tier of timber located near the top of the truss on which the deck was placed and put bracing under the deck. His top chord, in addition to its contribution to the truss, was also the bridge railing. He ordered timbers up to 16 x 18 inches in section, over 50-feet long with a natural curvature to match the curvature of his three chord members. When opened in 1794 this was the longest span bridge in the world.

Palmer's  
Piscataqua Bay  
Bridge, 244 feet,  
1794



Schematic of the  
Piscataqua Bay  
Bridge Main Span

drawings from: *Piscataqua Bridge, Historic Structures (magazine), August 1913*



In 1797 he was the fourth man to be awarded a patent on a bridge. Unfortunately, as the result of a fire in the offices of the Patent Office in 1836, any record of what he had patented was lost. It is likely, however, that the bridge would be very much like the bridge he built across the Potomac River at Little Falls. He also built bridges over the Kennebec River near present Augusta, Maine and over the Connecticut River at Windsor-Cornish.

### Palmer's Bridge Over the Potomac at Little Falls, ca. 1797

sketch by Benjamin H. Latrobe, of the early Philadelphia Centre Square water pumping station.  
Note second span at far right.

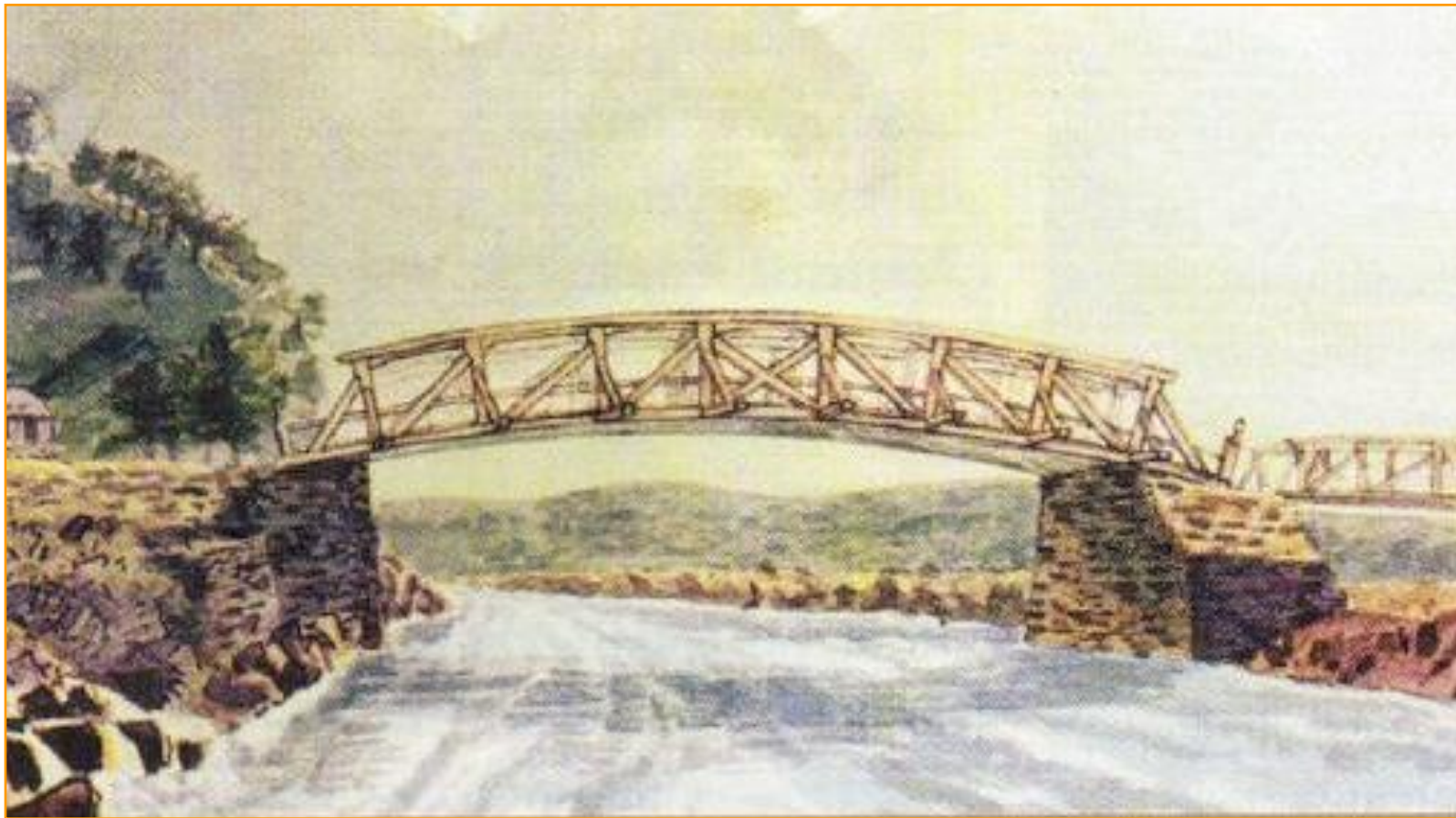
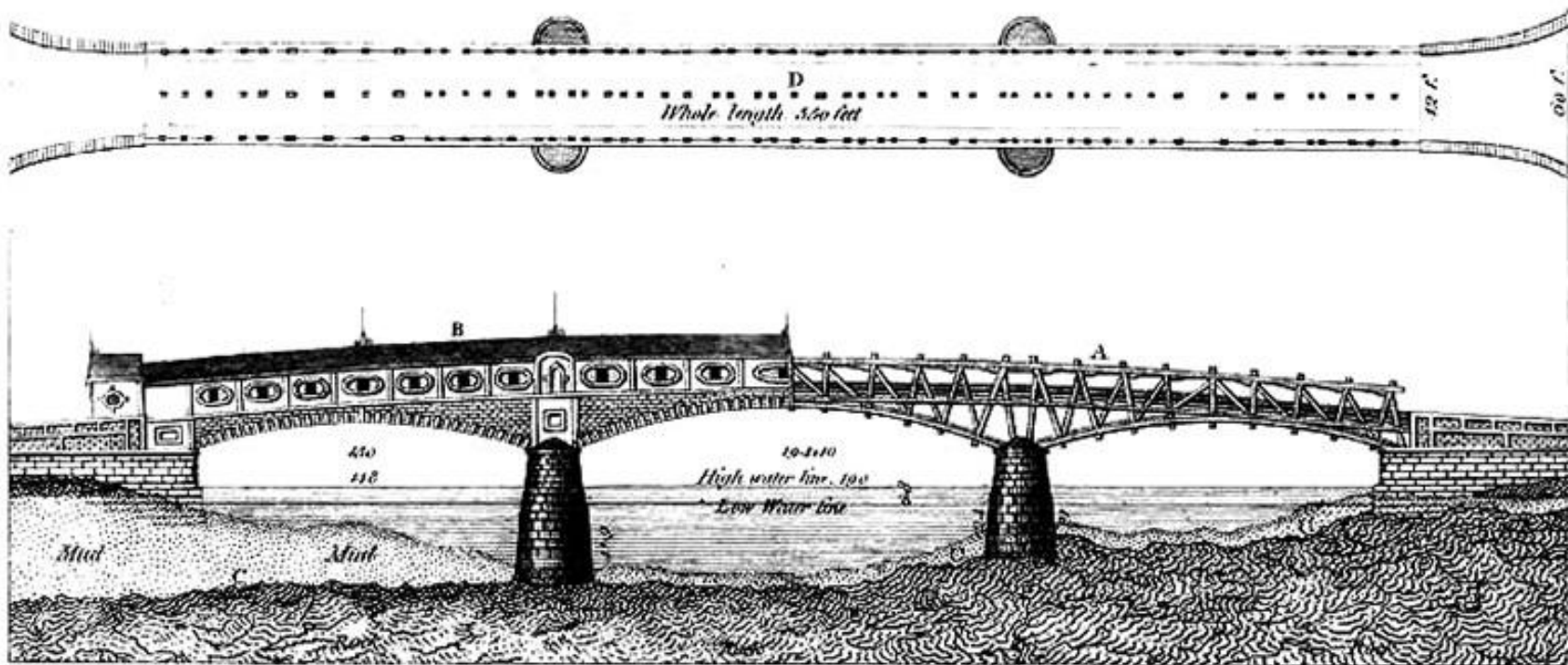


image from: *Civil Engineering Dept., University of Memphis*

Palmer was called to Philadelphia in 1803 to build a bridge over the Schuylkill River. The bridge company had started to place two abutments and two river piers under very difficult conditions. With the final design of the bridge still undetermined, the Company asked Palmer to design and build a wooden structure that would be inexpensive, as they had already spent a great deal of money on the masonry work. Palmer designed a three-span structure with side spans of 150-feet and a central span of 195-feet. It was called the Permanent Bridge, as it replaced a floating bridge that had to be taken up in times of flood or ice flow. When it was nearing completion, Judge Richard Peters, leader of the bridge committee, suggested that it be covered to protect the investment of the stockholders. Palmer, who had recommended covering some of his earlier bridges, agreed and modified the structure to receive a roof and siding, making this the first covered bridge in the country. The bridge opened on January 1, 1805 without the roof or siding that was designed and added in the following year by another builder. The bridge survived until 1850 when it was replaced by another with a horizontal deck enabling it to carry railroad traffic as well as carriage and pedestrian traffic.

*Architectural Plan and Elevation of the Schuylkill R. Bridge.*



Period drawing, From: *Structure* (Magazine), Dr. Frank Griggs, October, 2013

# Palmer's High (Market) St. Bridge, Philadelphia, 1805 before it was covered in 1806, bridge lasted until damaged by fire in 1850



*painting by William Birch*

# Palmer's High St. Bridge, Philadelphia – After Covering in 1806

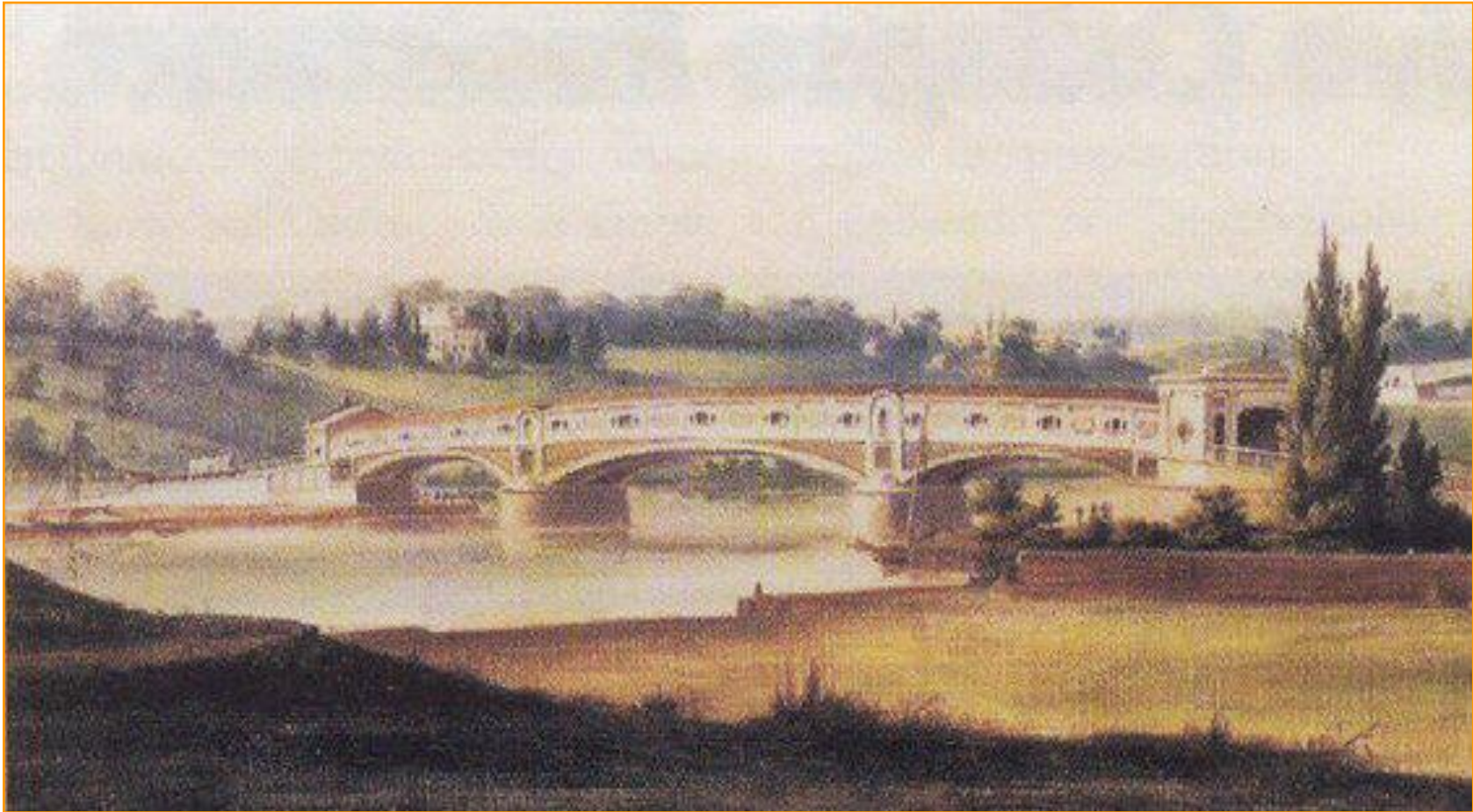
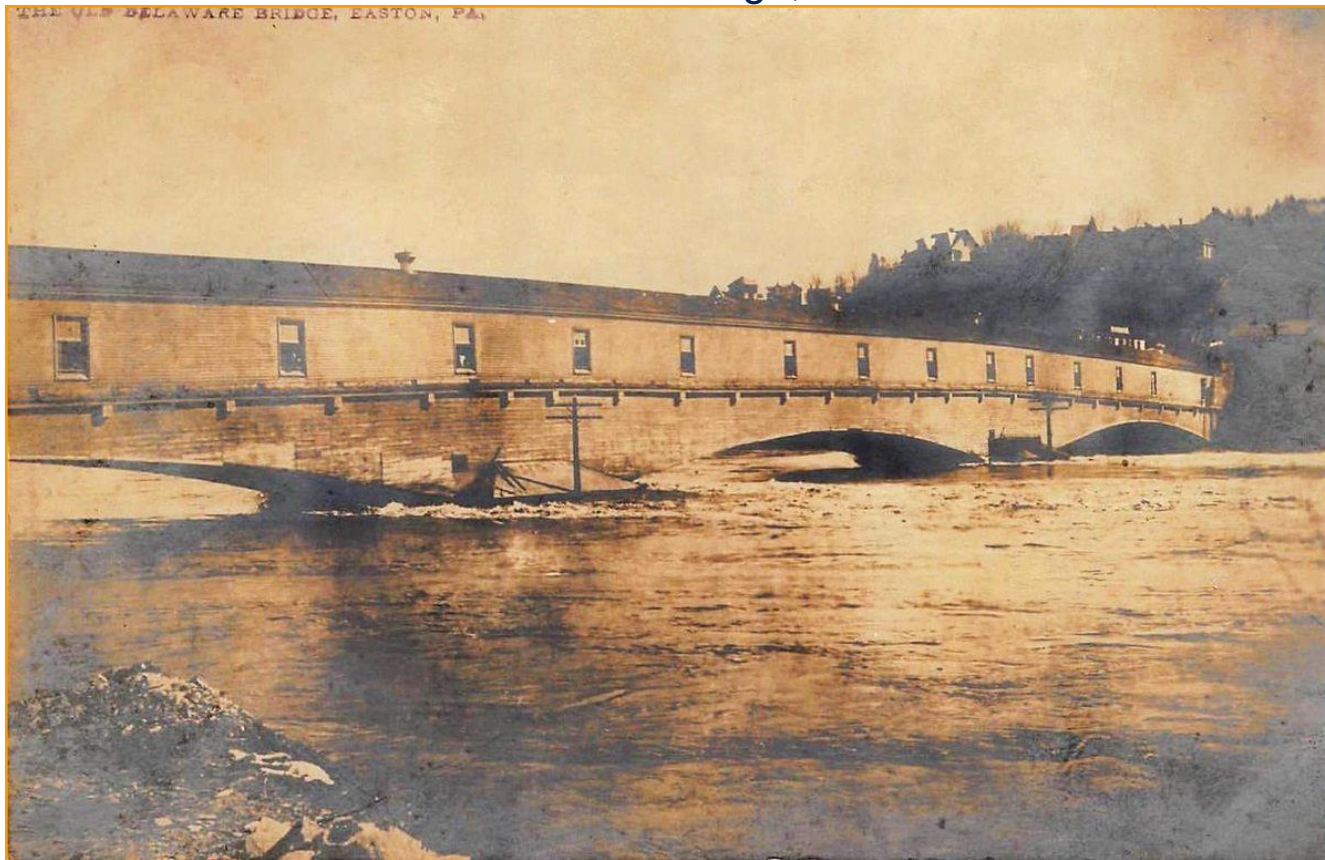


image from: *Civil Engineering Dept., University of Memphis*



Palmer's last major structure was a bridge over the Delaware River connecting Easton, Pennsylvania with Philipsburg, New Jersey. The bridge company started this bridge in the late 1790s, but had financial and technical difficulties. Palmer was called to the project about the same time he was awarded the Permanent Bridge contract. He gave them a design for three spans fitting the requirements of the abutments and piers then in the process of being completed. Span lengths ranged from 155-feet to nearly 160-feet. The design was similar to his Schuylkill Bridge, and he moved his crew directly from Philadelphia to Easton to build it. For the first time his middle truss did not run to the roof of the bridge. Instead he had the deck sit on top of the central truss, while his side trusses ran to the roof. This bridge lasted until 1895, surviving many floods common to the Delaware River.

### Palmer's Easton Bridge, 1806-1895



Found online, source unknown, description in upper left corner

With the completion of the Easton Bridge, Palmer returned to Newburyport where he was Surveyor of Highways from 1800 to his death in 1823. He submitted designs for the successor to his Haverhill Bridge and consulted on several other projects while also serving as the local agent for James Finley and his chain suspension bridges. His linkage with Finley began when the 160' span of his Essex Merrimack Bridge was replaced with a chain bridge in 1812 (believed actually to be 1810). Palmer's work convinced many that he indeed was the "Nestor of American Bridge Builders".

### Palmer's Easton Bridge, 1806-1895

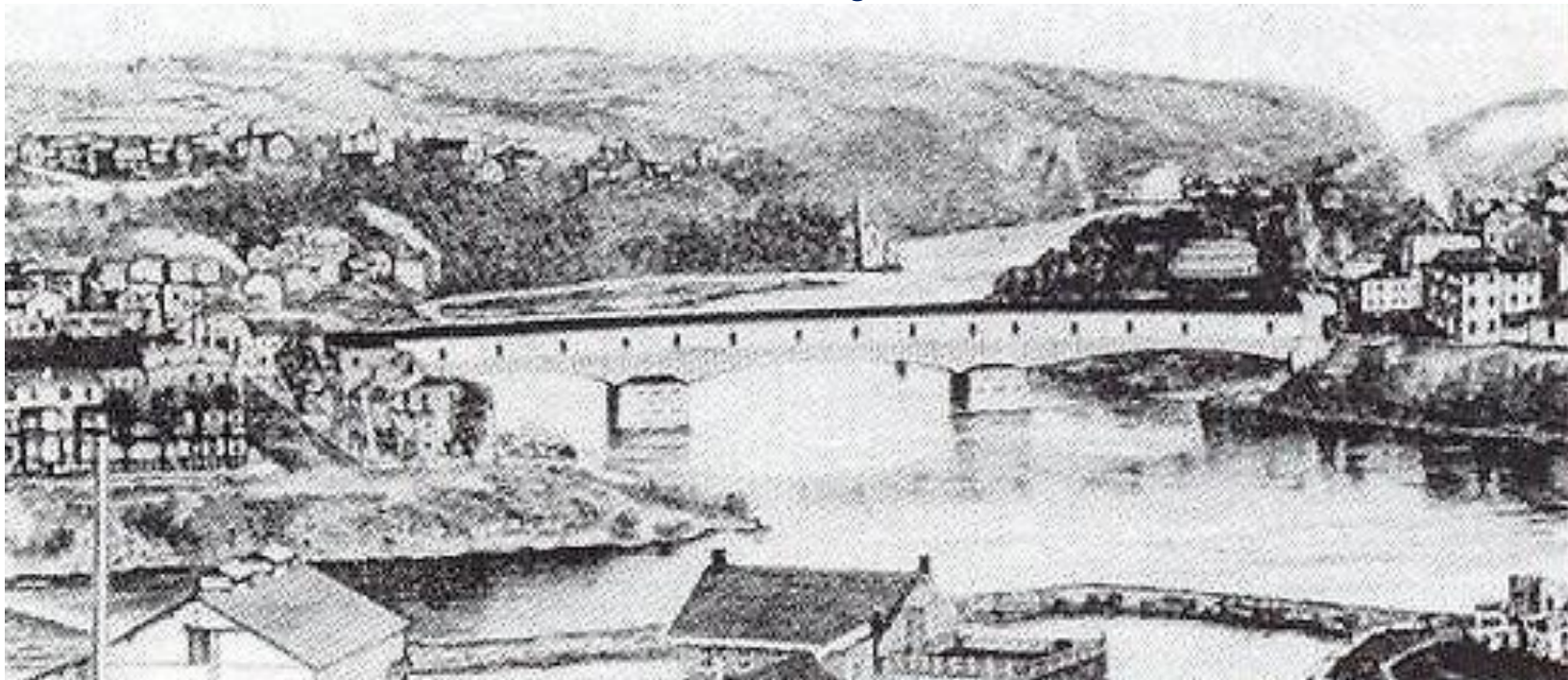


image from: *Civil Engineering Dept., University of Memphis*