Historic Structures

significant structures of the past

The Colossus of the Schuylkill River

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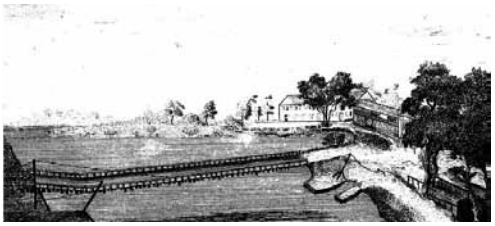
In 1811, the only bridge crossing the Schuylkill River near Philadelphia was Timothy Palmer's Permanent Bridge that opened in 1805 (STRUCTURE®, October 2013). Ferries continued to serve the community at the Upper Ferry (Sheridan's) and the Lower Ferry (Gray's). Both of these ferries at times also had floating bridges adjacent to them. As early as January 30, 1811, an Act was submitted to the legislature authorizing "A company for erecting a permanent bridge over the River Schuylkill at or near where the floating bridge of Abraham Sheridan is at present situate, known by the name of the upper ferry in the County of Philadelphia." The legislature approved it and the governor signed it on March 28, 1811. Section 9 of the act stated, "And be it further enacted by the authority aforesaid…a good and complete bridge shall be erected at the place aforesaid by said company, at least thirty feet wide with a good and sufficient railing on each side…" The Act included a statement that nothing would authorize the company "to erect the same in such a manner as to injure, stop or intercept the navigation of the said river by boats, rafts or other vessels without masts."



Sheridan's Upper Ferry Floating Bridge – ferry rope in foreground.

Abraham Sheridan's floating bridge and ferry was featured in an article in the *Massachusetts Magazine* (September 1792) entitled "Description of the UPPER FERRY, on the River Schuylkill, near the city of Philadelphia."

An announcement by the Bridge Company in the fall of 1811 stated that the company would accept proposals for "a permanent bridge over the River Schuylkill at or within two hundred feet north of Sheridan's floating bridge. The bridge is to be as high as the Permanent Bridge at Market Street and not have more than one pier (a single arch would be preferred) and to be thirty six feet wide…"

On the date specified, Thomas Pope submitted the only proposal for his Flying Pendant cantilever bridge. He wrote, "The said estimate of $50,000 is to be considered the separate expense of the structure alone, after the foundations of the two abutments are prepared for its reception." Two days later Robert Mills, a local architect, submitted two additional proposals. One was for an uncovered bridge that would cost $36,674, or $35,074 without a toll house. Mills noted, however, that "the timbers above the floor of this bridge are proposed to be lined or cased within as well as without, and secured from injury of rains." The other proposal "has the passage ways covered in every particular relative to traveling conveniences…" The cost of this covered bridge would be $44,174, but if the tollhouse and other parts "not absolutely requisite to the convenience and strength" were deleted, the cost could be as low as $38,564. The proposal contained much less detail than Pope's. Apparently the managers did not like any of these initial proposals, as they took no action.

At the time, Lewis Wernwag was well-known in Philadelphia for work on the construction of his Economy bridges at Bridesburg over Frankford Creek and near Bristol over Neshimany Creek. Both were early examples of a cantilever bridge. He submitted his proposal on November 14 writing, "Mr. Wernwag proposes to contract to build a bridge with the necessary abutments and piers according to his plan and to give security for the performance in a penal sum equal to the amount of the cost of the said Bridge on the following terms and conditions. Supposing the cost of the Bridge to be forty thousand dollars and he thinks it will not exceed thirty six thousand dollars, he expects to have five thousand dollars, for his superintendence." He signed a contract with the company on December 5, 1811 that placed much of the responsibility on him, with the exception that the company would buy the materials based upon Wernwag's recommendations and pay the workmen. The contract stated in part, "Whereas the said Lewis Wernwag hath furnished… a Plan of a Permanent Bridge to be erected over the river Schuylkill at the Upper Ferry… and hath proposed to superintend the building of said bridge, to collect all the materials necessary for the making and erecting the same and to find fit and suitable Workmen to do all the work…that he will forthwith proceed to collect all the materials necessary for erecting the said bridge and at all times to keep employed a full complement of capable and

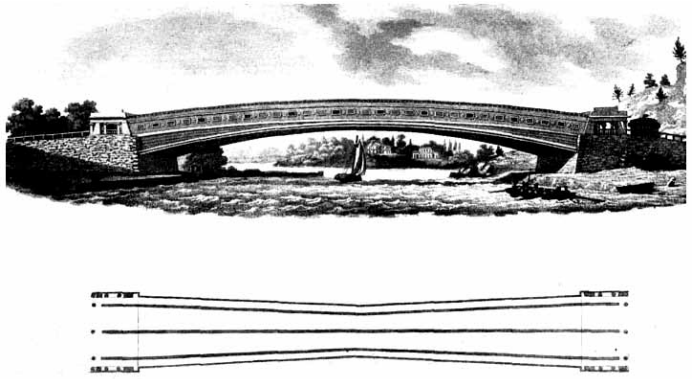
Wernwag's Colossus 1812 structure from broadside.

suitable workmen…And he will from the date hereof until the end of one year from and next after the first cornerstone of the abutments of the said Bridge is laid…devote his whole time and attention to the best interests of the said party of the second part…In consideration of all which services to be rendered and performed by the said Lewis Wernwag and in full compensation thereof and for the Plan of the said Bridge and the use of Tools and Apparatus…the sum of three thousand dollars…and they further agree to make him a complement of five hundred dollars."

Wernwag originally recommended a 400-foot span with five arches but on January 6, 1812, the managers approved "of the plan of one arch in the construction of the Bridge about to be built with our funds, and that the chord thereof be from 300 to 350 feet as may be judged by the managers to suit best with the foundations of the two abutments."

A corner stone laying, Masonic ceremonies, on the easterly abutment took place on April 28, 1812. The cornerstone included a copper plate indicating Louis Wernwag as the bridge's architect.

The easterly abutment rested on rock that was close to the surface and went in without difficulty, but the westerly abutment was a major problem. *Niles Weekly Register* wrote an article on January 23, 1813, entitled "American Ingenuity" and stated, "The western abutment, with its wings, is built on 599 piles, driven through a frame containing two hundred and seventy-five thousand feet (board feet) of timber, well connected, as well by the combination of the parts by iron bolts, weighing on the whole three tons. This abutment is sixty-two feet front on the river, and forty feet thick." Wernwag started work on this foundation in the summer of 1812, placing his timber grid and driving wooden piles ranging in length from 15 feet to 30 feet, and finished in early September. On July 2, he made a major change in the original design of the bridge, which was to have five arches spanning the river. He determined that three arches would do the job instead. The Board wrote that they, "do agree that a superstructure formed of three ribs be erected, upon condition that Lewis Wernwag shall superintend the sawing, construction & framing of the two outside ribs now conditionally omitted, and every part thereof with whatever else belongs thereto as well as the complete erection of the same…without the said Lewis



William Strickland, official drawing of the Board of Managers.

Colossus by Thomas Birch.

Wernwag claiming any further compensation therefore than the managers are now under contract to pay."

The final 340-foot 3-inch span far exceeded any bridge of its time. The deck width was variable with two carriageways and two sidewalks. At the top of the curve, the ribs were 13 feet 1 inch apart and 21 feet apart at the abutment. The overall width was 33 feet at the peak and 50 feet at the abutment. The rise of the lower chord/arch was 19 feet 11 inches. Wernwag summed up his report with, "The ribs, the cart-way, and the string-pieces, form so many arches, which are all connected and secured by ties, braces and bars of iron, in such a manner as to form one connected and combined whole, equal in strength, perhaps, to any thing that human ingenuity could devise. "

The *Niles Weekly Register* of January 23, 1813 wrote of the arches, "Each of these ribs is composed of six small ones, in thickness six inches, and of the average depth fourteen inches – the small ribs are placed on their edges, two in breadth and three in depth, and so formed as to be at the abutment equal to a solid mass of timber, four feet deep and one foot thick gradually diminishing in size, so as to be at the apex but three feet deep and one foot thick. They are prevented from coming into contact by one inch iron bars placed between them, six feet asunder, but are connected together by large iron bands also six feet apart, well secured, and susceptible of being drawn together as the timber dries, by strong screws."

On January 7, 1813, the bridge opened and *Poulson's Advertiser* carried a brief notice when it stated, "On Thursday last the centres were removed from this beautiful edifice in the presence of a large concourse of people – when was exhibited an arc of three hundred and forty feet three inches straight cord; being ninety six feet longer than any single arc in Europe or America. This truly elegant structure was completed thus far in eight months, and rests upon stone abutments of vast solidity, containing together 7000 perches of stone."

The bridge to this date cost a total of $64,500 including the cost of property and monies given to the ferry companies. It was estimated that the rest of the construction including covering would cost $20,550.

Shortly after removal of the scaffolding, the northerly wingwall of the westerly abutment cracked. It was clear that the wall was being pushed northerly by the backfill material. In spite of this problem, on March 13, 1813, the Board determined that "it is expedient to roof and finish the bridge" and selected Robert Mills as their designer and builder. He proposed a very decorative siding and roofing and was given the contract to enclose the bridge and build the tollhouses for the sum of $4,520, not including the cost of materials. His proposal and contract were very detailed, with a circular toll house to be built with a colonnade surrounding the walls. The work was to be completed within six months.

Apparently something was still going wrong on the northerly wingwall on the westerly abutment, and Wernwag was called in to remove "the defect in the bridge" which he did with great effort. By early May, however, another problem developed that caused Wernwag and the managers a great deal of alarm. The westerly abutment face, which up to this time was stable, started to shift. The northerly end rotated about the southerly end, causing the two northerly ribs to rise up in the middle. The Board wrote, "Mr. Wernwag, is, at his own proper cost removing the earth from behind the abutment, with an expectation that the weight of the Bridge upon the wall will bring the piles to their original bearing: In this experiment, the managers have no very great confidence. It was due however to Mr. Wernwag to suffer him to make the trial." He was successful in this effort and the managers wrote, "It was reserved for the genius of America to throw a single arch over a river, three hundred and forty feet wide, without any other support than its abutments, for in no part of the old world can such an instance be shown. "

The Board commissioned a drawing of the bridge by William Strickland to be part of the final Report.

One of the most copied images of the bridge was Birch's. It was reproduced on Staffordshire China and many versions of it reproduced in European books.

Its title as the longest span lasted until 1815, when Theodore Burr built his McCall's Ferry Bridge, was reclaimed when Burr's bridge was taken out by ice in 1818. The bridge lasted until September 1, 1838 when it was consumed by fire after a life of only 26 years. The directors were anxious to rebuild the bridge but lacked the finances to do so for several years. In 1842, Charles Ellet, Jr., on the same site, built the Fairmount Suspension Bridge. Its central span was 358 feet and it was the first major wire cable suspension bridge in the United States, lasting until 1870. It was replaced with an iron bridge by Jacob Hays Linville.

The span, along with its beautiful covering, resulted in the bridge being called the Colossus after the famous Colossus of Rhodes Statue, one of the Seven Wonders of the Ancient World. It is likely that Wernwag himself named it the Colossus, as on his 1813 Broadside he calls it his Patent Bridge Colossus. Wernwag's accomplishment was to build the longest single span bridge in the world in just over eight months, with the woodwork taking only three months. Fletcher and Snow wrote in their 1934 Transactions ASCE article on "A History of the Development of the Wooden Bridges" that "this bold design, scientific and architecturally beautiful, probably was never surpassed in America."▪