

MARKET STREET BRIDGE

HAER No. PA-455

Pennsylvania Historic Bridges Recording Project

Spanning E. channel of Susquehanna River at Market St. (State Rt. 3012)

Harrisburg

Dauphin County

Pennsylvania

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HISTORIC AMERICAN ENGINEERING RECORD

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MARKET STREET BRIDGE

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Location: Spanning east channel of Susquehanna River at Market St. (State Rt. 3012), Harrisburg, Dauphin County, Pennsylvania.

USGS Quadrangle: Harrisburg West, Pennsylvania (7.5-minute series).

UTM Coordinates: 18/339700/4457730

Dates of Construction: 1926-28.

Designer: Ralph Modjeski and Frank N. Masters, engineers; Paul Philippe Cret, architect.

Builder: James McGraw Company, contractor.

Present Owner: Pennsylvania Department of Transportation.

Present Use: Vehicular bridge.

Significance: The river crossing where the Market Street Bridge now stands has historically been the western gateway into the city of Harrisburg. For over a century spans here were operated by the Harrisburg Bridge Company, including the first bridge, the famous Camel Back covered bridge designed by Theodore Burr. Because the Market Street Bridge was a toll crossing, the construction sequence was designed to interrupt traffic as little as possible and therefore maintain toll revenues. The present bridge, designed by engineers Modjeski and Masters and architect Paul Philippe Cret, serves as a monumental entrance to Pennsylvania's capital city. The Market Street Bridge was listed in the National Register of Historic Places in 1988.

Historian: Blythe Semmer, August 1997.

Project information: This bridge was documented by the Historic American Engineering Record (HAER) as part of the Pennsylvania Historic Bridges Recording Project - 1, co-sponsored by the Pennsylvania Department of Transportation (PennDOT) and the Pennsylvania

Historical and Museum Commission during the summer of 1997.
The project was supervised by Eric DeLony, Chief of HAER.

The Market Street Bridge in Harrisburg, Pennsylvania, carries State Route 3012 over the east channel of the Susquehanna River to City Island (formerly called Forster's Island).¹ The 1928 stone-faced concrete arch bridge creates a monumental entrance to Harrisburg's main commercial district from the west. Ornamentation and historical markers on the bridge indicate the traditional importance of this river crossing in Harrisburg's history.

Description

The total structure length of the Market Street Bridge is 1,415'-0". It is composed of sixteen 89'-0" segmental reinforced concrete arches. Coursed ashlar masonry covers the massive concrete piers. Smoother ashlar was used for the voussoirs and spandrel walls. The bridge's deck width of 57'-8" contains a four-lane roadway 30'-0" wide and two 6'-0"-wide sidewalks. The deck is a 12"-thick reinforced concrete slab that extends the full length of the arch spans. The large rounded piers are 12'-0" wide at the springing lines and measure nearly 80 feet long.² Two red marble Ionic columns mark the entrance from the east approach on Front Street. The columns were taken from the old Department of Internal Affairs building, which was destroyed by fire in 1897. Also at the east end are two of the light standards that originally stood atop each balustrade pier.

Construction of the Market Street Bridge

The Market Street Bridge was built in 1928 by the Harrisburg Bridge Company, a private organization that had operated this crossing as a toll bridge since 1817. The company retained Ralph Modjeski and Frank N. Masters as engineers, and they presented their preliminary plans for changes to the existing Market Street Bridge in March 1924. Modjeski and Masters proposed three types of spans for the east channel crossing: a new steel bridge, a concrete arch bridge, or a

¹ For the purposes of this report, the Market Street Bridge is the four-lane concrete arch bridge completed in 1928, connecting the east bank of the Susquehanna with City Island. Market Street continues from City Island on to the west bank of the Susquehanna. When the Market Street Bridge was reconstructed in 1928, spans from the 1903 two-lane steel bridge over the east channel were floated around to the west channel, thus providing four lanes of traffic on both sides of City Island. The west channel bridge was later replaced with the present four-lane prestressed concrete girder bridge. In PennDOT's Bridge Management System, the east and west channel bridges are considered separate structures, and only the east channel bridge is included in the National Register of Historic Places and in Pennsylvania Department of Transportation, *Historic Highway Bridges in Pennsylvania* (Harrisburg: Pennsylvania Department of Transportation, 1986).

² Charles E. Modjeski, "Rebuilding a Toll Bridge in Service," *Engineering News-Record* 100 (21 Jun. 1928): 971.

stone-faced concrete arch bridge. The engineers stated that they "strongly recommend the last mentioned type of bridge, namely reinforced concrete arches faced with stone, because such a structure will be not only the most satisfactory in appearance, but also the least costly to maintain and its life will be practically unlimited."³ The stone-faced arch bridge would be the most expensive to construct, however, based on estimates in the 1924 proposal: \$1.4 million, compared with \$1.2 million for a concrete arch bridge without stone facing, or \$1.0 million for a steel girder bridge. In all three cases, the bridge across the west channel would remain the same.

At the time of reconstruction, the Market Street Bridge was farther upstream in Harrisburg than all other bridges, except the fourteen-span Baltimore truss at Walnut Street, the piers of which were very widely spaced. One particular risk to bridges along the Susquehanna, besides floods, was ice moving downstream in the winter. Stone facing would protect the concrete by providing a durable upstream surface for resisting damage from ice floes.

Construction on the bridge began in 1926, and was completed in 1928. Three contracts were issued for the complete bridge reconstruction project: for improvements to the bridge at the island, for construction of the island plaza and tollhouses (issued to the Central Construction Corporation of Harrisburg), and for the reconstruction of the bridge itself. C. Glennon Melville was resident engineer for Modjeski and Masters, and William Cullinane served as superintendent of the construction work of the James McGraw Company of Philadelphia, the contractor for the bridge reconstruction.

Rather than replace the less threatened bridge across the west channel, Modjeski and Masters decided to remove spans from the east channel and float them around to the west side, thus enabling traffic to use the bridge during almost the entire construction process and resulting in four lanes of traffic across the Susquehanna.

According to the invitation for bids on the project published by the Harrisburg Bridge Company, the goal of the construction project was to disrupt traffic as little as possible. Discouraging traffic would mean lower toll revenues for the Bridge Company, a private business.⁴ An intricate process was devised for moving the east channel spans to the west side of Forster's Island. After encasing the east bridge's masonry piers in concrete, the contractor moved the existing girder spans to a new position on the downstream side of the widened piers. Remarkably, the process of jacking up the spans and moving them slowly downstream caused no interruption of traffic. After the spans were raised up, long 12" x 3/8" plates were placed under the sole plates so that the bridge would slide sideways. With jacks and a team of workers at both abutments and at each pier, the construction crew coordinated their movements with a system of colored flags that resulted in the bridge being moved 2" at a time. The foreman gave the signal

³ Ralph Modjeski and Frank N. Masters, "Market Street Bridge Over the Susquehanna River in Harrisburg, Pennsylvania: Preliminary Report on Reconstruction," Mar. 1924, bridge inspection file, BMS No. 22-3012-0030-0000, PennDOT District 8-0, Harrisburg, Pa.

⁴ Harrisburg Bridge Company, "Invitation for Bids for the Reconstruction of Market Street Bridge," Harrisburg, Pa., 14 Oct. 1925, Market Street Bridge file, Modjeski and Masters, Inc., Mechanicsburg, Pa.

to move, and when the team had moved their section of the bridge 2", they raised a white flag. A red flag signaled difficulty to the foreman. The spans on either end tended to wedge against the back walls of the abutments, but the crew resolved the problem by moving the shore ends of these spans slightly ahead of the off-shore ends. The entire process of shifting all spans 15'-0" took five days.⁵ This temporary position made room for construction of the upstream half of the new concrete bridge.

Next, the masonry piers on the west channel bridge were lengthened on the downstream side to accommodate the steel girder spans to be moved. New arch spans on the upstream half of the east channel bridge were completed with the aid of a narrow-gauge construction railway that was constructed on the sidewalk of the old plate girder spans. A traveler carried materials from the cars to the work site. Once the new concrete spans could carry traffic, the old steel girder spans could be moved to their new position on the extended piers in the west channel. The spans were floated around the island and rotated 180 degrees to arrive in place on the extended concrete piers of the west channel. Finally, the downstream half of the east channel was built and the concrete arch bridge was complete.⁶ The result of this carefully orchestrated series of movements was a four-lane stone-faced concrete arch bridge over the east channel and two parallel, two-lane, steel plate girder bridges over the west channel. Because the old masonry piers were encased and extended, the spans of the concrete arch bridge have the same length as those of the steel girder bridge, 89'-0".

Modjeski and Masters included explicit instructions about the quality of masonry work in the bid manual for the Market Street Bridge. Indiana Quarries were given the subcontract for the dressed masonry work by the James McGraw Company. A letter from Masters, written on behalf of the Harrisburg Bridge Company, affirms the engineers' attention to the quality of stone work on the bridge. Masters emphatically refused to consider samples of several types of limestone proposed by the company, stating that Modjeski found all varieties but the buff colithic "very unsatisfactory and he would not care to have [them] used in this work."⁷

Ralph Modjeski

Ralph Modjeski, one of the engineers of the Market Street Bridge, was known as a master bridge builder, particularly of large bridges. His fame as a leading authority on bridge engineering was cemented by his participation in numerous well-known bridge building projects, including the reconstruction of the Quebec Bridge, the Delaware River Bridge between Philadelphia and Camden (also in collaboration with Cret), a number of bridges for the Oregon

⁵ Charles E. Modjeski, "Rebuilding a Toll Bridge," 972.

⁶ Charles E. Modjeski, "Rebuilding a Toll Bridge," 972-3.

⁷ Market Street Bridge correspondence file, Modjeski and Masters, Inc., Mechanicsburg, Pa.

Trunk Railway, the Manhattan Bridge, and others across the country.⁸ Modjeski, born Rudolphe Modrzejewski in Cracow, Poland, on 27 January 1861, was trained at the Ecole des Ponts et Chaussées in Paris.⁹ Though he worked around the country, Modjeski maintained an office during his partnership with Masters in Mechanicsburg, Pennsylvania, just across the Susquehanna River from Harrisburg. The firm continues to provide engineering services today.

Paul Philippe Cret

The consulting architect for the Market Street Bridge was Paul Philippe Cret (1876-1945), a French architect who taught at the University of Pennsylvania from 1903 to 1937.¹⁰ Cret was recognized for his development of a modern classical style that combined elements of Beaux Arts classicism with the functionality of steel construction. In demand as a designer of bridges, war memorials, and public buildings, Cret designed the Delaware River Bridge, now known as the Benjamin Franklin Bridge, in Philadelphia. That suspension bridge was constructed during 1920-26.¹¹ It served as the focus of an article Cret wrote on "The Architect as Collaborator With the Engineer" in the July 1928 issue of *Architectural Forum*.¹² He discussed the love of pure mechanical form in contrast to the highly decorated disguises worn by Victorian-era architecture. Cret cautioned against designing simply for function. He proposed that as engineers made choices about which means they would use to accomplish a structural end, it was the collaborating architect's opportunity to advise in favor of the choice that best enhanced the design's aesthetic qualities. In this way, the architect could fulfill his responsibility to unite the structural benefits of metal construction with art.

Always, the clear and at the same time imaginative interpretation of structural function must be sought, as where the angle of opposing lines can accent the sense of powerful resistance to strain, or where the massing and modeling of stone or concrete can convey an intensified feeling of solid and immovable repose.¹³

⁸ See U.S. Department of the Interior, Historic American Engineering Record (HAER) No. NY-127, "Manhattan Bridge," 1983, Prints and Photographs Division, Library of Congress, Washington, D.C.

⁹ Henry Petroski, *Engineers of Dreams* (New York: Knopf, 1995), 171-5. See this volume for more about Modjeski and his participation in landmark bridge-building projects.

¹⁰ For another Cret design built in conjunction with engineer Ralph Modjeski, see U.S. Department of the Interior, HAER No. PA-464, "Wissahickon Memorial Bridge," 1997, Prints and Photographs Division, Library of Congress, Washington, D.C.

¹¹ Elizabeth Greenwell Grossman, "Paul Philippe Cret," in Adolf F. Placzek, ed., *Macmillan Encyclopedia of Architects* (New York: Free Press, 1982), 476-7.

¹² Paul Philippe Cret, "The Architect as Collaborator With the Engineer," *Architectural Forum* 49 (Jul. 1928): 96-104.

¹³ Cret, "The Architect as Collaborator," 103.

The coursed ashlar facing on the pylons and anchorages of the Delaware River Bridge, which Cret used as the central example in his article, echo the details of another Cret project completed the year the article was published: the Market Street Bridge in Harrisburg. Cret's work on both bridges has a monumental quality evident in the coats of arms and inscriptions on the huge pylons of the Delaware River Bridge, and in the columns from the old Department of Internal Affairs building marking the entrance to the city at the east end of the Market Street Bridge. Simplified classicism characterizes Cret's designs in masonry and concrete for both bridges.

History of the Market Street Crossing

The site of the Market Street Bridge has been a bridge crossing since an act of the Pennsylvania General Assembly on 2 April 1811 authorized the creation of a company to build a bridge over the Susquehanna. The same act authorized the construction of similar bridges at Northumberland, Columbia, and McCall's Ferry, which would be operated as toll bridges by privately funded bridge companies. The Harrisburg Bridge Company was chartered on 6 July 1812, and was officially organized on 8 August.¹⁴ Theodore Burr, a Connecticut bridge builder who had come to Pennsylvania in 1811, was hired to build the wooden covered bridge at the village of Harrisburg.¹⁵ The first foundation was laid on 2 December 1812, and the bridge and toll house were finally completed in 1817. That year Burr patented his wooden arch truss design, which would become the most commonly constructed wooden bridge type.¹⁶ The Camel Back Bridge was built for a total cost of just under \$200,000. It was called the "Camel Back" bridge because of its eleven humped covered wooden spans, which rested on nine massive stone piers. Two cartways, each 40'-0" wide, carried east- and west-bound traffic. Pedestrian walkways were located on the outside of both cartways. The construction of the Camel Back Bridge greatly improved access to the Susquehanna's west shore, thereby aiding the development of that part of the Harrisburg area.

The Harrisburg Bridge Company

The Harrisburg Bridge Company was incorporated 6 July 1812, and was run by the leaders of Harrisburg politics and industry. A monument at the east shore approach to the

¹⁴ Luther Reilly Kelker, *History of Dauphin County, with Genealogical Memoirs* (New York: Lewis Publishing Co., 1907), 556-7.

¹⁵ Burr built five of the country's greatest wooden bridges at crossings of the Susquehanna. Four of these were in Pennsylvania: crossings at Nescopeck Falls, Columbia, and McCall's Ferry, in addition to the Camel Back Bridge. At McCall's Ferry, Burr prefabricated spans that were floated out into place on pontoons before being lifted onto the piers. The bridge at Columbia was over a mile long and was made up of twenty-seven spans. See Philip S. Klein and Ari Hoogenboom, *A History of Pennsylvania*, 2nd ed. (University Park: Pennsylvania State Univ. Press, 1980), 205, 575.

¹⁶ Donald C. Jackson, *Great American Bridges and Dams* (New York: John Wiley & Sons, 1988), 23.

Market Street Bridge is dedicated to the presidents of the company. Richard C. Haldeman was president at the time the present Market Street Bridge was constructed. Haldeman was a member of one of Harrisburg's most prominent families. His ancestor, Jacob M. Haldeman, was a founder, director, and president of the Harrisburg Bank, as well as an industrialist. Jacob helped organize the Harrisburg Bridge Company and served as its second president from 1845 until his death in 1857.¹⁷ The three previous presidents were all members of the McCormick family, who controlled Dauphin Deposit Bank in addition to their involvement in iron and nail manufacturing. These and other leading industrial families were well-represented among the officers and directors of the Harrisburg Bridge Company throughout its history.¹⁸ As Gerald Eggert has written in his study of industrialization in Harrisburg, owning stock in the company or being one of its officers was a badge of membership in the community's elite.¹⁹

When turnpike and road companies were organized during the late eighteenth and early nineteenth centuries, they were incorporated by wealthy community and business leaders. Harrisburg began to be connected to surrounding towns by turnpikes in the nineteenth century, particularly after its designation as the state capital in 1811. In 1814, the state authorized the construction of three turnpikes that would terminate in Harrisburg at west approach to the Harrisburg Bridge (the present Market Street Bridge). These roads ran south to York, southwest to East Berlin, and west to Carlisle and Chambersburg.²⁰ The Market Street Bridge would serve as a vital transportation route for the development of the city of Harrisburg, particularly as overland transportation became increasingly important along the essentially unnavigable Susquehanna.

The Harrisburg Bridge Company began collecting tolls on 16 October 1816, beginning an enterprise that would last for well over a century. The bridge over the east channel was damaged by flood on 15 March 1846, but was rebuilt and opened again on 20 September 1848. A rope ferry conveyed passengers across the river during the reconstruction. The rebuilt bridge was destroyed by fire on 25 May 1866, and was replaced again with a covered bridge by the autumn of 1867. Finally, a spring freshet on 2 March 1902, carried away the covered bridge for good, and a steel structure replaced the wooden bridges.²¹

The steel bridge, built by the Pennsylvania Steel Company and completed on 10 November 1903, was the one standing when Modjeski and Masters began their plans for the

¹⁷ Gerald G. Eggert, *Harrisburg Industrializes: The Coming of Factories to an American Community* (University Park: Pennsylvania State Univ. Press, 1993), 42, 170.

¹⁸ Eggert provides a chart delineating business interests and family ties of the McCormick, Cameron, and Haldeman families in *Harrisburg Industrializes*, 168-70. The entire study is a useful resource for Harrisburg history.

¹⁹ Eggert, *Harrisburg Industrializes*, 19.

²⁰ Eggert, *Harrisburg Industrializes*, 16-17.

²¹ "Bridges Now Enter the City from 3 Sides," *Patriot* (Harrisburg, Pa.), 23 August 1930.

reconstruction of the Market Street crossing.²² When the steel bridge was dedicated on 27 February 1904, the spectators were particularly impressed with the entrance to the bridge from Front Street in Harrisburg. Columns from the old Department of Internal Affairs Building, which stood near the Capitol before it burned in 1897, marked the entrance to the bridge. They were retained in the Cret and Modjeski and Masters design. The cornerstone of the original Camel Back Bridge was also incorporated into the 1903 steel bridge as part of the toll house.²³ A contemporary history commented, "Previous to the completion of this fine, unique, entrance, the approach was of the ordinary type, and was not in keeping with the recent improvements in Harrisburg."²⁴

The "recent improvements" showed the City Beautiful movement's impact on Harrisburg. One major project of the Harrisburg improvers was the creation of a waterfront park and walkway along Front Street. Vance C. McCormick, a civic leader and Harrisburg mayor from 1902 until 1905, was also a member of one of the city's leading industrial families that had long been involved in the Harrisburg Bridge Company. McCormick was interested in municipal reform and embraced the City Beautiful movement as one way of bettering the city. During his term as mayor, the McCormick family, which included several board members and past presidents of the Harrisburg Bridge Company, contributed generously to the effort to construct a new bridge at the Market Street crossing. On the day of its dedication, the east shore approach was "presented to the city by the estate of Colonel Henry McCormick."²⁵

The Market Street Bridge's competition for tolls across the river at Harrisburg was the Walnut Street Bridge, which was built by the People's Bridge Company in 1890.²⁶ E. Z. Wallower, a Harrisburg newspaper publisher and businessman, wrote about how the Walnut Street Bridge was built to break the Market Street Bridge's monopoly in his privately published autobiography: "The tolls charged by the Market Street bridge, a complete monopoly, were exorbitant, and prevented free access to the city..."²⁷ He went on to accuse the tolls charged by the Harrisburg Bridge Company of being the cause of high prices for produce in the city market and a detriment to commerce in Harrisburg in general. Wallower was the publisher of the *Independent*, and through this newspaper he began an effort to form a company to compete with

²² Kelker, *History of Dauphin County*, 557.

²³ Kelker, *History of Dauphin County*, 561.

²⁴ Kelker, *History of Dauphin County*, 561.

²⁵ Raymond Burkett, "A Miracle of Common Sense: The City Beautiful Movement in Harrisburg, Pennsylvania, 1900-1915" (M.A. thesis, Pennsylvania State Univ. at Harrisburg, 1988).

²⁶ See U.S. Department of the Interior, HAER No. PA-412, "Walnut Street Bridge," 1996, Prints and Photographs Division, Library of Congress, Washington, D.C.

²⁷ E. Z. Wallower, *Reminiscences of E.Z. Wallower* (Harrisburg, Pennsylvania: self-published, 1941), 68, Historical Society of Dauphin County Library, Harrisburg, Pa.

the Harrisburg Bridge Company by erecting another bridge across the Susquehanna. The People's Bridge Company, as it was named, was in marked contrast to the elite Harrisburg Bridge Company. The organization took subscriptions and ultimately hired Dean and Westbrook to construct a Baltimore truss bridge in 1889. The ensuing competition for tolls led to the reduction of Market Street's tolls and eventually to the construction of the concrete bridge across the east channel. One of the reasons that motivated the Harrisburg Bridge Company to choose a concrete bridge for the reconstruction in the 1920s was that it would be wider and could more comfortably accommodate four lanes of traffic than the narrower wrought-iron truss at Walnut Street.

The Market Street Bridge continued as a privately-owned toll bridge until it was sold to the Commonwealth of Pennsylvania. The Secretary of Highways first offered \$1,501,000.00 as a purchase price under the toll bridge acquisition legislation of 1927 (P.L. 395), but the Harrisburg Bridge Company rejected the offer as inadequate. The condemnation proceedings went to the Court of Common Pleas in Cumberland County during the February term of 1936. During the proceedings, the court solicited opinions from several experts about the value of the bridge. Masters, in his valuation, estimated the reproduction costs of the bridge as \$2,801,247.00, excluding the value of the location and other extraneous benefits. The Bridge Company argued convincingly that the Commonwealth was not just acquiring a structure but a lucrative business as well.²⁸ The Market Street Bridge was evaluated as an investment in June 1937 by the Standard Statistics Company of New York. Their report detailed the income production of the bridge and its potential for profit in the future. At the time of the report, the bridge was collecting over \$29,000.00 in tolls per month on average. The total for both eastbound and westbound traffic in 1935 was \$323,587.00 and \$375,729.00 in 1936.²⁹ Pennsylvania passed new legislation concerning the acquisition of toll bridges in 1949 (P.L. 715), and the Market Street Bridge was sold to the state on 18 October 1949 for the price of \$3.85 million.³⁰ The state removed the toll in May 1957, when toll revenues had paid for the bridge's purchase.

²⁸ "Condemnation of the Market Street Toll Bridge of Harrisburg Bridge Company by the Commonwealth of Pennsylvania," Court of Common Pleas of Cumberland County, Feb. 1936, Market Street Bridge correspondence file, Modjeski and Masters, Inc., Mechanicsburg, Pa.

²⁹ Standard Statistics Company, Inc. *Harrisburg Bridge Company: Valuation of the Market Street Bridge* (New York: Standard Statistics Company, 1937), bridge inspection file, BMS No. 22-3012-0030-0000, PennDOT District 8-0, Harrisburg, Pa.

³⁰ Lillian Keller Pratt, "The Harrisburg Bridge: 1809-1950," unpub. manuscript, Lebanon Valley College, May 1950, bridges vertical file, Historical Society of Dauphin County Library.

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APPENDIX: Suggestions for Future Research

Some questions concerning the Market Street Bridge arose during the research and writing of this report which, due to limitations in the scope of the Pennsylvania Historic Bridges Recording Project - I, remain unanswered. Scholars interested in this bridge are encouraged to investigate the following:

1. The records of the Harrisburg Bridge Company's board of directors for 1812-1934 are located at the Historical Society of Dauphin County in Manuscript Group 112. This reference was found late in the project, and these records were therefore not investigated for this report. The records could contain a copy of the contract for the erection of the bridge and other information about its construction.
2. The complete design and repair process may be read in the files of Modjeski and Masters, Inc., at their office in Mechanicsburg, Pa.