POTOMAC RIVER BRIDGE HAER No. MD-204
(Governor Harry W. Nice Bridge)
Spanning the Potomac River at Crain Highway (US 301)
Vicinity of Newburg
Charles County
Maryland

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA
REDUCED COPIES OF MEASURED & INTERPRETIVE DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Interior Region 1, North Atlantic – Appalachian
1234 Market Street, 20th Floor
Philadelphia, PA 19107

HISTORIC AMERICAN ENGINEERING RECORD

POTOMAC RIVER BRIDGE
(Governor Harry W. Nice Memorial Bridge)

HAER No. MD-204

Location: Spanning the Potomac River at Crain Highway (US 301) from the vicinity of Newburg, Charles County, Maryland, to the vicinity of Dahlgren, King George County, Virginia. The Potomac River Bridge and Administration Building is located at latitude 38.364494, longitude -76.977186. The coordinate represents the Administration Building at the eastern end of the bridge. This coordinate was obtained on May 27, 2016, by plotting its location on the Colonial Beach North, VA USGS Digital Raster Graphic in ESRI ArcGIS Online. The accuracy of the coordinate is +/- 12 meters. The coordinate's datum is North American Datum 1983.

Present Owner: Maryland Transportation Authority (MDTA)

Present Use: Public vehicular road bridge

Significance: The Potomac River Bridge is the only known metal cantilever bridge in Maryland. It was built between 1938 and 1940 as part of the State Roads Commission's (SRC) (now the Maryland Department of Transportation State Highway Administration) Primary Bridge Program, a campaign that also included planning and constructing the Susquehanna River Bridge at Havre de Grace, and that proposed constructing the first Chesapeake Bay Bridge and a bridge or tunnel crossing the Patapsco River in Baltimore. The Potomac River Bridge and Administration Building benefited from New Deal programs by being partially funded by Public Works Administration (PWA) money. Built at a time when design standardization for bridges was the norm, the project was unusual as it was outsourced to the J.E. Greiner Company. Their unique design took advantage of the latest techniques and engineering innovations of the mid-twentieth century, making it a significant example of the firm's work. During the design of the bridge, Greiner partner, Herschel Allen, developed and patented a new method of bridge support construction known as the "Potomac Pier."

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Project Information: On behalf of MDTA, Johnson, Mirmiran and Thompson recorded the Potomac River Bridge and Administration Building between 2016 and 2019 in compliance with the Programmatic Agreement for the Governor Harry W. Nice Memorial Bridge Improvement Project.

Part I. Historical Information

A. Physical History:

1. Dates of Construction: September 1938 - December 1940

2. Engineer: J.E. Greiner Company

The **J.E. Greiner Company** was a Maryland-based bridge design company that became one of the largest civil engineering firms in Baltimore in the twentieth century. John Edwin Greiner, a distinguished bridge engineer, established the firm in 1908 in Baltimore, Maryland. Led by Greiner and longtime associate Hershel Heathcote Allen, Sr., the J.E. Greiner Company designed many noteworthy railroad bridges over the Ohio River at Louisville, Kentucky, Parkersburg, West Virginia, and Benwood, West Virginia; over the James River at Richmond, Virginia; and over the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania. In Maryland, the firm designed many large vehicular bridges for the SRC, including Baltimore's Hanover Street Bridge (1938), the Potomac River Bridge (1940), the Susquehanna River Bridge at Havre de Grace (Thomas J. Hatem Memorial Bridge, 1940), and the first Chesapeake Bay Bridge (1947-1952). The latter three monumental bridges were built as a result of the state's acceptance of the J.E. Greiner Company's planning report, *Maryland's Primary Bridge Program*, completed in 1938.[1] In 1995, the J.E. Greiner Company merged with United Research Services (URS) Corporation, a San Francisco-based architecture and engineering firm; in 2014, URS was acquired by AECOM, an American multinational engineering firm.

John Edwin Greiner (1859-1942) was born in Wilmington, Delaware, and attended Delaware College (now the University of Delaware), where he received his B.S. and civil engineering degrees in 1880 and 1884, respectively. He began his career as a draftsman for Edge Moor Bridge Works in Wilmington, Delaware, (1880-1883) and Keystone Bridge Works in Pittsburgh, Pennsylvania (1883-1885). In 1885, Greiner was hired by the Baltimore and Ohio (B&O) Railroad, where he quickly rose through the ranks and was promoted from draftsman to bridge inspector to assistant chief engineer of bridges. In 1891, he went to work for the Philadelphia Bridge Company but returned to Baltimore and the B&O Railroad in 1893. In 1908, he left the railroad industry to establish the J.E. Greiner Company, a civil engineering consulting firm that grew into one of the top firms in Baltimore in the twentieth century.[2] A news article published in 1908 lauds Greiner as "…one of the best known and most thoroughly educated and practical civil engineers in the country. As an expert on bridge work he has few peers."[3]

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1. P.A.C. Spero & Company and Louis Berger & Associates, "Historic Highway Bridges in Maryland: 1631-1960, Historic Context Report," Prepared for the Maryland Department of Transportation, State Highway Administration, 1995, B-4, http://www.roads.maryland.gov/Index.aspx?PageId=196.

2. Sandra L. Tatman, "Greiner, John Edwin (1859 - 1942)," *Philadelphia Architects and Buildings*, accessed June 9, 2016, https://www.philadelphiabuildings.org/pab/app/ar_display.cfm/79966; Bernard C. Steiner et al., *Men of Mark in Maryland: Biographies of Leading Men of the State*, vol. 2, Johnson's Makers of America Series (Baltimore, Md.: B.F. Johnson, 1910), 40–45, https://archive.org/details/menofmarkinmaryl02stei.

3. "Mr. John E. Greiner Resigns: Leaves B. And O. To Take Up Work As Consulting Engineer," *The Sun (1837-1990)*, April 13, 1908.

Herschel Heathcote Allen, Sr. (1890-1964) was a senior partner at the J.E. Greiner Company who supervised the construction of the Potomac River Bridge.[4] His obituary from the Baltimore Sun recounts that he prepared the Maryland Primary Bridge Program report in 1938. He became an engineer at J.E. Greiner in 1919 and was named junior partner in 1937. Upon John Greiner's death in 1942, Allen became the firm's senior partner.[5] He retired from the Greiner Company in 1952 but continued to serve as a senior consultant to the company until his death in 1964.

While designing and building the Potomac River Bridge, Allen invented a new method of bridge support construction, which he later patented. This method known as the "Potomac Pier", eliminated the need for a coffer dam or caisson and instead "steel piles were driven into the bedrock, sometimes 200 feet below water level, to hold the concrete supports which appear to be the sole foundations of the structure."[6] Allen submitted his new method to the U.S. Patent office on October 20, 1939, and obtained U.S. Patent No. 2317016 on April 20, 1943.[7]

3. Builder: Harris Structural Steel Company; Merritt-Chapman & Scott Corporation

Harris Structural Steel Company was a steel manufacturing company in South Plainfield, New Jersey. Established in 1915 by George Harris, it became one of the largest steel manufacturers in the country during World War II.[8] Harris Steel fabricated and erected the steel on many large projects in New York City, including the Brooklyn tower of the Verrazano-Narrows Bridge, the Daily News Building, and the Port Authority Bus Terminal.[9] The company exists today as Harris Structural Steel Fabrication, LLC, part of The Davis Group.

Merritt-Chapman & Scott Corporation was a marine salvage and construction firm from New York, New York. It was America's preeminent salvage company in the late nineteenth and early twentieth centuries. In 1860, the Board of Marine Underwriters of New York City formed the Coast Wrecking Company to address the mounting material losses by shipwrecks and the inefficient state of salvage along the Atlantic seaboard. Israel J. Merritt was elected head of the organization, and he reorganized the company as Merritt's Wrecking Organization soon thereafter. In 1897, the

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4. "World War I Draft Registration Card for Herschel Heathcote Allen, Local Draft Board 4, Roll 1684238, Baltimore County, Maryland" 1917, United States, Selective Service System. World War I Selective Service System Draft Registration Cards, 1917-1918, M1509, National Archives and Records Administration, Washington, D.C., http://ancestry.com.

5. "H.H. Allen, Sr., Engineer, Dies: Supervised Design Of Bay Bridge, Harbor Tunnel," *Baltimore Sun*, December 7, 1964. https://baltimoresun.newspapers.com/image/377425936/?article=7afac9bd-a944-4ace-a989-27bdd1529a35.

6. URS Corporation, "Phase II State Historic Bridge Context and Inventory of Modern Bridges," Survey Report and Assessments of Significance (MDOT SHA, 2011), Vol. I, 4-3, https://www.roads.maryland.gov/OPPEN/MDBridgeSurvey.pdf; "H.H. Allen, Sr., Engineer, Dies."

7. Herschel H. Allen. "Bridge Foundation and Method of Making Same." United States Patent Office 2317016. Towson, MD, filed October 20, 1939, and issued April 20, 1943.

8. "History of South Plainfield," *Borough of South Plainfield*, accessed July 5, 2016, http://www.southplainfieldnj.com/spnj/Community/Who%20We%20Are/Our%20History/.

9. "Thomas Harris, 88, President of a Steel Company in New Jersey," *The New York Times*, August 16, 1984, sec. Obituaries, http://www.nytimes.com/1984/08/16/obituaries/thomas-harris-88-president-of-a-steel-company-in-jersey.html.

Organization merged with Chapman Derrick & Wrecking Company to form Merritt & Chapman Derrick & Wrecking Company. The Company merged again in 1922 with T.A. Scott Company to form Merritt-Chapman & Scott Corporation.[10] In 1929, the Corporation acquired the McLean Contracting Company of Baltimore, a construction firm that had worked on several railroad bridges.[11] After corporate raider, Louis W. Wolfson, took over the company in the 1950s, Merritt-Chapman & Scott acquired the New York Shipbuilding Company around 1960 and closed around 1971.[12]

Among the many noteworthy projects associated with Merritt-Chapman & Scott were the investigation of the explosion on board the U.S. armored cruiser USS *Maine* (1898); the evaluation of the rescue or salvage possibilities of RMS *Republic* after that vessel was struck by SS *Florida* off Nantucket, Massachusetts (1909); the construction of the Marquette Ore Docks, Marquette, Michigan (1931); the construction of the Mount Vernon Memorial Highway Hunting Creek Bridge, Alexandria, Virginia (1932); the righting of *Normandie* after the giant liner capsized at Pier 88, North River, New York (1941-1943), generally cited as the most expensive salvage operation to date; the construction of the foundation for the Mackinac Bridge, Michigan (1954-1957); the construction of the Throgs Neck Bridge, New York City (1961); and the construction of the Chesapeake Bay Bridge-Tunnel, Hampton Roads, Virginia (1964).

4. Original Plans and Construction:

The J.E. Greiner Company published 15 plates about the proposed bridge in their October 15, 1938, report, *Maryland's Primary Bridge Program*. The plates included a sketch of the view from Maryland, plan and profile, general plan and elevation, sections, and piers and abutments specifications (see Figures 1-15).

The MDTA archives contain 91 original plans for the bridge, all from the initial phase of construction dating from March to September 1939. According to these plans, the bridge, including the Maryland approach, was 11,446.40' long and 29' wide, and had 29 spans. Greiner designed the bridge as a high-level structure so that ships could pass under it without the need for a movable span. The alignment was straight, and the main span over the channel had a horizontal clearance of 700' and a vertical clearance of 135'; the highest point in the roadway had 3.75 percent grade approaches.

The description of the bridge from *Maryland's Primary Bridge Program* states:

> The main channel span and the two side spans flanking it, comprise a cantilever unit, the main span of which is 800 feet long and the side spans of which are anchor spans each 366 feet 8 inches long. The cantilever units forming the approaches to this central unit are made up of alternate spans and cantilever spans 437 feet 6 inches and 500 feet long, respectively.
>
> The main section of the bridge is approached from the Virginia end by 63 spans of concrete pile bent and steel beam trestle construction 3873 feet long, and four plate girder spans 100 feet long,

10. "History of the T.A. Scott Company" (Mystic Seaport, CT), Coll. 1, Manuscripts Collection, G.W. Blunt White Library, Mystic Seaport Museum, accessed July 5, 2016, http://library.mysticseaport.org/manuscripts/coll/coll001.cfm.

11. Robert D. MacMillen, *Black Horse of the Sea* (New York: Merritt-Chapman & Scott Corporation, 1930), 37, http://hdl.handle.net/2027/mdp.39015018439656.

12. Kenneth J. Blume, *Historical Dictionary of the U.S. Maritime Industry* (Plymouth, UK: Scarecrow Press, 2011), 325.

> connecting trestle with the main cantilever section. On the Maryland side of the river, the main cantilever section of the bridge is approached by three 100 feet plate girder spans and two 250 feet simple truss spans connecting the filled approach with the main cantilever section. The bridge is 9918.84 feet long from abutment to abutment. The Maryland approach extends inland for a distance of 1527.56 feet.[13]

The central roadway measured 24' wide, with a lane of traffic in each direction. An emergency footway flanked the roadway to either side, each measuring 1'-6" wide.

A toll plaza, which included an administration building and toll booths (Figure 11), was included as a part of the Maryland approach:

> The toll plaza will provide two traffic lanes passing under the toll booth canopy and two traffic lanes passing in the clear outside the canopy with one toll island equipped with two toll booths. The lanes outside the canopy are intended to pass vehicles or equipment too high to clear the canopy.
>
> The plaza also includes a building for the administration of the maintenance and operation of the bridge. This building is located off the toll plaza in such location that the superintendent can continually oversee the toll taking operations. The toll booths are designed to have complete glass sections between the limits required for visibility from one side to the other side of the plaza.[14]

5. Alterations and Additions:

The SRC replaced the original, central toll booth from 1941 with three new booths in 1950. The new booths were sheltered by a single flat canopy. In 1954, SRC constructed an additional shop and garage facilities at the administration building.[15]

MDTA, an independent state agency formed in 1971 to be responsible for constructing, managing, and operating state toll facilities including the Potomac River Bridge, conducted an extensive rehabilitation project on the bridge in 1984. This undertaking modified both the east and west abutments, restored the bent struts, and replaced girder spans; involved structural modifications to the girders, approach trusses, and main spans; and rhomboid strengthened the girder and approach truss spans. That same year, MDTA constructed a new administration building east of the 1940 administration building.

MDTA renovated the new administration building in 1990. MDTA conducted cleaning, painting, and repair activities on the bridge in 2001 and again from 2013 to 2015.

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13. J. E. Greiner Company, "Maryland's Primary Bridge Program: Report Submitted to State Roads Commission of Maryland" (Baltimore, Md.: J.E. Greiner Company, 1938), 98–100.

14. Ibid., 113.

15. Maryland State Roads Commission, *Report of the State Roads Commission of Maryland for the Years 1953-1954* (Baltimore, Md.: Maryland State Roads Commission, 1954), 293, http://archive.org/details/reportofstateroa1953mary.

B. Historical Context:

Introduction

The Potomac River Bridge is a steel truss cantilever bridge with an overall length of 10,050', the only known metal cantilever bridge in Maryland. The SRC built it between 1938 and 1940 as part of its Primary Bridge Program, a campaign that also included planning and constructing the Susquehanna River Bridge at Havre de Grace, and that proposed constructing the first Chesapeake Bay Bridge and a bridge or tunnel crossing the Patapsco River in Baltimore. The bridge represents SRC's decades-long effort to improve significant major water crossings and expand the transportation network throughout Maryland from 1900 to 1940.

The Potomac River Bridge is a significant example of the work of the J.E. Greiner Company, whose unique design took advantage of the latest techniques and engineering innovations of the mid-twentieth century. The period of scientific development and refinement of cantilever truss design and construction is exemplified in Maryland by the Potomac River Bridge.[16] It further represents a milestone in the history of bridge engineering because of the patented "Potomac Pier" design and construction method employed.

Bridge Typology: Cantilever Truss Bridge

Simply defined, a cantilever is a structure that projects from a support. According to the book *How to Read Bridges: A Crash Course in Engineering and Architecture*,

> Cantilever bridges are usually balanced on both sides of a support with an anchor (or back) arm forming the back span and opposing the cantilever arm, which forms part of the main span. Compressive forces on the underside of each arm counter the tensile forces in the upper part and are transferred into the support. Most cantilever bridges comprise at least a pair of cantilevers that meet to form the main span.[17]

Cantilever arms balance over a supporting pier and are secured to abutments or adjacent cantilever sections. "A suspended section is sometimes inserted between the cantilever arms to extend the main span."[18] Balancing arms are anchored either to adjacent cantilevers or to solid abutments in the ground at each end of the bridge. This helps to counter the additional vertical loads to the main span. Cantilever bridges can be constructed from all different materials and can utilize different structures for the cantilever section including a beam or a truss.[19] Examples of the cantilever truss bridge include the San Francisco-Oakland Bay Bridge, San Francisco, California; the Commodore Barry Bridge connecting Philadelphia, Pennsylvania and Bridgeport, New Jersey; and the Potomac River Bridge.

Although there are examples of cantilever bridges dating back as far as the fourth century AD, this bridge type was first introduced in the United States in 1811 when Thomas Pope proposed cantilever bridges over the Hudson and East Rivers. The cantilever bridge was not a practical option at the time, so neither bridge was ever constructed. This bridge type did not become widely used until Heinrich Gerber's 1867

16. P.A.C. Spero & Company and Louis Berger & Associates, A-5.

17. Edward Denison and Ian Stewart. *How to Read Bridges: A Crash Course in Engineering and Architecture*. (New York: Rizzoli, 2012), 178.

18. Ibid., 179.

19. Ibid.

Hassfurt Bridge in Germany. [20]

During the mid-nineteenth century cantilever bridges were helpful in crossing wide bodies of water and spanning long distances while allowing wider clearance underneath the bridge. This bridge type eliminated the need to construct anchorages and falsework, which saved both money and materials. Additionally, if a pier or abutment sank due to unstable soil conditions, the superstructure of cantilever bridges could compensate for this change which was considered a significant design breakthrough at the time.[21]

Charles Conrad Schneider helped to popularize cantilever bridges in the United States "with the design of counterbalanced cantilever with arms supporting a simple suspended span."[22] In the United States, cantilever bridges were first used as railroad bridges and later became popular highway bridges as automobiles became the primary form of transportation in the United States. This bridge type was popular from the last quarter of the nineteenth century until the mid-twentieth century.[23] Today, cantilever bridges have been largely superseded by cable-stayed bridges, which are more economical.[24]

Maryland Highways in the Twentieth Century

As automobile travel became more and more popular during the early twentieth century, the country's road system needed widespread upgrades. Between 1915 and 1925, Maryland was at the forefront of road construction and boasted one of the best road systems in the United States. This dominance was largely due to the SRC's campaign to improve its already-paved road system, as well as paving secondary roads. Despite this early preeminence, Maryland's roads could not handle the fast-paced progress as tractor-trailers and passenger vehicles continued to become faster, heavier, and more numerous as the century progressed.[25] According to the 2011 "Phase II State Historic Bridge Context and Inventory of Modern Bridges" by URS Corporation:

> The solution lay in design improvements such as flattening steep grades, reducing dangerous curves, providing longer sight lines, widening pavement, adding more traffic lanes, and building medians to separate oncoming lanes in high volume traffic areas.[26]

Highway departments throughout the country faced similar predicaments, however Maryland's issues were more urgent and complex due to the bays, rivers, and estuaries located throughout the state. While these waterways had allowed for easier communication and transportation for centuries, they became obstacles with the advent of the automobile. Construction of numerous bridges were the only solution to

20. Parsons Brickerhoff, *A Context for Common Historic Bridge Types*. NCHRP Project 25-25, Task 15, (Prepared for the National Cooperative Highway Research Program Transportation Research Counsel National Research Council, October 2005), 3.142.

21. Parsons Brickerhoff, 3.142.

22. Ibid., 3.142.

23. Ibid., 3.142-3.143.

24. Denison and Stewart, 190.

25. URS Corporation.

26. Ibid.

creating a unified highway system in Maryland.[27] The SRC responded to this issue by focusing on creating proper standardized designs and constructing bridges and culverts.[28]

This evolution in roadway infrastructure is exemplified through the construction of the Robert Crain Highway, the predecessor to US 301. The Robert Crain Highway was first constructed in 1922. By 1927, the highway comprised thirty-two miles of paved road stretching from Brandywine to Baltimore.[29] This was the SRC's first major new road constructed in a completely new location.[30]

Surprisingly, the Great Depression did not have the same big impact on road travel and construction as it did on most other facets of American life. Road revenue remained largely stable, and some areas even saw an increase in the purchase and use of cars. For those who could not afford a personal vehicle, buses provided a cheaper alternative to trains. Additionally, the Federal Government responded to the nation's economic struggle by expanding road funding.[31] According to a 2011 report by URS Corporation:

> In 1930, federal aid increased from $75 million to $125 million and Congress appropriated emergency funding for highways even during the leanest years of the 1930s. The National Industrial Recovery Act of 1933 earmarked $400 million for highway projects without requiring matching state funds. Prior to the Great Depression, federal spending had targeted state highway systems in rural areas. Now, grants became available for improvements to city streets and municipal construction programs that linked to the state highway system. For the first time, the Public Works Administration (PWA) administered federal funds and bypassed state road departments by delivering the money directly to local governments. Road project[s] operated as employment programs as well as being an economic stimulus.[32]

Another boon to road construction was the 1934 Hayden-Cartwright Act. This important government action appropriated $200 million for highways by re-establishing the lapsed federal-aid program and keeping state gas tax money from being diverted away from highway projects. This legislation also allowed states to use matching funds to finance the creation of plans, surveys, and engineering and economic investigations that looked at the benefits of road improvements.[33] "In response to this new legislation, highway departments began examining such factors as road conditions, the volume and nature of highway traffic, highway life spans, and future highway needs."[34] Maryland created a solid and vital foundation for the creation and improvement of roadways throughout the early twentieth century – including the Potomac River Bridge.

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27. Ibid.

28. P.A.C. Spero & Company and Louis Berger & Associates, 30.

29. EHT Traceries, Inc. "Revised Identification and Eligibility Report: US 301 Transportation Study For: Project No. AW534B11 Maryland 301: US 50 to Governor Nice Bridge Transportation Study." (MDOT SHA, 2000), 20.

30. P.A.C. Spero & Company and Louis Berger & Associates, 30.

31. URS Corporation.

32. Ibid.

33. Kuennen, 20-21.

34. URS Corporation.

Maryland's Primary Bridge Program

As highway departments throughout the country upgraded their highway systems to accommodate the quickly evolving nature of automobile traffic, Maryland also had to create a unified highway system that could span their many waterways. Construction of numerous bridges were the only solution. In 1937, the Maryland General Assembly authorized the SRC to develop a comprehensive plan to construct bridges and tunnels across the major bodies of water throughout the state. The plan's main goal was to create a major north-south roadway that could serve as an alternative to U.S. 1, which took drivers directly through the centers of Baltimore and Washington, D.C. This program was funded by selling state revenue bonds, which would be repaid through the proceeds from newly developed tollways.[35]

The SRC hired the Baltimore civil engineering firm, J. E. Greiner Company, to create a statewide bridge construction plan. A report documenting the plan was submitted to the SRC in October 1938. According to the 2011 URS Corporation report:

> The resulting report, *Maryland's Primary Bridge Program*, recommended a bridge across the Susquehanna River at Havre de Grace; a bridge across or tunnel under the Patapsco River between the Fairfield and Canton sections of Baltimore City; a bridge across the Potomac River at Ludlow's Ferry; and a bridge across the Chesapeake Bay. These vital crossings would require the construction of long multi-span bridges (or possibly a tunnel in the case of the Patapsco River site). Congress ratified the plan in 1938 under its regulatory powers over navigable waterways and the PWA promptly awarded financial aid to the SRC to build the Susquehanna and Potomac River Bridges, but deferred action on the remaining projects until after the war.[36]

Not only did the Primary Bridge Program report suggest the location and design of the four toll facilities, but it also suggested that the bridges be financed by those tolls. The Greiner Company was an early proponent of the revenue-bond financing method, wherein tolls are applied against the construction and operation costs; the concept was later adopted by Pennsylvania on the first stage of its turnpike, which was also designed by the Greiner Company.[37]

The Susquehanna River Bridge (Thomas J. Hatem Memorial Bridge) carrying U.S. 40 over the Susquehanna River was the first project completed under the Primary Bridge Program. The first vehicles crossed the span between Havre de Grace and Perryville on August 28, 1940.[38] The Potomac River Bridge, later re-named the Governor Harry W. Nice Memorial Bridge, opened to traffic on December 14, 1940.

Planning the Potomac River Bridge

Planning the Potomac River Bridge was a long and arduous task with many ups and downs. Prior to the construction of the Potomac River Bridge, the only way to cross the Potomac in this area was via ferry. Ferries had been used at Ludlow's Ferry since the early colonial days when they connected the north and south seaboard road between the early colonies. However, with the rise of automobile travel, crossing by

35. Ibid.

36. URS Corporation.

37. "H.H. Allen, Sr., Engineer, Dies."

38. Maryland Transportation Authority, "Thomas J. Hatem Memorial Bridge (US 40)," *MDTA Toll Facilities, Northern Region*, 2016, http://www.mdta.maryland.gov/Toll_Facilities/TJH.html.

ferry was deemed too slow and inconvenient. This, in part, led to the construction of the Potomac River Bridge.[39] In the 1938 *Maryland's Primary Bridge Program* report, the Greiner Company argued that if constructed, this bridge would be the only span crossing the Potomac River between Washington, D.C., and the mouth of the river at the Chesapeake, thus providing unfettered access between Virginia and Maryland and connecting the highway systems of the two states. According to the report:

> The economic and social values of this bridge can be summarized in the following statement: The advantages to the people of the adjacent Maryland and Virginia counties in expediting the natural interchange of social and commercial relations must be apparent, and since the advent of the automobile, the need of a physical connection of the highways has become pressing.[40]

Years before the SRC included the Potomac River Bridge in its Primary Bridge Program, "A bridge over the lower Potomac [had] been advocated for some time by highway planners as a necessary link in a new arterial highway from Baltimore to Richmond, by-passing Washington and Alexandria."[41] Prior to the rise of the automobile, the railroads had called for a similar crossing. In 1916, they proposed to construct a bridge in this location to create a shorter rail line from Baltimore to Newport News, Virginia. It was to be named the Potomac and Baltimore Railway, but objections from the steamboat industry kept the plan from realization. Once automobiles began to rise in popularity in the 1920s, the plan became a combined highway and rail bridge. From 1926 to 1932, supporters were largely interested in a bridge in this location to provide easier access to Washington's birthplace in Virginia.[42] In 1933, Kent R. Mullikin sponsored a bill in the House of Delegates to permit the George Washington-Wakefield Bridge, Inc., to construct a toll bridge at the same location. The bill to fund the bridge passed in 1933 and was signed by Governor Albert Ritchie. However, authorization expired two years later when construction had still not started. [43]

The campaign for a bridge over the lower Potomac was again taken up as part of Maryland's Primary Bridge Program with the support of Governor Harry W. Nice. The Primary Bridge Program even won the backing of President Franklin D. Roosevelt who visited the proposed site of the Potomac Bridge on September 4, 1938, where he met with the governor and representatives of the SRC.[44] Roosevelt gave the project his immediate support and stated that the bridge "must be built just as fast as we can possibly do it."[45]

In 1938, the Potomac River Bridge was the second of two projects approved from Maryland's Primary Bridge Program. The first public hearing regarding approval of the Potomac River Bridge was held at the War Department on July 15, 1938. The PWA was asked to furnish forty-five percent of the funds for the project and the plans called for "a channel span with vertical clearance of 135 feet above low water and

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39. J. E. Greiner Company, 97.

40. Ibid.

41. "Bridge Is Planned South of District." *The Baltimore Sun*. 28 January 1938. ProQuest Historical Newspapers.

42. "Bridge Is Planned South of District."

43. Lewis O'Donnell. "Lewis Backers Urged Potomac Bridge in 1933." *The Baltimore Sun*. 2 Sept 1938. Available online at: ProQuest Historical Newspapers.

44. Ibid.

45. C.P. Trussell. "Roosevelt Keeps His Bridge Promise." *The Baltimore Sun.* 14 Oct 1938. Available online at: ProQuest Historical Newspapers.

horizontal clearance of 470 feet."[46] The remaining fifty-five percent of the costs would be financed via bonds sold by the state. At this point, the Federal government would not appropriate funds for a bridge project unless the design met military weight requirements. This was especially important for the Potomac River Bridge due to its proximity to the Capital and Dahlgren Naval Proving Ground.[47]

On October 13, 1938, the PWA and President Roosevelt broke a State quota limitation and permitted additional PWA funds to be granted to Maryland earmarked for the construction of the Potomac River Bridge. The PWA agreed to cover forty-five percent of the costs ($1,766,700), while the remaining share of the costs would be raised by the State through the sale of revenue bonds to be repaid via bridge tolls.[48]

On October 15, 1938, the Greiner Company submitted their *Maryland's Primary Bridge Program* report to the SRC. They also sent copies to President Roosevelt and the PWA. The original estimates for the Potomac span totaled $3,926,000, whereas the Greiner Company's report estimated that it would cost $4,658,000. The estimated difference in cost was due to necessary changes for navigational purposes. In order to meet War Department requirements, the main channel span width and lateral clearance height both had to be increased. Additionally, the main span had to be shifted slightly eastward into deeper water.[49] Upon hearing this difference in cost, the State of Maryland indicated that it could cover the difference through the sale of additional bonds if no more Federal funds could be obtained. Additionally, the Greiner Company stated that they were investigating the possible use of a patented bridge type that could reduce the overall cost.[50] It is unclear if this refers to Herschel Allen's "Potomac Pier" method.

In November 1938, the PWA threatened to withdraw funding for the Potomac River Bridge if the SRC did not start work by the January 1, 1939, deadline. M.E. Gilmore, regional director of the PWA in New York wrote, "Because of the limitations of the 1938 PWA Recovery Act, unless local officials take the necessary steps to get work started on these projects, I shall recommend immediate recession of the Federal grants."[51] PWA officials were concerned because the plans and specifications had yet to be approved by the New York office of the PWA, which typically took ten days to two weeks. After approval, the project had to be advertised for bids for two weeks. Greiner Company engineers and SRC officials responded that everything was in order and that they anticipated no difficulties.[52] Construction work on the Potomac River Bridge began on December 27, 1938, just a few days before the January 1, 1939 deadline.

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46. "Hearing Is Set in Washington on Bridge Plan." *The Baltimore Sun*. 3 July 1938. ProQuest Historical Newspapers.

47. Edward G. Maxwell. "Soon: Tires Over The Potomac." *The Baltimore Sun.* 17 Nov 1940. Available online at: ProQuest Historical Newspapers.

48. "Work Starts on Potomac Bridge Today." *The Baltimore Sun.* 27 Dec 1938. Available online at: ProQuest Historical Newspapers.

49. J. E. Greiner Company, 9.

50. "State's 2 New Spans to Cost $500,000 More." *The Baltimore Sun*. 30 Oct 1938. Available online at: ProQuest Historical Newspapers.

51. "Bridge Threat Is Surprise to Engineers." *The Baltimore Sun*, 17 Nov 1938. Available online at: ProQuest Historical Newspapers.

52. Ibid.

Engineering and Constructing the Potomac River Bridge

To address rapidly evolving and expanding automobile and truck traffic, the SRC focused on standardizing bridge building in Maryland during the first half of the twentieth century. However, the design of bridges that needed to span a particularly long or difficult area were often outsourced to consulting engineers. The Potomac River Bridge was one of these bridges. The SRC chose the Greiner Company to design and engineer the Potomac River Bridge after their publication of the *Maryland's Primary Bridge Program.*

Greiner Company partner, Herschel Allen's patent for the "Potomac Pier" makes the Potomac River Bridge even more unique. In addition to being the only bridge in Maryland to utilize a cantilever design, the Potomac River Bridge was innovative for its pier design and was the first to showcase this new method of bridge support construction. Allen's method eliminated the need for a coffer dam and instead "steel piles were driven into the bedrock, sometimes 200 feet below water level, to hold the concrete supports which appear to be the sole foundations of the structure." Allen submitted his new method to the U.S. Patent office on October 20, 1939, and obtained U.S. Patent No. 2317016 on April 20, 1943.[53]

Construction work on the Potomac River Bridge began on December 27, 1938, just a few days before the January 1, 1939, deadline. Work began with grading and filling operations on the Maryland side.[54] At the time, Nathan L. Smith, chief engineer of the SRC, stated that costs for the bridge would be very close to the estimate supplied in the Greiner Company's October 1938 report.[55] Unfortunately, this was not to be the case, and the final bridge construction costs totaled over $5 million.

Originally, the Potomac River Bridge was slated for completion by June 30, 1940. However, construction fell behind schedule due to a number of unforeseen difficulties. According to a November 1940 article in *The Baltimore Sun*, foundation contractors were aware of potential issues including strong tides that sweep through the river, but they did not account for the "nearly bottomless silt of the Potomac and the need to employ tugs as icebreakers when eight to ten-inch ice threatened their caissons."[56]

Due to the silt of the Potomac, foundation contractors had to change their tack when constructing the piers. According to a November 1940 article in *The Baltimore Sun:*

> Though it is a towering structure, it goes down farther than it shoots up. Some of the 1,700 steel piles supporting the twenty piers on which 13,000 tons of steel rest go down 195 feet. Not short of that depth was bedrock found at many points. The piles slipped down the first 100 feet almost of their own weight through a mud so fine that the workboats' anchors would not hold in it. This called for piles of such length that the contractors were forced to build the tallest of all piledrivers to handle them.[57]

To sink the steel piles deep enough (120-215 feet), the contractor had to build their own pile driver off site since nothing large enough existed at the time. Seven divers had to guide steel piers into place before

53. Allen.

54. "Work Starts on Potomac Bridge Today."

55. Ibid.

56. Maxwell.

57. Ibid.

the pile driver was used. The machine was so powerful that it could be heard miles away.[58] Steel caissons, weighing up to 524 tons, were put into place and concrete was poured into them to form the piers. "These are only small concrete islands barely rising above the water. They give no hint of their extensive roots or their appalling cost."[59] The closest railroad access was located three miles upriver at Pope's Creek. Large portions of the bridge were built there and floated downriver to the site of the Potomac River Bridge.

By September 30, 1940, the bridge was over ninety percent complete. According to the Report of the State Roads Commission of Maryland for the years 1939-1940:

> The major accomplishment in Charles County has been the construction of the bridge approximately 2 miles long across the Potomac River from Ludlows Ferry to Dahlgren, Virginia, and the two miles of modern concrete roadway from Newburg to the bridge.[60]

The Potomac River Bridge opened to traffic on December 14, 1940. Governor Herbert O'Conor presided over the ceremony, which more than 1,000 people attended.[61] Over 500 cars drove the span for free on opening day.[62] Collection of tolls began that evening at 9 P.M.[63]

At the peak of construction, the Potomac River Bridge project employed approximately 330 men. Because many of these jobs required skilled labor, few of the men were local. Many were transient laborers ranging from welders, rivet heaters, and hoisting engineers, who moved to the area for the life of the project and infused the local economy with their business. This project, as with many funded by the New Deal, provided employment, while bolstering the local economy.[64]

At the time, the Potomac River Bridge and the Susquehanna Bridge were the largest ever erected in the State of Maryland. They were unique not just for their size and novel engineering, but also for their plan to become free once the bridges had earned enough in tolls to pay off the revenue bonds.[65] In 1968, the bridge was re-named the Governor Harry W. Nice Memorial Bridge in honor of the Maryland leader who signed the Primary Bridge Program into law and helped the Potomac River Bridge become a reality.

Local and Interstate Travel

During the construction of the Potomac River Bridge, the SRC built the approach routes that connected

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58. Julia King, et. al. *Pathways to History: Charles County Maryland, 1658-2008.* (Mount Victoria, Maryland: Smallwood Foundation Inc., 2008), 183.

59. Ibid.

60. Maryland State Roads Commission. "Report of the State Roads Commission of Maryland for the Years 1939-1940" (Maryland: State Roads Commission, 1940), 109. Available online at: http://archive.org/details/reportofstateroa1939mary.

61. Governor Spiro T. Agnew, *Remarks Naming the Governor Harry W. Nice Bridge*, 15 April 1968, Executive Records of Governor Spiro T. Agnew, 1967-1969, reproduced in William Hand Browne, Edward C. Papenfuse, et. al. eds., *Archives of Maryland*, 215+ volumes, (Baltimore and Annapolis, Md., 1883-), 83: 763-766 (hereinafter cited as *Archives of Maryland*). Available online at http://aomol.msa.maryland.gov/ .

62. O'Donnell.

63. Maryland State Roads Commission. 1940, 172.

64. Maxwell.

65. Maryland State Roads Commission. 1940, 127.

the span to the Crain Highway, which at the time ran from Newburg north to Baltimore.[66] When the Potomac River Bridge opened, no approaches had been constructed on the Virginia side of the bridge and those who crossed from Maryland found only a dirt road and open field. According to a November 1940 article in *The Baltimore Sun:*

> [The Potomac River Bridge] carries the clean-limbed look of modern efficiency. But it couples highway routes inferior to it; second-class roads lead off from its Virginia end, near Dahlgren, such or worse, run down to its Maryland base at old Ludlow Ferry Farm above Morgantown. There is vague talk on both sides of the river and at Washington of roads to be built some day to induce its complete utilization.[67]

The SRC was aware of this deficiency and included a statement about the need for an improved highway to serve as the main north-south route in their report for 1939-1940.[68] No information regarding the exact date of completion for the Virginia approach was found during research.

When the bridge was constructed, traffic engineers projected that approximately 136,000 vehicles per year would cross the bridge during the first five years. That estimate turned out to be much too conservative. By 1942, traffic surpassed 171,600 vehicles per year, and by 1946 the count had increased to 453,900 vehicles. Traffic volume across the Potomac River Bridge continued to increase until it peaked in 1964 at 3.2 million vehicles. However, the next year this number decreased by approximately one-third following the opening of the Capital Beltway (Interstate-495), which allowed for a faster route around Washington D.C. and south into Virginia.[69] Vehicle traffic over the Governor Harry W. Nice Memorial Bridge continued to increase in volume over the second half of the twentieth and early twenty-first centuries. Due to this continued volume increase, the span was eventually determined insufficient for modern transportation needs. Planning work to replace the bridge with a new span began in 2006.

When the Crain Highway (now US 301) was constructed in Charles County during the 1920s, the increased traffic encouraged commercial development along the roadway. With the opening of the Potomac River Bridge in 1940, traffic increased again and with it came even more commercial development. Development was largely catered to tourists and travelers and took the form of entertainment establishments like nightclubs and restaurants and travel-related services including motels

and gas stations. Commercial development continued to thrive in the area during the 1940s and the 1950s.[70]

During this time Charles County became a tourist destination in large part due to its concentration of slot machines. In 1949, slot machine gambling was legalized in four Maryland counties including Charles; in contrast by 1949, Virginia had outlawed slot machines. At the time, Maryland had the only legalized slot machines east of Las Vegas, and the passage of the bill turned US 301 in Charles County into the “Las Vegas of the East Coast.” Tourists came from Baltimore, Virginia, and Washington D.C. to visit this

66. King, 184.

67. Maxwell.

68. Maryland State Roads Commission. 1940, 172.

69. URS Corporation.

70. EHT Traceries, 20.

stretch of roadway.[71] According to a history on Charles County by historians Julia King, Christine Arnold-Lourie, and Susan Shaffer:

> Legalized gambling ignited a period of growth unprecedented in the county's history. The Crain Highway had to be widened to four lanes to handle the traffic. The Chamber of Commerce boasted that an estimated 10 million travelers sped along the "super highway…cutting through the heart of Charles County," in 1959. Along one 14-mile stretch, 21 motels sprang up alongside restaurants that catered to tourists and gamblers. The impact of legalized gambling was incontrovertible.[72]

Casino owners wanted to capitalize on their success and attract not just adults, but entire families. So, they created amusement parks and waterparks that allowed adults to spend as much time at the casinos as they wanted while knowing that their children were happy and entertained. [73] Two of these amusement parks included Aqualand and Marshall Hall Park.

For a time, gambling also occurred on the Potomac River itself. Despite slot machines being outlawed in Virginia, entrepreneurs took advantage of a loophole and installed slot machines on piers that extended into the Potomac. This was technically legal because the 1632 royal charter given to Lord Baltimore decreed the Potomac River belonged entirely to Maryland. So, slot machines positioned beyond the low tide mark were technically governed by Charles County, Maryland and not Virginia. This Potomac Pier gambling lasted until 1958, when "Maryland's General Assembly voted to outlaw slot machines on the states navigable rivers."[74] The end of Potomac River gambling served to bring more casino owners and tourists to the Maryland side of the river.

1963 marked the beginning of the end of gambling in Charles County as the government implemented a five-year phase-out of slot machine gambling. The last slot machines were shut down on June 30, 1968.[75] Combined with the completion of the Capital Beltway, the end of legalized gambling marked the death knell of tourism along US 301. "Tourists no longer needed to rely on US 301 as a major North/South transportation route". New construction of motels and recreational facilities dwindled, although gas stations, shopping centers, and restaurants continued to line the heavily traveled commuter route, catering to county residents rather than out-of-town travelers."[76]

Part II. Structural/Design Information

A. General Statement:

1. **Character:** The Potomac River Bridge exemplifies the scientific development and refinement of

71. Ibid., 34.
72. King,189.
73. Ibid.
74. Ibid., 191-193.
75. EHT Traceries, 34.
76. Ibid., 20.

cantilever truss design and construction in Maryland.

2. **Condition of Fabric:** At the time of this documentation effort, the Potomac River Bridge is generally in fair condition. The paint on the structural steel members is peeling and damaged. Some of the steel members exhibit corrosion and minor loss of fabric. The 1984 deck is cracking and near the end of its lifespan. Some concrete substructure elements exhibit minor spalling and cracking. It is planned for replacement in 2023.

B. Description:

Bridge Description (from JMT and Parsons Brinckerhoff's *Existing Condition Evaluation*, 2016)[77]

The Potomac River bridge has an overall length of 10,050' and is 24'-7" wide, curb-to-curb. The bridge carries two lanes of traffic, one in each direction.

The bridge consists of the following sections, beginning at the west (Virginia) end:

Sections B01-B60 are Beam Spans consisting of sixty simply supported steel multi-girder spans. The overall length of the Beam Spans section is 3,687′-4″ with an out-to-out width of 27′-9- ½″. The superstructure consists of three painted steel plate girders, which carry a 9″-thick reinforced lightweight concrete deck. The substructure consists of sixty concrete trestle bents and a reinforced concrete stub abutment with wing walls. The trestle bents consist of five steel H-pile columns at the single bents and ten steel H-pile columns at the double bents, which occur at every sixth bent. The H-piles between the top cap beam and the lower strut at the splash zone are encased in a 2′ square concrete section and the H-piles extending into the mudline below the lower strut are encased in a 3′ diameter concrete section wrapped in a fiberglass jacket.

Sections S01-S06 are Wichert-type Deck Truss Spans consisting of six spans with an overall length of 878′-9″, a curb-to-curb width of 24′-7″, and an out-to-out width of 27′-9- ½″. The superstructure consists of two rhomboid plate girders which carry a 4″-thick concrete filled deck with a 2″ latex-modified concrete (LMC) overlay. Piers 1-3 consist of a solid shaft reinforced concrete piers founded on steel H-piles, and Piers 4-6 consist of two concrete cylindrical pile caps supporting concrete bells that in turn support concrete columns and a strut.

Sections S07-S12 are composed of two three-span continuous Wichert-type Deck Truss Spans with an overall length of 1,803′, a curb-to-curb width of 24′-7″ and an out-to-out width of 27′-9 ½″. The deck truss units carry a 4 ¼″ concrete filled grid deck with a 2″ LMC overlay. The piers consist of two concrete cylindrical pile caps supporting concrete bells that in turn support concrete columns and a strut, except for Pier 10 which utilizes four pile caps and an A-frame steel tower.

Sections S13-S15 comprise a three-span cantilever through truss with an overall length of 1533′-4″, a curb-to- curb width of 24′-7″, and an out-to-out width of 27′. The through truss carries a 4 ¼″ concrete filled grid deck with a 2″ LMC overlay. Piers 13 and 16 consist of two concrete cylindrical pile caps supporting concrete bells that in turn support concrete columns and a strut, and Piers 14 and 15 utilize four pile caps and an A-frame steel tower.

77. Johnson Mirmiran and Thompson and Parsons Brinkerhoff, *Existing Condition Evaluation of the Harry W. Nice Memorial Bridge,* 2016. The accuracy of all measurements is +/- 1″.

Sections S16-S19 are two three-span continuous Wichert-type Deck Truss Spans with an overall length of 1,250′, a curb-to-curb width of 24′-7″ and an out-to-out width of 27′-9 ½″. The deck truss units carry a 4 ¼″ concrete filled grid deck with a 2″ LMC overlay. The piers consist of two concrete cylindrical pile caps supporting concrete bells that in turn support concrete columns and a strut, except for Pier 19, which utilizes four pile caps and an A-frame steel tower.

Sections S20-S25 are Wichert-type Deck Truss Spans consisting of six spans with an overall length of 878′- 9″, a curb-to-curb width of 24′-7″, and an out-to-out width of 27′-9 ½″. The superstructure consists of two rhomboid plate girders that carry a 4 ¼″ concrete filled deck with a 2″ LMC overlay. Pier 20 consists of solid shaft reinforced concrete piers founded on steel H-piles. Piers 21-23 consist of two concrete pedestals supporting steel bents and Piers 24 and 25 directly support the superstructure. Pier 24 is a dual-column rigid frame member and Pier 27 consists of two concrete pedestals.

C. Site Information:

The Potomac River Bridge carries U.S. Route 301 across the Potomac River, connecting Charles County, Maryland, and King George County, Virginia. The topography of the land on both sides of the river is flat, and gently slopes down to the Potomac River. The area is forested in areas that are not developed. The 1940 administration building lies on the north side of US 301 in Maryland, approximately 0.3 miles east of the Potomac River. A modern toll booth and administration building lies to the east of the 1940 building. Significant developments on the Maryland side of the bridge include the Morgantown Generating Station (a coal power plant) on the south side of US 301, and the Aqualand Marina and Campground on the northern side. The Naval Support Facility Dahlgren lies to the south of Route 301 in Virginia.

Part III. Sources of Information

Plans, elevations, and details of the bridge can be found in J.E. Greiner Company's 1938 *Maryland's Primary Bridge Program.*

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Site Plan

Potomac River Bridge

Legend

Potomac River Bridge Administration Building

Potomac River Bridge

USGS 7.5-min Topographic Quadrangle Maps: Colonial Beach North, MD/VA 1984

0 0.25 0.5 0.75 1 Miles

1 in = 1 miles

HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO PHOTOGRAPHS

POTOMAC RIVER BRIDGE HAER No. MD-204
(Governor Harry W. Nice Bridge)
Spanning the Potomac River at Crain Highway (US 301)
Vicinity of Newburg
Charles County
Maryland

Photographs 1-9 by David Haas, June 2020. Photographs 10-24 by Rob Tucher, September 2022.

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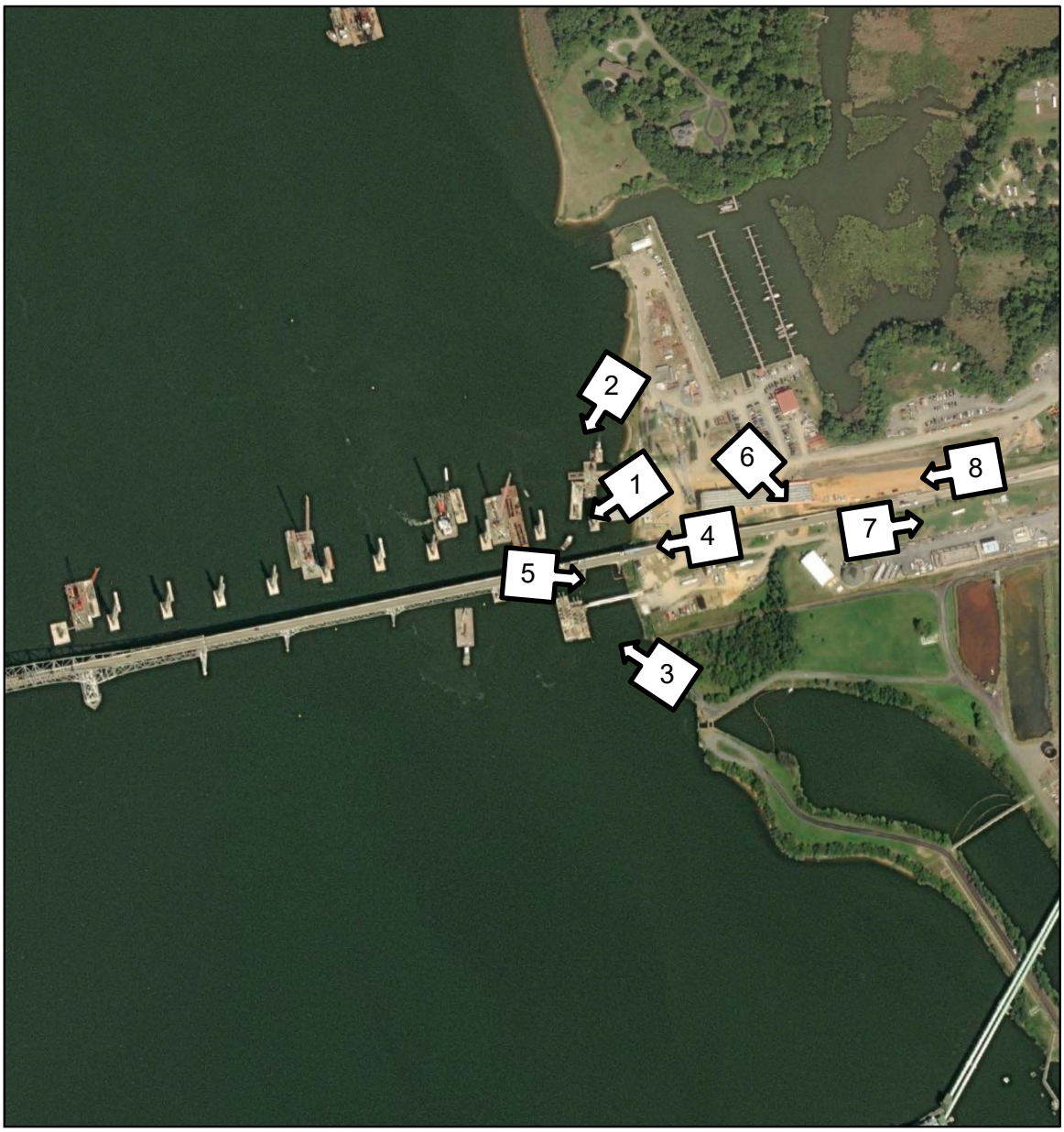
Photograph Location Map

Potomac River Bridge (Map 1 of 3)



Legend

Photograph Location

0 135 270 540 810 1,080 Feet

1 in = 417 feet

N

Photograph Location Map

Potomac River Bridge (Map 2 of 3)

Legend

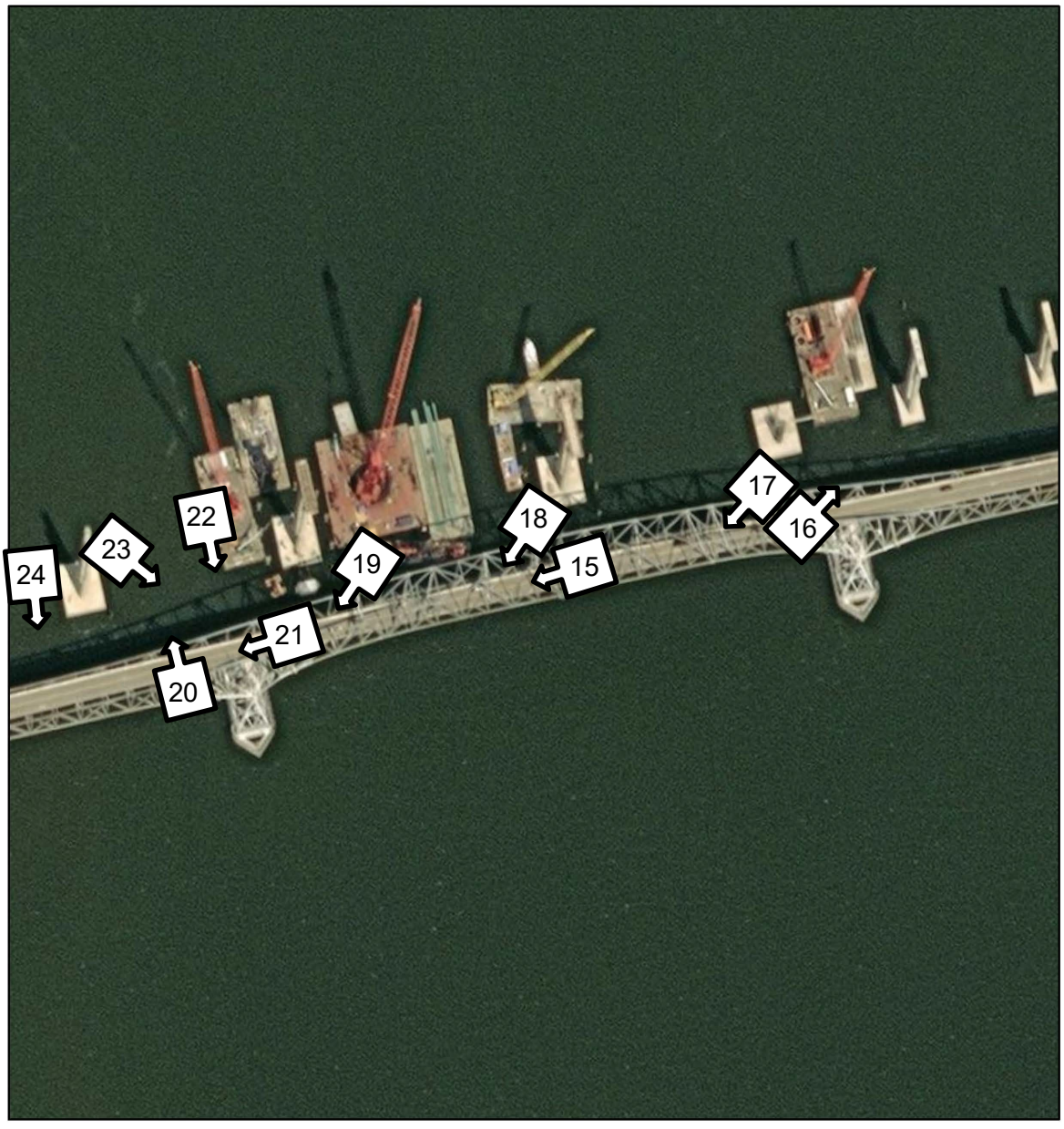
Photograph Location

0 385 770 1,540 2,310 3,080 Feet

1 in = 1,167 feet

Photograph Location Map

Potomac River Bridge (Map 3 of 3)



Legend

Photograph Location

0 55 110 220 330 440 Feet

1 in = 167 feet


21


TWO WAY
TRAFFIC
ON BRIDGE
NO PASSING


MARYLAND
TRANSPORTATION
AUTHORITY