

# Dedication of the Thomas Viaduct Plaque

## National Historic Civil Engineering Landmark

April 13, 2024



**East Side looking North, April 2024**

Courtesy of William Parks, PE

*Established in 1852, the **American Society of Civil Engineers** (ASCE) is the oldest national professional engineering society. With more than 150,000 members and an annual operating budget of over \$65 million, the Society is dedicated to advancing the art, science, and profession of engineering for the betterment of humanity.*



## OUR SPEAKERS

**Kristopher Shea, PE – President, ASCE, Maryland Section:** Kris is a Project Engineer at Wohlsen Construction, focusing on healthcare and senior living new build and renovation construction. Kris spent seven years working for Century Engineering as a Highway Design Engineer. Since graduating from the University of Maryland with a degree in Civil Engineering, Kris has served the Maryland chapter of ASCE, as the programming chair, secretary, vice president, and now president. Kris enjoys spending time with friends and catching as many baseball games as possible throughout the year.

**Sam Voso – Park Ranger: Maryland Department of Natural Resources, Patapsco Valley State Park:** Ranger Voso began working for the Maryland Park Service in June 2020 as a seasonal employee at Gunpowder Falls State Park, moving to Patapsco Valley State Park as a full-time employee in 2022. Ranger Voso enjoys learning about all the historical and natural features of the Patapsco Valley reminding him there's something new to understand and appreciate around every corner.

**Thomas W. Smith III, NAC ENV SP, CAE, F.ASCE – Executive Director, ASCE:** A dedicated member of the American Society of Civil Engineers (ASCE) for more than 25 years and a civil engineer, Tom served as the deputy executive director and general counsel before becoming the executive director in January 2015. Smith is responsible for the day-to-day management of the Society. He provides executive leadership to a staff of over 200 and an active volunteer workforce of over 10,000 facilitating ASCE's tradition of supplying high-quality and high-value products and services to its members and other customers worldwide.

**Jonathan Goldman – Chief Curator, B&O Railroad Museum, Baltimore, Maryland:** Jon has worked in the museum field for 14 years. Jonathan provides leadership and management of the B&O's exhibitions, collections, archives, restoration, volunteers, and education efforts. He received a B.A. in Asian Studies from Occidental College, a B.F.A. in Art Direction as well as Design for Social Impact from the Art Center College of Design, and an M.A. in Exhibition Design from George Washington University. Jonathan has taught at the undergraduate and graduate levels at George Washington University and Towson University.

**Michael O'Connor, PE – ASCE History & Heritage Committee:** Mike has over fifty years of experience in developing civil engineering projects, mostly working in transportation or railroads. He has taught at several engineering schools and serves as a volunteer with ABET, the engineering accreditation organization. Recently, he was part of creating a railroad history non-profit, the Frederick and Pennsylvania Line Railroad Museum. He writes extensively on civil engineering and railroad history on Wikipedia. Over 300 people a day read his content.

**Holly Arnold – Administrator, MDOT Maryland Transit Administration:** Ms. Arnold oversees the 13th largest transit system in America, managing six modes; Local Bus, Metro Subway, Light Rail, Mobility paratransit services, Commuter Bus, and MARC Train Service; with an annual budget of \$900 million and a 6-year capital budget of over \$3 billion. Since 2012, Ms. Arnold has served as the Capital Program Manager, Director of Planning and Programming, and Deputy Administrator/Chief Planning, Programming, and Engineering Officer. She has a BA from Duquesne University and an MA in Public Administration, Urban and Regional Affairs from the University of Pittsburgh. Ms. Arnold is a 2017 graduate of the Leadership APTA program, recognized in 2018 as a Top 40 Under 40 transit professional in Mass Transit Magazine, and a 2019 40 Under 40 honoree in the Baltimore Business Journal.

**Brian Hammock – Resident Vice President, CSX Transportation:** Brian leads state affairs for CSX in Maryland and Delaware. Over the past ten years he has been part of the team to develop, finance, and construct the Howard Street Tunnel double-stack project. The project has induced significant investment into the Port of Baltimore for containerized transport, including a recently announced \$1.5 billion private container terminal planned in East Baltimore. Prior to CSX, Brian was an attorney and served on the board of the Canton Railroad Company, a shortline railroad owned by the State of Maryland. Brian, his wife Carolyn, and three children reside in Cockeysville.

# PROGRAM

## Welcome and Greetings

- ❖ Kris Shea, PE
- ❖ Sam Voso

*President – ASCE, Maryland Section*  
*Park Ranger – Patapsco Valley State Park*

## Plaque Dedication

- ❖ Tom Smith, PE

*Executive Director – ASCE*

## Historical Background & Remarks

- ❖ Jonathan Goldman
- ❖ Michael O'Connor, PE
- ❖ Holly Arnold
- ❖ Brian Hammock

*Chief Curator – B&O Railroad Museum*  
*History & Heritage Committee – ASCE*  
*Administrator – MDOT MTA*  
*Resident Vice President – CSX Transportation*

## Closing Remarks

- ❖ Kris Shea, PE

*President – ASCE, Maryland Section*

## Lunch is provided, courtesy of the ASCE Maryland Section

**ASCE Maryland thanks** our speakers, Ken Derrenbacher PE, William Parks PE, Mike O'Connor PE, Matthew Fenton PE, Stephanie Richmond PE, Kylie Snyder PE, Jennifer Trimble, Ken Briers, Kevin Langley, Rob Marmet, Harvey Goolsby and others who helped achieve this designation and ceremony.

With **Special Thanks** to Daniel Vorsteg, who donated the granite rock on which the plaque is mounted.

## OF FURTHER INTEREST

Visit the **William Offutt Johnson History Center**, one of the few surviving buildings from Avalon Iron & Nail Works. Built in the 1830s, this tiny stone duplex has interpretive exhibit panels and remnants of the Baltimore County Water and Electric Company's water filtration plant. The History Center can be reached by walking from the pavilion or driving towards the Avalon entrance road. Instead of turning right to exit, go straight to the parking lot on the right.

Stop at the entrance to the park, just outside the pay station, to **observe the ASCE Plaque** mounted on a stone, at the courtyard with the other waysides and flagpoles. Please be mindful of traffic. Do not block traffic, nor park in the grass.



### Plaque at Avalon Entrance Patapsco Valley State Park

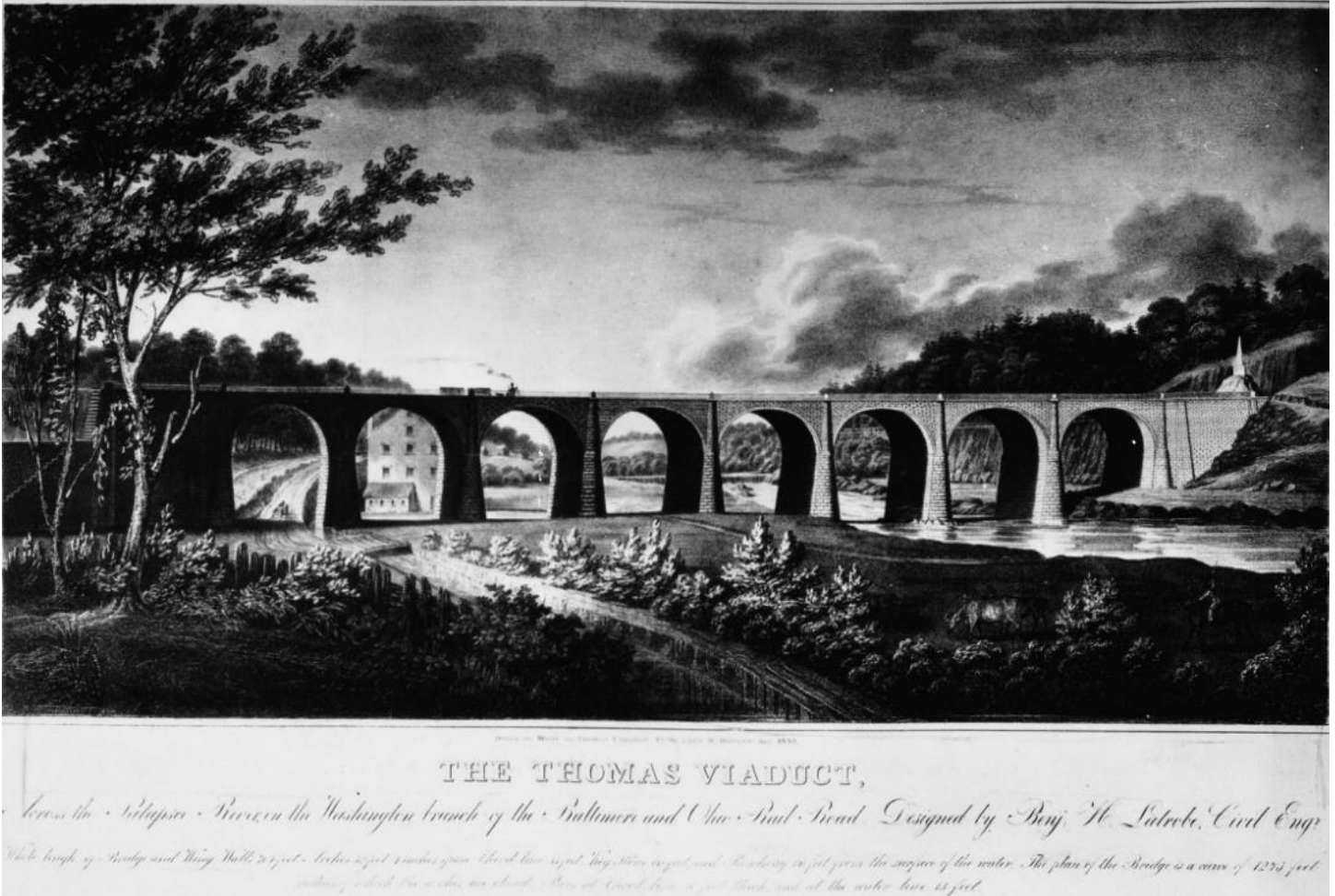
Plaque Photos Courtesy of Ken Derrenbacher, PE & Ken Briers

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## LEARN MORE – Thomas Viaduct History and Construction

The Thomas Viaduct is the first multi-span masonry railroad bridge built on a curving alignment in the United States. Construction began in July 1833 and was completed in July 1835. The viaduct was designed by civil engineer Benjamin H. Latrobe, Jr. (1806-1878), and is named for Philip E. Thomas, the Baltimore and Ohio Railroad's first president.



**1835 Chevalier Drawing – Newly constructed Thomas Viaduct, looking west** From Wikipedia

In the early 1830s, the Baltimore and Ohio Railroad began planning what would become the first rail line into the Nation's capital. The route from Baltimore to Washington D.C. required crossing the Patapsco River on the surrounding plain, crossing the valley of the Patapsco between Elkridge and Relay, Maryland, with a structure of sufficient elevation and strength to avoid potential damage from flooding of the river. The route would diverge from the existing alignment of the Old Main Line, which ran west towards Ellicott City. The new alignment turned south across the Patapsco River valley. Railroad operating conditions made it essential to follow as gentle a grade as possible. The crossing required a curved alignment, with a radius of about 1273 feet (4.5 degrees curve), substantially complicating the design and construction of the structure. The challenge of the curved plan was in designing the eight cylindrical arches on a skew, with piers that were trapezoidal in plan, to fit the curve. Thus, the width of the piers on the outside of the curve is greater than the width along the inside of the curve, and the lateral sides of the piers follow radial lines.

**BY THE NUMBERS** The span of the viaduct is 612 feet (187 m) long; and the individual arches are roughly 58 feet (18 m) in span, with a height of 59 feet (18 m) from the water level to the base of the rail. The width at the top of the spandrel wall copings is 26 feet 4 inches (8 m). The viaduct contains 24,476 cubic yards (18,713 m<sup>3</sup>) of masonry and cost \$142,236.51, equal to \$4,034,929 today.



**B&O Railroad (Dashed) Line: 1860 Map** Courtesy of Library of Congress (Viaduct Location Circled)

**THE BUILDER** The viaduct was built by John McCartney of Ohio, who received the contract after completing the Patterson Viaduct, upstream, on the Old Main Line, at Ilchester. Caspar Wever, the railroad's chief of construction, supervised the work. The bridge is constructed using ashlar (rough-dressed) Maryland granite from Patapsco River quarries. Known as Woodstock granite, the stone was quarried upstream, in Granite Maryland, now a National Historic District. Stone from this quarry was also utilized in many government buildings in Washington D.C., including the Washington Monument. A railroad track was constructed from the B&O's Old Main Line east of Woodstock to the quarry. This abandoned line is located partially in Patapsco State Park.

A wooden-floored walkway built for pedestrian and railway employee use was 4-feet wide and supported by cast iron brackets and edged with ornamental cast iron railings along the sides of the railroad. Parts of it still remain.

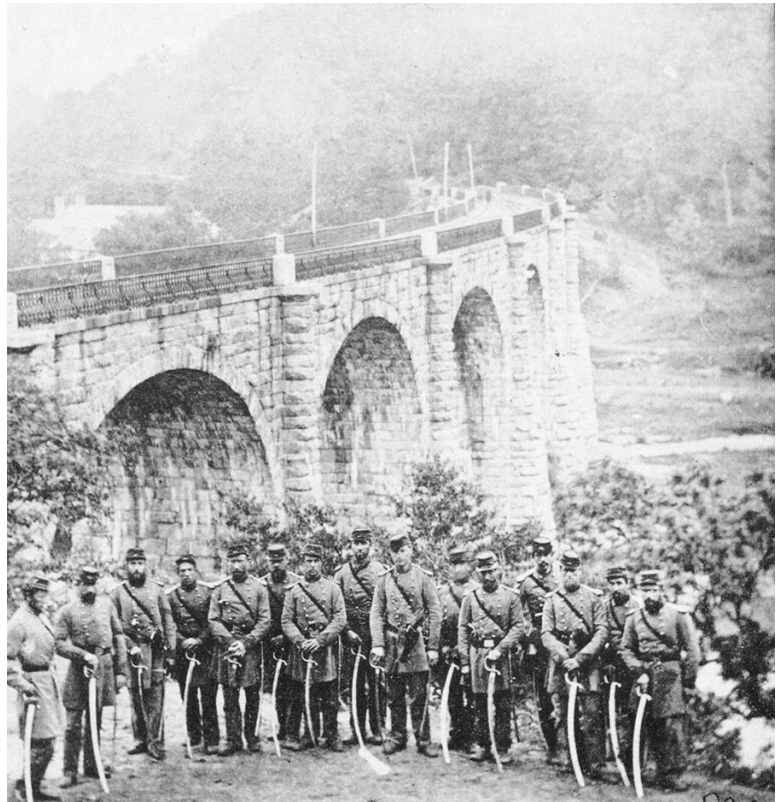
During its construction the viaduct was derided as "Latrobe's Folly" as many expected it would never be able to support its own weight of 63,000 tons of granite. However, upon its successful completion in 1835, the American Railroad Journal recognized its engineering significance by declaring it a "university" for the design and construction of railroad bridges. The uniqueness of Latrobe's design is noted in the 1888 edition of Mahan's Treatise on Civil Engineering as "one of the few existing bridge structures with a curved axis." The strength of Latrobe's design would be demonstrated in 1868 when the viaduct survived a major flood of the Patapsco River, which essentially destroyed the nearby Patterson Viaduct, an earlier B&O stone arch bridge designed and built by Wever and McCartney.

The B&O considered straightening the line and eliminating the many curves in the route, which may have caused the viaduct to be abandoned. Despite numerous studies, the B&O retained the existing alignment, and CSX has followed suit.

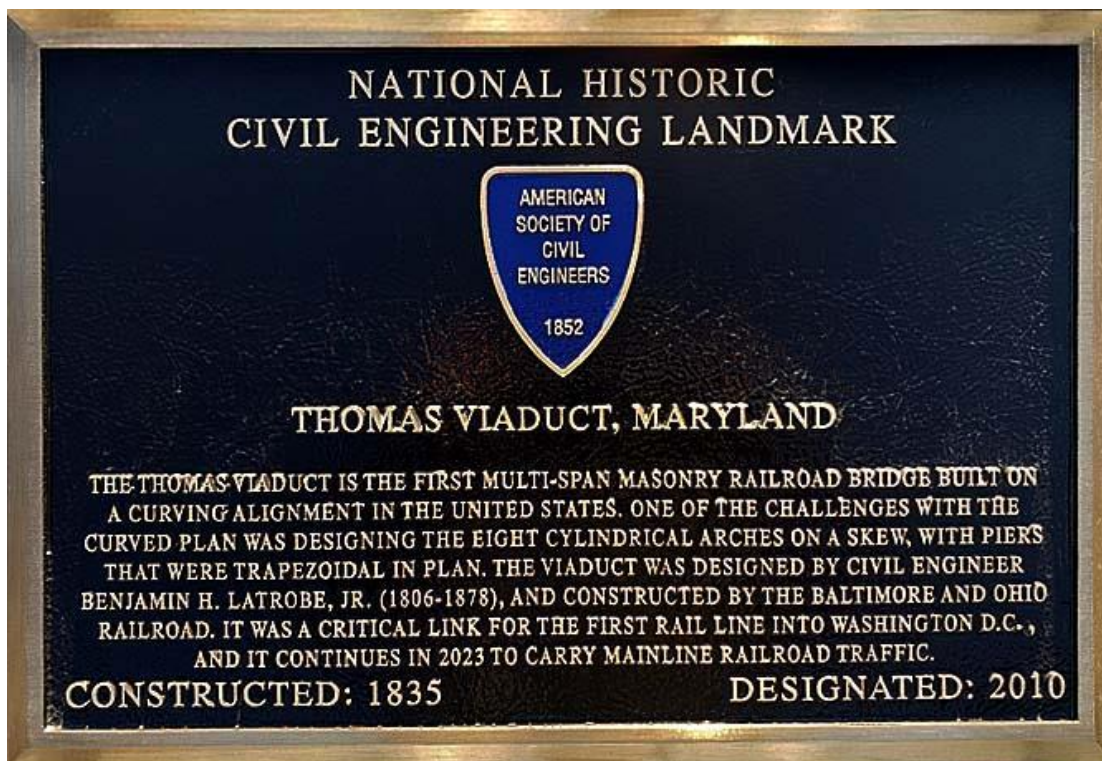


**HISTORY** During the American Civil War, the B&O was the only railroad into Washington, D.C. from the north. Thus, the Thomas Viaduct was essential for supplies and soldiers to reach the capital and the front during that conflict. Union troops heavily guarded the bridge to prevent sabotage.

This important railway link still sees active service today, 189 years after the completion, and is operated by CSX Transportation as a part of their freight system. The Maryland Department of Transportation also operates passenger commuter rail service over the viaduct with MARC Camden Line trains between Baltimore and Washington D.C. The viaduct has survived numerous storms and floods including Hurricane Agnes in 1972 which destroyed many bridges in the Patapsco River Valley. In 1964, it was designated as a National Historic Landmark. The American Society of Civil Engineers (ASCE) designated the viaduct as a National Civil Engineering Landmark in 2010. Today, we are dedicating the placement of the plaque near the park entrance for this landmark.



**Cook's Light Artillery (USA) Overlooking the Thomas Viaduct on the Relay side, 1861**  
Courtesy of Library of Congress



**ASCE Plaque** Plaque Photos Courtesy of Ken Derrenbacher, PE & Ken Briers

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## LEARN MORE – The Engineer

### Benjamin Henry Latrobe II

(December 19, 1806 – October 19, 1878)

Latrobe was an American civil engineer who is best known for his railway bridges and as a railway executive. Although trained in the law, Latrobe was an accomplished draftsman and mathematician.

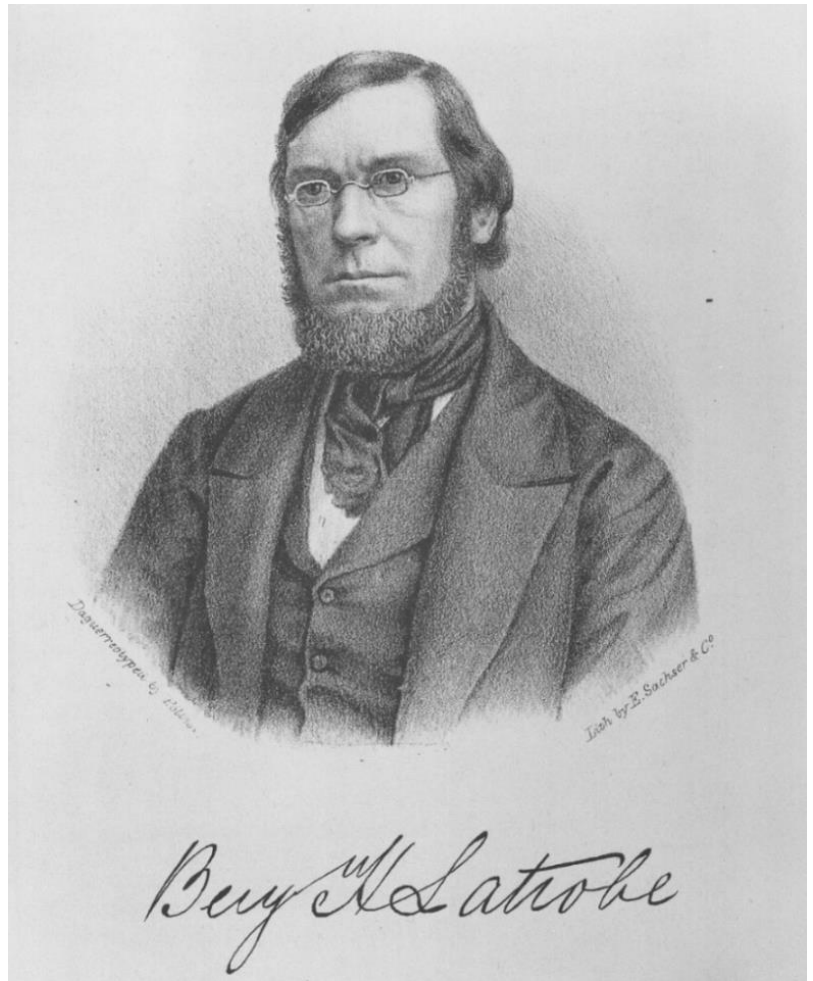
In 1830, he left the practice of law and entered into civil engineering. Latrobe was hired as a rodman on the survey locating the railroad west of Ellicott's Mills, Maryland. He read Jean-Rodolphe Perronet's books on bridges in the French language and traveled to Philadelphia to study the bridges there. As the project engineer, Latrobe worked closely with the railroad's construction chief, Caspar Wever.

Latrobe designed the Thomas Viaduct, which spans the Patapsco River between Reay and Elkridge, Maryland. Nicknamed "Latrobe's Folly" by those who doubted the massive structure could support itself, the bridge remains in use today, carrying far heavier loads than ever envisioned.

In 1835, Latrobe became the chief engineer for the Baltimore and Port Deposit Railroad Company, which helped build the first rail link (Baltimore to Havre-de-Grace) between Philadelphia and Baltimore. The alignment crossed the Susquehanna River by means of a series of three bridges supported by piles which at that time were the first long bridges of that type erected in the United States. Latrobe returned to the B&O Railroad in 1836. Along with Louis Wernwag, he designed the railroad's first bridge across the Potomac River at Harper's Ferry, West Virginia, which opened in 1837.

In 1842, the railroad appointed Latrobe Chief Engineer, and he served in the position for 22 years. He was appointed to the concurrent position of general superintendent of the B&O in 1847. Latrobe later became president of the Pittsburgh and Connellsville Railroad, part of the B&O's Pittsburgh District. In the 1860s, Latrobe became a consulting engineer for the Troy and Greenfield Railroad and worked on the construction of the Hoosac Tunnel in Massachusetts, then the second-longest tunnel in the world.

Benjamin Latrobe died on October 19, 1878, at his home in Baltimore, and is buried in Green Mount Cemetery.

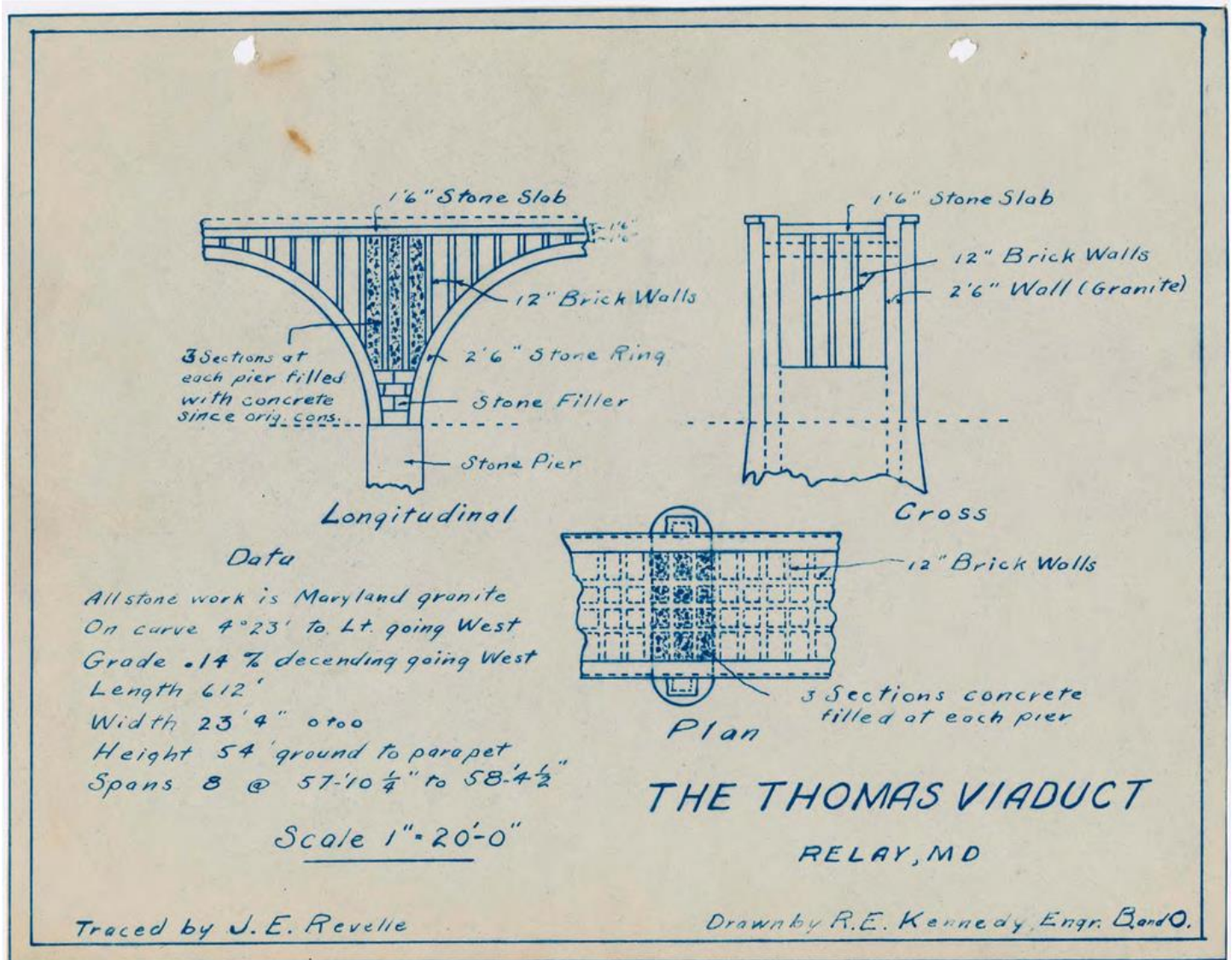


**Benjamin H. Latrobe (1806 -1878)**  
**Civil Engineer (photo taken in 1861)**

Courtesy of the B&O Railroad Museum

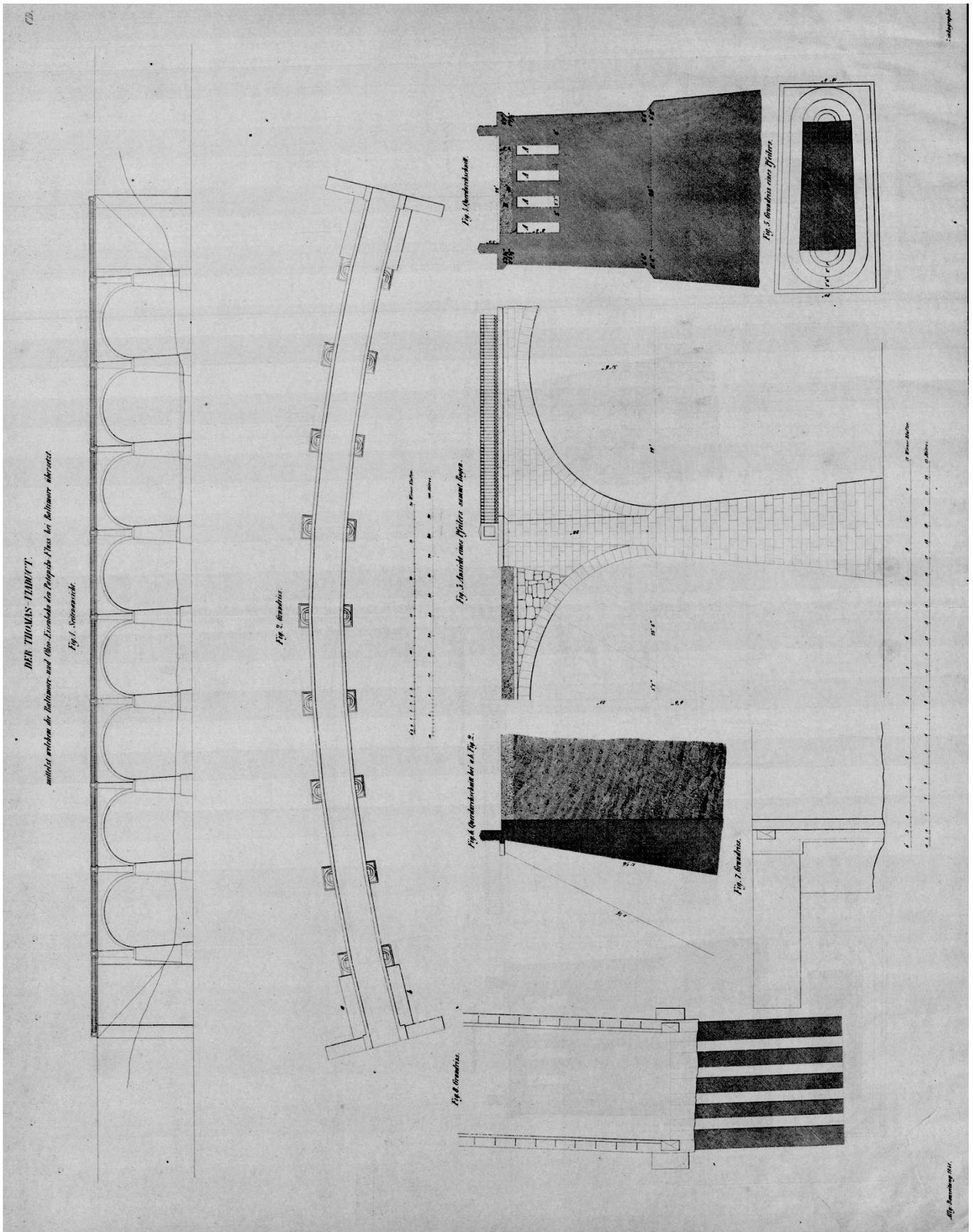


# LEARN MORE – Plans and Photos through the Years



Plans Drawn in 1925 for Repairs (not to scale) From Wikipedia



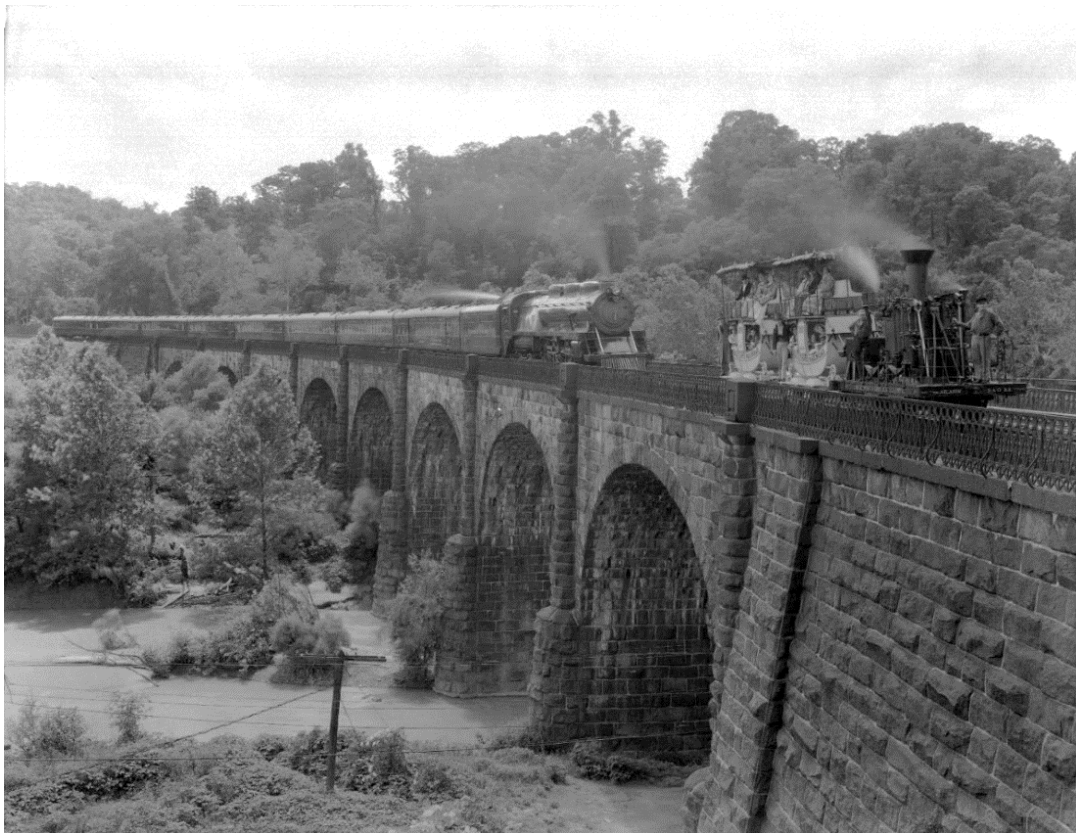


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**Circa 1920s, looking North to the Viaduct Hotel** Courtesy of the B&O Railroad Museum



**B&O replica Atlantic pulling replica Imlay Cars named Maryland and Ohio, followed by B&O No. 2, Lord Baltimore, Circa 1935** Courtesy of the B&O Railroad Museum

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The *Royal Blue* on the Thomas Viaduct, Relay, Maryland, in 1937  
Courtesy of the B&O Railroad Museum



B&O's *Columbian*, 1949 From collection of [JGHowes](#), Wikipedia

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**Viaduct in 1977 (Library of Congress) From Wikipedia**



**March, 2020 View** Courtesy of Tinker, Steve. "Thomas Viaduct."  
Clio: Your Guide to History. March 20, 2020; <https://theclio.com/entry/96870>)

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