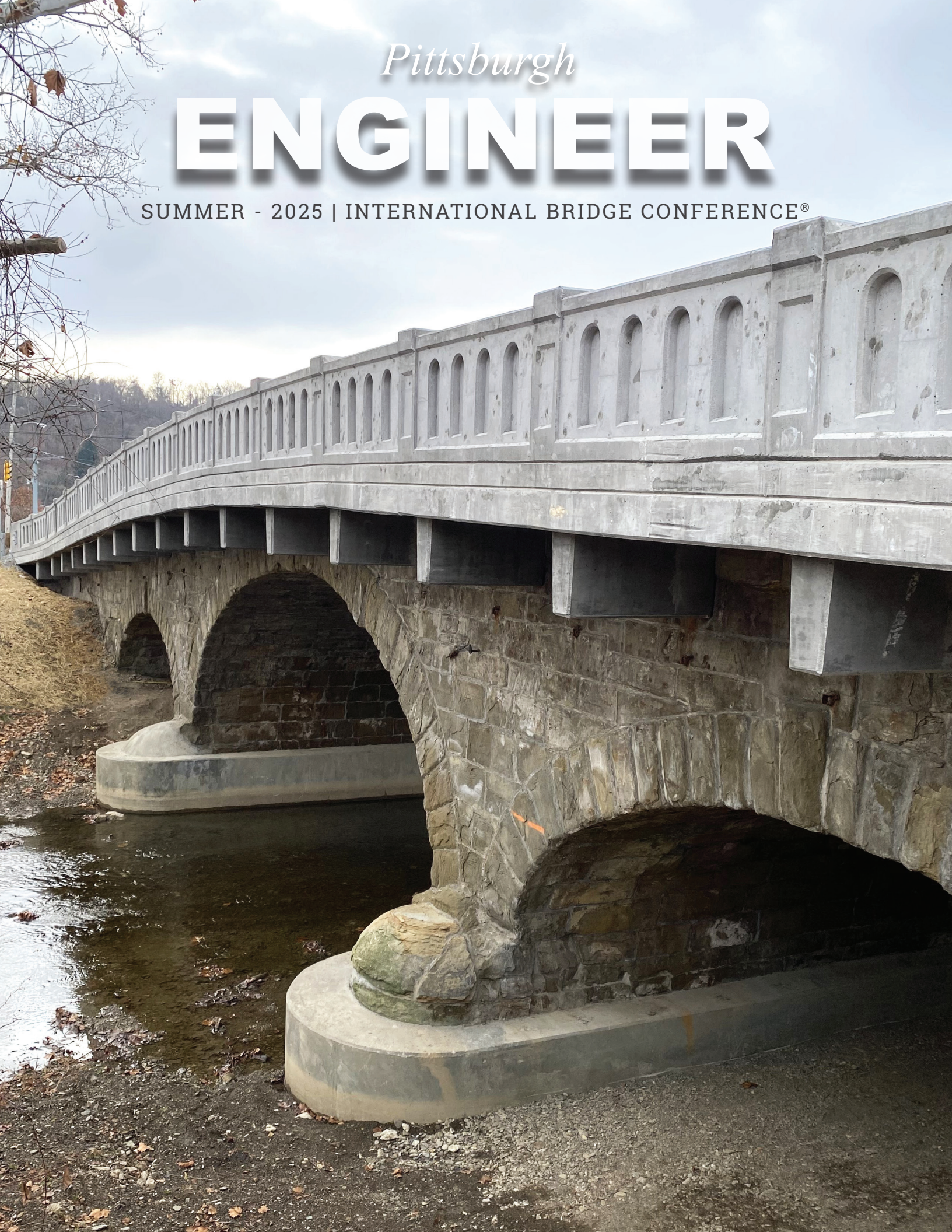


Pittsburgh

ENGINEER

SUMMER - 2025 | INTERNATIONAL BRIDGE CONFERENCE®

ACROW







BUILDING BRIDGES
LEAVING LEGACIES

At no other time in history has there been such a critical need for modern bridging solutions. Acrow is fulfilling the demand for durable infrastructure worldwide. Expertly designed and engineered, our steel bridges feature customizable modular design, superior quality and durability. Whether your project requires a permanent bridge, a reliable temporary detour, or an emergency application, Acrow connects you to the right solution.

PERMANENT | DETOUR RENTAL | MILITARY | EMERGENCY | DEVELOPMENT PROGRAMS

acrow.com
sales@acrow.com
+1.973.244.0080

SUMMARY

04.
Guest Editors

05.
Welcome to the IBC!

06.
Rehabilitation of a National Treasure

10.
Wufengshan Yangtze River Bridge

13.
Bridge Trivia

16.
ESWP Member News

18.
Bridge Quiz

19.
Levi Bird Duff Bridge

22.
Revitalizing a Landmark - the Armstrong Tunnel

25.
IBC Awards

26.
Roebling Award

27.
IBC Photo Contest

PUBLICATIONS COMMITTEE

The ESWP produces a range of publications as a service to our members and affiliated technical societies. ESWP Publications are supported by an all-volunteer Publications Committee.

Marki B. Johnson, CCM, LEED AP
G. Stephens, Inc.

GUEST EDITORS

Jonathan McHugh, P.E.
LS Gallegos

Jay P. Hyland, P.E.
GFT

Michael Cuddy, P.E
GFT

Matthew A. Bunner, P.E.
HDR



ON THE COVER

Monument Place Bridge, Wheeling, WV

Find & Follow ESWP!

ESWP on X

ESWP on Facebook

ESWP on Linkedin

ESWP337

Pittsburgh ENGINEER is the on-line, quarterly publication of the Engineers' Society of Western Pennsylvania (ESWP). The opinions expressed herein are not necessarily those of the membership or management of the ESWP. Every effort is made to ensure accuracy, but we do not guarantee that there will be no errors. Past issues of the Pittsburgh ENGINEER are available on-line at eswp.com/eswp/publications. All content within is the property of the ESWP unless otherwise noted.

Advertising opportunities are available for the Pittsburgh ENGINEER can be found on our website, eswp.com

2025 ESWP BOARD OF DIRECTORS

PRESIDENT
Cheryl Moon, P.E.
The Lindy Group

1ST VICE-PRESIDENT
Stephen G. Shanley, P.E.
Allegheny County DPW

2ND VICE-PRESIDENT
Greg E. Cerminara, P.E., PTOE
GFT

SECRETARY
Mallory Griffin, P.E.
GHD, Inc.

TREASURER
John A. Nemmer
Trumbull Corporation

IMMEDIATE PAST PRESIDENT
James R. McMaster, PMP
Westinghouse

DIRECTORS

Chad R. Davis, P.E.
HDR, Inc.

William Detwiler, P.E., *IBC Chair*
TYLin

Heather H. Dodson, P.E., LEED AP
Brown & Caldwell

Frederick Douglas
Cosmos Technologies, Inc.

Larry Friedline, P.E.
R.T. Patterson Co.

Gregg Johnson, Ph.D.
Point Park University

Marki B. Johnson, CCM, LEED AP
G. Stephens, Inc.

Barry K. King, P.E., PMP
PWSA

Jason M. Koss, CSP
CAWP

Patrick M. Leach, P.E.
Michael Baker International

Zach Merritt
Duquesne Light Company

Ivan Morales, *IWC Chair*
Nalco Water, an Ecolab Company

Jamie North, P.E.
DLZ Corporation

Gregory S. O'Hare, P.E.
Port Authority of Allegheny County

Lori Rossetti, P.E.
AECOM

Eric J. Setzler, P.E.
City of Pittsburgh

Daniel C. Sharek, P.E.
ALCOSAN

Dr. Julie Vandenbossche
University of Pittsburgh

Mike Wood, E.I.T.
Allegheny County Airport Authority

Jason Zang, P.E.
Pennsylvania DOT, District 11-0

Welcome back, bridge professionals...

The City of Bridges and its four fine host agencies- Allegheny County Department of Public Works, The City of Pittsburgh, Pennsylvania Department of Transportation, and the Pennsylvania Turnpike Commission- are all grateful you made the journey here to this year's International Bridge Conference®, no matter how far or how close you travelled from.

As one may imagine, in a city with as storied a legacy of bridges, tunnels, and other built infrastructure as Pittsburgh, that rehabilitation is a major part of the ongoing maintenance and upkeep of the area's transportation systems. As such, the committee is delighted to feature articles about several different rehabilitation projects from throughout the region. The sheer (pun intended) variety of structure types and materials featured herein is truly riveting (I'll stop) and we hope you enjoy it.

We also have the great honor of featuring 2018 John Roebling Medal winner, the distinguished Dr. Gongyi Xu's article about the award-winning and state-of-the-art Wufengshan Yangtze River Bridge - the first high-speed railway suspension bridge in the world. Thank you, Dr. Xu!

The IBC Magazine is once again thrilled to showcase the winners of the IBC Bridge Awards- a global celebration of ingenuity and passion for this art. Please join us in honoring:

- John A. Roebling Medal: Mr. Kenneth Butler, AECOM
- Gustav Lindenthal Medal: Shuangbao Bridge, Wulong, Chongqin, China
- Eugene C. Figg Medal: Te Ara Pekapeka and Taurapa Bridges, Hamilton, New Zealand
- Arthur G. Hayden Medal: Nansha Three-River Bridge, Nansha New District, Guangdong, China
- Abba G. Lichtenstein Medal: Restoration Project of Minjiang Bridge, Yibin City, Sichuan Province, China
- George S. Richardson Medal: Huangmaohai Link, Taishan & Jinwan Districts, Guangdong Province, China
- Theodore Cooper Medal: Hongqili Grand Bridge of the Nansha Port Railway, Guangdong Province, China

It is also with a heavy heart that we take a moment to pay our respects to our dear colleague and friend, Richard L. "Rich" Conners, P.E., who sadly passed away earlier this year. We miss you and will always cherish your contributions to the Pittsburgh bridge community.

Sincerely,

Jon McHugh, Matt Bunner, Mike Cuddy, and Jay Hyland
-the editors



Jon McHugh | Matt Bunner | Mike Cuddy | Jay Hyland

Welcome to the 42nd International Bridge Conference!

It is my pleasure to welcome you to the 42nd annual International Bridge Conference hosted by the Engineer's Society of Western Pennsylvania (ESWP). The first Conference, held in 1984 featured 44 papers. We are returning to the David L. Lawrence Convention Center in Pittsburgh after successful Conferences in San Antonio and National Harbor the previous two years.

This year's Conference will showcase 84 papers, 4 special technical sessions, 9 workshops and presentations by our four Featured Agencies: Allegheny County, The City of Pittsburgh, PennDOT and the Pennsylvania Turnpike Commission. The schedule also includes the IBC Awards Dinner on Tuesday evening where our Awards Committee will present medals to the seven selected recipients. The successful "Bridging the Gap Theater" Session, featuring presentations by attendees discussing ideas for the bridge industry will also continue. There will be a site tour on Tuesday of the Beaver River Bridge Replacement Project. Be sure to stop by our Exhibit Hall to welcome our exhibitors and enjoy lunch buffets and evening receptions.

The planning for the conference by the Executive Committee started the day after the 2024 conference. Our dedicated volunteer group of 32 Voting Members, 6 Honorary Members (25 years of service), and 7 Emeritus Members (10 years of service) meet monthly and manage our 17 Committees. Our group will have 21 session chairs for the technical sessions, and 8 moderators for the workshops. The reliable experienced ESWP staff, headquartered in Pittsburgh, PA, of Dave Teorsky, Kristina Emmerson and Mike Gaetano ensure we meet deadlines, post notifications, put technologies in place, and make sure we abide by the Manual of Operations. Since our Executive Committee is geographically diverse, with individuals from 19 different cities in 10 states, the virtual meeting choice has been the preferred way to meet. I thank all of them for their effort and cooperation.



ESWP is dedicated to encouraging the "next generation" of engineers through innovative, enjoyable, and hands on learning opportunities. At the IBC, a Student Poster Competition is conducted. Students submit on any topic relating to their bridge engineering experience. Stop by their posters near the Exhibit Hall as they will answer any questions you may have about their poster. A Special Session will feature four Young Attendee Presentations.

The financial success of our conference is due to our Exhibitors and your registration fees. Thanks for attending and hope you enjoyed the content we provided. Last year's conference survey question, "Would you recommend IBC to others" garnered a 98.3% "yes" answer. We are working for an even higher response for this year's conference.

Bill

Bill Detwiler, P.E.
General Chair IBC 2025
Bill is Vice President and Bridge Sector Manager for TYLin Internationals US South and is based in Miami, FL

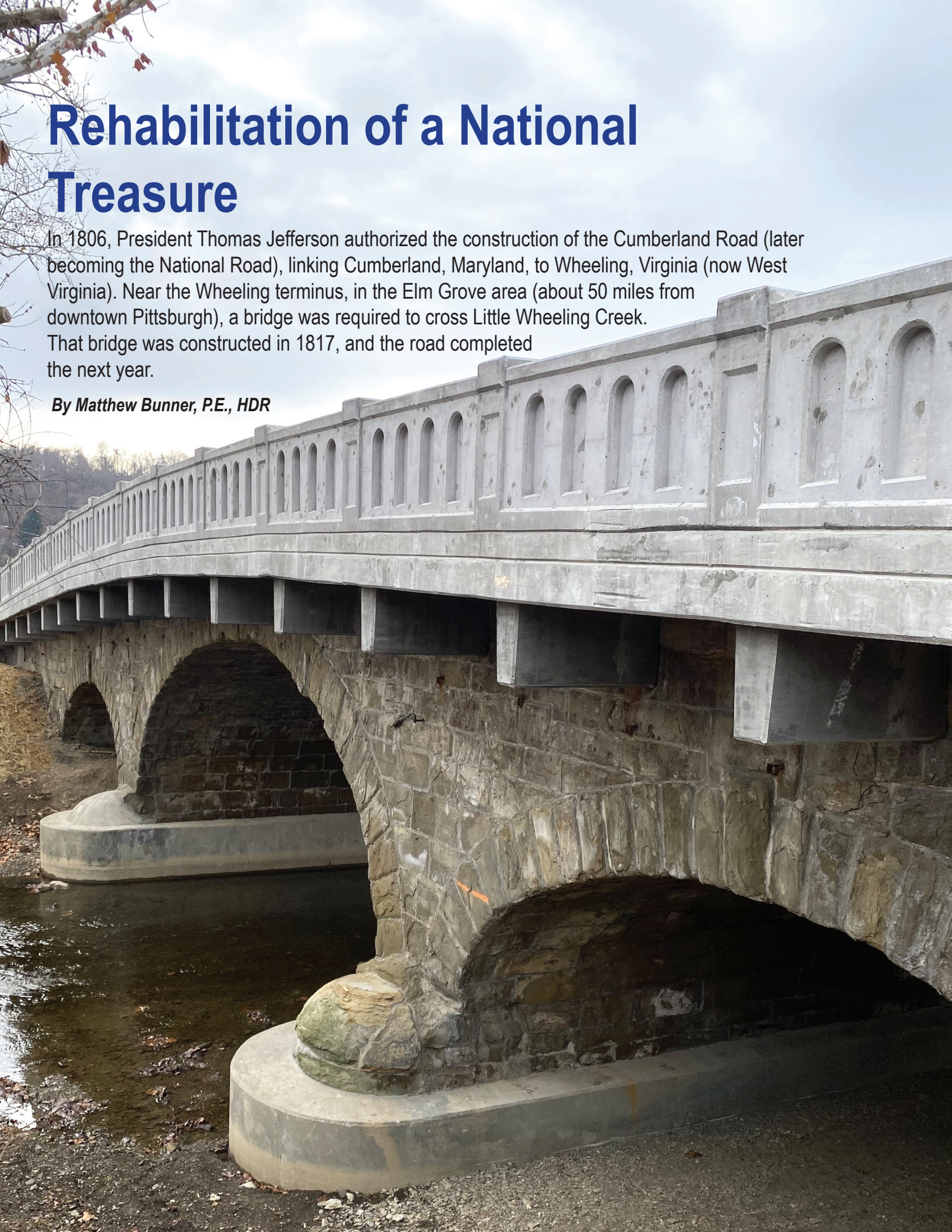
2026 Featured Agency: FHWA

In 2026, IBC is excited to the Federal Highway Administration (FHWA) as the Featured Agency. The FHWA and/or its predecessors has been around and involved with the design and construction of public roads since 1905, so it's about time they get a feature. In truth, the FHWA plays a vital role in supporting and advancing the U.S. bridge industry. It provides critical funding for bridge construction, maintenance, and modernization, helping ensure that infrastructure remains safe and reliable. FHWA sets national safety standards and inspection requirements, promoting consistent, high-quality practices across the country. Through initiatives like Every Day Counts, the agency encourages the adoption of innovative technologies and faster construction methods. It also supports the bridge workforce by offering expert training and technical assistance. Additionally, FHWA manages the National Bridge Inventory, a key resource that helps transportation agencies make informed, data-driven decisions about repairs and long-term investments. Together, these efforts reinforce the integrity and future readiness of the nation's bridge network.

Rehabilitation of a National Treasure

In 1806, President Thomas Jefferson authorized the construction of the Cumberland Road (later becoming the National Road), linking Cumberland, Maryland, to Wheeling, Virginia (now West Virginia). Near the Wheeling terminus, in the Elm Grove area (about 50 miles from downtown Pittsburgh), a bridge was required to cross Little Wheeling Creek. That bridge was constructed in 1817, and the road completed the next year.

By Matthew Bunner, P.E., HDR





Original Bridge Appearance (Photo courtesy of Ohio County Public Library Archives).

The Monument Place Bridge is the oldest bridge in West Virginia, among the oldest in the country, and one of two extant bridges in West Virginia from the historic National Road (along with the Wheeling Suspension Bridge). Today, the bridge carries US 40 over Little Wheeling Creek and is listed on the National Register of Historic Places. The stone arch bridge is a unique and rare example of an elliptical style stone arch. The three-span structure was updated in 1931 when the original parapets were removed and replaced with concrete sidewalks and balustraded parapets. In 1958, a shotcrete veneer was applied over the stone, giving it the appearance of a concrete arch bridge.

The Monument Place Bridge is the oldest bridge in West Virginia, among the oldest in the country,

When originally constructed, the Monument Place Bridge and the completion of the National Road spurred a regional economic boom and helped Wheeling become the gateway to the West as hundreds of wagons carried goods over the road annually. The new linkage between the Potomac and Ohio Rivers reduced travel time and greatly reduced shipping costs. For two centuries, the bridge served the local community, the region, and the nation.

Over time, portions of the shotcrete veneer had fallen into Little Wheeling Creek, which exposed the masonry underneath that had suffered loss of mortar, staining, and stone deterioration. Scour had undermined an abutment and the two intermediate supports. The sidewalk overhangs and support brackets installed in the 1930's showed extensive deterioration, particularly below the construction joints in the sidewalks. The bridge was posted for weight limits of 16 tons for single-unit trucks and 32 tons for tractor trailers, based solely on engineering judgement.

The design project for the rehabilitation of the bridge was advertised by the West Virginia Division of Highways (WVDOH) in 2009, and HDR was selected. This project involved the investigation and evaluation of the bridge condition, including analysis, study of various rehabilitation schemes, and final design of the selected method.

Given the bridge's historic nature, all rehabilitation work had to adhere to Section 106 of the National Historic Preservation Act of 1966 and The Secretary of the Interior's Standards for the Treatment of Historic Properties.

Project Goals

A key goal of this project was to maintain the character-defining features of the original bridge, restoring the original beauty and grandeur, and preserving the structure for continued use by future generations. It was determined that elements of the rehabilitated structure were to include new architectural barriers reminiscent of the 1930's barriers, faux concrete overhang brackets to recreate the appearance of the sidewalks that had been installed in the 1930's, accept-

able new scour-resistant encasements with clean lines at the abutments and interior supports, and masonry that was cleaned, repaired and repointed, eliminating delaminations and spalling, and restoring the original color and appearance of the sandstone.

Besides restoring the integrity of a historic treasure for years to come, this project would help ensure that US 40 would continue to safely convey vehicular and pedestrian traffic through the community of Elm Grove and maintain the continuity of the local transportation system.



Deterioration of bridge prior to rehabilitation.

The process necessary to move through alternatives analysis, environmental documentation and clearance, preliminary and final design and construction was quite long and systematic, but was to be expected given the historic nature of the bridge.

Environmental and historic clearance involved extensive work over many years of design, culminating in a Final Environmental Assessment that included a Programmatic Section 4(f) Evaluation, Cultural Resources coordination resulting in a Memorandum of Agreement (MOA) between the West Virginia Division of Highways, FHWA, WV State Historic Preservation Officer and the Advisory Council on Historic Preservation, and significant public involvement, including workshops. The environmental process established stipulations and commitments for the rehabilitation that were strictly adhered to in the design.

Rehabilitation Design

Since original construction was in 1817, there was no information available related to the exact configuration, component size and materials used in the bridge. This was complicated by the shotcrete that hid much of the structure from visual inspection. To address this, a pilot project to remove portions of the shotcrete veneer was let in advance of final design. In addition, a boring program was performed to ascertain critical stone dimensions and properties. Finally, the surface of the bridge was scanned with LiDAR to permit the inventory of individual spandrel stones. These tools helped in the development of the analyses that were necessary to determine the degree of arch strengthening that may be required.

The analysis method utilized was based on the ultimate limit state method. For the Monument Place Bridge, the limit state analysis was performed using the LimitState:RING software from LimitState Ltd. based in the United Kingdom. Based on the analysis performed, various methods of increasing the arch live load capacity were investigated, with the complete replacement of existing fill with lightweight reinforced concrete being the least intrusive and most effective option.

The renovation work would include removal of the existing cantilever sidewalks, barriers, roadway surface, and fill material between the spandrel walls, repair and repointing of the arch barrel and spandrel stonework, backfill with the lightweight reinforced concrete, and placement of a new concrete deck and architecturally enhanced, context-sensitive barriers and concrete faux overhang support brackets.

Where possible, historically accurate materials were to be utilized, such as a mortar consistent with what had originally been used. Where individual stones needed to be replaced, they were to be sourced from the local area

Where possible, historically accurate materials were to be utilized, such as a mortar consistent with what had originally been used. Where individual stones needed to be replaced, they were to be sourced from the local area (in fact, the City of Wheeling provided some 80 compatible stones) or from stones shifted from other locations on the bridge (and approved by the WVDOH/SHPO). For other portions of the bridge, modern materials such as the lightweight concrete fill over the arches and high chromium corrosion-resistant steel reinforcing bars in the new deck and barriers were utilized.

A new concrete deck slab and sidewalks were cast above the new fill and arch extending beyond the spandrel walls and designed for the cantilever demands. Although the new cantilevered deck was strong enough as designed, it was desired to mimic the concrete brackets present on the existing bridge, therefore concrete faux overhang support brackets were incorporated into the design.

Research was conducted on new barriers which would be a close approximation of the 1931 barriers (which were considered historic in their own right), and a MASH compliant barrier from Texas (Type C411) was chosen and approved by stakeholders.

To limit future maintenance, new sleeper slab transitions to approach pavement were provided to minimize differential settlement at the limits of the bridge, modern preformed silicone coated foam joints between the deck and sleeper slabs were incorporated, and slight modifications to the new C411 barriers to prevent roadway drainage from passing through barrier openings and onto the masonry below were detailed.

Construction

The Monument Place Bridge is in a tight urban site, bordered by several businesses and Wheeling Creek, with numerous utilities near and on-structure that needed to be maintained or relocated. To maintain strict control over the design and ensure the bridge met all requirements and commitments, the WVDOH determined that a Design-Bid-Build format was critical. The design team was engaged throughout construction to review contractor submissions for temporary works and material selection to ensure that the integrity of the original bridge was not compromised. In addition, the WVDOH Environmental Group and other agencies (such as SHPO) were consulted throughout construction to confirm that the environmental and historic commitments were met.

The project was let in April 2021. The WVDOH's Engineer's Estimate was $5.04M. Six bids were received ranging from $3.78M to $5.80M (75% to 115% of the Estimate), and Clearwater Construction of Mercer, PA was the winning bidder who performed construction between 2021 and 2024. Construction was interrupted during that period, as the bridge was on an important detour route for a nearby I-70 reconstruction project. In addition, like many aspects of life, construction was disrupted somewhat through the COVID-19 pandemic. However, even with these schedule impacts, the final project cost came in within budget.



Fill removed prior to lightweight concrete placement.

Construction complexities included the degree of care which had to be exercised during the removal of any remaining shotcrete veneer, existing roadway surface and concrete sidewalks, barriers and sidewalk support brackets in order to not to damage the masonry to remain. Additional complexities included the repair and repointing of the intricate stonework, and excavation and replacement of the arch fill.

Masonry arches, while stout in their completed condition, can exhibit instabilities when fill is removed and unsymmetric loads are placed on the bare arch. Therefore, extensive temporary shoring of the arch barrels was necessary. Through the extensive coordination and commitment to timely reviews, construction was completed with very few field issues and no changes to the as-designed structure.

Project Completion

Extensive coordination was required throughout the entire project which stretched over multiple years. Key to the success of this project was clear and consistent communication and an atmosphere of partnering. The completed bridge was reopened to traffic on Wednesday, November 6, 2024.

According to the current AASHTO Bridge Design Specifications, new bridges are designed for a 75-year design life. Today, owners and designers talk about designing for an enhanced service life of 100 years or even a maximum service life of 150 years, and the additional effort, requirements, and cost that are required to achieve that life. In the case of the Monument Place Bridge, the structure has already served its purpose long beyond what is even now considered "maximum service life".

As stated by the West Virginia State Bridge Engineer, Tracy Brown, P.E., "This bridge has been used by multiple generations and crossed by countless people over the 207 years it has been in service, including President Andrew Jackson and other historic figures. The recent renovation will help to ensure that this historic bridge will continue to be used by future generations and will provide them a direct connection to a special piece of West Virginia's infrastructure that has been around since the infancy of our country."

Wufengshan Yangtze River Bridge:
the First High-speed Railway Suspension Bridge in the world

By: Xu Gongyi, China Railway Major Bridge Reconnaissance & Design Institute Co., Ltd., Wuhan, China



Introduction

The Wufengshan Yangtze River Bridge is located in Zhenjiang City, Jiangsu Province, China. The main bridge, a single-main-span suspension structure, is a double-deck road-cum-rail high-speed railway suspension bridge with a main span length of 1,092 m and combines an eight-lane expressway on the upper deck and a four-line high-speed railway on the lower deck.

The Wufengshan Yangtze River Bridge has a design speed of 250 km/h for railway and has broken the world record for the fastest running speed of 275 km/h during a railway joint test. It is the first high-speed railway suspension bridge in the world, the first road-and-rail suspension bridge in China, as well as the first railway suspension bridge in China. The fact that it has been successfully put into operation has opened a new era in high-speed railway suspension bridge technology worldwide.

Technical Challenges

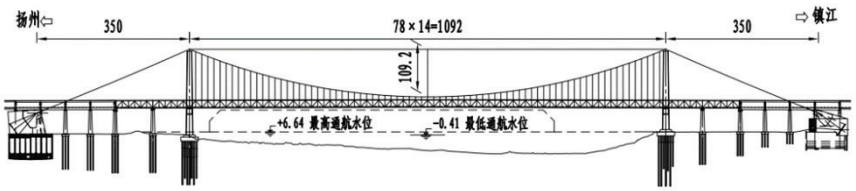
Highway suspension bridges have a construction history of 100 years and have thousands of engineering cases. However, there are few cases of railway suspension bridges.

For example, for both the Franklin Bridge in Philadelphia and the Manhattan Bridge in New York, the train speeds are below 100 km/h and carries relatively low traction mass, equivalent to the level of urban light rail. The three suspension bridges in Japan, namely the Shouth Bisan Seto Bridge, the Nouth Bisan Seto Bridge, and the Shimotsui Seto Bridge, carry a maximum operating speed of 180 km/h and a total towing capacity of 1,400 tons. The Tagus River Suspension Bridge in Lisbon, Portugal, carries the operating speed of less than 60 km/h and a total towing weight of 740 tons. Our Wufengshan Yangtze River Bridge requires a speed of 250 km/h and a total vehicle traction weight of 3,559 tons. It can be seen that the standards required for railway bridges in China are the highest.

Since there were no similar bridge projects like Wufengshan Yangtze River Bridge, the designer had to innovate and propose new standards for the stiffness of high-speed railway suspension bridges, the loading mode of railway trains, the structural stiffness of the suspension bridge, beam end angles, and the effects of temperature deformation to meet the safety and comfort requirements of train operation. They performed the wind-vehicle-rail-bridge coupling dynamic analysis of suspension bridges and railway track geometric evaluation for confirming the accuracy of the methods and theories.

Main Innovation

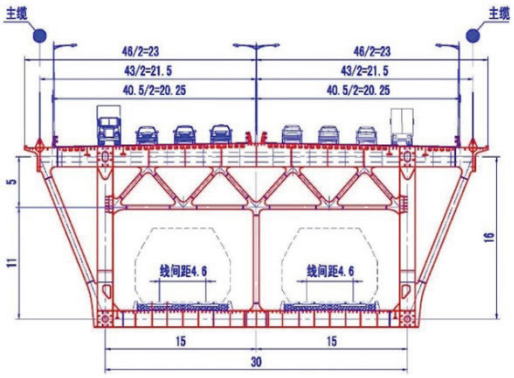
3.1 Design Theories and Methods



Wufengshan Yangtze River Suspension Bridge

Based on the wind-vehicle-rail-bridge coupling analysis, the design team proposed to evaluate track geometry calculation and Chinese railway loading and design speed, the stiffness criteria for suspension bridges of Chinese high-speed railways.

They analyzed the train loading length, multi-line discount factor, public-railway combination discount factor, and formulated the loading mode and calculation method for large-span suspension bridges with multi-line railways and multi-lane highways. If only running a train set, train loading length is 450 m. The probabilities of the second, third, and fourth line trains traveling simultaneously are about 8%, 0.75%, and 0.075%, respectively. Therefore, the recommended reduction coefficients are of 0.9, 0.7, and 0.6. When combining highway and railway loads, the highway load combination coefficient is recommended to be 0.8.

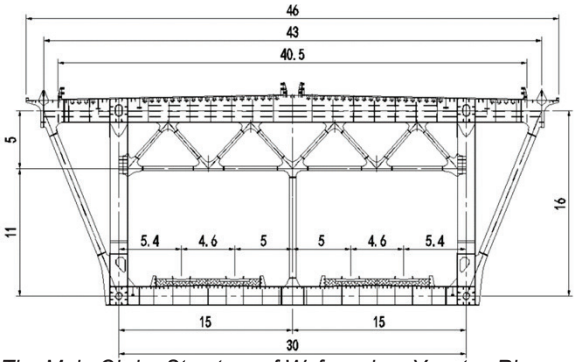


Lane Arrangement of Wufengshan Yangtze River Bridge

The team developed the existing wind-vehicle-rail-bridge coupled dynamic analysis and track geometry evaluation methods for girder bridges, arch bridges and cable-stayed bridges, and applied to vehicle-bridge coupled with dynamic analysis and track geometry evaluation of suspension bridges with greater geometric nonlinear deformations and displacements, forming the latest design theories and technological methods for high-speed railway suspension bridges.

3.2 Structure Design Innovation

The stiffening girder of the suspension bridge adopts the overall arrangement of five continuous spans suspended from the main span. The steel joist girder elevation is Warren type truss structure, and the cross section is straight main truss structure with sub-trusses. The steel joist diagonal bracing with sub-trusses is innovatively adopted to connect the straight main truss structure with double webs and the diagonal bracing is connected with the main trusses and the cross girder with double webs, which improves the structural stress and fatigue performance, while saving a significant amount of steel.



The Main Girder Structure of Wufengshan Yangtze River Bridge

The longitudinal reinforcement beam of the suspension bridge adopts a multi-damping constraint system, and a total of 8 sets of high resistance viscous dampers were installed at the main tower of the bridge to constrain the impact effects of earthquakes and also braking forces. It also reduces the elongation and cumulative displacements of the beam ends, improving the durability of the bearings and expansion devices. Setting a small angle flexible central buckle between the cable beams in the middle of the span also plays a similar damping role, improving the stress on the short suspension cables and reducing the expansion and contraction under live and wind loads.

The stiffening girder of suspension bridge adopts a new type of steel truss girder structure with plate-truss combined joint force, and the upper and lower deck systems adopt plate-truss combined structure to participate in the main truss joint force, which improves the overall stiffness of the suspension bridge, and adapts to the ballasted track high-speed railway at the same time. For the first time, the double-sided submerged arc full penetration welding process was adopted between the top plate and U-ribs of the highway steel bridge deck, and the rolled stainless steel composite steel plate structure was used for the railway ballast groove panel, which improved the structural durability.

The team developed an integrated rail expansion regulator and girder end expansion device of under-bearing type suitable for large displacement (1,760 mm) of railway suspension bridges.

3.3 Technology for Stability and Track Geometry Control

Through theoretical calculations, it was possible to accurately grasp the bridge operation safety, wind resistance stability, train wind-induced response laws, and temperature-induced large deformation laws. The goal was to ensure the safe and smooth operation of high-speed trains.



Closure of the Main Beam for Wufengshan Yangtze River Bridge

By simulating the wheel-rail contact relationship, in-depth evaluation and research were conducted on the geometric shape of the track, vehicle dynamic response, and bridge vibration acceleration, forming a driving smoothness control technology. A 60-m midpoint chord measurement method was proposed for the acceptance standard of long wave track roughness. At the actual bridge acceptance test speed of 275 km/h, the train operation is safe and stable, and all indicators are consistent with theoretical calculations, resulting in a fully optimal level.

3.4 Construction and Manufacturing Innovation

The team successfully completed the design and manufacture of super-large diameter main cables, three-block main saddles, large swing axis loose saddles, super-large diameter cable clamps, and the research and development of super-large diameter tightening cables, wire wrapping, and super-large tonnage cable-carrying cranes. Additionally, new technologies were developed for the synchronized tensioning of the screw group of the cable clamps and real-time detection. The team realized the high-precision control of the manufacturing and processing of the main components of the super-large suspension bridge were crucial to the installation of the cable sets during construction.

3.5 New Type of Foundation

This bridge pioneered a new type of protective structure, including an anchor reverse step shaped expansion foundation and an unclosed deep rock embedded circular connecting wall at the bottom. The team developed an “impact drilling and groove milling machine repair” construction and directional blasting technology for bedrock pre-splitting. The “cross excavation method” was proposed for the large sunken well and small pot bottom to ensure the smooth sinking of the foundation of the giant anchor sunken well. A construction technology was developed for ultra deep piles using “double casing” and large counterweight pressure reducing drilling. The technology of large-scale anchoring and main tower foundation was expanded.

Great Contribution and Influence

The main technical contributions of the Wufengshan Yangtze River Bridge are reflected in the following aspects:

- The different technical requirements of China’s high-speed rail in terms of bridge load and speed have led to different structural design and engineering strategies for this bridge compared to those in other countries.
- The design capability, manufacturing capability, and quality control of the large-span high-speed railway suspension bridge have been fully autonomous through the practice of this bridge.
- Design methods, technical specifications, and standards for high-speed railway suspension bridges in China have been established.
- The Wufengshan Yangtze River Bridge high-speed railway has been in operation for three years since it opened to traffic in December 2020, with 77 pairs of trains crossing the bridge every day. The stability index of the train meets the safety requirements under the maximum geometric deformation state.

The research results have filled the technical gaps of the world high-speed railway suspension bridge, dual-purpose suspension bridge in China, and railway suspension bridge in China. Technologies adopted in this high-speed railway suspension bridge are pioneering and innovative, which would be popularized and applied to the design and construction of many railway suspension bridges in China and further worldwide.

References:

[1] Xu Gongyi Research on the Stress Performance of Kilometer Span Railway Bridges [J] China Railway Science, 2011, 32

[2] Tang Heqiang, Xu Gongyi, Liu Hanshun Feasibility analysis of using suspension bridges for railway bridges [J] Bridge construction, 2017, 47 (2): 13-18

[3] Tang Heqiang Design ideas for reducing the unbalanced force of the main cable at the top of the tower in a three tower suspension bridge [J] Bridge Construction, 2015,45 (5): 83-87

Bridge Trivia – US State Quarters Edition



1. This state's quarter features Narragansett Bay with what famous bridge?



2. This state's quarter features what famous bridge that was until recently the longest arch bridge in the world?



3. Though not featured on its quarter, this state once boasted this the third longest suspension bridge in the world (by main span), this bridge?



4. Though also not featured on its quarter, this state lays claim to what famous river crossing, which was named after the engineer, who also designed and constructed Ironclads for the civil war?



5. This state's quarter features a prominent mountain named after this USACOE surveyor who also received patents for truss designs in 1830 and 1839?



6. Although not depicted on this state's quarter, this prominent concrete bridge is named in honor of a former NFL player who perished in combat as a member of US Army Rangers?

The Scoring:
Name the State- 1 pt.;
Answer the Question- 2 pts.
18 Total Points possible

The Grading:
18-16 pts: Are you John Roebling?
15-13 pts: Bridge Aficionado
12-9 pts: Not bad
8-6 pts: Not good
5-3 pts: CS3
2-0 pts: CS4, critical finding

Answers: 1. Rhode Island, Pell Bridge; 2. West Virginia, New River Gorge Bridge; 3. Washington, Tacoma Narrows Bridge (original); 4. Missouri, Eads Bridge; 5. Colorado, Stephen Long; 6. Nevada, Pat Tillman Bridge

Reviving a Relic: The Remarkable Journey of the Mount Carbon Bowstring Truss

By: Brian Teles, PE, CBSI, Vice President

Project Background

In 2021, PennDOT District 5-0 and the Office of Multimodal Transportation identified a deteriorated iron truss bridge spanning the Schuylkill River in Mount Carbon, Pennsylvania. At 100 feet in length, the bridge had sat idle for decades, its sole purpose being to carry an active waterline. Its ownership was unknown, prompting a detailed review of property and local records that ultimately confirmed the Schuylkill County Municipal Authority (SCMA) as the owner.

Constructed in 1878 in neighboring Palo Alto and relocated to Mount Carbon in the late 1800s, the bridge is one of only three remaining bowstring trusses in Pennsylvania. It is eligible for listing on the National Register of Historic Places. Recognizing its historical value and potential for adaptive reuse, PennDOT designated the effort as a pilot project focused on repurposing historic bridges that are no longer suitable for vehicular traffic but offer new life as part of pedestrian and trail infrastructure.

PennDOT assumed ownership of the structure and retained the project team to complete the truss rehabilitation and associated trail design for the Schuylkill River Greenway Association (SRGA).

Existing Conditions and Structural Documentation

With no original plans or documentation available, the project began with a comprehensive field investigation. Engineers measured each accessible member, connection, and fastener. This data formed the basis of a conceptual relocation and restoration plan that prioritized structural integrity and preservation of original materials.

The truss lacked any existing deck, railing, or stringer system. The team relied on historical references to guide reconstruction, including a century-old postcard depicting the original railing design. These elements were reimagined to meet current safety standards while maintaining compatibility with the structure's period architecture.



Elevation view of the restored bridge looking toward the Coal Creek Commons Shopping Center

Site Constraints and Engineering Challenges

The project site between State Route 61 (SR61) and Mill Creek introduced significant logistical constraints. Unlike modern bridge projects, where spans can be adjusted to fit existing conditions, the restoration required the site to accommodate a fixed-length structure. The design team developed a placement strategy that preserved parking at the adjacent Coal Creek Commons Shopping Center and avoided encroachment on Mill Creek's hydraulic profile.

Hydraulic modeling and utility impact assessments were completed early in the design process. Coordinating with a future $100 million SR61 corridor improvement project was equally critical. The alignment, foundation locations, and trail tie-ins were all reviewed to avoid conflicts with the upcoming highway work and maintain compatibility with future development.

Stakeholder Engagement and Coordination

Proactive communication ensured that business operations could continue throughout construction. Regular coordination meetings and advanced notice of staging and equipment movement allowed tenants to plan around the work with minimal disruption. These efforts were essential to maintaining stakeholder support and project momentum.



Schuylkill River Trail across the restored bridge looking toward SR61.

Disassembly, Fabrication, and Reconstruction

To begin construction, the bridge was lifted from its original abutments and moved to a nearby staging area, where each member was labeled and documented during disassembly. The components were then shipped to a blacksmith in Ohio, where traditional restoration techniques — including hot-driven rivets — were used to restore the truss in accordance with its original fabrication practices.

While the original connections had deteriorated, new cast components were produced using molds designed to replicate the originals as closely as possible.

Back on site, new abutments were constructed to accept the restored truss. The structure was transported and placed with precision using a crane at one end and a supporting forklift at the other. The limited staging area required detailed lift planning and close coordination between the contractor, rigging specialists, and the design team to ensure a successful set without damaging nearby features or obstructing existing infrastructure.

Preservation-Focused Detailing

The design approach emphasized the retention of original members wherever possible. When replacement was required, new members were fabricated to similar original dimensions and material specifications. The design incorporated a new deck and pedestrian railing that drew from historical references while meeting current code requirements for trail structures.

The new railing was selected with a muted gray galvanized finish to minimize its visual impact. In contrast, the truss was repainted in a bold red—a deliberate nod to the region's industrial heritage and a visual tie-in to other local coal and steel-era structures.

Outcome and Legacy

The Mount Carbon Bowstring Truss now forms a vital connection within the Schuylkill River Greenway's expanding trail network. In addition to extending trail access along the SR61 corridor, the bridge adds historical character to the Coal Creek Commons area and supports multimodal access through St. Clair and surrounding communities.

What began as an abandoned span — once described in an 1890 news clipping as "a dilapidated structure tumbling into the Schuylkill" — has been carefully restored and reintroduced as a fully functional pedestrian bridge. The project stands as a model for the adaptive reuse of historic infrastructure and demonstrates how careful planning, engineering discipline, and community engagement can deliver lasting value.

ESWP Member News

We are pleased to recognize the more than 75 firms in the Corporate Member program of the Engineers' Society of Western Pennsylvania (ESWP). Corporate Memberships are available at 3 levels: Gold, Silver and Bronze; Gold members are entitled to 14 memberships that can be exchanged by employees; Silver, 9; and Bronze, 5 — annual dues are $2400, $1700, and $1000 respectively. In addition, ESWP Corporate Member Firms may add 2 additional individuals in our "Under-35" age category at no additional cost! This is a great way to recognize those future leaders in your firm!

We also offer Individual Memberships, including our "Under-35" category, which allows for full member privileges at annual dues of $25 and a Government rate (full-time), for $50.00! More information can be found at eswp.com. Please contact the ESWP Office (412-261-0710, or eswp@eswp.com) with any questions.

Membership in ESWP comes with a long list of benefits! From our continuing education opportunities earning you Professional Development Hours (PDHs), to the business networking events at our social events, there is something for everyone in your organization. Also, ESWP is helping the next generation of engineers with student STEM outreach programs, giving you the opportunity to participate in many rewarding programs, encouraging the next generation of engineers (*and ESWP members!*).

2025 Member Dues were invoiced in January, 2025. If you have yet to receive your invoice, please contact the ESWP offices. Thank you!

ESWP Gold Corporate Member Firms

AECOM
ALLEGHENY COUNTY AIRPORT AUTHORITY
ARCADIS
CDR | MAGUIRE ENGINEERING
DLC DUQUESNE LIGHT CO.
gai consultants transforming ideas into reality
GFT
GPI
Geosyntec consultants
HATCH
HDR
Michael Baker INTERNATIONAL

ESWP Silver Corporate Member Firms

CEC Civil & Environmental Consultants, Inc.
GATEWAY On Call. On Time. On Target.
KTA
KU Resources, Inc.
PJ DICK TRUMBULL LINDY PAVING
PRT Pittsburgh Regional Transit
RVE 1901 REMINGTON & VERNICK ENGINEERS
WADE TRIM

ESWP Bronze Corporate Member Firms



























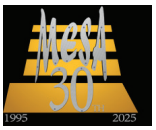






































College of Engineering
ADVANCED COLLABORATION















Truss Patents– A Bridge Quiz

1. Patents in both 1830 and 1839; Named for famous engineer who also has a mountain named after him.

2. Patented in 1840 by a Massachusetts construction contractor.

3. Patented 1844; Named for two railway engineers from Boston MA, USA.

4. Named for a British Engineer who patented it in 1848.

5. Named for an American architect who has two patents for this truss type.

6.1896; Named for a Belgian engineer who proposed this truss type with no diagonals.

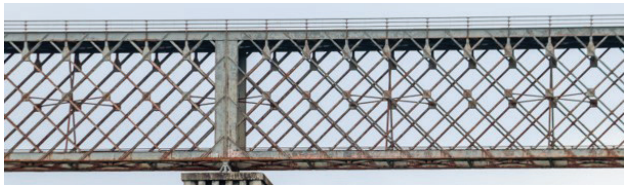
7. Patented in 1854, this truss is used for bridge and roofs alike.













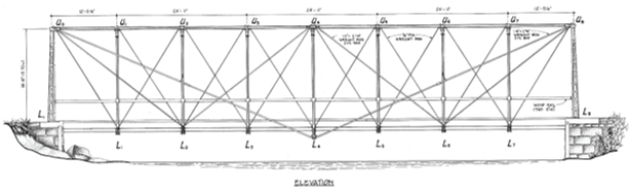


Photo Credits:

Long- https://tile.loc.gov/storage-services/service/pnp/habshaer/ma/ma1200/ma1280/color/571561cv.jpg

Howe- https://commons.wikimedia.org/wiki/Category:Howe_truss#/media/File:Large_Timber_Howe_Truss.jpg

Pratt-https://commons.wikimedia.org/wiki/Category:Pratt_truss_bridges#/media/File:New_Bridge_over_River_Likova_near_Meshkovo_1.jpg

Warren- https://upload.wikimedia.org/wikipedia/commons/8/8d/Moerdijkbrug_in_aanbouw%2C_Bestanddeelnr_906-4597.jpg

Town- https://upload.wikimedia.org/wikipedia/commons/6/62/Viaduc_des_Fades_2022_%282%29.jpg

Vierendeel- https://en.wikipedia.org/wiki/Vierendeel_bridge#/media/File:Grammene-vierendeelbridge_20030618.jpg

Fink- https://upload.wikimedia.org/wikipedia/commons/2/20/Fink_Through-Truss_Bridge%2C_Hunterdon_County_Government_Complex_%28moved_to%29%2C_Flemington%2C_Hunterdon_County%2C_NJ_HAER_NJ%2C10-CLIN.V%2C1-_%28sheet_2_of_6%29.png

Answers: 1. Long 2. Howe 3. Pratt 4. Warren 5. Town 6. Vierendeel 7. Fink

The 2013 Levi Bird Duff Bridge Preservation Using Galvanic Anodes 10 Years After Construction

By: William A. Armstrong, P.E., WEC Engineers



A view of the Levi Bird Duff Bridge (40.508863, -80.046584) prior to the start of 2013 preservation project.

The Levi-Bird Duff Bridge is an 830-foot continuous five-span composite plate girder weathering steel bridge carrying Center Avenue over I-279, which is a vital link between West View and Bellevue Boroughs. When it opened in 1985, it was a beautiful structure. However, by 2007, it had an estimated remaining service life of only 10 years and was an eyesore due to extensive spalling and rust staining.

The Allegheny County Department of Public Works (ACDPW) hired engineering consultant HDR to inspect the bridge. Due to the extensive spalls on the piers, ACDPW asked HDR to core the piers, determine the cause of the deterioration, and provide repair recommendations.



Pier 1 prior to the 2013 preservation project (left), and in October 2024 (right).

HDR completed the report on May 2, 2007 and listed the causes of deterioration, which were leaking joints and downspouts as well as deicing salts. ACDPW and engineering consultant W.E.C. Engineers, Inc. (WEC) reviewed HDR's repair recommendations and agreed that one particular item had to be included in a future preservation project. HDR's inspectors wrote that "since the existing concrete in the deteriorated areas are already affected by chlorides, corrosion of the reinforcing steel will most likely continue after patching. In order to mitigate this

corrosion, provide a galvanic control and prevention system for the repaired areas."

Based on past experience, ACDPW and WEC knew that Class AA cement repairs tended to fail over time. Therefore, in 2007, they contacted Vector Corrosion Technologies (VCT) about what would be needed to incorporate galvanic protection into a future preservation project. VCT recommended embedded galvanic anodes.



Pier 3 prior to the 2013 preservation project (left), and in October 2024 (right).

ACDPW then secured federal funding for the preservation project. Working with the Pennsylvania Department of Transportation (PennDOT) District 11, ACDPW advanced the bridge quickly into design and selected WEC to develop plans. Mosites Construction Company was the low bidder and performed the construction.

The project included the following work:

- The bridge had three leaking expansion dams – one at each abutment and one at pier 1. All three expansion dams were replaced with strip seal dams.
- The reinforced concrete deck wearing surface was replaced with a 1.25-inch thick latex modified concrete deck. The top inch was removed by scarification, and an additional quarter-inch was removed by hydro demolition.
- The 6-inch diameter downspouting on the structure, which had clogging issues, was replaced with the current standard 10-inch diameter downspouting. Hydraulic analysis of the scupper spacing on the bridge deck was performed, which showed that scuppers could be removed. Thus, the scupper and downspouting over the 119-foot tall pier 3 were removed.
- The weathering steel was painted at the three joint locations.
- The rusting protective fencing was replaced with vinyl coated protective fencing.
- The substructure and superstructure were given a protective coating using an aesthetic penetrating stain, covering the extensive rust staining on the bridge and slowing the absorption of salt spray into the concrete from I-279.

Ten years after construction was completed, the embedded galvanic anodes in the Class AA cement repairs are withstanding the test of time.

The galvanic anodes, which are tied to the structure reinforcement bars, will continue to corrode instead of the reinforcement steel until they are depleted. By doing typical preservation work on the bridge, the time until those anodes are depleted has been extended.



Pier 3 hammerhead prior to the 2013 preservation project (left), and in October 2024 (right). Note the scupper and downspouting were eliminated on this pier per the project plans. The undersides of the pier caps were repaired with shotcrete because form and pour methods were not feasible for the overhead repairs.

The exposed structure reinforcement bars were sand-blasted clean, and the anodes were then

installed in the repair by tying the anode wires to the existing reinforcement. The exposed rebar was then coated with an epoxy paint except at the tied connections, which were left uncoated. That was done to further extend the life of the repairs.



The edge of deck prior to the 2013 preservation project (left), and in October 2024 (right). Anodes were tied to the transverse deck bars while the longitudinal edge bars were replaced.

A cursory inspection of the abutment and pier Class AA cement repairs with embedded galvanic anodes on October 21, 2024 – more than 10 years after the construction was completed – found no bleeding of rust coming from any of the repairs.

The October 21, 2024 cursory inspection was interesting, as no rust bleeding from any of the extensive Class AA cement repairs was seen in the inspection or in the review of the photographs afterward. A little rust staining was seen on pier 1, but it was coming from a pop-off in an unrepaired section of the cap above the repair.

The consultant replaced expansion dams, removed and replaced downspouting, and applied penetrating stains to reduce the absorption of salt into the concrete, which causes rusting of the uncoated reinforcement bars and eventual spalling. But all factors cannot be eliminated, as the bridge is still affected by weather, mist from I-279 every time it rains, and salt mist every time it snows.

Thus far, the hockey puck-shaped galvanic anodes spaced at 14 inches center to center have kept the 2,581 cubic feet of Class AA cement repairs rust-free. The galvanic anodes increased the cost of the Class AA cement repairs in the $2.96 million project by approximately 25% and the total cost of the project by about 4%. A decade later, that looks like money well spent.



A view of the Levi Bird Duff Bridge about 10 years after a 2013 preservation project.

Revitalizing a Landmark:
The Armstrong Tunnel Rehabilitation Project

Jason J. Molinero, P.E., PTOE, County of Allegheny Department of Public Works



The Armstrong Tunnel Rehabilitation Project stands as a testament to the Allegheny County Department of Public Works' ongoing commitment to preserving and modernizing critical transportation infrastructure. With its unique historical significance and central location in Pittsburgh, the Armstrong Tunnel is undergoing a transformative rehabilitation effort that balances engineering ingenuity with historical preservation.

Initiated in December 2022 and expected to conclude in the summer of 2025, the Armstrong Tunnel Rehabilitation Project promises to deliver a brighter, cleaner, and safer experience for its users. Spearheaded by the Allegheny County Department of Public Works (ACDPW)- in partnership with the design and construction team of Gannett Fleming/TranSystems, Michael Baker International, and Mosites Construction Company -this project exemplifies the County's proactive approach to infrastructure renewal.

Historical Significance

The origins of the Armstong Tunnel date back to 1908 when a man named Joseph Armstrong first advocated for an underground connection to be built from the recently completed 10th Street Bridge to Forbes Avenue through what was then known as Boyd's Hill. Nicknamed "Joe the Builder", Joseph Armstrong was an important public official in the history of Pittsburgh. Through his various elected and appointed public positions, including Director of Allegheny County Public Works and Mayor of the City of Pittsburgh, Joseph Armstrong was instrumental in shaping the landscape of the region with various public infrastructure projects. Allegheny County Public Works completed construction of the Tunnel in 1927 and named it in honor of Joseph Armstrong, the realization of a dream almost 20 years in the making. The cost of the tunnel's original construction was approximately $1.6 Million.

The Armstrong Tunnel is notable not only for its length and location but also for a distinctive 45-degree bend near its approach to Forbes Avenue. The Armstrong Tunnel was the first curved vehicular tunnel in the world, but urban legends persisted over the years that this bend was a mistake by the architects and engineers responsible for the original design. The truth is that the orientation of the tunnel was intentional and necessary to not only properly line up with the existing roadway network, but to avoid existing building structures on the hillside above.

In the years after opening, the Armstrong Tunnel gained a reputation for being very dark and dirty, and acquired an unflattering nickname: the "Dark and Dirty Elephant,". A simple string of lights lit the tunnel, while exhaust from vehicles, dust and dirt collected on the Tunnel surface as the Tunnel



Liner Panels with White Ceramicoat Coating Replaced Existing Ceramic Tiles

lacked a ventilation system. The outside of the tunnel did not fare much better, as the beautiful stone façade turned black thanks to Pittsburgh's industrial heritage. Despite maintenance repairs and other rehabilitation projects over the years, the Armstrong Tunnel was again plagued by dark and dirty conditions prior to this latest rehabilitation.

Upgrading Pedestrian Infrastructure

While the Armstrong Tunnel is unique in the Pittsburgh region in that it has a protected sidewalk for pedestrians on the outbound side, the existing width of sidewalk was only 45 inches, well short of PennDOT's minimum clearance requirement of 60 inches to accommodate two wheelchairs. One of the key aspects of the latest County rehabilitation project is the expansion of the sidewalk to a width of 75" for most of its length, accomplished through restriping of the roadway to a single lane in each direction that expands to two lanes at the traffic signals at each exit.

In addition to changes in the tunnel, the establishment of one-way traffic on Forbes Avenue allowed for excess roadway used for left turns in and out of the Tunnel to be repurposed into an expanded curb island separating inbound and outbound Armstrong Tunnel vehicular traffic. This alteration greatly reduced the length of the unprotected pedestrian path on the south side of Forbes Avenue crossing the Armstrong Tunnel, enhancing safety and walkability for an important pedestrian link between Downtown Pittsburgh and Duquesne University.

Upgrading Tunnel Liner Systems

One of the more visible components of the tunnel's overhaul was the installation of new tunnel liner panels, which replaced the existing ceramic tile that lined the tunnel walls. These calcium silicate panels can withstand the conditions expected in a tunnel, including exhaust, dust and chlorides, and are finished with a durable white Ceramicoat coating that provides additional fire protection, and should be easier to clean and maintain.

The panels underwent a complex logistical journey to get to the project, from various points in Europe via Chunnel for manufacturing and coating before arriving in the United States. Each panel measures 4 by 8 feet and is 0.55 inches thick. Preparation for panel installation included extensive chipping of the concrete arch and joints, followed by shotcrete application to repair and smooth the tunnel surfaces. The existing ceramic tile in the tunnel had become compromised due to water infiltration wearing away the mortar. The new tunnel liner panels will be anchored into the tunnel wall, making them less vulnerable to such effects and easier to replace if needed.



Interior Tunnel Cleaning



Electrical Systems Upgrade inside the Tunnel

Lighting and Fire/Life Safety Enhancements

Safety is at the forefront of the tunnel's rehabilitation. Fire and life safety improvements are being implemented to bring the structure up to modern standards. These include:

- State-of-the-art LED lighting systems, installed in both standard and transition zones
- Phenolic fiberglass conduit for electrical infrastructure
- Installation of a tunnel dry standpipe system
- Reflective "Running Man" emergency signage
- Intumescent panels around cross-passageways to contain heat and smoke

These enhancements not only protect tunnel users but also assist emergency responders by ensuring visibility and accessibility during incidents.

Construction

The rehabilitation has progressed through multiple phases of complex construction activity. These include:

- Chipping and preparing surfaces for embedded conduit or other spall and joint repairs
- Applying shotcrete to the tunnel arch and walls for structural reinforcement
- Installing tunnel liner panels
- Reconstructing the tunnel roadway and sidewalks
- Installing new electrical conduit and light fixtures
- Cleaning and restoring the stone masonry at tunnel portals

Each stage of construction has been meticulously planned to minimize disruption while achieving long-term structural and aesthetic improvements.

Restoring the Historic Character

The project also includes efforts to honor the tunnel's historic architecture. The cleaning of stone masonry at the tunnel portals has dramatically improved their appearance, restoring original details long obscured by decades of grime and pollution. In lieu of a chemical cleaning, the County opted to use a wet abrasive blasting process that was successful in the previous year's rehabilitation of the stone piers and pylons of the County's "Sister Bridges" (6th, 7th, and 9th Street). These efforts represent the County's continued commitment to preserving its civic landmarks and restoring them to their former glory.



Exterior View of Tunnel Before and After Cleaning

Conclusion

With a completion date projected for summer 2025, the Armstrong Tunnel Rehabilitation Project is well on its way to reviving one of Pittsburgh's most historically and functionally important transportation arteries. More than a routine repair, this project exemplifies how thoughtful engineering, historical reverence, and public safety considerations can converge in a modern infrastructure renewal effort.

Through this initiative, Allegheny County not only addresses immediate structural and safety needs but also enhances the aesthetic, functional, and cultural value of the Armstrong Tunnel for future generations.

IBC Awards 2025

The IBC Awards Committee presents Medals and Awards of Distinction to worthy contributions from the international engineering community. This year's winners, along with quotes from Committee members include:



Gustav Lindenthal Medal

We have selected the Shuangbao Bridge in Wulong District, China as the 2025 recipient of the Gustav Lindenthal Medal recognizing an outstanding structure that is also aesthetically and environmentally pleasing.

"This concrete-filled steel tube deck arch bridge provides two main arch spans over the dual valleys and resembles a double rainbow suspended in the clouds."



Arthur G. Hayden Medal

We have chosen the Nansha Three-River Bridge in Guangzhou, Guangdong Province, China as the 2025 recipient of the Arthur G. Hayden Medal recognizing a single recent outstanding achievement demonstrating vision and innovation in special use bridges.

"The unique three-dimensional design of this three-leg pedestrian bridge has become a centerpiece of Guangzhou."



Abba G. Lichtenstein Medal

We honor the Restoration Project of the Minjiang Bridge in Yibin City, Sichuan Province, China as the 2025 recipient of the Abba G. Lichtenstein Medal, recognizing a recent outstanding achievement in bridge engineering demonstrating artistic merit and innovation in the restoration and rehabilitation of bridges of historic or engineering significance.

"The Minjiang Bridge restoration maintains all aesthetics of the original design in the true spirit of the Lichtenstein Medal."



George S. Richardson Medal

We have selected the Huangmaohai Link in Guangdong Province, China as the 2025 recipient of the George S. Richardson Medal, recognizing a recent, single achievement in bridge engineering.

"This Link over the Huangmaohai River consists of a two-tower cable stayed bridge system and a three-tower cable stayed bridge system providing three different shipping channels. The hyperbolic single-columned towers combined with split steel box girders is a distinctive and aesthetically pleasing design."



Eugene C. Figg Medal

We are pleased to honor the Te Ara Pekapeka and Taurapa Bridges in Hamilton, New Zealand as the 2025 recipient of the Eugene C. Figg Jr. Medal recognizing a single recent outstanding achievement which is considered an icon to the communities for which it is designed.

"This two-bridge project is integrated into the roadway and the surrounding trails providing symbolic designs representing the long-tailed bat and canoe sternposts. The unique designs provide an icon to the City of Hamilton."



Theodore Cooper Medal

The 2025 Theodore Cooper Award, recognizing a recent outstanding achievement in railroad engineering, is awarded to the Hongqili Grand Bridge of the Nansha Port Railway in Zhongshan, Guangdong Province, China.

"This unique steel truss bridge controls deflections with the addition of steel arches."

2025 John A. Roebling Award

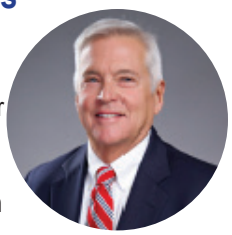
"Recognizing a lifetime achievement in bridge engineering. Major achievements may include design, construction, research or educational endeavors"

The International Bridge Conference Awards Committee is pleased to recognize Mr. Kenneth V. Butler, P.E., as the recipient of the 2025 John A. Roebling Medal for lifetime achievement in bridge engineering.

As an engineering executive with four decades of experience, "Ken" has contributed to some of North America's most iconic bridge projects. He has been involved with the business development, project management, design, and construction of 38 complex bridge projects worth more than $12 billion in construction cost. Currently, Ken is leading the $3.5 billion Brent Spence Bridge Corridor Project in Cincinnati, Ohio. This is the largest progressive design build bridge project in the country and includes a signature bridge over the Ohio River.

During his 32-year tenure with AECOM his bridge responsibilities have progressively grown from Mid-Atlantic Regional Bridge Engineer (RBE) to East Coast RBE, followed by eight-years as the North America Director of Bridges Services and seven-years as Chief Bridge Engineer for the North America Complex Bridge Practice. Currently, and for the last four-years, he is AECOM's Global Head of Complex Structures leading a team of 1,744 industry-leading bridge engineers, architects and designers. Ken has demonstrated strong leadership abilities, outstanding technical skills, amazing client responsiveness and a dedication to the field of bridge engineering. He has a reputation of always being prepared; produces high quality work; and assigns the best technical expertise to deliver award winning projects. Prior to joining AECOM, Ken spent eight years with Figg and Muller Engineers/ Figg Engineering Group designing some of the nation's most iconic precast segmental, cable-stayed and arch bridges including the Senator William Roth Jr. Bridge over the Chesapeake & Delaware Canal, DE and the Natchez Trace Parkway Arches, TN.

Ken has received national recognition for his performance on high profile bridge projects having been involved with the design of seven (7) cable stayed bridges; ten (10) major river crossings; and two (2) bay bridges. For the Frederick Douglass Memorial Bridge (FDMB) Project, Washington D.C., Ken was the Designer of Record serving as the Design Manager and Bridge Director. It represents the largest transportation project in the history of the District of Columbia and includes a signature bridge over the Anacostia River that transforms South Capitol Street into a prominent gateway into the Nation's Capital. The unique three-arch system allows the superstructure to freely move through the arches and combines variable depth hexagonal structural steel unbraced arches seamlessly supported by post-tensioned concrete v-piers that spring to the waterline. The FDMB was opened to traffic in 2021 and has received 11 design awards including the ACEC MW Grand Pinnacle & People's Choice Award and IBC's Eugene C. Figg Award for Innovative Bridge Design.



For the Charles W. Cullen Bridge over the Indian River Inlet, DE, Ken was the Designer of Record serving as the Design Manager and Bridge Director. It represents the fifth bridge to be replaced in this extremely harsh coastal environment in the last 75 years. Opened to traffic in 2012 and designed to last 100-years, it has already withstood record hurricane & nor'easter storms as well as a record magnitude earthquake. Its elegant shape with tall mast-like pylon towers and blue cable stays arranged in a semi-harped array signify the bridge's nautical theme. The bridge has received 7 design awards including the ARBTA, ACEC – Grand Conceptor, ASBI, ASCE, and ENR Mid-Atlantic.

For the Nice/Middleton Bridge over the Potomac River, MD, Ken was the Designer of Record serving as the Design Manager and Bridge Director. This 2-mile-long bridge with 200-ft deep foundations was designed and built in record time in 34-months. Opened to traffic in 2022 it represents an extremely efficient and cost-effective design, high-quality repetitive construction, maximum durability and reduced maintenance over its' service life. The bridge has received 10 design awards including the DBIA Project of the Year & Best in Design Excellence, ACI, MDQI, ASHE and ACEC.

In addition to the numerous project awards he has received over his career, in 2024 Ken was inducted as an AECOM Fellow. The Fellow's Program celebrates AECOM Technical Leaders for their decades of contribution, innovation, and dedication to their respective fields of engineering. The Program celebrates them as experts, mentors, thought leaders, and true pioneers whose work continually raises the bar in the industry. Ken is one of four Fellow's in the entire AECOM organization (51,000 employees) to be inducted into this prestigious program. A video was prepared honoring Ken and his contributions to the field of bridge engineering. The video includes commentary from Richard Kenney, PE (DDOT Chief Engineer – FDMB); Natalie Barnhardt, PE (Former DelDOT Chief Engineer – Charles W. Cullen Bridge); and Joe Tse, PE (AECOM Chief Bridge Engineer).

Over his career Ken has worked on bridge projects with previous John A. Roebling Award Winners including Daniel Tassin, PEng, Dennis Mertz, Ed Wasserman, Malcolm Kerley, PE, Eugene Figg Jr., PE, Dr. Man-Chung Tang, PE, and Dr. Jean Muller. In the early part of his career Eugene Figg Jr., PE (Figg Engineering Group) and John Corven, PE (Corven Engineers/Hardesty & Hanover) were great influences and mentors, shaping the bridge engineer that he is today.

Ken earned his BS, Civil Engineering, University of Maryland, in 1984 and is a registered Professional Engineer in 14 different states.

IBC Photo Contest 2025

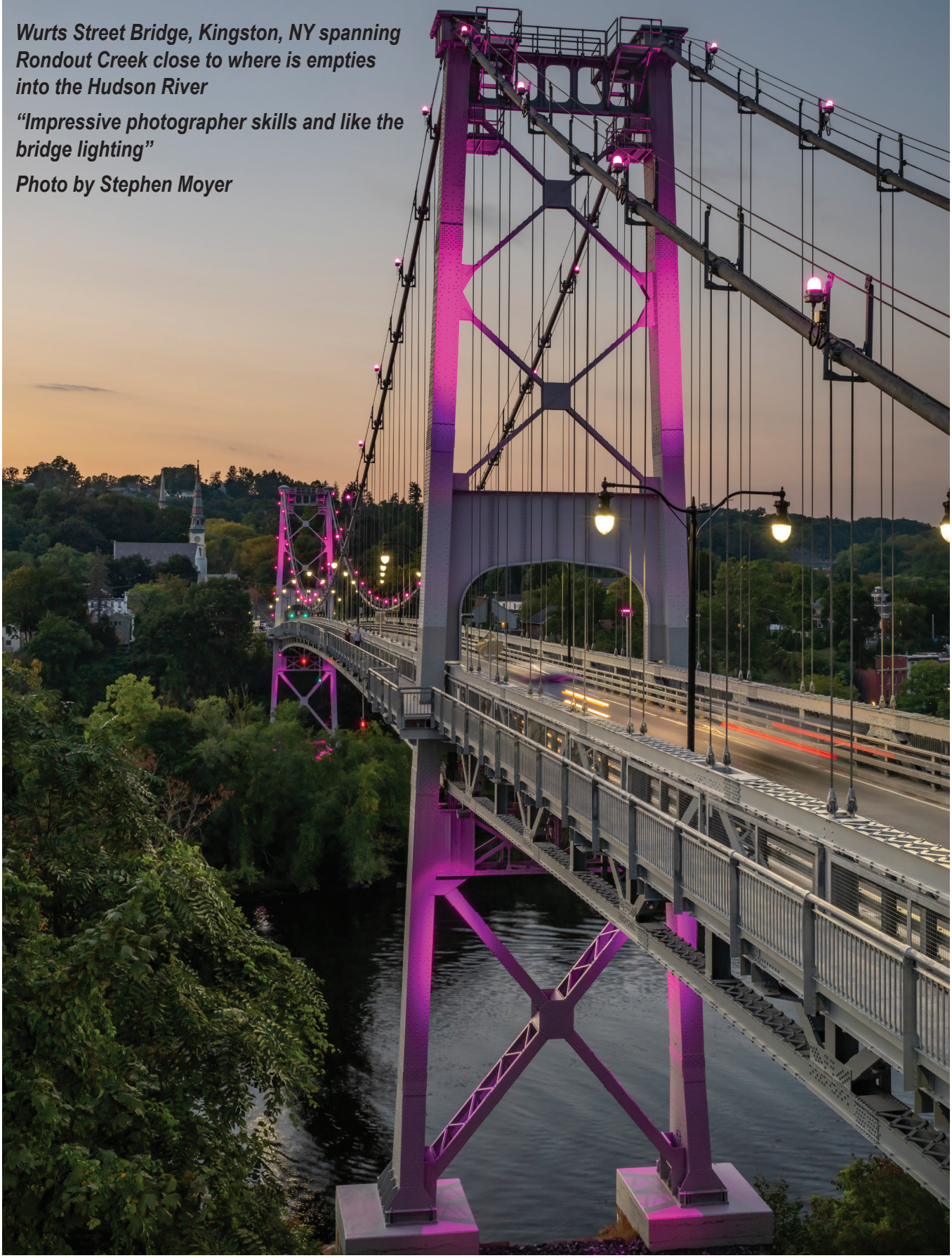
The theme for this year: “Rehabilitated Bridges”

...with comments by our Judges

Wurts Street Bridge, Kingston, NY spanning Rondout Creek close to where is empties into the Hudson River

“Impressive photographer skills and like the bridge lighting”

Photo by Stephen Moyer

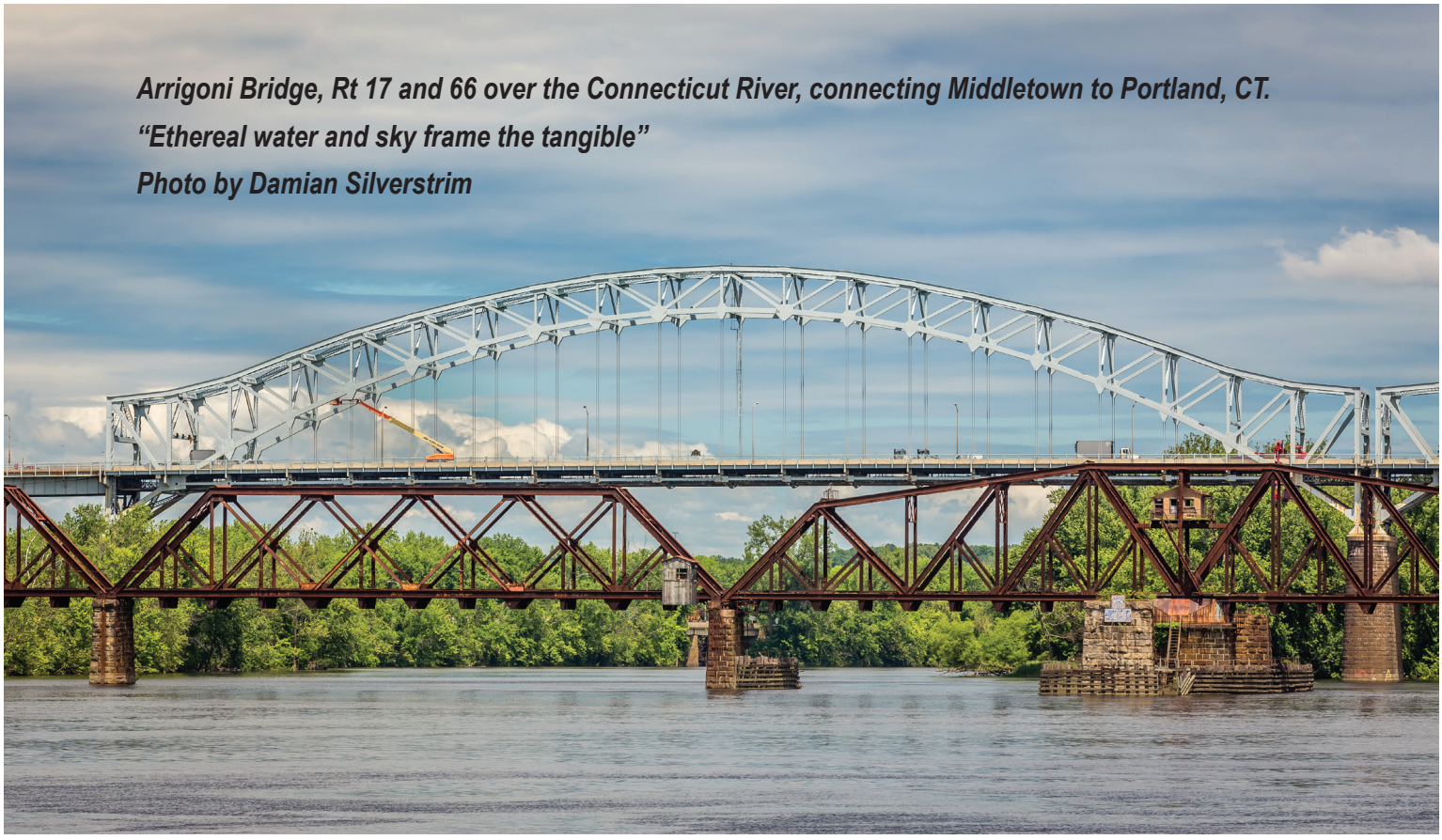




Roberto Clemente Bridge (Sixth Street Bridge), Connecting the North Shore to downtown Pittsburgh over the Allegheny River

"Good photo of iconic bridge"

Photo by Jim Meehan



Arrigoni Bridge, Rt 17 and 66 over the Connecticut River, connecting Middletown to Portland, CT.

"Ethereal water and sky frame the tangible"

Photo by Damian Silverstrim



Franklin Delano Roosevelt Mid-Hudson Bridge, US 44 and NY 55 across the Hudson River between Poughkeepsie and Highland, NY

"Nice photo of historic bridge"

Photo by Damian Silverstrim

Parkersburg Memorial Bridge, Parkersburg, WV crosses the Ohio River

"Great photo contrast and lighting"

Photo by Stephen Moyer





Wheeling Suspension Bridge, Wheeling, WV over the Ohio River

"Very interesting bridge and like the photo contrast"

Photo by Matt Bunner



Wheeling Suspension Bridge, Wheeling, WV over the Ohio River

"Beautiful shadows"

Photo by Matt Bunner



Monument Place Bridge, Elm Grove, WV over Little Wheeling Creek

"Saving history"

Photo by Matt Bunner



Gold Star Memorial Bridge, I-95 and Rt 1 over the Thames River between New London and Groton, CT.

"Nice photo and looks like fun rehab project."

Photo by Damian Silverstrim



New Kensington Bridge, bridge takes you from Allegheny County to Westmoreland County crossing NSRR, Pittsburgh Street, 10th St. & Allegheny River

"Great contrast photo"

Photo by Stephen J. Reyes

The International Water Conference®





Hilton in the Walt Disney World Resort®

Orlando, FL, USA

November 9-13, 2025

https://eswp.com/water



2026

June 15-17
Gaylord National Resort & Convention Center
National Harbor, Maryland

THE INTERNATIONAL BRIDGE CONFERENCE

Returning to the Nation's Capital Region

Since 1984, sponsored by the Engineers' Society of Western Pennsylvania

ESWP.COM/BRIDGE