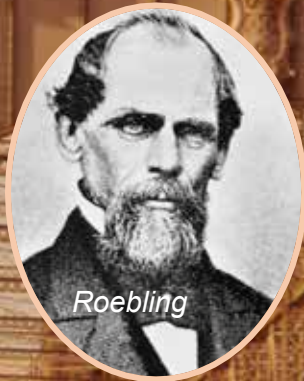


Pittsburgh
ENGINEER

SPECIAL ISSUE - 2022 INTERNATIONAL BRIDGE CONFERENCE

The Bridge Professionals

– an introspective view of the people behind bridges



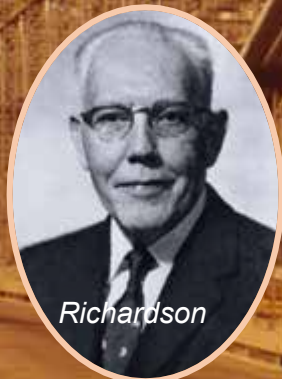
Roebling



Figg



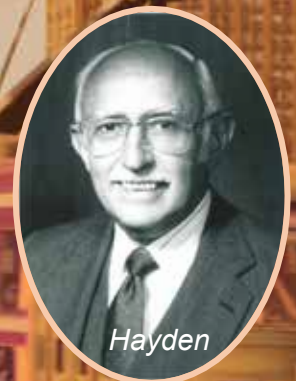
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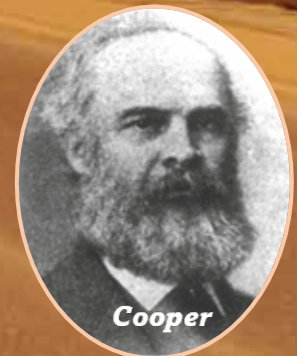
Richardson



Lichtenstein



Hayden



Cooper

**11th Annual
Photo Contest**
*all roads & rivers
lead to Pittsburgh*

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The International Bridge Conference* annually awards medals and awards of distinction to many projects of eminence and distinction from the world-wide engineering community. This year is no exception - enjoy this year's award winners.



On the Cover: Smithfield Street Bridge, Pittsburgh, Pennsylvania; Photo courtesy of the Library of Congress

EDITORIAL

Bridge Practitioners - Tracing our Lineage



PA Turnpike, Toll 43 over the Monongahela River in Brownsville, Pennsylvania (completed in 2012) is a cast in place, balanced cantilever, post-tensioned, segmental, major river crossing in western Pennsylvania.

LINEAGE - the kinship relation between an individual and the individual's progenitor's filiation

As a developing professional, who influenced you? Was it a teacher, your supervisor, a colleague, a friend?

Throughout your career, who have you admired in the profession of engineering? Was it a historical and well-known person, who made a significant contribution to the profession? Was it a dedicated colleague, perhaps reserved in character, but steadfast in pursuit of excellence?

What one person directly affected the trajectory of your career? Or what series of persons affected, in some sequence, a series of careers that ultimately affected you?

Consider:

- It was the Renaissance architect Palladio, who, recognized the power of the triangle and in 1570, developed the early designs for wooden truss bridges.
- It was Long, who in his 1830 patent, took Palladio's conception and applied the first rational design of a wooden truss bridge and introduced a crude, but elementary form of longitudinal pre-tensioning.
- It was Howe, who in his patent of 1840, improved on Long's invention by applying vertical pre-tensioning forces that improved the performance of a wooden truss system.
- It was Eads, Cooper, Modjeski and many others in the late 1800's and early 1900's that, with better materials - first iron then steel - refined the concept and use of a truss as a suitable structural form for bridges conveying large loadings.
- Starting in the late 1800's, it was Doebling and Rabut, who initially introduced pre-stressing of modest concrete elements, later to be eclipsed by Rabut's pupil, Freyssinet.

- In the early 20th century, Freyssinet realized that only high-strength prestressing wire could counteract the effects of creep and relaxation, and in turn, Freyssinet developed anchorages and other technology which made the system flexible enough to be applied to many different types of structures.
- It was Jean Muller, who worked closely with Freyssinet in the 1950's and imported the technology to the United States. Muller then introduced match casting technology and other innovations as an efficient means of post-tensioned segmental construction.
- It was Daniel Tassin, IBC's 2022 John A. Roebling Medal winner, who worked with Jean Muller in the 70s and 80s which led to the design and construction of many notable bridges in the later 20th and early 21st centuries.
- And today, in 2022, we witness the design construction of many pre-tensioned and post-tensioned bridges of modest to significant spans throughout the world.

Question 1: Who do you admire as a major contributor to the bridge engineering community?

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We posed this series of questions to the executive committee of the International Bridge Conference. The results are striking, sensitive and introspective. The results span the history of bridge design and construction. And the results comprise the feature article of this year's IBC Special Magazine Edition, as we focus our attention, not on projects ... but ... in this issue ... we FOCUS ON PEOPLE.

Matt Bunner, Rich Connors, Mike Cuddy, Tyson Hicks, Jon McHugh, and Tom Leech
-the editors



The Reading-Halls Station Bridge (1846), U.S. Route 220, spanning railroad near Halls Station, Muncy, Lycoming County, PA, is almost certainly the oldest all-metal (Howe) truss bridge in active service in the United States, a lone survivor from the first series of all-metal trusses of any kind designed and constructed in the United States. A characteristic of the Howe truss is the introduction of internal prestressing in the diagonals through tensile forces applied to the vertical members during fit-up at erection.

IBC 2022 Chairman's Welcome



M. Patrick Kane, P.E., is a Senior Transportation Engineer (Structures) for GPI – Greenman-Pedersen, Inc. in Pittsburgh, PA and the chairman of the executive committee for IBC 2022.

It is my honor and privilege to welcome you to the 39th annual International Bridge Conference (IBC) hosted by the Engineer's Society of Western Pennsylvania. Following two unprecedented years of COVID-19 restrictions and virtual on-line conferences, I am especially excited to see everyone in person again. I am also honored and excited to welcome everyone back to the host City of Pittsburgh, my home for over 30 years. I trust you will find many interesting things to do here, including our walking bridge tour to see the rehabilitation of the iconic Roberto Clemente (6th Street) Bridge, and a return of the IBC Boat Cruise on the 3 rivers of Pittsburgh on Monday evening.

For nearly 4 decades, the IBC has been the premier showcase of the latest ideas and knowledge of state-of-the-art bridge engineering, design, construction and evaluation from the United States and around the world. Every year, the program is brought to fruition by a dedicated, all volunteer group of bridge practitioners who make up the IBC Executive Committee. It is through their tireless efforts that we consistently offer a stellar program and event. Functioning in the background, is the steadfast ESWP crew of Dave Teorsky,

Kristina Emmerson and Mike Gaetano who repeatedly meet deadlines, post notifications and leverage technology to facilitate the conference. Please thank them for their efforts.

We are honored to welcome and include presentations the Indiana Department of Transportation as our Featured Agency this year. Monday afternoon will be dedicated to a presentation of their papers.

Some of the technical sessions that we will present this year include: Accelerated Bridge Construction, Alternate Delivery, Design/Build, Cable Stayed Bridges, Long Span Bridges, Pedestrian and Special Purpose Bridges, Railroad and Transit Bridges, Segmental Concrete Bridges, and Suspension Bridges. Our trusted exhibitors have stayed the course with us through the last two "virtual" years. We are happy to welcome them back with in-person booths. Please be sure to stop in and visit. To celebrate the achievements of our peers, we will once again present honors at the IBC Awards Dinner on Tuesday evening.

I wish you all a heartfelt welcome to ESWP's 39th International Bridge Conference – enjoy the conference!

IBC 2023 - a look ahead

Colorado

– where the great plains meet the rocky mountains

- land of stunning landscapes and fascinating bridges

... a small sampling of some of the finest of

Colorado's bridges spanning the Arkansas River, near Cănon City, Colorado

The **Royal Gorge Bridge** is a tourist attraction within Royal Gorge Bridge and Park, a 360-acre amusement park located along the edge of the Royal Gorge. At 955 feet above the valley floor, the bridge held the record of the highest bridge in the world until 2001.



Photo courtesy
Wikimedia Commons



Photo courtesy
Wikimedia Commons

HISTORY: The bridge was built between June and November 1929. The project was financed by Lon P. Piper, president of the Royal Gorge Bridge and Amusement Company of San Antonio, Texas. Piper hired George E. Cole as the Chief Engineer and the bridge was completed in about six months with no deaths or serious injuries. The formal opening occurred on December 8, 1929. Piper agreed to a twenty-year lease of the gorge and surrounding land. Ninety years later, the bridge and other attractions draws large crowds annually and Park officials estimate that more than 26 million people had visited the park since it opened in 1929.

I-70 – Glenwood Canyon – 15 miles of bridges, retaining walls and tunnels – completed 1992

A road had existed through spectacular Glenwood Canyon, with its cliffs towering a maximum of 2,000 feet above the Colorado River, from pioneer times. Photos of teams and wagons negotiating a rough trail through the canyon date from the 1880s.

The final link of I-70 through Glenwood Canyon has been hailed as an engineering marvel because of the care taken to incorporate the interstate improvements into the fragile canyon environment leaving as much of the flora and fauna intact as possible.

Construction of three tunnels, 15 miles of retaining walls, and numerous other structures, comprised a challenging but very rewarding project. The result of the Glenwood Canyon I-70 Final Link is much more than just a transportation facility. State-of-the-art rest areas provide opportunities for relaxation, education about the canyon and the project, and direct access to recreational pursuits such as river rafting and bicycling/jogging as well as walking along the canyon's recreation path.



Hanging Lake Viaduct carrying I-70 along the Colorado River through an extremely steep and narrow portion of Glenwood Canyon. EB: 1,308', WB 7,121'

Photo courtesy of FIGG (EOR),

REF: www.codot.gov/about/CDOTHistory/50th-anniversary/interstate-70/glenwood-canyon

A tribute to the Featured State of the 2023 International Bridge Conference, the state of Colorado.

Come, visit the 2023 IBC in National Harbor, Maryland to experience the bridges of one of our western states

Herb Mandel – the Herb we knew and the Herb we never knew (until now)



The Herb we knew – with 35 years of service to IBC

“After attending the 1983 PennDOT conference, my own work began on the IBC began with the fourth conference when I joined the executive committee. Two years later I was the general chairman of the sixth conference, and service on the executive committee has been continuous ever since ... Watching the conference grow, working on the executive committee, making friends both within the committee and at the conference, and getting to know some of the greatest bridge engineers in the world are all the things that make me continue to be active in IBC. I realize that IBC is much more than a meeting. It is a celebration of bridges and the people who design and build them. I am so glad that while all this was going on, I was not a bystander ...” from *The International Bridge Conference and How it Grew* by Herb Mandel, published by ESWP in *Reflections ...*, June 2013.

The Herb we never knew (until now)

- Before he taught a graduate course in bridge engineering at the University of Pittsburgh ...
- Before he supervised the design of the Williamstown -Marietta Bridge across the Ohio River ...
- Before he moved to Pittsburgh and supervised the design of the PAAC Stage I, Light Rail Transit Project ...
- Before he supervised the design of the Pell Bridge across the Narragansett Bay in Newport, Rhode Island ...
- Before he was a graduate student at Yale University and a student of Hardy Cross ...
- The year was 1945 ...

“In April 1945, Herb Mandel was Pfc. Mandel of the 8th Armored Division, 399th Armored Field Artillery Battalion, C Battery – a role he earned while on leave from his civil engineering coursework at Virginia Tech. His group was rerouted and trekked into the Harz Mountains of Germany through the night around April 10, 1945. At dawn they set up their firing position. No enemy fire was returned, which allowed Pfc. Mandel to take note of the three men in striped suits who walked up to C Battery’s position and began picking up cigarette butts from the ground, desperate for the slightest drag. Noticing the red cross on an American’s helmet – indicating a trained medic – one of the men approached, speaking Polish, and revealing a fresh wound on his hand: a missing finger. The medic did not speak Polish, but the sergeant did. After listening to the story, the sergeant said aloud, ‘My God, we’ve over-run a concentration camp!’...”

Published on May 13, 2021, in the Post-Gazette depicting the story of a WWII Army Veteran from Pittsburgh [Herb Mandel] connect[ing] with the son of a Holocaust prisoner who he helped liberate.



We, as members of the editorial staff and members of the executive committee of IBC are also glad, that our colleague and friend, Herb Mandel, chose not to be a “... bystander ...” – the editors

who am i?

AS IBC CELEBRATES THE INDIVIDUALS WHO HAVE MADE AN IMPACT ON THE BRIDGE PROFESSION, BOTH NATIONALLY AND INTERNATIONALLY. TAKE OUR QUIZ AND SEE IF YOU CAN MATCH THE CAREER HIGHLIGHTS WITH THE INDIVIDUALS WHO WERE THE TITANS OF RAILROAD DESIGN AND CONSTRUCTION OF THE 19TH AND EARLY 20TH CENTURIES ... AND ANSWER THE FOLLOWING QUESTION ... WHO AM I? - THE EDITORS

A. After resigning from the Navy in 1872, I went to work for James Eads and succeeded him as engineer for his bridge and tunnel company, until the bridge in St. Louis was complete. I designed many bridges including one over the Allegheny River in Pittsburgh, but I am best known for my published works on railroad and highway bridges from 1885 to 1902 and railroad loadings named after me.

B. I was born in 1787 in Bucks County, PA. At first, I worked on the Chesapeake and Ohio Canal in Maryland and then on the National Road, in Maryland, Pennsylvania and (West) Virginia. In 1828, I joined the B&O Railroad to help create an engineering staff and became the first Chief Engineer of the B&O. Later in life, I became a member of the US House of Representatives

C. I am a self-taught civil engineer, best known for my iron railway bridges with tension members radiating from the end posts. One of my patented truss railroad bridges survives in Savage Maryland and is pictured to the left. Frank Griggs, Jr. said this about me: "He may be said to be a true representative of the transitional period between intuitive and exact engineering."



D. I was born in Philadelphia in 1806. I was hired by the B&O Railroad in 1830 and designed the Thomas Viaduct, the B&O's first railroad bridge across the Patapsco River in Reilly, Maryland. They Nicknamed the multi-span stone arch: "Latrobe's Folly", as they doubted the massive structure could support itself - "haha" it is still standing! In 1842, I was appointed chief engineer - the second chief engineer for the B&O. They also named a city after me in Western Pennsylvania.

E. I was born in Boston in 1812 and am the second cousin to president, John Quincy Adams. I was an assistant and then chief engineer for many railroads and am best remembered as the designer of the handsome stone arch, Starucca Viaduct (1848). I served in the Army of the Potomac during the Civil War, and after being injured in combat, I returned to New York City to become a consulting engineer.

F. I was born in 1861 and loved to play the piano, but bridges were for me. I emigrated from Poland to the US in 1876 but returned to Europe to obtain my engineering degree. I opened my own bridge design office in Chicago in 1893. I designed many bridges over the great rivers of the US, but am best known for my design (actually, it was the second design) of the Quebec Bridge, the largest cantilever truss bridge in the world at the time of construction.

Personalities and some of their work :

Julius W. Adams, Wendall Bollman, Theodore Cooper, Jonathan Knight, Benjamin H. Latrobe, II, Ralph Modjeski,



Starucca Viaduct, 1848, Susquehanna County, PA (photo courtesy of the Library of Congress)



Eads Bridge spanning the Mississippi River, St. Louis, MO (photo courtesy of the Library of Congress)



Quebec Bridge, spanning the St. Lawrence River, Quebec, Canada (photo courtesy of WikiCommons)

Answers: A - Cooper, B - Knight, C - Bollman, D - Latrobe II, E - Adams, F - Modjeski

Bridge Practitioners

- Tracing our Lineage -

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Photo Courtesy of Gannett Fleming, Inc.

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the editors – Matt Bunner, Rich Connors, Mike Cuddy, Tyson Hicks, Jon McHugh and Tom Leech



Photo courtesy of the Library of Congress, HAER PA-55

The Reading-Halls Station Bridge (1846), U.S. Route 220, spanning railroad near Halls Station, Muncy, Lycoming County, PA, is almost certainly the oldest all-metal (Howe) truss bridge in active service in the United States, a lone survivor from the first series of all-metal trusses of any kind designed and constructed in the United States. A characteristic of the Howe truss is the introduction of internal prestressing in the diagonals through tensile forces applied to the vertical members during fit-up at erection.

THE BRIDGE PROFESSIONALS – AN INTROSPECTIVE VIEW OF THE PEOPLE BEHIND BRIDGES

This article is dedicated to the professionals - historical and present - who have made an impact on the bridge profession, both nationally and internationally. Hear, in the words of the executive committee of the International Bridge, Conference(R) and others - the engineers, educators and constructors - who have influenced and continue to impact the design and construction of bridges from the first century through the twenty-first century.

The First Century - With only geometry to guide them

Marcus Vitruvius Pollio (c. 90-20 BCE)

“The [engineer] should be equipped with knowledge of many branches of study and varied kinds of learning, for it is by his judgement that all work done by the other arts is put to test. This knowledge is the child of practice and theory. Practice is the continuous and regular exercise of employment where manual work is done with any necessary material according to the design of a drawing. Theory, on the other hand, is the ability to demonstrate and explain the productions of dexterity on the principles of proportion.

... [Engineering] depends on Order, Arrangement, Fitness & Beauty, Symmetry, [the perfection of style], and Economy.”

Vitruvius, de architectura, libri decem (The Ten Books on Architecture) first century BCE



Photo courtesy of Wiki Commons

The Pont du Gard, constructed in the first century (CE), is the highest of all Roman aqueduct bridges, as well as one of the best preserved. It was added to UNESCO's list of World Heritage sites in 1985 because of its exceptional preservation, historical importance, and architectural ingenuity. With no knowledge of the fundamentals of forces and only geometric principles to guide them, the Roman engineers and constructors achieved with perfection, the ideals of Vitruvius - namely: Order, Arrangement, Fitness & Beauty, Symmetry, [the perfection of style], and Economy with this magnificent first century bridge structure.

"Once I saw a photo of the Pont du Gard in high school, it instilled in me a life-long fascination with arches – both natural and man-made. Back then I asked myself, 'how can these arches defy gravity?' - I found the answer to this and many other interesting questions about nature and structures in engineering school – nevertheless, I am still fascinated and inspired by the simplicity and beauty of arches". Tom Leech

The Sixteenth Century - The Renaissance

Andrea Palladio (1508-1580)

Triangle after triangle after triangle – the dominating feature of the metal elements of many modern bridges. Where did this notion of triangle, strength and long span bridge come from?



Portrait of Andrea Palladio

Image courtesy of Wiki Commons

The year is 1570; and at the height of the Renaissance, Italian architect, Andrea Palladio, wrote a small architectural composition, "I quattro libri dell' Architectura" – translated: The Four Books of Architecture. In this writing, Palladio presented text, sketches and personnel interpretations of his "inventioni" - "inventions" - of wooden bridges he proposed to be built over small Italian streams. While it is not certain which, if any of these bridges, were actually built, these wooden bridge "inventions" were unique. Each bridge, though appearing quite differently, one from another, was formed by a series of wooden triangles, with rhythmic triangular patterns, repeating over and over again. Although more interested in form than strength, Palladio uncovered an important engineering principle: the triangle is a powerful engineering form. Palladio did not give a name to his "invention" and his idea of repeated triangles, uncovered by contemporaries, became slowly put into use in the roofs of cathedrals, but forgotten as a use in bridges until the 19th century. With modest success in wooden and iron bridges in the 19th century, the truss – by modern definition: a rigid framework of individual members connected to form a series of triangles - became the workhorse of long span bridge types in the 20th century.

from Bridge Stories - Every Bridge has a Story by Thomas Leech



Sketch from "I quattro libri dell' Architectura", Andrea Palladio, 1570

The Nineteenth Century – From Intuition to Engineering



Stephen Harriman Long (1784-1864)

Long's system of trusses was similar to that of Palladio [Renaissance scientist and engineer of early truss bridge designs], but he [Long] evidently knew a valid method of calculating stresses in truss members and, in his work, gave very reasonable proportions for all the members of structures of various spans." Stephen Timoshenko (1878–1972), Russian-Ukrainian engineer, father of modern engineering mechanics

A remarkable engineer with a remarkable career. A snapshot of his wide range of engineering practice and accomplishments follows.

- Became a Major in the Army Corps of Engineers assigned the responsibility of Topographical Engineer where he led five expeditions through the Upper Mississippi Valley and the borderlands with Canada.
- Served as a chief engineer & consulting engineer for a number of railroad companies.
- Received (in 1829) his first (of many) patents for his work on railroad steam locomotives.
- Authored a publication in 1830 entitled Description of the Jackson Bridge [near Baltimore, Maryland] Together with Directions to Builders of Wood or Frame Bridges (which was the basis for his 1830 patent).
- Received patents in 1830 and 1839 for pre-stressing the wooden diagonal trussed members in covered bridges, leading to many covered bridge designs in New England and the mid-west.
- Long's Peak, rising 14,259 ft. in beautiful Rocky Mountain National Park, near Estes Park Colorado, is named in honor of his expeditions and legacy.

The 1830 patent of Stephen Long was remarkable in two features.

1. The patent provided a series of tables that rationally proportioned the upper and lower chords on the basis of engineering mechanics principles, much as one would compute the stresses in the upper and lower flanges of a wide flange beam. This is one of the earliest examples of a rational approach in an era where handed-down craftsmanship principles were the norm.

2. The diagonals were of simple fabrication with joggle joints for ease of installation. However, the most important feature was the use of wedges, which were driven along the joggle lines of the lower end of the diagonals. During driving, the wedges induced compressive stresses in the diagonals – an early form of prestressing.

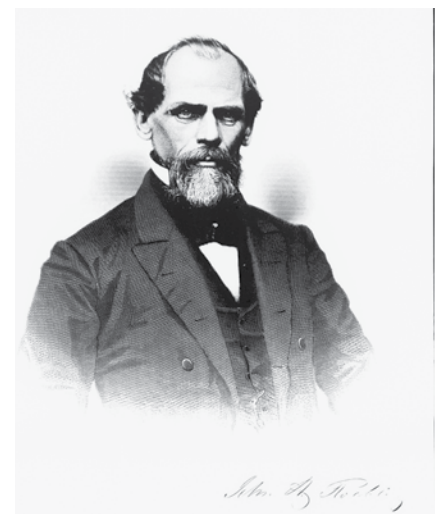


From: *Twice Repurposed – the (Stephen) Long Covered Bridge, from Brownsville to Columbus (Indiana)*, by **Thomas Leech**, published in *Structure Magazine*, May 2022

John Augustus Roebling (1806-1869)

“We are born to work and study... True life is not only active, but also creative.” John Roebling

The first commission that Roebling earned as an engineer in the United States was for the rebuilding of the Aqueduct carrying the Pennsylvania Canal over the Allegheny River. His impressive work on the Aqueduct quickly landed him the contract for the replacement of the critically damaged wooden Smithfield Street Bridge, in Pittsburgh, Pennsylvania, following the Great Fire of 1845. The then new bridge's “specifications” follow:



Portrait of John A. Roebling from frontispiece of John A. Roebling. “LONG AND SHORT SPAN RAILWAY BRIDGES.” New York: Van Nostrand, 1869, Image Courtesy Library of Congress

Monongahela River Bridge (at Smithfield Street) 1845 – Design Specifications

Type: Wire Suspension – 7 spans – longest span: 188 feet

“Weight of the Superstructure supported by Cables”

“Four-six horse tams, loaded with 104 bushels of coal”

“Weight of 100 head of cattle”

This was Roebling’s first true bridge project and was the beginning of the path that would lead him to the Brooklyn Bridge. This first bridge was not perfect and deformed significantly under heavy loads, but when looking back 40 years after its construction, Engineering News noted its historical significance in the development of bridge design and technology.

“Mr. Roebling belongs all the credit for teaching engineers how to use wire in the form in a railway bridge; and that his connections were faulty in the light of modern practice, and that his stiffening truss was no such truss at all, does not detract from his boldness as an engineer and the services he performed in developing the manufacture of wire in this country.”

from Bridges ... Pittsburgh at the Point ... A Journey Through History by Thomas Leech & Linda Kaplan



Delaware Aqueduct (1848), Spanning Delaware River, Lackawaxen, Pike County, PA; design is similar to the 1845 Monongahela River Bridge and other early Roebling Bridges; Photo Courtesy the Library of Congress

IBC Annually bestows the John Roebling Medal to individuals honoring a lifetime achievement in bridge engineering.

Emily Roebling (1843-1903)

Emily Warren Roebling was an engineer known for her contributions over a period of more than 10 years to the completion of the Brooklyn Bridge after her husband Washington Roebling developed caisson disease and became bedridden. She served as a liaison and supervisor of construction through communicating between her husband and on-site personnel. Her husband was the chief engineer during construction of the Brooklyn Bridge, which had been designed by his late father, John A. Roebling.

Emily displayed class and professionalism while taking care of her family. She fought for the Roebling reputation and ultimately finished the Brooklyn Bridge.

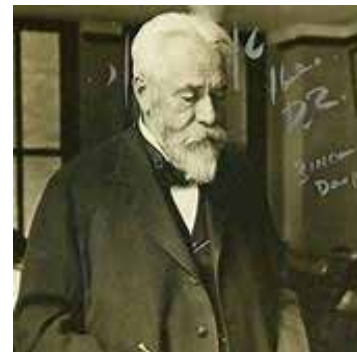
“Emily Roebling was the OG for women in the civil engineering industry. She acted as the liaison for her bedridden husband, Washington Roebling, and gained the confidence and trust from the bridge crew, politicians and public.” Maggie Jackson



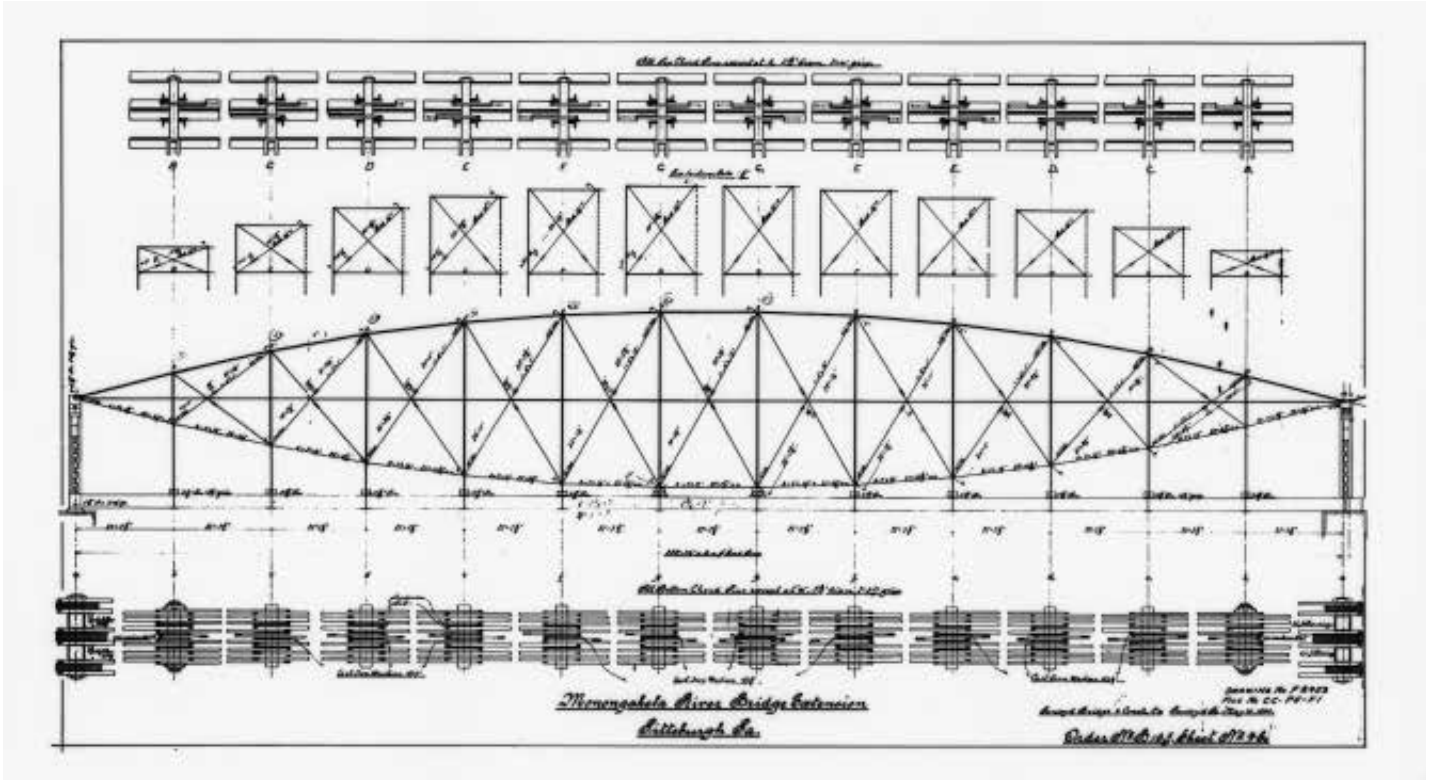
Brooklyn Bridge – image courtesy the Library of Congress

Gustav Lindenthal (1850-1935)

“Lindenthal’s designs had originality and boldness. His designs differed from his contemporaries as he was not afraid to use more complex structural arrangements.” Rich Connors



Lindenthal taught himself mathematics, engineering theory, metallurgy, hydraulics, estimating, and everything else that a successful bridge engineer needed to know. His lack of his formal education hindered him from further advancement in Europe, so he decided to emigrate to the United States in 1874. He later went into business as a consulting engineer in Pittsburgh, and over time became known as the “Dean of American Bridge Builders”



Original Design Drawing of the Smithfield Street Bridge, Pittsburgh, PA, by Lindenthal, 1883 (image courtesy of the Library of Congress)

“A bridge with a double backbone. Lindenthal’s design for the Smithfield Street Bridge, with its dual 360- foot spans, was daring and bold – but not original. The idea was a product of Europe and the imagination of the 19th century.”

from Bridges ... Pittsburgh at the Point ... A Journey Through History by Thomas Leech & Linda Kaplan

Lindenthal, an outspoken individual, was quite active in the bridge community in Pittsburgh in the 1880's and into the next century. His design of a stiffened-chain suspension bridge, at Seventh Street in 1884, was novel for its day, although his design was not without controversy. In April of 1911, he testified before the Allegheny County Board of Viewers in response to a petition to remove the bridge, and in his testimony, he gave a vigorous defense of his design. Before radio, before cable TV, before twitter – how can we hear the words of an individual “in his own words”? In his April testimony, Lindenthal forcefully defended his design, especially with respect to a highly critical 1903 article from Engineering News, written by Gus Henning. His 1903 written defense was attached to the board of Viewers recorded testimony and is presented, in part, to the right.



Lindenthal's Stiffened-chain Suspension Bridge over the Allegheny River at 7th Street 1884-1925



THE SEVENTH ST. CHAIN SUSPENSION BRIDGE AT PITTSBURGH, PA.

Sir: Referring to a communication by Mr. Gus C. Henning, published in your issue of July 30, the accompanying view of the Seventh St. Suspension Bridge at Pittsburgh, built by me in 1894, may be of interest to your readers.

It will be observed that the stiffening in this bridge is obtained by inserting a triangular web bracing between the top and bottom chains, making of it a suspended arch bridge.

It does not seem to me necessary to reply to the rest of the article which I quoted, except perhaps to suggest that engineers, here and abroad, will wonder how it was possible for the thousands of eye-bar bridges built in the last 30 years not to have collapsed long before this time. If the opinion of Mr. Henning is correct the bridge stays in this country had better close their eye-bar plates forthwith and cease to impose their dangerous structures on an unsuspecting and non-finding public.

It seems that your correspondent, who believes that the bending and shearing strains in suspension and arch bridges resemble those in truss bridges, has yet much to learn in bridge engineering before essaying to discuss that intricate subject.

G. Lindenthal.
45 Cedar St., New York City, Oct. 22, 1903.

Courtesy of Allegheny County, Records Department

A sampling of Lindenthal, in his own words, in defense of his stiffened-chain design, and the press's view of "hot" topics of the day follow:



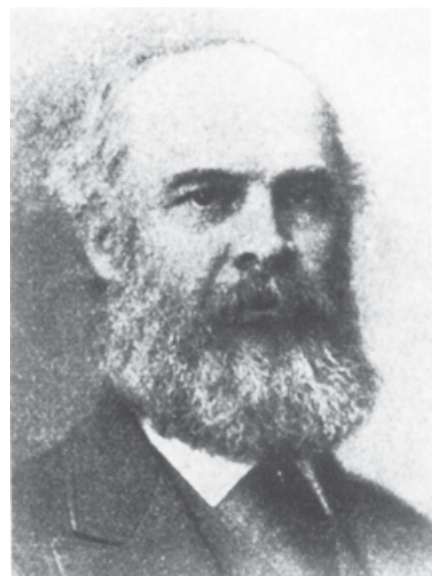
Public reaction to bridge "tolls" – yes, the bridges were "tolled", Pittsburgh Press clipping, c. 1910

IBC annually bestows the Gustav Lindenthal Medal which recognizes an outstanding structure that is also aesthetically and environmentally pleasing.

Theodore Cooper (1839-1919)

"The most perfect system of rules to insure success must to interpreted upon the broad ground of professional intelligence and common sense", Theodore Cooper

As transportation modes evolved, and the automobile became the expected live load across a highway bridge, design methodologies had to evolve as well ... Theodore Cooper developed and published the first General Specifications for Iron Railroad Bridges and Viaducts



in 1884. Engineering News Record, a major industry publication, called it the “first authoritative specification on bridge construction that had been published and circulated.” Cooper then published the Specifications for Highway Bridges in 1890, and re-issued it with updates in 1896, 1901, and 1906. These specifications were the basis of many more editions to come, leading up to present day bridge codes. Railroad bridge codes show Cooper’s legacy best, as train loads are still referred to as “Cooper-E” loading with numeric designations for weight

... When Theodore Cooper passed away in 1919, he had spent over 40 years as a bridge engineer. The obituary in the New York Times referred to him as a “Builder of Great Bridges”

from Bridges ... Pittsburgh at the Point ... A Journey Through History by Thomas Leech & Linda Kaplan

Commencing in 2022, IBC annually bestows the Theodore Cooper Medal which recognizes an outstanding heavy or light rail structure which is either newly constructed or has been significantly rehabilitated



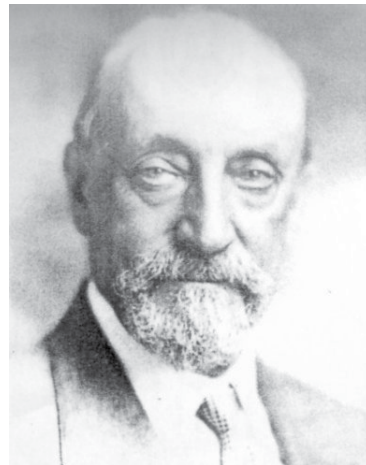
6th Street Bridge over Allegheny River, Pittsburgh, PA (1892) by Theodore Cooper; later (1927) transported downstream to new location on the back channel of Ohio River at Coraopolis, PA

Early Twentieth Century – Bold Design Innovations and Art Deco Integration

Ralph Modjeski (1861-1940)

“A Bridge builder known for innovation and variety over a great number of bridges, both railroad and vehicular.” Annette Adams

Modjeski was considered “America’s greatest bridge builder” with innovative solutions for unique site locations such as double decker railroad bridges; and he included aesthetic components in large, landmark bridges. He founded his own design company in 1893 and is most famously known for the redesign of the Quebec Bridge (after the 1907 disaster that killed 75 workers) and he succeeded in creating the longest truss span in the world at that time and still the longest cantilever bridge in the world.

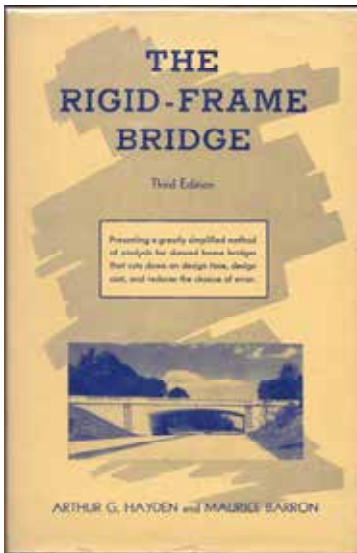


Arthur G. Hayden (1875-1964)

BRONXVILLE, N. Y., March 18—Arthur Gunderson Hayden, a consulting civil engineer who developed the design and construction of the rigid frame bridge now used extensively for short and medium spans, died today at his home in Saint Michaels, Md. He Was 89 years old ... From 1920 to 1937, Mr. Hayden was successively chief designing engineer for the old Bronx Parkway Commission and head of the design department of the Westchester County Park Commission ... Before joining the Bronx commission, Mr. Hayden had been with the New York State Barge Canal for 16 years ... Obituary of Arthur Hayden, New York Times, March 19, 1974



Arthur Haden was the Westchester County, New York, bridge engineer in the 1930's. In that time period, he along with landscape architectural collaborator Gilmore Clark, designed seminal rigid frame bridges over the then new Parkways leading northward from New York City. They described their architectural vision: as “fitness, beauty and unity”. After his career as a County Engineer, he captured the



analysis, research and architecture, that is the essence of rigid frame bridges in his textbook called “The Rigid Frame Bridge”.

The concrete rigid frame became an inspiration for many urban parkway designs in the coming decades and a well-represented structural form. duplicated dwell beyond Westchester County, with rigid frames appearing in the Palisades Parkway (NY), the Merit Parkway (CT) and the Pennsylvania Turnpike (PA)

IBC annually bestows the Arthur G. Hayden Medal which recognizes a single recent outstanding achievement in bridge engineering demonstrating vision and innovation in special use bridges, such as pedestrian, people-mover, or non-traditional structures an outstanding structure that is also aesthetically and environmental pleasing.

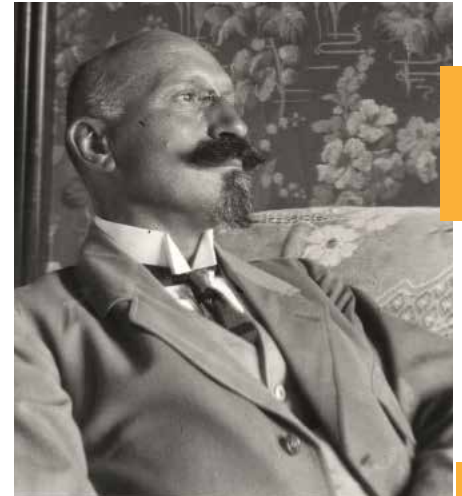
“Hayden’s architectural notions of ‘fitness, beauty and unity’ are well represented by the awardees of this medal.” Tom Leech



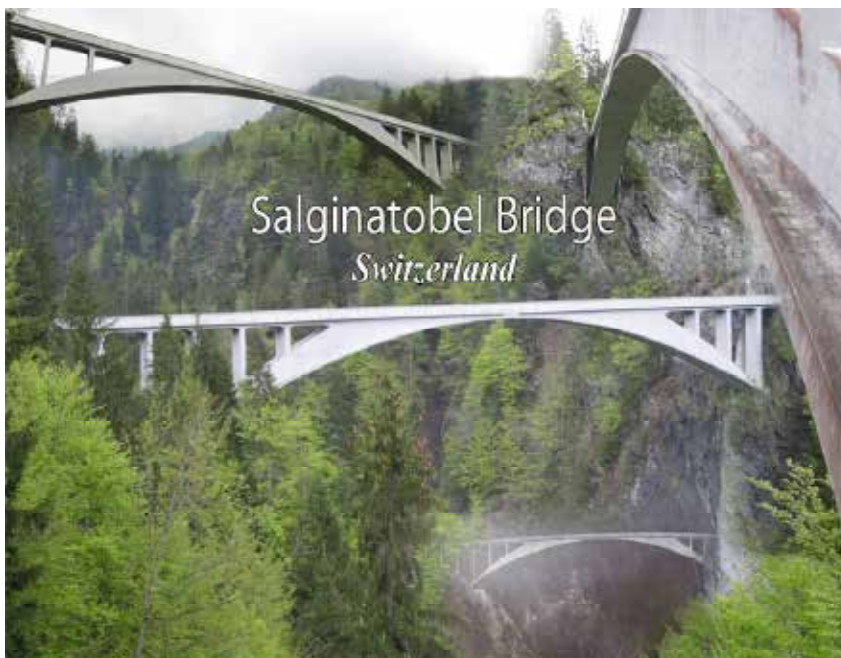
Stanwich Road Bridge, Spanning Merritt Parkway, Greenwich, Fairfield County, Connecticut

Robert Maillart (1872-1940)

Maillart was a Swiss Civil Engineer who revolutionized the use of structural reinforced concrete with designs incorporating a deck-stiffened, three-hinged arch concept for bridges such as the Salginatobel Bridge (1930), which, in 1991, was declared an International Historic Civil Engineering Landmark by the American Society of Civil Engineers. Many of his bridge designs incorporated aesthetics and engineering, to dramatic effect.



Courtesy wikimedia commons



Creative Imaging courtesy of Jonathan McHugh

"Such structures remind us that in this fragmented world, a highly rational, deeply educated engineer can integrate utility and beauty and bring into being objects to which all engineers must make a least one pilgrimage in their lifetimes." David Billington, August 1991

"In May of 2010, I, as a technical advisor, ... and a group of Penn State engineering students ... made this 'pilgrimage' ... as part of an undergraduate, upper-level design/construction course, which included a European Bridge Tour of world-famous bridges in Switzerland, Germany and France." Tom Leech

Hardy Cross (1885–1959)

Hardy Cross was an American structural engineer and was the developer of the moment distribution method of analysis of statically indeterminate structures. As an educator, he was known for his stringent requirements and his demand for exact and clear thinking.

"I was a student of Professor Cross in graduate school at Yale University. Cross not only forged new boundaries in structural analysis with his development of the Moment Distribution Method, but he served as a leader in general civil engineering education and practice. His influence on structural engineering is further exemplified by his ground-breaking paper "The Relation of Analysis to Structural Design", which presented a new way to understand structural behavior that is still relevant. Although his work took place in the first half of the last century, Hardy Cross' impact on the profession continues today in design offices and classrooms worldwide." Herb Mandel



Hardy Cross

George S. Richardson (1896–1988)

“George Richardson was called the “dean of Pittsburgh bridge engineers” by Fortune Magazine in 1967.” Lisle Williams

George Richardson was the designer of many elegant river crossings and viaducts in the Pittsburgh area and served as mentor to other prominent local engineers during the renaissance of Pittsburgh and the Golden Triangle. And, in his own words:

“Elimination of the streetcars made possible an entirely new concept for the arrangement of roadways. With this recommendation before me ... I returned to the drawing board...” George S. Richardson (bridge designer), April 1949.



With the decision to vacate the Pittsburgh Railways rights-of-way across the rivers, Scheme “X” - dual double deck bridges with inbound/outbound traffic on opposing levels – was adopted. This decision, difficult at the time, greatly simplified the arrangement of the interchange connecting ramps, resulting in a compact layout of the Point Interchange and the preservation of a large public space, which can be enjoyed by all who come to Point State Park for either the historical experience, the pleasant setting in a major downtown area or simply the view from The Point. from Bridges ... Pittsburgh at the Point ... A Journey Through History by Thomas Leech & Linda Kaplan

The above captures the most significant milestone in the development of the design of the Fort Pitt and Fort Duquesne Bridges, at the point in Pittsburgh. This is but one small snapshot of the decision making during the planning stages of many of the bridges, where George Richardson led a design team in the Pittsburgh Region. Other bridge designs led by George Richardson included the West End Bridge, South Tenth Street Bridge, The Westinghouse Bridge and many, many others.

ERECTION OF THE FORT PITT BRIDGE
July 10, 1958



Image Courtesy of HDR, Inc.

IBC annually bestows the George Richardson Medal which recognizes an outstanding achievement in bridge engineering.

Latter Twentieth Century – The Interstate Era



Fred Graham, Allegheny County / Joel Abrams, University of Pittsburgh

IBC, the Early Years: Fred and Joel were instrumental in creating IBC. The result is that IBC has for years, been the premier source of information /technology sharing for practicing bridge engineers. That has impacted the industry!

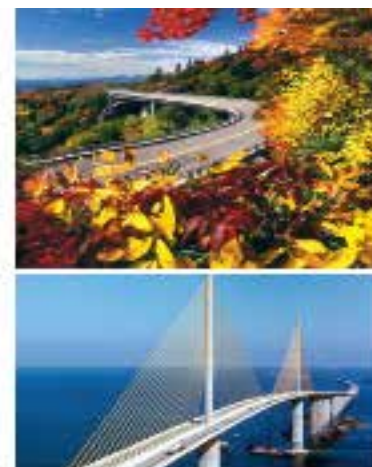


“Fred and Joel worked to raise awareness about the bridge funding crisis at that time. Together they worked with ARTBA and others to gain political support for our industry. Fred was always willing to share his thoughts and ideas to train young engineers. For me, as an intern, he shared many ideas on how to improve the industry.” Gary Runco

Eugene C. Figg, Jr. (1936-2002)

Gene Figg provided a forum for introducing Beautiful Concrete Segmental Bridges into the United States. The successful application of this structure type for bridges has been magnified by the number of other countries that adopted this segmental approach after observing its use in the United States. Gene Figg also championed creation of the American Segmental Bridge Institute (ASBI) that was founded in 1988.

Under Gene's leadership, Figg Engineering Group achieved an international reputation for designing award-winning bridges that are cost-efficient. Gene Figg received numerous prestigious honors, including the International Bridge Conference Roebling Medal for Outstanding Lifetime Achievement in Bridge Design in 2000.



Gene Figg seated in front of Natchez Trace Parkway Arches near Nashville, TN; Blue Ridge Parkway Viaduct, Grandfather Mountain, NC; I-275 Sunshine Skyway cable-stayed Bridge, Tampa, FL; image courtesy of the Figg Engineering Group

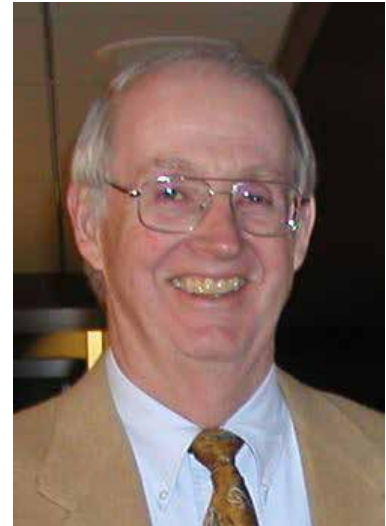
IBC annually bestows the Eugene C. Figg, Jr. Medal which recognizes a single recent outstanding achievement for bridge engineering, which is considered an icon to the community for which it is designed.

“Gene Figg successfully championed his vision of introducing and establishing Concrete Segmental Bridges within the United States. He innovatively applied this technique to create beautiful bridges along with pioneering community involvement in the development of signature bridges through design charettes”. Jay Rohleder

IBC annually bestows the Eugene C. Figg, Jr. Medal which recognizes a single recent outstanding achievement for bridge engineering, which is considered an icon to the community for which it is designed.

Dr. Arthur Hedgren

Art is a PhD. from Princeton University, a Fulbright Scholar, and was the Structures Section Manager for Richardson, Gordon & Associates and HDR Engineering in Pittsburgh while developing designs of many notable regional bridges such as the Sewickley Bridge, I-79 Tied Arch and I-470 Tied Arch, all over the Ohio River.



*I-470 Tied Arch over the Ohio River, Wheeling, WV
Photo Courtesy of HDR, Inc.*

Art influenced and advanced the practice of steel arch bridge design in the US and beyond. A segment of the WQED (Pittsburgh PBS Affiliate) Special, "Flying Off the Bridge to Nowhere and Other Pittsburgh Bridge Stories", features Art speaking about his involvement with design of the Glenfield Tied Arch carrying I-79 over the Ohio River – a most interesting reflection.

"An arch consists of two weaknesses which, leaning one against the other, make a strength." Leonardo DiVinci

"Art Hedgren is the smartest bridge engineer I have ever known and had the most impact on my career. Art taught me most of what I know about design of steel arch bridges. Once I was working on a set of design calculations for nearly a day. Art came up behind me, glanced over my shoulder and within 10 seconds pointed to my sheet and said, 'that's wrong'. It was a learning moment for me." Pat Kane

"Art is a great engineer and a wonderful person. In my 30+ years in the industry, I've never met anyone who had a better understanding of bridge behavior and design." Matt Bunner

Art is an Emeritus Member of IBC and has been a mentor of several current IBC Executive Committee Members

Terrence (Terry) Tiberio

“Terry was a visionary engineer who helped introduce computer-aided design and drafting to the bridge community.” John Dietrick

Terry’s vision led to the creation of the PennDOT Bridge Automated Design and Drafting (BRADD) system, a pioneering software system that helped usher in computer aided design and drafting to the bridge community. In addition, Terry contributed to the design, rehabilitation, and emergency repair of many major bridges, including multiple Ohio and Mississippi River crossings. His 30-plus year career was distinguished by an ability to combine engineering innovation with practicality and a strong understanding of constructability and durability.



Harry White

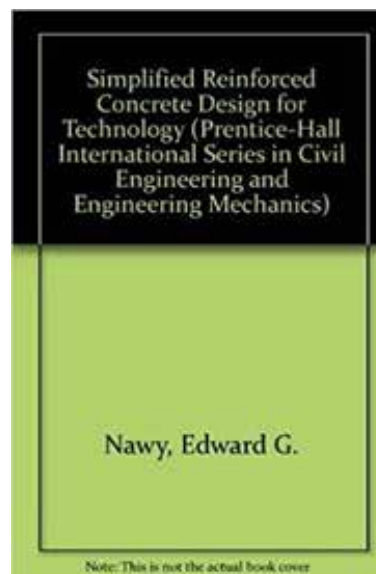
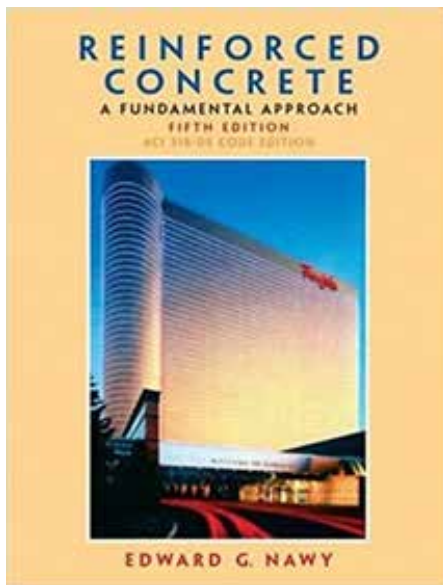
From his obituary: “ William Harry White, 91, of Severna Park passed away October 1, 2012. He was born in Bidwell, Ohio, and grew up in Royal Oak, Michigan. White and his family moved to Severna Park in 1974. White served as a navigator on a B-24 Liberator in World War II. He received an air medal and the Distinguished Flying Cross award for his service. White received his undergraduate degree from Michigan State and his MS in Civil Engineering from Yale University. He retired in 1980 as regional administrator for the Federal Highway Administration in Baltimore, Maryland.”

“I only met Harry White once, but he left a lasting and very positive impression ... Harry was the regional bridge engineer for FHWA when I met him. We had a field view on the Sewickley Bridge about the time it was about to be closed. I was a young engineer working at District 11 with Nalin Udani, the district bridge engineer. This was mid 1970’s and the Sewickley Bridge was in poor condition. I did not expect to see Harry dressed in coveralls and commencing to free climb the truss to get a first-hand view of the pin connections. Harry was not a young man, but he was very able and did the climbing inspection a lot better than I could at that time. I think he was fearless. When I read his obituary and saw his background, it all made sense.” Vic Bertolina

Dr. Edward G. Nawy

“His knowledge and expertise with the area of concrete (reinforced and prestressed) design had a huge impact on the civil engineering students at Rutgers during his tenure at the university. As my professor for Reinforced Concrete, his encouragement really made an impact on my career plans in civil engineering Dr. Nawy was my Senior Design professor and facilitated our group’s design of a prestressed concrete bridge, again huge impact.” Jen Lanning

Dr. Nawy is an educator, innovator and author including several books discussing reinforced concrete design including:



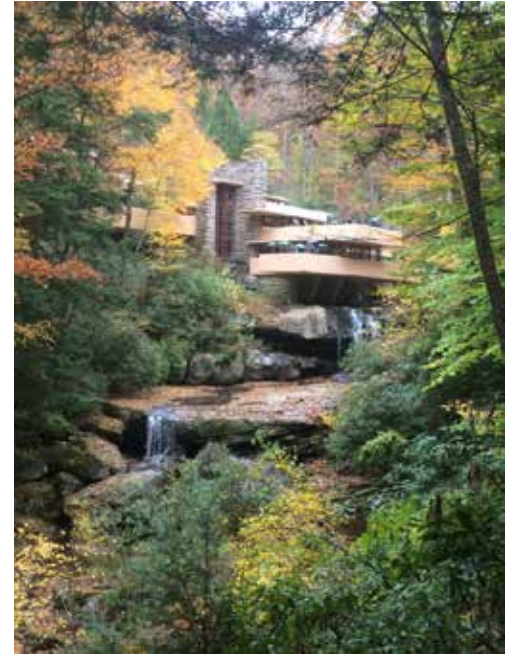
Mario G. Suarez (1926-2014)

“Mario was an early pioneer in the prestressed concrete industry”. Rachel Stiffler

Mario Suarez was Internationally recognized post-tensioning subject matter expert, well known for designing and building complex and long span prestressed concrete bridges in Cuba in the 1950s, notably the Canas River Bridge (250 ft span) in 1952 and the Zaza River Bridge (300 ft span) a segmental precast concrete truss bridge. His many contributions to the prestressing/post tensioning industry include committee work with ACI, PTI, and PCI Bridge Committee as well as a co-patent holder for an electrically isolated tendon.



"In the late 1900's, Mario kept the attendees of a Pittsburgh ASCE evening dinner meeting spellbound, as he explained the intricacy of the failures of the cantilevers and the then anticipated post-tensioning repairs to Frank Lloyd's masterpiece – Fallingwater" Tom Leech

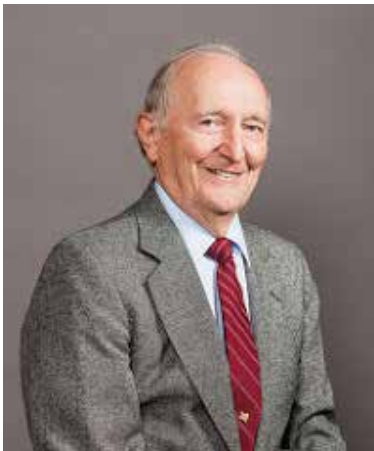


Fallingwater in the Fall, Kaufmann, PA

Image courtesy of Tom Leech

Dr. Joseph Yura

Dr. Yura (of the University of Texas, Austin) is expert in the field of structural stability and has displayed exceptional talent for teaching engineers about this topic.



"Joe was one of my professors as I pursued graduate studies at the University of Texas, Austin. Joe taught me elastic stability and also plastic design. In the decades since, I have applied what I learned from him countless times, including both in terms of engineering concepts and in the way he taught me to critically think about problem solving." Ronnie Medlock

David M. Moskowitz

David was an industry champion, who taught classes across the country on the inspection of bridges during the infancy of national attention. In addition, he was an extremely accomplished engineer specializing in the rehabilitation of historic bridges. A supervisor, mentor, and colleague who taught his staff the complexities of bridge inspection and rehabilitation, his keen business sense was equally important. David mentored many on the "business" of engineering.

"A National leader in the inspection of bridges, David Moskowitz helped shape the industry implementation of Federal bridge inspection standards." Mike Cuddy



The Twenty-first Century – Sensitive Restoration, Aesthetics & A Look to the Future

Abba G. Lichtenstein (1923-2015)

Dr. Abba Lichtenstein build a career and a company devoted to sensitive restoration of historic structures. Dr. Lichtenstein was a nationally known expert in the inspection and rehabilitation of bridges, particularly historic bridges. Although there many good examples of his work and influence, one striking example is the noted restoration of the Roebling Aqueduct over the Delaware River.



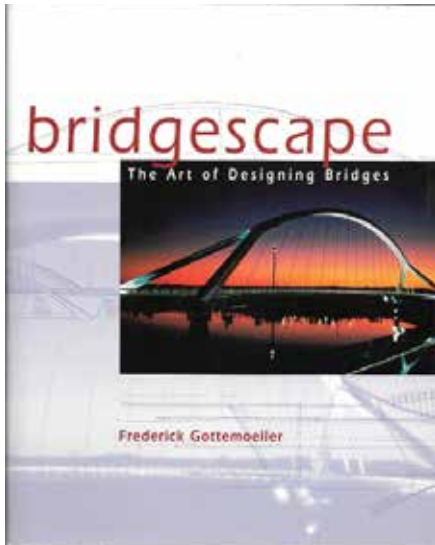
Dr. Lichtenstein instilled in me the passion to understand the workings of and effective means to rehabilitate historic structures without comprising their historic integrity. His drive and knowledge created the foundation that has allowed me to work on such significant structures as the Brooklyn Bridge, the Wheeling Suspension Bridge, the Frankford Avenue Bridge (oldest bridge in America) and the Dunlap Creek Bridge (first cast iron bridge in America). As a testament to his teaching and mentorship, I have worked on the rehabilitation of 7 of the 10 oldest bridges in America. A giant in the field who demonstrated how historic bridges can be rehabilitated to meet today's challenges. Michael Cuddy

IBC annually bestows the Abba Lichtenstein Medal which recognizes a recent outstanding achievement in bridge engineering demonstrating artistic merit and innovation in the restoration and rehabilitation of bridges of historic or engineering significance.

Frederick Gottemoeller

"Fred's Bridgescape book is one of the most comprehensive guides to the development and application of bridge aesthetics that I have come across in practice. Fred introduced me to the works of many prominent bridge "Architects" such as Christian Menn and Robert Maillart." Jon McHugh

Fred has shaped the aesthetics on countless bridges emphasizing the principles of "structural art" to make signature bridges and the "everyday" roadway bridge look and perform better. His work in Maryland, Ohio and along the Pennsylvania Turnpike has helped shape the aesthetics of bridges in those regions and enhance the rider's appreciation of public infrastructure.



“Fred has changed the narrative on what a bridge or a “workhorse bridge” should be. His belief in public engagement, context sensitive design, and bridge aesthetics is more vital now than ever given the impacts that the built environment has on people and society.” Jon McHugh

Santiago Calatrava

“I was fascinated by the concept of gravity and convinced that it was necessary to begin work with simple forms.” Santiago Calatrava

Santiago Calatrava is globally known for sculptural-like bridges and buildings. Although primarily known as an architect, Santiago is also a structural engineer, sculptor, and painter. His philosophy is grounded in the belief that each innovative design must emanate from its cultural context, conveying traditional sensibility through modern architecture to create truly inspiring structures. Calatrava’s designs look towards the future, not just in terms of technology but also through the materials that the architect uses.

“When I was IBC General Chair in 2005, the IBC gave a special award to the Sundial Bridge in Redding, CA which resulted in me doing research into the style and other structures of Santiago Calatrava. Although he has drawn criticism for cost overruns and delay, his unique bridge design style has changed the game in many regards combining art with engineering.” Enrico Bruschi

“Calatrava explained that he was particularly influenced by the work of the early 20th century Swiss engineer Robert Maillart (1872–1940), which taught him that, ‘with an adequate combination of force and mass, you can create emotion’...” Elliot Mandel



Sundial Bridge, Redding, CA, IBC Award Winning Bridge – 2005

R. Kent Montgomery

“While working in the same regional office with Kent, I witnessed him developing the AASHTO Segmental Box Girder Standards as the “man behind the scenes”, never receiving any public recognition for this effort.” Jay Rohleder



Kent has impacted the general public through a long history of leading the technical design of many completed major bridge projects. Kent has impacted the general bridge engineering community through his involvement as a technical Subject Matter Expert advisor to the AASHTO Standing Committee on Structures and Bridges (SCOBS) Concrete Design Subcommittee (T-10). Kent has been intimately involved in rewriting and reorganizing Section 5 of the AASHTO Bridge Design Specification.

Between 1999 through 2003, a series of research projects were performed at the University of California at San Diego to investigate the seismic performance of precast segmental concrete bridges. Kent served on an Industry Panel to offer input regarding aspects of the study that would allow a practical application of the study so it would be relevant for real-world bridges. Kent has always freely provided his knowledge and experience in service to individual engineers and the broad engineering community without seeking any personal recognition.

“Kent represents everything that is good about being an engineer. He has performed brilliant, innovative bridge design solutions and does it in a very humble manner. He has superior knowledge of engineering mechanics, has served as the Engineer of Record for many major bridge designs and served on site to facilitate the successful construction of those bridges. He is constantly mentoring other engineers – He is An ‘Engineer’s – Engineer’.” Jay Rohleder

M. Myint Lwin

In 2022, IBC will have presented 34 John A Roebling Awards for lifetime achievement in bridge engineering. M. Myint Lwin received this award in 2013 recognizing his design excellence in floating bridge design, his leadership roles in both Washington State, DOT and the FHWA, as well as his commitment to the profession. His acceptance speech reflected the humility and grace that most bridge professionals aspire to. A few of his words of acceptance follow:

John A. Roebling had amazing, life-long accomplishments in manufacture of wire ropes, in the design and construction of suspension bridges, as an entrepreneur, and in many other endeavors. When I received the award, I felt much honored and humbled as the John A. Roebling Award was bestowed in recognition of my lifetime achievement in bridge engineering ... I was humbled by the fact that my achievements were minimal and contributions to the bridge engineering community were small as compared to those of John Roebling. I took the honor of receiving the award as an incentive and encouragement for me to continue to strive for excellence in bridge engineering, and for continued contributions to the community through learning, sharing and teaching. I thank the IBC Executive Board for the vision in creating the John A. Roebling Award in memory of John Roebling and in recognition of lifetime achievements of those who follow him.” ...M. Myint Lwin, June 2013





Photo courtesy of Becky Claypoole

ALL ROADS (and rivers) LEAD TO PITTSBURGH – PART 1

In two parts we look at the bridges that lead travelers on their way to Pittsburgh. In our first part, a local historian and bridge enthusiast looks at the City of Pittsburgh’s bridges from a passionate laymen’s, interesting perspective. In our second part, we look at bridges within a 100-mile radius of the point, from the photographer’s perspective – sharing the results of the ten best photographs from our 11th annual photo contest. Enjoy this celebration of regional bridges – the editors

NOT THE MOST BRIDGES, BUT SOME OF THE BEST

Visitors to the “City of Bridges” understand Pittsburgh’s nickname the moment they arrive. As they emerge from a tunnel onto the Fort Pitt Bridge, an urban panorama of skyscrapers, rivers, and bridges bursts into view.

Ride the incline to the top of Mount Washington, the steep ridge the tunnel pierces, and you can count more than a dozen large bridges spanning the city’s three rivers. Pittsburghers often boast of having more bridges than any other city in the world. President Joe Biden himself repeated the claim during a visit here in January to tout his infrastructure bill. Any pride locals may have felt was tempered by the fact that Biden shared this information while standing over a ravine containing the wreckage of the Fern Hollow Bridge, which had collapsed a few hours before his arrival.

Miraculously, none of the passengers in the five vehicles and city

bus that plunged down with the superstructure lost their lives. But the disaster not only severed a major city traffic artery; it also wounded Pittsburghers’ pride. Our bridges haven’t been a source of embarrassment since the 1960s, when the Fort Duquesne “Bridge to Nowhere” jutted like an enormous diving board for six years while planners squabbled over where its offramps should land.

So perhaps it was insensitive of me to seize on the collapse as an opportunity to spoil Pittsburgh’s most cherished myth, but facts are facts. As I explained on City Cast Pittsburgh and in a Pittsburgh Magazine article, April 2022, our city does not have more bridges than any other. The U.S. Department of Transportation, in its National Bridge Inventory, counts 297 road bridges spanning 20 feet or more in Pittsburgh (make that 296 now). Houston has 2,325. Four other Texas cities have more than 1,000, as do Los Angeles and



Photo Courtesy of the Library of Congress

West End Bridge, Pittsburgh, PA

Can you pick Mark out in the crowd? - the editors

New York, Chicago, Boston, Baltimore, and Cleveland each have more than Pittsburgh, which doesn't even have the most bridges of any city in Pennsylvania. That distinction goes to Philadelphia, with 591.

Yet as I contend in a TEDx Talk titled *Bridge Stories: Triumphs and Tragedies*, Pittsburgh still deserves to be known as the City of Bridges. This is where engineering pioneers John Roebling and Gustav Lindenthal both got their start. Before local legend Andrew Carnegie built his first library, his Keystone Bridge Company erected the world's first major steel span, the Eads Bridge across the Mississippi. Our city is graced with an outstanding assortment of bridges crossing its rivers and ravines, with many of the best

seemingly arranged to frame that signature postcard view from Mount Washington.

My favorite is the West End Bridge, thanks to a childhood memory. One perfect Fourth of July, my father timed a drive across it so that our station wagon reached the middle just as fireworks began bursting over the Point. Traffic froze completely as drivers and their passengers piled out onto the roadway to watch.

It's a feat I have tried to perform for my own children on more than one occasion, alas without success. Now they are grown, and they love their city as I do. To us — and indeed to anyone lucky enough to visit — Pittsburgh is clearly the City of Bridges just

as Paris is the City of Lights. It is not about counting. It is simply the essence of the place.

*Mark Houser is a frequent public speaker and the author of **MultiStories: 55 Antique Skyscrapers & the Business Tycoons Who Built Them**, published by Houser Talks 2020 (and available on Amazon). TEDx: **Bridge Stories: Triumphs and Tragedies** can be viewed on youtube at: <https://www.youtube.com/watch?v=mJqTR856gLw>. Learn more at HouserTalks.com.*

IBC's 11th Annual Photo Contest

ALL ROADS (and rivers) LEAD TO PITTSBURGH – PART 2

In two parts we look at the bridges that lead travelers on their way to Pittsburgh.

We now look at bridges within a 100-mile radius of the point, from the photographer's perspective – the artist's perspective, if you wish. Our artists are professional photographers, bridge professionals, and bridge enthusiasts who share their love of regional bridges by entry into our annual contest. The executive committee of IBC has reviewed many entries and after a difficult selection process has identified the following as the 10 best entries of 2022 – enjoy the results of our contest – the editors



1st Place – Birmingham Bridge over the Monongahela River, Pittsburgh, PA

- the Birmingham Bridge's simple bowstring arch design and solar orientation, set against a rich context of both urban and natural landscapes

Photographer: P. F. Hassett

The Bridge links the Forbes Avenue connection to the Uptown-Oakland Districts of Pittsburgh, on the north bank, with East Carson Street and the south side of Pittsburgh on the south bank of the river. The bridge is named in honor of the English city of Birmingham and also for the neighborhood it connects to, which was once called Birmingham, now a part of Pittsburgh's South Side. Pittsburgh's Birmingham was once home to famous 19th century millwright, lens maker, astronomer and ESWP member, John Brashear.

Judge's Comments: "... like a rainbow ... eerily suspended above the clouds ..."



2nd Place – Caperton Trail Bridge over Decker’s Creek, near the mouth of the Monongahela River, Morgantown, WV

– former B&O RR Bridge – now a part of the Monongahela River Trails Conservancy, a 46-mile rail-trail system linking urban and rural communities in three West Virginia counties.

Photographer: Thomas DaCosta

Judge’s Comments: “ ... a solemn winter scene ... with elegant perspective ...”



3rd Place – Roberto Clemente Bridge over the Allegheny River, Pittsburgh, PA

– named after the legendary Hall of Fame, Pittsburgh Pirate, Roberto Clemente who tragically died on New Year’s Eve, 1972, while flying a relief mission to earthquake devastated Nicaragua.

Photographer: Steve Shanley

Judge’s Comments: “ ... perfectly framed on a wind-swept icy day ...”



4th Place – Andy Warhol Bridge over the Allegheny River, Pittsburgh, PA

– formerly known as the Seventh Street Bridge, the bridge is currently the only bridge in the country to be named for a visual artist, (Oakland raised) Andy Warhol.

Photographer: Steve Shanley

Judge’s Comments: “ ... bold ... strong ... and balanced ...”



5th Place – Rachael Carson Bridge over the Allegheny River, Pittsburgh, PA

– named after, Springdale, PA native, who became a marine biologist, writer, and conservationist whose influential book *Silent Spring* (1962) and other writings are credited with advancing the global environmental movement.

Photographer: Bob Debski

Judge's Comments: "... beautiful bridge ... beautiful city ..."



6th Place – Hot Metal Bridge over the Monongahela River, Pittsburgh, PA

– the bridge is actually two parallel Pennsylvania through trusses converted to roadway and trail uses in 2000 to provide regional access to the City's South Side Works riverfront development.

Photographer: P. F. Hassett

Judge's Comments: "... a bridge in sight - birds in flight ..."



7th Place – Smithfield Street Bridge over the Monongahela River, Pittsburgh, PA

– designed by renowned Gustav Lindenthal (IBC Award namesake), this steel lenticular truss is noted for being one of the first bridges in the United States to use steel in its trusses as opposed to exclusively wrought and cast iron.

Photographer: Damian Silverstrim

Judge's Comments: "... excellent juxtaposition of historic and modern. ... a nighttime gem ..."



8th Place – Corridor H over the South Branch of Haddox Run, near Montrose, WV

– a part of West Virginia's Appalachian Corridor H, a limited access highway, ultimately linking I-79 and I-81, by an east-west route, traversing the scenic and rugged Allegheny Mountain Range

Photographer: Zach Thomas

Judge's Comments: "... some new construction in a beautiful mountainous setting ..."



9th Place – Phillip Murphy Bridge (South Tenth Street Bridge) over the Monongahela River, Pittsburgh, PA

– this suspension bridge, built in 1931, was renamed on Labor Day, 2007, for Phillip Murray, the first president of the United Steel workers of America.

Photographer: Edward Kapelewski

Judge's Comments: "... handsome bridge ... handsome view ..."



10th Place – Homestead Grays Bridge over the Monongahela River, Homestead, PA

– lying near the site of the 1892 Homestead Steel Strike, the bridge was, in 2002, renamed in honor of the Homestead Grays, a professional baseball team, founded by Cumberland Posey in 1912. The Homestead Grays played in the Negro Leagues in the United States until 1950..

Photographer: Stephen Shanley

Judge's Comments: "... a delicate steel skeleton illuminated in the night ..."

IBC Awards 2022

The International Bridge Conference® annually awards medals and awards of distinction to many projects of eminence and distinction from the world-wide engineering community. This year is no exception – enjoy this year’s award winners.
The editors

John A. Roebling Medal:

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

2022 Roebling Medal Winner



Daniel Tassin, P.E., P.Eng. who has served as an influential and practicing engineer on many major bridge projects in North America and all over the world for the past 50 years. Mr. Tassin has served as a bridge designer, construction advisor, technical director and engineer-of-record on many bridges over the extent of his career and continues to serve as a Bridge Senior Statesman, Mentor and Technical Resource for the bridge design and construction industry

Judge’s Comments: “Let’s put Daniel Tassin’s career in perspective; Daniel’s engineering lineage can be traced back to Eugene Freyssinet (1879-1962), who invented and developed prestressing in 1938. From 1972 thru the 1990’s Daniel worked with Jean Muller (1994 Roebling Award) on the innovative design and construction of many exciting segmental concrete bridges. Similarly, from 1947 thru the 1950’s, Jean Muller (1925 to 2005) worked closely with Eugene Freyssinet in the development of many precasting and post-tensioning techniques used today.”

Previous Recipients of the John A. Roebling Medal

2019	Karl Frank, Ph.D., P.E.	2008 ..	Leonardo Fernandez Troyano	1997	Christian Menn, Ph.D.
2018.	Gongyi Xu PhD., P.E.	2007 .	William B. Conway, P.E.	1996	Frank D. Sears
2017.	Vijay Chandra P.E.	2006 .	Charles Seim, P.E., F. ASCE	1995 ..	John W. Fisher, Ph.D.
2016	Dennis R. Mertz, Ph.D., P.E.	2005	John E. Breen, Ph.D.	1994 .	Jean M. Muller, Ph.D.
2015 .	Edward P. Wasserman	2004 ..	William Brown, Ph.D.	1993	Arthur L. Elliott
2014 ..	Malcolm T. Kerley, P.E.	2003 ..	Hiroyuki Fujikawa	1992	Frank L. Stahl
2013	M. Myint Lwin, P.E., S.E.	2002 .	Jackson Durkee, C.E., P.E.	1991 .	Herbert Rothman
2012	Dann H. Hall	2001 ..	James E. Roberts	1990 .	TY Lin
2011 .	Michael J. Abrahams, P.E.	2000	Eugene C. Figg, Jr., P.E.	1989 .	Blair Birdsall
2010 ..	John M. Kulicki, Ph.D, P.E.	1999	Abba G. Lichtenstein, P.E., Ph.D.	1988	Carl H. Gronquist
2009 .	Harold R. Sandberg, P.E., S.E.	1998 .	Man-Chung Tang, P.E.	1987	Gerald F. Fox

IBC Awards 2022

George S. Richardson Medal: Recognizing a single recent outstanding achievement in bridge engineering

"Constructed under a design-build contract, the unique design of the towers emerged from a combination of aesthetics, constructability, and seismic performance ... A spartan design concept that blends effectively into an industrial environment and is designed to be resilient enough to achieve a 100-year minimum service life..."



Gerald Desmond Bridge Replacement; Long Beach, California, USA

Gustav Lindenthal Medal: Recognizing an outstanding structure that is also aesthetically and environmentally pleasing

"The Huayudong Bridge Removal and Reconstruction Project creates an integrated demolition and reconstruction method for this bridge, and demonstrates a green and efficient infrastructure solution to the industry. What a truly impressive achievement, worthy of the Lindenthal Medal."



Huayudong Bridge Removal and Reconstruction Project; Shanghai-Kunming State Highway (G320) Guiyang Section, Guiyang, Guizhou, Peoples Republic of China

Eugene C. Figg, Jr. Medal: Recognizing a single recent outstanding achievement which is considered an icon to the community for which it was designed

"The willingness of the project partners to embrace technology for each stage of the project has resulted in an aesthetically pleasing, light structure that belies its complex nature and fits in perfectly within its marine environment ... The merging of design and analysis processes resulted in a seamless transition between traditionally distinct stages of design, fabrication and installation on site"



Varvsbron (the shipyard bridge); Helsingborg, Sweden

IBC Awards 2022

**Author G. Hayden Medal:
Recognizing a single recent
outstanding achievement
in bridge engineering
demonstrating vision and
innovation in non-traditional
structures**

"The Pittsburgh Urban Cap shows that we can improve transportation corridors and connect communities in meaningful ways by bridging over a decidedly disruptive interstate highway. The Frankie Pace Park is a wonderful addition to the downtown and a walkable connection for residents in the neighboring Hill District. This makes the community a better place to live."



I-579 Urban Open Space Cap; Pittsburgh, PA, USA

**Abba G. Lichtenstein Medal:
Recognizing a recent outstanding
achievement in bridge
engineering demonstrating
artistic merit and innovation
in the restoration of bridges of
historic significance**

"The first eye-bar chain suspension structure constructed in the United States ... The project renovated this historic, self-anchored suspension structure while maintaining its unique aesthetic characteristics."



Rachel Carson (Ninth Street) Bridge Rehabilitation; Pittsburgh, PA, USA

**Theodore Copper Medal:
Recognizing a recent outstanding
achievement in railroad
engineering and construction**

"Located on the Qinghai-Tibet Plateau where the air is thin and the temperature cycles wildly ...

The bridge is both aesthetically pleasing and functional, utilizing many innovative features in its design, which help it to accommodate rail traffic through this harsh environment."

Michael J. Cuddy is a principal of Transystems and is the co-chair of the 2022 IBC Awards Committee.



Zangmu Yarlung Zangbo River Bridge; Jiacha County, Shannan City, Tibet, People's Republic of China

