

David Steinman

America's Greatest Native Son Bridge Builder of the 20th Century

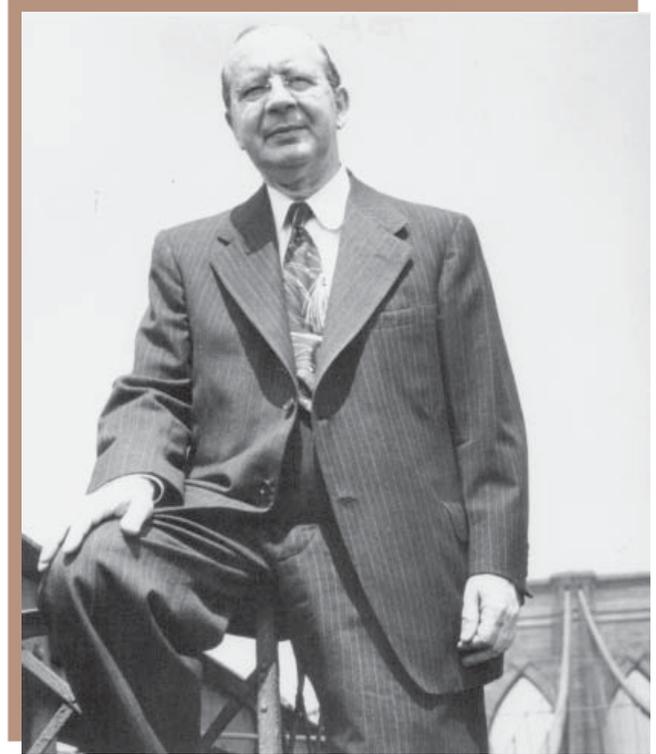
By Richard G. Weingardt, P.E.

In 1981, the U.S. lost one of its most cherished structural titles, being the home to the longest clear span bridge in the world. The record was captured by Great Britain and the Humber Bridge, with a clear span of 1410 meters. For 17 years prior, the world title was held by New York City's Verrazano Narrows Bridge at 1298 meters. Designed by Othmar Ammann, the Verrazano had previously eclipsed San Francisco's Golden Gate Bridge by a mere 18 meters. The Golden Gate, designed by Joseph Strauss and Charles Ellis, was the world recordholder from 1937 to 1967.

Although the 1981 longest-clear-span bridge crown transfer to overseas ended America's claim to one of the world's major individual suspension bridge honors, it continued to hold on to one other—having the world's longest suspension bridge (2626 meters under cable). This record would be America's for nearly two more decades, until 1998, when the Akashi Kaikyo Straits Bridge in Japan overtook the 1957 Mackinac Straits Bridge in Michigan in total length under cable. The Mackinac (the "Mighty Mack" or "Big Mack") was the masterwork of one of the greatest bridge builders the U.S. would ever produce—David Barnard Steinman.

From the late-1920s until 1960, Steinman ranked as America's preeminent home-grown designer of the long-span bridges, engineering more than 400 major bridges on five continents. He and his archrival Swiss-born Ammann dominated the American bridge-building scene. In their heyday in the mid-20th century, the two New York-based geniuses designed most of the suspension bridges that were built and had a hand in shaping the majority of the rest of them.

Of the two, Steinman designed a far greater number and variety of major bridges globally, while Ammann concentrated on New York City suspension masterpieces. Steinman's commissions



David Steinman at the Brooklyn Bridge (c1953). Steinman considered it his supreme accolade to be chosen to modernize the Brooklyn. (Photo courtesy of Parsons Corporation)

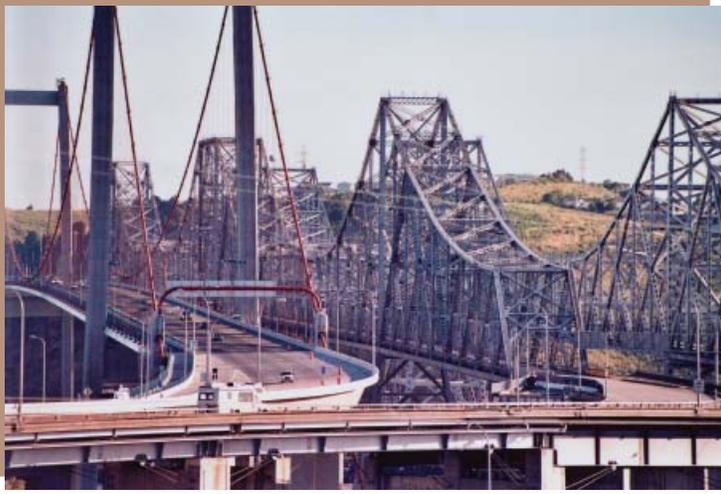
came from every part of the world, and his designs were regularly hailed for their cutting-edge engineering and construction innovations. He refined the use of exposed structural steel as art and pioneered the use of color and illumination on bridges. Over the years, dozens of his structures were honored for being the most beautiful bridges in America and/or the world—many still are.

To Steinman, the elegant, streamlined and aerodynamically stable Mackinac Bridge would always be his crowning achievement. A commemorative U.S. postage stamp of the structure issued shortly after its completion recognized it as an American icon. When, in a formal national ceremony on June 25th, 1958, Postmaster General Arthur Summerfield invited him to the podium and personally presented him with a customized, first-issue album of the stamps, the not-one-to-shun-publicity Steinman was in his element.

A genuine Horatio Alger success story, David Steinman figuratively rose from rags to riches. Born into poverty, he became a financial success beyond anyone's expectations



Mackinac Bridge, connecting Upper and Lower Michigan. Over 5 miles long, it was the world record holder as the longest suspension bridge under cable for more than 40 years, from 1957 until 1998. (Photo courtesy of Balthazar Korab Ltd.)



Carquinez Bridge (the center bridge in the left photo), San Francisco, California (1927). The Carquinez is currently scheduled for demolition in the latter half of 2005. (Photos courtesy of William Andrews, DASSE Design Inc.)

and rose to the highest plateau in his field: one of the greatest bridge engineers of all time.

David came into this world on June 11th, 1887, the seventh child of Eva Scollard and Louis Steinman, an immigrant laborer family in a blighted tenement neighborhood on New York's East Side. A mathematics prodigy, he was the only family member to graduate from college. His five older brothers followed in their father's footsteps and became factory workers, constantly struggling to make a living. His only sister married into a family of similar circumstances.

It was from such abject poverty that the youngest Steinman vowed to escape and make his mark in the world by getting a comprehensive education, working hard and accumulating money. While a youngster, he, like his siblings and many of his peers, worked at odd jobs for pennies, including selling newspapers often under the shadow of the awesome Brooklyn Bridge.

Completed in 1883, the majestic Brooklyn, with a clear span between towers of 833 meters, reigned as the world's longest suspension bridge. To young Steinman, it represented the outstanding engineering achievement of his day, and its designers/builders the Roeblings—John, Washington and Emily—became heroic figures in his eyes. As a feisty, scraggly kid, he would get chuckles when he pointed to the Brooklyn and said, "Some day I'm going to build bridges like that!"

While still in high school, the undersized David started taking college classes at the City College of New York. Because he was under five-foot tall and less than 90-pounds at the time, he was known to his older classmates as "the kid." At City College, he completed the first phase of his post-high school education, working at odd jobs to pay for his tuition and living expenses. He graduated summa cum laude with a bachelor's of science degree in 1906 at the age of 20.

He immediately enrolled in Columbia University and, by obtaining scholarships and taking on night-time jobs to support himself, he earned three degrees, culminating with a Ph.D. in civil engineering. While at Columbia, Steinman received his first publishing contract, translating two German books, *Theory of Arches and Suspension Bridges* and *Plain and Reinforced Concrete Arches*. The assignment introduced him to the joy of writing academic as well as practical engineering publications.

His thesis for his first degree in civil engineering at Columbia, *The Design of the Henry Hudson Memorial Bridge as a Steel Arch*, foretold of a project he would complete 25 years later—a student's dream come true. Between his civil engineering degree and his master's degree (in physics and mathematics)—both in the spring of 1909—and finishing up his Ph.D., Steinman took a Civil Service summer job. There he worked on his first real-job projects, the Cold Spring and Catskill Aqueducts in New York.

With all his doctoral coursework completed in 1910, Steinman accepted a position at the University of Idaho, where he would become the youngest civil engineering professor in the country. While there, the "city slicker" reached his full height of five-foot, eight-inches and took on outdoor western pursuits—and horseback riding. He purchased

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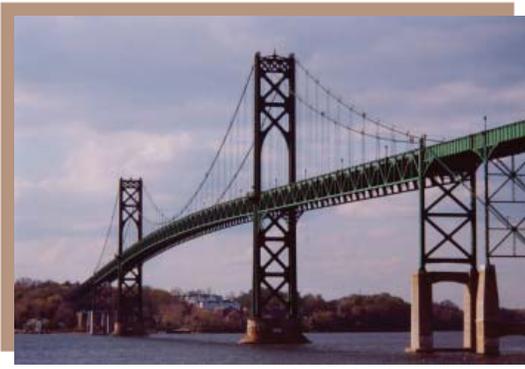
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Mt. Hope Bridge over Narragansett Bay, Rhode Island (1929). For many years, Mt. Hope was the longest suspension bridge in New England. (Photo courtesy of Richard Weingardt Consultants, Inc.)

a big white stallion named “Bill” from an army officer; he rode him everywhere including between the surveying classes he was in charge of, and even at the head of school parades.

In 1910, the Boy Scout movement was taking hold around the country and Steinman became scoutmaster to one of Idaho’s first chapters. Among the New York City boy’s unlikely tasks were the teaching of forest survival skills and woodworking crafts.

During this time, his doctoral thesis *Suspension Bridges and Cantilevers: Their Economic Proportions and Limiting Spans* was published by the well-known Van Nostrand Company of New York. The book quickly became an industry best seller and a popular textbook internationally.

After four years in Idaho, Steinman longed for New York and contacted Gustav Lindenthal, America’s leading long-span bridge designer at the time, for a job. Lindenthal had just secured a lucrative commission to design the Hell Gate Bridge in New York City and hired Steinman as his special assistant for the project, second only to another budding young bridge-building star Othmar Ammann. The experience of working together on Hell Gate commenced an intense rivalry between the two superstars that would last a lifetime.

Shortly after joining Lindenthal, Steinman met his bride-to-be, Irene Hoffmann, on a trolley car in Long Island. They were immediately attracted to each other. That Irene’s father Dr. E. Franz Hoffmann, formerly on the faculty at the School of Medicine in Vienna, approved of Steinman believing he had good prospects helped move the romance along. The doctor was also impressed that David could play a mean game of chess, and intelligently discuss Kantian philosophy and world events with him.

Married on June 9th, 1915, the young couple would have two sons and a daughter: John, Alberta and David, Jr. John and David would become medical doctors specializing in psychiatry, and Alberta would become a renowned psychologist.

After his stint with Lindenthal, which along with Hell Gate included working on the noteworthy Scitoville Bridge, Steinman went to work for John Waddell, a renowned U.S. bridge builder at the time. Waddell’s main engineering office was located in Kansas City and Steinman was put in charge of his newly established New York office. While there, he helped design the Marine Parkway Bridge.

From 1917 until 1920, Steinman was a part-time professor of civil and mechanical engineering at the newly formed engineering school at City College. In 1920, he opened his own consulting engineering office. His prospects looked quite bleak at the start. Recalled Steinman, “My first fee was \$5, and for several months it was a difficult and discouraging struggle. Then Holton Robinson, who built the Manhattan and Williamsburg bridges, asked me to join him in a competition to build the Florianapolis Bridge in Brazil.”

Their design proposal won and they were selected as the project’s designers. Thus began a partnership—the firm of Robinson and

Steinman—that would, over a 25-year period, result in the design of hundreds of impressive bridges around the globe before Robinson’s death in 1945. The Florianapolis, the largest-span bridge in South America when completed in 1926, was the largest eyebar-cable suspension ever built and the first in the Americas to use rocker towers.

Next for Robinson and Steinman came the Carquinez Strait Bridge northeast of San Francisco, the fourth largest cantilever bridge in the world, and the Mount Hope Bridge over Narragansett Bay, Rhode Island. Then, commissions for the company quickly started flowing in from everywhere, several from overseas. Neither the 1929 stock market crash nor the Great Depression itself seemed to slow down the rapidly emerging firm.

In late 1929, Steinman designed the Grand Mere over the St. Maurice River in Quebec. The project introduced prestressed twisted wire rope-strand cables, a Steinman innovation that later debuted in the U.S. in 1931, with the simultaneous completion of the St. John Bridge across Willamette River in Portland, Oregon, and the Waldo-Hancock Bridge across the Penobscot near Bucksport, Maine. The Waldo-Hancock also featured the first-time use of Vierendeel trusses in bridge towers.

Following those came many other noteworthy bridges such as the Henry Hudson (New York), Deer Isle (Maine) and Thousand Islands (linking Canada and the U.S. across the St. Lawrence River)—plus a wide assortment of significant structures outside the western hemisphere.

In 1947, Steinman was selected to do the reconstruction and updating of the Brooklyn Bridge—the structure that had first inspired him to become an engineer. He often said he considered it his supreme accolade to be chosen to modernize the Brooklyn.

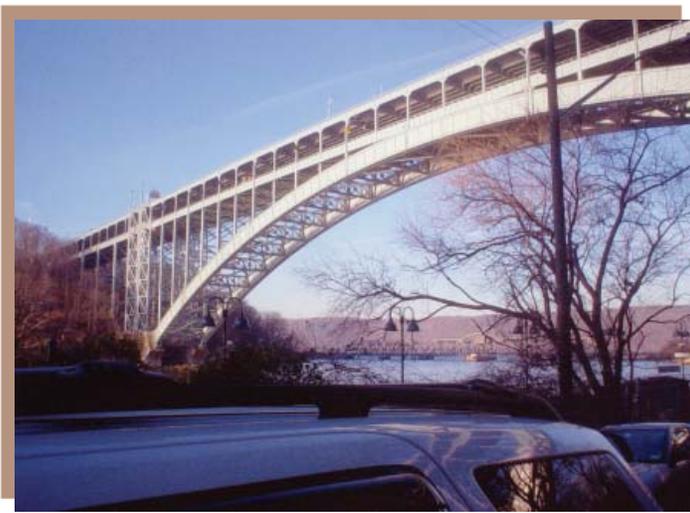
In the late 1950s, Steinman was involved in developing a design for the Messina Bridge, crossing the two-mile-wide Strait of Messina between Sicily and the Italian mainland. It would have been the world’s longest suspension bridge by a long margin. It still remained on the drawing board, however, when, on August 21st, 1960, Steinman passed away in his beloved New York City at the age of 73.

In the early 2000s, the firm Steinman founded was purchased by Parsons Transportation.

A true believer in giving back to the profession and helping advance it, Steinman served as president of a number of engineering groups, including the New York State Society of Professional Engineers, Society for the History of Technology and American Association of Engineers (AAE).



The Mt. Hope Visitor Information Board (located at the bridge site) contains this photo of bridge company officials. Steinman is at the far right next to William H. Vanderbilt, a prominent Newport, RI, businessman and senator whose influence prompted the construction of the project. (Photo courtesy of Richard Weingardt Consultants, Inc.)



Henry Hudson Bridge, New York City (1936). Steinman's thesis for his first degree in civil engineering was about the design of a steel arch bridge at the site 25 years prior to its actual construction.

As president of AAE, he became the single most effective champion nationally for improving professionalism within the field of engineering. He encouraged more stringent educational and ethical standards—and that P.E. registration laws be enacted in every state in the Union. He vigorously pushed the concept that engineering was a profession on par with medicine, law and science.

In 1934, he invited engineering leaders from four state professional engineering societies—Connecticut, New Jersey, New York and Pennsylvania—to discuss forming a nationwide society of professional engineers. The result was the formation of the National Society of Professional Engineers (NSPE), for which he worked tirelessly to ensure its success. He was its first president (1934-1937, serving two terms) and, in his inaugural address, he emphasized a need to protect legitimate engineers against competition from the unqualified, from unethical practices and from inadequate compensation. An inspiring figure on the platform, Steinman made countless speeches on behalf of NSPE and the profession, always striving to build public appreciation and recognition of the engineering community.

In addition to being a much sought-after speaker, David was a prolific and accomplished author, writing both prose and poetry. He was the author of more than 600 professional papers and 20 books, among them *Bridges and Their Builders* (1941) with co-author Sarah Watson, *The Builders of the Bridge* (1945), a best-selling biography of the Roeblings and *I Built a Bridge and Other Poems* (1955). His 150-plus published poems included titles like, “Brooklyn Bridge: Nightfall,” “Blueprint,” “The Harp,” “The Song of the Bridge,” and “The Challenge.”

Over his illustrious career, Steinman received numerous prestigious honors and tributes, nationally and internationally. He was the recipient of 19 honorary degrees. Among his awards, plaques, citations and decorations were the (1) William Procter Prize (American Association for the Advancement of Science), (2) Grand Croix de l'Etoile du Bien (French Government), (3) Kimbrough Gold Medal (American Institute of Steel Construction), (4) George Goethals

Medal (Society of American Military Engineers), (5) Gzowski Medal (Engineering Institute of Canada), (6) Louis Levy Medal (Franklin Institute) and (7) Gold Medal of the Americas (Chamber of Commerce of Latin America).

In his later years, Steinman became extremely philanthropic, especially in assisting needy students with engineering potential. He established the David Steinman Foundation, the Irene Steinman Scholarship and the Holton Robinson Scholarship. At City College, the school of engineering building—Steinman Hal—is named in his honor, as are numerous engineering awards programs around the world.

A man with many passions, Steinman excelled at engineering, business, public speaking, writing and photography—and he loved classical music. He often said, “If I had my life to live over again, I would correct one omission. I would learn to play a musical instrument.” The man from Brooklyn, however, will for all time be remembered as an unlikely poverty-born American lad who bravely pulled himself up by the bootstraps, overcoming all odds, to reach the highest levels of fame and fortune and become one of history's greatest bridge builders. His many great bridges around the world are tributes to his brilliance. ■

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