



*Harold P. Lomon*

## HERBERT B. ROTHMAN

1924–2015

Elected in 1990

*“For outstanding contributions to the design and rehabilitation of hundreds of bridges of all types and for exceptional contributions to the understanding of wind effects of complex structures.”*

BY MATTHYS LEVY

HERBERT BERNARD ROTHMAN, an exceptionally talented and versatile engineer and expert in aerodynamic analysis of suspension bridges, died on July 26, 2015. A native New Yorker, Herb was influenced by his father and uncle, who were both architects/engineers, but was drawn to the engineering side by a talent for mathematics. As a young man he had polio and fought to strengthen his legs, an experience that drove him to always strive to succeed no matter what challenge he faced. I remember that whenever we were together, he always took the stairs, three steps at a time, and avoided the elevator, all to assure himself that his legs were as strong as ever.

After graduation from Rensselaer Polytechnic Institute and a brief stint at another firm, he joined Ammann & Whitney (A&W) in 1945. There he met Boyd Anderson and Milton Brumer, both of whom were to have a major impact on his career. From Brumer he learned to apply a methodical approach to problems, which served him well whenever he was challenged to find solutions to difficult bridge problems, and from Anderson he learned how to analyze structures of all types. Early on, he also learned to articulate complex concepts in simple ways and to look for solutions out of the ordinary. In his 32 years with Ammann & Whitney, where he rose to become the firm’s chief bridge engineer, he developed

a solution for failing bridge anchorages of the Triborough Bridge, initiated the first cable inspection of the Golden Gate Bridge, and spent a couple of years in France providing engineering for American bases around that country where he pioneered the use of precast concrete for hangars and dormitories. Back in the United States, Herb worked on what was at the time the longest suspension bridge in the world, the Verrazano Narrows Bridge. He was also the designer for Philadelphia's Walt Whitman Bridge, the Oakland Coliseum, Massachusetts Institute of Technology's thin concrete shell Kresge Auditorium, the Society Hill Tunnel in Philadelphia, the General Manuel Belgrano cable-stayed concrete bridge in Argentina, and a large radio telescope. In addition, he developed a matrix algebra system that was a precursor for modern stress analysis systems.

Clients generally developed a long-lasting respect for Herb's engineering acumen as exemplified by the many projects that George Schoepfer, chief engineer of the Triborough Bridge and Tunnel Authority, entrusted to him first when he was at A&W and later when he joined Weidlinger Associates.

In 1977 Herb, having met Paul Weidlinger while consulting for the John Hancock tower in Chicago, was invited to join Weidlinger Associates (WAI) as a principal, to start a bridge and transportation design division. One of his first projects at WAI was the stiffening of the Bronx Whitestone Bridge that had exhibited potentially dangerous oscillations under certain wind conditions. He conceived of a 94-ton tuned mass damper that was fitted between the stiffening girders and designed to protect the bridge in the event of a 100-year storm. He later improved the aerodynamic behavior of the bridge by installing lightweight fiber-reinforced polymer fairings that would stabilize the bridge for winds up to 120 mph, thus ensuring stability for a more than 100,000-year return period as well as returning the bridge to its original sleek profile. During his 30 years with WAI, Rothman participated in the rehabilitation and strengthening of the Manhattan Bridge and many of the other New York area bridges, as well as designing the largest single-cell cofferdam.

The Manhattan Bridge, a suspension bridge linking Manhattan to Queens, was particularly challenging. A subway line rode on tracks located on one side of the bridge. Every time a train crossed the bridge, the truss/deck structure would twist, a condition that had existed ever since the bridge's construction in 1909. As a result, steel elements would crack and had to be constantly repaired. Herb devised a solution creating two torsionally stiff tubes, one on each side of the bridge, by adding lateral elements to the two-level deck and stiffening the girders of the existing bridge. This resisted the twisting motion and essentially eliminated cracking of members.

One of his last major projects was the design of the new east span of the San Francisco–Oakland Bay Bridge. The project was developed as a competition between a cable-stayed and a suspension bridge to replace a cantilever bridge that was insufficiently earthquake resistant. Herb had the task of developing the suspension concept, preferred by the community and academics because it was more visually compatible with the suspension spans on the west side. Rather than arriving at a conventional suspension bridge with anchorages at both ends, Herb proposed a self-anchored suspension bridge in which the cables connect to the deck rather than to difficult to construct anchorages. A secondary benefit was its increased resistance to the area's high seismic forces. This bridge, which was recently completed, is the world's longest self-anchored suspension bridge. At the time of his retirement, he was the chairman of WAI.

Rothman was an avid sailor and took a number of cruises to Nova Scotia on his 44-foot *Cambria* (the last of many sailboats he owned) that he would describe as occasionally challenging when the wind suddenly grew to gale proportions. He hated to use the engine and when becalmed, his passengers would be retching over the side while he waited for the wind to pick up. The only time he willingly used the engine was one July 4th in New York Harbor to avoid a near collision when the USS *Iowa*, with President Reagan aboard, bore down on his prime viewing position. Friends and colleagues, such as his partner Ron Mayrbaur, were often invited to

crew with him. An unfulfilled ambition of his was to sail around the world.

Herb was always open to new experiences and when I offered to fly him down to Washington for a meeting we were to attend, he enthusiastically accepted. If there was any trepidation on his part when he saw the single-engine plane, I did not see it. The morning flight in a clear blue-sky day was spectacular with practically infinite visibility. After a successful meeting we took off in the afternoon from National Airport and had just passed Baltimore when the door on Herb's side popped open and vibrated with a roar from the slipstream. Herb tried valiantly to pull the door shut but when that proved impossible, I landed at a small airport. As the plane slowed Herb was finally able to close and lock the door. We immediately took off again and completed the flight without further excitement. Of course, Herb never again flew with me.

He published numerous papers and articles on such diverse topics as matrix analysis, suspension bridges, and cofferdams and was the keynote speaker at professional conferences. He was recognized for his accomplishments and received the John A. Roebling Medal from the Engineers' Society of Western Pennsylvania and the Thomas Fitch Rowland Prize from the American Society of Civil Engineers. In 1993 the Institute for Bridge Integrity and Safety named him Bridge Engineer of the Year. He was also a member of a number of professional societies.

Throughout his life, Herb was very close to his family, his wife Joan, and their two daughters, Betty and Jane. He also helped raise his granddaughter, Becky, and lived to meet his great-granddaughter. In his hometown of Laurel Hollow, he served as deputy mayor and highway commissioner.

