William LeMessurier

Builder of Elegant Cutting-edge Structures

By Richard G. Weingardt, D.Sc. (h.c.), P.E., Dist.M.ASCE, F. ACEC

Figure 1: William J. LeMessurier. Courtesy of Bill Thoen.

At his zenith, William ("Bill") James LeMessurier, Jr. (*Figure 1*) was known around the world as one of America's most daring tall building designers. Based in Cambridge, Massachusetts, his firm's list of outstanding projects included elite high-rises in all of the northeastern states and in many others scattered around the country. Internationally, several of his company's more noteworthy projects were found in Egypt and in Middle Eastern countries like the United Arab Emirates, Saudi Arabia, Bahrain and Iraq. Although best known for skyscrapers, LeMessurier's life-time body of work also included numerous civic and educational buildings, and a wide array of commercial and industrial facilities.

According to William Thoen, a long-time personal friend and professional partner, LeMessurier was a Renaissance man who collaborated with architects in such a way that "his structural organization and economy showed through in the finished work. In many cases, Bill worked closely with the architect from the concept stages to final design so that the project, while still the architect's design, had the subtle structural harmony of form that the problem called for. He had an exceptional talent for interfacing with architects to make even their most difficult designs feasible."

Additionally, said Thoen, "Bill loved teaching as much as engineering, and was always at his best with an audience. He was extremely intelligent, insightful and highly articulate, and if you got into a verbal argument with him you would surely lose, usually in the first round. He thought very carefully about whatever he said and was precise in his use of language. I think that is what made him such a good leader, lecturer and teacher."

Bill was born on June 12, 1926 in Pontiac, Michigan, the youngest of four children of Bertha (Sherman) and William James LeMessurier, Sr., who owned a dry-cleaning business. After finishing high school, Bill left Michigan to major in mathematics at Harvard University, earning a Bachelor of Arts degree in 1947. He then studied architecture at Harvard's Graduate School of Design, and received a master's degree from Massachusetts Institute of Technology (MIT) in building engineering and construction in 1953.

While at MIT, LeMessurier worked part-time for Albert Goldberg, an established Boston structural engineer with a good reputation. Shortly after receiving his master's, LeMessurier joined Goldberg full-time. By the mid-1950s, he had become a partner and the firm was renamed Goldberg-LeMessurier Associates.

In April 1961, the two separated, dividing up staff and clients, and Bill launched LeMessurier Associates. It began with a dozen engineers and draftsmen. In addition to 35-year-old LeMessurier, the new company's partners were William Thoen, Emil Hervol and James Collins. Prominent among the firm's early projects were elementary schools. From the very beginning, LeMessurier always gave his architectural clients innovative structural solutions whether projects were large-scale or minor in size.

For example, on a small school gymnasium project, the architect wanted to match the gable-roof shape and style of the other buildings on campus. Because the space was intended for basketball and other games, a deep ridgeline girder or tie rods at the knees of the frame were out of the question. Rigid frames were also ruled out because of cost and the architect's objection to sub-floor tie rods. The LeMessurier solution? A funicular truss within both planes of the roof that spanned from end to end of the building, effectively taking advantage of the full depth of the slanted roof. Utilized in the system were laminated wood rafters, two continuous (draped and diagonally placed) flat steel bars secured to the rafters (one bar on each side of the roof) and a layer of plywood sheathing on top of the rafters (and steel bars) acting as a diaphragm.

For the Exeter, New Hampshire Athletic Center and Ice Skating Rink (*Figure 2*), the goal was to give visitors a clear view into the activity spaces from a galleria along a central spine, without having to look though a ceiling cluttered with structural framework. LeMessurier put the structural frame on the outside of the building, and hung the roof from it. This achieved maximum structural economy because deep structural frames could be utilized.

One of LeMessurier's first and longest-lasting architectural clients was Hugh Stubbins, a promising architect just appearing on the national scene in the mid-1950s. Said Thoen, "There were not a lot of structural engineers in the area then, and Stubbins came to Goldberg-LeMessurier one day for us to do an elementary school. As soon as Hugh and Bill met, there was a chemistry between them. Both were looking for excellence in their work. From then on LeMessurier became Hugh's only structural engineer. Stubbins was sort of a destiny's tot, and as his reputation grew, so did ours."

Representative of Stubbins-designed, high-profile skyscrapers engineered by LeMessurier were the 770-foot-tall Singapore Treasury Building (*Figure 3, page 36*) and the 920-foot-tall Citicorp Tower in New York City (*Figures 4* and *5, page 36*). The Treasury Building (aka Temasek Tower) has a round concrete spine or core that supports the entire weight of the building, from which the floors cantilever out 40 feet. One major element, its concrete tube, essentially provides all the required framing strength and rigidity needed for the entire building.

The unique base column configuration of the Citicorp Tower came about because of an

Figure 2: Exeter, New Hampshire, Athletic Center. Courtesy of Bill Thoen.

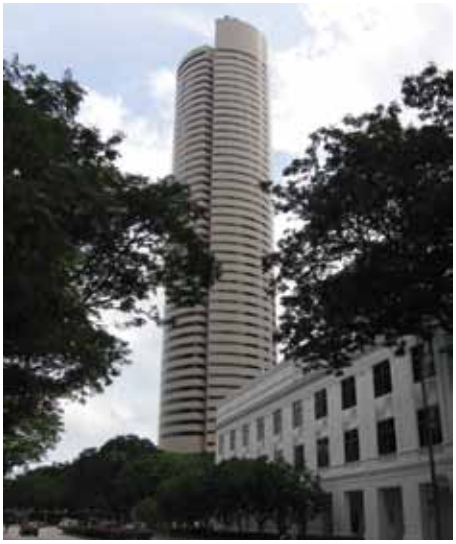

Figure 3: Singapore Treasury Building (aka Temasek Tower). Courtesy of Wikimedia Commons/Sengkang.

Figure 4: Citicorp Tower, New York City. Courtesy of Wikimedia Commons.

Figure 5: Base of Citicorp Center tower. Courtesy of Wikimedia Commons.

unusual site constraint: St. Peter's Church, which had sold its air rights but would not allow columns from any building above it to penetrate into its floor area. Instead, the new skyscraper's four major corner columns were relocated to the center of the building's four sides. From these side columns, the building edges were supported using large-scale chevron trusses.

The building required a light steel structure and lightweight glass and aluminum curtain walls, all of which had a very low mass. Although the building had sufficient strength, additional damping was needed to enhance structural performance and provide for better occupant comfort. A tuned-mass damper – the first use of such a damper in a major tall building – was the low-cost solution.

In June 1978, shortly after Citicorp Tower was completed and occupied, a potential weakness was uncovered. If hurricane-force winds – 70 miles an hour or more – hit it at a 45-degree angle, the building might be unsafe or unstable. First alerted to the problem by a Princeton University senior-class engineering student, Diane Hartley, LeMessurier revisited his structural design. In doing so, he discovered another aggravating issue: The building's vital chevron trusses, originally designed to be welded, had been joined with weaker bolted joints, a cheaper method substituted during construction to save the owner money.

To eliminate the structure being vulnerable to a lethal problem from a severe hurricane and to provide for a higher factor of safety, LeMessurier oversaw a furious schedule of repairs in August 1978, in which drywall workers, carpenters and welders worked around the clock to strengthen and repair the flawed joints. Because of his quick actions in resolving the issue, stepping forward and taking responsibility whatever the consequences to himself or his reputation, most structural engineers today celebrate LeMessurier as an industry hero and a role model for ethics. David Fowler, the legendary University of Texas professor, reflects the general sentiment: "What LeMessurier did was absolutely the right thing."

In addition to Exeter, Singapore and Citicorp, representative of LeMesurier's many other notable buildings are the National Air and Space Museum, Washington, DC; Dallas-Fort Worth Regional Airport, Texas; King Khalid Military City, Al Batin, Saudi Arabia; City Hall, Boston, Massachusetts; First Republic Bank Plaza, Dallas, Texas; Metro-Dade Administration Building, Miami, Florida; and Federal Reserve Bank, Boston, Massachusetts.

Robert McNamara, co-founder of McNamara-Salvia, who joined LeMessueier

after receiving his master's degree from the University of California at Berkeley, recalled LeMessurier's skill in dealing with new engineers, especially with those like him having in-depth training in the use of the latest and greatest computer methods. "Bill took me under his wing and we applied this new technology to most of the new projects in the office. My experience working with Bill was certainly a highlight of my early career. He openly shared his experience and creativity, and I learned quickly the importance of looking at the total system from the start."

As time went on, LeMessurier developed a close association with the Harvard Graduate School of Design, and served in his later years as an adjunct professor who lectured Harvard graduate students on building design, emphasizing the need for a close relationship between architects and structural engineers.

An avid reader, LeMessurier also enjoyed playing the piano, which he did expertly. Although not a sailor, he owned a speedboat, which he used to get from the mainland to his retreat island on Lake Sebago in Maine – and which he often liked to operate at high speeds. Originally called "Doctor's Island," LeMessurier's private island was a quiet, remote, and out-of-the-mainstream place where he went to rest, relax and reflect.

Inducted into the National Academy of Engineering (NAE) in 1978, LeMessurier was made an honorary member of the American Institute of Architects (AIA) in 1988 and an honorary member of the American Society of Civil Engineers (ASCE) in 1989. He was also the recipient of an honorary degree in engineering from Rensselaer Polytechnic Institute. Among his many other prized awards were the 1999 Kimbrough Award from the American Institute of Steel Construction (AISC), 1996 President's Medal from ASCE and 1968 Allied Professions Medal from AIA.

LeMessurier died on June 14, 2007, in Casco, Maine, at age 81. He was survived by his wife of 54 years, the former Dorothy Judd; by two daughters, Claire and Irene; by a son, Peter, a mechanical engineer; and by seven grandchildren.▪

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James J. Rongoe, Jr, P.E. passed away on Thursday, August 9, 2012 at Stamford Hospital. Jim received his B.S. from the University of Virginia and an M.S. from Columbia University. He completed graduate studies at Cornell University and Hofstra University and established his structural engineering firm, Rongoe Engineers, LLC, in 1980, which is where he worked until the time of his death. Jim was the author of numerous technical papers and journal articles, and holds a U.S. patent for a composite girder system. He chaired the Connecticut Code Advisory Committee, served on technical committees of ASCE and AISC, and was a member of the Board of Directors of the James Merriam Delahay Foundation. Jim, James Delahay, and John Hooper were the first practicing structural engineers on the International Code Council Structural Committee; and Jim's work on building codes on behalf of NCSEA earned him the first James Delahay Award. He was also honored with a Lifetime Achievement Award from the Structural Engineers Coalition of the American Council of Engineering Companies of Connecticut, marking his induction into the Connecticut Structural Engineers Hall of Fame.

Jim is survived by his wife, Toni-Ann, two daughters, Christine Osborn and Catherine Rongoe, his son, Nicholas Rongoe, and two granddaughters.

Jim served his profession as few do and made countless friends in the process. He was a gentleman, a scholar, an inventor, and a good engineer. He will be sorely missed by his family, his friends and the structural engineering profession to which he gave so much.

Donations in Jim's memory may be made to the Carl and Dorothy Bennett Cancer Center, c/o Stamford Health Foundation, 1351 Washington Blvd., Suite 202, Stamford, CT 06902, or the Whittingham Cancer Center, 24 Stevens Street, Norwalk, CT 06850.