# WILLIAM J. HALL

*1926–2020*

Elected in 1968

*"Contributions to structural engineering, structural mechanics, and soil dynamics."*

BY DAVID E. DANIEL AND ROBERT H. DODDS JR.

WILLIAM JOEL HALL, an eminent structural engineer, university teacher, and scholar, died June 9, 2020, at the age of 94 in Urbana, Illinois.

He was born in Berkeley, California, on April 13, 1926, the eldest son of Eugene Raymond and Mary F. (Harkey) Hall, who both hailed from Kansas, where they had met at the University of Kansas (KU). Bill's father earned a PhD in zoology from the University of California, Berkeley, and went on to become curator at the university's Museum of Vertebrate Zoology. Bill's mother held a master's degree in botany from KU and was active in the Girl Scouts.

In Bill's early childhood, the family moved to a 12-acre ranch in Lafayette, just east of Berkeley. The ranch had a water well, chickens, cows, and numerous fruit trees. Bill learned everything needed to maintain the ranch and developed a strong work ethic. As a teenager, he worked occasionally as a cowboy on other ranches in the area.

He attended UC Berkeley for a year, planning to study mechanical engineering, but left to join the Merchant Marines when World War II began. He served on a Victory-class cargo ship in the Pacific and survived attacks by Japanese bombers.

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The authors appreciate input from Doug Nyman and Bill's son Jim Hall.

After the war he joined his family who had returned to Lawrence, Kansas; he enrolled at KU and graduated with his BS in civil engineering in 1948. While there, he met Elaine Frances Thalman, who earned a degree in music; they married in 1948.

After graduation, Bill joined the SOHIO Pipeline Company, part of Standard Oil of Ohio. He soon had his first experience with problems of applied dynamics—a pump station vibrating so strongly it caused unacceptable vibrations at a home 4 miles away. He traced the problem to an issue involving geology (the house was built on the same strata of rock as the station) and the synchronous operation of multiple pumps, and solved it by changing the pump operation to avoid their synchronous vibrations.

A year later, Bill entered graduate school at the University of Illinois at Urbana-Champaign (UIUC) and was assigned to be a research assistant for Nathan M. Newmark (one of the 25 founding members of the National Academy of Engineering), an assignment he described as "one of the luckiest things that ever happened to me in my whole life."[1] Their research, funded by the military, concerned problems of structures and dynamics with a focus on blast effects. Bill earned his master's degree in 1951 and, when he got his PhD in 1954, Newmark convinced him to join the UIUC faculty.

Professor Hall rose rapidly through the faculty ranks and taught a variety of structural engineering courses. He was the principal investigator on a number of earthquake engineering projects sponsored by the National Science Foundation. His research spanned a range of topics in structural engineering, from evaluation of design and performance issues of steel structures to shock and blast effects on structures and military equipment, and earthquake engineering studies of structures and equipment.

[1] Quoted in *Connections, The EERI Oral History Series: William J. Hall* (2015) – interview by Robert D. Hanson and Robert Reitherman, with an appendix on Nathan M. Newmark (https://www.eeri.org/images/oralhistory/hall.pdf). This detailed personal account is a trove of information about Hall's life and includes a number of photographs.

He served as department head from 1984 through 1991; in 1990 the department was ranked first nationally by *US News and World Report*. He led a very successful, major transformation of the faculty during his tenure as head and, with his many decades on the faculty, was an invaluable resource to foster connections across multiple generations of faculty and alumni, especially as the transition from the postwar faculty accelerated in the 1980s.

After his formal retirement in 1993 he remained very active as a consultant, in professional activities, and in the daily life of the UIUC Civil Engineering Department. As new department heads came on board, Bill booked regular meetings with them to offer support and advice when called upon.

In the mid-1970s Bill served as a consulting specialist and technical advisor for the design and construction of the Trans-Alaska Pipeline System (TAPS). His contributions included the development of earthquake hazard mitigation concepts for the aboveground pipeline and pump station and marine terminal facilities.

He also led a unique experimental research program in the UIUC Structural Engineering Laboratory to understand the behavior of aboveground support piles for TAPS. Large refrigerated structures, several stories tall, were fabricated in the lab to load-test the piles embedded in frozen soil. The implementation of these design elements was tested during the magnitude 7.9 Denali fault earthquake of 2002, which caused no damage to the pipeline.

Concurrent with his academic career, Bill engaged in major consulting engineering projects, individually and as a collaborator with Newmark (until his death in 1981), in the areas of new design criteria for hardened protective structures. These jobs spanned missile facilities, military physical vulnerability studies, vibration studies of NASA missile test stands, reactor containment analysis and design studies (including seismic considerations), field test studies on nuclear blast effects, development and review of seismic design criteria for structure and equipment, and review of seismic designs of some 70 nuclear power plants for the US Atomic Energy

Commission and US Nuclear Regulatory Commission (US NRC).

In 1990–92 he aided SAIC in an investigation into the design of hardened facilities using advanced high-strength cementitious materials. Other notable consulting projects included the Foothills Alaska-Canada gas line and Western LNG Terminal at Point Conception, CA (1980–83), the Yukon Pacific Corporation (CSX) for a proposed trans-Alaska gas pipeline and LNG facility (1989–92), and the Defense Nuclear Facilities Safety Board on engineering matters for DOE facilities (1989–2000).

His expertise also put him in high demand to serve on study and advisory committees for many organizations, including NSF, the Department of Defense, and Department of Commerce, among others. A particularly noteworthy assignment was in 1982 when Bill served on the Defense Science Board Task Force on Closely Spaced Basing for the MX missile system, the so-called Townes Committee, reporting to the Secretary of Defense. Bill was especially proud to serve his country on these high-visibility and critical military challenges at the height of the Cold War.

Bill was an active member of professional organizations and societies. For the National Academies, he was appointed to the Committee on Earthquake Engineering (1983–86), Advisory Committee for the International Decade of Hazard Reduction (1987–88), and Committee on Feasibiltiy of Applying Blast-Mitigating Technologies and Design Methodologies from Military Facilities to Civilian Buildings (1994–95). For ASCE he served on the Structural Division's executive committee (1971–75; chair, 1973–74) and research committee (1960–64), executive committee of the Technical Council on Lifeline Earthquake Engineering (1980–84; chair, 1982–83), and Central Illinois Section (secretary-treasurer, vice president, president, and director, 1956–68).

He was the author or coauthor of more than 220 articles, books, and book chapters, covering topics in the fields of structural engineering, structural mechanics and dynamics, soil dynamics, earthquake engineering, plasticity, fatigue, brittle fracture mechanics, civil defense, and education.

His research earned him numerous honors: UIUC's A. Epstein Memorial Award (1958), ASCE's Walter L. Huber Civil Engineering Research Award (1963), the Adams Memorial Membership Award of the American Welding Society (1967), election to the NAE[2] (1968, at the age of 42), ASCE's Newmark Medal and E.E. Howard Award (both in 1984), the KU College of Engineering Distinguished Engineering Service Award (1985), the first C. Martin Duke Award (1991, given by the ASCE Technical Council on Lifeline Earthquake Engineering), ASCE's Norman Medal (1992), and the Housner Award from the Earthquake Engineering Research Institute (1998). He was also a member of the honor societies Tau Beta Pi, Sigma Tau, Phi Kappa Phi, Sigma Xi, and Chi Epsilon.

Always deeply immersed in his work, Bill was similarly involved in the lives and welfare of his students and faculty colleagues as well as staff and professional colleagues worldwide. He was dedicated to helping others whenever possible. As a testament to his commitment to teaching, he and his wife created the William J. and Elaine F. Hall Endowed Professorship in Civil and Environmental Engineering.

One of Bill's and Professor Newmark's best lessons—taught by example—for all their students was the understanding that, whatever their career choice (and many became professors, department heads, and deans), they were engineers first and were trained to solve engineering problems. Because of their leadership and inspiration, their students carried on in this tradition and the engineering world has clearly benefited from their example.

For many who came to know Bill Hall, the most treasured memory is that of one-on-one engagement with him and the support and encouragement that he selflessly offered. Bill was simultaneously a serious man with almost encyclopedic recall of people and details and, at the same time, a warm, caring person who was interested in others and could smile and laugh with ease. The combination of his wealth of knowledge,

[2] His brother Benjamin D. Hall (1932–2019) was elected to the National Academy of Sciences in 2014.

tremendous story-telling ability, caring heart, and sense of humor made him not only a giant in civil engineering but a giant as a human being as well.

Bill's wife of 71 years, Elaine, died November 23, 2020. They are survived by their three children: Martha (Matt) Sigler of Dublin, Ohio; James (Melody) Hall of Thompson's Station, Tennessee; and Carolyn (Larry) Vandendriessche of Bentleyville, Ohio; four grandchildren; and four great-granddaughters.