



F. E. Richart, Jr.

Frank E. (Bill) Richart, Jr.

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Submitted by the NAE Home Secretary

F. E. (Bill) Richart, W. J. Emmons Professor Emeritus of Civil Engineering, the University of Michigan, engineer and educator, died on September 16, 1994, at the age of seventy-five at his home in Ann Arbor, Michigan.

Elected to the National Academy of Engineering in April 1969, Bill was an outstanding engineering educator, dedicated to the development of four generations of university students. He was also a pioneer in defining the specialty field of soil dynamics, including the development of design procedures for the selection of foundations for vibrating machinery, sensitive instruments, and structures subject to earthquake shaking.

Bill received his education from the University of Illinois— B.S. (1940), M.S. (1946) and Ph.D. (1948). He received his bachelor's degree in mechanical engineering, his master's in civil engineering, and his Ph.D. in engineering/applied mechanics and structures. He later received honorary degrees from the University of Florida and Northwestern University in 1972 and 1987, respectively.

During his academic career, Bill taught at Harvard University as an assistant professor from 1948 to 1952, the University of Florida as an associate professor from 1952 to 1954 and as full professor from 1954 to 1962, and the University of Michigan as a professor, 1962 to 1986. At the University of Michigan, Bill served as chairman of the Department of Civil Engineering

from 1962 through 1969, and under his leadership, the department gained national stature and recognition. He was an outstanding technical leader, researcher, administrator, and recognized authority in his field. He chaired eighteen doctoral committees, developing nine engineering educators and countless engineering practitioners.

F. E. Richart's contributions in engineering science have made it possible to design foundations and structures to resist the destructive forces of water waves, earthquakes, and other ground-borne vibrations. These contributions were made through the branch of civil engineering known as geotechnical engineering and specifically in the subdiscipline for which he is credited as an originator, soil dynamics.

Before the research of F. E. Richart, the design procedures for dynamically loaded foundations of structures and earth dams were mainly empirical and often produced less than satisfactory results. In 1962 Bill published the award-winning paper "Foundation Vibrations," which for the first time tied together theoretical mechanics and soil properties for use in analysis and design. Bill offered the first graduate course in soil dynamics in the United States and possibly the world in the fall of 1961 at the University of Florida. In 1970 he coauthored the world-renowned textbook *Vibrations of Soils and Foundations* with former students J. R. Hall and R. D. Woods. This text remains after twenty-five years the basis for most courses in soil dynamics and has been translated into Japanese, Chinese, and Romanian.

Bill was one of the first to recognize that soils behave differently under cyclic and dynamic loads than under static loads, and he initiated research in the 1950s to define this behavior. The response of soils to cyclic loads plays a role in the effects of wave forces on structures in the marine environment, the resistance of foundations to earthquake shaking, and the behavior of foundations for sensitive instruments and vibrating machinery. To measure appropriate soil parameters, he directed the development of both laboratory and field testing apparatus and techniques. He guided the development of the resonant column and cyclic torsional shear apparatus, which

have become standard equipment for the laboratory, and the adaptation of seismic crosshole and seismic surface wave techniques for *in situ* measurement of soil properties.

Bill's more than 180 special lectures, seminars, workshops, and short courses in the United States, Europe, the Middle East, India, China, and Japan over three decades resulted in applications of his developments throughout the world. One of his lectures was the Terzaghi Lecture, the most prestigious named lecture in his field. His services were required in the 1950s for large radar antennas for the Distant Early Warning (DEW Line) system. Later his work was applied to the design of Texas Towers for both offshore tracking towers and oil exploration. The current state of the art in the design of foundations for large structures, earth dams, and nuclear power plants to resist earthquake shaking is heavily based on the methods developed by Bill Richart.

He shared his knowledge through more than seventy publications, for which he won nine prestigious national awards, and through his work as a consultant to many private and government agencies. These included the U.S. Army Corps of Engineers Waterways Experiment Station, U.S. Army Chief of Engineers, U.S. Air Force Weapons Laboratory, U.S. Air Force Science Advisory Board, U.S. Department of the Interior Bureau of Reclamation, NASA Apollo Lunar Landing program, and the Nuclear Regulatory Commission Advisory Committee for Reactor Safety.

Throughout his career, Bill was dedicated to the highest standards in engineering education. As department chairman of civil engineering at the University of Michigan, he greatly enhanced the quality of civil engineering through recruitment of outstanding new faculty members, many of whom have become leaders in their own right. He nurtured many graduate students who have gone on to make significant contributions as researchers, practicing professional engineers, university professors, department heads, and deans of engineering.

A loyal member of the American Society of Civil Engineers (ASCE), he served in many roles as chairman of technical committees and, most important, as chairman of the Executive

Committee of the Geotechnical Engineering Division from 1968 to 1969. He received the Terzaghi Award and later was recognized for his service to the ASCE, being elected as an honorary member in 1986.

Bill was a lifelong avid golfer, winning many tournaments both as an individual and with his wife Betty and sons John and Willard. He served as coach of the women's golf team at the University of Michigan before a professional was appointed.

