



Alfred H. Defore

ALFRED HEDEFINE

1906-1981

BY THOMAS R. KUESEL

ALFRED HEDEFINE, a distinguished bridge and structural engineer, died on January 26, 1981, in Englewood, New Jersey. For twenty years a partner and principal of Parsons Brinckerhoff Quade & Douglas of New York, he directed the design of many notable bridges, including the Newport suspension bridge in Rhode Island and the Fremont Bridge at Portland, Oregon, as well as New Jersey's Garden State Parkway.

Alfred Hedefine was born in Newport News, Virginia, on March 9, 1906. He studied civil engineering at Rutgers University (**B.S.** in civil engineering, 1929) and the University of Illinois (**M.S.** in civil engineering, 1931).

When he graduated in the midst of the Great Depression, the only job he could find in the construction industry was operating a pile driver on a power plant project in Brooklyn. After a year, he obtained a six-week temporary assignment with Waddell & Hardesty, checking calculations for a bridge design, during which he so impressed Dr. Shortridge Hardesty that he was given a full-time job, which was itself a major award in the 1930s. His job was to work on the design of the Mill Basin bascule bridge of the Belt Parkway in Brooklyn, and innovations that he developed on this project became the basis for a thesis on bascule bridges, which earned him a civil engineer's degree from the University of Illinois in 1942. This was followed by the design of the Marine Parkway vertical lift bridge in Brooklyn, the Rainbow Arch over Niagara Gorge, and the St.

George's tied arch over the Chesapeake and Delaware Canal, each of which established new standards for excellence in the bridge design for its type.

For the theme building of the 1939 New York World's Fair, the architects conceived a 700-foot-tall spike and a 200-foot-diameter hollow globe- the Tylon and Perisphere. Architecturally striking, they were structurally unprecedented. Alfred Hedefine was selected to prepare the structural design, which was accomplished entirely by hand calculation a generation before the development of electronic computers. His paper on the design of the Tylon and Perisphere earned the Thomas Fitch Rowland Prize of the American Society of Civil Engineers in 1942.

While with Waddell & Hardesty, he taught in the evening school at New York University and continued his own education with special studies at Columbia University in the then new discipline of soil mechanics, and at New York University in aviation engineering. At the outset of World War II, he was called as a special consultant to the Department of Defense and to the U.S. Air Force Strategic Air Command. He served from 1943 to 1945 in England with the Eighth Air Force on photoreconnaissance work.

In 1945 he returned to Hardesty & Hanover, the successors to Waddell & Hardesty, as an associate of the firm. Recognizing the changing climate of the design professions, he advocated the undertaking of professional business development. This was a departure from the traditional consulting engineer position whereby commissions come to an engineer solely because of his eminence. Disagreement on this philosophy led to a split with Hardesty & Hanover, and in 1948 Mr. Hedefine moved to Parsons Brinckerhoff Hall & Macdonald.

Starting as a Principal Associate and Head of the Bridge Department, he was admitted to the partnership in 1952. He became a Senior Vice-President of Parsons Brinckerhoff Quade & Douglas, and served as President from 1965 until his retirement in the early 1970s. In this second career he was responsible for pioneering efforts in the planning, design, and construction of bridges, tunnels, rapid transit systems, airfields, and marine terminals throughout the world.

His outstanding bridge project was the Newport Bridge in Rhode Island, which was the first major suspension bridge to use prefabricated, parallel-wire strands, a significant advance in bridge cable construction. This project also involved developing procedures for driving piles under water at depths up to 162 feet, the deepest ever attempted, and for placement of the largest amount of structural concrete ever placed under water (more than 90,000 cubic yards). The project received awards for excellence in engineering design from the New York Association of Consulting Engineers, the Consulting Engineers Council, the American Iron and Steel Institute, and the American Society of Civil Engineers. It *also* earned Mr. Redefine a patent for a system of prestressed posttensioned suspension bridge cable anchorage.

An unexpected tribute to the soundness of the Newport Bridge design came in February 1981 when a 50,000-ton oil tanker collided with one of the main piers, scoring a direct hit in a dense fog. The bow of the ship was shortened 10 feet by the impact, but the bridge did not budge, and the only damage it suffered was an enormous blotch of gray paint spread over the end of the pier.

The Fremont Bridge in Portland, Oregon, is the third-longest arch bridge in the world, with a main span of 1,255 feet. It is a unique double-deck, three-span stiffened tied arch, which was selected for its clean architectural lines and its structural efficiency, after consideration of many alternatives. The analysis of this exceedingly complex space frame structure required development, under Mr. Hedefine's direction, of a new computer-aided analytic methodology. The Fremont Bridge design received awards from the American Institute of Steel Construction and the Lincoln Arc Welding Foundation.

Among Mr. Hedefine's many other bridge projects, the Arthur Kill Bridge between Staten Island and New Jersey still holds the record (558 feet) as the world's longest vertical lift span. His designs for the 62nd Street Bridge in Pittsburgh and the Martin Luther King, Jr., Memorial Bridge in Richmond won architectural and engineering awards. He was also involved in notable tunnel projects, including studies for a proposed immersed tube railway tunnel for the English Channel and an award-winning proposal for an

immersed highway-rail tube supported on an underwater rock dike for the Straits of Messina international design competition in 1973.

In the fields of civil engineering, he personally directed the design and construction of the Garden State Parkway in New Jersey, prepared criteria for design and construction of military airfields that became a standard for the U.S. Air Force, and developed a unique concept for an automated vertical storage and retrieval system for handling large shipping containers.

Alfred Hedefine was active in many professional societies, including the International Association for Bridge and Structural Engineering, for which he served on the U.S. Council and the International Permanent Committee Policy-Making Body. For twenty years he was an active member of the Committee on Steel Structures of the American Railway Engineering Association and participated in the development of their standard specifications for fixed and movable bridges. He was a Fellow of the American Society of Civil Engineers, serving in various offices from 1942 to 1954, and of the American Institute of Consulting Engineers. His other professional memberships included those in the Society of American Military Engineers, National Society of Professional Engineers, Engineering Institute of Canada, and The Moles (the honorary tunneling fraternity).

His academic attainments earned him membership in Phi Beta Kappa, Tau Beta Pi, and Sigma Xi; he was one of the few individuals ever to receive high recognition in liberal arts, engineering, and science. He was elected to the National Academy of Engineering in 1973. In addition, he was a member of the New York Academy of Science and of the Cosmos Club. In 1975 he was awarded an honorary degree of Doctor of Science by Rutgers University. He was a member of the Board of Trustees of Rutgers and active in many of its committees.

In addition to his professional accomplishments, Alfred Hedefine was an accomplished musician. He served as President and Chairman of the Board of Trustees of the Guilmant Organ School, the oldest organ school in the country, founded in 1899. He was a Trustee of the Sussex County Music Foundation, and a member of the Board of Directors of the Bohemians, a New York musicians'

club . He enjoyed playing the organ in his home at Lake Mohawk, New Jersey, and for some years served as host of a classical music radio program that he taped in the music room of his home.

He is survived by his wife, the former Julia Ann Fullagar, and a son, Alfred II, and three grandchildren, as well as by a generation of civil engineers who grew under his guidance, benefited from his wise counsel and from his personal and professional uniqueness.