



Roy W. Carlson

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1900–1990

By Wallace L. Chadwick

Roy W. Carlson, consulting civil engineer, teacher, inventor, and specialist in materials technology, particularly Portland cement concrete, died November 21, 1990, in Oakland, California, at age ninety. At the time of his death, he was retired research associate at the University of California, Berkeley.

Dr. Carlson was born in Big Stone, Minnesota, on September 23, 1900. He graduated from the University of Redlands (California) in 1922 with an A.B. in mathematics. In 1923–1924 he studied at the California Institute of Technology, majoring in physics. The following year he received an M.S. in civil engineering from the University of California, Berkeley, and in 1939 a Sc.D. in materials from the Massachusetts Institute of Technology (MIT).

Dr. Carlson began his engineering career in 1925 as a concrete inspector on construction of the Florence Lake multiple-arch dam of the Southern California Edison Company in the Sierra Nevada Mountains of California. This experience whetted a keen interest in concrete dam design that was furthered while serving as an inspector of construction and testing of the Stevenson Creek Test Dam, also in the Sierra Nevada, during 1925 and 1926. This dam was built as a research tool to supplement the technology then used in designing arch dams.

Elected to membership in the National Academy of Engineering in 1974, Carlson received a Berkeley Citation from the

University of California in 1980, and in 1984 he was awarded the Order of the Southern Cross by the government of Brazil in recognition of his contributions to the engineering of large hydroelectric power developments in that country, including the great Itaipu project where he solved puzzling problems with Portland cement concrete construction. Such an award is seldom made to a foreign individual.

Carlson received an honorary doctor of science degree from the University of Redlands in 1951, the Dudley Medal of the American Society for Testing Materials, and the Wason and Turner Medals from the American Concrete Institute. In 1972 he received an Outstanding Civilian Service Award from the U.S. Army Corps of Engineers. He was elected an honorary member of the American Concrete Institute in 1967, and a fellow of the American Society of Civil Engineers.

During 1944 Carlson worked at Los Alamos and at the Radiation Laboratory at Berkeley on development and testing of the atomic bomb, his particular role being development of the required high-strength materials.

Carlson wrote fifty-six technical papers that were published by various professional societies. The subjects were principally design and testing of remote sensing instruments for measuring stress, strain, temperature, pore pressure, similitude requirements for model construction and testing, structural action in dams and bridges, safety of dams, concrete technology, chemistry of cement and concrete, and methods of structural analysis.

The Stevenson Creek Experimental Dam, built of high-quality concrete, was 60 feet high, and varied from 7.5 feet thick at its base to 2 feet thick through its upper 30 feet. It was tested to failure. When ready for loading, it was packed with instruments and built to the leading edge of the current technology. However, acceptable instruments to measure internal stress did not yet exist, and authoritative opinion doubted the possibility of developing such devices. This notion challenged Carlson, who invested in, built, and for many years manufactured instruments for measurement of stress, strain, temperature, and pressure. He proved that compressive stress could be measured in a semielastic material without needing to know the deformation. Thou

sands of Carlson's instruments were built into major dams of the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation, as well as those of Brazil and other countries.

In addition to his development and manufacture of instruments for internal measurements of concrete dams, Carlson developed a worldwide consulting practice and for eight years was active as lecturer and research assistant at MIT, and later at the University of California, Berkeley. Carlson was an active member of the Committee on the Long Term Performance of Portland Cement in Concrete that developed the five kinds of Portland cement now in general use.

Carlson was testing engineer on ten dams for the Los Angeles County Flood Control District from 1927 to 1931. He then served until 1934 as assistant director of Research on Materials for the construction of Hoover Dam. Following that he divided his time between teaching; the manufacture of instruments of his own design; and consultation on concrete dams, structural analysis, and concrete technology.

Carlson was the donor of several auxiliary facilities of the Engineering Department of the University of California, Berkeley. He owned patents on the Carlson Strain Meter #2,036,458, Electric Pressure Meters #2,059,549, Stress Meters #2,148,013, and stress meter for soils and granular materials #3,529,468. Carlson resumed manufacture of his instruments in 1972 in a limited partnership with Walter D. Dieden. The writer gratefully acknowledges the assistance of Mr. Dieden in assembling biographical data for this memorial tribute.

Carlson is survived by two daughters, Susan C. Ichinaga of Morgan Hill, California, and Sally C. Brasseur of Penn Grove, California.