James E. Roberts

JAMES E. ROBERTS

1930–2006

Elected in 1996

"For the development and implementation of innovative bridge retrofit concepts and criteria under seismic conditions."

BY RICHARD DOKKEN
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JAMES E. ROBERTS, a longtime leader in the bridge design profession, died on July 6, 2006, at the age of 75. He was born on November 24, 1930, in Missouri and moved with his family to California when he was 6.

Jim Roberts held a number of significant engineering titles throughout his 50-plus-year career, including state bridge engineer for California and chief deputy director for the California Department of Transportation. He was a leader during the state's highway and bridge construction boom in the 1950s and 1960s. He is the only Caltrans employee to have been inducted into the National Academy of Engineering. Jim earned his bachelor of science degree in engineering from the University of California, Berkeley, and his master of science from the University of Southern California (USC). He was a registered professional engineer. He served on active duty in the U.S. Army Corps of Engineers during the Korean conflict and in all served 33 years in the U.S. Army Reserve. He retired as a colonel. His obituary called him "An Engineer's Engineer," a term respectfully coined by a coworker. Roberts did not identify himself as an engineer's engineer, however.

He always maintained a professional attitude, work ethic, and appearance in the office, which carried over, in part, from his military experience. His career at Caltrans started in 1951

as a junior engineer before he had completed his B.S. degree from UC Berkeley. He later earned his master's degree while working full time as a resident engineer at Caltrans. For several years he logged a full day at a job site in the Central Valley and then made the six-hour round trip to USC for evening classes. Even then he was always the first one to the office in the morning.

After accumulating a decade of field experience, Roberts was assigned to Caltrans' Design Section 2 in 1962. His mentors in the bridge design section were engineers who would go on to be public works directors and chief executive officers of engineering firms. The early 1960s were a time of tremendous change in bridge engineering. Computational tools had recently become available. Roberts learned quickly, worked fast, and asked questions constantly. He soon not only mastered the conventional bridge design techniques of the time but also absorbed the importance of the new computer-aided wave of bridge design. His bridge projects grew in importance as his experience grew.

In the 1960s, most steel bridges were simple. Curved steel bridges used short spans with straight girders flared to accommodate the curves. The slide rule was used for most design calculations. The first large bridge design that Roberts was responsible for as a senior engineer was the Tuolumne River Bridge in California's Tuolumne County. That bridge was substantially different from other steel bridges of the time. It was a six-span, 1,400-foot-long bridge on a 1,200-foot radius with a 350-foot main span and an 8 percent super-elevation. Time was of the essence, as the bridge would be constructed over a river that was soon to turn into Lake Don Pedro. Roberts's efforts on this project exemplified the leadership and engineering skills that he demonstrated throughout his career.

The design standards of the time did not fully address many of the structural issues presented by this particular bridge. Research was under way nationally on curved steel girders with spans as long as 150 feet, but these lengths were substantially shorter than the planned spans on this bridge. Preliminary

longhand calculations of the structure implied results that were substantially different from those of a traditional short-span bridge, and the available design tables were completely inadequate to handle the three-dimensional effects of this highly curved bridge. The only computer software available to address bridge analysis was a then-experimental piece of software called STRUDL. The Tuolumne River Bridge became the first application of this type of software to a bridge in the western United States. Similar software applications to complex bridge designs have only recently become commonplace. Roberts's work was performed 40 years ago.

Roberts's leadership was further tested during the construction of the bridge. Midway through erection of the steel girders, a material failure occurred during construction of a steel bridge near Sacramento. That bridge utilized the same materials that were already in Roberts's partially constructed Tuolumne River Bridge. With flooding of the valley imminent, the design team feverishly worked out extensive field modifications to the fracture-critical girders while lawyers for the state and the steel fabricator argued over liability.

Roberts's team argued internally over an appropriate repair strategy. Ultimately, they relied on seasoned judgment, intuition, and new computer tools to produce field repairs for the substandard steel-plate flanges on the bridge. It would be more than a year before enough was known about fracture mechanics to determine just how close the team might have been to losing the bridge. In 2007, a year after Roberts passed away, the structure was officially renamed the James E. Roberts Memorial Bridge.

Roberts went on to many leadership roles. He soon took over a Caltrans bridge design section and then served several years as the chief engineer for the Sacramento Regional Transit's light rail system. He then went back to Caltrans and became director of the Engineering Service Center, where he was responsible for the work of 2,300 engineers, architects, and support staff responsible for designing, building, and maintaining all of California's bridges. He was at the reins as the state bridge engineer when the 1987 Whittier earthquake,

the 1989 Loma Prieta earthquake, and the 1994 Northridge earthquake hit. He supervised a renaissance in seismic retrofit design that occurred at Caltrans in the late 1980s and early 1990s. Because California has historically been on the cutting edge of bridge design, his leadership made not only California's roads and bridges safer but also much of the nation's.

Roberts eventually served as chief deputy director (while simultaneously running the bridge department) of Caltrans before retiring in 2001. He continued to work part time, advising bridge designers until his death in 2006.

An engineer is someone who can confidently stamp a set of plans. Jim Roberts was responsible for the design and construction of countless bridges in California. More importantly, he was a leader, an accomplished speaker, a man with great foresight, and a mentor and he was politically savvy. That amounts to much more than a typical "engineer's engineer."

Jim Roberts is survived by his wife, Patricia Lee Brighton Roberts, of Carmichael, as well as two children and two grandchildren.