Alexander C. Scordelis

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1923–2007

Elected in 1978

"For pioneering the development and application of advanced structural analysis to the design of record-breaking and unique structural systems."

BY JOHN E. BREEN

ALEXANDER C. SCORDELIS, Byron L. and Elvira E. Nishkian Professor Emeritus of Structural Engineering at the University of California, Berkeley, and one of the nation's most influential experts on design and analysis of thin-shell structures and long-span, prestressed-concrete bridges, died on August 27, 2007, at the age of 83. He was elected a member of NAE in 1978 for "pioneering the development and applications of advanced structural analysis to the design of record-breaking and unique structural systems."

Although Alex was first and foremost a renowned teacher at Berkeley, his clear, comprehensive papers and reports extended his influence far beyond the Berkeley campus. His superbly organized lectures, clear explanations, and penetrating questions led his students in the classroom and researchers in the laboratory to a deep understanding and mastery of the material. Through publications, consulting activities, and public service, he extended these benefits to consulting engineers, national and international committees, commissions charged with assessing the safety of huge, complex structures, and fellow experts struggling to understand the behavior and dynamic loading of newly emerging structural systems of prestressed concrete and thin concrete shells.

Alex was born on September 27, 1923, in San Francisco. His parents, Greek immigrants who owned a grocery store in the Marina district, instilled in him a lifelong pride in his Greek heritage. At 16, he entered UC Berkeley as an undergraduate. After Pearl Harbor, he joined ROTC and then interrupted his studies to serve in Europe during World War II with the U.S. Army Corps of Engineers. His leadership skills were developed under fire at an early age, when he fought in the Battle of the Bulge and was with the troops that liberated concentration camps at the close of European hostilities. He was awarded the Bronze Star for meritorious achievement and the Purple Heart for combat wounds. In 1946, he left active duty as a captain but continued to serve in the reserves. He ultimately achieved the rank of major.

After the war, Alex returned to Berkeley where he completed his B.S. in civil engineering in 1948, and went on to MIT where he received an M.S. in civil engineering in 1949. He then returned to UC Berkeley as an instructor and was promoted through the professorial ranks to full professor in 1962. He was awarded the Nishkian Chair as professor of structural engineering in 1987.

In the years immediately following World War II, there were three major developments in structural engineering that greatly influenced his career. The first of these was the great expansion of graduate education in engineering in the United States, which created a ready market for Alex's skills as a leader, lecturer, and innovative researcher. The civil engineering faculty at Berkeley, led by Alex and others, became one of the foremost creative teams in the world advancing structural mechanics and structural engineering.

The second development was the emergence of an essentially new material, prestressed concrete, as the dominant construction material in medium- and long-span bridges. Alex was an organizer of the First World Conference on Prestressed Concrete in 1957. Led by T. Y. Lin, his Berkeley colleague and lifelong friend, this conference was the practical introduction in the United States of a unique form of construction that had been recently introduced more widely in Europe for the reconstruction

of major bridges that had been damaged or destroyed during the war. Alex's advanced analysis techniques became the most widely used procedures for analyzing reinforced and post-tensioned concrete box-girder bridges, an efficient and attractive structural art form that soon appeared in California and across the country. He worked closely with Lin to provide an analytical framework for many of Lin's pioneering designs.

The third development was the birth of the electronic computer and the mushrooming growth of numerical analysis and computation procedures in structural engineering. The Berkeley group, with leaders like Ray Clough, Ed Wilson, Karl Pister, Vitelmo Bertero, Boris Bresler, T. Y. Lin, Egor Popov, and others, combined efficient numerical analysis tools and advanced understanding of both structural analysis and structural behavior to launch comprehensive new analysis and design procedures for structural engineering. Alex, who had great insight into structural behavior based on more classical analyses, brought this insight to the new computer analyses to develop revolutionary analysis procedures for long-span, box-girder bridges and free-form, thin-shell structures. He enabled designers to analyze and design graceful, slender bridges and inspirational thin-shell roofs. Using models of box-girder bridges, he verified the accuracy of the analyses in laboratory tests.

In recognition of his accomplishments, Alex received three American Society of Civil Engineers (ASCE) Moisseiff Awards for papers in 1976, 1981, and 1992. This award is given for excellence in papers on structural design, including applied mechanics, theoretical analysis, or constructive improvement of engineering structures. Alex was cited for nonlinear analysis of reinforced-concrete shells, the analysis of curved, prestressed, segmental bridges, and the analysis of slender, concrete bridge towers under cyclic lateral load, all of which were not only complex analytically but were also important to practical design and public safety. These were the overriding common denominators of Alex's work—intellectually advanced and rigorous analysis for important engineering applications.

The engineering profession recognized his accomplishments

by naming him an Honorary Member of ASCE in 1989 and an Honorary Member of the International Association for Shell and Spatial Structures in 1992 and bestowing on him ASCE's Howard Award for structural design in 1989. In 1994, the International Federation for Structural Concrete awarded him its highest honor, the Freyssinet Medal, only the third time an American was so honored. He was the author of more than 170 papers and also served on a number of governmental boards assessing seismic safety — including panels on the Golden Gate Bridge and the design of a new eastern span for the San Francisco-Oakland Bay Bridge. He was one of 11 members appointed by the governor of California in 1989 to a Board of Inquiry into the Loma Prieta Earthquake, to issue the defining assessment of the quake's impact on California's infrastructure. Throughout his career, Alex Scordelis was a consultant on applications of his physical and computational research to practical engineering projects, including more than 40 major projects, such as thin-shell structures and long-span bridge structures.

However, simply recounting Alex's technical accomplishments does not convey the essence of his greatness. Alex was vitally interested in the development of engineers as people. He challenged his students in the classroom with penetrating questions to stimulate their understanding, encourage them to apply the techniques they had learned to a wide range of problems, and help them learn to express themselves effectively.

A treasured member of professional committees, Alex had the ability to clarify competing and conflicting points of view and develop consensus on important design and analysis procedures. Particularly in the area of thin-shell structures, he had to deal with strong-willed experts with fiery artistic temperaments. Somehow, Alex was able to "herd cats" and move even these groups toward consensus.

He had a special gift for relating to young people — his children, his students, his research students, young faculty, neophyte experts serving on their first national or international

technical committees, young designers in consulting offices or bridge departments. He never talked down to them, and he always took a personal interest in their work. He had a wonderful sense of humor, often self-deprecating, and a knack for reducing complex subjects to their essence, showing relationships between topics, and presenting the results in the form of targeted questions that ensured his pupils or listeners really understood the solution.

He could be as dedicated in teaching the proper appreciation of a glass of ouzo as he was in explaining how to set up a proper finite-element analysis of a curved post-tensioned bridge. He was just as willing to teach important life lessons—how to make an effective presentation, or win engineers over to your point of view, or achieve consensus on a report assessing the structural safety of a complex structure — as he was to teach technical solutions.

With his passing, many of us recall his pivotal role in the development of our engineering judgment and, more important, in the development of our engineering character. Alex Scordelis left behind a legion of former graduate students who have extended his research ideas in myriad ways. At his memorial service, one of these students said that he wished "to recognize and applaud this thought-provoking mentor and educator who motivated many of us to follow in his footsteps." Socrates would approve.

Just as Alex Scordelis influenced generations of engineering students, he leaves a legacy of wisdom, values, and love for generations of his family. He is survived by his wife of 59 years Georgia, son and daughter-in-law Byron and Stephanie Scordelis, daughter and son-in-law Karen and Robert Holtermann, and four grandchildren.