



John A. Blume. Courtesy of John A. Blume Earthquake Engineering Center, Stanford University.

John Augustus Blume

Father of Earthquake Engineering

By Richard G. Weingardt, P.E.

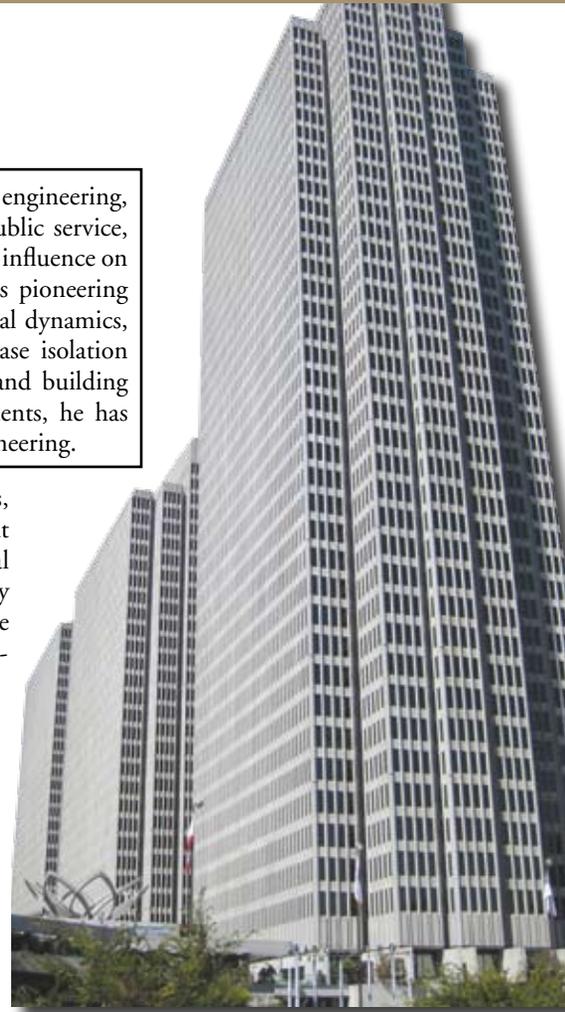
Because of his breakthroughs in seismic and structural engineering, and his publications, lectures, consulting and devoted public service, California native John A. Blume exerted an unprecedented influence on modern earthquake engineering practices worldwide. His pioneering efforts in the development and understanding of structural dynamics, earthquake effects on buildings, ground motions and base isolation intricacies greatly influenced seismic design procedures and building codes. For his accomplishments and industry advancements, he has been recognized as the nation's Father of Earthquake Engineering.

Blume was co-founder of the Earthquake Engineering Research Institute (EERI), serving as one of its early presidents. He helped organize the First World Conference on Earthquake Engineering, held in Berkeley, California in 1956 and presented distinguished papers at every World Conference for 20 years thereafter. In 1974, he established the John A. Blume Earthquake Engineering Center at Stanford University, an enterprise devoted to the refinement of earthquake engineering. He also endowed the John A. Blume Professor Chair at Stanford and for many years was a consulting professor of civil/environmental engineering there.

Not one to put his head in the sand with regard to the capabilities of man-made works, Blume believed that most buildings could be made earthquake resistant, but *not*

earthquake-proof. He often told reporters, "Don't say 'proof' unless you're talking about whiskey." Seismic-knowledgeable structural engineers can greatly increase occupant safety in structures, but they are not able to make them totally earthquake-proof within normally accepted construction budgets.

The recipient of many prestigious honors and awards over his career, Blume was honored posthumously in 2006, on the 100th anniversary of the great San Francisco Earthquake, as one of the "Top Ten Seismic Engineers of the 20th Century" by *Engineering News-Record* (ENR) and the Applied Technology Council (ATC). When *ENR* put Blume on its September 18, 1980 cover, it featured him as the engineer who was "taming earthquakes with ideas."



Embarcadero Center highrises, San Francisco, CA. Courtesy of William Andrews.



Diablo Canyon Power Plant, California. Courtesy of Bill Hall Photo Collection.

John was born on April 8, 1909 in Gonzales, California, the only child of Charles August and Vashti (Rankin) Blume. He grew up listening to stories by his parents and both sets of grandparents about how they survived the great 1906 San Francisco Earthquake and the ensuing fires. It stimulated an early interest in learning all he could about earthquakes and how to deal with them.

John's paternal grandfather, Nils August Blume, was a Swedish sea captain who came to the U.S. at the start of the Civil War and served throughout that conflict in the U.S. Navy, afterward settling in California. He married Pauline (Challamel) Blume from France in 1869, just before she was to enter a convent in Honolulu. John's maternal grandparents were John and Phoebe (Lane) Rankin. A native of Ireland, Rankin also fought in the Civil War, then studied medicine, moved to California



Oakland Bay Bridge. The state-of-the-art structure was Blume's first engineering job after graduation from Stanford. He served as a field engineer for the U.S. Coast and Geodetic Survey and the California State Toll Bridge Authority. Courtesy of Richard Weingardt Consultants, Inc.

and became a country doctor practicing in Gonzales. Phoebe was from England, giving Blume a diverse ancestry of English, French, Irish and Swedish.

When John was three years old, his mother Vashti died suddenly. A couple of years later, his father married Alice Holland. Charles and Alice had one daughter, Beverly Mae. John and his half sister were close, remaining so until his passing. Plus, said Blume, "My stepmother did a fine job raising us, especially me."

Charles Blume was a successful steel erector and contractor in northern California, and this had a prominent influence on his son's life and career. According to John, "My father built most of early San Francisco, including City Hall, the civic auditorium, and many theaters and big buildings of the 1900 to 1924 era." His active participation in the reconstruction of San Francisco after the 1906 earthquake, including the rebuilding of the Palace Hotel – where John would one day be second tenor in a quartet singing with dance bands in the Rose Room – was similarly a source of great pride for the Blume family.

In the early 1920s, when John was in his early teens, his father secured several major building contracts in Hawaii and moved the family there. For the two-plus years that they lived on the Islands, John was essentially a beachcomber, swimming and surfing, and *not* attending school. Large for his age, he occasionally earned money giving tourists swimming and surfing lessons. Additionally, he worked for his father as an ironworker, steel erector and rigger, dangerously scaling tall steel frames.

When the Blumes returned to California, John re-entered formal school, older and more worldly

than his classmates. During summers, he worked as a laborer, carpenter, cannery worker and truck driver to earn money. In 1925, when he was 16, while driving a long-distance moving van, John was caught in the Santa Barbara Earthquake, a 6.3 Richter scale event. Thirteen people died in the quake and, though most houses survived, many commercial buildings were severely damaged or destroyed. Nearby Sheffield Dam also collapsed, sending devastating flood waters through the city. While helping with rescue efforts, Blume said he "made a vow, then and there, that someday I would do something about [the destruction of earthquakes]."

When John graduated from Lowell High School in San Francisco, in December 1928, he immediately entered Stanford University at mid-term in January 1929. By then, he was 19 but uncertain if he wanted to study civil engineering or medicine, so he took mostly hard science, chemistry and math courses his first few semesters. By his second year, with the 1906 San Francisco and 1925 Santa Barbara quakes in his thoughts, he committed to becoming an engineer – an earthquake engineer, even though such a course per se did

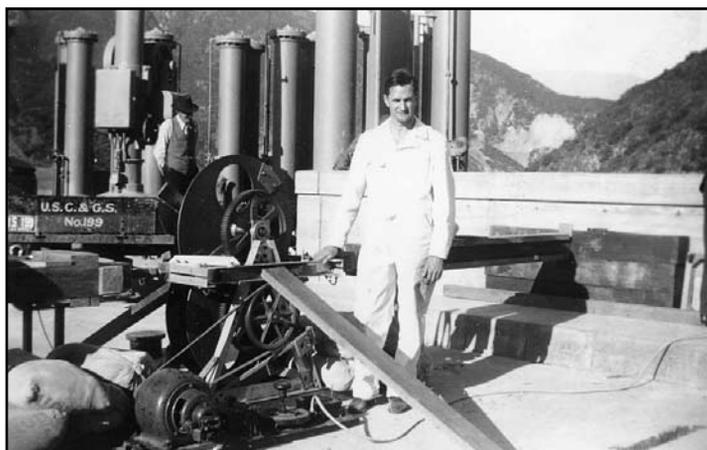
not really exist at the university at the time.

Before his freshman year was over, America experienced Black Thursday (October 24) – the stock market crash and the beginning of the Great Depression. Like many others, Blume's father went broke. John needed to take on a variety of part-time jobs, not just for spending money but to support himself. Eventually, he was able to secure an engineering assistant position with the Seismological Division of the U.S. Coast and Geodetic Survey (now the USGS). To stay in college, though, he needed to supplement his income with student loans, and by the time he graduated, John was deeply in debt. "It took me eight years to get out of the red," he reported.

After receiving his bachelor's degree in 1933, Blume decided to pursue an advanced engineering degree. Working under the guidance of Professor Lydik S. Jacobsen, a genius on dynamics and a colleague of the renowned Stephen Timoshenko, Blume designed and built an exotic multi-story dynamic building model and shaking table to simulate the motion of an existing multi-story building, the Alexander Building in San Francisco.

His model, a "lumped mass and spring type" with five degrees of freedom per story, was the basis for his master's thesis, *The Reconciliation of the Computed and Observed Periods of Vibration of a Highrise Building*. Blume's model still exists, on display in the lobby of the Blume Earthquake Engineering Center.

After receiving his Degree of Engineering in January 1935, Blume took a position as a construction engineer on the San Francisco-Oakland Bay Bridge, employed by both the USGS and State Toll Bridge Authority. When it was completed, he went to work for



Blume measuring forced vibration on Morris Dam on the San Gabriel River, for the U.S. Coast and Geodetic Survey in 1935. Courtesy of John A. Blume Earthquake Engineering Center, Stanford University.

Standard Oil Company of California, where he helped develop seismic standards for refinery structures.

In 1940, John went to work for Henry J. Brunnier, one of California's leading structural engineers designing high-rises. Brunnier was awarded a number of defense contracts in the U.S. and Panama for the design of buildings and waterfront structures in the military buildup preceding the U.S. entry into World War II. While working in Panama, Blume came down with a severe case of pneumonia in 1945. After recovering, he decided to go out on his own, establishing the consulting engineering company John A. Blume, Structural Engineer (changed to John A. Blume and Associates in 1952). One of its early clients was Standard Oil, which led to the engineering of several buildings and deep-water harbors for ARAMCO in Saudi Arabia, and laboratory facilities for Chevron Research in California.

Included among scores of projects that incorporated earthquake innovations designed and/or analyzed by Blume's firm were the two-mile-long Stanford Linear Accelerator, restoration of the California State Capitol, Guam's commercial port, and over 70 nuclear power plants in the U.S. and six other countries, including the Diablo Canyon Nuclear Power Plant in California.

Other significant California projects included the first man-made offshore island for oil production near Ventura, a supersonic wind tunnel at Moffett Field north of San Jose, the Embarcadero Center in San Francisco (including several high-rises and the Hyatt

Regency Hotel with its iconic rotating rooftop restaurant), the Westin-Bonaventure Hotel in Los Angeles and earthquake research on school buildings for the California Division of Architecture. Blume also served as a consultant to the U.S. Nuclear Regulatory Commission, monitoring structural responses to underground weapons testing at its Nevada Test Site.

In 1964, when he was 55, Blume returned to Stanford to work on a PhD degree, taking a half-time course load while running his business full time. After completing his dissertation, *Dynamic Behavior of Multistory Buildings with Various Stiffness Characteristics* (under the direction of Professor Donovan Young, the son-in-law of Timoshenko), Blume received his doctorate on January 6, 1967, exactly thirty-four years to the day after receiving his bachelor's degree.

Blume was the author of more than 190 papers, articles, book chapters and books. His *Design of Multistory Reinforced Concrete Buildings for Earthquake Motions* – co-authored with Nathan Newmark and Leo Corning and published in 1961 – is still in wide use today, an industry classic internationally. Likewise, many of his landmark papers, such as *Structural Dynamics in Earthquake-Resistive Design*, *The Motion and Damping of Buildings Relative to Seismic Response Spectra*, and *Dynamic Characteristics of Multi-Story Buildings*, remain popular around the world.

A popular speaker, Blume delivered more than 300 significant talks and lectures nationwide and internationally. As the 1979 commencement speaker for Stanford's

Department of Civil Engineering, he told graduates, "Civil engineers for many decades have been creating things of great benefit to the peoples of the world. Many of these creations were without precedent, and many were done without public awareness, and without public recognition. But the main reward was still there, the self-satisfaction of creating and building things useful to others."

As a strong believer in the importance of engineering societies, Blume was an officer in many of them. In addition to EERI, he was an honorary member or fellow of the American Society of Civil Engineers (ASCE), Consulting Engineers Association of California and Structural Engineers Association of California, American Concrete Institute, International Association of Earthquake Engineering, New York Academy of Sciences and Society of American Military Engineers. He was also a member of the National Academy of Engineering and the recipient of numerous industry awards, including ASCE's Leon Moisseff Medal and Ernest Howard Award, EERI's Housner Medal, the Medal of the Seismological Society of America and the Construction Man of the Year Award of the Northern California Building Industry.

Blume passed away at his home in Hillsborough, California on March 1, 2002, one month before of his 93rd birthday. Although suffering from Parkinson's disease, he retained an active interest in seismological matters and earthquake engineering until the end. He was survived by his wife Jene, his sister Beverly, two nieces, three grandnieces, a stepson and two step-granddaughters. ■



Hyatt Regency Hotel at the Embarcadero Center, San Francisco, CA. Courtesy of William Andrews.

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