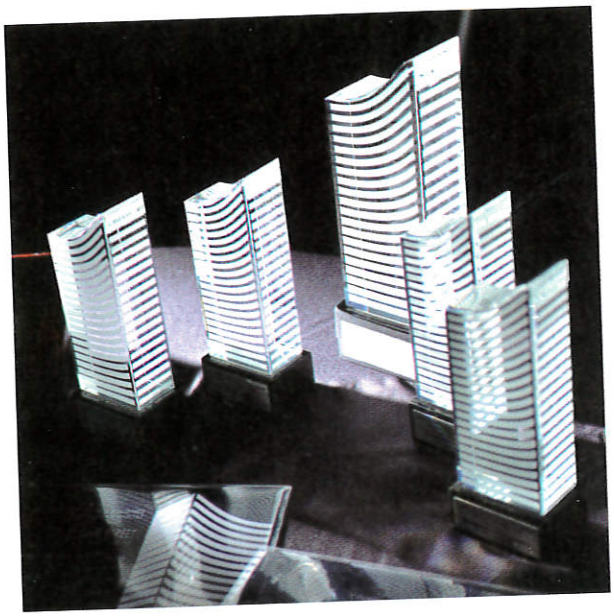
Best TALL Buildings 2011:

CTBUH International Award Winning Projects



Edited by Antony Wood

Council on Tall Buildings and Urban Habitat, Chicago

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Lifetime Achievement
Fazlur R. Khan Medal

Dr. Akira Wada
Tokyo Institute of Technology

Dr. Akira Wada was born on January 11, 1946—one year after the end of the second world war. He thus grew up at a time when many young Japanese people yearned for technologies and modern life—highway systems, tall buildings, sports cars, high-speed computers, etc.—seen in Western cultures through increased media. While an undergraduate student at the Tokyo Institute of Technology, Dr. Wada witnessed the construction of the Mitsui Kasumigaseki Building, the first Japanese building to break the 100 meter (328 foot) height marker at 156 meters (512 feet), following the changes to the Japanese building code instituted by the Minster of Construction in 1964. Previously no building over 31 meters (102 feet) in height had been allowed. This experience was a great influence on Dr. Wada who would go on to dedicate his career to the engineering of tall buildings in the region. Japan is a country that needs to coexist with natural hazards such as earthquakes, tsunamis, floods, heavy snows, and landslides, all significant factors when considering the construction of tall buildings. Dr. Wada notes that, "our ancestors understood this land and didn't fight against nature, but rather found ways to coexist with it." This philosophy has driven Dr. Wada to many innovations in tall building engineering, not only for the benefit of Japan, but for the wider global context of seismic design.

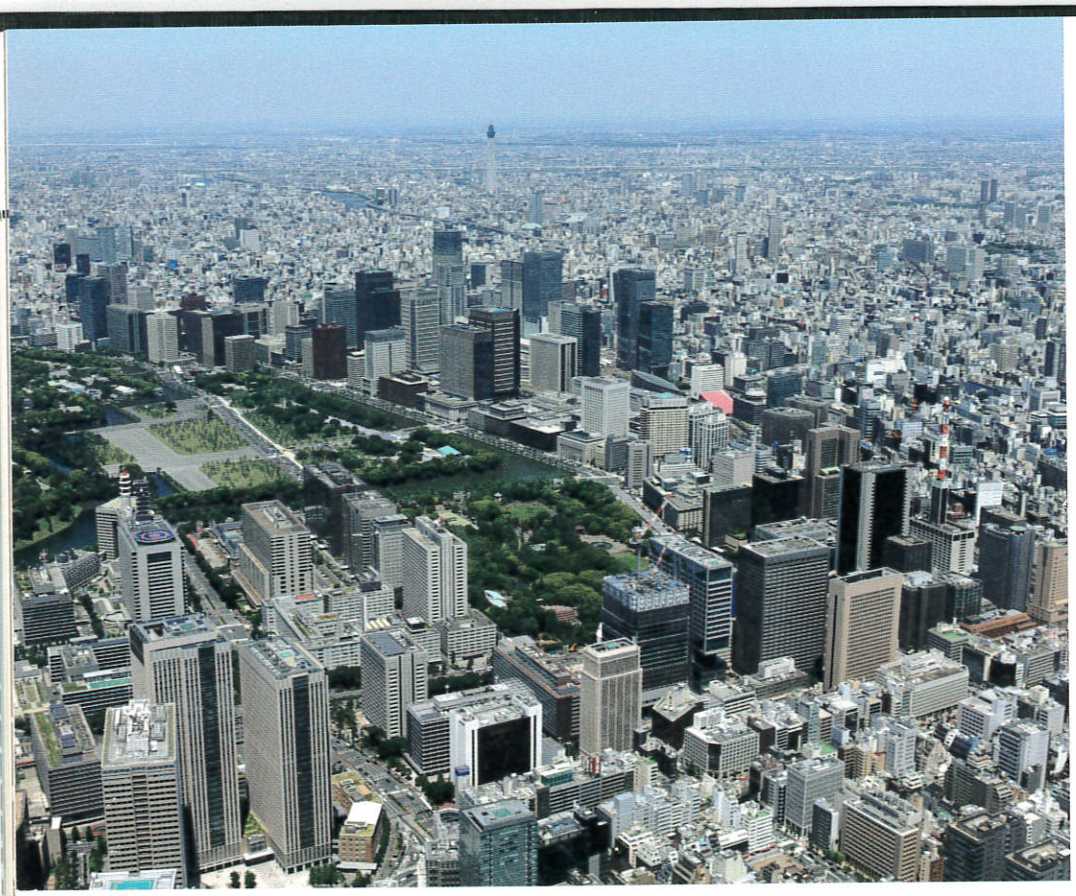
Currently Professor Emeritus at Tokyo Institute of Technology, Dr. Wada is an academic and an educator, associated with Tokyo Institute of Technology for 30 years; first as a student where he graduated from the department of architecture and building engineering in 1968, and from the masters course of the graduate school in 1970. He also received a doctorate degree of engineering in 1981. The next year he became an associate professor of the department of architecture and building engineering. By 1989 he was promoted to a full professor in the structural engineering research center. Other academic endeavors have included a stay in the US as a foreign lecturer at the University of Washington in 1984 and a visiting professorship at the department of Civil and Environmental Engineering at the Massachusetts Institute of Technology in 1991.

His research interests are in the fields of the structural engineering of buildings, seismic design, seismic isolated structures, damage-controlled design and the computer simulation of structures. The Architectural

Opposite: Mid Town Tower, Tokyo (2007). Designed with buckling restrained braces researched by Dr. Wada

"Few men have contributed so greatly to the understanding and development of tall building structures in seismically active regions, and his recent election as the new president of the AIJ is a testament to the significant influence of his career."

Professor Sang Dae Kim, CTBUH Chairman, Korea University



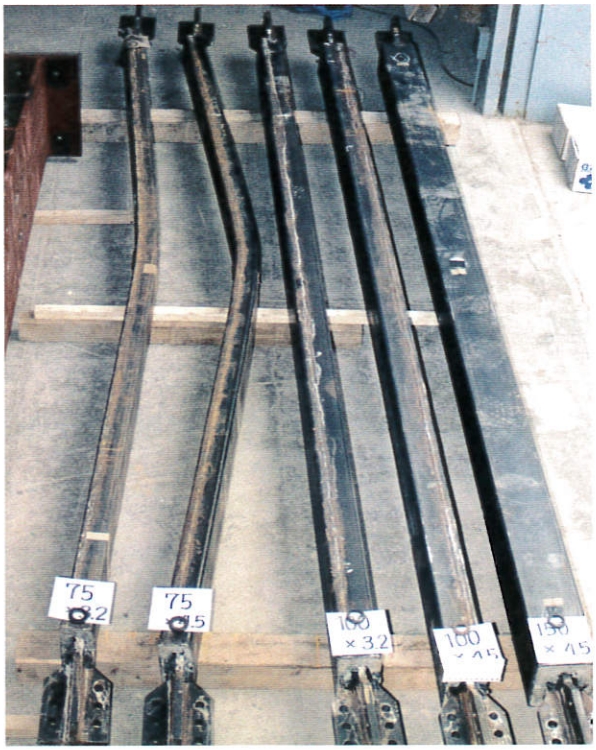
Left: View of the modern Tokyo skyline, continually rising taller, achieved safely in no small part thanks to Dr. Wada's research
Opposite Left: Five tested buckling restrained braces—an important research breakthrough for the design of tall buildings in seismic regions
Opposite Right: Diagrams comparing the old-fashioned "Weak-beam/Strong-column" design and the "Damage Controlled Structures" developed by Wada

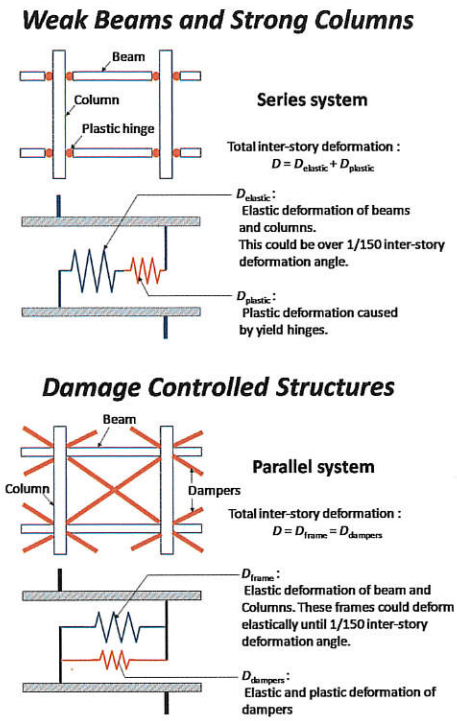
"Dr. Wada has been extremely active in the international structural engineering community for many years, generously sharing his expertise, particularly in the field of progressive collapse and seismic design."

William Baker, CTBUH Trustee, Skidmore, Owings & Merrill

Institute of Japan gave a research award in 1995 for his work "Analytical and experimental research of the nonlinear behavior of building structures" and the engineering award in 2003 for his work with two colleagues: "The invention and realization of damage controlled structures." He is one of most active researchers in the seismic design of building structures in Japan and has undertaken many active roles as chair and/or a member of many research committees concerning these fields within the Architectural Institute of Japan, Japan Society of Seismic Isolation, Building Center of Japan and Japan Society of Steel Construction. Currently, he is President of the Architectural Institute of Japan through the end of May 2013 and a member of the Science Council of Japan through the end of August 2017.

Dr. Wada's early professional career started when he took a job in structural engineering at Nikken Sekkei Ltd., one of the large architecture and engineering design firms in Japan. His first job was to conduct research on eccentric brace frames and test four specimens in 1970. Dr. Wada and colleagues published this research entitled "The Structural Characteristics of Eccentric K-Braced Frames" in May 1972. Professor Egor P. Popov at the University of California Berkeley





noted that this research was "the earliest attempt at studying the seismic use of EBFs" in the book of "Connections" in the EERI Oral History Series.

In 1987 Dr. Wada participated in the testing of five buckling restrained braces using the testing frame at Kanagawa University. They were at the forefront of this research when they published "Experimental and Theoretical Studies on Buckling Restrained Braces" in the Journal of Structural Engineering, Science Council of Japan in March 1988. Almost ten years later, many structural engineers in the US recognized the excellent benefits of buckling restrained braces and discussed many important aspects of the seismic design of frames with buckling restrained braces. A significant example of this system is the Mid Town Tower, currently the tallest building in Tokyo at 248 meters (813 feet) completed in 2007.

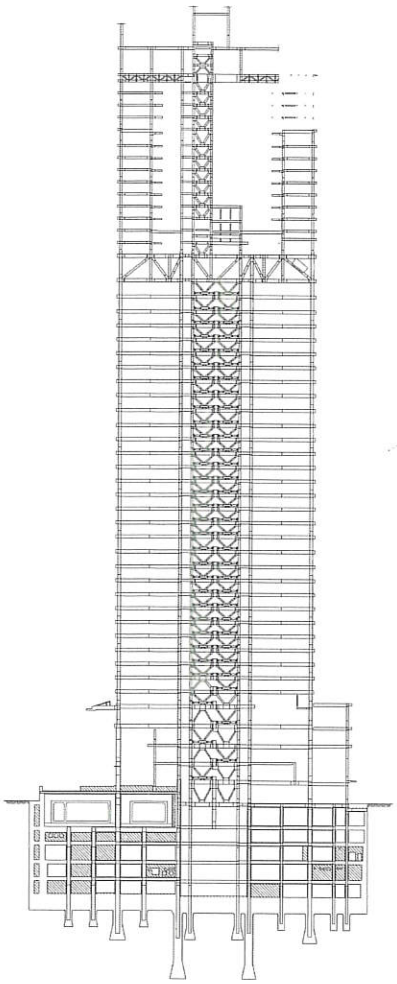
Dr. Wada has also been instrumental in research into damage-controlled structures or passive controlled structures. With Prof. Jerome J. Connor at the Massachusetts Institute of Technology and Prof. Mamoru Iwata, he published "Damage Tolerant Structures" for the Fifth US–Japan Workshop on the Improvement of Building Structural Design and Construction Practices in 1992. And later they (with Dr. Yi Hua Huang) published their research entitled "Damage-controlled Structures I: Preliminary Design Methodology for Seismically Active Regions" in the Journal of Structural Engineering, ASCE, in 1997.

The basic concept of the damage controlled structures is very simple: structural frames consist of beams and columns which have to be in elastic behavior during earthquakes, but seismic members such as hysteretic dampers or viscous dampers are allowed to be plastic or non-linear in behavior during the earthquake. After a seismic event, buildings designed by this concept will not sustain severe damage. This concept allows for the construction of a resilient city and a resilient society against big earthquakes. Following the Kobe Earthquake of 1995, more than 80% of tall buildings are now designed with this new idea and almost none utilize the old fashioned system of weak-beams and strong-columns design.

Left: Research Office Twin Towers, Tokyo (2002). Utilizes a seismic isolation system
Right: Retrofit project, Tokyo Institute of Technology (2009). View of a stiff rocking wall supported by a pin-joint which will control the deformation pattern of the building during seismic events
Opposite: The Mori Building, Tokyo (under construction – scheduled for completion in 2015). Structural section (left) shows bracing on every floor

Throughout his career at the Tokyo Institute of Technology he had been involved in many building projects for the campus. He consulted on the structural design of many buildings, such as the Centennial Hall in Ookayama Campus in 1983, the Suzukake Hall in Suzukake Campus in 2000 and the Research Office Twin Towers in 2002—20-story steel buildings constructed with a seismic isolation system. Just before his retirement, he worked on the retrofit of three buildings originally constructed on the Suzukake Campus prior to 1979. Due to changes in the Japanese seismic design code in 1981, Dr. Wada and colleagues had to check the behavior of these three buildings under strong earthquake ground motions. To prevent story failure, they decided to install six rocking walls around each old building and to set many vertical steel shear dampers between both sides of the walls and the existing columns.

Another more contemporary project of Dr. Wada's is currently under construction at the second-loop road in the center of Tokyo. The new Mori building which, when completed, will become the tallest building in Tokyo at 256 meters (838 feet), is designed with many kinds of dampers including buckling restrained braces and viscous dampers which will be installed on every floor for vibration control against earthquakes and strong winds. The project was designed by Nihon Sekkei and Dr. Akira consulted on the structural design for many years leading up to its construction.



Jury Statement

Dr. Wada has had an extensive impact on tall building design around the world. He is a leading expert in seismic design and has been instrumental in the development of the performance based design philosophy used on tall buildings in Asia and internationally. He has actively developed new engineering approaches for progressive collapse in tall buildings, as well as high strength steel and ductile steel solutions.

He has generously shared his expertise, through active participation with professional organizations and academia including the CTBUH. He currently serves as Chair of the CTBUH Japan Chapter. His recent appointment as President of the Architectural Institute of Japan is further evidence of Dr. Wada's prominent role in the profession.