CTBUH Journal

Tall buildings: design, construction and operation | 2009 Issue I

Mode Gakuen Cocoon Tower

Tall Buildings in the Global Recession

40 years of the CTBUH: Reflections

The Skycourt

860 - 880 Lake Shore Drive

The Remaking of Mumbai

Aqua Tower Tour

Council on Tall Buildings and Urban Habitat

CTBUH 40th Anniversary 1969-2009

"Towards a sustainable urban future"

Editor's Message

Zak Kostura, Editor

We have witnessed an inauspicious beginning to 2009, a year that will likely host numerous transformations of our project plans, business models and the very structure of the markets in which we operate. Some of the tall building projects around the world have been put on hold as developers attempt to reinterpret demand in this very different economic climate. The resulting decline in activity among designers and builders is in all likelihood temporary, and while a global recession of this scale inevitably breeds pathos, it likewise provides tremendous opportunity for advancement and learning.

Advancements in building design and technology continue to push the evolution of the tall building typology. A firm grasp of related products, design techniques and case studies is a perennial necessity; one that will be even more necessary as markets are corrected and we find ourselves positioned for the next fierce construction boom. The Council on Tall Buildings and Urban Habitat has for forty years collected and disseminated such information, and as its official publication the CTBUH Journal is a key resource for those in search of the latest tall building developments.

This issue of the Journal is infused with many informative pieces, including case studies of two very different building projects in Tokyo and Chicago. The Chicago project, involving the rehabilitation of a Mies van der Rohe classic, embodies insight into techniques and challenges inherent to the refurbishment of existing tall buildings.

Trends in tall building development and economics are examined in a paper by Antony Wood and Philip Oldfield. Their work explores historical links between economic growth and the completion of world's-tallest towers.

The concept of urban civic space is revisited in a paper by Jason Pomeroy, who surveys several instances of early-generation skycourts around the world, presents a critical analysis of their strengths and weaknesses, and forecasts the future of grand public spaces within high-rise building complexes. It is an issue with resounding cultural significance: as our cities continue to grow upward, the ratio of built environment to public communal and civic space falls out of balance with that of historic urban models. Skycourts are a high-altitude response to this imbalance, and their inclusion in tall buildings may one day be socially compulsory in many regions of the world.

The Council on Tall Buildings and Urban Habitat is committed to the dissemination of insightful technical papers that convey accurate and useful information on current research, developments and achievements in the field of Tall Building design and construction. As the CTBUH Journal continues to develop as a primary outlet for this insight, the Council has convened an official peer review board to evaluate the relevance of technical submissions, promote the Journal as a key forum for the submission of research, and oversee the expansion of the publication in the future.

Comprised of preeminent experts and representing a broad array of related disciplines and professional experience, the peer review board has accepted the task of ensuring that patrons of the Journal receive the most current and useful information available within the industry. The CTBUH is delighted to introduce this new panel of experts, on the left, to the Journal Readership.

Now more than ever, we welcome your contribution to the CTBUH Journal as we seek to inform those who have wisely chosen to use this time of economic uncertainty to enhance their knowledge and capacity. Please share with us your work through technical papers, tall building case studies, or casual commentary in the form of a brief letter to the editor. On behalf of the Council, I hope you continue to find the Journal to be a powerful resource for your own learning and professional development.

Best Regards,

Zak Kostura

Published by
the Council on Tall Buildings and Urban Habitat

ISSN: 1946-1186

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Print
This Journal is printed by Alphagraphics, Chicago.

Front cover: Mode Gakuen Coccoon Tower ©Koji Horiuchi

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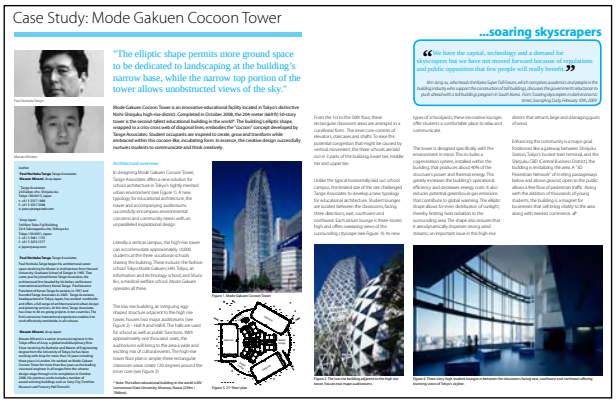

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"For sky courts to be truly adaptable, the high-rise needs to be conceived as a vertical extension of the city, and the sky court an area of public realm that can act as the gel that brings the disparate mixed uses and functions together."

Jason Pomeroy, page 28

Visit www.ctbuh.org for more on the global tall building industry and the Council on Tall Buildings and Urban Habitat

Global News

The CTBUH Global News Archive is an online resource for all the latest news on tall buildings, urban development and sustainable construction from around the world. Each issue, the CTBUH Journal publishes selected feeds from the online archive. For comprehensive industry news, visit the Global news Archive at: www.ctbuh.org/news.htm

The latest: A skyscraper for seniors

Architect Ralph Johnson, a principal at the Chicago office of Perkins+Will, has recently designed his tallest building, The Clare, at 55 E. Pearson St., Chicago which was developed, and is operated, by the Franciscan Sisters of Chicago Service Corp. Unlike Johnson's previous contributions to Chicago's great architecture, The Clare is entirely different.

The design caters to the millions of Baby Boomers who are nearing their 65th birthday and who could use a stylish skyscraper to grow old in. This 54-story high-rise would nestle deftly into the cityscape and provide a humane environment for its residents, some of whom get around with walkers and white canes. It is a stacked version of a suburban senior citizens home, combining individual apartments and common spaces such as workout rooms and dining areas. While most of its 334 apartments are for independent, able-bodied seniors, the rest offer assisted living and skilled nursing similar to hospital care. In the city that invented the skyscraper, this high-rise for seniors is the latest new wrinkle in the art of building tall.

China sprouts first ever super-tall district

The Shanghai Tower, designed by Gensler and commissioned by the Shanghai Tower Construction and Development Co. Ltd, recently broke ground to start its journey to become the tallest building in China. This 632 m tower will join and rise above the Shanghai World Financial Center, 'Best Tall Building Overall' recently appraised by the CTBUH, and the Jin Mao Tower in the Luijiazui Finance and Trade Zone as China's first ever super-tall district.

The tower is organized as nine cylindrical buildings stacked one atop another. The inner layer of the double-skin façade encloses the stacked buildings, while a triangular exterior layer creates the second skin, or building envelope, which gently rotates as it rises. The spaces between the two façade layers create nine atrium sky gardens. Once complete, the tower will set the record for the highest open air observation deck in the world.

Sustainability rewarded

Project architect Ronald Schleurholts and the commissioning Government Buildings Agency were recently awarded the Dutch Construction Award 2009 for the design of the Westraven Office Complex in Utrecht, Netherlands. Westraven is a complex and large-scale combination of an existing tower and new construction for various sections of the Dutch

...height burj dubai

"We're not allowed to say. The client hasn't announced what it is and I don't think they will… It'll turn into urban folklore, you'll have people measuring the shadows on Google Earth and trying to figure it out… If you put the Empire State Building on top of the Sears Tower then it's reasonable to say you'll be in the neighborhood."

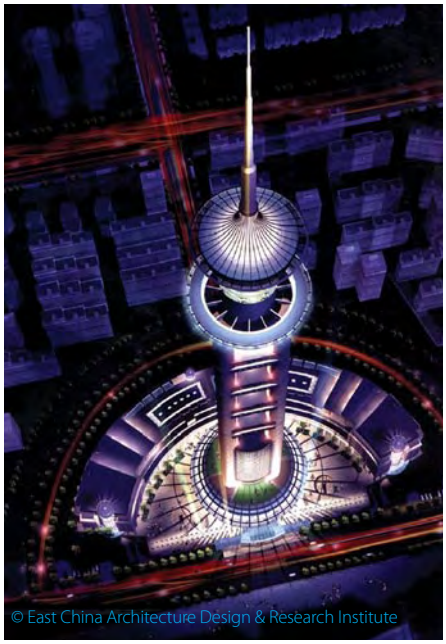
William Baker, Structural Engineer of the Burj Dubai , Partner at SOM and CTBUH Trustee, suggests it may be a while before we find out the final height of the Burj Dubai. From "Skyscraper Nears Date with Destiny", BBC News, January 3, 2009.

Department of Public Works in the Westraven area.

Much attention has been devoted to realizing perfect equilibrium between low energy consumption and an optimum working climate. A revolutionary feature is the innovative second-skin façade of open-weave, Teflon-coated glass fibre that offers all-round protection against the wind and makes it possible to work with open windows, even on the top floors. Atriums, conservatories, and inner gardens furnish the transparent new construction with an unprecedented spatial quality. Due to its balanced use of natural and artificial light, the project also received the Daylight Award 2008.

The Mode-Gakuen Spiral Towers: a New Twist on School Design

Architectural group Nikken Sekkei has designed another stunning tower 36 stories (170 m) above the busy streets of Nagoya, Japan. The Mode-Gakuen Spiral Tower will house educational facilities for three different disciplines in three tapered 'wings' - fashion design, computer programming and a medical support. The concept behind the design adds another layer of beauty to the building. The twisting glass and steel spiral is meant to evoke, "the enthusiasm of students from three schools, twining and rising up to the sky then departing to the real world." This work of scholastic architecture includes a host of ecological features like a double-glazed air flow window system and a natural air ventilation system. Unlike the advanced green technologies adopted in the design, the basic structure is simple; a strong inner truss tube which acts as a central pillar supporting the three, gently tapering wings. The truss tube is constructed of concrete-filled, steel tubular columns with structural braces affixed around the base and the entire structure is fitted with some of the most robust seismic engineering in the region.



Tower Project for Jakarta

A consortium of local business officials announced in January the commencement of a development project that includes a 588-meter tower in the northern Kemayoran area of the city. The group said that plans were moving forward despite the global recession, and indicated a target completion date of 2012.

At 588 meters, the Jakarta Tower would be the tallest telecommunications tower in the world, surpassing the 553-meter CN Tower in Toronto and the 460-meter Oriental Pearl Tower in Shanghai.

The Jakarta Tower complex is slated to house mixed-use space, both within the tower and in the surrounding area on site. Commercial and hotel space is included alongside business and lifestyle centers. An observation deck atop the tower would provide a tourism destination as well. The project is currently estimated at US$300 million.

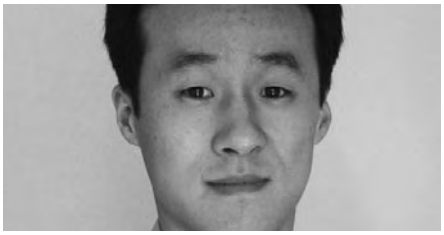
Zaha Unveils Romanian Skyscraper

The design studio of Zaha Hadid Architects has unveiled the design for a 200 meter tower planned for the city of Bucharest, Romania. Renderings of the proposed hotel and condominium tower show an elliptical extrusion tapered at top and bottom. The exterior structure involves a series of elegant, flowing exterior columns running vertically from the top of the tower to its midsection, where the perimeter system morphs into an ornate diagonal grid.

The architect has indicated motivation for the building's tapered form precipitated from local building setback regulations and the presence of listed buildings nearby. To carry the building's loads, the perimeter columns will be comprised of concrete-filled steel tube sections.

Case Study: Mode Gakuen Cocoon Tower

Paul Noritaka Tange



Masato Minami

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[1]**Paul Noritaka Tange**, Tange Associates

Paul Noritaka Tange began his architectural career upon receiving his Master in Architecture from Harvard University, Graduate School of Design in 1985. That same year he joined Kenzo Tange Associates, the architectural firm headed by his father, well known international architect, Kenzo Tange. Paul became President of Kenzo Tange Associates in 1997 and founded Tange Associates in 2003. Tange Associates, headquartered in Tokyo, Japan, has worked worldwide and offers a full range of architectural and urban design and planning services. At this time, Tange Associates has close to 40 on-going projects in ten countries. The firm's extensive international experience enables it to work effectively worldwide, in all cultures.

[2]**Masato Minami**, Arup Japan

Masato Minami is a senior structural engineer in the Tokyo office of Arup, a global multidisciplinary firm. Since receiving his Bachelor and Master of Engineering degree from the University of Tokyo, he has been working with Arup for more than 10 years including three years in London. He worked on Mode Gakuen Cocoon Tower for more than four years as the leading structural engineer in all stages from the scheme design stage through to its completion in October 2008. His previous works include a number of award-winning buildings such as Sony City, Tomihiro Museum and Forestry Hall Tomochi.

"The elliptic shape permits more ground space to be dedicated to landscaping at the building's narrow base, while the narrow top portion of the tower allows unobstructed views of the sky."

Mode Gakuen Cocoon Tower is an innovative educational facility located in Tokyo's distinctive Nishi-Shinjuku high-rise district. Completed in October 2008, the 204-meter (669 ft) 50-story tower is the second-tallest educational building in the world*. The building's elliptic shape, wrapped in a criss-cross web of diagonal lines, embodies the "cocoon" concept developed by Tange Associates. Student occupants are inspired to create, grow and transform while embraced within this cocoon-like, incubating form. In essence, the creative design successfully nurtures students to communicate and think creatively.

Architectural overview

In designing Mode Gakuen Cocoon Tower, Tange Associates offers a new solution for school architecture in Tokyo's tightly meshed urban environment (see Figure 1). A new typology for educational architecture, the tower and accompanying auditoriums successfully encompass environmental concerns and community needs with an unparalleled inspirational design.

Literally a vertical campus, the high-rise tower can accommodate approximately 10,000 students at the three vocational schools sharing the building. These include: the fashion school Tokyo Mode Gakuen; HAL Tokyo, an information and technology school; and Shuto Iko, a medical welfare school. Mode Gakuen operates all three.

The low rise building, an intriguing egg-shaped structure adjacent to the high rise tower, houses two major auditoriums (see Figure 2) – Hall A and Hall B. The halls are used for school as well as public functions. With approximately one thousand seats, the auditoriums will bring to the area a wide and exciting mix of cultural events. The high-rise tower floor plan is simple; three rectangular classroom areas rotate 120 degrees around the inner core (see Figure 3)

* Note: The tallest educational building in the world is MV Lomonosov State University, Moscow, Russia (239m / 784feet).

Figure 1. Mode Gakuen Cocoon Tower

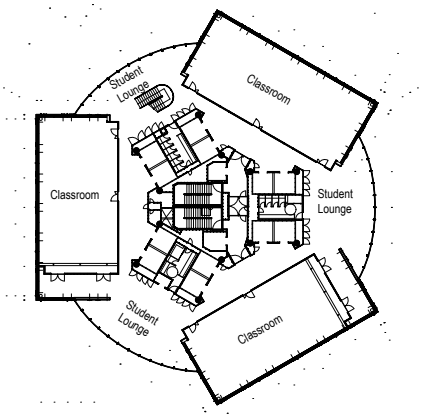

Figure 3. 21st floor plan

...soaring skyscrapers

> "We have the capital, technology and a demand for skyscrapers but we have not moved forward because of regulations and public opposition that few people will really benefit."
>
> *Kim Jong-su, who heads the Korea Super Tall Forum, which comprises academics and people in the building industry who support the construction of tall buildings, discusses the government's reluctance to push ahead with a tall buildings program in South Korea. From 'Soaring skyscrapers in dark economic times,' JoongAng Daily, February 10th, 2009*

From the 1st to the 50th floor, these rectangular classroom areas are arranged in a curvilinear form. The inner core consists of elevators, staircases and shafts. To ease the potential congestion that might be caused by vertical movement, the three schools are laid out in 3 parts of the building; lower tier, middle tier and upper tier.

Unlike the typical horizontally laid out school campus, the limited size of the site challenged Tange Associates to develop a new typology for educational architecture. Student lounges are located between the classrooms, facing three directions; east, southwest and northwest. Each atrium lounge is three-stories high and offers sweeping views of the surrounding cityscape (see Figure 4). As new types of schoolyards, these innovative lounges offer students a comfortable place to relax and communicate.

The tower is designed specifically with the environment in mind. This includes a cogeneration system, installed within the building, that produces about 40% of the structure's power and thermal energy. This greatly increases the building's operational efficiency and decreases energy costs. It also reduces potential greenhouse gas emissions that contribute to global warming. The elliptic shape allows for even distribution of sunlight, thereby limiting heat radiation to the surrounding area. The shape also ensures that it aerodynamically disperses strong wind streams; an important issue in this high-rise district that attracts large and damaging gusts of wind.

Enhancing the community is a major goal. Positioned like a gateway between Shinjuku Station, Tokyo's busiest train terminal, and the Shinjuku CBD (Central Business District), the building is revitalizing the area. A "3D Pedestrian Network" of inviting passageways below and above ground, open to the public, allows a free flow of pedestrian traffic. Along with the addition of thousands of young students, the building is a magnet for businesses that will bring vitality to the area along with needed commerce.

Figure 2. The low rise building adjacent to the high rise tower, houses two major auditoriums.

Figure 4. Three-story high student lounges in between the classrooms facing east, southwest and northwest offering stunning views of Tokyo's skyline.

Tall Buildings in the Global Recession: 2008, 2020 and beyond

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Antony Wood

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Philip Oldfield received his Bachelor of Architecture degree and Diploma in Architecture from the University of Nottingham, England, obtaining First Class honours at undergraduate level and a Distinction for his Diploma portfolio. He is currently undertaking a PhD examining strategies to reduce operational and embodied energy in tall buildings, sponsored by Arup. Philip is a founding member of the Tall Buildings Teaching and Research Group (www.tallbuildingstarg.com) and has taught high-rise design advanced studio projects at both the University of Nottingham and Illinois Institute of Technology. He has written many papers and articles in the field of tall buildings and also sat on the Scientific Committee for the CTBUH Dubai World Congress.

[2]Antony Wood

Antony Wood is Executive Director of the CTBUH since 2006, responsible for the day-to-day running of the Council and steering in conjunction with the Board of Trustees, of which he is an ex-officio member. Prior to this, he was CTBUH Vice-Chairman for Europe and Head of Research. Based at the Illinois Institute of Technology, Antony is also an Associate Professor in the College of Architecture at IIT, where he convenes various tall building design studios. A UK architect by training, his field of specialism is the design, and in particular the sustainable design, of tall buildings.

"Is this the end of the tall ambitions of places such as Moscow, Chicago or Dubai for the short to mid term future?"

The year 2008 will long be remembered as the start of an economic crisis that has gripped the entire globe – a year that may also have brought to an abrupt end the worldwide construction boom of the past decade that has seen ever-denser cities containing ever-taller buildings proposed from Madrid to the Middle East, from Shanghai to San Francisco. As financial shock waves have reverberated around the world, high-profile tall building projects in virtually all skyscraper cities have been cancelled, delayed, or put on hold in response to the precarious global economic conditions. The question that everyone is now asking – is this the end of the tall ambitions of places such as Moscow, Chicago or Dubai for the short-mid term future? The correlation between tall buildings and economic recession is not a new one. In 1999 the economist Andrew Lawrence created the 'Skyscraper Index'[1] showing how almost all of the world's tallest buildings throughout history have reached completion virtually simultaneously with the onset of a major economic recession. Using the research and criteria of the Council on Tall Buildings and Urban Habitat (CTBUH), and specifically their annual 'Ten Tallest Buildings Completed Annually' and projected 'Tallest 20 in 2020' research, this paper seeks to examine further the link between skyscrapers and economic cycles, and suggest how the current economic crisis will affect tall building developments in the next decade or so.

The Current: The Ten Tallest Buildings Completed in 2008

Against the backdrop of global economic crisis, 2008 has witnessed probably the most successful year of skyscraper construction ever, with more – and taller – skyscrapers constructed globally within a single year than at any other time. The CTBUH 'Ten Tallest Buildings Completed in 2008' research[2] (see Figure 2), indicates that the average height of these tallest ten constructed in 2008 was 319 meters / 1048 feet, some 31 meters above the previous highest average of 288 meters / 944 feet (set in 1998 with completion of the two 452 meter-tall Petronas Towers). That constitutes some 676 floors of new

The Ten Tallest Buildings Completed in 2008

For locations of the Ten Tallest Buildings completed in 2008 see Figure 1, above right.

To download a PDF including more information on all projects shown on the right visit: www.ctbuh.org/2008.htm

1. Shanghai World Financial Center
Shanghai, China
492m / 1614ft

2. Almas Tower
Dubai, UAE
363m / 1191ft

3. Minsheng Bank Building
Wuhan, China
331m / 1087ft

For a detailed overview of Tall Building Construction 2008, see 'Tall Buildings In Numbers' pp. 44+45.

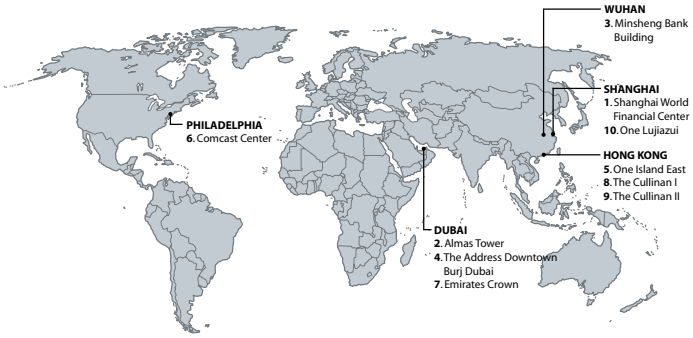


Figure 1. Locations: The Ten Tallest Buildings Completed in 2008 ©CTBUH

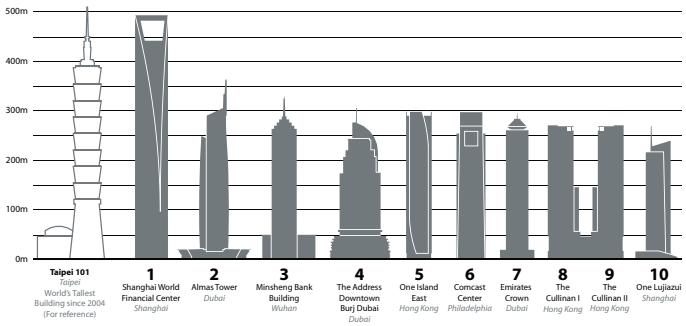


Figure 2. The Ten Tallest Buildings Completed in 2008 ©CTBUH

construction amongst these ten buildings alone, and has added in a single year four supertall buildings to an existing global super-tall stock of only 38 supertalls.[3]

Geographically the Tallest Ten Buildings Completed in 2008 reinforces what is becoming a well known doctrine in the tall building world – namely that Asia and the Middle East are the current center of high-rise construction globally. There are now more tall buildings in Asia than in North America, and of the ten tallest buildings on the 2008 list, six are located in Asia (all in China) and three in the Middle East (all in Dubai). Only the Comcast Center in Philadelphia, at number six on the list, is located in North America. In fact one has to go back to 1991, with the completion of the Key Tower in Cleveland, to find the last time a building in North America topped the 'Ten Tallest Completed' list. This shift in skyscraper construction location has occurred at a staggering pace; as recently as 1990, 80% of the 100 Tallest Buildings in the World were located in North America. By 2010, just two decades later, this figure will have decreased to just 22%.

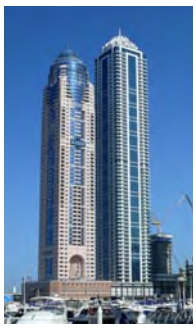
If we put the 2008 figures in the context of previous and upcoming years (see Figure 3), we can see confirmed the incontestable fact that the tallest buildings in the world have been getting taller each decade, and this is set to continue certainly in 2009 with the expected completion of the next 'World's Tallest Building' – the Burj Dubai. At over 800 meters / 2700 feet in height, the Burj Dubai will be approximately 60% taller than the world's current tallest building – the 509 metre high Taipei 101 in Taiwan.

However, how can this be, in a world of global bailouts, failing banks and rising unemployment? How can we have such discrepancy between on the one hand the stark realities of economic bust now evident, and on the other hand the delivery of these very visual products of economic boom? Well, given that any tall building project – and certainly any supertall building – takes often 5-10 years to come to fruition from the initial concept of the project, it is perhaps not surprising that there is this mis-match between idea and delivery. Tall buildings – like many large, intensive developments – are inextricably linked to the confidence inspired by a buoyant market i.e. they are often conceived at the height of a market. Given, as history shows, that unbridled economic prosperity beyond a certain period of time without slowdown is highly unlikely, it is virtually inevitable then that many of these projects – conceived at the height of the market – will be delivered at the trough of a market, or at least in a time of economic slowdown.

4. The Address Downtown Burj Dubai
Dubai, UAE
306m / 1004ft

5. One Island East
Hong Kong, China
492m / 1614ft

6. Comcast Center
Philadelphia, USA
297m / 974ft



7. Emirates Crown
Dubai, UAE
296m / 971ft

8. The Cullinan I
Hong Kong, China
270m / 886ft

9. The Cullinan II
Hong Kong, China
270m / 886ft

10. One Lujiazui
Shanghai, China
269m / 883ft

About the Council

The Council on Tall Buildings and Urban Habitat, based at the Illinois Institute of Technology in Chicago, is an international not-for-profit organization supported by architecture, engineering, planning, development and construction professionals. Founded in 1969, the Council's mission is to disseminate multi-disciplinary information on tall buildings and sustainable urban environments, to maximize the international interaction of professionals involved in creating the built environment, and to make the latest knowledge available to professionals in a useful form.

The CTBUH disseminates its findings, and facilitates business exchange, through: the publication of books, monographs, proceedings and reports; the organization of world congresses, international, regional and specialty conferences and workshops; the maintaining of an extensive website and tall building databases of built, under construction and proposed buildings; the distribution of a monthly international tall building e-newsletter; the maintaining of an international resource center; the bestowing of annual awards for design and construction excellence and individual lifetime achievement; the management of special task forces / working groups; the hosting of technical forums; and the publication of the CTBUH Journal, a professional journal containing refereed papers written by researchers, scholars and practicing professionals. The Council actively undertakes research into relevant fields in conjunction with its members and industrial partners, and has in place an international 'Country Representative' network, with regional CTBUH representatives promoting the mission of the Council across the globe.

The Council is the arbiter of the criteria upon which tall building height is measured, and thus the title of 'The World's Tallest Building' determined. CTBUH is the world's leading body dedicated to the field of tall buildings and urban habitat and the recognized international source for information in these fields.

Council on Tall Buildings and Urban Habitat

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ISSN: 1946 - 1186

CTBUH *AWARDS 09

*Call for Awards 2009

Deadline for receipt of nominations is Friday 15th May 2009

Best Tall Building Americas * Best Tall Building Asia & Australasia * Best Tall Building Europe * Best Tall Building Middle East & Africa * Best Tall Building Overall * Lynn S. Beedle Lifetime Achievement Award * Fazlur Rahman Khan Lifetime Achievement Medal

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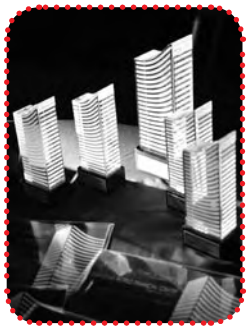

The Council on Tall Buildings and Urban Habitat is pleased to announce the call for awards for the 2009 CTBUH Awards, under the direction of 2009 CTBUH Awards Chairman, Mr. Gordon Gill of Adrian Smith + Gordon Gill Architecture.

Submit your qualifying projects* to be considered for one of four regional Best Tall Building Awards, (as listed top left) and the Best Tall Building Overall, and/or your distinguished colleagues for one of two Lifetime Achievement Awards.

Winners and Finalists will be honored at the 8th Annual CTBUH Awards Dinner and Ceremony to be held in Crown Hall, Chicago on the evening of **Thursday October 22nd, 2009,** and will also be featured in the 2009 Awards Book published in conjunction with Elsevier/ Architectural Press, which will be distributed internationally.

For more information on the CTBUH Awards including Submission Criteria and Procedure please visit the CTBUH website:
www.ctbuh.org/awards.htm

*NOTE: Best Tall Building nominated projects must be completed (topped out architecturally, fully clad, and at least partially occupied) no earlier than January 1st, 2008 and no later than October 1st, 2009.

Timeline