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Case Study: Gate Towers, Abu Dhabi

Designing Tall to Promote Physical Activity in China

The Monadnock Building, Technically Reconsidered

Thermal Breaks in High-Rise Balconies

Demolition or Renovation?

In Numbers: Middle East

Talking Tall with Phyllis Lambert

Council on Tall Buildings and Urban Habitat

Inside

26


History, Theory & Criticism
The Monadnock Building, Technically Reconsidered

32


Materials
Thermal Breaks and Energy Performance in High-Rise Concrete Balconies

46


Talking Tall: Phyllis Lambert
"Joan of Architecture" and the Difficulty of Simplicity

"Preliminary research in China finds that density is inversely correlated with physical activity. These findings suggest that not all dense urban development patterns promote physical activity. Designing tall buildings to promote physical activity is an objective of increasing global significance."

Day et al., page 18

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Asia and Oceania

To a region used to seeing several new Asian skyscraper renderings each week, one stood out among the crowd by hiding in plain view. GDS Architects has achieved planning approval for its "invisible" **Cheongna City Tower Infinity** just outside of **Seoul,** South Korea. The recreational-amusement tower is to use a sophisticated camera and LED system to appear to blend in with its background at certain times of day. The tower will also feature what could be the world's third-highest observation deck.

A more conventional quest for maximum visibility took place in **Colombo,** Sri Lanka. Units in the **Krrish Square** development went on sale in September. Designed by Kukreja Associates, Krrish Square will feature four towers containing 450,000 square meters of offices, luxury apartments, a hotel, and a commercial center. The complex will be constructed next to an old British fort with heritage designation, the Transworks House. The preservation and redevelopment of the old fort will be handled by Maison Edouard Francois. Construction has yet to begin on the 420-meter Tower One, but the Krrish Group has set the completion date for 2016.

The much-observed **SkyCity,** China Broad Group's planned 838-meter skyscraper to be constructed in **Changsha,** China, entirely of prefabricated modules, was featured in an extensive profile in the New York Times, amid reports that construction had stalled due to a lack of permits from local regulators. Chairman Zhang Yue has vowed to overcome all obstacles and continue the project.

Cheongna City Tower Infinity, Seoul. © GDS Architects

Krrish Square, Colombo. © Maison Edouard Francois.

Never publicity-shy, the **Shanghai Tower,** which will ultimately rise to 632 meters, celebrated the completion of its structural core in August, receiving extensive play on Chinese television and a recorded statement of congratulations from the CTBUH. The US$2.4 billion tower, designed by Gensler, will feature the world's fastest elevators, traveling the building's entire height in one minute. The tower's sustainable credentials, height, and twisting shape have garnered significant media attention.

To the northwest of Shanghai, near **Nanjing,** another attention-grabbing shape appeared to rise from the water as MAD Architects' **Sheraton Huzhou Hot Spring Resort** opened this summer. The 100-meter-high,

Shanghai Tower. © Gensler

THEY SAID

"Our solution aims to provide the world's first invisible tower, showcasing innovative Korean technology while encouraging a more global narrative in the process."

GDS Architecture Principal Charles Wee commenting on the Infinity Tower obtaining permission. From "New Tower is Not All it Seems…" World Architecture News. September 5, 2013.

Sheraton Huzhou Hot Spring Resort, Nanjing. © Weibo

177 Pacific Highway, Sydney. © Bates Smart

116-meter-wide horseshoe-shaped building, meant to recall traditional arch bridges in the region, is festooned with blue neon lighting strips.

In Australia, Leighton Properties announced the development of North **Sydney**'s first new commercial building in six years. The 30-story development at **177 Pacific Highway** will feature 40,000 square meters of commercial space. Completion of the Bates Smart-designed tower is scheduled in the first half of 2016.

Developers of a luxury hotel complex at Sydney's Darling Harbour erased one high-rise from the plans after complaints that the previous two-tower design blocked views and monopolized waterfront space. The proposal has been consolidated into a single 38-story **ICC Hotel Tower** that offers 250 fewer rooms than the original plan. In addition to the hotel tower, the US$2.3 billion development will also include new convention and exhibition centers.

ICC Hotel, Sydney. © Lend Lease

Keren HaKirya Complex, Tel Aviv.
© Israel Land Authority

Middle East

Israel is not a nation known for supertall building enthusiasm, although it seems attitudes may be changing as its major cities seek to become global entities. The **Tel Aviv** Local Planning and Building commission approved the **Keren HaKirya** plan for a mixed-use tower as tall as 355 meters, which could become Israel's tallest skyscraper. The building will be part of a four-tower development, including office, commercial, and residential space.

Two of the other Keren HaKirya towers will be 45 stories, in addition to a 50-story tower. The complex, already nicknamed the **"Toblerone Towers"** for the towers' triangular shapes, will add 540 residential units to the Tel Aviv market, and will be located near three existing train stations, as well as the city's future light-rail system.

In the always supertall-positive United Arab Emirates, vertical development is proceeding at its typically rapid pace. Skidmore, Owings &

An Elliptical Introduction, A Curving Embrace, & A Bridge in The Sky


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Gurjit Singh is the Chief Development Officer of Aldar Properties PJSC. Previously, he served as Chief Operating Officer of Sorouh Real Estate PJSC. He has been internationally active in the real estate industry for 29 years, and has been involved in the development and asset management of resort, commercial, retail, leisure, and residential township developments in the Middle East, North Africa, Malaysia, and Singapore.

Hossam Eldin Elsouefi managed the design, pre-construction, engineering, and construction of both Sky and Sun Towers and Gate Towers. He has also managed the design and construction of a number of iconic projects in UAE, such as Aldurrah Tower in Dubai and Albustan complex in Abu Dhabi. In Egypt, he was the Architectural Manager for Snohetta-Hamza Consortium and was responsible for the execution of the Bibliotheca Alexandria between 1997–2003.

Peter Brannan led The Gateway team as Project Director since its inception in 2005. He has worked on a number of high-profile projects in Asia and the Middle East, including Cyberport in Hong Kong, TaiKoo Hui in Guangzhou, and the International Finance Centre in Seoul. Based in Hong Kong for 25 years, Peter is responsible for managing the practice's work and expanding new business across Asia, China, and the Middle East.

The Shams Abu Dhabi district is a newly-created land mass, formed as an extension of the Central Business District of Abu Dhabi, UAE, on what was formerly exposed tidal sands within a fringe of mangroves. Set at five to seven meters above sea level, Shams is gradually developing at a high density and growing in prominence. The Gateway complex occupies a narrow strip of land at the far side of Al Reem Island, which forms the neck of the isthmus leading to the wider Shams development.

The Gateway forms one of the Middle East's largest developments, signifying the entrance to Shams. The developer, Aldar, set forth a challenge: create an unmistakable introduction to a larger development, that would also serve as a landmark on its own. The brief called for a unique mixed-use development on a complex site. This involved demanding standards for innovation, quality, and schedule.

In August 2005 the architects, Arquitectonica, began designing the project. The concepts were developed in close cooperation with the developer under a tight schedule, and were approved in March 2006. The project was officially launched on April 2, 2006. The engineering was prepared in parallel with the architecture to facilitate an early construction start and save costs.

The complexity of the project required phased construction. The first phase began with the Sky and Sun towers, a pair of elliptical buildings; the second involved the Gate, a three-tower group with a connecting, curved skybridge. The economic crisis in 2008 slowed construction slightly, but the modest downturn was put to good use in value engineering and refining the construction process.

Design Concept

The Gate's architecture announces the arrival at, and forms a welcoming statement for, Shams Abu Dhabi, Reem Island.

A series of residential gateway towers act as pillars supporting the skybridge, a large-scale lintel that creates a monumental portal, defining the threshold to the island. The lintel, containing penthouses, glows at night and serves as a marker, visible from miles away. An oval courtyard containing residential and hotel towers, sits behind the gateway towers and serves as a foyer; this contained space acts as a monumental room. It provides an unexpected event on the road, intended to calm both traffic and the human psyche, similar to how a square amidst the rush of the city does. The first half of the oval has been built; the second half will be built at a later date.

The role of the site is to act as the gateway to the larger development of Shams Abu Dhabi.

Figure 1. The Sun and Sky towers rise alongside the Gate. © Neil Roberts

Figure 2. The Sun Tower's bay windows wrap horizontally around the elliptical form.

The design was enacted to carry that message. The composition seeks to assign meaning to forms, telling a story about the purpose and location of the buildings.

The Sky and Sun Towers

The first phase of the development consisted of two tall and slender glass ellipses, the Sky and Sun towers, which rise alongside the Gate like welcoming torches (see Figure 1). Clinging to their sides, a series of crystalline structures sparkle and reach to the sky like three-dimensional light beams. The Sky Tower contains Grade "A" office space in its lower half and luxury residential apartments in its upper half. The Sun Tower exclusively contains luxury residential apartments.

The first phase of the development consisted of these two elliptical torch-like forms. The Sky Tower, at 74 floors and 293 meters in height, is the tallest structure, announcing the island from afar. The Sun Tower, at 65 floors and 232 meters in height, is slightly shorter. The towers' cylindrical forms make them multidirectional icons, intended to be seen from land and sea, city and island. The Sky Tower's cantilevered bay windows stack vertically and are staggered in their placement around its circumference. The Sun Tower's cantilevered bay windows wrap horizontally around the elliptical form, in juxtaposition to the vertical emphasis of the Sky Tower (see Figure 2).

The towers rise from a pedestrian plaza that marks the arrival into the complex. A podium forms the base, containing shops facing the wide, shaded sidewalks of the boulevard. The retail experience is carried to the center of the block, where an atrium engages a second level of shops. Several levels of car park lead to the residents' landscaped deck. The deck's height affords a unique vantage point for observing the Gulf and the new city. An infinity pool visually links the two towers. Cabanas, tennis courts, a lap pool, a yoga lawn, and children's playground are all part of the elevated deck offering. A fitness center and party room share the floor and view.

On the ground floor, the separate residential and office lobbies are accessed from separate *porte-cocheres,* each with its own décor. The residential lobbies are warm in tonality, with rich woods and earth-tone stones and fabrics. The ground-floor office lobby, accompanied by a lower office lobby for registration, is elegant and more attuned to corporate tastes, finished in stones and leathers with cool tones. Escalators lead to an upper elevator lobby that connects to the retail atrium.

The residences are designed for maximization of views. The façade curvature emphasizes the panoramic perspective. Expansive windowed areas flood the spaces with natural light. Rooms flow gracefully into each other, minimizing the need for circulation corridors and supporting a contemporary lifestyle.

The central core arrangement and elliptical plan provides a unique office floor plate with an excellent ratio of window to usable space.

Gate Towers

The second phase of the development centers on the Gate Towers, which contains 3,533 apartments. Its towers are arranged in a

> "The skybridge spans approximately 87 meters between each of the towers and cantilevers 45 meters from the easternmost tower. Containing penthouses with indoor pools overlooking the city, elliptical oculi also punctuate the skybridge between the towers ceilings."

Designing Tall Buildings to Promote Physical Activity in China


Kristen Day


Mariela Alfonzo


Zhan Guo


Lin Lin

This study asks the question: how do the design of tall buildings and tall building districts impact walking and bicycling in Chinese cities? Little is known about the relationship between the design of tall buildings and physical activity. Research in Western countries links residential density to increased physical activity. Western research typically examines cities where relatively few residents live in tall buildings, and where density levels are low. China, in contrast, has the largest number of tall buildings in the world, along with high urban density (800–900 people per square kilometer, excluding the few largest cities).

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Mariela Alfonzo is the founder of State of Place,™ a place rating and walkability diagnostic tool tied to economic value. She is also an assistant research professor at the Polytechnic Institute of NYU, where she is examining the links between the built environment and obesity in rapidly urbanizing Chinese cities.

Zhan Guo's research has focused on how the governmental regulation over the built environment limits travel options and encourages one particular travel means; and how travelers perceive different travel options. Within this framework, Zhan has conducted empirical studies in Boston, Chicago, London, Portland, and New York.

Lin Lin's research interests lie in conceptualizing and understanding the reciprocal relationship between the built environment, human behaviors, and public health, as she believes this relationship underpins the development of genuinely healthy sustainable communities. She has accumulated research experience in this field both in the United States and China.

Background

Preliminary research in China finds that density is inversely correlated with physical activity. These findings suggest that not all dense urban development patterns promote physical activity. Designing tall buildings to promote physical activity is an objective of increasing global significance.

China faces growing problems with obesity and chronic disease. A recent survey of adults in ten provinces of China found that 34% of adults between age 20 and 69 are overweight (Xiaochen and Lei 2013). One-fifth of all overweight or obese people in the world are Chinese. Chronic diseases cause 80% of deaths in China, costing billions of dollars in lost productivity (Bekedam 2006). Obesity is concentrated in Chinese cities and in its more affluent populations. This fact is of great

Primary Elements	Definition	Hypothesis
Orientation	Overall form or orientation for tall buildings	Buildings with higher connectedness (visual and actual) to neighboring buildings, will be associated with higher rates of walking and bicycling
Density	Number of stories for most buildings (low, medium, tall, supertall)	None
Envelope	Whether block is ringed by buildings and land use of perimeter buildings	Commercial perimeter of block will be associated with higher rates of walking and bicycling
Diversity of land uses	Single or mixed-use	Mixed-use will be associated with higher rates of walking and bicycling
Location	Urban or suburban	Urban location will be associated with higher rates of walking and bicycling
Secondary Elements		
Compactness	Degree to which development is concentrated	Compact development will be associated with higher rates of walking and bicycling
Age	Age of the tall buildings, by decade	None
Block size	Small, medium, or large	Smaller block size will be associated with higher rates of walking and bicycling
Street width	Narrow, medium, or wide	Narrower streets will be associated with higher rates of walking and bicycling
Streetscape	Continuous versus discontinuous	Continuous streetscape will be associated with higher rates of walking and bicycling
Shopping options	On street retail and/or shopping mall	On street retail will be associated with higher rates of walking and bicycling

Table 1. Characteristics of Chinese tall building developments hypothesized to be associated with walking and bicycling.

concern, given China's rapid urbanization. According to UN Habitat, by 2025 China will have 221 cities with one million or more people.

Obesity and chronic disease in China are caused by decreasing physical activity and other factors (especially changing diets and environmental pollution). In the last two decades, physical activity has declined over 30% among Chinese adults, including reduced walking and bicycling (Ng et al. 2009). In Shenzhen, for example, travel by bicycle dropped from 30% of trips taken in 1995 to 4% of trips in 2007.[1] Declining physical activity is exacerbated by Chinese development patterns that encourage sprawl and impede active modes of travel. China's urbanization will require massive additional development, including an estimated 170 mass-transit systems, 5 billion square meters of road, and 40 billion square meters of floor space. It is important to consider future development in China that can support increased physical activity, especially bicycling and walking for transportation and for recreation. This study directly examines the design of tall buildings tied to physical activity.

The objectives for this study were to:

1. Develop a typology of tall building design and development tied to walking and bicycling for Chinese cities;
2. Identify associations between walking and bicycling and the design of tall buildings and tall building districts, for three types of districts in Shanghai.

Typology of Urban Development Tied to Walking and Bicycling in Chinese Cities

This typology of Chinese building design and development was intended to increase understanding of the features of tall building design and tall building districts that may impact walking and bicycling. The typology is also intended to help inform future urban development in China, by characterizing a range of current development types and identifying which of these types may be associated with the highest rates of walking and bicycling. Development of the typology was guided by a review of the literature to examine urban design, walking, and bicycling in Chinese cities. It was also informed by systematic observations in several Chinese cities, and by interviews with six Chinese urban development experts.

The typology characterized urban districts according to several elements. Primary elements were those that most strongly differentiated various development types. Table 1 also includes hypotheses on how various elements may be associated with walking and bicycling, based on existing research in mostly Western contexts.

The typology includes seven current urban development types in Chinese cities. These types vary in terms of the primary and secondary elements described above. The typology is not exhaustive. In reality, many urban developments display elements of more than one type. As demonstrated in Table 2, several types include more of the elements that are expected to impact walking and bicycling. The relative importance of each of these elements, and its actual impact on walking and bicycling, is unknown, and thus became the focus of this study.

Associations between Walking, Bicycling, and Tall Building Design

This study examined associations between walking and bicycling and the design of tall buildings and tall building districts, for three types of districts in Shanghai. This study focused on Shanghai as China's densest city (3,631 persons/km^2), with among the most completed tall buildings (116 buildings of 150 m+) (eChinacities.com 2011, The Skyscraper Center 2013).

Site selection

Based on the typology described above, three tall building districts were selected for inclusion in the study. Each district was one kilometer in area, centered on a subway station. Districts included:

- **Xintiandi area: old urban tower type**
  This mixed-use district in central Shanghai is famous for the upscale Xintiandi retail and nightlife center built around reused historic *shikumen* ("stone gate") buildings. The area includes several tall, luxury residential towers and high-end retail, as well as traditional, low-rise courtyard housing units that serve a low-income resident population (see Figure 1). The area includes many pleasant

Primary Elements	Tower in the Park	Old Urban Tower	New Urban Tower	Inward-Facing Block	Mixed-use Block	Historical District	Exurban
Orientation	Tower in the park	Discrete buildings	Tower in the park	Oriented towards block interior	Linear	Linear	Interior orientation
Density	Tall	Tall	Supertall	Mid-rise	Mid-rise and tall	Low-rise	Low- to mid-rise
Envelope	None	None	None	Commercial perimeter	None	None	None
Diversity of land uses	Single-use (residential)	Mixed-use	Predominantly single-use	Single-use (residential)	Mixed-use	Mixed-use	Single-use (residential)
Location	Suburban	Old urban center	New urban center	Right outside urban center	Edge of urban center	Urban center	Exurban/new town
Secondary Elements							
Compactness	Medium	High	Medium to high	Medium to high	High	High	Low
Age	1990s to present	2000 to present	1990s to present	1980s	1950s to 1980s	Before 1950	After 2000
Block size	Large	Small to medium	Medium to large	Medium to large	Small to medium	Small	Large
Street width	Wide	Narrow	Wide	Medium to wide	Medium	Narrow	Wide
Streetscape	Discontinuous	Continuous	Discontinuous	Mostly continuous	Mostly continuous	Continuous	Discontinuous
Shopping options	Shopping mall	Street retail	Shopping mall	Street retail and shopping center	Street retail	Street retail	Shopping mall

Table 2. Primary and secondary elements of current Chinese urban development types. Shaded cells are elements that are hypothesized to be associated with higher levels of walking and bicycling.

[1] At: http://www.china.com.cn/news/local/2009-09/02/content_18452604.htm.

The Monadnock Building, Technically Reconsidered

Thomas Leslie

Far from being the world's last and largest "masonry skyscraper," the Monadnock was a profoundly transitional structural achievement, making important advances in steel construction while still relying in part on the well-proven strength and reliability of masonry. Historically celebrated as the "last masonry skyscraper," the real story behind the Monadnock is more complex, and more revolutionary than commonly assumed.

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Figure 1. Monadnock Building, Chicago.
© Aric Austermann

Introduction – The Monadnock in Chicago's Skyscraper History

Burnham and Root's 1892 Monadnock Building at 53 W. Jackson Boulevard (see Figure 1), occupying half a block on Chicago's Dearborn Street between Jackson and Van Buren streets, has come to symbolize the "apotheosis of the brick wall in American urban architecture" (Hoffman 1973: 165).[1] At 16 stories (plus a penthouse) and 65.5 meters, it was not the tallest building in Chicago, but its thick masonry walls and restrained ornament made it one of the city's most remarkable. Surrounded by structures that adhered to the tenuous proportions of lighter-weight steel framing, the Monadnock's relentless brick elevations have also stood as a counterpoint to the more open, glass-filled frames of the era, and as an endpoint to the long tradition of masonry skyscraper construction throughout North America. "It is," noted Carl Condit in his 1964 book *The Chicago School of Architecture,* "the ultimate logical step in strictly functional construction with masonry bearing walls; it remains today the last great building in the ancient tradition of masonry architecture." Siegfried Giedion, among others, used its brick elevations to point out the functional shortcomings that came with heavy masonry construction – particularly the resulting deep, narrow windows in a building type that demanded maximum daylight. "Heavy masonry walls," wrote Giedion, "were not the solution to the problem of the many-storied building."

Yet historians have also noted – often parenthetically – major technical advances contained within the Monadnock. Condit, for example, noted that the building's walls are braced, in part, by steel portal framing, a remarkable distinction for a construction type that usually relied on sheer mass to resist wind forces (Condit 1974). Donald Hoffman also pointed out in his interpretation of the block that the building's undulating bay windows also relied on advanced cantilevered steel to support their weight (Hoffman 1973: 137). Further pioneering technology at work in the Monadnock included electric lighting. It was the most extensively wired skyscraper in Chicago at the time, in part to overcome the shadows of its deeply recessed windows.

The paradox of the Monadnock – that it was a conservatively expressed yet technically advanced structure – has been noted but never adequately explained. The choice of bearing masonry as a structural system has generally been assigned to the buildings' clients, the Brooks brothers from Boston, and this has allowed critics and historians to credit John Wellborn Root for finding an expressive language with which to refine and dress the bulky form that was handed to him. This is certainly not undeserved, as the consistency with which the Monadnock was detailed remains a remarkable example of brick's expressive potential. In particular, the gently curved brick that makes up transitions from the base and cornice to the subtly battered street wall, and from that wall into gracefully undulating bay windows are detailing tours de force that "succeed in making the bays appear to have grown from the wall" (Hoffman 1973: 166). For Hoffman, this organic metaphor extended to the entire elevation, which seemed to reflect the proportions and shapes of an Egyptian papyrus reed.

By pointing out the organic appearance of this detailing palette, Hoffman made a case for Root as a forebear to Sullivan and Wright's claim to the organic. Yet this family of details is problematic, in that it presents the Monadnock's street wall as a monolithic surface, emphasizing the reading of its brick skin as a single structural element that is molded to accommodate bay windows along its elevation. In fact, this obscures the Monadnock's actual structural system, which was more of a hybrid between steel and masonry than has typically been acknowledged. A close reading of the building's construction drawings from sets in the Centre Canadien d'Architecture and newly executed digital reconstructions by a team of graduate students at Iowa State University show that the Monadnock was largely a steel frame that worked in tandem with a system of much larger brick piers. The bay windows that both Hoffman and Condit referred to were structured in a way that was virtually identical to those of Holabird and Roche's Tacoma (1887) or the Pontiac (1891) – two skyscrapers that are often cited as technically more advanced than the Monadnock – and the combination of iron and brick structural elements that supported the Monadnock was nearly identical to those which held up these two buildings. The Monadnock was, in fact, a building that marked the beginning of the metal framing era more than it did the end of masonry, and it is precisely the details so praised by Hoffman – the gently-curved brick interfaces between bay windows and masonry "wall" – that conceal its reading as a frame structure. Far from being the world's last and largest "masonry skyscraper," the Monadnock was a profoundly transitional structural achievement, making important advances in steel construction while still relying in part on the well-proven strength and reliability of masonry.

Figure 2. The 1885 scheme originally drawn by John Wellborn Root (Drawing by the author, based on Centre Canadien d'Architecture drawing DR1986:0767:063).

> "Root labored to "solve" the tall office building with the Monadnock commission, and the resulting elevations show him struggling to resolve the mass of a heavy, brick-pier skyscraper with the proportions and textures of the modified Richardsonian Romanesque that had become his *métier*."

Burnham and Root designed the Monadnock in two phases. The Brooks family had planned to develop their lot at the corner of Dearborn and Van Buren since 1881, but only after the city planned to open Dearborn south to Dearborn Station in 1885 did they commission Burnham and Root. Rumors of restrictive building codes forced the hands of developers throughout the city that year, and this scheme seems to have been rushed through to ensure they could build under older, more permissive codes. This original Monadnock commission in 1885 was put on hold as economic uncertainty slowed construction, but the project was revived and executed rapidly in 1890–1892 when excitement over the Columbian Exposition began to drive real-estate prices back up.[2]

These two schemes by Root are similar in mass but different in appearance and structure. The 1885 scheme recalls contemporary projects in Burnham and Root's office, in particular the Rialto, the Phoenix (1886), and the Rookery (1888), which relied on brick piers for their structures and elevational motifs. Hoffman notes that Root labored to "solve" the tall office building with the Monadnock commission, and the resulting elevations show him struggling to resolve the mass of a heavy, brick-pier skyscraper with the proportions and textures of the modified Richardsonian Romanesque that had become his *métier.* One sketch shows arches in the lower stories that are clear allusions to Richardson's Field Warehouse (see Figure 2), then being constructed nearby, while the Dearborn Street elevation was developed as a plain grid of double-hung windows and wide brick piers – the Brooks brothers were known for their aversion to excess ornament, since projections attracted dirt and pigeons.[3] "As yet," noted Hoffman of the early scheme, "there are none of the wonderful projecting bays" (Hoffman 1967: 271).

The lack of bay windows, however, should not be surprising for a scheme developed in 1885. Bay windows, or oriels, had only just appeared in Chicago skyscraper elevations. John J. Flanders used them in the Mallers Building (1884), but their deployment as a non-bearing curtain wall came only with Holabird & Roche's Tacoma Building, completed in 1889. Root's elevations for the Monadnock at this early stage came before the full exploration of the bay window as a lighting and space-grabbing device in Holabird and Roche's Caxton (1890) or Pontiac (1891) buildings. Instead, his use of brick piers and double-hung windows related more to buildings of this scheme's era – W. W. Boyington's Royal Insurance, for example (1885), or Cobb and Frost's Opera House (1885). All of these buildings struggled to bring in enough daylight, since neither the steel to make these piers narrower, nor the plate glass to fill larger openings, was economical enough to

1 In fact, Root's Women's Temple, completed in 1892, was the last bearing masonry skyscraper constructed in Chicago.
2 Among other sources, "Chicago's Great Buildings." ***Chicago Daily Tribune.*** Jan. 1, 1893: 28, gives evidence that the real estate boom of 1890–93 was largely speculative, and based on assumptions that Chicago's economy would benefit from the Columbian Exposition – predictions that proved to be wildly optimistic.
3 Burnham & Root Drawing, Centre Canadien d'Architecture, Acquisition DR1986:0767:001. n.d.

Thermal Breaks and Energy Performance in High-Rise Concrete Balconies


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Dieter Hardock is a product manager at Schöck Bauteile GmbH, which develops and manufactures products related to the prevention of thermal bridges and impact noise in buildings. He has more than 14 years experience in the construction industry, ranging from structural design to project management. He specializes on solutions to structural thermal bridging with more than six years experience, being involved in several structural researches and thermal analyses in different markets. Currently he focuses on the North American market.

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Patrick Roppel is a principal and building science specialist in Morrison Hershfield's Buildings, Technology and Energy Division. Patrick specializes in the analysis of building envelope performance through numerical methods. His mixture of field experience, investigations, computer modeling, and research is leveraged at Morrison Hershfield to set realistic expectations for building envelope performance during design and evaluation of existing buildings. Patrick's research includes predicting indoor moisture levels for uncontrolled humidity, thermal performance of the building envelope, generic solutions for wall assemblies with low air and vapor permeance insulation, and attic ventilation.

Editor's Note:

Thermal bridging is a significant and under-explored issue in tall buildings, particularly where floor slabs are connected to balconies and façades. While the study described below is deliberately narrow in scope, we believe it raises issues of broad applicability for future designs. We note that even the most innovative façade technologies available today, such as the "raster façades" used on Tour Total, Berlin – a Finalist for the 2013 CTBUH Innovation Award – have yet to satisfactorily resolve the issue of bridging in a way that would make it broadly applicable and financially appealing to developers generally. North America lags behind Europe in this regard; I recently toured a LEED-Gold high-rise in Chicago that considered the issue, but found all the solutions on the market to be too expensive. We encourage further research and development in this vital field, so as to create more marketable and effective solutions. – ***Daniel Safarik, CTBUH***

Introduction

The building sector is the largest consumer of energy in the United States and Canada – approximately 30 to 40% of primary energy use. Space conditioning makes up nearly half of the energy use in residential buildings (DOE, IEA, NRCAN). This reality creates a significant need for increased energy efficiency in buildings. This need is widely recognized, and measures are being taken by North American jurisdictions, to implement increasing energy efficiency standards for buildings. Building envelope thermal performance is a critical consideration for meeting current energy efficiency targets, and will be an increasingly important factor, as authorities strive for low-energy buildings. To meet these challenges and completely realize the full potential of low-energy buildings, building envelope durability and occupant comfort must be considered concurrently with reducing heat loss when designing building envelopes. Otherwise, buildings will not operate as intended and resources will be wasted on components that need to be prematurely repaired or replaced. With this context in mind, this paper explores how thermal break technology for concrete buildings can help designers overcome the challenges of meeting energy efficiency standards.

Thermal bridges – highly conductive penetrations through the envelope – can have a significant impact on the thermal performance of the building envelope and whole-building energy consumption. Concrete balconies, formed by direct extension of the concrete structural floor slab, are an example of a significant thermal bridge that not only results in poor energy efficiency, but also results in cold interior surface temperatures during the heating season. The consequences of substandard interior surface temperatures include: increased risk of condensation and conditions favorable to mold growth. This paper examines the benefits of two methods for reducing thermal bridging for concrete balconies, compared to the prevailing method of continuous concrete projections.

Currently North American codes and energy standards that apply to high-rise residential buildings, with regard to energy efficiency requirements, have no specific prescriptive requirements for thermally broken slabs (for example ASHRAE 90.1, IECC, NECB, or MNECB). Moreover, the codes and standards do not explicitly address how thermal bridges at interfaces between assemblies, such as floor and balcony slabs, should be addressed in thermal transmittance calculations (U-values) that are necessary when determining

Figure 1. Study multi-unit residential high-rise building.

compliance. Some codes and standards allow designers to ignore the impact of structural slabs if the cross-sectional area of the projection meets specific criteria. The lack of clarity and consistency often leads designers to overlook the impact of concrete balconies on thermal transmittance.

However, for some cases, the standards are clear that concrete slab projections must be considered when determining compliance, for example when determining compliance by performance paths where the balcony areas are greater than 2 to 5% of the total envelope area. Furthermore, research such as ASHRAE 1365-RP makes it more difficult to ignore thermal bridging where it has been demonstrated to have a significant impact on the overall thermal transmittance of the building envelope. This paper expands on 1365-RP by providing thermal performance data for thermally broken concrete balconies and examples of how the 1365-RP methodology can be applied in practice for the design of high-rise buildings. Examples include the following:

- How to effectively model several balcony scenarios using whole-building energy models to consider both heat loss (U-value) and thermal mass
- How thermally broken slabs can help achieve code compliance for energy efficiency requirements
- How thermally broken slabs reduce the risk of condensation and increase occupant comfort

Challenged by a dynamic market fostered by these new standards, the industry still holds the desire to minimize costs, changes to construction methods, and constraints on architectural design. The market desires window-walls spanning floor-to-ceiling and concrete balconies wrapping around a large percentage of each floor. This desire is supported by the cost-effectiveness of the system, advantages related to installation and construction sequencing, marketability, and architectural appeal. The downside is that the thermal performance of window-wall systems is typically poor. To overcome a marginally performing thermal envelope, heat recovery ventilators (HRVs) are used to lower loads related to ventilation, and batt insulation is placed behind the spandrel areas to optimistically meet energy codes.

Some people might think that the practice of providing a marginal thermal envelope alongside efficient mechanical systems is backwards. Some might question putting batt insulation behind spandrel sections because of the ineffectiveness of the insulation and increased risk of condensation on the metal back-pan for any quantity of air leakage. These are valid points from a technical perspective, and there are definitely more holistic approaches available.

However, this case study highlights the reality of a market solution that satisfies the current state of codes and standards in North America. The objective of this paper is to highlight how thermally broken slabs can help improve the thermal performance of the building envelope and help meet the objectives of building codes and energy standards, despite the current lack of prescriptive requirements for thermally broken balconies in North America.

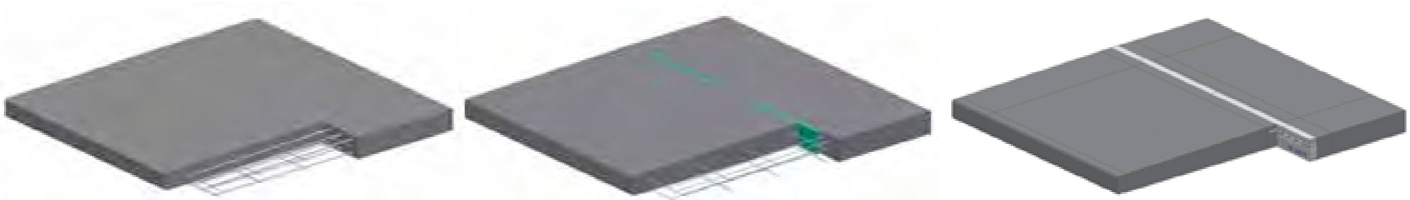
Building Characteristics and Construction Methods

These examples are covered by a case study of a multi-unit residential high-rise building. The case study building is representative of a common type of construction for high-rise buildings in some North American markets. The construction is very common for the market in question (Toronto), but the building envelope assemblies are not thermally efficient, and the codes in this jurisdiction have recently adopted more stringent energy standards.

The study building is a multi-unit residential complex with 32 floors and 422 units (see Figure 1). It is designed with approximately 40% vision glass area and 3.5% exposed cantilever slab. The opaque area is largely insulated spandrel sections with metal back-pans.

The building envelope is primarily window wall, spanning floor-to-ceiling, and concrete balconies wrapping around large percentages of each floor. Three types of balcony connections were considered for this study (see Figure 2):

a. Cantilevered concrete balcony without interruption between the interior floor slab and exterior slab extension – **conventional construction**
b. Cantilevered concrete balcony with interruptions consisting of reinforced concrete (500 millimeters) and rigid



a. Conventional solution with continuous concrete slab.

b. Site solution with intermittent reinforced concrete and rigid insulation

c. Manufactured structural thermal break technology.

Figure 2. Balcony connection details.

Confronting the Question of Demolition or Renovation

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Dario Trabucco
Dario Trabucco is a professor of Building Technology at the IUAV University of Venice, Italy. He is involved in many research fields at the university, particularly through participation in the "my ideal city" project financed by the EEU 7th framework program.

In 2009 he obtained a PhD in building technology with a thesis entitled "The Strategic Role of the Service Core in the Energy Balance of a Tall Building." This research examines the implications of alternative service core placement in relation to the embodied energy and the energy consumption of a tall building. During this period Dario also spent two research secondments at CTBUH/IIT, and one in Paris Belleville.

Dario has taught tall building design in many courses at IUAV and also in Paris Belleville, where he tutored at the Master "La Tour Metropolitaine" program.

He currently publishes in national and international periodicals and peer-reviewed journals and regularly takes part in conferences on tall building related topics.

Paolo Fava
Paolo Fava completed the master studies at the IUAV University of Venice, Italy where he graduated in 2012, presenting a thesis on the causes and the recovery solutions for obsolescence in tall buildings. He is now a practicing architect.

Crumbling façades, asbestos, and outdated elevators are often cited as reasons to tear down tall buildings and create new skyscrapers. However, renovating a tall building is often a better option than demolition and reconstruction. This paper examines the reasons for the demolition of tall buildings in the United States, Canada, and Europe and makes recommendations for alternative approaches.

Tall buildings suffer from the passing of time, exactly like all other building typologies. But their aging is rarely caused by structural decay, due to the characteristics of the materials used to construct them – steel, concrete, glass, and aluminum. Instead, the decline of tall buildings is more often a consequence of functional obsolescence. Tall buildings must meet the expectations of occupants, in terms of internal comfort, functionality, environmental performance, and cost. In fact, tall buildings typically are icons of modernity and, except in very few cases, such as the Empire State Building or similar "historically iconic" towers, they do not represent assets in themselves, but are simply seen by tenants as business facilities.

Only the most visible and distinctive tall buildings offer tenants long-term value. For example, on a low-rise scale, the historic and social appeal of an old Renaissance building may provide a marketing opportunity to a bank or a public institution, which in turn might ignore an inefficient floor plan or the lack of complete environmental comfort. But if the headquarters of a large firm or a bank is located in a modern office tower, optimal working conditions are expected, and the building is required to meet very high standards to retain the tenant and its end-users, the employees, in a competitive market. This is even more important for hotel towers, where the end-users, the hotel guests, literally change every night, and poor comfort conditions may result in customers not returning.

> "Depending on the extent, the renovation of a tall building can cost 50–90% less than the demolition of the present building and the erection of a brand-new tower of a similar size."

Lack of Decisions vs. Pros of Refurbishing

The decision on how to handle a deteriorating facility is a critical moment in the life of a tall building (Sloman & Edwards 2012). Undertaking upgrades can significantly impact the economic sustainability of the building. When the building requires a complete interruption of business due to renovations, tenants are forced to relocate to other facilities, and it may be difficult to attract them back or to find new tenants when the building reopens. This may prevent the building owner from undertaking the required work, and the decision is usually made in conjunction with the end of a significant tenant's lease.

The intervention is even more complex for multi-tenant buildings, where small tenants continue to come and go. The progressive decline of the building performance or the difference with competing buildings in the same area often results in an increase in the vacancy rate and a decrease in the profit for the investors.

If the decision is not taken to renovate – or the renovations are not economically justified by the market's needs – owners can make the dramatic decision to leave the building vacant, leaving the tower as an empty giant until the necessary funds are found. This is a very rare

Name	Built in	Height (m)	Height (floors)	Abandoned since	Reasons
Ryugyong Hotel, Pyongyang	1992	330	105	1992	Structural issues
The Sathorne Unique, Bangkok	1990	164 (est.)	50	1990	Never completed, due to recession
Torre Insignia, Mexico City	1962	127	25	1992	Lack of interested tenants due to recession
Sterick Building, Memphis	1930	111	29	1980	Excessive renovation costs
Torre Galfa, Milan	1956	109	28	2006	Asbestos, inefficient floor plate and elevators
211 North Ervay, Dallas	1958	76	20	1995	Lack of marketing appeal
Chicago Motor Club Building	1928	72	17	1996	Converted to residential units, unsold
Statler Hilton Hotel, Dallas	1956	71	20	2001	Low ceiling height, asbestos
Lady Luck Hotel Casino, Las Vegas	1964	82 (est.)	17	1998	Structural issues

Table 1. Examples of vacant buildings worldwide.

circumstance, but there are a number of significant examples of vacant buildings worldwide (see Table 1).

The abandonment of a building is a temporary decision that the owner takes waiting for improved market opportunities before a demolition or refurbishment of the building.

The Case Against Demolition

The demolition of a building generally occurs when there are no viable options to keep it as it is. This may be a consequence of a completely inappropriate technical aspect (i.e., a very low floor-to-ceiling height that prevents any installation of new equipment) or when the expected value of a new building (i.e., with a different use or an augmented rentable area) outweighs the demolition and construction costs.

Demolishing a tall office building is a very complex task, especially in dense urban environments. The technical difficulties are even higher if the building has a concrete structure that transforms the piece-by-piece deconstruction process typical of steel buildings into kinetic demolition work. The use of explosives in these cases represents the cheaper and quicker solution, but that is often not a viable option in dense urban areas, considering the potential consequences for the neighboring buildings and underground infrastructures as well as the dust, noise, and vibrations generated by the demolition (Mizutani & Yoshikai 2011).

Another important consideration is the waste of construction materials produced by the demolition. Many building materials can be recycled to produce new materials, thus recovering the energy they embodied during their production. On the contrary, other materials cannot be recycled (bricks, tiles, coated glass, concrete, etc.) and they can only be used as infill materials for civil engineering projects such as roads, or disposed of in a landfill. The energy that was used to produce such materials is therefore wasted forever.

Building part	Average cost	Probability to be modified. 0= Very unlikely; 2=very likely
Frame & upper floors	20.6%	0
Design & on-site costs	19.9%	Variable as a share of cost
External walls, windows & doors	18.4%	2
MEP	16.5%	2
Lifts & stairs	7.7%	1
Substructure	7.6%	0
Internal walls, partitions & doors	5.8%	2
Floors & ceiling finishes	1.9%	2
Furniture & fittings	1.6%	2

Table 2. Average cost of tall building renovation (Source: Watts & Kalita 2007. Data modified by the authors).

As a consequence, the restoration of an existing building represents not only an economic opportunity, but also a sustainable practice for reusing the embodied energy contained in building materials.

The Case for Renovation

Depending on the extent, the renovation of a tall building can cost 50–90% less than the demolition of the present building and the erection of a brand new tower of a similar size. Cost models for tall buildings (Watts & Kalita 2007), detail the economic relevance of those parts of the building that, in a typical renovation, are likely to remain almost untouched and unrelated to the intervention cost (see Table 2).

But there are other advantages to a building renewal compared to the erection of a new tower. In many cases, the restoration of a building takes less than half the time required for demolition and new construction. The speed of the refurbishment can provide a faster response to market needs, resulting in a more successful investment.

From the point of view of sustainability, the renovation of an existing building affords important savings in building material, as large parts of the existing building, including foundation, structure, and cores, are maintained. The energy needed to tear down the old building, clear the site, and produce and transport the new construction materials can be saved, reducing the embodied energy of the restored building.

A New Study

For the purposes of this paper, a survey was carried out on all buildings exceeding 200 meters in the United States and Canada (188 buildings) and all those exceeding 100 meters in the European countries (651 buildings). It was found that a total of 81 buildings had experienced significant renovations. Of those, the authors were able to collect information about the ameliorations introduced and the causes of the necessary interventions in 60 buildings (see Table 3). On average, major

The Middle East: 20 Years of Building Skyscrapers

Given the location of this Journal's case study, the Gate Towers, Abu Dhabi, we thought it would be interesting to investigate tall buildings in the Middle East. Twenty years ago, the region contained only one skyscraper over 150 meters in height. It is now estimated that by the end of 2015 the region will have 289 buildings in this category. While this massive increase has centered in Dubai, by the end of 2015 over 20 cities in 10 countries will have completed a 150 m+ project.

Middle East Totals

Total Population:[3] **381,402,626**
Total Land Area:[4] **7,119,839 km²**
Regional Population Density: **53.6 people/km²**
Cities of 1,000,000+ Population:[5] **38**

Est. by 2015…
Countries with at least one 150 m+ building: **10**
Cities with at least one 150 m+ building: **22**
City with the most 150 m+ buildings: **Dubai (150)**
Total 150 m+ buildings: **289**
Tallest building height: **828 m**
Average height of 150 m+ buildings: **217 m**

Mapping the Middle East 2015: Population and Skyscrapers

Map shows data on skyscrapers and population as estimated in the year 2015 (see key for details). Building outlines show the tallest building in each country by the year 2015.

Footnotes

1. The focus on buildings over 150 meters is driven by the need to ensure accuracy of data, rather than suggesting that this is the threshold for a tall building.
2. All tall building data is taken from the CTBUH Skyscraper Center as of October 1st, 2013.
3. Unless otherwise noted, all population data is taken from the CIA World Factbook 2013 population estimates.
4. Unless otherwise noted, all land area data is taken from the UN Demographic Yearbook 2009–2010.
5. "City" refers to the Urban Agglomeration, defined as an extended city or town area comprising the built-up area of the central place (usually a municipality) plus any cities and suburbs linked in a continuous urban area. Estimate of 1,000,000+ cities is based on data from the World Gazetteer.
6. Population listed is estimated population of Asiatic Turkey taken from the Turkish Statistical Institute. For the purposes of this study, Istanbul is considered to be part of Europe.

Key

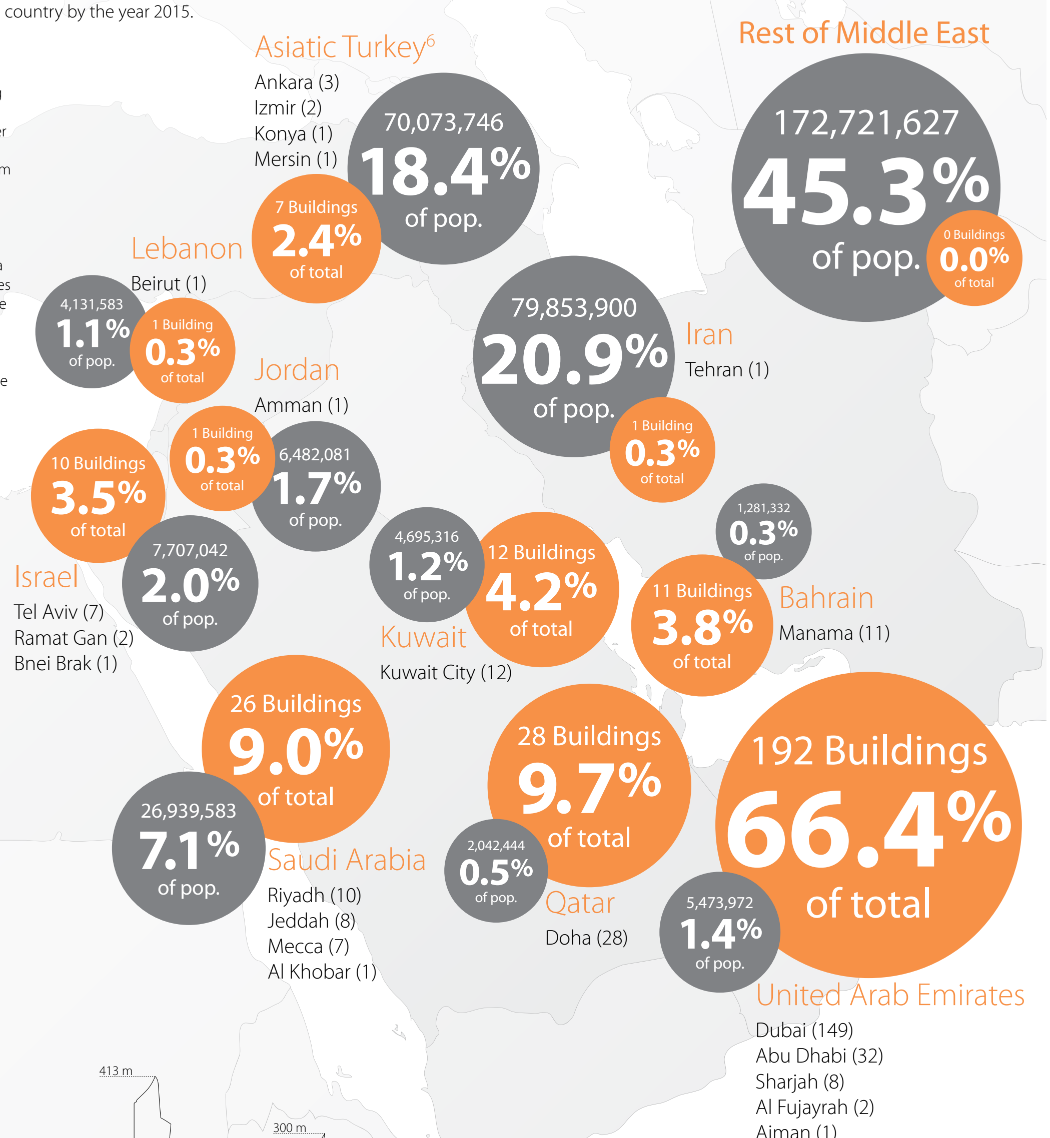
X Buildings X.X% of total — number of **buildings** 150 m+ in height in country and **percentage** of region total by the year 2015

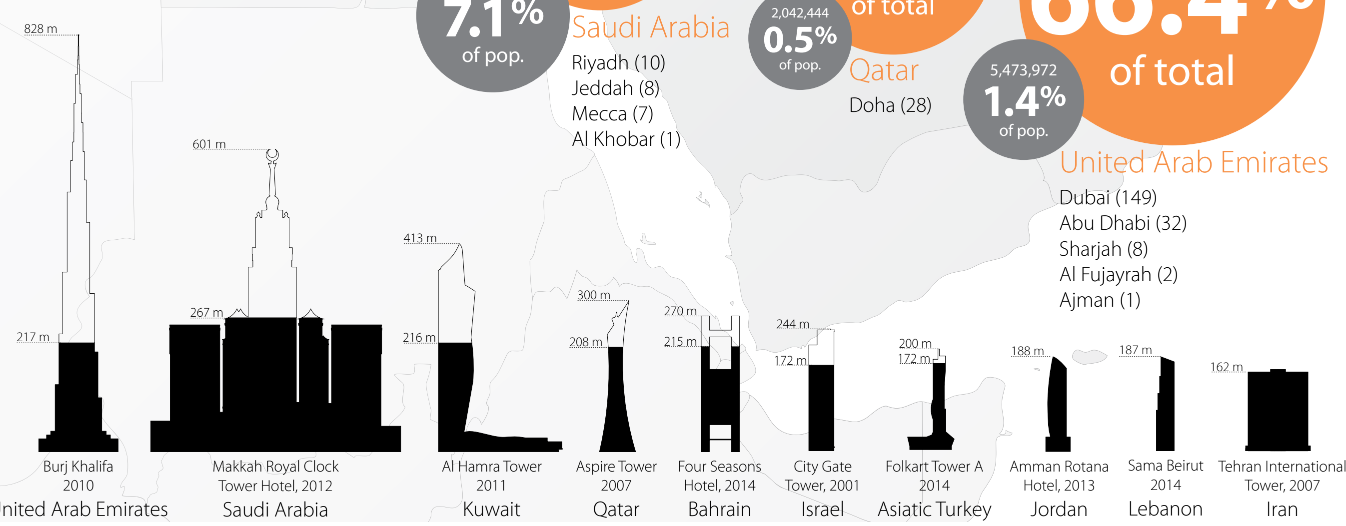
X Buildings X.X% of total — total **population** of country and **percentage** of region population

height of country's tallest building by the year 2015

silhouette of country's tallest building by the year 2015

average height of all buildings 150 m+ in country by the year 2015

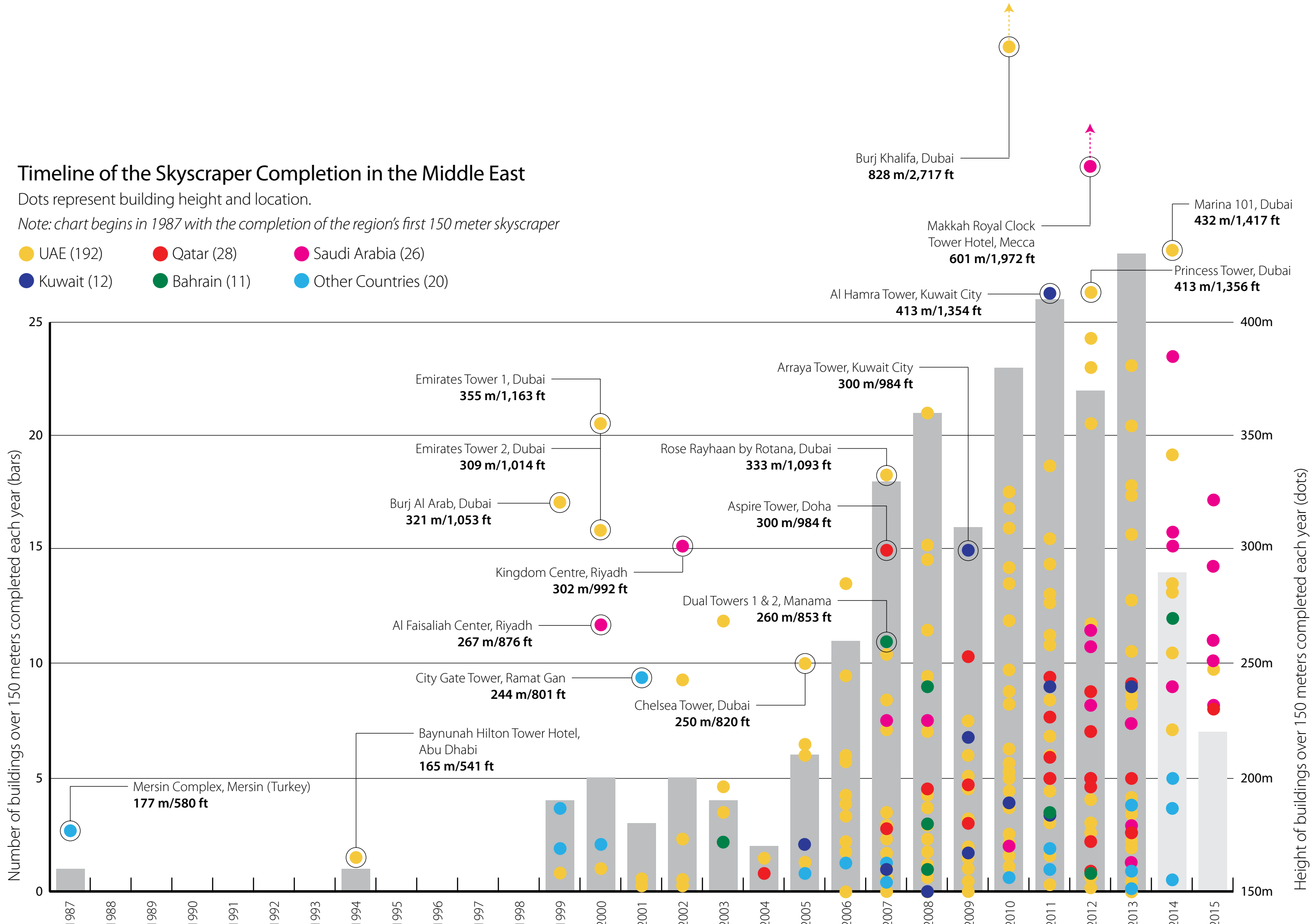




Timeline of the Skyscraper Completion in the Middle East

Dots represent building height and location.

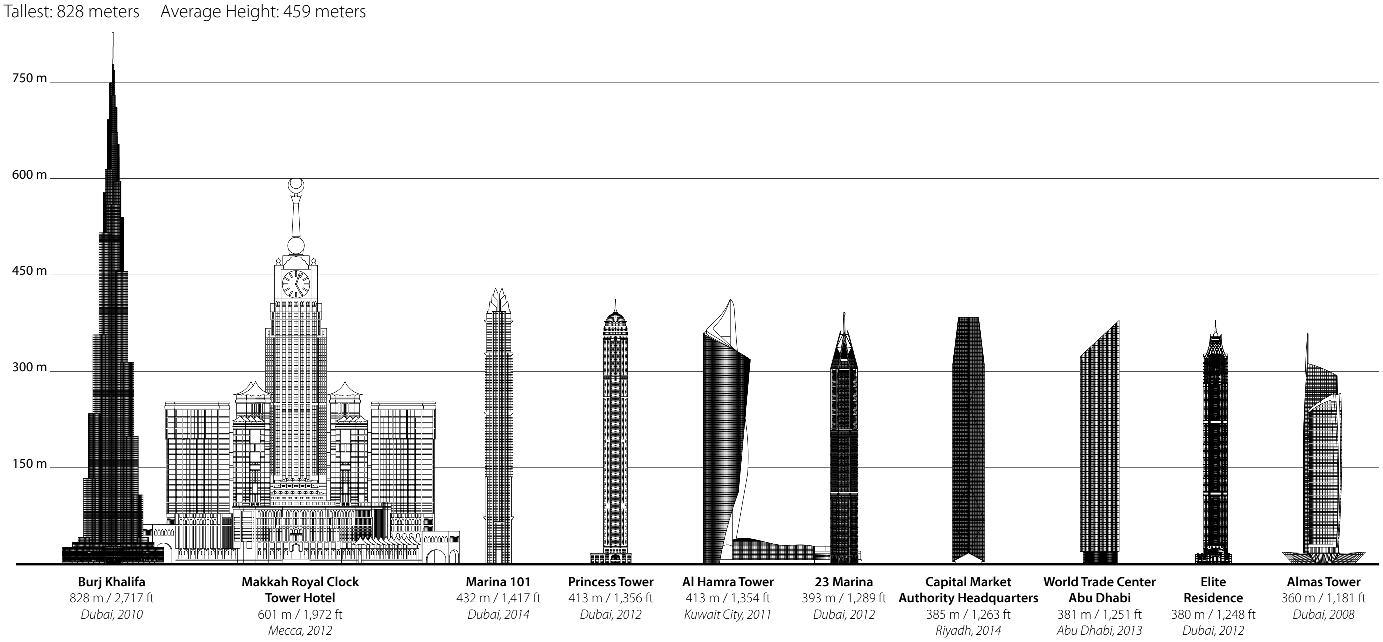
Note: chart begins in 1987 with the completion of the region's first 150 meter skyscraper

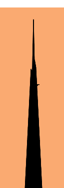


Note: We can predict 2015 building completions with some accuracy due to projects now in advanced construction.

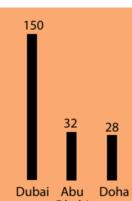
The Middle East's Future Tallest Ten: 2015

Tallest: 828 meters   Average Height: 459 meters





Kingdom Tower, the 1000+ meter project now under construction in Jeddah, is not included in this study because of its estimated 2019 completion



After Dubai, which is set to contain 149 buildings over 150 meters, the cities which will contain the most skyscrapers in the Middle East by 2015 are Abu Dhabi (32) and Doha (28).

Dubai's first 150 m+ skyscraper was the Burj Al Arab completed in 1999, just 14 years ago.

"Joan of Architecture" and the Difficulty of Simplicity

Phyllis Lambert

Interviewee

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Phyllis Lambert
Phyllis Lambert is founding director and chair of the board of trustees of the Centre Canadien d'Architecture in Montreal. As Director of Planning for the Seagram Building, she was influential in bringing Ludwig Mies van der Rohe onto the project. In 1975, she founded the heritage preservation group Heritage Montreal. In 1979, she founded the Centre Canadien d'Architecture, a museum and research center in Montreal with an international reputation. In 1990 she received an honorary DFA in Architecture from the Pratt Institute. In 1992, she was made Officier of the Ordre des Arts et des Lettres de France. She holds honorary degrees from some 26 universities in North America and in Europe. Her work also includes serving as developer on the restoration of the Biltmore Hotel in Los Angeles by architect Gene Summers as well as designing the Saidye Bronfman Centre in Montreal with Ludwig Mies van der Rohe. In 1985 she was made a Member of the Order of Canada, promoted to Officer in 1990, and promoted to Companion in 2001. In 1985, she was made a Knight of the National Order of Quebec and was promoted to Grand Officer in 2005. She has contributed essays to numerous books and is the subject of the 2007 documentary film Citizen Lambert: Joan of Architecture.

Phyllis Lambert, the daughter of the Seagram beverage company owner Samuel Bronfman, played an integral role in selecting Mies van der Rohe and Phillip Johnson to design the definitive International Style skyscraper, the 1956 Seagram Building in New York (see Figure 1). Her career of advocacy for better urban design continued, when she mounted numerous protests against ill-advised construction projects in her hometown of Montreal, Canada. She later founded the Centre Canadien d'Architecture (Canadian Center for Architecture), which holds one of the world's most significant collections of architectural drawings. Lambert's experience has been highlighted in new detail in her chronicle of the Seagram project: ***Building Seagram*** (see Review, page 56). On November 14, she will return to her alma mater, the Illinois Institute of Technology, home of the CTBUH headquarters office. Editor Daniel Safarik caught up with Lambert before her journey.

Given your advocacy for one of the most important skyscrapers of all time, I was surprised to learn that you actually participated in a struggle against an earlier design for a tall building, the Place Montreal Trust (see Figure 2), which was eventually built, though differently than what was planned. What was it that you objected to?

Well, it was a double thing. The original plan would have blocked views of Mont Royal, and some codes in Montreal guard against that, but of course cities let developers break those codes if they think somebody's going to put up a building that will generate taxes. Also, the developers privatized the public street and turned it into a shopping center, and those were heinous things. And I didn't care who was doing it. I said, "No you couldn't do it!"

Figure 1. Philip Johnson, Ludwig Mies van der Rohe, and Phyllis Lambert in front of an image of the model for the Seagram building, New York, 1955. Source: Fonds Phyllis Lambert, Canadian Centre for Architecture, Montréal. © United Press International.

What has changed since that time?

I think developers are becoming a lot more sensitive to the public realm and to the social aspects of architecture. But they used to think that they were doing everybody a favor by building without any discussion with the people. That's been slowly changing.

The Seagram was pretty important in that discussion, and it was one of the first to have a plaza cleared around it.

It's a private company building with a great architect, which is rare. What happened with the Seagram Building, and also with the Lever House across the street, was that zoning changes were made in New York. The city gave 10 square feet of bulk to the building per 1 square foot of open plaza on the street level. So that change was taken up by everybody. New York changed, very much because of the zoning. It was very advantageous to builders.

It seems the International Style championed by van der Rohe was a boon for developers, but when it was copied, it was copied badly. What are the essential characteristics that made that architecture great and made all the copies very different?

When I walk down the street and I look at the Seagram Building (see Figure 3), and I look at all the other buildings, I wonder why they can't do it. It's so simple! The proportions are so elegant and so wonderful. The Seagram was not just a commercial building stuck up by some architect who was trying to make a buck for a developer. It really was a great architect, whose question was, "what is this civilization we live in?" So there's a philosophic basis of the whole attitude towards the building. And when that's pulled out of the equation, and it's just a bad copy, then it loses all the qualities. They're not artists. They're copyists. You've seen it all through history.

Mies famously said "God is in the details." Is it the details the "copyists" tend to throw aside, just because they lack the philosophy that you described?
Yes of course! There's no question about it! There is a wonderful edition of *L'Architecture d'Aujourd'hui* at the time of the Seagram Building, that was written about Mies, called, « L'art difficile d'être simple, » "The Difficult Art of Being Simple." There is a difference between somebody who's creating something according to a deeply understood idea of what society is, versus somebody who's doing something commercially.

To take the devil's advocate position, the ideal design project would achieve both a commercial and artistic objective.
It's not so much that cheap, run-off copies are bad; it's the fact that there's no thought given as to why the building is being done. Why are you putting up a building? If it's just to house some occupational people, okay, but that's not going to make anything special, especially when it's a large building that has an effect on the city. It's a question of how you think, not of anything else. And when you are concerned about the public realm and what happens to people, then you do something quite different.

The mid-century period is currently enjoying a resurgence of interest. We have so much nostalgia now for mid-century furniture and clothes from the period, and it extends to architecture. Why do you think that is, and do you think it's healthy?
Well I don't know that it is nostalgia. I think that it's just lack of "inventivity." Everything in art, literature, and architecture looks back from time to time. I think things have improved since Post-Modernism, and there has been lots of very good research on materials; you can do such interesting things with concrete and glass now. And I think that there are a lot of good buildings built with the impulse that created the International Style, that industrial architecture. But then also we've added concern for the environment, which is great

Figure 2. Place Montreal Trust. ©①◎ Jean Gagnon

because we can get back to not having everything [mechanically conditioned].

When Mies and I were talking about glass in buildings such as 860–880 Lake Shore Drive (see Figure 4), he said, "Well, it's really not up to the architect, it's up to the engineers to find some way to stop the heat from coming in or going out." Well, that has become politically incorrect. People are beginning to reason that you just can't throw the book at it, and there is a kind of containment one has to have about what one's doing.

It's interesting, because our fascination with the "Mad Men" era has a lot to do with fetishizing social behaviors that we now think of as irresponsible. Yet the certainty and solidity of the principles that informed the International Style seem to remain valid.
They're very strong, absolutely. I guess what post-modernism was doing was trying to relate to the traditional city, but not very successfully. They didn't know where to stand. Now with interest in materiality and the environmental movement, people think differently.

Speaking of movements, at one point, you actually picketed the offices of a developer, Cadillac Fairview, on whose board you sat.
Yeah. It was my own family. I did it because money is not the most important thing to me. The most important thing is living on Earth. So when something is wrong, I have no choice but to say, "You can't do this."

> "The proportions are so elegant and so wonderful. The Seagram was not just a commercial building stuck up by some architect who was trying to make a buck for a developer."

Given how shareholder-driven corporations are today, and your past work in getting people to change their minds about design, do you think a shareholder revolt in favor of better design would be possible?
I suppose you could get environmentalists and people concerned with architecture to do that. But I think it's much deeper than that. You have to have a society that's interested in the public realm. I wrote a lot about that in ***Mies in America*** in one chapter.

Figure 3. Seagram Building, New York. © Antony Wood

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 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

Council on Tall Buildings and Urban Habitat

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