Frank Lloyd Wright’s 1956 Mile-High Skyscraper – The Illinois

Peter Lobner, 19 April 2020

On 16 October 1956, architect Frank Lloyd Wright, then 89 years old, unveiled his design for the tallest skyscraper in the world, a remarkable mile-high spire named “The Illinois,” proposed for a site in Chicago.

Also known as the Illinois Mile-High Tower, Wright’s skyscraper would stand 528 floors and 5,280 feet (1,609 meters) tall plus antenna; more than four times the height of the Empire State Building in New York City, then the tallest skyscraper in the world at 102 floors and 1,250 feet (380 meters) tall plus antenna. At the unveiling of The Illinois at the Sherman House Hotel in Chicago, Wright presented an illustration measuring more than 25 feet (7.6 meters) tall, with the skyscraper drawn at the scale of 1/16 inch to the foot.
Frank Lloyd Wright presents *The Illinois* at the Sherman House Hotel in Chicago on 26 October 1956. Source: IBM.com/blog
Basic parameters for The Illinois are listed below:

- Floors, above grade level: 528
- Height:
  - Architectural: 5,280 ft (1,609.4 m)
  - To tip of antenna: 5,706 ft (1,739.2 m)
- Number of elevators: 76
- Gross floor area (GFA): 18,460,106 ft² (1,715,000 m²)
- Number of occupants: 100,000
- Number of parking spaces: 15,000
- Structural material:
  - Core: Reinforced concrete
  - Cantilevered floors: Steel
  - Tensioned tripod: Steel

The Illinois was intended as a mixed-use structure designed to spread urbanization upwards rather than outwards. The Illinois offered nearly three times the gross floor area (GFA) of the Pentagon, and more than seven times the GFA of the Empire State Building for use as office, hotel, residential and parking space. Wright said the building could consolidate all government offices then scattered around Chicago.

Each elevator was a five-story unit that moved on rails and served five floors simultaneously. The 76 elevators were divided into five groups, each serving a 100-floor segment of the building, with a single elevator serving only the top floors. With the tapering, pyramidal shape of the skyscraper, the vertical elevator shaft structures eventually extended beyond the sloping exterior walls, forming protruding parapets on the sides of the building. In his 1957 book, “A Testament,” Wright said the elevators were designed to enable building evacuation within one hour, in combination with the escalators that serve the lowest five floors.
THE ILLINOIS
MILE-HIGH CANTILEVER SKY-CITY TO HONOR THE STATE OF ILLINOIS AND CITY OF CHICAGO
538 FLOORS FROM GRADE TO TOP FLOOR ELEVATOR

MEMORIAL TO LOUIS H. SULLIVAN
FIRST MADE THE TALL BUILDERS TALL

ELISHA OTIS
INVENTOR OF THE UPJUMP STREET

JOHN RODBLING
FIRST STEEL IN TENSION ON THE GRAND SCALE, THE BROOKLYN BRIDGE

LIDGERWOOD
NOW APPLIES THE SAME PRINCIPLE TO SKY CITIES

COIGNET & MONIER
REINFORCED CONCRETE, THE BODY OF THE MODERN WORLD

SALUTATIONS
EDUARDO TORROJA, INGENIERO, ESPAÑA

PROFESSORS BERGAMO & CREN

PROFESSOR PIERLUIGI NERI

DR. J.J. POLIVKA, ARCHITECT, CHICAGO

MAILLART

FRANK LLOYD WRIGHT
SON OF CHICAGO. ACHIEVED DEGREE OF ARCHITECTURE, TELEGRAPH HALL OF SANTA FE, NEW YORK CITY, DOCTOR OF ENGINEERING SHELLS, INNOVATION IN DUCATI, INVENTOR OF THE TALL BUILDING, THE FIRST TALL BUILDING.

STATISTICS:

GROSS AREA: 19,643,000 sq. ft.

NET RENTABLE AREA: 13,042,000 sq. ft.

TOTAL OCCUPANCY: 72,000

GRAND TOTAL: 180,000

PARKING: 5400 CARS

First successful application of principle of continuity. Horizontal elements derived from steel in tension applied to enormous floor construction. The principle of the cantilever vertical applied to the tall building. The first tabroot foundation.

Frank Lloyd Wright illustrations of The Illinois.
L-R: The central core structure for carrying the building’s dead loads into the “taproot” foundation; Back exterior view; Front exterior view; Side exterior view. Source: Wright Mile Gallery, MCM Daily
Close-up view of the five-story base of The Illinois.
Source: Frank Lloyd Wright Foundation

Illustration of the footprint of The Illinois base and tower.
Source: Wright Mile Gallery, MCM Daily
Frank Lloyd Wright illustration of The Illinois, showing the five-story base structure and the transition of the central reinforced concrete core into the “taproot” foundation structure. In the background are scale silhouettes of famous tall structures: Eiffel Tower, the Great Pyramid, and Washington Monument.

Source: Wright Mile Gallery, MCM Daily

Blaire Kamin, writing for the Chicago Tribune, reported: “The Mile-High didn’t simply aim to be tall. It was the ultimate expression of Wright’s "taproot" structural system, which sank a central concrete
mast deep into the ground and cantilevered floors from the mast. In contrast to a typical skyscraper, in which same-size floors are piled atop one another like so many pancakes, the taproot system lets floors vary in size, opening a high-rise's interior and letting space flow between floors."

“Wright already had used the system in his 15-story S.C. Johnson Research Tower of 1950 in Racine, Wis. There, alternating square and round floors reach out like tree branches from a reinforced concrete core. Now, he was joining the approach to a kind of hyper-centralization that sought to replace many tall buildings with a single super tall skyscraper. The idea: Free up the ground plane and rid cities of the very congestion and over-crowding Wright had spent decades attacking.”

In addition to the central core to support the building’s dead loads, The Illinois also incorporated an external tensioned steel tripod structure to resist external wind loads and other flexing loads (i.e., earthquakes), distributing those loads through the integral steel structure of the tripod, and resisting oscillations.

Tuned mass dampers (TMD) for reducing the amplitude of mechanical vibrations in tall buildings had not been invented when Wright unveiled his design for The Illinois in 1956. The first use of a TMD in a skyscraper did not occur until the mid-1970s, first as a retrofit to the troubled, 790 foot (241 m) tall, John Hancock building completed in 1976 in Boston, and then as original equipment in the 915 foot (279 m) tall Citicorp Tower completed in 1977 in New York City. I don’t think there’s much question that The Illinois would have benefitted from TMD technology, particularly on the upper floors.

Wright alluded to the building being “atomic powered,” but there were no provisions for a self-contained power plant as part of the building. The much smaller Empire State Building currently has a peak electrical demand of almost 10 megawatts (MW) in July and August. Scaling on the basis of gross floor area, The Illinois could have had a peak electrical demand of about 70 MW. You’ll find more information on current Empire State Building energy usage here: https://www.esbnyc.com/sites/default/files/esb_overall_retrofit_fact_sheet_final.pdf
You'll find an animation of the construction of The Illinois in the 2012 short video, by Charles Muench “A Peaceful Day in BroadAcre City - One Mile High - Frank Lloyd Wright” (1:31 minutes), at the following link: https://www.dailymotion.com/video/xp86uo

The start of The Illinois construction sequence. Screenshots from Charles Muench video, 2012.
You can see more architectural details in the 2009 video, “Mile High Final Movie - Frank Lloyd Wright” (3:42), produced for the Guggenheim Museum, New York, and available here: https://vimeo.com/4937909

The Illinois, showing architectural exterior details. Screenshot from Guggenheim video, 2009.
The top of The Illinois, showing details at the 528\textsuperscript{th} floor, including the protruding parapets for the elevators, and the 420+ foot (128 m) antenna on top. Screenshot from Guggenheim video, 2009.
The Illinois skyscraper as part of Frank Lloyd Wright’s mid-1950s landscape for his urban planning concept known as Broadacre City. Source: utopicus2013.blogspot

Artist’s concept of The Illinois skyscraper punctuating a rather congested contemporary Chicago skyline, not quite as Frank Lloyd Wright envisioned. Source: Neoman Studios
In September 2012, Mary Louise Schumacher, writing for the Milwaukee Sentinel Journal, reported that Columbia University and the Museum of Modern Art (MoMA) in Manhattan had jointly acquired the Frank Lloyd Wright archives, which consist of architectural drawings, large-scale models, historical photographs, manuscripts, letters and other documents.

Since Wright’s death in 1959, the archives have been in the care of the Frank Lloyd Wright Foundation (https://franklloydwright.org/frank-lloyd-wright/) and stored at Wright’s homes / architectural schools at Taliesin in Spring Green, WI and Taliesin West, near Scottsdale, AZ.

Columbia University’s Avery Architectural & Fine Arts Library (https://library.columbia.edu/libraries/avery/da.html) will be the keeper of all of Wright’s paper archives, as well as interview tapes, transcripts and films. MoMA (https://www.moma.org) will add Wright’s three-dimensional models to its permanent collection.

The Frank Lloyd Wright Foundation will retain all copyright and intellectual property responsibilities for the archives, and all three organizations hope to see the archives placed online at some point in the future.

On 12 June 2017, MoMA opened its exhibit, "Frank Lloyd Wright at 150: Unpacking the Archive," which ran thru 1 October 2017. You can take an online tour of this exhibit, which included Wright’s plans for The Illinois, here: https://www.moma.org/calendar/exhibitions/1660

MoMA’s curator of the Wright collection, Barry Bergdoll, provided an introduction to the trove of recently acquired documentation on The Illinois in a short 2017 video (4:32 minutes) at the following link: https://www.youtube.com/watch?v=VhUDu0Q08UA
For more information on Frank Lloyd Wright, his design concept for the mile-high skyscraper, The Illinois, and his urban concept, Broadacre City:


• “Introduction to Frank Lloyd Wright and Broadacre City,” Utopicus: http://utopicus2013.blogspot.com/2013/06/introduction-to-frank-lloyd-wright-and.html


Also check out the following short videos:

• Justin Chen, “Mile High Office Tower: Student Animation” (1:53 minutes), Guggenheim Museum, New York, 3 June 2010: https://www.youtube.com/watch?v=nRgLz41m_U

• Professor Allen Sayegh with Justin Chen & John Pugh, “Mile High Final Movie - Frank Lloyd Wright” (3:42), Harvard University Graduate School of Design for the Guggenheim Museum, New York, 2009: https://vimeo.com/4937909

• “Frank Lloyd Wright | HOW TO SEE Mile-High Tower with MoMA curator Barry Bergdoll” (4:32 minutes), The Museum of Modern Art (MoMA), 14 June 2017: https://www.youtube.com/watch?v=VhUDuQ0Q8UA

• Stefan Al, “Will there ever be a mile-high skyscraper” (4:45 minutes), TED Talks, 7 February 2019: https://www.ted.com/talks/stefan_al_will_there_ever_be_a_mile_high_skyscraper/transcript?language=en