Chicago
City of Steel

A Self-Guided Walking Tour
Celebrating Chicago's
Structural Steel Heritage

AISC
AMERICAN INSTITUTE OF STEEL CONSTRUCTION
FOUNDED 1921

Smarter.
Stronger.
Steel.

The Skyscraper

Date of Birth: 1885 **Place of Birth: Chicago, Ill.**

No city in the world has influenced the design and construction of modern buildings more than Chicago, and no material has made a greater contribution in the design and construction of those buildings than structural steel. The Chicago skyscraper was born out of the ashes of the Great Chicago Fire of 1871. As Chicago was rebuilt, great architects and talented structural engineers worked together to develop a new concept in building construction. Rather than use thick masonry walls to support the weight of upper floors, they designed a skeleton frame to support the floors and "hang" the walls. The material that made that skeleton system possible: structural steel.

We invite you to spend an hour or so casually touring the Chicago Loop discovering the history of structural steel in the great buildings, infrastructure, and bridges of the birthplace of the modern skyscraper. Chicago's heritage of great buildings, great architects, and great engineers is not just a legacy. It continues today as Chicago continues to build and grow using structural steel to frame the skyscrapers of the 21st century.

Tour Instructions

Of course, no tour of Chicago can hope to visit every major steel-framed structure. Today's tour route will take you on a two-mile path through the Loop, highlighting just some of the significant structural engineering achievements using steel. ★**You can start and end anywhere along the route. However, we've conveniently started our tour at "The Bean," a favorite meeting spot.**★ At some points along the route, we encourage you to enter a building. In doing so you will be in areas of the building where the general public is allowed access.

One of the challenges of a walking tour of great buildings is that you will be walking at ground level. Be prepared to look up and gain a full perspective of the building, especially from a few blocks away. Please don't just think of these buildings as buildings. Appreciate also the talented architects, creative engineers, and skilled tradespeople who invested their lives in building the Chicago we enjoy today.

It's time to start your journey!

Notable Steel Structures

Key	Name	Height	Year Built
A	Cloud Gate "The Bean"	42 ft	2006
B	Pritzker Pavilion	120 ft	2004
C	One Prudential Plaza	601 ft	1955
D	Aon Center	1,136 ft	1973
E	Blue Cross Blue Shield	796 ft	1997/2009
F	Carbon & Carbide Bldg.	503 ft	1929
G	LondonHouse Chicago	318 ft	1923/2016
H	Wrigley Building	425 ft	1921/1924
J	875 N Michigan Avenue	1,127 ft	1969
K	Apple Store	—	2019
L	Wabash Avenue Bridge	—	1930
M	35 E Wacker Drive	523 ft	1927
N	Kemper Building	522 ft	1962
O	The Elevated	—	1897
P	162 N State Street	231 ft	1924/2000
Q	Richard J Daley Center	648 ft	1965
R	Picasso Sculpture	50 ft	1967
S	Chicago Temple	568 ft	1924
T	James R Thompson Center	332 ft	1985

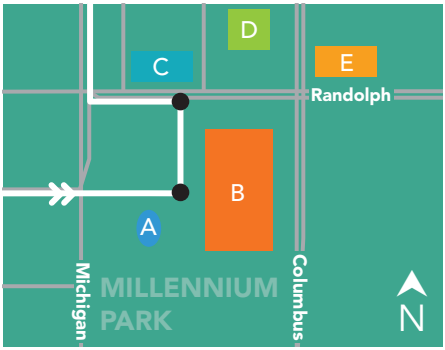
Key	Name	Height	Year Built
U	300 N LaSalle Street	784 ft	2009
V	321 N Clark Street	510 ft	1987
W	353 N Clark Street	624 ft	2009
X	333 W Wacker Drive	489 ft	1983
Y	155 N Wacker Drive	638 ft	2009
Z	444 W Lake Street/ River Point	730 ft	2017
AA	150 N Riverside Plaza	724 ft	2017
BB	Boeing Building	560 ft	1990
CC	71 S Wacker Drive	679 ft	2005
DD	Willis Tower	1,454 ft	1974
EE	Bank of America Building	535 ft	1934
FF	Marquette Building	205 ft	1895
GG	Inland Steel	332 ft	1957
HH	1 S Dearborn Street	571 ft	2003
JJ	The Reliance Building (Staypineapple Chicago)	202 ft	1895

A
Millennium Park—Cloud Gate

Nicknamed "The Bean" by Chicago visitors and residents, the official name of this sculpture by British artist Anish Kapoor is *Cloud Gate*. The sculpture was constructed between 2004 and 2006 using 110 tons of stainless steel, consisting of 168 highly polished plates all mounted on a structural steel frame. It stands 42 ft high, 66 ft long, and 33 ft wide. The bean-like shape and mirror-like finish spectacularly reflect the Chicago skyline, resulting in a "steel on steel" image. It was originally feared that Kapoor's design could not be implemented, but the combination of the inherent flexibility of steel and the skill of the fabrication community allowed the creation of this new Chicago landmark.

B
The Pritzker Pavilion

The Pritzker Pavilion is composed of a south-facing bandshell housing the stage and related support facilities, which in turn support metallic forms. The central portion of the bandshell roof cantilevers up to 100 ft beyond the proscenium door. There are a total of 12 individual metal-clad assemblies arranged around and above the central stage, forming an overall composition some 300 ft wide by 120 ft tall. Project structural engineer Skidmore, Owings and Merrill developed a steel grid/ribbed frame concept by for the support of the metal elements, configuring the structure to closely follow the curvature of the shapes to take advantage of the inherent geometric stiffness of each form. Standardized member sizes throughout the structure promote repetition and control of steel connection detailing and fabrication, as well as coordination with cladding systems and attachments. A 625-ft-by-325-ft shell-shaped trellis structure, formed by arched steel pipes, defines the audience space and connects the stage to the great lawn. The trellis structure supports a system of speakers, eliminating the need for speaker towers.



C
One Prudential Plaza *(far left)*

National headquarters to the American Institute of Steel Construction (AISC), Pru One was, at the time of its construction in 1955, the tallest building in the city and featured a multi-level observatory (since closed) at the top.

D
The Aon Center *(left)*

The Aon Center, originally known as the Standard Oil Building, stands 1,136 ft tall with 83 floors. Designed by Perkins and Will, the building uses a tubular steel-framed structural system with V-shaped perimeter columns to resist seismic and wind loads, reduce sway, minimize column bending, and maximize column-free space. The original marble façade developed cracks and was replaced in 1991. The discarded marble was crushed and used for landscaping stone at Amoco's refinery in Whiting, Ind.

E
Blue Cross Blue Shield

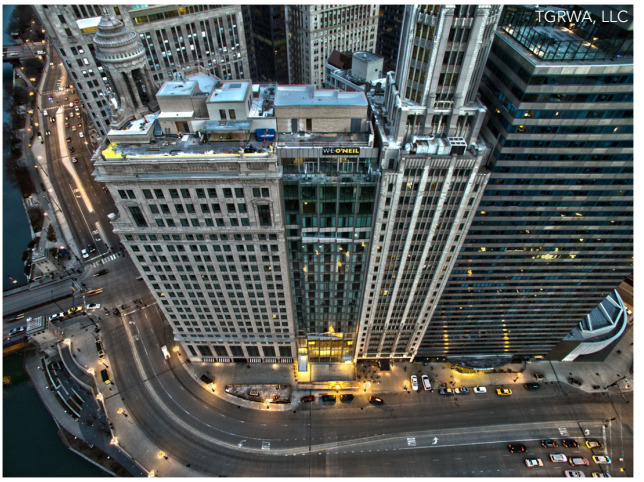
The first phase of this 32-story building, completed in 1997, was designed to accommodate a vertical expansion of 24 additional floors. The unprecedented vertical expansion, possible only with a structural steel framing system, began in 2007 while the building was still occupied by 4,000 Blue Cross Blue Shield employees. The original building plans included open atrium space to accommodate additional elevator banks. Chris Stefanos and Associates was the original structural engineer and Magnusson Klemencic Associates performed the structural engineering design for the expansion.

F
Carbon & Carbide Building

Clad in dark green terra-cotta tiles, this Art Deco gem is said to resemble a champagne bottle with its gold-leaf top!

J

G
LondonHouse Chicago



Located at the site of the London Guarantee Building (originally built in 1923) this project involved the renovation of the 288,000-sq.-ft building, as well as the construction of an adjacent 22-story, 70,000-sq.-ft, steel-framed structure on an empty lot. Structural engineer TGRWA faced a number of hurdles in the design of the lateral system to accommodate for project cost, architectural requirements, and local building code wind-load criteria. They ultimately settled on an inventive hybrid lateral system using braced frames in the north-south direction and the steel moment frame lateral system of the existing structure in the east-west direction. The addition relied on the existing lateral system in only one direction and allowed for slip in the perpendicular direction, using specially designed joints between the two buildings to allow for movement. This hybrid system allowed for more usable space and clear views of Wacker Drive and the Chicago River. LondonHouse Chicago won and AISC IDEAS^2 Award in 2019.

H
Wrigley Building

One of the first commercial office buildings north of the Chicago River, the south tower of the Wrigley Building was completed in 1921 while the north tower was completed in 1924. The steel structure is clad in white terra-cotta tiles that are spectacularly lit at night. The Wrigley Building was the first Chicago home of the American Institute of Steel Construction (AISC).

J
875 N Michigan Avenue

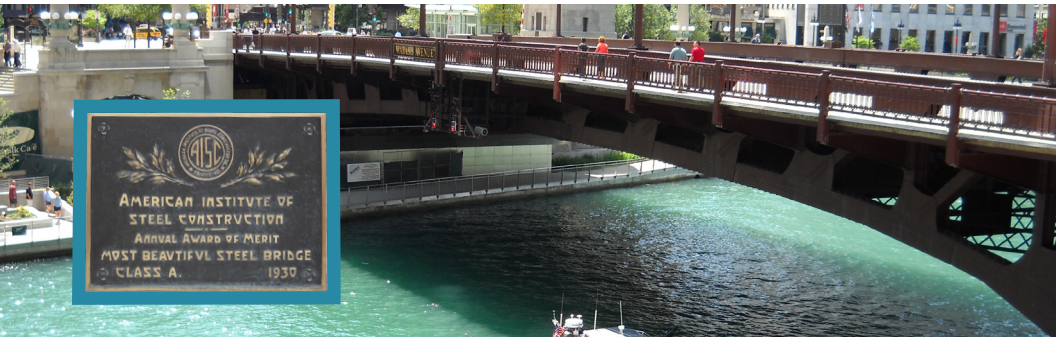
Looking to the north along Michigan Avenue, you'll see 875 N Michigan Avenue, formerly known as the John Hancock Center. Completed in 1969, this 100-story, 1,127-ft dark brown skyscraper is most recognizable for its external diagonal X-bracing. This X-bracing coupled with a tapered tubular design allows for a more efficient structural system and the ability to open up the inside floor plan resulting in more usable floor space. Structural engineer Fazlur Khan and architect Bruce Graham of Skidmore, Owings and Merrill pioneered the concept. The tapered design allowed for larger floor plates at the base of the tower, where commercial and business spaces dominate, and smaller floor plates near the top of the tower, which is primarily residential.

K
Apple Michigan Avenue

Prominently situated along North Michigan Avenue and the Chicago River, Apple Michigan Avenue showcases its wares with the structure itself. The MacBook-shaped roof, designed with extremely thin carbon-fiber-reinforced-polymer (CFRP) supported on a tightly integrated structural steel frame of built-up steel box sections, is situated atop four steel box columns to create a light, open-span glass box. The four columns provide all of the lateral and vertical support for the roof, with the two north columns additionally supporting the cantilever mezzanine balcony and a portion of the plaza. A large steel torsion box girder (dubbed the "Miracle Girder") simultaneously supports the south line of reactions from the plaza beams and the cantilevering mezzanine balcony, showcasing the use of torsion as a primary structural action. The structure won an AISC IDEAS^2 Award in 2019.

L
Wabash Avenue Bascule Bridge

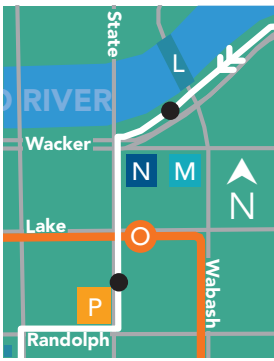
This AISC award-winning bridge, built in 1930, is one of 20 bascule bridges crossing the Chicago River—the greatest concentration of bascule bridges anywhere in the world. A bascule bridge is a lift bridge that uses a counterweight mechanism to continuously balance the span, which is sometimes referred to as a "leaf," throughout its movement. This seesaw effect is the origin of the name, as the French word *bascule* can be translated as *seesaw* or *balance*. They are the most common type of moveable bridge in use today, as they open quickly and require very little energy to operate. Bascule bridges in Chicago are typically double-leaf, steel-grated deck structures opening in the middle with the counterweights below deck. Two particularly unique bascule bridges in Chicago are the DuSable Bridge (just east of you), which carries two levels of Michigan Avenue traffic, and the Wells Street bridge (farther to the west), which supports "L" tracks above traffic lanes.




Edward Stojakovic, Wikimedia Commons

M
35 E Wacker Drive *(far left)*

A product of the 1920s, the terra-cotta clad "Jeweler's Building" (as it is sometimes known) at one time featured automobile elevators so the jewelers who frequented the building could drive their wares directly to their floor.



N
The Kemper Building *(left)*

The 41-story Kemper Building was the tallest marble-clad building in the world at the time of its completion in 1962. It was the first Chicago skyscraper to use 50-ksi steel, which is now the industry standard for W-shapes. The Kemper Building was the second Chicago home of the American Institute of Steel Construction (AISC).

O
The Chicago Transit System—Elevated Lines

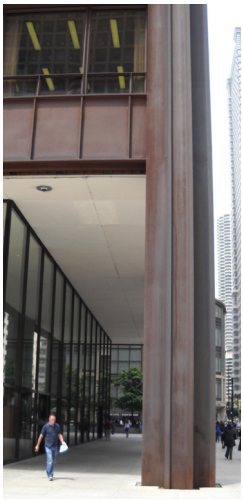
Not all significant uses of steel for structural systems in Chicago involve buildings. The famed Chicago "L" operates on 35.8 miles of elevated track installed on steel supports throughout the city. Elevated rail service in Chicago began in 1893, with trains running on the Lake Street Elevated Railroad. The original route followed Lake Street from just west of the Chicago River (three-quarters of a mile west of where you are standing) to the western boundary of the city. The Metropolitan West Side Elevated began service in 1895 and was the first rapid-transit system in the U.S. powered by electric traction motors. To provide service to the central business district, an elevated rail loop opened in 1897. While many people assume this elevated loop was the source of downtown Chicago's famous nickname, the term "Loop" was in use prior to 1897 based on an earlier streetcar route. Many of the original steel support structures for the original Loop are still in service today and can be readily identified by their riveted connections. The Chicago Transit Authority assumed responsibility for the "L" system in 1947 and currently operates 1,900 rail cars on a total of 102.8 miles of track, of which 35.8 miles are on elevated steel structures, serving 650,000 passengers daily.

P
162 North State Street

162 North State Street is currently home to retail space and the dormitory for the School of the Art Institute of Chicago. The building was completed in 2000 and combined a 200,000-sq.-ft structure on the corner of State and Randolph with the existing Butler Building, which was built in 1924. The 1,500-ton steel frame of the new building matched the 12-ft floor-to-floor height of the Butler Building. Because the original plans for the Butler Building were not available, the new steel frame was designed to carry the lateral loads for both the old and new building using three eccentrically braced frames on each of floors 6 and above. To keep space open for retail uses on the lower levels, the third through fifth levels use a perimeter moment frame. Thornton Tomasetti was the structural engineer for the project.

Q
The Richard J. Daley Center

This 648-ft-tall, 31-story building is the tallest court/judicial center and the tallest building with fewer than 40 floors (typically a 648-ft-tall building would have 50 to 60 stories) in the world. Courtroom requirements mandated high ceilings and long spans, requiring a structural system featuring plate girders similar to those used in bridges. These girders span 87 ft between columns in the east-west direction and 48 ft north-south. The building's distinctive reddish brown color is the result of the use of Cor-Ten, a self-weathering steel with a 2% copper content. Cor-Ten or ASTM A588 steel develops a patina during its initial corrosion process, naturally protecting the steel from further corrosion. This allowed the building's architect, C.F. Murphy and Associates, and structural engineer Lester B. Knight to expose the structural steel frame. You can reach out and touch the large steel plate columns that support the structure. Feel the strength!



R
The Picasso Sculpture

Also located in Daley Plaza is Chicago's famous unnamed Picasso sculpture. The 50-ft-tall, 162-ton sculpture uses Cor-Ten weathering steel fabricated by the U.S. Steel Company at its facility in Gary, Ind. Skidmore, Owings and Merrill provided structural engineering services for the sculpture.

S
Chicago Temple

Home to the congregation of the First United Methodist Church of Chicago, the Chicago temple skyscraper was completed in 1924. The building steeple houses a "Sky Chapel" which seats 30 people, created in 1952 as a gift from the Walgreen family. The church's bells are frequently heard in the Loop.

T
The James R. Thompson Center

Named for former Illinois Gov. James R. Thompson, the Thompson Center is the Chicago seat of Illinois state government, with the office of the governor on the 16th floor. The Murphy/Jahn–Lester B. Knight design features a sloping, aggressively curvilinear mass topped with a diagonal truncated glass cylinder, which is fully framed in structural steel. Offices on all floors open into the 17-story atrium conveying the message of an open governmental system for all citizens of Illinois. During construction, the atrium roof framing was assembled on the ground and lifted into place in one piece using a series of lifting cables. The floors are serviced by stairs and elevators cantilevered into the atrium space. The architecturally controversial structure was completed in 1985 and occupies an entire city block.

U
300 N LaSalle Street

With a glass and stainless steel facade, this 57-story structure provides 200 feet of river frontage.

V
321 N Clark Street

Known as the Quaker Tower (after the oatmeal) when it was completed in 1987, this skyscraper is an excellent example of Chicago's "glass box" commercial architecture designed by Skidmore, Owings and Merrill.

W
353 N Clark Street

Completed in 2009, this steel tower clad in glass and aluminum provides more than 1,000,000 sq. ft of interior space.

X
333 W Wacker Drive

Completed in 1983, this green-glass building echoes the curve in the Chicago River at this point. Hailed for its understated but striking design, this steel structure is particularly captivating when viewed from across the river.


Hyperion924, Wikimedia Commons

Z
444 W Lake Street/River Point

Located at a prominent location along the Chicago River, River Point Tower's curves subtly echo 333 W Wacker Drive across the river. Structural engineer Magnusson Klemencic Associates created a structural steel super frame for the 52-story office tower that coordinated with existing live rail tracks on the site and subway tracks below grade. Avoiding the tracks required some sloping support columns, resulting in the curving geometry of the building as well as the distinctive parabolic arch at its base. The building features open spaces with long spans, ideal for the office floors. Steel's light weight allowed the design team to reduce column sizes as well as the overall load on the foundation.


MKA/Michael Dickter

AA
150 N Riverside Plaza

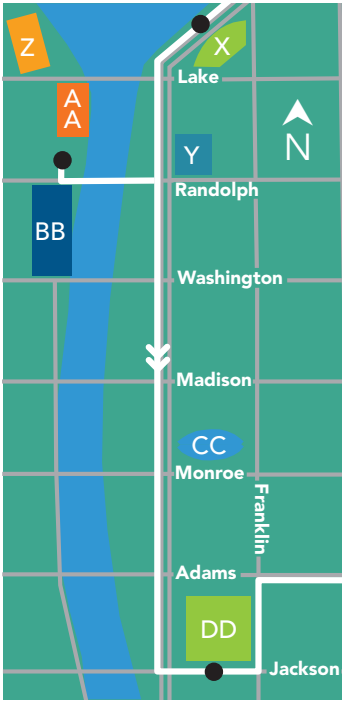
Situated along the west bank of the Chicago River between Lake and Randolph Streets, the 54-story building uses a cantilevered system to minimize the building footprint to accommodate the tight restrictions of the riverfront site. The building cantilevers out to the full floor size from levels 4 through 8, not only creating the signature design element of the structure but also allowing for a portion of the site to be set aside for public use: the 1.2 million-sq.-ft building only occupies a quarter of the site. It is also noted as the first project to use ASTM A913 70-ksi steel in the United States, as the design team used high-strength materials and the largest available shapes to resist the loads as the building transfers forces inwards to the compact core. Cross the river at Randolph to enjoy the outdoor plaza.

BB
The Boeing Building

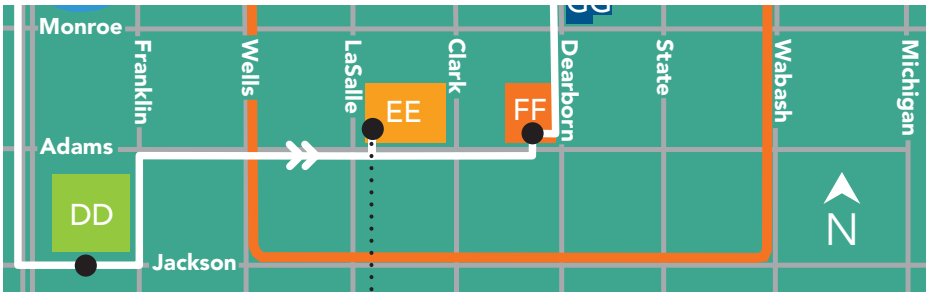
Formerly known as the Morton International Building, this building on the west side of the Chicago River was completed in 1990. Designed by Perkins and Will, one of the most distinctive aspects of the building is the exposed truss on the roof. The southern portion of the building is located over an active rail yard. The density of the train tracks did not allow columns extend from the interior of the building down through the tracks for a regularly spaced caisson foundation configuration. To overcome this challenge the structural engineers devised the truss configuration, which allows the southeastern corner of the building to be suspended over the tracks with no columns underneath it. The truss redistributes the loads to the locations where caissons could be placed. Structural steel offered a solution that made this previously unbuildable site buildable.

Y
155 N Wacker Drive
Designed by Goettsch Partners and structural engineers Magnusson Klemencic Associates, this tower tops out at 584 ft.

CC
71 South Wacker Drive
The gently curving facades of this structure provide panoramic views for the tenants in this 48-story steel structure, which is served by 28 elevators.



DD
The Willis Tower *(pictured above)*
The 110-story, 1,454-ft-tall Willis Tower, long known as the Sears Tower, was the tallest building in the world when completed in 1974—a record it held until 1997. Designed by the same team at Skidmore, Owings and Merrill that designed 875 N Michigan Avenue, the Sears Tower took a different approach to the concept of "tube" construction by bundling nine smaller 75-ft-square tubes into a single 225-sq.-ft footprint. Each tube is framed with large columns set 15 ft apart and connected by 42-in.-deep girders, allowing the "walls" of the tube, rather than a more expensive interior frame, to carry the majority of the load. The "bundled" effect of the tubes provides enhanced stiffness to resist wind loads. The northwest and southeast tubes end at the 49th floor, while the southwest and northeast tubes terminate at the 65th floor. The remaining five tubes continue in a cruciform pattern with the north, east, and south tubes ending at the 90th floor. The center and west tubes form a rectangle continuing to the full 110-story height.



EE
Home Insurance Building
1885–1931

originally on the site of the Bank of America Building (EE)
(see the plaque at the LaSalle Street entrance)

The Home Insurance Building was built in 1885 and was demolished in 1931. Rising to a height of 138 ft, the 10-story building is considered to be the first skyscraper in the world. It was the first building in Chicago to use structural steel in its framing system and the first building in the U.S. to carry both floor and wall loads on its metal frame. The metal structural framing system for the building was a combination of structural steel, wrought iron, and cast iron. In 1890, two additional floors were added to the building. While the Home Insurance Building made use of steel framing technology, it is not correct to say that it was a pure steel-framed structure because it was supported by granite piers at its base and a masonry wall at the rear of the building. Designed by William LeBaron Jenney, the building weighed one-third as much as a traditional masonry building of similar size would have weighed.

photo courtesy of the Francis Loeb Library, Harvard

photo courtesy of Chicago Tribune

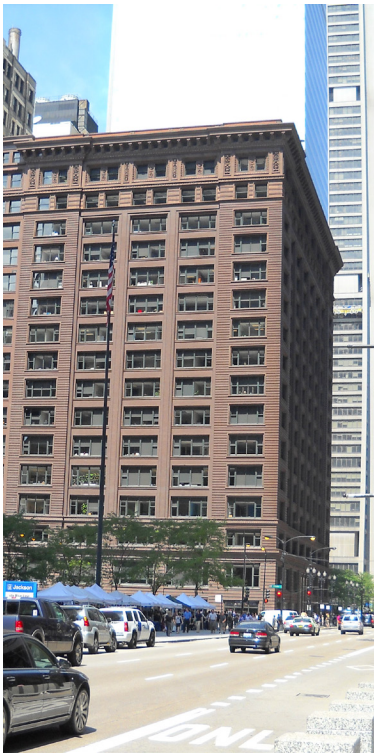
EE

Bank of America Building (135 South LaSalle)

When it was built in 1934 as the Field Building, this was the headquarters of the Marshall Field Company. The building was later renamed the LaSalle Bank Building and more recently the Bank of America Building. Enter the building from the west and walk through the art deco atrium. Near the center of the atrium a wall display further discusses the construction of the original Field Building. Designed as the largest office building in Chicago, it was the last major building constructed in downtown Chicago until the mid-1950s, when the Inland Steel Building (20 W Monroe Street) and the Prudential Building (130 E Randolph Street) joined the Chicago skyline. The structural steel frame supports a 45-story, 535-ft-tall central rectangular tower surrounded by four lower corner towers arranged in an H pattern. In December 2004, fire swept through the 29th floor of the building for five hours. No significant structural damage resulted from the fire and the areas of the building affected by the fire were renovated and reoccupied.

FF

The Marquette Building

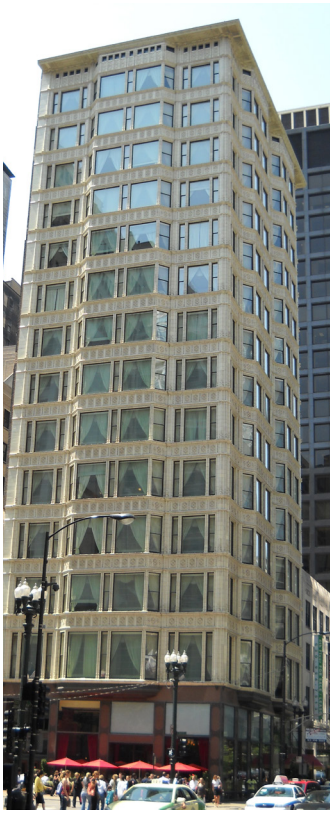


The Marquette Building was built in 1895 by the George A. Fuller Company based on a design by architects Holabird and Roche and structural engineers Purdy and Henderson. Today it is considered one of the premier examples of early steel-framed skyscrapers and the Chicago School of Architecture. The building is designated both a Chicago Landmark and a National Historic Landmark, and has been preserved through the efforts of the Landmarks Preservation Council of Illinois and the John D. and Catherine T. MacArthur Foundation.

Originally a 14-story building, the building now stands at 15 stories following the addition of a story in the early 1950s. The building's structural steel skeleton supports the grid-like window frames and horizontal spandrels; it also allowed the construction of a large, ornate central lobby rotunda featuring Tiffany glass, mother-of-pearl, and semi-precious stones. Scenes of early Illinois history focus on the exploits of Father Jacques Marquette, for whom the building is named. Be sure to visit the display discussing the construction and renovation of the Marquette Building; it's located just to the west of the central atrium.

GG
Inland Steel Building
Designated a Chicago landmark in 1998, the Inland Steel Building is clad in brushed stainless steel that hints at the corporation that commissioned the building, the Inland Steel Company. Due to the placement of the elevator and service functions in a separate core (clad in stainless steel, to the east), the office spaces of the building feature no interior columns—quite the innovation in 1957!

HH
1 S Dearborn Street
This 39-floor skyscraper houses offices in the heart of Chicago's Loop.



JJ
The Reliance Building (Staypineapple Chicago)
This steel-framed structure is located on the site of a structure designed by John Wellborn Root in 1891, shortly before his death. While the foundations for Root's structure were placed in 1891, the original designs were lost at the time of Root's death. Four years later, Charles Atwood, working with structural engineer Edward C. Shankland, developed a new design using the foundations already in place. The new structure is famous for its early use of Chicago-style windows and horizontal terra-cotta façades in a way that expresses the steel beams and columns. Lightweight trusswork columns carry vertical loads to the foundation. These shop-assembled columns are two stories in height, reducing the number of field connections. In 1895, the 10-story steel frame was erected in just 15 days. The stiff columns rigidly coupled to extra-deep girders provided adequate wind bracing; the concept was a radical departure from the heavier portal frame bracing commonly used at that time. The historic structure was renovated in the late 1990s through the combined efforts of the City of Chicago and a private developer. The building is now a hotel. Visit the elevator lobby and learn more about the design and construction of the Reliance Building.

Thank you for visiting Chicago!
Learn more about structural steel and its many economic and environmental benefits at **www.aisc.org**.