Empire State Building

A Reading A–Z Level Z1 Leveled Book
Word Count: 1,965

Connections

Writing

Do you think it was right to tear down the Waldorf-Astoria Hotel to build the Empire State Building? Write a persuasive essay explaining your answer.

Social Studies

Research the stock market crash of 1929. How did this event affect the construction of the Empire State Building? Write an article explaining your findings.

LEVELED BOOK • Z[1]

Empire State Building

WORLD LANDMARKS

Written by Elspeth Leacock

www.readinga-z.com

Glossary

art deco *(n.)* a bold style of decorative art, design, and architecture from the 1920s and 1930s that featured strong lines and geometric shapes (p. 10)

barges *(n.)* boats with flat bottoms that carry freight, usually on a canal or river (p. 8)

dirigibles *(n.)* large, often rigid airships without wings that are filled with gas and float (p. 14)

iconic *(adj.)* of or relating to an important symbol; famous and recognizable (p. 5)

mass-produced *(v.)* made or created on a large scale (p. 10)

moguls *(n.)* important or powerful people within a profession or industry (p. 6)

riveted *(v.)* joined together with metal pins or bolts that are held in place by being beaten or bent while hot (p. 9)

scaffolds *(n.)* temporary platforms used to support workers during building, repairing, or decorating a structure (p. 16)

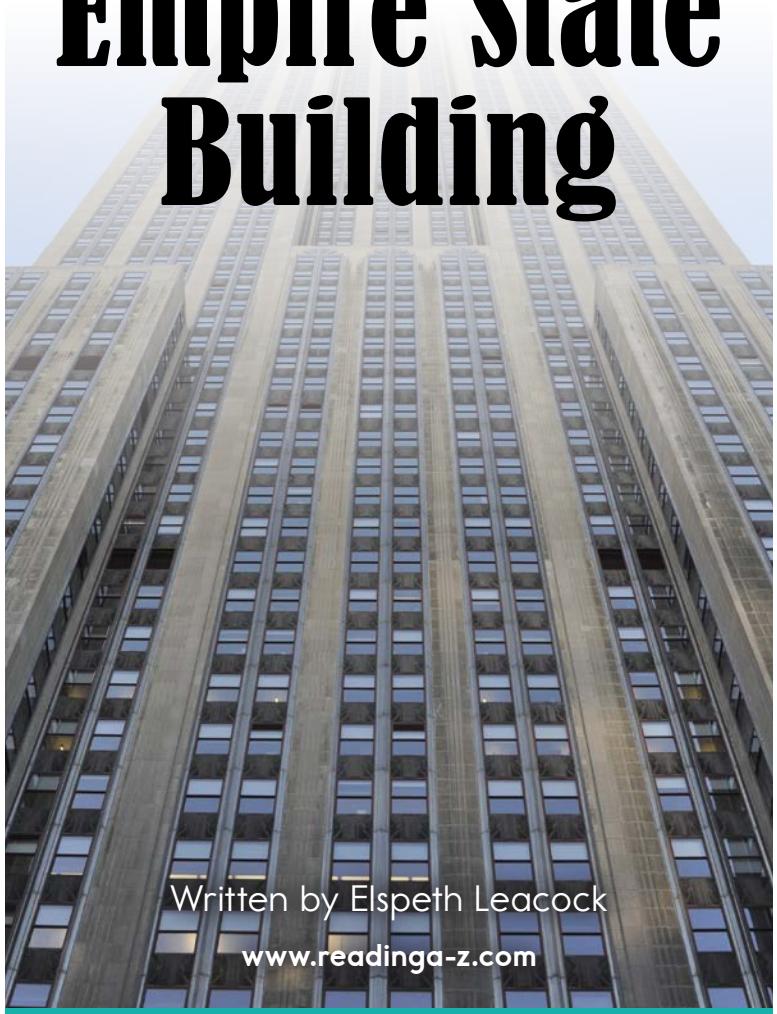
spire *(n.)* the pointed top of a tower or other building (p. 6)

steel *(n.)* a kind of strong metal made of iron and carbon (p. 9)

unprecedented *(adj.)* never having happened before (p. 6)

vantage point *(n.)* the position from which one looks at or thinks about something (p. 4)

Empire State Building



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Focus Question

Why is the Empire State Building an important historical landmark?

Words to Know

art deco
barges
dirigibles
iconic
mass-produced
moguls
riveted
scaffolds
spire
steel
unprecedented
vantage point

Front and back cover: The north side of the Empire State Building looking south toward New York Harbor

Title page: The Fifth Avenue side of the building

Page 3: Coin-operated binoculars allow visitors to see even farther at the top of the building.

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Empire State Building
World Landmarks
Level Z1 Leveled Book
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Written by Elspeth Leacock

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Correlation

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Fountas & Pinnell	W–X
Reading Recovery	N/A
DRA	60

On special holidays, the building uses its new LED lighting system, with sixteen million colors, to put on light shows.

The Empire State Building became the world's tallest skyscraper when it was completed in 1931. It held that title for longer than any other building, until the World Trade Center took over as the tallest in 1971. The Empire State Building has been designated America's favorite building and one of the Seven Wonders of the Modern World.

Soon after the building's fiftieth birthday in 1981, it was declared a landmark, which means it must be preserved to appear as it always has—with renovations and modernizations, of course, including air conditioning!

Today, the world's most famous office building is still a prominent feature of New York City's skyline, proving that Al Smith was accurate when he declared that the building had been built for generations to come.

A Building for the Ages

Some people thought the Empire State Building would be struck by lightning and destroyed or that winds would batter and sway the top floors, causing people to fall.

As for the lightning, during one summer, a scientist recorded lightning striking the mast forty-eight times without any damage. When a hurricane struck with winds up to 120 miles per hour (193.1 kmph), the top of the building did sway, but only a few inches, and no one fell.

Disaster did strike, however, during World War II. It was a Saturday when the pilot of a U.S. Army Air Force bomber became disoriented in the fog and crashed it into the building. Fourteen people perished in the crash and the fire that followed, but the building stood strong.

When a 10-ton (9.1 mt) U.S. bomber struck the 78th to 80th floors, the plane left a hole 18 feet (5.5 m) wide, and one of its engines bore right through the building.

Table of Contents

An Amazing View

How do you see five states in five minutes? Choose a clear day, travel to 350 Fifth Avenue in New York City, take a one-minute elevator ride to the 86th floor, and amble around the perimeter as you look out toward the horizon. From the **vantage point** of the observatory of the Empire State Building, you can see up to 80 miles (129 km) in every direction—a distance that allows you to see not only New York but also parts of New Jersey, Pennsylvania, Connecticut, and Massachusetts.

Visit in the evening and you may see stars in the night sky. Sometimes visitors see stars in the daytime, too, since actors and recording artists enjoy the awesome view as well.

As Far as the Eye Can See

From the top of the Empire State Building, you can see five states.

Five workers died while working on the Empire State Building.

On the busiest days, some 3,500 workers bustled around the site at once. Keeping that many people safe and healthy on a dangerous construction site is a big job, so the site had its own hospital. A nurse was present full-time, and a doctor visited several times a day to attend to any patients.

August is hot in New York City, so cool drinking water was piped to every floor. Water boys, often as young as sixteen years old, took bucketfuls to the workers, no matter how precarious their location. Some water boys thought it was a thrill working on the beams, but they quickly learned not to look down, but instead to look to the end of the beam.

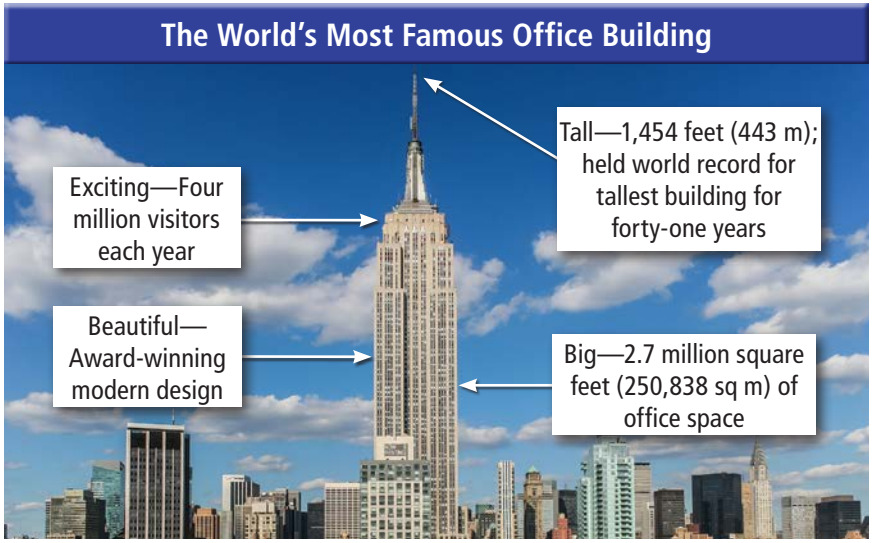
Many of the best steelworkers were from the Mohawk Nation—Native Americans from New York State. Some could set a rivet every minute.

Right behind the sky boys, on **scaffolds** high above the streets, were the men who built the curtain wall. Behind them came the interior workers, including plumbers, carpenters, electricians, bricklayers, and more. In one day, there might be between sixty and eighty different kinds of specialized workers at the Empire State Building.

Do You Know?

It took 7 million hours of labor to:

- set and rivet 57,000 tons (51,709 mt) of steel
- place 6,400 windows and 200,000 cubic feet (5,663 cu m) of limestone
- lay 10 million bricks
- apply 10,000 tons (9,072 mt) of plaster
- install 6,700 radiators, 2,500 sinks and toilets, and 51 miles (82 km) of pipe
- install 67 elevators in 7 miles (11 km) of shafts
- build a 365,000-ton (331,122 mt) building



Fame!

The Empire State Building was the tallest building in the world for decades—so tall that sunrise occurs about a half hour earlier on top than at street level. It is beautiful, big enough to have its own zip code, and an exciting place to visit.

Its fame draws tourists from every nation; athletes are drawn to the challenge of reaching the 86th floor by racing up the 1,576 steps during the annual Run-Up event. The tower is also a hot spot for couples in love. Hopeful people choose the Empire State Building as the place to propose marriage. No wonder it is called the world's most famous office building.

This **iconic** building has a lot to offer, and so did the men who created it.

Alfred E. Smith

John J. Raskob

A Winning Team

Alfred E. Smith and John J. Raskob, two friends who decided to build the world-famous building, both grew up in poor immigrant families in New York. Each lost his father at an early age, dropped out of school, and went to work to help support his family. By 1929, however, Raskob was wealthy and Smith was famous, having run a campaign for president of the United States and lost. Together they made a winning team. Raskob had friends who invested in the project, and Smith was a great talker who supplied the press with stories about every aspect of the building—especially its **unprecedented** height.

In 1929 and 1930, the competition among New York real estate **moguls** to erect the tallest skyscraper was heated. The Empire State Building and the Chrysler Building were both in the race, and floors kept being added to each to win the honor of being the tallest. When a surprise **spire** was added to the Chrysler Building in 1930, it became the tallest—until the spire was added to the Empire State Building in 1931 and it won the race.

Photographer Lewis Hine called the steelworkers "sky boys."

The Workers

People jammed the sidewalks to stare up at them strolling on the thin edge of nothingness. Reporters called them the best open-air show in town. They were the steelworkers, and their job was dangerous. The timing and trust among team members was critical. It was so important that when one member of a four-man crew got sick, the other three also went home. Crew members had to be brave and skilled, and had to know and trust each other completely.

Each worker had a specific role. To fasten the steel beams together, the "heater," got a rivet red hot in his bucket of glowing coals and tossed it. The "catcher" caught the rivet and placed it in its hole. Then the "bucker-up" pushed on one end of the rivet with a metal bar as the "riveter" smashed the other end with an air hammer. They did all this while standing on narrow beams with nothing to catch them if they fell.

From the street, thousands of people watched the dirigible *Columbia* fail in its attempt to pick up mail from the mooring mast of the Empire State Building in 1931.

With such thorough planning and so many innovations, you might think everything went well. But when the spire was added to beat the Chrysler Building in height, Al Smith dreamed up a plan that was a total failure.

Smith wanted the Empire State Building's spire to be useful—a great mooring mast for the **dirigibles** that were considered the modern way to travel at the time. He said passengers could simply walk down a plank from a dirigible to the 102nd floor. When the first dirigibles approached the mooring mast, however, the winds were so strong that the airships could not get close, let alone dock.

It was not until 1950 that a use for the mast was found. It became an antenna base for something completely new—television!

When it opened in 1893, the Waldorf-Astoria was the biggest, most luxurious hotel in all of New York City.

Crash to the Bottom!

Smith and Raskob wanted to build their skyscraper in the middle of Manhattan in a part of town called *midtown*. They decided they'd like to build where Fifth Avenue and 34th Street crossed. They just had one problem: the luxurious Waldorf-Astoria Hotel was already there, so Smith and Raskob bought the building. The enormous hotel was built to last for decades to come. Tearing it down would not only be a backbreaking job, but it had to be done quickly. Investors couldn't get the return on their money until the Empire State Building was opened for business and its offices rented.

Six hundred men toiled day and night to demolish the grand hotel. Then workers had to dynamite and dig their way to the hard bedrock 40 feet (12.2 m) below street level.

A fleet of dump trucks carried 28,529 loads through the city to **barges** on the East River. From there, tugboats pushed earth, stone, and the remains of a once-proud hotel out to the Atlantic and dumped it all into the ocean. After five months, nothing remained of the hotel but a gaping hole in the ground.

As workers razed the great hotel, the stock market crashed, which led to the Great Depression. Within a year, almost one-fourth of American workers were unemployed. It was hard times in New York City, but work with good pay continued at the Empire State Building. Al Smith even devised a way to assist people through the cold winter months. Instead of discarding used lumber, he had carpenters cut it up and leave it in an empty lot for unemployed people to gather and use as fuel to heat their homes.

Unemployed New Yorkers lined up at soup kitchens for free soup, coffee, doughnuts, or bread during the Great Depression.

The unprecedented size of the Empire State Building caused all sorts of new problems that required new solutions and innovations. Using cranes to lift supplies above crowded sidewalks was not only slow but also dangerous to pedestrians below. The solution was to use elevator cars from the demolished hotel to deliver supplies to the upper floors safely and quickly—an innovation used for construction to this day.

Moving supplies by wheelbarrow was slow work. To speed up that task, tracks similar to small train tracks were laid around each floor as well as in the elevators. The tracks enabled workers to push larger carts with heavier loads. One cart could hold as many supplies as eight wheelbarrows.

Wowser!

Who climbed up the side of the Empire State Building and clung to the mast, only to be shot down by airplanes? King Kong! And he did it twice—in 1933 and again in 1983. To celebrate the fiftieth anniversary of the first movie, a whopping 82-foot (24.9 m) King Kong balloon was mounted on the mast.

King Kong
1933

1983

Construction of the Empire State Building

On March 17, 1930, construction of the Empire State Building begins. The first steel beams are put in place.

In just a few months, the steel grid reaches the 40th floor, and the outside curtain wall is catching up.

In the fall, the steel grid reaches eighty-eight stories in height, and the curtain wall is not far behind.

While the exterior of the building goes up, electricians, plumbers, and carpenters aren't far behind on finishing the interior.

In just a little more than a year, on May 1, 1931, the Empire State Building is officially opened. President Hoover, Alfred E. Smith, his five-year-old grandchildren, Governor Roosevelt, and others participate in an opening-day event.

Race to the Top

The race to build what would become the world's tallest skyscraper began on April 7, 1930. The first building supplies to arrive at the site were the giant **steel** columns and beams. At the bottom, where the weight is greatest, 210 columns weighing in at 44 tons (39 mt) each were set upright. Then horizontal beams were **riveted** to the columns to form a strong grid of steel. Similar to skeletons supporting human weight, steel grids support the weight of skyscrapers. Weighing 365,000 tons (331,122 mt), the Empire State Building needed tremendous support.

As the grid moved skyward, the concrete floors and outside wall, or curtain wall, followed close behind. The steelwork set the pace, and it was a fast one: the grid rose at the breakneck rate of four-and-one-half floors per week.

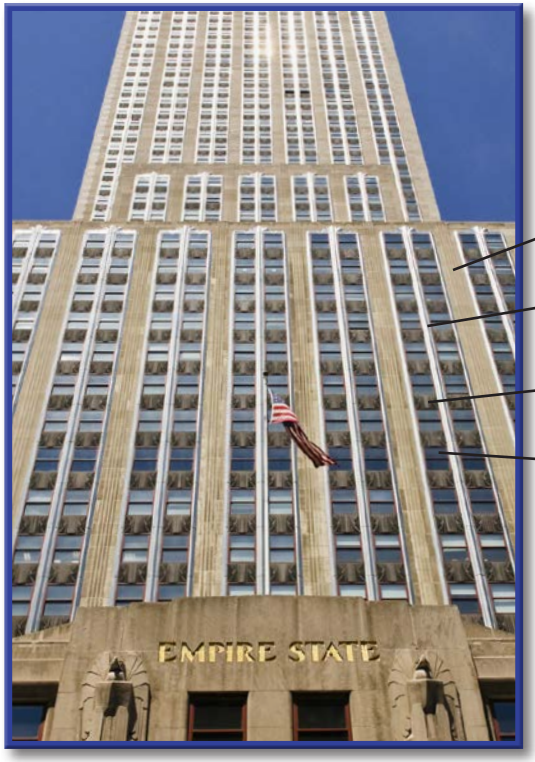
The contractor in charge of getting supplies and workers as needed was Starrett Brothers and Eken. If supplies came too early, they had to be unloaded, moved, stored, and then moved again to where they were needed, which wasted time and labor. A contractor's worst nightmare, however, was when supplies arrived late, which stalled construction. To prevent this from happening, a complex schedule included every detail.

Supplies From Near and Very Far

From the United States		Distance from New York City
New York	cement and mortar	149.5 miles (240 km)
Pennsylvania	steel girders	369.3 miles (594 km)
Indiana	limestone	707.9 miles (1,139 km)
From Europe		
Belgium	marble	3,670 miles (5,906 km)
France	marble	3,689 miles (5,936 km)
Germany	marble	3,892 miles (6,263 km)
Italy	marble	4,283 miles (6,892 km)

When a supplier could not send enough marble in time, the builders bought an entire marble quarry in Germany.

Paul Starrett was one of the contractors. He thought that never before in the history of building had there been an architectural design so magnificently adapted to speed in construction. The architect, William F. Lamb, chose **art deco** for the building, a style popular in the 1920s and 1930s. The look reflected the machine age—modern and geometric with its squares, rectangles, and simple curves. Art deco skyscrapers showed imaginative and technical daring, and because they often used the newly available **mass-produced** building materials, they were fast to build.



limestone column

mullion

window

spandrel

The curtain wall's soaring effect is exciting to behold.

The curtain wall is a perfect example of how art deco made for speedy construction. It was made of windows, stone, decorative aluminum plates called *spandrels*, and long strips of steel called *mullions*, all delivered ready to use. First the mullion strips were attached to the steel grid, then a spandrel was slid in behind, followed by a window and then another spandrel, and so on. Next to that column of windows and spandrels, a column of limestone was slid in behind the mullions. The result was a curtain wall that was bold, proud, and soaring, and that went up at a rate of a floor a day on the upper floors.