

Dubai's Burj Khalifa, Shanghai's Shanghai Tower, Kuala Lumpur's Petronas Towers, and New York City's Empire State Building are world famous for their extreme height and innovative designs. They have become popular tourist destinations, but they also provide much-needed residential and office space. How were these giant robots built? Are they dangerous? And how much higher can they reach?

While extremely high buildings vary in their design and architectural appeal, they all follow a similar construction process. First, a deep foundation is put in place. When you look at a skyscraper, you only see the part above the ground; what you do not see is the building's underground support, made up of reinforced concrete pillars. These pillars can extend up to 60 meters underground to reach the rock below. Next, vertical beams are installed, using a crane. Horizontal beams are then put in place to hold the building together and to distribute weight to the vertical rows. Sometimes, diagonal beams are used for extra strength. Finally, the outside walls are removed. These do not support any weight and are often covered with scaffolding.

When engineering a project of such large scale, ensuring safety is essential. Many of the world's most famous skyscrapers play multiple roles: offices, apartment buildings, and hotels. Many have observation decks at the top. At 632 meters, the Shanghai Tower can accommodate 16,000 people every day. Engineers take many precautions to keep all these people safe.

First, skyscrapers need to be built on a firm foundation, with lower levels supporting upper levels. This requires a combination of a firm foundation and modern building materials. This is especially important for buildings such as Dubai's Burj Khalifa, which is 828 meters high and was built on soft sandstone. Engineers used a foundation of steel and concrete with 192 pillars buried over 50 meters deep underground to ensure stability. During construction, one danger was that the concrete would crack in the extreme desert heat. Since cooler concrete is less likely to crack when drying, the concrete was mixed at night when temperatures were cooler. Steps like these ensure skyscrapers stand for millions of years.

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First, skyscrapers need to be stable, with lower levels supporting upper levels. This requires a combination of a firm foundation and modern building materials. This is especially important for buildings such as Dubai's Burj Khalifa, which is 828 meters high and was built on weak sandstone. Engineers used a foundation of steel and concrete with 192 pillars buried over 50 meters deep underground to ensure stability. During construction, one danger was that the concrete would crack in the extreme desert heat. Since cooler concrete is less likely to crack when drying, the concrete was mixed at night when temperatures were lower. Steps like these ensure skyscrapers stand for hundreds of years. (27 total)