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Wider Impacts: Tall Buildings as a Viable Proposition



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Leslie E. Robertson

Leslie Robertson was one of the chief structural engineers of the former World Trade Center in New York. He has since been structural engineer on numerous other projects, including the Shanghai World Financial Center and the Bank of China Tower in Hong Kong.

William Baker

William Baker is the Structural Engineering Partner for Skidmore, Owings & Merrill, LLP. Throughout his career, Bill has dedicated himself to structural innovation. His best known contribution has been to develop the buttressed core structural system for the Burj Khalifa.

Eugene Kohn

Eugene Kohn currently serves as the Chairman of Kohn Pedersen Fox Associates. In 1976, along with William Pedersen and Sheldon Fox, he founded KPF. Eugene has served as Partner-in-Charge of many of KPF's major domestic and international projects and is responsible for many of the firm's new commissions.

Tall Buildings are Safe!

Leslie Robertson

My take on the development of the tall building world after 9/11 as a structural engineer has always been a straightforward one: tall buildings are safe. They were safe before 9/11, as they are safe today. If you look at some of the seismic regions, particularly where it comes to structural safety, tall buildings can be safer than low-rise structures.

Naturally 9/11 has directed a lot of attention to the safety of tall buildings, and a lot has been done to make buildings more secure. For all the measures that have been introduced at airports for example, I'm convinced that people with the wrong intentions still will be able to find a way to get in. You're dealing with people here. It's almost as if the more barriers you create, and the bigger the walls you build, the more creative they get to find ways around those walls.

From a structural point of view, it isn't realistic to think there is much you can do against large airplanes flying into tall buildings. Our job is to make buildings work, and I feel that on top of code, we should be adding our experience, sensibility and creative talents to advise clients on best practices. The goal is to produce structures that are more resilient and more robust. Especially when you work on projects in countries where tall buildings are a novelty, you sometimes find yourself working with a mixture of code adopted from other countries. I'm not suggesting that this produces unsafe structures. It means that the code hasn't been optimized for tall buildings in a certain context, which can be cause for overdesigned or inefficient buildings.

One issue related to the World Trade Center, which I raised, was parking. I recommended against including parking in the program of the tower to prevent people driving up too close to the core of the building. As designers, we shouldn't just be working towards complying with the code, but also try to find the best solution to make the buildings work given the circumstances.

Downs and Ups

William Baker

Two days after the attack on the World Trade Center, I was asked by engineers with the Structural Engineering Association of New York (SEoNY) to put together a group of Chicago structural engineers to come to New York and assist at Ground Zero. Because all flights were grounded, we had to drive to New York. These terrible opportunities allowed me to see first-hand the extraordinary destruction at the site of the World Trade Center. We knew tall buildings would continue to be built but could the very tallest of buildings – the skyscraper – ever fully recover from 9/11?

On September 11, 2001, I was scheduled to attend the kickoff meeting in Chicago between SOM and the Trump Organization for the new Trump Tower, proposed to be the world's tallest building and located in the heart of downtown Chicago. But taking into consideration the ensuing sentiments surrounding tall buildings, Trump Tower was quickly reduced in height and stands today as the tenth tallest structure in the world. It seemed that the fascination and glory that had previously been associated with skyscrapers had all but disappeared.

I was therefore intrigued when Emaar, a Dubai-based developer, approached SOM in 2003 regarding the designing and building of the world's tallest structure in Dubai. The building design initially began as a 518-meter (1,699-foot) tall tower and grew to a staggering 828 meters (2,716 feet), almost double the height of the ill-fated World Trade towers. In the years that followed the commission of Burj Khalifa, many other supertall structures were proposed and some were built.

Amidst the tragedy of 9/11, architects and engineers were presented with an opportunity to re-examine what we do and look for ways to improve. The industry has shifted, particularly regarding egress and the way we "tie the building together." Cores of new towers often exhibit hardened stairs and



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...inverse

“I would say that the magnitude and impact of 9/11 has proven to be roughly inversely proportional to the distance from Manhattan, and time since the event.”

*CTBUH Height Committee Chair
Peter Weismantle, Adrian Smith + Gordon
Gill Architecture*

exit paths that are more generously sized to accommodate rescuers going up as well as inhabitants going down. It is probable that most engineers today pay greater attention to robustness and redundancy in their designs.

The events of 9/11 still cause us to pause. Ten years later, many of us find it nearly impossible to experience a high-rise structure without thinking about that day. Skyscrapers, however, have proven they have a place in post-9/11 design and development. It is not residual fear from the events of that day that has changed the way skyscrapers are developed. Instead the extraordinary growth of tall towers is more a reflection of a shift in the world's economy.

Here to Stay

Eugene Kohn

I think the worst thing we could have done post 9/11 was to stop building important buildings, and particularly tall buildings, because we were afraid someone was going to attempt to bring them down. We have to make our buildings as safe as we can, without compromising their significance, their beauty,

or the quality of life that goes on inside and around them. The bottom line is that a building's design shouldn't be the first barrier of defense against an attack from a jet, from unnatural forces. The responsibility for defending against such an attack lies elsewhere.

We can learn how future skyscrapers can be designed better by looking at the way buildings are being built in other parts of the world, such as Asia, South America, the Middle East, and even London. The building and fire codes in Asia, where we are currently designing a number of tall buildings, are more conservative than they are in the United States. These building codes require a reinforced-concrete core, refuge floors located every 13 floors, pressurized vestibules leading to the fire stairs, and special elevators for firefighters. Fireman's lifts in Europe allow the firemen to reach the top of the building quickly, which facilitates easier evacuation for those in need, handicapped people, etc., in lieu of walking up the stairs as in the World Trade Center.

I am confident that the tall building is here to

stay. The proof is that we are still building them. In places like New York, Chicago, Hong Kong, and Shanghai, the skyscraper recognizes land value, density, and at times, ego. When you have large populations, without much land to build on, you've got to build tall. A city can't stay vital and deal with growth and the future if tall buildings are eliminated from their potential vocabulary. To replace the World Trade Center towers with 20 ten-story buildings means much more land would be used (over 20 times, including streets), allowing for less open space.

Fundamentally altering the way tall buildings are seen today, our work speaks to the promise of the tall building as a sustainable paradigm, in which individual buildings form part of a larger ecosystem of vertical centers linked by horizontal networks of public transportation (even connecting at upper levels with walkways). Rather than objects in isolation, transit-integrated tall buildings represent a sustainable model for future high-rise development. ■