

FROM THE DESK OF...

REFLECTIONS on the people, the towers and the profession

The emails...the phone calls...the messages via our website...they came in one after the other...all with the same message: "The strength and redundancy of the

World Trade Center Towers saved tens of thousands of lives after the planes hit and before the fire caused the structure to fail." Architects, engineers, and builders from all over the world, some of them well-known friends, but most total strangers, shared their heart-felt condolences.

Yes, they are right. But it is so very, very hard to feel any kind of a "victory" when so many lives were lost.

Thirty-five years ago, John Skilling and Les Robertson led a team of structural engineers who produced a structure with more redundancy than any other I have ever seen. No other building in the world has, on each side, sixty-one 14-inch box columns spaced with only 25 inches clear between them. This redundancy was able to create a Vierendeel "bridge" over a hole in the side of the structure about 140 feet wide and several stories high. That is the one and only reason there was time for so many people were able to escape with their lives.

And, yet, the horror of the fire and all the events that followed are worse than the worst of all nightmares.

In these difficult times, our entire profession should be proud of the engineers, many of them members of Structural Engineers Association of New York and the Metropolitan Section of ASCE, who went into buildings surrounding the World Trade Center to make sure that the buildings were safe. They put their own lives at risk to protect the lives of others.

While all the important work was going on at the site, the news media kicked into high gear for coverage. Our firm received over 80 requests for interviews from every form of print and broadcast media. What did they want to know? Let's look at some of their questions, because every structural engineer should think about these answers carefully:

Q: Do you think a structural engineer helped plan the attack?

A: Structural engineers dedicate their entire careers to trying to keep people safe. There may have been someone with engineering training involved, but anyone who would participate in anything like this should not be called a structural engineer.

Q: Why did the towers fall?

A: The question should not be "Why did they fall?", but, rather, "How were they able to stand so long after direct hits from 767's?" Without exaggeration, more than 99% of all buildings would collapse immediately if hit by a 767.



Jon Magnusson
SEI Board of Governors

Q: The towers failed in a progressive collapse. Can't buildings be designed to prevent progressive collapse?

A: "Normal" progressive collapse involves the

failure of one or two columns or bearing walls, which can be countered by providing alternate load paths for damaged columns to "shed" load to adjacent columns. This case involved the failure of the vertical load-carrying capacity of entire floors. If all the columns have failed, it is impossible to shed load to columns that no longer exist.

Q: Can buildings be "hardened" to resist the impact of airplanes?

A: The holes created in the very tough exterior frames of the WTC were as much as 140 feet across. Many buildings aren't even 140 feet wide. You don't need to be a structural engineer to know what happens when you put a hole that size in a 135-foot-wide building. And then what do you do about the horrendous fire that will result? In a few years, the Airbus A380 will be flying. Its wingspan will be 260 feet. The weight and fuel tank capacity will be about four times greater than that of a 767. It is simply unrealistic to think that functional buildings could be designed to resist this kind of an attack.

Q: What does this mean for the future of high-rise buildings?

A: When the public realizes that it is not possible to harden buildings against intentional airplane attacks of this magnitude, then the first step will have been taken on the road to solving the problem. This particular hazard is not about problems with the buildings being done by the profession or the building codes; rather, the problem is with the security of our airplanes. And, that is the good news! I am optimistic that the security problem can, and will, be solved.

With all that said, the engineering profession should not jump to any conclusions but instead carefully study what happened at the World Trade Center. Even though we can't design buildings for huge airplane hits, there may be some knowledge gained that will help our profession design buildings for other intentional, or even unintentional, acts. We, as a nation and a profession, never, ever want to experience horrific events like those of September 11th again.

Jon Magnusson is Chairman/C.E.O. of Skilling Ward Magnusson Barkshire Inc., and a member of the SEI Board of Governors.

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