

# SCHULTE & ASSOCIATES

Building Code Consultants  
880D Forest Avenue  
Evanston, IL 60202  
fpeschulte@aol.com  
847/866-7479

## ERRORS AND OMISSIONS: THE NIST WORLD TRADE CENTER COLLAPSE INVESTIGATIONS

By Richard Schulte

*“real, honest, ethical leadership matters”*

Jeff Immelt, Chairman and Chief Executive Officer, General Electric Company

The investigations into the collapse of the World Trade Center towers (WTC 1 and WTC 2) and the World Trade Center 7 Building by the National Institute of Standards and Technology officially commenced in August 2002. Three years later, NIST’s final report on the collapse of the WTC towers was issued and seven years later, NIST’s final report on the collapse of the WTC 7 Building was issued.

For many, the events of September 11 seem like ancient history, but, in my opinion, the seeds of “great recession” which

still persists across America (and in many other countries), particularly in the US construction industry, were sown on that day. The lowering of interest rates to fight the economic turmoil caused by the terrorist attacks on New York and Washington in 2001 set the stage for the “bubble” in the housing industry and the results of that “bubble” are plainly evident today. Was 9/11 responsible for the “great recession” which began in late 2007?

Certainly, a strong case can be made for this theory, but perhaps it’s best to leave a discussion of the economic effects of the terrorist attacks on the US economy to economists. What is of more interest to those of us who work in the construction industry is the impact of the recommendations for making high rise buildings “safer” on the industry. Both the International Code Council (ICC) and the National Fire Protection Association (NFPA) have, for the most part, implemented NIST’s recommendations and new more restrictive provisions which address the construction of high rise buildings have been included in building codes used in the United States.

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Given that both the ICC and the NFPA have implemented NIST's recommendations and included more restrictive provisions which address the construction of high rise buildings, why are the NIST's WTC collapse investigation reports still important today? Simply because the recommendations included in these two reports will have a significant impact on the design and construction of high rise buildings in the future.

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The adoption of the NIST recommendations by the International Code Council (ICC) and the National Fire Protection Association (NFPA) will forever change the future landscape of our cities, unless, of course, the new regulations addressing the construction of high rise buildings are repealed. And, of course, since these new regulations make the construction of high rise buildings more costly, citizens across America will have to pay for these new safety regulations-the costs of implementing these new regulations will be included in the price of all goods and services that all Americans purchase. While the costs on a per capita basis may seem negligible, in the aggregate, these costs are anything but negligible.

Is the burden of the new regulations proposed by NIST and recently adopted in our building codes and standards justifiable? That's a question which many in the private sector have been asking since the publication of NIST's recommendations for making high rise buildings "safer" in 2005 and it appears that the consensus in the private sector is that there seems to be little justification for NIST's recommendations. In other words, the public sector has overruled the private sectors consensus regarding the safety of high rise buildings in America.

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Despite the fact that the private sector's consensus has been defeated by government officials in Washington, the NIST recommendations are still worth discussing because it's still possible for the American public and Congress to "wake up" and understand that they have been "hood-winked" into believing that architects, engineers and building developers simply are not interested in building safety. Yes, it's still not too late to undo the damage that NIST has done to the construction industry with its recommendations for making high rise buildings only a little bit more "safe", but significantly more costly to construct.

If my memory serves me correctly, the price tag on the NIST investigation into the collapse of the World Trade Center towers was \$18 million. That's quite a price tag for an investigation, particularly an investigation with so many flaws-errors and omissions, if you will.

Given the fact that the National Institute of Standard and Technology made numerous recommendations for improving the "safety" of high rise buildings, it appears obvious that NIST concluded that improving the "safety" of tall buildings was a necessity. What was NIST's basis for this conclusion?

If you read all 10,000 pages of the NIST's WTC towers collapse report, you won't find any discussion or references to the safety record of existing high rise buildings in America or in other countries. One would think that if a government agency were going to make a multitude of recommendations for improving building safety that the agency would include a review of the safety record of existing high rise buildings in its report.

The reason why NIST neglected to include any discussion of safety record of high rise buildings in a 10,000 page report becomes apparent when the actual safety record of high rise buildings is reviewed. High rise buildings are the safest buildings that we build. The number of Americans who die annually as a result of fire in high rise buildings protected by a sprinkler system is zero, or very close to zero. Americans are far more likely to die as a result of fire or building collapse in their own homes than in a high rise building.

A second major omission in the NIST investigation report is the fact that the report failed to put the collapse of the World Trade Center towers in perspective. To fully comprehend the events which occurred in Lower Manhattan on September 11<sup>th</sup> and to be able to put the collapse of the Twin Towers in perspective, an excerpt from Jon Magnusson's comments at a meeting of the Council on Tall Buildings and Urban Habitat (CTBUH) on October 15, 2001 perhaps says it best:

*"I can say without exaggeration, 99 percent of all buildings would collapse immediately if hit by a 767."*

*Yes, it's still not too late to undo the damage that NIST has done to the construction industry with its recommendations for making high rise buildings only a little bit more "safe", but significantly more costly to construct and maintain.*

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Jon Magnusson, Magnusson Klemencic Associates, October 15, 2001

In other words, engineers wouldn't have been surprised if the World Trade Center towers had collapsed immediately upon impact by the aircraft. And if the World Trade Center towers had collapsed immediately and 20 to 30 thousand people had been killed in the collapses, rather than only 3,000, there would likely have been less clamor over the collapses of these buildings. The fact that only 3,000 people died in the collapses of these buildings is a testament to the magnificent performance of the buildings, but you won't find that information in the NIST investigation report. Again, it seems reasonable to ask NIST why this information and perspective wasn't included in the report. This perspective would certainly have changed the American public's opinions on the collapse of the Twin Towers.

Another less obvious flaw in NIST's reports on the building collapse at the World Trade Center site has to do with NIST's modeling of the building structures' response to fire. While the investigations were on-going, NIST repeatedly stated that their modeling analysis was at the "cutting edge" of technology. In other words, NIST's modeling efforts were "pioneering new frontiers" by combining structural engineering analysis with state-of-the-art fire engineering. The only problem with "pioneering new frontiers" is the lack of our understanding of a building's structural response to fire and the

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limitations on the capabilities of our fire models.

Both prior to and after the publication of the NIST investigation report on the collapse of the WTC Towers, members of the NIST Building and Fire Research Laboratories (BFRL) staff published papers and gave presentations on the limitations of our capabilities to combine structural and fire engineering and the limitations on the capabilities of fire modeling. Hughes Associates, Inc. also weighed in on our limited capabilities to combine structural engineering and fire engineering in research work done for NIST published in June 2007.

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In short, work done by NIST's own staff and by research contractors working for NIST cast doubts on NIST's abilities and capabilities to perform the combined structural/fire analysis which NIST did as part of their investigations into the 9/11 collapses. Again, in other words, NIST's own research work published both before and after the publication of the WTC Towers collapse investigation report indicates that NIST did, more or less, the impossible in their investigation. NIST can't have it both ways-either we have sufficient capability to combine structural and fire engineering or we don't have sufficient capabilities. It appears obvious that, even with today's knowledge, we can't do what NIST did in their investigation report.

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Once again, the term "junk science", *i.e.*, *b.s.*, seems to be an appropriate description of at least a portion of NIST's investigation. And, once again, it appears that modeling has been utilized in a "Wizard of Oz" like manner. Given that the fire models have been developed primarily at NIST, it's difficult for those in the private sector to challenge NIST's use of the models. After all, the engineers and scientists at NIST are assumed to be the ultimate experts in fire modeling. But, if the ultimate experts are saying that this is beyond the capability of their models, perhaps we should believe them. I guess that means that we're in a situation of asking who's correct, NIST or NIST?

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## Conclusions

Based upon the above, it appears that NIST's investigation work on the collapse of the World Trade Center Towers and the WTC 7 could be described as just another ruse.

There seems to be no explanation for why NIST did not include the safety record for high rise buildings in their report. Similarly, there seems to be no explanation for why NIST neglected to put the collapse of the Towers in the same easily understood manner as did Jon Magnusson. Seemingly, the only plausible reason for not including these facts in their investigation report is the NIST reports were scripted and the script was written by members of Congress who were trying to keep the Skyscraper Safety Campaign, the Jersey Girls and The New York Times happy.

Based upon the above, it appears that NIST's investigation work on the collapse of the World Trade Center Towers and the WTC 7 could be described as just another ruse.

The private sector rendered its verdict on the NIST recommendations back in 2005 and it was “thumbs down”. The only way for NIST to keep its benefactors in Congress satisfied (and keep NIST’s funding flowing) was to use our tax dollars to develop a lobbying campaign to defeat the opinions of the architectural and engineering professions. Perhaps, if NIST had paused and listened to the architectural and engineering professions, rather than to the building safety experts in Congress, the Skyscraper Safety Campaign and The New York Times, NIST wouldn’t be in a position now of having the validity of its work questioned based upon the work of NIST’s own staff and the work of its research contractor, Hughes Associates.

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One way to get NIST’s attention is to suggest to Congress that the Building and Fire Research Laboratory’s budget be cut as part of the effort to reduce the Federal budget deficit. Unfortunately, the money saved by cutting the BFRL’s budget is “just a drop in the bucket” when compared to the cost of compliance with the new regulations for making buildings with a magnificent safety record, high rise buildings, a little bit “safer”.

**Editor’s Note:** The NIST research work referred to in this article is as follows:

*“Prediction of the Structural Fire Performance of Buildings”*, Richard Bukowski, 2003.

*“Fire Modeling: Where Are We? Where Are We Going?”*, Dr. Kevin McGrattan, September 2005

*“The Technical Basis of a Fire Resistance Test for Performance-Based Fire Design of Buildings”*, Hughes Associates, Inc., June 18, 2007

Excerpts from these documents are included in the following articles in the **Commentary** section of this website:

*“Political Science: Structural Design for Fire”*

*“Political Science: NIST’s World Trade Center Investigations”*

**Editor's Note:** The author, Richard Schulte, was the recipient of Engineering News-Record's "**Top 25 Newsmakers of 2004**" award and the American Institute of Steel Construction's "**Special Achievement Award**" in 2006 for his commentary on NIST's investigation into the collapse of the World Trade Center towers.

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Richard C. Schulte