

# Readers Write



## Structural Forum

December 2004

I read the article by Daniel Lavrich concerning the question of whether or not architects should be allowed to do structural engineering, and felt compelled to reply.

On the issue of the structural design of single-family housing, Mr. Lavrich is correct. No building code in the fifty United States requires the involvement of either an architect or an engineer in the design of any building having less than fifty thousand cubic feet of space. Carpenters, contractors or unlicensed designers, who have little or no formal training in structural design, design most residences. These are the structures most subject to damage from hurricanes, tornados, wind loads or other live loads imposed on the structure. It is time to lobby individual state legislatures to require the use of either an architect or engineer to protect the public from harm.

On the issue of architect's ability to do structural design, Mr. Lavrich repackages the same old sour grapes offered by many unemployed or underemployed professional engineers. Of course architects who are qualified by education and experience should not only do structural engineering, but also mechanical engineering. Whose ox is gored when an architect prepares engineering calculations and drawings for the built environment? It would appear that only the unnecessary engineer suffers.

While it is true that some schools of architecture emphasize design at the expense of engineering education, many architectural schools have moved to correct the trend. The University of Illinois at Champaign is one such school. Two extra years of study will allow the graduate architect to sit for the Illinois Structural Engineer's exam. This option ultimately leads to licensing one as both architect and structural engineer.

An architect worthy of the name knows his engineering limits. It's too bad that many engineers do not have the same built-in common sense.

In closing, I would like to remind Mr.

Lavrich that some of the most egregious building failures of the 20th and 21st centuries were the result of structural engineers that pushed the building envelope, literally and figuratively, in the name of reducing costs instead of paying attention to the safety and protection of the general public:

1. 1981 Kansas City, MO, Hyattwalkway collapse.
2. 2001 New York City. Twin Towers collapses resulting from a lack of structural redundancy in the structural design.
3. 19?? Boston, John Hancock Building, window unit failures.
4. 199? New York City, unnamed high-rise building, probable wind load failure due to the use of riveted "K" wind braces instead of the specified welded braces.
5. And others too numerous to mention.

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In reply to Mr. Balistreri's letter, I would like to offer the following comments.

Mr. Balistreri's statement that no building code in the fifty United States requires the involvement of an Architect or Engineer for any building less than 50,000 cubic feet is absolutely incorrect. I can't speak for the other 49 states, but the Florida Building Code in Dade and Broward Counties of Florida requires that an Architect or Engineer prepare plans for every building whose cost exceeds \$5,000.00, and on every single family residence whose cost exceeds \$10,000.00. This requirement has been in effect for over 40 years and has not been questioned. I do agree with Mr. Balistreri that we need more regulation of the design of single family residences. However, where we differ is in determining who is qualified to do the structural engineering design.

Suggesting that my comments stem from "sour grapes offered by unemployed or underemployed professional engineers" is typical of an unknowledgeable designer. Most structural engineers would rather not design single family residences. The complexity of the structural engineering design required in many residences is often coupled

with a resistance by developers to pay a reasonable fee to properly engineer such buildings. However, I suggest that there is a very real need for such engineering design, particularly in high wind and seismic areas, perhaps in all areas of the Country.

I absolutely agree with Mr. Balistreri that Architects who are qualified by education and experience should be allowed to do structural or mechanical engineering, or in fact, any other discipline of engineering. However, I also believe that, before they are allowed to do so, they should be required to prove their competence by applying for licensure as a Professional Engineer, showing adequate education and experience to practice engineering, and finally sitting for the appropriate engineering examination to become licensed as a Professional Engineer in the appropriate discipline. It appears that the University of Illinois recognizes this need and provides an avenue for an Architect to do just that.

Not everyone knows their limitations, engineers and architects alike. That is one of the reasons why licensing of Structural Engineers is so necessary and important in setting limitations and qualifications for practice. If we left it up to everyone to "know their limitations," then we wouldn't need any licensing at all. I'm sure he doesn't suggest that. The issue of qualification is very broad and transcends the limited scope of my article.

Of course there have been errors made by Engineers in the past, and sadly there will be more in the future, just as there have been errors made by Physicians, Lawyers, Police Officers, Contractors, Bankers, Politicians, and even.... Architects. Errors will continue as long as humans perform services. Unfortunately, errors will never be eliminated, but we can minimize them by starting with adequately qualified individuals.

Mr. Balestreri cited "the most egregious building failures of the twentieth and twenty-first centuries were the result of structural engineers that pushed the building envelop literally and figuratively in the name of reducing costs instead of paying attention to the safety and protection of the general public." His comments show a distinct lack of understanding of structural engineering.

1. The Hyatt Regency collapse was not a result of the structural engineer reducing costs, but rather the substitution of a

## Structural Engineer Engaged In New Discovery



Bryce Tupper, a structural engineer at KPFF Consulting Engineers in Seattle, recently embarked on a unique adventure with The Discovery Channel to film a new, 5-episode television series titled Urban Explorers.

Urban Explorers follows a team of four adventurers as they infiltrate and explore abandoned structures, once cornerstones of our cities. From tunnel systems to grain elevators, from breweries to missile silos, the team delves into the archaeology, architecture and engineering of these forgotten structures, while trying to understand the historical and sociological impacts that these places had on the community. The Urban Explorers are two professional rock climbers, an urban archeologist and a structural engineer. The series is slated to start airing late in the second quarter on the Discovery Channel.

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connection detail by the fabricator that was not caught during the shop drawing review process.

2. The collapse of the Twin Towers was not the result of the lack of redundancy in structural design, but rather the intentional crashing of an extremely large aircraft into the buildings with the malicious intent to bring down the buildings.

3. The failure of the windows of the John Hancock Building in Boston was not the result of structural failure. According to an article in Architecture Week in April 25, 2001, "extraordinary external forces and the building's structural design were not the cause of the failure. The problem actually lay in the insulating glass itself." The article describes the causes in more detail.

4. The building referred to here is actually the New York City Citicorp Tower designed by William LeMessurier. Due to the Contractor's substitution, the bracing connections were changed from welded to bolted, not riveted as described by Mr. Balestreri. This change was unknown initially to Mr. LeMessurier. When he found out, he did not initially consider it to be a safety hazard; however, subsequently, he became aware that there could be a significant structural deficiency under severe wind loading. He contacted the Owner of the building and initiated repairs and modifications. As a result of his commendable and ethical efforts, the building now exceeds its originally intended safety factor. A lesser qualified Engineer could not have done as well.

Perhaps the most famous of American Architects, Frank Lloyd Wright, could also be cited for structural errors. His famous "Falling Water" house had to be significantly structurally reinforced due to grossly inadequate reinforcing steel in concrete cantilevers designed by Mr. Wright himself. An example of an Architect that pushed the limits of architectural design in most innovative ways, but didn't know his own limitations when it came to structural engineering design?

I believe that discussions such as those that are being promulgated by my article are good for our Professions. From time to time, we all need to look at what we are doing and how we are doing it. Just because we have approached something one way for a long time doesn't make it right. I hope that the issues I have raised will cause a lot of people, both Architects and Engineers, to take a hard look at the way they have been practicing. Maybe it's time for a change.

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**INVOICE**

Project No: 05-287  
Project Name: Downtown Loft, Seismic Retrofit  
Contract Type: Fixed  
Contract Amount: \$ 18,500.00  
Retainer Received: \$ 3,500.00

Due Now, Progress Payment #: 6 Amount: \$4,918.00

Reimbursable Expenses:

4/29/2005	CR	Blue prints	\$95.00
4/15/2005	JA	MISCELLANEOUS	\$23.00
4/2/2005	CJ	Federal Express	\$35.50
Total Expenses:			\$166.50
Retainer Applied:			\$1,666.50
Amount Due This Invoice:			\$1,000.00
The invoice is due upon receipt			\$4,918.50

Account Summary

Services BTD	Expenses BTD	Last Inv Num	Last Inv Date	Last Inv Amt	Last Pay Amt	Prnt Unpaid Amt
\$ 19,418.00	\$ 166.50	1862	3/22/05	\$ 6,758.00	\$ 4,758.00	\$ 8.00
Total Amount Due Including This Invoice:				\$4,064.50		

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