

PROFESSIONAL ISSUES

issues affecting the structural engineering profession

Sustainability and the Structural Engineer

A Dialectic of the Structural Engineer's Role in Sustainable Building Practice

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Every single player in the design and execution of the built environment plays a major role in the sustainability of our future. The process of creating a green building by today's standards requires the input and cooperation of every professional on the design team. The process beckons for a form of leadership equipped with the capability to envision and realize a rational end product amongst an ocean of competing objectives. It could be argued that, as structural engineers, we are the best outfitted among consultants to take the lead in this respect. By doing so, our efforts would at once drive the evolution of modern sustainable design and the enhancement of the structural engineering profession.

There are indisputable truths worth noting. In the United States and around the world, more available resources go into creating buildings than any other manmade enterprise in existence today. These resources – manifested as energy, raw materials, and available land for both the building itself and the waste generated – are largely non-renewable. As builders, our collectively unchecked consumptiveness continues to negate the positive impact our industry may otherwise have on modern society.

It is also an unassailable fact that the face of contemporary building design and construction is changing. Design teams face ever greater motivation to consider and address the impact their work will have on the world around them. The annual number of new certified green building projects and accredited sustainable designers continues to increase dramatically. Every year, more clients demand sustainability in the design of their projects throughout the country and, in turn, they face impressive public support for their business practices in the form of real estate sales and press coverage.

Beyond these established realities, there is much uncertainty. The very definition of a "green building" remains elusive and the criteria for certification by prominent organizations remains fundamentally flawed. It has been shown time and again that building green is marketing gold, but how much of our effort in promoting sustainability stems from our humanitarian sense of social responsibility? Even for the engineers, architects, consultants and builders who have accepted the concept of sustainable design with open arms, it remains to be fully decided how these

principles will ultimately settle upon professional fields that are themselves in a constant state of flux.

Symbiosis

Enter the structural engineer. With extensive technical training and an affinity for interpreting complex systems, structural engineers have the capacity to preserve and enhance the principles behind modern sustainable design. By harnessing these principles, the structural engineering industry could in turn reap tremendous symbiotic opportunities to enhance their role in the design process and the quality of the end product.

Commonly accepted and often implemented tactics of the sustainable-minded structural engineer center on responsible materials selection. Recycled and low energy materials, as well as locally produced sources, are the most apparent contributions a structural engineer can make to the "greenness" of a project. Because they are easily quantifiable, these additions are recognized by current metric standards such as LEED. However, this is far from the end of the contributions to be made. Structural engineers can lead a project toward enhanced sustainability by doing what they commonly do: take a proactive role at the design table and facilitate solutions to problems requiring a multidisciplinary approach.

An enhanced building feature, whether it serves to benefit the structure's mechanical efficiency, energy consumption or recycled content often requires the cooperation of numerous constituencies across varied building trades. It is the nature of the design process that enhancements in one area may lead to added complications in others. When a building feature is considered non-essential (as many modern-day green building features often are), such a complication is often solved quickly through exclusion. Vigilance is required to realize any complex design approach that is not strictly required by the client's scope. By taking an assertive role in facilitating collaboration across disciplines,

the structural engineer can uphold and promote the design team's sustainable objectives.

Bearing in mind the already considerable complexity of our profession, the difficult balance of market interests, building security concerns, architectural intentions, and technological advances, one might proffer that a leadership role in sustainability is a second helping on an already too full plate. But how do we prioritize? As the industry advances, we should look toward making the process better and not simply faster. In truth, the fact is that the choice is no longer one to be made. The building industry, via bodies such as the USGBC, the AIA COTE, the GSA, a swarm of publications such as Ecostructure and Metropolis Magazine, privately funded research, and a multitude of inspired individuals have already blazed a path in the direction of sustainable building practices. It is now vital to the profession that the structural engineer take a primary lead in the further development of techniques, metrics and standards related to sustainability.

The holistic fiber of sustainability is often touted, meaning that the whole is greater than the sum of its parts. Consequently, by asserting a lead role in this domain, we increase our primacy as members of the design, construction, political and societal spheres. Technical fields may grow more specialized, but the world in which they exist grows evermore interconnected. Any single action on behalf of an individual can have resounding implications. The specific duties of the structural engineer are generally opaque to the public due to their complexity and in some cases as a result of disinterest. Little attention is paid the structural engineer at the completion of design as compared with the architect or owner. When interest is spurred, it is often in the wake of disaster and failure. Firms devote portions of their revenues to developing an attractive website and other marketing materials in order to appeal to clients as well as potential employees. There is no question that, with amplified participation in sustainable design, we increase the accessibility and appeal of our persona. It is certainly in the interest of safety that the structural engineer must remain sober to interests of self-promotion that might compromise the integrity of our work, but it is also true that public perception will sway how we are valued by clients and other consultants. This, combined with the additional services we can provide as sustainable minded consultants and the demand for sustainable buildings in the real estate market, will translate to greater job security and accordingly higher fees.

Structural engineers are equipped with excellent analytical tools; if they lack in any field, it is in regard to communication and leadership skills. Favorably, the altruistic nature of interest in sustainability is often accompanied by a personality interested in people and communication. Thus, in addition to benefiting the practicing engineer by enhancing the value associated with our work by others, respecting sustainability increases the appeal of our industry to the kind of employees firms seek to hire and keep.

Conclusion

By approaching structural engineering in a sustainable fashion, structural engineers have the opportunity to serve as role models within the building community, which collectively contributes in enormous proportion to the ever growing levels of consumption and waste in America. Change begins with small steps, such as individual engineers adhering to practical and proven methods of design with greater sustainability. Such a mindset is in fact practical, not idealistic. If a substantial portion of the professional engineering community can be convinced of this, the approach will grow. Guidelines will improve and many of the most progressive green building tactics may someday become industry standard. Someday, perhaps green buildings will just be called buildings.

The nature of structural engineering is what we make of it. The duties and responsibilities mandated by the global building industry are virtually endless. With all the talk about hand-off of risk and responsibility and tasks that we as structural engineers don't want to do, who's talking about what we do want to do? The field can be as mundane or as challenging as we seek it to be. Our choices set the stage for the future. If we adopt technically challenging – and socially responsible – aspects of 21st Century building design, we realize an industry that will attract a generation of young, innovative designers and problem solvers; fuel innovation in sustainable living, working and development; and continue the bold traditions of visionary engineers that have come before us. ■

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