Editorial

Fire Protection

Understand, Embrace, Participate

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As design engineers, we are generally risk-adverse. That's good, because it assures our communities that they will be safe in the buildings that they build and occupy. We have a keen sense of what can go wrong and we work hard to "cover all the bases." The whole notion of building codes developed in the early 20th century because of a growing desire by communities and their engineers for consistent safety and longevity of their built environment. We are constantly working to improve and refine our codes and standards to avoid the occurrences that we find unacceptable. The time has come for us to take on our part of fire protection design.

When it comes to fire protection, the lines of responsibility have spread to multiple design disciplines because modern buildings employ multiple active and passive protection systems. Active systems such as sprinklers systems are designed by the mechanical, electrical and plumbing (MEP) engineer to control a developing fire. MEP engineers also designs alarm systems, to provide early warning to the building's occupants, and such manual systems as standpipes, hose cabinets, and fire extinguishers to assist firefighters. Egress systems and firewalls are designed by the architect to allow building occupants to safely exit or shelter in place. Passive systems, which are normally specified by the architects, are intended to protect structural elements from fire-induced severe damage or collapse. Spray applied fireproofing, gypsum board assemblies, and concrete encasement are the most common forms specified, with little or no involvement of the structural engineer.

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Over the decades since great fires destroyed entire cities, code provisions have been developed that have served us well. The fire-resistive standards in the building code include a wide variety of prescriptive requirements for fire resistant building materials and assemblies, including structural members, walls, partitions, floors, and roofs. The method is conservative by nature and if properly implemented should achieve the goal of the code. Unfortunately, the code requirements are not always achieved due to a lack of understanding on the part of the design professionals and constructors.

Similar to other areas of building design, performance-based design methods are gaining popularity over the standard code prescriptive solutions. Performance-based design methods have been permitted by the code for a long time, though not implemented often. They rely on a realistic estimate of the quantity of combustible building contents, along with knowledge of how the structure behaves locally and globally under the extreme temperatures of an uncontrolled fire. In most cases, such analysis results in a reduction in the amount of passive fire protection needed in the structure because it considers the whole system and the environment it supports. That's good, especially when evaluating existing non-complying systems that are a part of rehabilitation projects. It reduces cost without sacrificing performance, uses less material making it more sustainable, and permits new forms of architecture that would otherwise not be possible. The Water Cube and Birds Nest, iconic structures of the Beijing Olympics, were both designed with performance-based passive fire protection systems. It is an area of design that needs an engineer as the designated design professional. We as structural engineers are in good position to step up for the task, at times even as the prime professional.

Needless to say, structural engineers are not generally trained in fire protection system design. To take on this new level of participation and responsibility, training through self-study, coursework, and assistance from specialty consultants is needed. This training also needs to be incorporated at the University level so that the next generation of engineers is prepared. Recognizing the need for advocacy and better understanding, CASE has just published the *Structural Engineers Guide to Fire Protection*, which is available on the CASE website (**www.acec.org\case**). Jim DeStefano and the CASE/NCSEA Fire Protection Committee have distilled the broad field of passive fire protection system design into a succinct primer that provides a general orientation to fire protection design procedures, and components, as well as an overview of the specific requirements for steel, concrete, masonry, and wood. It also includes a comprehensive list of resources. The guideline is free to CASE member firms and available for purchase from the ACEC Bookstore.

I believe that structural engineers should insist on having full control of the design and construction of a building's structural system, including its fire protection. We are in the best position to determine how to effectively and efficiently design an integrated structural system that is capable of enduring a lifetime of normal use, and safely withstand the dramatic overloads imposed by natural and man-made hazards such as wind, fire, flood, earthquakes, and terrorist attack. We need to do this in a sustainable manner that assures that the structural system can be economically built, rehabilitated, maintained and repaired after significant disasters strike.

I also believe that structural engineers should be fully compensated for the work they do. Taking on fire protection system design is an added service that needs to come with added fee. It is another in a long list of opportunities we have to expand our work in a meaningful way that adds value and further contributes to building sustainability. Your challenge is to offer full service, insist on a full fee, and provide a maximum contribution to sustainable construction.▪