SCHULTE & ASSOCIATES
Building Code Consultants
880DForest Avenue
Evanston, IL 60202
504/220-7475

BALANCED FIRE PROTECTION:
THE FIRST INTERSTATE BANK BUILDING FIRE

The Alliance for Fire Safety (AFS) website indicates that the AFS is "*a consortium of concerned firefighting groups and built-in fire protection interests*" and that the purpose of the organization is "*to advocate* [for] *stronger building codes and higher fire safety standards for our nation's high rise commercial buildings, hotels, schools, hospitals and other structures*".

The AFS website includes links to two rather interesting articles-one titled "*Have We Learned Enough About Fire Safety From 9/11?*" written by Dr. W. Gene Corley and the other titled "*Reliability of Automatic Sprinkler Systems*" written by William E. Koffel. The AFS website also includes a web page titled "*The Need for Balanced Fire Protection in Building*[s]". This web page summarizes the Alliance for Fire Safety's position on the subject of "balanced" fire protection.

Given that the recommendations for fire safety improvements in high rise buildings included in the draft final report of the National Institute of Standards and Technology (NIST) have essentially adopted the AFS's "balanced" fire protection concept, a review of *"The Need for Balanced Fire Protection in Building*[s]" web page should be relevant at this point in time. One excerpt from the web page concerning the fire at the First Interstate Bank Building in Los Angeles in 1988 is of particular interest:

> "*The value of fire-resistant construction was clearly demonstrated in a fire that gutted four floors of the 62-story First Interstate Tower office complex in downtown Los Angeles in 1987. The blaze blew out windows and destroyed office furnishings on each of the four floors, but resulted in no loss of life. This was attributed, in part, to the performance of fireproofing that had been applied to the building's steel framing 16 years earlier. While the fireproofing was burned and blackened, it provided an effective protective shield, preventing key structural* [a]*ssemblies from warping and collapsing from the intense heat. Four months later, the building was re-opened and was totally functional*."

Let's juxtapose this excerpt with excerpts from the investigation report on the fire issued by the U.S. Fire Administration (USFA):

"*On Wednesday, May 4 and continuing in to May 5, 1988, the Los Angeles City Fire Department responded to and extinguished the most challenging and difficult high-rise fire in the city's history. The fire destroyed four floors and damaged a fifth floor of the modern 62 story First Interstate Bank building in downtown L.A., claimed one life, injured approximately 35 occupants and 14 fire personnel, and resulted in a property loss of over $50 million.*"

"*This was one of the most destructive high-rise fires in recent United States history. The fire presented the greatest potential for the "Towering Inferno" scenario of any U.S. fire experience and was controlled only through the massive and dedicated manual fire suppression efforts of a large metropolitan fire department. It demonstrated the absolute need for automatic sprinklers to provide protection for tall buildings.*"

"*A total of 383 Los Angeles City Fire Department members from 64 companies -- nearly one-half of the on-duty force of the entire city – were involved in fighting the fire, mounting an offensive attack via four stairways.*"

"*The building has a structural steel frame, protected by a sprayed-on fire protective coating, with steel floor pans and lightweight concrete decking. The exterior curtain walls are glass and aluminum.*"

"*A complete automatic sprinkler system costing $3.5 million was being installed in the building at the time of the fire. The installation was not required by codes at the time the owners decided to provide increased fire protection for the building. The project was approximately 90 percent complete, with work in progress at the time of the incident. The piping and sprinkler heads* [sprinklers] *had been installed throughout the five fire floors and connected to the standpipe supply. However, a decision had been made to activate the system only on completion of the entire project, when connections would be made to the fire alarm systems, so the valves controlling the sprinklers on completed floors were closed.*"

"*The fire or*[i]*ginated in an open-plan office area in the southeast quadrant of the 12th floor. (See Appendix A.) The area of origin contained modular office furniture with numerous personal computers and terminals used by securities trading personnel. The cause is thought to be electrical in origin, but the precise source of ignition was not determined. The fire extended to the entire open area and several office enclosures to fully involve the 12th floor, except for the passenger elevator lobby, which was protected by automatic closing fire doors.*"

"*The fire extended to floors above, primarily via the outer walls of the building; windows broke and flames penetrated behind the spandrel panels around the ends of the floor slabs. The curtain wall construction creates separations between the end of the floor slab and the exterior curtain wall.*"

"*There was heavy exposure of flames to the windows on successive floors as the fire extended upward from the 12th to 16th floors. The flames were estimated to be lapping 30 feet up the face of the building. The curtain walls, including windows, spandrel panels, and mullions, were almost completely destroyed by the fire. There were no "eyebrows" to stop the exterior vertical spread, and fireground commanders were concerned about the possibility of the fire "lapping" higher to involve additional floors.*"

"*Minor fire extension also occurred via poke-through penetrations for electricity and communications, via HVAC shafts, and via heat conduction through the floor slabs. A minor fire occurred in a storeroom on the 27th floor, ignited by fire products escaping from an HVAC shaft that originated on the 12th floor. This fire self-extinguished due to oxygen deficiency, but could have greatly complicated the situation if it had continued to burn. The secondary extensions were minor compared to the perimeter fire spread at the curtain walls.*"

"*The fire extended at a rate estimated at 45 minutes per floor and burned intensely for approximately 90 minutes on each level. This resulted in two floors being heavily involved at any point during the fire. The upward extension was stopped at the 16th floor level, after completely destroying four and one-half floors of the building.*"

"*Due to the magnitude of the fire on the 12th floor, attack was initiated from all four stairways. The crews had great difficulty advancing lines through the doors and onto the floor. As the doors were opened, heat and smoke pushed into the stairways and rose rapidly to the upper levels of the building.*"

"*It soon became evident from the exterior and the interior that the fire was spreading upward. Companies successively launched attacks from all four stairways onto the 13th, 14th, 15th, and 16th floors, often encountering heavy fire from the point of entry and having to fight their way onto the floors with handlines. At times active suppression efforts were underway simultaneously on four levels as crews attempted to push the fire back from the central core to the perimeter of each floor. As more doors were opened, conditions in the stairways deteriorated with heat and smoke going up and water cascading down.*"

"*The strategy employed to stop the upward progress of the fire was to use aggressive tactics on the 14th and 15th floors to reduce the fire's intensity and the resulting exposure to floors above, while setting-up with hoselines and waiting for the fire to attack the 16th floor. This strategy proved to be successful but required extreme efforts by crews operating handlines on heavily involved floors, with as many as four floors burning below them. Approximately 20 handlines were used by 32 attack companies on the five involved floors.*"

"*Due to the heavy smoke and heat conditions in all four stairways, it was impossible to send search and rescue crews to the upper floors until the fire was knocked-down at 0219.*"

"*Falling glass and other debris created a major problem during this incident. Virtually all of the exterior curtain wall, from the 12th through 16th floors, was destroyed and fell to the ground. The falling glass and debris caused significant damage to pumpers hooked-up to the Fire Department connections. The hose lines were cut several times and had to be replaced, under the constant danger of additional falling materials. The entire perimeter of the building, for over 100 feet out from the walls, was littered with this debris.*"

"*The floors below the fire received massive water damage, and those above were heavily damaged by heat and smoke. During the fire, no efforts were directed toward property conservation as all available firefighters were committed to stopping the progress of the fire.*"

"*After the fire, the building remained closed for several months while the structure was inspected, and a large force of clean-up contractors worked through the building. The efforts to save property were conducted on a very large scale as virtually every part of the building was damaged by flames, heat, smoke, or water. . . . The property loss has been estimated at over $200 million, without taking into account the business interruption loss.*"

"*In spite of the total burnout of four and a half floors, there was no damage to the main structural members and only minor damage to one secondary beam and a small number of floor pans. Although there was concern for structural integrity during the incident, post fire analysis indicates that there was no danger of major or minor structural collapse. It was noted that quality control in the application of the sprayed-on fire protection was unusually good.*"

"***Unsprinklered high-rise fires create massive manpower requirements.*** *The fire took advantage of a large open area, with readily combustible contents, to quickly reach major proportions. This combined with an available path for vertical spread to create a situation that taxed a large, well equipped, and experienced fire department to its maximum. Many potentially serious problems arose, such as failing standpipe valves and delayed activation of building fire pumps. A fire department without the resources, capabilities, and experience of the Los Angeles City Fire Department would have great difficulty controlling upward extension, if faced with the same circumstances.*"

"***High danger to firefighters was mitigated by physical fitness, good personal safety equipment, and safety training.*** *The fact that almost 400 Fire Department members operated on this fire, with only 14 minor injuries, is a credit to the training and physical fitness of Los Angeles firefighters and the safety procedures that were employed.*"

"***Smoke in stairways is still a problem.*** *The concept of maintaining at least one stairway free of smoke, to be used for evacuation, proved ineffective in this incident. This concept may be valid for a less severe fire, but when the fire reaches this magnitude all vertical shafts become potential chimneys. The ventilated vestibule design failed to keep heat and smoke out of the pressurized smoke tower.*"

"***Vertical and horizontal fire spread can still be rapid in modern buildings without sprinklers and without adequate compartmentation.*** *Vertical fire spread and fire development in open floor areas were major factors in this incident. The floor of origin might not have become involved as quickly if it had been divided into smaller offices, providing for more rapid control of the fire. Exterior features of building design can be provided to reduce the risk of vertical flame impingement. Automatic sprinklers are usually effective in dealing with both of these concerns.*"

Analysis

The excerpt addressing the fire at the First Interstate Bank Building on the AFS website appears to be somewhat at odds with the U.S. Fire Administration report on the fire. Aside from the fact that the fire actually occurred in 1988, rather than in 1987, and the fact that there was one fatality, rather than no loss of life, there seems to be a number of other errors in the AFS's viewpoint on this fire.

The purpose of passive fire protection in a high rise building is to not only maintain the structural stability of the building, but, more importantly, to contain the spread of fire to the floor of origin so that the fire can be controlled by manual firefighting. Obviously, the passive fire protection systems at the First Interstate Bank Building failed to accomplish this objective. If not for the combination of both the massive amount of manpower available at the fire and the skilled efforts of the Los Angeles Fire Department, it is highly likely that this fire would have continued to spread throughout the upper stories of the building.

Given the above, it is my opinion that the First Interstate Bank Building fire (as well as the fire at the One Meridian Plaza Building in Philadelphia 1991) is an excellent illustration of the potential ineffectiveness of the passive approach (other than structural fire protection) to high rise building fire protection. In essence, the First Interstate Bank Building fire (and also the fire at the One Meridian Plaza Building) demonstrates that the "balanced" approach to high rise building fire protection advocated by the Alliance for Fire Safety is simply invalid. (This does not mean that the "balanced" fire protection concept is invalid, only the "finger-on-the-scale" concept of "balanced" fire protection being advocated by the AFS.) Again in my opinion, the most effective and logical approach to protecting both occupants and firefighters from fire in a high rise building is the balanced approach adopted by the three regional model building codes in the middle 1970's-the simple combination of sprinkler protection, fire resistive construction and egress facilities.

The proponents of the "balanced" fire protection concept (as defined by the AFS) have asserted that the reliability of sprinkler systems is suspect, and, hence, additional passive fire protection (compartmentation) in high rise buildings is necessary as a "back-up" in the event of the failure of the sprinkler protection. While it is a fact that sprinkler systems are not 100 percent reliable, it is also a fact that a major fire has never occurred in a U.S. high rise building protected throughout by a sprinkler system (except as the result of terrorist attacks). Certainly, this statistic would seem to cast at least some doubt on the validity of AFS's assertions concerning the reliability (or, more accurately, the unreliability) of sprinkler systems protecting high rise buildings.

If the reliability of sprinkler systems is indeed questionable, there are two alternatives available to address this issue. One alternative is additional passive fire protection in the form of compartmentation as advocated by the AFS. The other alternative is to make sprinkler systems more reliable (i.e. a secondary water supply and redundant pumps). Given the failure of the passive fire protection to contain the fire on the floor of origin at the First Interstate Bank Building (and also the One Meridian Plaza Building), it would seem that the more rational approach would be to improve the reliability of sprinkler systems.

How can sprinkler systems be made more reliable? Simple. In addition to the suggestions above, better reviews of sprinkler shop drawings and hydraulic calculations; better inspections of initial sprinkler installations; routine inspections and testing of existing sprinkler installations. In short, better quality control within the sprinkler installation industry. Making sure that sprinkler protection is properly maintained so that it is even more reliable is sure a whole lot easier than trying to maintain the effectiveness of passive fire protection systems over the life of a high rise building.

Given the perfect record of sprinklered high rise buildings in the United States, is it really necessary to mandate compartmentation, in addition to sprinkler protection and fire resistive building construction in high rise buildings? Of course, the answer to that question is yes, if you will be profiting from selling or installing passive fire protection products as do the members of the Alliance for Fire Safety. The fire safety provisions presently included in both the International Building Code and NFPA 5000 are already balanced. In my mind, the "balanced" fire protection concept as now being advocated by the AFS is really all about using building codes to sell unnecessary fire protection products, and has little to do with building fire safety It's about time that someone steps up and exposes the AFS's concept of "balanced" fire protection for what it's really is. I'd do it myself, but I'm out of space in this column.

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