TerranearPMC Safety Share

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Back in the 1970's – there I was - in San Francisco when I walked into the newest hotel in the city…the Hyatt Regency. It was like I walked into a city within a city. One of the defining features of the hotel was its lobby, which incorporated a multistory atrium, spanned by elevated walkways made of glass, steel and concrete. They were impressive-looking as they connected the second, third, and fourth floors expanding from the north to the south wings. The walkways were approximately 120 feet long and weighed approximately 64,000 lbs. In the center of the lobby, where various shops and restaurants provided the appeal of walking through a quaint village street, an elaborate sculpture took center stage. Here, finely thinned sheets of water flowed from one level to the next providing the illusion of a glassy film that passers-by could not help but place a finger and reassure themselves that the moving liquid was indeed, water. Soon after, these modern designed Hyatt Regencies were being built around the country.

One such hotel was in Kansas City, Missouri. The construction of the 40-story Hyatt Regency Kansas City began in May 1978. After delays and setbacks, including an incident in which 2,700 square feet (250 m^2) of the roof collapsed, the hotel officially opened on July 1, 1980.

One year later, on the evening of Friday, July 17, 1981, approximately 1,600 people gathered in the atrium for a tea dance. The second-level walkway held approximately 40 people with more on the third and an additional 16 to 20 people on the fourth level. The fourth-floor bridge was suspended directly over the second-floor bridge, with the third-floor walkway offset several meters from the others. Persons said that they heard popping noises that was immediately followed by the fourth-floor walkway dropping several inches. The stunned crowed did not know what to make of the situation as everyone froze as if time could be suspended and the depressed walkway would somehow stabilize. However, within seconds the walkway gave way and fell directly on top of the second-floor. Instantly, both walkways then fell to the lobby floor. The result was 114 deaths and 219 injuries. It was the deadliest structural collapse in U.S. history until the collapse of the World Trade Center towers 20 years later.

What followed was a gruesome tale of finding survivors and using crude machinery to remove dead bodies to rescue those trapped under the massive amounts of debris while performing life-saving amputations with chainsaws. Meanwhile water from the hotels' ruptured the fire suppression system flooded the lobby and put trapped survivors at risk of drowning. Rescue efforts were further hampered because of poor visibility due to massive amounts of airborne dust and a lack of light as electrical lines were cut to prevent potential fires. Rescue operations lasted fourteen hours.

No other Hyatt Regency of the same architectural design had a similar occurrence. This suggests that something was different in either design or construction that caused such a tragic event. Three days after the disaster, is was discovered that a significant change was made to the original design of the walkways.

The original design had called for sets of support rods to suspend the fourth and second floor walkways from the ceiling. Instead, the designs were changed so that a second set of rods hung the second-floor walkway from the fourth-floor walkway. This arrangement made the upper walkway support its own weight as well as the weight from the walkway below instead of suspending all the weight directly from the stronger ceiling supports.

It was also noted that the rods holding the walkways were bolted into a box beam so that only a small nut and washer held the walkways to each rod. When the walkways collapsed, the rods had simply ripped through the walkways' box beams. Investigators noted that this design was far below Kansas City's existing building codes, yet it had passed inspection. In fact, the National Bureau of Standards later declared that the walkways could barely have supported their own weight, much less the weight of dozens of people.

Investigators concluded that the basic problem was a lack of proper communication between the engineering firm and the materials manufacturer. As it turns out, the original designs were preliminary sketches but were interpreted by the manufacturer as final drawings. At this point, the engineering company failed to review the revised designs thoroughly (suggested by the manufacturer) and accepted the proposed plan without performing basic calculations or viewing sketches that would have revealed its serious intrinsic flaws; the doubling of the load on the fourth-floor beams. It was later revealed that when the revised design was proposed, the modifications were approved via an informal phone conversation with no documentation of agreement.

The engineers employed by the design company who had "approved" the final drawings were found culpable of gross negligence, misconduct, and unprofessional conduct in the practice of engineering by the Missouri Board of Architects, Professional Engineers, and Land Surveyors. Though they were acquitted of all crimes that they were initially charged with, they all lost their respective engineering licenses in the states of Missouri, Kansas, and Texas and their membership with the American Society of Civil Engineers. Although the company was discharged of criminal negligence, it lost its licenses to be an engineering firm in Missouri and Kansas

The Hyatt collapse remains a classic model for the study of engineering ethics and errors, as well as disaster management.

It is not uncommon for any project to change or modify original work plans. Such modifications can include new equipment, personnel and even altering processes and adding/changing the scope of work. Of course, such revisions may involve change orders and a revised cost schedule, but more importantly, new hazards may also be introduced. And without a thorough review of these modifications, the hazards related to these new conditions need to be identified. And once identified, appropriate controls can be established, followed by the revised work processes being performed within these controls. In the case of the Hyatt Regency disaster, investigations concluded that with the right amount of effort by both the engineering company and fabricator – as well as having appropriate support documentation - the structural failures that caused so many to lose their lives and countless others that received severe and permanent injuries, could have been prevented.

The present is the ever-moving shadow that divides yesterday from tomorrow. In that lies hope - Frank Lloyd Wright