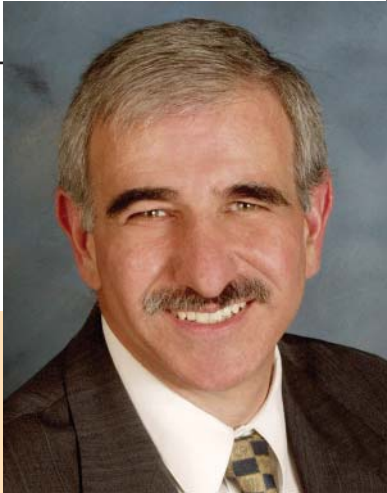


Much Ado about Something

By Ronald O. Hamburger, S.E., NCSEA President



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Nearly four years ago, with the attacks of September 11, 2001, we experienced one of the most significant peacetime disasters in our nation's history and the most costly human-induced event to strike our civilian population. As often occurs following a disaster, people wanted to place blame and take affirmative steps to ensure that repeat disasters would not occur. One obvious source of blame was the perpetrator itself. Within weeks we engaged in military action against Al-Qaeda in Afghanistan. Over the next months, we enacted legislation to enhance our internal security and then moved against Iraq.

Perhaps, had the twin towers fallen immediately, we would have been satisfied with these political and military responses. Few would have questioned that a 400,000-pound airliner, traveling at 500 mph, could cause building collapse. It would have been evident to nearly everyone that buildings are not generally designed for such events and should not be expected to survive them.

However, the buildings did not collapse immediately. Despite losing a large number of exterior and interior columns the buildings were able to remain standing, in one case for an hour and, in the other, for nearly two hours. We watched transfixed with awe and pride as the towers stood, allowing nearly all occupants to escape and emergency responders to rush to the rescue. We began to believe the buildings would survive, until, inevitably as we watched in horror, the fires triggered the ultimate collapse of each building in turn.

The relatives of victims demanded an explanation as to why the buildings fell and determination as to who was at fault. They were joined by a variety of interests, each with their own agenda. Concrete interests pointed out the vulnerability of steel frames to fire damage. Steel interests noted that, prior to September 2001, the only high-rise buildings that had failed in fires were reinforced concrete structures. Fire protection engineers noted that standard methods of designing for fire resistance were nearly 100 years old and lacked sound technical basis. Building officials cited the practice of permitting government agencies to construct buildings without conforming to local codes or regulations. The building developer/owner was accused of negligence, the designers were criticized for cutting corners, and the contractors were criticized for shoddy construction. Despite nearly 30 years of exemplary service, including survival despite large fires and bomb attacks, the towers were called firetraps and disasters waiting to happen.

FEMA and ASCE partnered to perform a preliminary study published in May 2002 as FEMA 403. The report gave preliminary analyses of the cause of collapse and recommended a broader scope study to determine if changes to design and construction practice were warranted. Congress responded by awarding NIST a grant to conduct the more detailed study. NIST conducted an exhaustive study that included collection of photographic and video data, witness interviews, recovery and laboratory investigation of steel from the buildings, aircraft impact simulations, fire simulations, laboratory fire-testing of building components, and structural collapse simulations, as well as other investigations. NIST concluded that the most probable sequence of collapse for the buildings was similar and, in each case, was caused by fire-induced effects on steel framing, which had its fire protection removed by the aircraft impact and resulting debris flow. A number of scenarios were evaluated; and only in those scenarios in which substantial removal of fireproofing was assumed, due to aircraft impact, was the collapse predicted to occur. NIST announced these findings in April of this year and, on June 23rd, placed a draft summary report and recommendations on their project web site, for public review and comment.

The NIST report includes 30 recommendations that range in scope, from requiring structural design to resist progressive collapse, to increasing fire protection requirements on steel structures, to requiring higher capacity egress paths, to improving fire department communications procedures, to requiring fire protection engineer involvement in design of major buildings, to cross training architects, structural engineers and fire protection engineers. NCSEA is partnering with the American Institute of Architects and the Council on Tall Buildings in the Urban Habitat to provide NIST with consolidated comment from the design professions on this important and wide-ranging report. To bolster this effort, NCSEA's Code Advisory Committee is concurrently performing a detailed review of the structural engineering aspects of the NIST report and recommendations.

Prominent design professionals have already commented that many of NIST's recommendations go beyond the scope of their investigation, offer solutions to problems that have not been demonstrated to exist, and would not, in any event, have made any difference in the outcome of the September 11, 2001 attacks. I hope that, as a profession, we give serious consideration to each of the recommendations and judge them on their individual merits, considering the costs and benefits associated with the implementation of each, regardless of their direct link to the tragedy of September 2001. Structural fire has been and remains one of the most significant property and life risks in the United States. NIST is convincingly correct that, despite the significance of fire to the public safety, our fire and life safety design methods use technologies that have evolved little in the last 50 years. Clearly, there must be room for improvement. ■