NFSA The Voice of the Fire Sprinkler Industry

TechNotes

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This issue of TechNotes was written by Robert Upson, Manager of Installation Standards. He served as a panel member for the FPRF project on Disaster Resiliency and NFPA Codes and Standards.

Research Foundation Report: Disaster Resiliency

NFSA staff is often asked to participate in Fire Protection Research Foundation project technical committees. These committees are drawn from a variety of interest categories and provide expert guidance to the projects' principle investigators over the course of their research. Some currently in progress FPRF projects include topics such as *Protection of Storage Under Sloped* Ceilings, Obstructions and ESFR Sprinklers, Quantification of Water Flow Testing Adjustments *for Sprinkler System Design*, and *Water Based System Tagging Review*. Practical research projects like these often answer questions raised by NFPA technical committees to establish installation standards that are central to our industry. One of these projects was just completed and published its final report last December: *Disaster Resiliency and NFPA Codes and Standards* (This report is available online at http://www.nfpa.org/research/fire-protection-research-foundation/reports-and-proceedings/building-and-life-safety/general-life-safety-issues/disaster-resiliency-and-nfpa-codes-and-standards).

One of the first questions the project sought to answer was: What is resilience? Several definitions were presented from the literature but one of the simplest sums it up well:

Resilience *- Ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies.*(FEMA 2011, 81)

The NFPA isn't the first to recognize the importance of resiliency in the built environment. Indeed, it has become a hot topic in the ICC family of codes and was actually listed ahead of safety in the press release announcing the release of the 2015 I-Codes last June:

"The 2015 International Codes reflect the most advanced building science construction methods and practices available," said ICC CEO Dominic Sims, CBO. "The I-Codes are a comprehensive and coordinated family of codes that support the construction industry to achieve resiliency, safety, innovation and affordability in the built environment." (International Code Council 2014)

The *Disaster Resiliency and NFPA Codes and Standards* project was "intended to identify key gaps in knowledge necessary to support the integration of resiliency concepts into NFPA codes and standards" (Dungan 2014, 2). The NFPA has traditionally dealt primarily with standards

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dedicated to fire, electrical, and life safety. The introduction of the NFPA 5000 *Building Construction and Safety Code* created a need to expand the nature of hazards addressed in the NFPA standard family to include natural and manmade disasters. One of the primary tasks incorporated into the study was to examine NFPA standards for features related to resiliency to those disasters.

With the limited exception of some seismic support requirements, NFPA standards do not adequately address the role of the fire protection system during and after natural disasters, or other disruptive events. Defining this role is an important element to *disaster resilience.* As implied by the four categories identified in the proposed *Disaster Resilience Framework,* the role of structures and their supporting systems should influence the resilience of its design. (Dungan 2014, 27)

It should be noted that the one standard that came up in discussions during project conference calls as well as being mentioned in the final report for addressing resilience issues was NFPA 13. As an industry we should take pride in being ahead of the curve in this respect.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, is one of these system documents that addresses earthquake. Again, it does not mandate that a system must be protected from an earthquake but states, that when a system is required to be protected against an earthquake, here is how it should be done. (Dungan 2014, 22)

The seismic considerations in Chapter 9 of NFPA 13 are sometimes looked on as complicated and something to be avoided but they serve an important purpose in ensuring the effective survival of crucial life saving fire protection systems in the event of an earthquake. No mechanical system can be expected to survive every possible disaster but the protection provided in Chapter 9 is a good hedge against worst credible earthquake scenarios and serves as a good model for what good resilient installation standards should look like.

The project suggests, among other things, that a paradigm shift is necessary to do more than just provide protection from fire; provisions for other disruptive events must be a part of the NFPA standards suite as well. Another major paradigm shift suggested is that the implementation of minimum standards may not be enough when higher performance is desirable. Lastly, the report questions whether prescriptive solutions are enough to meet the requirements of performance based post-event goals such as those in the proposed NIST *Disaster Resilience Framework*.

The final project report suggests a clear path forward in summary:

All of the referenced quotes above emphasize that the path to better community and infrastructure resilience must be risk-informed and performance-based. That means more flexible guidelines may be required to achieve a mix of **engineered features** and **administrative features** to fit a wide variety of facilities and communities. In response to Recommendation 7 in *Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure,* a new document, initially presented as a guide or a recommended practice,

could be developed on High Performance Buildings. This could separate the roles of immediate risk to occupants during the event and continuity of use after the event for establishing design criteria. Likewise, additional training and planning documents could be developed to support emergency response. To facilitate both efforts, a *Disaster Resilience Concepts Tree* or similar decision tool could be developed. Some overarching guidance to existing committees would be helpful in implementing the concepts of resilience into the many NFPA activities. (Dungan 2014, 28)

References

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