



Building Disaster Resilient Communities

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Healthy cities continuously grow by driving economic development while protecting their cultural heritage. Success, in part, depends on a healthy built environment that is rooted in contemporary urban planning, sustainability and disaster resilience. Our job, as structural engineers, is to provide a built environment that supports all of those goals. Our designs need to be efficient, economical, adaptive, sustainable, and disaster resilient. We are doing well on all fronts except for the last.

Structural Engineers need to write, and have added to the code, provisions that will provide the buildings and lifelines needed to support disaster resilience. That is, provide safe buildings for everyone and usable buildings for those needed to support economic recovery.

Whether hit by a massive earthquake, hurricane, tornado, or flood, communities have shown an incredible ability to recover. Resilient communities have a credible disaster response plan that assures a place

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and ability to govern after a disaster has struck. When power, water, and communication networks begin operating again shortly after a disaster and people can stay in their homes, travel to where they

need to be, and resume a fairly normal living routine within weeks, then communities return to a "new" normal within a few years. They are a resilient community because such a blow from nature remains a disaster, but does not become a catastrophe, that is, one that defies recovery.

Hurricane Katrina dealt such a catastrophic blow to New Orleans; the Wenchuan China Earthquake did the same to multiple cities in China that are now undergoing complete relocation. These disasters turned into catastrophes for a wide variety of reasons, one of which relates to the level of damage that occurred to the built environment. While every building should protect its occupants from harm, a select few buildings need to remain operational and a larger group need to be at least usable during repair. Lifeline systems must be restored quickly to support response and reconstruction.

As the code writers of the United States, we structural engineers need to understand what a resilient city needs from its built environment, and start the process of building and rehabilitating structures to meet those needs. It will take a long time, but we need to change our ways and get started on this process.

San Francisco is already moving in this direction. The San Francisco Planning and Urban Research Association (SPUR) recently published four policy

papers related to what San Francisco needs from its seismic mitigation policies. Called the Resilient City Initiative, the papers define resiliency in a deterministic manner based on what the city needs from its buildings and lifelines to support response, recovery and rebuilding post-disaster. It is a set of goals that can be applied to any community facing any natural disaster. At the heart of the recommendations are the need for clarity in the hazard level and the expected damage from a disaster.

First and foremost, codes need to be modified so that all buildings, new and existing, protect their occupants from personal harm. Beyond that, buildings that support disaster response – Hospitals, Police and Fire Stations, Emergency Response Centers, shelters – need to be able to operate immediately and without impediment. Buildings that support the work force – homes, schools, retail centers and medical offices – need to be restored to usefulness within 30 days to reestablish the economic base of the community. Structures needed to restore neighborhoods must remain usable while they are under going repair. Our current codes cover the first two goals, but we have not yet dealt adequately with the issue of emergency shelters or the buildings that support neighborhoods.

The lifelines systems – power, water, wastewater, communication and transportation – need to be restored to the facilities supporting the emergency response within 4 hours, and to most of the neighborhoods and business districts within 30 days. While a conscious attempt is being made by structural engineers to improve the durability and recovery time of the lifeline systems serving the nation, those efforts are generally individual and unequal in performance expectations because of a lack of code provisions.

While making the shift to updated codes requires new policies and community support, that change is not possible without solid, unified support from the structural engineering community. It has always been that way. Structural engineers have always recognized when they need to improve designs, convincing their clients first and eventually convincing their fellow code writers. Such changes happen routinely in the normal course of code writing. Structural engineers have also derailed efforts to change through public disagreements that create confusion. We are the key to creating buildings that will support disaster resilient communities. We just need to agree on how to do it.

I urge each of you to take the time to understand this issue, join the conversation about how to achieve resiliency, build it into your projects, convince your owners, and be a part of the common voice from our profession on how to change the codes. As a nation, we are about to embark on an infrastructure reconstruction program that is unparalleled in time; and yet, it is still based on the old ways. Without our action to change the codes, that reconstruction will not contribute to creating the disaster resilient nation we need; definitely an opportunity lost. We can avoid that from happening – please do your part. ■

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