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CODE CONFORMANCE OR SEISMIC RESILIENCE?

IN EVERY OTHER issue of *Civil + Structural Engineer*, I look forward to sharing what I learn out in the world, both in far-flung places and closer to home. The last six months have found me mostly in Nepal, where a 7.8-M earthquake in April took more than 8,600 lives and destroyed more than 600,000 houses and 40,000 classrooms. Much of this destruction and loss of life can be mitigated. We know how to build high-performance structures. One of the most relevant lessons for countries like the United States is the crippling damage to the newer high-rises in Nepal's modern capital city, Kathmandu. Even when international standard building codes are adhered to, a big gap exists between what standard code provides and what society expects.

Most building owners do not know that their structures may be “one-earthquake buildings.”

In one particular meeting, angry luxury condo owners learned that the buildings they invested hundreds of thousands dollars into met standards, but were too badly damaged to occupy. The reality, we explained, is that code provides life safety performance, but not always property. They were stunned. Even well-detailed and designed concrete moment frames cannot provide continuous occupation unless it is designed for higher performance than what minimum code provisions require.

As a California Seismic Safety Commissioner, I testified before the commission in June that we can expect similar situations after a large earthquake in cities like Los Angeles and San Francisco. No matter where they live, people are not expecting the reality that code does not guarantee that buildings will be operational or even repairable after a large earthquake. This parallel between Nepal and other urban centers is a major wake-up call too few have heard so far.

That code “isn't good enough” is well known in New Zealand, where a major city saw buildings damaged in earthquakes that struck in 2011 on a previously unknown fault. More than 1,800 of the 2,400 buildings in Christchurch were structurally damaged and torn down because the code focused on life safety rather than on building earthquake-resilient communities. New Zealand code, practice, and construction quality is as good as anywhere. Imagine a Los Angeles, San Francisco, or Seattle with tens of thousands of the buildings damaged and unable to be occupied.

Most building owners do not know that their structures may be “one-earthquake buildings” — one earthquake and their investment is severely compromised. But for a relatively small investment, we can build better or retrofit buildings to provide improved performance. Conforming to minimum building code may not be good enough to satisfy society's expectations. We know how to engineer seismically resilient buildings. We engineers have the responsibility to communicate this to the society we serve.

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