EARTHQUAKE RETROFITS COME WITH NO GUARANTEES, BUT THEY ARE PROVEN TO WORK

Earthquakes are unpredictable. The only thing we know for certain is that they will strike.

By Ali Sahabi

Because we cannot foresee the magnitude of the next "Big One," nor the nature of its shuddering and rolling body and surface waves, there is no way to obtain a one hundred percent guarantee that a building will withstand any earthquake that comes its way.

The City of Los Angeles, when it adopted its retrofit ordinance in 2016, said the primary purpose of the law was: "to promote public welfare and safety by reducing the risk of death or injury that may result from the effects of earthquakes on existing wood-frame multi-story buildings with soft, weak or open-front walls."

"Adherence to these minimum standards," the ordinance states, "will improve the performance of these buildings during earthquakes and reduce, but not necessarily prevent, the loss of life, injury or earthquake-related damage."

Seatbelts and airbags do not guarantee survival in a car crash. Crosswalks do not protect pedestrians from oncoming traffic. Proper diet and exercise are not a guarantee for good health. But each of these precautions has a proven impact on the risk factors associated with the various threats they are intended to protect you from.

Why Retrofit?

With soft-story structures, deficient ground-story walls or columns for carports, garages or storefronts can collapse in an earthquake, U.S. Geological Survey geophysicist Ken Hudnut explained in a video interview posted recently by the Los Angeles Times. (Visit https://lat.ms/2jyviyb to view his demonstration.) Retrofits, Hudnut said, "are very effective at protecting a building from damage in a quake. It's not that hard, it's not that expensive, and it can even be done while people are living in the structure.".

The Federal Emergency Management Agency, in a 2014 study, cited multiple benefits to having a vulnerable building retrofitted.: "If you live or work in retrofitted structures, you're less likely to be injured during an earthquake. After the earthquake, you're also more likely to have a home and a job to which you can quickly return. Businesses that use retrofitted buildings are more likely to survive damaging earthquakes and to sustain shorter business interruptions and fewer inventory losses."

Researchers at Caltech University recently determined that for every dollar spent in retrofitting soft-story structures, property owners could expect to save up to seven dollars, and that study did not factor in loss to contents, alternate living expenses or deaths and injuries – all of which would have significantly increased the cost-to-benefit ratios.

For many building owners, their property represents a life-long investment; it's their retirement plan. Retrofitting your building to protect against damages in a quake not only helps to guard against death, injury or damage – and the potential for subsequent liability or loss of income – it also helps to ensure the value of your investment. Consider these factors when weighing the cost benefits of a seismic retrofit:

- Liability associated with damage, death and injury
- Loss of income when a building gets red-tagged
- Financial obligations tied to the original mortgage loan when a building is damaged
- Demolition costs including abatement of asbestos and lead

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Terry Bichlmeier, executive vice president of Bichlmeier Insurance Services, Inc., remembers the devastation left by the 1994 Northridge Earthquake when many buildings collapsed. "Some people had to walk away from their properties," he said. "They just couldn't sustain the loss."

How Do Retrofits Work?

Researchers at the University of California, San Diego – using the nation's largest outdoor shake table to simulate earthquakes – have been studying the effects of retrofits on a variety of buildings and other structures including bridges, wind turbines and retaining walls. The goal of these studies is to determine the fragile points of these constructions when exposed to earthquake-like motion and define retrofit approaches that will be most effective at guarding against damage. Their findings demonstrate the value of retrofitting in protecting not only lives and social order, but also a property owner's investment.

In a four-month series of shake tests on identical soft-story buildings, their research showed a four-story structure – when retrofitted – survived simulated seismic motion with only minor, cosmetic damage. Without the retrofit, the structure sustained major damage, including collapse. "The larger shakes damaged the building, but with the retrofits in place, it is still structurally safe enough for occupancy," researcher John van de Lindt announced following the four-month study. (Visit https://bit.ly/2KBjBTP to watch a demonstration of a soft-story structure collapse during one of the university's experiments.)

Clearly, even though they come with no guarantees, retrofits have been proven to protect structures in earthquakes. Retrofitting your building to protect against damages in a quake not only helps to guard against death, injury or damage – and the potential for subsequent liability or loss of income – it helps to safeguard the value of your investment.

How many of us insist that our children wear seatbelts while driving? Why wouldn't we want the same safety precautions for our buildings? AA

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