

Earthquake Retrofits: Solutions for Low-Rise, Wood-Framed Condominiums

The floor layouts that make many condominiums and townhouses economical to build and maintain also make them vulnerable to earthquake damage. A typical condominium unit has many openings in the front and rear walls: either garage doors, entries, windows, or sliding patio doors. Since there is typically another unit next door, the side walls cannot have any openings. Large openings (or several smaller openings) in walls reduce the ability of the wall to resist earthquakes forces.

Retrofitting an individual unit with extensive openings in the front and rear walls can be accomplished by installing a steel “moment-frame” in each of those walls. However, such moment-frames are costly to fabricate and install. Fortunately, the same traits that make condos economical to build in the first place could (with some creative legal and engineering solutions) also make them more economical to retrofit. From a strict engineering standpoint, it would usually work just as well to install only two moment-frames in an entire *building*, not two in every unit. The building would still need to be tied to the frames, but this process would be much less expensive than installing moment-frames in every unit. If both the front and rear walls of the building need moment-frames, they could be installed in different units; this could allow greater flexibility in construction and lessen the disturbance to occupants.

The above solution would work easily for an apartment building, where the manager could simply say, “Your unit is the one with slightly less storage because of the seismic retrofit frame.” With condos, all sorts of issues could arise—for instance, is an easement required for structural elements that clearly cross property lines? If the moment-frame that strengthens an entire building is within an individual unit, would the association have right-of-entry to perform inspections? Do the owners of the unit with the frame pay less in assessments because they are giving up space? Are they compensated because there will be more disturbance to their unit during construction?

For many condo associations, addressing these issues could allow a much more economical retrofit of a building as a whole versus retrofitting individual units as completely separate entities. Community associations exist to achieve solutions to common problems, so a cooperative solution should be within reach.

Some ideas:

- **Talk to your association’s legal counsel.** Clearly, a single building shared by several property owners already has other shared elements such as the roof, possibly fire alarm systems, etc. A common structural system to resist earthquakes is very similar to these.
- **Volunteer to have a moment-frame installed in your unit.** Homeowner associations hardly ever come to unanimous agreement; people who are resistant to retrofitting may be happier to know that their unit will have less construction disturbance than yours.
- **Place bids on how much to compensate units with frames or other retrofit hardware installed.** Maybe in your particular building, the moment-frame would block off a storage closet in which ever unit receives the frame. How much money would you want in exchange for permanently losing that closet? If you want \$2,500 but your neighbor will accept less than that, then the frame would go in the neighbor’s unit. Many factors could affect how much “compensation” a unit owner would accept. An absentee owner with a unit vacant between tenants might not mind construction disturbance as much as an owner who uses their unit for a home business.

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