

Announcements

Mary McBride, CERT Volunteer Coordinator spoke about upcoming CERT/Preparedness events.

- The city of Berkeley has declared October as **Emergency Preparedness Month**. The citywide drill is scheduled for Saturday, October 17th, 9 – 11 am, and will be followed by a debriefing at Berkeley Bowl West from 11:30 am – 1:30 pm.
- The theme of the month is **Get Started Now**, and guides with easy and affordable activities to improve family safety are provided online: <http://cityofberkeley.info/prepare/>
- Please sign-up your family or neighborhood group! (same link as above)
- CERT Volunteers are hosting an event for neighborhood, community, and faith leaders to prepare for the city-wide drill. It is called **Getting Ready Together** and will be held at Berkeley Bowl West, Saturday Sept 19th from 10 am – Noon. Contact Khin Chin at Berkeley OES (KChin@ci.berkeley.ca.us) for more information.
- October's CERT Volunteer Monthly meeting will be held Wednesday, Oct 14th 7 pm – 9 pm at the BFD training center (997 Cedar Street). Roger Sharp (civil engineer), David Snippen (architect), and Steven Greenberg will discuss retrofitting your house and making a shelter in your backyard.

Mark your calendars for the next Network meeting Thursday, Oct 29th. More details to come!

We hope to host a Ham/Cram (studying and testing to get your HAM radio license) in the fall.

Seismic Evaluation panel (guest speakers)

Alan Block—retired general contractor and home inspector in the East Bay for 30+ years

Adrian Nacamuli—structural engineer for 16+ years

Larry Guillot—general contractor for 30+ years; specialized in earthquake preparedness for 10+ years.

History of retrofitting houses

The 1971 San Fernando Valley quake (6.6 magnitude) caused major damage to public, commercial, and residential buildings. Several hospitals were damaged, causing the majority of fatalities from the quake. As a result of the disaster, the state senate passed the Alquist-Priolo Act (1972), calling for a special study of the zones with the most severe damage. Known active fault areas were mapped, and property owners in the zone were required to disclose that their property was in the fault area prior to selling the property. The Act restricted new construction along active fault lines. According to Alan Block, this measure is only spottily enforced today.

Retrofitting houses

The most common house type in this area is the “cookie cutter” box-type house on a flat piece of land. This house sits on a concrete slab foundation topped by a mud sill with a small wall (a cripple wall) between it and the first floor of the house. During an earthquake, you want your house to be reinforced to stay on the foundation and to keep intact. While there is no such thing as making your house “earthquake proof,” you can mitigate the damage. A proper retrofit will dissipate the force from the quake, making it more likely that your house will stay in one piece.

Steps to a retrofit:

1. Secure the house to the foundation so your house won't slide off it in an earthquake. Attach the mud sill to the foundation using bolts.

2. Stiffen the cripple wall with plywood. An unreinforced cripple wall is likely to fail in an earthquake. The wall distorts because the ground shifts under it, and the house can fall off its foundation. It falls over like a deck of cards, and once the house is on the ground, it cannot be raised, and it is unusable. The correct plywood (structural plywood, not shearing grade, that is 1/2" or greater width) will not distort up and down if it is properly attached. Plywood needs to be nailed to the studs and attached to the foundation with hold-down brackets. It should be secured to the floor joists with transfer ties.

What can go wrong in your retrofit

Retrofitting is not highly technical work, but it has to be done right. Larry Guillot stated that many contractors don't know much about retrofitting.

Common retrofitting errors:

- Bolts at wrong angle--With shorter cripple walls, there may not be enough space to easily bolt the cripple wall to the foundation. Therefore, bolts are driven in at a 45-degree angle, which may fail in an earthquake.
- Bad nailing of plywood—Plywood is nailed to studs and mud sill, but it is not fastened to the top plate of the cripple wall.
- Missing/Wrong type of transfer ties—Transfer ties are hardware used to hold floor joists to the cripple wall or mudsill. If these are omitted, the house can slip off the foundation. Another error is to use hurricane ties rather than earthquake ties.

Difficult houses (i.e., not cookie cutter, not on flat land, or using special materials)

For these building types, you should consult a structural engineer for retrofitting specifications.

- Soft story—the prime example of this is an apartment building in the Marina in the 1989 Loma Prieta earthquake. Many of these were built in the 1970s or earlier. Typically, a garage is located on the first floor, underneath living quarters, supported by piers or posts. In an earthquake, these posts are akin to toothpicks stood on end; they can't resist the lateral (side-to-side) load. Large picture windows can also be considered as soft story hazards. There are compensating retrofitting techniques for soft story structure.
- Terra cotta tiled buildings--In response to the 1923 fire in Berkeley, houses were built using terra cotta tile. These are very dangerous in an earthquake, as their tiles can peel away and fall, causing injury.
- Split level homes—This type of house needs 2 separate sets of bracing to tie it together. Otherwise, the house can be torn apart in a quake.
- Buildings on stilts on a hillside—The house can fall if the stilts fail in a quake.
- Hillside homes—Quake induced landslides are a hazard in the hills, but there isn't much you can do about it. Technically, you're not supposed to build within 1/8 mile of a fault, but that law wasn't passed until the 1970's. (Most of The Arlington sits on a fault.) Sliding blocks have been used to stabilize large buildings along the fault. This is used for dorms at Cal and for the stadium retrofit. According to Adrian Nacamuli, these may work....
- Unreinforced masonry (URM)--The most dangerous buildings are not wooden, single floor homes, but ones with unreinforced masonry or chimneys, brick facades, or masonry curtain walls. URM needs to be tied in properly. If a brick chimney is squat and close to the roof line, it could be ok in a quake, but taller chimneys need to be retrofitted according to plans by an engineer. (Besides falling over on someone outside, chimneys have also fallen inside through the roof, causing injury to people inside the home.)

- Non-ductile concrete commercial buildings (3000+ in SF)--This type of building (typically schools, parking garages, office buildings) was constructed in the 1930s through the 1970s and usually has large open lower floors held up by unreinforced concrete posts. They are a serious risk for collapse in an earthquake.

Berkeley Plan Set A

If you have a “cookie cutter” house in Berkeley, you may not need a structural engineer to determine the retrofitting needs of your house. The city of Berkeley created a retrofit plan (Plan Set A) to give guidance to the contractor for simple houses with a cripple wall of 4 feet or less. If you don’t have a “cookie cutter” house, you will need to hire a structural engineer to plan the retrofit.

Transfer tax rebate for retrofitting

If you buy a house, the city of Berkeley will rebate up to 1/3 of the 1.5% transfer tax on the sale of the house if you have voluntarily made eligible seismic upgrades. (Alan’s experience has been that getting the refund hasn’t been easy.)

Automatic gas shut-off valves

In the event of an earthquake, these valves shut-off your gas at the meter automatically. These have gotten a bad reputation from PG&E with tales of valves shutting off due to the vibration from a passing garbage truck. No one on the panel had ever heard of this happening in real life. By law, activation of the valve is calibrated to a 5.4 or greater quake (sustained motion). The valve that Larry’s company installs has an easy reset, although you need to be aware of relighting pilot lights according to your specific appliances. After a quake, you would also need to be alert to signs of breaks in your gas line past the shut-off valve. If you smell gas, hear it hissing, or see dirt spraying up [from a break in a buried line], you should close the valve manually. The benefit of these valves is that they will automatically close in a quake, which is very handy if you are away from your home or unable to get to your gas meter (if you were trapped in your house). Note—if your PG&E gas valve doesn’t turn easily, call PG&E to come out and fix it, as this is a safety issue and their responsibility to fix it. Take the opportunity to have them show you how to relight your pilot lights. Call 1-800-PGE-5000 to schedule.

City of Berkeley also has a gas shut-off valve program, which could be slightly cheaper than Larry’s install (\$225 vs \$245), but you must have completed 2 emergency preparedness or CERT classes per household (either new courses or within the past 2 years), and would need to go to the permit office to get a reduced price permit. (<http://cityofberkeley.info/gasshutoff/>)

Hazard-proof your house

In addition to retrofitting your house, you also want to hazard-proof it. The majority of injuries in an earthquake are due to people getting hit by falling objects or themselves falling as they attempt to reach safety (or what they think is safety). Remember to drop, cover and hold on!

You can mitigate your household hazards using these steps:

- Secure your hot water heater to the wall stud (this is mandatory building code)
- Install an automatic gas shut-off valve
- Anchor tall and/or heavy furniture that could fall on you (anchor to a wall stud).
- Keep a crowbar/hammer next to your bed in case the door is jammed. Keep leather gloves and old boots next to your bed in case you need to climb over debris on your way out of the house.
- Secure objects that might fall—pictures, knickknacks, books, etc.

- Remove glass objects from your bedroom.

For further info, go to the FEMA website for the following publications:

Earthquake Safety Guide for Homeowners (FEMA 530) <https://www.fema.gov/media-library-data/1420417719892-b9b41636569f3c41eea88e70ddfae2e2/FEMA528.pdf>

Earthquake Safety Checklist (FEMA 526)
https://www.fema.gov/media-library-data/1421937886237-e683b4975c2c324b18967ead20336b2f/FEMAB526_2014.pdf

Questions:

Should I build an earthquake “safe” room (akin to a tornado safe room)?

No. Many earthquake injuries are due to people moving during the quake instead of following the basic procedure of "duck, cover, and hold on", so it could be dangerous to move to a safe room during the quake.

How can you tell if your house is unsafe after a quake?

- Has the house slid off the foundation?
- Is the house out of plumb (no longer square) by > 1 inch?
- Have the house floor joists (smaller horizontal parts) come off the beam (larger horizontal part)?
- Are there huge cracks evident (small cracks are ok)?
- Has the foundation settled and dropped significantly?
- Does your instinct tell you that the house is unsafe?