

Earthquake Preparedness and Response

Many of us living on the Coastsides sit directly on top of the San Andreas Fault. Earthquakes in the San Francisco Bay Area result from strain energy constantly accumulating across the region because of the motion of the Pacific Plate relative to the North American Plate. The region experienced large and destructive earthquakes in 1838, 1868, 1906 and 1989. Future large earthquakes to relieve this continually accumulated strain are a certainty.

As experience has demonstrated, large earthquakes can have a profound impact on the social and economic fabric of densely urbanized areas.

- Northern California – Loma Prieta, on October 17, 1989, 6.9 magnitude, resulted in 63 deaths, 3,757 injuries and an estimated \$6B in property losses.
- Northridge, California, 1994, 6.7 magnitude, resulted in 20 killed, \$20B in direct losses.
- Kobe, Japan, 1995, 6.9 magnitude, resulted in 5,500 killed, \$147B in direct losses.
- Tohoku earthquake and tsunami in Japan, March 11, 2011. The tsunami resulted in waves up to 133 ft., 15,893 deaths, 6,152 injuries, 2,572 missing and \$34.6B in damages.

The year after the 1989 Loma Prieta shock, a panel of scientists reassessed the earthquake threat to the San Francisco Bay region. Their conclusions were published in the USGS report "Probabilities of Large Earthquakes in the San Francisco Bay Region, California." They projected 2-in-3 odds for one or more destructive earthquakes (magnitude 7 or larger) to strike the Bay region in the period 1990 to 2020.

Studies made since that 1990 report have added much new information for determining earthquake probabilities. Geologists have uncovered new evidence for the dates and amounts of slip of prehistoric earthquakes on the Hayward, San Andreas, and other active Bay region faults and for the amounts of movement on those faults over past millennia. Seismologists have reassessed the early earthquake history of the region. Many strong earthquakes occurred in the several decades before the 1906 San Francisco earthquake, whereas in the decades since then, the region has been rather quiet seismically. Seismologists attribute this to the 1906 quake temporarily relieving most of the stress in crustal rocks in the Bay region. Using satellite-based techniques, geophysicists have gained a better picture of the continuous motions of crustal plates that cause faults to accumulate stress and rupture in earthquakes.

These data are incorporated in a new USGS report that estimates the locations, sizes, and probabilities of damaging Bay region earthquakes during the next 30 years (2000 to 2030). This new assessment will help business, government, and the public assign priorities for strengthening weak structures and for other measures to reduce earthquake impacts. **The new estimate predicts that the overall probability of a magnitude 6.7 or greater earthquake in**

the Greater Bay Area before the year 2030 is 70%. For information on the full report, go to <http://earthquake.usgs.gov/regional/nca/wg02/index.php>

Another great resource for information on earthquakes in the Bay Area, see: [Putting Down Roots in Earthquake Country](#).

What to Do During an Earthquake

If You Are Indoors When the Shaking Starts

- Drop, cover and hold on. Move only a few steps to a nearby safe place. Most people injured in earthquakes move more than 5 ft. during the shaking.
- If you are elderly or you can't move about easily, remain where you are, bracing yourself in place.
- If you are in bed, stay there (broken glass on the floor may injure you), hold on and protect your head with a pillow.
- Stay away from windows to prevent being injured by flying glass.
- Stay indoors until the shaking stops.
- AFTER THE SHAKING STOPS, check for and extinguish small fires. Note: Fire alarms and sprinkler systems frequently go off during earthquakes, even if there is no fire.
- Check doors for heat (indicating fire) before opening.
- Exit only if you are sure it's safe, and use the stairs.
- The risk of a significant Tsunami in Northern California is unlikely. The Office of Emergency Services reports that the highest surge to ever hit this part of the coast, since reported history, was about 10 feet. Unless you live in Princeton or downtown Pescadero, or are visiting the beach, you do not need to do anything. If you are in one of those situations, the OES recommends that you walk uphill a little ways and sit it out. The vast majority of our coastline sits atop bluffs that are far higher than any tsunami we could face. If people try to evacuate by car, the roads will be jammed, blocking emergency vehicles.

If You Are Outdoors When the Shaking Starts

- Drop to the ground away from buildings, trees, street lights and power lines. Stay there until the shaking stops.
- If you are in a vehicle, stop at a location clear of trees, power lines, poles, street signs, overpasses and the like. Stay there with your seat belt fastened until the shaking stops.
- AFTER THE SHAKING STOPS, proceed with caution, avoiding bridges or ramps that might have been damaged.
- If you are located in a mountainous area, or near unstable slopes or cliffs, be alert for falling rocks and other debris.

If You Are Away from Your Home During an Earthquake

- Return to your home only when the authorities say it is safe to do so.

General Tips:

- Expect aftershocks minutes, days, weeks, even months afterwards. When you feel one, drop, cover and hold on.
- If there is no electricity, listen to a portable, battery-operated or hand-cranked AM radio or TV or HAM Radio for emergency information and instructions.
- Remain alert and observe official warnings.
- Watch for fallen power lines or broken gas lines and stay out of damaged areas.
- After the shaking stops, assess yourself, your animals and other people for injuries.
- Get first aid for yourself, if necessary, before giving first aid and rescue assistance to injured or trapped persons or animals.
- Put on long pants, a long-sleeved shirt, sturdy shoes and work gloves to protect yourself from injury.
- Check quickly for damage to your home and get everyone out if your home is unsafe. Aftershocks can further damage unstable buildings.
- Help neighbors who require special assistance.
- If you are a Community Emergency Response Team (CERT) member, be alert for activation instructions.

Checking Your Home

- Watch for loose plaster, drywall and ceilings that could fall as you move about. Do not smoke.
- If you smell gas or hear blowing or hissing noises, open windows and get everyone out quickly.
- Turn off the gas or propane.
- Clean up spilled bleach, gasoline or other flammable liquids to avoid a chemical emergency.
- Check your electrical system. If you see sparks or broken or frayed wires, or if you smell burning insulation, turn off the electricity at the main fuse box or circuit breaker. Do not step in water.
- Check for damage to sewer/septic and water lines or your water tanks. If you suspect damage to the sewer lines or septic, avoid using the toilets. If you suspect damage to the water lines, avoid using tap water. Instead, melt ice cubes or use water from your stored supply.
- Check telephones, land-lines and cell. If you can use a phone, call your out-of-state contact to report your status. It's likely that the phones will become overloaded and you will not be able to call out.
- If you have a phone, use 9-1-1 to report serious injuries, fires or damage. If you have a Neighborhood Communication Plan, use that to contact your neighbors, or if you have a

HAM Radio, use the Coastside Emergency Communication Plan to obtain assistance from first responders.

Assessing Your Animals

- Pet behavior may change dramatically. They may become aggressive, defensive, scared or disoriented. Try to calm them with re-assurances or treats and keep them under your direct control.
- Check your animals for injuries and hazards at nose and paw level, such as debris, spilled chemicals, etc.
- Check animal enclosures for breaks or damage that could cause injury.

Helping Your Neighbors

- Use your Neighborhood Emergency Preparedness plan to communicate with neighbors and conduct assessments of injuries and damage.
- Try to determine the structural status of their home and smell for smoke and gas from the outside.
- If safe to do so, approach the home and make contact with those within.
- If it is safe to enter the home, give first aid and rescue assistance for those inside who are injured or trapped. If possible, have trained CERT members or Medically Trained Personnel perform assessment and first aid.
- Report serious injuries to 9-1-1 or through your Neighborhood Emergency Plan or through the Coastside Emergency Communication Plan for Ham Operators.
- If outside assistance is not coming soon, safely transport injured persons to the nearest medical facility. Utilize, whenever possible, trained CERT members to assist injured persons, perform triage and safe transportation to the medical facility.
- Assist neighbors in shutting off damaged utilities, suppress small fires and clean up potential chemical hazards.
- Once assessed, report the status of your neighbor to your Neighborhood Emergency Coordinator.
- If no one is home and you have prior permission and it is safe to enter the home, go in and check for and assist with injured or trapped persons, fire, gas and other hazards.

After Checking On Your Immediate Neighbors

- Get together with your Neighborhood Emergency Preparedness Team if available to share information and evaluate what further actions are necessary.