

## What to do Before, During and After an Earthquake

One of the most frightening and destructive phenomena of nature is a severe earthquake and its terrible aftereffects.

Earthquakes strike suddenly, violently, and without warning at any time of the day or night. If an earthquake occurs in a populated area, it may cause many deaths and injuries and extensive property damage.



Photos taken by Jacob Goad.

## What to Do Before an Earthquake

Although there are no guarantees of safety during an earthquake, identifying potential hazards ahead of time and advance planning can save lives and significantly reduce injuries and property damage. Repairing deep plaster cracks in ceilings and foundations, anchoring overhead lighting fixtures to the ceiling, and following local seismic building standards, will help reduce the impact of earthquakes.

### Six Ways to Plan Ahead

#### 1. Check for Hazards in the Home

- Fasten shelves securely to walls.
- Place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from beds, couches, and anywhere people sit.

- Brace overhead light fixtures.
- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure a water heater by strapping it to the wall studs and bolting it to the floor.
- Repair any deep cracks in ceilings or foundations. Get expert advice if there are signs of structural defects.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.

## 2. Identify Safe Places Indoors and Outdoors

- Under sturdy furniture such as a heavy desk or table.
- Against an inside wall.
- Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over.
- In the open, away from buildings, trees, telephone and electrical lines, overpasses, or elevated expressways.
- Interior columns and beams, which can serve as safe zones.

## 3. Educate Yourself and Family Members

- Contact your local emergency management office or American Red Cross chapter for more information on earthquakes. Also read the "How-To Series" for information on how to protect your property from earthquakes.
- Teach children how and when to call 9-1-1, police, or fire department and which radio station to tune to for emergency information.
- Teach all family members how and when to turn off gas, electricity, and water.
- Identify escape routes within the building.

## 4. Have Disaster Supplies on Hand

- Flashlight and extra batteries.
- Portable battery-operated radio and extra batteries.
- First aid kit and manual.
- Emergency food and water.
- Nonelectric can opener.
- Essential medicines.
- Cash and credit cards.
- Sturdy shoes.
- Blankets.

## 5. Develop an Emergency Communication Plan

- In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.
- Ask an out-of-state relative or friend to serve as the "family contact." After a disaster, it's often easier to call long distance. Make sure everyone in the family knows the name, address, and phone number of the contact person.
- Find a well-known meeting place in the case that during the earthquake family members become separated.

## 6. Help Your Community Get Ready

- Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross, and hospitals.
- Conduct a week-long series on locating hazards in the home.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home.
- Interview representatives of the gas, electric, and water companies about shutting off utilities.
- Work together in your community to apply your knowledge to building codes, retrofitting programs, hazard hunts, and neighborhood and family emergency plans.

## What to Do During an Earthquake

Stay as safe as possible during an earthquake. Be aware that some earthquakes are actually foreshocks and a larger earthquake might occur. Minimize your movements to a few steps to a nearby safe place and stay indoors until the shaking has stopped and you are sure exiting is safe.

### If indoors

- DROP to the ground; take COVER by getting under a sturdy table or other piece of furniture; and HOLD ON until the shaking stops. If there isn't a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures or furniture.
- Stay in bed if you are there when the earthquake strikes. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.
- Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported, loadbearing doorway.
- Stay inside until shaking stops and it is safe to go outside. Research has shown that most injuries occur when people inside buildings attempt to move to a different location inside the building or try to leave.
- Be aware that the electricity may go out or the sprinkler systems or fire alarms may turn on.
- DO NOT use the elevators.

### If outdoors

- Stay there.
- Move away from buildings, streetlights, and utility wires.
- Once in the open, stay there until the shaking stops. The greatest danger exists directly outside buildings, at exits, and alongside exterior walls. Many of the 120 fatalities from the 1933 Long Beach earthquake occurred when people ran outside of buildings only to be killed by falling debris from collapsing walls. Ground movement during an earthquake is

seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

### If in a moving vehicle

- Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses, and utility wires.
- Proceed cautiously once the earthquake has stopped. Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

### If trapped under debris

- Do not light a match.
- Do not move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

## What to Do After an Earthquake

- Check yourself for injuries. Often people tend to others without checking their own injuries. You will be better able to care for others if you are not injured or if you have received first aid for your injuries.
- Protect yourself from further danger by putting on long pants, a long-sleeved shirt, sturdy shoes, and work gloves. This will protect you from further injury by broken objects.
- After you have taken care of yourself, help injured or trapped persons. If you have it in your area, call 9-1-1, then give first aid when appropriate. Don't try to move seriously injured people unless they are in immediate danger of further injury.
- Look for and extinguish small fires. Eliminate fire hazards. Putting out small fires quickly, using available resources, will prevent them from spreading. Fire is the most common hazard following earthquakes. Fires followed the San Francisco earthquake of 1906 for three days, creating more damage than the earthquake.
- Leave the gas on at the main valve, unless you smell gas or think it's leaking. It may be weeks or months before professionals can turn gas back on using the correct procedures. Explosions have caused injury and death when homeowners have improperly turned their gas back on by themselves.
- Clean up spilled medicines, bleaches, gasoline, or other flammable liquids immediately. Avoid the hazard of a chemical emergency.
- Open closet and cabinet doors cautiously. Contents may have shifted during the shaking of an earthquake and could fall, creating further damage or injury.

- Inspect your home for damage. Get everyone out if your home is unsafe. Aftershocks following earthquakes can cause further damage to unstable buildings. If your home has experienced damage, get out before aftershocks happen.
- Help neighbors who may require special assistance. Elderly people and people with disabilities may require additional assistance. People who care for them or who have large families may need additional assistance in emergency situations.
- Listen to a portable, battery-operated radio (or television) for updated emergency information and instructions. If the electricity is out, this may be your main source of information. Local radio and local officials provide the most appropriate advice for your particular situation.
- Expect aftershocks. Each time you feel one, drop, cover, and hold on! Aftershocks frequently occur minutes, days, weeks, and even months following an earthquake.
- Watch out for fallen power lines or broken gas lines, and stay out of damaged areas. Hazards caused by earthquakes are often difficult to see, and you could be easily injured.
- Stay out of damaged buildings. If you are away from home, return only when authorities say it is safe. Damaged buildings may be destroyed by aftershocks following the main quake.
- Use battery-powered lanterns or flashlights to inspect your home. Kerosene lanterns, torches, candles, and matches may tip over or ignite flammables inside.
- Inspect the entire length of chimneys carefully for damage. Unnoticed damage could lead to fire or injury from falling debris during an aftershock. Cracks in chimneys can be the cause of a fire years later.
- Take pictures of the damage, both to the house and its contents, for insurance claims.
- Avoid smoking inside buildings. Smoking in confined areas can cause fires.
- When entering buildings, use extreme caution. Building damage may have occurred where you least expect it. Carefully watch every step you take.
  - Examine walls, floor, doors, staircases, and windows to make sure that the building is not in danger of collapsing.
  - Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and quickly leave the building. Turn off the gas, using the outside main valve if you can, and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.
  - Look for electrical system damage. 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. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice.
  - Check for sewage and water line damage. If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged,

- contact the water company and avoid using water from the tap. You can obtain safe water from undamaged water heaters or by melting ice cubes.
- Watch for loose plaster, drywall, and ceilings that could fall.
  - Use the telephone only to report life-threatening emergencies. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls to get through.
  - Watch animals closely. Leash dogs and place them in a fenced yard. The behavior of pets may change dramatically after an earthquake. Normally quiet and friendly cats and dogs may become aggressive or defensive.

## Know Your Earthquake Terms

Familiarize yourself with these terms to help identify an earthquake hazard:

### Aftershock

An earthquake of similar or lesser intensity that follows the main earthquake.

### Earthquake

A sudden slipping or movement of a portion of the earth's crust, accompanied and followed by a series of vibrations.

### Epicenter

The place on the earth's surface directly above the point on the fault where the earthquake rupture began. Once fault slippage begins, it expands along the fault during the earthquake and can extend hundreds of miles before stopping.

### Fault

The fracture across which displacement has occurred during an earthquake. The slippage may range from less than an inch to more than 10 yards in a severe earthquake.

### Magnitude

The amount of energy released during an earthquake, which is computed from the amplitude of the seismic waves. A magnitude of 7.0 on the Richter Scale indicates an extremely strong earthquake. Each whole number on the scale represents an increase of about 30 times more energy released than the previous whole number represents. Therefore, an earthquake measuring 6.0 is about 30 times more powerful than one measuring 5.0.

## Seismic Waves

Vibrations that travel outward from the earthquake fault at speeds of several miles per second. Although fault slippage directly under a structure can cause considerable damage, the vibrations of seismic waves cause most of the destruction during earthquakes.

## Why Earthquakes Occur

The earth's crust is divided into several major plates, some 50 miles thick, which move slowly and continuously over the earth's interior.

Most earthquakes occur as the result of slowly accumulating pressure that causes the ground to slip abruptly along a geological fault plane on or near a plate boundary. The resulting waves of vibration within the earth create ground motion at the surface that vibrates in a very complex manner.



The point where the fault first slips is the "focus" or "hypocenter" of the earthquake. A theoretical point on the earth's surface directly above the focus is the "epicenter" of the earthquake.

## Earthquake Publications and Resources

### Publications for . . .

- [Individuals and Homeowners](#)  
Posters, checklists, and guides
- [Teachers and Kids](#)  
Posters, activities, and handouts
- [Community Planners and Public Policy Makers](#)  
Guides, reports, handbooks, and recommendations
- [Building Professionals and Engineers](#)  
Guides, recommendations, examples, and manuals

### Online Tools

- [Seismic Rehabilitation Cost Estimator \(SRCE\)](#)  
Use this online program to calculate cost estimates for the seismic rehabilitation of buildings. For best results, learn about the two cost estimation methods: limited and detailed.
- Source: [FEMA](#)