

Doing Business in Earthquake Country

Nonstructural Damage



Photo by FEMA/Jennifer Lynette

Above: Hands-on technical earthquake training in American Samoa includes how to identify nonstructural hazards and reduce the risk of damage during an earthquake.

In this fact sheet:

- **Why businesses should be concerned about non-structural hazards**
- **Tips and links to help you identify and address nonstructural hazards at your workplace**
- **What Northwest businesses can learn from recent earthquakes**

Did You Know?

- **About 80% of a building's value is in its non-structural components.**
- **Nonstructural damage can render even a structurally sound building unusable.**
- **Bracing of many non-structural elements can be done by staff using off-the-shelf hardware and components.**

Learn more on page 2.

How Businesses Can Avoid Nonstructural Damage

By mitigating nonstructural hazards now, businesses can protect their employees from injury and prevent damage to valuable property during an earthquake. They can also resume operations more quickly after the earthquake.

Nonstructural elements include the building's contents and furnishings and its mechanical, electrical, and plumbing components. Even a moderate earthquake can cause these elements to slide, tip over, swing, fall, break, or collapse.

Fortunately, you can do a lot to secure nonstructural elements and avoid potential injuries and damage. The first step is to inventory the business's nonstructural components and identify potential vulnerabilities. Next, prioritize the hazards and develop a plan: Address first the nonstructural hazards that will have the greatest impact on safety and the business's critical functions.

See page 2 for more information and resources . . .

Owners and Tenants

Nonstructural elements include inventory, furniture, and equipment, so even a business that occupies leased space can address hazards in the workplace. It is relatively simple to anchor or brace many free-standing objects, such as heavy appliances, tall file cabinets, and computers.

To tackle the building's nonstructural parts, such as its mechanical and electrical systems, tenants should consult with the building's owner and an engineer. Owners can mitigate hazards related to these shared systems.



Photo by FEMA (480, 2005)

The M6.7 Northridge earthquake in 1994 caused the overloaded racks at this business to collapse.

What Can You Do?

- Determine the seismic hazard in your area.
- Learn how to identify nonstructural elements that may be vulnerable to earthquake.
- Conduct a survey of your workplace and create a list of the hazards that you need to address.

Lessons from Chile's Magnitude 8.8 Quake

Recent earthquakes around the world offer lessons for all those who live and do business in earthquake-prone areas. Chile's Maule earthquake in 2010 is a case in point: After the quake, engineers documented extensive nonstructural damage in all types of buildings. Nonstructural components that commonly suffered damage included suspended ceilings, partitions, elevators, air handling units, ductwork, and pipes. Unsecured computer monitors, computers, and expensive specialist equipment also fell and broke. At a number of industrial facilities, buildings that were designed to meet new seismic codes performed well during the earthquake, but nonstructural damage caused substantial losses and downtime.

Reduce Your Risk

Begin by developing a prioritized list of non-structural hazards around the workplace; then develop a plan to address them. Many solutions are easy:

- Anchor tall cabinets and bookcases.
- Anchor or brace the business's special equipment, machinery, and computers.
- Move the heaviest objects to the lowest shelves and secure breakables.
- Lock storage cabinets or install latches to prevent contents from spilling out.

Top priorities include any elements that might cause injuries, block exits, or result in costly damage or downtime. As you assess your workspace, also consider whether employees have safe places to drop, cover, and hold on during an earthquake: Keep the space under desks and sturdy tables clear.



Photo by Charlie Maccauley

The unanchored bookcase in the left-hand photo fell over during the Nisqually quake in 2001; the bookcases on the right were bolted to wall studs and stayed put.

Featured Links

FEMA E74 (reduce nonstructural damage):
www.fema.gov/earthquake-publications/fema-e-74-reducing-risks-nonstructural-earthquake-damage

EERI nonstructural mitigation:
<http://mitigation.eeri.org/category/structures/non-structural-abc-testing>

Washington EMD Business Portal:
www.emd.wa.gov/preparedness/prepare_business.shtml

EPICC Earthquake Planning for Business:
www.iclr.org/images/Earthquake_planning_for_business.pdf

FEMA earthquake training online:
www.training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-325

Learn More at CREW.ORG