

Earthquake Retrofitting

Earthquake damage to older homes

Homes built before 1974, when Oregon adopted its first statewide building code, will suffer the worst damage in a serious earthquake. Constructed to specific seismic standards, homes built after 1993 are the most likely to withstand earthquakes.

Earthquake forces can affect your home in three ways.

- The house may slide off its foundation.
- The cripple walls (walls between the foundation and floor) may buckle and collapse (this is called racking).
- Your house may be lifted off its foundation.

Earthquakes can cause considerable damage to the structure and to utilities and services like water heaters and gas lines.



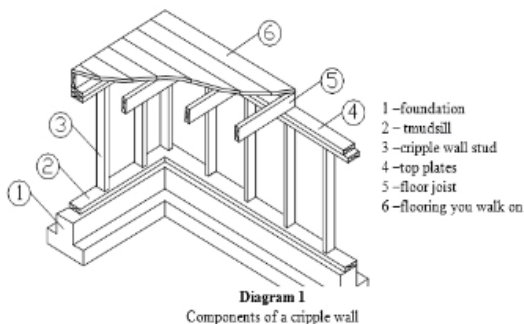
While there are many types of earthquake retrofitting, the two most common are bolting the house (mudsill) to the foundation and reinforcing the cripple walls with plywood sheathing. (Cripple walls are also called “pony” walls.)

Some older homes do not have cripple walls. There are still several methods available for improving the connection of the framing to the foundation when a house does not have cripple walls.

If a living space sits atop a garage or other open structure, that area may be particularly vulnerable to earthquakes. The garage or open structure (“soft story buildings”) may need additional bracing. Strapping water heaters is now required by code and new water heaters are generally secure. Older water heaters may need to be strapped to the wall studs. There are other items, like masonry chimneys, that may need to be considered in an earthquake retrofit.

You may choose to have an automatic shutoff valve installed on a gas line. Located between the gas meter and the house, the valve is activated by the shaking of an earthquake.

Earthquake retrofitting



City of Portland Requirements

The City of Portland is the only jurisdiction in Oregon that has adopted specific, prescriptive standards for earthquake retrofitting. The information is set out in [Bulletin 12](#), “Residential Seismic Strengthening – Methods to Reduce Potential Earthquake Damage.”

Prescriptive standards are standards that provide exact rules, directions or instructions to do something. The City of Portland allows a person to retrofit to these standards, without engineering the design, if the building:

- Is a one- or two-family dwelling,
- Is not over three stories high with a cripple wall stud height not over 14,”
- Has a continuous concrete foundation around the entire building, and
- Is not on a foundation subgrade steeper than 3 (horizontal) to 1 (vertical) at any point.

All other retrofits must be engineered.

The City of Portland requires a permit for retrofitting. (You should contact your local building official in other jurisdictions. Some do not require permits.)

Costs for Retrofitting

The cost for retrofitting varies considerably. If the work can be done in a fairly open crawl space as oppose to a finished basement, it likely will be less costly. A ballpark estimate for standard work by a licensed contractor is at about \$2 - \$5 per square foot of crawl space or basement. (This translates to between \$4,000 and \$10,000 for a 2,000 square foot, single-level home).

Grants and Loans

The City of Portland [announced](#) that it received federal funds to help retrofit 150 homes. That money has been committed. Homeowners interested in joining a seismic assessment wait list and receiving notification of any future funding to offset retrofit costs should visit <https://enhabit.org/seismic/>. Depending on your location, [loans may also be available](#).

If you retrofit a house that is an income-producing property listed in the National Register of Historic Places, you may qualify for federal tax credits. Contact the [Oregon State Historic Preservation Office](#).

Earthquake Insurance

As a general rule, homeowners insurance does not cover earthquake damage. However, you may be able to purchase separate earthquake coverage through your current insurance company or a separate company. Earthquake insurance tends to carry large deductibles. In some cases, you may need to provide proof of a retrofit to obtain the insurance.

Oregon’s Department of Consumer and Business Services has further information on [earthquake insurance](#).

Finding a Contractor

There is no license or other requirement for contractors to perform retrofit services. Any contractor licensed in Oregon to work on residential structures is legally permitted to perform earthquake retrofits. However, you may want to find somebody that specializes in this work and has gained some expertise.

Here are questions you might ask your retrofit contractor:

- Are you licensed with the Oregon Construction Contractors Board? (Only licensed contractors may perform earthquake retrofits.)
- What experience do you have performing earthquake (seismic) retrofits?
- What exactly does the process involve?
- Will you need to obtain a permit for the work?
- If my retrofit requires the services of a professional engineer, do you have one on staff or one that you ordinarily work with?
- What is the charge for a standard engineering plan?
- What, approximately, will the work cost if no engineering is required? Can you provide a square foot price?
- If I have items in my (unfinished) basement, what happens to them?
- If I have a fully finished basement, can my house still be retrofitted? Will it cost more?
- Do you have past customers that I may contact? (Ask for at least three names and phone numbers).
- Do you warranty your work? For how long?