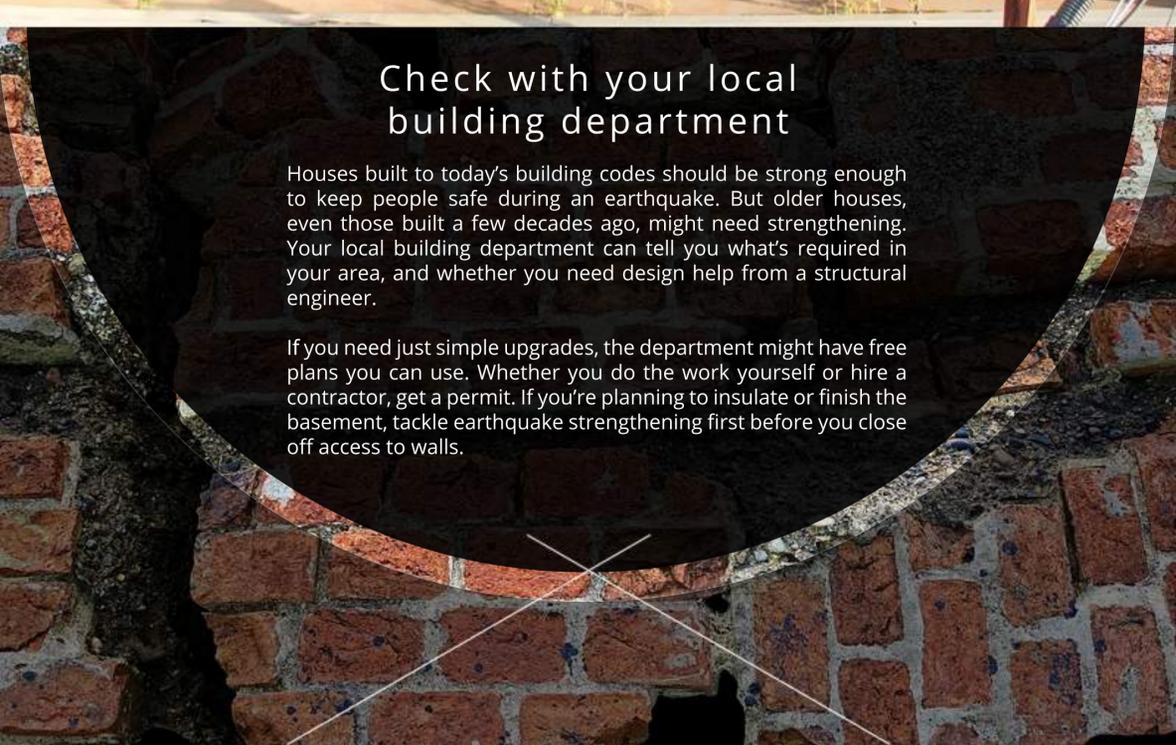




Earthquake Proofing Your Home

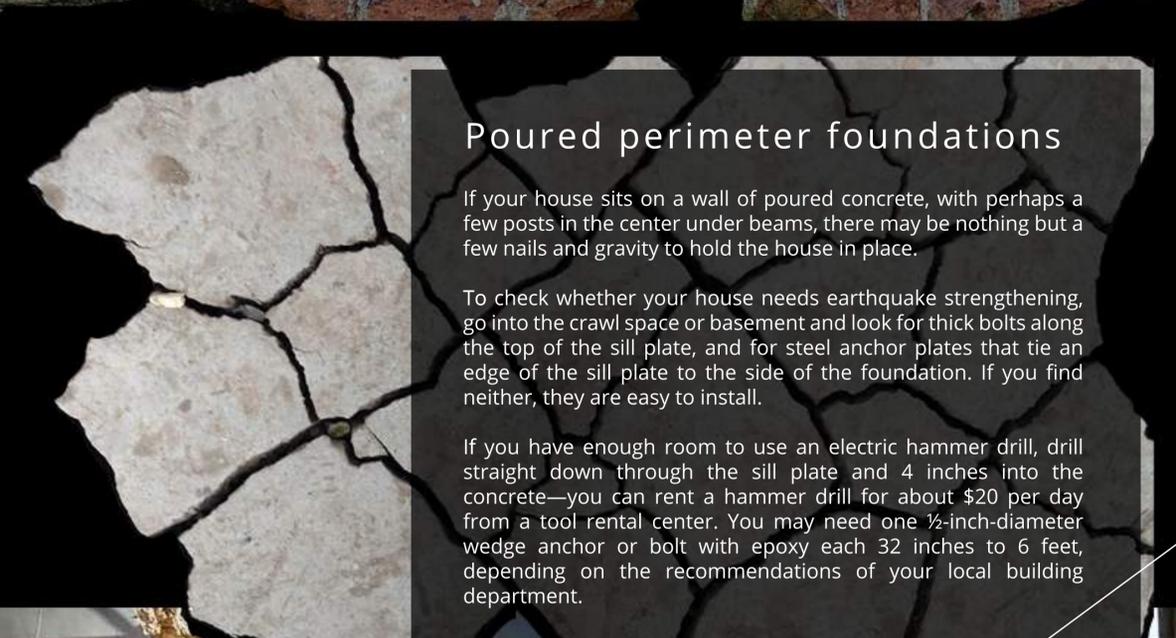
Homes constructed more than two decades ago may need earthquake strengthening upgrades to their foundations. Here's how to earthquake proof your home and resist the seismic forces.



Check with your local building department

Houses built to today's building codes should be strong enough to keep people safe during an earthquake. But older houses, even those built a few decades ago, might need strengthening. Your local building department can tell you what's required in your area, and whether you need design help from a structural engineer.

If you need just simple upgrades, the department might have free plans you can use. Whether you do the work yourself or hire a contractor, get a permit. If you're planning to insulate or finish the basement, tackle earthquake strengthening first before you close off access to walls.



Poured perimeter foundations

If your house sits on a wall of poured concrete, with perhaps a few posts in the center under beams, there may be nothing but a few nails and gravity to hold the house in place.

To check whether your house needs earthquake strengthening, go into the crawl space or basement and look for thick bolts along the top of the sill plate, and for steel anchor plates that tie an edge of the sill plate to the side of the foundation. If you find neither, they are easy to install.

If you have enough room to use an electric hammer drill, drill straight down through the sill plate and 4 inches into the concrete—you can rent a hammer drill for about \$20 per day from a tool rental center. You may need one ½-inch-diameter wedge anchor or bolt with epoxy each 32 inches to 6 feet, depending on the recommendations of your local building department.

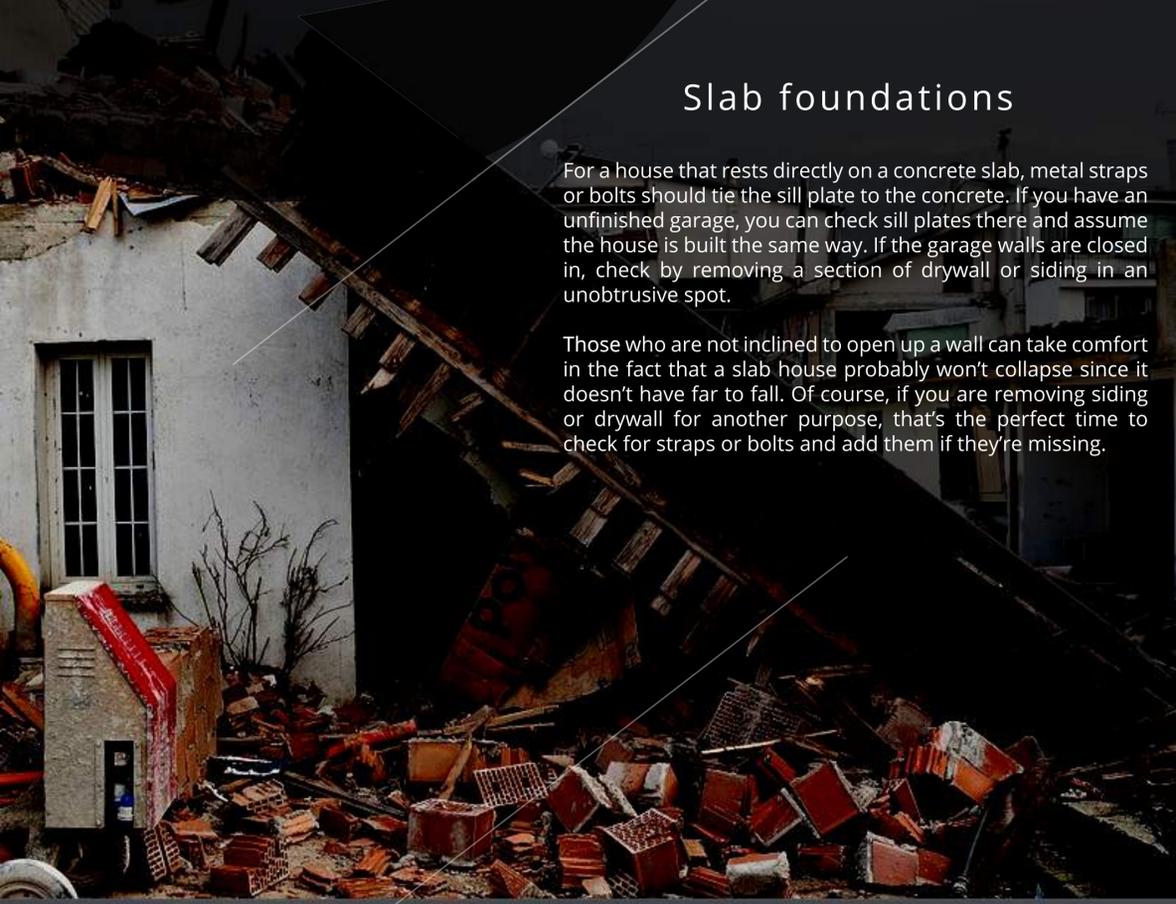


Unreinforced masonry foundations

If your house sits on a perimeter foundation made with concrete blocks that are completely filled with rebar and concrete, retrofit it as if the foundation was made of solid poured concrete. But if the blocks are hollow or if the foundation is unreinforced brick or stone, you'll need a structural engineer's advice.

You might learn that your foundation is sturdy enough and you just need a creative way to fasten down your house. Or, you might learn that the foundation is at risk of collapsing in a quake. Expect to pay \$500-\$700 for an evaluation and recommendation from a structural engineer.

If your foundation consists of more than three rows of concrete blocks and is in good shape, you might be able to fasten the sill plate to the foundation by drilling slightly oversized holes into hollow parts of the blocks and then inserting mesh sleeves, epoxy, and threaded bolts. Tightening the bolts causes the epoxy to squeeze through the mesh and mushroom out inside the hollow cavity, holding the bolts much like drywall anchors work to hold screws in walls.



Slab foundations

For a house that rests directly on a concrete slab, metal straps or bolts should tie the sill plate to the concrete. If you have an unfinished garage, you can check sill plates there and assume the house is built the same way. If the garage walls are closed in, check by removing a section of drywall or siding in an unobtrusive spot.

Those who are not inclined to open up a wall can take comfort in the fact that a slab house probably won't collapse since it doesn't have far to fall. Of course, if you are removing siding or drywall for another purpose, that's the perfect time to check for straps or bolts and add them if they're missing.



Post-and-pier foundations

Some houses are supported by upright posts that rest on concrete blocks or piers. During an earthquake, these support posts are especially vulnerable to back-and-forth seismic movement and may collapse. Repairing collapsed posts starts around \$20,000, if the house can be salvaged.

The preventative solution may be as easy as bracing the posts at a cost of about \$1,000, or as expensive as adding a new foundation for approximately \$25,000. Between these extremes, you may be able to pour short L-shape concrete foundations around each corner and securely attach them to the floor framing. Seek the advice of a structural engineer.