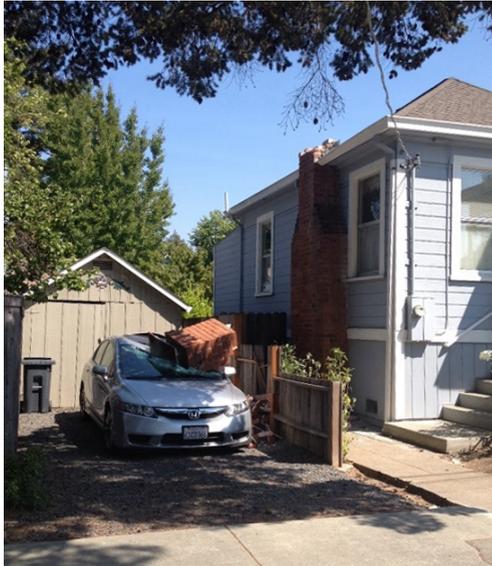


Collapse of Masonry Chimney

Even moderate earthquake shaking can cause a brick or stone chimney to collapse. It may break and fall to the ground, injuring people or damaging cars and nearby structures; or it may fall onto or through the roof into your living space.



Louay Shamroukh | South Napa Earthquake Clearinghouse, EERI

What does it cost to repair? Costs range widely but tend to start high (\$24,000 and up): in addition to rebuilding the chimney, you'll have to repair the roof and whatever the chimney damaged when it fell.

What can you do before an earthquake to prevent or reduce damage? Options include chimney bracing or rebuilding the chimney with a metal flue or fireplace insert inside a frame. Consult an experienced contractor to determine the best option for your house. Costs vary based on the type of retrofit but typically start around \$2,500.

Shifting Off of the Foundation

Some houses aren't firmly bolted to their foundations. An older wood-frame home with a crawl space may slide off of its foundation during an earthquake, the short "cripple" walls supporting the house over the crawl space can collapse, and utility lines can break. Homes with basements may also be at risk if anchor bolts are not installed.

What does it cost to repair? Costs depend on many factors, including location, labor, materials, number of stories, and type of siding. A 2020 PEER-CEA study estimated a range of about \$100,000 to \$300,000 in one scenario, based on a \$200-per-square-foot construction cost (2020peercea.crew.org). The cost could be higher where you live.



Betsy Mathieson | S. Napa Earthquake Clearinghouse, EERI

What can you do before an earthquake to prevent or reduce damage? Bracing cripple walls and bolting the house to the foundation are relatively inexpensive—typically less than \$3,000. Skilled do-it-yourselfers may be able to do this themselves.

Collapse of Unreinforced Masonry

Unreinforced masonry—be it concrete, adobe, brick, or stone—is prone to severe damage: moderate to strong earthquake shaking breaks the bond of the mortar or glue holding bricks or stones together. Walls can break away from roof and floor beams, resulting in life-threatening collapse.



Greg McDonald | Utah Geological Survey

What does it cost to repair? The cost of repairing damage and ensuring that the home will be safe in the next earthquake can be very high. The cheapest solution may even be to demolish the house and rebuild.

What can you do before an earthquake to prevent or reduce damage? Life-safety retrofits include bracing parapets and anchoring walls to roof and floor systems. Walls may also be strengthened, and shear walls can be built to brace brick gable ends. These retrofits must be done by qualified professionals.