

## The Problem

Houses built of unreinforced masonry – bricks, hollow clay tiles, stone, concrete blocks, or adobe – are very likely to be damaged during earthquakes.

The mortar holding the masonry together is generally not strong enough to resist earthquake forces.

Anchorage of walls to the floor and the roof is critical.

These houses are weak (brittle) and can break apart.

Walls may fall away or buckle, resulting in damage.

## How to Identify

- ✓ Can bricks or stone be seen from the outside (unless the walls are covered with stucco)?
- ✓ Do the brick walls have “header courses” of bricks turned endways every five or six rows? (See Figure 22)
- ✓ Was the house built before 1940?

If you cannot tell from the outside, turn off the power and take the cover plate off one of the electrical outlet boxes on an outside wall and look for brick or other masonry.

If the wall is concrete or concrete block, it is very difficult to find out if reinforcing steel was added during construction.

You will then need:

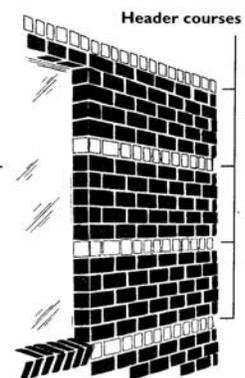
- The house’s plans, which may be on file with the Building Department, or
- To consult a licensed engineer to make the determination.



California Seismic Safety Commission

**Figure 21** - The plaster-covered brick walls of this building collapsed during a recent earthquake.

**Figure 22** - Header courses of bricks are usually placed endwise every six or so rows in unreinforced masonry walls to tie the outer layer of bricks to the layers inside the wall.



California Seismic Safety Commission

## Remember

- It is very expensive to shore up a house, remove damaged walls, and put in new walls.

**The Solution**

Consult a licensed architect or engineer to fix this problem.

One solution may involve:

- Tying the walls to the floor and roof
- Installing a steel frame and bolting the wall to it.



*Jessica Tran*

**Figure 23** - Unreinforced masonry wall strengthened by installing a steel frame inside.



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**Figure 24** - Bolting of unreinforced masonry wall to steel frame on the inside.

**How-to Resource**

- Detailed information can be found in the [International Existing Building Code](#), published by the International Code Council.

**Comparison of Cost: Preventing vs. Repairing Earthquake Damage**

**Project Cost**

**Cost to Repair After an Earthquake**

Project and Repair costs can vary widely.