

Jacking and Shoring Old Foundations

by Walter Jowers



I see a fair amount of foundation trouble on new houses I inspect. But of all of the old houses I've ever worked on, or inspected, I've only seen one masonry foundation wall that had to be taken down and rebuilt. The foundation was built with no footings, on clay soil, on a hill. I've also seen a couple of wooden foundations fail outright; but these were situations where wood (not pressure-treated) was laid right on the ground. The wood simply rotted away.

In these extreme cases, the damage wasn't hard to spot. The failed masonry wall was limestone, about a foot thick, with a clearly visible bulge in it. The brick veneer above was bulging, too, and there were cracks everywhere. The rotten wood foundations were under sleeping porches (a common detail in Nashville), and the porches had pronounced leans. In all of these cases, the contractors consulted with engineers, and came up with customized solutions for the specific conditions.

The lesson here is twofold: If something looks wrong with a foundation (bulging, leaning), it is wrong. And, in every case of serious damage to old foundations that I've ever seen, if something is wrong, it looks wrong.

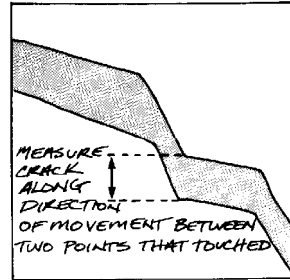
Consult an Expert

Bulging, leaning walls in an old house can be caused by a number of factors—undermining, overloading, and frost heaves among them. Whenever you run into a foundation problem in an old house, I think it's best to consult a structural engineer. Even if you know exactly what caused the problem, and have a pretty good idea how to fix it, don't assume that you know how to hold the house up while the foundation walls are taken down and rebuilt. Making foundation repairs with a house suspended over your head is unforgiving and dangerous work. So, it's wise to get an engineer to spec the shoring, and also to bring in an experienced sub to do the work. Here in Nashville,

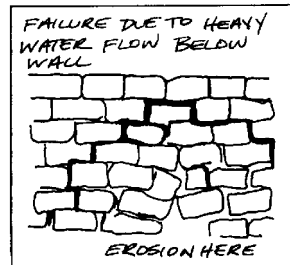
contractors faced with serious foundation problems often bring in house movers as subs.

Though major reconstruction jobs are rare, smaller-scale problems are

common enough in old brick-and-block foundations. It's not unusual for masonry foundations to have a good many cracks, caused by differential settling, vibration, or water. Cracks that follow mortar joints, and are less than 1/4 inch wide, are no big deal. If you find foundation wall cracks wider than 1/4 inch and you're not absolutely sure that the crack has stopped



Cracks over 1/2 inch wide or over 1/4 inch and still moving, require structural attention.



Water flow under a foundation can lead to erosion, and undermine a stone or unit-masonry wall.

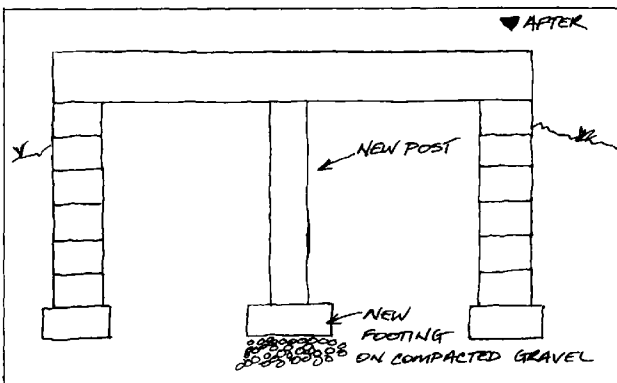
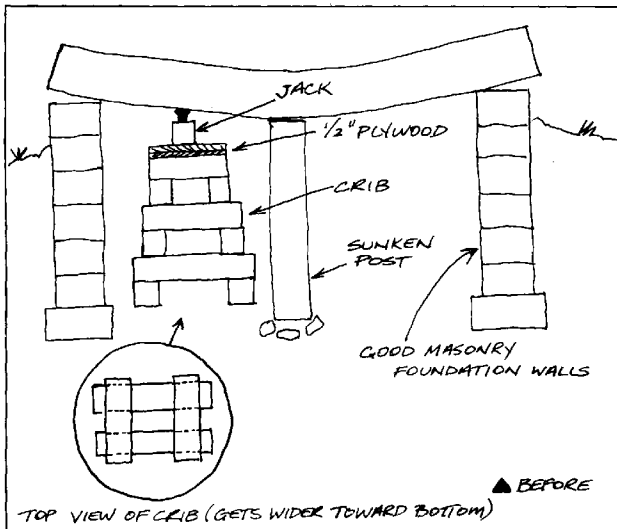
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growing or that you've cured the problem that caused them, it's smart to call in an engineer. If you find cracks of 1/2 inch or more, you should call an engineer anyway.

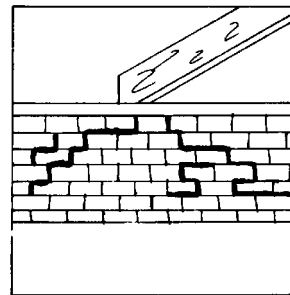
Don't Mix and Match

To fix cracks of 1/4 inch or less, chip out the mortar in the cracked area and repoint with mortar that matches the original. You want the mortar to match not only for aesthetic reasons, but also because in some old houses (typically, those built before 1900), the mortar is a relatively soft lime-based mortar, which must be replaced in kind. If you put a hard Portland patch in a wall built with soft lime mortar, the joints are just about guaranteed to come apart after a few years, if not months, due to the different rates of expansion and contraction in the old and new mortar. (To test for lime mortar, put a little chip of the mortar into a container of water and give the container a good shake. If the mortar starts to dissolve, it's lime.)

I'd love to give you mortar recipes that would work in every case based on the date and type of foundation—but the truth is that mortar-matching



Houses with masonry foundation walls, but wood interior posts, are prone to sink toward the middle (top). The solution is to lift the beam with a screw jack and add new posts with footings (above).



A heavy point load combined with an undersized footing can lead to a distinctive pattern of cracking.

Check Your Gutters

Most of the foundation problems I run across are caused by water. Sometimes, houses are damaged by water that sneaks in unexpectedly—from a change in the water table, or an improvement to a yard or neighboring property that shunts a little stream toward the house.

But most of the time, when I see an undermined foundation or eroded foundation mortar joints, the water that did it came from the house's own roof! Well, actually the gutters.

Poor neglected gutters! Many people who think nothing of installing a \$50,000 kitchen will argue with a contractor when he points out that the gutters need a couple of hundred bucks' worth of work.

"Ah... you've got seedlings growing in your gutters. Want me to take care of that while I'm here?"

"No! Just make sure the seams look good in that slate countertop!"

There are few things more destructive, long and short term, than a lot of concentrated rainwater spilling out of clogged or leaky gutters and down the exterior walls, scouring out mortar joints and causing paint to peel as it goes, wending its way to the ground, where it forms a little river that invariably finds its way through or under the foundation and into the basement.

So, the first step in fixing most foundation problems is to fix the water problems. Check the ground slope all around the house. Do it while it's raining. Take a good look at the gutters, downspouts, and any underground drains. If you can make sure water won't get to your foundation walls, and posts, and sills, you can be fairly sure that your foundations fixes will stay fixed.

can only be accomplished by trial and error. A while back, I spent weeks researching nothing but old mortar recipes. I found out that every mason and every restoration consultant has a different recipe. I also found out that mortar recipes are highly localized — that is, masons working 20 miles away from each other during the same period used different mortar recipes. The best advice I can give for matching mortar on pre-1900 buildings is to consult a local mason with plenty of restoration experience.

For post-1900 buildings, most of which have Portland-cement mortar, the only real trick is to match the aggregate. Exact matching isn't always possible, because quarries that supplied aggregate to masons generations ago often aren't around anymore. You should always try to match the color of the mortar to the original, though. Conscientious masons will mix up a batch of mortar, add a little pigment, then let the mortar cure before they compare it to the existing mortar. When repointing, it's also important to match the contour of the new joints to that of the old joints.

Rescuing a Sinking House

In houses that are built with masonry perimeter walls, and wood post-and-girder interior foundation walls, a common problem is that the house sinks toward the middle. Over the years, the perimeter walls hold up just fine, but the wood posts sink into the ground or are eaten by termites. I had this problem in one of my own houses, and cured it this way: I hired a house mover to replace my sunken, termite-eaten posts. First, he built a crib out of 4x4s, just a few inches to the side of the offending post. On top of the crib, he placed a 1 1/2-inch-thick sheet of plywood (two 3/4-inch pieces glued together), and a screw jack. He jacked the center beam of the house just enough to free the old post, which he discarded. He then broke up the old concrete footing and discarded it. He dug a new, slightly deeper hole for the new footing, poured in about six inches of gravel, tamped it with the old post, then poured a new concrete footing over the gravel—about 8 inches thick and 2 feet square. A couple of days later, after the concrete cured, he stood a new 8x8 oak post on the footing, and drove in a pair of oak shims to snug the post up to the beam. Then he released the screw jack. Didn't even break any plaster. ■

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