Shoring & Jacking: Part II

by Walter Jowers

Jacking and shoring an old building is a job unlike anything in new construction. When you frame a new floor or roof deck, you know your spans and material dimensions, and how to nail it all together so it stays together. But when you need to jack up a 50-plus-year old building to repair its disintegrating underbelly, there are few known quantities. Every jacking and shoring job is a tricky custom job, and a dangerous one. In fact, every time I get under a jacked-up building, I hear the refrain from that Jimmy Dean song about getting buried in a mine because some shoring came loose. . .

So, here are some guidelines about jacking and shoring, which I hope will keep us all from ending up like Big John in the song. I've got to preface the discussion, though, with this disclaimer: Don't do anything unless you're absolutely sure it will work. When in doubt, consult an engineer.

Basics first: For our purposes, jacking is the actual process of lifting a building or letting it down after it's been lifted. Shoring is the structural system that holds the building in place between jackings. It's like when you pull the oil pan on your car: You jack the car up. That's jacking. Then you place jack-stands under the axle. That's shoring.

For jacking buildings, I like screw jacks and crank jacks (which are just geared screw jacks) because they work in a continuous motion. Hydraulic jacks are no good because you can't control the lowering rate. Ratcheted jacks (like automobile bumper jacks) come in sizes big enough to work on houses, but they move a notch at a time rather than continuously. Ratchet jacks also have to be raised a little before they can be lowered. When you're working on a building, that last little lift can mean broken plaster, twisted door and window frames, and loose shoring. And sometimes, it's very hard to get that last release on a ratchet jack. I once spent a half hour with two other men bouncing on a six-foot handle extension attached to a ratchet jack, trying to get it loose from a truss that we had jacked back to level. One other thing: Make sure you've got enough jack to do the job. If you're in doubt, consult an engineer to size the jacks for your job. The last thing you want is to have a jack break while you're lifting a house.

There are many ways to jack a building. You can set the jacks directly under the member(s) you're trying to lift; or, you set beams under the member, and jack the beams. If you need to lift a wall without lifting the floor, you can tie beams into the wall framing, cut the wall loose from the floor, and jack the beams that are tied into the wall. The beam can run across the wall or can be "needled" through or under it (see drawing).

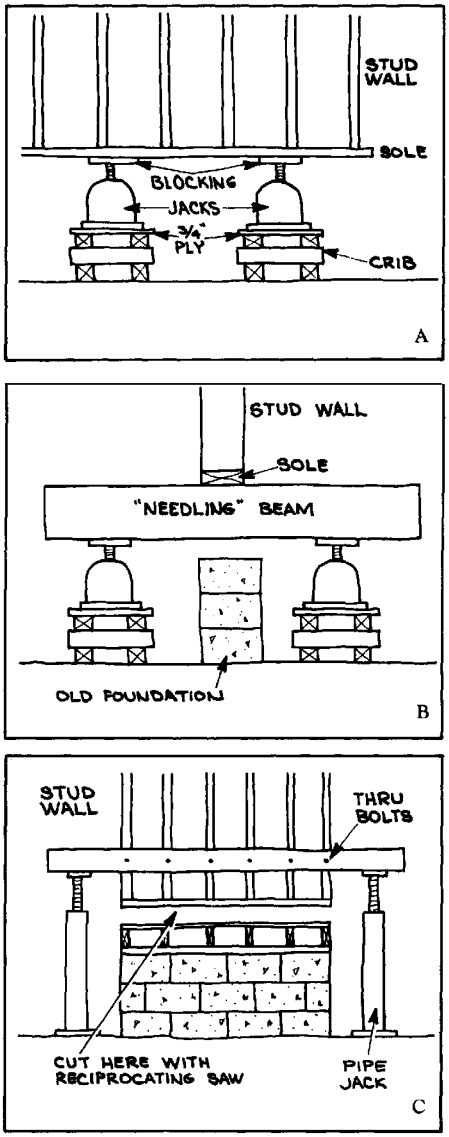
Start on Solid Ground

The first rule of jacking a building is to remember that the support system you're going to use to lift the building is itself a building. It must be built on stable soil, have proper footings, and be properly braced. You have to make sure drainage is good; otherwise water can undermine the footings of your lifting system.

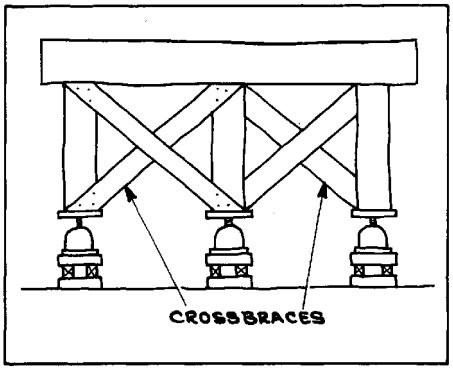
The second rule is to make sure you understand how the building you're about to jack is put together. Make sure you're going to lift only what you want to lift, and that you're not going to pull anything apart. Problems often arise when additions are jacked, because sometimes those "old-world craftsmen" hung additions on houses in strange ways.

I have one other general suggestion for jacking and shoring jobs: When you're working on the temporary support system—cleating jack heads to beams, installing cross bracing, and such like—use screws or lags rather than nails whenever practical. I get nervous when people take hammers to temporary supports. All the sudden shocks from hammers tend to loosen things up. And you may not hear things moving around because of the loud construction noises.

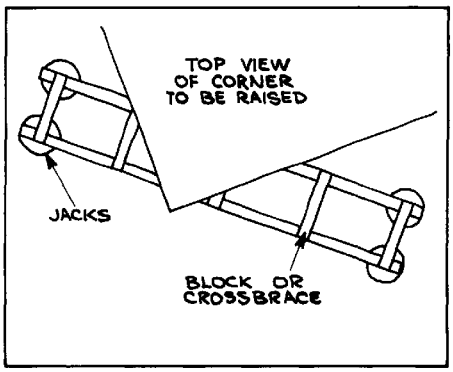
The minimum footing for a jack on dirt should be two pairs of 2x8s, arranged in "crib" fashion, topped by



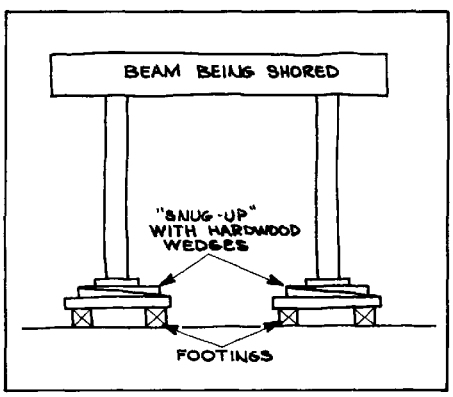
How you jack a wall will depend on where you can get good bearing for the jacks and what type of access you need. Jacks can go directly beneath a beam (A), or can lift by needling (B). For a lightweight structure, such as a porch, an attached beam (C) can support the lifted wall.



Good bracing is essential to counteract horizontal forces trying to roll out the jacking posts.



To jack the corner of small structures, use four jacks and a "ladder" built from 2x8s with solid blocking to keep them from rolling.



Shoring must be securely founded on bearing surface—minimally a crib of flat 2x8s. Any shimming must be done with hardwood shims or they will crush under the load.

a one-foot-square piece of ¾-inch plywood. If you must shim such a footing, use hardwood shims (softwood shims will crush under the load). Check the footing periodically as you jack. If it digs in out of level, loosen the jack and start over. Make sure nothing—or nobody—undermines any of your footings. Make sure nobody cuts any soil away from the edges of your footers, and watch the drainage there.

In most house-jacking jobs, small jacks are placed on cribs. Though I've never seen or read any specs for cribbing (it's probably in a mining-safety handbook somewhere), the house movers I know use oak 4x4s. Of course, cribbing, like the minimum footing described above, must be level and wide enough to distribute the load it will bear.

Slow and Easy

Jack heads should be securely fastened (with nails or, preferably, crews) to a piece of 2x blocking the width of the member being lifted. This keeps the jack head from "swimming" out from under the member.

Beams used for jacking should always be of adequate size (a pair of 2x10s spiked together is sufficient for all but the heaviest jobs); and, they must be adequately supported along their spans, by adequately-sized jacks on adequate footings.

When the actual jacking starts, it's vital that all the jacks under a beam stay level. If one jack drops out, the potential for collapse or a "domino-effect" rollover increases greatly. Jack slowly, and monitor the beam(s) you're jacking for level. Use your ears. If you hear something start to groan, stop jacking and analyze what's groaning before you go any further. Also, install cross-bracing or blocking as necessary to keep the beam from rolling over the jacks. Horizontal forces, which are all too common in a house that's being jacked, are always working to roll all your supports in the same direction.

Next Comes Shoring

Most house-jacking jobs require some shoring. Shoring is simply a temporary support system that doesn't move up and down. Steel-frame shoring, which is similar to scaffolding, is commercially available; in most areas, it can be rented. Shoring, like scaffolding, is modular and can be assembled to almost any height and to any length. One thing to remember when using commercial steel-frame shoring is: *Don't mix brands.*The pins, couplers, and other fasteners that hold the stuff together are not interchangeable brand-to-brand. Of course, all the provisions for adequate footings and spans mentioned above apply to shoring as well.

More often than not—at least on residential jobs—shoring is site-built out of wood. The typical practice is to do the jacking, then install the shoring—just like that car-jacking analogy. All of the warnings about footings and spans apply. And, it's especially important to use hardwood wedges when "snugging up" shoring (see drawing). Softwood shims will crush under these loads.

During any jacking or shoring job, it's very important to check the condition of all the footings, all the jacks, all the shims—everything—*every day.* It's not unusual in a job like this to find jacks that have suddenly gotten a little loose and need adjusting.

When it's time to let the jacks down, pay special attention to keeping the jacks level and plumb, and make sure all cross-bracing and blocking is tight. Don't remove any bracing until all the load is taken off. ■

Walter Jowers is a renovation specialist and technical writer bused in Nashville, Tenn. He recommends the following publications: Recommended Steel-Frame Shoring Erection Procedure *(SH304) $.50, and* Steel-Frame Shoring Safety Rules *(SH300) $2.00. Available from Scaffolding, Shoring, & Forming Institute, Inc., 1230 Keith Building, Cleveland, OH 44115; 216/241-7333.*