Porch Repair From The Bottom Up

The wrap-around porch on this 1860s house had rotten joists, backed-up gutters, and decaying columns—a typical neglected porch.

by Peter and Maureen Nicolazzi
For a complete cure, start with a thorough diagnosis

The porch looked well-maintained, spruced up with yearly paint jobs. The owners just wanted us to check out a minor problem—a broken decorative bracket. We soon discovered, however, that everything above eye level was held up by trim, and everything below our feet threatened to collapse.

Naively, the owners had hired people to do a yearly camouflage job to cover up water stains on the porch ceiling and floor. They also hired a guy to come out every six months and jack the porch roof back up. No one had told them the porch had major problems. On a large porch like this, you can't repair just one or two places. You have to work on it "from the bottom up."

Where To Start

The first thing we did on this job was to inspect the entire porch—footings and piers, posts, beams, joists, flooring, railings and columns, cornice, and roof. We sketched out the areas that needed attention, a step we feel is absolutely essential in repair work.

In this type of work, you learn to recognize little clues. For instance, if we see a brown stained area on the porch ceiling, we know water penetration may have damaged the structure. If we see little pellets trapped in spider webs under the porch, we're clued in to the possibility of termite damage. Above all, this first inspection's got to be thorough. You don't want to miss termite damage, carpenter ants, structural weakness, nonexistent footings, rotten wood, gutters pitched the wrong way, mortar failure, or a host of other problems—especially if you're bidding the job at a fixed price.

Start by digging down to the footings. Make sure all the footings lie below frost line. Examine the footings and piers with an awl or pocket knife. If concrete, are they solid? If they're crumbling or severely cracked, they'll need to be replaced (see Figure 1). On this job we found every kind of footing imaginable. The most common footing

Figure 1. *Dig down and you'll find surprises at footing level. This concrete footing, cracked apart, is resting on the original hunk of limestone.*

Patching With Epoxy

Epoxy is expensive, so it's best to use it sparingly. And, you may not be able to find the material in your local hardware store. This means you have to figure out about how much epoxy you'll need, and order in plenty of time for mail-order delivery.

Epoxy repairs are done in two stages. First, we use a very liquid epoxy, called a consolidant. Drill tiny holes through the rotten wood. Mix two parts of the consolidant epoxy according to manufacturers' instructions. Mix very small batches. We use a foam coffee cup for mixing and to apply the stuff. When you put the two parts together, the epoxy generates a lot of heat. (Watch out for coffee cup melt-down, which can occur if you try to mix too much at one time.) Squeeze the coffee cup and dribble the epoxy into the tiny holes.

An empty, squeezable mustard bottle with a tapered top will work too. Load the epoxy from the mixing cup into the squeeze bottle; then inject the epoxy into the holes. Make sure you have epoxy solvent on the job. (get this from the manufacturer when you order your supply.) Otherwise, the bottle clogs up quickly and you won't be able to use it more than once. The consolidant hardens as it dries, turning the wood into "petrified wood." The wood absolutely will not absorb moisture once it has been consolidated. This works great for solid column bottoms, normally made of end-grain wood, which soaks up water like a sponge.

The next step is to fill the wood with epoxy filler. Usually the manufacturer gives you a waiting period for this step—between 6 and 24 hours. We normally use Abatron epoxies because they're close by and we're used to working with their materials (Abatron, 33 Center Dr., Gilberts, IL 60136; 312/426-2200). You mix up an epoxy filler that looks like wood dough and apply the filler to the rotten areas you've just consolidated. The filler bonds to the consolidant. When the filler dries, sand it with ordinary sandpaper. If some areas need to be filled, you can build up a thick coat of this filler and shape it with a rasp.

was, simply, six unmortared bricks, stacked criss-cross, a foot below ground. We also found cinderblock props, crumbling concrete, and wood blocks.

Next, you inspect posts and beams to see if they're structurally sound. Check for sagging, cracked, or rotten timbers. When you walk on the porch does the floor feel springy beneath your feet? measure the size and spacing of material. Are they adequate for the span? Older buildings sometimes used smaller-dimension lumber with a greater spacing than the code allows today. If you have to repair the substructure anyway, you might as well replace it with framing that meets code. Otherwise, if the substructure is generally sound, you can divide the load by placing anew beam in the middle of the span.

Where rain or snow hit the edge of the porch flooring, you'll often find water damage, especially if the water doesn't drain off quickly. On this job we found extensive damage in a 2-foot ring around each column. This was our first clue that water damage was related to column construction. The porch floor looked worse from the underside than it did from the top. The minimum pitch for a porch floor is 1/4 inch per foot. We checked the porch with a level; in some places the porch dropped 2 inches per foot in the proper direction; in others, it sloped the other way, with water running onto the porch.

Inspect the columns and balustrade. With solid columns, you'll have to make sure the lumber is structurally sound by poking the column base with a scratch awl. Here we had boxed columns, so we opened them up to check the internal structural member (see Figure 2). These were supposed to be supporting the roof structure. Instead we found that the built-in gutters above had rusted through, turning the tops of the columns into a funnel.

Figure 2. *Columns wrapped in 1x stock conceal hidden damage. Take the columns apart very carefully because much of the material can be reused.*

Water had funneled from the roof into the entire lower structure and caused extensive damage (see Figure 3).

We also made another appalling discovery. When we took apart the columns of the original porch (the front section), we looked up into the chamber at the top of the columns expecting to find a beam. There wasn't one. We could see 2x4 rafters, 24 inches on-center, with a 17-foot span. The rafters were toenailed to the wall. They'd been nailed with 20-pennies, but the nails had pulled all the way out. Sitting on top of this flimsy platform was a scabbed-on room. We had planned to take the roof down anyway, but the discovery of the undersized rafters and the missing structural member caused us to approach demolition with extra caution.

Figure 3. *The post looks like it's been nibbled by beaver, but it's actually water damage.*

Our first indication of the roof's structural damage had been peeling paint around the tops of the columns. Peeling paint indicates the presence of moisture, especially when the wood beneath the paint is stained and discolored. Left unchecked, the moisture promotes rot. If the roof is leaking, spread tarps over the roof and allow the wood to dry before you start repairs on either the substructure or the roof. A lot more becomes evident when wood dries. You can thump dry wood and tell if it's damaged. Sometimes a piece will surprise you. It may look water stained, but when it dries out, it's fine.

Start at the Bottom

After the initial assessment, we plan how to repair each of the problems we've identified. We always start at the lowest point of degeneration.

Footings and piers. You can't do structural work until you have good footings beneath the structure. Brick or block footings and piers can be repaired by repointing, if the masonry is in good shape. If the piers are exposed and an important design element of the porch, find a mason who can mix mortar to match the old. Wide Brixment joints will spoil the appearance of a repair job. If you need to replace piers, concrete footings and piers (if historically acceptable) would be the route we'd go. Replacement requires jacking and temporary supports. If the beam above the posts is solid, you can set jacks under the beam (see Figure 4). If the beam is not solid, jack under the floor joists (see Figure 5). Jacking under the floor joists will also let you replace the beams as needed. We used hydraulic jacks (22-ton) because we didn't have much working room under the porch. (The long handle of a screw jack won't work in tight spaces.) Hydraulic jacks are easy to move around, but you can't trust them completely, so we always shore with a solid post to solid blocking. We use 4x4, 6x6, or 8x8 jack posts with a 1/4-inch steel plate (the same size as the post) on top of the jack. The steel keeps the jack from driving into the end grain. We place the jacks on cribbing so we don't drive them into the ground.

Before raising the structure, we take benchmark measurements at the points we are jacking. We measure the distance from the floor to the ceiling and the floor to the soffit, because we want to see if the whole thing is moving up as we jack. If the column and header are crushing as we're jacking, we stop and rearrange the set-up. Sometimes we need to go out to the yard and jack the roof. In that case we build an A-frame brace to support the roof load.

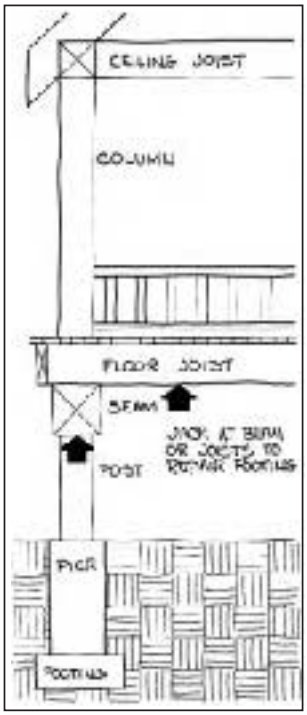

Figure 4. *Arrange jacks on either side of posts or columns to carry the loads during repair. Note the relationship between the beam atop the column, the column, and the beam below the column. This is the straight path the loads will follow.*

We may jack against 4x4s placed against the rafter seats.

After we've made sure the jacking setup is working, we jack up the beams or joists just slightly—enough to relieve weights from the posts. Then we remove the existing posts, which are often rotten. If we can salvage them, we mark their position for re-use. If more than one jack is being used, we jack equally to distribute the load evenly among the jacks.

Once we have the posts out and the structure supported, we dig below frost line and pour new footings and piers to 8 inches above grade. Anchor bolts should be centered in piers to accept metal post brackets, centered on the piers. On this job we eventually dug 32 new footings by hand and poured concrete with buckets. We only had 2 to 4 feet of head room so this part of the job was literally a pain in the neck. The structural work below the porch floor would eventually be hidden by a lattice screen.

Posts and beams. We take out any beams that need to be replaced while the structure is jacked. When we put in the new beams, we cut the spans from 20 feet to 10 feet by adding extra beams. I prefer to use douglas fir instead of pressure-treated lumber. Even though this porch is outside, it is protected by the roof, and the substructure will be protected by the painted porch floor. Rot shouldn't be a problem because the space is so well ventilated. Once we're ready to set new posts, we lower the jacks until the porch has the proper pitch. Next, we measure the dis-

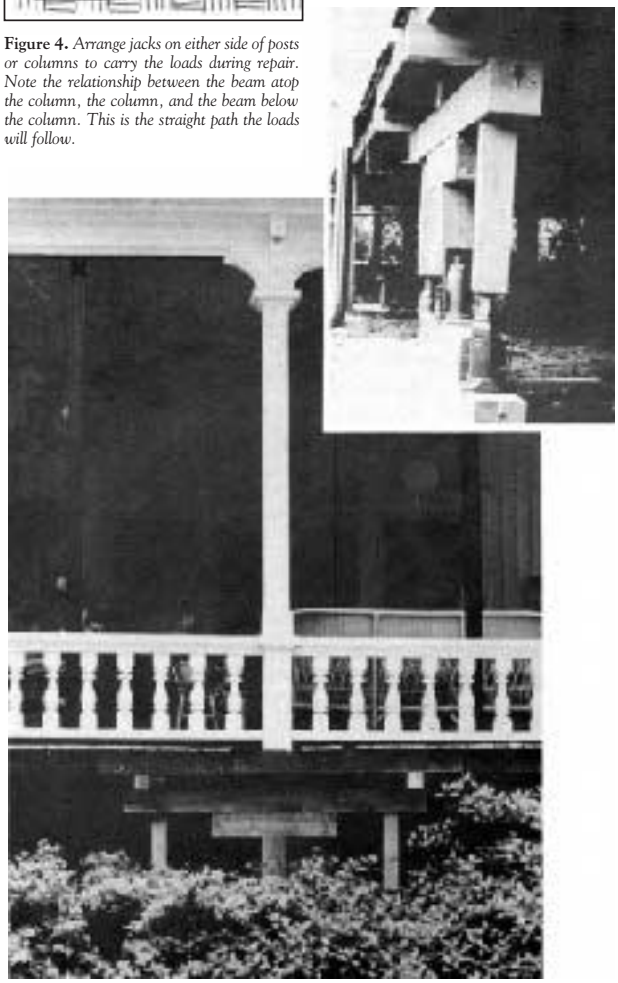

Figure 5. *Jacks support the floor joists while a beam is being repaired. Make sure the jacks sit on a solid base (inset).*

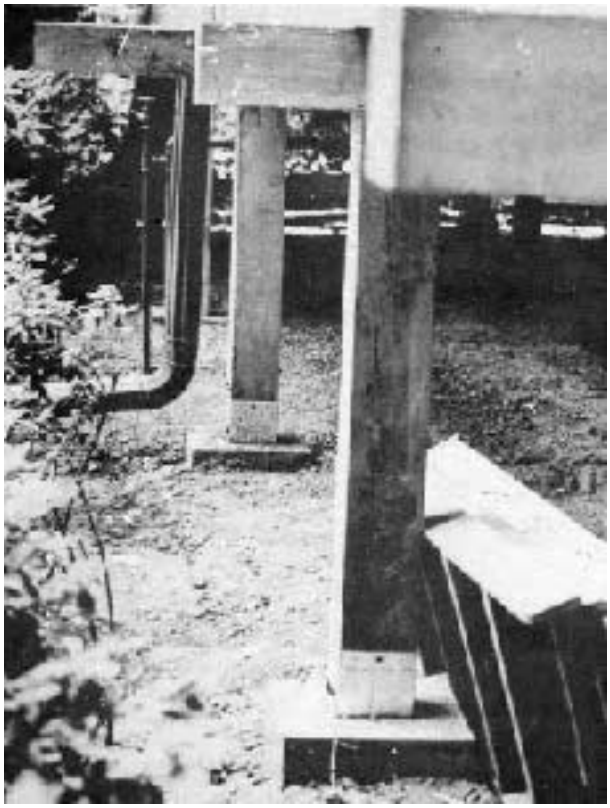

Figure 6. *New posts are in place. The post-anchors will reduce future water damage.*

tance between the beam and the pier or post-bracket and cut the post to size. We install it by raising the jack enough to slip in the post. After we plumb the post, we remove the jack (see Figure 6).

Floor joists. We sistered all broken, stressed, or inadequate floor joists, and replaced all those that had rot or termite damage. We also had to add joists in between the existing 2x6s to beef up the structure. The owners use this as an outdoor room all summer long, so it needed to support a full load of people.

Floor. We replaced sections of the tongue-and-groove flooring with douglas fir porch flooring (see Figure 7). We prime the new floor boards before they go in—edges too. We swear by Benjamin Moore's "Maxim." It's used to maintain a wooden roller coaster at our local amusement park, and it's worked great for us as a primer. You can go over it with any kind of oil paint.

Figure 7. *The thermos jug marks the spot where new tongue-and-groove porch flooring begins. Douglas fir flooring to match the old is still available.*

Columns and railings. The columns are both structural and ornamental. They are generally worth repairing due to the high cost of replacement. We repair with epoxy or with wood patches to avoid the headache of duplicating the original pieces.

We didn't need to on this job, but occasionally we remove the columns for repair. To do this, you need to jack against the roof beam. It's best to remove any finish material and jack directly against the beam.

You don't need to raise the roof structure a lot; 1/8 inch will do. If the substructure is completed, you can jack from it. Make sure you support the roof load securely on braces before you remove the columns. Use a saber saw or hacksaw blade to cut through the nails at the top and bottom of the columns.

There are three ways to repair columns. First, if the column is not solid (the middle may be made of 2xs nailed together), simply replace the core with new lumber. You may need to rip down 2x6s or 2x8s to get the same nominal dimension as the original columns. Make up new column interiors by nailing this lumber together. Then repair the column casing with wood patches or epoxy as described below. When you reinstall the column interiors, it's best to seat them in metal post brackets. The post bracket will allow water to evaporate from the bottom of the column and prevent future deterioration.

The second repair technique uses traditional "scarf" patches. For solid columns, you may find that part of the base is completely rotten, while the rest of the column is in good shape. You should use the same type of wood as the column for repair or you'll get two woods that expand and contract at different rates. You'll soon have a joint or crack appearing. Common woods used for solid columns are pine, douglas fir, and cypress.

We prime the replacement tongue-and-groove floor boards with Benjamin Moore's "Maxim." It's used to maintain a wooden roller coaster at a local amusement park, and it's worked great for us.

First, cut out the rotten area carefully and square the corners. Use a rasp to take down high spots. Cut your new materials so it is a tight fit. Don't worry about the top surface. You can take that down with a chisel, rasp, or plane later on. Make sure the grain runs the same way, or you may have problems planing. Don't rely on white glue and acrylic caulk to hide poor craftsmanship; use a good epoxy to secure the patch.

A third technique we use to repair rotten column bottoms or decorative railings is epoxy repair (see "Patching With Epoxy"). Epoxy repairs and wood patches can be used on the same job. Both can be primed and painted with regular paint. I've been repairing exterior wood this way for nine years, and I've never had a problem. Good paint prep and application are paramount. The extra effort put into a proper paint job will pay off in the long run. Don't leave the epoxy exposed to sunlight once it cures because the epoxy degrades.

Railings should be repaired or replaced as needed in the same manner. After you scrape off loose paint, you will see rotten wood. Remove or flake out rot from areas and allow the wood to dry. Fill with epoxy and prep for paint. Turned balusters with square ends beyond repair can also be saved. Cut the baluster where the turning ends and the square begins. Dowel and glue a new block of the same size to the turned end (see Figure 8).

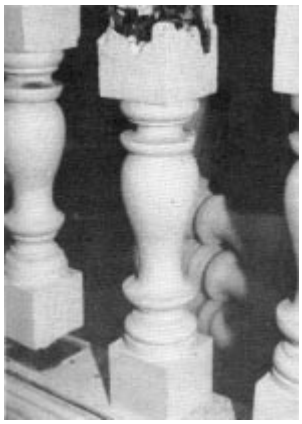

Figure 8. *Balusters decay at block ends. Cut off these ends and repair with a doweled block to save the expense of turning new balusters.*

Ceiling. The ceiling needs to be scraped thoroughly and prepped for paint. You'll see where the problems are after you finish scraping. Falling or sagging ceiling boards or flaking paint point to a problem with the roof. Repairs to the ceiling are similar to those for the floor, because it too usually has tongue-and-groove material. You can still get "porch beading" at many lumberyards.

Cornices. Repairs to cornices and related moldings should be handled in much the same way as discussed previously. Paint builds up on moldings but a thorough scraping brings out the detail.

Any moldings to be replaced should be matched to that existing. To replicate a molding, we begin with a clean stripped sample to get an accurate profile. If you can't match it at your local lumberyard, you may need to go to catalogues or to a millwork shop. If you have a very small amount of molding to duplicate, you may be able to buy something close and shape it with a hand plane to conform. For small pieces, we use antique planes. For larger pieces, we use a simple Bel-Saw molding machine. It's the size of a table saw, and we can move it from job to job. We get much quicker turnaround on our cutters by ordering from an independent supplier (Wanager's Custom Knives, 536 East B. Ave., Kingman, KS 67068). He sends us the knife in two days, but ordering from Bel-Saw takes six to eight weeks. We have touched on the basics of porch repair from bottom to top and tried to represent common problems and solutions to repair. As preservationists, we strive to repair when possible and to replace in kind with matching material and craftsmanship when necessary. ■

Maureen and Peter Nicolazzi are Carpenter and Smith Restoration, Highland Park, Illinois.