Replacing a Mudsill

Careful bracing inside and out holds a house steady as rot is removed

BY BILL PHILLIPS

Repairing rot was never one of my career goals. It just seemed to happen, along with the new-construction and remodeling projects that I picked up. As I began developing my building business, I discovered that few of my competitors seemed interested in repairing structures that had been damaged by water and insects. That's probably why my crew landed some of those repair jobs. In the process, though, I ultimately found a great deal of satisfaction in turning a waterlogged mess into a solid and long-lasting repair.

Our clients were people like the young woman, a first-time homeowner, who called a home inspector when she noticed a piece of deteriorating siding. She had bought the house assuming that it was solid, and from the outside, that's just the way it looked. But the inspector found that extensive rot lay beneath the siding (photo above right). The one-piece 4x10 mudsill, which also served as a rim joist, had been badly damaged over the years from a combination of termites and a damp location near a stream. About 80% of the existing mudsill would have to come out and be replaced with new material (photo above left).

Built entirely of southern yellow pine in the 1940s or '50s, the house otherwise seemed sturdy. With relatively simple equipment, we tackled the job methodically, removing and replacing the sill one piece at a time. We raised the house with jacks and suspended it with stout braces. The house never budged as we completed repairs.

Exterior posts and railroad jacks do most of the work

I started by visiting a rental company in town that handles everything from dump trucks to champagne glasses. I had nosed around before and knew that they had jacks that, I was told, were designed to lift railroad cars. These jacks, while expensive, are readily available new

An unwelcome surprise
A homeowner noticed some deteriorating siding. Out of sight, termites had done their work. It became necessary to replace most of the mudsill, the large wooden framing member that rests directly on the foundation.

with lifting capacities from 5 tons to 20 tons. The jacks that I chose had a 10-ton capacity. They were probably more than we needed, but they seemed like the ticket for taking the weight off the sill.

Beneath the house, where we installed new carrying beams to supplement the girders that already were in place, we used 10-ton hydraulic bottle jacks that are both compact and powerful. In all, I'm sure we had more lifting capacity than we needed for this single-story house, but I preferred erring on the safe side rather than discovering too late that we didn't have enough.

We peeled off the top layer of the siding so that we could attach a 2x10 to the stud wall (photo top right). Along with a second layer of 2x blocking, this member would bear the strain of the jacks, so we used two ½-in. by 6-in. lag bolts at each stud. By locating the 2x10 at the top of the stud wall, in a position immediately below the top

TAKING THE WEIGHT OFF OUTSIDE

A post made of four 2x4s is toenailed to a 2x10 that's lagged to the stud wall, helping to spread the load among several studs. A 10-ton capacity railroad jack raises the assembly.

Angled jacks raise house in ¼-in. increments. Plumb jacks would have been better, but circumstances did not allow them. Clearance of 16 in. to 18 in. from the house created a safe lift and room to work.

Drawings: Christopher Clapp

TAKING THE WEIGHT OFF INSIDE

Because the original sill supported the joists, they needed to be propped before the sill was removed.

These 2x4 braces support the floor joists.

plate, we minimized the risk of pushing in the walls as we lifted the house.

We ran the 2x10s the full width of the wall to distribute the load as evenly as possible. We used two railroad jacks to work a 12-ft. to 14-ft. section of wall at a time. The jacks were never more than 7 ft. or 8 ft. apart.

We made jacking posts by nailing four 2x4s together. Each post rested on an L-shaped lip on a jack (bottom photo, p. 89). The jacks sat on pads made of 2x10 blocks set into soil I tamped with a 6-lb. sledgehammer. These jacking posts were toenailed to the bottom of the 2x10 (drawing p. 89), although I later devised a method of notching jacking posts, ensuring a better connection.

The posts leaned in toward the house at an angle that seemed right, safe and solid, what I call "gut-level engineering." I would add, however, that I call on structural engineers when a job calls for lifting serious loads beyond the collective experience of my crew, the building inspector or the architect we might be working with.

Easy does it with the jacks

With siding removed at the bottom of a wall section and jacking posts in place, we would crank on a jack until it started to feel tight, or until we could hear the framing groan slightly. These ratcheting jacks moved the posts only a little with each push of the lever, probably no more than ⅛ in. The idea was not to lift the house into the air, but just to take the weight off the sill so that it could be removed. We checked periodically inside the house to make sure we were not cracking any plaster.

Once jacks were holding the weight of the house from the outside, we moved operations to the crawlspace and supported each joist with a 2x4 brace (photo left). The 2x4 posts are toenailed to a 2x10 that is lying flat on the crawlspace floor near the foundation wall. We tapped the 2x4s into place and secured them before removing the section of sill nearby.

After both the wall and the floor framing were supported, we could begin cutting out a section of the rotten sill. The original floor joists were notched to fit around a 2x4 ledger that was nailed to the sill (drawing facing page). This ledger also was rotted and required replacement. A reciprocating saw was our constant companion; armed with the saw and a metal-cutting blade, we severed the nails holding a section of sill in place and eased it out. Each section of sill that we removed was replaced the same day, so the jacks were never left unattended to support the house overnight.

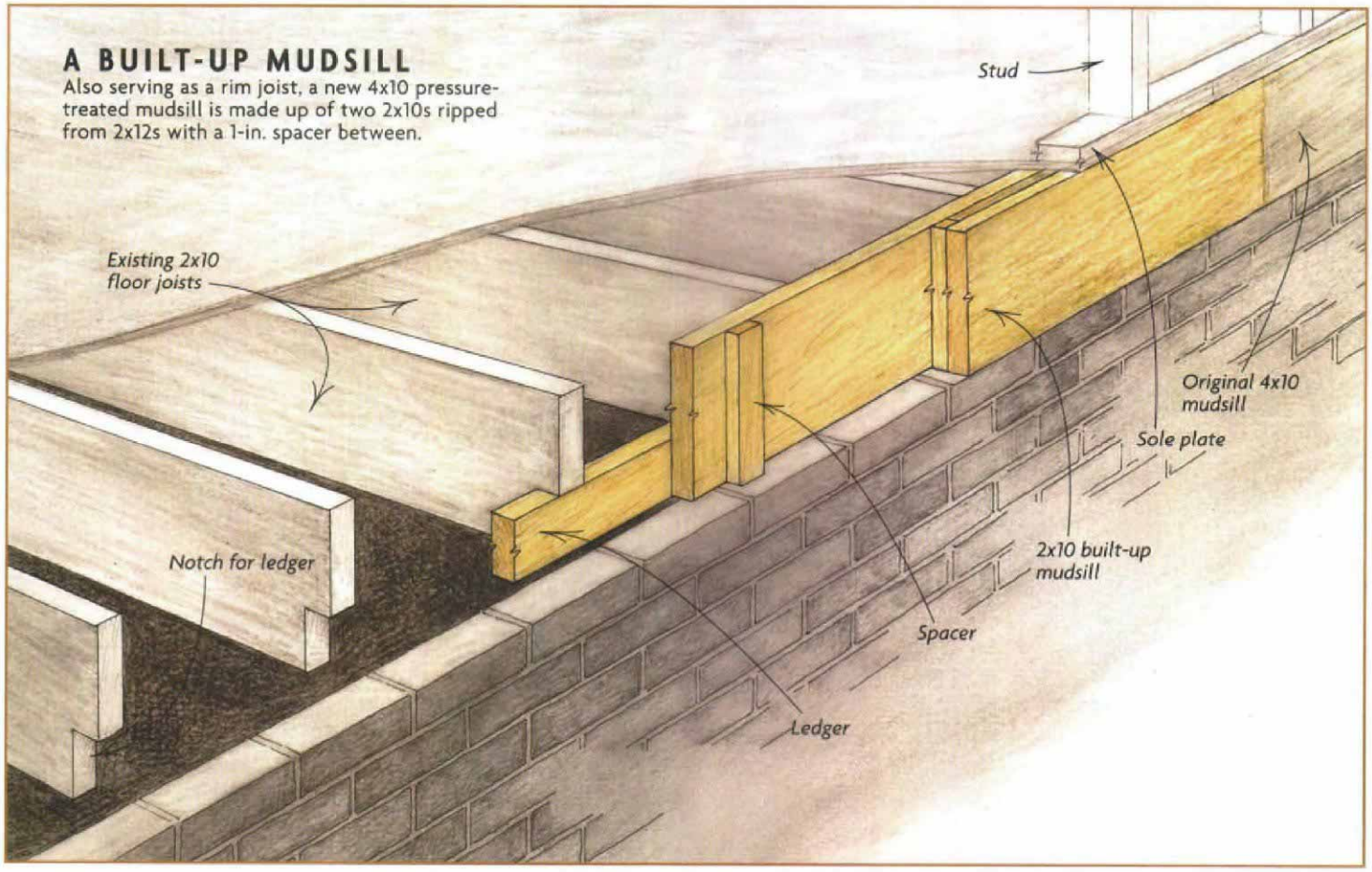
Replacing rot with solid wood

Although damage in most areas was limited to the sill, there were some lower-wall sections that also needed repair. All the lumber we used to replace rotten wood was the best grade of pressure-treated material we could find. We used material that had been kiln-dried both before and after treatment so that it would not shrink after repairs had been made. Because the original sill was a full 4x10, replacement pieces were ripped from 2x12s. Spacers, which brought the thickness of the new sill to a full 4 in., were made of the same pressure-treated material.

After finishing work around the exterior, we had to face the inevitable: working in the tight space under the house. Fortunately, there was no wood that needed replacement below, but there were sagging beams that needed reinforcement, and some general repairs and tidying up to do. The bottom of the bridging between joists, for example, never had been nailed in.

At the back of the house, we had enough clearance to scoot around, but working under the front section was a matter of squirming on elbows with barely enough room to roll over. I decided that we needed to dig an access trench into that area to get tools, materials and ourselves in and out more easily. We made an opening through the brick foundation and dug a trench about 8 in. deep and wide enough to crawl through (a couple of small picks and foxhole shovels from an Army surplus store came in handy). We built a wooden tray with a metal bottom that would slide easily. At each end of the sled, we attached an eye bolt and a rope. The person digging under the house would pull the sled in and fill it with dirt; someone on the outside pulled the full sled out to empty it.

Beneath the sagging beams, we built new supporting timbers from pressure-treated 2xs and then jacked them into place with the bottle jacks. The new beams were supported at each end, either resting on brick that went down to the original pier footing, on a wooden brack-



et supported by brick or by a steel L-bracket bolted to the brick pier wall.

A further complication was the brick stoop at the front of the house. It was clear we had to demolish what was there and rebuild. Not only was the rubble-filled brick construction weak, but the stoop also had been built tight against the sill and provided a path for termites to enter the structure. To reduce moisture, we built a new set of ventilated steps with a suspended slab supported by a corrugated-steel form (photo right). Galvanized flashing primed with red oxide paint was placed between the stoop and the house to prevent water damage.

Adding details to prevent future water damage

Time, moisture and neglect had contributed to the extensive problems the homeowner had to correct. When structural repairs were complete, we took steps to prevent a recurrence beginning with treating the foundation for termites. In the crawlspace, we spread 6-mil plastic over the dirt floor. It helps to prevent moisture in the soil from migrating into the crawlspace. We also trenched around the house, waterproofed the foundation and backfilled the trench with gravel and a perforated pipe that drains about 40 ft. from the house. We refilled the working trench under the house so that it wouldn't invite any ground water, and we repaired the new access hole in the foundation wall.

Eventually, the woman who hired us sold the house. But this time, she was confident the new owners would not inherit any hidden problems. The house's value has done nothing but rise. □

Bill Phillips is a builder in Durham, NC. Photos by the author.

VENTILATION FOR A NEW SET OF STEPS

A new front stoop includes vents to evacuate unwanted moisture and a concrete slab cast on corrugated steel. Galvanized-steel flashing protects the house. Repaired, painted and adequately drained, the house is as structurally sound as the day it was built, this time with preventive measures that should keep it that way.