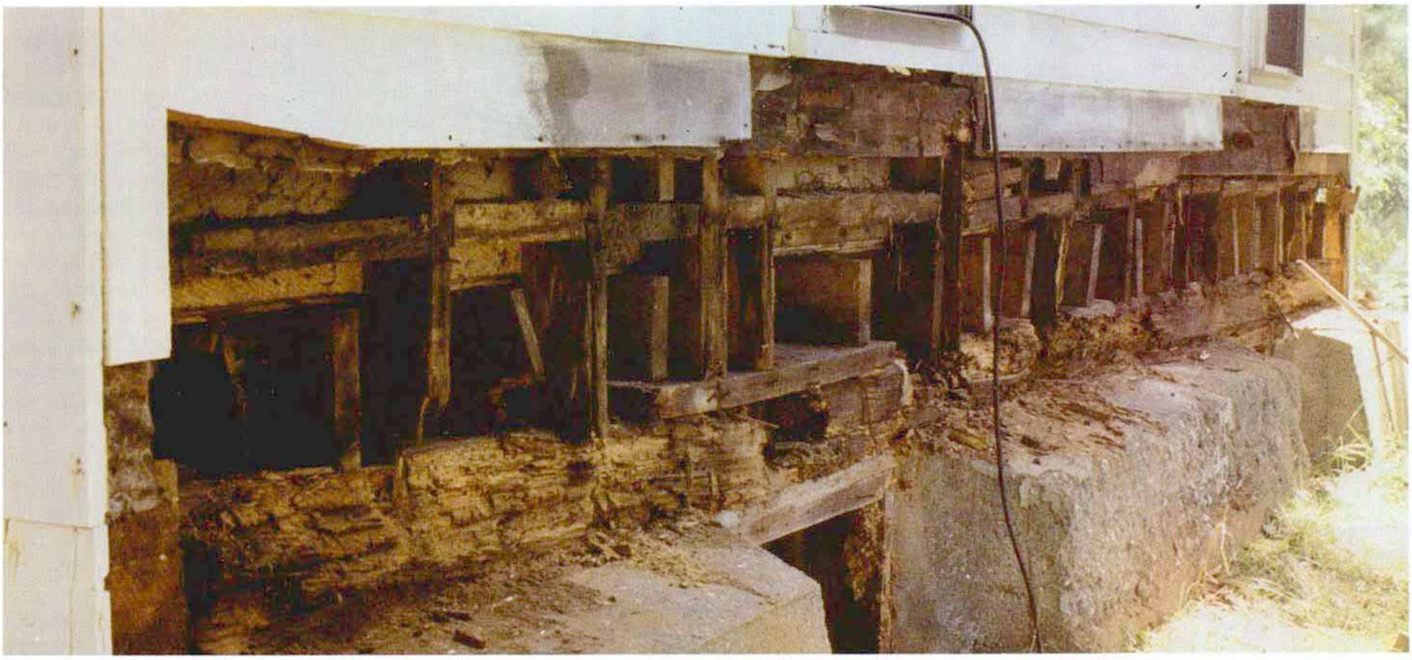


Replacing Rotted Sills

It's a dirty job, but somebody's got to do it

by George Nash

The heavy clay soil of northern Vermont is notorious for its poor drainage. Before the era of the backhoe and dump truck, foundation walls were usually backfilled with the soil taken from the cellar excavation. If this happened to be gravelly soil, then the dry-laid fieldstone foundation walls would remain in place. If not, they would inevitably begin to heave inward.

Another problem with these dry-laid foundation walls became apparent each spring as the water table rose, or especially after a heavy rain; water washed into the cellar through the cracks between the stones.

Heavy equipment and transit-mix concrete allow present-day renovators to remove a failed foundation and replace it. Carpenters of an earlier generation did not have this luxury. In the attempt to shore up a heaved wall or to prevent water infiltration, they would often pour a sloped concrete wall directly against the old stone; sometimes on the inside, but more typically on the outside. This "buttress" wall would sometimes extend to the bottom of the foundation, but it would often end wherever the ditch diggers felt was deep enough.

The bulky, spalling buttress wall was the first thing I noticed about the house that Will Leas and Lisa Dimondstein hired me to help renovate. The house had begun life as a hunting camp some 50 years ago. Over time the camp had been tinkered with and remodeled until it was almost a regular house. The Dimondsteins were following a long tradition when they decided to give the house a facelift and upgrade its energy efficiency. Leas had discovered and repaired a section of rotten sill along one wall the previous year and suspected that there might be more decay behind the mildewed clapboards on the remaining walls.

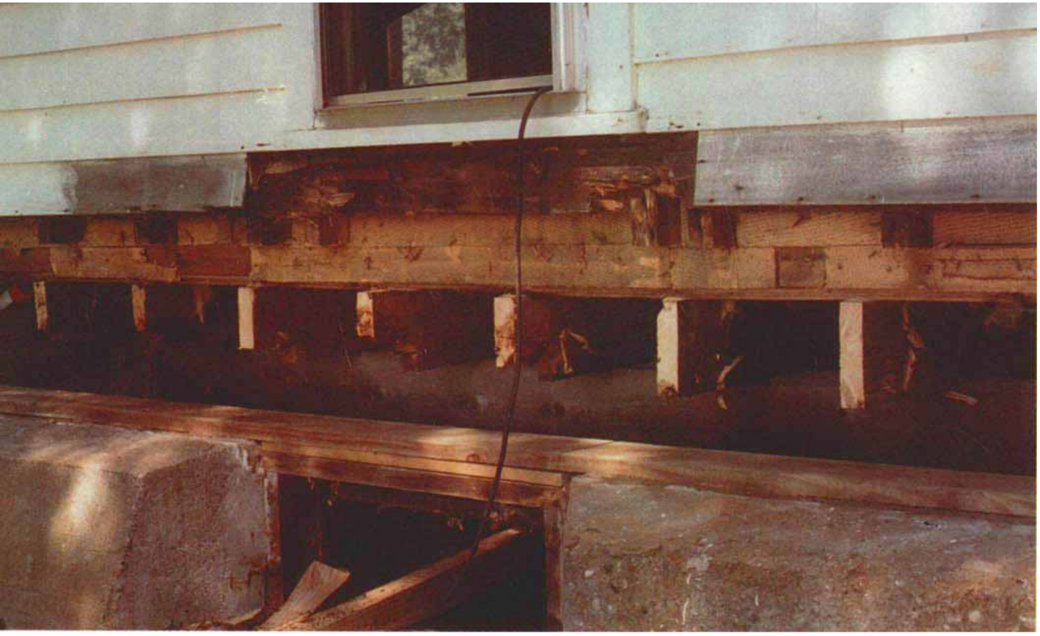
Finding fault—Structural rot is not always apparent. When probed with an awl from the cellar side, the timber sills felt as solid as new wood. There was no evidence here of rot caused by a dank, unventilated cellar. On the outside, however, the bottom edge of the siding was punky where it slipped behind the top of the buttress wall. I was hoping that a simple flashing installed over the concrete and up under the first course of clapboards might be all that was needed to halt damage.

When probed with an awl from inside, the sills pictured above felt solid, but mildew and signs of decay on the clapboards outside suggested otherwise. The concrete wall, used to buttress the old stone foundation, had no flashing or drip cap on top of it, so water seeped behind the wall and into the sills, joists and studs.

We inserted flat bars under the edge of the second course of siding, loosened the nails and removed the first clapboard. Like a vampire shrinking from the noonday sun, the freshly exposed sheathing board virtually crumbled into compost as it was revealed. The next clapboard was removed, and yet another. Still the decay continued upward, joining a vein of rot that had begun under the window sills. I was beginning to wonder what had held those clapboards on the wall.

With a nail-eating carbide blade in the circular saw, I sawed along the bottom edge of the sixth course, removing all the siding below the window sills. Feeling like a surgeon probing a malignant cancer, I removed the sheathing boards. What remained of the timber sill would have made an excellent medium for growing mushrooms. The decay had progressed into the ends and bottom edges of floor joists that rested on the sill and continued up into the bottom of the wall studs (photo above).

Surprises such as this are what make renovation work so stimulating—and so difficult



After cutting back the studs and joists (above) to a point where there was solid wood, the author capped off the old stone foundation with mortar and nailed down a pressure-treated 2x10 mudsill.

Rebuilding (above) involves a lot of improvising based on the configuration of the original framing, the extent of the decay and the materials at hand. Here the author added doubled sole plates to the stud wall, a 2x10 rim joist to cap the joist ends, a 2x6 on edge under the joists and blocking.

To prevent future rot, the author blocked water access by installing lead flashing between the sheathing and the concrete wall (below). Lead conforms well to the irregularities in concrete and lasts indefinitely. However, exposed lead is a health hazard, so the flashing had to be painted.

to estimate. To protect myself against financial ruin, I had long ago learned to stipulate in bids and contracts that any decay discovered in the course of a job would be repaired as an extra at cost plus. The extent of rot or insect damage can seldom be determined until walls are ripped apart and the bones of the house exposed. Here was a case where a barely noticeable lesion—the punky first course of siding—concealed lethal structural decay.

The irony of all this is that the damage and subsequent repair work could have been avoided if a drip cap or simple flashing had been installed when the buttress wall was poured. Why this was not done eludes me. Perhaps it was ignorance or laziness, but I have seen many such walls over the years, and except for a desiccated bead of caulk between clapboard and concrete, nothing protected this problem zone.

The buttress wall had been poured directly against the siding, forming an exquisite water trap. The old building paper soaked up moisture like a paper towel and held it against the sheathing. Ventilation was discouraged by the painted siding, which was relatively rot-resistant red cedar. A more ideal environment for decay-producing fungi would be hard to build. Thus the rot grew inward, first through the sheathing boards, then into the framing. The sills were hardest hit because they rested on masonry, which tends to draw water.

Structural support—Once the rot had been exposed, we had to determine how to support the structure while the sills were removed and replaced. Most of the rotted sills that I've replaced have been on timber-frame houses. And the salient feature of the timber frame, at least from a structural point of view, is concentrated loading. Unless it carries the floor joists or girt, removing a portion of sill between posts is not hard because there is little or no load on it. But where the sill supports a post, the entire load carried by that post must be relieved before the sill is removed. At times this can get tricky.

The situation is much easier with a stick-frame structure. Here the load is distributed along the entire length of the sill. Now one might suppose that this would complicate things, but since the actual portion of the load at any given point is quite small, rather large sections of sill and attendant framing can be removed with impunity. The web of framing, siding, sheathing and interior finish also help to distribute the load and support itself so long as some portion of the wall is left to bear on the foundation. An adjacent section of wall will often support the corner of the building, while the sill directly under the corner is removed, which is not always the case with timber-framed walls. I am continually amazed by how much sill can be removed and how little support is required to maintain the structural stability of a stick-framed house.

Of course, it is wise, in either case, to err on the side of caution. Experience will guide you, but cracking the interior wall finish or ex-

Drawing: Michael Mandarano

ploding a window is not a particularly gratifying way to learn.

This particular house was a bit unusual. The hand-hewn 8x8 sill beams had obviously been salvaged from an older structure. These supported rough-sawn 2x4 studs toenailed directly to the sill. The floor joists ran perpendicular to the gable wall and were also supported by the sills, so the roof load was separate from the floor load. That meant there would be less of a problem supporting the walls while the sills were removed.

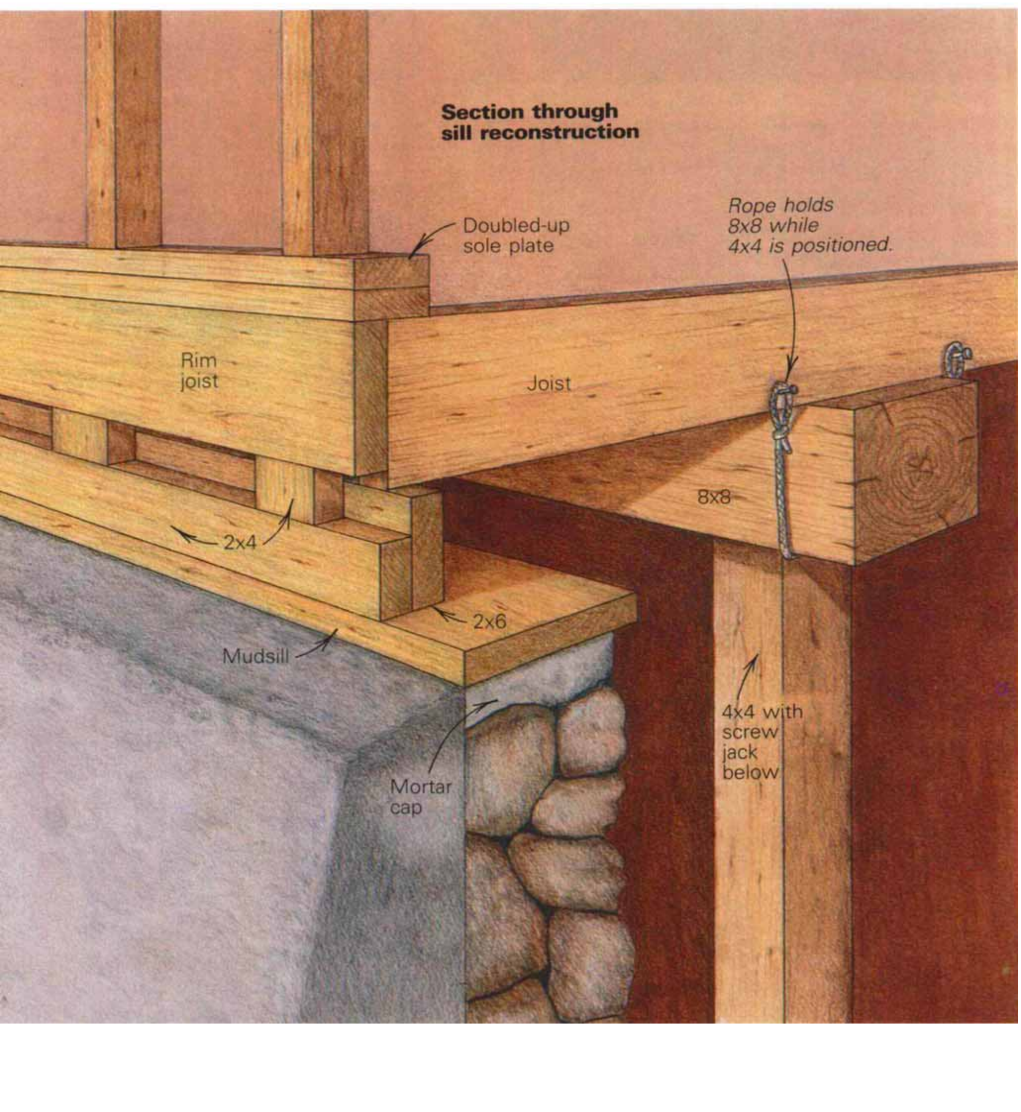
We maneuvered a 16-ft. 8x8 timber into the cellar through the window opening and hung it from ropes just under the floor joists. This way we didn't have to worry about the timber crashing down on our heads while we positioned the jacks and uprights. We kept the timber far enough back from the sill that we could work on the sill from inside if necessary. I use hydraulic jacks if I'm actually lifting something, but here I was merely supporting the weight of the floor, so I used several screw jacks and 4x4 posts under the timber.

In with the new—Once the floor load was supported, the sill could be removed about 12 ft. at a time (half the length of the wall) before we had to reposition the jacks and timbers. The inside portion of the sill was still solid, so I sawed it into bite-sized portions with a reciprocating saw. The pieces were easily pulled free with a prybar. The nails securing the studs to the sill had long since rusted away. To avoid splitting the bottom of the floor joists, which were mostly sound and nailed with 30d spikes, I cut them free with a nail-cutting blade in the reciprocating saw.

The dry-laid stone foundation was uneven and covered with dirt and debris. I sprayed the stones with water from a hose and wire-brushed them clean. Then I capped them with mortar, troweling the surface level to the top of the buttress wall, eliminating the watertrap. We drove 20d galvanized spikes through a 2x10 pressure-treated mudsill, then set the sill on the wet mortar so the nails would anchor it. The mortar was left to set up until the next day before we proceeded.

I squared the ends of the floor joists (top photo facing page), making allowances for a new rim joist flush to the outside edge of the new sill. An additional pressure-treated 2x6 on edge supports the underside of the joists, replacing the timber sill (drawing below). This left a gap between the top of the mudsill and the bottom of the rim joist, which I filled in with a horizontal 2x4 on edge and a series 2x4 blocks (middle photo facing page and drawing below) to provide nailing for the sheathing boards. Once the joists were supported, I sawed off the studs above the rot and then installed a pair of sole plates to support them. For additional rot protection, we coated all exposed edges of existing framing with Cuprinol #10 Wood Preservative (Darworth Co., 50 Tower La., Avon, Conn. 06001).

The stud cavities were refilled with fiberglass batt insulation. Fortunately for us, the walls had not contained loose-fill insulation, which would have made quite a mess. Had it contained loose-fill, I would have plugged the cavities with rolled-up batt insulation to prevent the loose fill from spilling and then blown in new material after sheathing the walls.



Shim, sheathe, flash and finish—In a perfect world, the new 1-in. rough-sawn sheathing boards would have lined up flush with the old. But the old sheathing varied in thickness, and I found myself using ¾-in. stock in some places and furring it out with the remodeler's most useful tool—the cedar shingle. Also, the new straight sill didn't line up exactly plumb to the old irregular wall. A straightedge held vertically over each stud established the amount of shimming required to align the old wall with the new sill before applying sheathing boards. I stapled up a layer of resin-coated building paper to seal the boards against air infiltration (a high-tech house wrap, such as Tyvek or Typar, would have been better, but I only needed a little and couldn't get a partial roll).

To make sure that no more water would get in under the siding, I installed 8-in. wide lead flashing (bottom photo facing page). Lead is ideal for this purpose because it conforms to every irregularity in the concrete and is flexible enough not to tear or split. It lasts longer than galvanized steel or aluminum, and it is cheaper than copper. Federal Housing Authority regulations prohibit exposed lead where it can be touched by animals or people (chimney flashings are okay, for instance), so Leas had to paint the metal. He used metal primer and enamel from Rust-Oleum Corp. (11 Hawthorne Parkway, Vernon Hills, Il. 60061). I sealed the flashing to the concrete with a bead of Geocel acrylic copolymer (Geocel Corp., P. O. Box 398, Elkhart, Ind. 46515). This is an excellent choice wherever dissimilar materials are to be joined because it is extremely flexible over a wide temperature range, and it's very sticky. Finally, I plugged the nailholes in the original siding with latex painter's caulk before renailing.

Repair and replacement of rotted sills is a highly idiosyncratic procedure. Improvisation and extrapolation from previous experience must guide you to the best approach. Take time to visualize the downward flow of the loads, the connections of the frame and what each member is carrying; it will become obvious where support is critical and when. □

George Nash is a builder and writer who lives in Wolcott, Vermont. Photos by the author.