



Built in 1884, the mansion had a number of different plaster finishes. Here, Ron Bisson applies brown coat to a textured wall using a putty knife (1) and a trowel (2). Pushing the brown coat hard against the old plaster helps key it in along the edge (3). On large repairs, a 42-inch-long slicker is used to flatten the brown coat using a sawing motion (4).

## Repairing Traditional Wall Plaster

BY RON AND WILLIAM BISSON

**Last fall, we wrote about** a plaster ceiling restoration project we worked on along with helper Derek Dawson in St. Johnsbury, Vt. (see “Repairing Ornamental Plaster,” Nov/18). In addition to doing the ceiling restoration, we repaired numerous textured plaster walls and polished flat plaster walls in the historic 135-year-old mansion. The wall repairs varied from small cracks to a roughly 7-by-10-foot replacement section of polished wall. In this story, we’ll focus on repairing the textured plaster walls (located in the same space as the ornamental ceiling) and give a glimpse into plaster wall restoration work using traditional materials and techniques.

### LIME PLASTER VS. GYPSUM PLASTER

There are basically two kinds of interior plaster used for walls and ceilings: lime-base coat and gypsum-base coat. Lime plaster is a much older interior finish, with a history stretching back more than a thousand years. Gypsum was very expensive to refine until the mid-1800s, so gypsum plaster was used only in the ornamental trade before that time, and only started to appear in northern New England around 1900.

**Lime-base coat.** Traditional lime-base plaster is composed of two coats: a base coat consisting of water, sand, lime, and either wood fiber or animal hair; and a finish coat made of water, lime, and sand. The first coat is scratched in onto wooden lath and allowed to set for seven days, followed by the second coat, which also is allowed to set for seven days. Plasterers would then come back a third time to water trowel the plaster down and polish the finish wall or ceiling smooth. Lime-base plaster takes much longer to dry than gypsum-base plaster and is less durable.

**Gypsum-base coat.** The walls we repaired on this project were gypsum-base plaster (which encompasses both scratch and brown coats) with a lime-putty finish coat. The scratch coat consists of water, gypsum, and wood fiber, while the brown coat consists of water, gypsum, and sand. The finish coat is made from water, lime, gauging (highly refined gypsum), and a retarder (which keeps the plaster from prematurely setting). The scratch coat is applied over the wood lath. Then, the next day, the brown coat is applied over the scratch. The two-coat base is allowed to set two or three days before the lime-putty finish coat is applied. The resulting finish coat is either polished flat or textured while still wet.

On our initial walk-through, we tested the walls by pushing a putty knife into them (if the knife goes through to the lath, it’s lime-base coat; if it doesn’t, it’s gypsum-base coat—gypsum is much harder than lime). A few of the home’s original lime-base-coat walls remained, while most had been redone over the years with gypsum. The remaining few lime-base walls were in good shape and did not need to be repaired.

Photos by Tim Healey and William Bisson

## REPAIRING THE WALLS

Working on historic buildings, we're obligated to save as much of the existing plaster as possible and don't remove stable plaster unless told otherwise. On this project, the architect mandated that we preserve as much of the existing swirled textured wall as we could. For us, the skill is knowing what plaster to remove and what to leave in place.

Starting out, we scraped out damaged areas until we reached sound plaster. Any plaster that had come loose from the lath or "lost its key" was removed. We then meticulously scraped out the gaps between the existing lath in order to key in the new plaster. Next, we cleaned the lath with a stiff brush and then vacuumed it off (vacuuming helps with the bonding agent application).

**Wood lath repair.** In restoration work, it's common to come across damaged lath that needs to be replaced. We mostly encounter sawed lath on our projects (which was the case here), and occasionally split lath. Sawed lath is readily available at most lumberyards, while split lath needs to be custom-sawn at a mill. Typically found in older buildings, it is made from thin,  $\frac{3}{8}$ -to- $\frac{1}{2}$ -inch-thick boards and is generally 6 feet long and between 6 and 14 inches wide. A board is tacked in place, then split and pried apart with a plasterer's hatchet every couple of inches. The resulting split-up board is nailed off with 4- or 6-penny nails. Split lath is not as good as sawn, but on historical work, we always try to match the materials we replace, if possible. This includes whether or not we can use a bonding agent.

**Bonding agent.** Prior to mixing the scratch coat, we wet down the existing wood lath with a pump sprayer and brushed on the bonding agent. A bonding agent is used to help adhere new plaster to old, dusty lath. It's basically made out of alum and it holds in moisture; we typically use USG's Plaster Bonder. On older historical work, a bonding agent was often not used. On those projects, we're therefore obligated not to use one. That means we have to be more conscious of dampening the lath—wetting it more frequently—which adds time to the plaster installation.

**Scratch coat.** One hour after wetting down the lath and brushing on the bonding agent, we applied the scratch coat. The scratch coat is made of water, gypsum, and wood fiber, which helps to stop the plaster from falling through the gaps in the lath when being applied, while also strengthening the base coat.

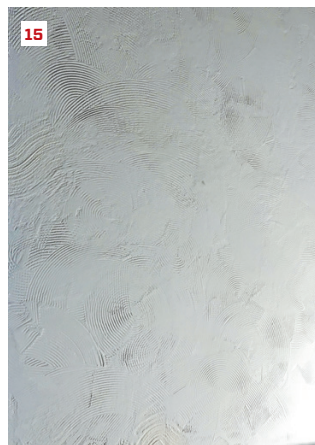
Using a 14-inch trowel, we applied the plaster perpendicular to the lath to a  $\frac{1}{4}$ -inch thickness, using just enough pressure to force it to "key" into the gaps in the lath. We then raked the plaster with a plaster rake in one, smooth motion with a gentle touch (raking helps create a mechanical bond between the scratch and the brown coats). The scratch coat doesn't have to fully set before the brown coat is applied, which we typically do the next day.

**Brown coat.** The brown coat is composed of water, gypsum, and sand. On this project, the plaster walls generally ranged from  $\frac{7}{8}$  inch to  $1\frac{1}{8}$  inches thick. Plaster finish is usually fairly flat, but the underlying framing is typically not—plaster can therefore be very thick or thin in different locations on a wall. The brown coat helps to compensate for the variation in thickness and is applied to accommodate a  $\frac{1}{8}$ -inch-thick lime-putty finish coat—the new



William Bisson applies brown coat to the damaged textured walls (5) and uses a slicker to gauge the straightness of the brown coat at corners (6). He dampens the walls (7), then mixes the finish coat (8). The finish coat is applied to the repaired area with a 14-inch trowel (9) and slicker (10), then the texture is combed in.





On this small crack, helper Derek Dawson uses a putty knife to flatten the new plaster and push it in along the edges (11). The electrical box is set at the proper depth to avoid interfering with the new finish (12). The lime-putty coat is applied in two passes; here, the first pass is made (13). Ron Bisson uses a texture comb to mimic an existing swirl pattern (14, 15).

finish is applied flush with the existing plaster finish.

We applied the brown coat with a 14-inch trowel and firmly pressed it into the scratch coat to flatten it out. Depending on the size of the repair area, we flattened and smoothed out the brown coat with darbies, slickers, trowels, or putty knives. We then allowed the two-coat base to set two or three days before applying the lime-putty finish coat.

**Quick primer on plastering tools.** On large repairs, we need to use a darby or a slicker to help flatten out the brown and finish coats. A darby is a 4-foot-long piece of metal that has two handles, one at each end. You hold one handle while you swing it around in an arc against the wall to flatten it. A slicker (or feathered edge) is a 42-inch-long metal straightedge that's used to plane the brown and finish coats and square up corners. On mid-size repairs, we typically use 14-inch trowels to flatten out the base and finish coats. On cracks less than 2 inches wide, we use 6-inch broad putty knives to flatten and smooth the plaster. We also use the knives to push the new plaster hard against the old plaster and help key it in along the edges of the repair, regardless of the repair size.

**Finish coat.** The lime-putty coat consists of water, "slacked" lime, gauging, and a retarder—the lime being the bulk of the mix. On textured finishes, as was the case here, we add sand to the putty to texture it. "Slacked" lime is lime that has been soaked for a few days. Slacked lime is more pliable, and it blends into itself better. We store the wet lime in buckets and use it as needed. Plaster retarder is added to control how long you want a batch to last. But getting the mix right is tricky: Too much will weaken the plaster and it'll crack; too little, and it'll prematurely harden. Once we mix in the retarder, we add gauging to the lime. The gauging is highly refined gypsum and it serves as the hardener. We have about a 40-minute window to use the batch.

With the lime putty mixed and the two-coat base coat wetted down, we applied the finish coat. Working in concert, William and I applied the textured finish coat. William put the putty coat on in two passes; the first pass was applied with pressure, the second, with little to no pressure. The second pass was loose enough for me to texture the wall with a plastic texture comb to match the wall's existing swirl pattern. We needed to work fast, as we had only a five-to-10-minute window to start texturing the wall. The texture was fairly simple but difficult to mimic.

**Feathering.** Because the existing wall was painted and lime putty cannot adhere to paint, we had to feather our new finish coat right up to the edge of the painted surface. As we textured to match the existing wall, we wiped the plaster off the paint. After the lime putty dried, we applied parging (spackle) over the hairline seam between the new plaster and the existing painted surface and sanded it smooth to cover the seam.

The cure time on a traditional gypsum-base wall on wood framing is 30 days. Before the cured walls were painted, their moisture content was tested with a moisture meter.

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