Replacing Giant Columns

A methodical approach yielded masterful results in this oversize remodeling project

by Noah Woodruff

Our company was called in to replace the bases of six large columns on the two-story porch of a Colonial Revival house in Bernardsville, N.J., 30 miles outside New York City. The column shafts had a diameter of a little over 27 inches and a circumference of around 86 inches. Installed when the house was built in 1907, they were showing degradation at the bases, and there was some concern that they might be failing.

The original plan was to replace just the bottom portion of the columns. An engineer's inspection revealed no problems with the upper shafts, and there were good reasons to avoid pulling entire columns. In particular, the two end columns were tied into second-story porches at mid-height. One of these columns had a concealed structural post supporting a porch beam, and both of them interrupted the outside corner of a large entablature, whose moldings were all scribed into the flutes. Plus, there would be roofing and flashing intersections to rework. While the four middle columns would be easy enough to replace, the two end columns would surely prove challenging.

Providing Temporary Support

The first step was to determine how the architrave — the beam supporting the porch roof — was built. After some investigative work and consultation with a structural engineer, we devised a method of tying the beam together with framing members so that we could jack and support it as a unit as we transferred the load from the columns.

Next we built five jacking "towers" (**see Figure 1, next page**), on top of which we placed 20-ton hydraulic jacks. The towers would support the architrave and roof, but we would also need to hold the weight of the columns. For this purpose, we had two-piece steel clamping rings fabricated by a local metal shop (**Figure 2, page 3**). By bolting these rings to the column above the cut line, we could safely support the columns while we worked on them. Once

the columns were cut off and the bases removed, we planned to make templates for the replacement sections by tracing around the flutes. We would then block up the shortened columns until the new bottoms arrived from the millwork shop.

Best-laid plans. With two jacks per tower, the architrave and roof lifted easily, as did the columns. Cutting the columns proved more difficult. After making saw guides from bending plywood, we started in with a Big Foot wormdrive saw, hoping its 4-inch cutting depth would allow us to cut through in one pass. However, as we began to cut, the saw began to bind — it felt as though the inside staves of the laminated column were coming apart. We drove screws through from the outer layer into the inner layer, tying everything together. We abandoned the Big Foot and instead used a standard circular saw, finishing the cut with a recip saw.

Once the first column had been cut completely through, our suspicions were confirmed: The inner staves were delaminating because the glue was failing. The engineer advised that the columns would have to be replaced. We cut and cribbed the remaining columns (**Figure 3, next page**) and suspended the job while the homeowners decided how to proceed. It was the end of September 2009.

New Columns

A decision was reached to go with matching columns, and an order was placed with Somerset Door and Column, a company outside of Pittsburgh. It was late January 2010 when the new columns arrived. They are made from 10/4 Spanish cedar, with two coats of oil primer on the outside and asphalt tar on the inside.

The new columns weighed over 1,200 pounds apiece. In order to move them, we brought in an extended-reach forklift. To protect the lawn from the machine, we laid out 40 sheets of ¾-inch plywood, creating a path between the drive and the front of the house (**Figure 4, page 4**). This turned out to be a good idea, as there was lots of precipitation during the course of the job; twice, the site received more than 18 inches of snow.

We moved the columns from the staging area using a pair of straps. Once the column was in front of its final location, the lift operator used a single strap attached near its top to swing it into a vertical position and set it on a temporary platform in front of the porch, where we secured it to the scaffolding for stability. Because there was so little clearance

Figure 1. To temporarily support the porch roof while the columns were replaced, the carpenters built posts from 10-foot-long 2x4s and 2x6s (A). The double-post assemblies were joined by top and bottom plates stacked two high (B), then sheathed with ½-inch plywood (C). Full-length 2x4 strongbacks were added to the outside for rigidity.

Figure 2. The original plan was to replace only the column bases. Accordingly, the crew installed structural steel clamp rings around the shafts (A) and shifted the weight from the pedestals to the concrete porch using 20-ton hydraulic jacks. Rings of bending plywood served to guide the cutting of the wood columns, which was done with reciprocating saws (B) and circular saws (C). Removing the bases (D) confirmed that the interiors were delaminating and that the columns would have to be replaced.

Figure 3. After cutting away the bases (A), the crew placed cribbing under the shafts (B) while awaiting the delivery of new columns (C).

Figure 4. Sheets of 3/4-inch plywood protected the lawn from the lift (A), which was fitted with a site-made cradle (B) for moving the columns (C).

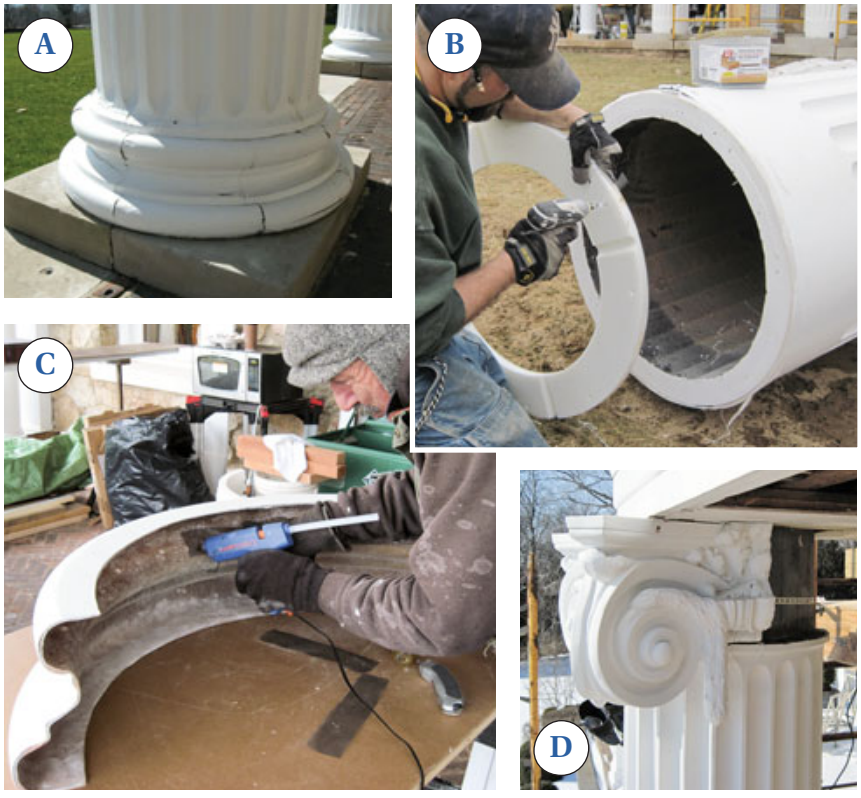

Figure 5. To prevent the moisture degradation that had affected the existing columns (A), the crew installed polycarbonate spacers on the bottoms of the new columns, thus isolating the wood from the damp stone plinths (B). Two-piece fiberglass bases replaced the old wooden ones (C); vent holes drilled in the bases were covered with screen to keep bugs out. The original fiberglass capitals (D) were salvaged and reused.

for the new columns between the bottom of the architrave and the top of the limestone plinth — only about 3/4 inch — there was no way to move the column into place with the strap attached. So we fashioned a cradle for the lift that allowed the operator to pick up the column by the shaft. Working from the scaffolding, we attached the columns to the cradle with three ratchet straps, then the lift operator — with a very steady hand — inched them into place. We also used the cradle for removing the original columns.

Installation Details

To prevent moisture from wicking up into the new columns, we screwed 1-inch-thick polycarbonate spacer rings, supplied by the manufacturer, to their bottoms before we installed them (**Figure 5**). In addition, we drilled a series of 1-inch holes around the bottom of the columns to provide ventilation. These holes were covered by new two-piece fiberglass base assemblies, in which we also drilled vent holes, on the bottom of one of the radius moldings where they couldn't be seen. On the inside we glued insect screens over the holes to keep bugs out.

Figure 6. Replacing the columns at each end of the porch was complicated by scribed trim (A) and abutting rooflines (B). One of these columns also concealed a Parallam post that supported the end of a load-bearing beam (C, D).

Figure 7. At the end of the colonnade, the carpenters used one of the old columns to practice scribing to the adjoining porch roofline (A). A plywood template helped in orienting the flutes to the existing trim (B). Where the support beam of the adjacent deck dies into the column, a recip saw (C) was used to create the beam pocket (D).

We also drilled vent holes in the tops of the columns. These holes were covered by the hollow two-piece fiberglass capitals that we salvaged and reinstalled. To complete the ventilation path, we installed two 2-inch-diameter louvers in the back of each capital where they wouldn't be obvious. We also added several 1-inch louvers in areas of the capitals that couldn't be seen from below.

Securing the columns. Following the engineer's specs, we attached four Simpson A-24 L-brackets to each column with ½-inch-diameter Spax lag screws, then secured the brackets to the plinths with stainless-steel wedge anchors. The upper connections were similar — four brackets per column attached with Spax lags, with the brackets anchored to the roof framing with 5-inch LedgerLok screws. All the A-24 brackets were primed and top-coated twice before installation.

Working the Corners

Because of all the scribed trim and intersecting rooflines (**Figure 6, previous page**), the columns at each end took a lot longer to

Figure 8. Once the practice column was moved, the new corner column was set in place (A). In a series of back-and-forth moves, the column was scribed and fitted to the adjoining trim (B, C). To facilitate the process, the crew created a solid, level base covered with plastic laminate just in front of the column's final location (D). They experimented with rollers, but found that two men could slide the column across the slippery laminate without them.

Figure 9. A round support pedestal (A) was built to replace the Parallam post in the old corner column. After carefully checking its final position on the porch (B), the carpenters slid the pedestal — dubbed "the plug" — into the column (C), where it was secured with lag screws driven from the outside. The raw wood of the scribed column was primed (D) before final installation.

install than the middle four columns. We knew we would have to move these columns back and forth to achieve a tight fit, so we first built staging platforms in front of and in the same plane as the corner plinths. We covered the staging platforms and the plinths with plastic laminate, initially thinking this would protect the limestone plinth from the wood and steel dowels we placed under the column to enable it to roll back and forth.

After a couple of moves, however, we realized that there was very little friction between the polycarbonate ring on the bottom of the column and the plastic laminate, and that two men could actually slide the column back and forth without using the dowel rollers. Suffice it to say, it took many moves back and forth to properly align and scribe the new columns to the existing moldings and rooflines, including the large built-up entablatures that intersected the columns at right angles, several porch railings, and some radiused copper flashings protecting the rubber roof membranes over the flanking porches.

We also had to carefully cut beam pockets to receive the ends of structural girders from the abutting porches (**Figure 7, page 5**). Plywood jigs helped us align the flutes with the previously scribed moldings. We actually practiced the cuts on an old column first, which allowed us to rehearse the entire process before trying it on one of the new columns (**Figure 8, previous page**).

Structural plug. As mentioned above, one of the corner columns housed a structural post that supported the end of a porch girder. The girder had been added during a previous remodel, to support the extra load created when the rooftop deck was covered with heavy masonry pavers. The builder had inserted the post by simply cutting a wedge out of the column, then patching it back in.

We wanted to do something a little cleaner, so instead we built a structural "plug" that would be inserted into the column before we set it in position (**Figure 9**). We framed the plug like a small round room, with radiused top and bottom plates and studs in between. We used ¾-inch pressure-treated plywood for the plates, and framed in a 5½-inch by 5½-inch Parallam post to support the girder. We also had to allow for the taper of the column, meaning the top of the plug was slightly smaller than the bottom.

It was more than a little tricky to position the post in its exact orientation inside the column. First we had to lift the

Figure 10. The finished job matches the original perfectly (A). The original two-piece fiberglass capitals were reinstalled (B) and new trim scribed to fit (C). Where adjoining roofs meet the column, a rubber membrane was adhered to the shaft, then covered with copper (D).

column into place "empty" to test fit it — to the end of the beam, the entablature moldings, and the porch railing. Once we were satisfied, we had to move the column back onto a set of horses so we could install the plug, which we did by pushing the snug-fitting assembly inside and securing it with LedgerLok screws driven from the outside.

Then the lift operator had to once again stand up the column with straps, attach it to the cradle, and move it back into place. When the column was close, we manually slid it into place. We had to twist it as it went so that the projecting beam landed inside the beam pocket (which was only ½ inch wider than the beam) and so that the flutes aligned correctly with the entablature and the porch rails. It was a challenge we don't care to repeat.

Once the column was home, we secured it with the Simpson brackets top and bottom, then used long Spax screws to secure the porch beam to the post inside, tying everything together solidly.

Finish

After installing the capitals and bases, we moved on to the trim. In some places we had to disassemble and replace the entablature moldings because the new columns had a slightly different profile from the originals. We made some of the new trim components on site and had some of the profiles milled at a local wood shop.

The final step was patching the rubber roofing. The previous roofers had installed a tar-and-copper curb against the column, attempting to follow the radius and patching with cement where necessary. This didn't seem like the best approach — besides being unattractive, it would be prone to leaks. Instead, at the spot where the roof deck met the column, we ground back the flutes to create a flat area. We primed the bare wood, then adhered rubber roofing to the column and covered it with new copper flashing.

After we finished our work, the painters came in. When they were done and the scaffolding — which had been up for eight months — came down, it looked as if we had never been there (**Figure 10**).

Cost

The total cost for the columns was $43,500, and the fiberglass bases and associated flexible cove moldings added another $12,240 — for a total, with tax, of about $60,000, or $10,000 apiece. We were on the job for about six months, with two men half of that time and three men (not including the lift operator) the other half.

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