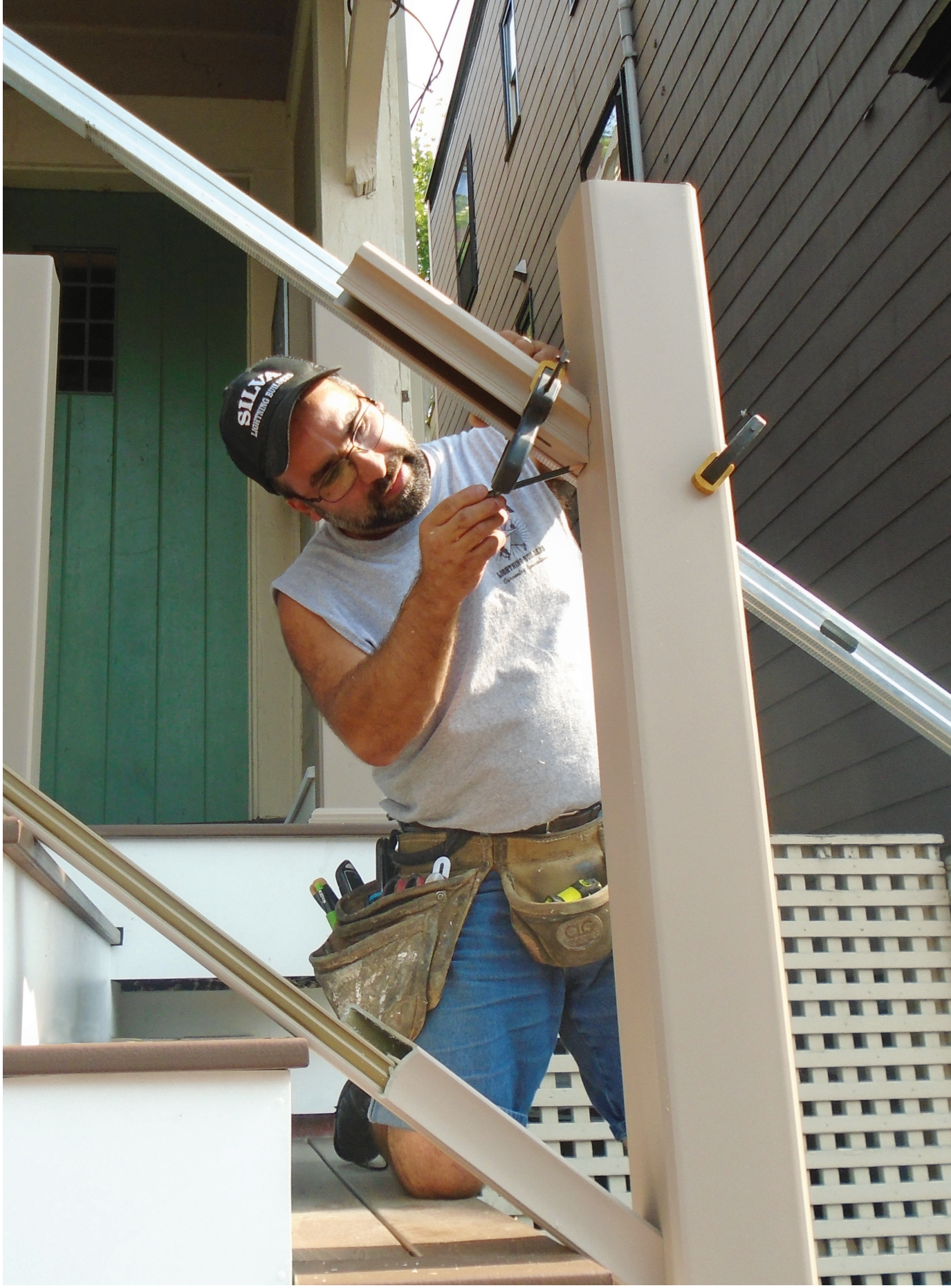
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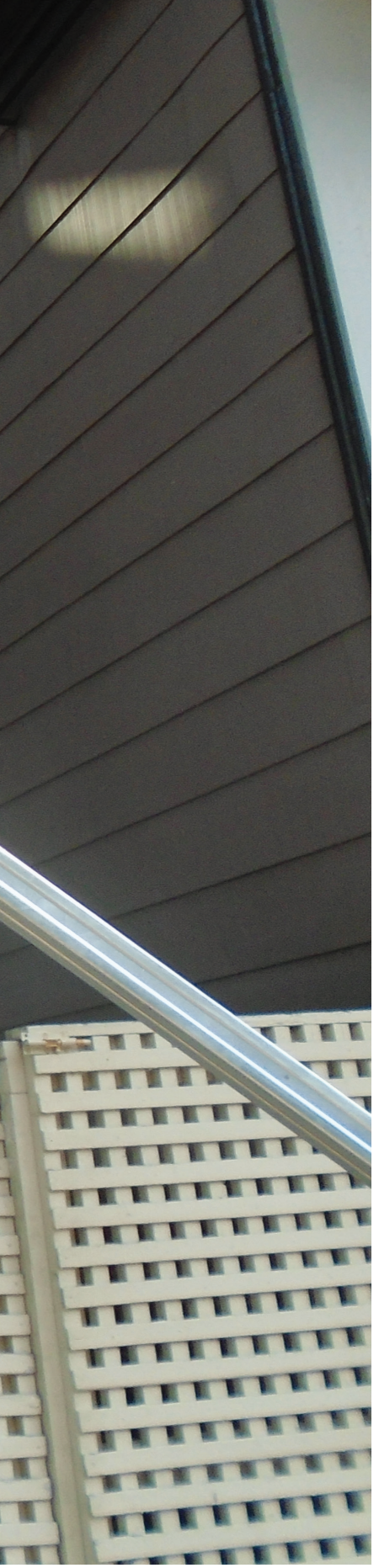


Installing a Composite Rail Kit

by Emanuel Silva

Prefabricated components take the guesswork out of building good-looking railings for decks and porches

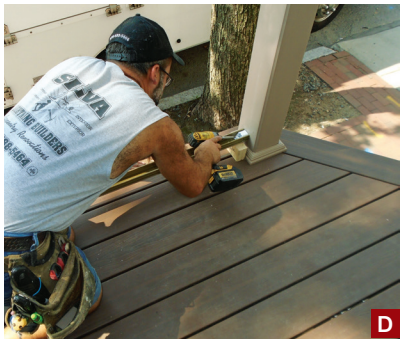
When it comes to railings, I'm a firm believer in wood: Nothing is as strong or stable in New England's fickle weather as mahogany rails and fir balusters. But while a wood railing won't shrink or become brittle when it gets cold, it requires more maintenance than a synthetic railing system does, which is why my clients chose a composite rail for the rebuilt front porch of their multifamily rental unit.

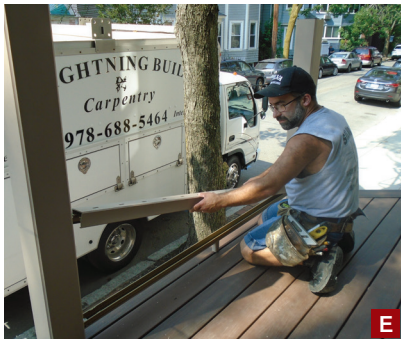
I've installed a number of different manufactured rail systems. Because each one has its own quirks and assembly details, I'm careful to follow the manufacturer's instructions. (If the instructions are missing from the packaging, they can usually be found on the manufacturer's website, along with code-compliance information that your building inspector may require.) On this project, my clients selected an RDI Transform composite railing, whose two-part design allows it to be installed without any visible mounting brackets or fasteners connecting the balusters to the rails or the rails to the posts. Its traditional look also fit the character of the house.

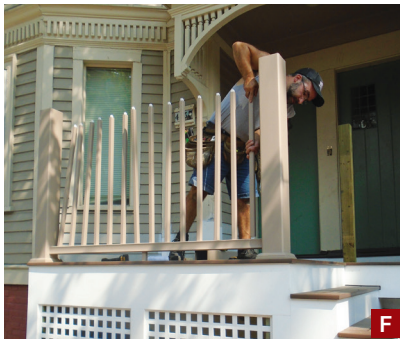
Start With Strong Posts

Because of strict local zoning regulations, the replacement porch occupies the same footprint as the old one. When I reframed it and installed the new posts, I used plenty of blocking and appropriate metal hardware as required to ensure that the posts were strong enough to meet code. Most rail installation instructions are vague on these details, but the strength of any rail system is dependent on posts that can withstand 200-lb. concentrated loads applied in any direction—or 500 lb., with a safety factor of 2.5, which is the load referenced by the ASTM D7032 testing criteria that manufactured-composite-rail kits must meet (see "Code-Compliant Guardrail Posts," May/Jun 2011).

For multifamily homes in this area, 42-inch rail heights are required. To accommodate the additional post height needed for the taller rails, I included six RDI Transform 54-inch 5x5 PVC post sleeves in my railing order. The sleeves are fitted to the smaller, 4x4 posts with pairs of HDPE spacers—one each at the top and bottom of the post—so there's little







Each PVC post-sleeve kit comes with a pair of HDPE spacers that lock the sleeve in place over a 4x4 post (A). The bottom rail will be supported in the center by a 2-inch-long hollow support block that slips over a short length of PVC trim screwed to the rail (B). PVC mounting brackets slide into the ends of the bottom beam and are screwed in place (C). The beams are then screwed to the posts (D), and the slotted bottom rail is snapped down over the beam (E). The pre-cut balusters are already fitted with end plugs, which fit into the slots in the bottom rail (F).

opportunity for shimming the sleeves if the posts are out of plumb.

Unlike the post sleeves, the rail components are made with a non-wood co-extruded composite, which the manufacturer calls Resalite, and finished with a colored acrylic capstock.

One-inch-square hollow blocks are included with Transform rail kits. These are cut to length and used as needed (typically one at the center of the rail; for longer rail spans, the manufacturer recommends two) to support the bottom rail and prevent sagging. The actual height of the bottom rail can vary depending on the balustrade design, as long as the top rail meets minimum height requirements and there is less than 4 inches of clearance between the top of the decking and the bottom of the rail.

Pre-cut balusters are available in different lengths, depending on whether the required rail height is 36 inches or 42 inches.

Level-Rail Installation

The two-piece rail sections consist of beams, which are fastened to the posts, and matching rails that snap over the beams, finishing and reinforcing the assembly. For longer rail lengths, up to 8 feet, an optional Resalite stiffener can be inserted into the upper beam before the upper rail is snapped in place. While I didn't use the stiffener on this project, I probably would in the future—even for shorter rail lengths—to make the rail feel a little more solid.

PVC mounting brackets are used to connect the beams to the posts. After cutting the lower beam to length, I aligned the brackets with the ends of the beam and fastened them in place with pairs of screws driven through the sides of the beam.

While prepping the longer beams, I also screwed a short PVC block to the bottom of the beam. I sized the block to fit inside the hollow bottom-rail support, although I could have omitted the block and simply screwed down through

the beam and support into the decking after the beam was installed.

Finally, I slipped the support over the PVC block, set the beam in position, and fastened it to the posts using the mounting screws—three per bracket—that came with the rail kit. These screws are beefy, so to avoid damaging the post sleeve, I pre-drilled the holes for them.

The bottom rail and the top beam are slotted to accept PVC plugs that connect the balusters to the rails, so the baluster layout has to be taken into consideration before cutting the beam and rail to length. I simply placed the uncut sections against the posts and adjusted their positions until the clearance between the posts and the baluster slots at either end was equal. To allow room for the internal PVC mounting brackets, clearance between the slots and the ends also has to be greater than 1 3/8 inches.

Compared with other composite-rail kits that I've installed, the bottom beams seemed surprisingly flexible after they were installed. But once I'd snapped the matching lower rail over a beam, the assembly stiffened up considerably.

After that, it was a quick matter to insert balusters, snap the top beam into place, and fasten the beam to the posts through the mounting brackets. Following the manufacturer's instructions, I aligned the plugs in the same direction when I installed the balusters so that they would all lean the same way when I installed the top beam.

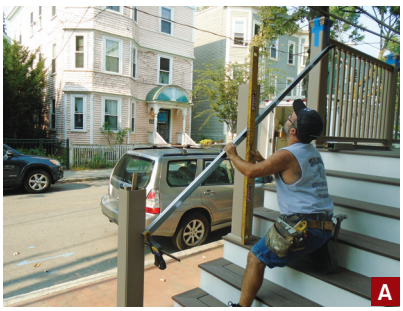
Because the porch takes a 45-degree jog at one of the corners, I had to choose between two versions of the Transform top rails on this project. Cutting a 45-degree angle on the 3 1/2-inch-wide Aspire top rail that I originally selected created a 5-inch diagonal cut, which caused the corners to slightly overlap the beveled outside edges of the 5-inch-wide post sleeve. There's no easy way to conceal or dress up this overlap, but fortunately RDI also offers a stair rail called Emerge with a 3-inch-wide profile. The narrower rail—which I planned to use anyway for the stairs—looks very similar to the wider Aspire rail and can be used with the same upper beam, so I decided to use it for all of the porch rails.

The manufacturer advises that after a top rail is snapped in place, pairs of screws be driven up through the bottom of the upper beam and into the top rail at either end to lock the assembly together. I omitted this step because I worried about damaging the top rail, but I can always come back later and carefully install the screws if it turns out to be a problem.

Stair Rails

Building inspectors in my area want multifamily units to have "graspable" stair handrails. Unfortunately, not many manufactured handrails technically meet IRC graspability guidelines:

After verifying that the upper and lower stair posts are plumb, the author clamps them to a straightedge and repeats the procedure with the middle post (A). The lower beam's length and cut angles are found by laying the beam across the stair-tread noses (B). Note the cutout in the trim ring around the post (C). An offcut is used to mark where the handrail intersects the post (D) and to find the length of the stair balusters. Orient stair-rail plugs in the same direction (E). The upper beam snaps down over the baluster plugs (F).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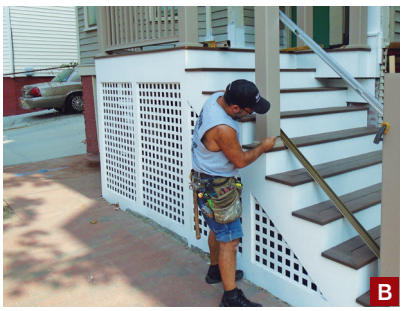
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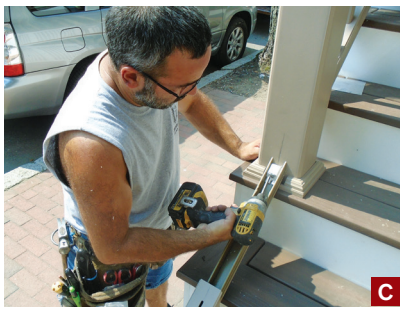
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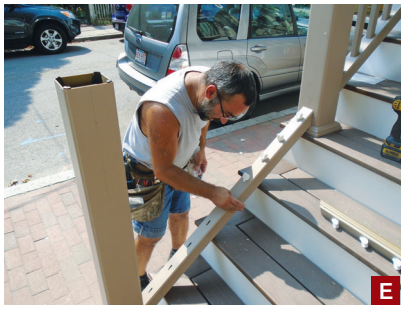
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F

a maximum cross-section dimension of 2.25 inches and a perimeter dimension of between 4 and 6.25 inches for non-circular shaped rails. The narrower Emerge stair-rail profile I used doesn't meet these guidelines, but it does have graspable finger holds on both sides of the profile and was approved by my building inspector for this project. Different inspectors have different interpretations for this rule.

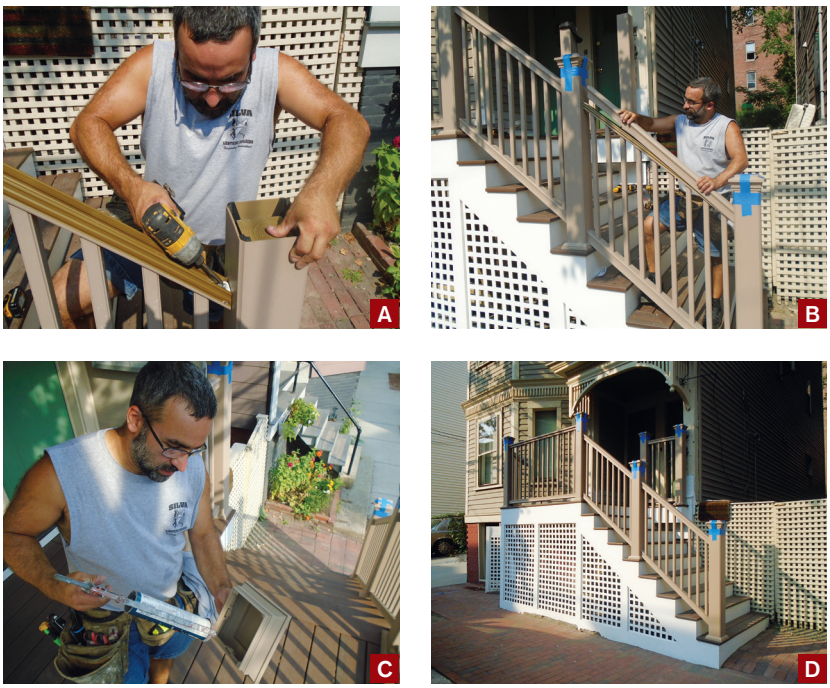
Before I measured or cut anything, I verified that the upper and lower stair posts were plumb, then locked them in position by clamping them to my aluminum straightedge. Next, I made sure the intermediate post was plumb, and clamped that in position as well. To determine cut lengths and angles, I simply laid the bottom beam across the noses of the treads and marked where the posts intersected the beam.

By code, the triangle created by each tread, riser, and stair rail must be smaller than a 6-inch sphere. To meet that requirement, I always drop the bottom stair rail down as low as possible. However, this often creates a problem with post trim rings, which have to be cut to fit around the lower rail. Trim rims are usually pretty flimsy and subject to damage, so I carefully cut the notch out with a multitool.

For a snug and precise fit, I always start with a rail-section offcut to act as a template as I determine the correct cut angle. Once I'm satisfied with the angle and the fit, I mark the exact locations of the upper and lower assembled rail sections right on the posts. Even after carefully measuring, I always cut stair rails slightly long and make several more incremental cuts as I sneak up on the final length. Better to spend a little extra time at the saw than to end up with a gap between the rail and the post or—even worse—a railing that's too short.

While upper- and lower-beam assembly for the stair rail is similar to the level-rail installation, the PVC mounting brackets are inserted into the ends of the beams prior to cutting, rather than afterward. A wrap of tape around the brackets ensures a snug fit while the cut is being made. The idea is to remove as little of the plastic on the bracket as possible while giving it the proper rake angle. If the bracket is left square, not enough of the mounting screws engage in the post, which weakens the connection between the rail and the post.

Unlike the balusters for the level sections, the stair-rail balusters must be cut to fit so that the handrail height is between 34 inches and 38 inches above the tread nosings, as required by code. To make sure the balusters are all the same length, I set up a stop block on my chopsaw table. The plug design allows them to rotate slightly within the slots in the lower rail and upper beam to accommodate different stair pitches.



The upper beams are screwed to the posts (A), then the upper rails are snapped into place (B). To prevent the post caps from being dislodged, the author glues them to the post sleeves with elastomeric sealant (C). Masking tape holds the post caps in place while the sealant cures (D).

Finishing Up

Once I'd fitted the balusters and screwed the upper stair beams to the posts, I snapped the handrails in place. The post caps also snap on, over the post sleeves, but I worry that they could pop off in a wind gust or when bumped. For a rock-solid attachment, I put a small drop of Geocel Pro Flex elastomeric sealant at each inside corner prior to installation. I tape the caps down with masking tape while the sealant cures overnight.

The total cost for the railing components used on this project was about $2,000, and it took me about 20 hours to install the rail. In comparison, I would have charged my client about 35% more to build a custom mahogany railing. ❖

Emanuel Silva owns Silva Lightning Builders, a remodeling company in North Andover, Mass. Photos are by the author.